STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

STATE PROJECT # C-79-4-49

US 67
ERATH COUNTY

STATE PROJECT NO.			
C-79-4-49			
CONT	SECT	JOB	HIGHWAY
0079	04	049	US 67
DIST	COUNTY		SHEET NO.
FTW	ERATH		1

FUNCTIONAL CLASS: PRINCIPAL ARTERIAL
DESIGN SPEED: 40 MPH

A.D.T. (2022)
= 5,740 (PER STATEWIDE PLANNING MAP)

A.D.T. (2035)
= 6,500 (PER 2018 TPP TRAFFIC DATA)

A.D.T. (2045)
= 7,300 (PER 2018 TPP TRAFFIC DATA)

INDEX OF SHEETS

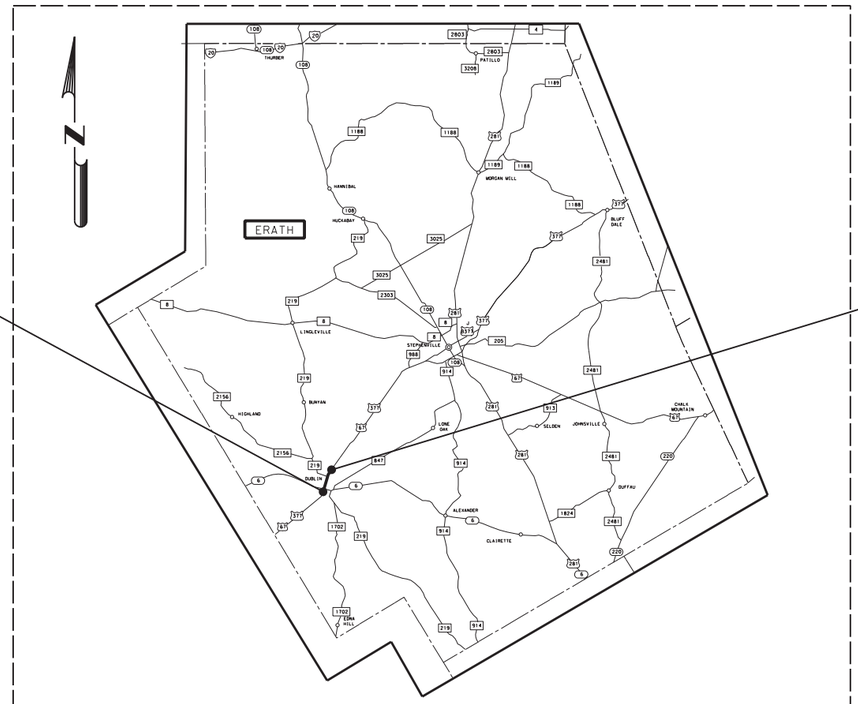
SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	INDEX OF SHEETS

CSJ	HWY	LIMITS	ROADWAY LENGTH		BRIDGE LENGTH		PROJECT LENGTH	
			FEET	MILES	FEET	MILES	FEET	MILES
0079-04-049	US 67	FROM FORT WORTH AND WESTERN RAILROAD TO FM 219	4,835.50	0.916	0.0	0.0	4,835.50	0.916

TOTAL PROJECT LENGTH = 0.916 MILES

FOR THE CONSTRUCTION OF: OVERLAY WORK

CONSISTING OF: REPAIR BASE FAILURES, REMOVE BRICK, MILL, REPLACE CURB AND GUTTER, STORM SEWER SYSTEMS, AND PAVEMENT MARKINGS



BEGIN PROJECT
BEGIN CSJ 0079-04-049
STA 11+51.00
REF MARKER 522-0.696
BEGIN MP 0.389

END PROJECT
END CSJ 0079-04-049
STA 59+86.50
REF MARKER 520-0.379
END MP 1.309

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED
PROFESSIONAL ENGINEER

7/8/2024

Abulkhair M. Zobayed
PROJECT MANAGER

LETTING DATE: 10/1/2024
CONTRACTOR:
WORK BEGAN:
WORK COMPLETED:
WORK ACCEPTED:
CHANGE ORDERS:

REQUIRED SIGNS SHALL BE IN ACCORDANCE WITH BC (1)- 21 THRU BC (12)- 21 AND THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES".

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, SEPTEMBER 1, 2024 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT:
SPECIAL LABOR PROVISIONS FOR STATE PROJECTS (000-008)

REGISTERED ACCESSIBILITY SPECIALIST (RAS) INSPECTION NOT REQUIRED.

EQUATIONS : NONE
RAILROAD : FORT WORTH & WESTERN RAILROAD (FWWR)
STA 11+23.89
EXCEPTIONS : NONE
NO TDLR REQUIRED

Texas Department of Transportation

SUBMITTED FOR LETTING: 7/9/2024
DocuSigned by:
Sarah S. Homer, PE
862BEBCA16FA483...

RECOMMENDED FOR LETTING: 7/18/2024
DocuSigned by:
7879B0B92E5D403...
DIR, TP&D

APPROVED FOR LETTING: 7/18/2024
DocuSigned by:
David M Salazar, P.E.
B741E64FAD82411...

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2		INDEX OF SHEETS
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11		SUMMARY OF QUANTITIES - REMOVAL
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132	+	I-FG (FTW)
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SHEET NO.		DESCRIPTION
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STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED PROFESSIONAL ENGINEER

THESE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

Abulkhair M. Zobayed , P.E. 7/12/2024
ABULKHAIR M. ZOBAYED DATE
VRX, INC. TBPE# F-9690

STATE OF TEXAS
ANTHONY SCHNEIDER
71848
LICENSED PROFESSIONAL ENGINEER

+ THESE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

Anthony Schneider , P.E. 7/12/2024
ANTHONY SCHNEIDER DATE
VRX INC. TBPE# F-9690

STATE OF TEXAS
LISA M. DEITEMEYER
83758
LICENSED PROFESSIONAL ENGINEER

* THESE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

Lisa M. Deitemeyer , P.E. 7/12/2024
LISA DEITEMEYER DATE
JMT INC. TBPE# F-16341

NO.	DATE	REVISION	APPROVED

VRX

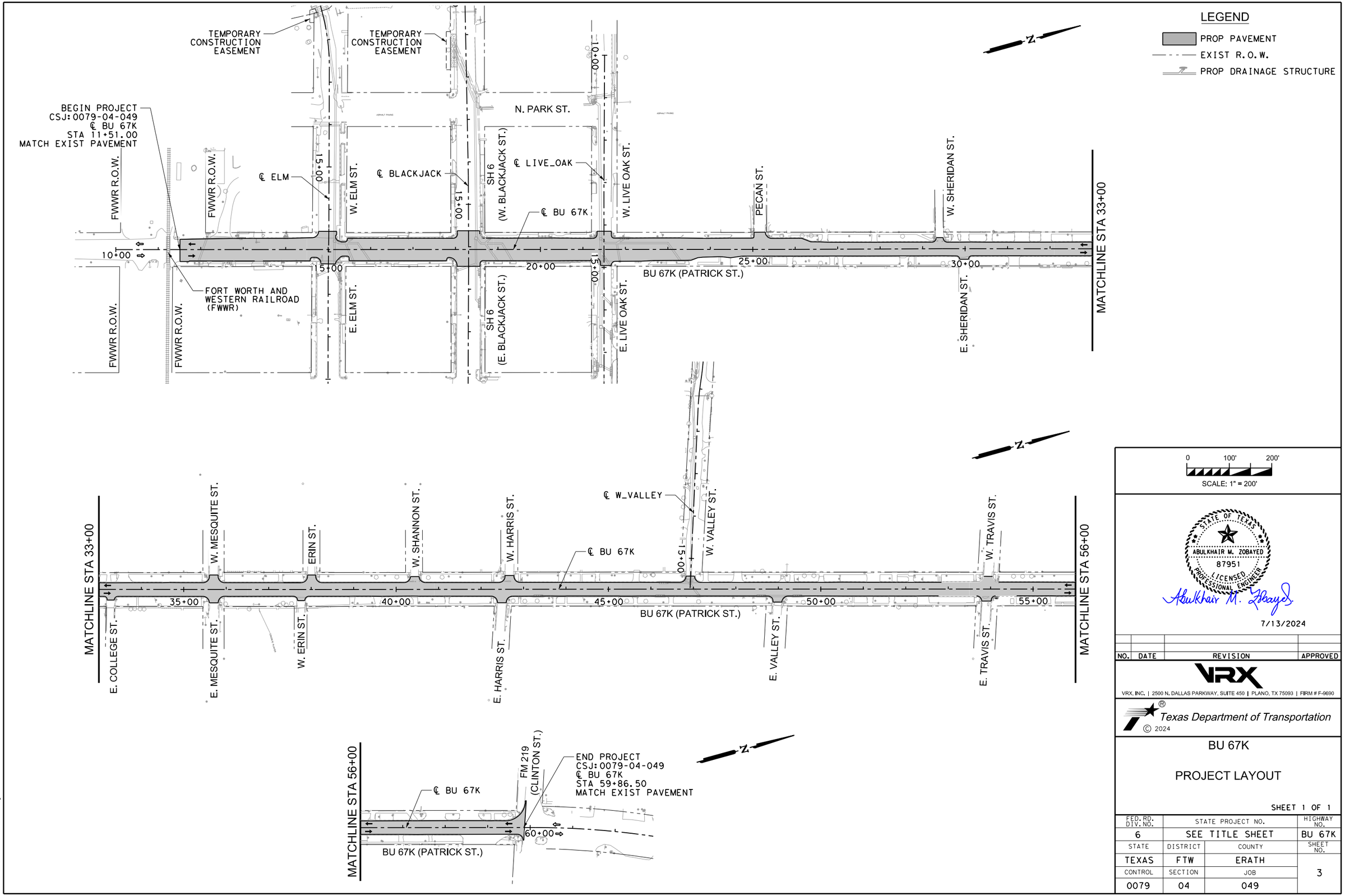
VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

INDEX OF SHEETS

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	
CONTROL	SECTION	JOB	2
0079	04	049	



0 100' 200'

SCALE: 1" = 200'

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED PROFESSIONAL ENGINEER

Abulkhair M. Zobayed

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

PROJECT LAYOUT

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	
CONTROL	SECTION	JOB	3
0079	04	049	

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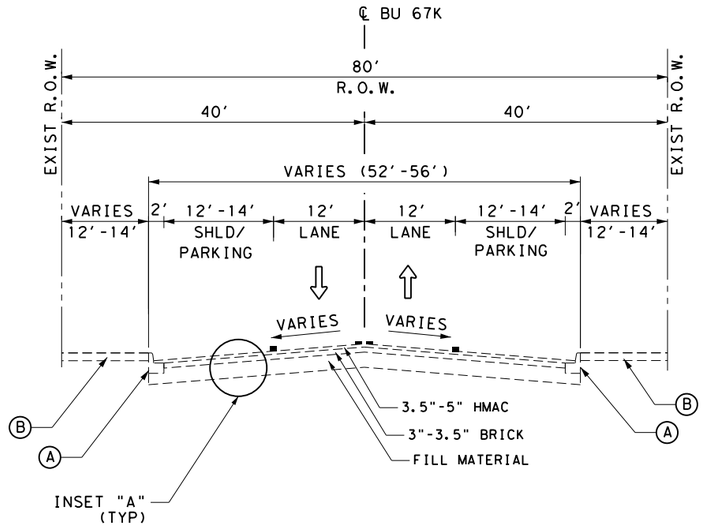
LEGEND

⇦ EXIST TRAFFIC DIRECTION

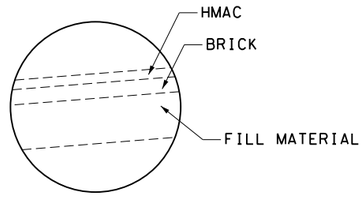
Ⓐ EXIST CURB & GUTTER

Ⓑ EXIST SIDEWALK (TO REMAIN)



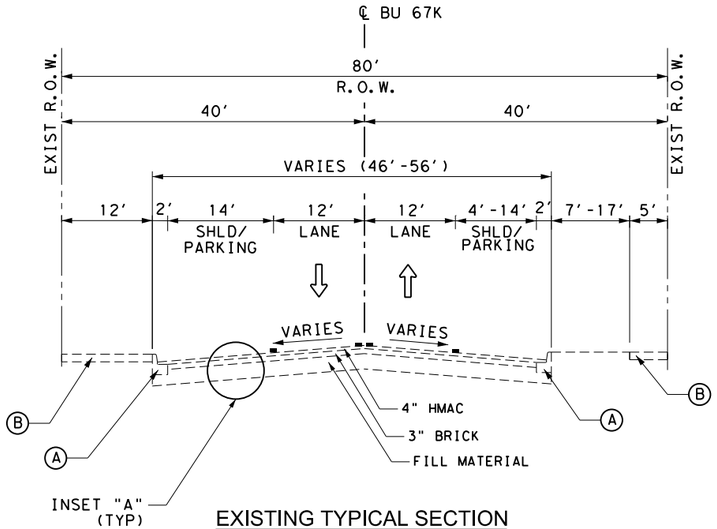
EXISTING TYPICAL SECTION

BEGIN PROJECT (STA 11+51.00) TO STA 22+53.00



INSET "A"

(NTS)



EXISTING TYPICAL SECTION

STA 22+53.00 TO STA 23+93.00

NOTES:

1. EXISTING PAVEMENT STRUCTURE SHOWN IS BASED ON BEST INFORMATION FROM GEOTECHNICAL INVESTIGATION AND MAY VARY FROM LOCATION TO LOCATION. CONTACT ENGINEER FOR DIRECTION, IF ANY SIGNIFICANT DISCREPANCY IS NOTICED DURING CONSTRUCTION.

SCALE = N.T.S

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED PROFESSIONAL ENGINEER

Abulkhair M. Zobayed

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

EXISTING TYPICAL SECTIONS

SHEET 1 OF 2

FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	
CONTROL	SECTION	JOB	4
0079	04	049	

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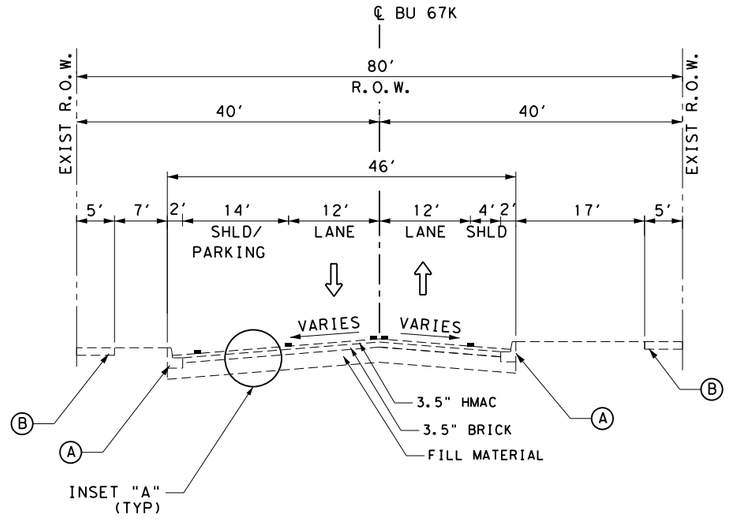
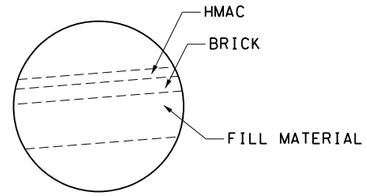
LEGEND

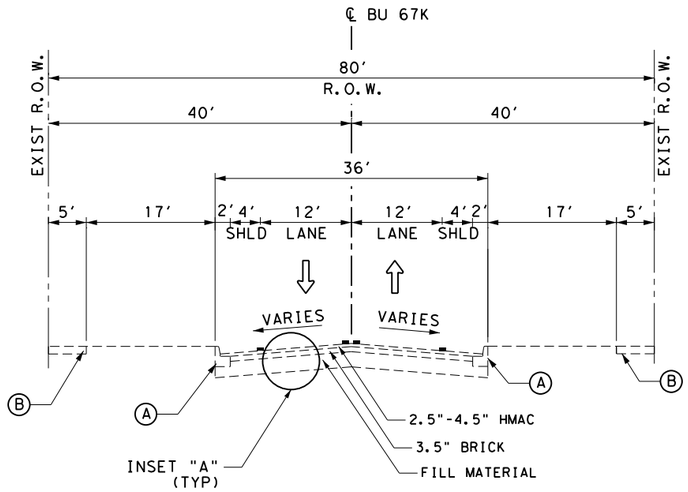
⇦ EXIST TRAFFIC DIRECTION
Ⓐ EXIST CURB & GUTTER
Ⓑ EXIST SIDEWALK (TO REMAIN)



EXISTING TYPICAL SECTION
STA 23+93.00 TO STA 26+14.00



INSET "A"
(NTS)



EXISTING TYPICAL SECTION
STA 26+14.00 TO PROJECT END (STA 59+86.50)

NOTES:

1. EXISTING PAVEMENT STRUCTURE SHOWN IS BASED ON BEST INFORMATION FROM GEOTECHNICAL INVESTIGATION AND MAY VARY FROM LOCATION TO LOCATION. CONTACT ENGINEER FOR DIRECTION, IF ANY SIGNIFICANT DISCREPANCY IS NOTICED DURING CONSTRUCTION.

SCALE = N.T.S

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED
PROFESSIONAL ENGINEER

Abulkhair M. Zobayed

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

EXISTING
TYPICAL SECTIONS

SHEET 2 OF 2

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	5
CONTROL	SECTION	JOB	
0079	04	049	

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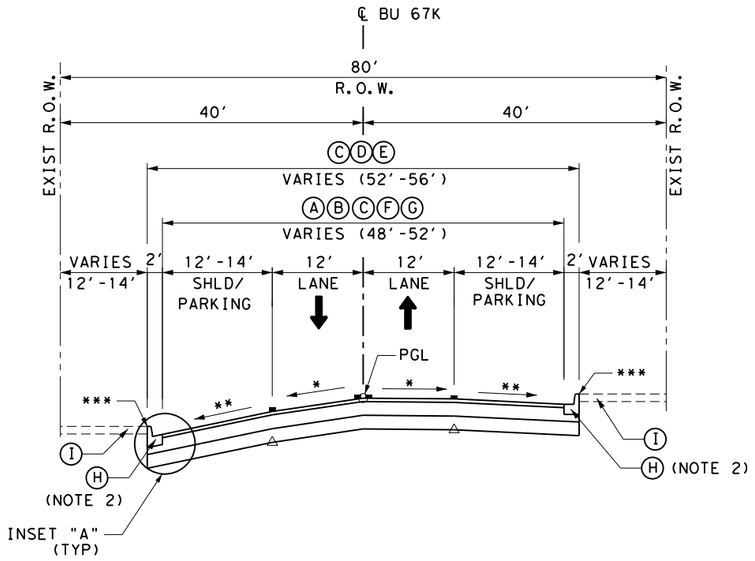
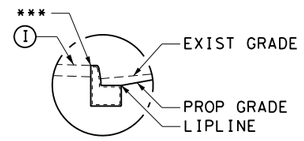


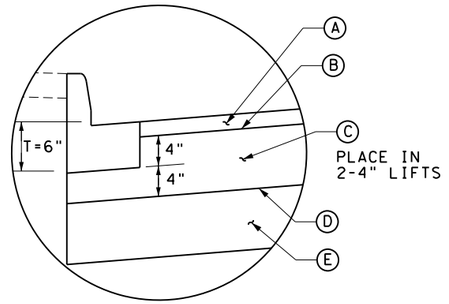
PROPOSED TYPICAL SECTION (DOWNTOWN)

BEGIN PROJECT (STA 11+51.00) TO STA 22+53.00



CURB DETAIL (DOWNTOWN)

(NTS)



INSET "A"

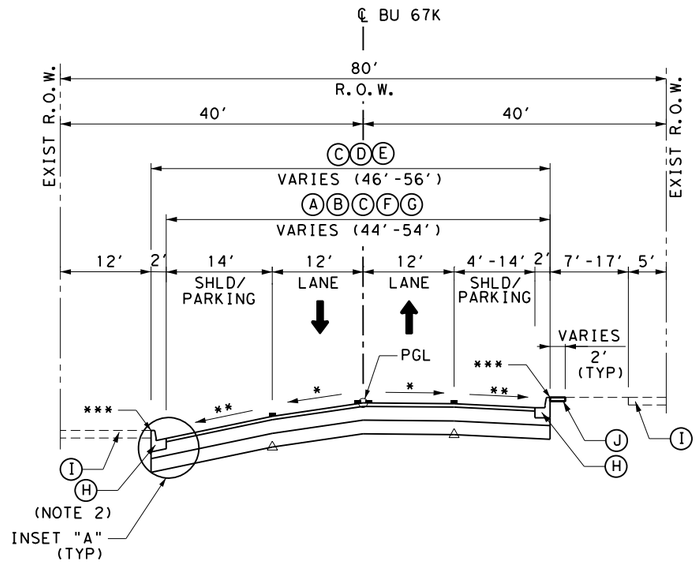
(NTS)

LEGEND

- (A) 2" SP MIXES SP-C SAC-A PG70-28
- (B) TACK COAT
- (C) 8" D-GR HMA TY-B SAC-B PG64-22
- (D) PRIME COAT
- (E) 8" SUBGRADE LIME TREATED (EXIST MATERIAL)
  OR
  8" SUBGRADE CEMENT TREATED (EXIST MATERIAL) (NOTE 6)
- (F) PLAN & TEXT ASPH CONC PAV(0"-6")
- (G) RMV, CLN, PALLETZ, & STORE STREET BRICK
- (H) CURB & GUTTER (TY II)
- (I) EXIST SIDEWALK (TO REMAIN)
- (J) BLOCK SODDING (NOTE 3)
- ⬅ PROP TRAFFIC DIRECTION

NOTES:

1. REPLACE EXISTING CURB & GUTTER WITH NEW CURB & GUTTER.
2. MATCH EXISTING SIDEWALK ELEVATION UNLESS DIRECTED OTHERWISE BY THE ENGINEER. SAWCUT CAREFULLY WITHOUT DAMAGING EXISTING SIDEWALK. ANY DAMAGED SIDEWALK SHALL BE REPLACED IMMEDIATELY AT CONTRACTOR'S EXPENSE. SAWCUT IS SUBSIDIARY TO CURB & GUTTER PAY ITEM.
3. MATCH EXISTING ELEVATION. MINIMIZE IMPACT TO EXISTING GROUND ADJACENT TO NEW CURB & GUTTER. ANY EARTHWORK NEEDED TO MATCH GRADING IS SUBSIDIARY TO CURB & GUTTER PAY ITEM. USE BLOCK SODDING AS SHOWN OR AS DIRECTED BY THE ENGINEER, ON DISTURBED GROUND.
4. FOR ADDITIONAL INFORMATION, SEE ROADWAY PLAN AND PROFILE, REMOVAL PLAN, SIGNING AND PAVEMENT MARKING SHEETS.
5. CONTRACTOR SHALL MATCH EXISTING PAVEMENT ELEVATION AT EXISTING LIP OF CURB LINE. REFER TO ROADWAY PLAN AND PROFILE SHEETS FOR MORE INFORMATION.
6. LIME TREATMENT OF EXISTING SUBGRADE IS ANTICIPATED FROM THE BEGINNING OF THE PROJECT UP TO SH 6 (BLACKJACK ST.) AND CEMENT TREATMENT OF EXISTING SUBGRADE IS ANTICIPATED FROM SH 6 (BLACKJACK ST.) TO THE END OF THE PROJECT. CONTRACTOR SHALL WORK WITH THE ENGINEER TO DETERMINE EXACT LOCATION. LIMITS AND QUANTITY TO BE DETERMINED IN THE FIELD BY THE ENGINEER.
7. CONTRACTOR SHALL PREPARE PROFILE FOR PROPOSED GUTTER LINES FOR BOTH SIDES OF ROADWAY TO DETERMINE PROPOSED CROSS SLOPES THROUGHOUT THE PROJECT LENGTH (MINIMUM AT EVERY 50' AND AT LOCATIONS TO MATCH AND MAKE A SMOOTH TRANSITION WITH EXISTING DRIVEWAYS, CURB RAMPS, AND OTHER EXISTING FEATURES THAT WILL REMAIN). CONTRACTOR SHALL WORK WITH ENGINEER NOT TO EXCEED 5% LONGITUDINAL SLOPE AND 2% CROSS SLOPE AT CROSS WALK LOCATIONS. CONTRACTOR SHALL REVIEW THEIR FINDINGS WITH THE ENGINEER AND GET ENGINEER'S APPROVAL BEFORE MAKING FINAL DECISION ABOUT PROPOSED CROSS SLOPES TO BE MAINTAINED DURING CONSTRUCTION.



PROPOSED TYPICAL SECTION (DOWNTOWN)

STA 22+53.00 TO STA 23+93.00

SYMBOL NOTES:

* CROSS SLOPE VARIES. SEE BELOW.
3% TYPICAL
1% MIN.
>3% WILL REQUIRE ENGINEER'S APPROVAL.

** CROSS SLOPE VARIES. SEE BELOW.
9% MAX.
>9% WILL REQUIRE ENGINEER'S APPROVAL.
ANY GRADE BREAK DIFFERENCE >6% WILL REQUIRE ENGINEER'S APPROVAL.

*** (CONTROLLING ELEVATION - EXIST TOP OF CURB (TOC)):
PROPOSED TOC WILL MATCH THE EXISTING TOC ELEVATION AND SHALL BE TRANSITIONED SMOOTHLY TO MATCH EXISTING FEATURES THAT WILL REMAIN.

△ GRADE BREAK (IF NEEDED)

SCALE = N.T.S

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED PROFESSIONAL ENGINEER

Abulkhair M. Zobayed

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

PROPOSED
TYPICAL SECTIONS

SHEET 1 OF 2

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	6
CONTROL	SECTION	JOB	
0079	04	049	

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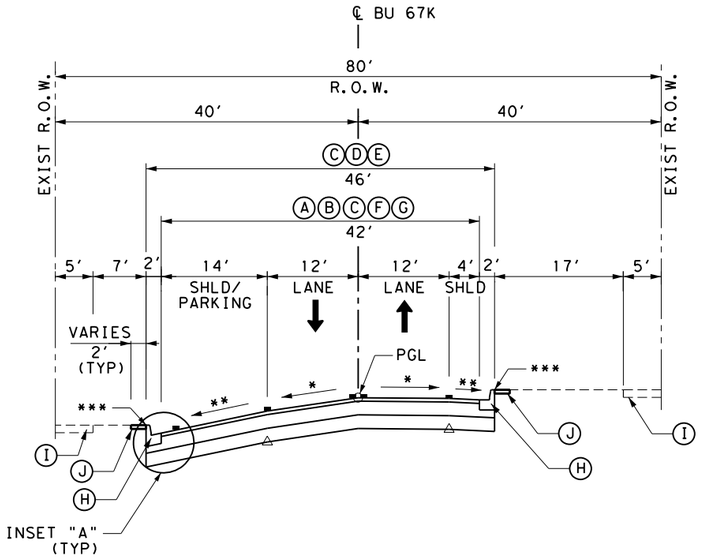
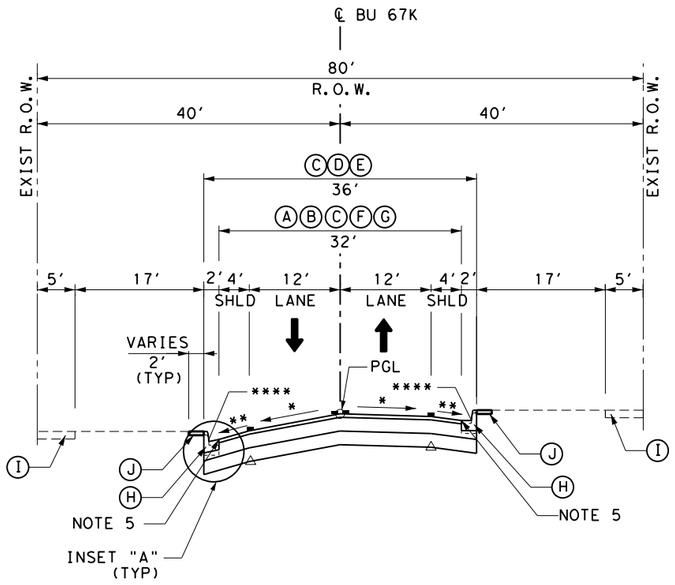


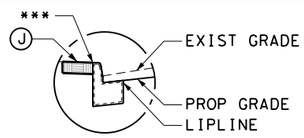
PROPOSED TYPICAL SECTION (DOWNTOWN)

STA 23+93.00 TO STA 26+14.00



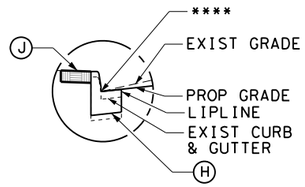
PROPOSED TYPICAL SECTION (NORTH OF DOWNTOWN)

STA 26+14.00 TO PROJECT END (STA 59+84.50)



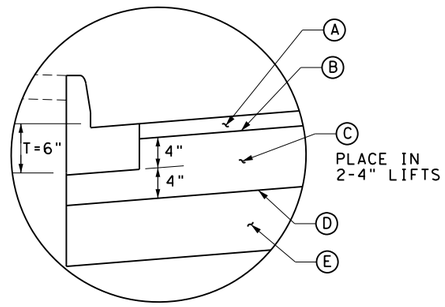
CURB DETAIL (DOWNTOWN)

(NTS)



CURB DETAIL (NORTH OF DOWNTOWN)

(NTS)



INSET "A"

(NTS)

LEGEND

- (A) 2" SP MIXES SP-C SAC-A PG70-28
- (B) TACK COAT
- (C) 8" D-GR HMA TY-B SAC-B PG64-22
- (D) PRIME COAT
- (E) 8" SUBGRADE LIME TREATED (EXIST MATERIAL)
  OR
  8" SUBGRADE CEMENT TREATED (EXIST MATERIAL) (NOTE 6)
- (F) PLAN & TEXT ASPH CONC PAV(0"-6")
- (G) RMV, CLN, PALLETZ, & STORE STREET BRICK
- (H) CURB & GUTTER (TY II)
- (I) EXIST SIDEWALK (TO REMAIN)
- (J) BLOCK SODDING (NOTE 3)
- ← PROP TRAFFIC DIRECTION

NOTES:

1. REPLACE EXISTING CURB & GUTTER WITH NEW CURB & GUTTER.
2. MATCH EXISTING SIDEWALK ELEVATION UNLESS DIRECTED OTHERWISE BY THE ENGINEER. SAWCUT CAREFULLY WITHOUT DAMAGING EXISTING SIDEWALK. ANY DAMAGED SIDEWALK SHALL BE REPLACED IMMEDIATELY AT CONTRACTOR'S EXPENSE. SAWCUT IS SUBSIDIARY TO CURB & GUTTER PAY ITEM.
3. MATCH EXISTING ELEVATION. MINIMIZE IMPACT TO EXISTING GROUND ADJACENT TO NEW CURB & GUTTER. ANY EARTHWORK NEEDED TO MATCH GRADING IS SUBSIDIARY TO CURB & GUTTER PAY ITEM. USE BLOCK SODDING AS SHOWN OR AS DIRECTED BY THE ENGINEER, ON DISTURBED GROUND.
4. FOR ADDITIONAL INFORMATION, SEE ROADWAY PLAN AND PROFILE, REMOVAL PLAN, SIGNING AND PAVEMENT MARKING SHEETS.
5. CONTRACTOR SHALL MATCH EXISTING PAVEMENT ELEVATION AT EXISTING LIP OF CURB LINE. REFER TO ROADWAY PLAN AND PROFILE SHEETS FOR MORE INFORMATION.
6. LIME TREATMENT OF EXISTING SUBGRADE IS ANTICIPATED FROM THE BEGINNING OF THE PROJECT UP TO SH 6 (BLACKJACK ST.) AND CEMENT TREATMENT OF EXISTING SUBGRADE IS ANTICIPATED FROM SH 6 (BLACKJACK ST.) TO THE END OF THE PROJECT. CONTRACTOR SHALL WORK WITH THE ENGINEER TO DETERMINE EXACT LOCATION. LIMITS AND QUANTITY TO BE DETERMINED IN THE FIELD BY THE ENGINEER.
7. CONTRACTOR SHALL PREPARE PROFILE FOR PROPOSED GUTTER LINES FOR BOTH SIDES OF ROADWAY TO DETERMINE PROPOSED CROSS SLOPES THROUGHOUT THE PROJECT LENGTH (MINIMUM AT EVERY 50' AND AT LOCATIONS TO MATCH AND MAKE A SMOOTH TRANSITION WITH EXISTING DRIVEWAYS, CURB RAMPS, AND OTHER EXISTING FEATURES THAT WILL REMAIN). CONTRACTOR SHALL WORK WITH ENGINEER NOT TO EXCEED 5% LONGITUDINAL SLOPE AND 2% CROSS SLOPE AT CROSS WALK LOCATIONS. CONTRACTOR SHALL REVIEW THEIR FINDINGS WITH THE ENGINEER AND GET ENGINEER'S APPROVAL BEFORE MAKING FINAL DECISION ABOUT PROPOSED CROSS SLOPES TO BE MAINTAINED DURING CONSTRUCTION.

SYMBOL NOTES:

* CROSS SLOPE VARIES. SEE BELOW.
3% TYPICAL
1% MIN.
>3% WILL REQUIRE ENGINEER'S APPROVAL.

** CROSS SLOPE VARIES. SEE BELOW.
9% MAX.
>9% WILL REQUIRE ENGINEER'S APPROVAL.
ANY GRADE BREAK DIFFERENCE >6% WILL REQUIRE ENGINEER'S APPROVAL.

*** (CONTROLLING ELEVATION - EXIST TOP OF CURB (TOC)):
PROPOSED TOC WILL MATCH THE EXISTING TOC ELEVATION AND SHALL BE TRANSITIONED SMOOTHLY TO MATCH EXISTING FEATURES THAT WILL REMAIN.

**** (CONTROLLING ELEVATION - EXIST GUTTER AT EXIST OVERLAY):
NEW GUTTER LINE WILL MATCH THIS ELEVATION AND MAY BE CHANGED, WITH ENGINEER'S APPROVAL, AS NEEDED, TO MATCH EXISTING FEATURES THAT WILL REMAIN.

△ GRADE BREAK (IF NEEDED)

SCALE = N.T.S

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

PROPOSED
TYPICAL SECTIONS

SHEET 2 OF 2

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	7
CONTROL	SECTION	JOB	
0079	04	049	

7/13/2024 2:59:25 PM
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GENERAL NOTES:

Specification Data

Basis of Estimate

Item	Description	Rate	Unit
166	Fertilizer (16-8-8)	600 lb./acre**	ton
168	Vegetative Watering	169,400 gal./acre	1,000 gal.
260	Lime (Quicklime)(Slry) (Subgr.) (PI>20)	150 lb./cu. yd.	ton
275	Cement (Subgr.)(PI<20)	125 lb./cu. yd.	ton
310	Asph Mat'l (AE-P) (Subgrade)(Priming)	0.20 gal./sq. yd.*	gal.
341	D-GR HMA TY-B	115 lb./sq. yd.-in.	ton
344	SP Mixes SP-C	115 lb./sq. yd.-in.	ton
344	Tack Coat - CSS-1P	0.20 gal./sq. yd.	gal.

* Based On 50% Asphalt Residue.
** Non-Pay, for Contractor's Information Only.

Special Notes

Electronic files containing answered pre-letting questions and other project related design information will be placed in the following FTP site periodically.

Check this site for new information. Notices of new postings will not be sent out by the Engineer.

The data located in these files is for non-construction purposes only and can be found at

TxDOT's public FTP site at https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting Responses/.

Access is read-only.
All files in the FTP site are subject to the License Agreement shown on the FTP site.
To obtain a copy of the project plans free of charge, submit a request from the following site:
http://www.txdot.gov/business/letting-bids/plans-online.html

Contractor questions on this project are to be addressed to the following individual(s):

Area Engineer's Email: Sarah.Horner @txdot.gov
Assistant Area Engineer's Email: Noel.Spaar @txdot.gov
Design Manager's Email: Emmanuel.Navarro @txdot.gov

For Q&A's on Proposals navigate to https://tableau.txdot.gov/views/ProjectInformationDashboard/NoticetoContractors. Use the dashboard to navigate to the project you are interested in by scrolling or filtering the dashboard using the controls on the left. Hover over the blue hyperlink for the project you want to view the Q&A for and click on the link in the window that pops up.

All questions submitted that generate a response will be posted through this site. The site is organized by District, Project Type (Construction or Maintenance), Letting Date, CCSJ/Project Name.

Single lane closures, except as otherwise shown in the plans, will be restricted to off-peak hours as defined in the following table:

Peak Hours		Off-Peak Hours	
6 to 9 AM Monday through Friday	3 to 7 PM Monday through Friday	9 AM to 3 PM and 7 PM to 6 AM Monday through Friday	All day Saturday and Sunday

Work that requires closure of multiple travel lanes in the same direction, except as otherwise shown in the plans, are restricted to night hours between 9 PM and 6 AM.

For dimensions of right-of-way not shown on the plans, see right-of-way map on file at the TxDOT District Office.

Modifications to Lane Closure / Work Restrictions:

Submit a request in writing for approval by the Engineer a minimum of 10 days in advance of implementing a change to lane closure restrictions.

When deemed necessary, the Engineer will lengthen, shorten, or otherwise modify lane closure restrictions as traffic conditions warrant.

When deemed necessary, the Engineer will modify the list of major events when new events develop, existing events are rescheduled, or when warranted.Special Events/ Special Situations will be handled on a case-by-case basis. No work restricting lane closures is allowed from 3 PM a day before to 9 AM the day after the Special Event or Special Situation.

The following Holiday/Event lane closure restriction requirements apply to this project:
No work that restricts or interferes with traffic shall be allowed between 3 PM on the day preceding a Holiday or Event and 9 AM on the day after the Holiday or Event.

Holiday Lane Closure Restrictions	
New Year's Eve and New Year's Day (December 31 through January 1)	3 PM December 30 through 9 AM January 2
Easter Holiday Weekend (Friday through Sunday)	3PM Thursday through 9 AM Monday
Memorial Day Weekend (Friday through Monday)	3 PM Thursday through 9 AM Tuesday
Independence Day (July 3 through July 5)	3 PM July 2 through 9 AM July 6
Labor Day Weekend (Friday through Monday)	3 PM Thursday through 9 AM Tuesday
Thanksgiving Holiday (Wednesday through Sunday)	3 PM Tuesday through 9 AM Monday
Christmas Holiday (December 23 through December 26)	3 PM December 22 through 9 AM December 27

Plan work schedules around the appropriate dates above to ensure productive work is performed without lane closures.

Nighttime Work

Night time work is only allowed with written permission from the Area Engineer. Nighttime work hours shall start after 9 PM and complete before 6 AM, unless otherwise approved by the Engineer.

If nighttime work is allowed/required, provide Multi-Directional Lighting Device with the following quality requirements:

Provide a 2000 watt (minimum) SIROCCO lighting balloon, Airstar lighting or equivalent.

It is the intent of the MDLD lighting to supplement the Portable Road Light and Power Unit used to illuminate work hours.

Provide MDLD units which can self-inflate and capable of illuminating approximately 15,000 sq ft.

Provide MDLD units of 1.1 meter horizontal diameter and capable of withstanding 60 mph winds when fully inflated and operating.

Provide MDLD units with two (2) 1,000 watt halogen bulbs recommended by the manufacturer.

Night Time Work Safety Clothing Department approved safety hats and vests (Class 3 with retro-reflective striping) shall be worn by all workers and visitors at all times when at the work sites. When work is approved by the Engineer to be performed at night, pants (Class 3 with retro-reflective striping) shall be worn by all workers and visitors when at the work sites.

Existing Storm Sewers and Utilities:

Existing storm sewers and utilities are shown from the best available information. Verify the location of all underground facilities prior to starting work.

Driveways:

Provide all-weather surface for temporary ingress and egress to adjacent property, as directed. Materials, labor, equipment and incidentals necessary to provide temporary ingress and egress will not be paid for directly, but will be subsidiary to the various bid items.

Do not discolor or damage existing ADA curb ramps and sidewalks during construction operations. In the event of discoloration or damage, clean or repair as directed, at contractor's expense.

Drainage:

Locations shown for drainage structures refer to the control points of structures as follows:

1) Manholes, Inlets, and Junction Boxes—Locations are at the centroid of the structure; when two structure types are specified, location is at the centroid of the top structure. Bottom structure may be positioned as required to align with top structure, storm drain pipes and other adjacent structures.

2) Street Inlets—Locations are at the face of curb at a distance of L/2 from the end of the inlet.

3) Headwalls—Locations are to the outside face of the headwall at the centerline of the pipe or box structure. For pipe headwalls with Type "P" or "C" safety end treatment, locations are on the centerline of the pipe structure at the limit of payment for pipe.

Plugging/capping of pipes or culverts will not be paid for directly, but will be subsidiary to the various bid items, unless otherwise shown on the plans.

Provide temporary drain openings at all low points or other drainage structures, as required, at the Contractor's expense.

Remove any obstructions to existing drainage due to the contractor's operations, as required, at the Contractor's expense.

The following standard detail sheets have been modified: 144-146 MDD(FTW)(MOD)

Item 4. Scope of Work

Reimbursement for project overhead will not be considered until project completion has extended beyond the original Contract Time.

Item 6. Control of Materials

To comply with the latest provisions of Build America, Buy America Act (BABA Act) of the Bipartisan Infrastructure Law, the contractor must submit an original of the TxDOT Construction Material Buy America Certification Form for all items classified as construction materials. This form is not required for materials classified as a manufactured product.

Refer to the Buy America Material Classification Sheet for clarification on material categorization.

The Buy America Material Classification Sheet is located at the below link. https://www.txdot.gov/business/resources/materials/buy-america-material-classification-sheet.html for clarification on material categorization.

Item 7. Legal Relations and Responsibilities

This contract requires work to be done on railroad property. Cooperate with the railroads and comply with all of their requirements including obtaining any required training before performing work on railroad property.

Submit to the Engineer an original railroad liability insurance policy.

Do not initiate activities in a project specific location (PSL) associated with a U.S. Army Corps of Engineers (USACE) permit area that has not been previously evaluated by the USACE as part

of the permit review of this project. Such activities include, but are not limited to haul roads, equipment staging areas, borrow and disposal sites. “Associated” as defined here means materials are delivered to or from the PSL. The permit area includes all waters of the U.S. or associated wetlands affected by activities associated with this project. Special restrictions may be required for such work. The contractor will be responsible for all consultations with the USACE regarding activities, including project specific locations (PSLs) that have not been previously evaluated by the USACE. Provide the Department with a copy of all consultations or approvals from the USACE prior to initiating activities.

The Contractor may proceed with activities in PSLs that do not affect a USACE permit area if a self-determination has been made that the PSL is non-jurisdictional or proper USACE clearances have been obtained in jurisdictional areas or have been previously evaluated by the USACE as part of the permit review of this project. The contractor is solely responsible for documenting any determinations that their activities do not affect a USACE permit area. Maintain copies of these determinations for review by the Department or any regulatory agency.

Document and coordinate with the USACE, if required, prior to any excavation hauled from or embankment hauled into a USACE permit area by either (1) or (2) below.

(1) Restricted Use of Materials for Previously Evaluated Permit Areas. Document both the project specific location (PSL) and its authorization. Maintain copies for review by the Department or any regulatory agency. When an area within the project limits has been evaluated by the USACE as part of the permit process for this project:

a. Suitable excavation of required material in the areas shown on the plans and cross sections as specified in Item 110 is used for permanent or temporary fill (Item 132, Embankment) within a USACE permit area;
b. Suitable embankment (Item 132) from within the USACE permit area is used as fill within a USACE evaluated area; and,
c. Unsuitable excavation or excess excavation [“Waste”] (Item 110) that is disposed of at a location approved by the Engineer within a USACE evaluated area.

(2) Contractor Materials from Areas Other than Previously Evaluated Areas. Provide the Department with a copy of all USACE coordination or approvals prior to initiating any activities for an area within the project limits that has not been evaluated by the USACE or for any off right of way locations used for the following, but not limited to haul roads, equipment staging areas, borrow and disposal sites:

a. Item 132, Embankment, used for temporary or permanent fill within a USACE permit area; and,
b. Unsuitable excavation or excess excavation [“Waste”] (Item 110, Excavation) that is disposed of outside a USACE evaluated area.

The total area disturbed for this project is 5.81 acres. The disturbed area in this project, all

project locations in the Contract, and the Contractor project specific locations (PSLs), within 1 mile of the project limits, for the Contract will further establish the authorization requirements for storm water discharges. The Department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction activities shown on the plans. The Contractor is to obtain required authorization from the TCEQ for Contractor PSLs for construction support activities on or off the right of way. When the total area disturbed in the Contract and PSLs within 1 mile of the project limits exceeds 5 acres, provide a copy of the Contractor NOI for PSLs on the right of way to the Engineer and to the local government that operates a separate storm sewer system.

Prevention of Migratory Bird Nesting

It is anticipated that migratory birds, a protected group of species, may try to nest on bridges, culverts, vegetation, or gravel substrate, at any time of the year. The preferred nesting season for migratory birds is from February 15 through October 1. When practicable, schedule construction operations outside of the preferred nesting season. Otherwise, avoid nests containing migratory birds and perform no work in the nesting areas until the young birds have fledged.

Structures

Do not begin culvert construction operations until swallow nesting prevention is implemented, until after October 1 if it's determined that swallow nesting is actively occurring, or until it's determined swallow nests have been abandoned. If the State installed nesting deterrent on the culverts, maintain the existing nesting deterrent to prevent swallow nesting until October 1 or completion of the culvert work, whichever occurs earlier. If new nests are built and occupied after the beginning of the work, do not perform work that can interfere with or discourage swallows from returning to their nests. Prevention of swallow nesting can be performed by one of the following methods:

1. By February 15 begin the removal of any existing mud nests and all other mud placed by swallows for the construction of nests on any portion of the culverts. The Engineer will inspect the culverts for nest building activity. If swallows begin nest building, scrape or wash down all nest sites. Perform these activities daily unless the Engineer determines the need to do this work more frequently. Remove nests and mud through October 1 or until culvert construction operations are completed.

2. By February 15 place a nesting deterrent (which prevents access to the culvert by swallows) on the culverts.

No extension of time or compensation payment will be granted for a delay or suspension of work caused by nesting swallows. This work is subsidiary to the various bid items.

Item 8. Prosecution and Progress

Each contract awarded by the Department stands on its own, and as such, is separate from other contracts. A Contractor awarded multiple contracts must be capable and sufficiently staffed to concurrently process and/or execute all contracts at the same time.
Working days will be computed and charged in accordance with Section 8.3.1.1, 'Five-Day Workweek.'

Prepare the progress schedule as a CPM, include all planned work activities and sequences and show Contract completion within the number of working days specified. Submit an updated hard copy when changes to the schedule occur or when requested.

The number of working days for final acceptance will be _363__ working days.

Item 100. Preparing Right of Way

Measurement for this item will be along the centerline of the project with the limits of measurements as shown on the plans.

Item 105. Removing Treated and Untreated Base and Asphalt Pavement, Remove, Clean, Palletz and Store Street Brick

Cement, lime, and/or lime fly-ash treated and untreated existing base material removed on this project will become the property of the Contractor.

Contractor shall remove, clean, palletize, transport and stockpile salvageable existing bricks removed from the project. The transport of brick will be the responsibility of the contractor and will not be paid separately.

Stockpile cleaned bricks at: 602 N Norton, Dublin, TX 76446. Contact Cory James (254-434-1082), 48 hours prior to stockpiling.

Where proposed pavement work is adjacent to historic brick streets, care should be taken to avoid damage to historic brick. If brick is disturbed or damaged, follow the procedures listed below for removal and stockpiling of street brick:

1. Remove existing street brick by hand or by other approved method that assures the least amount of damage to the brick.
2. Store reusable brick in a manner and location that will protect the brick from loss or damage. Replace any unusable or damaged brick with a compatible unit. Any brick that is not reused shall be salvaged and delivered to the City of Dublin for their use.
3. Adjust and compact subgrade as directed to ensure proper final grade will be achieved.

4. Install bedding sand, brick and joint sand in accordance with Item 528, "Colored Textured Concrete and Landscape Pavers." Install new street brick in the same pattern as existed before removal on side streets where applicable.
5. Removal, cleaning, installation of street brick will not be paid for directly, but shall be considered subsidiary to Item 5099 and cutting and restoring pavement.

Item 110. Excavation

Review proposed waste sites to determine if any site is located in a “Base Floodplain” or “Floodway” as defined by the Federal Emergency Management Agency (FEMA).

If waste material from this project is placed in a base floodplain as defined by FEMA, obtain a permit from the local community responsible for enforcing National Flood Insurance Program (NFIP) regulations. Ensure that the owner of the property receiving the waste has obtained the necessary permit.

Item 132. Embankment

Do not provide Type B embankment material with a Plasticity Index (PI) higher than 35.

Furnish test results per Test Procedures Tex-104, 105, and 106-E (PIs), Tex-113 or 114-E (M-D Curves), and Tex-145 and/or Tex-146-E (Sulfates) for each material sample provided by the Engineer. Perform field density tests (Tex-115-E, Part I) at a frequency for each worked section to produce passing results prior to testing by the Engineer per Tex-115-E, Part I. The Engineer will perform separate testing of the material.

Item 162. Sodding for Erosion Control

Furnish and place Bermudagrass sod.

Item 166. Fertilizer

Fertilize all areas of project to be seeded or sodded.

Item 168. Vegetative Watering

Furnish and install an approved rain gauge at the project site, as directed. Furnishing and installation of the rain gauge will not be paid for directly, but will be subsidiary to Item 168.

Apply vegetative watering for an establishment period of thirteen weeks following application of seed or installation of sod, at a rate of 1/2 inch of water depth per week (approximately 13,030 gallons per acre). During the first four weeks after seeding, apply water twice per week, on non-

consecutive days, each at half the weekly application rate. For the remainder of the establishment period, apply vegetative watering once per week during the months of January through June or September through December, at the weekly application rate; apply watering twice per week, on non-consecutive days during the months of July and August, each at one-half the weekly application rate.

Average weekly rainfall rates for the District are:

January—0.39"	April—0.86"	July—0.48"	October—0.68"
February—0.46"	May—1.00"	August—0.47"	November—0.46"
March—0.48"	June—0.63"	September—0.74"	December—0.37"

Item 260. Lime Treatment (Road-Mixed)

Treat subgrade material with a maximum 6% lime by weight unless otherwise directed by the Engineer. Apply lime by the “slurry placement” method. Allow the mixture to mellow for a minimum of 4 days after initial mixing. Contractor shall coordinate with the Engineer and get Engineer’s approval to use lime treatment of subgrade for subgrade materials having a PI greater than 20 and use either lime or cement treatment for subgrade materials with a PI between 15 and 20.

Unless otherwise noted, treat the existing subgrade to a depth of 8".

Item 275. Cement Treatment (Road-Mixed)

Apply cement for subgrade treatment by the “slurry placement” method.

Treat subgrade material with a maximum 4% cement by weight unless otherwise directed by the Engineer. The 7-day compressive strength of treated material will be 250 psi. Contractor shall coordinate with the Engineer and get Engineer’s approval to use cement treatment of subgrade for subgrade materials having a PI less than 20 and use either lime or cement treatment for subgrade materials with a PI between 15 and 20.

Unless otherwise noted, treat the existing subgrade to a depth of 8".

Item 301. Asphalt Antistripping Agent

Furnish a liquid antistripping agent unless otherwise directed.

Item 310. Prime Coat

Provide an AE-P for this Item.

County: Erath

Highway: BU 67K

For the use of AE-P, process the top of one inch (1") of base material to be finished for final surfacing with AE-P to conform with the typical sections shown on the plans and to the established lines and grades as directed.

Item 341. Dense-Graded Hot-Mix Asphalt

Place TY B HMAC for a depth of 8" at 2-4" lifts. Provide aggregate with a Surface Aggregate Classification (SAC) value of ___B__ for the travel lanes and shoulders.

Natural (field) sands are not allowed.

Provide a PG 64-22 asphalt for the base course.Furnish a CSS-1P with greater than 50% asphalt residue for the tack coat on this project. A trackless tack can be used in lieu of CSS-1P tack coat or as directed by the Engineer. The Engineer will set the rate at time of application.

Warm Mix Asphalt (WMA) is not permitted in any mix type on this project.

RAP and RAS are not permitted in any surface and levelup mixes on this project.

Include the approved mix design number on each delivery ticket.

Use a Material Transfer Device (MTD) unless otherwise directed.

Shoulders, and other areas listed on the Plan sheets or as directed are not subject to in-place air void determination for this project.

Temporary detours are subject to in-place air void determination for this project.

Item 344. Superpave Mixtures

Provide aggregate with a Surface Aggregate Classification (SAC) value of _A____ for the travel lanes and shoulders.

Natural (field) sands are not allowed.

Provide a PG 70-28 asphalt for the base course.

Furnish a CSS-1P with greater than 50% asphalt residue for the tack coat on this project. A trackless tack can be used in lieu of CSS-1P tack coat or as directed by the Engineer. The Engineer will set the rate at time of application.

County: Erath

Highway: BU 67K

Warm Mix Asphalt (WMA) is not permitted in any mix type on this project.

RAP and RAS are not permitted in any surface and levelup mixes on this project.

Provide a mix design with the gradation curve below the restricted zone.

Use the Boil Test, Test Procedure Tex-530-C, and provide only mixes that produce zero percent (0%) stripping for design verification and during production.

Include the approved mix design number on each delivery ticket.

Use a Material Transfer Device (MTD) unless otherwise directed.

Shoulders, and other areas listed on the Plan sheets or as directed are not subject to in-place air void determination for this project.

Temporary detours are subject to in-place air void determination for this project.

Use Surface Test Type B for this project. For downtown section of the project from the FWWR to Live Oak St, contractor shall use Surface Test Type A as the contractor is limited to very short sections of construction.

Item 354. Planing and Texturing Pavement

Stockpile salvaged materials at:
602 N Norton, Dublin, TX 76446. Contact Cory James (254) - 434 - 1082, 48 hours prior to stockpiling.

Intent is to remove all HMAC from existing brick layer. Repair damaged concrete sidewalk and ADA ramps caused by Contractor's operations at the expense of the Contractor as directed by the Engineer.

Item 432. Riprap

The quantities for riprap at the location indicated may be varied to the extent necessary to ensure proper functioning for the purpose intended.

All concrete riprap will be 5" (.42') in thickness, unless otherwise shown on the plans, and must be reinforced.

An 8 inch (.67 ft.) by 18 inch (1.5 ft.) toe wall is required at the exposed edges of all concrete riprap, unless otherwise directed.

Item 462. Concrete Box Culverts and Drains

All bends and connections in pipe must be refabricated.

Item 466. Headwalls and Wingwalls

Do not use precast headwalls/wingwalls.

Item 496. Removing Structures

When required by the plans, partial or complete removal of a structure for staged construction shall be accomplished in a manner which does not cause damage to the remainder of the structure or its supporting members. The Contractor shall submit a demolition plan for all structures to be replaced and/or removed in accordance with Item 496. Submit the procedure for removal of superstructure or substructure in writing or plan drawing for approval prior to implementation.

Item 502. Barricades, Signs, and Traffic Handling

The contractor force account 'safety contingency' that has been established for this project is intended to be utilized for work zone enhancements to improve the effectiveness of the traffic control plan that could typically not be foreseen in the project planning and design stage. These enhancements will be mutually agreed upon by the Engineer and the Contractor's responsible person based on weekly or more frequent traffic management reviews on the project. The Engineer may choose to use existing bid items if it does not slow the implementation of enhancement.

Permanent signs may be installed when construction in an area is complete and they will not conflict with the traffic control plan for the remainder of the job.

Existing signs are to remain as long as they do not interfere with construction and they do not conflict with the traffic control plan.

Any sign not detailed in the plans but called for in the layout will be as shown in the current "Standard Highway Sign Designs for Texas".

When traffic is obstructed, arrange warning devices in accordance with the latest edition of the "Texas Manual on Uniform Traffic Control Devices".

Cover or remove any work zone signs when work or condition referenced is not occurring.

Do not place barricades, signs, or any other traffic control devices where they interfere with sight distance at driveways or side streets. Provide access to all driveways during all phases of construction unless otherwise noted in the plans or as directed.
As approved by The Engineer, provide uniformed off duty police officers and squad cars during lane closures, nighttime work or other situations that indicate a need for additional traffic control to protect the traveling public or the construction workforce. Provide documentation such as payroll, log sheets with signatures and badge number, or invoices from the government entity providing the officers for reimbursement. Complete the weekly tracking form provided by the department and submit invoices that agree with the tracking form for payment at the end of each month approved services were provided. Reimbursement will not be made for the coordination fees charged by any party.

Item 503. Portable Changeable Message Signs

Provide all portable changeable message signs and arrow panels with a photoelectric device to allow for automatic dimming of operations to approximately 50% of their normal brightness when ambient light drops to approximately five footcandles, and then increase back again for daytime operations.

7 electronic portable changeable message sign unit(s) will be required. Individual or collective use of signs will be required by the Engineer when deemed necessary to supplement the traffic control plan.

Each sign must have programmed in its permanent memory the following 15 messages:

1. Exit Closed Ahead
2. Use Other Routes
3. Right Lane
4. Left Lane
5. Closed Ahead
6. Two Lane
7. Detour Ahead
8. Thru Traffic
9. Prepare To Stop
10. Merging Traffic
11. Expect 15 Minute Delay
12. Max Speed ** MPH
13. Merge Right
14. Merge Left
15. No Exit Next ** Miles

Item 504. Field Office and Laboratory

Furnish the following structures for this project:

Type	No.
Field Office (Ty. C)	1
Field Lab (Ty. A)	1

Field office will require at least a 3' by 3' landing on the outside of each exit door and a concrete landing at the bottom of exit stairs. The concrete landing will be the width of the stairs and extend at least 4' in front of the bottom step.

Furnish the following for the Field Office structure:

Item	No.
Desktop Computer	1
Laptop Computer	1
Printer	1
Internet Service	1

Provide Laptop computers with an Intel i5 (2.8 GHz) processor, or greater.

Integrated printer/copier/scanner/fax units will be permitted.

Item 505. Truck Mounted Attenuator (TMA) and Trailer Attenuator (TA)

In addition to the shadow vehicles with truck mounted attenuator (TMA) that are specified as being required on the traffic control plan for this project, provide 0 additional shadow vehicle(s) with TMA.

Therefore, 1 total shadow vehicles with TMA will be required for this type of work. Determine if one or more of these operations will be ongoing at the same time to determine the total number of TMAs needed for the project.

For traffic control during storm drainage system construction along cross streets, as well as during any other construction as decided by the Engineer, if contractor decides to use applicable TxDOT TCP standard that shows TMA (Stationary), contractor shall only use it with Engineer's approval. TMA (Stationary) will not be paid for separately but will be subsidiary to Item 502.

Item 506. Temporary Erosion, Sedimentation, and Environmental Controls

Remove accumulated sediment or replace SW3P controls when the capacity has been reduced by 50% or when the depth of sediment at the control structure exceeds one foot.

Item 512. Portable Concrete Traffic Barrier

"*Furnish and Install*" barrier in compliance with Low Profile Concrete Barrier (LPCB) standards as shown on the plans.

Provide the hardware assemblies to join barrier sections.
Previously used barrier will be inspected and approved by the engineer prior to using, in accordance to Item 512.2.1.3.

Provide (2) 1-1/4" x 2'2" threaded rods, (4) standard USS washers, grade 5, (4) 1-1/4" hex nuts, and (2) 5" x 10" x 3/8" plate washers for each section of LPCB.

Delineate all barriers in accordance with Barricade and Construction (BC) Standard sheets. Barrier delineation will not be paid for directly, but will be subsidiary to Item 512,"Portable Concrete Traffic Barrier".

Remove and replace traffic barrier damaged by the traveling public and no longer serviceable as directed. Additional payment will be provided as compensation to remove, replace and dispose of the traffic barrier damaged by the traveling public in accordance with Item 512.

Item 585. Ride Quality for Pavement Surfaces

Before performing work, the Engineer will determine whether Surface Test Type A will be used instead of the specified payment adjustment schedule when the following conditions exist in existing travel lanes:

- travel lane is directly adjacent to existing curb and gutter, or
- travel lane has repair areas or crack sealing that may result in reflective defects.

Use Surface Test Type B pay adjustment schedule 2 to evaluate ride quality of the travel lanes in accordance with Item 585, "Ride Quality for Pavement Surfaces."

Item 644. Small Roadside Sign Supports and Assemblies

Supply shop drawings for all signs requiring fabrication in this contract. Fabricate and install signs only after approval of shop drawings by Fort Worth District Traffic Office.

Item 666. Reflectorized Pavement Markings with Retroreflective Requirements

Collection of retro-reflectivity readings using a mobile retro-reflectometer is the required method. A TxDOT inspector must witness collection of all retro-reflectivity data.

Where replication of existing pavement markings and markers is required, no layout or plan may

be provided. Prior to removal or demolition of pavement markings, record the beginning and ending locations of each type of pavement marking to be replaced. Use the recorded information to establish guides as required by Article 666.4.1 of the Standard Specifications to re-create the original markings on the final pavement surface.

Use pavement marking standard drawings for pavement marking layout where existing pavement markings contradict the standard drawings in the plans.

Item 618. Conduit

Signals:
After installing conduit and pulling conductor, leave a high tensile strength polyester fiber pull tape in the conduit for future use.

Illumination:
Contractor shall bed all PVC conduit placed by open cut in field sand as approved.

Conduit for the ground rod at high mast poles shall be schedule 40 PVC.

Conduit bends at roadway illumination assembly foundations shall not be paid for directly, but shall be considered subsidiary to Item 416.

The fused disconnect switch used for underpass circuits if present shall not be paid for directly, but shall be considered subsidiary to the various bid items.Contractor shall not use cast iron junction boxes in concrete traffic barriers and single slope traffic barriers. Contractor shall use polymer concrete junction boxes instead of the cast iron junction boxes shown on standard sheets CTBI(3), CTBI(4), and SSCB(4). Mount the junction boxes flush (+ 0", - ½") with concrete surface of concrete barrier.

Contractor shall use materials from prequalified material producers list as shown on the Texas Department of Transportation (TxDOT) materials producers list. Category is "Roadway Illumination and Electrical Supplies."

The polymer concrete barrier box shall not be paid for directly, but shall be considered subsidiary to item 618.

Where PVC, duct cable, and HDPE conduit 1" and larger is allowed and installed as per TxDOT standards, contractor shall provide a PVC elbow in place of the galvanized rigid metal elbow required by the Electrical Detail standards. Contractor shall ensure the PVC elbow is of the same schedule rating as the conduit to which it is connected.

Contractor shall ensure only a flat, high tensile strength polyester fiber pull tape is used for pulling conductors through the PVC conduit system.

Preparation and/or troubleshooting of any conduit or duct cable shall not be paid for directly, but shall be considered subsidiary to the various bid items.

Item 620. Electrical Conductors

Signal:
Clearly and permanently mark each conductor installed in a signal pole where it can be clearly seen from the hand hole. Use plastic zip ties with labelling plate to mark conductor with appropriate designation.
Illumination:
Contractor shall not install any electrical conductors without security measures already in place for those runs.

For both transformer and shoe-base type illumination poles, contractor shall provide double-pole breakaway fuse holder as shown on the Texas Department of Transportation (TxDOT) materials producers list. Category is "Roadway Illumination and Electrical Supplies". Fuse holder is shown on list under Items 610 & 620.

Contractor shall provide 10-amp time delay fuses.

If removal of existing electrical conductors is used it will be measured and paid for by the run only one time, regardless of how many conductors are present. Preparation of conduit for new conductors shall not be paid for directly, but shall be subsidiary to item 620.

Item 624. Ground Boxes

Signals:
Slack conductors required by Standard Sheet ED(3)-14 will be subsidiary to Item 624.

Concrete removal required for installation of ground boxes will be subsidiary to Item 624.

Ground all junction boxes mounted on bridges and underpasses with a ground rod in the nearest ground box.

Item 628. Electrical Services

Signals:
Before installing any electrical service, consult with the appropriate utility company before beginning work and verify all metering equipment requirements with the provider have been met.

Provide a commercial grade, meter base with by-pass switch if required by the utility company. Contractor shall obtain 911 address and EISD from electric utility company then contact the TXDOT Signal Shop to receive the Contract Request for Electrical Service Meter form to complete and return. TXDOT will make application to the Electric Utility Company for service,unless otherwise maintained by the following Cities: Arlington, Bedford, Colleyville, Euless, Fort Worth, Grand Prairie, Grapevine, Hurst, Mansfield, North Richland Hills, and Weatherford.
Illumination:
All roadway illumination circuits are 240/480V/3 wire with the roadway luminaires operating at 480V. All roadway illumination circuit breakers are 2-pole.

The concrete riprap pad at electrical service points shall not be paid for directly, but shall be subsidiary to Item 628.
Contractor shall place a decal stating "DANGER/HIGH VOLTAGE" on the door of the service assembly enclosure. The size of the decal and lettering shall be as outlined in the current TxDOT electrical detail (ED) standard sheets.

Item 662. Work Zone Pavement Markings

Paint and Beads may be used for non-removable work zone pavement markings, if TxDOT approved materials are used.

When buttons are used for Removable Markings, on finished pavement surfaces, hot applied thermo adhesive must be used on concrete and bituminous adhesive on asphalt.

Buttons may not be used for stop bar markings or symbols.

Item 680. Installation of Highway Traffic Signals

Signals:
Contractor shall contact Fort Worth District TMC 817-370-3664 prior to starting any signal modifications. Provide qualified personnel reachable by telephone and available to receive calls on a 24-hour basis. Respond to reported calls and make field assessment within 2 hours and make appropriate repairs within 24 hours.

Furnish and install all required materials, incidentals and equipment necessary for a fully operational traffic signal. The proposed equipment shall be compatible with the existing systems in the area.

Provide all illumination fixtures to be installed in this contract. Use 250W equivalent LED luminaires.

Where work requires the removal of power from the controller and cabinet assembly, erect

temporary stop signs. Remove the stop signs after the traffic signals are in operation.
Deliver the cabinet, controller, accessories, and three complete sets of signal construction plans to the TXDOT Signal Shop, 2501 SW Loop 820, Fort Worth for testing. Notify the Signal Shop two working days prior to delivery of the cabinet.

Wire the signal installation to operate in accordance with phase diagrams in these plans. Timing and phasing will be maintained by the operating agency. Deliver a copy of all revisions to the original timing and phasing plans to the operating agency and TXDOT Signal Shop. One copy is to stay in the controller cabinet at the completion of the project and two supplied to the operating agency Signal Shop.

Project Inspection. Contact the TxDOT Signal Shop in advance of needed inspections. At the time of the final electrical inspection, the Inspector will create a discrepancy list to be corrected and repaired before signal is put into flash mode.

Signal Flash. Upon the satisfactory completion of repairs or corrections, notify the TxDOT Signal Shop at least one week prior to placing in flash. Schedule signal flash for Monday thru Thursday between 9:00 AM – 12:00 PM. Operate the signal in flash mode for 2-3 days prior to turning on to full actuation. The TXDOT signal inspector and technician must be present when the signals are placed in flash.

Signal Turn-On. Upon completion of the signal flash, schedule the date and time for the turn on of the traffic signal on Monday thru Thursday between 9:00 AM – 12:00 PM. Place the traffic signal into full operation only after all required striping is complete and all conflicting signing is removed. The TXDOT signal inspector and technician must be present when the signals are placed in full color operation.

Test Period. During the 30-day test period, the Contractor shall be the first responders to all trouble calls. They will, in turn contact TxDOT Signal Shop with information about problem and repairs made. Provide qualified personnel to respond to these and all trouble calls. Provide a local telephone number, not subject to frequent changes and available to receive calls on a 24-hour basis. Respond to reported calls within a maximum of two hours. Make appropriate repairs within 24 hours or at engineer's direction.

Place a logbook in each controller cabinet and keep a record of each trouble call reported. Notify the Engineer of each trouble call. The error log in the conflict monitor shall not be cleared during the thirty-day test period without approval. If it is necessary to replace equipment, such as a controller, in order to return the signals to normal operation, TXDOT will provide temporary replacement equipment until the original equipment is repaired and/or replaced at the engineer's direction.

Removal. Salvageable signal controllers and related equipment shall remain the property of TXDOT. Deliver to the TXDOT Signal Shop at 2501 SW Loop 820, Fort Worth

Item 682. Vehicle and Pedestrian Signal Heads

Signals:
Vehicle signal heads shall be yellow aluminum with 5 inch, black, aluminum, reflective border, vented back plates unless otherwise shown on plans.

Signal heads shall be installed level and plumb and aimed as directed. Cover all signal faces until placed in operation.

All new mast arm mounted signal heads to be mounted horizontally.

Item 684. Traffic Signal Cables

Signals:
Clearly and permanently mark each cable as shown on the plans (CABLE 1, etc.) at each signal head, ground box, terminal block, pole base and controller. Use plastic zip ties with labeling plate to mark cable.
Provide an extra 10’ for each cable terminating in the controller cabinet and coil an extra 5’ of cable in each ground box.

Terminate all electrical conductors from the controller (including spares) at the termination block in the signal pole hand hole.

Item 686. Traffic Signal Pole Assemblies (Steel)

Signals:
Provide all signal poles for a project or work order from the same manufacturer.

Install mast arm damping plates at the end of SMA and DMA standard poles in accordance with the details shown in the MA-DPD standard sheet. Dampers are not recommended for LMA poles.

Plug any unused openings in the mast arms or poles with an approved material.

Provide a 3-piece bracket assembly on strain poles or drill the pole and use thimble eyebolts to attach the strand vise for the span wire.

Item 688. Pedestrian Detectors and Vehicle Loop Detectors

Signals:
For Accessible Pedestrian Signals. Provide a completed final system operational check list, completed schematic diagram for pushbutton station locations, and a completed default and field settings sheet as provided in the APS manufacturer's manual. Provide a qualified personnel for testing and set up of the equipment at the time of signal flash and turn on.

Item 690. Traffic Signals

Signals:
Department will furnish anchor bolts, nuts, poles, arms, bases, cabinets, controllers, LED’s, signal heads, luminaires, ground boxes, signs, pedestrian button assemblies, down guys, down guy guards, down guy anchors, cable, antennas, radar sensors, battery back-up systems, and ITS radios when using this Item. Payment for installation and replacement of cable under this Item applies only to Department-supplied cable.

When using existing ground boxes, ensure that the ground boxes are clean, properly secured, and have a minimum of 9 in. of gravel as a base. This work will not be paid for directly, but is subsidiary to this Item.

Provide vertical clearance of 19 feet from the roadway to the lowest point of the signal head or mast arm. Place signal heads 40 ft. minimum and 180 ft. maximum from the stop line. If the nearest signal is more than 180 ft. from the stop line, place a supplemental near-side signal head. Determine the field measurements and elevations from the actual field location of the poles, considering all above and below ground utilities and existing roadway elevations. Plug any unused openings in existing mast arms and poles with an approved material.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0079-04-049 **DISTRICT** Fort Worth **COUNTY** Erath
HIGHWAY US 67

			CONTROL SECTION JOB		**0079-04-049**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00060812**		
			COUNTY		**Erath**		
			HIGHWAY		**US 67**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	100-7002	PREPARING ROW	STA	49.000		49.000	
	104-7013	REMOV CONC (SIDEWALK, RAMP OR SUP)	SY	159.000		159.000	
	104-7017	REMOV CONC (CURB & GUTTER)	LF	7,450.000		7,450.000	
	105-7024	RMV (4") TRT/UNTRT BASE & ASPH PAV	SY	22,764.000		22,764.000	
	105-7125	RMV, CLN, PALLETZ, & STORE STREET BRICK	SY	21,356.000		21,356.000	
	110-7001	EXCAV (ROADWAY)	CY	200.000		200.000	
	132-7004	EMBANK (FNL)(DC)(TY B)	CY	200.000		200.000	
	134-7007	BACKFILL (TY B)(VEH)	CY	167.000		167.000	
	162-7002	BLOCK SODDING	SY	1,510.000		1,510.000	
	168-7001	VEGETATIVE WATERING	TGL	52.900		52.900	
	260-7003	LIME (QUICKLIME (SLURRY))	TON	79.000		79.000	
	260-7007	LIME TRT (EXIST MATL)(8")	SY	4,716.000		4,716.000	
	275-7001	CEMENT	TON	251.000		251.000	
	275-7003	CEMENT TRT (EXIST MATL)(8")	SY	18,048.000		18,048.000	
	310-7001	PRIME COAT (AE-P)	GAL	4,553.000		4,553.000	
	341-7002	D-GR HMA TY-B SAC-B PG64-22	TON	10,129.000		10,129.000	
	344-7024	SP MIXES SP-C SAC-A PG70-28	TON	2,446.000		2,446.000	
	344-7077	TACK COAT	GAL	4,253.000		4,253.000	
	354-7005	PLANE & TEXT ASPH CONC PAV(0" TO 6")	SY	21,193.000		21,193.000	
	400-7006	CUT & RESTORING PAV	SY	1,912.000		1,912.000	
	400-7010	CEM STABIL BKFL	CY	4,053.000		4,053.000	
	402-7001	TRENCH EXCAVATION PROTECTION	LF	2,588.000		2,588.000	
	416-7043	DRILL SHAFT (TRF SIG POLE) (30 IN)	LF	44.000		44.000	
	432-7002	RIPRAP (CONC)(5 IN)	CY	25.000		25.000	
	462-7001	CONC BOX CULV (3 FT X 2 FT)	LF	3,585.000		3,585.000	
	462-7003	CONC BOX CULV (4 FT X 2 FT)	LF	533.000		533.000	
	465-7184	INLET (COMPL)(CO)(5 FT)(FTW)	EA	3.000		3.000	
	465-7186	INLET (COMPL)(CO)(15 FT)(FTW)	EA	1.000		1.000	
	465-7187	INLET (COMPL)(CO)(20 FT)(FTW)	EA	4.000		4.000	
	465-7192	INLET (COMPL)(CU)(5 FT)(FTW)	EA	7.000		7.000	
	465-7194	INLET (COMPL)(CU)(15 FT)(FTW)	EA	1.000		1.000	
	465-7195	INLET (COMPL)(CU)(20 FT)(FTW)	EA	11.000		11.000	
	465-7208	INLET (COMPL)(FG)(3FT X 3FT)(FTW)	EA	4.000		4.000	
	465-7234	INLET (COMPL)(AD)(3FT X 3FT)(FTW)	EA	1.000		1.000	
	465-7286	JUNCT BOX (COMPL)(JB)(5FT X 5FT)(FTW)	EA	6.000		6.000	
	465-7290	JUNCT BOX (COMPL)(JB)(6FT X 6FT)(FTW)	EA	2.000		2.000	
	465-7332	JCT BOX (COMPL)(SPL)	EA	24.000		24.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0079-04-049 **DISTRICT** Fort Worth **COUNTY** Erath
HIGHWAY US 67

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0079-04-049**			
		PROJECT ID		**A00060812**			
		COUNTY		**Erath**			
		HIGHWAY		**US 67**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	466-7175	WINGWALL (PW - 1) (HW=5 FT)	EA	3.000		3.000	
	467-7043	SET (TY I)(S= 3 FT)(HW= 3 FT)(6:1)(P)	EA	1.000		1.000	
	479-7001	ADJUSTING MANHOLES	EA	2.000		2.000	
	479-7004	ADJUSTING MANHOLES (UTILITY BOX)	EA	15.000		15.000	
	496-7002	REMOV STR (INLET)	EA	8.000		8.000	
	496-7003	REMOV STR (MANHOLE)	EA	2.000		2.000	
	496-7007	REMOV STR (PIPE)	LF	444.000		444.000	
	496-7019	REMOV STR (RET WALL)	LF	18.000		18.000	
	500-7001	MOBILIZATION	LS	1.000		1.000	
	502-7001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	17.000		17.000	
	503-7002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	7.000		7.000	
	505-7003	TMA (MOBILE OPERATION)	DAY	40.000		40.000	
	506-7002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	80.000		80.000	
	506-7011	ROCK FILTER DAMS (REMOVE)	LF	80.000		80.000	
	506-7020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	78.000		78.000	
	506-7024	CONSTRUCTION EXITS (REMOVE)	SY	78.000		78.000	
	506-7039	TEMP SEDMT CONT FENCE (INSTALL)	LF	496.000		496.000	
	506-7041	TEMP SEDMT CONT FENCE (REMOVE)	LF	496.000		496.000	
	506-7043	BIODEG EROSN CONT LOGS (INSTL) (8")	LF	811.000		811.000	
	506-7046	BIODEG EROSN CONT LOGS (REMOVE)	LF	811.000		811.000	
	510-7003	ONE-WAY TRAF CONT (PORT TRAF SIG)	MO	6.000		6.000	
	512-7009	PORT CTB (FUR & INST)(LOW PROF)(TY 1)	LF	220.000		220.000	
	512-7010	PORT CTB (FUR & INST)(LOW PROF)(TY 2)	LF	80.000		80.000	
	512-7033	PORT CTB (MOVE)(LOW PROF)(TY 1)	LF	460.000		460.000	
	512-7034	PORT CTB (MOVE)(LOW PROF)(TY 2)	LF	240.000		240.000	
	512-7057	PORT CTB (REMOVE)(LOW PROF)(TY 1)	LF	220.000		220.000	
	512-7058	PORT CTB (REMOVE)(LOW PROF)(TY 2)	LF	80.000		80.000	
	529-7009	CONC CURB & GUTTER (TY II)	LF	6,950.000		6,950.000	
	610-7012	REPLACE LUMINAIRE W/(250W EQ) LED	EA	4.000		4.000	
	618-7036	CONDT (PVC) (SCH 40) (3")	LF	310.000		310.000	
	618-7037	CONDT (PVC) (SCH 40) (3") (BORE)	LF	350.000		350.000	
	620-7009	ELEC CONDR (NO.6) BARE	LF	370.000		370.000	
	620-7010	ELEC CONDR (NO.6) INSULATED	LF	30.000		30.000	
	624-7007	GROUND BOX TY D (162922)	EA	6.000		6.000	
	625-7001	ZINC-COAT STL WIRE STRAND (3/16")	LF	280.000		280.000	
	625-7003	ZINC-COAT STL WIRE STRAND (5/16")	LF	280.000		280.000	
	628-7148	ELC SRV TY D 120/240 060(NS)SS(E)SP(O)	EA	2.000		2.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0079-04-049 **DISTRICT** Fort Worth **COUNTY** Erath
HIGHWAY US 67

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0079-04-049**			
		PROJECT ID		**A00060812**			
		COUNTY		**Erath**			
		HIGHWAY		**US 67**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	636-7001	ALUMINUM SIGNS (TY A)	SF	62.000		62.000	
	644-7001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	14.000		14.000	
	644-7004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	1.000		1.000	
	644-7009	IN SM RD SN SUP&AM TY10BWG(1)SB(P)	EA	12.000		12.000	
	644-7015	IN SM RD SN SUP&AM TY10BWG(1)SB(U)	EA	1.000		1.000	
	644-7044	IN SM RD SN SUP&AM TYS80(1)SB(U-2EXT)	EA	2.000		2.000	
	644-7048	IN SM RD SN SUP&AM TYS80(2)SA(P)	EA	1.000		1.000	
	644-7065	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	1.000		1.000	
	644-7073	REMOVE SM RD SN SUP&AM	EA	27.000		27.000	
	662-7004	WK ZN PAV MRK NON-REMOV (W)4"(SLD)	LF	15,921.000		15,921.000	
	662-7017	WK ZN PAV MRK NON-REMOV (W)24"(SLD)	LF	1,154.000		1,154.000	
	662-7035	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	LF	15,135.000		15,135.000	
	666-7024	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	100.000		100.000	
	666-7036	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	1,044.000		1,044.000	
	666-7042	REFL PAV MRK TY I (W)(ARROW)(100MIL)	EA	1.000		1.000	
	666-7066	REFL PAV MRK TY I (W)(WORD)(100MIL)	EA	1.000		1.000	
	666-7081	REFL PAV MRK TY I (W)(RR XING)(100MIL)	EA	1.000		1.000	
	666-7411	REFL PAV MRK TY I (W)6"(SLD)(100MIL)	LF	11,621.000		11,621.000	
	666-7423	REFL PAV MRK TY I (Y)6"(SLD)(100MIL)	LF	10,835.000		10,835.000	
	672-7002	REFL PAV MRKR TY I-C	EA	5.000		5.000	
	672-7004	REFL PAV MRKR TY II-A-A	EA	227.000		227.000	
	677-7001	ELIM EXT PM & MRKS (4")	LF	8,710.000		8,710.000	
	680-7002	INSTALL HWY TRF SIG (ISOLATED)	EA	2.000		2.000	
	680-7004	REMOVING TRAFFIC SIGNALS	EA	2.000		2.000	
	682-7001	VEH SIG SEC (12")LED(GRN)	EA	16.000		16.000	
	682-7002	VEH SIG SEC (12")LED(GRN ARW)	EA	2.000		2.000	
	682-7003	VEH SIG SEC (12")LED(YEL)	EA	20.000		20.000	
	682-7005	VEH SIG SEC (12")LED(RED)	EA	20.000		20.000	
	682-7018	PED SIG SEC (LED)(COUNTDOWN)	EA	14.000		14.000	
	682-7042	BACKPLATE W/REF BRDR(3 SEC)(VENT)ALUM	EA	14.000		14.000	
	682-7043	BACKPLATE W/REF BRDR(4 SEC)(VENT)ALUM	EA	2.000		2.000	
	684-7009	TRF SIG CBL (TY A)(12 AWG)(4 CONDR)	LF	631.000		631.000	
	684-7033	TRF SIG CBL (TY A)(14 AWG)(7 CONDR)	LF	2,234.000		2,234.000	
	684-7042	TRF SIG CBL (TY A)(14 AWG)(16 CONDR)	LF	745.000		745.000	
	684-7079	TRF SIG CBL (TY C)(12 AWG)(2 CONDR)	LF	1,674.000		1,674.000	
	686-7033	INS TRF SIG PL AM(S)1 ARM(32')	EA	2.000		2.000	
	686-7035	INS TRF SIG PL AM(S)1 ARM(32')LUM	EA	2.000		2.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0079-04-049 **DISTRICT** Fort Worth **COUNTY** Erath
HIGHWAY US 67

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0079-04-049**			
		PROJECT ID		**A00060812**			
		COUNTY		**Erath**			
		HIGHWAY		**US 67**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	687-7001	PED POLE ASSEMBLY	EA	2.000		2.000	
	688-7001	PED DETECT PUSH BUTTON (APS)	EA	6.000		6.000	
	690-7131	INSTALL BBU SYSTEM	EA	2.000		2.000	
	690-7134	INSTALL RADAR VEHICLE DETECTION SYSTEM	EA	4.000		4.000	
	12	RAILROAD FLAGGING: RAILROAD FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	
	18	SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	

SUMMARY OF TCP ITEMS

ROADWAY (CSJ 0079-04-049)	TCP PHASE	TCP PHASING DETAIL SHEET NO.	502 7001	503 7002	505 7003	510 7003 *	512 7009	512 7010	512 7033
			BARRICADES, SIGNS AND TRAFFIC HANDLING	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (MOBILE OPERATION)	ONE-WAY TRAF CONT (PORT TRAF SIG)	PORT CTB (FUR & INST) (LOW PROF) (TY 1)	PORT CTB (FUR & INST) (LOW PROF) (TY 2)	PORT CTB (MOVE) (LOW PROF) (TY 1)
			MO	EA	DAY	MO	LF	LF	LF
BU 67K	P1-ST3-S1	3 OF 9					220	80	
BU 67K	P1-ST3-S2	4 OF 9							200
BU 67K	P1-ST3-S3	5 OF 9							100
BU 67K	P1-ST3-S4	6 OF 9							160
BU 67K	PERM STRIPING CONFIGURATION								
PROJECT TOTAL			17	7	40	6	220	80	460

SUMMARY OF TCP ITEMS

ROADWAY (CSJ 0079-04-049)	TCP PHASE	TCP PHASING DETAIL SHEET NO.	512 7034	512 7057	512 7058	662 7004	662 7017	662 7035	677 7001
			PORT CTB (MOVE) (LOW PROF) (TY 2)	PORT CTB (REMOVE) (LOW PROF) (TY 1)	PORT CTB (REMOVE) (LOW PROF) (TY 2)	WK ZN PAV MRK NON-REMOV (W)4" (SLD)	WK ZN PAV MRK NON-REMOV (W)24" (SLD)	WK ZN PAV MRK NON-REMOV (Y)4" (SLD)	ELIM EXT PM & MRKS (4")
			LF	LF	LF	LF	LF	LF	LF
BU 67K	P1-ST3-S1	3 OF 9				1,810	44	1,810	3,664
BU 67K	P1-ST3-S2	4 OF 9	80			834	22	834	1,690
BU 67K	P1-ST3-S3	5 OF 9	80			1,040	22	1,040	2,102
BU 67K	P1-ST3-S4	6 OF 9	80	220	80	616	22	616	1,254
BU 67K	PERM STRIPING CONFIGURATION					11,621	1,044	10,835	
PROJECT TOTAL			240	220	80	15,921	1,154	15,135	8,710

* - EXACT LOCATION, QUANTITY AND LIMITS TO BE DETERMINED IN THE FIELD BY THE ENGINEER.

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

BU 67K

SUMMARY OF QUANTITIES
TCP

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	
CONTROL	SECTION	JOB	10
0079	04	049	

SUMMARY OF REMOVAL ITEMS

ROADWAY (CSJ 0079-04-048)	REMOVAL LAYOUT SHEET NO.	FROM	TO	104 7013	104 7017	105 7024 [1]	105 7125	354 7005 [2]	496 7002	496 7003	496 7007	496 7019
				REMOV CONC (SIDEWALK, RAMP OR SUP)	REMOV CONC (CURB & GUTTER)	RMV (4") TRT/UNTRT BASE & ASPH PAV	RMV, CLN, PALLETZ, & STORE STREET BRICK	PLANE & TEXT ASPH CONC PAV(0" TO 6")	REMOV STR (INLET)	REMOV STR (MANHOLE)	REMOV STR (PIPE)	REMOV STR (RET WALL)
				SY	LF	SY	SY	SY	EA	EA	LF	LF
BU 67K	1 OF 7	BEGIN	18+90		906	4,716	4,595	4,486	5	1	265	
BU 67K	2 OF 7	18+90	27+70		1,238	4,933	4,702	4,672	2		130	
BU 67K	3 OF 7	27+70	36+50	37	1,418	3,610	3,305	3,305				
BU 67K	4 OF 7	36+50	45+30	48	1,574	3,679	3,342	3,318				
BU 67K	5 OF 7	45+30	53+50	30	1,378	3,246	3,010	3,010				
BU 67K	6 OF 7	53+50	59+87	44	936	2,580	2,402	2,402				
BU 67K	7 OF 7	W VALLEY ST.							1	1	49	
DRAINAGE SHEETS (LIVE OAK STREET)	1 OF 2											18
PROJECT TOTAL				159	7,450	22,764	21,356	21,193	8	2	444	18

1- FOR THE REMOVAL OF EXISTING BASE MATERIAL BELOW THE EXISTING BRICK LAYER FOR THE ENTIRE PROJECT LIMIT.

2- FOR THE REMOVAL OF EXISTING ASPHALT ABOVE EXISTING BRICK LAYER FOR THE ENTIRE PROJECT LIMIT.

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

SUMMARY OF QUANTITIES
REMOVAL

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	
CONTROL	SECTION	JOB	11
0079	04	049	

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SUMMARY OF ROADWAY ITEMS

ROADWAY (CSJ 0079-04-049)	ROADWAY LAYOUT SHEET NO.	FROM	TO	100 7002	110 7001[1]	132 7004[1]	134 7007[1]	260 7003[2]	260 7007[2]	275 7001[2]	275 7003[2]	310 7001
				PREPARING ROW	EXCAV (ROADWAY)	EMBANK (FNL) (DC) (TY B)	BACKFILL (TY B) (VEH)	LIME (QUICKLIME (SLURRY))	LIME TRT (EXIST MATL) (8")	CEMENT	CEMENT TRT (EXIST MATL) (8")	PRIME COAT (AE-P)
				STA	CY	CY	CY	TON	SY	TON	SY	GAL
BU 67K	1 OF 12	BEGIN	14+50	3				30	1,780			356
BU 67K	2 OF 12	14+50	18+90	4				49	2,936			587
BU 67K	3 OF 12	18+90	23+30	4			1			39	2,813	563
BU 67K	4 OF 12	23+30	27+70	4			11			29	2,120	424
BU 67K	5 OF 12	27+70	32+10	4			17			24	1,756	351
BU 67K	6 OF 12	32+10	36+50	4			21			26	1,854	371
BU 67K	7 OF 12	36+50	40+90	4			20			26	1,860	372
BU 67K	8 OF 12	40+90	45+30	4			23			25	1,819	364
BU 67K	9 OF 12	45+30	49+50	4			28			23	1,673	335
BU 67K	10 OF 12	49+50	53+50	4			20			22	1,573	315
BU 67K	11 OF 12	53+50	57+90	4			21			25	1,795	359
BU 67K	12 OF 12	57+90	END	2			5			11	785	157
PROJECT TOTAL				49	200	200	167	79	4,716	251	18,048	4,553

SUMMARY OF ROADWAY ITEMS

ROADWAY (CSJ 0079-04-049)	ROADWAY LAYOUT SHEET NO.	FROM	TO	341 7002	344 7024	344 7077	432 7002	479 7001	479 7004	529 7009
				D-GR HMA TY-B SAC-B PG64-22	SP MIXES SP-C SAC-A PG70-28	TACK COAT	RIPRAP (CONC) (5 IN)	ADJUSTING MANHOLES	ADJUSTING MANHOLES (UTILITY BOX)	CONC CURB & GUTTER (TY II)
				TON	TON	GAL	CY	EA	EA	LF
BU 67K	1 OF 12	BEGIN	14+50	812	201	350		2		142
BU 67K	2 OF 12	14+50	18+90	1,321	323	562				591
BU 67K	3 OF 12	18+90	23+30	1,263	308	536			1	638
BU 67K	4 OF 12	23+30	27+70	951	232	403				479
BU 67K	5 OF 12	27+70	32+10	776	186	323				637
BU 67K	6 OF 12	32+10	36+50	815	194	337			5	716
BU 67K	7 OF 12	36+50	40+90	814	193	336				810
BU 67K	8 OF 12	40+90	45+30	799	190	330			3	775
BU 67K	9 OF 12	45+30	49+50	742	178	310				564
BU 67K	10 OF 12	49+50	53+50	690	164	285				663
BU 67K	11 OF 12	53+50	57+90	790	189	328	1		4	734
BU 67K	12 OF 12	57+90	END	356	88	152				201
DRAINAGE SHEETS (LIVE OAK STREET)	2 OF 2								2	
PROJECT TOTAL				10,129	2,446	4,253	1	2	15	6,950

1- EXACT LOCATION AND LIMITS TO BE DETERMINED IN THE FIELD BY THE ENGINEER.

2- LIME TREATMENT OF EXISTING SUBGRADE IS ANTICIPATED FROM THE BEGINNING OF THE PROJECT UP TO SH 6 (BLACKJACK ST.) AND CEMENT TREATMENT OF EXISTING SUBGRADE IS ANTICIPATED FROM SH 6 (BLACKJACK ST.) TO THE END OF THE PROJECT. CONTRACTOR SHALL WORK WITH THE ENGINEER TO DETERMINE EXACT LOCATION. LIMITS AND QUANTITY TO BE DETERMINED IN THE FIELD BY THE ENGINEER.

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

SUMMARY OF QUANTITIES
ROADWAY

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	12
CONTROL	SECTION	JOB	
0079	04	049	

SUMMARY OF DRAINAGE ITEMS										
ROADWAY	CSJ	400 7006	400 7010	402 7001	432 7002	462 7001	462 7003	465 7332	465 7184	465 7186
		CUT & RESTORING PAV	CEM STABIL BKFL	TRENCH EXCAVATION PROTECTION	RIPRAP (CONC)(5 IN)	CONC BOX CULV (3 FT X 2 FT)	CONC BOX CULV (4 FT X 2 FT)	JCT BOX (COMPL)(SPL)	INLET (COMPL)(CO)(5 FT)(FTW)	INLET (COMPL)(CO)(15 FT)(FTW)
		SY	CY	LF	CY	LF	LF	EA	EA	EA
BU 67K	0079-04-049	1,912	4,053	2,588	24	3,585	533	24	3	1
PROJECT TOTAL		1,912	4,053	2,588	24	3,585	533	24	3	1

SUMMARY OF DRAINAGE ITEMS											
ROADWAY	CSJ	465 7187	465 7192	465 7194	465 7195	465 7208	465 7234	465 7286	465 7290	466 7175	467 7043
		INLET (COMPL)(CO)(20 FT)(FTW)	INLET (COMPL)(CU)(5 FT)(FTW)	INLET (COMPL)(CU)(15 FT)(FTW)	INLET (COMPL)(CU)(20 FT)(FTW)	INLET (COMPL)(FG)(3FT X 3FT)(FTW)	INLET (COMPL)(AD)(3FT X 3FT)(FTW)	JUNCT BOX (COMPL)(JB)(5FT X 5FT)(FTW)	JUNCT BOX (COMPL)(JB)(6FT X 6FT)(FTW)	WINGWALL (PW - 1) (HW=5 FT)	SET (TY I)(S= 3 FT)(HW= 3 FT)(6:1)(P)
		EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
BU 67K	0079-04-049	4	7	1	11	4	1	6	2	3	1
PROJECT TOTAL		4	7	1	11	4	1	6	2	3	1

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

SUMMARY OF QUANTITIES
DRAINAGE

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	13
CONTROL	SECTION	JOB	
0079	04	049	

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SUMMARY OF SIGNING AND PAVEMENT MARKING ITEMS

ROADWAY	CSJ	644 7001	644 7004	644 7009	644 7015	644 7044	644 7048	644 7065
BU 67K	0079-04-049	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	IN SM RD SN SUP&AM TY10BWG(1)SB(P)	IN SM RD SN SUP&AM TY10BWG(1)SB(U)	IN SM RD SN SUP&AM TYS80(1) SB(U-2EXT)	IN SM RD SN SUP&AM TYS80(2) SA(P)	RELOCATE SM RD SN SUP&AM TY 10BWG
SHEET #		EA	EA	EA	EA	EA	EA	EA
SHEET 1 OF 12		1		3				
SHEET 2 OF 12				2		2		
SHEET 3 OF 12		2		4	1			1
SHEET 4 OF 12		2		2				
SHEET 5 OF 12		1						
SHEET 6 OF 12								
SHEET 7 OF 12		1						
SHEET 8 OF 12		4						
SHEET 9 OF 12		1						
SHEET 10 OF 12								
SHEET 11 OF 12		1	1				1	
SHEET 12 OF 12		1		1				
PROJECT TOTAL		**14**	**1**	**12**	**1**	**2**	**1**	**1**

SUMMARY OF SIGNING AND PAVEMENT MARKING ITEMS

ROADWAY	CSJ	644 7073	666 7024	666 7036	666 7042	666 7066	666 7081	666 7411
BU 67K	0079-04-049	REMOVE SM RD SN SUP&AM	REFL PAV MRK TY I (W)8"(SLD) (100MIL)	REFL PAV MRK TY I (W)24"(SLD) (100MIL)	REFL PAV MRK TY I (W)(ARROW) (100MIL)	REFL PAV MRK TY I (W)(WORD) (100MIL)	REFL PAV MRK TY I (W)(RR XING) (100MIL)	REFL PAV MRK TY I (W)6"(SLD) (100MIL)
SHEET #		EA	LF	LF	EA	EA	EA	LF
SHEET 1 OF 12		3		48			1	737
SHEET 2 OF 12		5		476				2,046
SHEET 3 OF 12		6		215				1,577
SHEET 4 OF 12		1		66				1,031
SHEET 5 OF 12								809
SHEET 6 OF 12								739
SHEET 7 OF 12								747
SHEET 8 OF 12		3		54				740
SHEET 9 OF 12		2						744
SHEET 10 OF 12		2						800
SHEET 11 OF 12		3						764
SHEET 12 OF 12		2	100	185	1	1		887
PROJECT TOTAL		**27**	**100**	**1,044**	**1**	**1**	**1**	**11,621**

NO.	DATE	REVISION	APPROVED

TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

BU 67K

SUMMARY OF QUANTITIES
SIGNING AND PAVEMENT MARKINGS

SHEET 1 OF 2

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	14
CONTROL	SECTION	JOB	
0079	04	049	

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SUMMARY OF SIGNING AND PAVEMENT MARKING ITEMS				
ROADWAY	CSJ	666 7423	672 7002	672 7004
BU 67K	0079-04-049	REFL PAV MRK TY I (Y)6"(SLD) (100MIL)	REFL PAV MRKR TY I-C	REFL PAV MRKR TY II-A-A
SHEET #		LF	EA	EA
SHEET 1 OF 12		598		8
SHEET 2 OF 12		2,355		81
SHEET 3 OF 12		970		31
SHEET 4 OF 12		784		11
SHEET 5 OF 12		694		9
SHEET 6 OF 12		708		10
SHEET 7 OF 12		646		8
SHEET 8 OF 12		740		10
SHEET 9 OF 12		644		9
SHEET 10 OF 12		800		10
SHEET 11 OF 12		764		10
SHEET 12 OF 12		1,132	5	30
PROJECT TOTAL		**10,835**	**5**	**227**

NO.	DATE	REVISION	APPROVED

TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

BU 67K

SUMMARY OF QUANTITIES
SIGNING AND PAVEMENT MARKINGS

SHEET 2 OF 2

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	15
CONTROL	SECTION	JOB	
0079	04	049	

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SUMMARY OF TRAFFIC SIGNAL ITEMS

ROADWAY	CSJ	416 7043	610 7012	618 7036	618 7037	620 7009	620 7010	624 7007	625 7001
		DRILL SHAFT (TRF SIG POLE) (30 IN)	REPLACE LUMINAIRE W/(250W EQ) LED	CONDT (PVC) (SCH 40) (3")	CONDT (PVC) (SCH 40) (3") (BORE)	ELEC CONDR (NO.6) BARE	ELEC CONDR (NO.6) INSULATED	GROUND BOX TY D (162922)	ZINC-COAT STL WIRE STRAND (3/16")
		LF	EA	LF	LF	LF	LF	EA	LF
BU 67K AT SH 6	0079-04-049	44	2	240	310	320	10	6	0
BU 67K AT FM219	0079-04-049	0	2	70	40	50	20	0	280
PROJECT TOTAL		**44**	**4**	**310**	**350**	**370**	**30**	**6**	**280**

SUMMARY OF TRAFFIC SIGNAL ITEMS

ROADWAY	CSJ	625 7003	628 7148	636 7001	680 7002	680 7004	682 7001	682 7002	682 7003
		ZINC-COAT STL WIRE STRAND (5/16")	ELC SRV TY D 120/240 060(NS)SS(E)SP(O)	ALUMINUM SIGNS (TY A)	INSTALL HWY TRF SIG (ISOLATED)	REMOVING TRAFFIC SIGNALS	VEH SIG SEC (12")LED(GRN)	VEH SIG SEC (12")LED(GRN ARW)	VEH SIG SEC (12")LED(YEL)
		LF	EA	SF	EA	EA	EA	EA	EA
BU 67K AT SH 6	0079-04-049	0	1	62	1	1	8	2	8
BU 67K AT LIVE OAK	0079-04-049	0	0	0	0	0	0	0	4
BU 67K AT FM 219	0079-04-049	280	1	0	1	1	8	0	8
PROJECT TOTAL		**280**	**2**	**62**	**2**	**2**	**16**	**2**	**20**

SUMMARY OF TRAFFIC SIGNAL ITEMS

ROADWAY	CSJ	682 7005	682 7018	682 7042	682 7043	684 7009	684 7033	684 7042	684 7079
		VEH SIG SEC (12")LED(RED)	PED SIG SEC (LED)(COUNTDOWN)	BACKPLATE W/REF BRDR (3 SEC) (VENT) ALUM	BACKPLATE W/REF BRDR (4 SEC) (VENT) ALUM	TRF SIG CBL (TY A)(12 AWG) (4 CONDR)	TRF SIG CBL (TY A)(14 AWG) (7 CONDR)	TRF SIG CBL (TY A)(14 AWG) (16 CONDR)	TRF SIG CBL (TY C)(12 AWG) (2 CONDR)
		EA	EA	EA	EA	LF	LF	LF	LF
BU 67K AT SH 6	0079-04-049	8	8	6	2	390	545	745	1,030
BU 67K AT LIVE OAK	0079-04-049	4	0	0	0	0	0	0	0
BU 67K AT FM 219	0079-04-049	8	6	8	0	241	1,689	0	644
PROJECT TOTAL		**20**	**14**	**14**	**2**	**631**	**2,234**	**745**	**1,674**

SUMMARY OF TRAFFIC SIGNAL ITEMS

ROADWAY	CSJ	686 7033	686 7035	687 7001	688 7001	690 7131	690 7134
		INS TRF SIG PL AM (S)1ARM(32')	INS TRF SIG PL AM (S)1ARM(32')LUM	PED POLE ASSEMBLY	PED DETECT PUSH BUTTON (APS)	INSTALL BBU SYSTEM	INSTALL RADAR VEHICLE DETECTION SYSTEM
		EA	EA	EA	EA	EA	EA
BU 67K AT SH 6	0079-04-049	2	2	0	0	1	4
BU 67K AT FM 219	0079-04-049	0	0	2	6	1	0
PROJECT TOTAL		**2**	**2**	**2**	**6**	**2**	**4**

NO.	DATE	REVISION	APPROVED

TBPE REGISTRATION NO. F-16341

BU 67K

SUMMARY OF QUANTITIES
TRAFFIC SIGNAL

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	16
CONTROL	SECTION	JOB	
0079	04	049	

SUMMARY OF SW3P ITEMS

ROADWAY (CSJ 0079-04-049)	SW3P LAYOUT SHEET NO.	FROM	TO	162 7002	168 7001	506 7002	506 7011	506 7020	506 7024	506 7039	506 7041	506 7043	506 7046
				BLOCK SODDING	VEGETATIVE WATERING	ROCK FILTER DAMS (INSTALL) (TY 2)	ROCK FILTER DAMS (REMOVE)	CONSTRUCTION EXITS (INSTALL) (TY 1)	CONSTRUCTION EXITS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (8")	BIODEG EROSN CONT LOGS (REMOVE)
				SY	TGL	LF	LF	SY	SY	LF	LF	LF	LF
BU 67K	1 OF 10	BEGIN	18+90					78	78			289	289
BU 67K	2 OF 10	18+90	27+70	115	4.1							145	145
BU 67K	3 OF 10	27+70	36+50	346	12.1								
BU 67K	4 OF 10	36+50	45+30	388	13.6							35	35
BU 67K	5 OF 10	45+30	53+50	434	15.2					60	60	160	160
BU 67K	6 OF 10	53+50	59+87	227	7.9								
BU 67K	7 OF 10	ELM ST.				20	20			45	45		
BU 67K	8 OF 10	BLACKJACK ST.				20	20			111	111	35	35
BU 67K	9 OF 10	LIVE OAK ST.				25	25					125	125
BU 67K	10 OF 10	VALLEY ST.				15	15			280	280	22	22
PROJECT TOTAL				1,510	52.9	80	80	78	78	496	496	811	811

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

SUMMARY OF QUANTITIES
SW3P

FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	17
CONTROL	SECTION	JOB	
0079	04	049	

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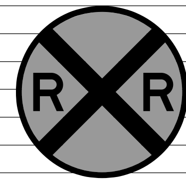
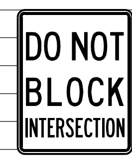
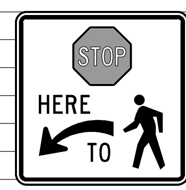
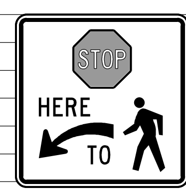
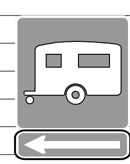
SUMMARY OF SMALL SIGNS

SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE: FRP = Fiberglass, TWT = Thin-Wall, 10BWG = 10 BWG, S80 = Sch 80	POSTS: 1 or 2	ANCHOR TYPE: UA=Universal Conc, UB=Universal Bolt, SA=Slipbase-Conc, SB=Slipbase-Bolt, WS=Wedge Steel, WP=Wedge Plastic	MOUNTING DESIGNATION – PREFABRICATED: P = "Plain", T = "T", U = "U"	MOUNTING DESIGNATION: 1EXT or 2EXT = # of Ext, BM = Extruded Wind Beam, WC = 1.12 #/ft Wing Channel, EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE: TY N, TY S
1	1	W10-1		36" DIA.	X		10BWG	1	SA	P		
1	2	M3-3		24"x12"	X		10BWG	1	SB	P		
		M4-3		24"x12"	X							
		M1-4B		24"x24"	X							
1	3	R10-7		24"x30"	X		10BWG	1	SB	P		
1	4	R1-5bL		36"x36"	X		10BWG	1	SB	P		
2	1	R1-5bL		36"x36"	X		10BWG	1	SB	P		
2	2	D9-3a		24"x24"	X		10BWG	1	SB	P		
		D9-1dPL		24"x6"	X							
2	3	M1-6T		24"x24"	X		S80	1	SB	U	2EXT	
		M6-4		21"x15"	X							
		M1-6F		24"x24"	X							
		M6-6R		21"x15"	X							

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

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.
http://www.txdot.gov/

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.

2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS) Standard Sheet.

3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS 4-16 8-16	DIST FTW		COUNTY ERATH	SHEET NO. 18

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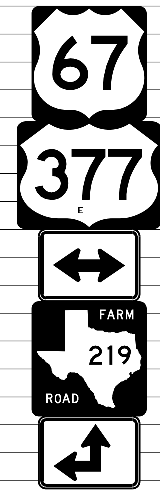
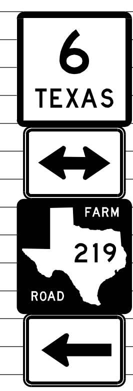
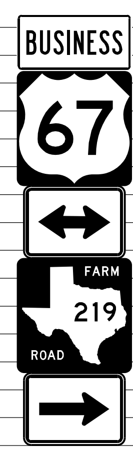
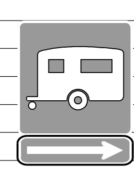
SUMMARY OF SMALL SIGNS

SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION: PREFABRICATED P = "Plain" T = "T" U = "U"	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
2	4	M1-4		24"x24"	X		USES SAME POST AS SIGN 2-3					
		M1-4		30"x24"	X							
		M6-4		21"x15"	X							
		M1-6F		24"x24"	X							
		M6-6F		21"x15"	X							
2	5	M1-6T		24"x24"	X		S80	1	SB	U	2EXT	
		M6-4		21"x15"	X							
		M1-6F		24"x24"	X							
		M6-1		21"x15"	X							
2	6	M4-3		24"x12"	X		USES SAME POST AS SIGN 2-5					
		M1-4B		24"x24"	X							
		M6-4		21"x15"	X							
		M1-6F		24"x24"	X							
		M6-1		21"x15"	X							
3	1	D9-3a		24"x24"	X		10BWG	1	SB	P		
		D9-1dPR		24"x6"	X							

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

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.
http://www.txdot.gov/

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.

2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS) Standard Sheet.

3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

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Texas Department of Transportation — Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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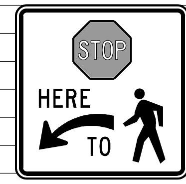
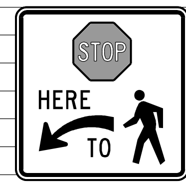
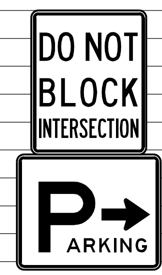
REVISIONS 4-16 8-16	DIST FTW	COUNTY ERATH		SHEET NO. 19

18

SUMMARY OF SMALL SIGNS

SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION: PREFABRICATED P = "Plain" T = "T" U = "U"	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
3	2	R1-5bL		36"x36"	X		10BWG	1	SB	P		
3	3	R1-5bL		36"x36"	X		10BWG	1	SB	P		
3	4	R10-7 D4-1R		24"x30" 30"x24"	X X		10BWG	1	SB	P		
3	5	M3-1 M4-3 M1-4B		24"x12" 24"x12" 24"x24"	X X X		10BWG	1	SA	P		
3	6	W11-2 W16-9P		36"x36" 24"x12"	X X		10BWG	1	SA	P		
3	7	D1-3		66"x36"	X		10BWG	1	SB	U		

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

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Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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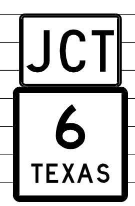
REVISIONS 4-16 8-16	DIST FTW		COUNTY ERATH	SHEET NO. 20

SUMMARY OF SMALL SIGNS

SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION: PREFABRICATED P = "Plain" T = "T" U = "U"	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
4	1	W11-2 W16-9P		36"x36" 24"x12"	X X		10BWG	1	SB	P		
4	2	R1-5bL		36"x36"	X		10BWG	1	SB	P		
4	3	R1-5bL		36"x36"	X		10BWG	1	SA	P		
4	4	M2-1 M1-6T		21"x15" 24"x24"	X X		10BWG	1	SA	P		
5	1	W11-2 W16-9P		36"x36" 24"x12"	X X		10BWG	1	SA	P		
7	1	W11-2 W16-9P		36"x36" 24"x12"	X X		10BWG	1	SA	P		

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

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Texas Department of Transportation | Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS 4-16 8-16	DIST FTW	COUNTY ERATH		SHEET NO. 21

18

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX): POST TYPE (FRP = Fiberglass, TWT = Thin-Wall, 10BWG = 10 BWG, S80 = Sch 80)	POSTS (1 or 2)	ANCHOR TYPE (UA=Universal Conc, UB=Universal Bolt, SA=Slipbase-Conc, SB=Slipbase-Bolt, WS=Wedge Steel, WP=Wedge Plastic)	MOUNTING DESIGNATION: PREFABRICATED (P = "Plain", T = "T", U = "U")	MOUNTING DESIGNATION: 1EXT or 2EXT = # of Ext, BM = Extruded Wind Beam, WC = 1.12 #/ft Wing Channel, EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE: TY N, TY S
8	1	R1-5bL		36"x36"	X		10BWG	1	SA	P		
8	2	R1-5bL		36"x36"	X		10BWG	1	SA	P		
8	3	R2-1		30"x36"	X		10BWG	1	SA	P		
8	4	R2-1		30"x36"	X		10BWG	1	SA	P		
9	1	W11-2		36"x36"	X		10BWG	1	SA	P		
		W16-9P		24"x12"	X							
11	1	D3-3bTR		90"x30"	X		10BWG	1	SA	T		
11	2	D3-3bTL		90"x30"	X		USES SAME POST AS SIGN 11-1					

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

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NOTE:

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Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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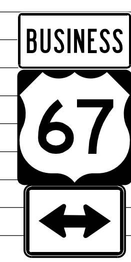
REVISIONS 4-16 8-16	0079	04	049	BU 67K
	DIST		COUNTY	SHEET NO.
	FTW		ERATH	22

18

SUMMARY OF SMALL SIGNS

SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION: PREFABRICATED P = "Plain" T = "T" U = "U"	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
11	3	D1-2		102"x30"	X		S80	2	SA	P		
11	4	M3-3 M4-3 M1-4B		24"x12" 24"x12" 24"x24"	X X X		10BWG	1	SA	P		
12	1	M1-6F M6-1		24"x24" 21"x15"	X X		10BWG	1	SA	P		
12	2	M4-3 M1-4B M6-4		24"x12" 24"x24" 21"x15"	X X X		10BWG	1	SB	P		
	S-1	R10-5L		30"x36"	X		PROPOSED TRAFFIC SIGNAL POLE A					
	S-3	D3-1G(7)		102"x18"	X		PROPOSED TRAFFIC SIGNAL POLE A					
	S-2	D3-1G(7)		84"x18"	X		PROPOSED TRAFFIC SIGNAL POLE B					
	S-1	R10-5L		30"x36"	X		PROPOSED TRAFFIC SIGNAL POLE C					
	S-3	D3-1G(7)		102"x18"	X		PROPOSED TRAFFIC SIGNAL POLE C					
	S-2	D3-1G(7)		84"x18"	X		PROPOSED TRAFFIC SIGNAL POLE D					

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

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Texas Department of Transportation — Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT 0079	SECT 04	JOB 049	HIGHWAY BU 67K
REVISIONS 4-16 8-16	DIST FTW		COUNTY ERATH	SHEET NO. 23

18

TCP GENERAL NOTES:

1. CONSTRUCTION SEQUENCE AND TRAFFIC CONTROL PLAN (TCP) OUTLINED IN NARRATIVE AND SHOWN IN ANY DETAILS ARE FOR CONTRACTOR'S USE AS GUIDELINES. CONTRACTOR HAS THE OPTION TO ALTER THE CONCEPT OF THESE CONSTRUCTION SEQUENCE AND TCP LAYOUT AND DETAILS, AND SUBMIT REVISED PLANS FOR ENGINEER'S APPROVAL BEFORE BEGINNING CONSTRUCTION.

2. LOCATION AND SPACING OF SHOWN SIGNS AND TRAFFIC CONTROL DEVICES ARE APPROXIMATE. THE CONTRACTOR SHALL PLACE APPLICABLE ADVANCE WARNING SIGNS, CONSTRUCTION SIGNS, TRAFFIC CONTROL DEVICES, BARRICADES AND WORK ZONE PAVEMENT MARKINGS USING LATEST TXDOT BARRICADES AND CONSTRUCTION (BC) STANDARDS, TCP STANDARDS, WORK ZONE (WZ) STANDARDS, GUIDELINES PROVIDED IN LATEST TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD), AND AS DIRECTED BY THE ENGINEER. CONTRACTOR SHALL PREPARE DETAILS OF ANY NON-STANDARD SIGN PER TMUTCD AND STANDARD HIGHWAY SIGN DESIGNS (SHSD) FOR TEXAS FOR ENGINEER'S APPROVAL BEFORE PLACING THEM. ADVANCED WARNING SIGNS ARE TO REMAIN IN PLACE THROUGHOUT THE DURATION OF THE PROJECT. CONTRACTOR SHALL ADJUST LOCATION AND SPACING BASED ON CONSTRUCTION SEQUENCE/TCP PHASING SHOWN IN NARRATIVE AND TCP LAYOUT/DETAILS, AND AS DIRECTED BY THE ENGINEER, TO MAKE ROOM FOR OPERATION OF TRUCKS, WIDE LOADS, EMERGENCY RESPONSE VEHICLES, SCHOOL BUSES, STUDENT PICK-UP/DROP-OFF OPERATIONS. ANY ADDITIONAL WORK (MATERIAL AND LABOR) FOR THESE WILL NOT BE PAID FOR DIRECTLY BUT WILL BE SUBSIDIARY TO ITEM 502.

3. NO WORK WILL BE PERFORMED WITHIN FORT WORTH AND WESTERN RAILROAD (FWWR) RIGHT-OF-WAY (ROW) WITHOUT AUTHORIZATION FROM THE ENGINEER AND FWWR. SIGNS AND TRAFFIC CONTROL DEVICES WILL NOT BE PLACED EITHER. SPACING OF ANY NEEDED SIGNS AND TRAFFIC CONTROL DEVICES WITHIN FWWR ROW WILL BE ADJUSTED PER ENGINEER'S DIRECTION.

4. FOR THE STORM DRAINAGE SYSTEM CONSTRUCTION ALONG CROSS STREETS, IF NEEDED AND WITH ENGINEER'S APPROVAL, THE CONTRACTOR MAY SHIFT TRAFFIC, IF ROADWAY WIDTH ALLOWS, AND UTILIZE TCP (2-3)-23 STANDARD TO MAINTAIN TWO-LANE TWO-WAY TRAFFIC MOVEMENT. IF NEEDED AND WITH ENGINEER'S APPROVAL, THE CONTRACTOR MAY MAINTAIN ONE-LANE TWO-WAY TRAFFIC UTILIZING TCP (2-2)-18 STANDARD. IF APPROVED BY THE ENGINEER, USE TEMPORARY SIGNAL UTILIZING TCP (2-8)-23 STANDARD FOR ONE-LANE TWO-WAY OPERATION WHERE ABSOLUTELY NEEDED. PAYMENT FOR ALL ITEMS (SIGNS, WORK ZONE PAVEMENT MARKINGS, TRAFFIC CONTROL DEVICES, ETC., EXCEPT TEMPORARY OR PORTABLE TRAFFIC SIGNAL) SHOWN IN STANDARDS MENTIONED ABOVE ARE SUBSIDIARY TO ITEM 502 UNLESS SHOWN OTHERWISE IN THE PLANS.

5. THE CONTRACTOR SHALL MAINTAIN ACCESS TO ALL BUSINESSES, RESIDENCES, AND OTHER ADJOINING PROPERTIES AT ALL TIMES UNLESS APPROVED OTHERWISE BY THE ENGINEER. CONTRACTOR SHALL SUBMIT HIS/HER PLAN FOR ENGINEER'S APPROVAL SHOWING THE DETAILS OF HOW THE ACCESS WILL BE MAINTAINED DURING ANY WORK UNDER THIS PROJECT. ANY ADDITIONAL WORK (MATERIAL AND LABOR) NEEDED TO MAINTAIN ACCESS WILL NOT BE PAID FOR DIRECTLY BUT WILL BE SUBSIDIARY TO ITEM 502.

6. CONTRACTOR SHALL SEQUENCE CONSTRUCTION IN SUCH A MANNER, SO THAT SAFE PEDESTRIAN ACCESS IS MAINTAINED AT ALL TIMES DURING WORKING AND NON-WORKING HOURS. TO MAINTAIN THIS ACCESS, CONTRACTOR CAN SUBMIT DETOUR PLAN FOR ENGINEER'S APPROVAL, USING APPLICABLE RELATED SIGNS (R9-9, R9-10DBL, R9-11, ETC.). DURING WORK IN ANY PHASE/STAGE/STEP, IF THERE IS ANY ELEVATION DIFFERENCE BETWEEN EXISTING ADA CURB RAMPS/SIDEWALK AND CROSS WALKS ACROSS PAVEMENT UNDER CONSTRUCTION, CONTRACTOR SHALL USE HMAC, PER ENGINEER'S DIRECTION, TO MAKE SMOOTH TRANSITION ACROSS THE ELEVATION DIFFERENCE AREA (PER TXDOT STANDARD PED-18) FOR SAFE AND CONTINUOUS MOVEMENT OF PEDESTRIANS. ANY ADDITIONAL WORK (MATERIAL AND LABOR) FOR THESE WILL NOT BE PAID FOR DIRECTLY BUT WILL BE SUBSIDIARY TO ITEM 502.

7. FOR ANY NIGHTTIME WORK, THE CONTRACTOR WILL PREPARE PLAN, AND SUBMIT TO THE ENGINEER FOR APPROVAL, SHOWING THE AMOUNT OF WORK THEY CAN COMPLETE DURING EACH NIGHT AND OPEN THAT AREA TO TRAFFIC AND BUSINESSES BY NEXT MORNING.

8. DURING ALL PHASE/STAGE/STEP CONSTRUCTION, CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE. CONTRACTOR SHALL TAKE APPROPRIATE MEASURES TO ENSURE THAT DRAINAGE WATER IN CONSTRUCTION AREAS DOES NOT CREATE ANY PONDING/SAFETY ISSUES IN SAFE AND CONTINUOUS TRAFFIC AND PEDESTRIAN MOVEMENT. ANY ADDITIONAL WORK (MATERIAL AND LABOR) FOR THESE WILL NOT BE PAID FOR DIRECTLY BUT WILL BE SUBSIDIARY TO ITEM 502.

9. CONSTRUCT ALL DRAINAGE SYSTEMS BEGINNING FROM OUTFALL/DOWNSTREAM ENDS. FOR PARTIALLY COMPLETED SYSTEM/LINE, CONTRACTOR SHALL TEMPORARILY CAP AT THE CONSTRUCTION LIMIT AND COMPLETE THAT SYSTEM/LINE IN NEXT PHASE/STAGE/STEP BY REMOVING CAP. THIS WORK (MATERIAL AND LABOR) WILL BE SUBSIDIARY TO DRAINAGE ITEMS.

10. AS MENTIONED IN TCP STANDARDS AND DIRECTED BY THE ENGINEER, THE CONTRACTOR SHALL ELIMINATE EXISTING PAVEMENT MARKINGS AND COVER EXISTING SIGNS THAT ARE IN CONFLICT WITH THE TCP LAYOUTS/NARRATIVE. MAINTAIN APPLICABLE EXISTING SIGNS DURING CONSTRUCTION. THIS WORK WILL BE CONSIDERED SUBSIDIARY TO ITEM 502.

11. PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS) SHALL BE PLACED ONE WEEK IN ADVANCE OF THE BEGINNING OF EACH PHASE OF CONSTRUCTION AND ONE WEEK IN ADVANCE OF ANY CLOSURE OF SIDE STREETS OR MAJOR TRAFFIC SHIFTS.

12. FOR EXCAVATION WORK, INSTALL TRENCH PROTECTION AND TAKE OTHER SAFETY MEASURES AS SHOWN IN THE PLAN SET AND CONTRACT DOCUMENTS, AND AS DIRECTED BY THE ENGINEER.

13. PROVIDE TEN DAYS NOTICE TO THE ENGINEER OF ANY PLANNED LANE CLOSURES TO ALLOW COORDINATION. THE PROJECT ENGINEER MUST APPROVE ALL LANE CLOSURES PRIOR TO IMPLEMENTATION.

14. NO EQUIPMENT SHALL BE LEFT IN A POSITION THAT WILL ENDANGER THE TRAVELLING PUBLIC. WORK SITES SHOULD BE CAREFULLY MONITORED TO ENSURE THAT TRAFFIC CONTROL MEASURES ARE OPERATING EFFECTIVELY AND THAT ALL DEVICES USED ARE CLEARLY VISIBLE, CLEAN AND IN GOOD REPAIR.

15. ADDITIONAL SIGNS, BARRICADES OR TRAFFIC CONTROL DEVICES OTHER THAN THOSE SPECIFIED MAY BE REQUIRED FOR THE SAFE MOVEMENT OF TRAFFIC THROUGHOUT THE PROJECT. PAYMENT FOR ALL SUCH SIGNS, BARRICADES OR OTHER TRAFFIC CONTROL DEVICES WILL BE CONSIDERED AS SUBSIDIARY TO THE ITEM "BARRICADES, SIGNS AND TRAFFIC HANDLING".

16. FOR SMOOTH TRAFFIC MOVEMENT BETWEEN DIFFERENT PHASES/STAGES/STEPS AND TO ADDRESS ANY ELEVATION DIFFERENCE BETWEEN COMPLETED AND EXISTING PAVEMENT, HMAC LEVEL-UP MAY BE NEEDED. CONTRACTOR SHALL PLACE LEVEL-UP ASPHALT AT APPROVED LOCATIONS PER ENGINEER'S DIRECTION. THIS WILL NOT BE PAID FOR SEPARATELY AND IS SUBSIDIARY TO ITEM 502.

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED PROFESSIONAL ENGINEER

Abulkhair M. Zobayed

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BU 67K

TCP GENERAL NOTES

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
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TEXAS	FTW	ERATH	
CONTROL	SECTION	JOB	24
0079	04	049	

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SEQUENCE OF CONSTRUCTION FOR ALL PHASE/STAGE/STEP:

1. CONTRACTOR SHALL SUBMIT DETAILED PLANS FOR EACH PHASE/STAGE/STEPS SHOWING LIMITS OF PLANNED WORK AS SUGGESTED BELOW, LOCATION OF TRAFFIC, TRAFFIC LANE SHIFT AND CLOSURE, SIGNS, TRAFFIC CONTROL DEVICES, ETC., AND RELEVANT TXDOT STANDARDS TO BE USED TO GET THE ENGINEER'S APPROVAL BEFORE BEGINNING WORK.

2. INSTALL ADVANCE WARNING SIGNS, CHANNELIZING DEVICES, AND CONSTRUCTION SIGNING AS SHOWN ON THE TRAFFIC CONTROL PLANS, STANDARDS, DETAILS.

3. INSTALL AND MAINTAIN SW3P ITEMS AS SHOWN ON THE SW3P LAYOUTS APPLICABLE TO EACH PHASE/STAGE/STEP AND AS DIRECTED BY THE ENGINEER BEFORE BEGINNING WORK FOR EACH PHASE/STAGE/STEP.

PHASE 1, STAGE 1:

1. THIS STAGE IS FOR THE CONSTRUCTION ALONG BU 67K FROM THE BEGINNING OF THE PROJECT (NORTH OF FWWR) TO ELM ST INTERSECTION, AS SHOWN IN TCP PHASING DETAILS. NO WORK, SIGNS, AND TRAFFIC CONTROL DEVICES WITHIN FWWR ROW.

2. CLOSE PART OF BU 67K AND BU 67K/ELM ST INTERSECTION, AS SHOWN.

3. DETOUR TRAFFIC AS SHOWN IN TCP PHASING DETAILS.

4. PERFORM REMOVAL WORK AS SHOWN IN REMOVAL PLANS. SALVAGE AND RETURN EXISTING BRICK TO CITY OF DUBLIN.

5. CONSTRUCT PROPOSED DRAINAGE SYSTEM "A" AND PART OF DRAINAGE SYSTEM "B" AS SHOWN. UNLESS APPROVED OTHERWISE, CUT AND RESTORE WORK WILL BE DONE AT NIGHTTIME.

6. CONSTRUCT PROPOSED PAVEMENT (EXCEPT TOP 2" OF SURFACE COURSE), CURB & GUTTER, AND OTHER PROPOSED ELEMENTS, AS SHOWN IN PLAN SET.

7. PLACE TEMPORARY STRIPING FOLLOWING THE PERMANENT STRIPING LAYOUT IN THE COMPLETED ROADWAY SECTION. ADJUST STRIPING AT MATCH LINES WITH EXISTING OR NEXT PHASE/STAGE/STEP AS DIRECTED BY THE ENGINEER.

8. INSTALL PERMANENT SIGNS IF NEEDED FOR NEXT PHASES/STAGES OR AS DIRECTED BY THE ENGINEER.

PHASE 1, STAGE 2:

1. THIS STAGE IS FOR THE CONSTRUCTION ALONG BU 67K FROM NORTH OF ELM ST INTERSECTION TO SOUTH OF BLACKJACK ST (SH 6), AS SHOWN IN TCP PHASING DETAILS.

2. CLOSE PART OF BU 67K, AS SHOWN.

3. DETOUR TRAFFIC AS SHOWN IN TCP PHASING DETAILS.

4. PERFORM REMOVAL WORK AS SHOWN IN REMOVAL PLANS. SALVAGE AND RETURN EXISTING BRICK TO CITY OF DUBLIN.

5. CONSTRUCT REMAINING PORTION OF PROPOSED DRAINAGE SYSTEM "B" AS SHOWN.

6. CONSTRUCT PROPOSED PAVEMENT (EXCEPT TOP 2" OF SURFACE COURSE), CURB & GUTTER, AND OTHER PROPOSED ELEMENTS, AS SHOWN IN PLAN SET.

7. PLACE TEMPORARY STRIPING FOLLOWING THE PERMANENT STRIPING LAYOUT IN THE COMPLETED ROADWAY SECTION. ADJUST STRIPING AT MATCH LINES WITH EXISTING OR NEXT PHASE/STAGE/STEP AS DIRECTED BY THE ENGINEER.

8. INSTALL PERMANENT SIGNS IF NEEDED FOR NEXT PHASES/STAGES OR AS DIRECTED BY THE ENGINEER.

PHASE 1, STAGE 3:

1. THIS STAGE IS FOR THE CONSTRUCTION OF BU 67K/BLACKJACK ST (SH 6) INTERSECTION, AS SHOWN IN TCP PHASING DETAILS.

PHASE 1, STAGE 3, STEP 1,2,3,4:

1. THESE STEPS ARE FOR THE CONSTRUCTION OF BU 67K/BLACKJACK ST (SH 6) INTERSECTION IN QUADRANT, AS SHOWN IN TCP PHASING DETAILS.

2. OPEN ROADWAY COMPLETED IN PREVIOUS PHASE/STAGE.

3. SHIFT BLACKJACK ST (SH 6) TRAFFIC, AS SHOWN. MAINTAIN 2-LANE-2-WAY OPERATION, UNLESS DIRECTED/APPROVED OTHERWISE BY THE ENGINEER. CONTRACTOR SHALL UTILIZE TEMPORARY SIGNAL, IF NEEDED, ONLY AFTER THE APPROVAL BY THE ENGINEER.

4. SHIFT BU 67K TRAFFIC, AS SHOWN. MAINTAIN 2-LANE-2-WAY OPERATION UNLESS, SHOWN OTHERWISE IN PLAN OR DIRECTED/APPROVED OTHERWISE BY THE ENGINEER.

5. ADJUST SIGNAL HEADS AND SIGNAL PHASE TIMING FOR EACH STEP, AS DIRECTED BY THE ENGINEER. CONTRACTOR SHALL SUBMIT PLANS SHOWING THESE ADJUSTMENTS FOR EACH STEP FOR ENGINEER'S APPROVAL BEFORE BEGINNING THIS WORK. ANY ADDITIONAL WORK (MATERIAL AND LABOR) FOR THESE WILL NOT BE PAID FOR DIRECTLY BUT WILL BE SUBSIDIARY TO ITEM 502.

6. PERFORM REMOVAL WORK AS SHOWN IN REMOVAL PLANS. SALVAGE AND RETURN EXISTING BRICK TO CITY OF DUBLIN.

7. CONSTRUCT MOST OF PROPOSED DRAINAGE SYSTEM "C" AS SHOWN. UNLESS APPROVED OTHERWISE, CUT AND RESTORE WORK WILL BE DONE AT NIGHTTIME.

8. CONSTRUCT PROPOSED PAVEMENT (EXCEPT TOP 2" OF SURFACE COURSE), CURB & GUTTER, AND OTHER PROPOSED ELEMENTS, AS SHOWN IN PLAN SET.

9. CONSTRUCT PERMANENT SIGNAL AS SHOWN IN PLAN SET FOLLOWING APPLICABLE STANDARDS.

10. PLACE TEMPORARY STRIPING FOLLOWING THE PERMANENT STRIPING LAYOUT IN THE COMPLETED ROADWAY SECTION. ADJUST STRIPING AT MATCH LINES WITH EXISTING OR NEXT PHASE/STAGE/STEP AS DIRECTED BY THE ENGINEER.

11. INSTALL PERMANENT SIGNS IF NEEDED FOR NEXT PHASES/STAGES OR AS DIRECTED BY THE ENGINEER.

PHASE 1, STAGE 4:

1. THIS STAGE IS FOR THE CONSTRUCTION ALONG BU 67K FROM NORTH OF BLACKJACK ST (SH 6) INTERSECTION TO LIVE OAK ST INTERSECTION, AS SHOWN IN TCP PHASING DETAILS.

2. CLOSE PART OF BU 67K AND BU 67K/LIVE OAK ST INTERSECTION, AS SHOWN.

3. OPEN ROADWAY COMPLETED IN PREVIOUS PHASE/STAGE.

4. UTILIZE "TCP DETOUR PHASE 1, STEP 4 THRU 9" AND TCP PHASING DETAILS SHEETS.

5. PERFORM REMOVAL WORK AS SHOWN IN REMOVAL PLANS. SALVAGE AND RETURN EXISTING BRICK TO CITY OF DUBLIN.

6. CONSTRUCT PROPOSED DRAINAGE SYSTEM "D" AND REMAINING PORTION OF DRAINAGE SYSTEM "C" AS SHOWN. UNLESS APPROVED OTHERWISE, CUT AND RESTORE WORK WILL BE DONE AT NIGHTTIME.

PHASE 1, STAGE 4 (CONTINUED):

7. CONSTRUCT PROPOSED PAVEMENT (EXCEPT TOP 2" OF SURFACE COURSE), CURB & GUTTER, AND OTHER PROPOSED ELEMENTS, AS SHOWN IN PLAN SET.

8. REPLACE EXISTING FLASHING BEACONS MOUNTED ON SPAN WIRES AS SHOWN IN PLAN SET FOLLOWING APPLICABLE STANDARDS.

9. PLACE TEMPORARY STRIPING FOLLOWING THE PERMANENT STRIPING LAYOUT IN THE COMPLETED ROADWAY SECTION. ADJUST STRIPING AT MATCH LINES WITH EXISTING OR NEXT PHASE/STAGE/STEP AS DIRECTED BY THE ENGINEER.

10. INSTALL PERMANENT SIGNS IF NEEDED FOR NEXT PHASES/STAGES OR AS DIRECTED BY THE ENGINEER.

PHASE 1, STAGE 5:

1. THIS STAGE IS FOR THE CONSTRUCTION ALONG BU 67K FROM NORTH OF LIVE OAK ST INTERSECTION TO E SHERIDAN ST INTERSECTION, AS SHOWN IN TCP PHASING DETAILS.

2. CLOSE PART OF BU 67K AND BU 67K INTERSECTIONS WITH PECAN ST, W SHERIDAN ST, AND E SHERIDAN ST, AS SHOWN.

3. OPEN ROADWAY COMPLETED IN PREVIOUS PHASE/STAGE.

4. UTILIZE "TCP DETOUR PHASE 1, STEP 4 THRU 9" AND TCP PHASING DETAILS SHEETS.

5. PERFORM REMOVAL WORK AS SHOWN IN REMOVAL PLANS. SALVAGE AND RETURN EXISTING BRICK TO CITY OF DUBLIN.

6. CONSTRUCT REMAINING PORTION OF DRAINAGE SYSTEM "D" AS SHOWN.

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED PROFESSIONAL ENGINEER

Abulkhair M. Zobayed

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Texas Department of Transportation

BU 67K

TCP NARRATIVE

SHEET 1 OF 2

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PHASE 1, STAGE 5 (CONTINUED):

7. CONSTRUCT PROPOSED PAVEMENT (EXCEPT TOP 2" OF SURFACE COURSE), CURB & GUTTER, BLOCK SODDING AND OTHER PROPOSED ELEMENTS, AS SHOWN IN PLAN SET.

8. PLACE TEMPORARY STRIPING FOLLOWING THE PERMANENT STRIPING LAYOUT IN THE COMPLETED ROADWAY SECTION. ADJUST STRIPING AT MATCH LINES WITH EXISTING OR NEXT PHASE/STAGE/STEP AS DIRECTED BY THE ENGINEER.

9. INSTALL PERMANENT SIGNS IF NEEDED FOR NEXT PHASES/STAGES OR AS DIRECTED BY THE ENGINEER.

PHASE 1, STAGE 6:

1. THIS STAGE IS FOR THE CONSTRUCTION ALONG BU 67K FROM NORTH OF E SHERIDAN ST INTERSECTION TO MESQUITE ST INTERSECTION, AS SHOWN IN TCP PHASING DETAILS.

2. CLOSE PART OF BU 67K AND BU 67K INTERSECTIONS WITH E COLLEGE ST, AND MESQUITE ST, AS SHOWN.

3. OPEN ROADWAY COMPLETED IN PREVIOUS PHASE/STAGE.

4. UTILIZE "TCP DETOUR PHASE 1, STEP 4 THRU 9" AND TCP PHASING DETAILS SHEETS.

5. PERFORM REMOVAL WORK AS SHOWN IN REMOVAL PLANS. SALVAGE AND RETURN EXISTING BRICK TO CITY OF DUBLIN.

6. CONSTRUCT PROPOSED PAVEMENT (EXCEPT TOP 2" OF SURFACE COURSE), CURB & GUTTER, BLOCK SODDING AND OTHER PROPOSED ELEMENTS, AS SHOWN IN PLAN SET.

7. PLACE TEMPORARY STRIPING FOLLOWING THE PERMANENT STRIPING LAYOUT IN THE COMPLETED ROADWAY SECTION. ADJUST STRIPING AT MATCH LINES WITH EXISTING OR NEXT PHASE/STAGE/STEP AS DIRECTED BY THE ENGINEER.

8. INSTALL PERMANENT SIGNS IF NEEDED FOR NEXT PHASES/STAGES OR AS DIRECTED BY THE ENGINEER.

PHASE 1, STAGE 7:

1. THIS STAGE IS FOR THE CONSTRUCTION ALONG BU 67K FROM NORTH OF MESQUITE ST INTERSECTION TO HARRIS ST INTERSECTION, AS SHOWN IN TCP PHASING DETAILS.

2. CLOSE PART OF BU 67K AND BU 67K INTERSECTIONS WITH ERIN ST, W SHANNON ST, AND HARRIS ST, AS SHOWN.

3. OPEN ROADWAY COMPLETED IN PREVIOUS PHASE/STAGE.

4. DETOUR TRAFFIC AS SHOWN IN TCP PHASING DETAILS.

5. PERFORM REMOVAL WORK AS SHOWN IN REMOVAL PLANS. SALVAGE AND RETURN EXISTING BRICK TO CITY OF DUBLIN.

6. CONSTRUCT PROPOSED PAVEMENT (EXCEPT TOP 2" OF SURFACE COURSE), CURB & GUTTER, BLOCK SODDING AND OTHER PROPOSED ELEMENTS, AS SHOWN IN PLAN SET.

7. PLACE TEMPORARY STRIPING FOLLOWING THE PERMANENT STRIPING LAYOUT IN THE COMPLETED ROADWAY SECTION. ADJUST STRIPING AT MATCH LINES WITH EXISTING OR NEXT PHASE/STAGE/STEP AS DIRECTED BY THE ENGINEER.

8. INSTALL PERMANENT SIGNS IF NEEDED FOR NEXT PHASES/STAGES OR AS DIRECTED BY THE ENGINEER.

PHASE 1, STAGE 8:

1. THIS STAGE IS FOR THE CONSTRUCTION ALONG BU 67K FROM NORTH OF HARRIS ST INTERSECTION TO E VALLEY ST INTERSECTION, AS SHOWN IN TCP PHASING DETAILS.

2. CLOSE PART OF BU 67K AND BU 67K INTERSECTIONS WITH W VALLEY ST AND E VALLEY ST, AS SHOWN.

3. OPEN ROADWAY COMPLETED IN PREVIOUS PHASE/STAGE.

4. UTILIZE "TCP DETOUR PHASE 1, STEP 4 THRU 9" AND TCP PHASING DETAILS SHEETS.

5. PERFORM REMOVAL WORK AS SHOWN IN REMOVAL PLANS. SALVAGE AND RETURN EXISTING BRICK TO CITY OF DUBLIN.

6. CONSTRUCT ENTIRE PROPOSED DRAINAGE SYSTEM "E" AS SHOWN. UNLESS APPROVED OTHERWISE, CUT AND RESTORE WORK WILL BE DONE AT NIGHTTIME.

7. CONSTRUCT PROPOSED PAVEMENT (EXCEPT TOP 2" OF SURFACE COURSE), CURB & GUTTER, BLOCK SODDING AND OTHER PROPOSED ELEMENTS, AS SHOWN IN PLAN SET.

8. PLACE TEMPORARY STRIPING FOLLOWING THE PERMANENT STRIPING LAYOUT IN THE COMPLETED ROADWAY SECTION. ADJUST STRIPING AT MATCH LINES WITH EXISTING OR NEXT PHASE/STAGE/STEP AS DIRECTED BY THE ENGINEER.

9. INSTALL PERMANENT SIGNS IF NEEDED FOR NEXT PHASES/STAGES OR AS DIRECTED BY THE ENGINEER.

PHASE 1, STAGE 9:

1. THIS STAGE IS FOR THE CONSTRUCTION ALONG BU 67K FROM NORTH OF E VALLEY ST INTERSECTION TO FM 219 (CLINTON ST), AS SHOWN IN TCP PHASING DETAILS.

2. CLOSE PART OF BU 67K AND BU 67K INTERSECTIONS WITH TRAVIS ST, AS SHOWN.

3. OPEN ROADWAY COMPLETED IN PREVIOUS PHASE/STAGE.

4. UTILIZE "TCP DETOUR PHASE 1, STEP 4 THRU 9" AND TCP PHASING DETAILS SHEETS.

5. ADJUST SIGNAL HEADS AND SIGNAL PHASE TIMING FOR EACH STEP, AS DIRECTED BY THE ENGINEER. CONTRACTOR SHALL SUBMIT PLANS SHOWING THESE ADJUSTMENTS FOR EACH STEP FOR ENGINEER'S APPROVAL BEFORE BEGINNING THIS WORK. ANY ADDITIONAL WORK (MATERIAL AND LABOR) FOR THESE WILL NOT BE PAID FOR DIRECTLY BUT WILL BE SUBSIDIARY TO ITEM 502.

6. PERFORM REMOVAL WORK AS SHOWN IN REMOVAL PLANS. SALVAGE AND RETURN EXISTING BRICK TO CITY OF DUBLIN.

7. CONSTRUCT PROPOSED PAVEMENT (EXCEPT TOP 2" OF SURFACE COURSE), CURB & GUTTER, BLOCK SODDING AND OTHER PROPOSED ELEMENTS, AS SHOWN IN PLAN SET.

8. INSTALL PROPOSED SPAN WIRES FOR THE SIGNAL AT FM 219 (CLINTON ST) INTERSECTION AS SHOWN IN PLAN SET FOLLOWING APPLICABLE STANDARDS.

9. PLACE TEMPORARY STRIPING FOLLOWING THE PERMANENT STRIPING LAYOUT IN THE COMPLETED ROADWAY SECTION. ADJUST STRIPING AT MATCH LINES WITH EXISTING OR NEXT PHASE/STAGE/STEP AS DIRECTED BY THE ENGINEER.

10. INSTALL PERMANENT SIGNS IF NEEDED FOR NEXT PHASES/STAGES OR AS DIRECTED BY THE ENGINEER.

PHASE 2:

1. THIS PHASE IS FOR THE CONSTRUCTION OF BU 67K (PATRICK ST) FOR THE REMAINING ITEMS.

2. COMPLETE ANY OTHER REMAINING ROADWAY AND DRAINAGE WORK BEFORE APPLYING FINAL SURFACE COURSE.

3. CONSTRUCT REMAINING 2" OF SURFACE COURSE AND OTHER REMAINING ELEMENTS AS SHOWN IN PLAN SET. CONTRACTOR SHALL NOT CLOSE ANY LANE WITHOUT ENGINEER'S APPROVAL. IF TEMPORARY LANE CLOSURE IS ALLOWED, USE APPROPRIATE TCP STANDARD WITH ENGINEER'S APPROVAL.

4. INSTALL PERMANENT PAVEMENT MARKINGS AND PERMANENT SIGNS AS SHOWN IN THE PLAN SET.

5. REMOVE ALL TRAFFIC CONTROL DEVICES, SIGNS, BARRICADES, CONSTRUCTION DEBRIS AND EROSION CONTROL DEVICES.

6. OPEN BU 67K AND CROSS STREETS TO TRAFFIC.

7. GET ENGINEER'S ACCEPTANCE OF THE COMPLETED PROJECT.

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED PROFESSIONAL ENGINEER

Abulkhair M. Zobayed

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BU 67K

TCP NARRATIVE

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CONTROL	SECTION	JOB	
0079	04	049	

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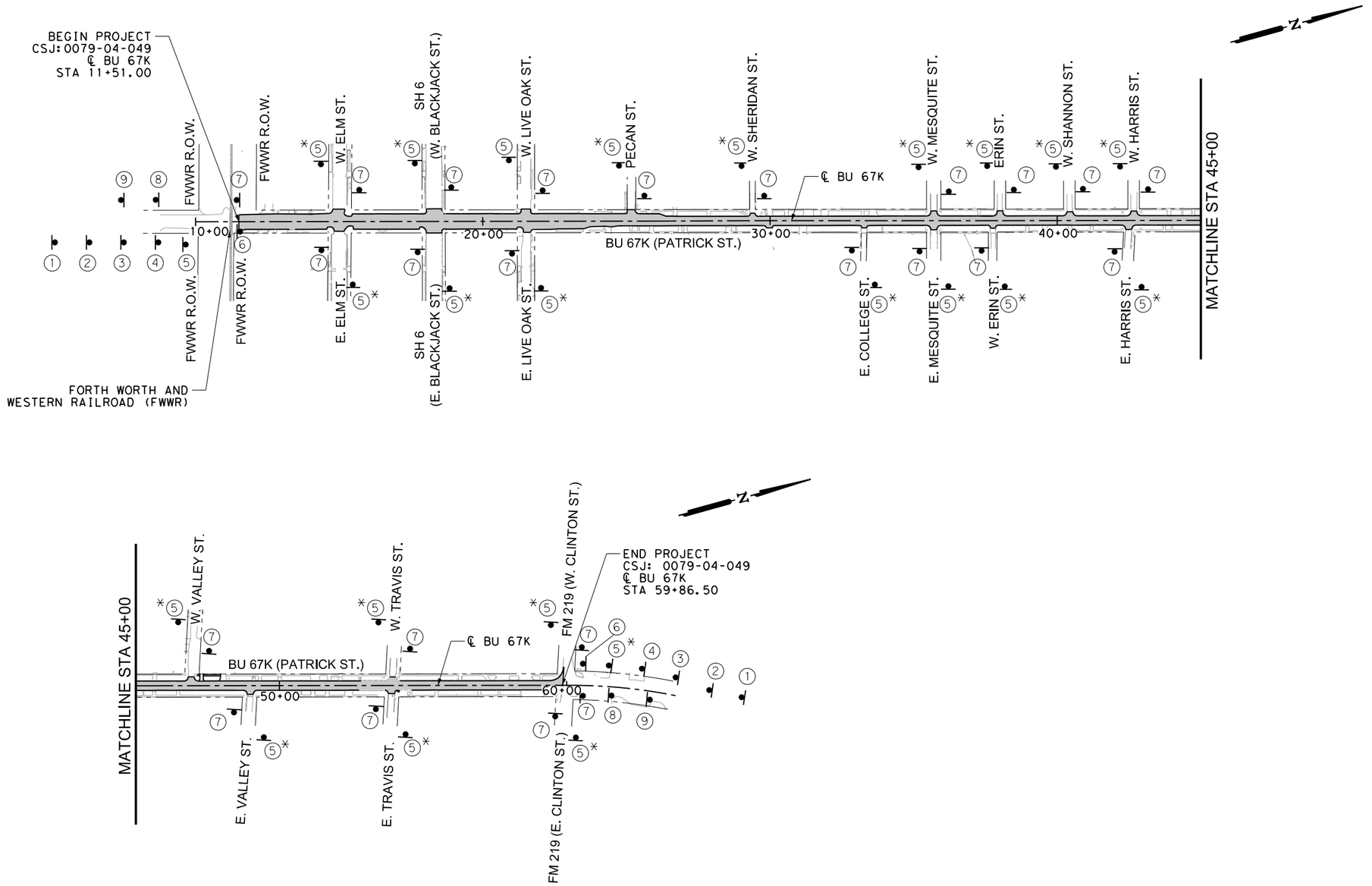


LEGEND

EXIST R.O.W.

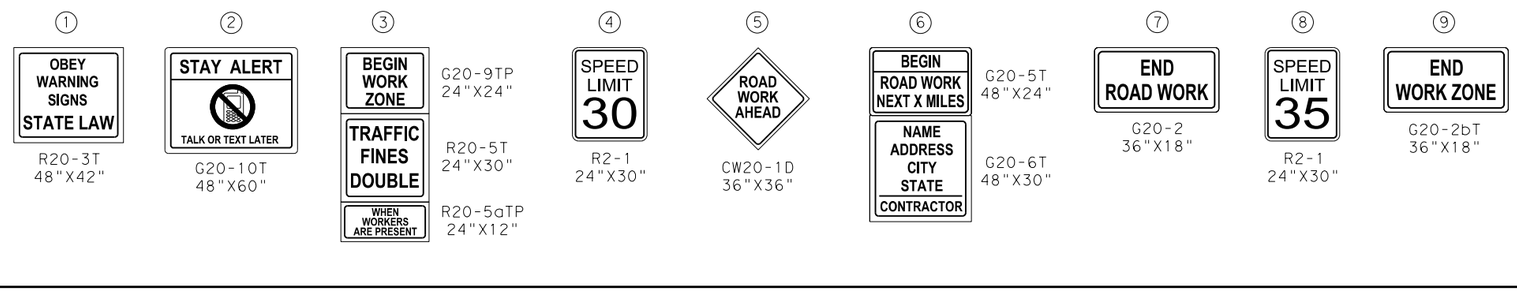
CONSTRUCTION SIGN

NOTES:

1. SEE TXDOT BC STANDARDS FOR SIGN SPACING AND OTHER SIGNS. ADJUST SIGN LOCATION AND SPACING, IF NEEDED BECAUSE OF FIELD CONDITION, PER ENGINEER'S APPROVAL.
2. SEE TCP PHASING DETAIL SHEETS FOR ADDITIONAL ADVANCE WARNING SIGNS AND OTHER SIGNS.
3. CONTRACTOR SHALL CHECK WITH THE ENGINEER TO CONFIRM SPEED LIMITS SHOWN IN R2-1 SIGNS.

*SEE NOTE 2

SCALE = N.T.S



STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED PROFESSIONAL ENGINEER

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BU 67K

TRAFFIC CONTROL PLAN
ADVANCED WARNING SIGNS

SHEET 1 OF 1

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STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	27
CONTROL	SECTION	JOB	
0079	04	049	

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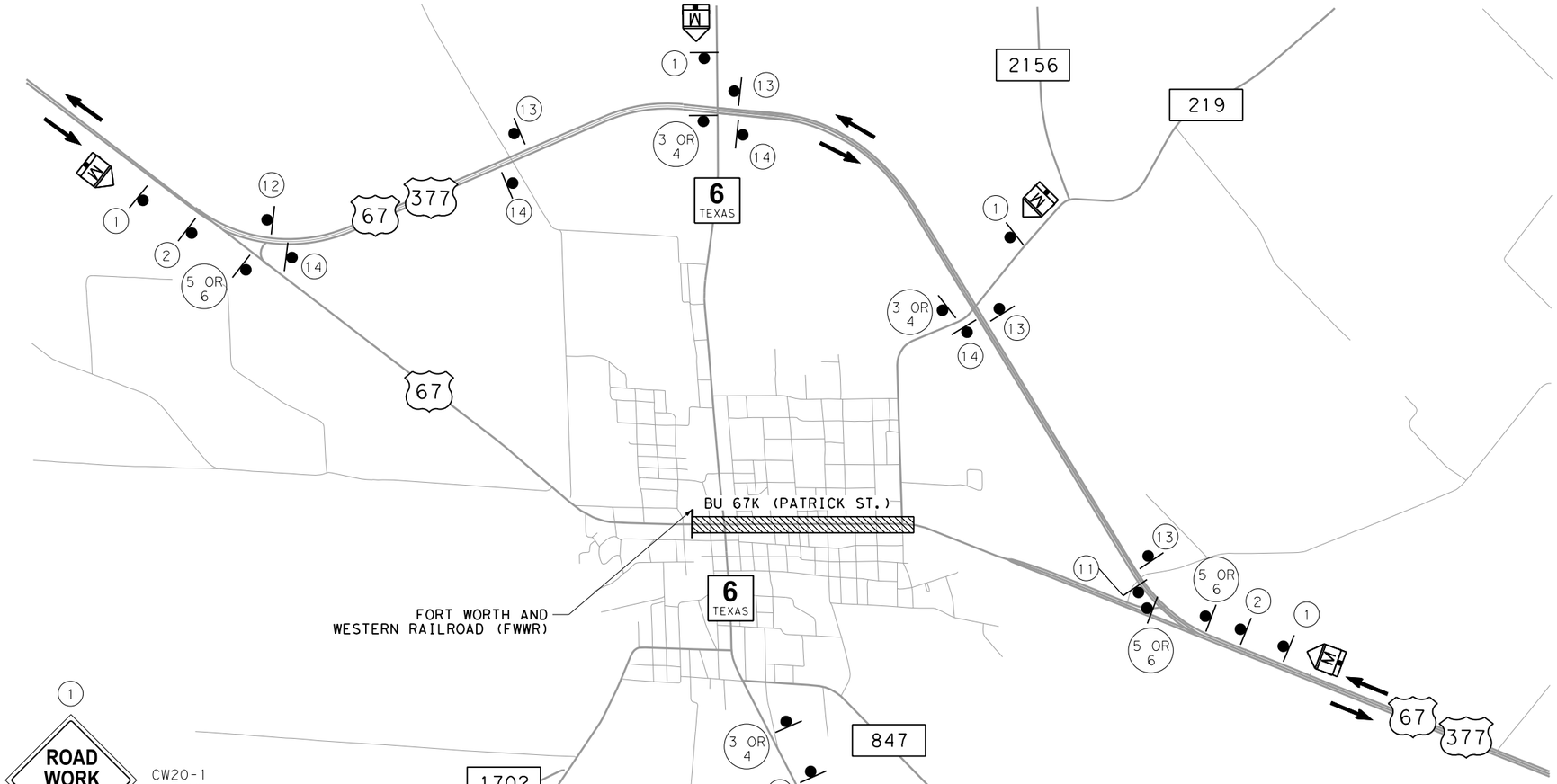

LEGEND

- TYPE 3 BARRICADE
- SIGN
- DIRECTION OF TRAFFIC FLOW
- WORK ZONE
- PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

NOTES:

1. THIS DETOUR WILL BE USED, WITH ENGINEER'S APPROVAL, WHEN THE FULL OR SIGNIFICANT PORTION OF PROJECT LENGTH WILL BE CLOSED, OR AS DIRECTED.
2. IF THIS DETOUR IS NOT USED, WITH ENGINEER'S APPROVAL, SHOWN PCMS CAN BE USED TO PROVIDE INFORMATION ABOUT LOCAL CLOSURES AND OTHER MESSAGES DURING DIFFERENT PHASES OF CONSTRUCTION.
3. IF REQUIRED BY THE ENGINEER, FOR THIS SIGN WHERE IT SAYS "(RD / ST NAME)", USE APPROPRIATE ROAD OR STREET NAMES MATCHING ROAD/STREET CLOSURES SHOWN IN DIFFERENT CONSTRUCTION PHASES.
4. REFER TO "TCP ADVANCE WARNING SIGNS" AND "PHASING DETAILS" SHEETS FOR DETAILS OF PHASING, LOCAL DETOURS, AND OTHER SIGNS.
5. NON STANDARD SIGNS (SIGN ID CONTAINING "VAR") WILL BE DESIGNED BY THE CONTRACTOR PER GUIDELINES MENTIONED IN SHSD AND NEED TO BE APPROVED BY THE ENGINEER BEFORE INSTALLING.

(1)
ROAD WORK AHEAD
CW20-1 36"X36"

(2)
DETOUR AHEAD
CW20-2D 36"X36"

(4)
ROAD CLOSED X MILES AHEAD
LOCAL TRAFFIC ONLY
R11-3a (60"X30")

(3) (NOTE 3)
ROAD CLOSED AT (RD/ ST NAME)
LOCAL TRAFFIC ONLY
R11-3a VAR 60"(VAR)X30"

(5) (NOTE 3)
ROAD CLOSED AT (RD/ ST NAME)
LOCAL TRAFFIC ONLY
R11-3a VAR 60"(VAR)X30"
DETOUR
M4-10R/L 48"X18"

(6)
ROAD CLOSED X MILES AHEAD
LOCAL TRAFFIC ONLY
R11-3a (60"X30")
DETOUR
M4-10R/L 48"X18"

(11)
END DETOUR — M4-8a 24"X18"
NORTH — M3-1 24"X12"
BUSINESS — M4-8a 24"X12"
67 — M1-4 24"X24"

(12)
END DETOUR — M4-8a 24"X18"
SOUTH — M3-3 24"X12"
BUSINESS — M4-8a 24"X12"
67 — M1-4 24"X24"

(13)
DETOUR — M4-8 24"X12"
SOUTH — M3-3 24"X12"
BUSINESS — M4-8a 24"X12"
67 — M1-4 24"X24"
M6-3 21"X15"

(14)
DETOUR — M4-8 24"X12"
NORTH — M3-1 24"X12"
BUSINESS — M4-8a 24"X12"
67 — M1-4 24"X24"
M6-3 21"X15"

SCALE = N.T.S

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED PROFESSIONAL ENGINEER
Abulkhair M. Zobayed
7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

BU 67K

TRAFFIC CONTROL PLAN
OFF-SITE DETOUR LAYOUT

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	28
CONTROL	SECTION	JOB	
0079	04	049	

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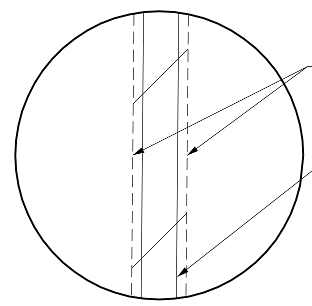
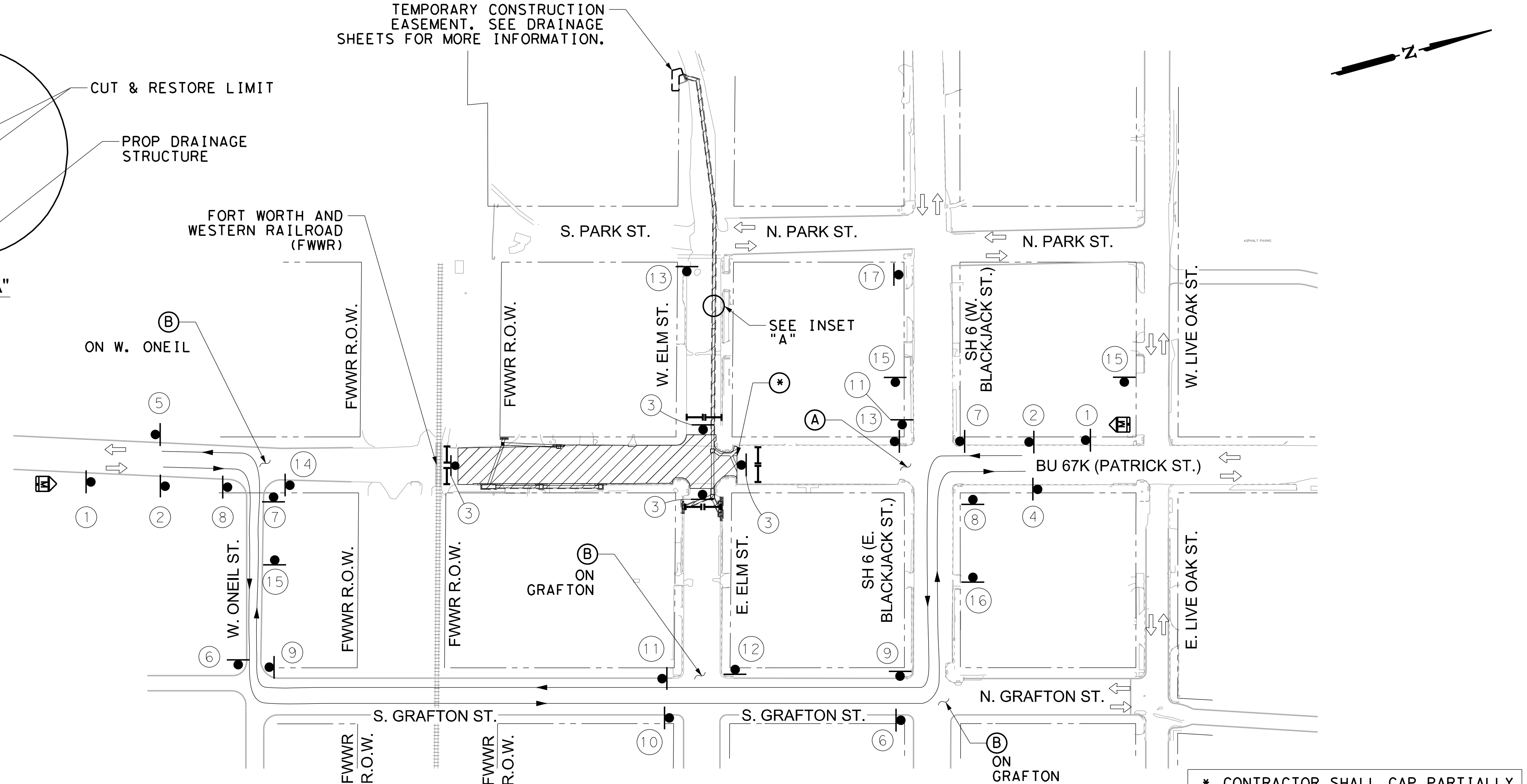
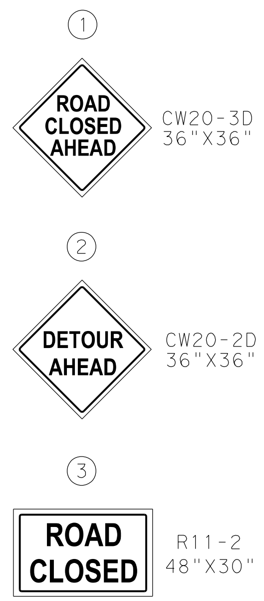
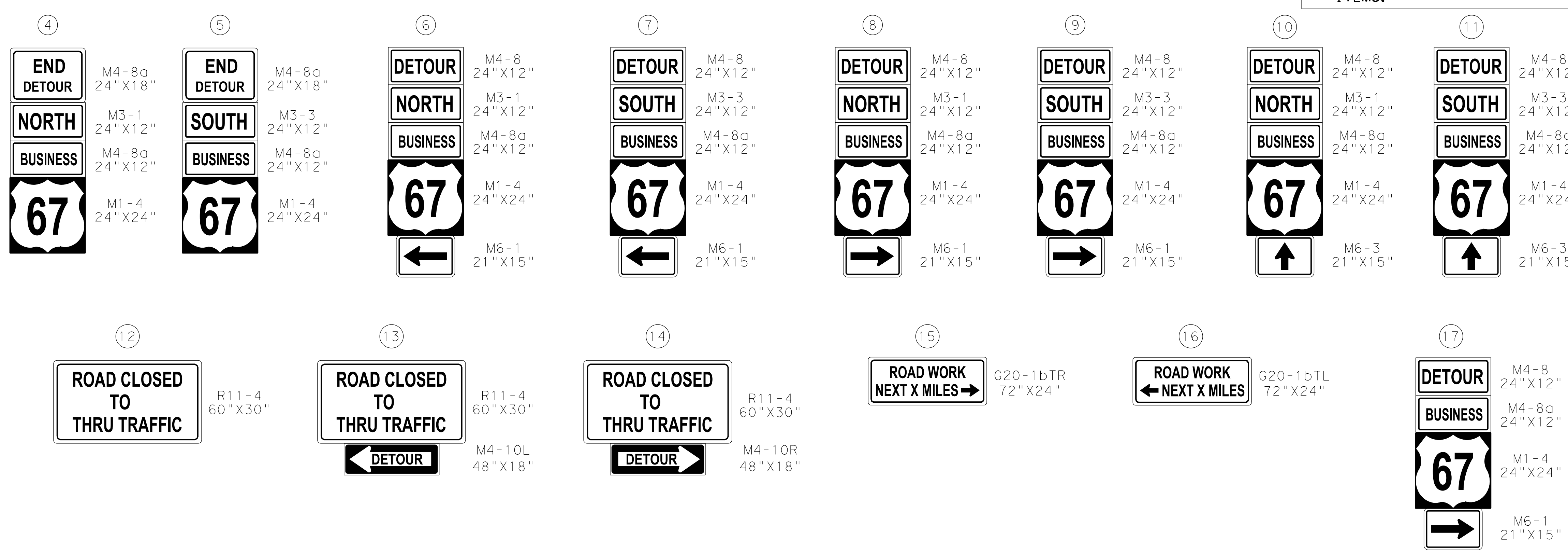


INSET "A"



* CONTRACTOR SHALL CAP PARTIALLY CONSTRUCTED DRAINAGE SYSTEM UNTIL NEXT PHASE. THIS IS SUBSIDIARY TO VARIOUS BID ITEMS.





LEGEND

- CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- CUT & RESTORE
- EXIST R.O.W.
- TYPE III BARRICADE
- CONSTRUCTION SIGN
- PORTABLE CHANGEABLE MESSAGE SIGN
- EXISTING DIRECTION OF TRAFFIC
- DETOUR ROUTE
- (A) SIGNALIZED INTERSECTION (EXIST)
- (B) ONE WAY STOP CONTROLLED (EXIST)
- (C) FOUR WAY STOP CONTROLLED (EXIST)

NOTES:

1. SEE TCP ADVANCE WARNING SIGNS SHEET FOR ADDITIONAL SIGNS.
2. SEE TXDOT BC STANDARDS FOR SIGN SPACING AND OTHER SIGNS. ADJUST SIGN LOCATION AND SPACING, IF NEEDED BECAUSE OF FIELD CONDITION, PER ENGINEER'S APPROVAL.
3. REFER TO DRAINAGE SHEETS FOR MORE INFORMATION.
4. REFER TO "TCP DETOUR - PHASE 1 STEP 4 THRU 9" SHEETS FOR DETOUR INFORMATION.

SCALE = N.T.S

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED PROFESSIONAL ENGINEER
Abulkhair M. Zobayed
7/13/2024

NO.	DATE	REVISION	APPROVED

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BU 67K

TCP PHASING DETAIL
PHASE 1, STAGE 1

SHEET 1 OF 9

FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	29
CONTROL	SECTION	JOB	
0079	04	049	

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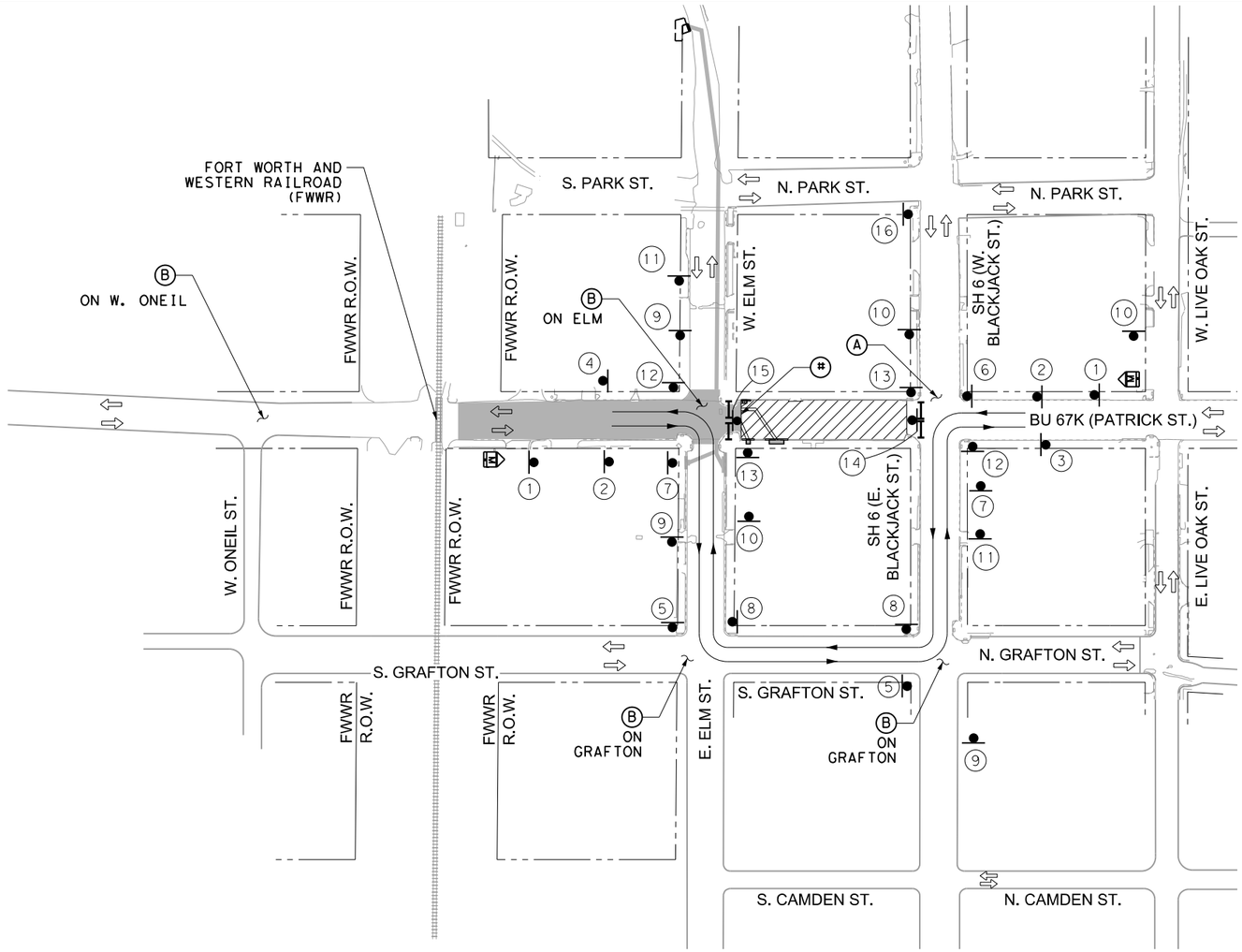

LEGEND

- CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- CUT & RESTORE
- EXIST R.O.W.
- TYPE III BARRICADE
- CONSTRUCTION SIGN
- PORTABLE CHANGEABLE MESSAGE SIGN
- EXISTING DIRECTION OF TRAFFIC
- DETOUR ROUTE
- (A) SIGNALIZED INTERSECTION (EXIST)
- (B) ONE WAY STOP CONTROLLED (EXIST)
- (C) FOUR WAY STOP CONTROLLED (EXIST)

NOTES:

1. SEE TCP ADVANCE WARNING SIGNS SHEET FOR ADDITIONAL SIGNS.
2. SEE TXDOT BC STANDARDS FOR SIGN SPACING AND OTHER SIGNS. ADJUST SIGN LOCATION AND SPACING, IF NEEDED BECAUSE OF FIELD CONDITION, PER ENGINEER'S APPROVAL.
3. REFER TO DRAINAGE SHEETS FOR MORE INFORMATION.
4. REFER TO "TCP DETOUR - PHASE 1 STEP 4 THRU 9" SHEETS FOR DETOUR INFORMATION.

CONTRACTOR SHALL COMPLETE CONSTRUCTION OF PARTIALLY CONSTRUCTED DRAINAGE SYSTEM FROM PREVIOUS PHASE. THIS IS SUBSIDIARY TO VARIOUS BID ITEMS.

SCALE = N.T.S

(1) ROAD CLOSED AHEAD — CW20-3D 36"X36"

(2) DETOUR AHEAD — CW20-2D 36"X36"

(3) END DETOUR — M4-8a 24"X18"; NORTH — M3-1 24"X12"; BUSINESS — M4-8a 24"X12"; 67 — M1-4 24"X24"

(4) END DETOUR — M4-8a 24"X18"; SOUTH — M3-3 24"X12"; BUSINESS — M4-8a 24"X12"; 67 — M1-4 24"X24"

(5) DETOUR — M4-8 24"X12"; NORTH — M3-1 24"X12"; BUSINESS — M4-8a 24"X12"; 67 — M1-4 24"X24"; M6-1 21"X15"

(6) DETOUR — M4-8 24"X12"; SOUTH — M3-3 24"X12"; BUSINESS — M4-8a 24"X12"; 67 — M1-4 24"X24"; M6-1 21"X15"

(7) DETOUR — M4-8 24"X12"; NORTH — M3-1 24"X12"; BUSINESS — M4-8a 24"X12"; 67 — M1-4 24"X24"; M6-1 21"X15"

(8) DETOUR — M4-8 24"X12"; SOUTH — M3-3 24"X12"; BUSINESS — M4-8a 24"X12"; 67 — M1-4 24"X24"; M6-1 21"X15"

(9) DETOUR — M4-8 24"X12"; NORTH — M3-1 24"X12"; BUSINESS — M4-8a 24"X12"; 67 — M1-4 24"X24"; M6-1 21"X15"

(10) ROAD WORK NEXT X MILES — G20-1bTR 72"X24"

(11) ROAD WORK ← NEXT X MILES — G20-1bTL 72"X24"

(12) R3-2 36"X36"

(13) R3-1 36"X36"

(14) ROAD CLOSED — R11-2 48"X30"; DETOUR — M4-10L 48"X18"

(15) ROAD CLOSED — R11-2 48"X30"; DETOUR — M4-10R 48"X18"

(16) DETOUR — M4-8 24"X12"; BUSINESS — M4-8a 24"X12"; 67 — M1-4 24"X24"; M6-1 21"X15"

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED PROFESSIONAL ENGINEER

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

BU 67K

TCP PHASING DETAIL
PHASE 1, STAGE 2

SHEET 2 OF 9

FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	30
CONTROL	SECTION	JOB	
0079	04	049	

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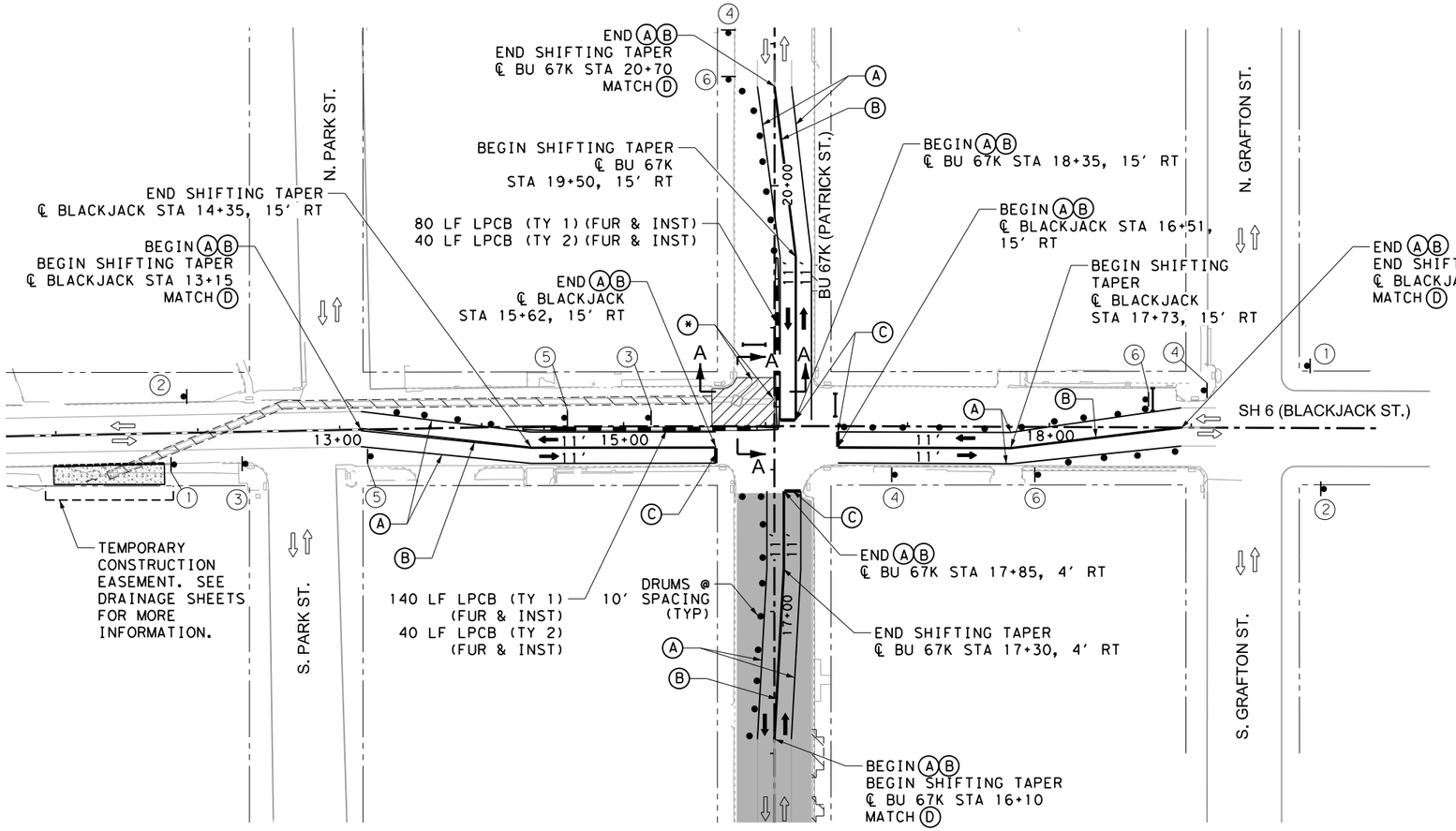
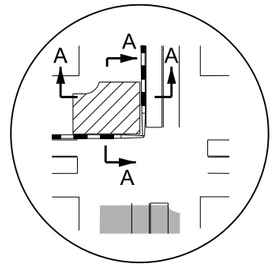




SECTION CUT DETAIL
N.T.S.

LEGEND

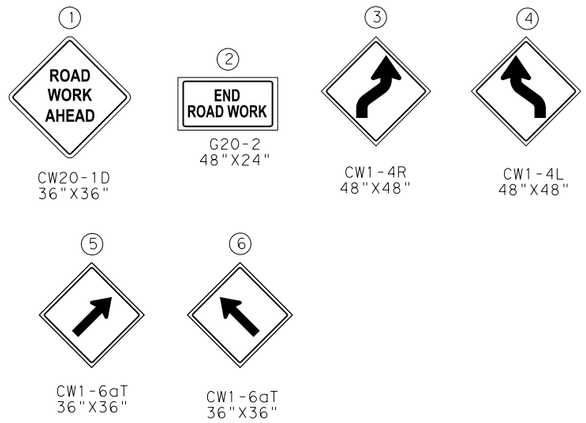
- EXIST R.O.W.
- PROP DIRECTION OF TRAVEL
- EXIST DIRECTION OF TRAVEL
- CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- CUT AND RESTORE
- PROP CONCRETE RIPRAP
- PROP SIGN
- DRUMS
- LOW PROFILE CONCRETE BARRIER (LPCB) TY 1
- LPCB END SECTION TY 2
- TYPE III BARRICADE
- (A) WK ZN PAV MRK REMOV (W) (4") (SLD)
- (B) WK ZN PAV MRK REMOV (Y) (4") (SLD) (DBL)
- (C) WK ZN PAV MRK REMOV (W) (24") (SLD)
- (D) EXIST/PREVIOUS STRIPING
- PCMS

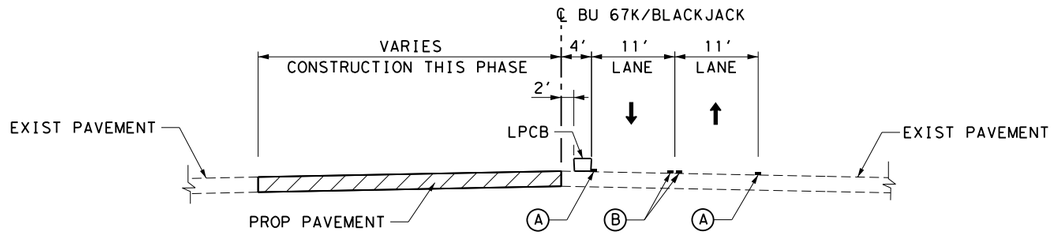
NOTES:

1. CUT AND RESTORE WORK SHALL BE PERFORMED AT NIGHTTIME, UNLESS OTHERWISE APPROVED BY THE ENGINEER. CONTRACTOR SHALL IMPLIMENT APPROPRIATE TCP STANDARDS FOR LANE CLOSURE AS NEEDED DURING THIS OPERATION.
2. REFER TO ROADWAY, TYPICAL SECTIONS, DRAINAGE AND TCP NARRATIVE SHEETS FOR MORE INFORMATION.

0 50' 100'

SCALE: 1" = 100'





SECTION A-A
N.T.S.

* CONTRACTOR SHALL CAP PARTIALLY CONSTRUCTED DRAINAGE SYSTEM UNTIL NEXT PHASE. THIS IS SUBSIDIARY TO VARIOUS BID ITEMS.

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED
PROFESSIONAL ENGINEER

Abulkhair M. Zobayed

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BU 67K

TCP PHASING DETAIL
PHASE 1, STAGE 3, STEP 1

SHEET 3 OF 9

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	31
CONTROL	SECTION	JOB	
0079	04	049	

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(NOTE 3)

℄ BU 67K

END (A)(B)
END SHIFTING TAPER
℄ BU 67K STA 20+70
MATCH (D)

BEGIN SHIFTING TAPER
℄ BU 67K STA 19+50, 15′ LT

80 LF LPCB (TY 1) (MOVE)
40 LF LPCB (TY 2) (MOVE)

BEGIN (A)(B)
℄ BU 67K STA 16+20, 15′ RT
(NOTE 3)

120 LF LPCB (TY 1) (MOVE)
40 LF LPCB (TY 2) (MOVE)

PREV PHASE TO REMAIN
END (A)(B)
END SHIFTING TAPER
℄ BLACKJACK STA 18+93
MATCH (D)
(NOTE 3)

PREV PHASE TO REMAIN
END SHIFTING TAPER
℄ BLACKJACK
STA 14+35, 15′ RT

BEGIN (A)(B)
℄ BU 67K
STA 18+36, 15′ LT

PREV PHASE TO REMAIN
END (A)(B)
℄ BLACKJACK,
STA 15+65, 15′ RT
(NOTE 3)

PREV PHASE TO REMAIN
BEGIN (A)(B)
BEGIN SHIFTING TAPER
℄ BLACKJACK STA 13+15
MATCH (D)
(NOTE 3)

PREV PHASE TO REMAIN
(A)

PREV PHASE TO REMAIN
(B)

N. PARK ST.

N. GRAFTON ST.

SH 6 (BLACKJACK ST.)

℄ BLACKJACK

13+00

15+00

19+00

11′

11′

20.00

TEMPORARY CONSTRUCTION EASEMENT. SEE DRAINAGE SHEETS FOR MORE INFORMATION.

PREV PHASE TO REMAIN
(A)

PREV PHASE TO REMAIN
(B)

PREV PHASE TO REMAIN
BEGIN SHIFTING TAPER ℄ BLACKJACK STA 17+73, 15′ RT

BU 67K (PATRICK ST.)

S. GRAFTON ST.

END (A)(B)
℄ BU 67K STA 17+95, 15′ LT

END SHIFTING TAPER
℄ BU 67K STA 17+30, 15′ LT

DRUMS @
10′ SPACING
(TYP)

BEGIN (A)(B)
BEGIN SHIFTING TAPER
℄ BU 67K STA 16+10
MATCH (D)

SECTION CUT DETAIL
N.T.S.

1 ROAD WORK AHEAD — CW20-1D 36"X36"

2 END ROAD WORK — G20-2 48"X24"

3 — CW1-4R 48"X48"

4 — CW1-4L 48"X48"

5 — CW1-6aT 36"X36"

6 — CW1-6aT 36"X36"

℄ BU 67K

11′ LANE | 11′ LANE | 4′ | VARIES CONSTRUCTION THIS PHASE

2′

LPCB

COMPLETED PAVEMENT

EXIST PAVEMENT

PROP PAVEMENT

SECTION A-A
N.T.S.

℄ BLACKJACK

VARIES CONSTRUCTION THIS PHASE | 4′ | 11′ LANE | 11′ LANE

2′

LPCB

EXIST PAVEMENT

EXIST PAVEMENT

PROP PAVEMENT

SECTION B-B
N.T.S.

* CONTRACTOR SHALL CAP PARTIALLY CONSTRUCTED DRAINAGE SYSTEM UNTIL NEXT PHASE. THIS IS SUBSIDIARY TO VARIOUS BID ITEMS.

\# CONTRACTOR SHALL COMPLETE CONSTRUCTION OF PARTIALLY CONSTRUCTED DRAINAGE SYSTEM FROM PREVIOUS PHASE. THIS IS SUBSIDIARY TO VARIOUS BID ITEMS.

LEGEND

- EXIST R.O.W.
- PROP DIRECTION OF TRAVEL
- EXIST DIRECTION OF TRAVEL
- CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- CUT AND RESTORE
- PROP CONCRETE RIPRAP
- PROP SIGN
- DRUMS
- LOW PROFILE CONCRETE BARRIER (LPCB) TY 1
- LPCB END SECTION TY 2
- TYPE III BARRICADE
- (A) WK ZN PAV MRK REMOV (W) (4") (SLD)
- (B) WK ZN PAV MRK REMOV (Y) (4") (SLD) (DBL)
- (C) WK ZN PAV MRK REMOV (W) (24") (SLD)
- (D) EXIST/PREVIOUS STRIPING
- PCMS

NOTES:

1. CUT AND RESTORE WORK SHALL BE PERFORMED AT NIGHTTIME, UNLESS OTHERWISE APPROVED BY THE ENGINEER. CONTRACTOR SHALL IMPLIMENT APPROPRIATE TCP STANDARDS FOR LANE CLOSURE AS NEEDED DURING THIS OPERATION.
2. REFER TO ROADWAY, TYPICAL SECTIONS, DRAINAGE AND TCP NARRATIVE SHEETS FOR MORE INFORMATION.
3. TEMPORARY WORK ZONE STRIPING ALONG BLACKJACK (SH 6) IS SHOWN AND WILL BE NEEDED IF THE STRIPING FROM PREVIOUS PHASE (P1S3ST1) IS DAMAGED AND TO ADJUST STRIPING AT THE INTERSECTION AS SHOWN IN THE PLAN.

0 50′ 100′
SCALE: 1" = 100′

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED PROFESSIONAL ENGINEER

7/13/2024

NO.	DATE	REVISION	APPROVED

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BU 67K

TCP PHASING DETAIL
PHASE 1, STAGE 3, STEP 2

SHEET 4 OF 9

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	32
CONTROL	SECTION	JOB	
0079	04	049	

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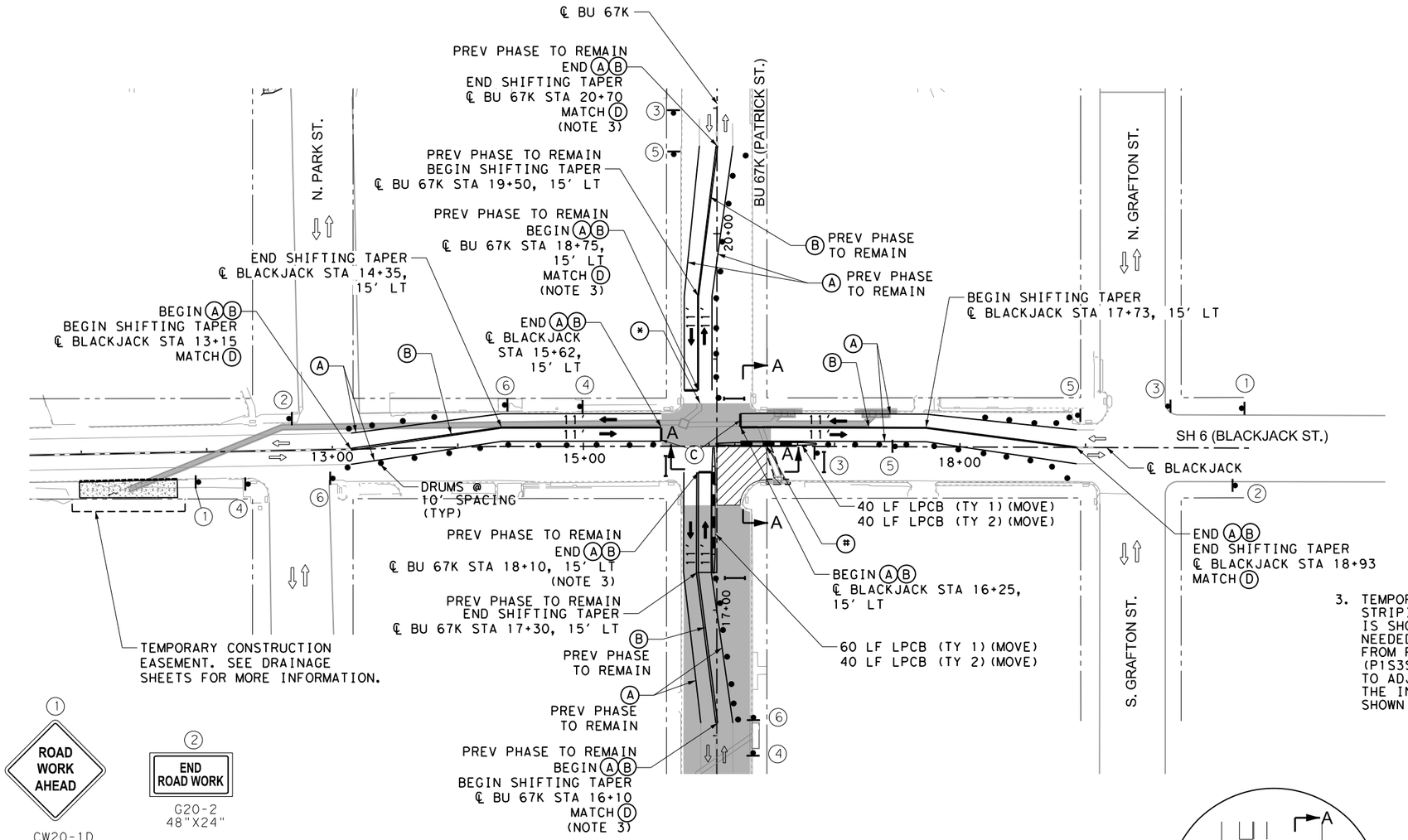
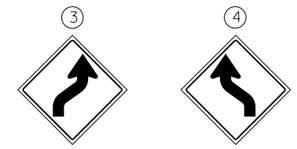
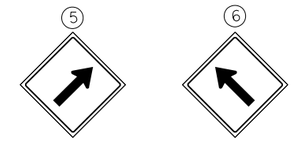


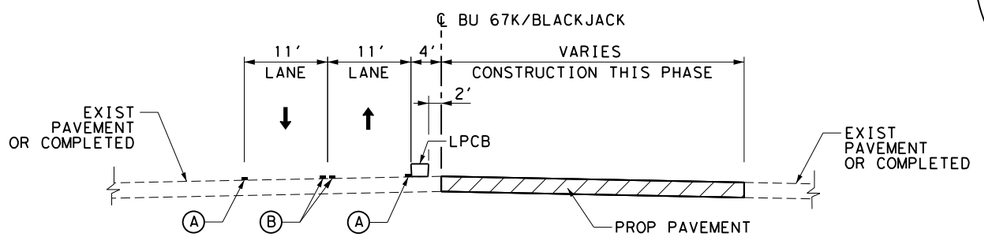
NOTES:

1. CUT AND RESTORE WORK SHALL BE PERFORMED AT NIGHTTIME, UNLESS OTHERWISE APPROVED BY THE ENGINEER. CONTRACTOR SHALL IMPLIMENT APPROPRIATE TCP STANDARDS FOR LANE CLOSURE AS NEEDED DURING THIS OPERATION.
2. REFER TO ROADWAY, TYPICAL SECTIONS, DRAINAGE AND TCP NARRATIVE SHEETS FOR MORE INFORMATION.
3. TEMPORARY WORK ZONE STRIPING ALONG BU 67K IS SHOWN AND WILL BE NEEDED IF THE STRIPING FROM PREVIOUS PHASE (P1S3ST2) IS DAMAGED AND TO ADJUST STRIPING AT THE INTERSECTION AS SHOWN IN THE PLAN.

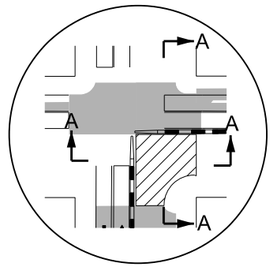
0 50' 100'
SCALE: 1" = 100'







SECTION A-A
N.T.S.



SECTION CUT DETAIL
N.T.S.

* CONTRACTOR SHALL CAP PARTIALLY CONSTRUCTED DRAINAGE SYSTEM UNTIL NEXT PHASE. THIS IS SUBSIDIARY TO VARIOUS BID ITEMS.

\# CONTRACTOR SHALL COMPLETE CONSTRUCTION OF PARTIALLY CONSTRUCTED DRAINAGE SYSTEM FROM PREVIOUS PHASE. THIS IS SUBSIDIARY TO VARIOUS BID ITEMS.

STATE OF TEXAS
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LICENSED PROFESSIONAL ENGINEER

7/13/2024

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BU 67K

TCP PHASING DETAIL
PHASE 1, STAGE 3, STEP 3

SHEET 5 OF 9

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	33
CONTROL	SECTION	JOB	
0079	04	049	

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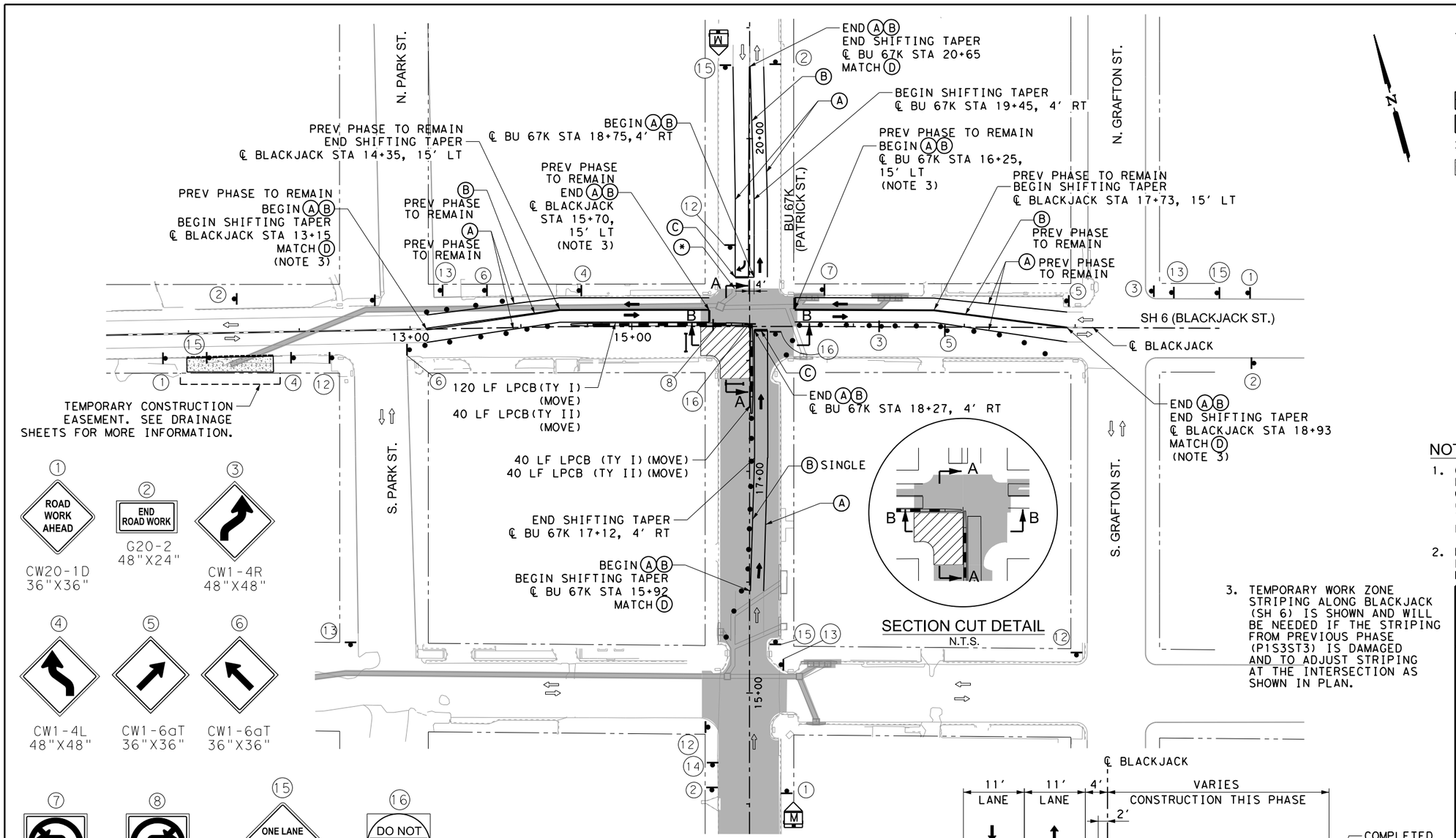
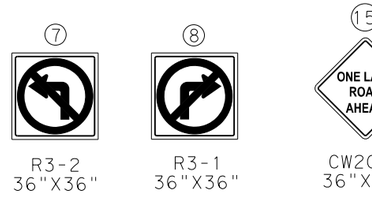
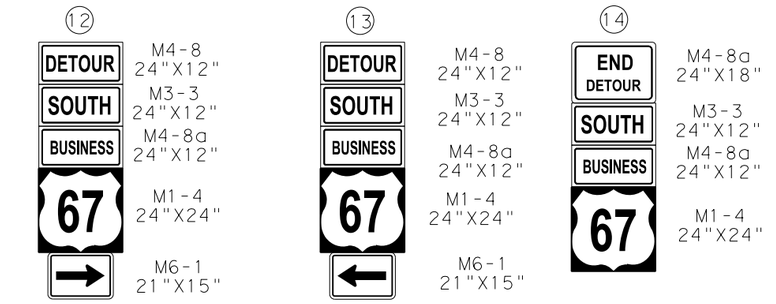
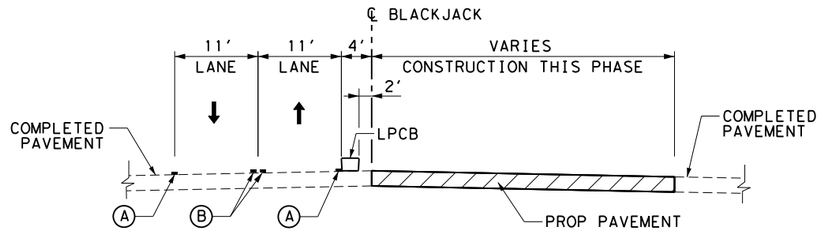


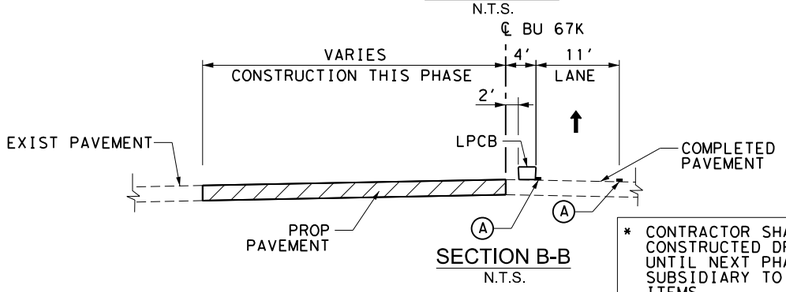




SECTION CUT DETAIL
N.T.S.



SECTION A-A
N.T.S.



SECTION B-B
N.T.S.

* CONTRACTOR SHALL CAP PARTIALLY CONSTRUCTED DRAINAGE SYSTEM UNTIL NEXT PHASE. THIS IS SUBSIDIARY TO VARIOUS BID ITEMS.

LEGEND

- EXIST R.O.W.
- PROP DIRECTION OF TRAVEL
- EXIST DIRECTION OF TRAVEL
- CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- CUT AND RESTORE
- PROP CONCRETE RIPRAP
- PROP SIGN
- DRUMS
- LOW PROFILE CONCRETE BARRIER (LPCB) TY 1
- LPCB END SECTION TY 2
- TYPE III BARRICADE
- (A) WK ZN PAV MRK REMOV (W) (4") (SLD)
- (B) WK ZN PAV MRK REMOV (Y) (4") (SLD) (DBL)
- (C) WK ZN PAV MRK REMOV (W) (24") (SLD)
- (D) EXIST/PREVIOUS STRIPING
- PCMS

NOTES:

1. CUT AND RESTORE WORK SHALL BE PERFORMED AT NIGHTTIME, UNLESS OTHERWISE APPROVED BY THE ENGINEER. CONTRACTOR SHALL IMPLIMENT APPROPRIATE TCP STANDARDS FOR LANE CLOSURE AS NEEDED DURING THIS OPERATION.
2. REFER TO ROADWAY, TYPICAL SECTIONS, DRAINAGE AND TCP NARRATIVE SHEETS FOR MORE INFORMATION.
3. TEMPORARY WORK ZONE STRIPING ALONG BLACKJACK (SH 6) IS SHOWN AND WILL BE NEEDED IF THE STRIPING FROM PREVIOUS PHASE (P1S3ST3) IS DAMAGED AND TO ADJUST STRIPING AT THE INTERSECTION AS SHOWN IN PLAN.

0 50' 100'
SCALE: 1" = 100'

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED
PROFESSIONAL ENGINEER
Abulkhair M. Zobayed
7/13/2024

NO.	DATE	REVISION	APPROVED

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BU 67K

TCP PHASING DETAIL
PHASE 1, STAGE 3, STEP 4

SHEET 6 OF 9

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	34
CONTROL	SECTION	JOB	
0079	04	049	

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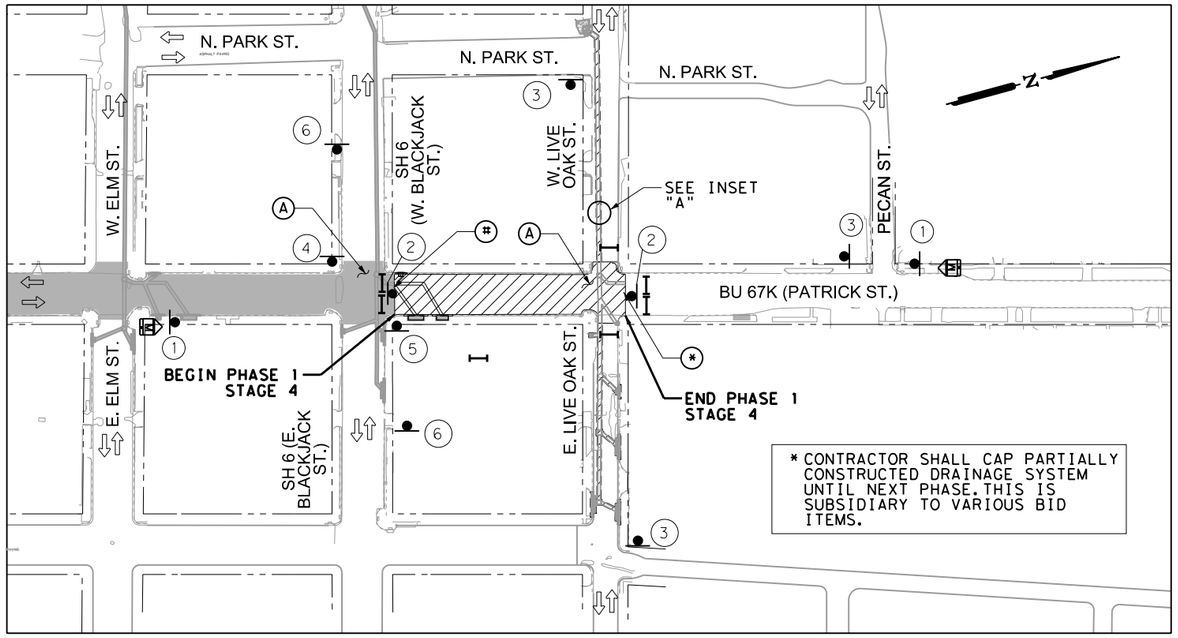
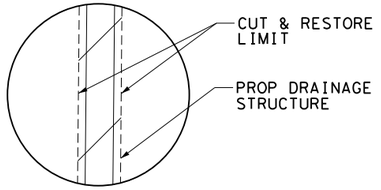
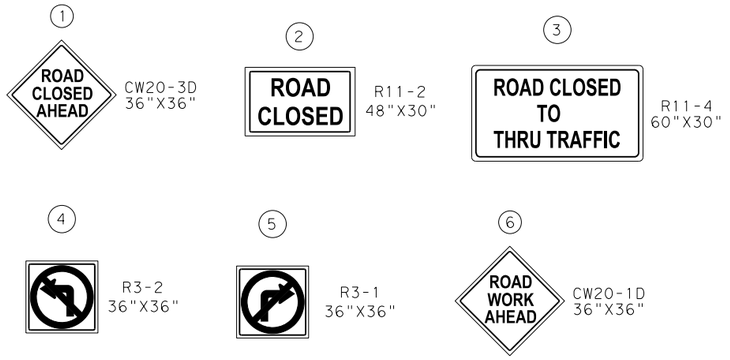


PHASE 1 STAGE 4 CONSTRUCTION LIMITS



INSET "A"

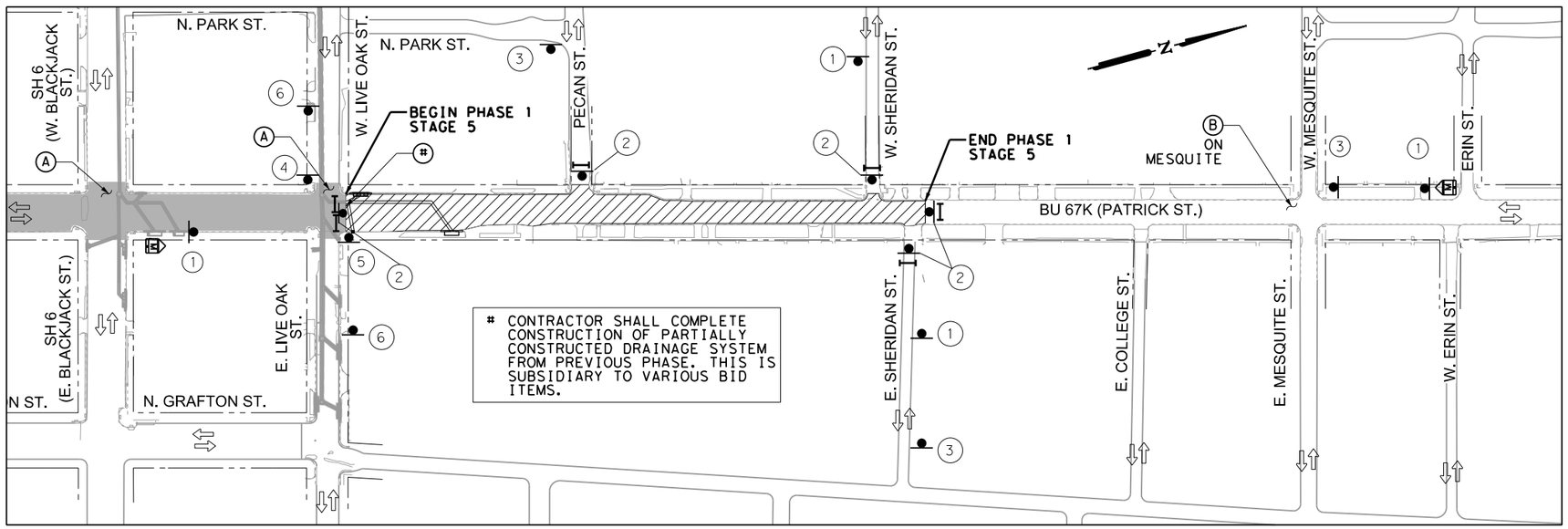


LEGEND

- CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- CUT & RESTORE
- EXIST R.O.W.
- TYPE III BARRICADE
- CONSTRUCTION SIGN
- PORTABLE CHANGEABLE MESSAGE SIGN
- EXISTING DIRECTION OF TRAFFIC
- DETOUR ROUTE
- (A) SIGNALIZED INTERSECTION (EXIST)
- (B) ONE WAY STOP CONTROLLED (EXIST)
- (C) FOUR WAY STOP CONTROLLED (EXIST)

NOTES:

1. SEE TCP ADVANCE WARNING SIGNS SHEET FOR ADDITIONAL SIGNS.
2. SEE TXDOT BC STANDARDS FOR SIGN SPACING AND OTHER SIGNS. ADJUST SIGN LOCATION AND SPACING, IF NEEDED BECAUSE OF FIELD CONDITION, PER ENGINEER'S APPROVAL.
3. REFER TO DRAINAGE SHEETS FOR MORE INFORMATION.
4. REFER TO "TCP DETOUR - PHASE 1 STEP 4 THRU 9" SHEETS FOR DETOUR INFORMATION.



PHASE 1 STAGE 5 CONSTRUCTION LIMITS

SCALE = N.T.S

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED PROFESSIONAL ENGINEER

Abulkhair M. Zobayed

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TCP PHASING DETAIL
PHASE 1, STAGES 4 & 5

SHEET 7 OF 9

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	35
CONTROL	SECTION	JOB	
0079	04	049	

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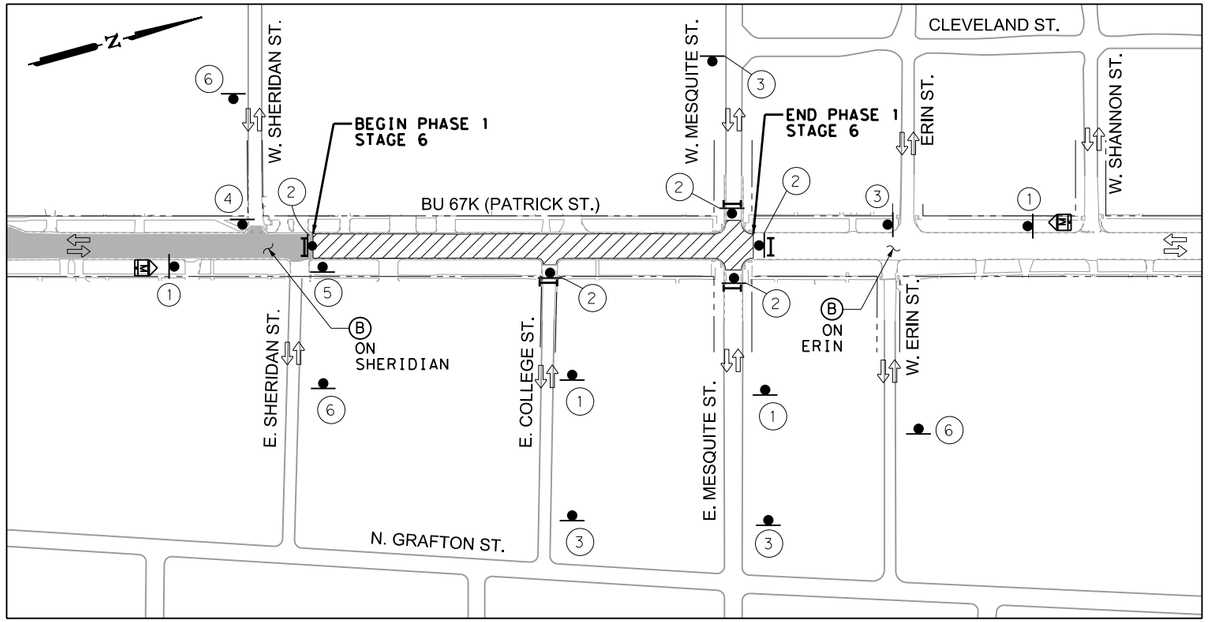
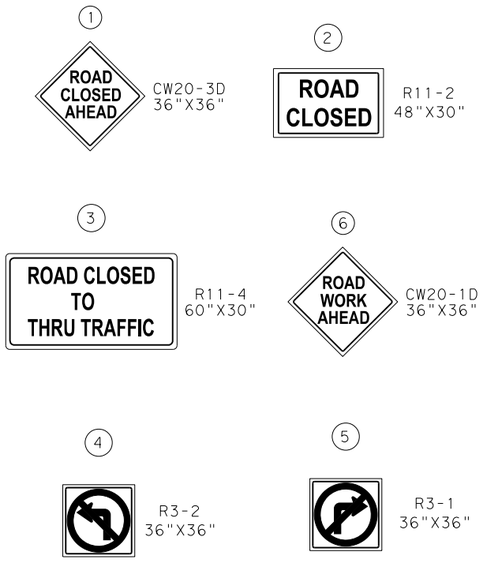


PHASE 1 STAGE 6 CONSTRUCTION LIMITS

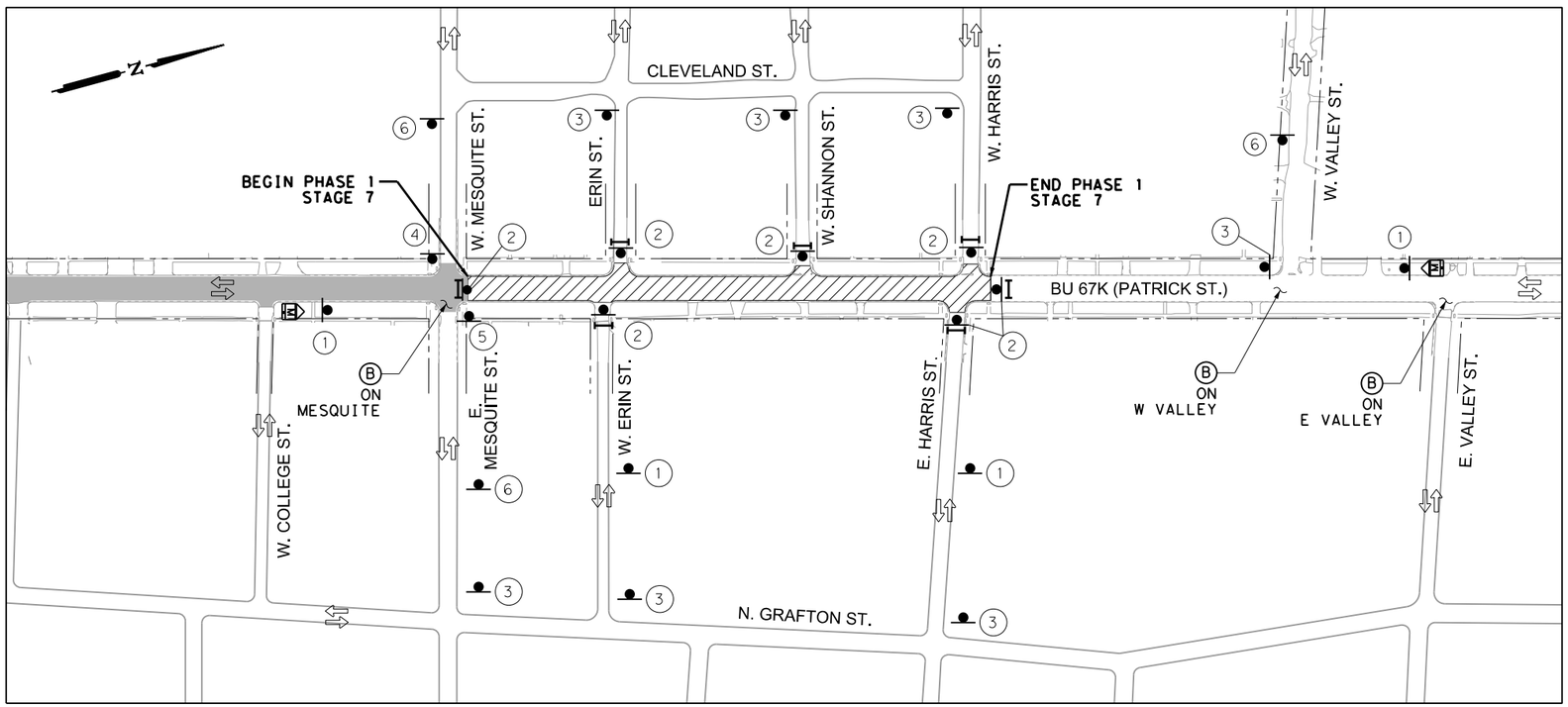


LEGEND

- CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- CUT & RESTORE
- EXIST R.O.W.
- TYPE III BARRICADE
- CONSTRUCTION SIGN
- PORTABLE CHANGEABLE MESSAGE SIGN
- EXISTING DIRECTION OF TRAFFIC
- DETOUR ROUTE
- (A) SIGNALIZED INTERSECTION (EXIST)
- (B) ONE WAY STOP CONTROLLED (EXIST)
- (C) FOUR WAY STOP CONTROLLED (EXIST)

NOTES:

1. SEE TCP ADVANCE WARNING SIGNS SHEET FOR ADDITIONAL SIGNS.
2. SEE TXDOT BC STANDARDS FOR SIGN SPACING AND OTHER SIGNS. ADJUST SIGN LOCATION AND SPACING, IF NEEDED BECAUSE OF FIELD CONDITION, PER ENGINEER'S APPROVAL.
3. REFER TO DRAINAGE SHEETS FOR MORE INFORMATION.
4. REFER TO "TCP DETOUR - PHASE 1 STEP 4 THRU 9" SHEETS FOR DETOUR INFORMATION.



PHASE 1 STAGE 7 CONSTRUCTION LIMITS

SCALE = N.T.S

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED
PROFESSIONAL ENGINEER

Abulkhair M. Zobayed

7/13/2024

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Texas Department of Transportation

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TCP PHASING DETAIL
PHASE 1, STAGES 6 & 7

SHEET 8 OF 9

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	36
CONTROL	SECTION	JOB	
0079	04	049	

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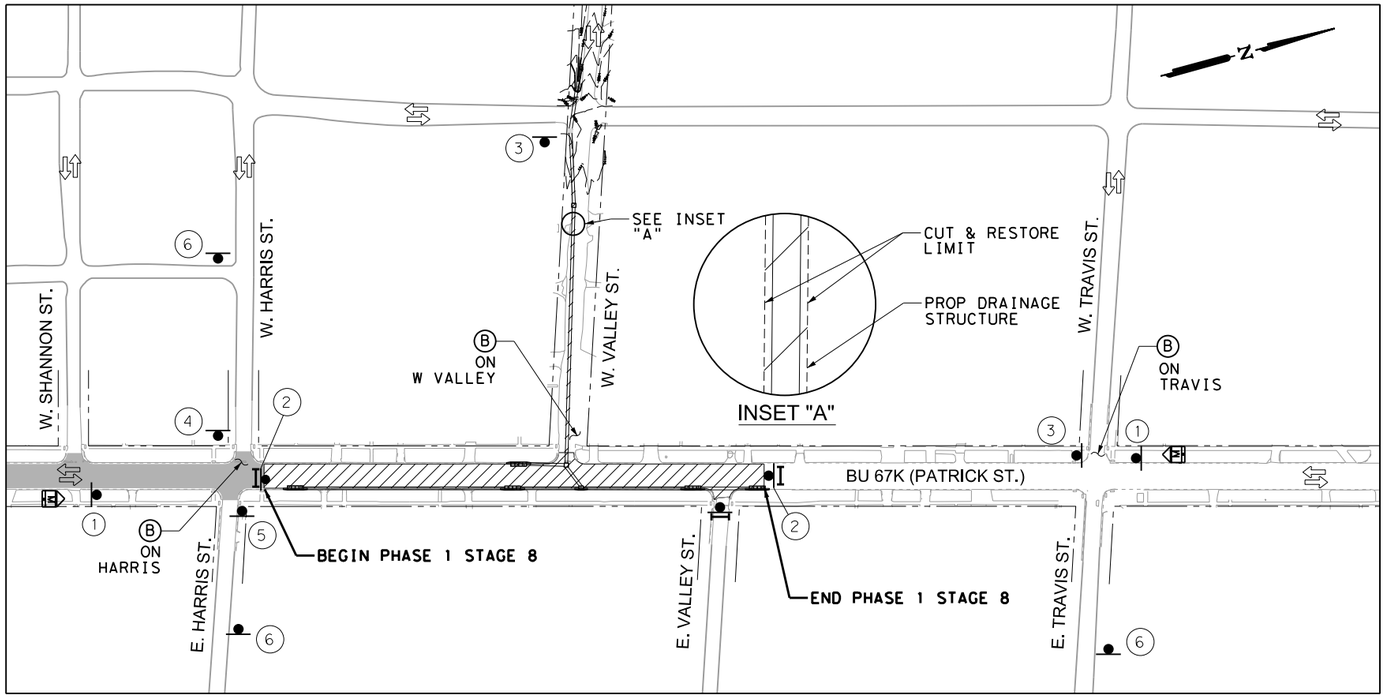
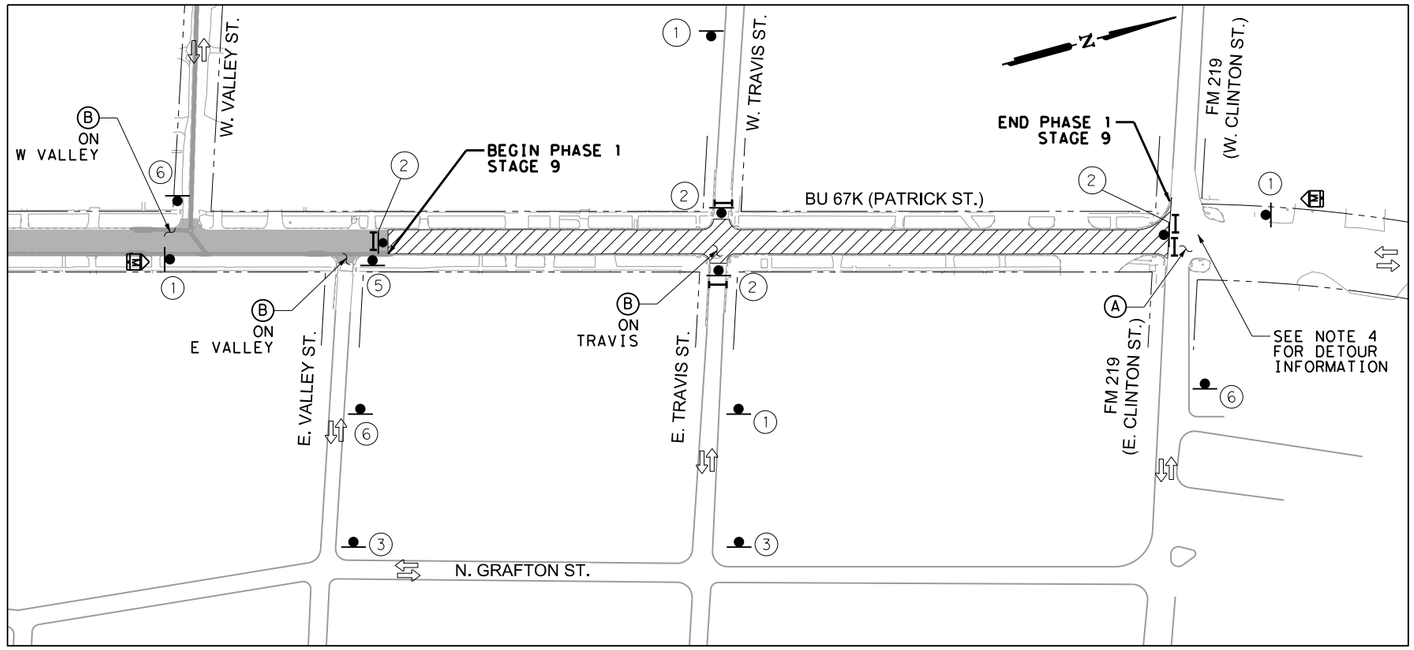


PHASE 1 STAGE 8 CONSTRUCTION LIMITS



PHASE 1 STAGE 9 CONSTRUCTION LIMITS

1 ROAD CLOSED AHEAD CW20-3D 36"X36"

2 ROAD CLOSED R11-2 48"X30"

3 ROAD CLOSED TO THRU TRAFFIC R11-4 60"X30"

6 ROAD WORK AHEAD CW20-1D 36"X36"

4 R3-2 36"X36"

5 R3-1 36"X36"

LEGEND

- CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- CUT & RESTORE
- EXIST R.O.W.
- TYPE III BARRICADE
- CONSTRUCTION SIGN
- PORTABLE CHANGEABLE MESSAGE SIGN
- EXISTING DIRECTION OF TRAFFIC
- DETOUR ROUTE
- (A) SIGNALIZED INTERSECTION (EXIST)
- (B) ONE WAY STOP CONTROLLED (EXIST)
- (C) FOUR WAY STOP CONTROLLED (EXIST)

NOTES:

1. SEE TCP ADVANCE WARNING SIGNS SHEET FOR ADDITIONAL SIGNS.
2. SEE TXDOT BC STANDARDS FOR SIGN SPACING AND OTHER SIGNS. ADJUST SIGN LOCATION AND SPACING, IF NEEDED BECAUSE OF FIELD CONDITION, PER ENGINEER'S APPROVAL.
3. REFER TO DRAINAGE SHEETS FOR MORE INFORMATION.
4. REFER TO "TCP DETOUR - PHASE 1 STEP 4 THRU 9" SHEETS FOR DETOUR INFORMATION.

SCALE = N.T.S

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED PROFESSIONAL ENGINEER

Abulkhair M. Zobayed

7/13/2024

NO.	DATE	REVISION	APPROVED

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Texas Department of Transportation

BU 67K

TCP PHASING DETAIL
PHASE 1, STAGES 8 & 9

SHEET 9 OF 9

FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	37
CONTROL	SECTION	JOB	
0079	04	049	

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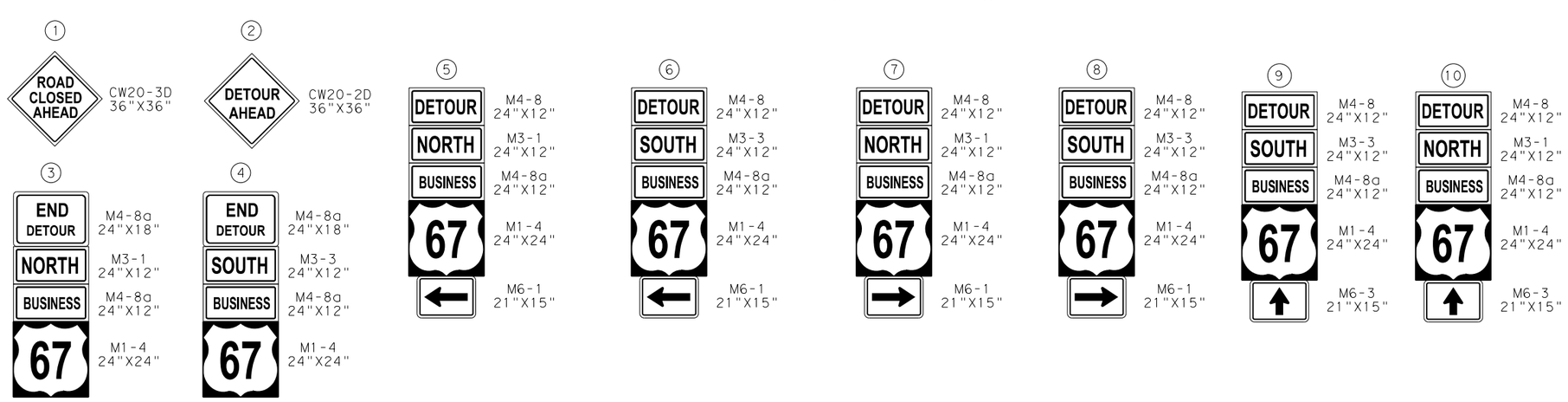
LEGEND

- CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- EXIST R.O.W.
- TYPE III BARRICADE
- CONSTRUCTION SIGN
- PORTABLE CHANGEABLE MESSAGE SIGN
- EXISTING DIRECTION OF TRAFFIC
- DETOUR ROUTE

NOTES:

1. SEE TCP ADVANCE WARNING SIGNS SHEET FOR ADDITIONAL SIGNS.
2. SEE TXDOT BC STANDARDS FOR SIGN SPACING AND OTHER SIGNS. ADJUST SIGN LOCATION AND SPACING, IF NEEDED BECAUSE OF FIELD CONDITION, PER ENGINEER'S APPROVAL.
3. REFER TO DRAINAGE SHEETS FOR MORE INFORMATION.
4. REFER TO "TCP PHASING DETAILS" SHEETS FOR DETAILED INFORMATION ON CONSTRUCTION LIMITS AND MORE INFORMATION.
5. IF REQUIRED BY THE ENGINEER, FOR THIS SIGN WHERE IT SAYS "(RD / ST NAME)", USE APPROPRIATE ROAD OR STREET NAMES MATCHING ROAD/STREET CLOSURES SHOWN IN DIFFERENT CONSTRUCTION PHASES.

SCALE = N.T.S



STATE OF TEXAS
ABULKHAIR M. ZOBAYED
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Abulkhair M. Zobayed

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BU 67K

TCP DETOUR
PHASE 1, STEP 4 THRU 9

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	38
CONTROL	SECTION	JOB	
0079	04	049	

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DATE:
FILE:

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

1. The Barricade and Construction Standard Sheets (BC sheets) are intended to show typical examples for placement of temporary traffic control devices, construction pavement markings, and typical work zone signs. The information contained in these sheets meet or exceed the requirements shown in the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).

2. The development and design of the Traffic Control Plan (TCP)is the responsibility of the Engineer.

3. The Contractor may propose changes to the TCP that are signed and sealed by a licensed professional engineer for approval. The Engineer may develop, sign and seal Contractor proposed changes.

4. The Contractor is responsible for installing and maintaining the traffic control devices as shown in the plans. The Contractor may not move or change the approximate location of any device without the approval of the Engineer.

5. Geometric design of lane shifts and detours should, when possible, meet the applicable design criteria contained in manuals such as the American Association of State Highway and Transportation Officials (AASHTO), "A Policy on Geometric Design of Highways and Streets," the TxDOT "Roadway Design Manual" or engineering judgment.

6. When projects abut, the Engineer(s) may omit the END ROAD WORK, TRAFFIC FINES DOUBLE, and other advance warning signs if the signing would be redundant and the work areas appear continuous to the motorists. If the adjacent project is completed first, the Contractor shall erect the necessary warning signs as shown on these sheets, the TCP sheets or as directed by the Engineer. The BEGIN ROAD WORK NEXT X MILES sign shall be revised to show appropriate work zone distance.

7. The Engineer may require duplicate warning signs on the median side of divided highways where median width will permit and traffic volumes justify the signing.

8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.

9. The temporary traffic control devices shown in the illustrations of the BC sheets are examples. As necessary, the Engineer will determine the most appropriate traffic control devices to be used.

10. Where highway construction or maintenance work is being undertaken, other than mobile operations as defined by the Texas Manual on Uniform Traffic Control Devices, CSJ limit signs are required. CSJ limit signs are shown on BC(2). The OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits. For mobile operations, CSJ limit signs are not required.

11. Traffic control devices should be in place only while work is actually in progress or a definite need exists.

12. The Engineer has the final decision on the location of all traffic control devices.

13. Inactive equipment and work vehicles, including workers' private vehicles must be parked away from travel lanes. They should be as close to the right-of-way line as possible, or located behind a barrier or guardrail, or as approved by the Engineer.

WORKER SAFETY NOTES:

1. Workers on foot who are exposed to traffic or to construction equipment within the right-of-way shall wear high-visibility safety apparel meeting the requirements of ISEA "American National Standard for High-Visibility Apparel," or equivalent revisions, and labeled as ANSI 107-2004 standard performance for Class 2 or 3 risk exposure. Class 3 garments should be considered for high traffic volume work areas or night time work.

2. Except in emergency situations, flagger stations shall be illuminated when flagging is used at night.

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

1. Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources.

2. Work zone traffic control devices shall be compliant with the Manual for Assessing safety Hardware (MASH).

THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT http://www.txdot.gov
COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)
MATERIAL PRODUCER LIST (MPL)
ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS)"
STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS (SHSD)
TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD)
TRAFFIC ENGINEERING STANDARD SHEETS

Texas Department of Transportation

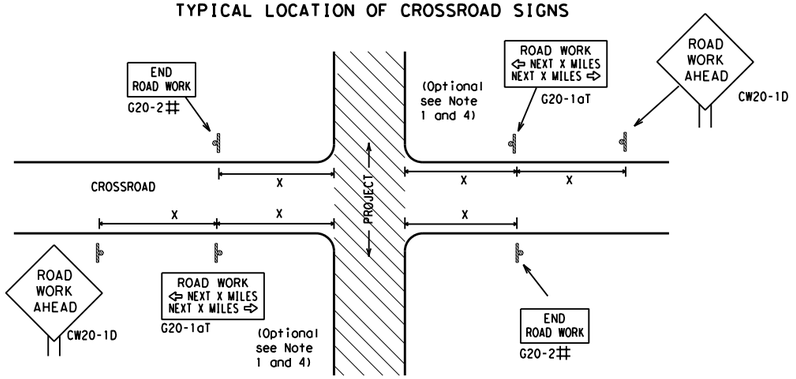
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13 9-07 8-14 5-10 5-21	0079	04	049	BU 67K
	DIST	COUNTY		SHEET NO.
	FTW	ERATH		39

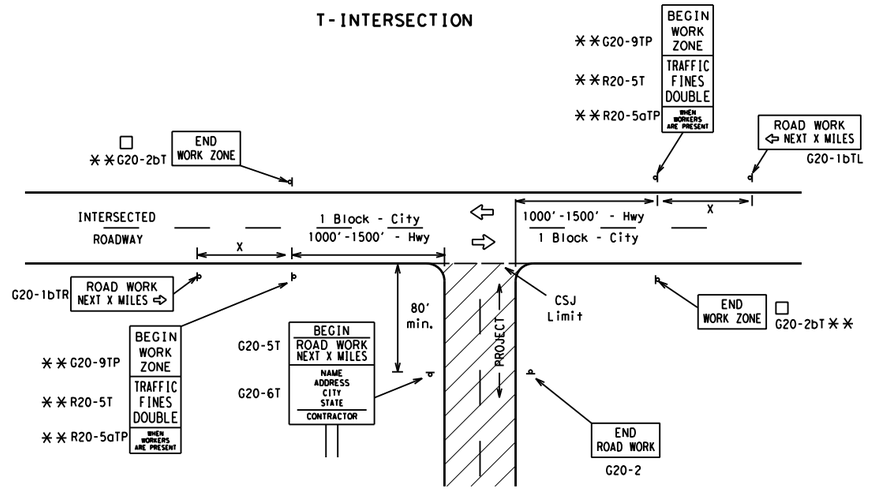
TYPICAL LOCATION OF CROSSROAD SIGNS



May be mounted on back of "ROAD WORK AHEAD"(CW20-1D) sign with approval of Engineer. (See note 2 below)

1. The typical minimum signing on a crossroad approach should be a "ROAD WORK AHEAD" (CW20-1D)sign and a (G20-2) "END ROAD WORK" sign, unless noted otherwise in plans.
2. The Engineer may use the reduced size 36" x 36" ROAD WORK AHEAD (CW20-1D) sign mounted back to back with the reduced size 36" x 18" "END ROAD WORK"(G20-2) sign on low volume crossroads (see Note 4 under "Typical Construction Warning Sign Size and Spacing"). See the "Standard Highway Sign Designs for Texas" manual for sign details. The Engineer may omit the advance warning signs on low volume crossroads. The Engineer will determine whether a road is low volume as per TMUTCD Part 5. This information shall be shown in the plans.
3. Based on existing field conditions, the Engineer/Inspector may require additional signs such as FLAGGER AHEAD, LOOSE GRAVEL, or other appropriate signs. When additional signs are required, these signs will be considered part of the minimum requirements. The Engineer/Inspector will determine the proper location and spacing of any sign not shown on the BC sheets, Traffic Control Plan sheets or the Work Zone Standard Sheets.
4. The "ROAD WORK NEXT X MILES"(G20-1aT)sign shall be required at high volume crossroads to advise motorists of the length of construction in either direction from the intersection. The Engineer will determine whether a roadway is considered high volume.
5. Additional traffic control devices may be shown elsewhere in the plans for higher volume crossroads.
6. When work occurs in the intersection area, appropriate traffic control devices, as shown elsewhere in the plans or as determined by the Engineer/Inspector, shall be in place.

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

1. The Engineer will determine the types and location of any additional traffic control devices, such as a flagger and accompanying signs, or other signs, that should be used when work is being performed at or near an intersection.
2. If construction closes the road at a T-intersection, the Contractor shall place the "CONTRACTOR NAME"(G20-6T) sign behind the Type 3 Barricades for the road closure (see BC(10) also). The "ROAD WORK NEXT X MILES" left arrow(G20-1bTL) and "ROAD WORK NEXT X MILES" right arrow (G20-1bTR)" signs shall be replaced by the detour signing called for in the plans.

TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING[1,5,6]

SIZE

Sign Number or Series	Conventional Road	Expressway/ Freeway
CW20[4] CW21 CW22 CW23 CW25	48" x 48"	48" x 48"
CW1, CW2, CW7, CW8, CW9, CW11, CW14	36" x 36"	48" x 48"
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48" x 48"	48" x 48"

SPACING

Posted Speed	Sign △ Spacing "X"
MPH	Feet (Apprx.)
30	120
35	160
40	240
45	320
50	400
55	500[2]
60	600[2]
65	700[2]
70	800[2]
75	900[2]
80	1000[2]
*	*[3]

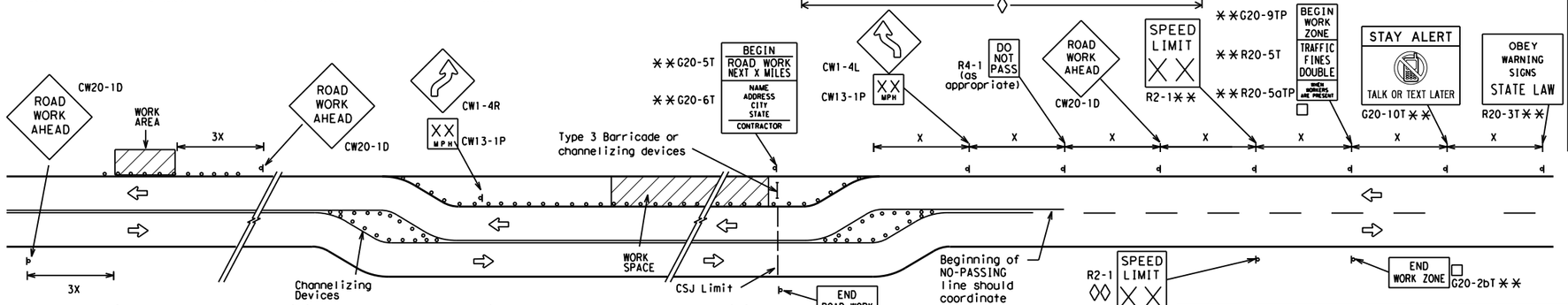
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

△ Minimum distance from work area to first Advance Warning sign nearest the work area and/or distance between each additional sign.

GENERAL NOTES

1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may be used on low volume crossroads at the discretion of the Engineer as per TMUTCD Part 5. See Note 2 under "Typical Location of Crossroad Signs".
5. Only diamond shaped warning sign sizes are indicated.
6. See sign size listing in "TMUTCD", Sign Appendix or the "Standard Highway Sign Designs for Texas" manual for complete list of available sign design sizes.

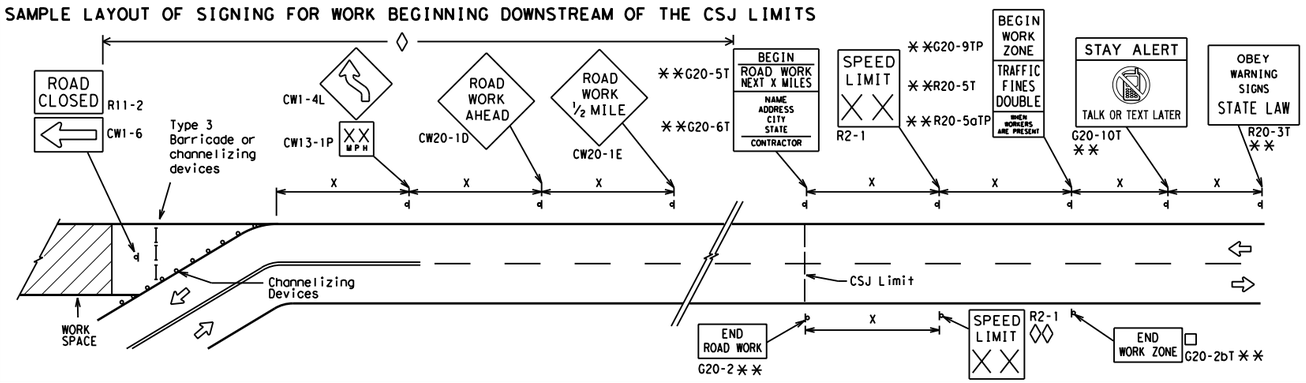
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing of signs and channelizing devices.

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING DOWNSTREAM OF THE CSJ LIMITS



NOTES

The Contractor shall determine the appropriate distance to be placed on the G20-1 series signs and "BEGIN ROAD WORK NEXT X MILES"(G20-5T)sign for each specific project. This distance shall replace the "X" and shall be rounded to the nearest whole mile with the approval of the Engineer. No decimals shall be used.

□ The "BEGIN WORK ZONE"(G20-9TP) and "END WORK ZONE" (G20-2bT) shall be used as shown on the sample layout when advance signs are required outside the CSJ Limits. They inform the motorist of entering or leaving a part of the work zone lying outside the CSJ Limits where traffic fines may double if workers are present.

** CSJ limit signing is required for highway construction and maintenance work, with the exception of mobile operations.

◊ Area for placement of "ROAD WORK AHEAD" (CW20-1D)sign and other signs or devices as called for on the Traffic Control Plan.

◊◊ Contractor will install a regulatory speed limit sign at the end of the work zone.

LEGEND	
⊢⊣	Type 3 Barricade
○ ○ ○	Channelizing Devices
▬	Sign
X	See Typical Construction Warning Sign Size and Spacing chart or the TMUTCD for sign spacing requirements.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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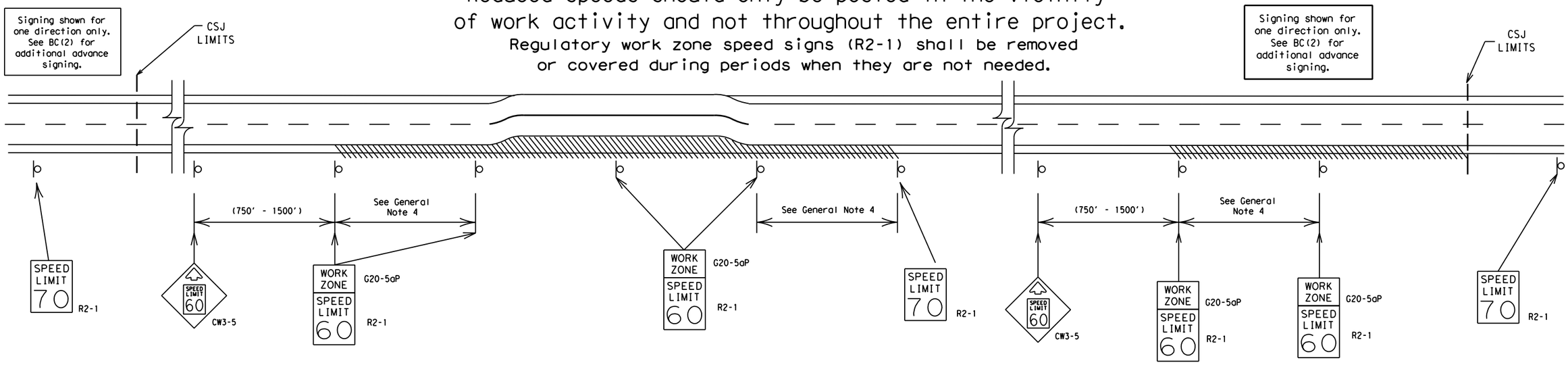
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

Work zone speed limits shall be regulatory, established in accordance with the "Procedures for Establishing Speed Zones," and approved by the Texas Transportation Commission, or by City Ordinance when within Incorporated City Limits.

Reduced speeds should only be posted in the vicinity of work activity and not throughout the entire project.

Regulatory work zone speed signs (R2-1) shall be removed or covered during periods when they are not needed.



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit should be included on the design of the traffic control plans when restricted geometrics with a lower design speed are present in the work zone and modification of the geometrics to a higher design speed is not feasible.

Long/Intermediate Term Work Zone Speed Limit signs, when approved as described above, should be posted and visible to the motorist when work activity is present. Work activity may also be defined as a change in the roadway that requires a reduced speed for motorists to safely negotiate the work area, including:

a) rough road or damaged pavement surface
b) substantial alteration of roadway geometrics (diversions)
c) construction detours
d) grade
e) width
f) other conditions readily apparent to the driver

As long as any of these conditions exist, the work zone speed limit signs should remain in place.

SHORT TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit may be included on the design of the traffic control plans when workers or equipment are not behind concrete barrier, when work activity is within 10 feet of the traveled way or actually in the traveled way.

Short Term Work Zone Speed Limit signs should be posted and visible to the motorists only when work activity is present. When work activity is not present, signs shall be removed or covered.
(See Removing or Covering on BC(4)).

GENERAL NOTES

1. Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
2. Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
3. Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
4. Frequency of work zone speed limit signs should be:
   40 mph and greater 0.2 to 2 miles
   35 mph and less 0.2 to 1 mile
5. Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
6. Fabrication, erection and maintenance of the"ADVANCE SPEED LIMIT"(CW3-5)sign, "WORK ZONE"(G20-5aP) plaque and the "SPEED LIMIT"(R2-1)signs shall not be paid for directly, but shall be considered subsidiary to Item 502.
7. Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
8. Techniques that may help reduce traffic speeds include but are not limited to:
   A. Law enforcement.
   B. Flagger stationed next to sign.
   C. Portable changeable message sign (PCMS).
   D. Low-power (drone) radar transmitter.
   E. Speed monitor trailers or signs.
9. Speeds shown on details above are for illustration only. Work Zone Speed Limits should only be posted as approved for each project.
10. For more specific guidance concerning the type of work, work zone conditions and factors impacting allowable regulatory construction speed zone reduction see TxDOT form #1204 in the TxDOT e-form system.

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

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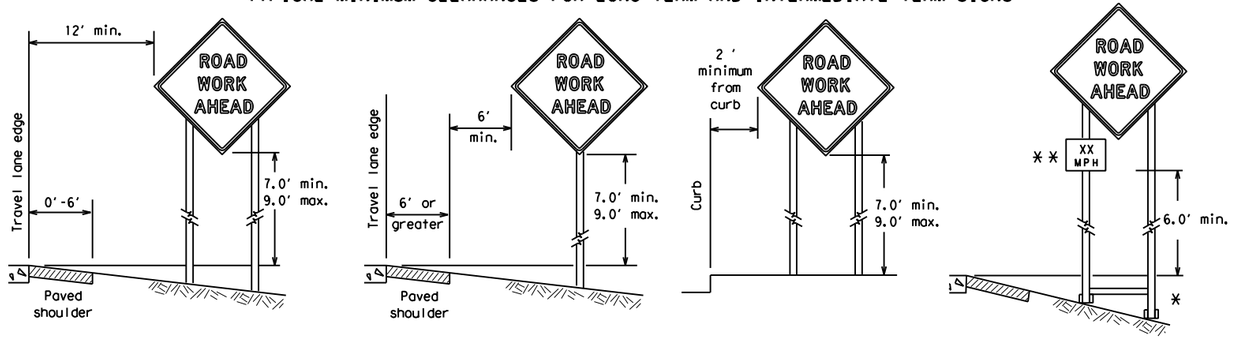
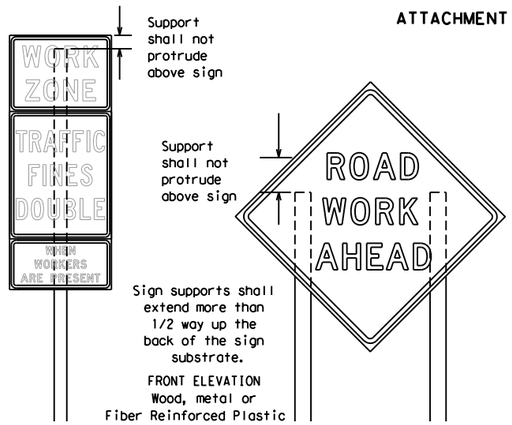
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

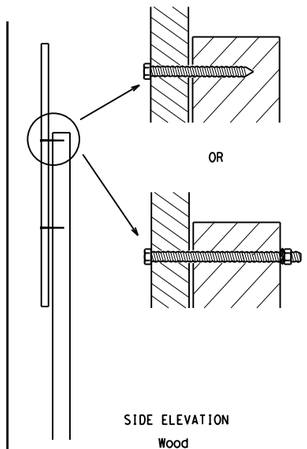


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

** When plaques are placed on dual-leg supports, they should be attached to the upright nearest the travel lane. Supplemental plaques (advisory or distance) should not cover the surface of the parent sign.

ATTACHMENT FOR SIGN SUPPORTS





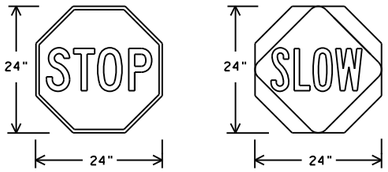
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

Nails shall NOT be allowed. Each sign shall be attached directly to the sign support. Multiple signs shall not be joined or spliced by any means. Wood supports shall not be extended or repaired by splicing or other means.

Splicing embedded perforated square metal tubing in order to extend post height will only be allowed when the splice is made using four bolts, two above and two below the spice point. Splice must be located entirely behind the sign substrate, not near the base of the support. Splice insert lengths should be at least 5 times nominal post size, centered on the splice and of at least the same gauge material.

STOP/SLOW PADDLES

1. STOP/SLOW paddles are the primary method to control traffic by flaggers. The STOP/SLOW paddle size should be 24" x 24".
2. STOP/SLOW paddles shall be retroreflectorized when used at night.
3. STOP/SLOW paddles may be attached to a staff with a minimum length of 6' to the bottom of the sign.
4. Any lights incorporated into the STOP or SLOW paddle faces shall only be as specifically described in Section 6E.03 Hand Signaling Devices in the TMUTCD.



Background - Red
Legend & Border - White

Background - Orange
Legend & Border - Black

SHEETING REQUIREMENTS (WHEN USED AT NIGHT)		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	ORANGE	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDER	WHITE	TYPE B OR C SHEETING
LEGEND & BORDER	BLACK	ACRYLIC NON-REFLECTIVE FILM

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

1. Permanent signs are used to give notice of traffic laws or regulations, call attention to conditions that are potentially hazardous to traffic operations, show route designations, destinations, directions, distances, services, points of interest, and other geographical, recreational, specific service (LOGO), or cultural information. Drivers proceeding through a work zone need the same, if not better route guidance as normally installed on a roadway without construction.
2. When permanent regulatory or warning signs conflict with work zone conditions, remove or cover the permanent signs until the permanent sign message matches the roadway condition. For details for covering large guide signs see the TS-CD standard.
3. When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
4. If existing signs are to be relocated on their original supports, they shall be installed on crashworthy bases as shown on the SMD Standard sheets. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards. This work should be paid for under the appropriate pay item for relocating existing signs.
5. If permanent signs are to be removed and relocated using temporary supports, the Contractor shall use crashworthy supports as shown on the BC standard sheets, TLRS standard sheets or the CWZTCD list. The signs shall meet the required mounting heights shown on the BC, or the SMD standard sheets during construction. This work should be paid for under the appropriate pay item for relocating existing signs.
6. Any sign or traffic control device that is struck or damaged by the Contractor or his/her construction equipment shall be replaced as soon as possible by the Contractor to ensure proper guidance for the motorists. This will be subsidiary to Item 502.

GENERAL NOTES FOR WORK ZONE SIGNS

1. Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
2. Wooden sign posts shall be painted white.
3. Barricades shall NOT be used as sign supports.
4. All signs shall be installed in accordance with the plans or as directed by the Engineer. Signs shall be used to regulate, warn, and guide the traveling public safely through the work zone.
5. The Contractor may furnish either the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD). The Engineer/Inspector may require the Contractor to furnish other work zone signs that are shown in the TMUTCD but may have been omitted from the plans. Any variation in the plans shall be documented by written agreement between the Engineer and the Contractor's Responsible Person. All changes must be documented in writing before being implemented. This can include documenting the changes in the Inspector's TxDOT diary and having both the Inspector and Contractor initial and date the agreed upon changes.
6. The Contractor shall furnish sign supports listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD) for small roadside signs. Supports for temporary large roadside signs shall meet the requirements detailed on the Temporary Large Roadside Signs (TLRS) standard sheets. The Contractor shall install the sign support in accordance with the manufacturer's recommendations. If there is a question regarding installation procedures, the Contractor shall furnish the Engineer a copy of the manufacturer's installation recommendations so the Engineer can verify the correct procedures are being followed.
7. The Contractor is responsible for installing signs on approved supports and replacing signs with damaged or cracked substrates and/or damaged or marred reflective sheeting as directed by the Engineer/Inspector.
8. Identification markings may be shown only on the back of the sign substrate. The maximum height of letters and/or company logos used for identification shall be 1 inch.
9. The Contractor shall replace damaged wood posts. New or damaged wood sign posts shall not be spliced.

DURATION OF WORK (as defined by the "Texas Manual on Uniform Traffic Control Devices" Part 6)

1. The types of sign supports, sign mounting height, the size of signs, and the type of sign substrates can vary based on the type of work being performed. The Engineer is responsible for selecting the appropriate size sign for the type of work being performed. The Contractor is responsible for ensuring the sign support, sign mounting height and substrate meets manufacturer's recommendations in regard to crashworthiness and duration of work requirements.
   a. Long-term stationary - work that occupies a location more than 3 days.
   b. Intermediate-term stationary - work that occupies a location more than one daylight period up to 3 days, or nighttime work lasting more than one hour.
   c. Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
   d. Short, duration - work that occupies a location up to 1 hour.
   e. Mobile - work that moves continuously or intermittently (stopping for up to approximately 15 minutes.)

SIGN MOUNTING HEIGHT

1. The bottom of Long-term/Intermediate-term signs shall be at least 7 feet, but not more than 9 feet, above the paved surface, except as shown for supplemental plaques mounted below other signs.
2. The bottom of Short-term/Short Duration signs shall be a minimum of 1 foot above the pavement surface but no more than 2 feet above the ground.
3. Long-term/Intermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
4. Short-term/Short Duration signs shall be used only during daylight and shall be removed at the end of the workday or raised to appropriate Long-term/Intermediate sign height.
5. Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the paved surface regardless of work duration.

SIZE OF SIGNS

1. The Contractor shall furnish the sign sizes shown on BC (2) unless otherwise shown in the plans or as directed by the Engineer.

SIGN SUBSTRATES

1. The Contractor shall ensure the sign substrate is installed in accordance with the manufacturer's recommendations for the type of sign support that is being used. The CWZTCD lists each substrate that can be used on the different types and models of sign supports.
2. "Mesh" type materials are NOT an approved sign substrate, regardless of the tightness of the weave.
3. All wooden individual sign panels fabricated from 2 or more pieces shall have one or more plywood cleat, 1/2" thick by 6" wide, fastened to the back of the sign and extending fully across the sign. The cleat shall be attached to the back of the sign using wood screws that do not penetrate the face of the sign panel. The screws shall be placed on both sides of the splice and spaced at 6" centers. The Engineer may approve other methods of splicing the sign face.

REFLECTIVE SHEETING

1. All signs shall be retroreflective and constructed of sheeting meeting the color and retro-reflectivity requirements of DMS-8300 for rigid signs or DMS-8310 for roll-up signs. The web address for DMS specifications is shown on BC(1).
2. White sheeting, meeting the requirements of DMS-8300 Type A, shall be used for signs with a white background.
3. Orange sheeting, meeting the requirements of DMS-8300 Type B_{FL} or Type C_{FL}, shall be used for rigid signs with orange backgrounds.

SIGN LETTERS

1. All sign letters and numbers shall be clear, and open rounded type uppercase alphabet letters as approved by the Federal Highway Administration (FHWA) and as published in the "Standard Highway Sign Design for Texas" manual. Signs, letters and numbers shall be of first class workmanship in accordance with Department Standards and Specifications.

REMOVING OR COVERING

1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
2. Long-term stationary or intermediate stationary signs installed on square metal tubing may be turned away from traffic 90 degrees when the sign message is not applicable. This technique may not be used for signs installed in the median of divided highways or near any intersections where the sign may be seen from approaching traffic.
3. Signs installed on wooden skids shall not be turned at 90 degree angles to the roadway. These signs should be removed or completely covered when not required.
4. When signs are covered, the material used shall be opaque, such as heavy mil black plastic, or other materials which will cover the entire sign face and maintain their opaque properties under automobile headlights at night, without damaging the sign sheeting.
5. Burlap shall NOT be used to cover signs.
6. Duct tape or other adhesive material shall NOT be affixed to a sign face.
7. Signs and anchor stubs shall be removed and holes backfilled upon completion of work.

SIGN SUPPORT WEIGHTS

1. Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects shall not be permitted for use as sign support weights.
4. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs.
5. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall NOT be used.
6. Rubber ballasts designed for channelizing devices should not be used for ballast on portable sign supports. Sign supports designed and manufactured with rubber bases may be used when shown on the CWZTCD list.
7. Sandbags shall only be placed along or laid over the base supports of the traffic control device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners. Sandbags shall be placed along the length of the skids to weigh down the sign support.
8. Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

FLAGS ON SIGNS

1. Flags may be used to draw attention to warning signs. When used, the flag shall be 16 inches square or larger and shall be orange or fluorescent red-orange in color. Flags shall not be allowed to cover any portion of the sign face.

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BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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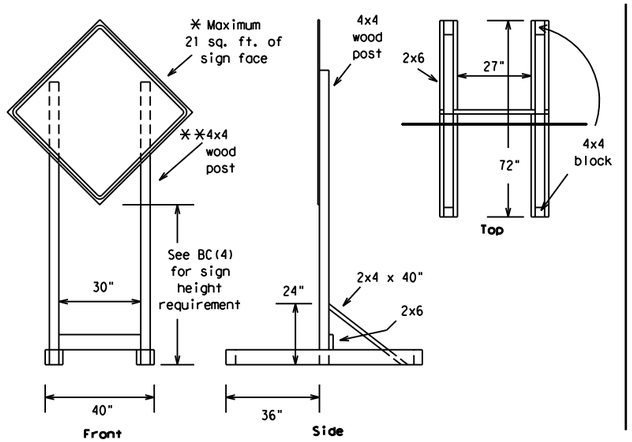
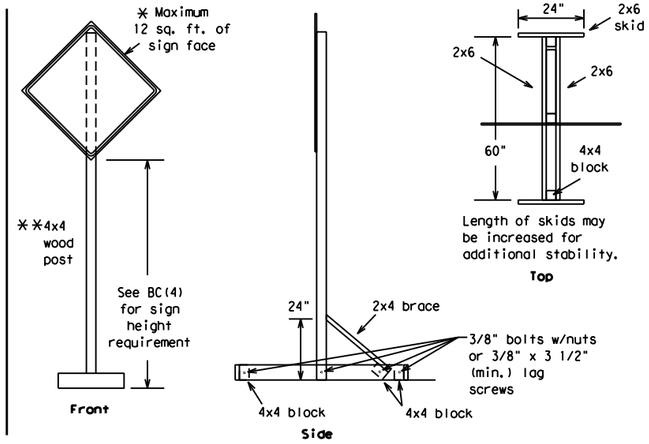
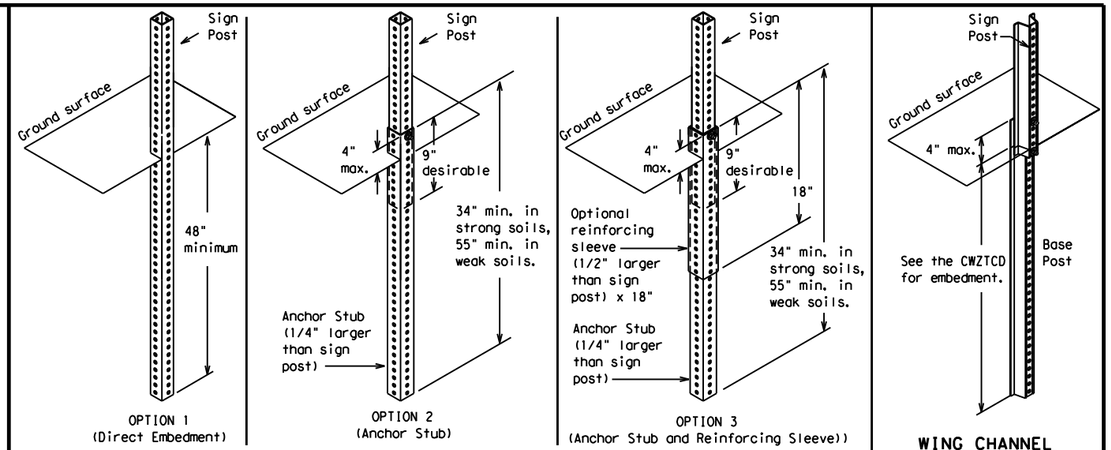




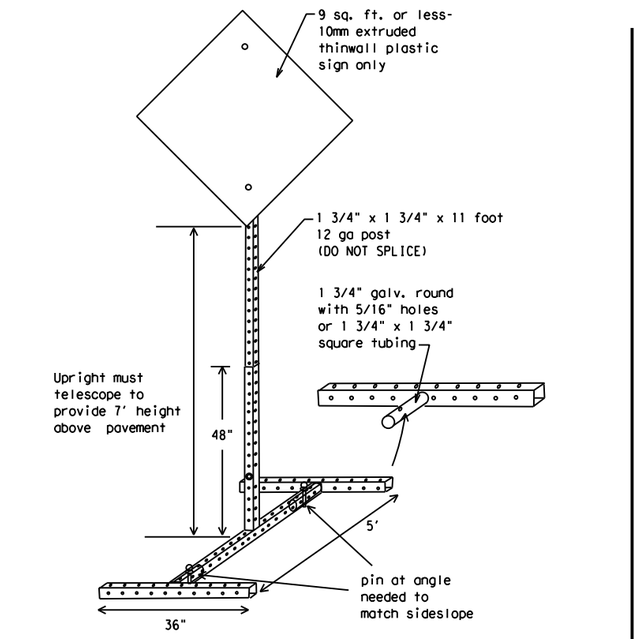
SKID MOUNTED WOOD SIGN SUPPORTS

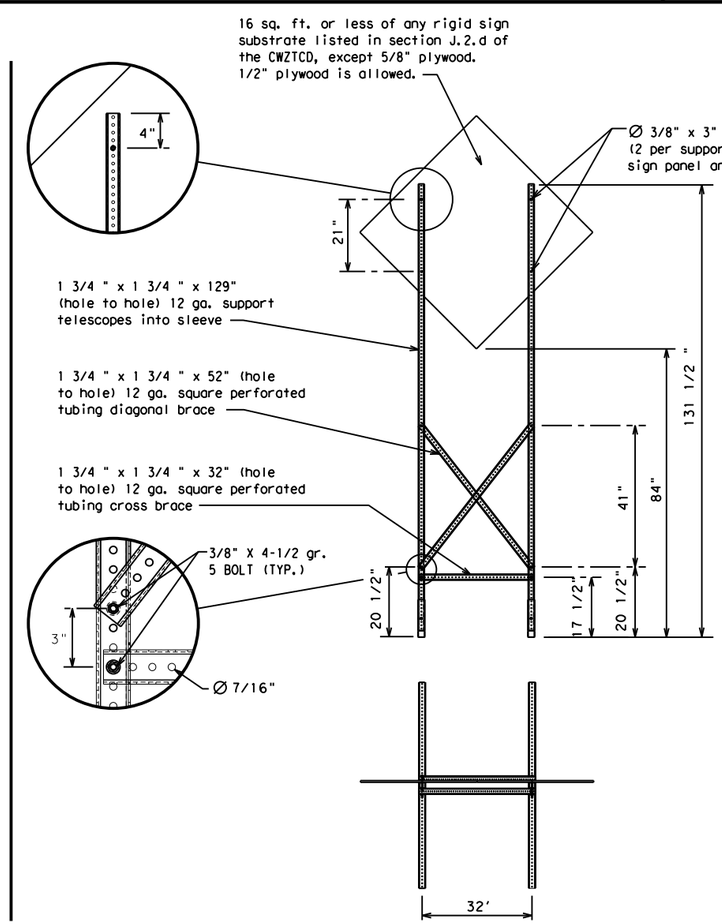
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

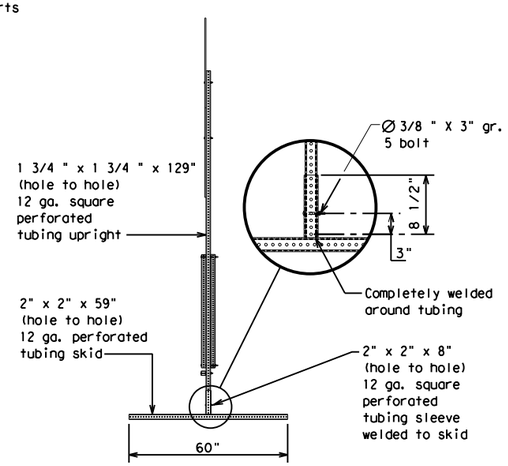


GROUND MOUNTED SIGN SUPPORTS

Refer to the CWZTCD and the manufacturer's installation procedure for each type sign support.
The maximum sign square footage shall adhere to the manufacturer's recommendation.
Two post installations can be used for larger signs.







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

WEDGE ANCHORS

Both steel and plastic Wedge Anchor Systems as shown on the SMD Standard Sheets may be used as temporary sign supports for signs up to 10 square feet of sign face. They may be set in concrete or in sturdy soils if approved by the Engineer. (See web address for "Traffic Engineering Standard Sheets" on BC(1)).

OTHER DESIGNS

MORE DETAILS OF APPROVED LONG/INTERMEDIATE AND SHORT TERM SUPPORTS CAN BE FOUND ON THE CWZTCD LIST. SEE BC(1) FOR WEBSITE LOCATION.

GENERAL NOTES

1. Nails may be used in the assembly of wooden sign supports, but 3/8" bolts with nuts or 3/8" x 3 1/2" lag screws must be used on every joint for final connection.
2. No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
3. When project is completed, all sign supports and foundations shall be removed from the project site. This will be considered subsidiary to Item 502.

* See BC(4) for definition of "Work Duration."

** Wood sign posts MUST be one piece. Splicing will NOT be allowed. Posts shall be painted white.

☐ See the CWZTCD for the type of sign substrate that can be used for each approved sign support.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

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WHEN NOT IN USE, REMOVE THE PCMS FROM THE RIGHT-OF-WAY OR PLACE THE PCMS BEHIND BARRIER OR GUARDRAIL WITH SIGN PANEL TURNED PARALLEL TO TRAFFIC

PORTABLE CHANGEABLE MESSAGE SIGNS

1. The Engineer/Inspector shall approve all messages used on portable changeable message signs (PCMS).
2. Messages on PCMS should contain no more than 8 words (about four to eight characters per word), not including simple words such as "TO," "FOR," "AT," etc.
3. Messages should consist of a single phase, or two phases that alternate. Three-phase messages are not allowed. Each phase of the message should convey a single thought, and must be understood by itself.
4. Use the word "EXIT" to refer to an exit ramp on a freeway; i.e., "EXIT CLOSED." Do not use the term "RAMP."
5. Always use the route or interstate designation (IH, US, SH, FM) along with the number when referring to a roadway.
6. When in use, the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible.
7. The message term "WEEKEND" should be used only if the work is to start on Saturday morning and end by Sunday evening at midnight. Actual days and hours of work should be displayed on the PCMS if work is to begin on Friday evening and/or continue into Monday morning.
8. The Engineer/Inspector may select one of two options which are available for displaying a two-phase message on a PCMS. Each phase may be displayed for either four seconds each or for three seconds each.
9. Do not "flash" messages or words included in a message. The message should be steady burn or continuous while displayed.
10. Do not present redundant information on a two-phase message; i.e., keeping two lines of the message the same and changing the third line.
11. Do not use the word "Danger" in message.
12. Do not display the message "LANES SHIFT LEFT" or "LANES SHIFT RIGHT" on a PCMS. Drivers do not understand the message.
13. Do not display messages that scroll horizontally or vertically across the face of the sign.
14. The following table lists abbreviated words and two-word phrases that are acceptable for use on a PCMS. Both words in a phrase must be displayed together. Words or phrases not on this list should not be abbreviated, unless shown in the TMUTCD.
15. PCMS character height should be at least 18 inches for trailer mounted units. They should be visible from at least 1/2 (.5) mile and the text should be legible from at least 600 feet at night and 800 feet in daylight. Truck mounted units must have a character height of 10 inches and must be legible from at least 400 feet.
16. Each line of text should be centered on the message board rather than left or right justified.
17. If disabled, the PCMS should default to an illegible display that will not alarm motorists and will only be used to alert workers that the PCMS has malfunctioned. A pattern such as a series of horizontal solid bars is appropriate.

WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD
Alternate	ALT
Avenue	AVE
Best Route	BEST RTE
Boulevard	BLVD
Bridge	BRDG
Cannot	CANT
Center	CTR
Construction Ahead	CONST AHD
CROSSING	XING
Detour Route	DETOUR RTE
Do Not	DONT
East	E
Eastbound	(route) E
Emergency	EMER
Emergency Vehicle	EMER VEH
Entrance, Enter	ENT
Express Lane	EXP LN
Expressway	EXPWY
XXXX Feet	XXXX FT
Fog Ahead	FOG AHD
Freeway	FRWY, FWY
Freeway Blocked	FWY BLKD
Friday	FRI
Hazardous Driving	HAZ DRIVING
Hazardous Material	HAZMAT
High-Occupancy	HOV
Vehicle Highway	HWY
Hour(s)	HR, HRS
Information	INFO
It Is	ITS
Junction	JCT
Left	LFT
Left Lane	LFT LN
Lane Closed	LN CLOSED
Lower Level	LWR LEVEL
Maintenance	MAINT

WORD OR PHRASE	ABBREVIATION
Major	MAJ
Miles	MI
Miles Per Hour	MPH
Minor	MNR
Monday	MON
Normal	NORM
North	N
Northbound	(route) N
Parking	PKING
Road	RD
Right Lane	RT LN
Saturday	SAT
Service Road	SERV RD
Shoulder	SHLDR
Slippery	SLIP
South	S
Southbound	(route) S
Speed	SPD
Street	ST
Sunday	SUN
Telephone	PHONE
Temporary	TEMP
Thursday	THURS
To Downtown	TO DWNTN
Traffic	TRAF
Travelers	TRVLRS
Tuesday	TUES
Time Minutes	TIME MIN
Upper Level	UPR LEVEL
Vehicles (s)	VEH, VEHS
Warning	WARN
Wednesday	WED
Weight Limit	WT LIMIT
West	W
Westbound	(route) W
Wet Pavement	WET PVMT
Will Not	WONT

Roadway designation ≠ IH-number, US-number, SH-number, FM-number

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

(The Engineer may approve other messages not specifically covered here.)

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

- FREEWAY CLOSED X MILE
- FRONTAGE ROAD CLOSED
- ROAD CLOSED AT SH XXX
- SHOULDER CLOSED XXX FT
- ROAD CLSD AT FM XXXX
- RIGHT LN CLOSED XXX FT
- RIGHT X LANES CLOSED
- RIGHT X LANES OPEN
- CENTER LANE CLOSED
- DAYTIME LANE CLOSURES
- NIGHT LANE CLOSURES
- I-XX SOUTH EXIT CLOSED
- VARIOUS LANES CLOSED
- EXIT XXX CLOSED X MILE
- EXIT CLOSED
- RIGHT LN TO BE CLOSED
- MALL DRIVEWAY CLOSED
- X LANES CLOSED TUE - FRI
- XXXXXXXX BLVD CLOSED

Other Condition List

- ROADWORK XXX FT
- ROAD REPAIRS XXXX FT
- FLAGGER XXXX FT
- LANE NARROWS XXXX FT
- RIGHT LN NARROWS XXXX FT
- TWO-WAY TRAFFIC XX MILE
- MERGING TRAFFIC XXXX FT
- CONST TRAFFIC XXX FT
- LOOSE GRAVEL XXXX FT
- UNEVEN LANES XXXX FT
- DETOUR X MILE
- ROUGH ROAD XXXX FT
- ROADWORK PAST SH XXXX
- ROADWORK NEXT FRI-SUN
- BUMP XXXX FT
- US XXX EXIT X MILES
- TRAFFIC SIGNAL XXXX FT
- LANES SHIFT *

* LANES SHIFT in Phase 1 must be used with STAY IN LANE in Phase 2.

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

- MERGE RIGHT
- FORM X LINES RIGHT
- DETOUR NEXT X EXITS
- USE XXXXX RD EXIT
- USE EXIT XXX
- USE EXIT I-XX NORTH
- STAY ON US XXX SOUTH
- USE I-XX E TO I-XX N
- TRUCKS USE US XXX N
- WATCH FOR TRUCKS
- WATCH FOR TRUCKS
- EXPECT DELAYS
- EXPECT DELAYS
- PREPARE TO STOP
- REDUCE SPEED XXX FT
- END SHOULDER USE
- USE OTHER ROUTES
- WATCH FOR WORKERS
- STAY IN LANE *

Location List

- AT FM XXXX
- BEFORE RAILROAD CROSSING
- NEXT X MILES
- PAST US XXX EXIT
- XXXXXXX TO XXXXXXX
- US XXX TO FM XXXX

Warning List

- SPEED LIMIT XX MPH
- MAXIMUM SPEED XX MPH
- MINIMUM SPEED XX MPH
- ADVISORY SPEED XX MPH
- RIGHT LANE EXIT
- USE CAUTION
- DRIVE SAFELY
- DRIVE WITH CARE

** Advance Notice List

- TUE-FRI XX AM- X PM
- APR XX-XX X PM-X AM
- BEGINS MONDAY
- BEGINS MAY XX
- MAY X-X XX PM - XX AM
- NEXT FRI-SUN
- XX AM TO XX PM
- NEXT TUE AUG XX
- TONIGHT XX PM- XX AM

* LANES SHIFT in Phase 1 must be used with STAY IN LANE in Phase 2.

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

1. Only 1 or 2 phases are to be used on a PCMS.
2. The 1st phase (or both) should be selected from the "Road/Lane/Ramp Closure List" and the "Other Condition List".
3. A 2nd phase can be selected from the "Action to Take/Effect on Travel, Location, General Warning, or Advance Notice Phase Lists".
4. A Location Phase is necessary only if a distance or location is not included in the first phase selected.
5. If two PCMS are used in sequence, they must be separated by a minimum of 1000 ft. Each PCMS shall be limited to two phases, and should be understandable by themselves.
6. For advance notice, when the current date is within seven days of the actual work date, calendar days should be replaced with days of the week. Advance notification should typically be for no more than one week prior to the work.

WORDING ALTERNATIVES

1. The words RIGHT, LEFT and ALL can be interchanged as appropriate.
2. Roadway designations IH, US, SH, FM and LP can be interchanged as appropriate.
3. EAST, WEST, NORTH and SOUTH (or abbreviations E, W, N and S) can be interchanged as appropriate.
4. Highway names and numbers replaced as appropriate.
5. ROAD, HIGHWAY and FREEWAY can be interchanged as needed.
6. AHEAD may be used instead of distances if necessary.
7. FT and MI, MILE and MILES interchanged as appropriate.
8. AT, BEFORE and PAST interchanged as needed.
9. Distances or AHEAD can be eliminated from the message if a location phase is used.

PCMS SIGNS WITHIN THE R.O.W. SHALL BE BEHIND GUARDRAIL OR CONCRETE BARRIER OR SHALL HAVE A MINIMUM OF FOUR (4) PLASTIC DRUMS PLACED PERPENDICULAR TO TRAFFIC ON THE UPSTREAM SIDE OF THE PCMS, WHEN EXPOSED TO ONE DIRECTION OF TRAFFIC. WHEN EXPOSED TO TWO WAY TRAFFIC, THE FOUR DRUMS SHOULD BE PLACED WITH ONE DRUM AT EACH OF THE FOUR CORNERS OF THE UNIT.

FULL MATRIX PCMS SIGNS

1. When Full Matrix PCMS signs are used, the character height and legibility/visibility requirements shall be maintained as listed in Note 15 under "PORTABLE CHANGEABLE MESSAGE SIGNS" above.
2. When symbol signs, such as the "Flagger Symbol"(CW20-7) are represented graphically on the Full Matrix PCMS sign and, with the approval of the Engineer, it shall maintain the legibility/visibility requirement listed above.
3. When symbol signs are represented graphically on the Full Matrix PCMS, they shall only supplement the use of the static sign represented, and shall not substitute for, or replace that sign.
4. A full matrix PCMS may be used to simulate a flashing arrow board provided it meets the visibility, flash rate and dimming requirements on BC(7), for the same size arrow.

Texas Department of Transportation

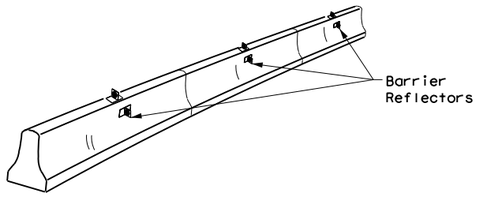
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

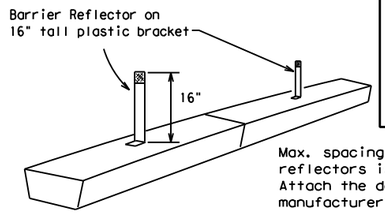
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0079	04	049	BU 67K
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	FTW	ERATH		44

1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost of the reflectors shall be considered subsidiary to Item 512.



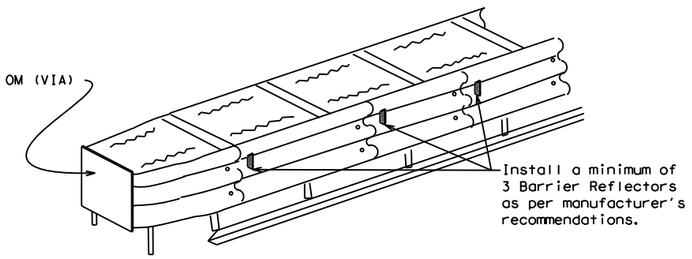
CONCRETE TRAFFIC BARRIER (CTB)

3. Where traffic is on one side of the CTB, two (2) Barrier Reflectors shall be mounted in approximately the midsection of each section of CTB. An alternate mounting location is uniformly spaced at one end of each CTB. This will allow for attachment of a barrier grapple without damaging the reflector. The Barrier Reflector mounted on the side of the CTB shall be located directly below the reflector mounted on top of the barrier, as shown in the detail above.
4. Where CTB separates two-way traffic, three barrier reflectors shall be mounted on each section of CTB. The reflector unit on top shall have two yellow reflective faces (Bi-Directional)while the reflectors on each side of the barrier shall have one yellow reflective face, as shown in the detail above.
5. When CTB separates traffic traveling in the same direction, no barrier reflectors will be required on top of the CTB.
6. Barrier Reflector units shall be yellow or white in color to match the edgeline being supplemented.
7. Maximum spacing of Barrier Reflectors is forty (40) feet.
8. Pavement markers or temporary flexible-reflective roadway marker tabs shall NOT be used as CTB delineation.
9. Attachment of Barrier Reflectors to CTB shall be per manufacturer's recommendations.
10. Missing or damaged Barrier Reflectors shall be replaced as directed by the Engineer.
11. Single slope barriers shall be delineated as shown on the above detail.



Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB)



DELINEATION OF END TREATMENTS

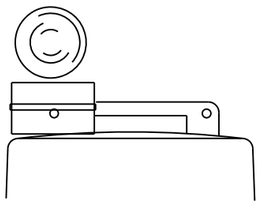
LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

LPCB is approved for use in work zone locations, where the posted speed is 45mph, or less. See Roadway Standard Sheet LPCB.

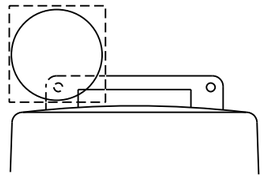
END TREATMENTS FOR CTB'S USED IN WORK ZONES

End treatments used on CTB's in work zones shall meet the apppropriate crashworthy standards as defined in the Manual for Assessing Safety Hardware (MASH). Refer to the CWZTCD List for approved end treatments and manufacturers.

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



Type C Warning Light or approved substitute mounted on a drum adjacent to the travel way.



Warning reflector may be round or square.Must have a yellow reflective surface area of at least 30 square inches

WARNING LIGHTS

1. Warning lights shall meet the requirements of the TMUTCD.
2. Warning lights shall NOT be installed on barricades.
3. Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "FL". The Type A Warning Lights shall not be used with signs manufactured with Type B_{FL} or C_{FL} Sheeting meeting the requirements of Departmental Material Specification DMS-8300.
4. Type-C and Type D 360 degree Steady Burn Lights are intended to be used in a series for delineation to supplement other traffic control devices. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "SB".
5. The Engineer/Inspector or the plans shall specify the location and type of warning lights to be installed on the traffic control devices.
6. When required by the Engineer, the Contractor shall furnish a copy of the warning lights certification. The warning light manufacturer will certify the warning lights meet the requirements of the latest ITE Purchase Specifications for Flashing and Steady-Burn Warning Lights.
7. When used to delineate curves, Type-C and Type D Steady Burn Lights should only be placed on the outside of the curve, not the inside.
8. The location of warning lights and warning reflectors on drums shall be as shown elsewhere in the plans.

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

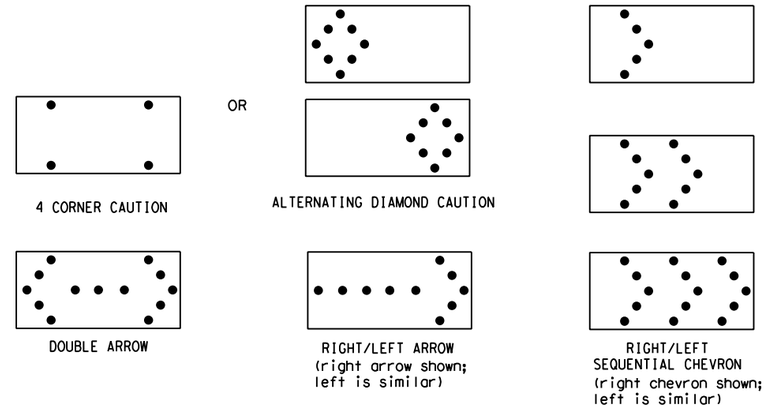
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing devices to form a merging taper may be used for delineation. If used, the successive flashing of the sequential warning lights should occur from the beginning of the taper to the end of the merging taper in order to identify the desired vehicle path. The rate of flashing for each light shall be 65 flashes per minute, plus or minus 10 flashes.
4. Type C and D steady-burn warning lights are intended to be used in a series to delineate the edge of the travel lane on detours, on lane changes, on lane closures, and on other similar conditions.
5. Type A, Type C and Type D warning lights shall be installed at locations as detailed on other sheets in the plans.
6. Warning lights shall not be installed on a drum that has a sign, chevron or vertical panel.
7. The maximum spacing for warning lights on drums should be identical to the channelizing device spacing.

WARNING REFLECTORS MOUNTED ON PLASTIC DRUMS AS A SUBSTITUTE FOR TYPE C (STEADY BURN) WARNING LIGHTS

1. A warning reflector or approved substitute may be mounted on a plastic drum as a substitute for a Type C, steady burn warning light at the discretion of the Contractor unless otherwise noted in the plans.
2. The warning reflector shall be yellow in color and shall be manufactured using a sign substrate approved for use with plastic drums listed on the CWZTCD.
3. The warning reflector shall have a minimum retroreflective surface area (one-side) of 30 square inches.
4. Round reflectors shall be fully reflectorized, including the area where attached to the drum.
5. Square substrates must have a minimum of 30 square inches of reflectorized sheeting. They do not have to be reflectorized where it attaches to the drum.
6. The side of the warning reflector facing approaching traffic shall have sheeting meeting the color and retroreflectivity requirements for DMS 8300-Type B or Type C.
7. When used near two-way traffic, both sides of the warning reflector shall be reflectorized.
8. The warning reflector should be mounted on the side of the handle nearest approaching traffic.
9. The maximum spacing for warning reflectors should be identical to the channelizing device spacing requirements.

Arrow Boards may be located behind channelizing devices in place for a shoulder taper or merging taper, otherwise they shall be delineated with four (4) channelizing devices placed perpendicular to traffic on the upstream side of traffic.

1. The Flashing Arrow Board should be used for all lane closures on multi-lane roadways, or slow moving maintenance or construction activities on the travel lanes.
2. Flashing Arrow Boards should not be used on two-lane, two-way roadways, detours, diversions or work on shoulders unless the "CAUTION" display (see detail below) is used.
3. The Engineer/Inspector shall choose all appropriate signs, barricades and/or other traffic control devices that should be used in conjunction with the Flashing Arrow Board.
4. The Flashing Arrow Board should be able to display the following symbols:



5. The "CAUTION" display consists of four corner lamps flashing simultaneously, or the Alternating Diamond Caution mode as shown.
6. The straight line caution display is NOT ALLOWED.
7. The Flashing Arrow Board shall be capable of minimum 50 percent dimming from rated lamp voltage. The flashing rate of the lamps shall not be less than 25 nor more than 40 flashes per minute.
8. Minimum lamp "on time" shall be approximately 50 percent for the flashing arrow and equal intervals of 25 percent for each sequential phase of the flashing chevron.
9. The sequential arrow display is NOT ALLOWED.
10. The flashing arrow display is the TxDOT standard; however, the sequential chevron display may be used during daylight operations.
11. The Flashing Arrow Board shall be mounted on a vehicle, trailer or other suitable support.
12. A Flashing Arrow Board SHALL NOT BE USED to laterally shift traffic.
13. A full matrix PCMS may be used to simulate a Flashing Arrow Board provided it meets visibility, flash rate and dimming requirements on this sheet for the same size arrow.
14. Minimum mounting height of trailer mounted Arrow Boards should be 7 feet from roadway to bottom of panel.

REQUIREMENTS			
TYPE	MINIMUM SIZE	MINIMUM NUMBER OF PANEL LAMPS	MINIMUM VISIBILITY DISTANCE
B	30 x 60	13	3/4 mile
C	48 x 96	15	1 mile

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

WHEN NOT IN USE, REMOVE THE ARROW BOARD FROM THE RIGHT-OF-WAY OR PLACE THE ARROW BOARD BEHIND CONCRETE TRAFFIC BARRIER OR GUARDRAIL.

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

1. Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the Manual for Assessing Safety Hardware (MASH).
2. Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
3. Refer to the CWZTCD for a list of approved TMAs.
4. TMAs are required on freeways unless otherwise noted in the plans.
5. A TMA should be used anytime that it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the work performance.
6. The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is an extended distance from the TMA.

SHEET 7 OF 12

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION ARROW PANEL, REFLECTORS, WARNING LIGHTS & ATTENUATOR

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0079	04	049	BU 67K
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	FTW	ERATH		45

DATE:
FILE:

101

DATE:
FILE:

GENERAL NOTES

1. For long term stationary work zones on freeways, drums shall be used as the primary channelizing device.
2. For intermediate term stationary work zones on freeways, drums should be used as the primary channelizing device but may be replaced in tangent sections by vertical panels, or 42" two-piece cones. In tangent sections, one-piece cones may be used with the approval of the Engineer but only if personnel are present on the project at all times to maintain the cones in proper position and location.
3. For short term stationary work zones on freeways, drums are the preferred channelizing device but may be replaced in tapers, transitions and tangent sections by vertical panels, two-piece cones or one-piece cones as approved by the Engineer.
4. Drums and all related items shall comply with the requirements of the current version of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
5. Drums, bases, and related materials shall exhibit good workmanship and shall be free from objectionable marks or defects that would adversely affect their appearance or serviceability.
6. The Contractor shall have a maximum of 24 hours to replace any plastic drums identified for replacement by the Engineer/Inspector. The replacement device must be an approved device.

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

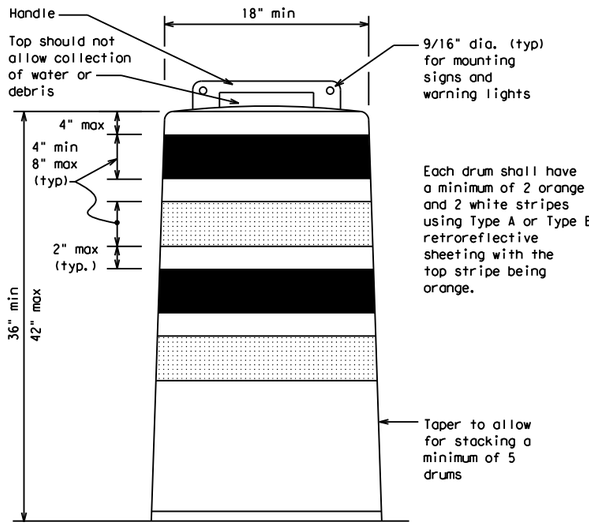
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents accidental separation due to normal handling and/or air turbulence created by passing vehicles.
3. Plastic drums shall be constructed of lightweight flexible, and deformable materials. The Contractor shall NOT use metal drums or single piece plastic drums as channelization devices or sign supports.
4. Drums shall present a profile that is a minimum of 18 inches in width at the 36 inch height when viewed from any direction. The height of drum unit (body installed on base) shall be a minimum of 36 inches and a maximum of 42 inches.
5. The top of the drum shall have a built-in handle for easy pickup and shall be designed to drain water and not collect debris. The handle shall have a minimum of two widely spaced 9/16 inch diameter holes to allow attachment of a warning light, warning reflector unit or approved compliant sign.
6. The exterior of the drum body shall have a minimum of four alternating orange and white retroreflective circumferential stripes not less than 4 inches nor greater than 8 inches in width. Any non-reflectorized space between any two adjacent stripes shall not exceed 2 inches in width.
7. Bases shall have a maximum width of 36 inches, a maximum height of 4 inches, and a minimum of two footholds of sufficient size to allow base to be held down while separating the drum body from the base.
8. Plastic drums shall be constructed of ultra-violet stabilized, orange, high-density polyethylene (HDPE) or other approved material.
9. Drum body shall have a maximum unballasted weight of 11 lbs.
10. Drum and base shall be marked with manufacturer's name and model number.

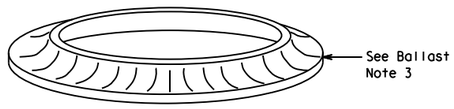
RETROREFLECTIVE SHEETING

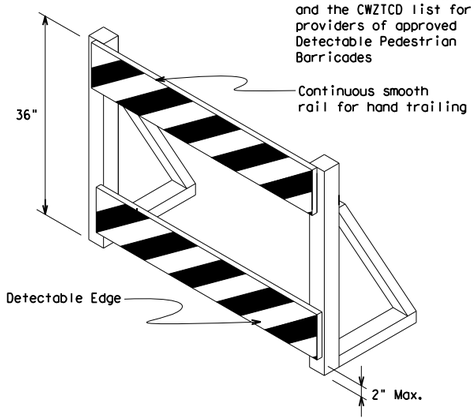
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall be suitable for use on and shall adhere to the drum surface such that, upon vehicular impact, the sheeting shall remain adhered in-place and exhibit no delaminating, cracking, or loss of retroreflectivity other than that loss due to abrasion of the sheeting surface.

BALLAST

1. Unballasted bases shall be large enough to hold up to 50 lbs. of sand. This base, when filled with the ballast material, should weigh between 35 lbs (minimum) and 50 lbs (maximum). The ballast may be sand in one to three sandbags separate from the base, sand in a sand-filled plastic base, or other ballasting devices as approved by the Engineer. Stacking of sandbags will be allowed, however height of sandbags above pavement surface may not exceed 12 inches.
2. Bases with built-in ballast shall weigh between 40 lbs. and 50 lbs. Built-in ballast can be constructed of an integral crumb rubber base or a solid rubber base.
3. Recycled truck tire sidewalls may be used for ballast on drums approved for this type of ballast on the CWZTCD list.
4. The ballast shall not be heavy objects, water, or any material that would become hazardous to motorists, pedestrians, or workers when the drum is struck by a vehicle.
5. When used in regions susceptible to freezing, drums shall have drainage holes in the bottoms so that water will not collect and freeze becoming a hazard when struck by a vehicle.
6. Ballast shall not be placed on top of drums.
7. Adhesives may be used to secure base of drums to pavement.

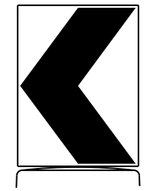




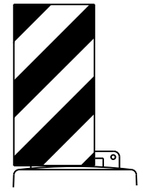


DETECTABLE PEDESTRIAN BARRICADES

1. When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, the temporary facilities shall be detectable and include accessibility features consistent with the features present in the existing pedestrian facility. Refer to WZ(BTS-2) for Pedestrian Control requirements for Sidewalk Diversions, Sidewalk Detours and Crosswalk Closures.
2. Where pedestrians with visual disabilities normally use the closed sidewalk, a Detectable Pedestrian Barricade shall be placed across the full width of the closed sidewalk instead of a Type 3 Barricade.
3. Detectable pedestrian barricades similar to the one pictured above, longitudinal channelizing devices, some concrete barriers, and wood or chain link fencing with a continuous detectable edging can satisfactorily delineate a pedestrian path.
4. Tape, rope, or plastic chain strung between devices are not detectable, do not comply with the design standards in the "Americans with Disabilities Act Accessibility Guidelines (ADAAG)" and should not be used as a control for pedestrian movements.
5. Warning lights shall not be attached to detectable pedestrian barricades.
6. Detectable pedestrian barricades should use 8" nominal barricade rails as shown on BC(10) provided that the top rail provides a smooth continuous rail suitable for hand trailing with no splinters, burrs, or sharp edges.



18" x 24" Sign
(Maximum Sign Dimension)
Chevron CW1-8, Opposing Traffic Lane Divider, Driveway sign D70a, Keep Right R4 series or other signs as approved by Engineer



12" x 24"
Vertical Panel
mount with diagonals sloping down towards travel way

Plywood, Aluminum or Metal sign substrates shall NOT be used on plastic drums

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

1. Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
2. Chevrons and other work zone signs with an orange background shall be manufactured with Type B_{FL} or Type C_{FL} Orange sheeting meeting the color and retroreflectivity requirements of DMS-8300, "Sign Face Material," unless otherwise specified in the plans.
3. Vertical Panels shall be manufactured with orange and white sheeting meeting the requirements of DMS-8300 Type A or Type B. Diagonal stripes on Vertical Panels shall slope down toward the intended traveled lane.
4. Other sign messages (text or symbolic) may be used as approved by the Engineer. Sign dimensions shall not exceed 18 inches in width or 24 inches in height, except for the R9 series signs discussed in note 8 below.
5. Signs shall be installed using a 1/2 inch bolt (nominal) and nut, two washers, and one locking washer for each connection.
6. Mounting bolts and nuts shall be fully engaged and adequately torqued. Bolts should not extend more than 1/2 inch beyond nuts.
7. Chevrons may be placed on drums on the outside of curves, on merging tapers or on shifting tapers. When used in these locations, they may be placed on every drum or spaced not more than on every third drum. A minimum of three (3) should be used at each location called for in the plans.
8. R9-9, R9-10, R9-11 and R9-11a Sidewalk Closed signs which are 24 inches wide may be mounted on plastic drums, with approval of the Engineer.

Texas Department of Transportation

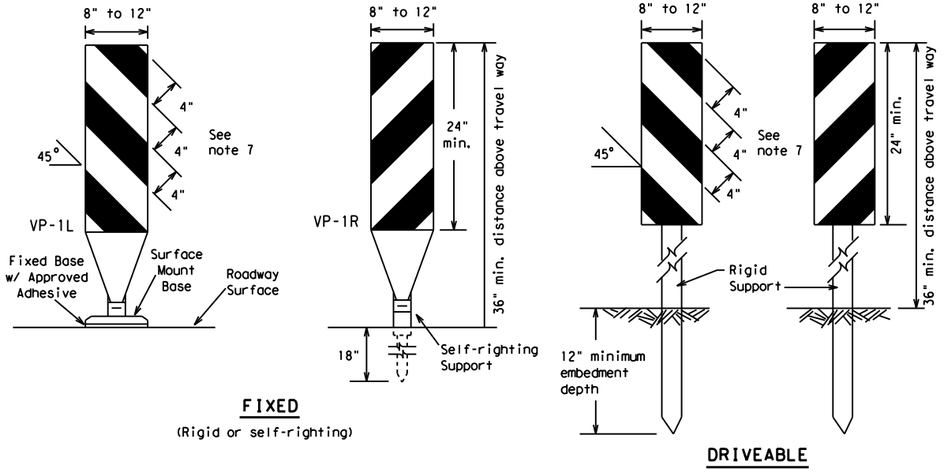
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

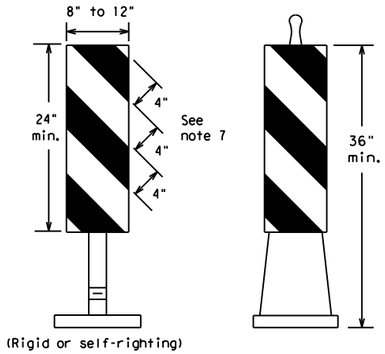
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0079	04	049	BU 67K
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	FTW	ERATH		46
7-13				

DATE:
FILE:



FIXED
(Rigid or self-righting)

DRIVEABLE

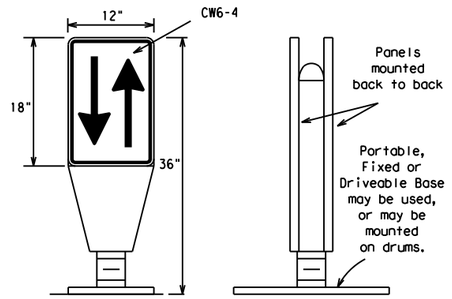


(Rigid or self-righting)

PORTABLE

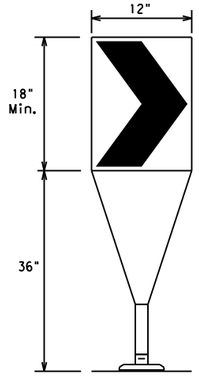
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is required. The Engineer/Inspector shall refer to the Roadway Design Manual for additional requirements on the use VP's for drop-offs.
3. VP's should be mounted back to back if used at the edge of cuts adjacent to two-way two lane roadways. Stripes are to be reflective orange and reflective white and should always slope downward toward the travel lane.
4. VP's used on expressways and freeways or other high speed roadways, may have more than 270 square inches of retroreflective area facing traffic.
5. Self-righting supports are available with portable base. See "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
6. Sheeting for the VP's shall be retroreflective Type A or Type B conforming to Departmental Material Specification DMS-8300, unless noted otherwise.
7. Where the height of reflective material on the vertical panel is 36 inches or greater, a panel stripe of 6 inches shall be used.

VERTICAL PANELS (VPs)



1. Opposing Traffic Lane Dividers (OTLD) are delineation devices designed to convert a normal one-way roadway section to two-way operation. OTLD's are used on temporary centerlines. The upward and downward arrows on the sign's face indicate the direction of traffic on either side of the divider. The base is secured to the pavement with an adhesive or rubber weight to minimize movement caused by a vehicle impact or wind gust.
2. The OTLD may be used in combination with 42" cones or VPs.
3. Spacing between the OTLD shall not exceed 500 feet. 42" cones or VPs placed between the OTLD's should not exceed 100 foot spacing.
4. The OTLD shall be orange with a black non-reflective legend. Sheeting for the OTLD shall be retroreflective Type B_{FL} or Type C_{FL} conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



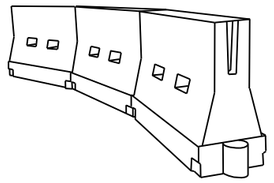
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

1. The chevron shall be a vertical rectangle with a minimum size of 12 by 18 inches.
2. Chevrons are intended to give notice of a sharp change of alignment with the direction of travel and provide additional emphasis and guidance for vehicle operators with regard to changes in horizontal alignment of the roadway.
3. Chevrons, when used, shall be erected on the outside of a sharp curve or turn, or on the far side of an intersection. They shall be in line with and at right angles to approaching traffic. Spacing should be such that the motorist always has three in view, until the change in alignment eliminates its need.
4. To be effective, the chevron should be visible for at least 500 feet.
5. Chevrons shall be orange with a black nonreflective legend. Sheeting for the chevron shall be retroreflective Type B_{FL} or Type C_{FL} conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.
6. For Long Term Stationary use on tapers or transitions on freeways and divided highways, self-righting chevrons may be used to supplement plastic drums but not to replace plastic drums.

CHEVRONS

GENERAL NOTES

1. Work Zone channelizing devices illustrated on this sheet may be installed in close proximity to traffic and are suitable for use on high or low speed roadways. The Engineer/Inspector shall ensure that spacing and placement is uniform and in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
2. Channelizing devices shown on this sheet may have a driveable, fixed or portable base. The requirement for self-righting channelizing devices must be specified in the General Notes or other plan sheets.
3. Channelizing devices on self-righting supports should be used in work zone areas where channelizing devices are frequently impacted by errant vehicles or vehicle related wind gusts making alignment of the channelizing devices difficult to maintain. Locations of these devices shall be detailed elsewhere in the plans. These devices shall conform to the TMUTCD and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
4. The Contractor shall maintain devices in a clean condition and replace damaged, nonreflective, faded, or broken devices and bases as required by the Engineer/Inspector. The Contractor shall be required to maintain proper device spacing and alignment.
5. Portable bases shall be fabricated from virgin and/or recycled rubber. The portable bases shall weigh a minimum of 30 lbs.
6. Pavement surfaces shall be prepared in a manner that ensures proper bonding between the adhesives, the fixed mount bases and the pavement surface. Adhesives shall be prepared and applied according to the manufacturer's recommendations.
7. The installation and removal of channelizing devices shall not cause detrimental effects to the final pavement surfaces, including pavement surface discoloration or surface integrity. Driveable bases shall not be permitted on final pavement surfaces. The Engineer/Inspector shall approve all application and removal procedures of fixed bases.



LONGITUDINAL CHANNELIZING DEVICES (LCD)

1. LCDs are crashworthy, lightweight, deformable devices that are highly visible, have good target value and can be connected together. They are not designed to contain or redirect a vehicle on impact.
2. LCDs may be used instead of a line of cones or drums.
3. LCDs shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. LCDs should not be used to provide positive protection for obstacles, pedestrians or workers.
5. LCDs shall be supplemented with retroreflective delineation as required for temporary barriers on BC(7) when placed roughly parallel to the travel lanes.
6. LCDs used as barricades placed perpendicular to traffic should have at least one row of reflective sheeting meeting the requirements for barricade rails as shown on BC(10). Place reflective sheeting near the top of the LCD along the full length of the device.

WATER BALLASTED SYSTEMS USED AS BARRIERS

1. Water ballasted systems used as barriers shall not be used solely to channelize road users, but also to protect the work space per the appropriate Manual for Assessing Safety Hardware (MASH) crashworthiness requirements based on roadway speed and barrier application.
2. Water ballasted systems used to channelize vehicular traffic shall be supplemented with retroreflective delineation or channelizing devices to improve daytime/nighttime visibility. They may also be supplemented with pavement markings.
3. Water ballasted systems used as barriers shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. Water ballasted systems used as barriers should not be used for a merging taper except in low speed (less than 45 MPH) urban areas. When used on a taper in a low speed urban area, the taper shall be delineated and the taper length should be designed to optimize road user operations considering the available geometric conditions.
5. When water ballasted systems used as barriers have blunt ends exposed to traffic, they should be attenuated as per manufacturer recommendations or flared to a point outside the clear zone.

If used to channelize pedestrians, longitudinal channelizing devices or water ballasted systems must have a continuous detectable bottom for users of long canes and the top of the unit shall not be less than 32 inches in height.

HOLLOW OR WATER BALLASTED SYSTEMS USED AS LONGITUDINAL CHANNELIZING DEVICES OR BARRIERS

Posted Speed	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'
35		205'	225'	245'	35'	70'
40		265'	295'	320'	40'	80'
45	L = WS	450'	495'	540'	45'	90'
50		500'	550'	600'	50'	100'
55		550'	605'	660'	55'	110'
60		600'	660'	720'	60'	120'
65		650'	715'	780'	65'	130'
70		700'	770'	840'	70'	140'
75		750'	825'	900'	75'	150'
80		800'	880'	960'	80'	160'

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0079	04	049	BU 67K
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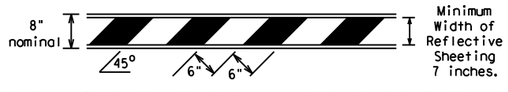
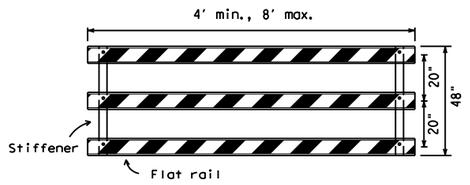
TYPE 3 BARRICADES

1. Refer to the Compliant Work Zone Traffic Control Devices List (CWZTCD) for details of the Type 3 Barricades and a list of all materials used in the construction of Type 3 Barricades.
2. Type 3 Barricades shall be used at each end of construction projects closed to all traffic.
3. Barricades extending across a roadway should have stripes that slope downward in the direction toward which traffic must turn in detouring. When both right and left turns are provided, the chevron striping may slope downward in both directions from the center of the barricade. Where no turns are provided at a closed road, striping should slope downward in both directions toward the center of roadway.
4. Striping of rails, for the right side of the roadway, should slope downward to the left. For the left side of the roadway, striping should slope downward to the right.
5. Identification markings may be shown only on the back of the barricade rails. The maximum height of letters and/or company logos used for identification shall be 1".
6. Barricades shall not be placed parallel to traffic unless an adequate clear zone is provided.
7. Warning lights shall NOT be installed on barricades.
8. Where barricades require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand is recommended. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight. Sand bags shall not be stacked in a manner that covers any portion of a barricade rails reflective sheeting. Rock, concrete, iron, steel or other solid objects will NOT be permitted. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall not be used for sandbags. Sandbags shall only be placed along or upon the base supports of the device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners.
9. Sheeting for barricades shall be retroreflective Type A or Type B conforming to Departmental Material Specification DMS-8300 unless otherwise noted.

Barricades shall NOT be used as a sign support.



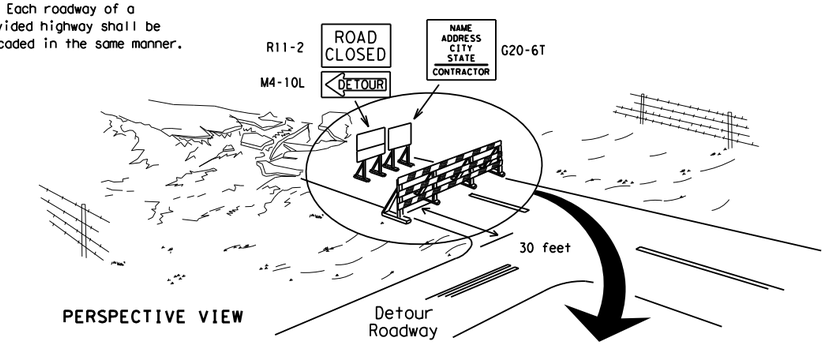
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



Stiffener may be inside or outside of support, but no more than 2 stiffeners shall be allowed on one barricade.

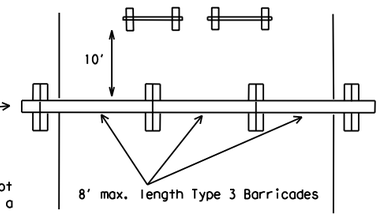
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

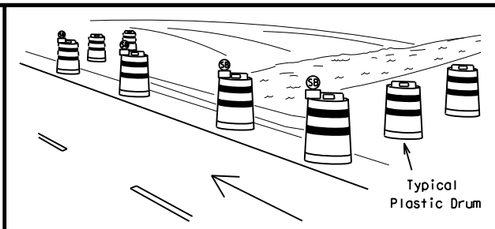
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

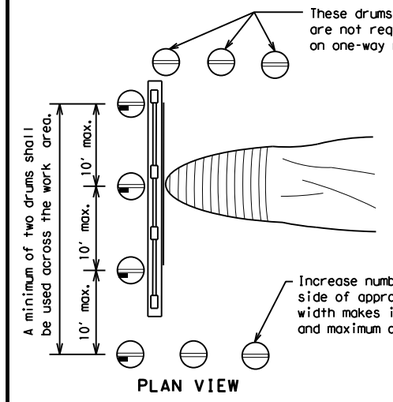
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

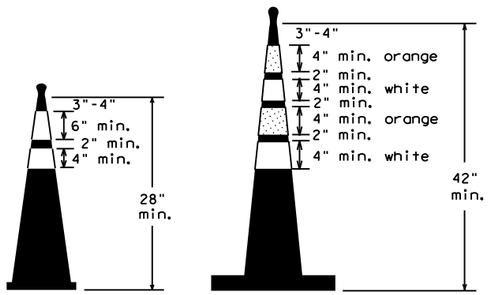
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder width is greater than 12 feet, steady-burn lights may be omitted if drums are used.
5. Drums must extend the length of the culvert widening.



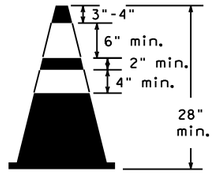
PLAN VIEW

LEGEND	
	Plastic drum
	Plastic drum with steady burn light or yellow warning reflector
SB	Steady burn warning light or yellow warning reflector

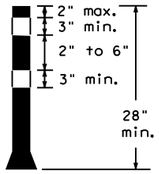
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

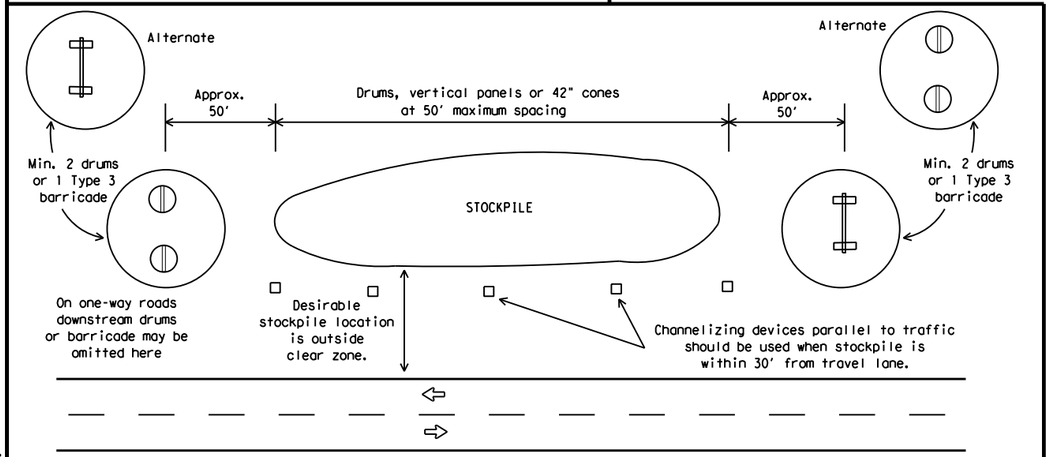


Tubular Marker

28" Cones shall have a minimum weight of 9 1/2 lbs.

42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

1. Traffic cones and tubular markers shall be predominantly orange, and meet the height and weight requirements shown above.
2. One-piece cones have the body and base of the cone molded in one consolidated unit. Two-piece cones have a cone shaped body and a separate rubber base, or ballast, that is added to keep the device upright and in place.
3. Two-piece cones may have a handle or loop extending up to 8" above the minimum height shown, in order to aid in retrieving the device.
4. Cones or tubular markers shall have white or white and orange reflective bands as shown above. The reflective bands shall have a smooth, sealed outer surface and meet the requirements of Departmental Material Specification DMS-8300 Type A or Type B.
5. 28" cones and tubular markers are generally suitable for short duration and short-term stationary work as defined on BC(4). These should not be used for intermediate-term or long-term stationary work unless personnel is on-site to maintain them in their proper upright position.
6. 42" two-piece cones, vertical panels or drums are suitable for all work zone durations.
7. Cones or tubular markers used on each project should be of the same size and shape.



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

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SHEET 10 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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WORK ZONE PAVEMENT MARKINGS

GENERAL

1. The Contractor shall be responsible for maintaining work zone and existing pavement markings, in accordance with the standard specifications and special provisions, on all roadways open to traffic within the CSJ limits unless otherwise stated in the plans.
2. Color, patterns and dimensions shall be in conformance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
3. Additional supplemental pavement marking details may be found in the plans or specifications.
4. Pavement markings shall be installed in accordance with the TMUTCD and as shown on the plans.
5. When short term markings are required on the plans, short term markings shall conform with the TMUTCD, the plans and details as shown on the Standard Plan Sheet WZ(STPM).
6. When standard pavement markings are not in place and the roadway is opened to traffic, DO NOT PASS signs shall be erected to mark the beginning of the sections where passing is prohibited and PASS WITH CARE signs at the beginning of sections where passing is permitted.
7. All work zone pavement markings shall be installed in accordance with Item 662, "Work Zone Pavement Markings."

RAISED PAVEMENT MARKERS

1. Raised pavement markers are to be placed according to the patterns on BC(12).
2. All raised pavement markers used for work zone markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and Departmental Material Specification DMS-4200 or DMS-4300.

PREFABRICATED PAVEMENT MARKINGS

1. Removable prefabricated pavement markings shall meet the requirements of DMS-8241.
2. Non-removable prefabricated pavement markings (foil back) shall meet the requirements of DMS-8240.

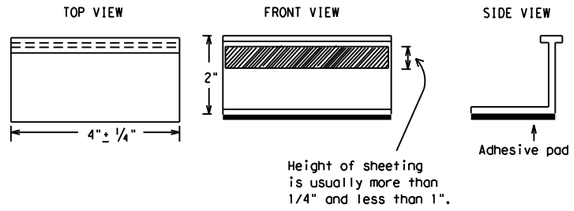
MAINTAINING WORK ZONE PAVEMENT MARKINGS

1. The Contractor will be responsible for maintaining work zone pavement markings within the work limits.
2. Work zone pavement markings shall be inspected in accordance with the frequency and reporting requirements of work zone traffic control device inspections as required by Form 599.
3. The markings should provide a visible reference for a minimum distance of 300 feet during normal daylight hours and 160 feet when illuminated by automobile low-beam headlights at night, unless sight distance is restricted by roadway geometrics.
4. Markings failing to meet this criteria within the first 30 days after placement shall be replaced at the expense of the Contractor as per Specification Item 662.

REMOVAL OF PAVEMENT MARKINGS

1. Pavement markings that are no longer applicable, could create confusion or direct a motorist toward or into the closed portion of the roadway shall be removed or obliterated before the roadway is opened to traffic.
2. The above shall not apply to detours in place for less than three days, where flaggers and/or sufficient channelizing devices are used in lieu of markings to outline the detour route.
3. Pavement markings shall be removed to the fullest extent possible, so as not to leave a discernable marking. This shall be by any method approved by TxDOT Specification Item 677 for "Eliminating Existing Pavement Markings and Markers".
4. The removal of pavement markings may require resurfacing or seal coating portions of the roadway as described in Item 677.
5. Subject to the approval of the Engineer, any method that proves to be successful on a particular type pavement may be used.
6. Blast cleaning may be used but will not be required unless specifically shown in the plans.
7. Over-painting of the markings SHALL NOT BE permitted.
8. Removal of raised pavement markers shall be as directed by the Engineer.
9. Removal of existing pavement markings and markers will be paid for directly in accordance with Item 677, "ELIMINATING EXISTING PAVEMENT MARKINGS AND MARKERS," unless otherwise stated in the plans.
10. Black-out marking tape may be used to cover conflicting existing markings for periods less than two weeks when approved by the Engineer.

Temporary Flexible-Reflective Roadway Marker Tabs



STAPLES OR NAILS SHALL NOT BE USED TO SECURE TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER TABS TO THE PAVEMENT SURFACE

1. Temporary flexible-reflective roadway marker tabs used as guidemarks shall meet the requirements of DMS-8242.
2. Tabs detailed on this sheet are to be inspected and accepted by the Engineer or designated representative. Sampling and testing is not normally required, however at the option of the Engineer, either "A" or "B" below may be imposed to assure quality before placement on the roadway.
   A. Select five (5) or more tabs at random from each lot or shipment and submit to the Construction Division, Materials and Pavement Section to determine specification compliance.
   B. Select five (5) tabs and perform the following test. Affix five (5) tabs at 24 inch intervals on an asphaltic pavement in a straight line. Using a medium size passenger vehicle or pickup, run over the markers with the front and rear tires at a speed of 35 to 40 miles per hour, four (4) times in each direction. No more than one (1) out of the five (5) reflective surfaces shall be lost or displaced as a result of this test.
3. Small design variances may be noted between tab manufacturers.
4. See Standard Sheet WZ(STPM) for tab placement on new pavements. See Standard Sheet TCP(7-1) for tab placement on seal coat work.

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

1. Raised pavement markers used as guidemarks shall be from the approved product list, and meet the requirements of DMS-4200.
2. All temporary construction raised pavement markers provided on a project shall be of the same manufacturer.
3. Adhesive for guidemarks shall be bituminous material hot applied or butyl rubber pad for all surfaces, or thermoplastic for concrete surfaces.

Guidemarks shall be designated as:
YELLOW - (two amber reflective surfaces with yellow body).
WHITE - (one silver reflective surface with white body).

DEPARTMENTAL MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
TRAFFIC BUTTONS	DMS-4300
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY REMOVABLE, PREFABRICATED PAVEMENT MARKINGS	DMS-8241
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS	DMS-8242

A list of prequalified reflective raised pavement markers, non-reflective traffic buttons, roadway marker tabs and other pavement markings can be found at the Material Producer List web address shown on BC(1).

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
1-02 7-13	FTW	ERATH		49
11-02 8-14				

DATE:
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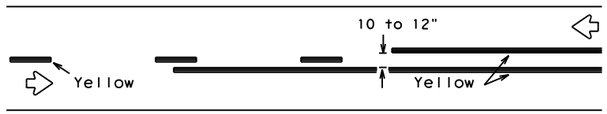
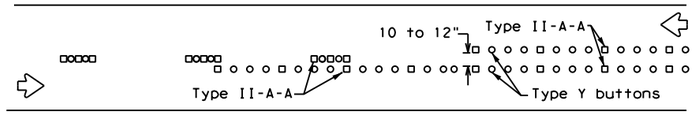
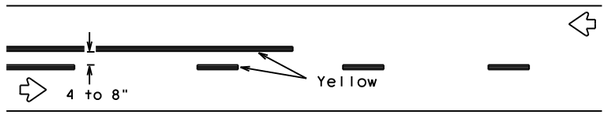
PAVEMENT MARKING PATTERNS



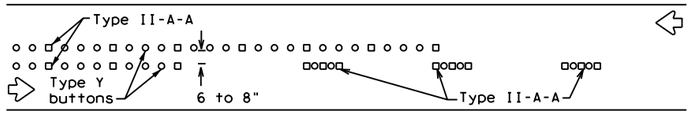
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



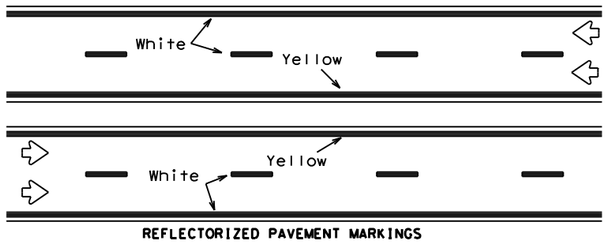
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



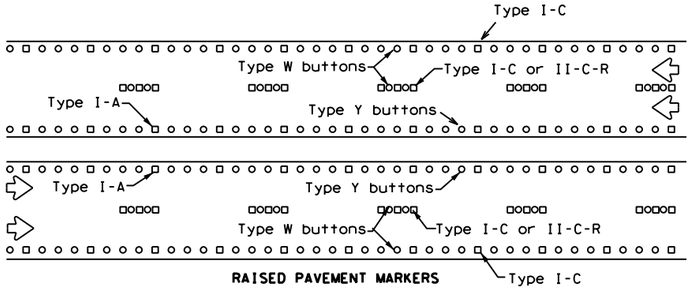
RAISED PAVEMENT MARKERS - PATTERN B

Pattern A is the TXDOT Standard, however Pattern B may be used if approved by the Engineer.
Prefabricated markings may be substituted for reflectorized pavement markings.

CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO-LANE, TWO-WAY HIGHWAYS



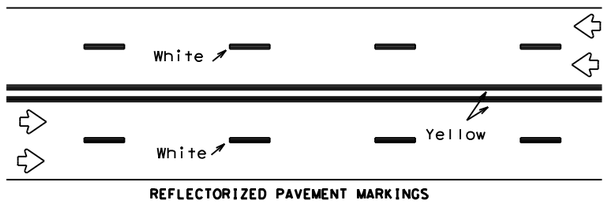
REFLECTORIZED PAVEMENT MARKINGS



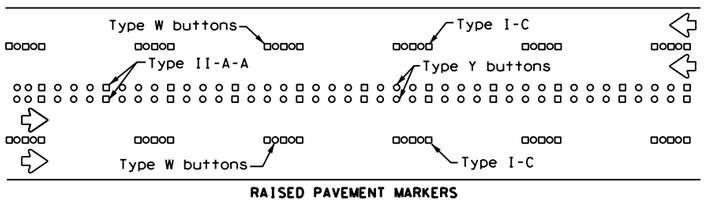
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



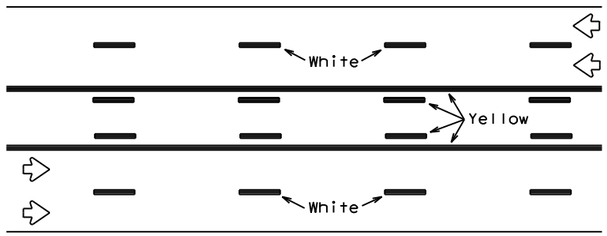
REFLECTORIZED PAVEMENT MARKINGS



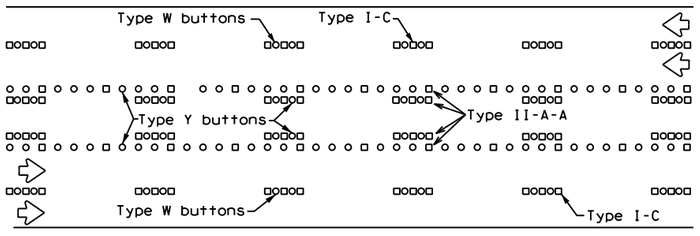
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

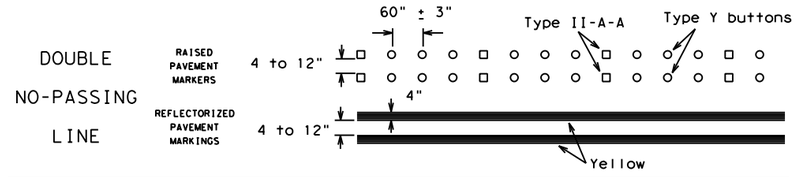
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

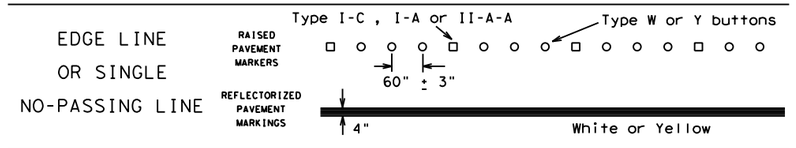
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

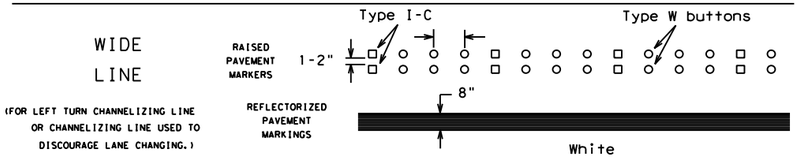


EDGE LINE OR SINGLE NO-PASSING LINE



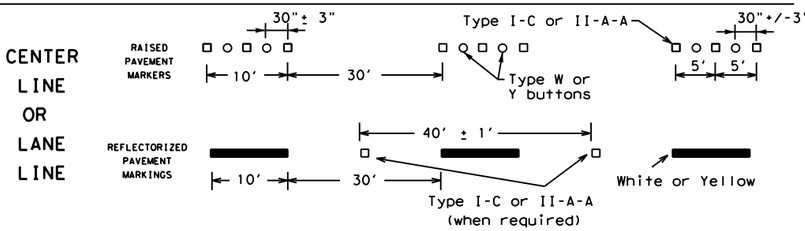
WIDE LINE

(FOR LEFT TURN CHANNELIZING LINE OR CHANNELIZING LINE USED TO DISCOURAGE LANE CHANGING.)

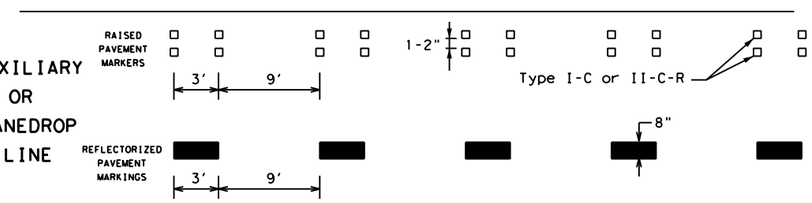


BROKEN LINES

CENTER LINE OR LANE LINE

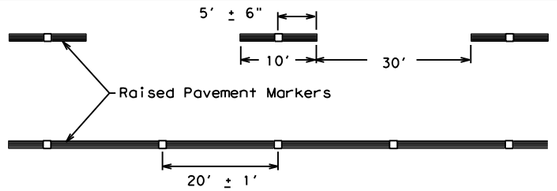


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

If raised pavement markers are used to supplement REMOVABLE markings, the markers shall be applied to the top of the tape at the approximate mid length of tape used for broken lines or at 20 foot spacing for solid lines. This allows an easier removal of raised pavement markers and tape.



Centerline only - not to be used on edge lines

Raised pavement markers used as standard pavement markings shall be from the approved products list and meet the requirements of Item 672 "RAISED PAVEMENT MARKERS."

SHEET 12 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

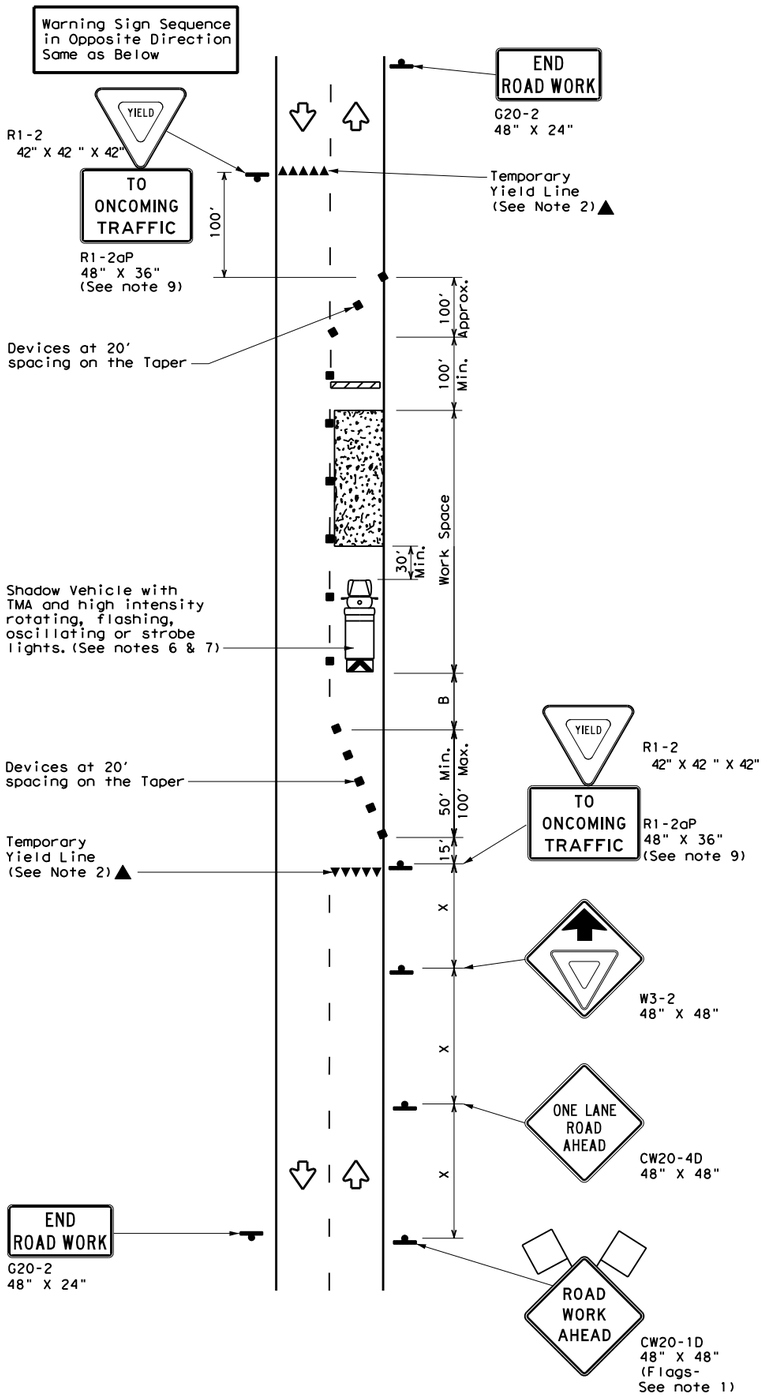
BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

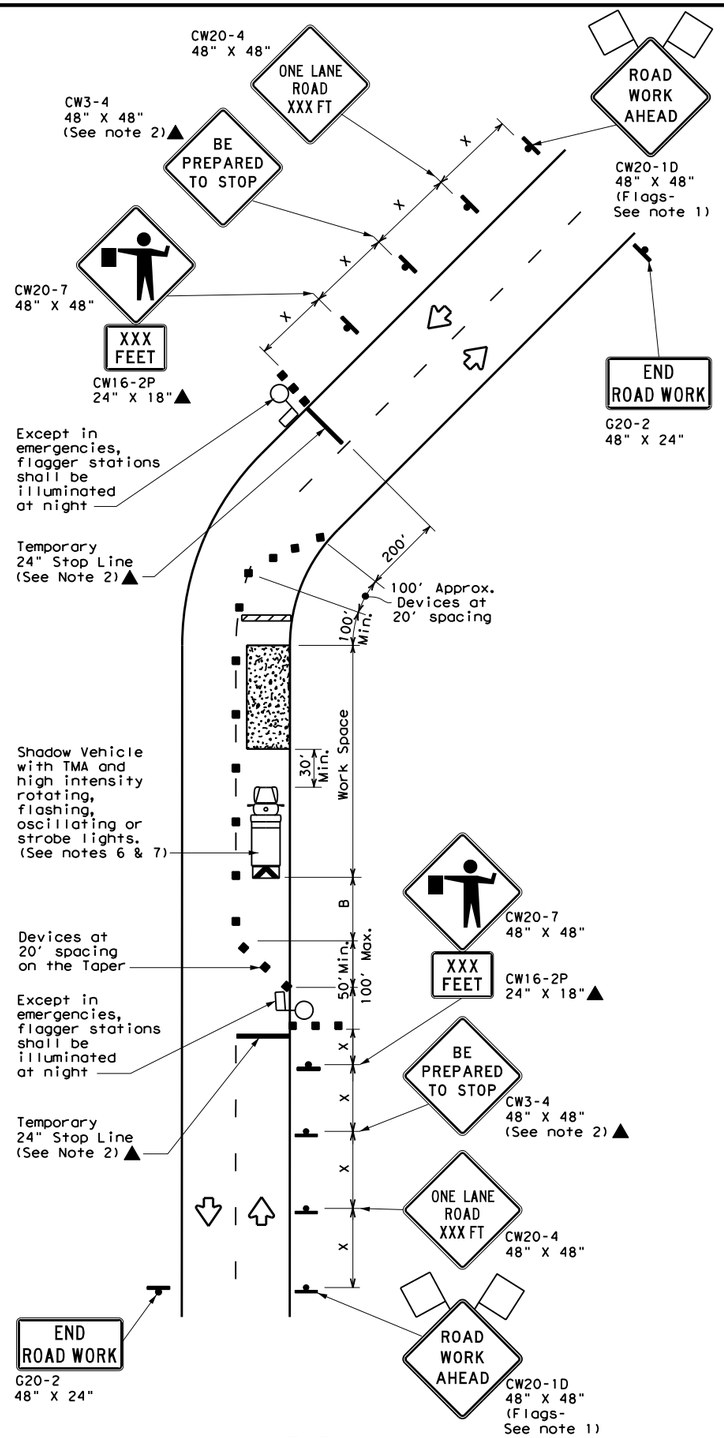
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	0079	04	049	BU 67K
	DIST	COUNTY		SHEET NO.
	FTW	ERATH		50

106

DATE:
FILE:



TCP (2-2a)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See Note 9)



TCP (2-2b)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH FLAGGERS

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L=WS	450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4 "ONE LANE ROAD XXX FT" sign, but proper sign spacing shall be maintained.
4. Flaggers should use two-way radios or other methods of communication to control traffic.
5. Length of work space should be based on the ability of flaggers to communicate.
6. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
7. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-2a)

8. The R1-2 "YIELD" sign traffic control may be used on projects with approaches that have adequate sight distance. For projects in urban areas, work space should be no longer than one half city block. In rural areas, roadways with less than 2000 ADT, work space should be no longer than 400 feet.
9. The R1-2aP "YIELD TO ONCOMING TRAFFIC" sign shall be placed on a support at a 7 foot minimum mounting height.

TCP (2-2b)

10. Channelizing devices on the center line may be omitted when a pilot car is leading traffic and approved by the Engineer.
11. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain stopping sight distance to the flagger and a queue of stopped vehicles. (See table above).
12. Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situtations.

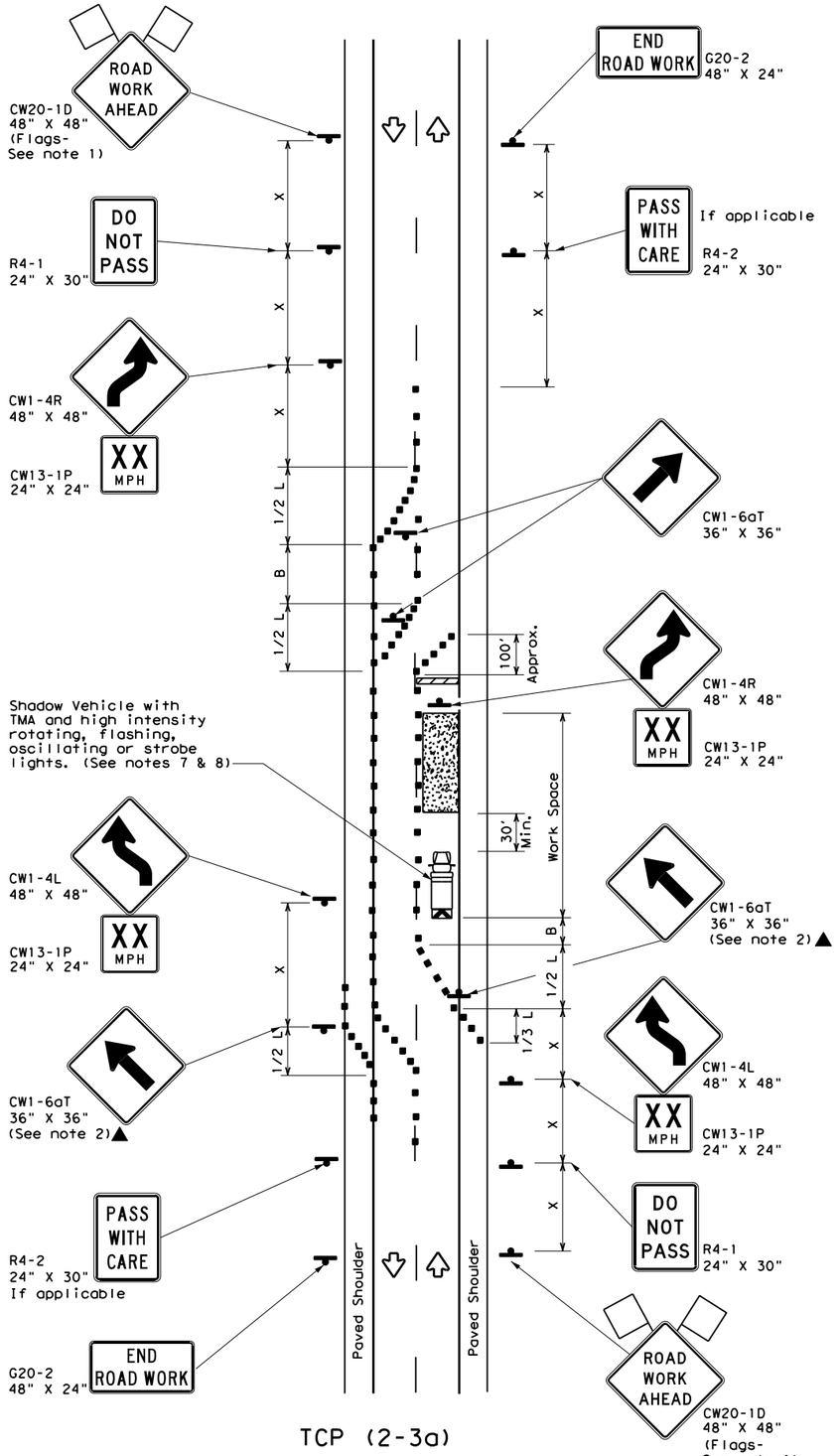
Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY
TRAFFIC CONTROL

TCP(2-2)-18

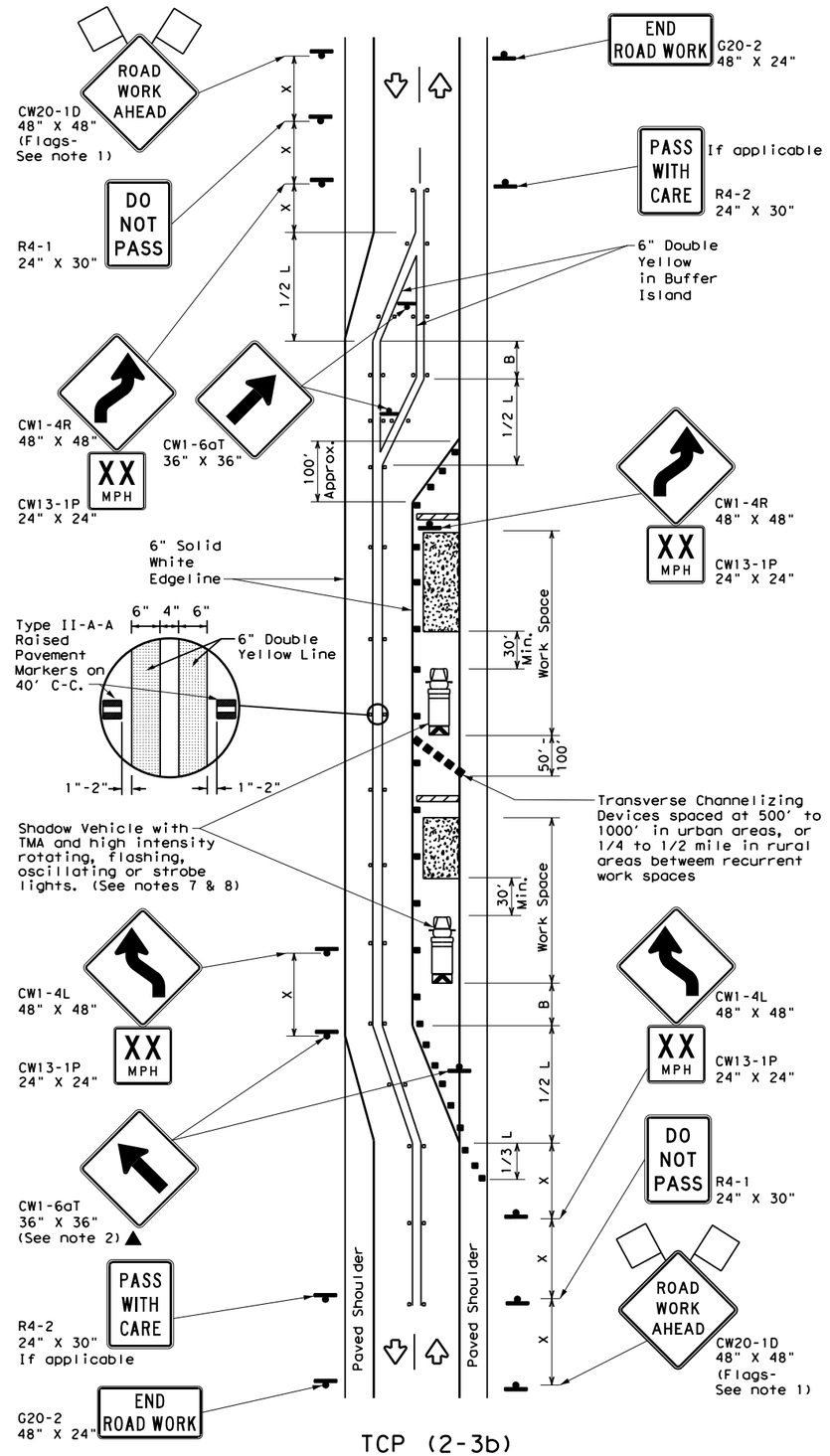
FILE: tcp2-2-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0079	04	049	BU 67K
1-97 2-12	DIST	COUNTY		SHEET NO.
4-98 2-18	FTW	ERATH		51

DATE:
FILE:



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

ONE LANE CLOSED
ADEQUATE FIELD OF VIEW



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

ONE LANE CLOSED
INADEQUATE FIELD OF VIEW

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

TCP (2-3a)

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

Texas Department of Transportation

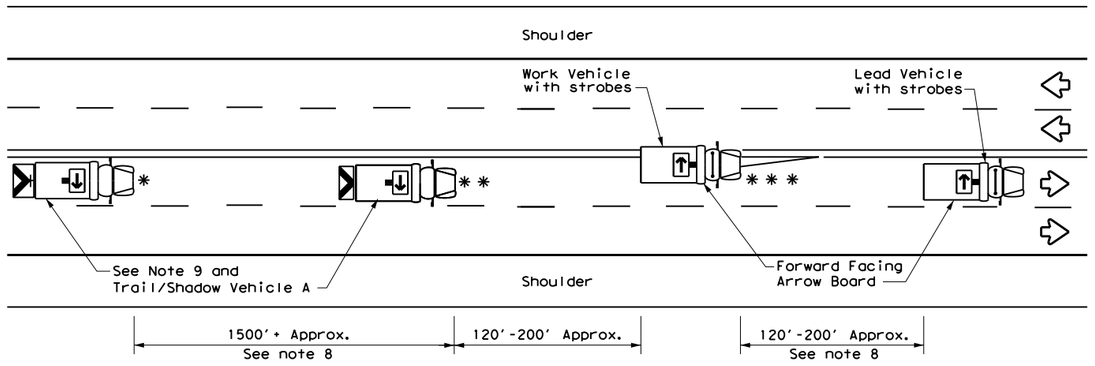
Traffic Safety Division Standard

TRAFFIC CONTROL PLAN TRAFFIC SHIFTS ON TWO-LANE ROADS

TCP(2-3)-23

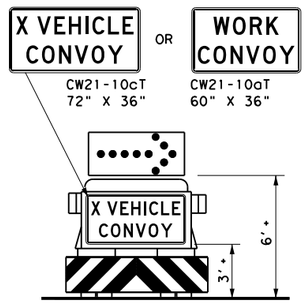
FILE: tcp(2-3)-23.dgn	DN:	CK:	DW:	CK:
© TxDOT April 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-85 4-98 2-18 8-95 3-03 4-23 1-97 2-12	0079	04	049	BU 67K
	DIST	COUNTY		SHEET NO.
	FTW	ERATH		52

DATE:
FILE:



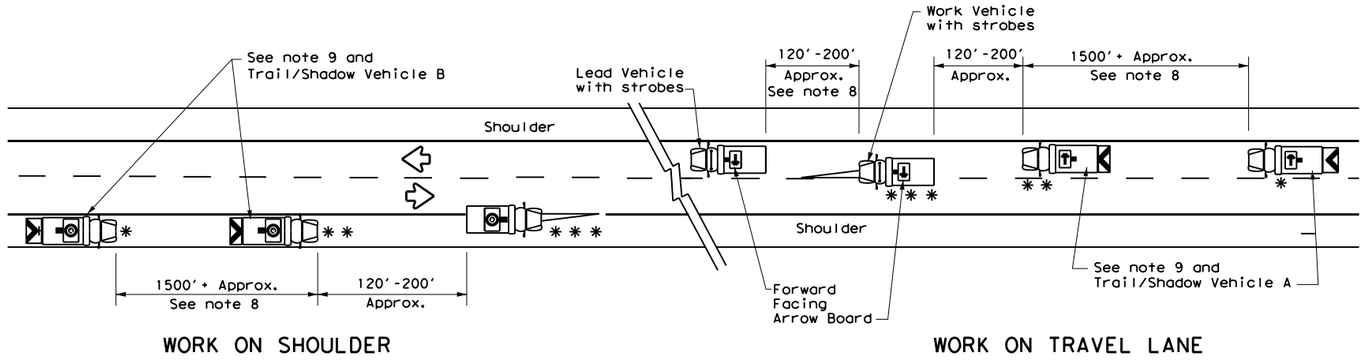
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

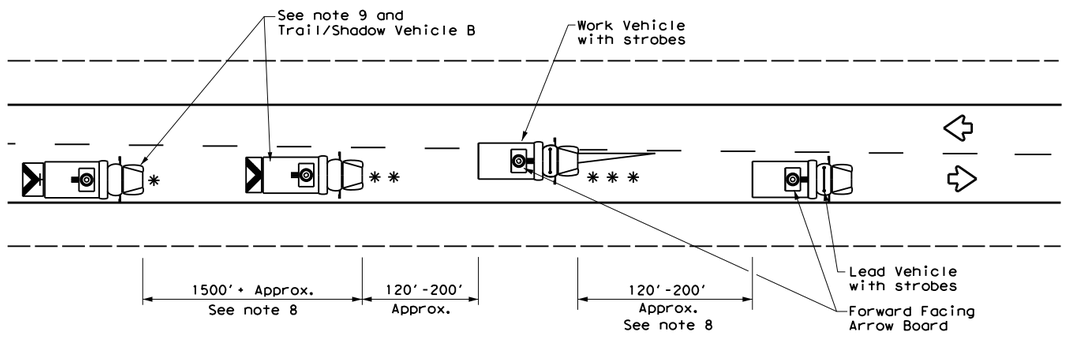


WORK ON SHOULDER

WORK ON TRAVEL LANE

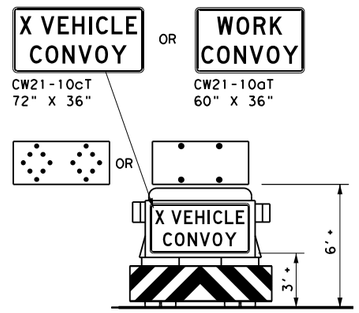
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

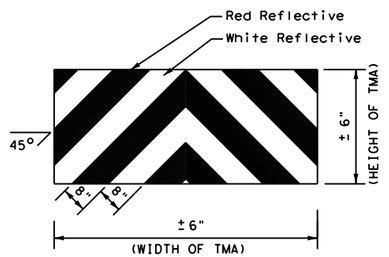
with Flashing Arrow Board in CAUTION display

LEGEND			
*	Trail Vehicle	ARROW BOARD DISPLAY	
* *	Shadow Vehicle		
* * *	Work Vehicle		RIGHT Directional
	Heavy Work Vehicle		LEFT Directional
	Truck Mounted Attenuator (TMA)		Double Arrow
	Traffic Flow		CAUTION (Alternating Diamond or 4 Corner Flash)

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

GENERAL NOTES

1. TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used the WORK vehicle must be equipped with an arrow board. The Engineer will determine if the LEAD VEHICLE and/or TRAIL VEHICLE are required based on prevailing roadway conditions, traffic volume, and sight distance restrictions.
2. The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
3. The use of truck mounted attenuators (TMA) on the SHADOW VEHICLE and TRAIL VEHICLE are required.
4. Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DEPARTMENTAL MATERIAL SPECIFICATION DMS 8300, Type A.
5. Flashing arrow boards shall be Type B or Type C as per the Barricade and Construction (BC) standards. The board shall be controlled from inside the vehicle.
6. Each vehicle shall have two-way radio communication capability.
7. When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles.
8. Vehicle spacing between the TRAIL VEHICLE and the SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE. Vehicle spacing between the WORK VEHICLE and SHADOW VEHICLE and vehicle spacing between WORK VEHICLE and LEAD VEHICLE may vary according to terrain, work activity and other factors.
9. "X VEHICLE CONVOY" (CW21-10cT) or "WORK CONVOY" (CW21-10aT) signs shall be used on TRAIL VEHICLES and SHADOW VEHICLES as shown. As an option 48" X 48" diamond shaped "WORK CONVOY"(CW21-10T) or "X VEHICLE CONVOY" (CW21-10bT) signs may be used where adequate mounting space exists. When used, the X VEHICLE CONVOY sign shall have the number of the convoy vehicles displayed on the sign in the number designation "X" location. The "X VEHICLE CONVOY" sign shall not be used on the SHADOW VEHICLE if a TRAIL VEHICLE is used.
10. On two-lane two-way roadways, the work and protection vehicles should pull over periodically to allow motor vehicle traffic to pass. If motorists are not allowed to pass the work convoy, a "DO NOT PASS" (R4-1) sign should be placed on the back of the rearmost protection vehicle.



STRIPING FOR TMA

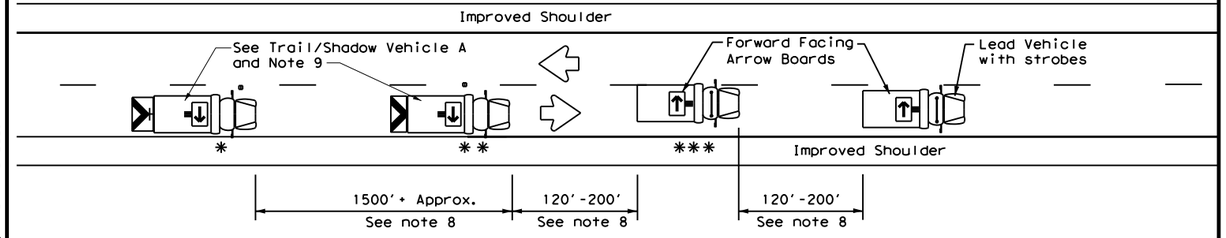
Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

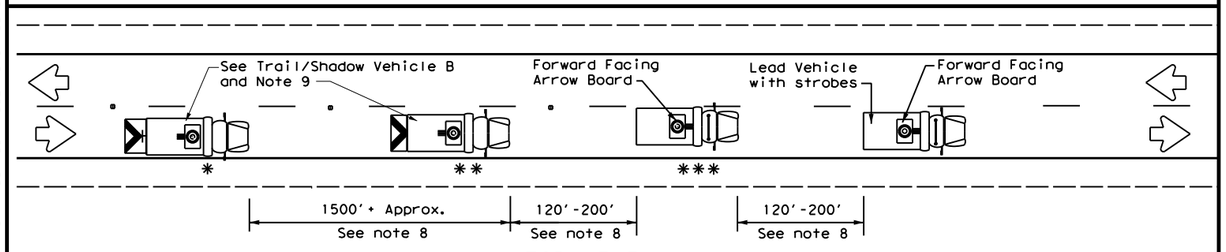
TCP(3-1)-13

FILE: tcp3-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0079	04	049	BU 67K
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	FTW	ERATH		53
1-97				



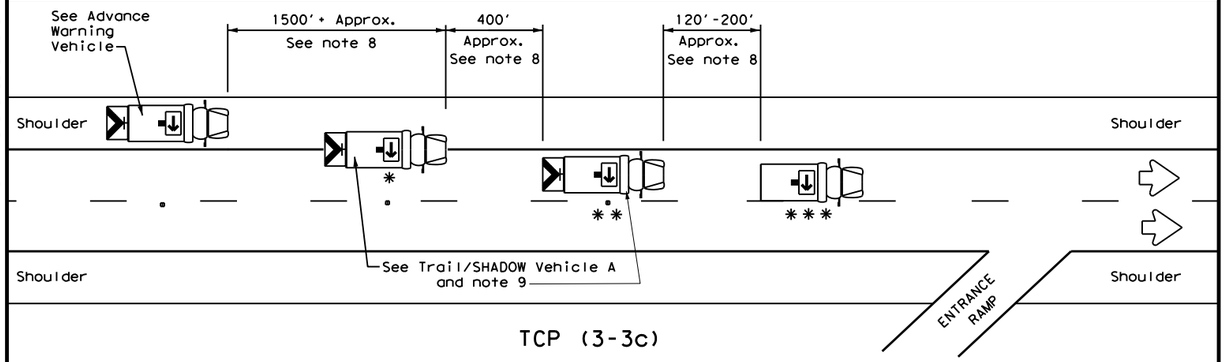
TCP (3-3a)

TWO LANE HIGHWAY WITH PAVED SHOULDERS (WORK ON TRAVEL LANE)



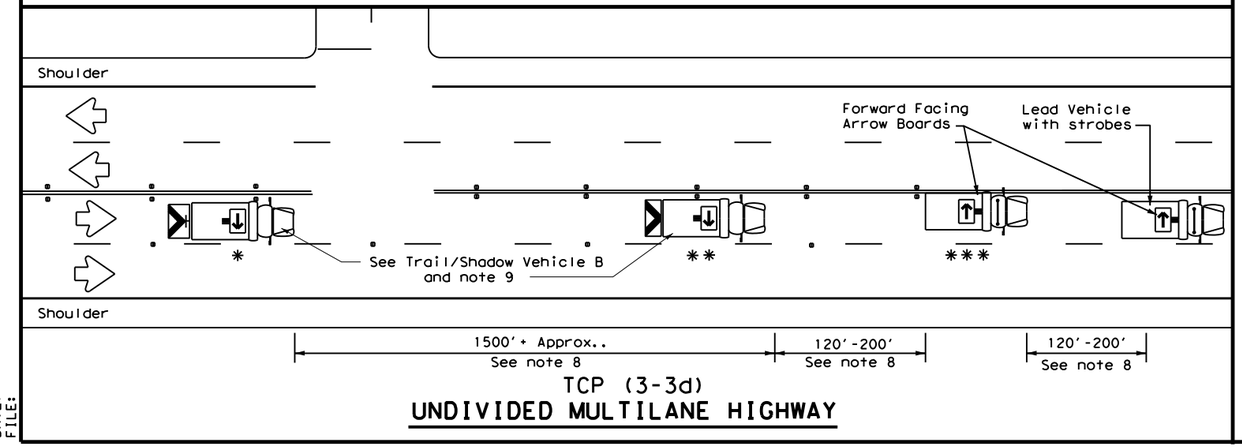
TCP (3-3b)

TWO LANE HIGHWAY WITHOUT PAVED SHOULDERS (WORK ON TRAVEL LANE)



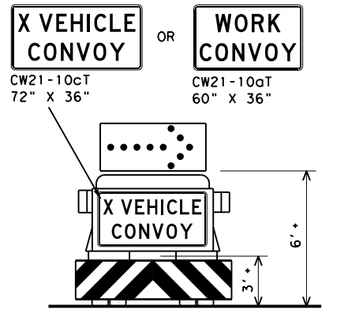
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



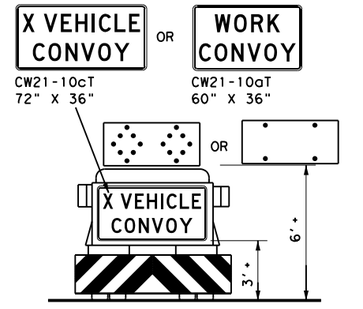
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



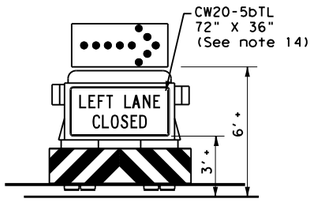
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

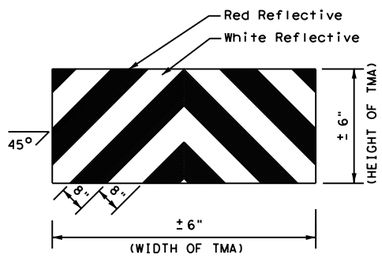


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board
in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

LEGEND			
*	Trail Vehicle	ARROW BOARD DISPLAY	
**	Shadow Vehicle		
***	Work Vehicle		RIGHT Directional
	Heavy Work Vehicle		LEFT Directional
	Truck Mounted Attenuator (TMA)		Double Arrow
	Traffic Flow		CAUTION (Alternating Diamond or 4 Corner Flash)

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

GENERAL NOTES

1. TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used on two way roads the WORK vehicle must have an arrow board. For divided roadways, the arrow board on the WORK vehicle is optional based on the type of work being performed. The Engineer will determine if the LEAD vehicle and/or TRAIL vehicle are required based on prevailing roadway conditions, traffic volume, and sight distance restrictions.
2. The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating, or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
3. The use of truck mounted attenuators (TMA) on the SHADOW VEHICLE, ADVANCE WARNING and TRAIL VEHICLE are required.
4. Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DEPARTMENTAL MATERIAL SPECIFICATION DMS 8300, Type A.
5. Flashing arrow boards shall be Type B or Type C as per the Barricade and Construction (BC) standards. The board shall be controlled from inside the vehicle.
6. Each vehicle shall have two-way radio communication capability.
7. When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles.
8. Vehicle spacing between the TRAIL VEHICLE and the SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE. Vehicle spacing between the WORK VEHICLE and SHADOW VEHICLE and vehicle spacing between WORK VEHICLE and LEAD VEHICLE may vary according to terrain, work activity and other factors.
9. X VEHICLE CONVOY (CW21-10cT) or WORK CONVOY (CW21-10aT) signs shall be used on TRAIL VEHICLES and SHADOW VEHICLES as shown. As an option 48" x 48" diamond shaped WORK CONVOY (CW21-10T) or X VEHICLE CONVOY (CW21-10bT) signs may be used where adequate mounting space exists. When used, the X VEHICLE CONVOY sign shall have the number of the convoy vehicles displayed on the sign in the number designation "X" location. The X VEHICLE CONVOY sign shall not be used on the SHADOW VEHICLE if a TRAIL VEHICLE is used.
10. For divided highways with two or three lanes in one direction, the appropriate LEFT LANE CLOSED (CW20-5bTL), RIGHT LANE CLOSED (CW20-5bTR), or CENTER LANE CLOSED (CW20-5dT) sign should be used on the Advance Warning Vehicle. As an option, a portable changeable message sign (PCMS) or truck mounted changeable message sign (TMCMS) with a minimum character height of 12", and displaying the same legend may be substituted for these signs. An appropriate directional arrow display, simulating the size and legibility of the flashing arrow board may be used in the second phase of the PCMS/TMCMS message. When this is done, the arrow board will not be required on the Advance Warning Vehicle.
11. A double arrow shall not be displayed on the arrow board on the Advance Warning Vehicle.
12. For divided highways with three or four lanes in each direction, use TCP(3-2).
13. Standard diamond shape versions of the CW20-5 series signs may be used as an option if the rectangular signs shown are not available.
14. The Advance Warning Vehicle may straddle the edgeline when Shoulder width makes it necessary.
15. On two-lane two-way roadways, the work and protection vehicles should pull over periodically to allow motor vehicle traffic to pass. If motorists are not allowed to pass the work convoy, a DO NOT PASS (R4-1) sign should be placed on the back of the rearmost protection vehicle.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL

TCP(3-3)-14

FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0079	04	049	BU 67K
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	FTW	ERATH		54
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DATE:
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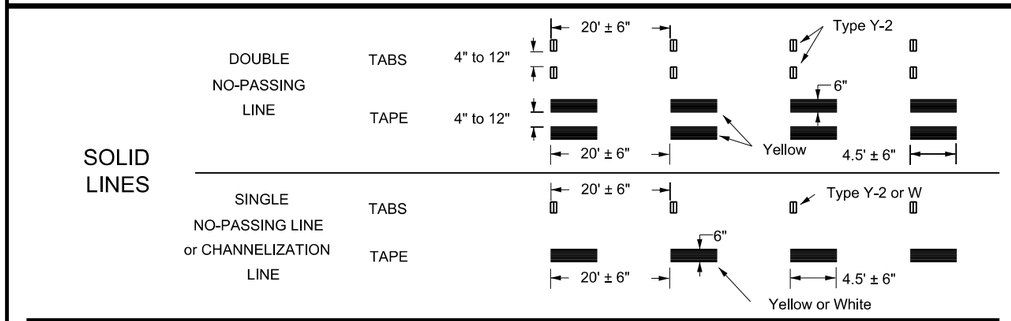
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



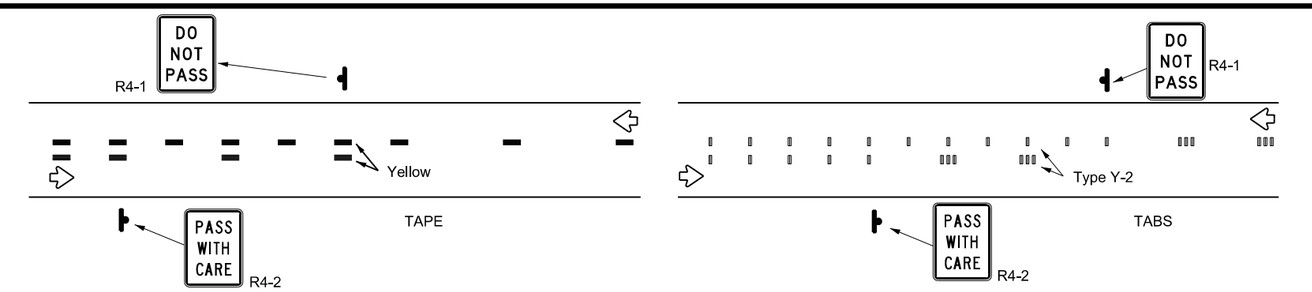
NOTES:

1. Short term pavement markings may be prefabricated markings (stick down tape) or temporary flexible reflective roadway marker tabs unless otherwise specified elsewhere in plans.
2. Short term pavement markings shall NOT be used to simulate edge lines.
3. Dimensions indicated on this sheet are typical and approximate. Variations in size and height may occur between markers or devices made by manufacturers, by as much as 1/4 inch, unless otherwise noted.
4. Temporary flexible-reflective roadway marker tabs will require normal maintenance replacement when used on roadways with an ADT per lane of up to 7500 vehicles with no more than 10% truck mix. When roadways exceed these values, additional maintenance replacement of devices should be planned.
5. No segment of roadway open to traffic shall remain without permanent pavement markings for a period greater than 14 calendar days. The Contractor will be responsible for maintaining short term pavement markings until permanent pavement markings are in place. When the Contractor is responsible for placement of permanent pavement markings, no segment of roadway shall remain without permanent pavement markings for a period greater than 14 calendar days unless weather conditions prohibit placement. Permanent pavement markings shall be placed as soon as weather permits.
6. For two lane, two-way roadways, DO NOT PASS signs shall be erected to mark the beginning of sections where passing is prohibited and PASS WITH CARE signs shall be erected to mark the beginning of sections where passing is permitted. Signs shall be in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) and may be used to indicate the limits of no-passing zones for up to 14 calendar days. Permanent pavement markings should then be placed.
7. For low volume two lane, two-way roadways of 4000 ADT or less, no-passing lines may be omitted when approved by the Engineer. DO NOT PASS and PASS WITH CARE signs shall be erected (see note 6).
8. For exit gores where a lane is being dropped place wide gore markings or retroreflective channelizing devices to guide motorist through the exit. If channelizing devices are to be used it should be noted elsewhere in the plans. One piece cones are not allowed for this purpose.

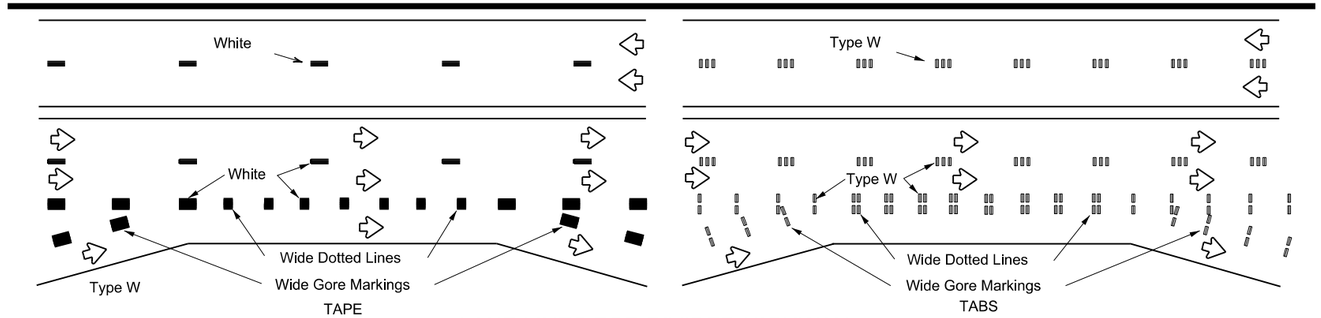
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

1. Temporary flexible-reflective roadway marker tabs detailed on this sheet will be designated Type Y-2 (two amber reflective surfaces with yellow body); Type Y (one amber reflective surface with yellow body); and Type W (one white or silver reflective surface with white body). Additional details may be found on BC(11).
2. Tabs shall meet requirements of Departmental Material Specification DMS-8242.
3. When dry, tabs shall be visible for a minimum distance of 200 feet during normal daylight hours and when illuminated by automobile low-beam head light at night, unless sight distance is restricted by roadway geometrics.
4. No two consecutive tabs nor four tabs per 1000 feet of line shall be missing or fail to meet the visual performance requirements of Note 3.

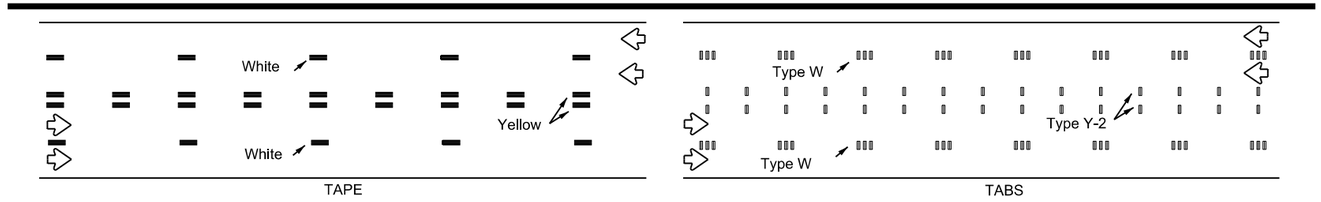
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



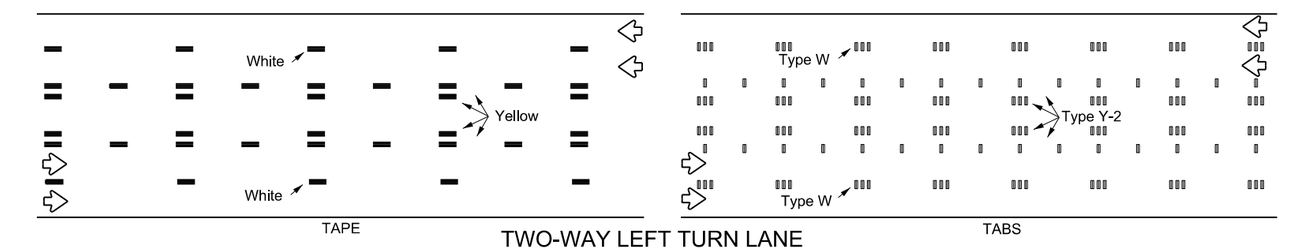
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



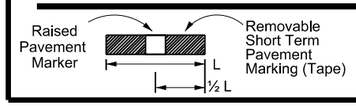
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



If raised pavement markers are used to supplement REMOVABLE short term markings, the markers shall be applied to the top of the tape at the approximate mid length of the tape. This allows an easier removal of raised markers and tape.

PREFABRICATED PAVEMENT MARKINGS

1. Temporary Removable Prefabricated Pavement Markings shall meet the requirements of DMS-8241.
2. Non-removable Prefabricated Pavement Markings shall meet the requirements of either DMS-8240 "Permanent Prefabricated Pavement Markings" or DMS-8243 "Temporary Costruction-Grade Prefabricated Pavement Markings."

RAISED PAVEMENT MARKERS

1. All raised pavement markers used for work zone markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and DMS-4200.

DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS) & MATERIAL PRODUCER LISTS (MPL)

1. DMSs referenced above can be found along with embedded links to their respective MPLs at the following website:

http://www.txdot.gov/business/contractors_consultants/material_specifications/default.htm

Texas Department of Transportation

Traffic Safety Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-23

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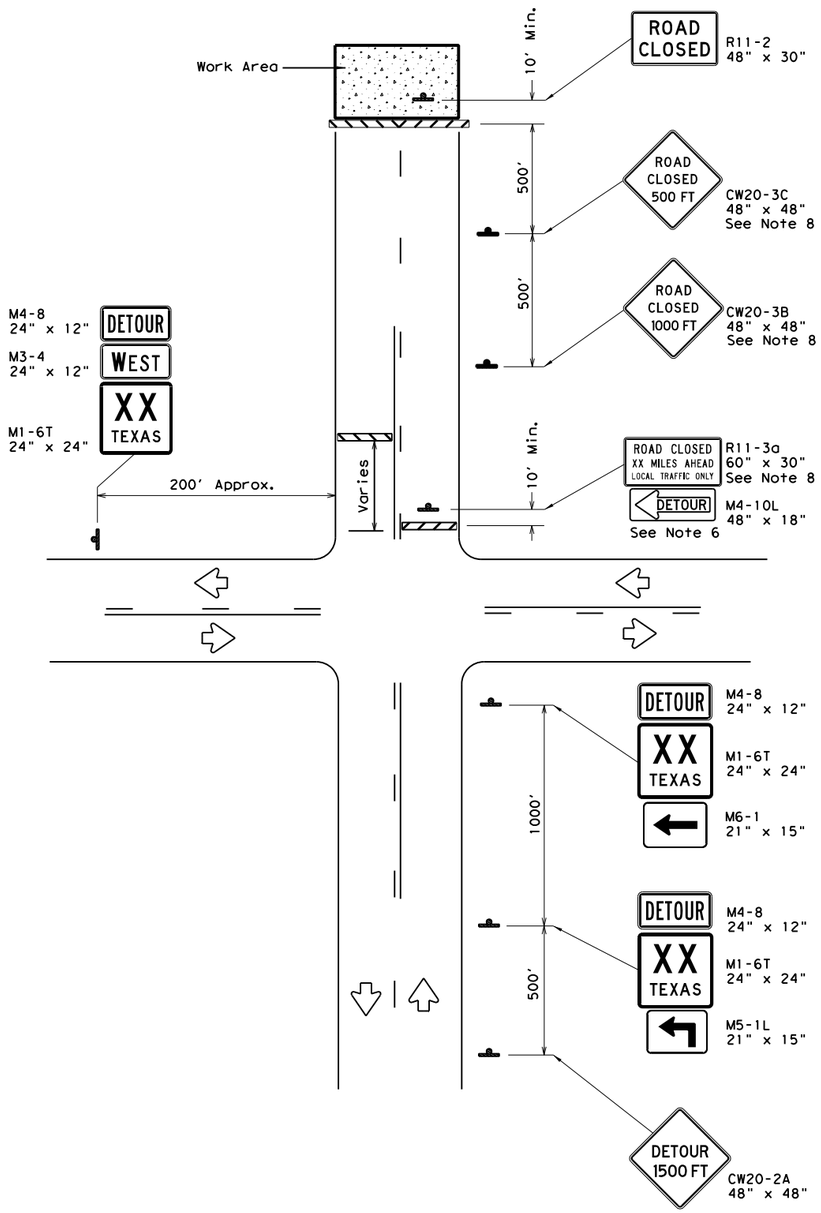
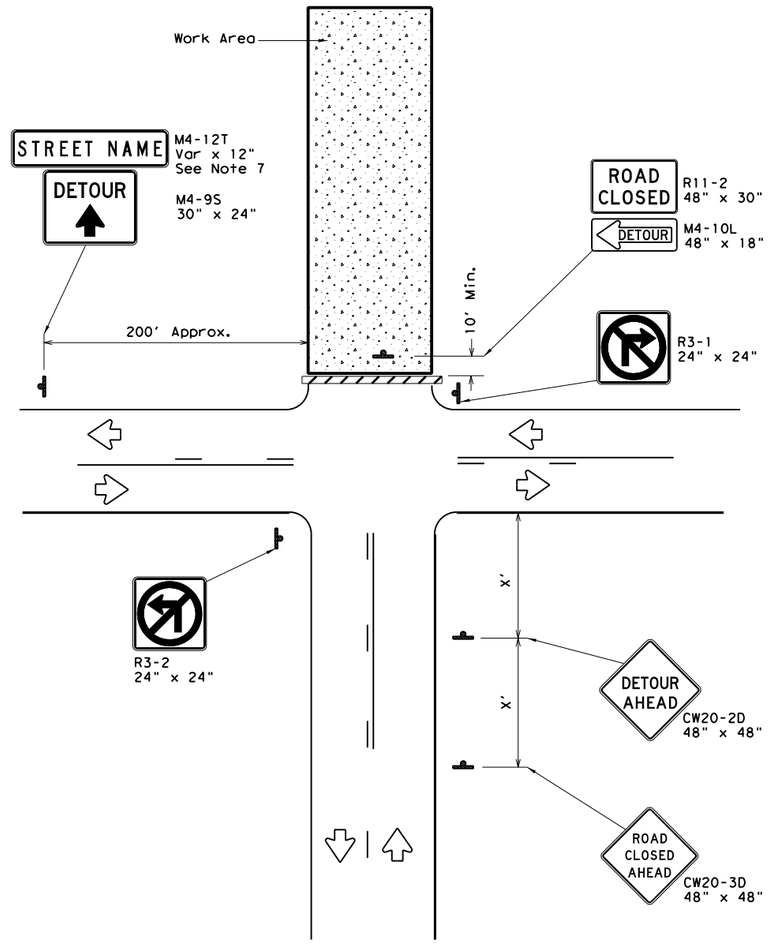


ROAD CLOSURE BEYOND THE INTERSECTION

Signing for a Numbered Route with an Off-Site Detour



ROAD CLOSURE AT THE INTERSECTION

Signing for an Un-numbered Route with an Off-Site Detour

LEGEND	
	Type 3 Barricade
	Sign

Posted Speed *	Minimum Sign Spacing "X" Distance
30	120'
35	160'
40	240'
45	320'
50	400'
55	500'
60	600'
65	700'
70	800'
75	900'

* Conventional Roads Only

GENERAL NOTES

1. This sheet is intended to provide details for temporary work zone road closures. For permanent road closure details see the D&OM standards.
2. Barricades used shall meet the requirements shown on Barricade and Construction Standard BC(10) and listed on the Compliant Work Zone Traffic Control Devices list (CWZTCD).
3. Stockpiled materials shall not be placed on the traffic side of barricades.
4. Barricades at the road closure should extend from pavement edge to pavement edge.
5. Detour signing shown is intended to illustrate the type of signing that is appropriate for numbered routes or un-numbered routes as labeled. It does not indicate the full extent of detour signing required. Detour routes should be signed as shown elsewhere in the plans.
6. If the road is open for a significant distance beyond the intersection or there are significant origin/destination points beyond the intersection, the signs and barricades at this location should be located at the edge of the traveled way.
7. The Street Name (M4-12T) sign is to be placed above the DETOUR (M4-9S) sign.
8. For urban areas where there is a shorter distance between the intersection and the actual closure location, the ROAD CLOSED XX MILES AHEAD (R11-3a) sign may be replaced with a ROAD CLOSED TO THRU TRAFFIC (R11-4) sign. If adequate space does not exist between the intersection and the closure a single ROAD CLOSED AHEAD (CW20-3D) sign spaced as per the table above may replace the ROAD CLOSED 1000 FT (CW20-3B) and ROAD CLOSED 500 FT (CW20-3C) signs.
9. Signs and barricades shown shall be subsidiary to Item 502. Locations where these details will be required shall be as shown elsewhere in the plans.

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE ROAD CLOSURE DETAILS

WZ(RCD)-13

FILE: wzrcd-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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1-97 4-98 7-13	DIST	COUNTY		SHEET NO.
2-98 3-03	FTW	ERATH		56

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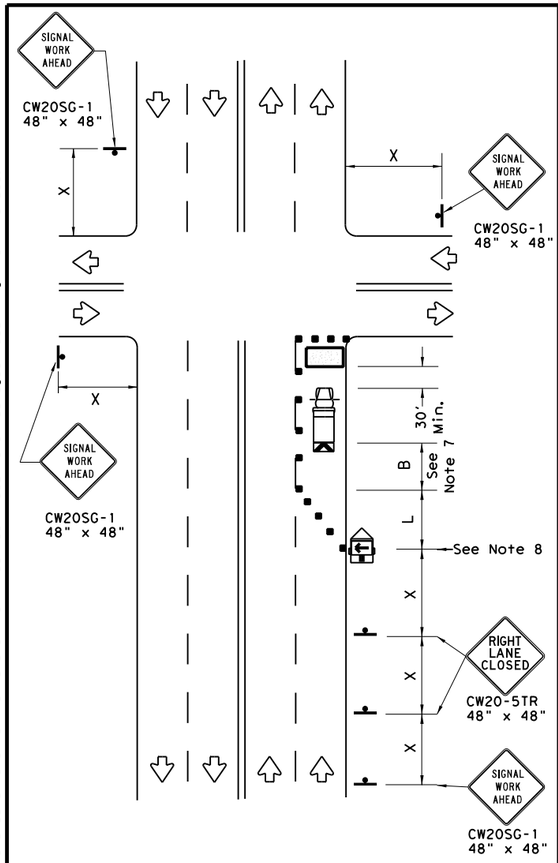
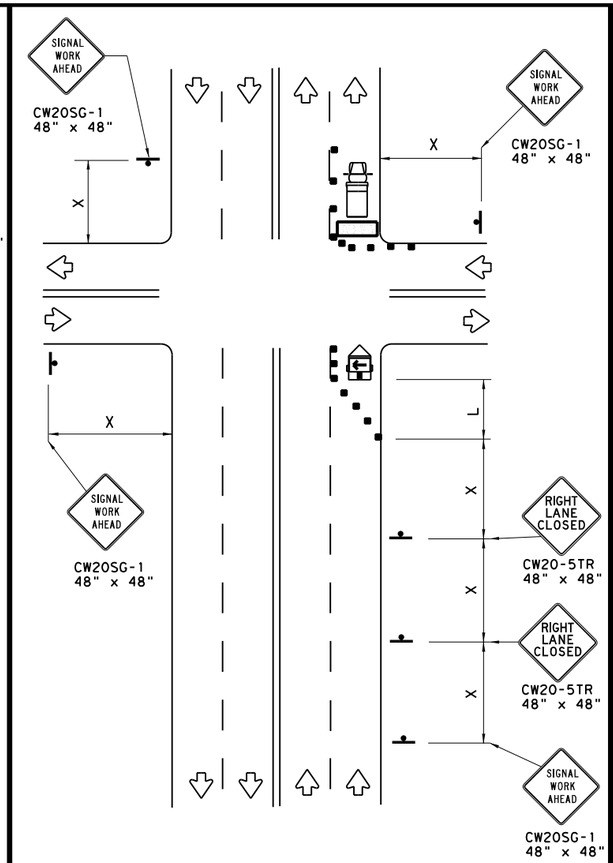


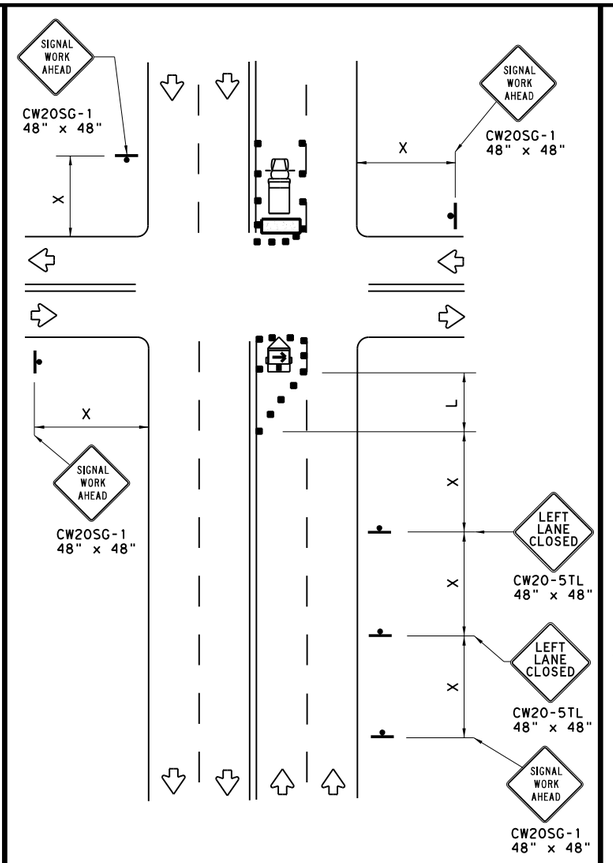
NEAR SIDE LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY



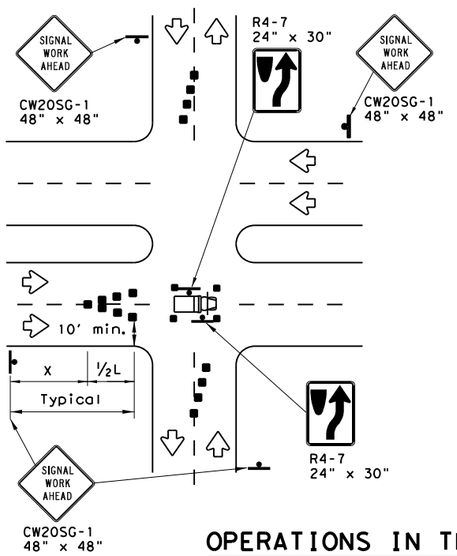
FAR SIDE RIGHT LANE CLOSURE

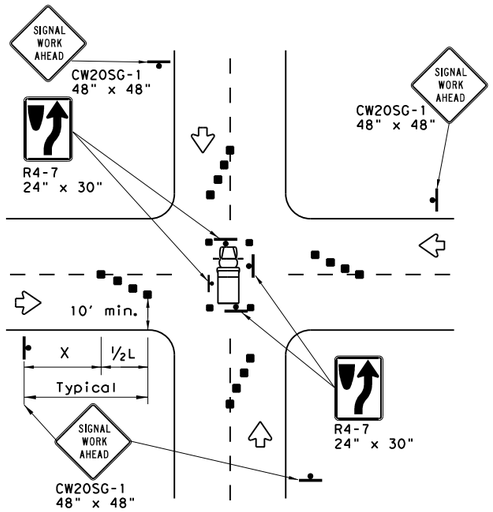
SHORT DURATION OR SHORT TERM STATIONARY



FAR SIDE LEFT LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY





OPERATIONS IN THE INTERSECTION

SHORT DURATION

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

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

* Conventional Roads Only

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

WORKERS IN BUCKET TRUCKS SHALL NOT WORK ABOVE OPEN LANES OF TRAFFIC.

GENERAL NOTES

1. The minimum size channelizing device is the 28" cone. 42" Two-piece cones, drums, vertical panels or barricades will be required when the device must be left unattended at night.
2. Obstructions or hazards at the work area shall be clearly marked and delineated at all times.
3. Flaggers and Flagger Symbol (CW20-7) signs may be required according to field conditions.
4. Vehicles parked in roadway shall be equipped with at least two high intensity rotating, flashing, oscillating or strobe type lights.
5. High level warning devices (flag trees) may be used at corners of the vehicle.
6. When work operations are performed on existing signals, the signals may be placed in flashing red mode when approved by the engineer. If existing signals do not have power, All-Way Stop (R1-1 and R1-3P) signs may be implemented when approved by the engineer.
7. For Short-Term Stationary work the buffer space "B" from the above table should be used if field conditions permit. For Short Duration (less than 1 hour) any buffer space provided will enhance the safety of the setup.
8. The arrow board at this location may be omitted for Short Duration work if the work vehicle has an arrow board in operation. As an option, the arrow board may be placed at the end of the taper in the closed lane if space is not available at the beginning of the taper.
9. Signs and devices for the NEAR SIDE LANE CLOSURE may be altered for a left lane closure by using a LEFT LANE CLOSED (CW20-5TL) and adding channelizing devices on the centerline to protect the work space from opposing traffic.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC SIGNAL WORK TYPICAL DETAILS

WZ(BTS-1)-13

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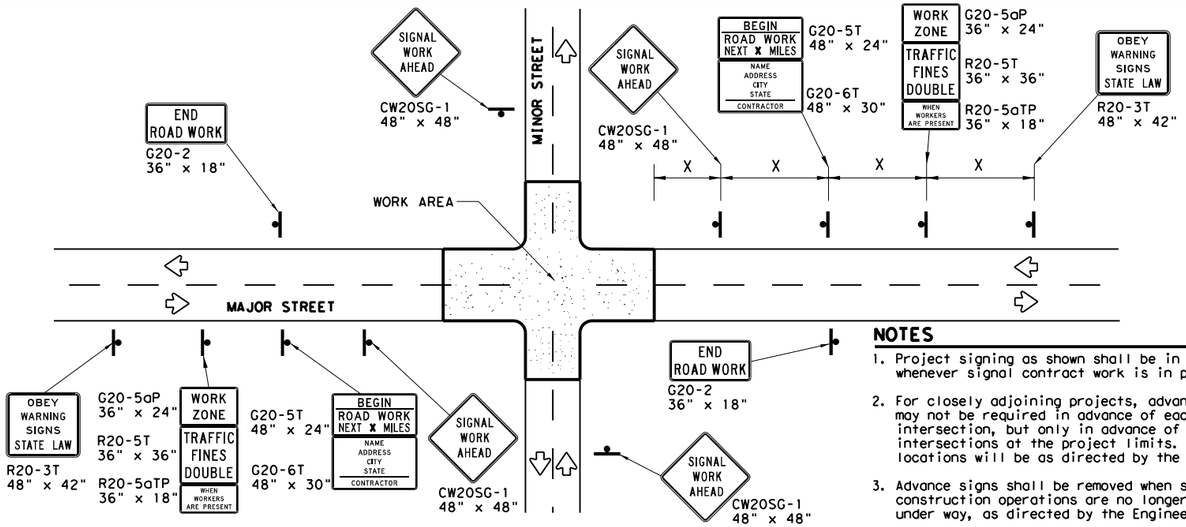


TYPICAL ADVANCE SIGNAL PROJECT SIGNING

FOR LONG TERM and INTERMEDIATE-TERM STATIONARY WORK OPERATIONS

NOTES

1. Project signing as shown shall be in place whenever signal contract work is in progress.
2. For closely adjoining projects, advance signing may not be required in advance of each intersection, but only in advance of the intersections at the project limits. Actual locations will be as directed by the Engineer.
3. Advance signs shall be removed when signal construction operations are no longer under way, as directed by the Engineer.
4. Warning sign spacing shown is typical for both directions.
5. See the Table on sheet 1 of 2 for Typical warning sign spacing.

GENERAL NOTES FOR WORK ZONE SIGNS

1. Signs shall be installed and maintained in a straight and plumb condition.
2. Wooden sign posts shall be painted white.
3. Barricades shall NOT be used as sign supports.
4. Nails shall NOT be used to attach signs to any support.
5. All signs shall be installed in accordance with the plans or as directed by the Engineer.
6. The Contractor shall furnish the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD).
7. The Contractor shall furnish sign supports and substrates listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD), installed as per the manufacturer's recommendations.
8. Temporary signs that have damaged or cracked substrates and/or damaged or marred reflective sheeting shall be replaced as directed by the Engineer.
9. Identification markings may be shown only on the back of the sign substrate. The maximum height of letters and/or company logos used for identification shall be 1".
10. Damaged wood posts shall be replaced. Splicing wood posts will not be allowed.

DURATION OF WORK

1. Work zone durations are defined in Part 6, Section 6G.02 of the Texas Manual on Uniform Traffic Control Devices (TMUTCD).

SIGN MOUNTING HEIGHT

1. Sign height of Long-term/Intermediate-term warning signs shall be as shown on Figure 6F-1 of the TMUTCD.
2. Sign height of Short-term/Short Duration warning signs shall be as shown on Figure 6F-2 of the TMUTCD.
3. Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the paved surface regardless of work duration.

REMOVING OR COVERING

1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered, unless otherwise approved by the Engineer.
2. When signs are covered, the material used shall be opaque, such as heavy mil black plastic, or other materials which will cover the entire sign face and maintain their opaque properties under automobile headlights at night without damaging the sign sheeting. Burlap, or heavy materials such as plywood or aluminum shall not be used to cover signs.
3. Duct tape or other adhesive material shall NOT be affixed to a sign face.
4. Signs and anchor stubs shall be removed and holes back filled upon completion of the work.

REFLECTIVE SHEETING

1. All signs shall be retroreflective and constructed of sheeting meeting the requirements of the DMS and color usage table shown on this sheet.

SIGN SUPPORT WEIGHTS

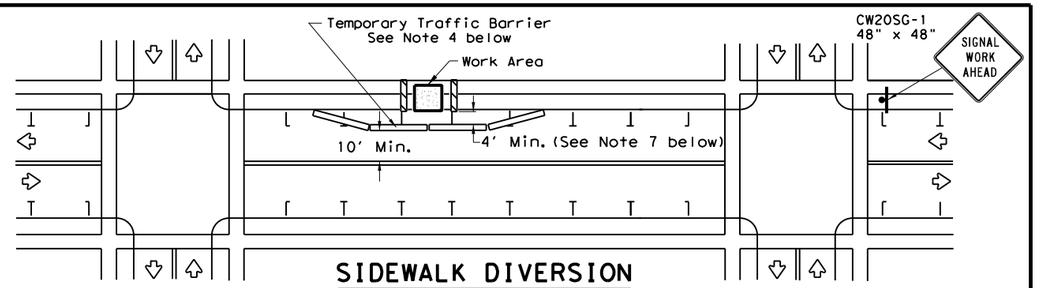
1. Weights used to keep signs from turning over should be sandbags filled with dry, cohesionless material.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects will not be permitted for use as sign support weights.
4. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs.
5. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber, such as tire inner tubes, shall not be used.
6. Rubber ballasts designed for channelizing devices should not be used for ballast on portable sign supports. Sign supports designed and manufactured with rubber bases may be used when shown on the CWZTCD list.
7. Sandbags shall only be placed along or laid over the base supports of the traffic control device and shall not be suspended above ground level or hung with rope, wire, chains or other fastners. Sandbags shall be placed along the length of the skids to weigh down the sign support.
8. Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

LEGEND	
	Sign
	Channelizing Devices
	Type 3 Barricade

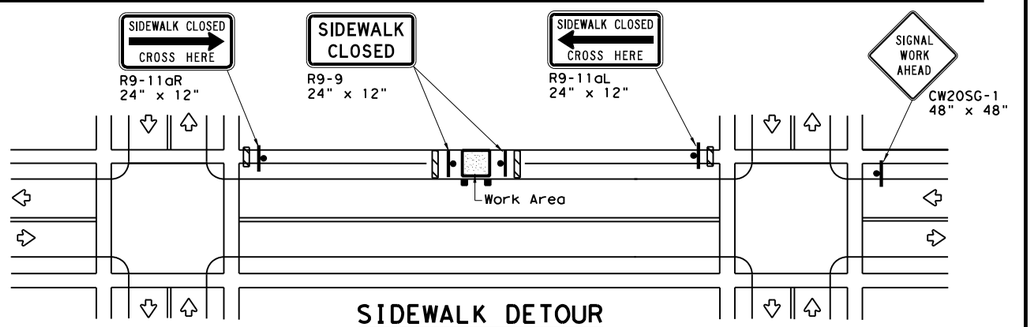
DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN FACE MATERIALS	DMS-8300
FLEXIBLE ROLL-UP REFLECTIVE SIGNS	DMS-8310

COLOR	USAGE	SHEETING MATERIAL
ORANGE	BACKGROUND	TYPE B_{FL} OR TYPE C_{FL} SHEETING
WHITE	BACKGROUND	TYPE A SHEETING
BLACK	LEGEND & BORDERS	ACRYLIC NON-REFLECTIVE SHEETING

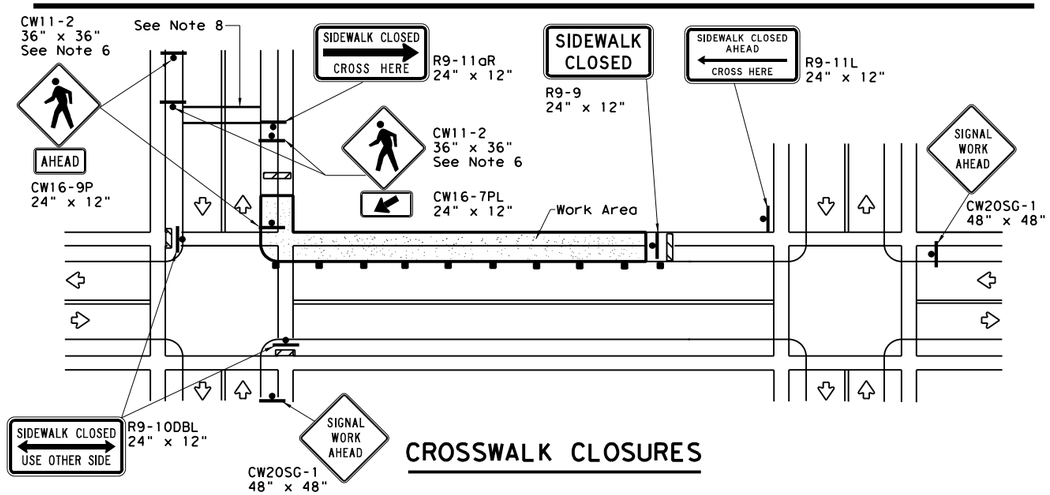
Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found at the following web address:
http://www.txdot.gov/txdot_library/publications/construction.htm



SIDEWALK DIVERSION



SIDEWALK DETOUR



CROSSWALK CLOSURES

PEDESTRIAN CONTROL

1. Holes, trenches or other hazards shall be adequately protected by covering, delineating or surrounding the hazard with orange plastic pedestrian fencing or longitudinal channelizing devices, or as directed by the Engineer.
2. "CROSSWALK CLOSURES" as detailed above will require the Engineer's approval prior to installation.
3. R9 series signs shown may be placed on supports detailed on the BC standards or CWZTCD list, or when fabricated from approved lightweight plastic substrates, they may be mounted on top of a plastic drum at or near the location shown.
4. For speeds less than 45 mph longitudinal channelizing devices may be used instead of traffic barriers when approved by the Engineer. Attenuation of blunt ends and installation of water filled devices shall be as per BC(9) and manufacturer's recommendations.
5. Location of devices are for general guidance. Actual device spacing and location must be field adjusted to meet actual conditions.
6. Where pedestrians with visual disabilities normally use the closed sidewalk Detectable Pedestrian Barricades should be used instead of the Type 3 Barricades shown.
7. The width of existing sidewalk should be maintained if practical.
8. Pavement markings for mid-block crosswalks shall be paid for under the appropriate bid items.
9. When crosswalks or other pedestrian facilities are closed or relocated, temporary facilities shall be detectable and shall include accessibility features consistent with the features present in the existing pedestrian facility.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC SIGNAL WORK BARRICADES AND SIGNS

WZ(BTS-2)-13

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© TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
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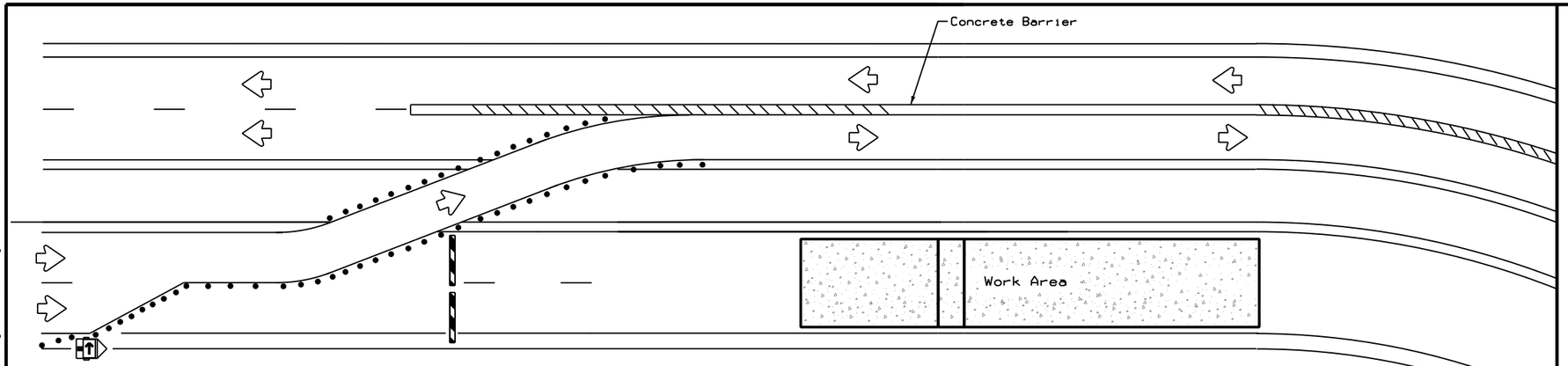
2-98 10-99 7-13	DIST	COUNTY		SHEET NO.
4-98 3-03	FTW	ERATH		58



NOTES:

1. Length of Safety Glare screen will be specified elsewhere in the plans.
2. The cumulative nominal length of the modular safety glare screen units shall equal the length of the individual sections of temporary concrete traffic barrier on which they are installed so the joint between barrier sections will not be spanned by any one safety glare screen unit.
3. Screen Panel/blades will be designed such that reflective sheeting conforming with Departmental Material Specification DMS-8300, Sign Face Materials, Type B or C Yellow, minimum size of 2 inches by 12 inches can be attached to the edge of the panel/blade. The sheeting shall be attached to one glare screen panel/blade per section of concrete barrier not to exceed a spacing of 30 feet. Barrier reflectors are not necessary when panel/blades are installed with reflective sheeting as described.
4. Payment for these devices will be under statewide Special Specification "Modular Glare Screens for Headlight Barrier."
5. This detail is only intended to show types of locations where Glare Screens would be appropriate. Required signing and other devices shall be as shown elsewhere in the plans.

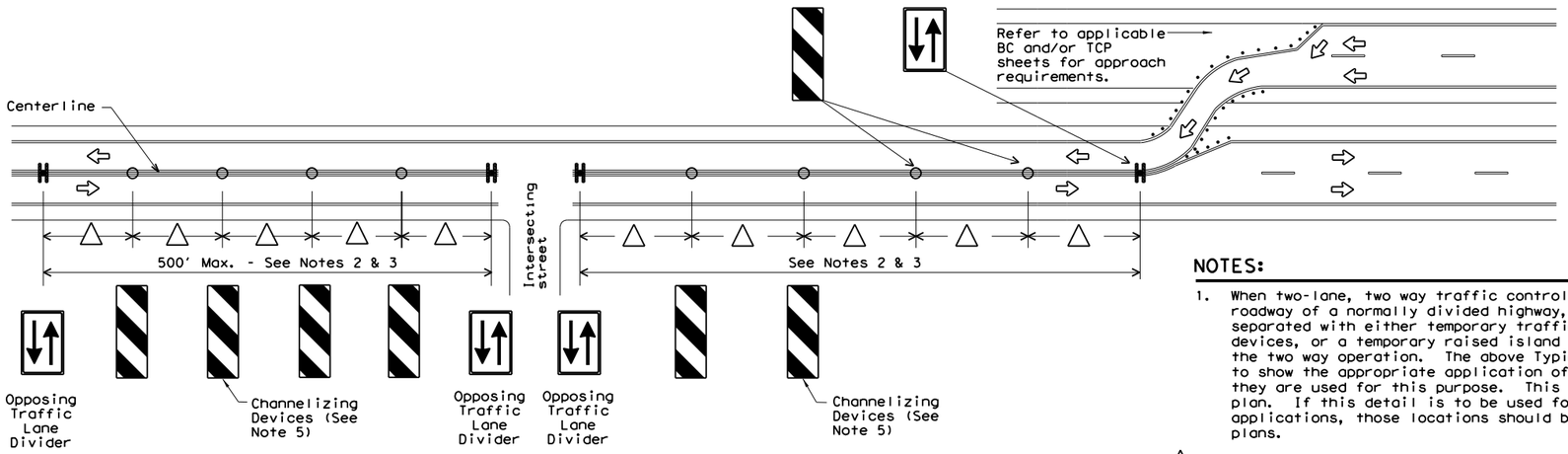
BARRIER DELINEATION WITH MODULAR GLARE SCREENS

LEGEND	
	Type 3 Barricade
• • •	Channelizing Devices
	Trailer Mounted Flashing Arrow Board
	Sign
\\\\	Safety glare screen

DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN FACE MATERIALS	DMS-8300
DELINEATORS AND OBJECT MARKERS	DMS-8600
MODULAR GLARE SCREENS FOR HEADLIGHT BARRIER	DMS-8610

Only pre-qualified products shall be used. A copy of the Compliant Work Zone Traffic Control Devices List" CWZTCD)describes pre-qualified products and their sources and may be found at the following web address:

http://www.txdot.gov/business/resources/producer-list.html



VERTICAL PANELS & OPPOSING TRAFFIC LANE DIVIDERS (OTLD)
SEPARATING TWO-WAY TRAFFIC ON NORMALLY DIVIDED HIGHWAYS

NOTES:

1. When two-lane, two way traffic control must be maintained on one roadway of a normally divided highway, opposing traffic shall be separated with either temporary traffic barriers, channelizing devices, or a temporary raised island throughout the length of the two way operation. The above Typical Application is intended to show the appropriate application of channelizing devices when they are used for this purpose. This is not a traffic control plan. If this detail is to be used for other types of roads or applications, those locations should be stated elsewhere in the plans.

△2. Space devices according to the Tangent Spacing shown on the Device Spacing table on BC(9) but not exceeding 100'.

3. Every fifth device should be an OTLD except when spaced closer to accommodate an intersection. An OTLD should be the first device on each side of intersecting streets or roads.
4. Locations where surface mount bases with adhesives or self-righting devices will be required in order to maintain them in their proper position should be noted elsewhere in the plans.
5. Channelizing devices are to be vertical panels, 42" cones or tubular markers that are at least 36" tall. Tubular markers used to separate traffic should have a rubber base weighing at least 30 pounds. Tubular markers that are 42" tall or more shall have four bands of reflective material as detailed for 42" cones on BC(10). Tubular markers less than 42" but at least 36" tall shall have three bands of 3" wide white reflective material spaced 2" apart. Reflective material shall meet DMS-8300, Type A.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN TYPICAL DETAILS

WZ(TD)-17

FILE: wztd-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-17	0079	04	049	BU 67K
4-98	DIST	COUNTY		SHEET NO.
3-03	FTW	ERATH		59
7-13				

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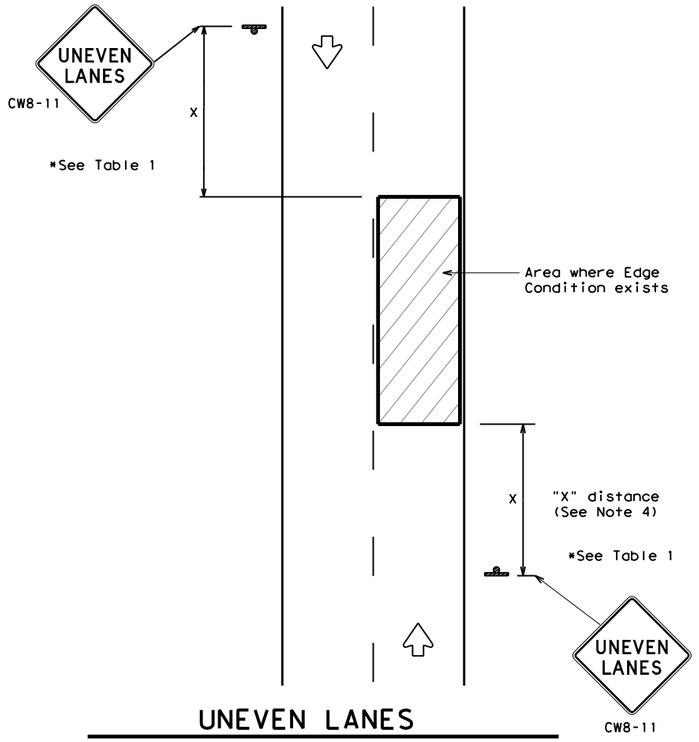
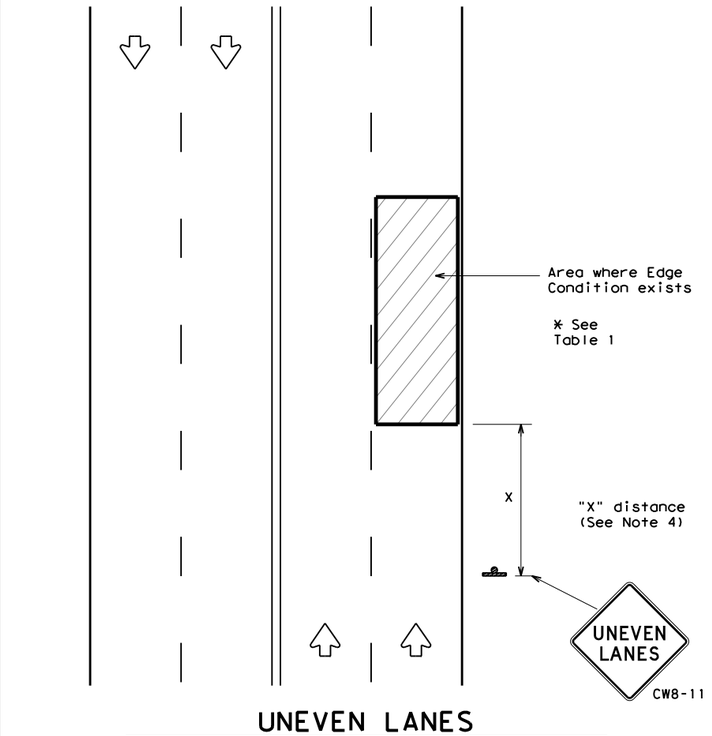
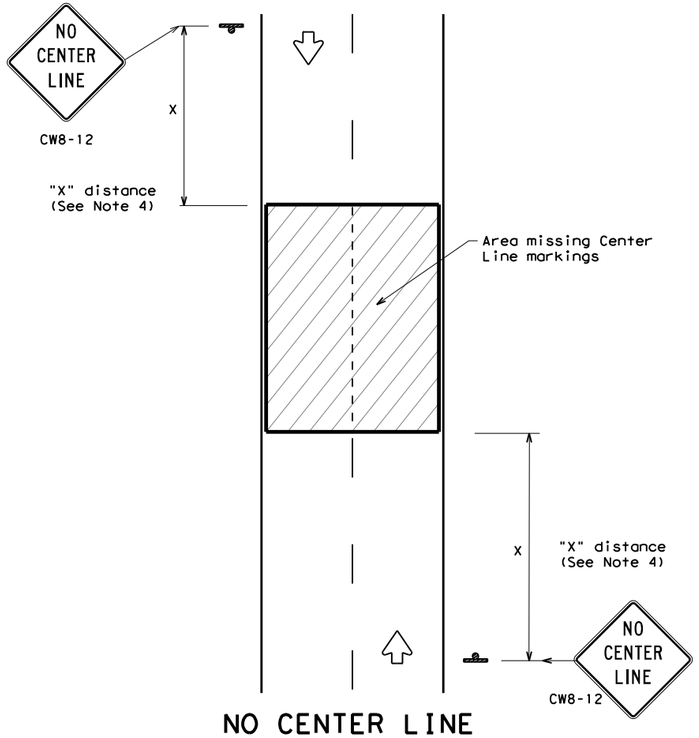


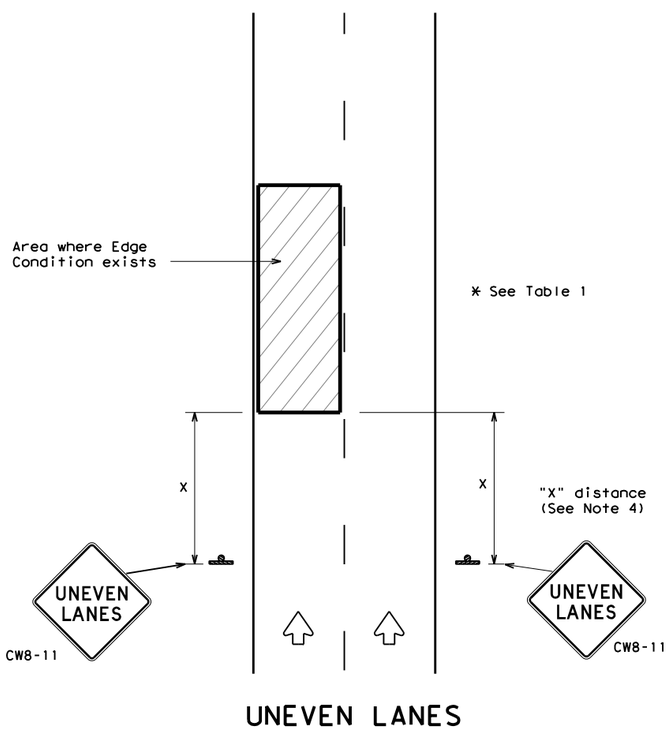
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

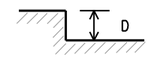
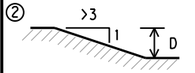
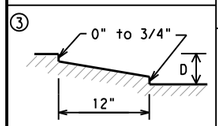
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

COLOR	USAGE	SHEETING MATERIAL
ORANGE	BACKGROUND	TYPE B_{FL} OR TYPE C_{FL} SHEETING
BLACK	LEGEND & BORDERS	ACRYLIC NON-REFLECTIVE SHEETING

GENERAL NOTES

1. If spalling or holes occur, ROUGH ROAD (CW8-8) signs should be placed in advance of the condition and be repeated every two miles where the condition persists.
2. UNEVEN LANES (CW8-11) signs shall be installed in advance of the condition and repeated every mile. Signs installed along the uneven lane condition may be supplemented with the NEXT XX MILES (CW7-3aP) plaque or Advisory Speed (CW13-1P) plaque.
3. NO CENTER LINE (CW8-12) signs and temporary pavement markings as per the WZ(STPM) standard shall be installed if yellow centerlines separating two way traffic are obscured or obliterated. Repeat NO CENTER LINE signs every two miles where the center line markings are not in place. The signs and markings shall remain in place until permanent pavement markings are installed.
4. Signs shall be spaced at the distances recommended as per BC standards.
5. Additional signs may be required as directed by the Engineer. Signs shall remain in place until final surface is applied. Signs shall be considered subsidiary to Item 502 "BARRICADES, SIGNS AND TRAFFIC HANDLING."
6. Signs shall be fabricated and mounted on supports as shown on the BC standards and/or listed on the "Compliant Work Zone Traffic Control Devices" list.
7. Short term markings shall not be used to simulate edge lines.
8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition.

TABLE 1

Edge Condition	Edge Height (D)	* Warning Devices
① 	Less than or equal to: 1¼" (maximum-planing) 1½" (typical-overlay)	Sign: CW8-11
	Distance "D" may be a maximum of 1 1/4 " for planing operations and 2" for overlay operations if uneven lanes with edge condition 1 are open to traffic after work operations cease.	
② 	Less than or equal to 3"	Sign: CW8-11
③  Notched Wedge Joint	Distance "D" may be a maximum of 3" if uneven lanes with edge condition 2 or 3 are open to traffic after work operations cease. Uneven lanes should not be open to traffic when "D" is greater than 3".	

TRAFFIC CONTROL DURING PLANING, OVERLAY AND LEVELING OPERATIONS ARE SHOWN ELSEWHERE IN THE PLANS.

MINIMUM WARNING SIGN SIZE	
Conventional roads	36" x 36"
Freeways/expressways, divided roadways	48" x 48"

Texas Department of Transportation

Traffic Operations Division Standard

SIGNING FOR UNEVEN LANES

WZ(UL)-13

FILE: wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	0079	04	049	BU 67K
8-95 2-98 7-13	DIST	COUNTY		SHEET NO.
1-97 3-03	FTW	ERATH		60

DATE:
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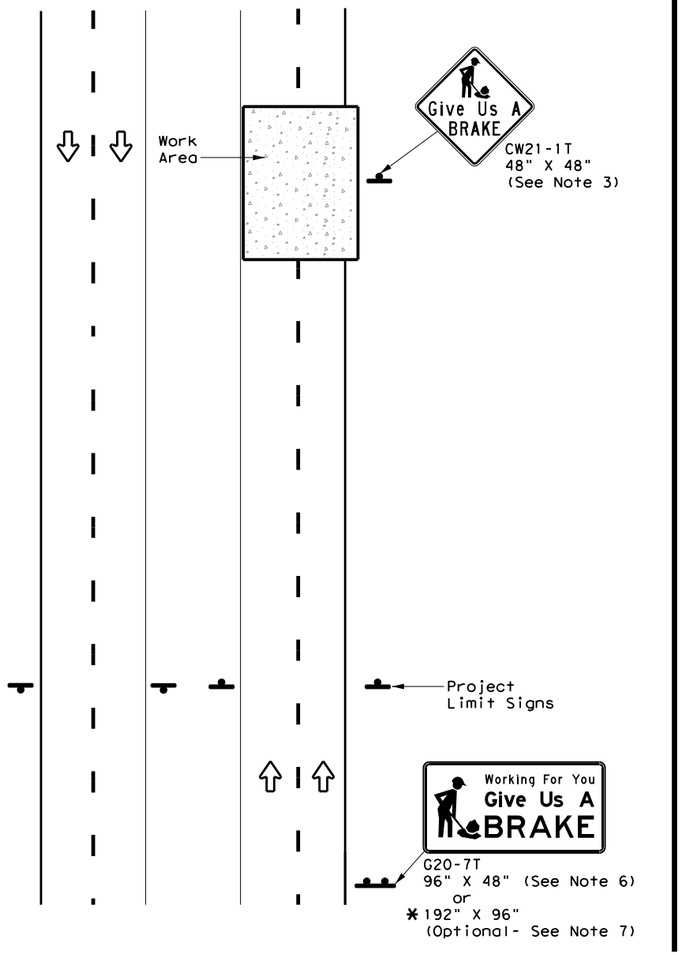
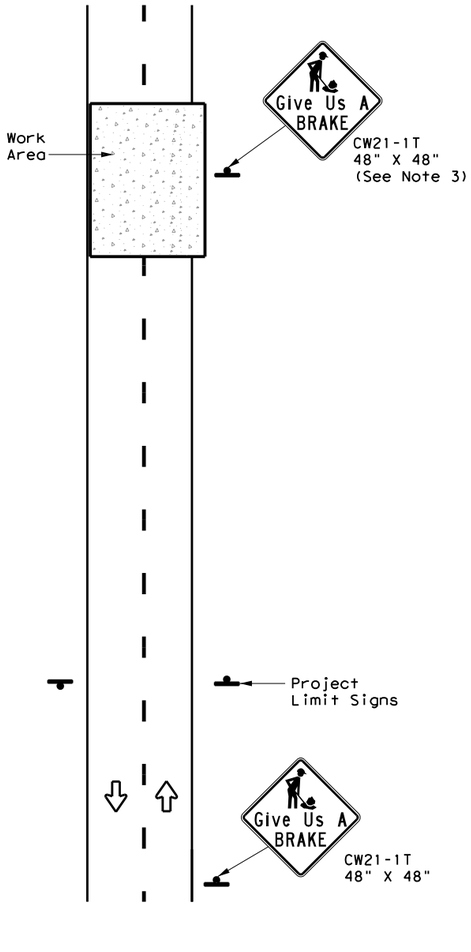


DIVIDED HIGHWAY



UNDIVIDED HIGHWAY

SIGNS ARE SHOWN FOR ONE DIRECTION OF TRAVEL

* When the optional larger WORKING FOR YOU GIVE US A BRAKE (G20-7T) 192" x 96" sign is required, the locations shall be noted elsewhere in the plans.

SUMMARY OF LARGE SIGNS

BACKGROUND COLOR	SIGN DESIGNATION	SIGN	SIGN DIMENSIONS	REFLECTIVE SHEETING	SQ FT	GALVANIZED STRUCTURAL STEEL			DRILLED SHAFT 24" DIA. (LF)
						Size	(LF) ①	(LF) ②	
Orange	G20-7T	Working For You Give Us A BRAKE	96" X 48"	Type B_{FL} or C_{FL}	32	▲	▲	▲	▲
Orange	G20-7T	Working For You Give Us A BRAKE	192" X 96"	Type B_{FL} or C_{FL}	128	W8x18	16	17	12

▲ See Note 6 Below

LEGEND	
	Sign
	Large Sign
	Traffic Flow

DEPARTMENTAL MATERIAL SPECIFICATIONS	
PLYWOOD SIGN BLANKS	DMS-7100
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

COLOR	USAGE	SHEETING MATERIAL
ORANGE	BACKGROUND	TYPE B_{FL} OR TYPE C_{FL}
BLACK	LEGEND & BORDERS	NON-REFLECTIVE ACRYLIC FILM

GENERAL NOTES

1. See BC and SMD sheets for additional sign support details.
2. Sign locations shall be approved by the Engineer.
3. For projects more than two miles in length, Give Us a BRAKE signs should be repeated halfway through the project. The Give Us a Brake (CW21-1T) may be used for this purpose.
4. Work zone speed limits are sometimes used in conjunction with GIVE US A BRAKE signing. See BC(3) for location and spacing of construction speed zone signing when required.
5. Give Us a Brake (CW21-1T) signs and supports shall be considered subsidiary to Item 502, "Barricades, Signs and Traffic Handling."
6. The 96" X 48" Working For You Give Us A BRAKE (G20-7T) may use a 1/2" or 5/8" plywood substrate or 0.125" aluminum sheeting substrate and may be supported by two 4" x 6" wood posts with drilled holes for breakaway as per BC(5) and will be subsidiary to Item 502.
7. The Working For You Give Us A BRAKE (G20-7T) 192" X 96" sign shall be paid for under the following specification items:
   Item 636 - Aluminum Signs
   Item 647 - Large Roadside Sign Supports and Assemblies.
   Item 416 - Drilled Shaft Foundations
8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE "GIVE US A BRAKE" SIGNS

WZ(BRK)-13

FILE: wzbrk-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
REVISIONS	0079	04	049	BU 67K
6-96 5-98 7-13	DIST	COUNTY		SHEET NO.
8-96 3-03	FTW	ERATH		61

DATE:
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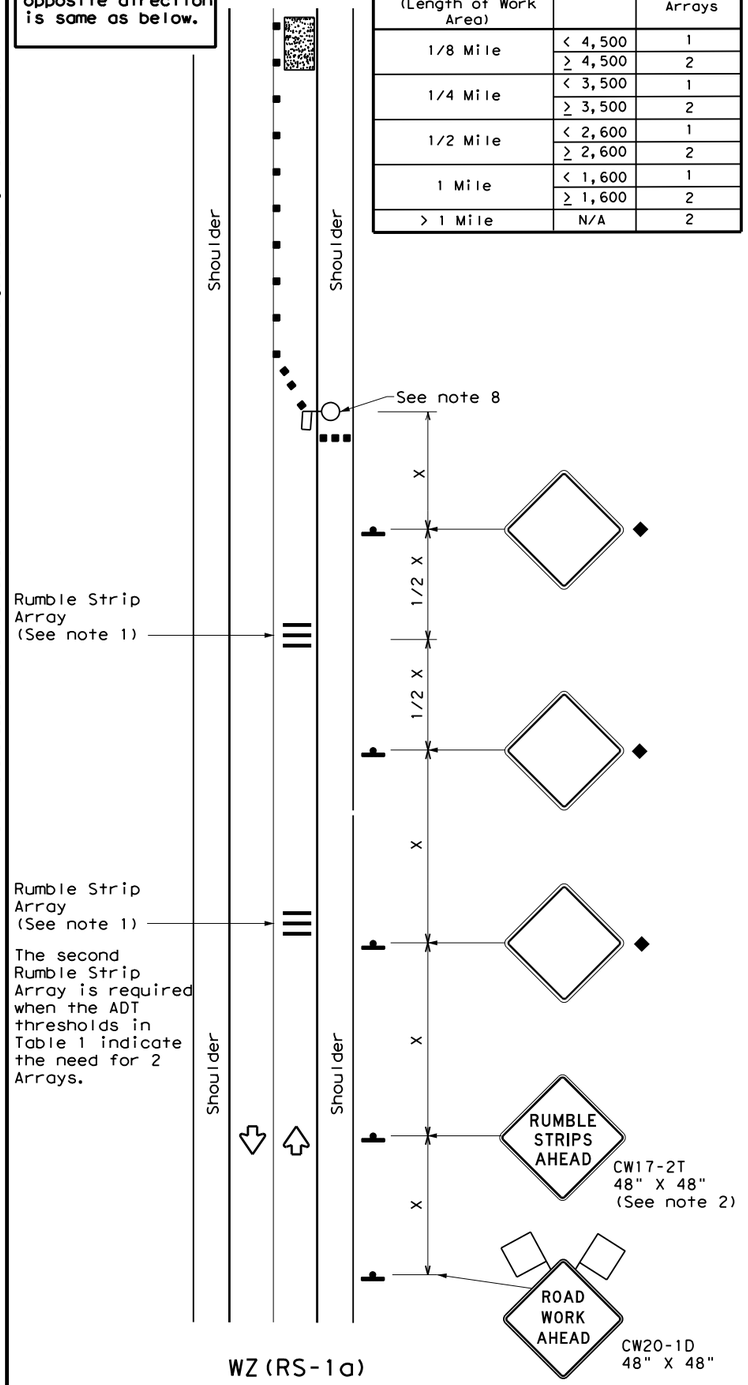
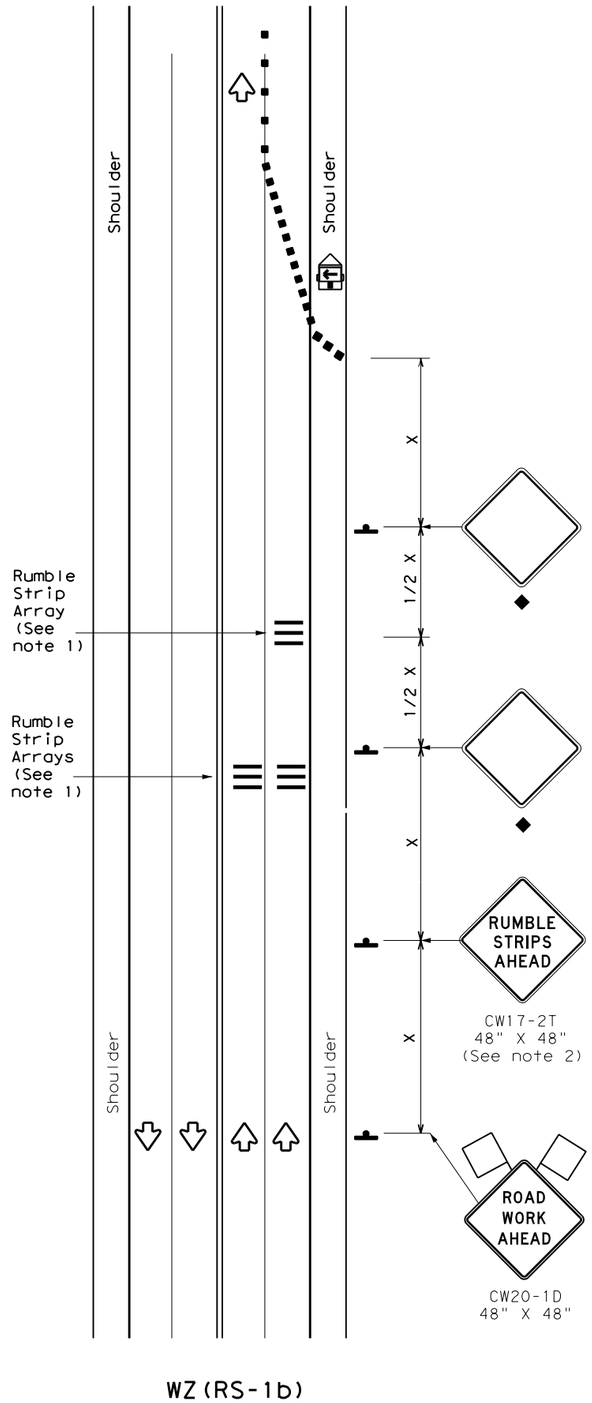
Warning sign and rumble strip sequence in opposite direction is same as below.

TABLE 1		
Flagger to Flagger (Length of Work Area)	ADT	# of Rumble Strip Arrays
1/8 Mile	< 4,500	1
	≥ 4,500	2
1/4 Mile	< 3,500	1
	≥ 3,500	2
1/2 Mile	< 2,600	1
	≥ 2,600	2
1 Mile	< 1,600	1
	≥ 1,600	2
> 1 Mile	N/A	2



WZ(RS-1a)

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



WZ(RS-1b)

RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

1. Each Rumble Strip Array should consist of three rumble strips spaced center to center at the spacing shown in Table 2, placed transverse across the lane at locations shown.
2. The CW17-2T "RUMBLE STRIPS AHEAD" sign should be located after the CW20-1D "ROAD WORK AHEAD sign and spaced as shown. If traffic is observed to be queuing, or is expected to queue beyond the Rumble Strips, the CW17-2T sign and the first Rumble Strip Array may be located upstream of the CW20-1D sign as necessary to provide needed warning.
3. Temporary Rumble Strips will be considered subsidiary to Item 502, and shall be a product listed on the Compliant Work Zone Traffic Control Devices.
4. Remove Temporary Rumble Strips before removing the advanced warning signs.
5. Temporary Rumble Strips should not be used on horizontal curves, loose gravel, soft or bleeding asphalt, heavily rutted pavements or unpaved surfaces.
6. Temporary Rumble Strips shall be installed and maintained as per manufacturer's recommendations.
7. This standard sheet shall be used in conjunction with other appropriate TCP standard, TMUTCD typical application or project specific detail for the project.
8. The one-lane two-way application may utilize a flagger, an Automated Flagger Assistance Device (AFAD) or a Portable Traffic Signal (PTS).
9. Replace defective Temporary Rumble Strips as directed by the Engineer.
10. Temporary Rumble Strips may be used on freeways or expressways based on engineering judgment and written direction from the Engineer.

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

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

* Conventional Roads Only

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

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

◆ Signs are for illustrative purposes only. Signs required may vary depending on the TCP, TMUTCD Typical Application, or project specific details for the project.

* For posted speeds in excess of 65 MPH, it is recommended that spacing is increased as speed limits increase. Increasing space between rumble strips will improve effectiveness.

TABLE 2	
Speed	Approximate distance between strips in an array
≤ 40 MPH	10'
> 40 MPH & ≤ 55 MPH	15'
= 60 MPH	20'
≥ 65 MPH	* 35' +

Texas Department of Transportation

Traffic Safety Division Standard

TEMPORARY RUMBLE STRIPS

WZ(RS)-22

FILE: wzrs22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-14 1-22 4-16	0079	04	049	BU 67K
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117

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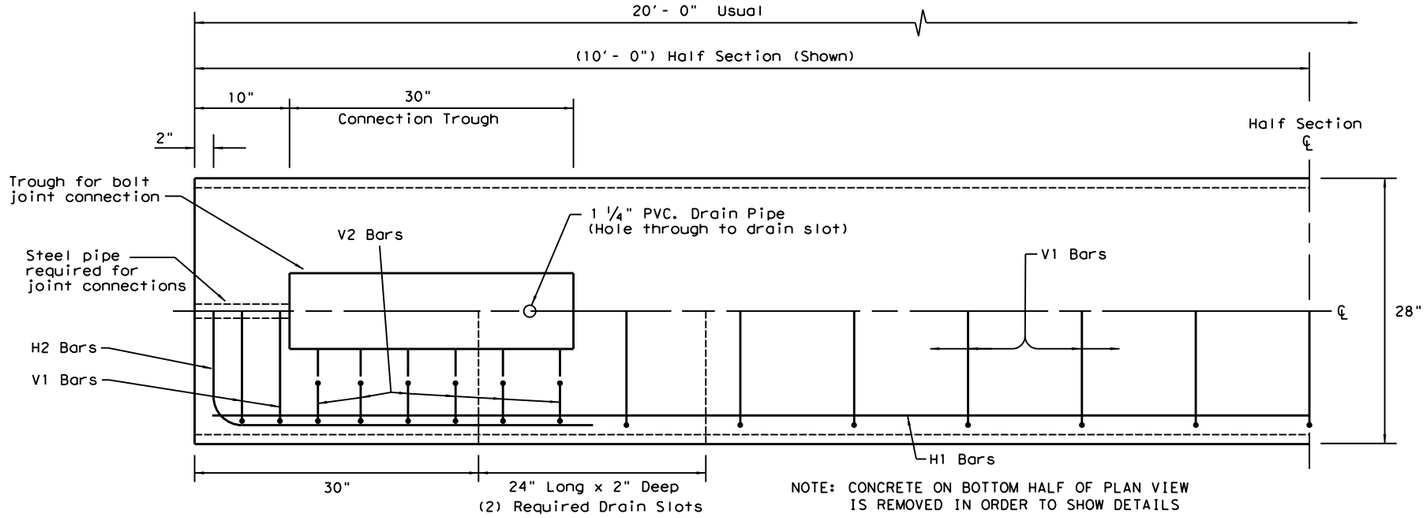
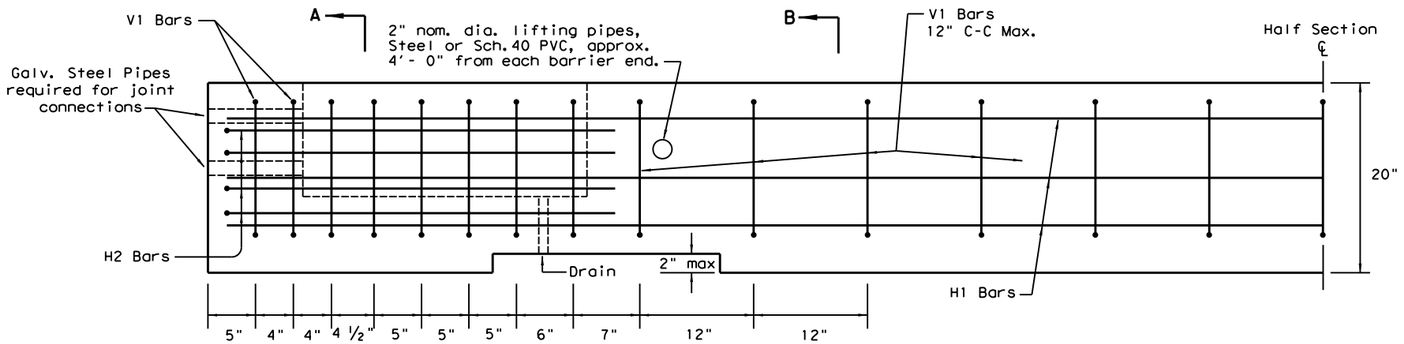
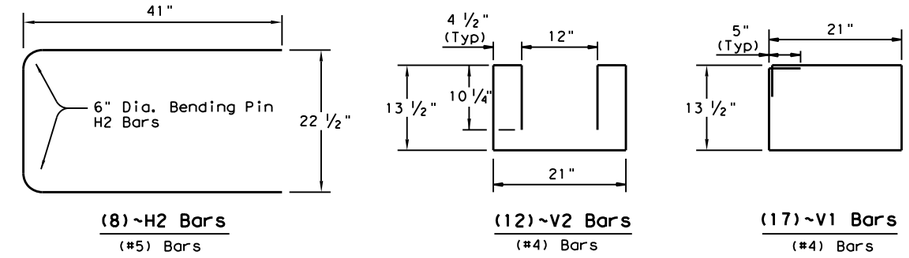


NOTE: CONCRETE ON BOTTOM HALF OF PLAN VIEW IS REMOVED IN ORDER TO SHOW DETAILS

PLAN
(TYPE 1) BARRIER SEGMENT
(SYMMETRICAL ABOUT CENTER LINES)



ELEVATION
(TYPE 1) BARRIER SEGMENT
(SYMMETRICAL ABOUT CENTER LINES)



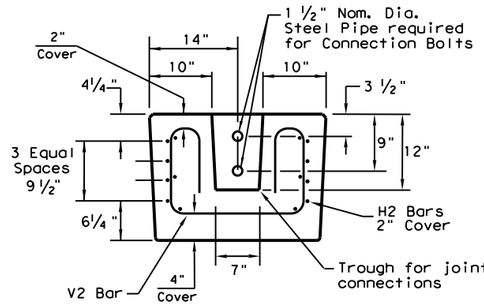
(8)~H2 Bars (#5) Bars

(12)~V2 Bars (#4) Bars

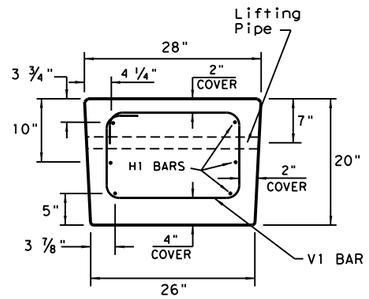
(17)~V1 Bars (#4) Bars

REINFORCING STEEL DETAILS
TYPE 1 - BARRIER SEGMENT

Note: Use 2" Dia. Bending Pin, unless otherwise shown



SECTION A-A



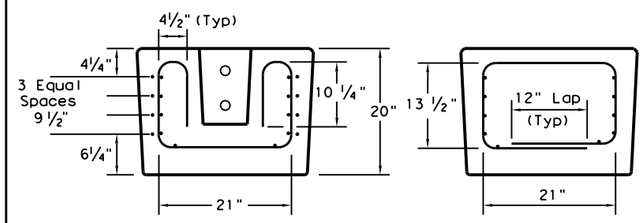
SECTION B-B

GENERAL NOTES

1. Low Profile Concrete Barrier (LPCB), is approved for use in temporary work zone locations, where the posted speed is 45 mph, or less.
2. Concrete shall be Class H for precast barrier with a minimum compressive strength of 3,600 psi.
3. Where used, rebar reinforcement shall be Grade 60 and conform to ASTM A615.
4. Precast LPCB barrier length shall be 20 ft.
5. All barrier edges shall have ¾" chamfer or a tooled radius.
6. Joint connection hardware shall be in accordance with Item 449, "Anchor Bolts." and is considered subsidiary.
7. Steel pipe required for joint connection bolts shall be galvanized in accordance with Item 445,"Galvanizing."
8. Welded wire reinforcement (WWR) may be used in lieu of conventional reinforcement for Type 1 barrier, and shall meet the requirements shown.

FOR CONTRACTORS INFORMATION ONLY

(TYPE 1) APPROX. QUANTITIES 20 FT. SECTION		
CONCRETE	CY	2.6
REINFORCING STEEL	LBS	330
TOTAL BARRIER WT.	LBS	11000



SECTION A-A SECTION B-B

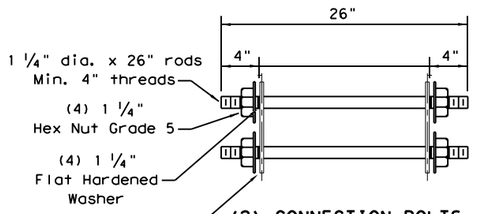
(WWR) GENERAL NOTES

1. Deformed Welded Wire Reinforcement shall conform to ASTM A497.
2. Welded wire cage may be cut or bent, if necessary, but must be approved by the Engineer.
3. Combinations of reinforcing steel and WWR are permitted, as directed by the Engineer. The dimensions from the end of the barrier section to the first wire shall not exceed 3".

REQUIRED (WWR) WIRE DESIGN

8 ~ (D31) Horizontal Wires (Equally spaced)
10 ~ (D20) Horizontal Wires (Equally spaced)
29 ~ (D20) Vertical Wires (Spaced as shown in Elevation View)

WELDED WIRE REINFORCEMENT (WWR)- OPTIONAL REINFORCING



(2) CONNECTION BOLTS
ASTM A36

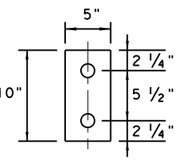


PLATE WASHER
5" x 10" x ⅜"

Note: Rods, Hex nuts and Washers shall be Galvanized.

SHEET 1 OF 2

Texas Department of Transportation

Design Division Standard

LOW PROFILE CONCRETE BARRIER
PRECAST BARRIER (TYPE 1)
LPCB-13

FILE: lpcb13.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
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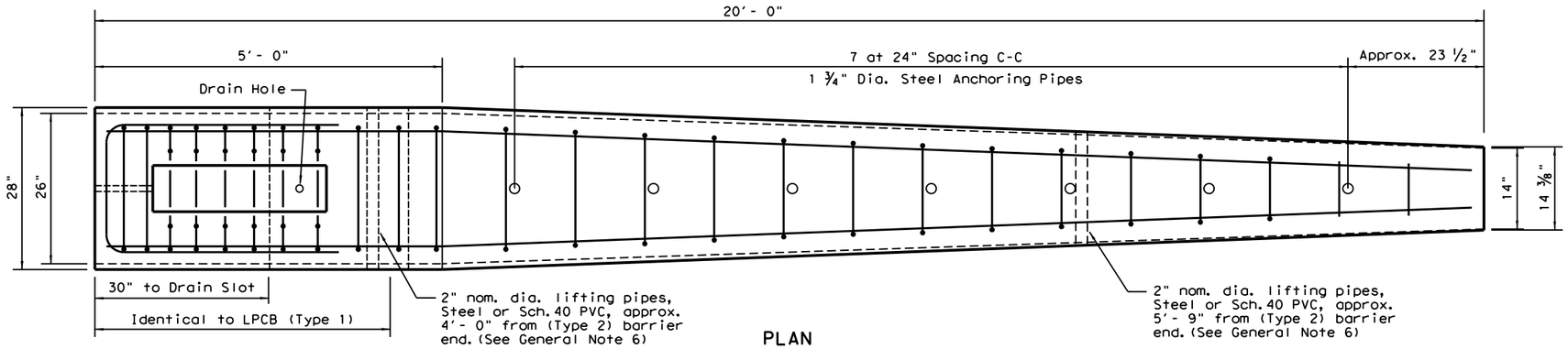
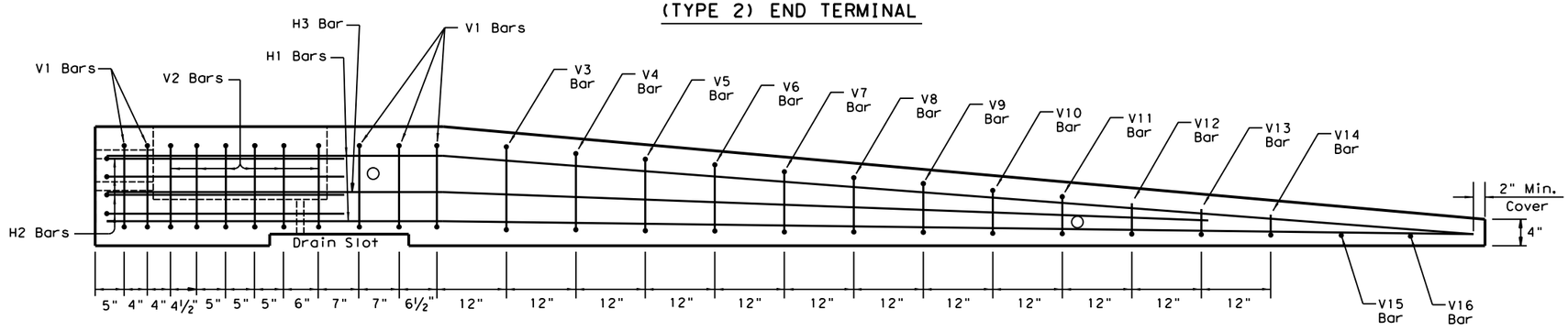
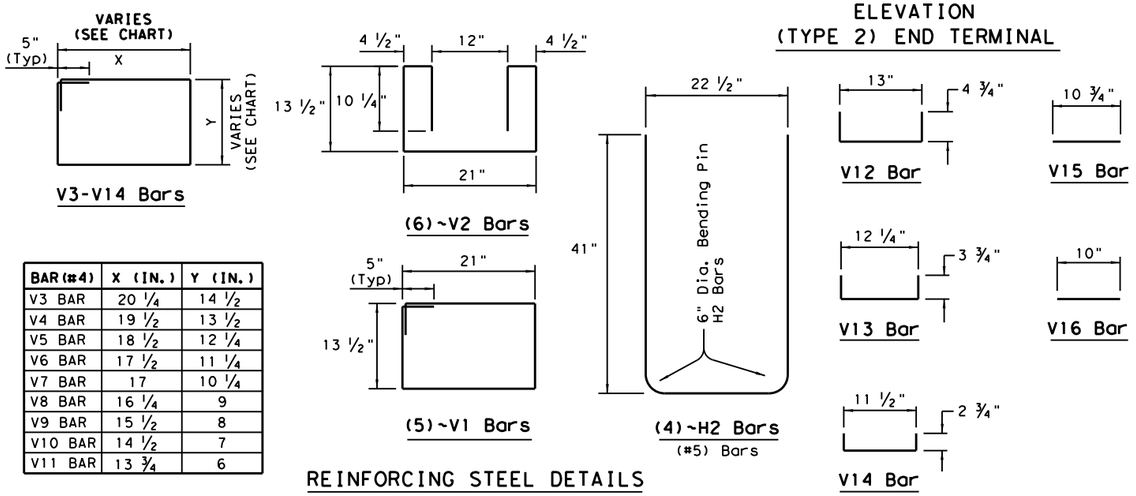


PLAN
(TYPE 2) END TERMINAL



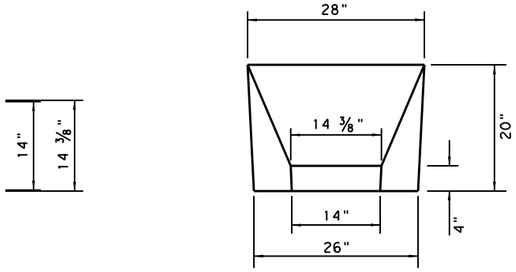
ELEVATION
(TYPE 2) END TERMINAL

Note:
Anchoring pipes not shown in Elevation View

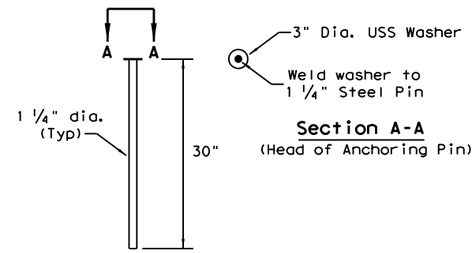


BAR (#4)	X (IN.)	Y (IN.)
V3 BAR	20 ¼	14 ½
V4 BAR	19 ½	13 ½
V5 BAR	18 ½	12 ¼
V6 BAR	17 ½	11 ¼
V7 BAR	17	10 ¼
V8 BAR	16 ¼	9
V9 BAR	15 ½	8
V10 BAR	14 ½	7
V11 BAR	13 ¾	6

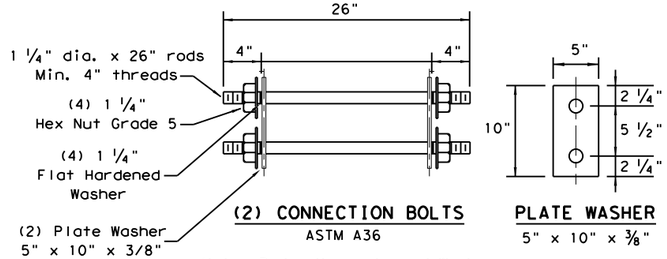
REINFORCING STEEL DETAILS
TYPE 2 - END TERMINAL



APPROACH VIEW



(7) Anchor Pins
ASTM A36 Steel
(See Note 3)



(2) CONNECTION BOLTS
ASTM A36

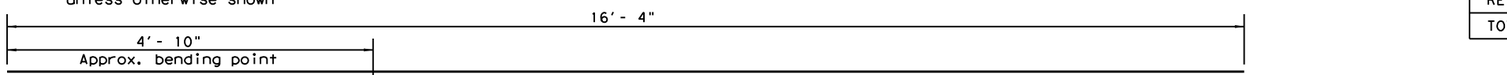
PLATE WASHER
5" x 10" x ⅜"

Note: Rods, Hex nuts and Washers shall be Galvanized.

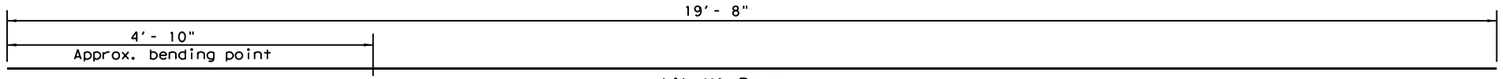
TYPE 2 - NOTES

1. Welded wire reinforcment (WWR) is "not" an option for Type 2 Barrier.
2. Type 2 Barrier shall be used as an end treatment for the Type 1 barrier segments, when applicable.
3. The end treatment can be used without the anchor pins in locations that can accommodate approximately 4 ft. of lateral displacement of the end treatment. The use of non-pinned end treatment does not affect the performance or the deflection of the Low-Profile barrier system.
4. The anchor pins are all the same length and are to be driven flush with the top of the (Type 2) barrier surface.
5. The bends in the H3 and H1 bars are slight, no formal bend is necessary.
6. The Type 2 barrier segment must be lifted from the rear first, to prevent cracking of sloped section.
7. See LPCB sheet 1 for additional information.

Note: Use 2" Dia. Bending Pin, unless otherwise shown



(2)~H3 Bars
(#5) Bar



Note: Bends on H1 and H3 bars are slight and do not require formal bends.

(4)~H1 Bars
(#5) Bar

FOR CONTRACTORS INFORMATION ONLY

(TYPE 2) APPROX. QUANTITIES 20 FT. SECTION		
CONCRETE	CY	1.65
REINFORCING STEEL	LBS	240
TOTAL BARRIER WT.	LBS	7000

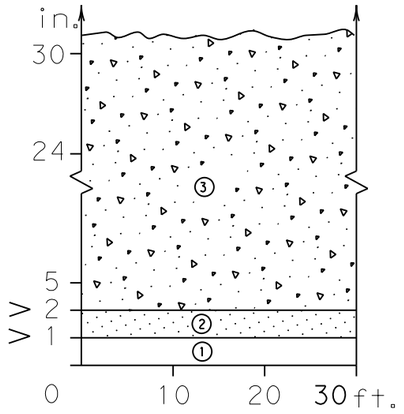
Texas Department of Transportation
Design Division Standard

LOW PROFILE CONCRETE BARRIER
PRECAST BARRIER (TYPE 2)
LPCB-13

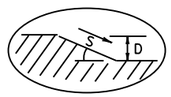
FILE: lpcb13.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
© TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0079	04	049	BU 67K
	DIST	COUNTY		SHEET NO.
	FTW	ERATH		64

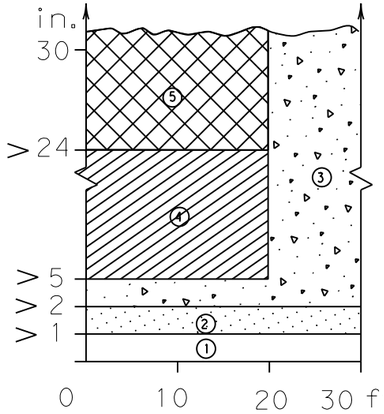
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

Edge Height (D) in Inches versus Lateral Clearance (Y) in Feet

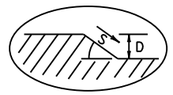


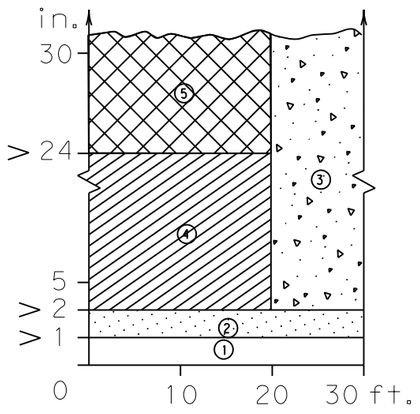
Edge Condition I
S = (3:1) (or flatter)



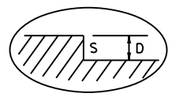


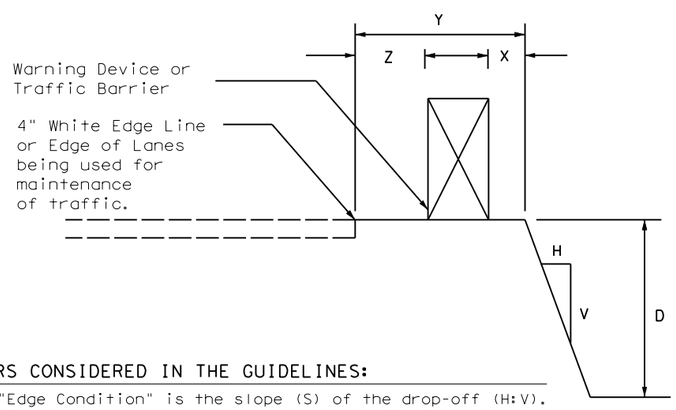
Edge Condition II
S = ((2.99):1) to (1:1)





Edge Condition III
S is steeper than (1:1)





FACTORS CONSIDERED IN THE GUIDELINES:

1. The "Edge Condition" is the slope (S) of the drop-off (H:V). The "Edge Height is the depth of the drop-off "D".

2. Distance "X" is to be the maximum practical under job conditions. Two feet minimum for high speed conditions. Distance "Y" is the lateral clearance from edge of travel lane to edge of dropoff. Distance "Z" does not have a minimum.

3. In addition to the factors considered in the guidelines, each construction zone drop-off situation should be analyzed individually, taking into account other variables, such as: traffic mix, posted speed in the construction zone, horizontal curvature, and the practicality of the treatment options.

4. The conditions for indicating the use of positive or protective barriers are given by Zone-5 and Figure-1. Traffic barriers are primarily applicable for high speed conditions. Urban areas with speeds of 30 mph or less may have a lesser need for signing, delineation, and barriers. Right-angled edges, however, with "D" greater than 2 inches and located within a lateral offset of 6 feet, may indicate a higher level of treatment.

5. If the distance "Y" must be less than 3 feet, the use of a positive barrier may not be feasible. In such a case, consider either: 1) narrowing the lanes to a desired 11 to 12 feet or 10 foot minimum (see CW20-8 sign), or 2) provide an edge slope such as Edge Condition I.

Zone	Treatment Types Guidelines:
①	No treatment
②	CW 8-11 "Uneven Lanes" signs.
③	CW 8-9a Shoulder Drop-Off" or CW 8-11 signs plus vertical panels.
④	CW8-9a or CW 8-11, signs plus drums. Where restricted space precludes the use of drums, use vertical panels. An edge slope to that of the profered Edge Condition I.
⑤	Check indications (Figure-1) for possitive barrier. Where positive barrier is not indicated, the treatment shown above for Zone-4 may be used after consideration of other applicable factors.

Edge Condition Notes:

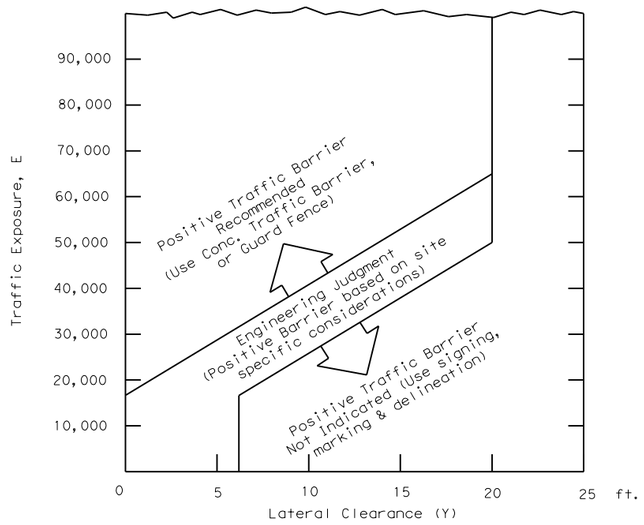
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

2. Edge Condition II: Most vehicles are able to traverse an edge condition with a slope between (2.99 to 1) and (1 to 1) so long as "D" does not exceed 5 inches. Under-carriage drag on most automobiles will occur when "D" exceeds 6 inches. As "D" exeeds 24 inches, the possibility for rollover is greater in most vehicles.

3. Edge Condition III: When slopes are greater than (1 to 1) and where "D" is greater than 2 inches, a more difficult control factor may exist for some vehicles, if not properly treated. For example, where "D" is greater than 2 inches and up to 24 inches different types of vehicles may experience different steering control at different edge heights. Automobiles might experience more steering control differential when "D" is greater than 2 inches and up to 5 inches. Trucks, particularly those with high loads, have more steering control differential when "D" is greater than 5 inches and up to 24 inches. When "D" exceeds 24 inches, the possibility of rollover is greater for most vehicles.

4. Milling or overlay operations that result in Edge Condition III should not be in place without appropriate warning treatments, and these conditions should not be left in place for extended periods of time.

FIGURE-1: CONDITIONS INDICATING USE OF POSITIVE BARRIER FOR ZONE 5 (▨)



1. E = ADT x T
   Where ADT is that portion of the average daily traffic volume traveling within 20 feet (generally two adjacent lanes) of the edge dropoff condition; and, T is the duration time in years of the dropoff condition.

2. Figure-1 provides a practical approach to the use of positive barriers for the protection of vehicles from pavement drop-offs. Other factors, such as the presence of heavy machinery, construction workers, or the mix and volume of traffic may make the use of positive barriers appropriate, even when the edge condition alone may not justify the use of a barrier.

3. An approved end treatment should be provided for any positive barrier end located within the clear zone.

These guidelines apply to temporary traffic control areas or work zones where continuous pavement edges or drop-offs exists parallel and adjacent to a lane used by traffic. The edge conditions may be present between shoulders and travel lanes, between adjacent or opposing travel lanes, or at intermediate points across the width of the paved surface. Due to the variability in construction operations, tolerances in the variables may be allowed by the engineer. These guidelines do not apply to short term operations. These guidelines do not constitute a rigid standard or policy; rather, they are guidance to be used in conjunction with engineering judgement. These guidelines may be updated on the Design Division's on-line manuals.

Engineer's Seal

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED PROFESSIONAL ENGINEER

Date 7/13/2024

Abulkhair M. Zbayed

Texas Department of Transportation

Traffic Safety Division Standard

TREATMENT FOR VARIOUS EDGE CONDITIONS

FILE: edgecon.dgn	DN:	CK:	DW:	CK:
©TxDOT August 2000	CONT	SECT	JOB	HIGHWAY
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03-01 08-01 9-21	DIST	COUNTY		SHEET NO.
	FTW	ERATH		65

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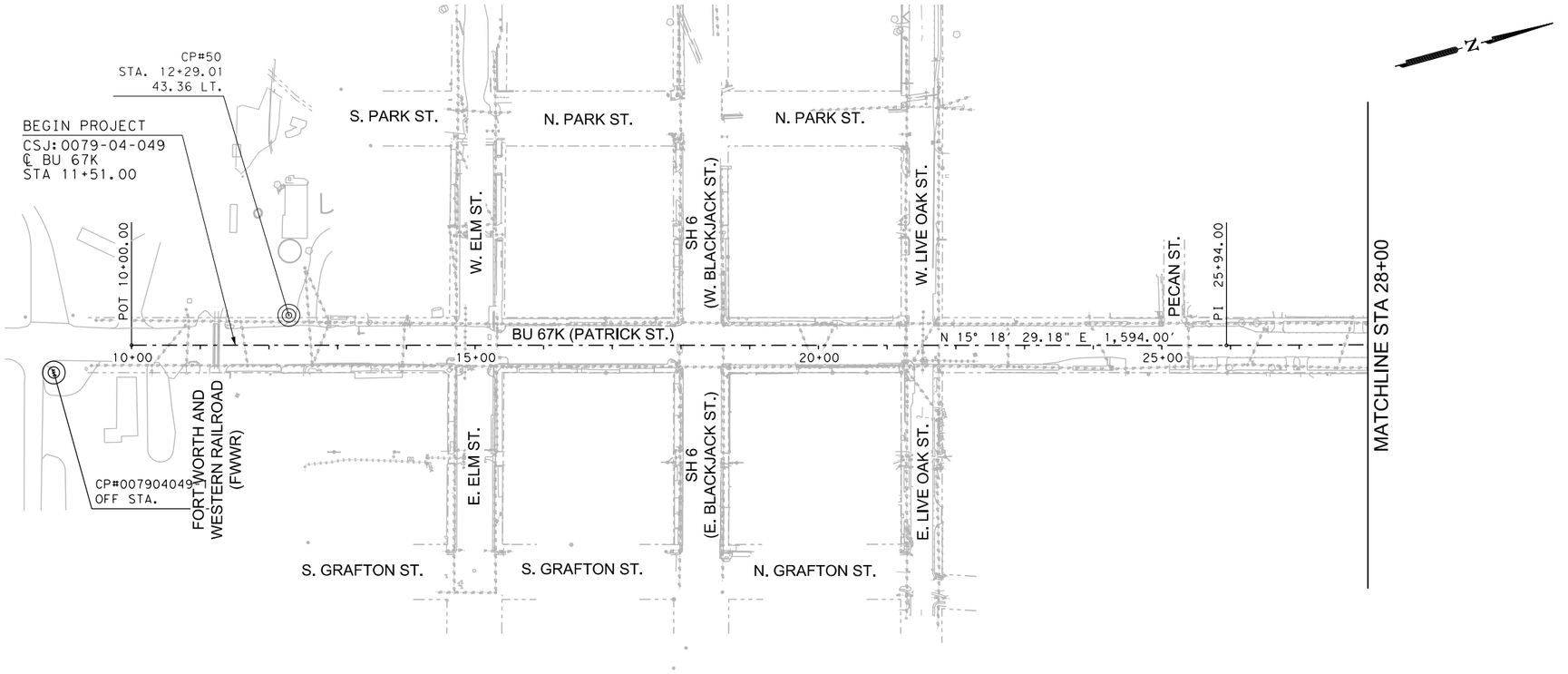

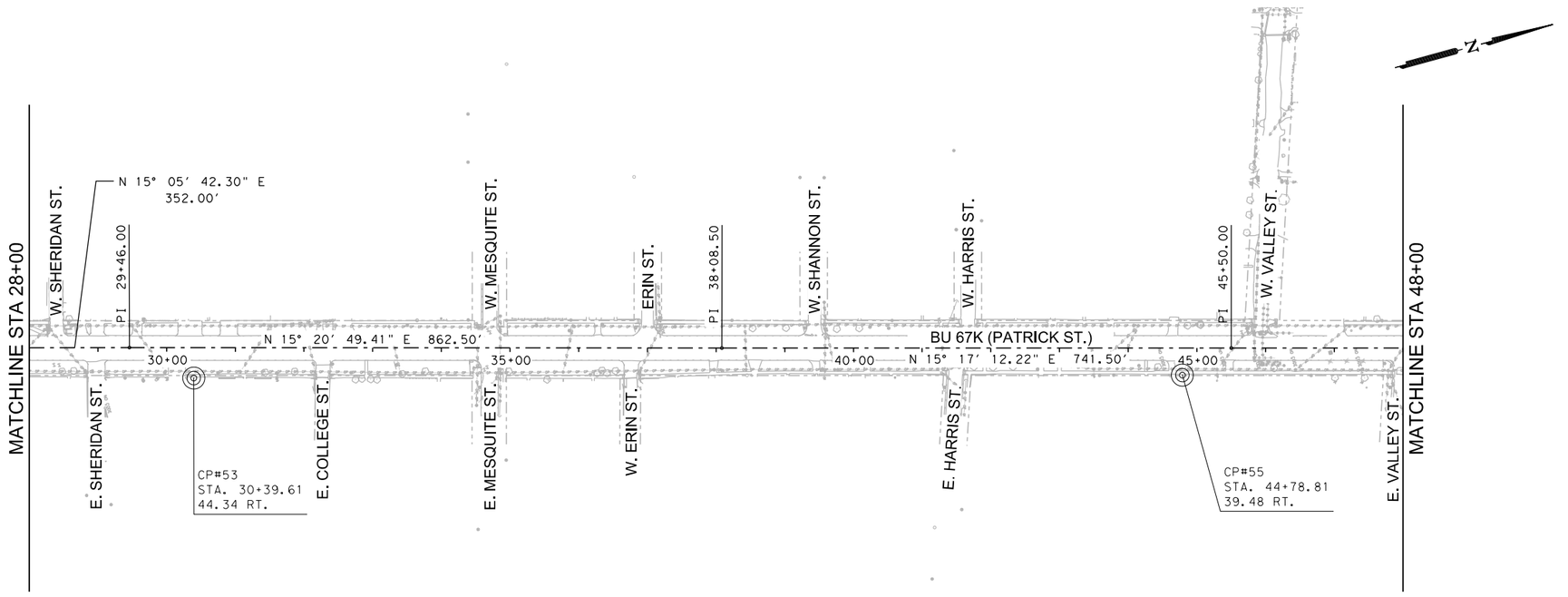

1. COORDINATES AND DISTANCES ARE US SURVEY FEET DISPLAYED IN SURFACE VALUES USING A SURFACE FACTOR OF 1.00006.
2. HORIZONTAL CONTROL IS BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM NAD83(2011)(EPOCH2010.00) NORTH CENTRAL ZONE (4202).
3. ALL ELEVATIONS ARE BASED ON A DIGITAL LEVEL LOOP HOLDING NGS MONUMENT H 194.
4. CONTROL ESTABLISHED ON MARCH 25, 2018 AND VERIFIED ON DECEMBER 13, 2021.

0 100′ 200′
SCALE: 1" = 200′

STATE OF TEXAS
REGISTERED
CURTIS SMITH
5494
PROFESSIONAL
LAND SURVEYOR
7/12/24

CURTIS SMITH
REGISTERED PROFESSIONAL LAND SURVEYOR
NO. 5494 TEXAS FIRM No. 10106900

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

GORRONDONA & ASSOCIATES, INC.
2800 NE LOOP 820, SUITE 660
FORT WORTH, TEXAS 76137
TEXAS REGISTERED SURVEYING FIRM 10106900

BU 67K

HORIZONTAL AND VERTICAL CONTROL INDEX

SHEET 1 OF 2

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	66
CONTROL	SECTION	JOB	
0079	04	049	

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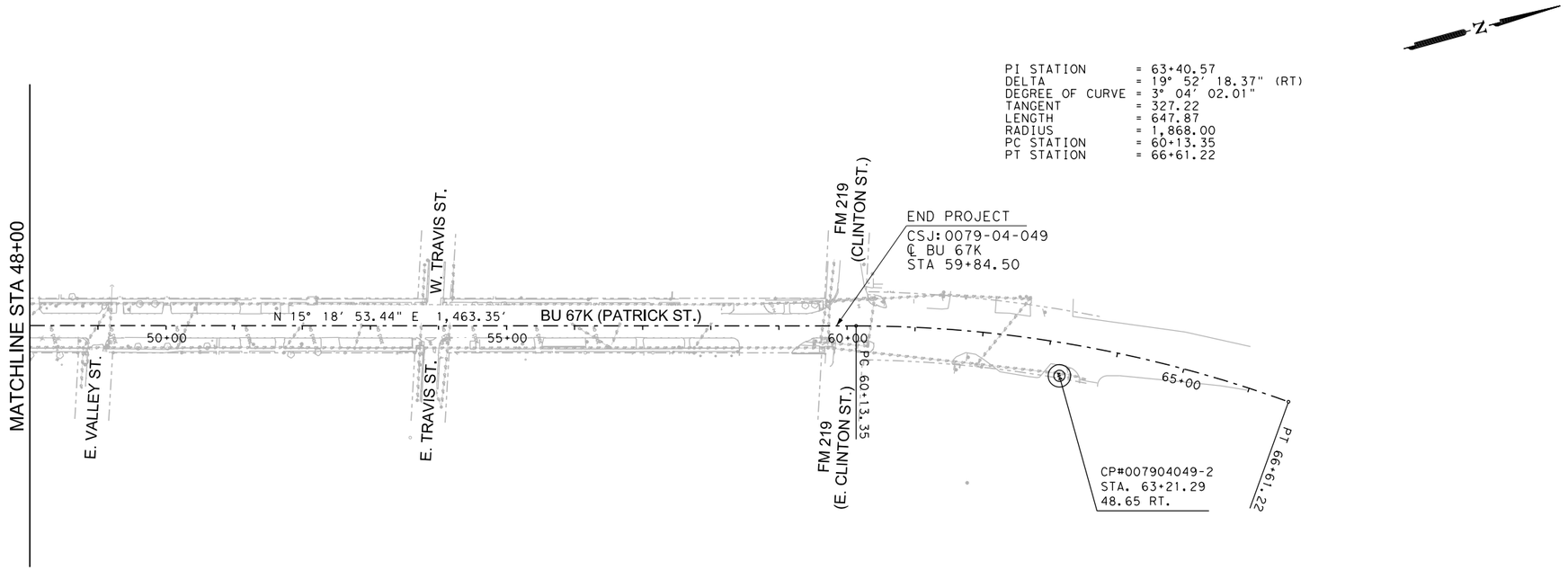

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TANGENT = 327.22
LENGTH = 647.87
RADIUS = 1,868.00
PC STATION = 60+13.35
PT STATION = 66+61.22

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0 100' 200'
SCALE: 1" = 200'

STATE OF TEXAS
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CURTIS SMITH
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FORT WORTH, TEXAS 76137
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BU 67K

HORIZONTAL AND VERTICAL CONTROL INDEX

SHEET 2 OF 2

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	
CONTROL	SECTION	JOB	67
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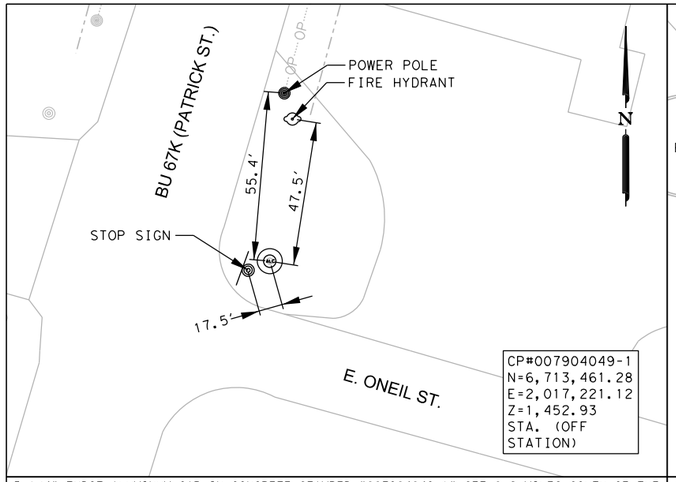
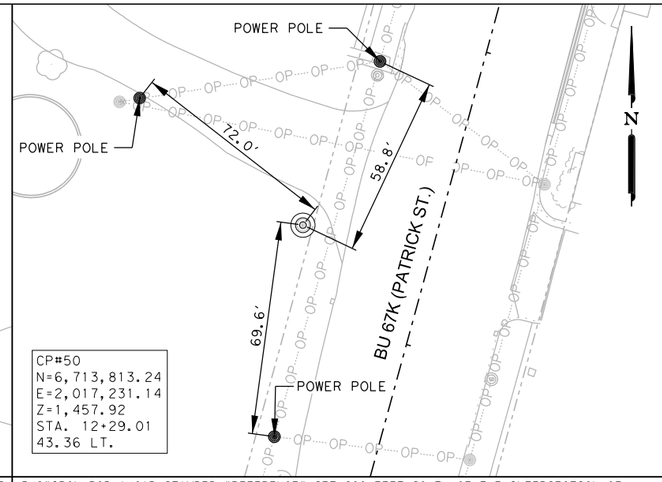
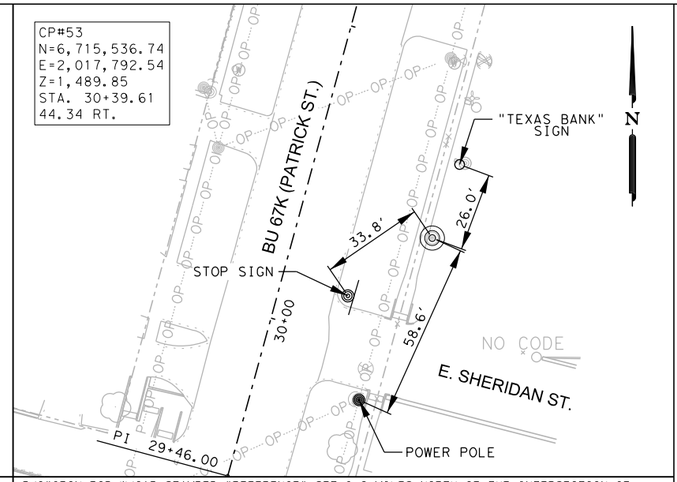


3-1/4" TXDOT ALUMINUM CAP IN CONCRETE STAMPED "007904049-1" SET 0.2 MILES SOUTH OF THE INTERSECTION OF BU67K AND STATE HIGHWAY 6 AND LOCATED 55.4 FEET SOUTH OF A POWER POLE, 47.5 FEET SOUTH OF A FIRE HYDRANT, AND 17.5 FEET NORTHEAST OF A STOP SIGN.



5/8"IRON ROD W/CAP STAMPED "REFERENCE" SET 600 FEET SOUTH OF THE INTERSECTION OF BU67K AND STATE HIGHWAY 6 AND LOCATED 58.8 FEET SOUTH OF A POWER POLE, 69.6 FEET NORTH OF A POWER POLE, AND 72.0 FEET SOUTHEAST OF A POWER POLE.



5/8"IRON ROD W/CAP STAMPED "REFERENCE" SET 0.2 MILES NORTH OF THE INTERSECTION OF BU67K AND STATE HIGHWAY 6 AND LOCATED 58.6 FEET NORTH OF A POWER POLE, 33.8 FEET NORTHEAST OF A STOP SIGN, AND 26.0 FEET SOUTH OF A "TEXAS BANK" SIGN.

5/8"IRON ROD W/CAP STAMPED "REFERENCE" SET 0.5 MILES NORTH OF THE INTERSECTION OF BU67K AND STATE HIGHWAY 6 AND LOCATED 30.0' FEET NORTH OF A POWER POLE, 10.5 FEET SOUTHEAST OF A POWER POLE, AND 18.5 FEET SOUTHEAST OF A "PEDESTRIAN X-ING AHEAD" SIGN.

3-1/4" TXDOT ALUMINUM CAP IN CONCRETE STAMPED "007904049-2" SET 0.8 MILES NORTH OF THE INTERSECTION OF BU67K AND STATE HIGHWAY 6 AND LOCATED 15.7 FEET SOUTH OF A POWER POLE, 28.5 FEET SOUTH OF THE EAST END OF A 2'PIPE FENCE, AND 16.0 FEET EAST OF THE EAST EDGE OF PAVEMENT OF BU67K.

1. COORDINATES AND DISTANCES ARE US SURVEY FEET DISPLAYED IN SURFACE VALUES USING A SURFACE FACTOR OF 1.00006.
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4. CONTROL ESTABLISHED ON MARCH 25, 2018 AND VERIFIED ON DECEMBER 13, 2021.

0 25' 50'
SCALE: 1" = 50'

STATE OF TEXAS
REGISTERED
CURTIS SMITH
5494
PROFESSIONAL
LAND SURVEYOR
7/12/24

CURTIS SMITH
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NO. 5494 TEXAS FIRM No. 10106900

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VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

GORRONDONA & ASSOCIATES, INC.
2800 NE LOOP 820, SUITE 660
FORT WORTH, TEXAS 76137
TEXAS REGISTERED SURVEYING FIRM 10106900

BU 67K

HORIZONTAL AND VERTICAL CONTROL DETAIL

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	68
CONTROL	SECTION	JOB	
0079	04	049	

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BU 67K

Beginning chain US67 description

Point 200 N 6,713,580.9025 E 2,017,212.5009 Sta 10+00.00

Course from 200 to 201 N 15° 18′ 29.18" E Dist 1,594.0000

Point 201 N 6,715,118.3475 E 2,017,633.3320 Sta 25+94.00

Course from 201 to 202 N 15° 05′ 42.30" E Dist 352.0000

Point 202 N 6,715,458.2017 E 2,017,725.0004 Sta 29+46.00

Course from 202 to 203 N 15° 20′ 49.41" E Dist 862.5000

Point 203 N 6,716,289.9453 E 2,017,953.2741 Sta 38+08.50

Course from 203 to 204 N 15° 17′ 12.22" E Dist 741.5000

Point 204 N 6,717,005.2099 E 2,018,148.7703 Sta 45+50.00

Course from 204 to PC US671 N 15° 18′ 53.44" E Dist 1,463.3478

Curve Data					
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Delta =	19° 52′ 18.37" (RT)				
Degree =	3° 04′ 02.01"				
Tangent =	327.2239				
Length =	647.8743				
Radius =	1,868.0000				
External =	28.4439				
Long Chord =	644.6320				
Mid. Ord. =	28.0173				
P.C. Station	60+13.35	N	6,718,416.5928	E	2,018,535.2741
P.T. Station	66+61.22	N	6,718,999.6301	E	2,018,810.2614
C.C.		N	6,717,923.2112	E	2,020,336.9396
Back = N 15° 18′ 53.44" E					
Ahead = N 35° 11′ 11.81" E					
Chord Bear = N 25° 15′ 02.63" E					

Ending chain US67 description

ELM ST

Beginning chain ELM description

Curve Data					
Curve ELMST_CL1					
P.I. Station	10+40.12	N	6,714,198.7294	E	2,016,707.6091
Delta =	8° 59′ 47.27" (LT)				
Degree =	11° 14′ 04.08"				
Tangent =	40.1220				
Length =	80.0791				
Radius =	510.0000				
External =	1.5758				
Long Chord =	79.9969				
Mid. Ord. =	1.5709				
P.C. Station	10+00.00	N	6,714,205.5125	E	2,016,668.0646
P.T. Station	10+80.08	N	6,714,198.2134	E	2,016,747.7278
C.C.		N	6,714,708.1712	E	2,016,754.2867
Back = S 80° 15′ 59.97" E					
Ahead = S 89° 15′ 47.24" E					
Chord Bear = S 84° 45′ 53.61" E					

Course from PT ELMST_CL1 to PC ELMST_CL2 S 89° 15′ 47.24" E Dist 55.6950

ELM ST (CONT.)

Curve Data					
Curve ELMST_CL2					
P.I. Station	12+01.92	N	6,714,196.6464	E	2,016,869.5582
Delta =	14° 46′ 46.79" (RT)				
Degree =	11° 14′ 04.08"				
Tangent =	66.1454				
Length =	131.5564				
Radius =	510.0000				
External =	4.2715				
Long Chord =	131.1920				
Mid. Ord. =	4.2361				
P.C. Station	11+35.77	N	6,714,197.4971	E	2,016,803.4182
P.T. Station	12+67.33	N	6,714,178.9514	E	2,016,933.2928
C.C.		N	6,713,687.5393	E	2,016,796.8593
Back = S 89° 15′ 47.24" E					
Ahead = S 74° 29′ 00.45" E					
Chord Bear = S 81° 52′ 23.85" E					

Course from PT ELMST_CL2 to 111 S 74° 29′ 00.45" E Dist 377.5569

Point 111 N 6,714,077.9487 E 2,017,297.0890 Sta 16+44.89

Course from 111 to 112 S 73° 52′ 37.58" E Dist 120.9112

Point 112 N 6,714,044.3718 E 2,017,413.2446 Sta 17+65.80

Course from 112 to 113 S 74° 36′ 31.84" E Dist 250.2632

Point 113 N 6,713,977.9501 E 2,017,654.5325 Sta 20+16.06

Ending chain ELM description

BLACKJACK ST

Beginning chain BLACKJACK description

Point 114 N 6,714,533.9549 E 2,016,844.8262 Sta 10+00.00

Course from 114 to 115 S 75° 46′ 47.71" E Dist 433.0270

Point 115 N 6,714,427.5830 E 2,017,264.5849 Sta 14+33.03

Course from 115 to 116 S 74° 45′ 48.68" E Dist 217.0120

Point 116 N 6,714,370.5515 E 2,017,473.9689 Sta 16+50.04

Course from 116 to 117 S 74° 28′ 01.01" E Dist 279.1051

Point 117 N 6,714,295.8088 E 2,017,742.8800 Sta 19+29.14

Ending chain BLACKJACK description

LIVE OAK ST

Beginning chain LIVE_OAK description

Point 118 N 6,714,812.2205 E 2,017,075.1321 Sta 10+00.00

Course from 118 to 119 S 74° 23′ 17.82" E Dist 320.5826

Point 119 N 6,714,725.9463 E 2,017,383.8876 Sta 13+20.58

Course from 119 to 120 S 74° 41′ 30.82" E Dist 459.8157

Point 120 N 6,714,604.5506 E 2,017,827.3891 Sta 17+80.40

Ending chain LIVE_OAK description

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED
PROFESSIONAL ENGINEER

Abulkhair M. Zobayed

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

HORIZONTAL ALIGNMENT DATA

SHEET 1 OF 2

FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	
CONTROL	SECTION	JOB	69
0079	04	049	

W VALLEY ST

Beginning chain W_VALLEY description

Point 152 N 6,717,325.8375 E 2,017,644.2571 Sta 10+00.00

Course from 152 to PC WVALLEYST_CL1 S 70° 16′ 41.73" E Dist 29.9175

		Curve Data			
Curve WVALLEYST_CL1					
P.I. Station		10+47.25	N	6,717,309.8913	E 2,017,688.7398
Delta	= 3° 18′ 36.76"	(RT)			
Degree	= 9° 32′ 57.47"				
Tangent	=	17.3370			
Length	=	34.6644			
Radius	=	600.0000			
External	=	0.2504			
Long Chord	=	34.6596			
Mid. Ord.	=	0.2503			
P.C. Station		10+29.92	N	6,717,315.7417	E 2,017,672.4197
P.T. Station		10+64.58	N	6,717,303.1083	E 2,017,704.6949
C.C.			N	6,716,750.9362	E 2,017,469.9482
Back	= S 70° 16′ 41.73" E				
Ahead	= S 66° 58′ 04.98" E				
Chord Bear	= S 68° 37′ 23.35" E				

Course from PT WVALLEYST_CL1 to PC WVALLEYST_CL2 S 66° 58′ 04.98" E Dist 31.8121

		Curve Data			
Curve WVALLEYST_CL2					
P.I. Station		11+21.05	N	6,717,281.0137	E 2,017,756.6658
Delta	= 5° 08′ 04.25"	(LT)			
Degree	= 10° 25′ 02.69"				
Tangent	=	24.6604			
Length	=	49.2878			
Radius	=	550.0000			
External	=	0.5526			
Long Chord	=	49.2713			
Mid. Ord.	=	0.5520			
P.C. Station		10+96.39	N	6,717,290.6620	E 2,017,733.9712
P.T. Station		11+45.68	N	6,717,273.4352	E 2,017,780.1328
C.C.			N	6,717,796.8197	E 2,017,949.1556
Back	= S 66° 58′ 04.98" E				
Ahead	= S 72° 06′ 09.23" E				
Chord Bear	= S 69° 32′ 07.10" E				

Course from PT WVALLEYST_CL2 to 153 S 72° 06′ 09.23" E Dist 426.8248

Point 153 N 6,717,142.2660 E 2,018,186.3028 Sta 15+72.51

Ending chain W_VALLEY description

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
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LICENSED
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7/13/2024

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Texas Department of Transportation

BU 67K

HORIZONTAL ALIGNMENT DATA

SHEET 2 OF 2

FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	70
CONTROL	SECTION	JOB	
0079	04	049	

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REMOVAL GENERAL NOTES

1. REFER TO "EXISTING TYPICAL SECTION" SHEETS FOR INFORMATION ON PAVEMENT STRUCTURE.

2. REFER TO DRAINAGE AND TCP SHEETS FOR LIMITS AND QUANTITIES OF CUT & RESTORE ASPHALT PAVEMENT ON SIDE STREETS FOR CONSTRUCTION OF PROPOSED DRAINAGE SYSTEMS.

3. REFER TO "SIGNING AND PAVEMENT MARKING" SHEETS FOR EXISTING SIGN & SIGNAL REMOVAL.

4. REMOVAL OF ABANDONED UTILITIES IN CONFLICT WITH PROPOSED CONSTRUCTION SHALL BE SUBSIDIARY TO ITEM 100.

5. REFER TO "ROADWAY PLAN & PROFILE" SHEETS FOR LIMITS OF SIDE STREETS CONSTRUCTION.

6. REMOVAL OF EXISTING PAVEMENT AND CURB AND GUTTER LIMITS MAY NEED TO BE ADJUSTED BECAUSE OF ACTUAL FIELD CONDITION DURING CONSTRUCTION AND ALSO TO AVOID DAMAGE/IMPACT TO CURB RAMPS, SIDEWALKS, DRIVEWAYS, UTILITIES, OTHER ROADWAY APPURTENANCES, ETC., THAT ARE EXISTING OR NEWLY CONSTRUCTED BEFORE THIS PROJECT. CONTRACTOR SHALL CONFIRM LIMIT OF REMOVAL WITH THE ENGINEER BEFORE REMOVING THESE. UNLESS SHOWN OTHERWISE, EXISTING ADA CURB RAMPS AND SIDEWALKS WILL NOT BE REMOVED. CONTRACTOR SHALL TAKE NECESSARY PRECAUTIONS SO THAT THEY ARE NOT DAMAGED. IF DAMAGED, THOSE SHALL BE REPAIRED IMMEDIATELY, PER ENGINEER'S DIRECTION, WITHOUT ANY ADDITIONAL COST.

7. REMOVAL OF ASPHALT ON TOP OF EXISTING GUTTER WILL BE PART OF CURB & GUTTER REMOVAL.

8. ONLY THAT PORTION OF EXISTING STORM DRAINAGE SYSTEMS WILL BE REMOVED WHICH WILL NOT BE REQUIRED TO MAINTAIN EXISTING SYSTEMS IN SERVICE DURING CONSTRUCTION. SEE CONSTRUCTION SEQUENCE AND TCP FOR ADDITIONAL INFORMATION. CONTRACTOR SHALL GET ENGINEER'S APPROVAL, BEFORE REMOVING ANY PORTION/ELEMENTS OF EXISTING STORM DRAINAGE SYSTEMS.

9. REMOVAL OF EXISTING BASE MATERIAL BELOW THE EXISTING BRICK LAYER WILL BE PAID UNDER ITEM 105.

10. CONTRACTOR SHALL TAKE NECESSARY PRECAUTIONS TO REMOVE EXISTING HISTORIC BRICK BASE COURSE WITH LEAST AMOUNT OF DAMAGE TO RETURN TO CITY OF DUBLIN. ANY ADDITIONAL WORK (MATERIAL AND LABOR) FOR THESE WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE SUBSIDIARY TO ITEM 105.

11. FOR ADDITIONAL INFORMATION, SEE ROADWAY PLAN AND PROFILE, TCP AND TYPICAL SECTION SHEETS.

7/18/2024

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BU 67K

REMOVAL GENERAL NOTES

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	71
CONTROL	SECTION	JOB	
0079	04	049	

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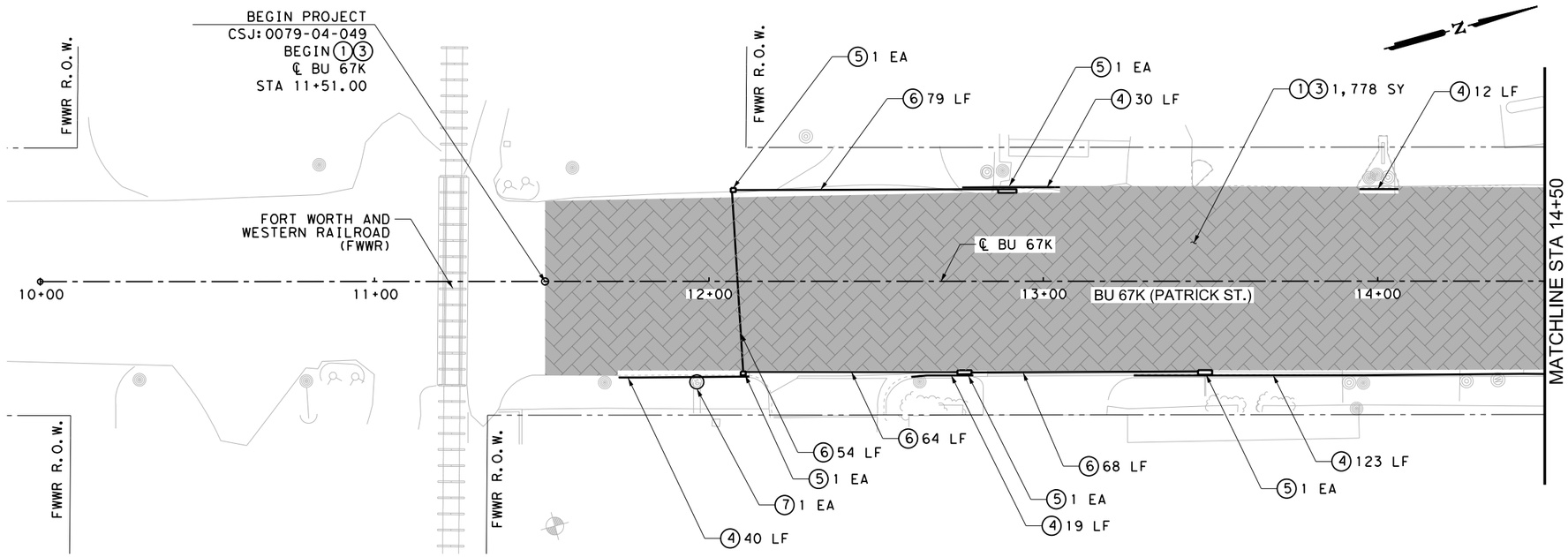

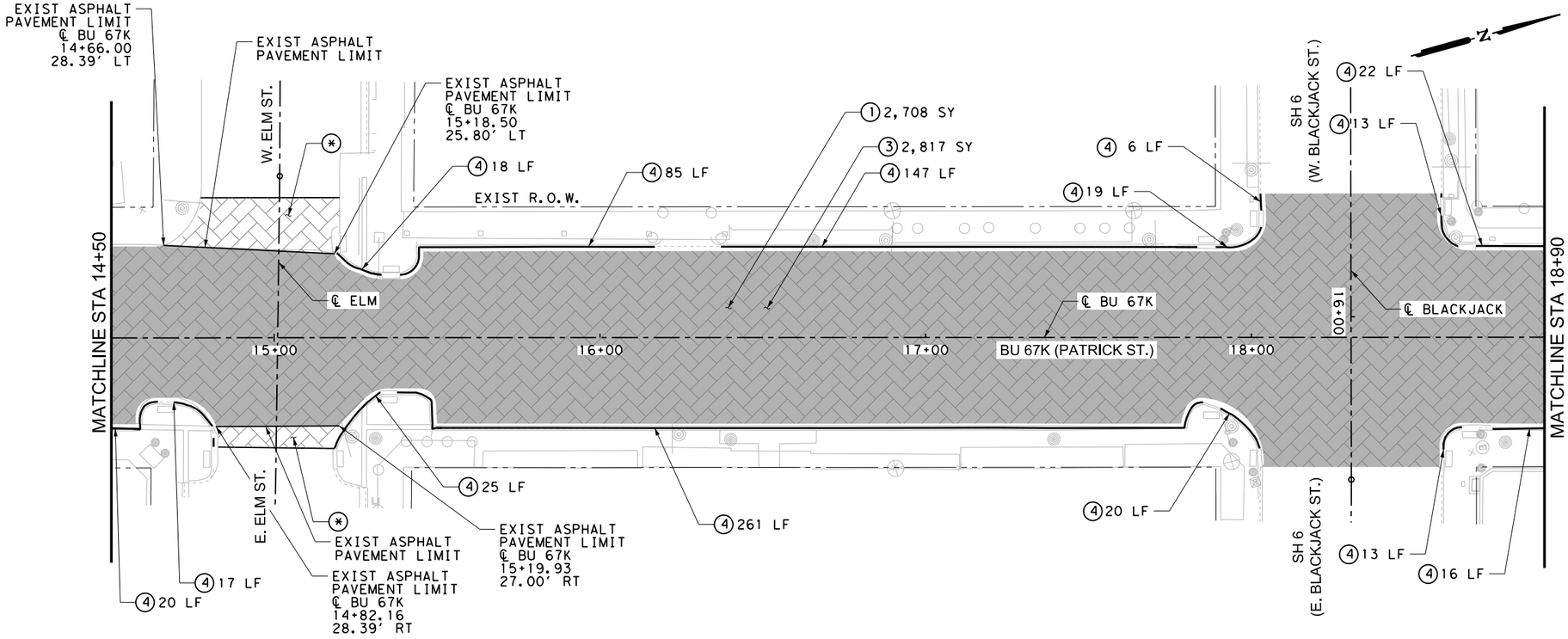

LEGEND

- EXIST R.O.W.
- (1) PLAN & TEXT ASPH CONC PAV(0"-6")
- (2) NOT USED
- (3) RMV, CLEAN, PALLETZ & STORE STREET BRICK
- (4) REMOVING CONC (CURB AND GUTTER)
- (5) REMOV STR (INLET)
- (6) REMOV STR (PIPE)
- (7) REMOV STR (MANHOLE)
- (8) REMOV CONC (SIDEWALK, RAMP OR SUP)

* SEE "MISCELLANEOUS ROADWAY DETAILS" SHEET FOR MORE INFORMATION ON ELM STREET TIE-IN.

0 20' 40'

SCALE: 1" = 40'

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED
PROFESSIONAL ENGINEER

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

REMOVAL LAYOUT

SHEET 1 OF 7

FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	
CONTROL	SECTION	JOB	72
0079	04	049	

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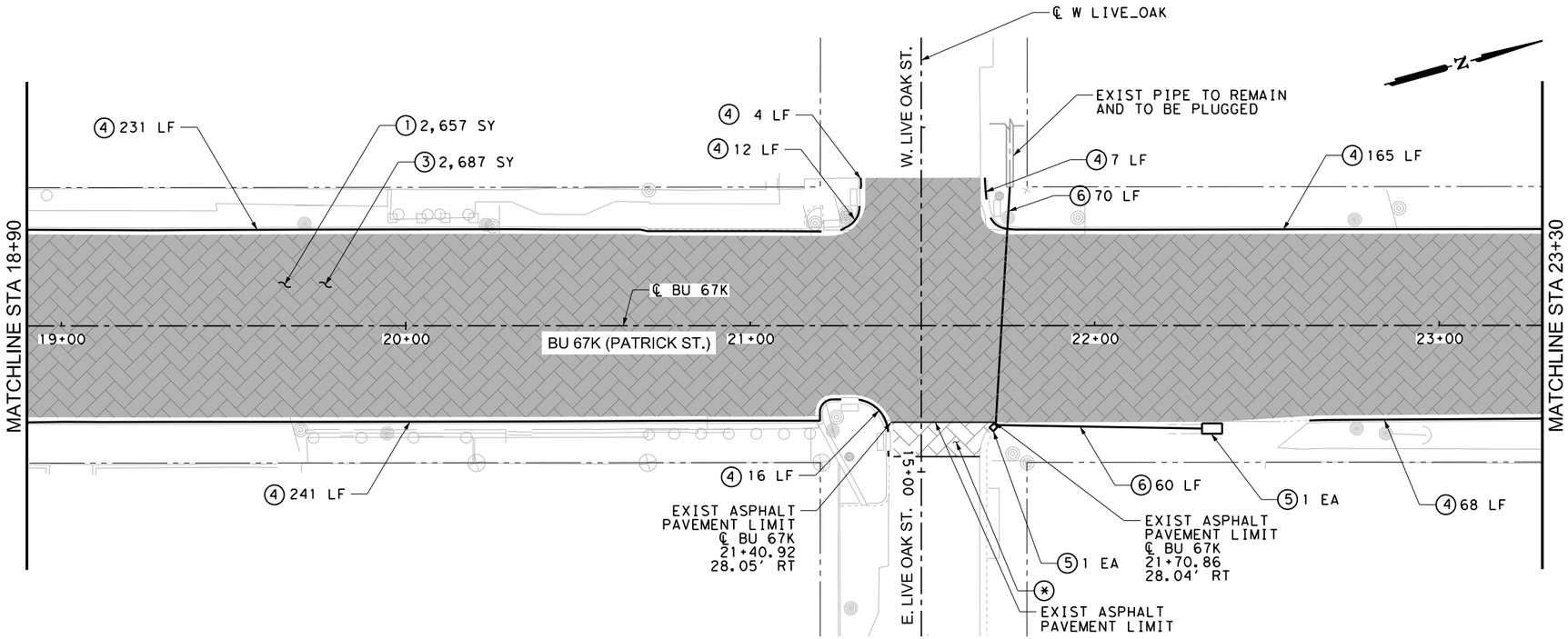

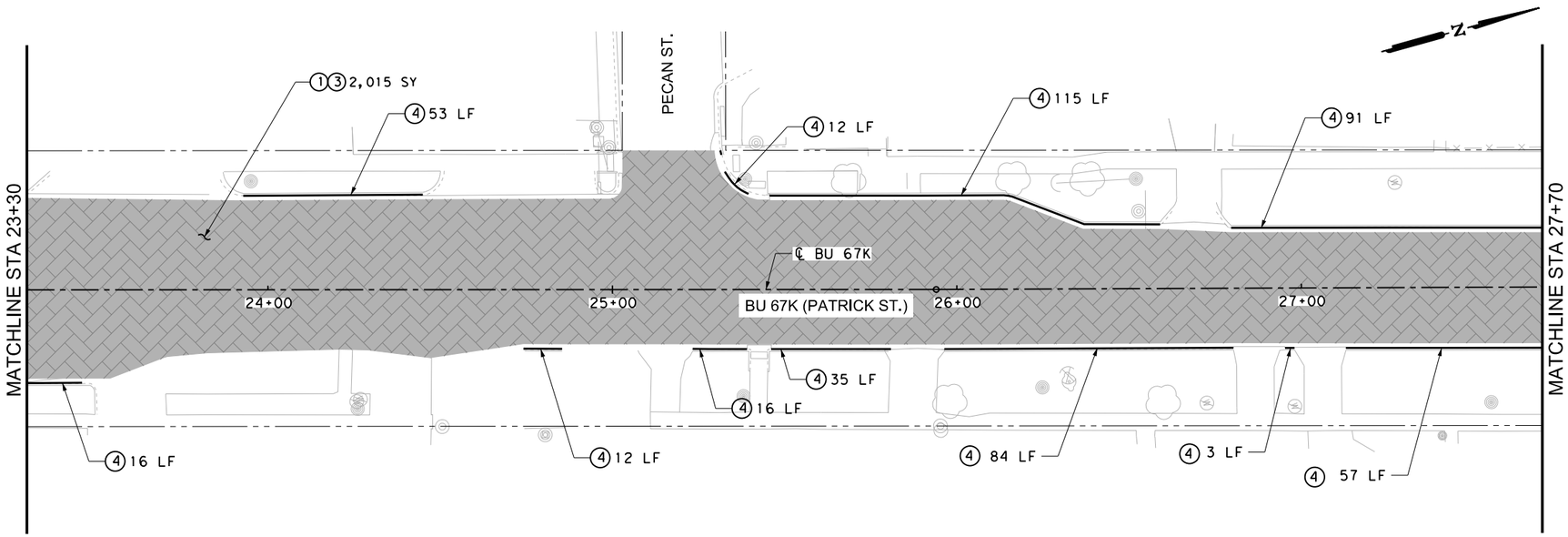

LEGEND

- EXIST R.O.W.
- (1) PLAN & TEXT ASPH CONC PAV(0"-6")
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- (5) REMOV STR (INLET)
- (6) REMOV STR (PIPE)
- (7) REMOV STR (MANHOLE)
- (8) REMOV CONC (SIDEWALK, RAMP OR SUP)

0 20' 40'

SCALE: 1" = 40'

*SEE "MISCELLANEOUS ROADWAY DETAILS" SHEET FOR MORE INFORMATION ON E. LIVE OAK STREET TIE-IN.

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
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LICENSED
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Abulkhair M. Zobayed

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

REMOVAL LAYOUT

SHEET 2 OF 7

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	73
CONTROL	SECTION	JOB	
0079	04	049	

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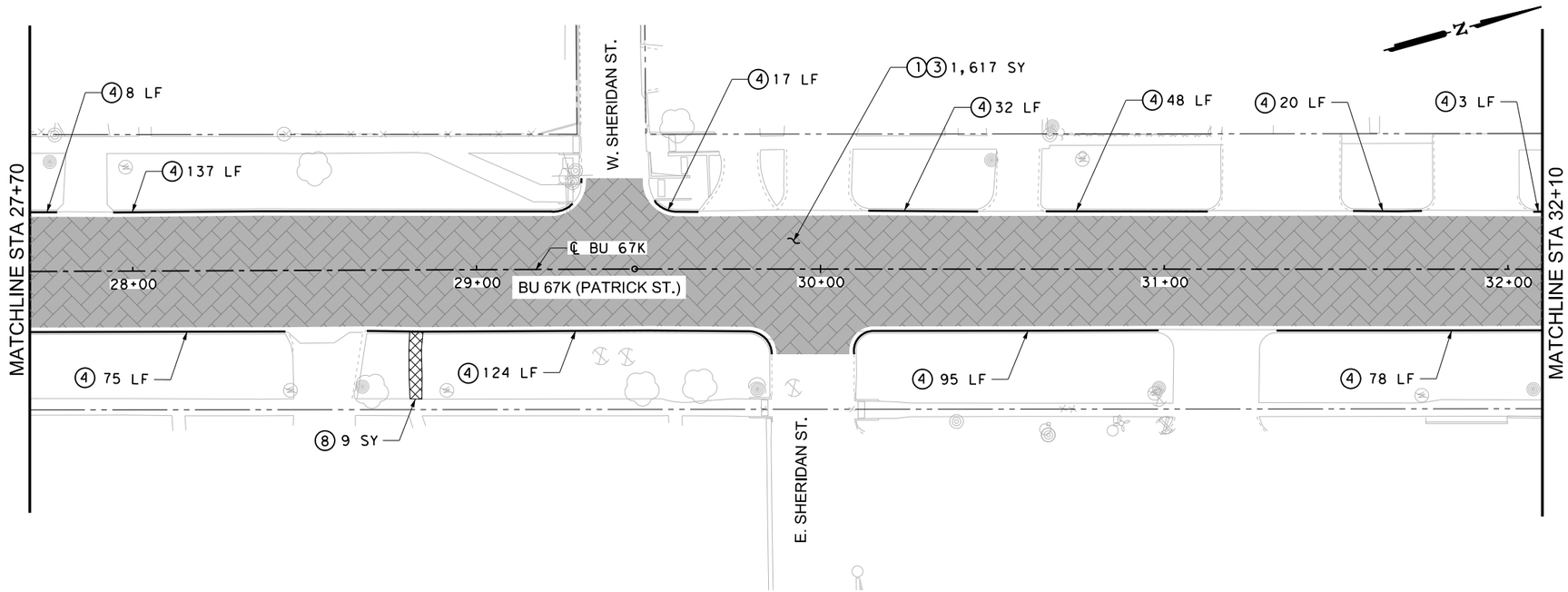

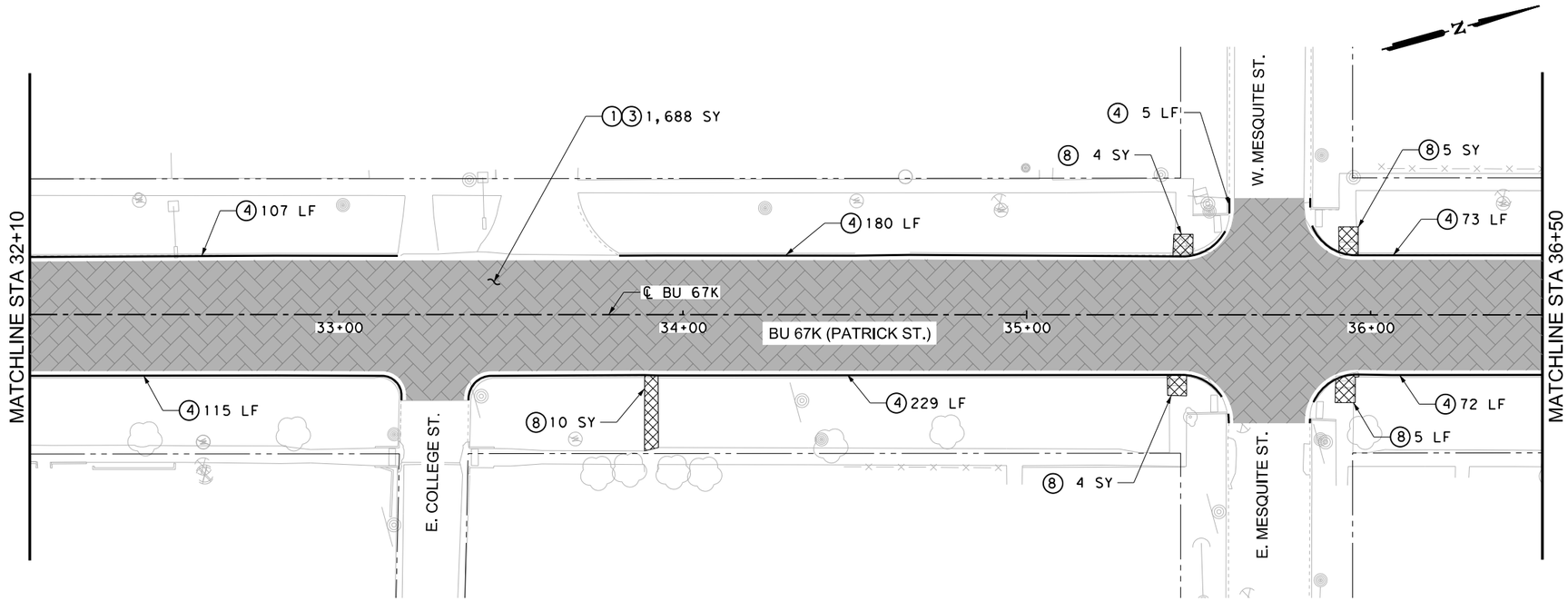

LEGEND

- EXIST R.O.W.
- (1) PLAN & TEXT ASPH CONC PAV(0"-6")
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- (5) REMOV STR (INLET)
- (6) REMOV STR (PIPE)
- (7) REMOV STR (MANHOLE)
- (8) REMOV CONC (SIDEWALK, RAMP OR SUP)

0 20' 40'

SCALE: 1" = 40'

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED PROFESSIONAL ENGINEER

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

REMOVAL LAYOUT

SHEET 3 OF 7

FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	
CONTROL	SECTION	JOB	74
0079	04	049	

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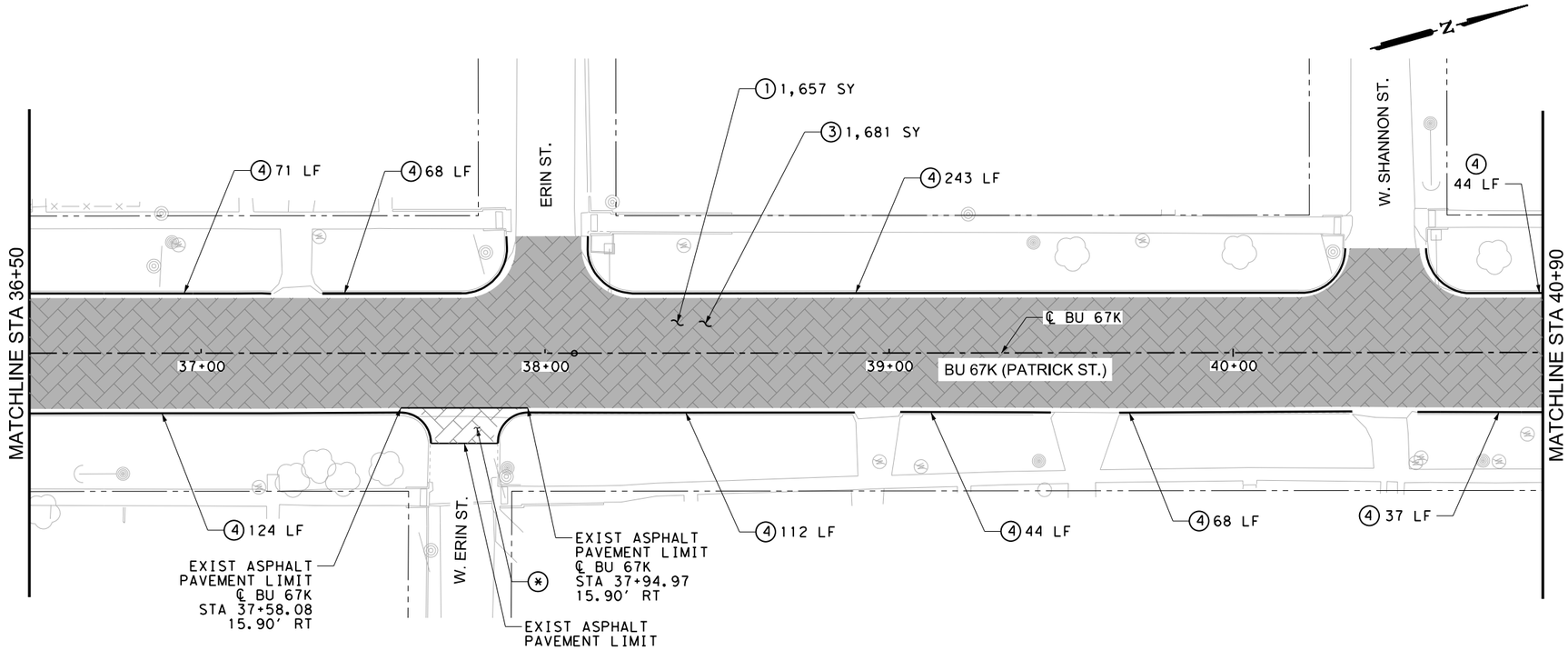

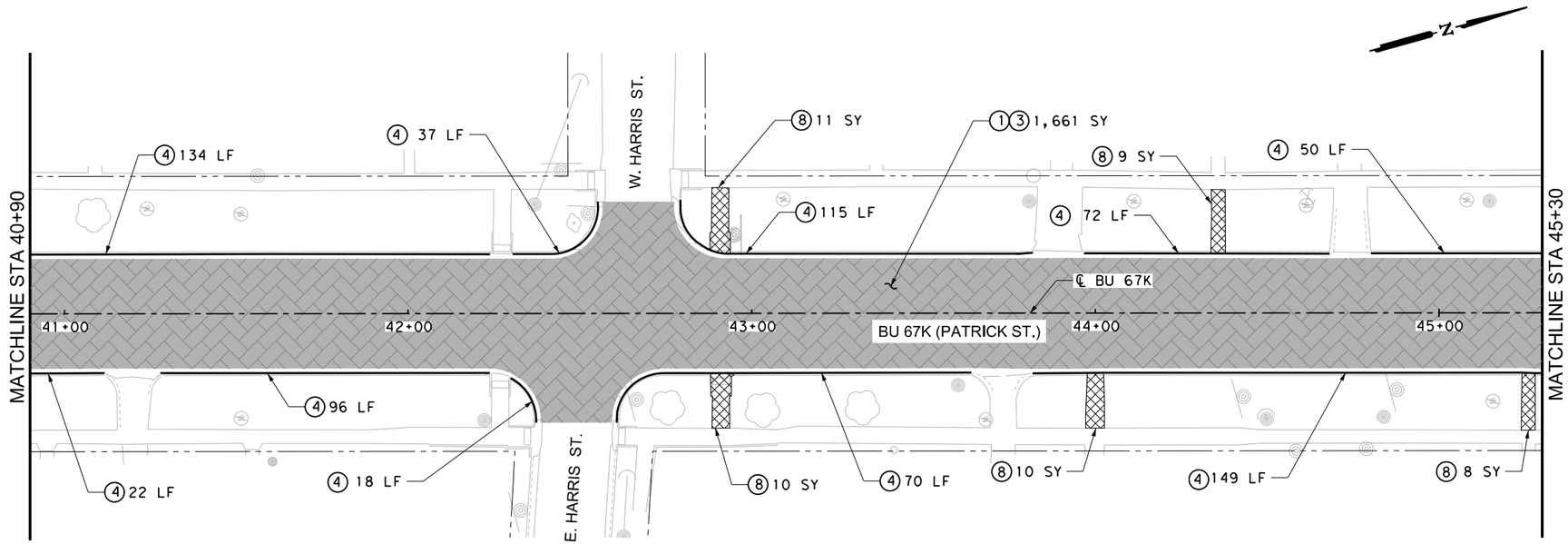

LEGEND

- EXIST R.O.W.
- (1) PLAN & TEXT ASPH CONC PAV(0"-6")
- (2) NOT USED
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- (5) REMOV STR (INLET)
- (6) REMOV STR (PIPE)
- (7) REMOV STR (MANHOLE)
- (8) REMOV CONC (SIDEWALK, RAMP OR SUP)

0 20' 40'

SCALE: 1" = 40'

*SEE "MISCELLANEOUS ROADWAY DETAILS" SHEET FOR MORE INFORMATION ON W. ERIN STREET TIE-IN.

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
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Abulkhair M. Zobayed

7/13/2024

NO.	DATE	REVISION	APPROVED

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Texas Department of Transportation

BU 67K

REMOVAL LAYOUT

SHEET 4 OF 7

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	75
CONTROL	SECTION	JOB	
0079	04	049	

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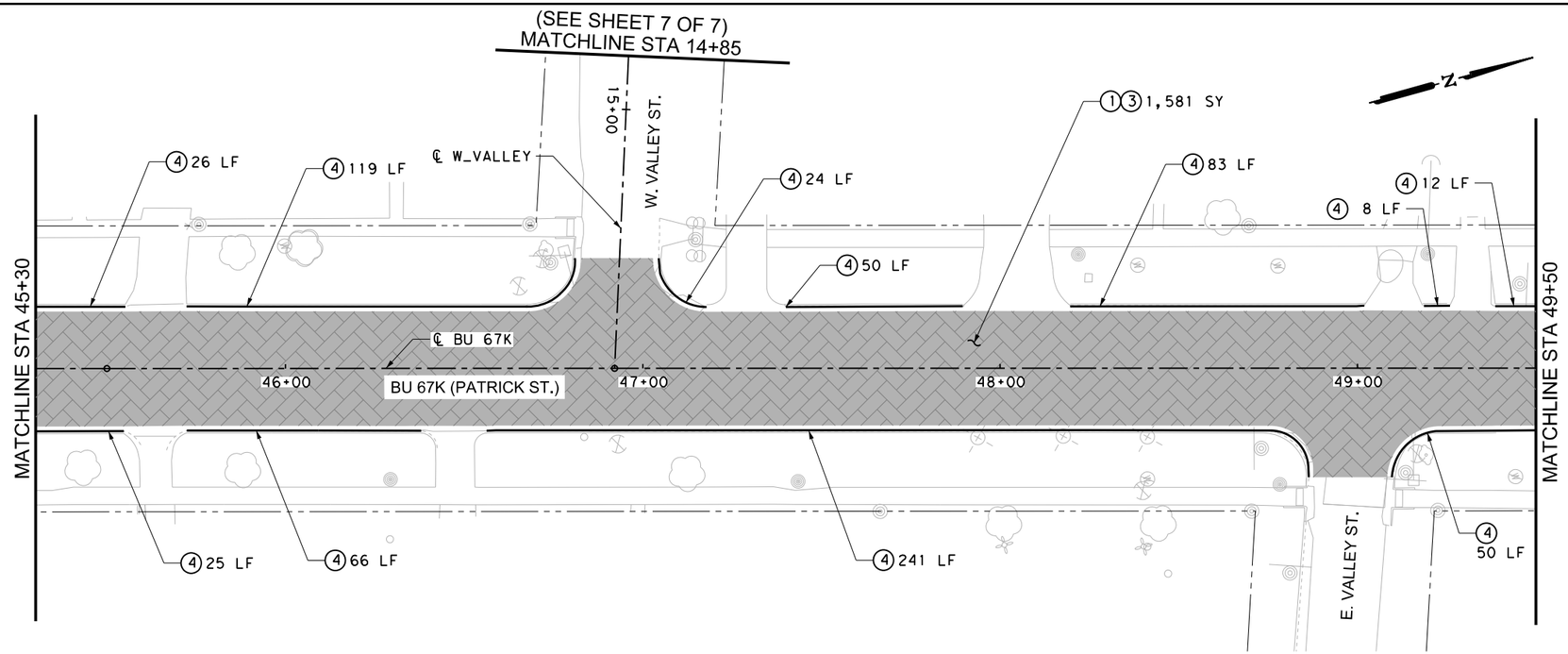

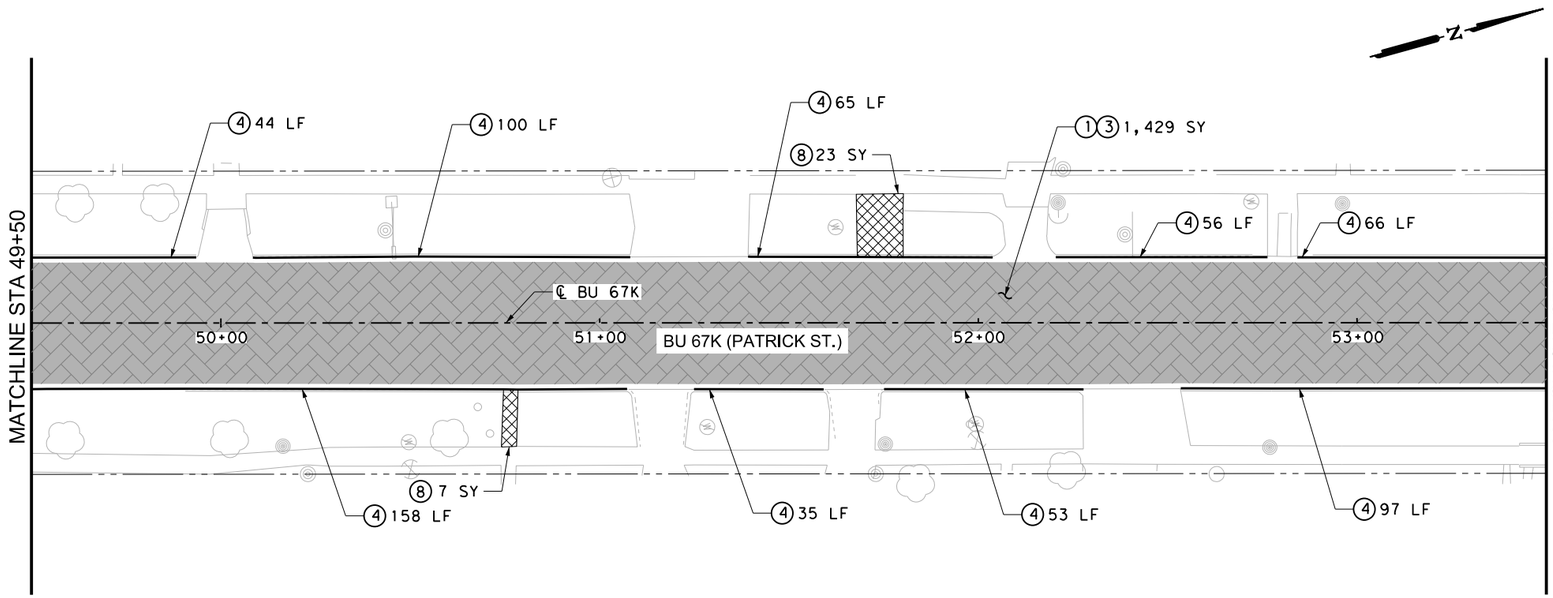

LEGEND

- EXIST R.O.W.
- (1) PLAN & TEXT ASPH CONC PAV(0"-6")
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- (3) RMV, CLEAN, PALLETZ & STORE STREET BRICK
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- (6) REMOV STR (PIPE)
- (7) REMOV STR (MANHOLE)
- (8) REMOV CONC (SIDEWALK, RAMP OR SUP)

0 20' 40'

SCALE: 1" = 40'

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
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LICENSED
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Abulkhair M. Zobayed

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

REMOVAL LAYOUT

SHEET 5 OF 7

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	76
CONTROL	SECTION	JOB	
0079	04	049	

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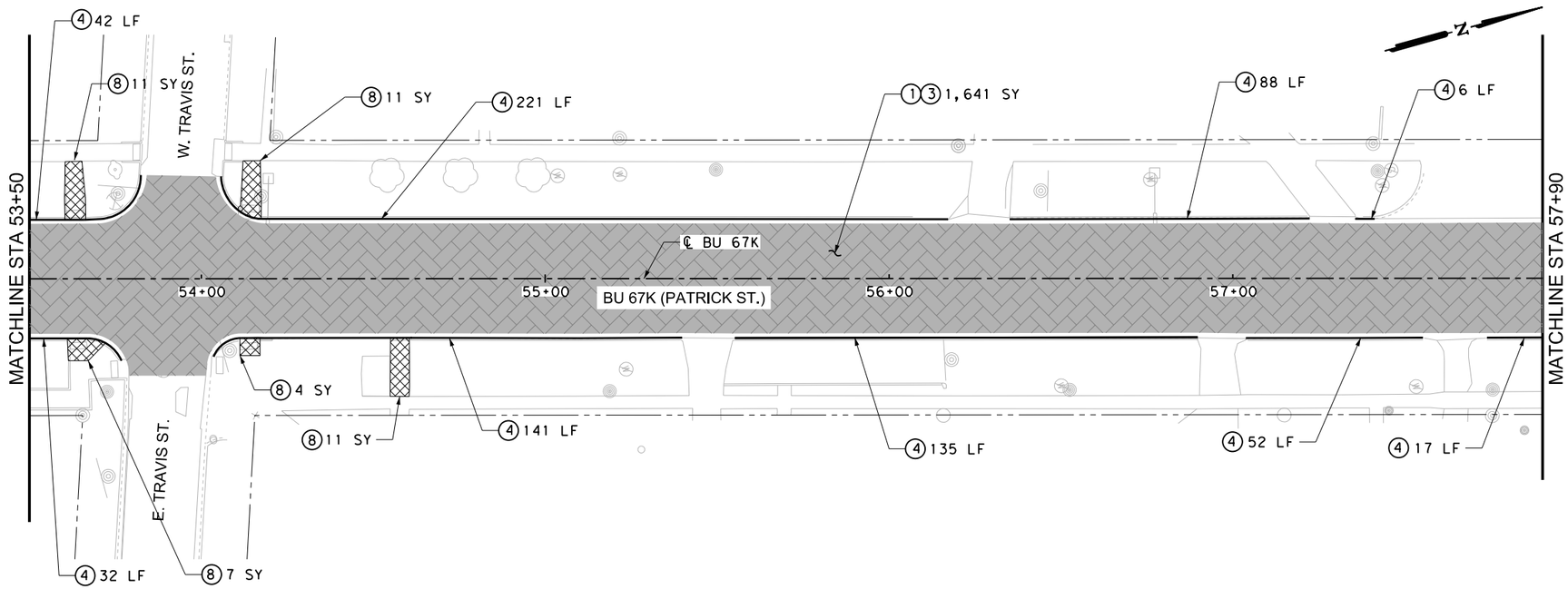

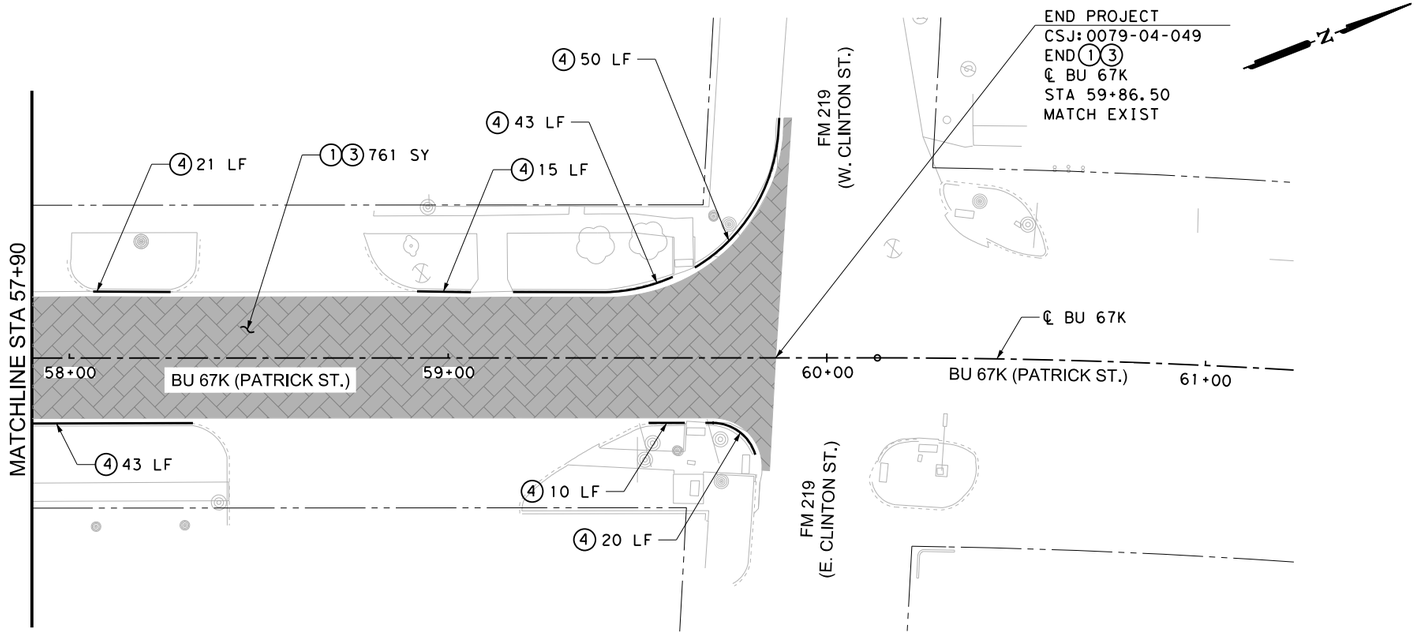

LEGEND

- EXIST R.O.W.
- (1) PLAN & TEXT ASPH CONC PAV(0"-6")
- (2) NOT USED
- (3) RMV, CLEAN, PALLETZ & STORE STREET BRICK
- (4) REMOVING CONC (CURB AND GUTTER)
- (5) REMOV STR (INLET)
- (6) REMOV STR (PIPE)
- (7) REMOV STR (MANHOLE)
- (8) REMOV CONC (SIDEWALK, RAMP OR SUP)

0 20' 40'

SCALE: 1" = 40'

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
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Texas Department of Transportation

BU 67K

REMOVAL LAYOUT

SHEET 6 OF 7

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	77
CONTROL	SECTION	JOB	
0079	04	049	

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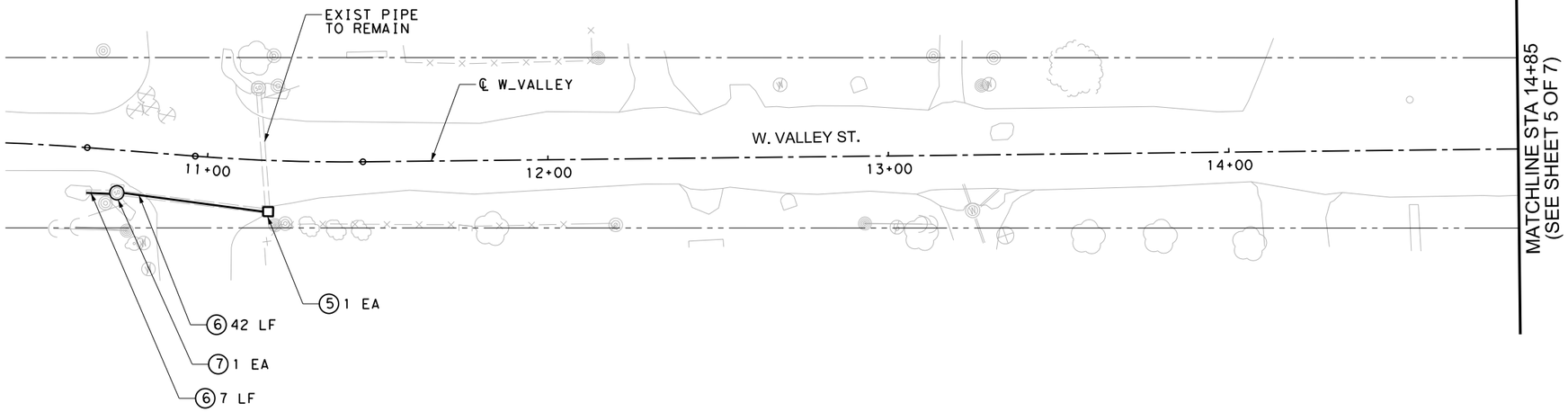
LEGEND

- EXIST R.O.W.
- (1) PLAN & TEXT ASPH CONC PAV(0"-6")
- (2) NOT USED
- (3) RMV, CLEAN, PALLETZ & STORE STREET BRICK
- (4) REMOVING CONC (CURB AND GUTTER)
- (5) REMOV STR (INLET)
- (6) REMOV STR (PIPE)
- (7) REMOV STR (MANHOLE)
- (8) REMOV CONC (SIDEWALK, RAMP OR SUP)



0 20' 40'

SCALE: 1" = 40'

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED PROFESSIONAL ENGINEER

Abulkhair M. Zobayed

7/13/2024

NO.	DATE	REVISION	APPROVED

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Texas Department of Transportation

BU 67K

REMOVAL LAYOUT

SHEET 7 OF 7

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	
CONTROL	SECTION	JOB	78
0079	04	049	

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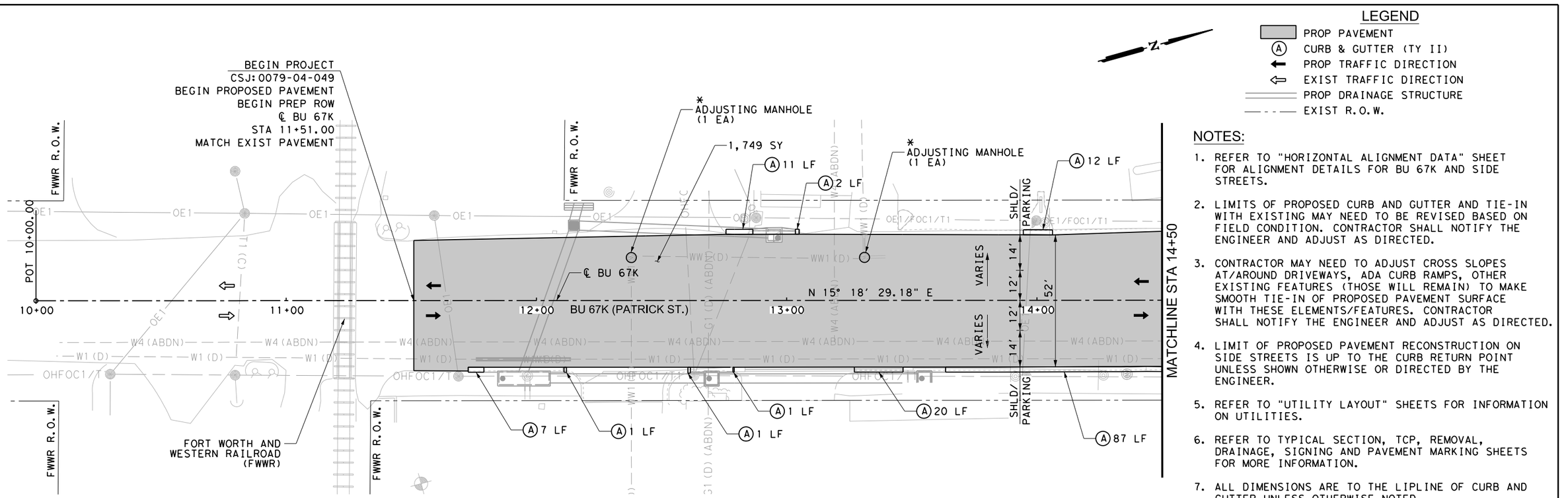


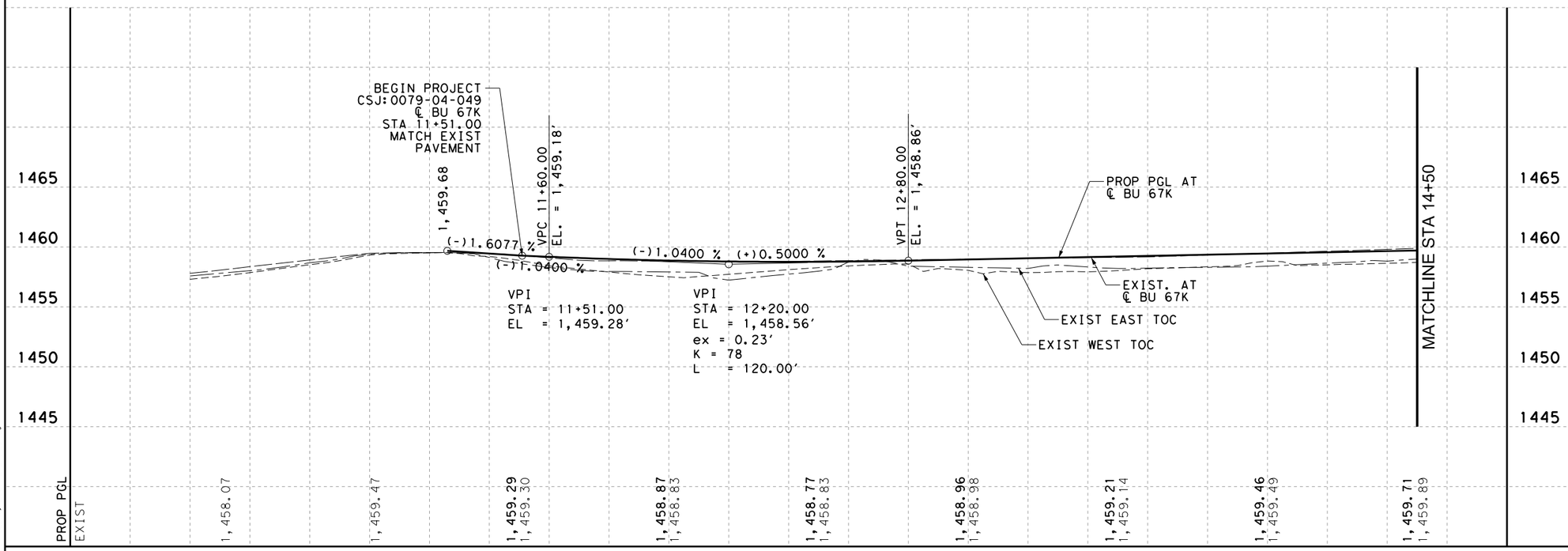
LEGEND

- PROP PAVEMENT
- (A) CURB & GUTTER (TY II)
- PROP TRAFFIC DIRECTION
- EXIST TRAFFIC DIRECTION
- PROP DRAINAGE STRUCTURE
- EXIST R.O.W.

NOTES:

1. REFER TO "HORIZONTAL ALIGNMENT DATA" SHEET FOR ALIGNMENT DETAILS FOR BU 67K AND SIDE STREETS.
2. LIMITS OF PROPOSED CURB AND GUTTER AND TIE-IN WITH EXISTING MAY NEED TO BE REVISED BASED ON FIELD CONDITION. CONTRACTOR SHALL NOTIFY THE ENGINEER AND ADJUST AS DIRECTED.
3. CONTRACTOR MAY NEED TO ADJUST CROSS SLOPES AT/AROUND DRIVEWAYS, ADA CURB RAMPS, OTHER EXISTING FEATURES (THOSE WILL REMAIN) TO MAKE SMOOTH TIE-IN OF PROPOSED PAVEMENT SURFACE WITH THESE ELEMENTS/FEATURES. CONTRACTOR SHALL NOTIFY THE ENGINEER AND ADJUST AS DIRECTED.
4. LIMIT OF PROPOSED PAVEMENT RECONSTRUCTION ON SIDE STREETS IS UP TO THE CURB RETURN POINT UNLESS SHOWN OTHERWISE OR DIRECTED BY THE ENGINEER.
5. REFER TO "UTILITY LAYOUT" SHEETS FOR INFORMATION ON UTILITIES.
6. REFER TO TYPICAL SECTION, TCP, REMOVAL, DRAINAGE, SIGNING AND PAVEMENT MARKING SHEETS FOR MORE INFORMATION.
7. ALL DIMENSIONS ARE TO THE LIPLINE OF CURB AND GUTTER UNLESS OTHERWISE NOTED.

* TO BE PAID BY ITEM 479-7001.



SCALE: 1" = 40' HORZ
1" = 10' VERT

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED PROFESSIONAL ENGINEER

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

ROADWAY PLAN & PROFILE

SHEET 1 OF 12

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	79
CONTROL	SECTION	JOB	
0079	04	049	

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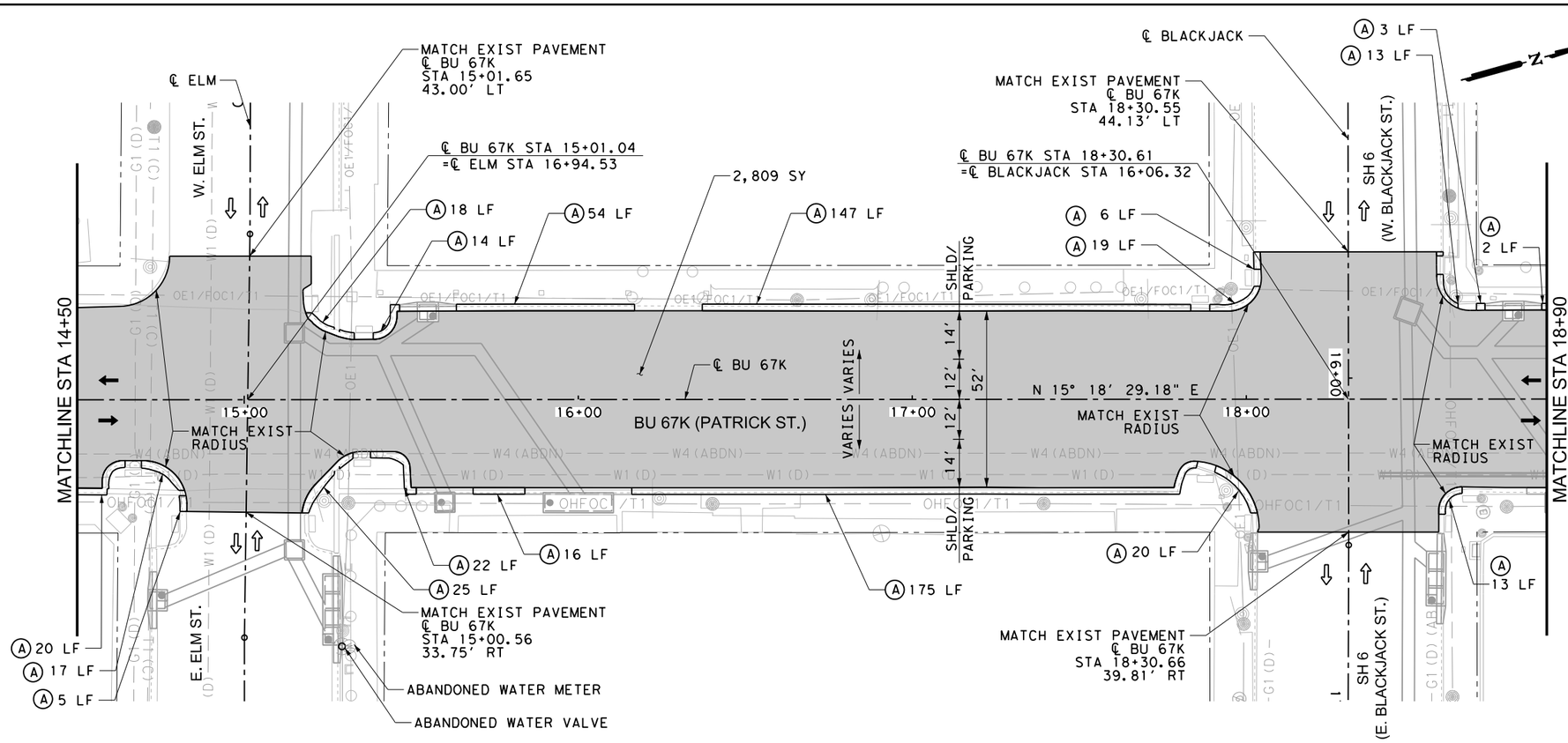

LEGEND

- PROP PAVEMENT
- (A) CURB & GUTTER (TY II)
- PROP TRAFFIC DIRECTION
- EXIST TRAFFIC DIRECTION
- PROP DRAINAGE STRUCTURE
- EXIST R.O.W.

NOTES:

1. REFER TO "HORIZONTAL ALIGNMENT DATA" SHEET FOR ALIGNMENT DETAILS FOR BU 67K AND SIDE STREETS.
2. LIMITS OF PROPOSED CURB AND GUTTER AND TIE-IN WITH EXISTING MAY NEED TO BE REVISED BASED ON FIELD CONDITION. CONTRACTOR SHALL NOTIFY THE ENGINEER AND ADJUST AS DIRECTED.
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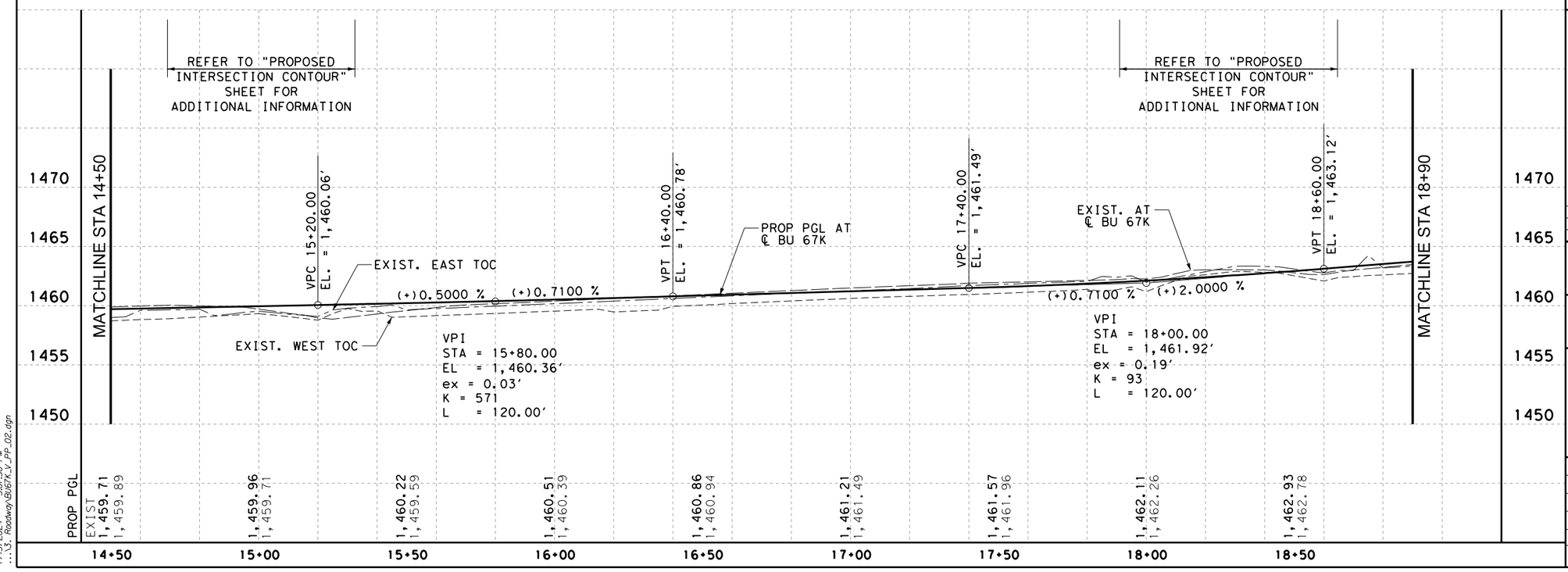

0 20' 40'

SCALE: 1" = 40' HORZ
1" = 10' VERT

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED PROFESSIONAL ENGINEER

Abulkhair M. Zobayed

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

ROADWAY PLAN & PROFILE

SHEET 2 OF 12

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	
CONTROL	SECTION	JOB	80
0079	04	049	

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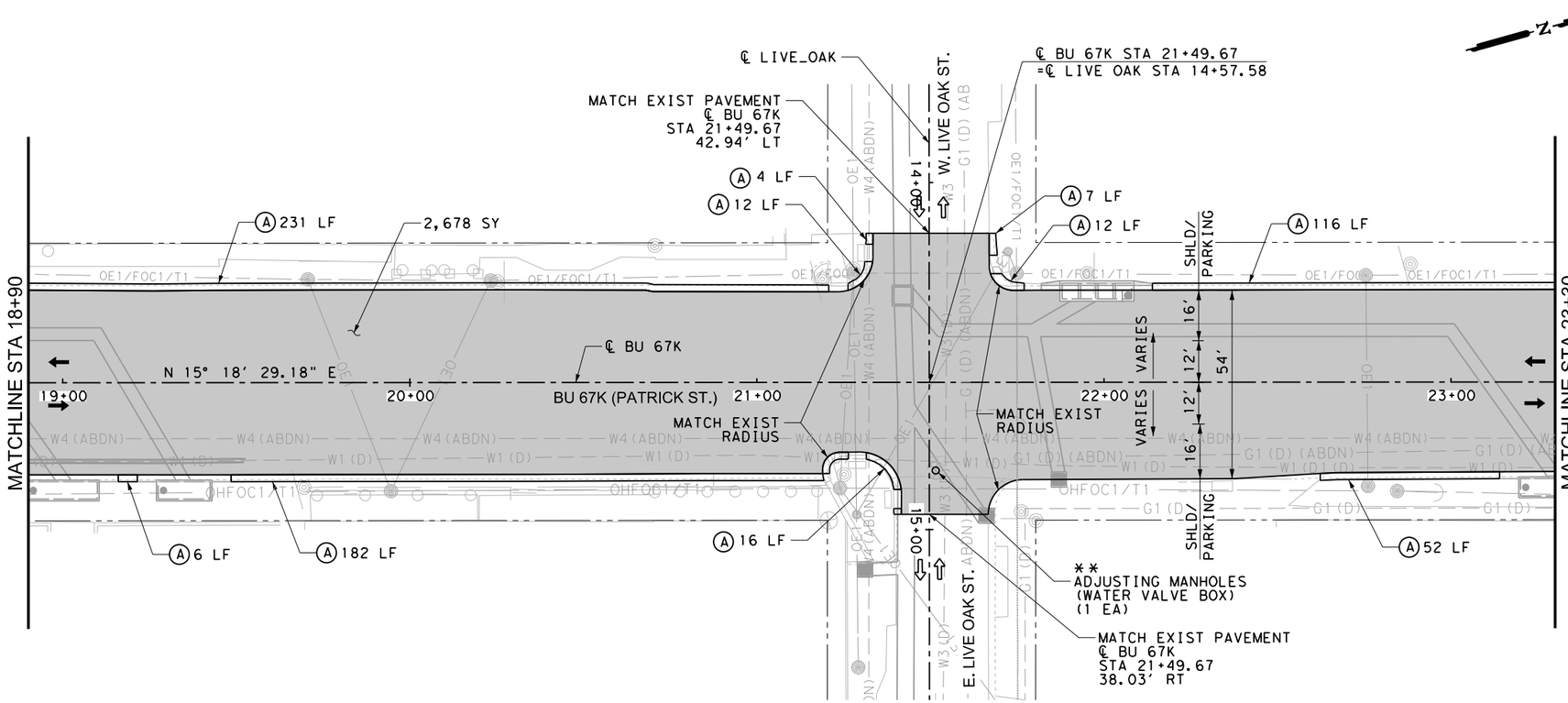

LEGEND

- PROP PAVEMENT
- (A) CURB & GUTTER (TY II)
- PROP TRAFFIC DIRECTION
- EXIST TRAFFIC DIRECTION
- PROP DRAINAGE STRUCTURE
- EXIST R.O.W.

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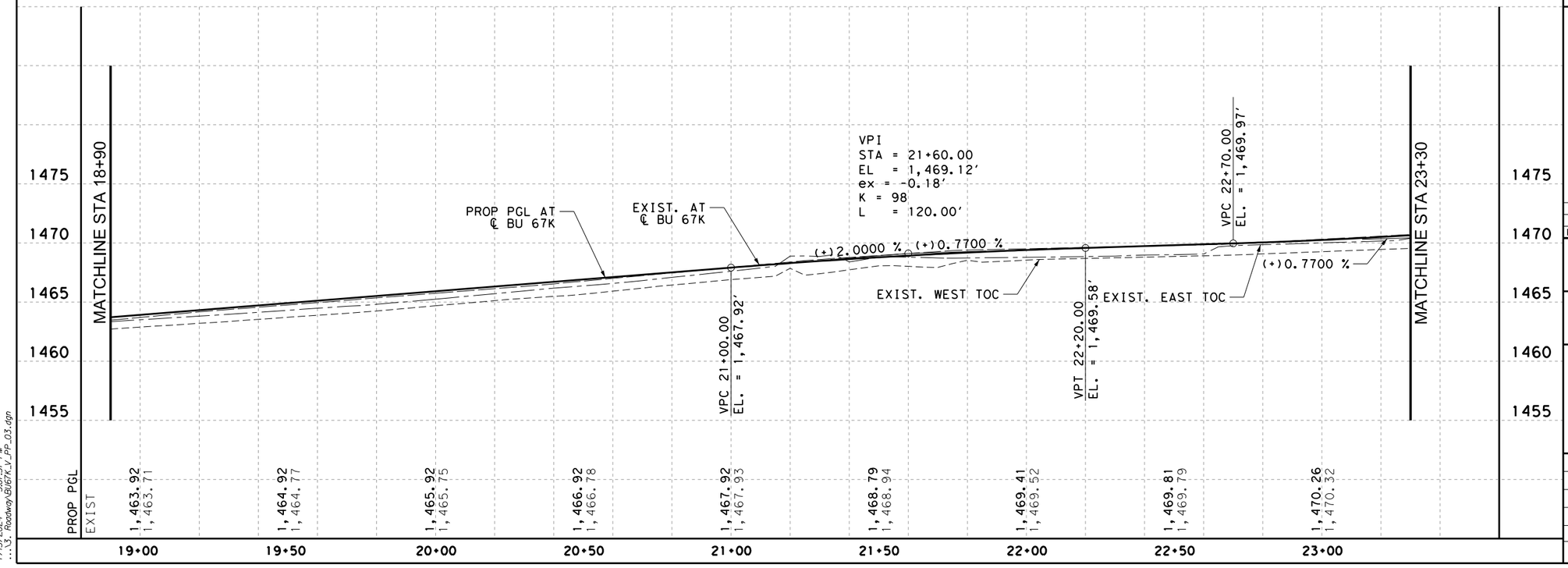
** TO BE PAID BY ITEM 479-7004.



0 20' 40'
SCALE: 1" = 40' HORZ
1" = 10' VERT

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED PROFESSIONAL ENGINEER
7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

ROADWAY
PLAN & PROFILE

SHEET 3 OF 12

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	81
CONTROL	SECTION	JOB	
0079	04	049	

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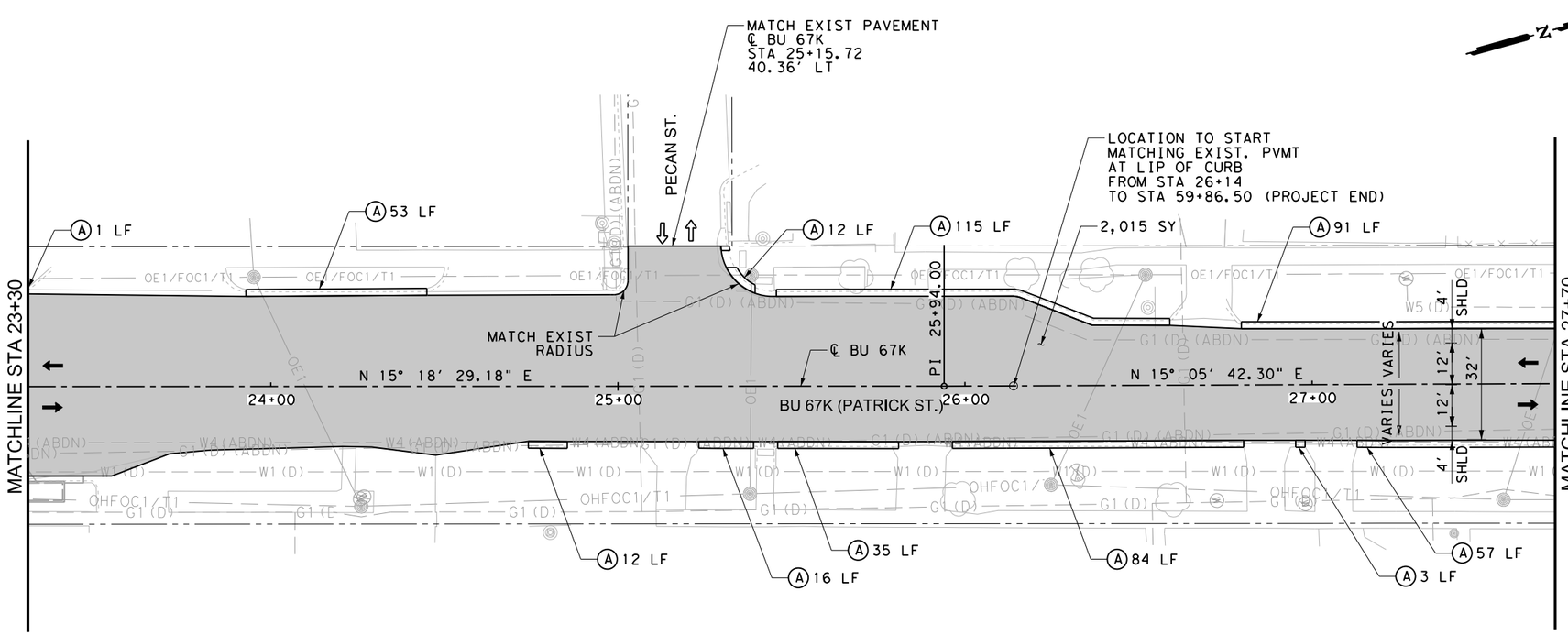

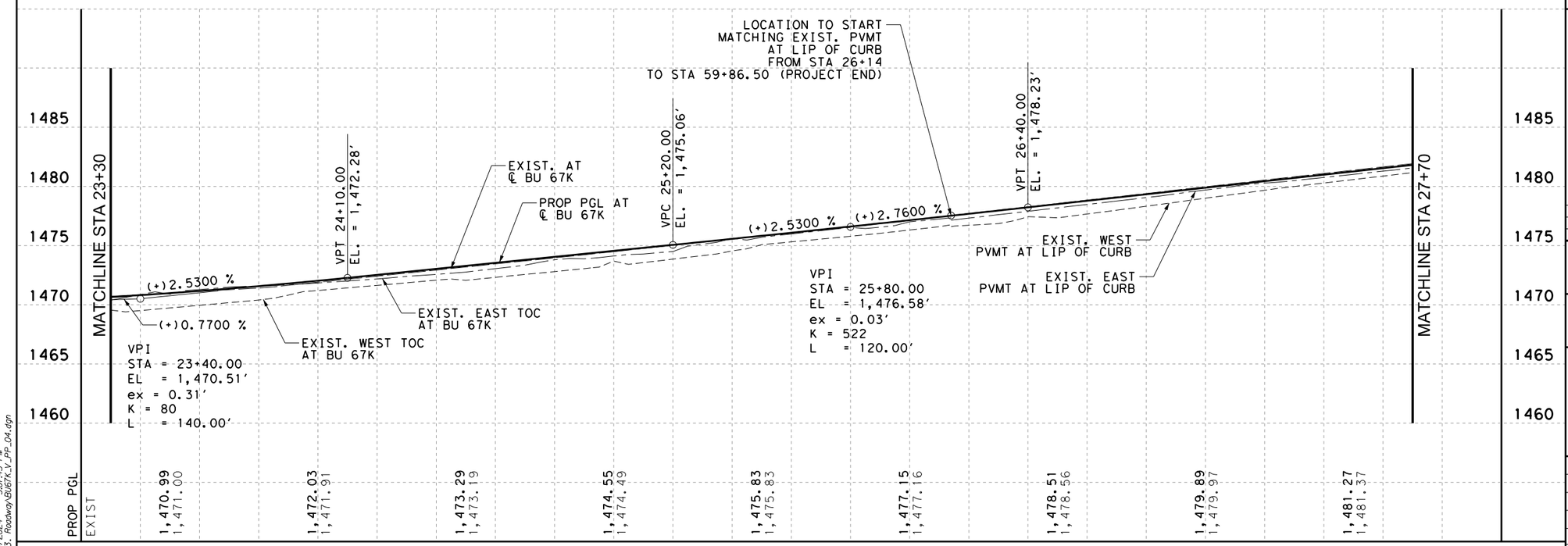

LEGEND

- PROP PAVEMENT
- (A) CURB & GUTTER (TY II)
- PROP TRAFFIC DIRECTION
- EXIST TRAFFIC DIRECTION
- PROP DRAINAGE STRUCTURE
- EXIST R.O.W.

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0 20' 40'
SCALE: 1" = 40' HORZ
1" = 10' VERT

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED
PROFESSIONAL ENGINEER
7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

BU 67K

ROADWAY
PLAN & PROFILE

SHEET 4 OF 12

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	82
CONTROL	SECTION	JOB	
0079	04	049	

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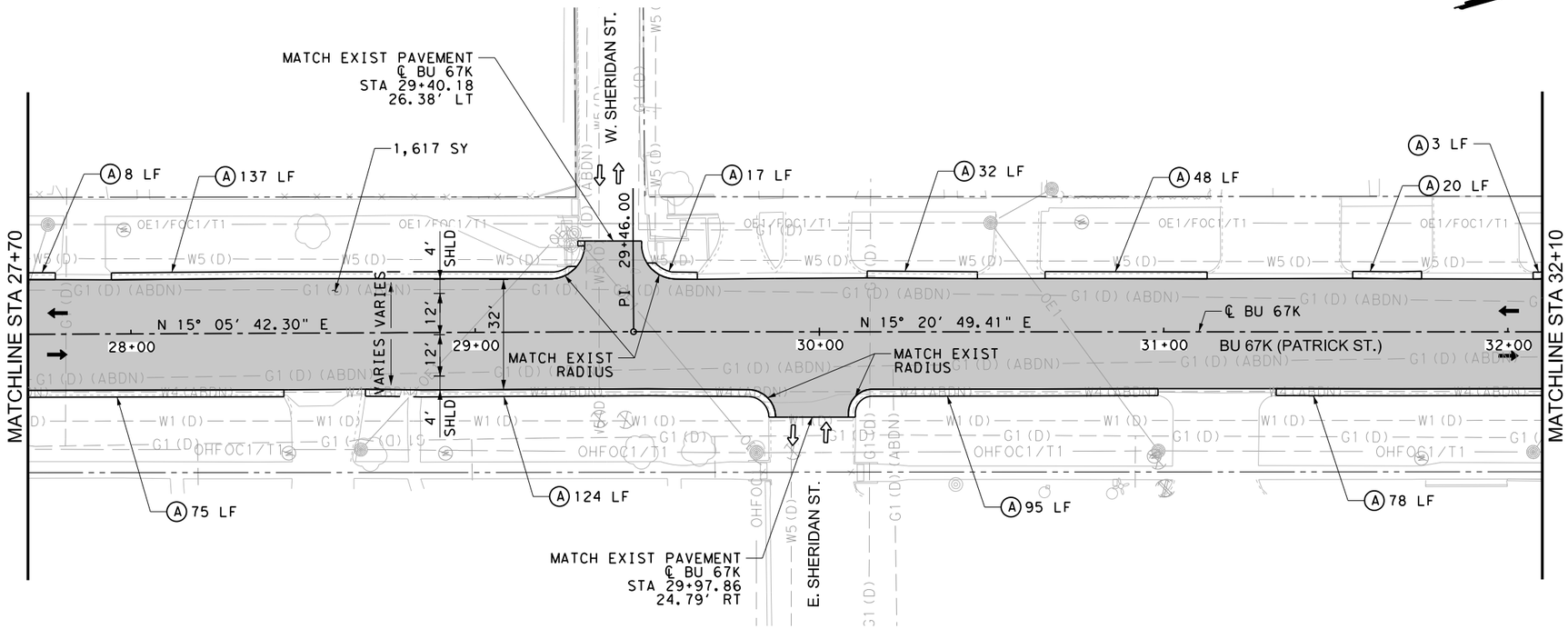

LEGEND

- PROP PAVEMENT
- (A) CURB & GUTTER (TY II)
- PROP TRAFFIC DIRECTION
- EXIST TRAFFIC DIRECTION
- PROP DRAINAGE STRUCTURE
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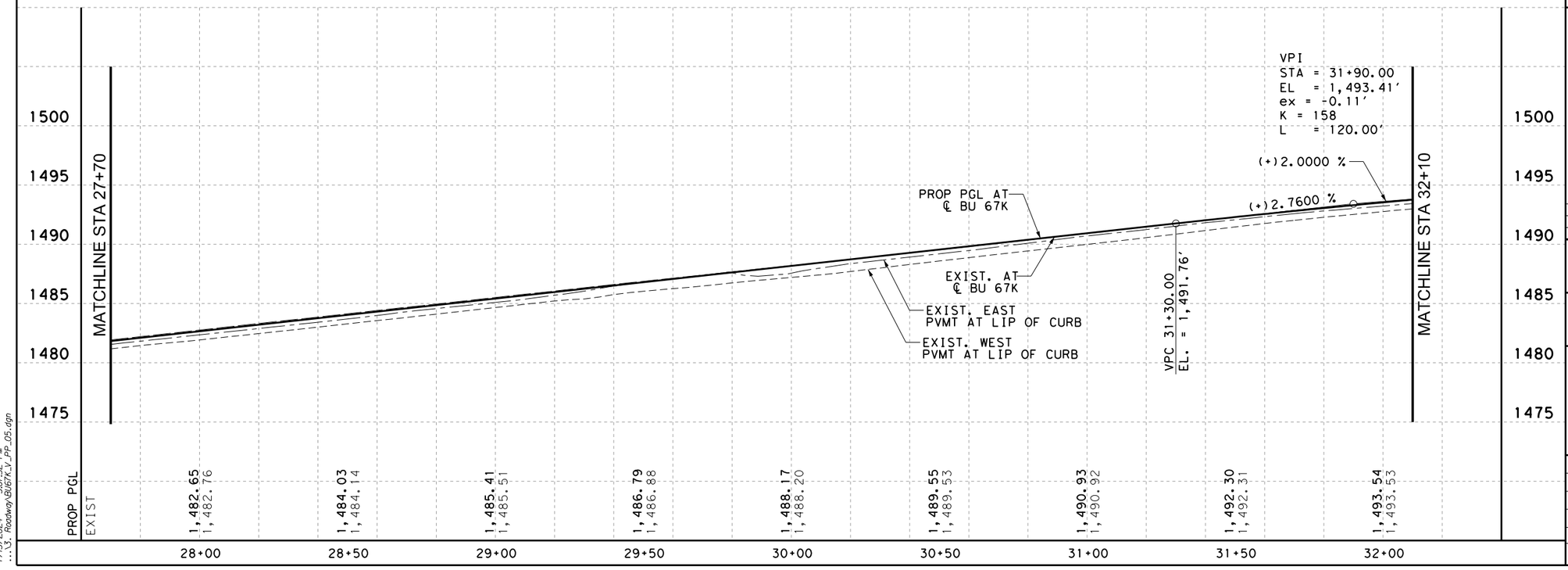

SCALE: 1" = 40' HORZ
1" = 10' VERT

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED
PROFESSIONAL ENGINEER
7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

ROADWAY
PLAN & PROFILE

SHEET 5 OF 12

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	83
CONTROL	SECTION	JOB	
0079	04	049	

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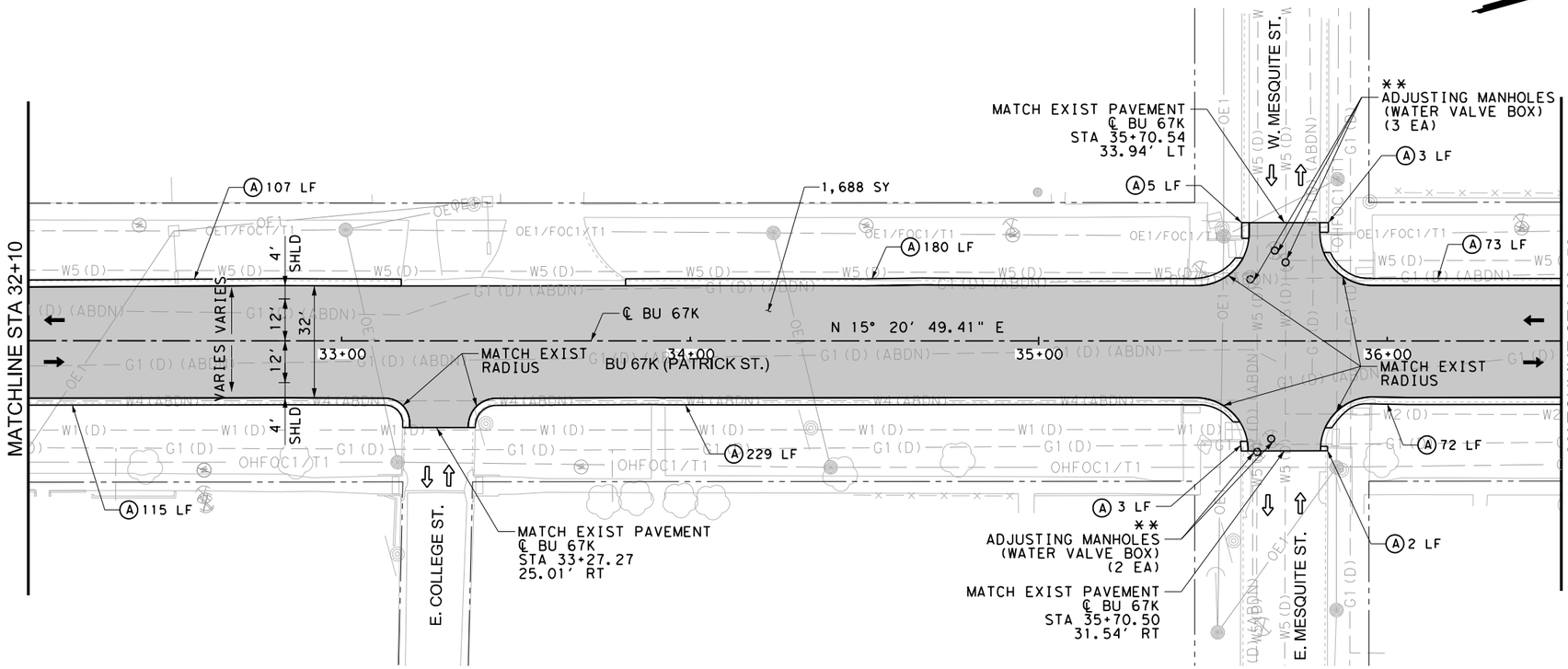

LEGEND

- PROP PAVEMENT
- (A) CURB & GUTTER (TY II)
- PROP TRAFFIC DIRECTION
- EXIST TRAFFIC DIRECTION
- PROP DRAINAGE STRUCTURE
- EXIST R.O.W.

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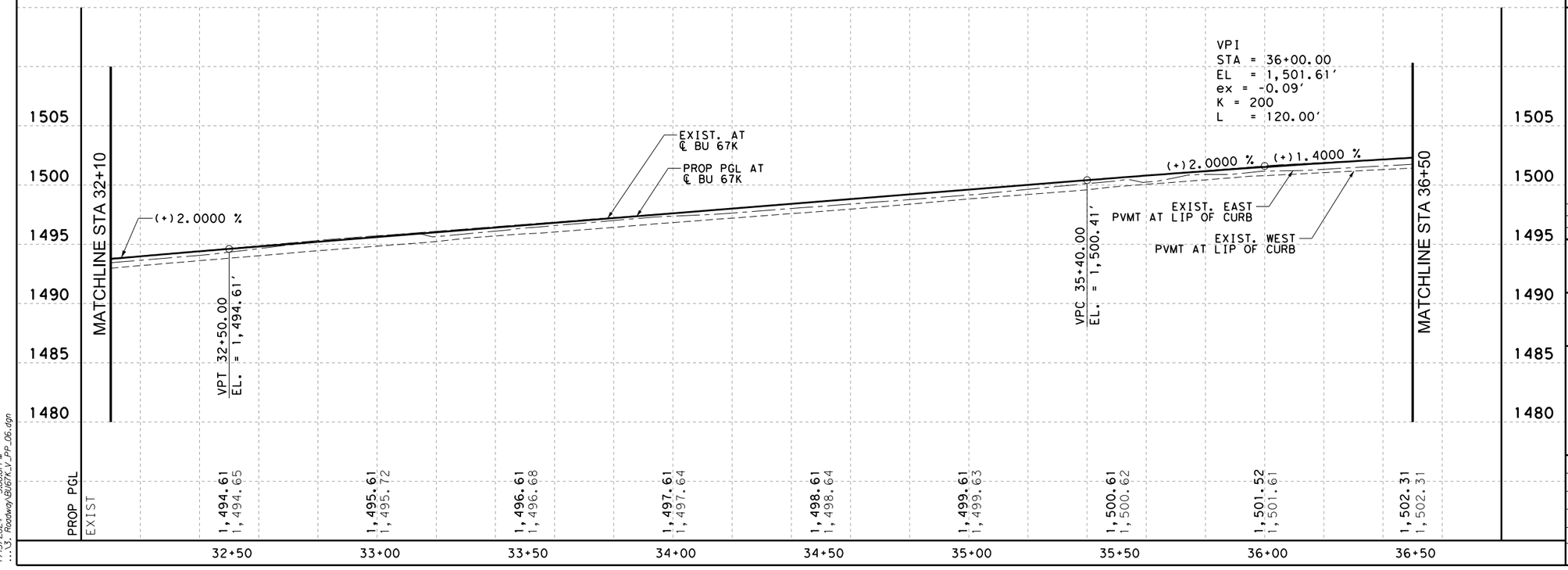
** TO BE PAID BY ITEM 479-7004.



SCALE: 1" = 40' HORZ
1" = 10' VERT

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED PROFESSIONAL ENGINEER

Abulkhair M. Zobayed

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

ROADWAY PLAN & PROFILE

SHEET 6 OF 12

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	84
CONTROL	SECTION	JOB	
0079	04	049	

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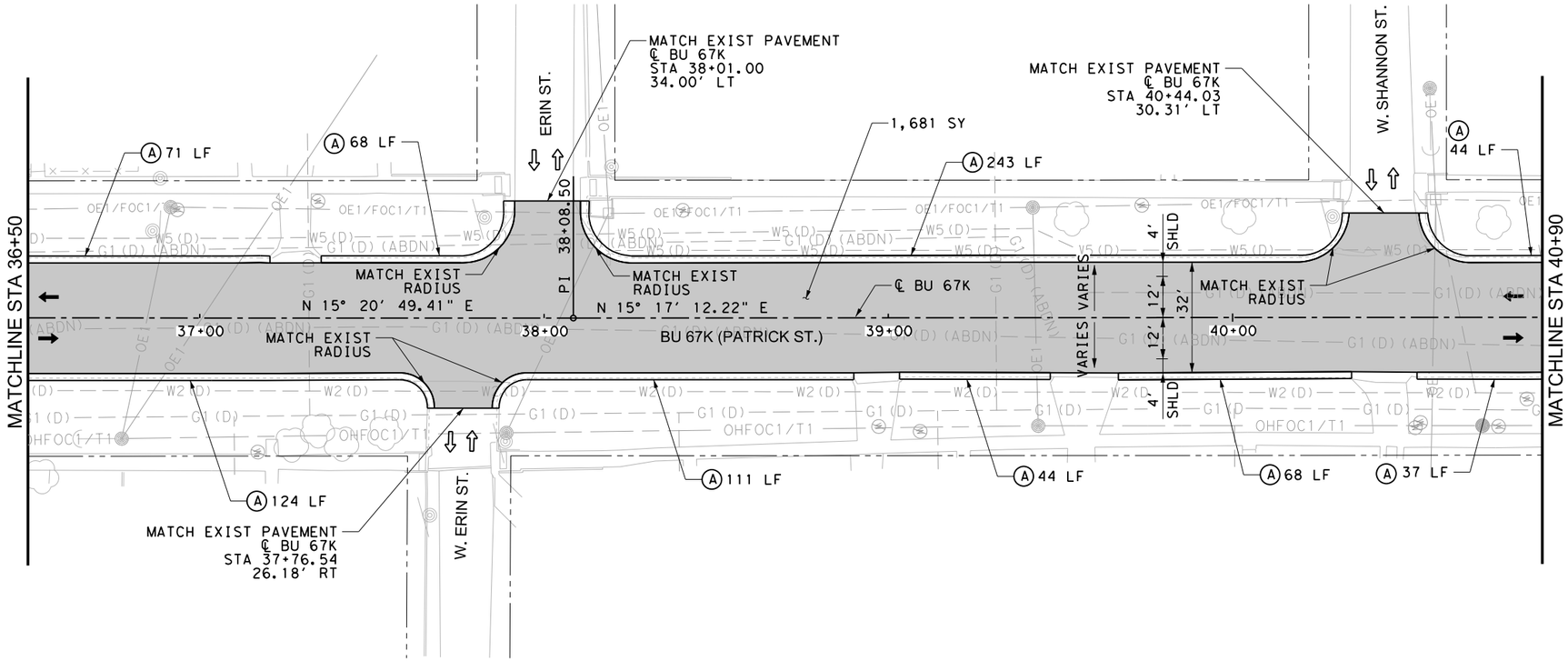

LEGEND

- PROP PAVEMENT
- (A) CURB & GUTTER (TY II)
- PROP TRAFFIC DIRECTION
- EXIST TRAFFIC DIRECTION
- PROP DRAINAGE STRUCTURE
- EXIST R.O.W.

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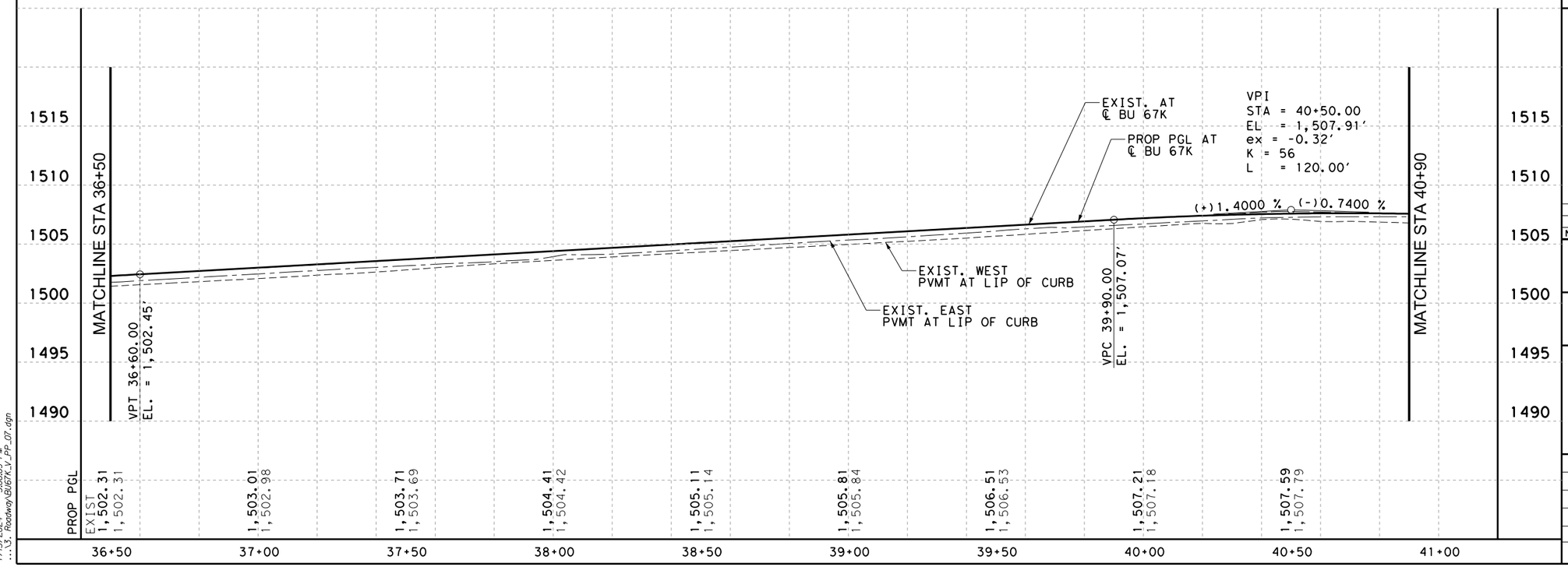

0 20' 40'

SCALE: 1" = 40' HORZ
1" = 10' VERT

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED PROFESSIONAL ENGINEER

Abulkhair M. Zobayed

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

ROADWAY
PLAN & PROFILE

SHEET 7 OF 12

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	85
CONTROL	SECTION	JOB	
0079	04	049	

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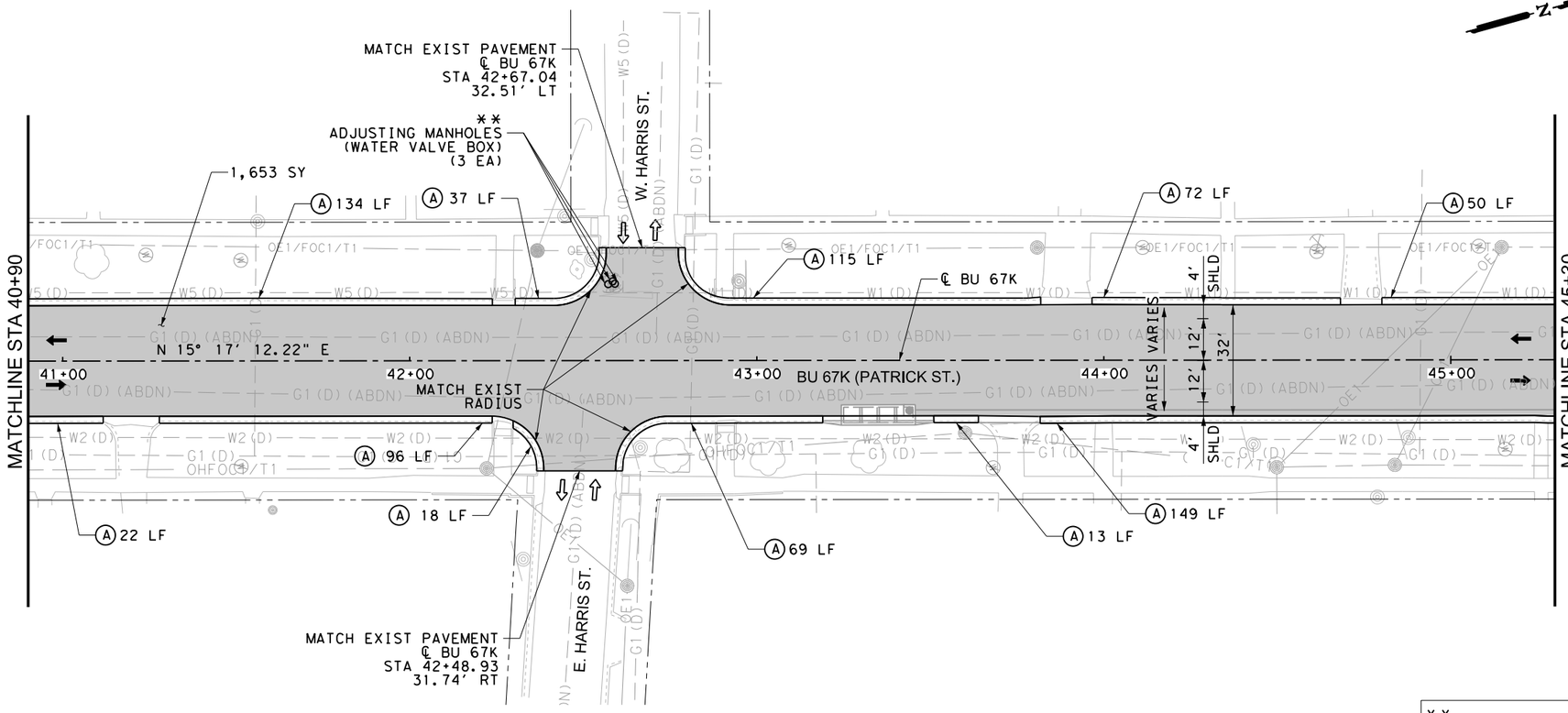

LEGEND

- PROP PAVEMENT
- (A) CURB & GUTTER (TY II)
- PROP TRAFFIC DIRECTION
- EXIST TRAFFIC DIRECTION
- PROP DRAINAGE STRUCTURE
- EXIST R.O.W.

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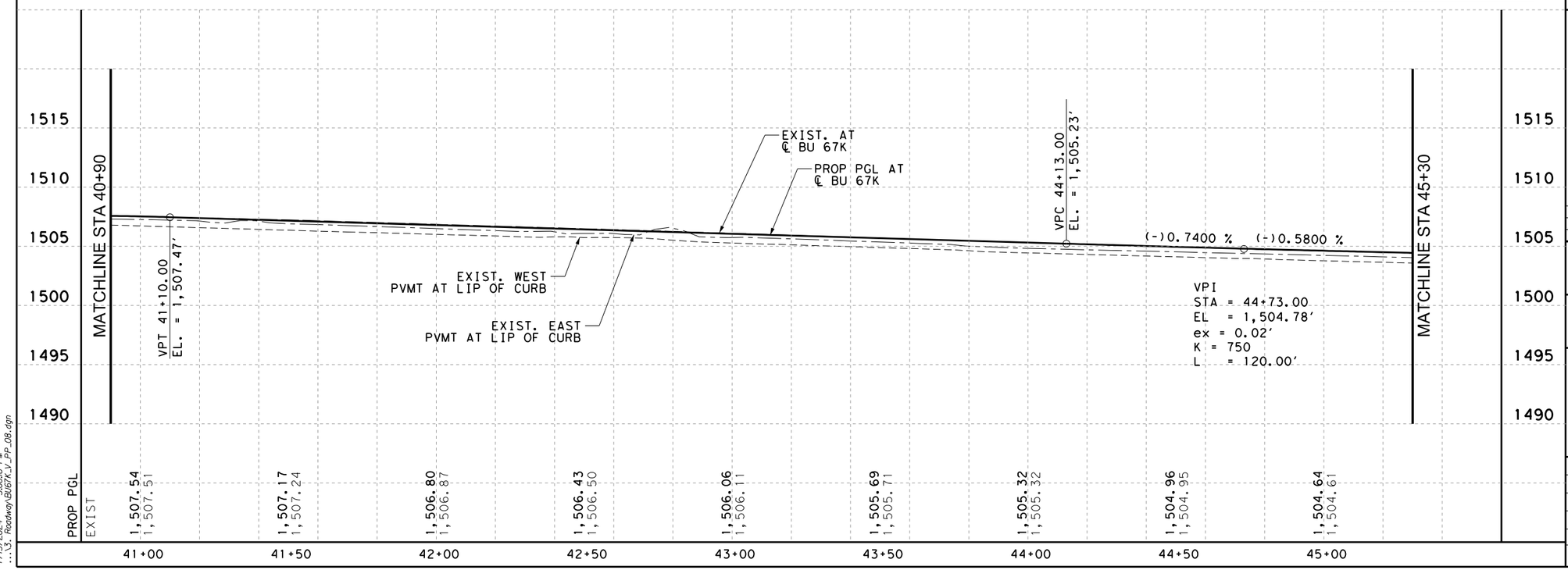

0 20' 40'
SCALE: 1" = 40' HORZ
1" = 10' VERT

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED PROFESSIONAL ENGINEER
Abulkhair M. Zobayed
7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

ROADWAY
PLAN & PROFILE

SHEET 8 OF 12

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	86
CONTROL	SECTION	JOB	
0079	04	049	

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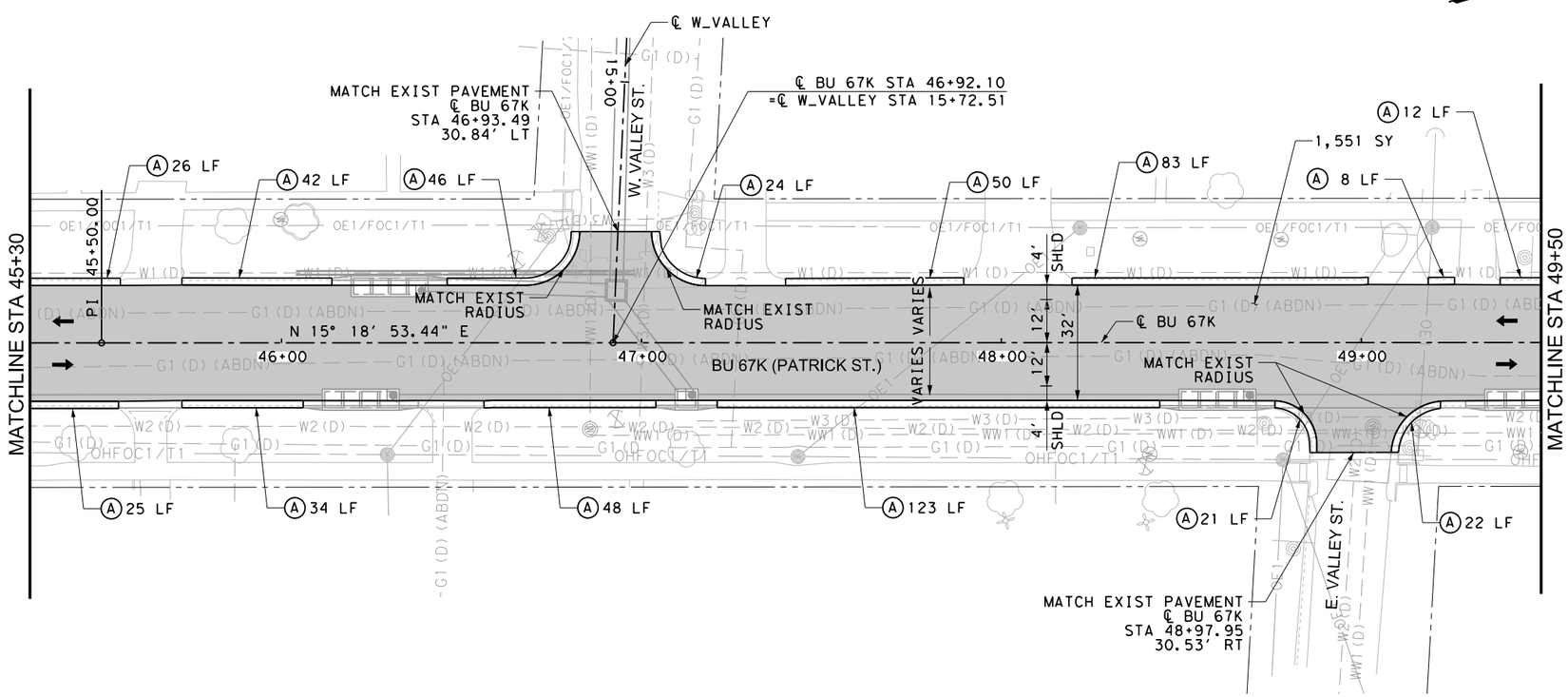

LEGEND

- PROP PAVEMENT
- (A) CURB & GUTTER (TY II)
- PROP TRAFFIC DIRECTION
- EXIST TRAFFIC DIRECTION
- PROP DRAINAGE STRUCTURE
- EXIST R.O.W.

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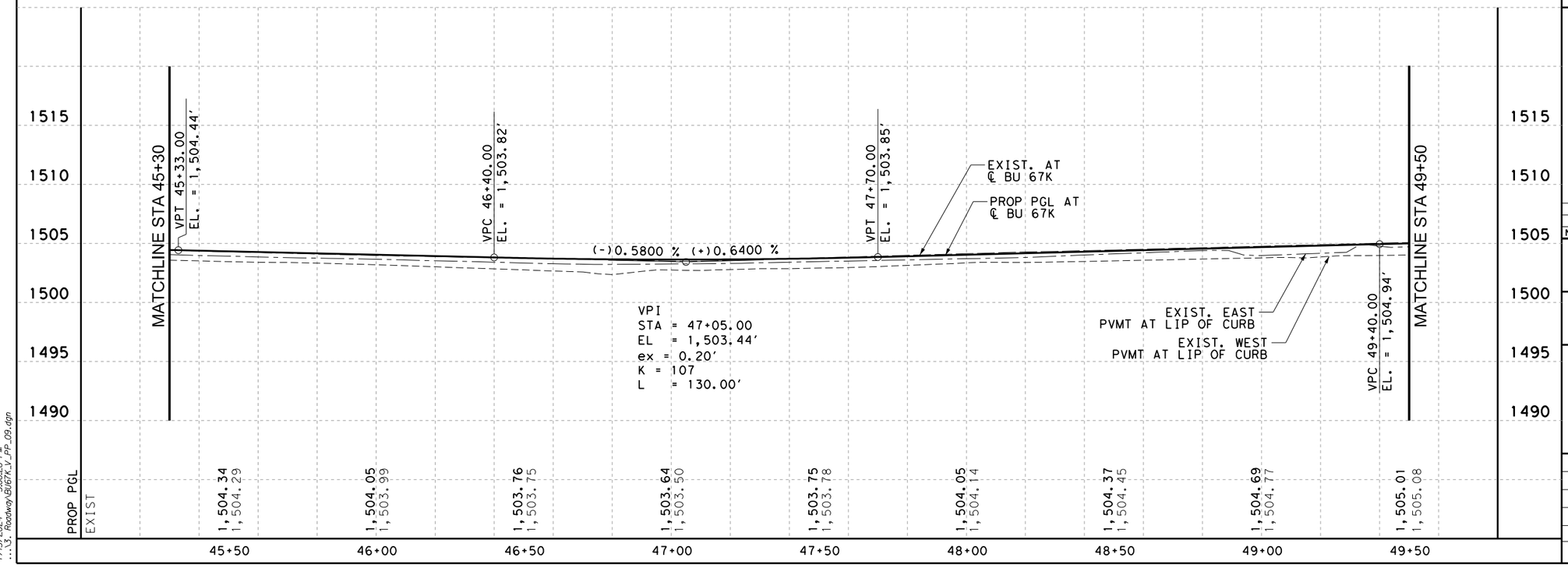

0 20' 40'

SCALE: 1" = 40' HORZ
1" = 10' VERT

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED PROFESSIONAL ENGINEER

Abulkhair M. Zobayed

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation
© 2024

BU 67K

ROADWAY
PLAN & PROFILE

SHEET 9 OF 12

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	87
CONTROL	SECTION	JOB	
0079	04	049	

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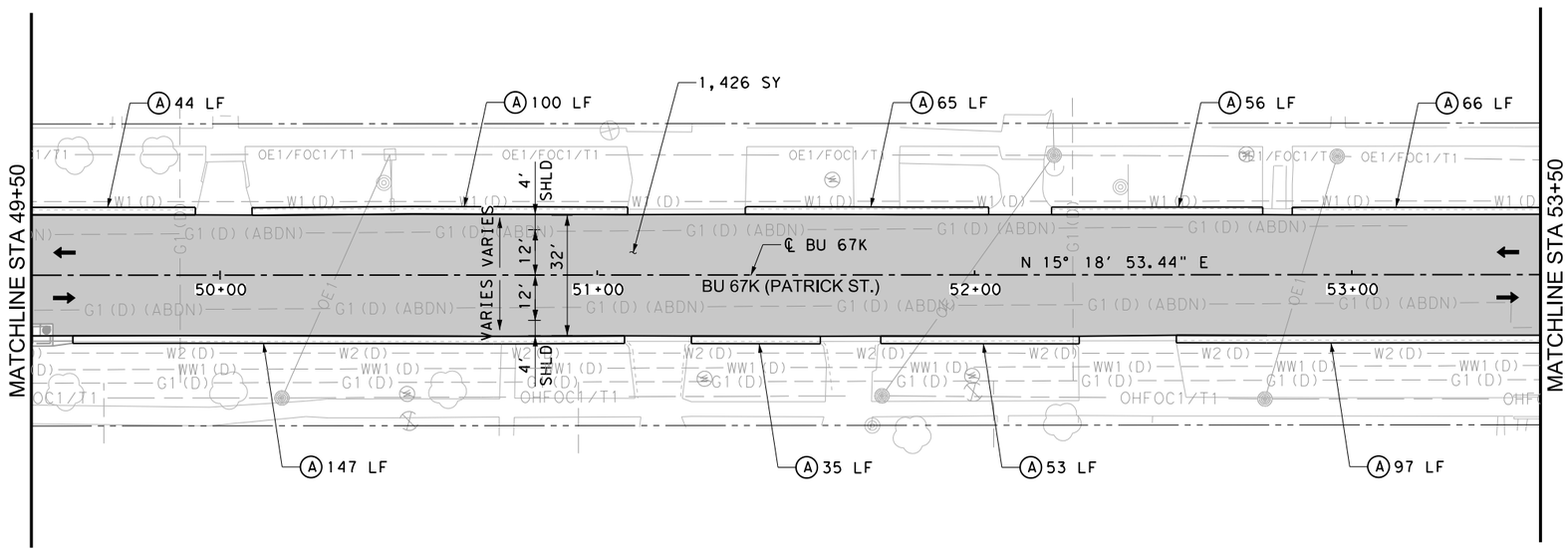
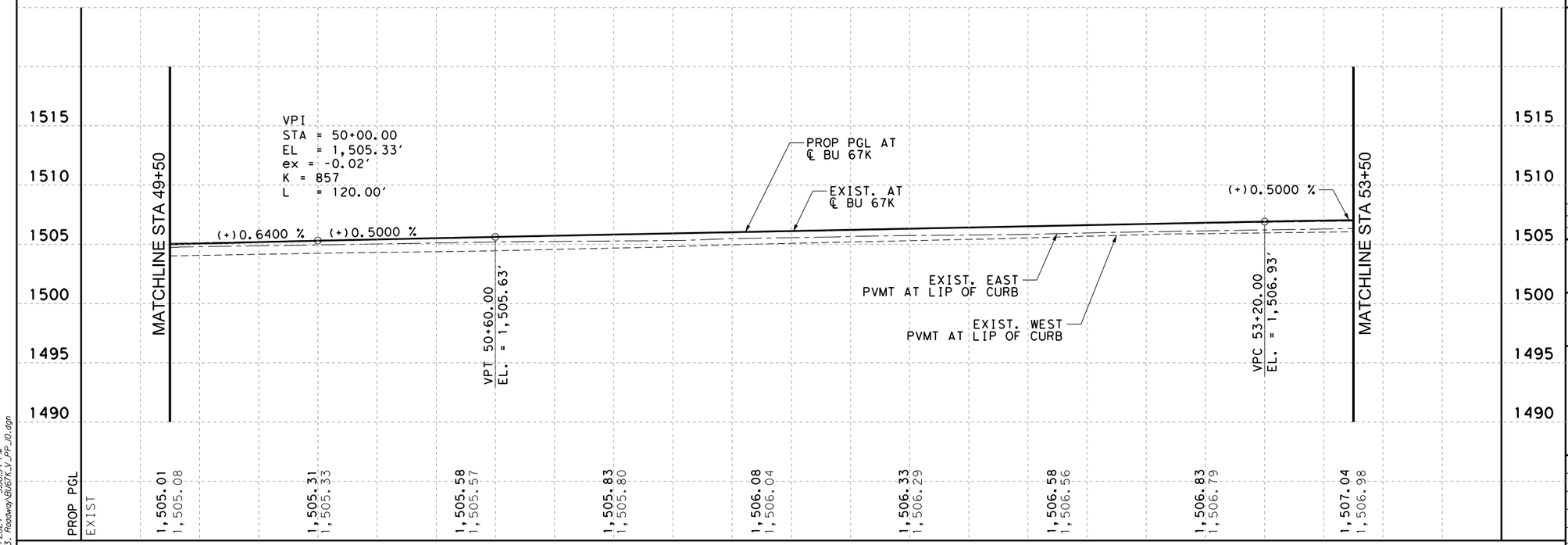


LEGEND

- PROP PAVEMENT
- (A) CURB & GUTTER (TY II)
- PROP TRAFFIC DIRECTION
- EXIST TRAFFIC DIRECTION
- PROP DRAINAGE STRUCTURE
- EXIST R.O.W.

NOTES:

1. REFER TO "HORIZONTAL ALIGNMENT DATA" SHEET FOR ALIGNMENT DETAILS FOR BU 67K AND SIDE STREETS.
2. LIMITS OF PROPOSED CURB AND GUTTER AND TIE-IN WITH EXISTING MAY NEED TO BE REVISED BASED ON FIELD CONDITION. CONTRACTOR SHALL NOTIFY THE ENGINEER AND ADJUST AS DIRECTED.
3. CONTRACTOR MAY NEED TO ADJUST CROSS SLOPES AT/AROUND DRIVEWAYS, ADA CURB RAMPS, OTHER EXISTING FEATURES (THOSE WILL REMAIN) TO MAKE SMOOTH TIE-IN OF PROPOSED PAVEMENT SURFACE WITH THESE ELEMENTS/FEATURES. CONTRACTOR SHALL NOTIFY THE ENGINEER AND ADJUST AS DIRECTED.
4. LIMIT OF PROPOSED PAVEMENT RECONSTRUCTION ON SIDE STREETS IS UP TO THE CURB RETURN POINT UNLESS SHOWN OTHERWISE OR DIRECTED BY THE ENGINEER.
5. REFER TO "UTILITY LAYOUT" SHEETS FOR INFORMATION ON UTILITIES.
6. REFER TO TYPICAL SECTION, TCP, REMOVAL, DRAINAGE, SIGNING AND PAVEMENT MARKING SHEETS FOR MORE INFORMATION.
7. ALL DIMENSIONS ARE TO THE LIPLINE OF CURB AND GUTTER UNLESS OTHERWISE NOTED.



0 20' 40'

SCALE: 1" = 40' HORZ
1" = 10' VERT

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED
PROFESSIONAL ENGINEER

Abulkhair M. Zobayed

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

ROADWAY
PLAN & PROFILE

SHEET 10 OF 12

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	88
CONTROL	SECTION	JOB	
0079	04	049	

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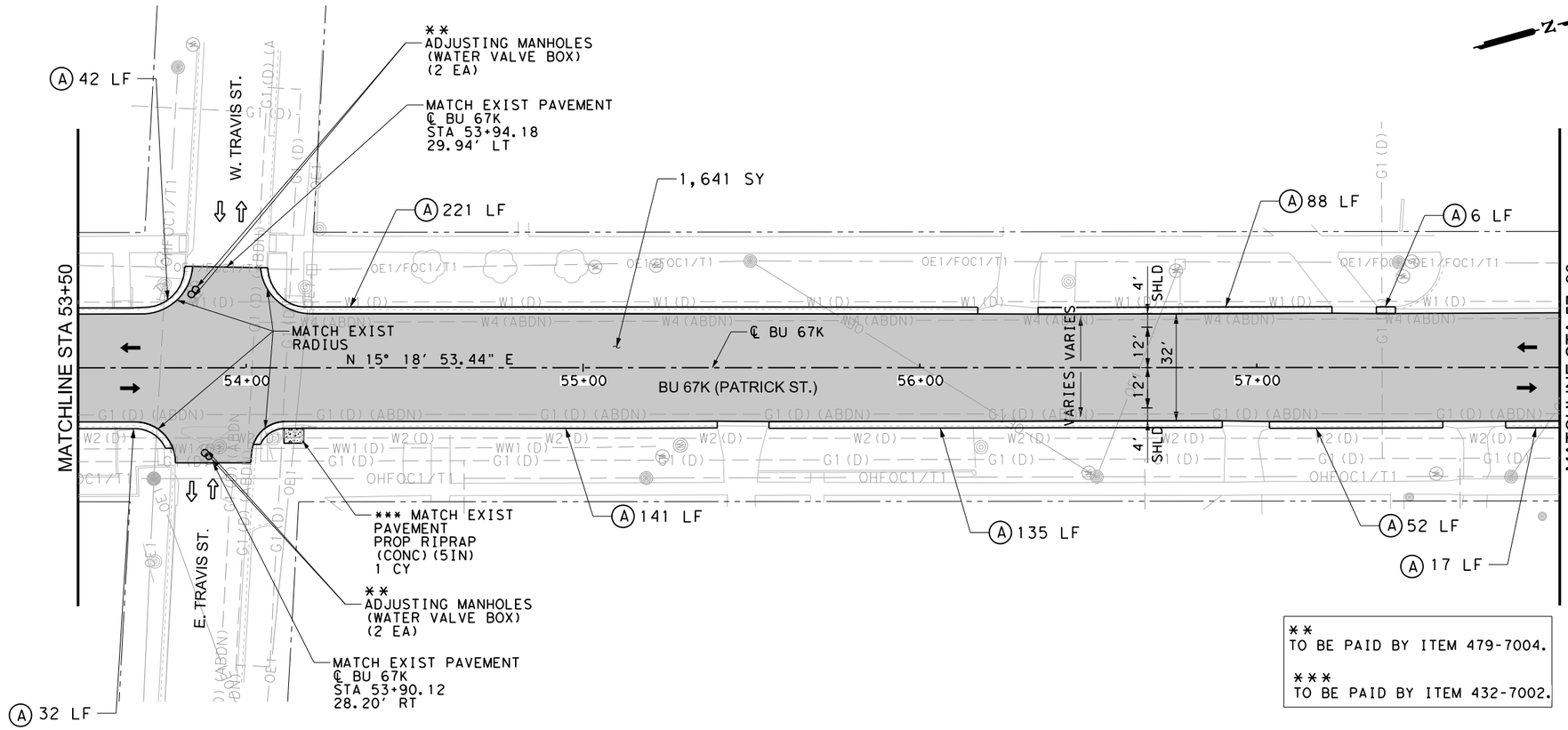


** TO BE PAID BY ITEM 479-7004.

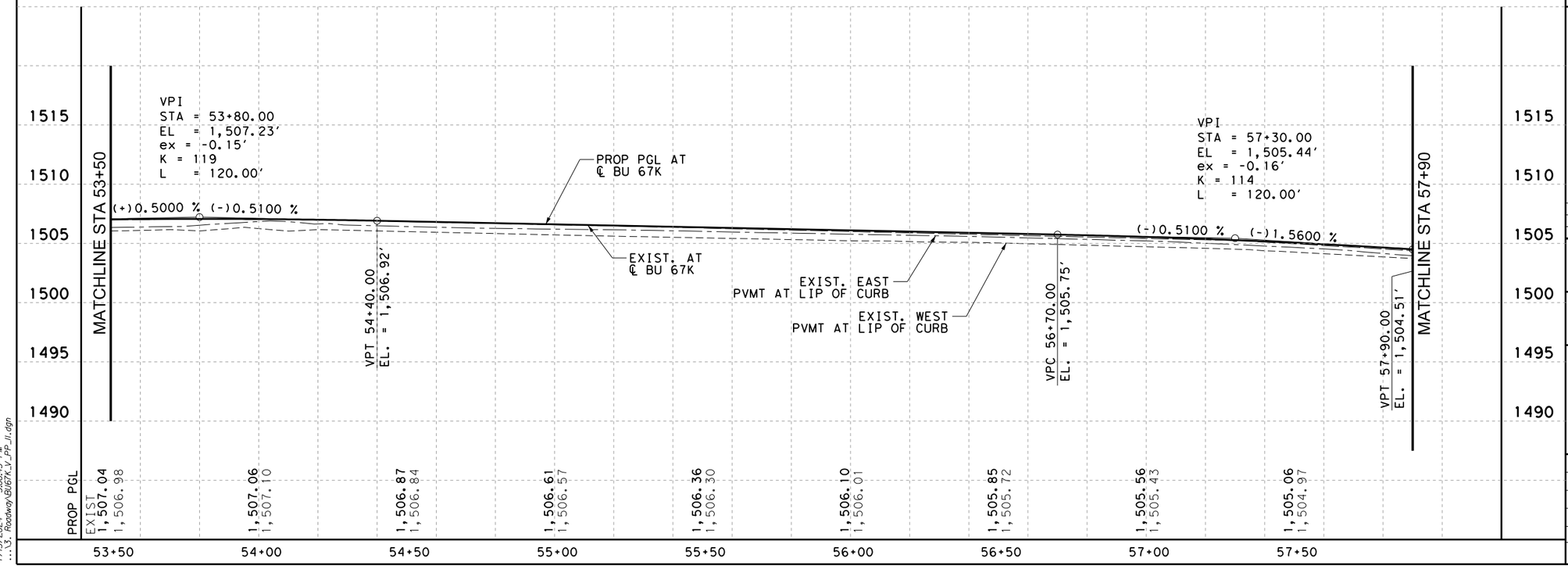
*** TO BE PAID BY ITEM 432-7002.

LEGEND

- PROP PAVEMENT
- (A) CURB & GUTTER (TY II)
- PROP TRAFFIC DIRECTION
- EXIST TRAFFIC DIRECTION
- PROP DRAINAGE STRUCTURE
- EXIST R.O.W.

NOTES:

1. REFER TO "HORIZONTAL ALIGNMENT DATA" SHEET FOR ALIGNMENT DETAILS FOR BU 67K AND SIDE STREETS.
2. LIMITS OF PROPOSED CURB AND GUTTER AND TIE-IN WITH EXISTING MAY NEED TO BE REVISED BASED ON FIELD CONDITION. CONTRACTOR SHALL NOTIFY THE ENGINEER AND ADJUST AS DIRECTED.
3. CONTRACTOR MAY NEED TO ADJUST CROSS SLOPES AT/AROUND DRIVEWAYS, ADA CURB RAMPS, OTHER EXISTING FEATURES (THOSE WILL REMAIN) TO MAKE SMOOTH TIE-IN OF PROPOSED PAVEMENT SURFACE WITH THESE ELEMENTS/FEATURES. CONTRACTOR SHALL NOTIFY THE ENGINEER AND ADJUST AS DIRECTED.
4. LIMIT OF PROPOSED PAVEMENT RECONSTRUCTION ON SIDE STREETS IS UP TO THE CURB RETURN POINT UNLESS SHOWN OTHERWISE OR DIRECTED BY THE ENGINEER.
5. REFER TO "UTILITY LAYOUT" SHEETS FOR INFORMATION ON UTILITIES.
6. REFER TO TYPICAL SECTION, TCP, REMOVAL, DRAINAGE, SIGNING AND PAVEMENT MARKING SHEETS FOR MORE INFORMATION.
7. ALL DIMENSIONS ARE TO THE LIPLINE OF CURB AND GUTTER UNLESS OTHERWISE NOTED.



0 20' 40'

SCALE: 1" = 40' HORZ
1" = 10' VERT

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED PROFESSIONAL ENGINEER

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

ROADWAY
PLAN & PROFILE

SHEET 11 OF 12

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	89
CONTROL	SECTION	JOB	
0079	04	049	

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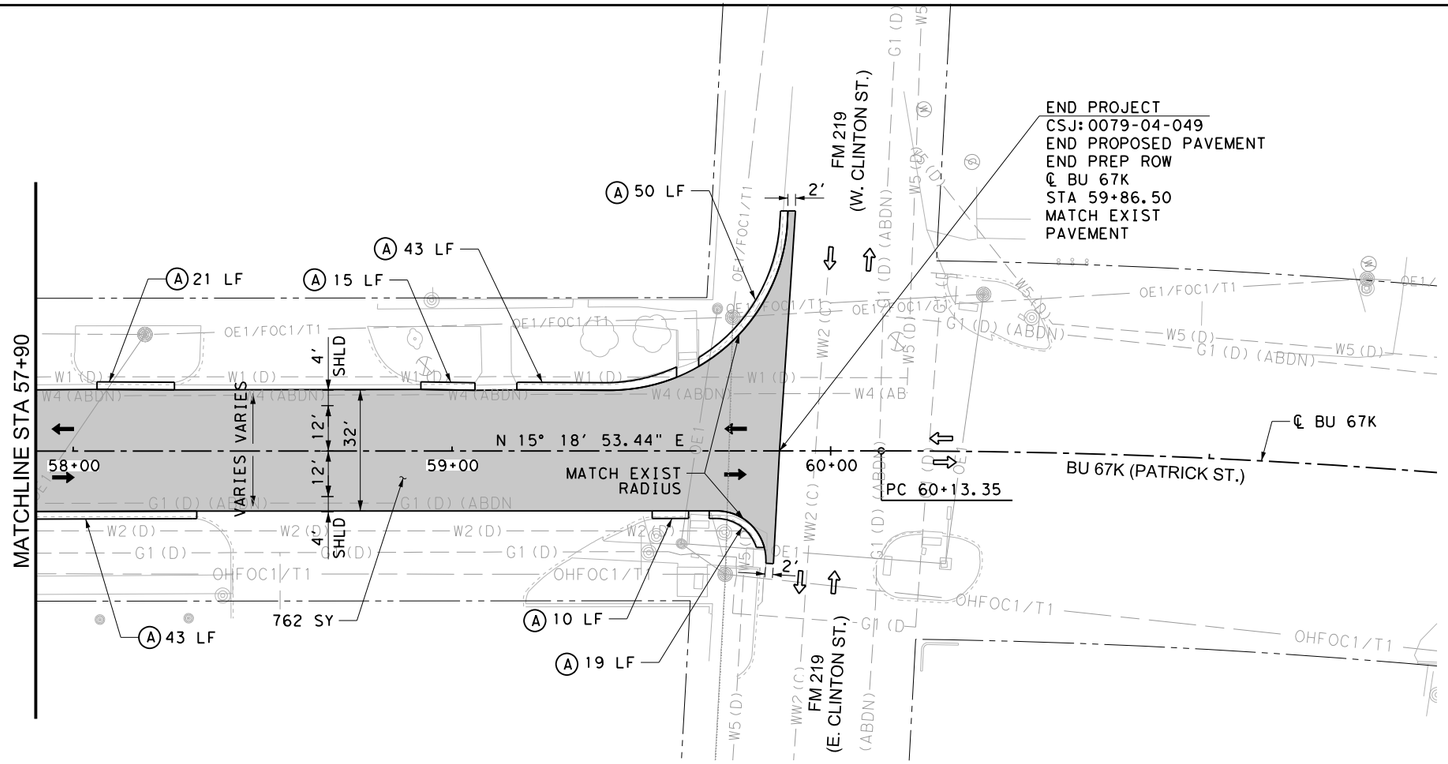

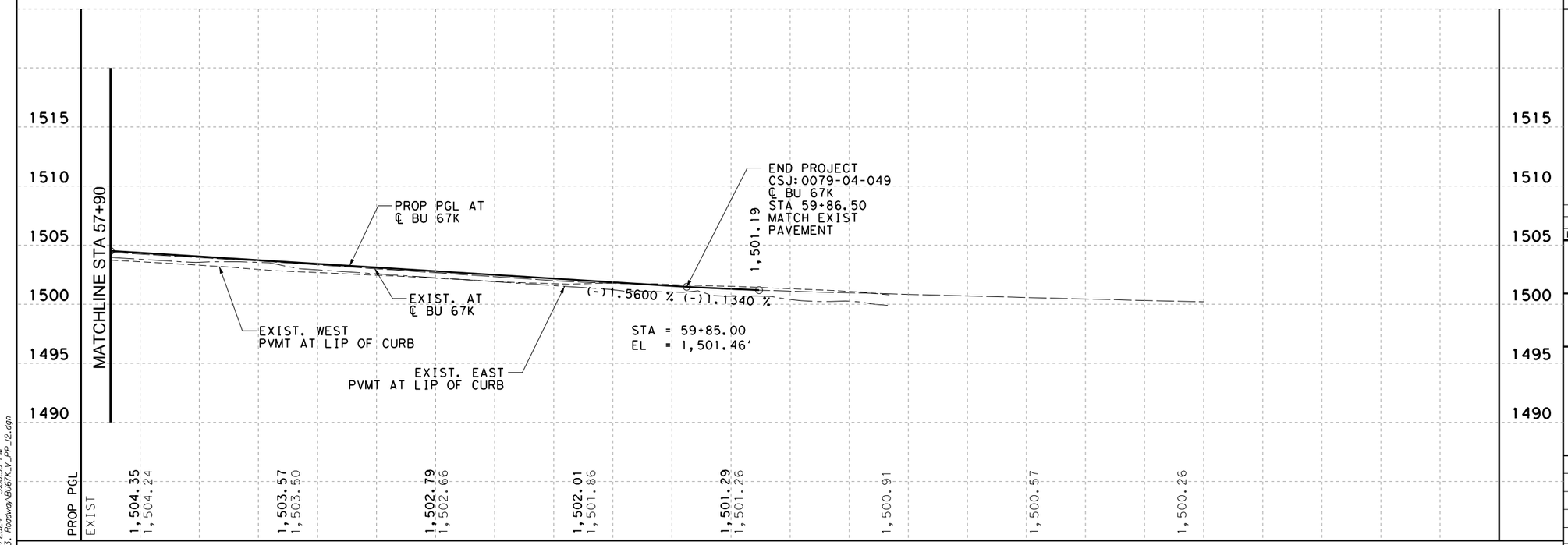

LEGEND

- PROP PAVEMENT
- (A) CURB & GUTTER (TY II)
- PROP TRAFFIC DIRECTION
- EXIST TRAFFIC DIRECTION
- PROP DRAINAGE STRUCTURE
- EXIST R.O.W.

NOTES:

1. REFER TO "HORIZONTAL ALIGNMENT DATA" SHEET FOR ALIGNMENT DETAILS FOR BU 67K AND SIDE STREETS.
2. LIMITS OF PROPOSED CURB AND GUTTER AND TIE-IN WITH EXISTING MAY NEED TO BE REVISED BASED ON FIELD CONDITION. CONTRACTOR SHALL NOTIFY THE ENGINEER AND ADJUST AS DIRECTED.
3. CONTRACTOR MAY NEED TO ADJUST CROSS SLOPES AT/AROUND DRIVEWAYS, ADA CURB RAMPS, OTHER EXISTING FEATURES (THOSE WILL REMAIN) TO MAKE SMOOTH TIE-IN OF PROPOSED PAVEMENT SURFACE WITH THESE ELEMENTS/FEATURES. CONTRACTOR SHALL NOTIFY THE ENGINEER AND ADJUST AS DIRECTED.
4. LIMIT OF PROPOSED PAVEMENT RECONSTRUCTION ON SIDE STREETS IS UP TO THE CURB RETURN POINT UNLESS SHOWN OTHERWISE OR DIRECTED BY THE ENGINEER.
5. REFER TO "UTILITY LAYOUT" SHEETS FOR INFORMATION ON UTILITIES.
6. REFER TO TYPICAL SECTION, TCP, REMOVAL, DRAINAGE, SIGNING AND PAVEMENT MARKING SHEETS FOR MORE INFORMATION.
7. ALL DIMENSIONS ARE TO THE LIPLINE OF CURB AND GUTTER UNLESS OTHERWISE NOTED.

0 20' 40'

SCALE: 1" = 40' HORZ
1" = 10' VERT

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED
PROFESSIONAL ENGINEER

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

ROADWAY PLAN & PROFILE

SHEET 12 OF 12

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	90
CONTROL	SECTION	JOB	
0079	04	049	

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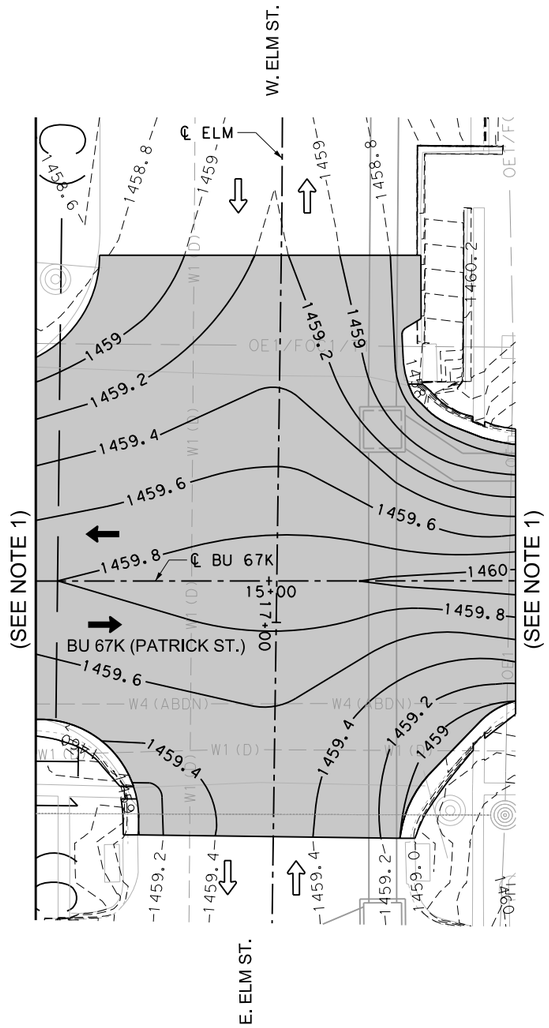

LEGEND

- PROP PAVEMENT
- 1460 EXIST CONTOUR
- 1460 PROP CONTOUR
- PROP TRAFFIC DIRECTION
- EXIST TRAFFIC DIRECTION
- PROP DRAINAGE STRUCTURE

NOTES:

1. THE GRADING BEYOND THE LIMITS SHOWN IN THIS SHEET IS CONTROLLED BY ROADWAY PGL AND TYPICAL SECTIONS.
2. CONTOURS SHOWN ARE AT 0.20' INTERVAL.
3. SEE PAVING PLAN SHEETS AND PROFILE SHEETS FOR MORE INFORMATION.
4. SEE DRAINAGE SHEETS FOR MORE INFORMATION ON DRAINAGE.

0 10' 20'

SCALE: 1" = 20'

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED PROFESSIONAL ENGINEER

Abulkhair M. Zobayed

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

PROPOSED INTERSECTION CONTOUR
BU 67K AT ELM STREET

SHEET 1 OF 2

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	91
CONTROL	SECTION	JOB	
0079	04	049	

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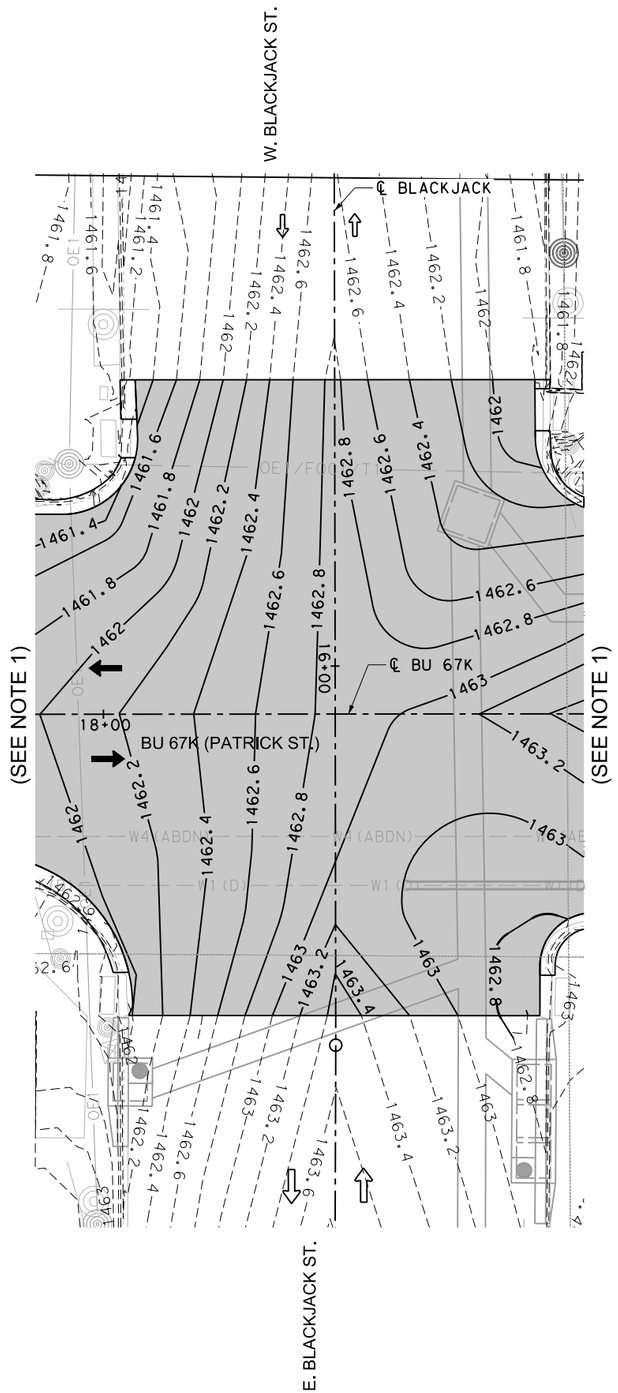

LEGEND

- PROP PAVEMENT
- 1460 EXIST CONTOUR
- 1460 PROP CONTOUR
- PROP TRAFFIC DIRECTION
- EXIST TRAFFIC DIRECTION
- PROP DRAINAGE STRUCTURE

NOTES:

1. THE GRADING BEYOND THE LIMITS SHOWN IN THIS SHEET IS CONTROLLED BY ROADWAY PGL AND TYPICAL SECTIONS.
2. CONTOURS SHOWN ARE AT 0.20' INTERVAL.
3. SEE PAVING PLAN SHEETS AND PROFILE SHEETS FOR MORE INFORMATION.
4. SEE DRAINAGE SHEETS FOR MORE INFORMATION ON DRAINAGE.

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

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED PROFESSIONAL ENGINEER

Abulkhair M. Zobayed

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

PROPOSED INTERSECTION CONTOUR
BU 67K AT BLACKJACK STREET

SHEET 2 OF 2

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	92
CONTROL	SECTION	JOB	
0079	04	049	

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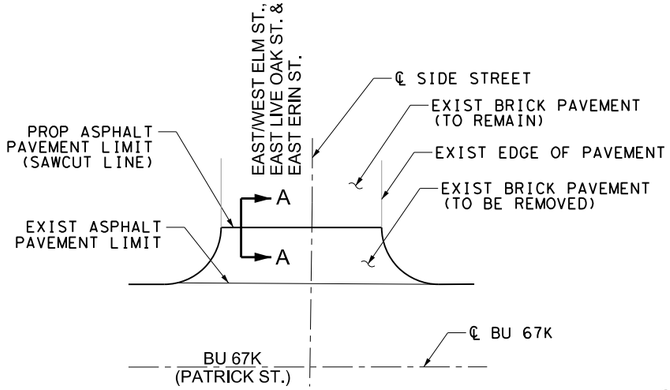
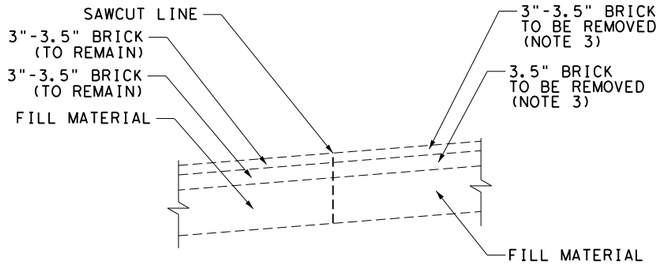
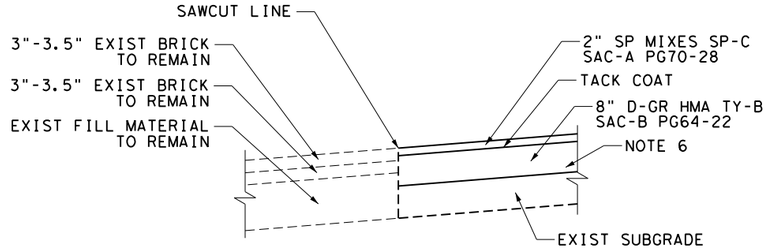


PLAN VIEW

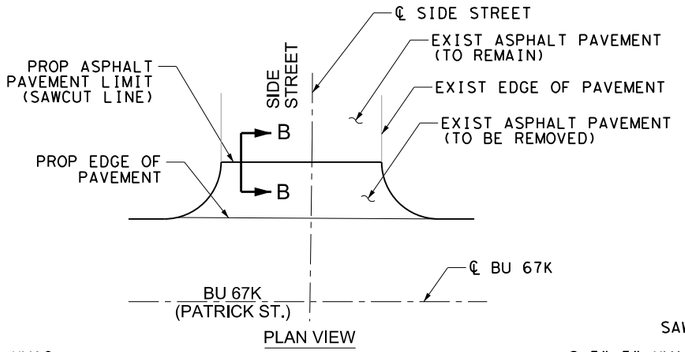


SECTION A-A
EXISTING CONDITION

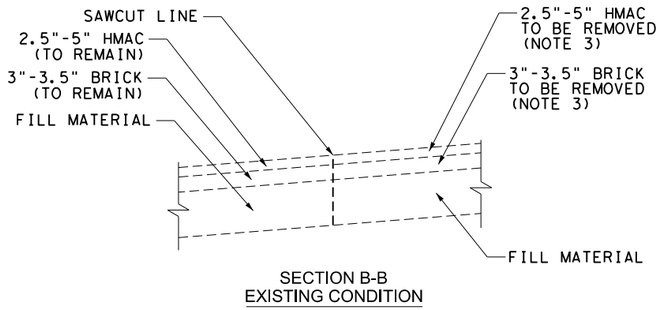


SECTION A-A
PROPOSED CONDITION

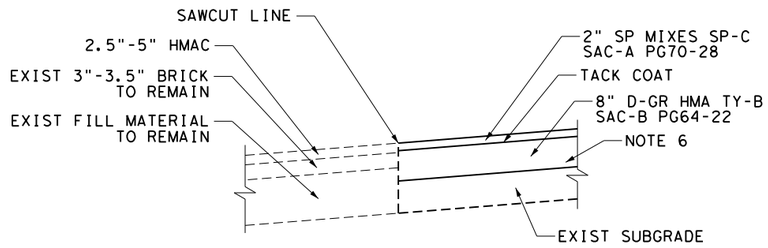
DETAILS OF CROSS STREETS
(EAST & WEST ELM ST., EAST LIVE OAK ST. & EAST ERIN ST.)
N.T.S.



PLAN VIEW



SECTION B-B
EXISTING CONDITION



SECTION B-B
PROPOSED CONDITION

DETAILS OF CROSS STREETS
(ALL OTHER SIDE STREETS)
N.T.S.

NOTES:

1. THE EXISTING PAVEMENT STRUCTURE ALONG ELM STREET AND ALL SIDE STREETS IS BASED ON ADJACENT CORES ALONG BU 67K AND SITE VISIT OBSERVATION. CONTRACTOR SHALL FIELD VERIFY THE EXISTING PAVEMENT PRIOR TO CONSTRUCTION AND SHALL COORDINATE WITH THE ENGINEER IF ANY SIGNIFICANT DIFFERENCE IS OBSERVED DURING CONSTRUCTION.
2. REFER TO "REMOVAL LAYOUT" SHEET FOR LIMITS OF EXISTING TOP LAYER BRICK REMOVAL ALONG SIDE STREET.
3. REFER TO TYPICAL SECTION, REMOVAL AND ROADWAY SHEETS FOR MORE INFORMATION.
4. ALL SALVAGED BRICK SHALL BE RETURNED TO CITY OF DUBLIN.
5. REFER TO "PLAN AND PROFILE" SHEETS FOR LIMIT OF CONSTRUCTION ON SIDE STREETS.
6. REMOVAL OF EXISTING FILL MATERIAL UNDER BRICK LAYER TO BE PAID UNDER ITEM 105.

SCALE = N.T.S

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED
PROFESSIONAL ENGINEER

Abulkhair M. Zobayed

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

MISCELLANEOUS
ROADWAY DETAILS

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	93
CONTROL	SECTION	JOB	
0079	04	049	

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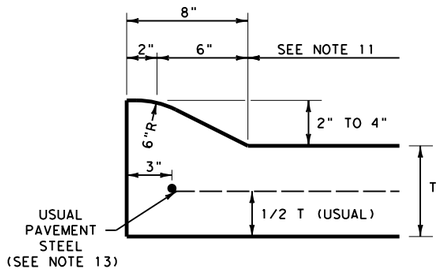
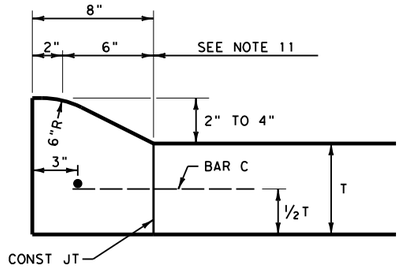
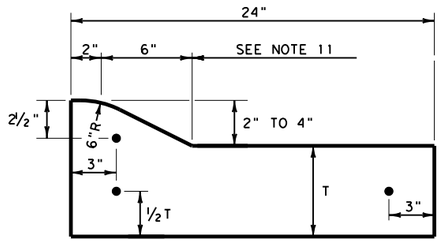


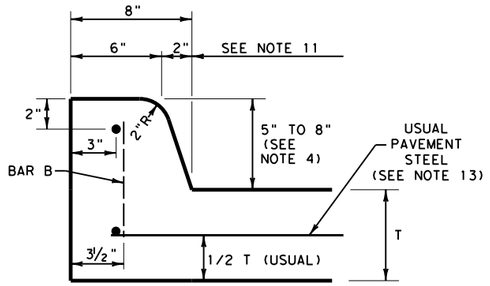
TYPE I CURB (MONOLITHIC)
2" - 4" HEIGHT



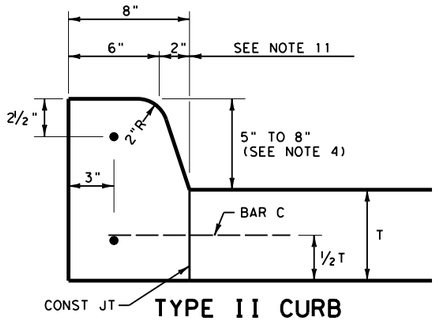
TYPE I CURB
2" - 4" HEIGHT



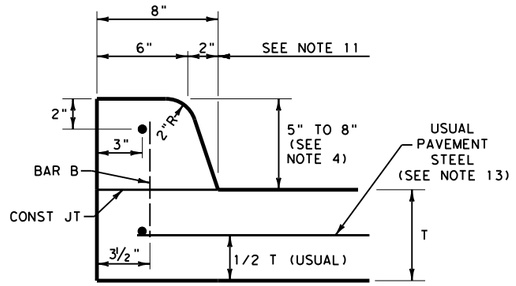
TYPE I CURB AND GUTTER
2" - 4" HEIGHT



TYPE II CURB (MONOLITHIC)
5" - 8" HEIGHT



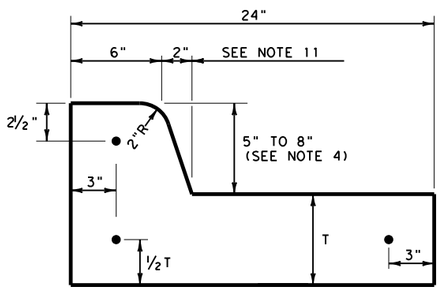
TYPE II CURB
5" - 8" HEIGHT
DOWELED VERTICAL JOINT



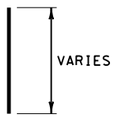
TYPE II CURB
5" - 8" HEIGHT
DOWELED HORIZONTAL JOINT

GENERAL NOTES

1. ALL MATERIALS AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH ITEM 529, "CONCRETE CURB, GUTTER, AND COMBINED CURB AND GUTTER".
2. ALL CONCRETE SHALL BE CLASS "A".
3. ALL REINFORCING BARS SHALL BE #4, UNLESS OTHERWISE SHOWN.
4. UNLESS OTHERWISE SHOWN, ALL TYPE II CURB SHALL BE 6" HEIGHT .
5. ROUND EXPOSED SHARP EDGES WITH A ROUNDING TOOL, TO A MINIMUM RADIUS OF 1/4".
6. ALL EXISTING CURBS AND DRIVEWAYS TO BE REMOVED SHALL BE SAW CUT FULL DEPTH OR REMOVED AT EXISTING JOINTS.
7. WHERE CONCRETE CURB IS PLACED ON EXISTING CONCRETE PAVEMENT, THE PAVEMENT SHALL BE DRILLED AND THE REINFORCING BARS GROUTED OR EPOXIED IN PLACE.
8. EXPANSION AND CONTRACTION JOINTS SHALL BE CONSTRUCTED TO MATCH PAVEMENT JOINTS IN ALL CURBS OR CURB AND GUTTER ADJACENT TO JOINTED CONCRETE PAVEMENT. WHERE PLACEMENT OF CURB OR CURB AND GUTTER IS NOT ADJACENT TO CONCRETE PAVEMENT, EXPANSION JOINTS SHALL BE PROVIDED AT STRUCTURES, CURB RETURNS AT STREETS OR DRIVEWAYS, AND AT LOCATIONS DIRECTED BY THE ENGINEER.
9. VERTICAL AND HORIZONTAL DOWELS BARS AND TRANSVERSE REINFORCING BARS SHALL BE PLACED AT 4' C-C.
10. DIMENSION "T" SHOWN IS THE THICKNESS OF ADJACENT CONCRETE PAVEMENT, OR, WHEN CURB IS INSTALLED ADJACENT TO FLEXIBLE PAVEMENT, "T" IS 6" MINIMUM, 8" MAXIMUM.
11. USUAL PROFILE GRADE LINE. REFER TO TYPICAL SECTIONS AND PLAN-PROFILE SHEETS FOR EXACT LOCATIONS.
12. A SEALED, 1/2" EXPANSION JOINT SHALL BE PROVIDED WHERE CURB AND GUTTER IS ADJACENT TO SIDEWALK OR RIPRAP.
13. LONGITUDINAL AND TRANSVERSE PAVEMENT STEEL SHALL BE PLACED IN ACCORDANCE WITH PAVEMENT DETAILS SHOWN ELSEWHERE IN THE PLANS.

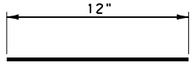


TYPE II CURB AND GUTTER
5" - 8" HEIGHT



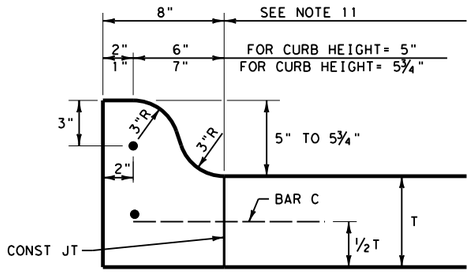
BAR B

L = (T/2) + (H- 1 1/2")
WHERE "H" = CURB HEIGHT
FOR NEW PAVEMENT, EMBED T/2 INTO FRESH CONCRETE.
FOR EXISTING PAVEMENT, DRILL 3/8" DIAM HOLE T/2 + 1/4" INTO PAVEMENT.
SECURE WITH TY III EPOXY, CLASS "E" OR "F".

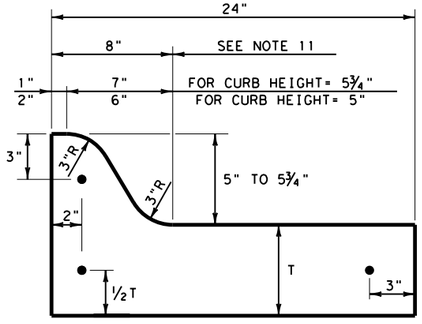


BAR C

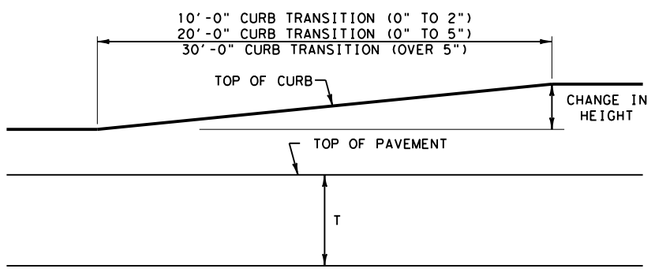
EMBED 6" INTO EXISTING CONCRETE PAVEMENT.
DRILL 3/8" X 6 1/4" HOLE
SECURE WITH TY III EPOXY, CLASS "E" OR "F".



TYPE IIA CURB
5" - 5 3/4" HEIGHT

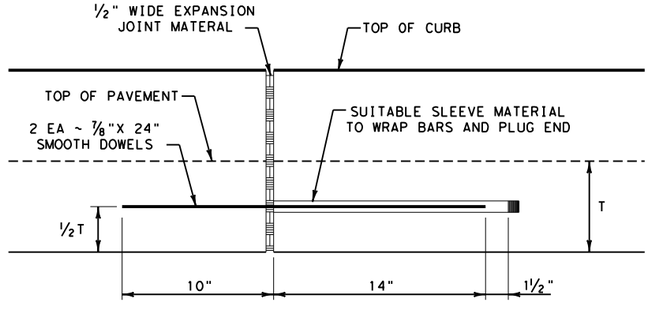


TYPE IIA CURB AND GUTTER
5" - 5 3/4" HEIGHT



CURB TRANSITION

NOTE: TO BE PAID FOR AS HIGHEST CURB



EXPANSION JOINT DETAIL

Texas Department of Transportation

Fort Worth District Standard

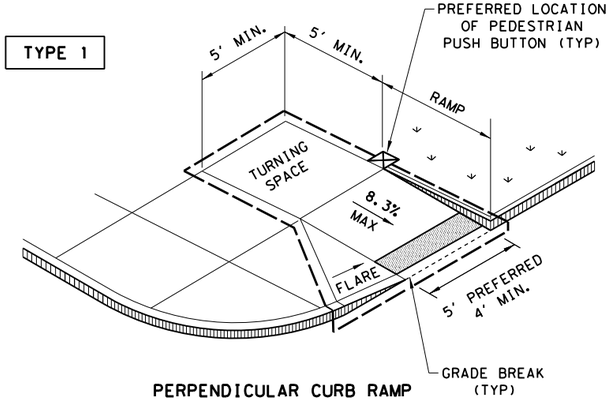
CONCRETE CURB AND CURB AND GUTTER DETAILS

CCCG (FTW)

ORIGINAL DRAWING: 05/2019	cccg-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
DATE	REVISIONS	6	SEE TITLE SHEET		94
05/2019	NEW STANDARD	STATE	STATE DIST.NO.	COUNTY	
07/2022	DESIGNATE USUAL 6" HEIGHT	TEXAS	FTW	ERATH	
		CONT.	SECT.	JOB	HIGHWAY NO.
		0079	04	049	BU 67K

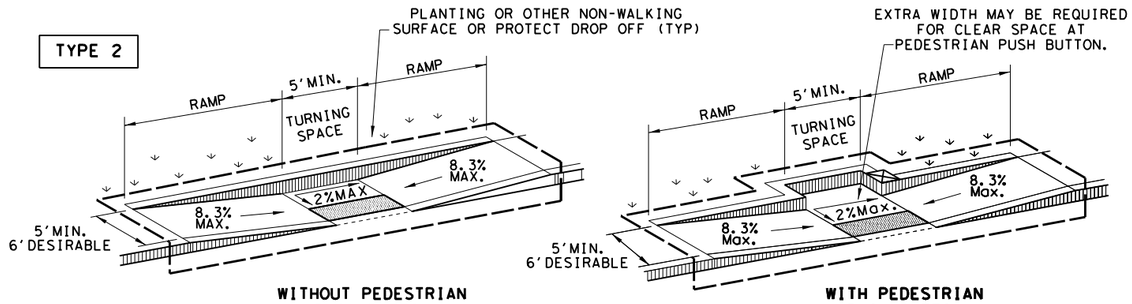
DATE:
FILE:

TYPE 1



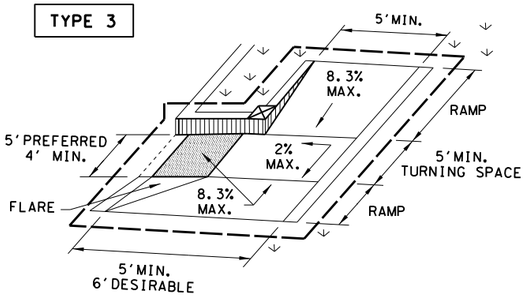
PERPENDICULAR CURB RAMP

TYPE 2

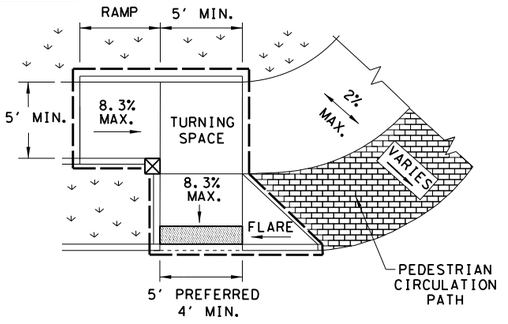


PARALLEL CURB RAMP

TYPE 3

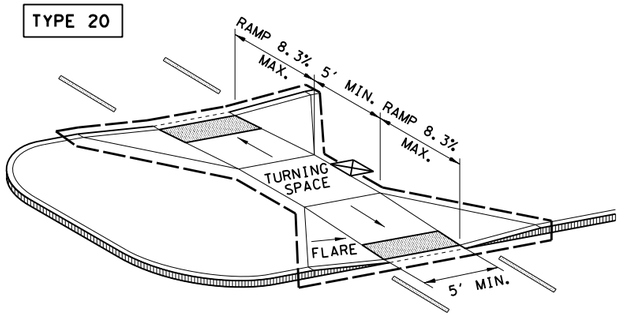


TYPE 6



COMBINATION CURB RAMPS

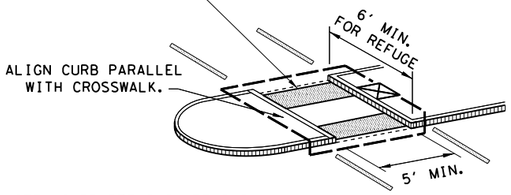
TYPE 20



CURB RAMPS AT MEDIAN ISLANDS

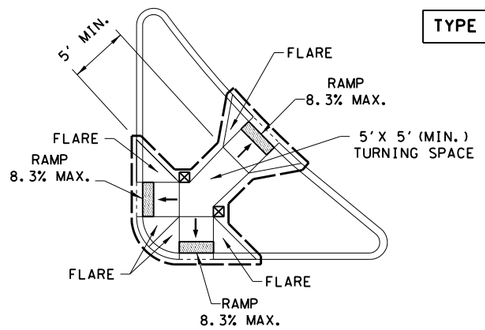
TYPE 21

INSTALL DETECTABLE WARNING SURFACE AT EACH END OF THE CUT-THROUGH RAMP WITH A MINIMUM 2' USUAL SIDEWALK SURFACE BETWEEN. IF MEDIAN IS LESS THAN 6' WIDE, ELIMINATE DETECTABLE WARNING SURFACES.



NOTE: CURB DETAILS ARE SHOWN ELSEWHERE IN THE PLANS.

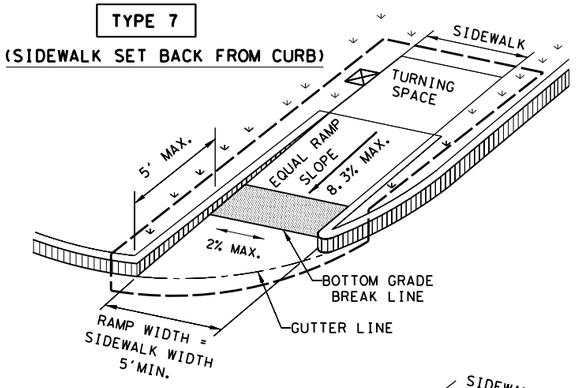
TYPE 22



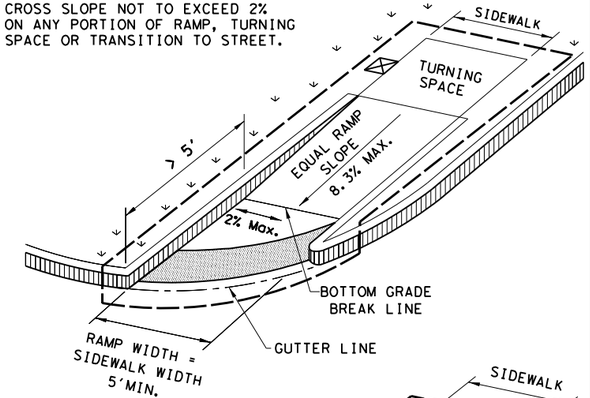
COMBINATION ISLAND RAMPS

TYPE 7

(SIDEWALK SET BACK FROM CURB)

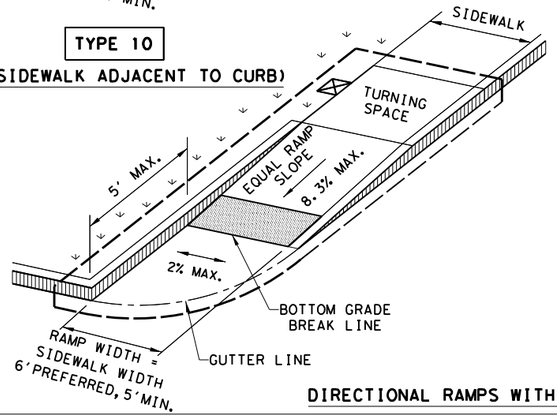


CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.

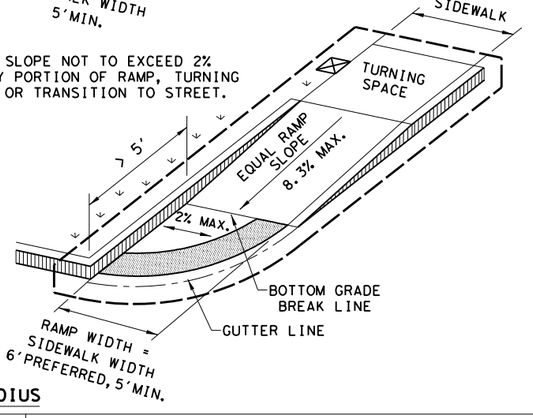


TYPE 10

(SIDEWALK ADJACENT TO CURB)

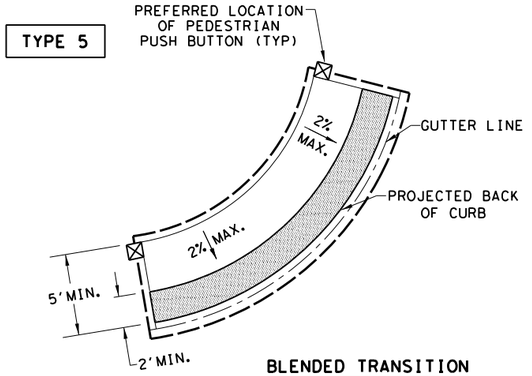


CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.



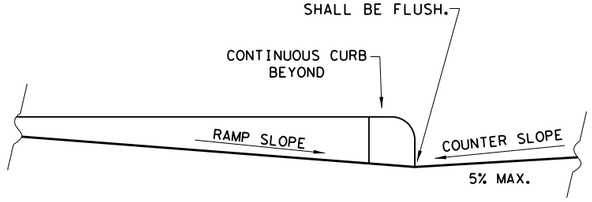
DIRECTIONAL RAMPS WITHIN RADIUS

TYPE 5



BLENDED TRANSITION
(FLUSH LANDING)

BOTTOM GRADE BREAK OF CURB RAMP WILL NORMALLY BE AT GUTTER LINE. SURFACE SLOPES AT GRADE BREAKS SHALL BE FLUSH.



TYPICAL SECTION OF PERPENDICULAR CURB RAMP AT CONNECTION TO ROADWAY

NOTES / LEGEND:

SEE GENERAL NOTES ON SHEET 2 OF 4 FOR MORE INFORMATION.

DENOTES PLANTING OR NON-WALKING SURFACE NOT PART OF PEDESTRIAN CIRCULATION PATH.

DETECTABLE WARNING SURFACE

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON IF APPLICABLE.

GUTTER LINE ——-

GRADE BREAK -------

RAMP LIMITS OF PAYMENT ——

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0079	04	049	BU 67K
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY		SHEET NO.
	FTW	ERATH		95

DATE:
FILE:

GENERAL NOTES

CURB RAMPS

1. Install a curb ramp or blended transition at each pedestrian street crossing.
2. All slopes shown are maximum allowable. Cross slopes of 1.5% and lesser running should be used. Adjust curb ramp length or grade of approach sidewalks as directed.
3. Maximum allowable cross slope on sidewalk and curb ramp surfaces is 2%.
4. The minimum sidewalk width is 5'. Where the sidewalk is adjacent to the back of curb, a 6' sidewalk width is desirable. Where a 5' sidewalk cannot be provided due to site constraints, sidewalk width may be reduced to 4' for short distances. 5'x 5' passing areas at intervals not to exceed 200' are required.
5. Turning Spaces shall be 5'x 5' minimum. Cross slope shall be maximum 2%.
6. Clear space at the bottom of curb ramps shall be a minimum of 4'x 4' wholly contained within the crosswalk and wholly outside the parallel vehicular travel path.
7. Provide flared sides where the pedestrian circulation path crosses the curb ramp. Flared sides shall be sloped at 10% maximum, measured parallel to the curb. Returned curbs may be used only where pedestrians would not normally walk across the ramp, either because the adjacent surface is planted, substantially obstructed, or otherwise protected.
8. Additional information on curb ramp location, design, light reflective value and texture may be found in the latest draft of the Proposed Guidelines for Pedestrian Facilities in the Public Right of Way (PROWAG) as published by the U.S. Architectural and Transportation Barriers Compliance Board (Access Board).
9. To serve as a pedestrian refuge area, the median should be a minimum of 6' wide, measured from back of curbs. Medians should be designed to provide accessible passage over or through them.
10. Small channelization islands, which do not provide a minimum 5'x 5' landing at the top of curb ramps, shall be cut through level with the surface of the street.
11. Crosswalk dimensions, crosswalk markings and stop bar locations shall be as shown elsewhere in the plans. At intersections where crosswalk markings are not required, curb ramps shall align with theoretical crosswalks unless otherwise directed.
12. Provide curb ramps to connect the pedestrian access route at each pedestrian street crossing. Handrails are not required on curb ramps.
13. Curb ramps and landings shall be constructed and paid for in accordance with Item 531 "Sidewalks".
14. Place concrete at a minimum depth of 5" for ramps, flares and landings, unless otherwise directed.
15. Furnish and install No. 3 reinforcing steel bars at 18" o.c. both ways, unless otherwise directed.
16. Provide a smooth transition where the curb ramps connect to the street.
17. Curbs shown on sheet 1 within the limits of payment are considered part of the curb ramp for payment, whether it is concrete curb, gutter, or combined curb and gutter.
18. Existing features that comply with applicalble standards may remain in place unless otherwise shown on the plans.

DETECTABLE WARNING MATERIAL

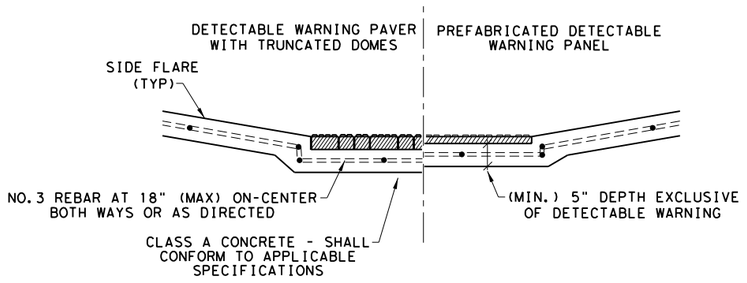
19. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with PROWAG. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material adjacent to uncolored concrete, unless specified elsewhere in the plans.
20. Detectable Warning Materials must meet TxDOT Departmental Materials Specification DMS 4350 and be listed on the Material Producer List. Install products in accordance with manufacturer's specifications.
21. Detectable warning surfaces must be firm, stable and slip resistant.
22. Detectable warning surfaces shall be a minimum of 24 inches in depth in the direction of pedestrian travel, and extend the full width of the curb ramp or landing where the pedestrian access route enters the street.
23. Detectable warning surfaces shall be located so that the edge nearest the curb line is at the back of curb and neither end of that edge is greater than 5 feet from the back of curb. Detectable warning surfaces may be curved along the corner radius.
24. Shaded areas on Sheet 1 of 4 indicate the approximate location for the detectable warning surface for each curb ramp type.

DETECTABLE WARNING PAVERS (IF USED)

25. Furnish detectable warning paver units meeting all requirements of ASTM C-936, C-33. Lay in a two by two unit basket weave pattern or as directed.
26. Lay full-size units first followed by closure units consisting of at least 25 percent (25%) of a full unit. Cut detectable warning paver units using a power saw.

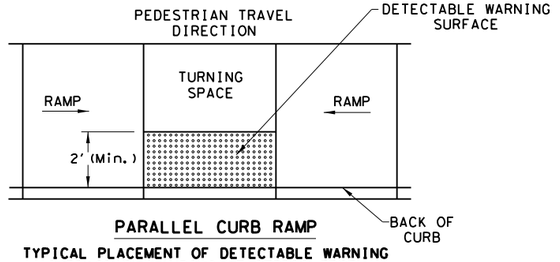
SIDEWALKS

27. Provide clear ground space at operable parts, including pedestrian push buttons. Operable parts shall be placed within unobstructed reach range specified in PROWAG section R406.
28. Place traffic signal or illumination poles, ground boxes, controller boxes, signs, drainage facilities and other items so as not to obstruct the pedestrian access route or clear ground space.
29. Street grades and cross slopes shall be as shown elsewhere in the plans.
30. Changes in level greater than 1/4 inch are not permitted.
31. The least possible grade should be used to maximize accessibility. The running slope of sidewalks and crosswalks within the public right of way may follow the grade of the parallel roadway. Where a continuous grade greater than five percent (5%) must be provided, handrails may be desirable to improve accessibility. Handrails may also be needed to protect pedestrians from potentially hazardous conditions. If provided, handrails shall comply with PROWAG R409.
32. Handrail extensions shall not protrude into the usable landing area or into intersecting pedestrian routes.
33. Driveways and turnouts shall be constructed and paid for in accordance with Item "Intersections, Driveways and Turnouts". Sidewalks shall be constructed and paid for in accordance with Item, "Sidewalks".
34. Sidewalk details are shown elsewhere in the plans.



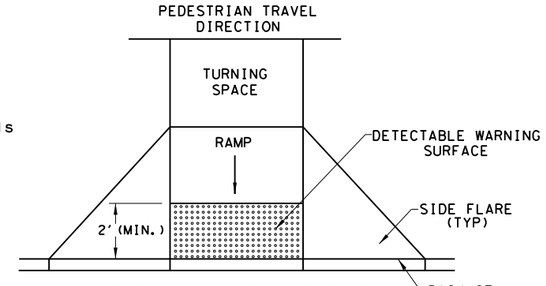
SECTION VIEW DETAIL
CURB RAMP AT DETECTIBLE WARNINGS

DETECTABLE WARNING SURFACE DETAILS



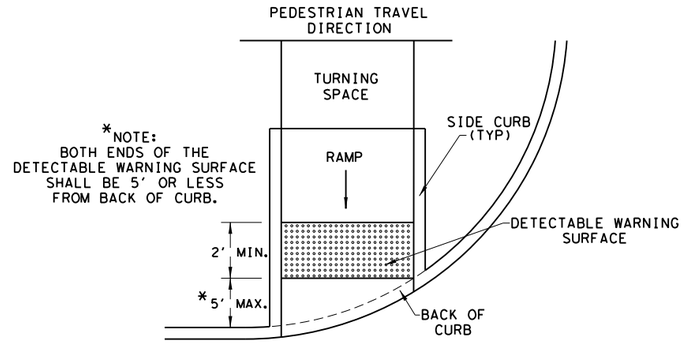
PARALLEL CURB RAMP

TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON LANDING AT STREET EDGE.



PERPENDICULAR CURB RAMP

TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.



DIRECTIONAL CURB RAMP

TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.

Texas Department of Transportation

Design Division Standard

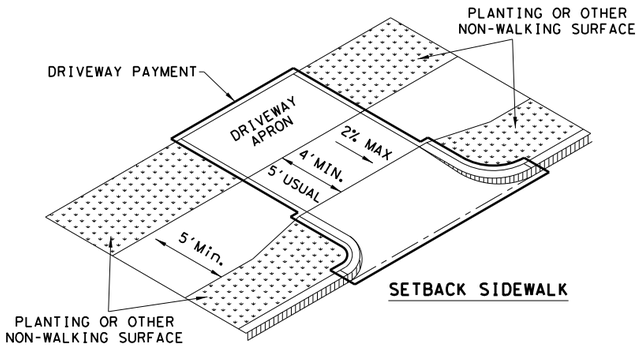
PEDESTRIAN FACILITIES CURB RAMPS

PED-18

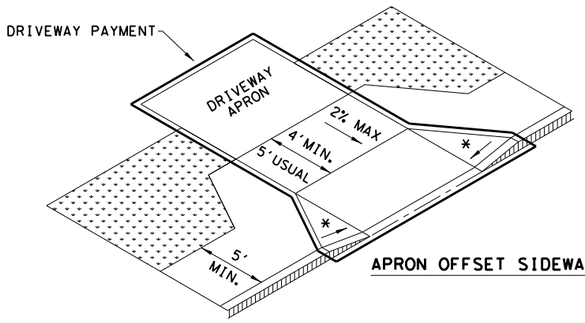
FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG	
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0079	04	049	BU 67K	
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY		SHEET NO.	
	FTW	ERATH		96	

DATE:
FILE:

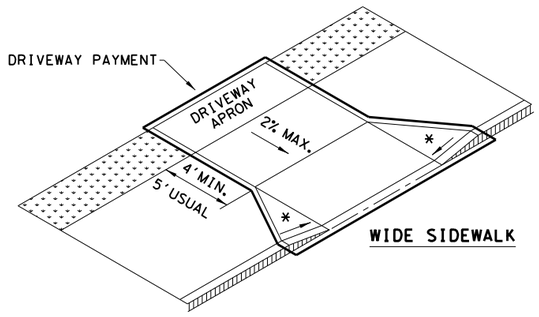
SIDEWALK TREATMENT AT DRIVEWAYS



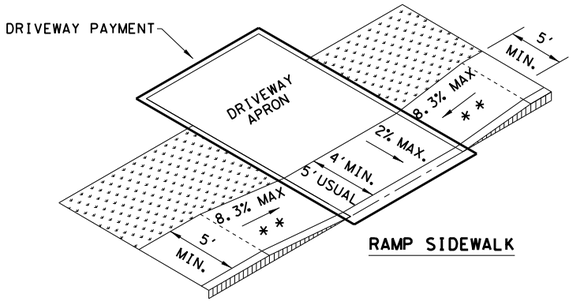
SETBACK SIDEWALK



APRON OFFSET SIDEWALK



WIDE SIDEWALK

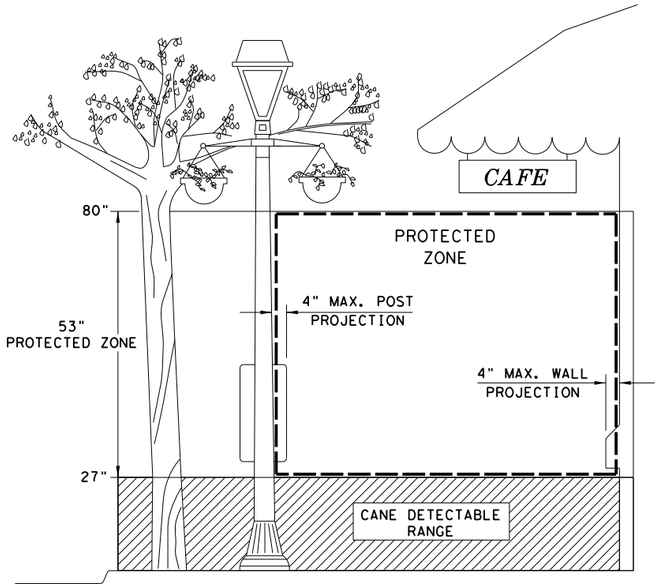


RAMP SIDEWALK

NOTES:

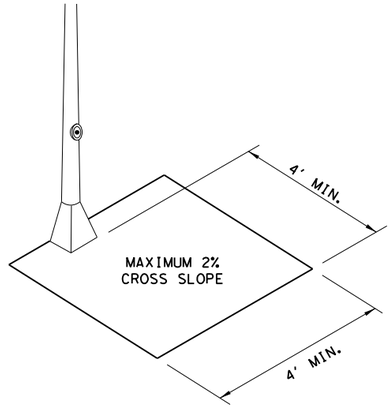
* WHERE DRIVEWAYS CROSS THE PEDESTRIAN ROUTE, SIDES SHALL BE FLARED AT 10% MAX SLOPE.

* * IF CURB HEIGHT IS GREATER THAN 6 INCHES, USE GRADE LESS THAN OR EQUAL TO 5%. HANDRAIL AND DETECTABLE WARNING ARE NOT REQUIRED.

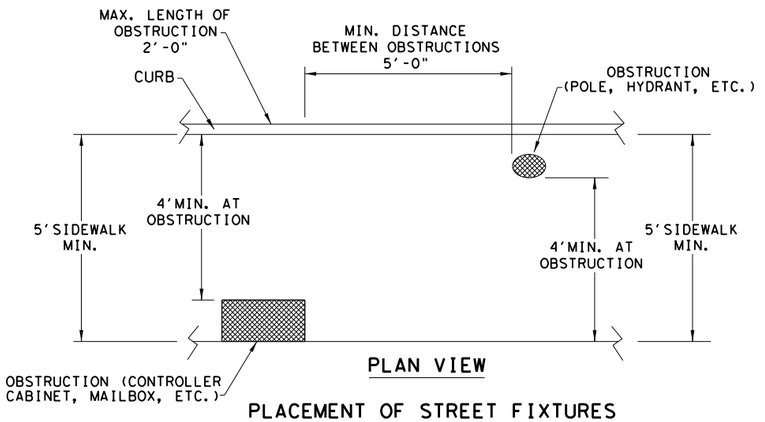


PROTECTED ZONE

NOTE: IN PEDESTRIAN CIRCULATION AREA, MAXIMUM 4" PROJECTION FOR POST OR WALL MOUNTED OBJECTS BETWEEN 27" AND 80" ABOVE THE SURFACE.



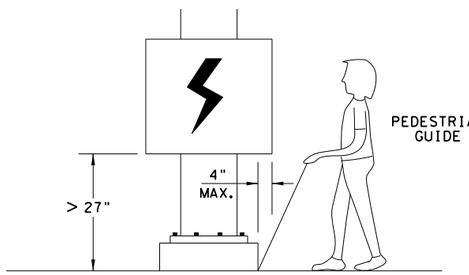
CLEAR SPACE ADJACENT TO PEDESTRIAN PUSH BUTTON



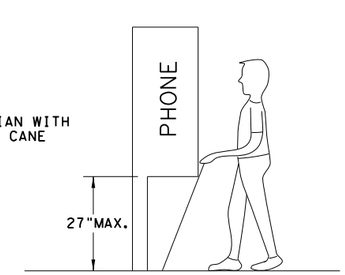
PLAN VIEW

PLACEMENT OF STREET FIXTURES

NOTE: ITEMS NOT INTENDED FOR PUBLIC USE. MINIMUM 4' X 4' CLEAR GROUND SPACE REQUIRED AT PUBLIC USE FIXTURES.



WHEN AN OBSTRUCTION OF A HEIGHT GREATER THAN 27" FROM THE SURFACE WOULD CREATE A PROTRUSION OF MORE THAN 4" INTO THE PEDESTRIAN CIRCULATION AREA, CONSTRUCT ADDITIONAL CURB OR FOUNDATION AT THE BOTTOM TO PROVIDE A MAXIMUM 4" OVERHANG.



PROTRUDING OBJECTS OF A HEIGHT ≤ 27" ARE DETECTABLE BY CANE AND DO NOT REQUIRE ADDITIONAL TREATMENT.

DETECTION BARRIER FOR VERTICAL CLEARANCE < 80"

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

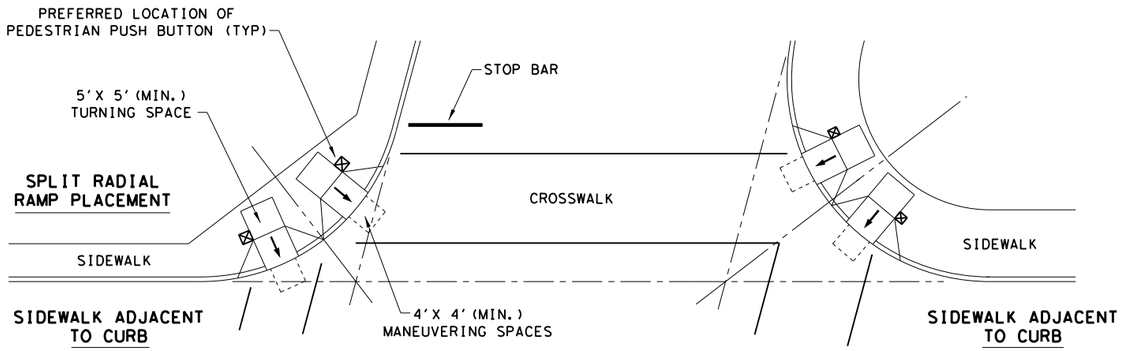
PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG	
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0079	04	049	BU 67K	
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY		SHEET NO.	
	FTW	ERATH		97	

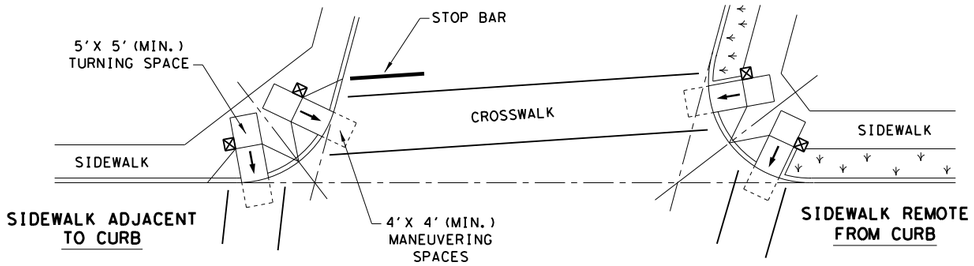
DATE:
FILE:

TYPICAL CROSSING LAYOUTS

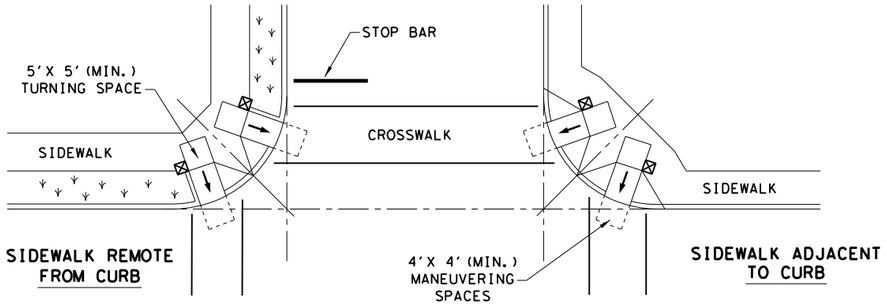
SEE SHEET 1 OF 4 FOR DETAILS AND DIMENSIONS



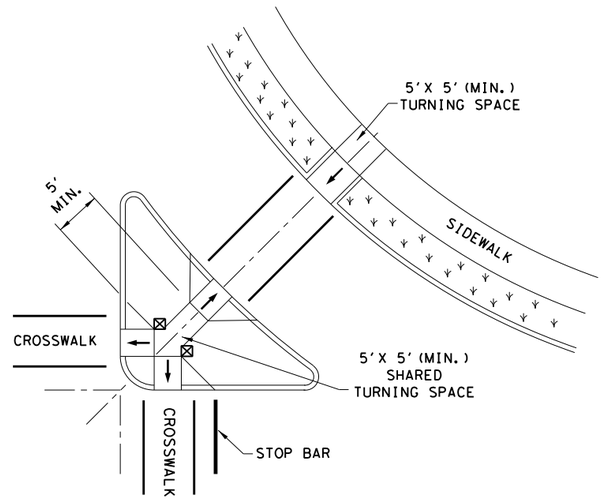
SKEWED INTERSECTION WITH "LARGE" RADIUS



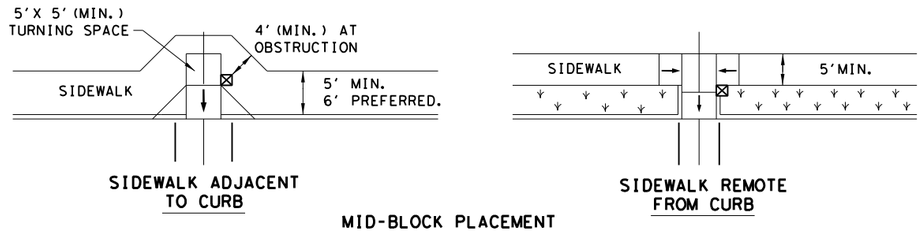
SKEWED INTERSECTION WITH "SMALL" RADIUS



NORMAL INTERSECTION WITH "SMALL" RADIUS



AT INTERSECTION
W/FREE RIGHT TURN & ISLAND



MID-BLOCK PLACEMENT
PERPENDICULAR RAMPS

LEGEND:

SHOWS DOWNWARD SLOPE. →

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON (IF APPLICABLE). ⊠

DENOTES PLANTING OR NON-WALKING SURFACE NOT PART OF PEDESTRIAN CIRCULATION PATH.

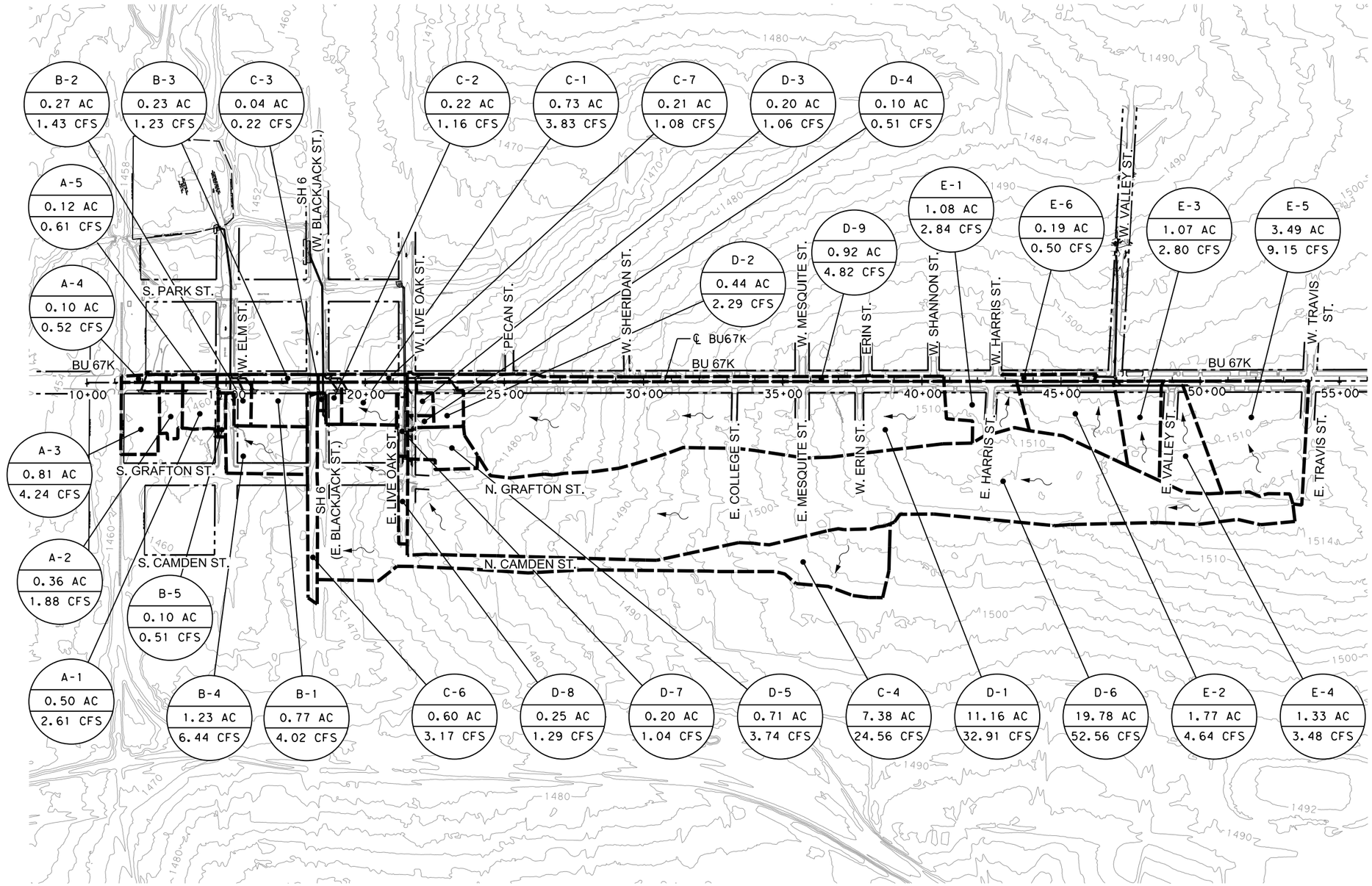
Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

PED-18

FILE: ped18	DN: TxDOT		DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB		HIGHWAY
REVISIONS	0079	04	049		BU 67K
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY			SHEET NO.
	FTW	ERATH			98



LEGEND

- EXIST R.O.W.
- DRAINAGE AREA BOUNDARY
- 1490 EXIST CONTOUR
- DIRECTION OF FLOW
- A-1 / X.XX AC / X.XX CFS — DRAINAGE AREA ID / ACREAGE / DESIGN FLOW

NOTES:

1. CONTOURS SHOWN ARE FROM TNRIS LIDAR DATA AND ARE FOR INFORMATIONAL PURPOSES ONLY.
2. REFER TO "INTERNAL DRAINAGE AREA MAP" SHEETS FOR RUNOFF CALCULATIONS.

0 200' 400'

SCALE: 1" = 400'

STATE OF TEXAS
ANTHONY SCHNEIDER
71848
LICENSED PROFESSIONAL ENGINEER

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

OVERALL DRAINAGE AREA MAP

SHEET 1 OF 1

FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	99
CONTROL	SECTION	JOB	
0079	04	049	

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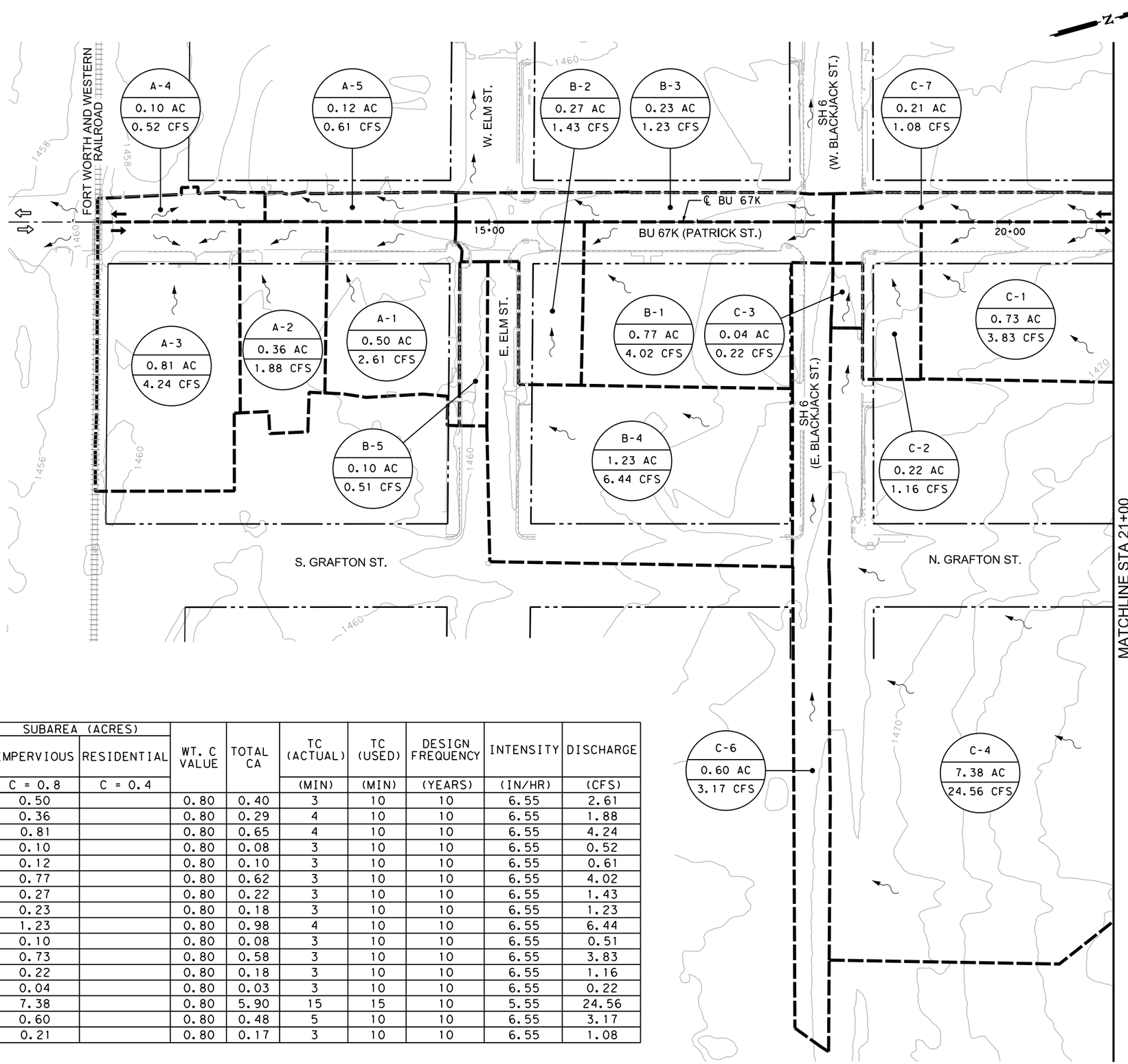

DRAINAGE AREA		SUBAREA (ACRES)		WT. C VALUE	TOTAL CA	TC (ACTUAL)	TC (USED)	DESIGN FREQUENCY	INTENSITY	DISCHARGE
		IMPERVIOUS	RESIDENTIAL							
ID	(ACRES)	C = 0.8	C = 0.4			(MIN)	(MIN)	(YEARS)	(IN/HR)	(CFS)
A1	0.50	0.50		0.80	0.40	3	10	10	6.55	2.61
A2	0.36	0.36		0.80	0.29	4	10	10	6.55	1.88
A3	0.81	0.81		0.80	0.65	4	10	10	6.55	4.24
A4	0.10	0.10		0.80	0.08	3	10	10	6.55	0.52
A5	0.12	0.12		0.80	0.10	3	10	10	6.55	0.61
B1	0.77	0.77		0.80	0.62	3	10	10	6.55	4.02
B2	0.27	0.27		0.80	0.22	3	10	10	6.55	1.43
B3	0.23	0.23		0.80	0.18	3	10	10	6.55	1.23
B4	1.23	1.23		0.80	0.98	4	10	10	6.55	6.44
B5	0.10	0.10		0.80	0.08	3	10	10	6.55	0.51
C1	0.73	0.73		0.80	0.58	3	10	10	6.55	3.83
C2	0.22	0.22		0.80	0.18	3	10	10	6.55	1.16
C3	0.04	0.04		0.80	0.03	3	10	10	6.55	0.22
C4	7.38	7.38		0.80	5.90	15	15	10	5.55	24.56
C6	0.60	0.60		0.80	0.48	5	10	10	6.55	3.17
C7	0.21	0.21		0.80	0.17	3	10	10	6.55	1.08

LEGEND

- EXIST R.O.W.
- DRAINAGE AREA BOUNDARY
- 1490 EXIST CONTOUR
- DIRECTION OF FLOW
- A-1 / X.XX AC / X.XX CFS — DRAINAGE AREA ID, ACREAGE, DESIGN FLOW

NOTES:

1. CONTOURS SHOWN ARE FROM TNRIS LIDAR DATA AND ARE FOR INFORMATIONAL PURPOSES ONLY.

0 50' 100'
SCALE: 1" = 100'

STATE OF TEXAS
ANTHONY SCHNEIDER
71848
LICENSED PROFESSIONAL ENGINEER
7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

BU 67K

INTERNAL
DRAINAGE AREA MAP

SHEET 1 OF 4

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	100
CONTROL	SECTION	JOB	
0079	04	049	

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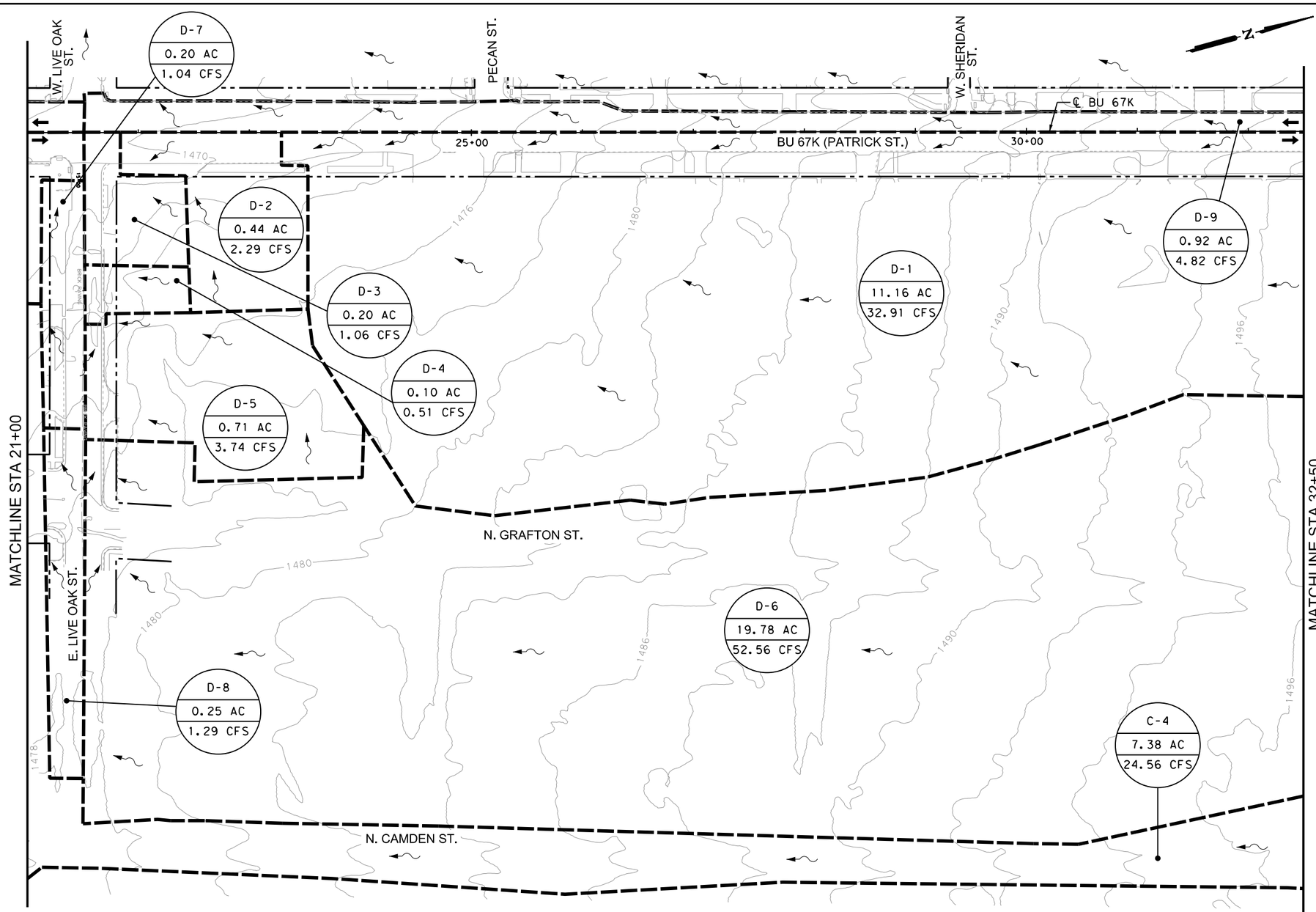

LEGEND

- EXIST R.O.W.
- DRAINAGE AREA BOUNDARY
- 1490 EXIST CONTOUR
- DIRECTION OF FLOW
- A-1 / X.XX AC / X.XX CFS — DRAINAGE AREA ID / ACREAGE / DESIGN FLOW

NOTES:

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0 50' 100'

SCALE: 1" = 100'

DRAINAGE AREA		SUBAREA (ACRES)		WT. C VALUE	TOTAL CA	TC (ACTUAL)	TC (USED)	DESIGN FREQUENCY	INTENSITY	DISCHARGE
		IMPERVIOUS	RESIDENTIAL							
ID	(ACRES)	C = 0.8	C = 0.4			(MIN)	(MIN)	(YEARS)	(IN/HR)	(CFS)
D1	11.16	1.52	9.64	0.45	5.02	7	10	10	6.55	32.91
D2	0.44	0.44		0.80	0.35	3	10	10	6.55	2.29
D3	0.20	0.20		0.80	0.16	3	10	10	6.55	1.06
D4	0.10	0.10		0.80	0.08	3	10	10	6.55	0.51
D5	0.71	0.71		0.80	0.57	3	10	10	6.55	3.74
D6	19.78	2.28	17.50	0.45	8.90	13	13	10	5.91	52.56
D7	0.20	0.20		0.80	0.16	3	10	10	6.55	1.04
D8	0.25	0.25		0.80	0.20	3	10	10	6.55	1.29
D9	0.92	0.92		0.80	0.74	7	10	10	6.55	4.82

STATE OF TEXAS
ANTHONY SCHNEIDER
71848
LICENSED PROFESSIONAL ENGINEER

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

BU 67K

INTERNAL
DRAINAGE AREA MAP

SHEET 2 OF 4

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	101
CONTROL	SECTION	JOB	
0079	04	049	

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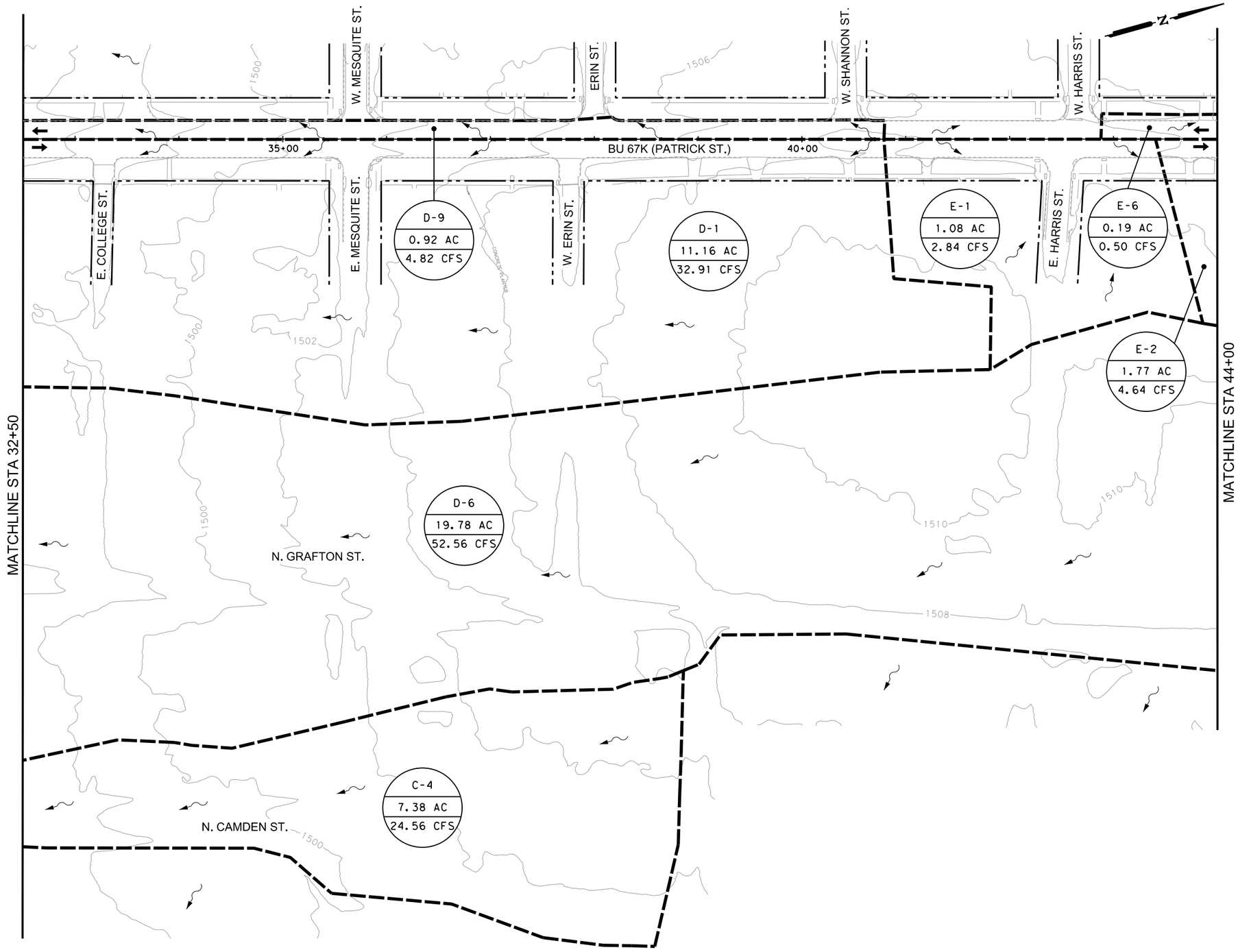

LEGEND

- EXIST R.O.W.
- DRAINAGE AREA BOUNDARY
- 1490 EXIST CONTOUR
- DIRECTION OF FLOW
- A-1 / X.XX AC / X.XX CFS — DRAINAGE AREA ID / ACREAGE / DESIGN FLOW

NOTES:

1. CONTOURS SHOWN ARE FROM TNRIS LIDAR DATA AND ARE FOR INFORMATIONAL PURPOSES ONLY.

DRAINAGE AREA		SUBAREA (ACRES)		WT. C VALUE	TOTAL CA	TC (ACTUAL)	TC (USED)	DESIGN FREQUENCY	INTENSITY	DISCHARGE
		IMPERVIOUS	RESIDENTIAL							
ID	(ACRES)	C = 0.8	C = 0.4			(MIN)	(MIN)	(YEARS)	(IN/HR)	(CFS)
E1	1.08		1.08	0.40	0.43	4	10	10	6.55	2.84
E2	1.77		1.77	0.40	0.71	4	10	10	6.55	4.64
E6	0.19		0.19	0.40	0.08	4	10	10	6.55	0.50

0 50' 100'

SCALE: 1" = 100'

STATE OF TEXAS
ANTHONY SCHNEIDER
71848
LICENSED
PROFESSIONAL ENGINEER

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NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

INTERNAL
DRAINAGE AREA MAP

SHEET 3 OF 4

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	102
CONTROL	SECTION	JOB	
0079	04	049	

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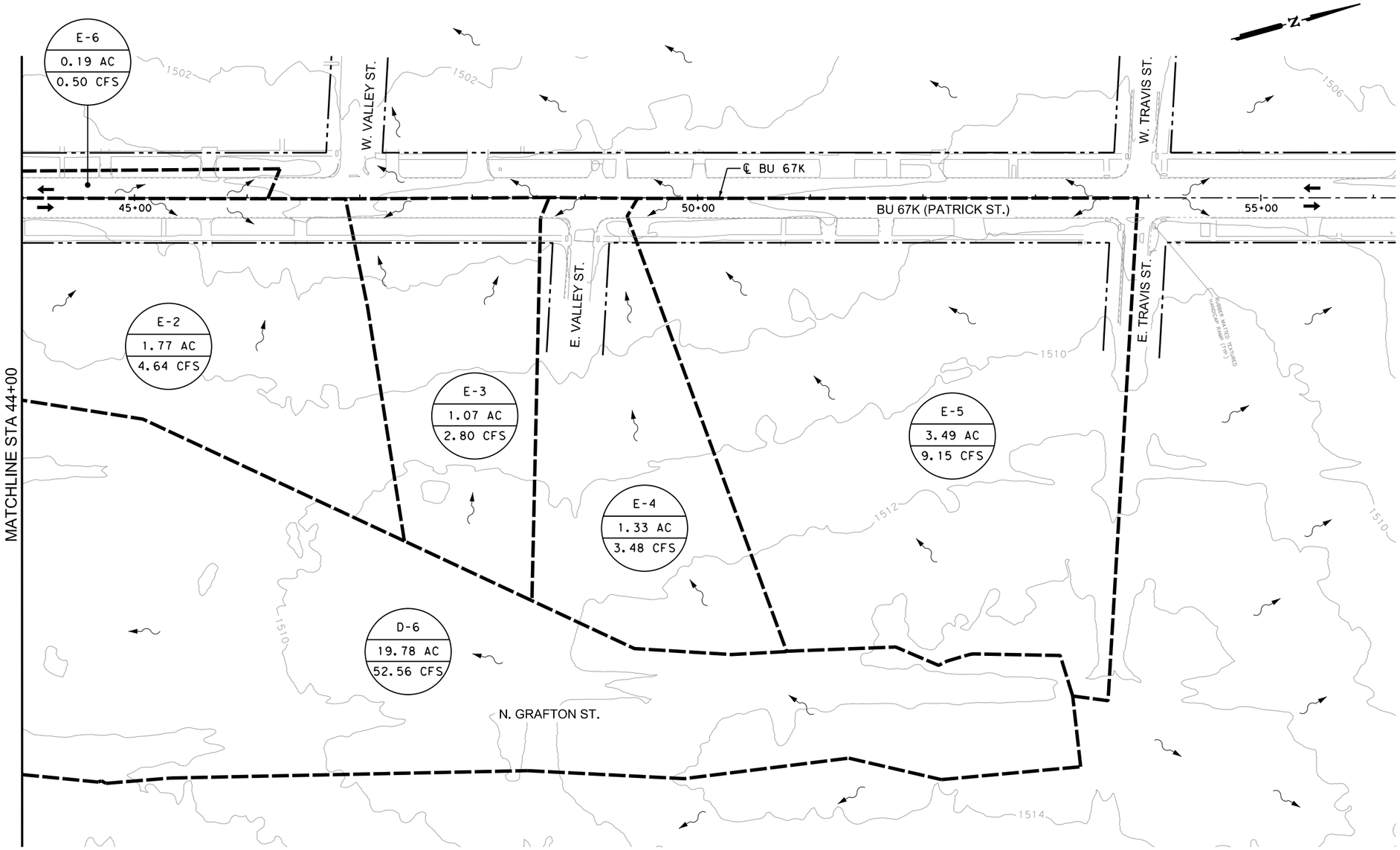

LEGEND

- EXIST R.O.W.
- DRAINAGE AREA BOUNDARY
- 1490 EXIST CONTOUR
- DIRECTION OF FLOW
- A-1 / X.XX AC / X.XX CFS — DRAINAGE AREA ID / ACREAGE / DESIGN FLOW

NOTES:

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0 50' 100'

SCALE: 1" = 100'

DRAINAGE AREA		SUBAREA (ACRES)		WT. C VALUE	TOTAL CA	TC (ACTUAL)	TC (USED)	DESIGN FREQUENCY	INTENSITY	DISCHARGE
		IMPERVIOUS	RESIDENTIAL							
ID	(ACRES)	C = 0.8	C = 0.4			(MIN)	(MIN)	(YEARS)	(IN/HR)	(CFS)
E3	1.07		1.07	0.40	0.43	4	10	10	6.55	2.80
E4	1.33		1.33	0.40	0.53	4	10	10	6.55	3.48
E5	3.49		3.49	0.40	1.40	4	10	10	6.55	9.15

ANTHONY SCHNEIDER
71848
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

INTERNAL
DRAINAGE AREA MAP

SHEET 4 OF 4

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	
CONTROL	SECTION	JOB	103
0079	04	049	

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DRAINAGE AREA		SUBAREA (ACRES)		WT. C VALUE	TOTAL CA	TC (ACTUAL)	TC (USED)	DESIGN FREQUENCY	INTENSITY	DISCHARGE
		IMPERVIOUS	RESIDENTIAL							
ID	(ACRES)	C = 0.8	C = 0.4			(MIN)	(MIN)	(YEARS)	(IN/HR)	(CFS)
A1	0.50	0.50	0	0.80	0.40	3	10	10	6.55	2.61
A2	0.36	0.36	0	0.80	0.29	4	10	10	6.55	1.88
A3	0.81	0.81	0	0.80	0.65	4	10	10	6.55	4.24
A4	0.10	0.10	0	0.80	0.08	3	10	10	6.55	0.52
A5	0.12	0.12	0	0.80	0.10	3	10	10	6.55	0.61
B1	0.77	0.77	0	0.80	0.62	3	10	10	6.55	4.02
B2	0.27	0.27	0	0.80	0.22	3	10	10	6.55	1.43
B3	0.23	0.23	0	0.80	0.18	3	10	10	6.55	1.23
B4	1.23	1.23	0	0.80	0.98	4	10	10	6.55	6.44
B5	0.10	0.10	0	0.80	0.08	3	10	10	6.55	0.51
C1	0.73	0.73	0	0.80	0.58	3	10	10	6.55	3.83
C2	0.22	0.22	0	0.80	0.18	3	10	10	6.55	1.16
C3	0.04	0.04	0	0.80	0.03	3	10	10	6.55	0.22
C4	7.38	7.38	0	0.80	5.90	15	15	10	5.55	24.56
C6	0.60	0.60	0	0.80	0.48	5	10	10	6.55	3.17
C7	0.21	0.21	0	0.80	0.17	3	10	10	6.55	1.08
D1	11.16	1.52	9.64	0.45	5.02	7	10	10	6.55	32.91
D2	0.44	0.44	0	0.80	0.35	3	10	10	6.55	2.29
D3	0.20	0.20	0	0.80	0.16	3	10	10	6.55	1.06
D4	0.10	0.10	0	0.80	0.08	3	10	10	6.55	0.51
D5	0.71	0.71	0	0.80	0.57	3	10	10	6.55	3.74
D6	19.78	2.28	17.5	0.45	8.90	13	13	10	5.91	52.56
D7	0.20	0.20	0	0.80	0.16	3	10	10	6.55	1.04
D8	0.25	0.25	0	0.80	0.20	3	10	10	6.55	1.29
D9	0.92	0.92	0	0.80	0.74	7	10	10	6.55	4.82
E1	1.08	0.00	1.08	0.40	0.43	4	10	10	6.55	2.84
E2	1.77	0.00	1.77	0.40	0.71	4	10	10	6.55	4.64
E3	1.07	0.00	1.07	0.40	0.43	4	10	10	6.55	2.80
E4	1.33	0.00	1.33	0.40	0.53	4	10	10	6.55	3.48
E5	3.49	0.00	3.49	0.40	1.40	4	10	10	6.55	9.15
E6	0.19	0.00	0.19	0.40	0.08	4	10	10	6.55	0.50

STATE OF TEXAS
ANTHONY SCHNEIDER
71848
LICENSED PROFESSIONAL ENGINEER

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

HYDROLOGIC DATA

SHEET 1 OF 1

FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	104
CONTROL	SECTION	JOB	
0079	04	049	

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INLET / JUNCTION COMPUTATIONS

INLET / JUNCTION									CURB INLET DESIGN					GRATE INLET DESIGN						
ID	REFERENCE CHAIN	STATION	OFFSET (FT)	LT / RT	TYPE	DESIGN FREQ (YEARS)	PROFILE TYPE	INLET TYPE	LENGTH REQUIRED (FT)	ACTUAL LENGTH (FT)	DEPRESSION (FT)	DEPRESSION WIDTH (FT)	INLET HEIGHT (FT)	INLET TYPE	INLET LENGTH (FT)	INLET WIDTH (FT)	INLET AREA (SF)	INLET CLOG AREA (SF)	INLET PERIM (FT)	CLOG PERIM (FT)
A1	BU67K	13+55.00	28.00	RT	I-CO(5'x5')(6" curb)	10	On Grade	Curb	9.73	5.00	0.33	1.33	0.49	n/a	n/a	n/a	n/a	n/a	n/a	n/a
A2	BU67K	12+70.00	28.00	RT	I-CO(5'x5')(6" curb)	10	On Grade	Curb	7.15	5.00	0.33	1.33	0.49	n/a	n/a	n/a	n/a	n/a	n/a	n/a
A3	BU67K	11+95.00	28.00	RT	I-CO(20'x5')(6" curb)	10	On Grade	Curb	14.07	20.00	0.33	1.33	0.49	n/a	n/a	n/a	n/a	n/a	n/a	n/a
A4	BU67K	12+15.00	-30.00	LT	I-FG(FTW)	10	On Grade	Grate	n/a	n/a	n/a	n/a	n/a	Parallel 1 7/8 - 4	3.54	3.38	6.90	0.50	8.67	0.50
A5	BU67K	12+95.00	-28.00	LT	I-CU(5')(6" curb)	10	On Grade	Curb	4.05	5.00	0.33	1.33	0.49	n/a	n/a	n/a	n/a	n/a	n/a	n/a
N_RR_OUTLET	BU67K	12+17.00	-39.00	LT	WINGWALL (PW - 1)(HW=5 FT)	10	On Grade	Outlet	8.29	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
B1	BU67K	16+00.00	28.00	RT	I-CO(20'x5')(6" curb)	10	On Grade	Curb	14.75	20.00	0.33	1.33	0.49	n/a	n/a	n/a	n/a	n/a	n/a	n/a
B2	BU67K	15+60.00	28.00	RT	I-CO(5'x5')(6" curb)	10	On Grade	Curb	8.10	5.00	0.33	1.33	0.49	n/a	n/a	n/a	n/a	n/a	n/a	n/a
B3	BU67K	15+55.00	-28.00	LT	I-CU(5')(6" curb)	10	On Grade	Curb	7.43	5.00	0.33	1.33	0.49	n/a	n/a	n/a	n/a	n/a	n/a	n/a
B4	ELM	17+57.00	-28.00	LT	I-CU(20')(6" curb)	10	On Grade	Curb	15.42	20.00	0.33	1.33	0.49	n/a	n/a	n/a	n/a	n/a	n/a	n/a
B5	ELM	17+55.00	28.00	RT	I-CU(5')(6" curb)	10	On Grade	Curb	3.80	5.00	0.33	1.33	0.49	n/a	n/a	n/a	n/a	n/a	n/a	n/a
B-JB1	BU67K	15+70.00	-15.00	LT	JCT SPL	10	On Grade	Junction	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
B-JB2	BU67K	15+41.00	-15.00	LT	JCT SPL	10	On Grade	Junction	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
B-JB3	BU67K	15+25.00	-15.00	LT	JCT SPL	10	On Grade	Junction	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
B-JB4	BU67K	15+15.00	-20.00	LT	JB(FW)(5'x5') w/ Manhole Riser	10	On Grade	Junction	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
B-JB5	BU67K	15+15.00	45.00	RT	JB(FW)(5'x5') w/ Manhole Riser	10	On Grade	Junction	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
B-JB6	ELM	13+30.00	-15.00	LT	JCT SPL	10	On Grade	Junction	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
B-JB7	ELM	11+45.00	-5.00	LT	JCT SPL	10	On Grade	Junction	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
ELM ST-OUTLET	ELM	11+35.00	11.50	RT	WINGWALL (PW-1) (HW=5 FT)	10	On Grade	Outlet	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

NOTES:

1. HYDRAULIC ANALYSIS ON OUTFALL STREAMS INDICATED ROADWAY OVERTOPPING. PER INVESTIGATION WITH STAKEHOLDERS, MAXIMUM DEPTH OF OVERTOPPING IS APPROXIMATELY 6". FOR HGL CALCULATION, A TAILWATER DEPTH OF ONE FOOT ABOVE ROADWAY ELEVATION AT OUTFALL WAS USED FOR HGL CALCULATIONS.
2. INLET ELEVATIONS WERE DETERMINED BY SUBTRACTING 6" FROM THE TOP OF EXISTING CURB.

STATE OF TEXAS
ANTHONY SCHNEIDER
71848
LICENSED
PROFESSIONAL ENGINEER

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

BU 67K

HYDRAULIC DATA

SHEET 1 OF 8

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	105
CONTROL	SECTION	JOB	
0079	04	049	

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INLET / JUNCTION COMPUTATIONS

INLET / JUNCTION									CURB INLET DESIGN					GRATE INLET DESIGN						
ID	REFERENCE CHAIN	STATION	OFFSET (FT)	LT / RT	TYPE	DESIGN FREQ (YEARS)	PROFILE TYPE	INLET TYPE	LENGTH REQUIRED (FT)	ACTUAL LENGTH (FT)	DEPRESSION (FT)	DEPRESSION WIDTH (FT)	INLET HEIGHT (FT)	INLET TYPE	INLET LENGTH (FT)	INLET WIDTH (FT)	INLET AREA (SF)	INLET CLOG AREA (SF)	INLET PERIM (FT)	CLOG PERIM (FT)
C1	BU67K	19+35.00	28.00	RT	I-CO(15'x5')(6" curb)	10	On Grade	Curb	16.36	15.00	0.33	1.33	0.49	n/a	n/a	n/a	n/a	n/a	n/a	n/a
C2	BU67K	19+00.00	28.00	RT	I-CO(20'x5')(6" curb)	10	On Grade	Curb	8.67	20.00	0.33	1.33	0.49	n/a	n/a	n/a	n/a	n/a	n/a	n/a
C3	BLACKJACK	16+60.00	-28.00	LT	I-CU(15')(6" curb)	10	On Grade	Curb	14.19	15.00	0.33	1.33	0.49	n/a	n/a	n/a	n/a	n/a	n/a	n/a
C4	BLACKJACK	17+33.00	-28.00	LT	I-CU(20')(6" curb)	10	On Grade	Curb	35.43	20.00	0.33	1.33	0.49	n/a	n/a	n/a	n/a	n/a	n/a	n/a
C6	BLACKJACK	16+55.00	28.00	RT	I-CU(5')(6" curb)	10	On Grade	Curb	13.15	5.00	0.33	1.33	0.49	n/a	n/a	n/a	n/a	n/a	n/a	n/a
C7	BU67K	18+80.00	-28.00	LT	I-CU(5')(6" curb)	10	On Grade	Curb	8.18	5.00	0.33	1.33	0.49	n/a	n/a	n/a	n/a	n/a	n/a	n/a
C-JB2	BLACKJACK	17+24.00	-18.00	LT	JCT SPL	10	On Grade	Junction	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
C-JB3	BLACKJACK	16+50.00	-18.00	LT	JCT SPL	10	On Grade	Junction	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
C-JB4	BLACKJACK	16+40.00	-18.00	LT	JCT SPL	10	On Grade	Junction	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
C-JB5	BU67K	18+70.00	-14.00	LT	JCT SPL	10	On Grade	Junction	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
C-JB6	BU67K	19+10.00	-14.00	LT	JCT SPL	10	On Grade	Junction	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
C-JB7	BLACKJACK	15+80.00	-18.00	LT	JB(FW)(6'x6') w/ Manhole Riser	10	On Grade	Junction	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
C-JB8	BLACKJACK	12+59.73	-18.08	LT	JCT SPL	10	On Grade	Junction	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
C-JB9	BU67K	18+60.00	-14.00	LT	JCT SPL	10	On Grade	Junction	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
BLACK_JACK_OUTLET	BLACKJACK	11+36.32	29.10	RT	OUTLET	10	On Grade	Outlet	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

NOTES:

1. HYDRAULIC ANALYSIS ON OUTFALL STREAMS INDICATED ROADWAY OVERTOPPING. PER INVESTIGATION WITH STAKEHOLDERS, MAXIMUM DEPTH OF OVERTOPPING IS APPROXIMATELY 6". FOR HGL CALCULATION, A TAILWATER DEPTH OF ONE FOOT ABOVE ROADWAY ELEVATION AT OUTFALL WAS USED FOR HGL CALCULATIONS.
2. INLET ELEVATIONS WERE DETERMINED BY SUBTRACTING 6" FROM THE TOP OF EXISTING CURB.

STATE OF TEXAS
ANTHONY SCHNEIDER
71848
LICENSED PROFESSIONAL ENGINEER

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

BU 67K

HYDRAULIC DATA

SHEET 2 OF 8

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	106
CONTROL	SECTION	JOB	
0079	04	049	

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INLET / JUNCTION COMPUTATIONS

INLET / JUNCTION									CURB INLET DESIGN					GRATE INLET DESIGN						
ID	REFERENCE CHAIN	STATION	OFFSET (FT)	LT / RT	TYPE	DESIGN FREQ (YEARS)	PROFILE TYPE	INLET TYPE	LENGTH REQUIRED (FT)	ACTUAL LENGTH (FT)	DEPRESSION (FT)	DEPRESSION WIDTH (FT)	INLET HEIGHT (FT)	INLET TYPE	INLET LENGTH (FT)	INLET WIDTH (FT)	INLET AREA (SF)	INLET CLOG AREA (SF)	INLET PERIM (FT)	CLOG PERIM (FT)
D1	BU67K	23+30.00	27.00	RT	I-CO(20'x5')(6" curb)	10	On Grade	Curb	57.37	20.00	0.33	1.33	0.49	n/a	n/a	n/a	n/a	n/a	n/a	n/a
D2	BU67K	21+87.00	28.00	RT	I-FG(FTW)	10	On Grade	Grate	n/a	n/a	n/a	n/a	n/a	Parallel 1 7/8 - 4	3.54	3.38	6.90	0.50	8.67	0.50
D3	LIVE_OAK	14+96.00	-16.50	LT	I-FG(FTW)	10	On Grade	Grate	n/a	n/a	n/a	n/a	n/a	Parallel 1 7/8 - 4	3.54	3.38	6.90	0.50	8.67	0.50
D4	LIVE_OAK	15+86.00	-19.50	LT	I-CU(5')(6" curb)	10	On Grade	Curb	18.75	5.00	0.33	1.33	0.49	n/a	n/a	n/a	n/a	n/a	n/a	n/a
D5	LIVE_OAK	16+60.00	-18.50	LT	I-CU(20')(6" curb)	10	On Grade	Curb	37.98	20.00	0.33	1.33	0.49	n/a	n/a	n/a	n/a	n/a	n/a	n/a
D6	LIVE_OAK	17+45.00	-19.50	LT	I-CU(20')(6" curb)	10	On Grade	Curb	54.62	20.00	0.33	1.33	0.49	n/a	n/a	n/a	n/a	n/a	n/a	n/a
D7	LIVE_OAK	15+11.50	18.50	RT	I-FG(FTW)	10	On Grade	Grate	n/a	n/a	n/a	n/a	n/a	Parallel 1 7/8 - 4	3.54	3.38	6.90	0.50	8.67	0.50
D8	LIVE_OAK	17+35.00	17.00	RT	I-CU(20')(6" curb)	10	On Grade	Curb	7.00	20.00	0.33	1.33	0.49	n/a	n/a	n/a	n/a	n/a	n/a	n/a
D9	BU67K	21+98.00	-28.00	LT	I-CU(20')(6" curb)	10	On Grade	Curb	19.18	20.00	0.33	1.33	0.49	n/a	n/a	n/a	n/a	n/a	n/a	n/a
D-JB1	BU67K	23+00.00	-15.00	LT	JCT SPL	10	On Grade	Junction	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
D-JB2	BU67K	21+79.56	-15.00	LT	JCT SPL	10	On Grade	Junction	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
D-JB3	BU67K	21+53.00	-15.00	LT	JCT SPL	10	On Grade	Junction	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
D-JB4	LIVE_OAK	16+40.00	7.30	RT	JB(FW)(6'x6') w/ Manhole Riser	10	On Grade	Junction	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
D-JB5	LIVE_OAK	15+63.00	7.00	RT	JCT SPL	10	On Grade	Junction	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
D-JB6	LIVE_OAK	15+11.00	6.70	RT	JCT SPL	10	On Grade	Junction	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
D-JB7	BU67K	21+43.00	6.00	RT	JCT SPL	10	On Grade	Junction	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
D-JB8	BU67K	21+42.00	-25.00	LT	JB(FW)(5'x5') w/ Manhole Riser	10	On Grade	Junction	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
D-JB9	LIVE_OAK	11+17.96	12.08	RT	JCT SPL	10	On Grade	Junction	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
D-JB10	LIVE_OAK	17+32.00	7.85	RT	JB(FW)(5'x5') w/ Manhole Riser	10	On Grade	Junction	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
LIVE OAK ST-OUTLET	LIVE_OAK	11+08.50	25.14	RT	WINGWALL (PW-1) (HW=5 FT)	10	On Grade	Outlet	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

NOTES:

1. HYDRAULIC ANALYSIS ON OUTFALL STREAMS INDICATED ROADWAY OVERTOPPING. PER INVESTIGATION WITH STAKEHOLDERS, MAXIMUM DEPTH OF OVERTOPPING IS APPROXIMATELY 6". FOR HGL CALCULATION, A TAILWATER DEPTH OF ONE FOOT ABOVE ROADWAY ELEVATION AT OUTFALL WAS USED FOR HGL CALCULATIONS.
2. INLET ELEVATIONS WERE DETERMINED BY SUBTRACTING 6" FROM THE TOP OF EXISTING CURB.

STATE OF TEXAS
ANTHONY SCHNEIDER
71848
LICENSED PROFESSIONAL ENGINEER

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

BU 67K

HYDRAULIC DATA

SHEET 3 OF 8

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	
CONTROL	SECTION	JOB	107
0079	04	049	

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INLET / JUNCTION COMPUTATIONS

INLET / JUNCTION									CURB INLET DESIGN					GRATE INLET DESIGN						
ID	REFERENCE CHAIN	STATION	OFFSET (FT)	LT / RT	TYPE	DESIGN FREQ (YEARS)	PROFILE TYPE	INLET TYPE	LENGTH REQUIRED (FT)	ACTUAL LENGTH (FT)	DEPRESSION (FT)	DEPRESSION WIDTH (FT)	INLET HEIGHT (FT)	INLET TYPE	INLET LENGTH (FT)	INLET WIDTH (FT)	INLET AREA (SF)	INLET CLOG AREA (SF)	INLET PERIM (FT)	CLOG PERIM (FT)
E1	BU67K	43+35.00	17.50	RT	I-CU(20')(6" curb)	10	On Grade	Curb	9.83	20.00	0.33	1.33	0.49	n/a	n/a	n/a	n/a	n/a	n/a	n/a
E2	BU67K	46+22.00	17.50	RT	I-CU(20')(6" curb)	10	On Grade	Curb	13.03	20.00	0.33	1.33	0.49	n/a	n/a	n/a	n/a	n/a	n/a	n/a
E3	BU67K	47+12.50	17.50	RT	I-CU(5')(6" curb)	10	Sag	Curb	11.80	5.00	0.33	1.33	0.49	n/a	n/a	n/a	n/a	n/a	n/a	n/a
E4	BU67K	48+60.00	17.50	RT	I-CU(20')(6" curb)	10	On Grade	Curb	11.05	20.00	0.33	1.33	0.49	n/a	n/a	n/a	n/a	n/a	n/a	n/a
E5	BU67K	49+45.00	17.50	RT	I-CU(20')(6" curb)	10	On Grade	Curb	19.18	20.00	0.33	1.33	0.49	n/a	n/a	n/a	n/a	n/a	n/a	n/a
E6	BU67K	46+30.00	-17.50	LT	I-CU(20')(6" curb)	10	On Grade	Curb	3.61	20.00	0.33	1.33	0.49	n/a	n/a	n/a	n/a	n/a	n/a	n/a
E-JB6	BU67K	46+93.00	-14.50	LT	JB(FW)(5'x5') w/ Manhole Riser	10	On Grade	Junction	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
E-JB7	W_VALLEY	12+15.00	5.50	RT	JB(FW)(5'x5') w/ Manhole Riser	10	On Grade	Junction	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
E-JB8	W_VALLEY	11+18.00	15.00	RT	I-AD(FTW)	10	Sag	Grate	n/a	n/a	n/a	n/a	n/a	Parallel 1 7/8 - 4	3.00	3.50	12.74	0.50	25.69	0.50
W VALLEY-OUTLET	W_VALLEY	10+65.00	14.00	RT	SET (TYI)(S=3FT)(HW=4FT)(4:1)(P)	10	On Grade	Outlet	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

NOTES:

1. HYDRAULIC ANALYSIS ON OUTFALL STREAMS INDICATED ROADWAY OVERTOPPING. PER INVESTIGATION WITH STAKEHOLDERS, MAXIMUM DEPTH OF OVERTOPPING IS APPROXIMATELY 6". FOR HGL CALCULATION, A TAILWATER DEPTH OF ONE FOOT ABOVE ROADWAY ELEVATION AT OUTFALL WAS USED FOR HGL CALCULATIONS.
2. INLET ELEVATIONS WERE DETERMINED BY SUBTRACTING 6" FROM THE TOP OF EXISTING CURB.

STATE OF TEXAS
ANTHONY SCHNEIDER
71848
LICENSED PROFESSIONAL ENGINEER

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

BU 67K

HYDRAULIC DATA

SHEET 4 OF 8

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	108
CONTROL	SECTION	JOB	
0079	04	049	

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SAG INLET COMPUTATIONS

ID	DRAINAGE LIBRARY ITEM	INLET TYPE	DESIGN FREQ. (YEAR)	ADDED BYPASS FLOW (CFS)	TOTAL DISCHARGE (CFS)	DISCHARGE (LEFT) (CFS)	DISCHARGE (RIGHT) (CFS)	INLET CAPACITY (CFS)	LONG SLOPE (LEFT) (%)	LONG SLOPE (RIGHT) (%)	COMP SPREAD SLOPE (FT/FT)	MANNING'S n-VALUE	POND WIDTH (LEFT) (FT)	POND WIDTH (RIGHT) (FT)	POND WIDTH (TOTAL) (FT)	MAX POND WIDTH (FT)	COMPUTED POND DEPTH (FT)	MAX POND DEPTH (FT)
E3	I-CO(5'x5')(6" curb)	Curb	10	0	2.80	1.4	1.4	11.05	0.62	0.56	0.02	0.015	9.91	7.35	15.00	18	0.30	0.75
E-JB8	I-AD(FTW)	Grate	10	0	5.00	2.5	2.5	25.75	1	50	0.02	0.015	12.84	1.10	12.57	18	0.25	0.75

ON-GRADE INLET COMPUTATIONS

ID	DRAINAGE LIBRARY ITEM	INLET TYPE	DESIGN FREQ (YEARS)	DISCHARGE Q (CFS)	ADDED BYPASS FLOW (CFS)	TOTAL DISCHARGE (CFS)	CAPACITY (CFS)	BYPASS FLOW (CFS)	BYPASS FLOW TO INLET ID	LONG. SLOPE (%)	COMP SPREAD SLOPE (%)	MANNING'S n-VALUE	ACTUAL POND WIDTH (FT)	MAX POND WIDTH (FT)	ACTUAL POND DEPTH (FT)	MAX POND DEPTH (FT)
A1	I-CO(5'x5')(6" curb)	Curb	10	2.61	0.00	2.61	1.89	0.71	A2	0.52	0.02	0.015	11.41	18	0.23	0.75
A2	I-CO(5'x5')(6" curb)	Curb	10	1.88	0.71	2.59	2.29	0.3	A3	0.13	0.02	0.015	14.69	18	0.29	0.75
A3	I-CO(20'x5')(6" curb)	Curb	10	4.24	0.30	4.53	4.53	0	N/A	0.65	0.02	0.015	13.46	18	0.27	0.75
A4	I-FG(FTW)	Grate	10	0.52	0.00	0.52	0.49	0.03	N/A	0.62	0.02	0.015	6.03	18	0.12	0.75
A5	I-CU(5')(6" curb)	Curb	10	0.61	0.00	0.61	0.61	0	A4	0.43	0.02	0.015	6.86	18	0.14	0.75
B1	I-CO(20'x5')(6" curb)	Curb	10	4.02	0.00	4.02	4.02	0	B2	1.10	0.02	0.015	11.67	18	0.23	0.75
B2	I-CO(5'x5')(6" curb)	Curb	10	1.43	0.00	1.43	1.17	0.25	N/A	1.10	0.02	0.015	7.92	18	0.16	0.75
B3	I-CU(5')(6" curb)	Curb	10	1.23	0.00	1.23	1.06	0.16	N/A	1.10	0.02	0.015	7.49	18	0.15	0.75
B4	I-CU(20')(6" curb)	Curb	10	6.44	0.00	6.44	6.44	0	N/A	0.40	0.02	0.015	16.82	18	0.34	0.75
B5	I-CU(5')(6" curb)	Curb	10	0.51	0.00	0.51	0.51	0	N/A	0.40	0.02	0.015	6.15	18	0.12	0.75
C1	I-CO(15'x5')(6" curb)	Curb	10	3.83	0.00	3.83	3.78	0.04	C2	2.00	0.02	0.015	10.24	18	0.20	0.75
C2	I-CO(20'x5')(6" curb)	Curb	10	1.16	0.04	1.20	1.2	0	N/A	2.35	0.02	0.015	6.44	18	0.13	0.75
C3	I-CU(15')(6" curb)	Curb	10	0.22	5.50	5.72	5.72	0	N/A	1.01	0.03	0.015	9.62	20	0.33	0.75
C4	I-CU(20')(6" curb)	Curb	10	24.56	0.00	24.56	19.06	5.5	C3	1.01	0.03	0.015	19.35	20	0.52	0.75
C6	I-CU(5')(6" curb)	Curb	10	3.17	0.00	3.17	1.83	1.34	N/A	1.22	0.02	0.015	10.46	8	0.21	0.5
C7	I-CU(5')(6" curb)	Curb	10	1.08	0.00	1.08	0.89	0.2	N/A	2.35	0.02	0.015	6.2	18	0.12	0.75
D1	I-CO(20'x5')(6" curb)	Curb	10	32.91	0.00	32.91	17.69	15.21	D2	2.25	0.02	0.015	22.42	18	0.45	0.75
D2	I-FG(FTW)	Grate	10	2.29	15.21	17.50	8.54	8.96	N/A	2.25	0.02	0.015	17.7	18	0.35	0.75
D3	I-FG(FTW)	Grate	10	1.06	4.29	5.36	4.12	1.24	N/A	1.80	0.03	0.015	9.19	16	0.28	0.75
D4	I-CU(5')(6" curb)	Curb	10	0.51	7.00	7.50	3.21	4.29	D3	1.80	0.04	0.015	9.47	16	0.33	0.75
D5	I-CU(20')(6" curb)	Curb	10	3.74	23.13	26.87	19.88	7	D4	1.80	0.04	0.015	15.27	16	0.53	0.75
D6	I-CU(20')(6" curb)	Curb	10	52.56	0.00	52.56	29.43	23.13	D5	1.80	0.04	0.015	19.63	16	0.69	0.75
D7	I-FG(FTW)	Grate	10	1.04	0.00	1.04	1.02	0.02	N/A	1.80	0.04	0.015	4.52	16	0.16	0.75
D8	I-CU(20')(6" curb)	Curb	10	1.29	0.00	1.29	1.29	0	D7	1.80	0.04	0.015	4.89	16	0.17	0.75
D9	I-CU(20')(6" curb)	Curb	10	4.82	0.00	4.82	4.82	0	N/A	2.25	0.02	0.015	10.92	18	0.22	0.75
E1	I-CU(20')(6" curb)	Curb	10	2.84	0.00	2.84	2.84	0	E2	0.43	0.02	0.015	12.19	18	0.24	0.75
E2	I-CU(20')(6" curb)	Curb	10	4.64	0.00	4.64	4.64	0	N/A	0.43	0.02	0.015	14.65	18	0.29	0.75
E4	I-CU(20')(6" curb)	Curb	10	3.48	0.00	3.48	3.48	0	N/A	0.43	0.02	0.015	13.15	18	0.26	0.75
E5	I-CU(20')(6" curb)	Curb	10	9.15	0.00	9.15	9.15	0	E4	0.43	0.02	0.015	18.89	18	0.38	0.75
E6	I-CU(20')(6" curb)	Curb	10	0.50	0.00	0.50	0.5	0	N/A	0.43	0.02	0.015	6.37	18	0.13	0.75

NOTES:

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2. INLET ELEVATIONS WERE DETERMINED BY SUBTRACTING 6" FROM THE TOP OF EXISTING CURB.

STATE OF TEXAS
ANTHONY SCHNEIDER
71848
LICENSED PROFESSIONAL ENGINEER

Anthony Schneider

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

BU 67K

HYDRAULIC DATA

SHEET 5 OF 8

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	109
CONTROL	SECTION	JOB	
0079	04	049	

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STORM SEWER COMPUTATIONS (CONTD.)

LINE	LINK ID	DESIGN FREQ (YEAR)	FROM	TO	INVERT UP	INVERT DOWN	DRAIN AREA (ACRES)	WEIGHTED RUNOFF "C"	ACCUM "CA"	ACCUM TC (MIN)	INTENSITY (IN/HR)	DISCHARGE (CFS)	CAPACITY (CFS)	HYDRAULIC LENGTH (FT)	LINK SHAPE	NUMBER OF BARRELS	SPAN (FT)	RISE (FT)
A	A1	10	A1	A2	1454.74	1454.65	0.86	0.80	0.69	4.00	6.55	4.18	16.71	85.00	Box	1	3	2
	A2	10	A2	A3	1454.66	1454.58	1.66	0.80	1.33	4.55	6.55	8.72	16.71	74.98	Box	1	3	2
	A3	10	A3	A4	1453.10	1453.03	1.88	0.80	1.50	4.92	6.55	9.82	17.65	64.61	Box	1	3	2
	A4	10	A4	N_RR_OUTLET	1453.03	1453.00	1.88	0.80	1.50	4.96	0.00	0.00	29.06	9.26	Box	1	3	2
	A5	10	A5	A4	1453.53	1453.03	1.88	0.80	1.50	4.92	6.55	9.82	42.00	80.07	Box	1	3	2
B	B1	10	B1	B-JB1	1450.61	1450.06	0.77	0.80	0.62	3.19	6.55	4.02	52.86	55.48	Box	1	3	2
	B2	10	B2	B-JB2	1449.97	1449.77	1.27	0.80	1.02	3.37	6.55	6.26	33.43	50.12	Box	1	3	2
	B3	10	B3	B-JB2	1449.84	1449.77	1.27	0.80	1.02	3.37	6.55	6.26	33.43	19.29	Box	1	3	2
	B4	10	B4	B-JB5	1455.06	1454.95	1.33	0.80	1.06	4.11	6.55	6.95	33.43	26.32	Box	1	3	2
	B5	10	B5	B-JB5	1455.72	1455.54	1.33	0.80	1.06	4.11	6.55	6.95	33.43	44.70	Box	1	3	2
	B-JB1	10	B-JB1	B-JB2	1450.06	1449.77	1.27	0.80	1.02	3.37	6.55	6.26	52.86	29.00	Box	1	3	2
	B-JB2	10	B-JB2	B-JB3	1449.76	1449.61	1.27	0.80	1.02	3.42	6.55	6.26	52.86	16.00	Box	1	3	2
	B-JB3	10	B-JB3	B-JB4	1449.61	1449.49	2.60	0.80	2.08	4.51	6.55	13.21	52.86	11.52	Box	1	3	2
	B-JB4	10	B-JB4	B-JB6	1449.49	1449.15	2.60	0.80	2.08	6.29	6.55	13.21	16.71	344.48	Box	1	3	2
	B-JB5	10	B-JB5	B-JB4	1449.56	1449.49	2.60	0.80	2.08	4.51	6.55	13.21	16.71	65.00	Box	1	3	2
	B-JB6	10	B-JB6	B-JB7	1449.15	1448.96	2.60	0.80	2.08	7.25	6.55	13.21	16.71	186.67	Box	1	3	2
	B-JB7	10	B-JB7	ELM ST-OUTLET	1448.96	1448.94	2.60	0.80	2.08	7.35	0.00	0.00	16.71	19.27	Box	1	3	2
C	C1	10	C1	C-JB6	1460.13	1459.10	0.73	0.80	0.58	3.15	6.55	3.78	74.75	51.95	Box	1	3	2
	C2	10	C2	C-JB5	1458.51	1458.30	1.16	0.80	0.93	3.40	6.55	5.87	33.43	54.78	Box	1	3	2
	C3	10	C3	C-JB3	1459.13	1459.08	7.42	0.60	4.45	15.22	5.51	24.59	33.43	13.69	Box	1	3	2
	C4	10	C4	C-JB2	1459.60	1459.52	7.38	0.60	4.43	15.03	5.55	19.06	40.94	12.62	Box	1	3	2
	C6	10	C6	C-JB4	1459.17	1458.98	8.02	0.62	4.97	15.24	5.51	25.90	33.43	47.47	Box	1	3	2
	C7	10	C7	C-JB5	1458.36	1458.30	1.16	0.80	0.93	3.40	6.55	5.87	33.43	16.80	Box	1	3	2
	C-JB2	10	C-JB2	C-JB3	1459.52	1459.08	7.42	0.60	4.45	15.22	5.51	24.59	40.94	74.09	Box	1	3	2
	C-JB3	10	C-JB3	C-JB4	1459.08	1458.98	8.02	0.62	4.97	15.24	5.51	25.90	52.86	10.00	Box	1	3	2
	C-JB4	10	C-JB4	C-JB7	1458.98	1457.75	9.18	0.64	5.88	15.32	5.50	30.72	75.53	60.19	Box	1	3	2
	C-JB5	10	C-JB5	C-JB9	1458.30	1458.10	1.16	0.80	0.93	3.43	6.55	5.87	74.75	10.00	Box	1	3	2
	C-JB6	10	C-JB6	C-JB5	1459.10	1458.30	1.16	0.80	0.93	3.40	6.55	5.87	74.75	40.00	Box	1	3	2
	C-JB7	10	C-JB7	C-JB8	1457.75	1456.47	9.18	0.64	5.88	16.14	5.50	30.72	33.43	320.77	Box	1	3	2
	C-JB8	10	C-JB8	BLACK_JACK_OUTLET	1456.47	1453.49	9.18	0.64	5.88	16.32	0.00	0.00	79.34	132.12	Box	1	3	2
	C-JB9	10	C-JB9	C-JB7	1458.09	1457.75	9.18	0.64	5.88	15.32	5.50	30.72	74.75	17.23	Box	1	3	2
D	D1	10	D1	D-JB1	1461.95	1461.73	11.16	0.45	5.02	7.16	6.55	17.69	33.43	54.78	Box	1	3	2
	D2	10	D2	D-JB2	1460.71	1460.52	12.52	0.49	6.13	7.42	6.55	31.05	34.89	43.66	Box	1	3	2
	D3	10	D3	D-JB7	1459.48	1459.32	21.24	0.47	9.98	13.47	5.82	57.29	33.43	40.46	Box	1	3	2
	D4	10	D4	D-JB5	1462.52	1462.38	20.84	0.47	9.79	13.37	5.84	52.58	33.43	34.86	Box	1	3	2
	D5	10	D5	D-JB4	1464.13	1464.00	20.74	0.47	9.75	13.19	5.87	49.74	33.43	32.47	Box	1	3	2
	D6	10	D6	D-JB10	1469.56	1469.44	20.03	0.45	9.01	13.08	5.89	30.46	33.43	29.65	Box	1	3	2
	D7	10	D7	D-JB6	1461.05	1461.00	21.03	0.47	9.88	13.43	5.82	53.39	33.43	11.81	Box	1	3	2
	D8	10	D8	D-JB10	1469.48	1469.44	20.03	0.45	9.01	13.08	5.89	30.46	33.43	9.04	Box	1	3	2
	D9	10	D9	D-JB2	1460.62	1460.52	12.52	0.49	6.13	7.42	6.55	31.05	36.27	22.03	Box	1	3	2
	D-JB1	10	D-JB1	D-JB2	1461.73	1460.52	12.52	0.49	6.13	7.42	6.55	31.05	52.86	120.44	Box	1	3	2
	D-JB2	10	D-JB2	D-JB3	1460.52	1460.26	12.52	0.49	6.13	7.47	6.55	31.05	52.86	26.56	Box	1	3	2
	D-JB3	10	D-JB3	D-JB8	1460.26	1460.10	33.76	0.48	16.20	13.50	5.81	83.77	52.86	15.62	Box	1	3	2
	D-JB4	10	D-JB4	D-JB5	1462.69	1462.38	20.84	0.47	9.79	13.37	5.84	52.58	47.81	77.00	Box	1	4	2
	D-JB5	10	D-JB5	D-JB6	1462.38	1461.00	21.03	0.47	9.88	13.43	5.82	53.39	123.25	52.00	Box	1	4	2
	D-JB6	10	D-JB6	D-JB7	1461.00	1459.32	21.24	0.47	9.98	13.47	5.82	57.29	142.30	47.42	Box	1	4	2
	D-JB7	10	D-JB7	D-JB8	1459.32	1458.10	33.76	0.48	16.20	13.50	5.81	83.77	149.94	31.02	Box	1	4	2
	D-JB8	10	D-JB8	D-JB9	1458.10	1456.43	33.76	0.48	16.20	14.00	5.81	83.77	55.16	314.70	Box	1	4	2
	D-JB9	10	D-JB9	LIVE OAK ST-OUTLET	1456.43	1456.28	33.76	0.48	16.20	14.02	0.00	0.00	71.70	16.12	Box	1	4	2
	D-JB10	10	D-JB10	D-JB4	1469.44	1467.00	20.74	0.47	9.75	13.19	5.87	49.74	86.08	92.00	Box	1	3	2

NOTES:

1. HYDRAULIC ANALYSIS ON OUTFALL STREAMS INDICATED ROADWAY OVERTOPPING. PER INVESTIGATION WITH STAKEHOLDERS, MAXIMUM DEPTH OF OVERTOPPING IS APPROXIMATELY 6". FOR HGL CALCULATION, A TAILWATER DEPTH OF ONE FOOT ABOVE ROADWAY ELEVATION AT OUTFALL WAS USED FOR HGL CALCULATIONS.
2. INLET ELEVATIONS WERE DETERMINED BY SUBTRACTING 6" FROM THE TOP OF EXISTING CURB.

STATE OF TEXAS
ANTHONY SCHNEIDER
71848
LICENSED
PROFESSIONAL ENGINEER

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

HYDRAULIC DATA

SHEET 6 OF 8

FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	
CONTROL	SECTION	JOB	110
0079	04	049	

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STORM SEWER COMPUTATIONS (CONTD.)

LINE	LINK ID	DESIGN FREQ (YEAR)	FROM	TO	FRICTION SLOPE (FT/FT)	MANNING'S n-VALUE	SLOPE (%)	UNIFORM DEPTH (FT)	CRITICAL DEPTH (FT)	UNIFORM VELOCITY (FT/S)	ACTUAL VELOCITY UP (FT/S)	ELEV UP (FT)	ELEV DOWN (FT)	HGL UP (FT)	HGL DOWN (FT)
A	A1	10	A1	A2	0.00	0.012	0.10	0.37	0.23	1.70	1.29	1456.74	1456.65	1455.23	1455.21
	A2	10	A2	A3	0.00	0.012	0.10	0.62	0.39	2.25	2.53	1456.66	1456.58	1455.21	1454.97
	A3	10	A3	A4	0.00	0.012	0.11	0.99	0.64	2.94	3.38	1455.10	1455.03	1453.96	1453.79
	A4	10	A4	N_RR_OUTLET	0.00	0.012	0.30	0.76	0.69	4.32	4.32	1455.03	1455.00	1453.79	1453.76
	A5	10	A5	A4	0.01	0.012	0.63	0.10	0.11	2.03	0.65	1455.53	1455.03	1453.85	1453.79
B	B1	10	B1	B-JB1	0.01	0.012	1.00	0.28	0.38	4.75	0.67	1452.61	1452.06	1458.44	1458.43
	B2	10	B2	B-JB2	0.00	0.012	0.40	0.17	0.17	2.25	0.20	1451.97	1451.77	1458.43	1458.43
	B3	10	B3	B-JB2	0.00	0.012	0.40	0.16	0.16	2.19	0.18	1451.84	1451.77	1458.43	1458.43
	B4	10	B4	B-JB5	0.00	0.012	0.40	0.52	0.52	4.14	1.07	1457.06	1456.95	1458.44	1458.44
	B5	10	B5	B-JB5	0.00	0.012	0.40	0.10	0.10	1.65	0.08	1457.72	1457.54	1458.44	1458.44
	B-JB1	10	B-JB1	B-JB2	0.01	0.012	1.00	0.28	0.38	4.75	0.67	1452.06	1451.77	1458.43	1458.43
	B-JB2	10	B-JB2	B-JB3	0.01	0.012	1.00	0.38	0.51	5.56	1.04	1451.76	1451.61	1458.43	1458.43
	B-JB3	10	B-JB3	B-JB4	0.01	0.012	1.00	0.38	0.51	5.56	1.04	1451.61	1451.49	1458.43	1458.42
	B-JB4	10	B-JB4	B-JB6	0.00	0.012	0.10	1.36	0.84	3.23	2.20	1451.49	1451.15	1458.42	1458.21
	B-JB5	10	B-JB5	B-JB4	0.00	0.012	0.10	0.87	0.55	2.67	1.16	1451.56	1451.49	1458.44	1458.42
	B-JB6	10	B-JB6	B-JB7	0.00	0.012	0.10	1.36	0.84	3.23	2.20	1451.15	1450.96	1458.21	1458.09
	B-JB7	10	B-JB7	ELM ST-OUTLET	0.00	0.012	0.10	1.36	0.84	3.23	2.20	1450.96	1450.94	1458.09	1458.08
C	C1	10	C1	C-JB6	0.02	0.012	2.00	0.22	0.37	5.80	1.92	1462.13	1461.10	1460.79	1459.31
	C2	10	C2	C-JB5	0.00	0.012	0.40	0.18	0.17	2.27	0.21	1460.51	1460.30	1460.40	1460.40
	C3	10	C3	C-JB3	0.00	0.012	0.40	0.48	0.48	3.98	1.56	1461.13	1461.08	1460.36	1460.36
	C4	10	C4	C-JB2	0.01	0.012	0.60	0.95	1.08	6.68	3.48	1461.60	1461.52	1461.42	1460.51
	C6	10	C6	C-JB4	0.00	0.012	0.40	0.23	0.23	2.67	0.54	1461.17	1460.98	1460.30	1460.30
	C7	10	C7	C-JB5	0.00	0.012	0.40	0.15	0.14	2.04	0.15	1460.36	1460.30	1460.40	1460.40
	C-JB2	10	C-JB2	C-JB3	0.01	0.012	0.60	0.95	1.08	6.68	5.89	1461.52	1461.08	1460.60	1460.03
	C-JB3	10	C-JB3	C-JB4	0.01	0.012	1.00	0.95	1.28	8.61	6.41	1461.08	1460.98	1460.36	1460.09
	C-JB4	10	C-JB4	C-JB7	0.02	0.012	2.04	0.77	1.32	11.27	6.52	1460.98	1459.75	1460.30	1458.59
	C-JB5	10	C-JB5	C-JB9	0.02	0.012	2.00	0.29	0.49	6.79	0.98	1460.30	1460.10	1460.40	1460.39
	C-JB6	10	C-JB6	C-JB5	0.02	0.012	2.00	0.22	0.37	5.80	0.97	1461.10	1460.30	1460.39	1460.40
	C-JB7	10	C-JB7	C-JB8	0.00	0.012	0.40	1.56	1.48	6.55	5.12	1459.75	1458.47	1460.39	1459.31
	C-JB8	10	C-JB8	BLACK_JACK_OUTLET	0.02	0.012	2.25	0.84	1.48	12.26	5.12	1458.47	1455.49	1459.31	1458.86
	C-JB9	10	C-JB9	C-JB7	0.02	0.012	2.00	0.29	0.49	6.79	0.98	1460.09	1459.75	1460.39	1460.39
D	D1	10	D1	D-JB1	0.00	0.012	0.40	1.04	1.03	5.69	2.95	1463.95	1463.73	1466.84	1466.77
	D2	10	D2	D-JB2	0.00	0.012	0.44	0.61	0.63	4.66	1.42	1462.71	1462.52	1466.65	1466.64
	D3	10	D3	D-JB7	0.00	0.012	0.40	0.39	0.39	3.55	0.69	1461.48	1461.32	1466.67	1466.67
	D4	10	D4	D-JB5	0.00	0.012	0.40	0.33	0.33	3.25	0.53	1464.52	1464.38	1467.16	1467.16
	D5	10	D5	D-JB4	0.00	0.012	0.40	1.13	1.11	5.87	3.31	1466.13	1466.00	1467.54	1467.49
	D6	10	D6	D-JB10	0.00	0.012	0.40	1.52	1.44	6.47	4.91	1471.56	1471.44	1472.07	1470.91
	D7	10	D7	D-JB6	0.00	0.012	0.40	0.16	0.15	2.15	0.17	1463.05	1463.00	1466.91	1466.91
	D8	10	D8	D-JB10	0.00	0.012	0.40	0.18	0.18	2.34	0.30	1471.48	1471.44	1470.91	1470.91
	D9	10	D9	D-JB2	0.00	0.012	0.47	0.41	0.43	3.96	0.80	1462.62	1462.52	1466.64	1466.64
	D-JB1	10	D-JB1	D-JB2	0.01	0.012	1.00	0.75	1.03	7.82	2.95	1463.73	1462.52	1466.77	1466.64
	D-JB2	10	D-JB2	D-JB3	0.01	0.012	1.00	1.12	1.49	9.23	5.18	1462.52	1462.26	1466.64	1466.55
	D-JB3	10	D-JB3	D-JB8	0.01	0.012	1.00	1.12	1.49	9.23	5.18	1462.26	1462.10	1466.55	1466.49
	D-JB4	10	D-JB4	D-JB5	0.00	0.012	0.40	1.67	1.69	7.44	6.22	1464.69	1464.38	1467.49	1467.16
	D-JB5	10	D-JB5	D-JB6	0.03	0.012	2.66	0.90	1.75	14.65	6.57	1464.38	1463.00	1467.16	1466.91
	D-JB6	10	D-JB6	D-JB7	0.04	0.012	3.54	0.82	1.77	16.24	6.67	1463.00	1461.32	1466.91	1466.67
	D-JB7	10	D-JB7	D-JB8	0.04	0.012	3.93	0.83	1.85	17.23	7.16	1461.32	1460.10	1466.67	1466.49
	D-JB8	10	D-JB8	D-JB9	0.01	0.012	0.53	2.00	2.00	10.58	10.47	1460.10	1458.43	1466.49	1462.63
	D-JB9	10	D-JB9	LIVE OAK ST-OUTLET	0.01	0.012	0.90	1.84	2.00	11.38	10.47	1458.43	1458.28	1462.63	1462.43
	D-JB10	10	D-JB10	D-JB4	0.03	0.012	2.65	0.78	1.47	12.96	6.89	1471.44	1469.00	1470.91	1467.83

NOTES:

1. HYDRAULIC ANALYSIS ON OUTFALL STREAMS INDICATED ROADWAY OVERTOPPING. PER INVESTIGATION WITH STAKEHOLDERS, MAXIMUM DEPTH OF OVERTOPPING IS APPROXIMATELY 6". FOR HGL CALCULATION, A TAILWATER DEPTH OF ONE FOOT ABOVE ROADWAY ELEVATION AT OUTFALL WAS USED FOR HGL CALCULATIONS.
2. INLET ELEVATIONS WERE DETERMINED BY SUBTRACTING 6" FROM THE TOP OF EXISTING CURB.

STATE OF TEXAS
ANTHONY SCHNEIDER
71848
LICENSED
PROFESSIONAL ENGINEER

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

HYDRAULIC DATA

SHEET 7 OF 8

FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	
CONTROL	SECTION	JOB	111
0079	04	049	

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STORM SEWER COMPUTATIONS

LINE	LINK ID	DESIGN FREQ (YEAR)	FROM	TO	INVERT UP	INVERT DOWN	DRAIN AREA (ACRES)	WEIGHTED RUNOFF "C"	ACCUM "CA"	ACCUM TC (MIN)	INTENSITY (IN/HR)	DISCHARGE (CFS)	CAPACITY (CFS)	HYDRAULIC LENGTH (FT)	LINK SHAPE	NUMBER OF BARRELS	SPAN (FT)	RISE (FT)
E	E1	10	E1	E2	1499.15	1498.00	2.86	0.40	1.14	5.52	6.55	7.48	33.43	286.99	Box	1	3	2
	E2	10	E2	E3	1492.72	1492.36	8.74	0.40	3.50	5.87	6.55	22.91	33.43	90.50	Box	1	3	2
	E3	10	E3	E-JB6	1492.37	1492.00	8.94	0.40	3.58	5.94	6.55	23.42	52.86	37.36	Box	1	3	2
	E4	10	E4	E3	1499.59	1499.00	8.74	0.40	3.50	5.87	6.55	22.91	33.43	147.50	Box	1	3	2
	E5	10	E5	E4	1499.93	1499.59	4.82	0.40	1.93	4.31	6.55	12.63	33.43	85.00	Box	1	3	2
	E6	10	E6	E-JB6	1494.25	1494.00	8.94	0.40	3.58	5.94	6.55	23.42	33.47	63.03	Box	1	3	2
	E-JB6	10	E-JB6	E-JB7	1490.83	1490.50	8.94	0.40	3.58	7.39	6.55	23.42	16.46	343.03	Box	1	3	2
	E-JB7	10	E-JB7	E-JB8	1490.50	1490.40	8.94	0.40	3.58	7.81	6.55	28.42	16.71	98.15	Box	1	3	2
	E-JB8	10	E-JB8	W VALLEY-OUTLET	1490.40	1490.35	8.94	0.40	3.58	8.00	0.00	0.00	16.71	53.60	Box	1	3	2

STORM SEWER COMPUTATIONS (CONT'D)

LINE	LINK ID	DESIGN FREQ (YEAR)	FROM	TO	FRICTION SLOPE (FT/FT)	MANNING'S n-VALUE	SLOPE (%)	UNIFORM DEPTH (FT)	CRITICAL DEPTH (FT)	UNIFORM VELOCITY (FT/S)	ACTUAL VELOCITY UP (FT/S)	ELEV UP (FT)	ELEV DOWN (FT)	HGL UP (FT)	HGL DOWN (FT)
E	E1	10	E1	E2	0.00	0.012	0.40	0.30	0.30	3.14	1.69	1501.15	1500.00	1499.71	1498.30
	E2	10	E2	E3	0.00	0.012	0.40	0.57	0.58	4.36	1.25	1494.72	1494.36	1494.84	1494.82
	E3	10	E3	E-JB6	0.01	0.012	1.00	0.90	1.22	8.44	3.82	1494.37	1494.00	1494.82	1494.75
	E4	10	E4	E3	0.00	0.012	0.40	0.82	0.82	5.14	5.14	1501.59	1501.00	1500.41	1499.82
	E5	10	E5	E4	0.00	0.012	0.40	0.66	0.66	4.64	2.70	1501.93	1501.59	1501.06	1500.25
	E6	10	E6	E-JB6	0.00	0.012	0.40	0.10	0.10	1.63	0.34	1496.25	1496.00	1494.75	1494.75
	E-JB6	10	E-JB6	E-JB7	0.00	0.012	0.10	2.00	1.24	3.94	3.90	1492.83	1492.50	1494.75	1494.08
	E-JB7	10	E-JB7	E-JB8	0.00	0.012	0.10	2.00	1.24	3.94	3.90	1492.50	1492.40	1494.08	1493.88
	E-JB8	10	E-JB8	W VALLEY-OUTLET	0.00	0.012	0.10	2.00	1.41	4.78	4.74	1492.40	1492.35	1493.88	1493.73

NOTES:

1. HYDRAULIC ANALYSIS ON OUTFALL STREAMS INDICATED ROADWAY OVERTOPPING. PER INVESTIGATION WITH STAKEHOLDERS, MAXIMUM DEPTH OF OVERTOPPING IS APPROXIMATELY 6". FOR HGL CALCULATION, A TAILWATER DEPTH OF ONE FOOT ABOVE ROADWAY ELEVATION AT OUTFALL WAS USED FOR HGL CALCULATIONS.
2. INLET ELEVATIONS WERE DETERMINED BY SUBTRACTING 6" FROM THE TOP OF EXISTING CURB.

STATE OF TEXAS
ANTHONY SCHNEIDER
71848
LICENSED PROFESSIONAL ENGINEER

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

HYDRAULIC DATA

SHEET 8 OF 8

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	112
CONTROL	SECTION	JOB	
0079	04	049	

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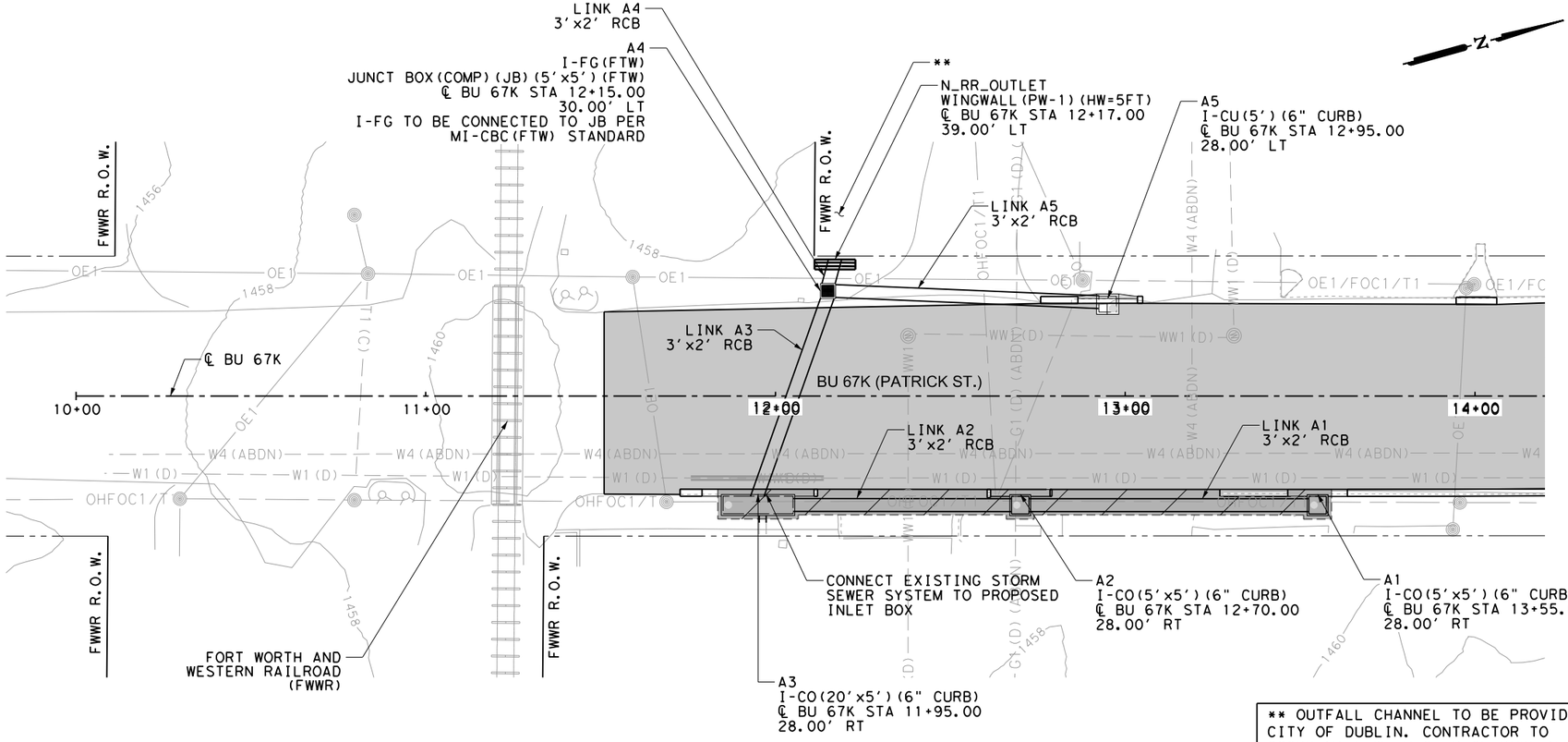


** OUTFALL CHANNEL TO BE PROVIDED BY CITY OF DUBLIN. CONTRACTOR TO COORDINATE WITH CITY OF DUBLIN FOR OUTFALL CHANNEL GRADING.

LEGEND

- EXIST R.O.W.
- DRAINAGE INLET
- DRAINAGE JUNCTION BOX
- DRAINAGE RCB
- TEMPORARY CONSTRUCTION EASEMENT
- 1490 EXIST CONTOUR
- CUT & RESTORE
- T1(C) LUMEN/CENTURYLINK - OVERHEAD QLD
- OE ONCOR ELECTRIC - OVERHEAD QLC
- G1(D) ATMOS ENERGY - GAS QLC
- W1(D) CITY OF DUBLIN - WATER QLC
- WW1 CITY OF DUBLIN - WASTEWATER QLC
- W4(ABDN) CITY OF DUBLIN - ABANDONED WATERLINE

NOTES:

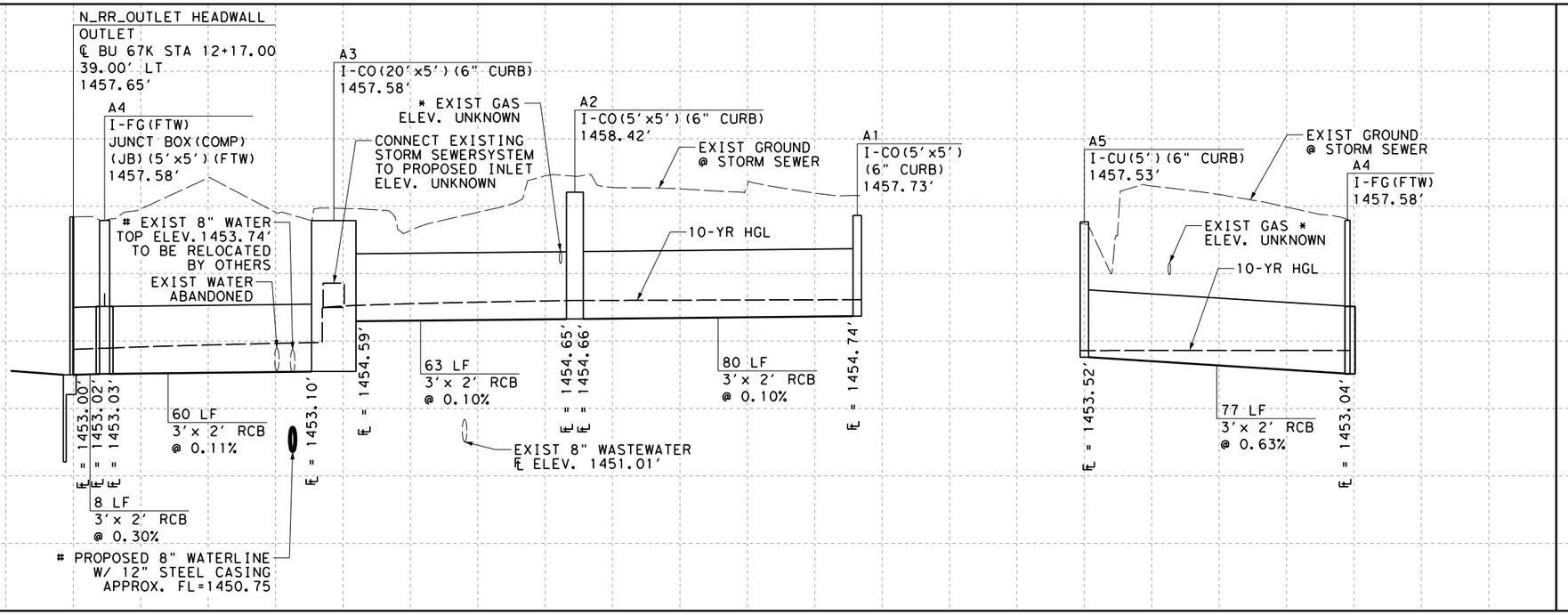
1. REFER TO ROADWAY, TYPICAL SECTIONS, HORIZONTAL ALIGNMENT DATA AND UTILITY SHEETS FOR MORE INFORMATION.
2. THE CONTRACTOR SHALL CUT AND RESTORE PAVEMENT AS SHOWN IN "MDD(FTW)(MOD)" SHEET.

* EXISTING GAS (ABANDONED IN PLACE)

\# APPROXIMATE DEPTH TO TOP OF UTILITY PROVIDED BY CITY OF DUBLIN. TO BE VERIFIED BY CONTRACTOR PRIOR TO THE START OF CONSTRUCTION.

0 20' 40'

SCALE: 1" = 40' HORZ
1" = 4' VERT



ANTHONY SCHNEIDER
71848
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

BU 67K

STORM SEWER PLAN & PROFILE
SYSTEM "A" (N. OF FWWR)

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	113
CONTROL	SECTION	JOB	
0079	04	049	

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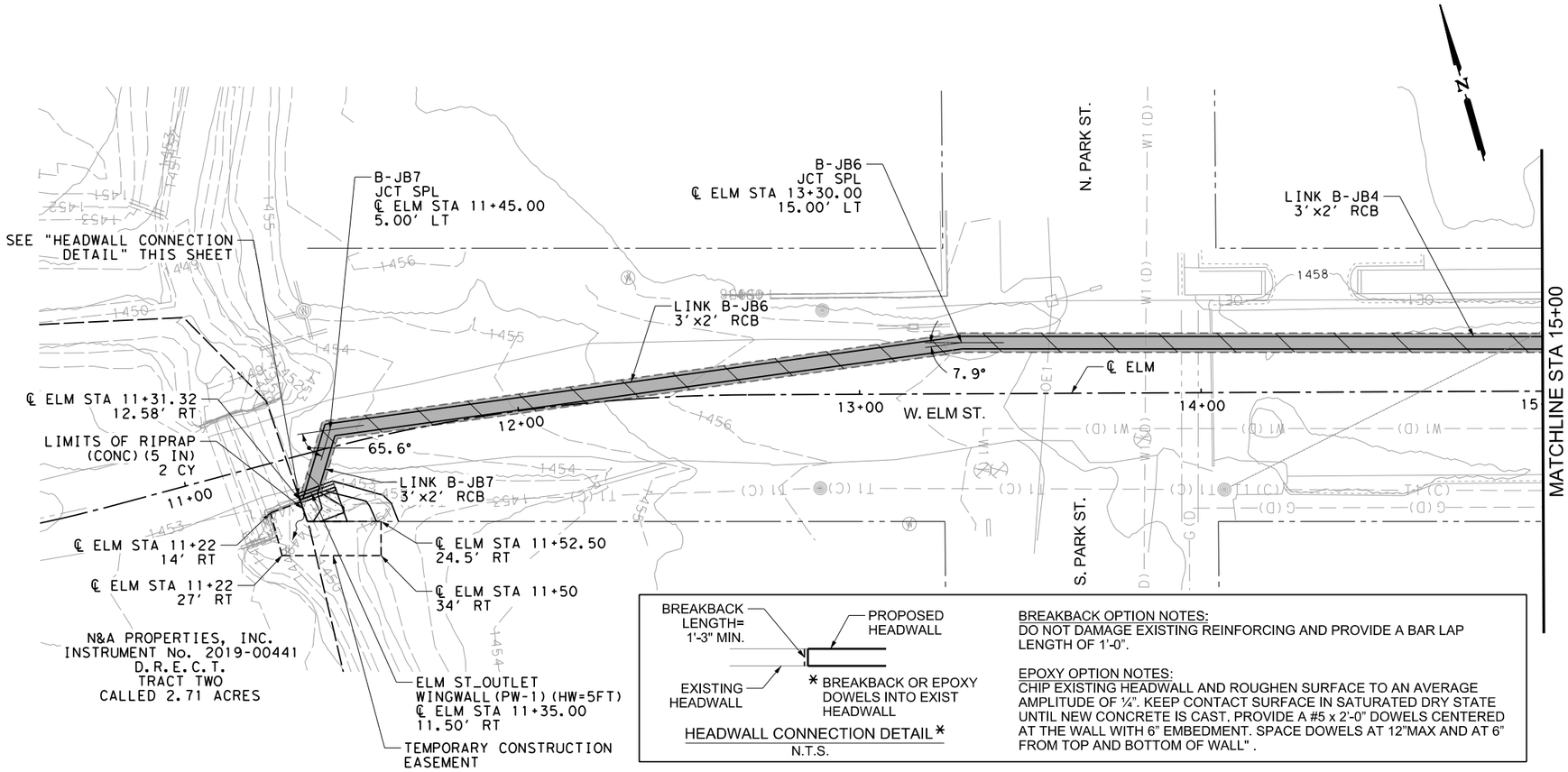


HEADWALL CONNECTION DETAIL *
N.T.S.

BREAKBACK OPTION NOTES:
DO NOT DAMAGE EXISTING REINFORCING AND PROVIDE A BAR LAP LENGTH OF 1'-0".

EPOXY OPTION NOTES:
CHIP EXISTING HEADWALL AND ROUGHEN SURFACE TO AN AVERAGE AMPLITUDE OF ¼". KEEP CONTACT SURFACE IN SATURATED DRY STATE UNTIL NEW CONCRETE IS CAST. PROVIDE A #5 x 2'-0" DOWELS CENTERED AT THE WALL WITH 6" EMBEDMENT. SPACE DOWELS AT 12"MAX AND AT 6" FROM TOP AND BOTTOM OF WALL" .

LEGEND

- EXIST R.O.W.
- DRAINAGE INLET
- DRAINAGE JUNCTION BOX
- DRAINAGE RCB
- TEMPORARY CONSTRUCTION EASEMENT
- 1490 EXIST CONTOUR
- CUT & RESTORE
- T1 (C) LUMEN/CENTURYLINK - OVERHEAD QLD
- OE ONCOR ELECTRIC - OVERHEAD QLC
- G1 (D) ATMOS ENERGY - GAS QLC
- W1 (D) CITY OF DUBLIN - WATER QLC
- WW1 CITY OF DUBLIN - WASTEWATER QLC
- W4 (ABDN) CITY OF DUBLIN - ABANDONED WATERLINE

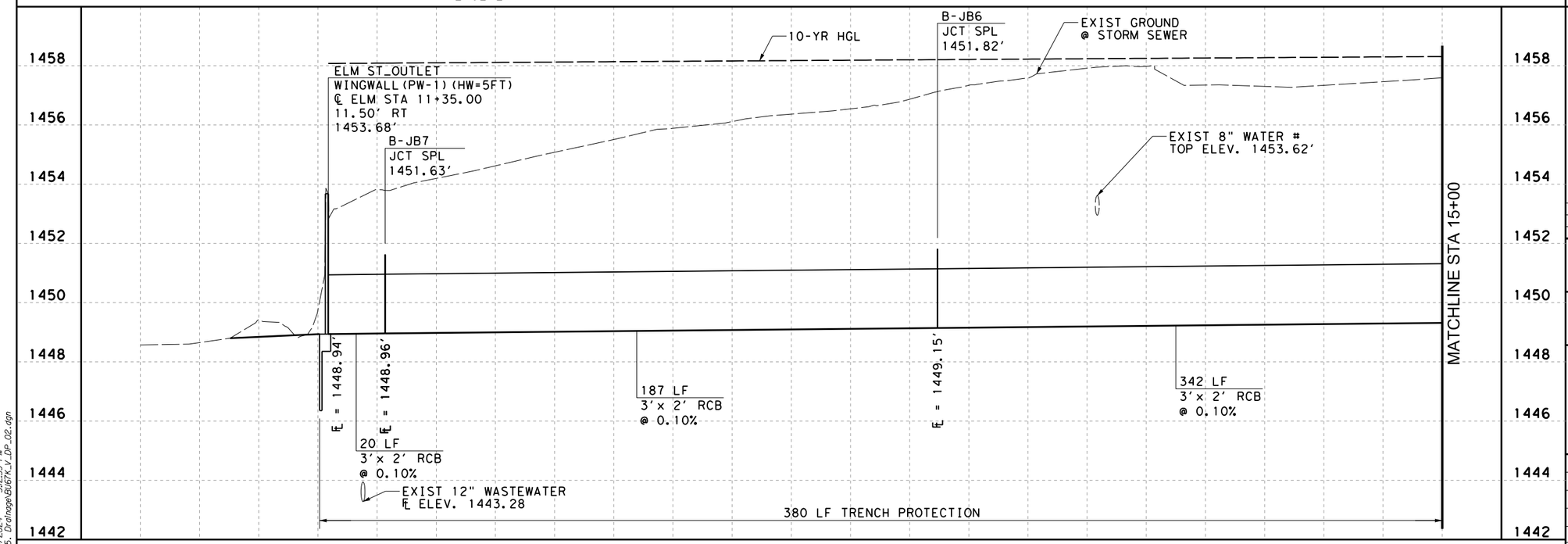
NOTES:

1. REFER TO ROADWAY, TYPICAL SECTIONS, HORIZONTAL ALIGNMENT DATA AND UTILITY SHEETS FOR MORE INFORMATION.
2. THE CONTRACTOR SHALL CUT AND RESTORE PAVEMENT AS SHOWN IN "MDD(FTW)(MOD)" SHEET.

* EXISTING GAS (ABANDONED IN PLACE)

\# APPROXIMATE DEPTH TO TOP OF UTILITY PROVIDED BY CITY OF DUBLIN. TO BE VERIFIED BY CONTRACTOR PRIOR TO THE START OF CONSTRUCTION.

0 20' 40'
SCALE: 1" = 40' HORZ
1" = 4' VERT



STATE OF TEXAS
ANTHONY SCHNEIDER
71848
LICENSED PROFESSIONAL ENGINEER
7/13/2024

NO.	DATE	REVISION	APPROVED

VRX

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

BU 67K

STORM SEWER PLAN & PROFILE
SYSTEM "B" (ELM STREET)

SHEET 1 OF 2

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	114
CONTROL	SECTION	JOB	
0079	04	049	

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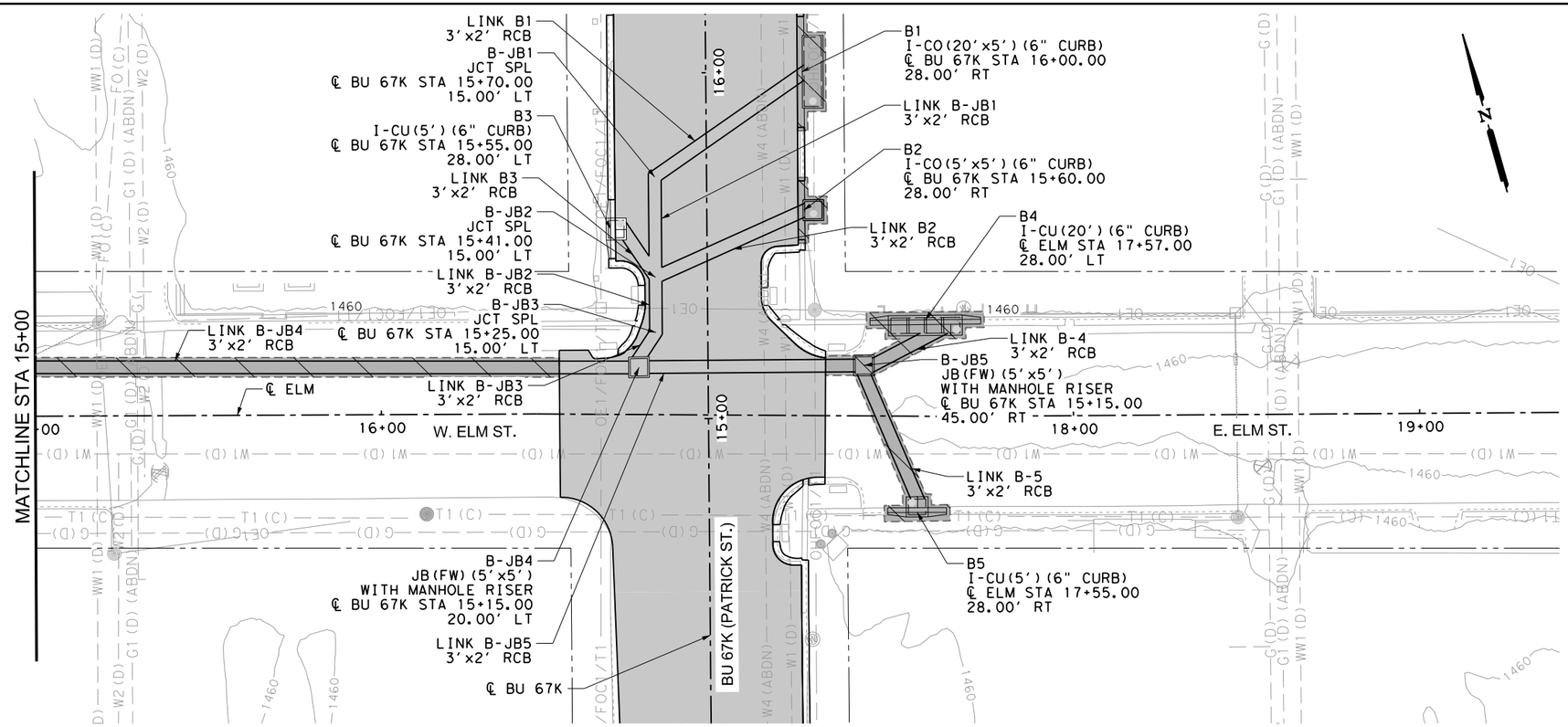


LEGEND

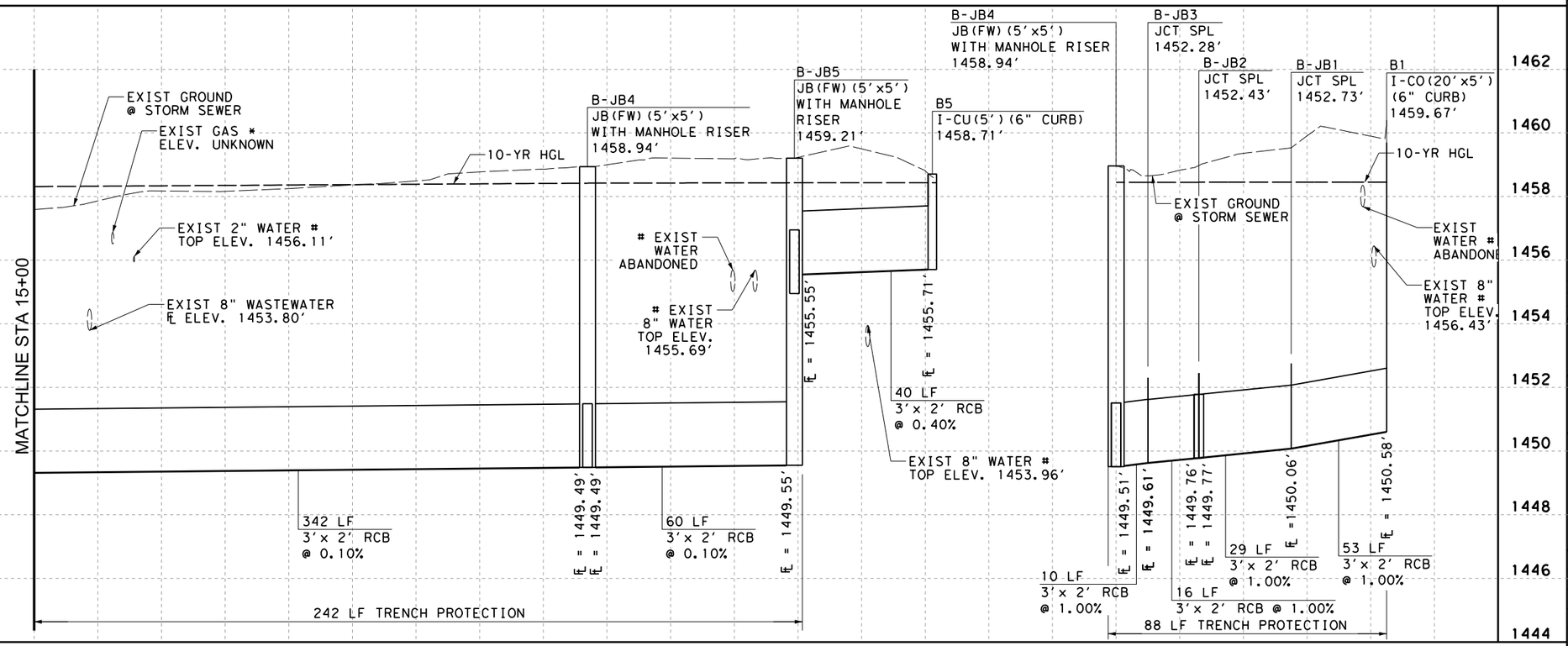
- EXIST R.O.W.
- DRAINAGE INLET
- DRAINAGE JUNCTION BOX
- DRAINAGE RCB
- TEMPORARY CONSTRUCTION EASEMENT
- 1490 EXIST CONTOUR
- CUT & RESTORE
- T1 (C) LUMEN/CENTURYLINK - OVERHEAD QLD
- OE ONCOR ELECTRIC - OVERHEAD QLC
- G1 (D) ATMOS ENERGY - GAS QLC
- W1 (D) CITY OF DUBLIN - WATER QLC
- WW1 CITY OF DUBLIN - WASTEWATER QLC
- W4 (ABDN) CITY OF DUBLIN - ABANDONED WATERLINE

NOTES:

1. REFER TO ROADWAY, TYPICAL SECTIONS, HORIZONTAL ALIGNMENT DATA AND UTILITY SHEETS FOR MORE INFORMATION.
2. THE CONTRACTOR SHALL CUT AND RESTORE PAVEMENT AS SHOWN IN "MDD(FTW)(MOD)" SHEET.

* EXISTING GAS (ABANDONED IN PLACE)

\# APPROXIMATE DEPTH TO TOP OF UTILITY PROVIDED BY CITY OF DUBLIN. TO BE VERIFIED BY CONTRACTOR PRIOR TO THE START OF CONSTRUCTION.



0 20' 40'

SCALE: 1" = 40' HORZ
1" = 4' VERT

STATE OF TEXAS
ANTHONY SCHNEIDER
71848
LICENSED
PROFESSIONAL ENGINEER

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

STORM SEWER PLAN & PROFILE SYSTEM "B" (ELM STREET)

SHEET 2 OF 2

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	115
CONTROL	SECTION	JOB	
0079	04	049	

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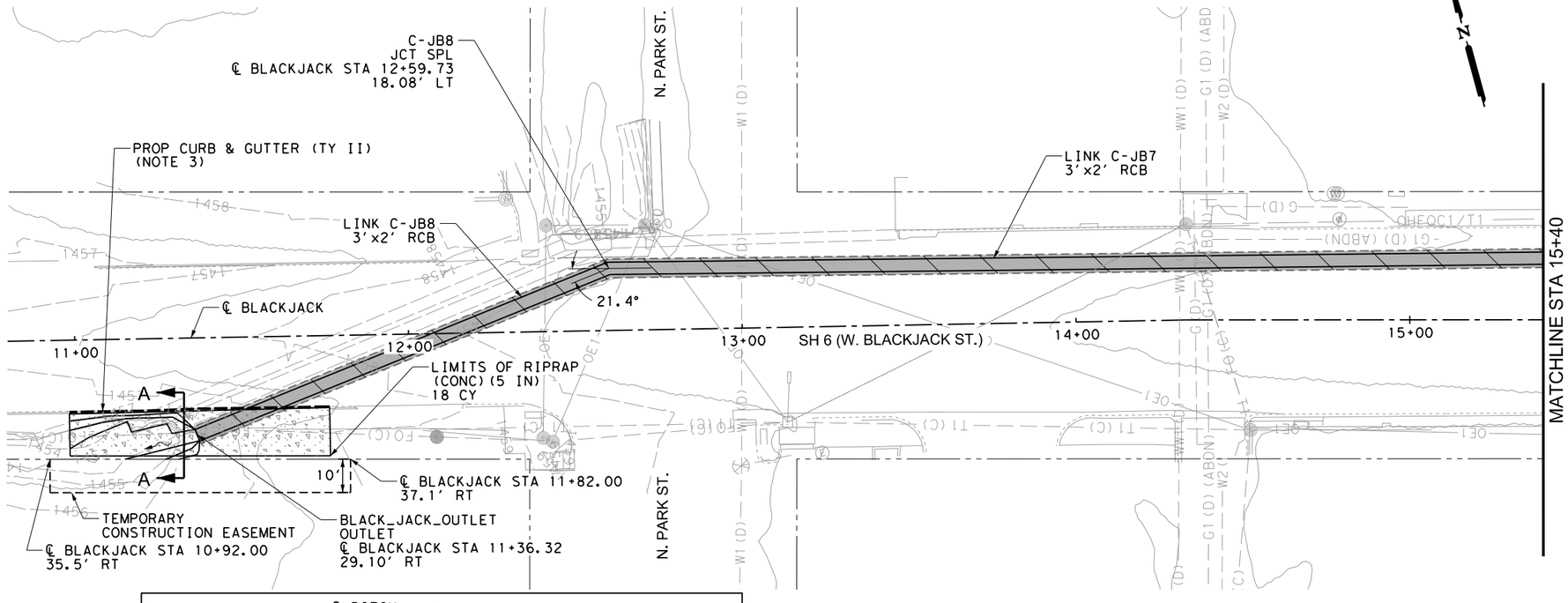
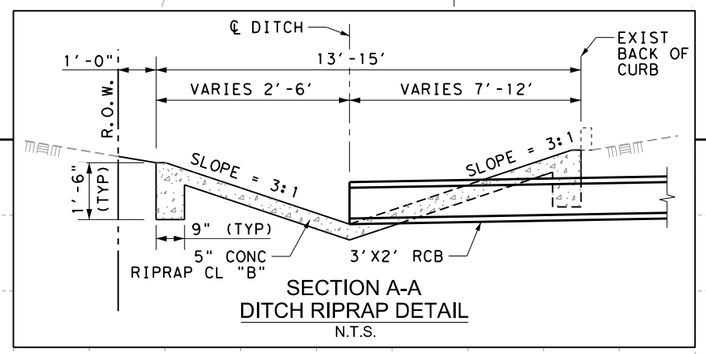
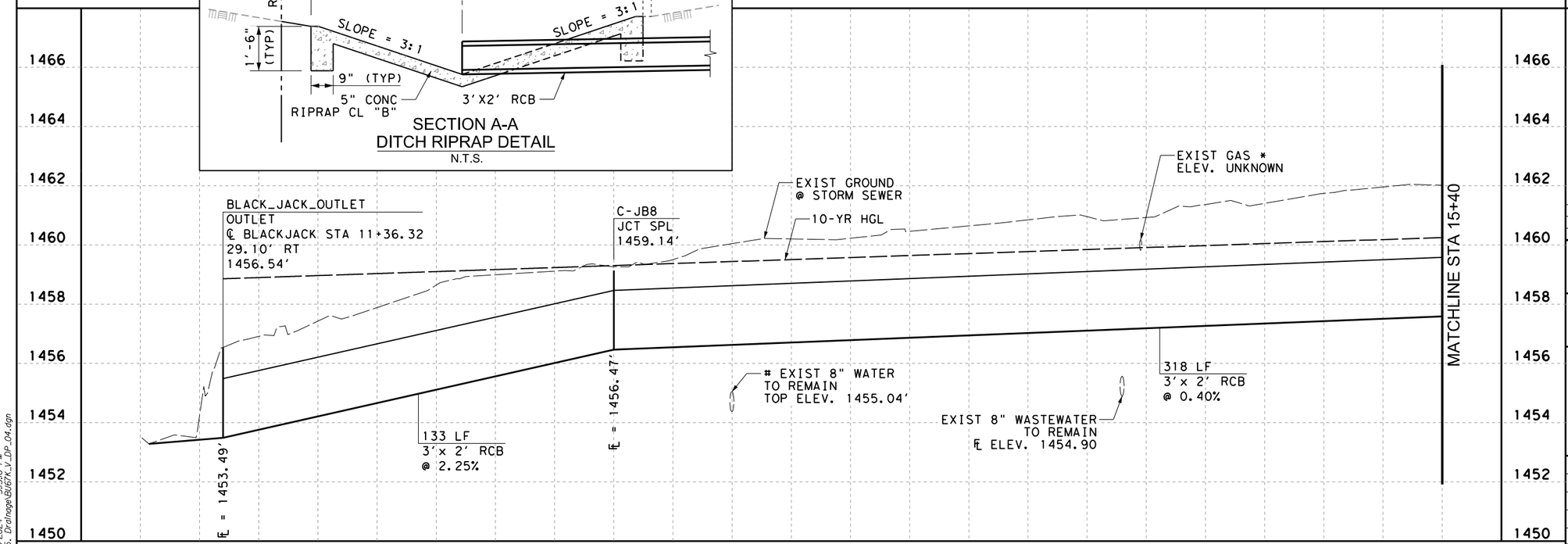




SECTION A-A
DITCH RIPRAP DETAIL
N.T.S.



LEGEND

- EXIST R.O.W.
- DRAINAGE INLET
- DRAINAGE JUNCTION BOX
- DRAINAGE RCB
- TEMPORARY CONSTRUCTION EASEMENT
- 1490 EXIST CONTOUR
- CUT & RESTORE
- T1 (C) LUMEN/CENTURYLINK - OVERHEAD QLD
- OE ONCOR ELECTRIC - OVERHEAD QLC
- G1 (D) ATMOS ENERGY - GAS QLC
- W1 (D) CITY OF DUBLIN - WATER QLC
- WW1 CITY OF DUBLIN - WASTEWATER QLC
- W4 (ABDN) CITY OF DUBLIN - ABANDONED WATERLINE

NOTES:

1. REFER TO ROADWAY, TYPICAL SECTIONS, HORIZONTAL ALIGNMENT DATA AND UTILITY SHEETS FOR MORE INFORMATION.
2. THE CONTRACTOR SHALL CUT AND RESTORE PAVEMENT AS SHOWN IN "MDD(FTW)(MOD)" SHEET.

* EXISTING GAS (ABANDONED IN PLACE)

\# APPROXIMATE DEPTH TO TOP OF UTILITY PROVIDED BY CITY OF DUBLIN. TO BE VERIFIED BY CONTRACTOR PRIOR TO THE START OF CONSTRUCTION.

3. CONTRACTOR SHALL CONSTRUCT CURB AND GUTTER (TY II) WITHIN THE PROPOSED RIPRAP LIMIT WITH 1' SLOT OPENINGS AT EVERY 4'. THIS WILL NOT BE PAID FOR SEPARATELY AND WILL BE SUBSIDIARY TO ITEM 400-6006 (CUT & RESTORING PAV).

0 20' 40'
SCALE: 1" = 40' HORZ
1" = 4' VERT

STATE OF TEXAS
ANTHONY SCHNEIDER
71848
LICENSED
PROFESSIONAL ENGINEER
7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

STORM SEWER PLAN & PROFILE
SYSTEM "C"
(SH 6 / BLACKJACK STREET)

SHEET 1 OF 2

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	
CONTROL	SECTION	JOB	116
0079	04	049	

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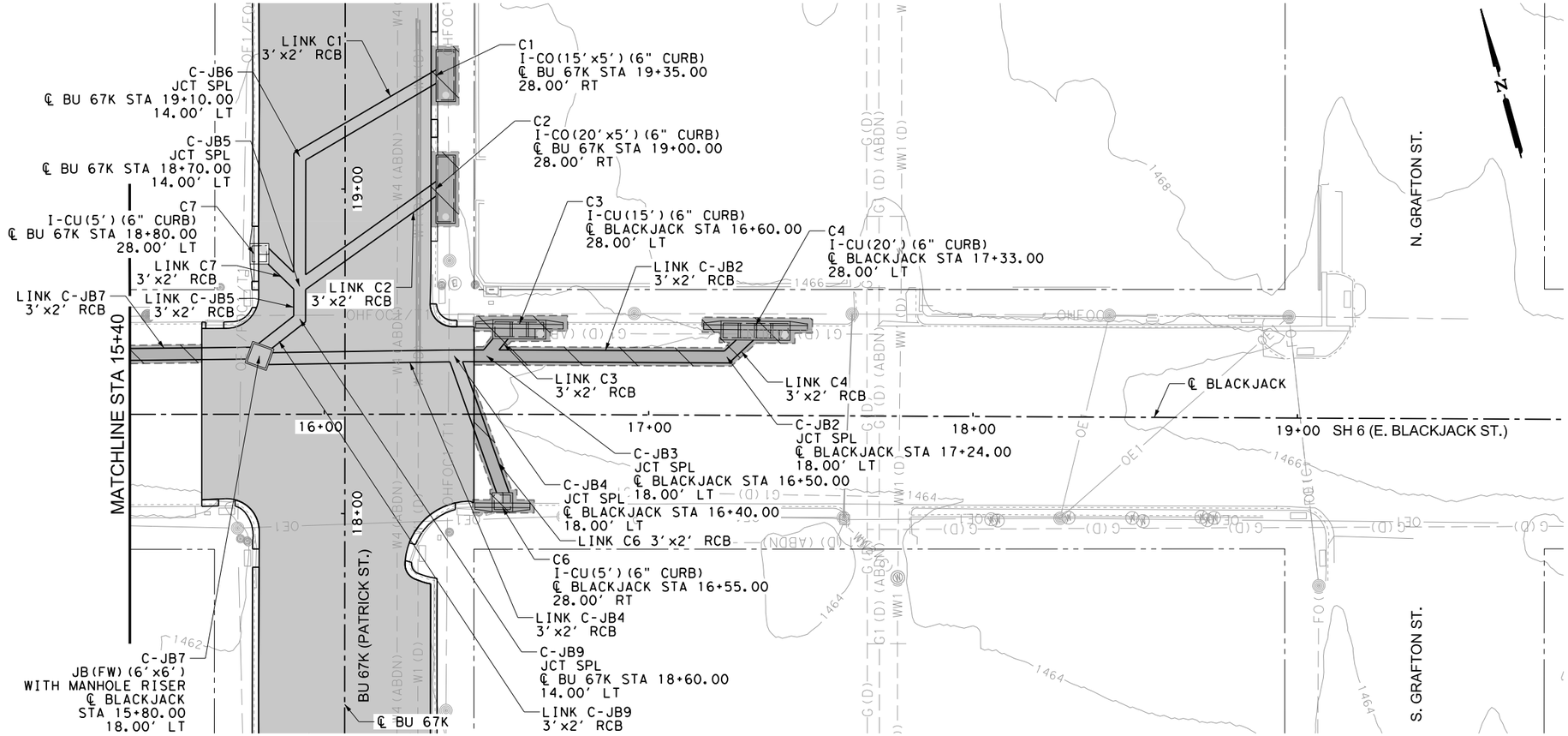


LEGEND

- EXIST R.O.W.
- DRAINAGE INLET
- DRAINAGE JUNCTION BOX
- DRAINAGE RCB
- TEMPORARY CONSTRUCTION EASEMENT
- 1490 EXIST CONTOUR
- CUT & RESTORE
- T1 (C) LUMEN/CENTURYLINK - OVERHEAD QLD
- OE ONCOR ELECTRIC - OVERHEAD QLC
- G1 (D) ATMOS ENERGY - GAS QLC
- W1 (D) CITY OF DUBLIN - WATER QLC
- WW1 CITY OF DUBLIN - WASTEWATER QLC
- W4 (ABDN) CITY OF DUBLIN - ABANDONED WATERLINE

NOTES:

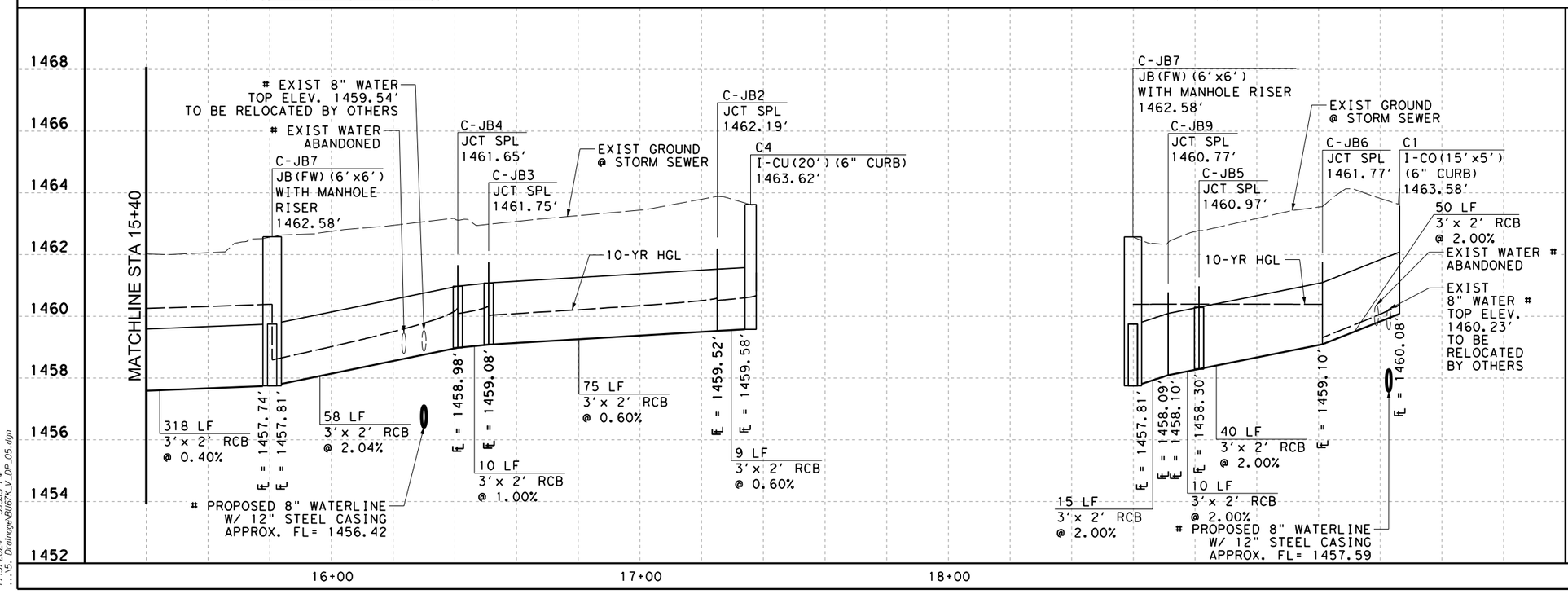
1. REFER TO ROADWAY, TYPICAL SECTIONS, HORIZONTAL ALIGNMENT DATA AND UTILITY SHEETS FOR MORE INFORMATION.
2. THE CONTRACTOR SHALL CUT AND RESTORE PAVEMENT AS SHOWN IN "MDD(FTW)(MOD)" SHEET.

* EXISTING GAS (ABANDONED IN PLACE)

\# APPROXIMATE DEPTH TO TOP OF UTILITY PROVIDED BY CITY OF DUBLIN. TO BE VERIFIED BY CONTRACTOR PRIOR TO THE START OF CONSTRUCTION.

0 20' 40'

SCALE: 1" = 40' HORZ
1" = 4' VERT



STATE OF TEXAS
ANTHONY SCHNEIDER
71848
LICENSED
PROFESSIONAL ENGINEER

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

STORM SEWER PLAN & PROFILE SYSTEM "C" SH 6 / BLACKJACK STREET

SHEET 2 OF 2

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	117
CONTROL	SECTION	JOB	
0079	04	049	

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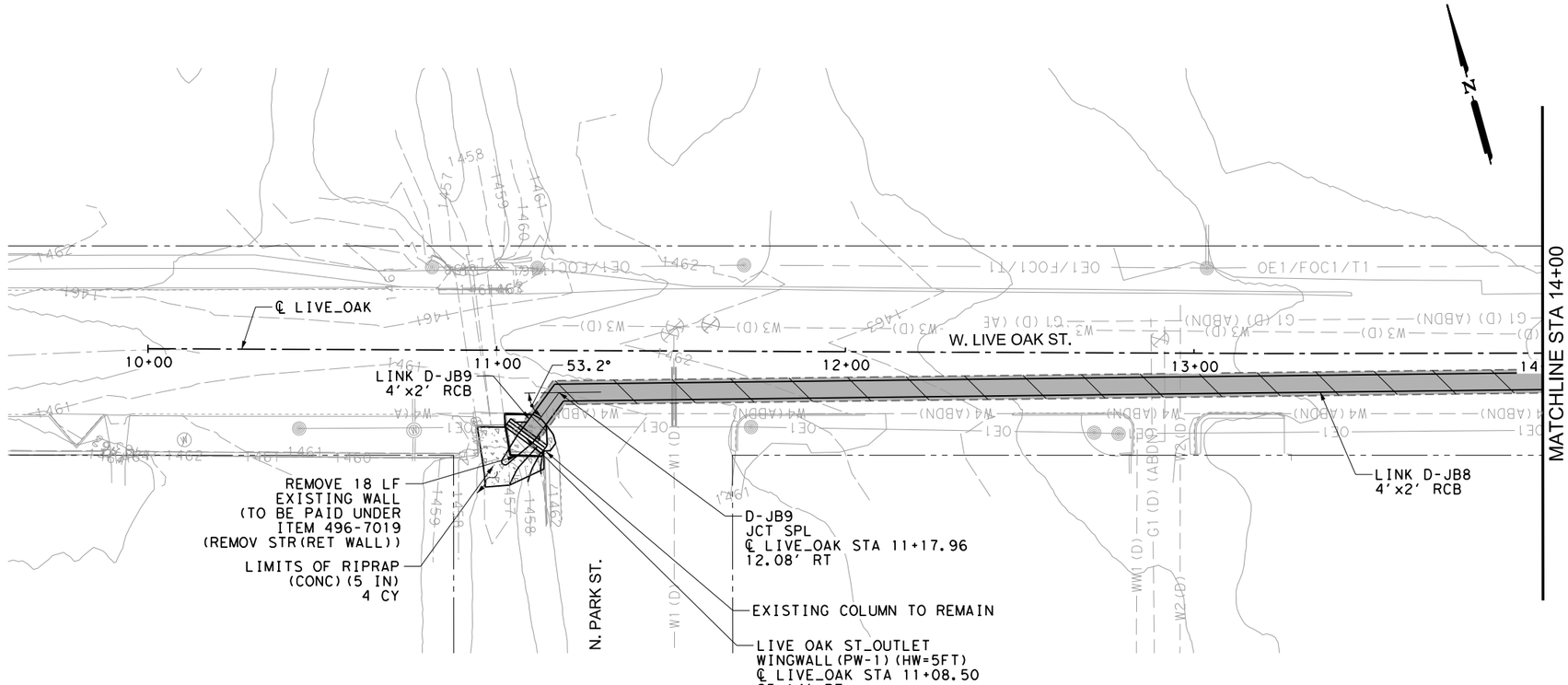

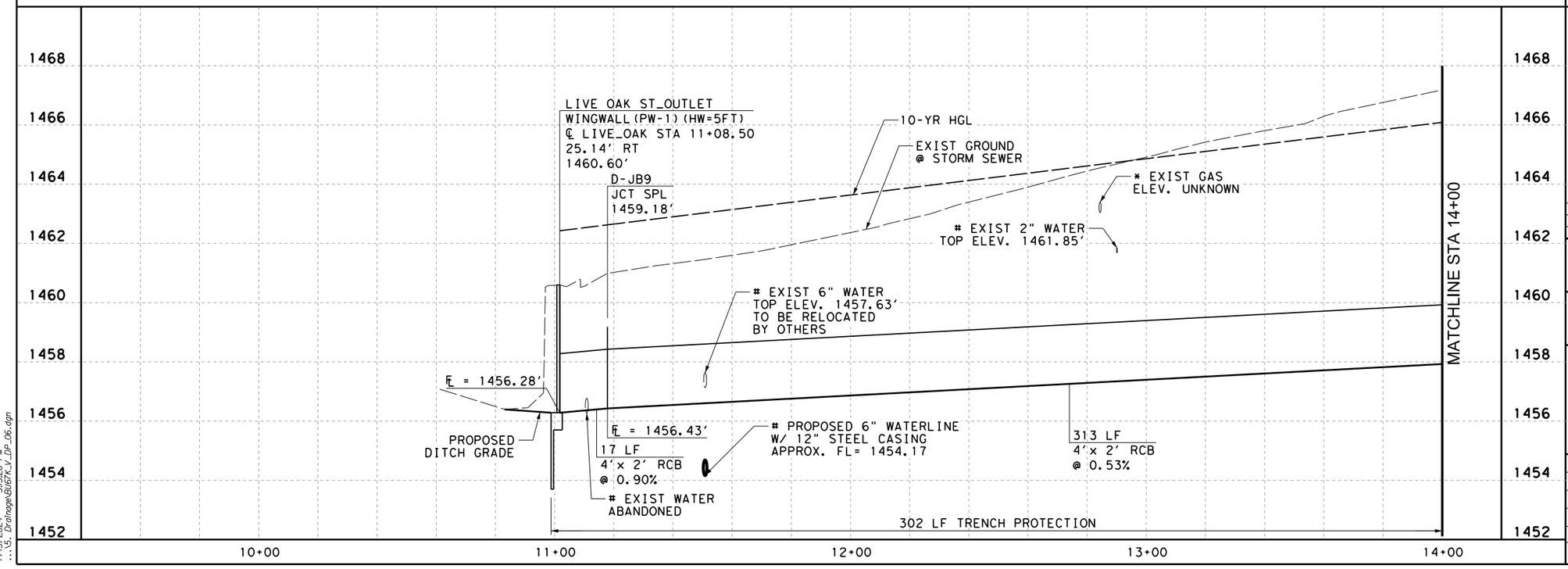

LEGEND

- EXIST R.O.W.
- DRAINAGE INLET
- DRAINAGE JUNCTION BOX
- DRAINAGE RCB
- TEMPORARY CONSTRUCTION EASEMENT
- 1490 EXIST CONTOUR
- CUT & RESTORE
- T1 (C) LUMEN/CENTURYLINK - OVERHEAD QLD
- OE ONCOR ELECTRIC - OVERHEAD QLC
- G1 (D) ATMOS ENERGY - GAS QLC
- W1 (D) CITY OF DUBLIN - WATER QLC
- WW1 CITY OF DUBLIN - WASTEWATER QLC
- W4 (ABDN) CITY OF DUBLIN - ABANDONED WATERLINE

NOTES:

1. REFER TO ROADWAY, TYPICAL SECTIONS, HORIZONTAL ALIGNMENT DATA AND UTILITY SHEETS FOR MORE INFORMATION.
2. THE CONTRACTOR SHALL CUT AND RESTORE PAVEMENT AS SHOWN IN "MDD(FTW)(MOD)" SHEET.

* EXISTING GAS (ABANDONED IN PLACE)

\# APPROXIMATE DEPTH TO TOP OF UTILITY PROVIDED BY CITY OF DUBLIN. TO BE VERIFIED BY CONTRACTOR PRIOR TO THE START OF CONSTRUCTION.

0 20' 40'

SCALE: 1" = 40' HORZ
1" = 4' VERT

STATE OF TEXAS
ANTHONY SCHNEIDER
71848
LICENSED
PROFESSIONAL ENGINEER

Anthony Schneider

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

STORM SEWER PLAN & PROFILE SYSTEM "D" (LIVE OAK STREET)

SHEET 1 OF 2

FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	
CONTROL	SECTION	JOB	118
0079	04	049	

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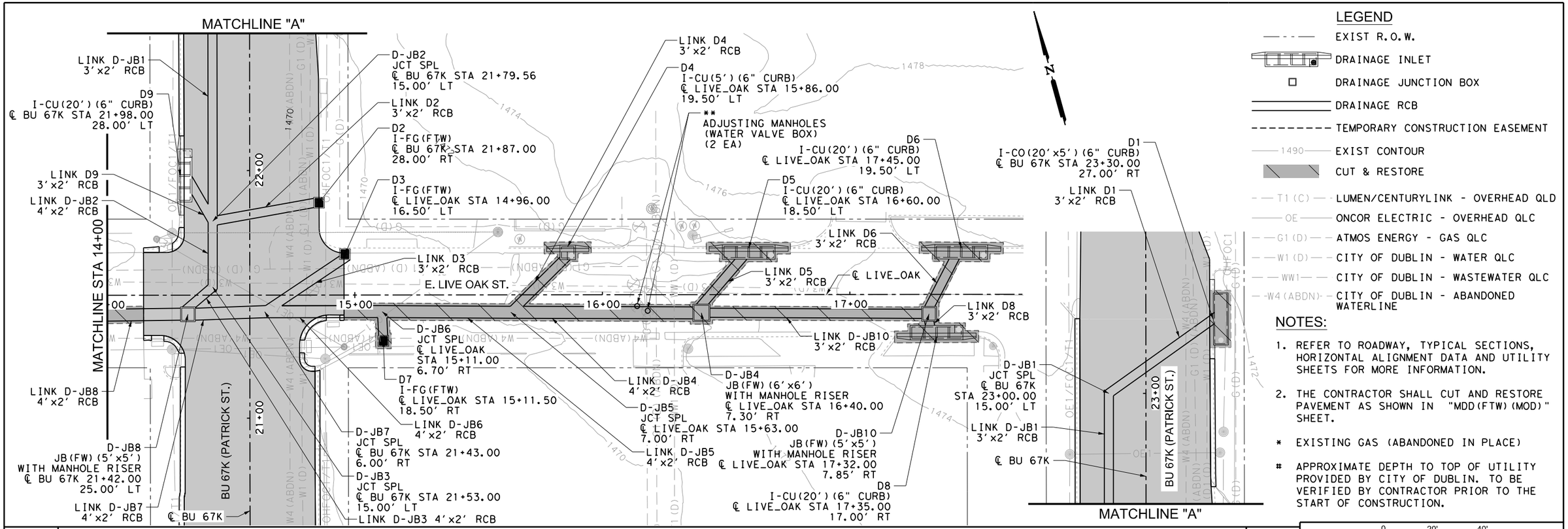
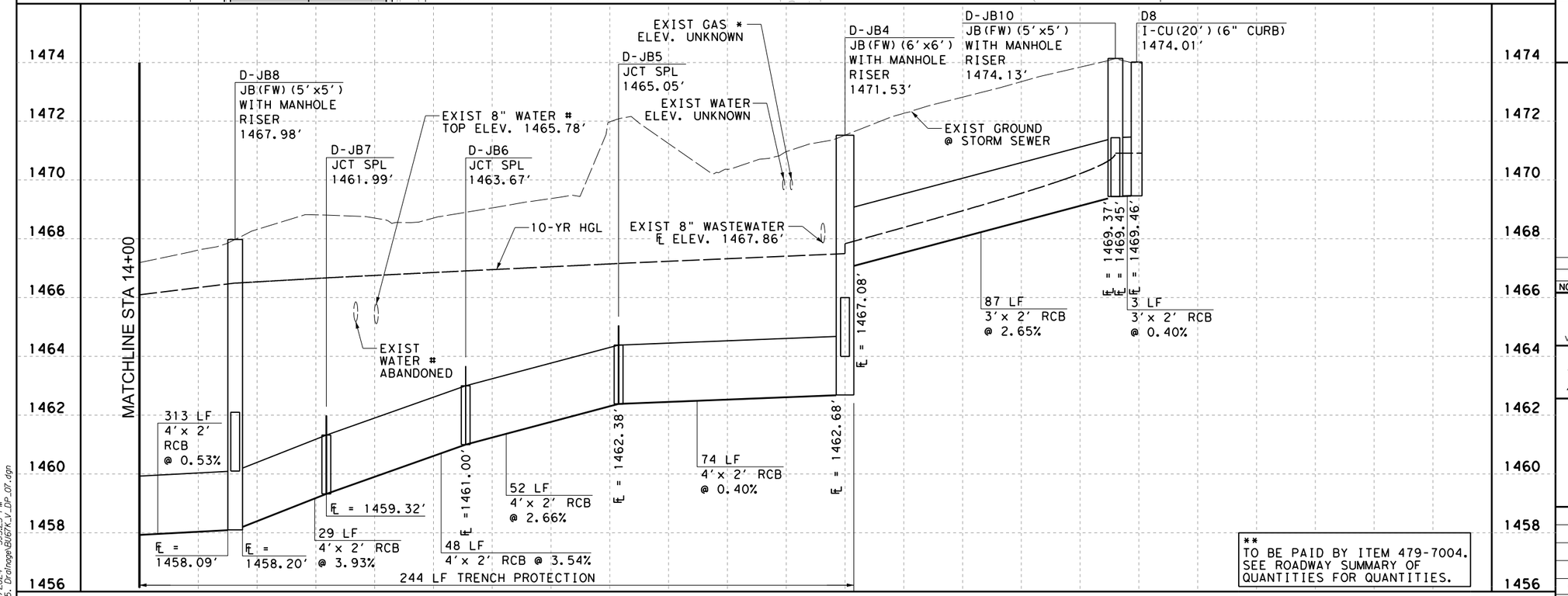


NOTES:

1. REFER TO ROADWAY, TYPICAL SECTIONS, HORIZONTAL ALIGNMENT DATA AND UTILITY SHEETS FOR MORE INFORMATION.
2. THE CONTRACTOR SHALL CUT AND RESTORE PAVEMENT AS SHOWN IN "MDD(FTW)(MOD)" SHEET.

* EXISTING GAS (ABANDONED IN PLACE)

\# APPROXIMATE DEPTH TO TOP OF UTILITY PROVIDED BY CITY OF DUBLIN. TO BE VERIFIED BY CONTRACTOR PRIOR TO THE START OF CONSTRUCTION.



** TO BE PAID BY ITEM 479-7004. SEE ROADWAY SUMMARY OF QUANTITIES FOR QUANTITIES.

0 20' 40'

SCALE: 1" = 40' HORZ
1" = 4' VERT

STATE OF TEXAS
ANTHONY SCHNEIDER
71848
LICENSED PROFESSIONAL ENGINEER

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

BU 67K

STORM SEWER PLAN & PROFILE
SYSTEM "D" (LIVE OAK STREET)

SHEET 2 OF 2

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	119
CONTROL	SECTION	JOB	
0079	04	049	

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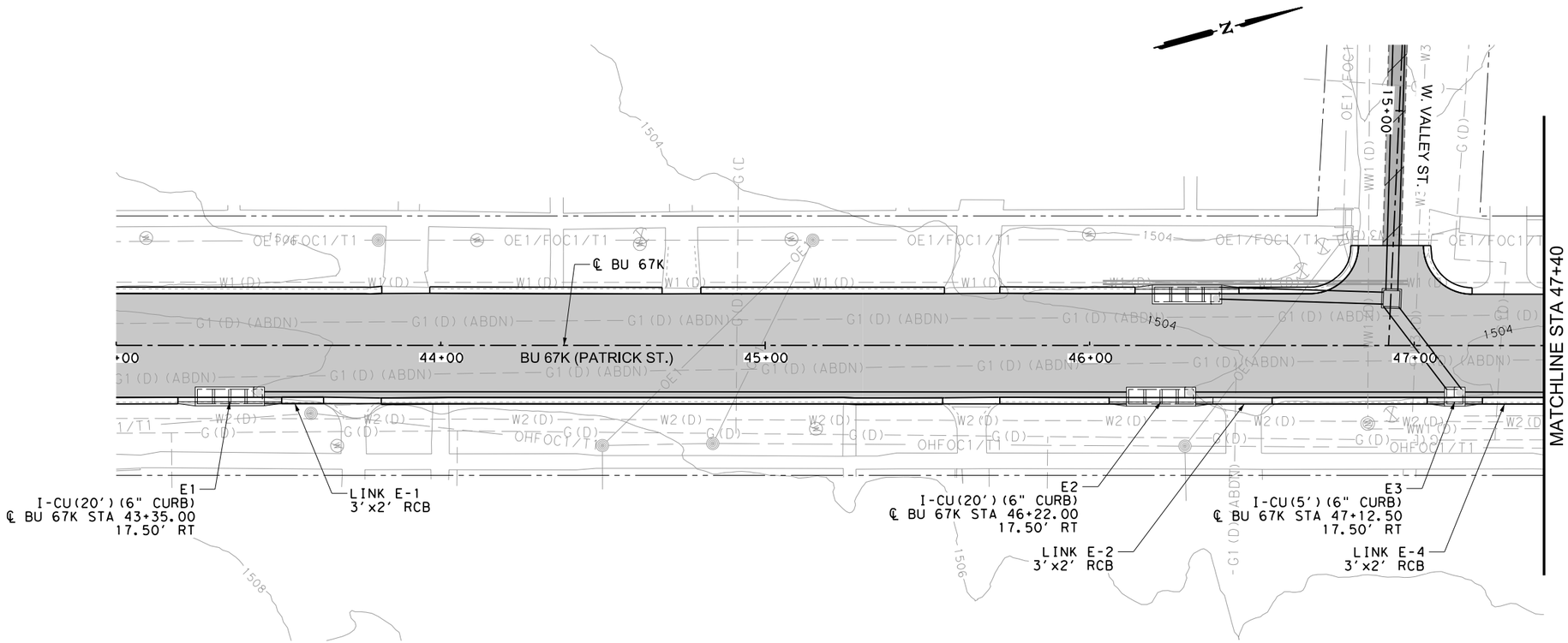


LEGEND

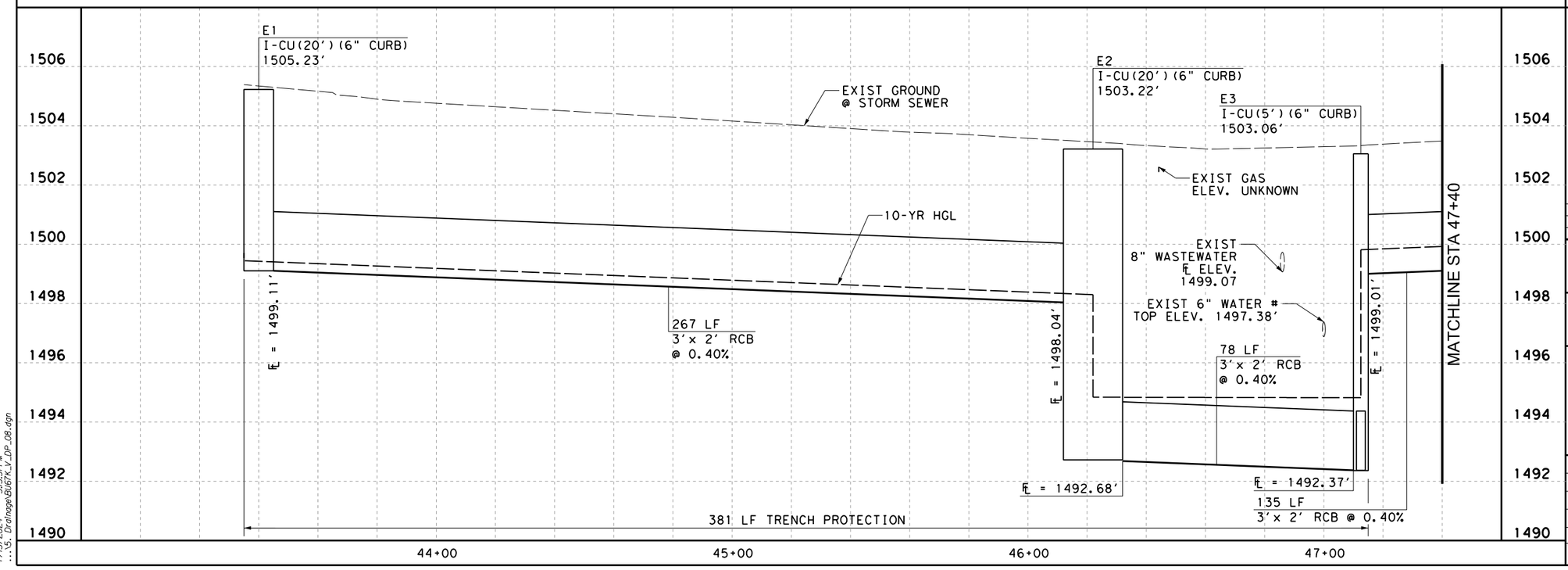
- EXIST R.O.W.
- DRAINAGE INLET
- DRAINAGE JUNCTION BOX
- DRAINAGE RCB
- TEMPORARY CONSTRUCTION EASEMENT
- 1490 EXIST CONTOUR
- CUT & RESTORE
- T1 (C) LUMEN/CENTURYLINK - OVERHEAD QLD
- OE ONCOR ELECTRIC - OVERHEAD QLC
- G1 (D) ATMOS ENERGY - GAS QLC
- W1 (D) CITY OF DUBLIN - WATER QLC
- WW1 CITY OF DUBLIN - WASTEWATER QLC
- W4 (ABDN) CITY OF DUBLIN - ABANDONED WATERLINE

NOTES:

1. REFER TO ROADWAY, TYPICAL SECTIONS, HORIZONTAL ALIGNMENT DATA AND UTILITY SHEETS FOR MORE INFORMATION.
2. THE CONTRACTOR SHALL CUT AND RESTORE PAVEMENT AS SHOWN IN "MDD(FTW)(MOD)" SHEET.

* EXISTING GAS (ABANDONED IN PLACE)

\# APPROXIMATE DEPTH TO TOP OF UTILITY PROVIDED BY CITY OF DUBLIN. TO BE VERIFIED BY CONTRACTOR PRIOR TO THE START OF CONSTRUCTION.



0 20' 40'

SCALE: 1" = 40' HORZ
1" = 4' VERT

STATE OF TEXAS
ANTHONY SCHNEIDER
71848
LICENSED
PROFESSIONAL ENGINEER

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

BU 67K

STORM SEWER PLAN & PROFILE SYSTEM "E" (W VALLEY STREET)

SHEET 1 OF 4

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	120
CONTROL	SECTION	JOB	
0079	04	049	

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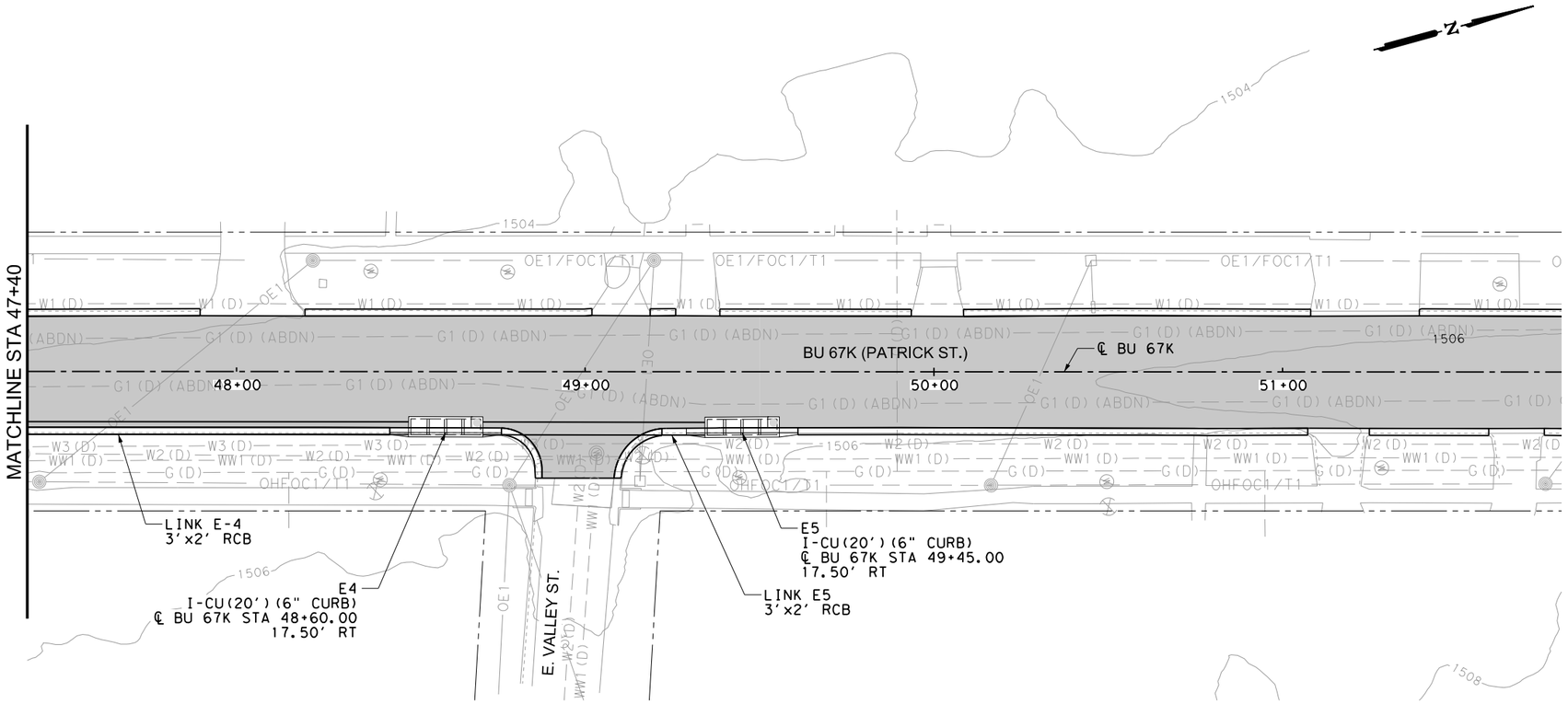

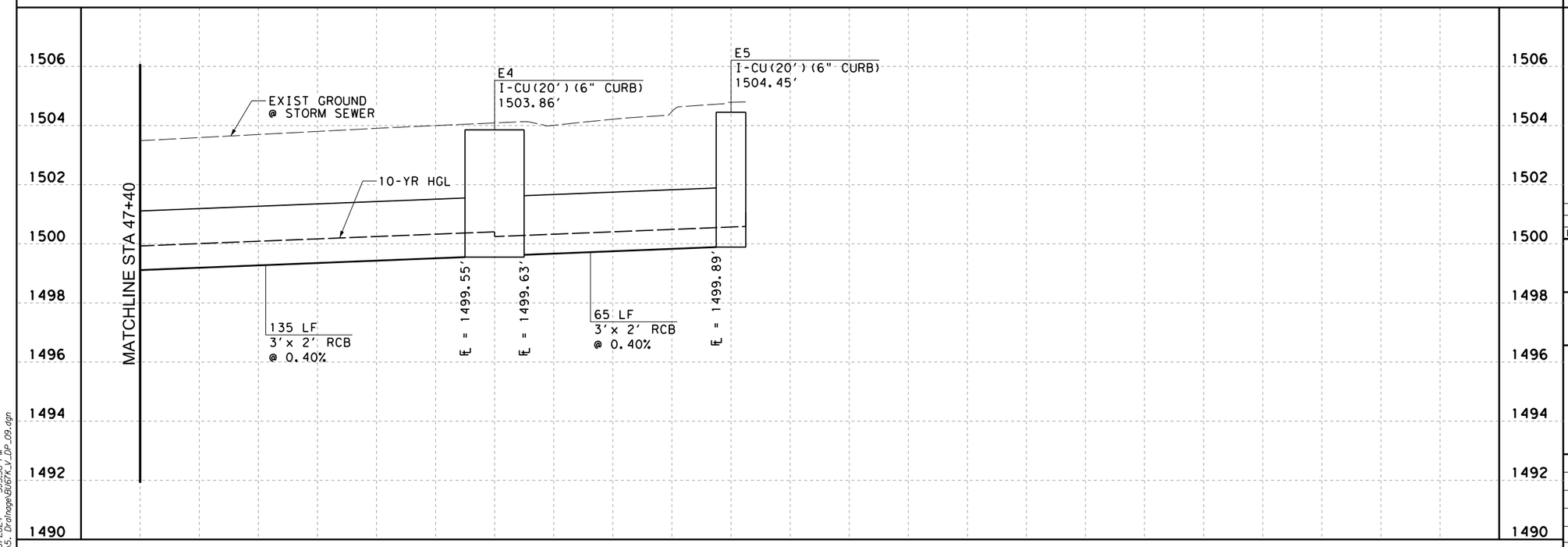

LEGEND

- EXIST R.O.W.
- DRAINAGE INLET
- DRAINAGE JUNCTION BOX
- DRAINAGE RCB
- TEMPORARY CONSTRUCTION EASEMENT
- 1490 EXIST CONTOUR
- CUT & RESTORE
- T1 (C) LUMEN/CENTURYLINK - OVERHEAD QLD
- OE ONCOR ELECTRIC - OVERHEAD QLC
- G1 (D) ATMOS ENERGY - GAS QLC
- W1 (D) CITY OF DUBLIN - WATER QLC
- WW1 CITY OF DUBLIN - WASTEWATER QLC
- W4 (ABDN) CITY OF DUBLIN - ABANDONED WATERLINE

NOTES:

1. REFER TO ROADWAY, TYPICAL SECTIONS, HORIZONTAL ALIGNMENT DATA AND UTILITY SHEETS FOR MORE INFORMATION.
2. THE CONTRACTOR SHALL CUT AND RESTORE PAVEMENT AS SHOWN IN "MDD(FTW)(MOD)" SHEET.

* EXISTING GAS (ABANDONED IN PLACE)

\# APPROXIMATE DEPTH TO TOP OF UTILITY PROVIDED BY CITY OF DUBLIN. TO BE VERIFIED BY CONTRACTOR PRIOR TO THE START OF CONSTRUCTION.

0 20' 40'

SCALE: 1" = 40' HORZ
1" = 4' VERT

STATE OF TEXAS
ANTHONY SCHNEIDER
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7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

STORM SEWER PLAN & PROFILE SYSTEM "E" (W VALLEY STREET)

SHEET 2 OF 4

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	
CONTROL	SECTION	JOB	121
0079	04	049	

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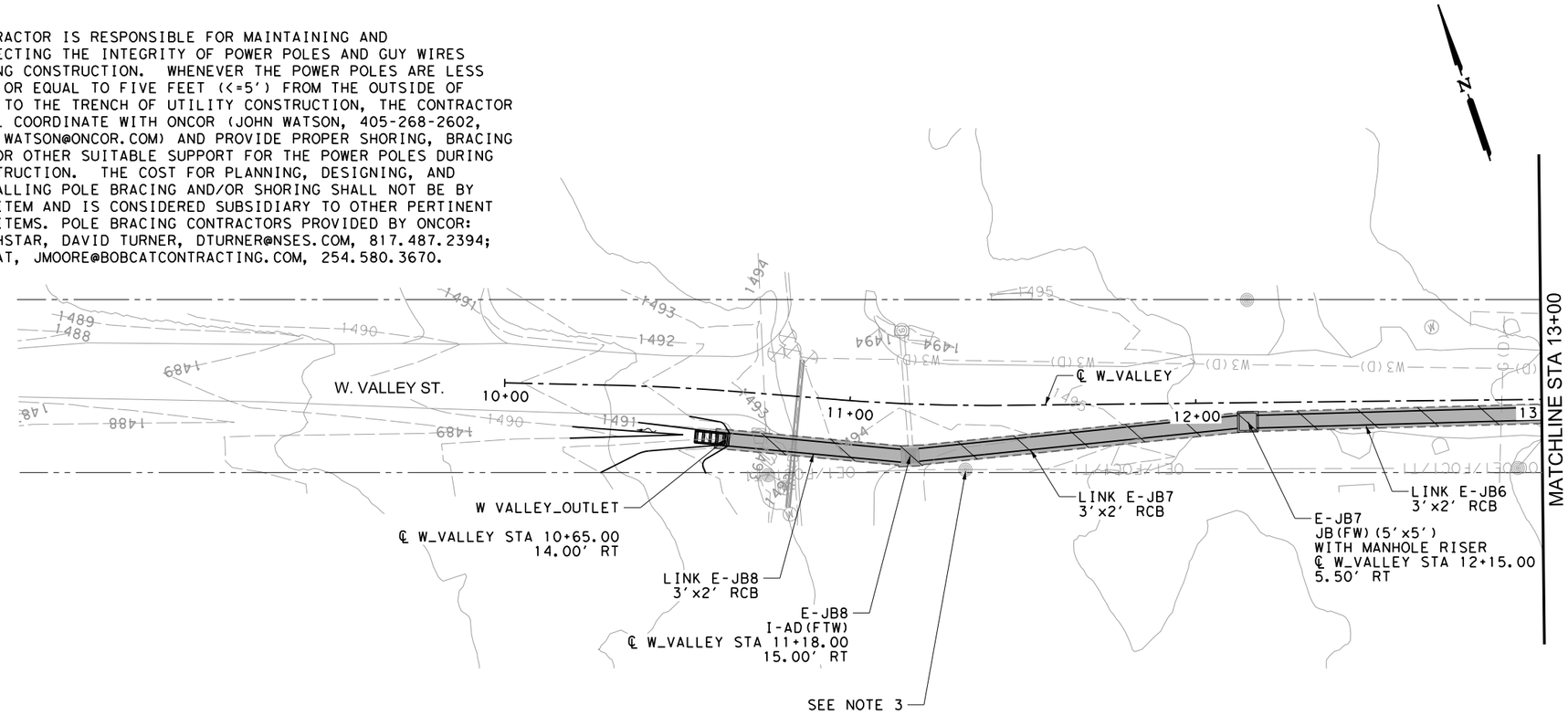
NOTES:

3. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING AND PROTECTING THE INTEGRITY OF POWER POLES AND GUY WIRES DURING CONSTRUCTION. WHENEVER THE POWER POLES ARE LESS THAN OR EQUAL TO FIVE FEET (<=5') FROM THE OUTSIDE OF POLE TO THE TRENCH OF UTILITY CONSTRUCTION, THE CONTRACTOR SHALL COORDINATE WITH ONCOR (JOHN WATSON, 405-268-2602, JOHN.WATSON@ONCOR.COM) AND PROVIDE PROPER SHORING, BRACING AND/OR OTHER SUITABLE SUPPORT FOR THE POWER POLES DURING CONSTRUCTION. THE COST FOR PLANNING, DESIGNING, AND INSTALLING POLE BRACING AND/OR SHORING SHALL NOT BE BY PAY ITEM AND IS CONSIDERED SUBSIDIARY TO OTHER PERTINENT PAY ITEMS. POLE BRACING CONTRACTORS PROVIDED BY ONCOR: NORTHSTAR, DAVID TURNER, DTURNER@NSES.COM, 817.487.2394; BOBCAT, JMOORE@BOBCATCONTRACTING.COM, 254.580.3670.



LEGEND

- EXIST R.O.W.
- DRAINAGE INLET
- DRAINAGE JUNCTION BOX
- DRAINAGE RCB
- TEMPORARY CONSTRUCTION EASEMENT
- 1490 EXIST CONTOUR
- CUT & RESTORE
- T1 (C) LUMEN/CENTURYLINK - OVERHEAD QLD
- OE ONCOR ELECTRIC - OVERHEAD QLC
- G1 (D) ATMOS ENERGY - GAS QLC
- W1 (D) CITY OF DUBLIN - WATER QLC
- WW1 CITY OF DUBLIN - WASTEWATER QLC
- W4 (ABDN) CITY OF DUBLIN - ABANDONED WATERLINE

NOTES:

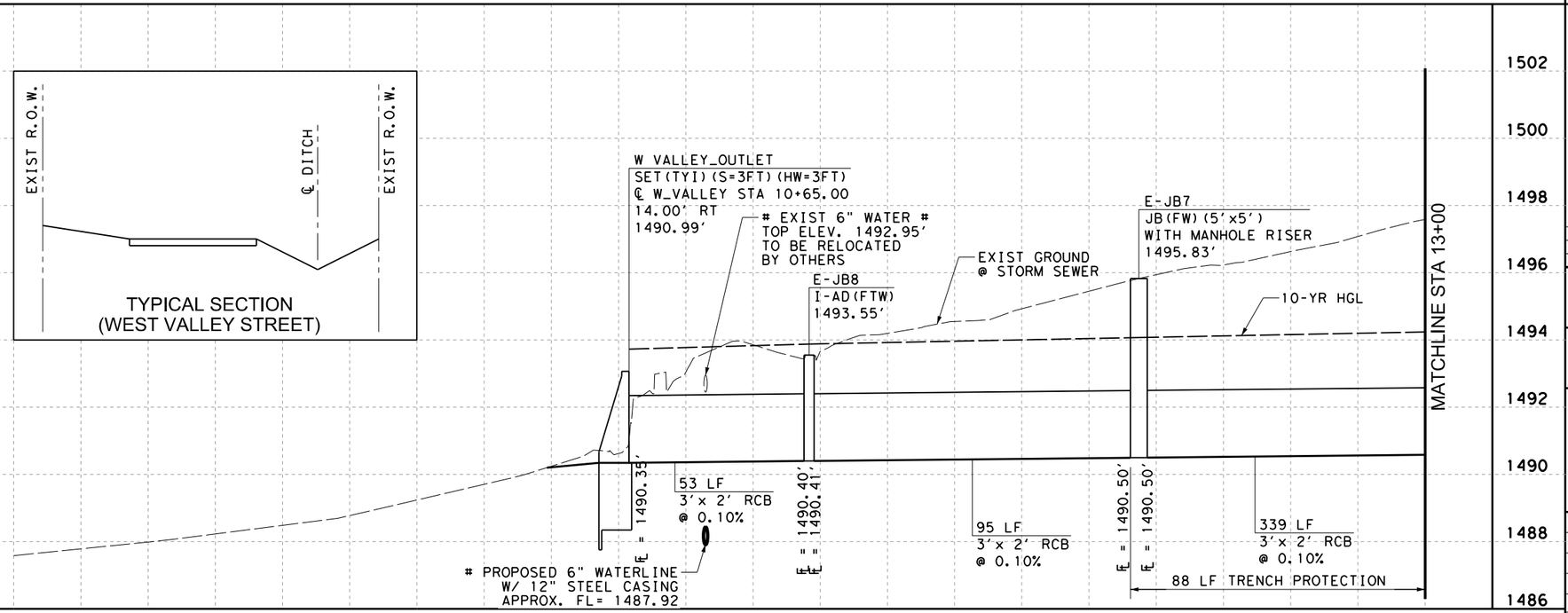
1. REFER TO ROADWAY, TYPICAL SECTIONS, HORIZONTAL ALIGNMENT DATA AND UTILITY SHEETS FOR MORE INFORMATION.
2. THE CONTRACTOR SHALL CUT AND RESTORE PAVEMENT AS SHOWN IN "MDD(FTW)(MOD)" SHEET.

* EXISTING GAS (ABANDONED IN PLACE)

\# APPROXIMATE DEPTH TO TOP OF UTILITY PROVIDED BY CITY OF DUBLIN. TO BE VERIFIED BY CONTRACTOR PRIOR TO THE START OF CONSTRUCTION.

SCALE: 1" = 40' HORZ
1" = 4' VERT

TYPICAL SECTION
(WEST VALLEY STREET)



STATE OF TEXAS
ANTHONY SCHNEIDER
71848
LICENSED PROFESSIONAL ENGINEER

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

STORM SEWER PLAN & PROFILE
SYSTEM "E" (W VALLEY STREET)

SHEET 3 OF 4

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	122
CONTROL	SECTION	JOB	
0079	04	049	

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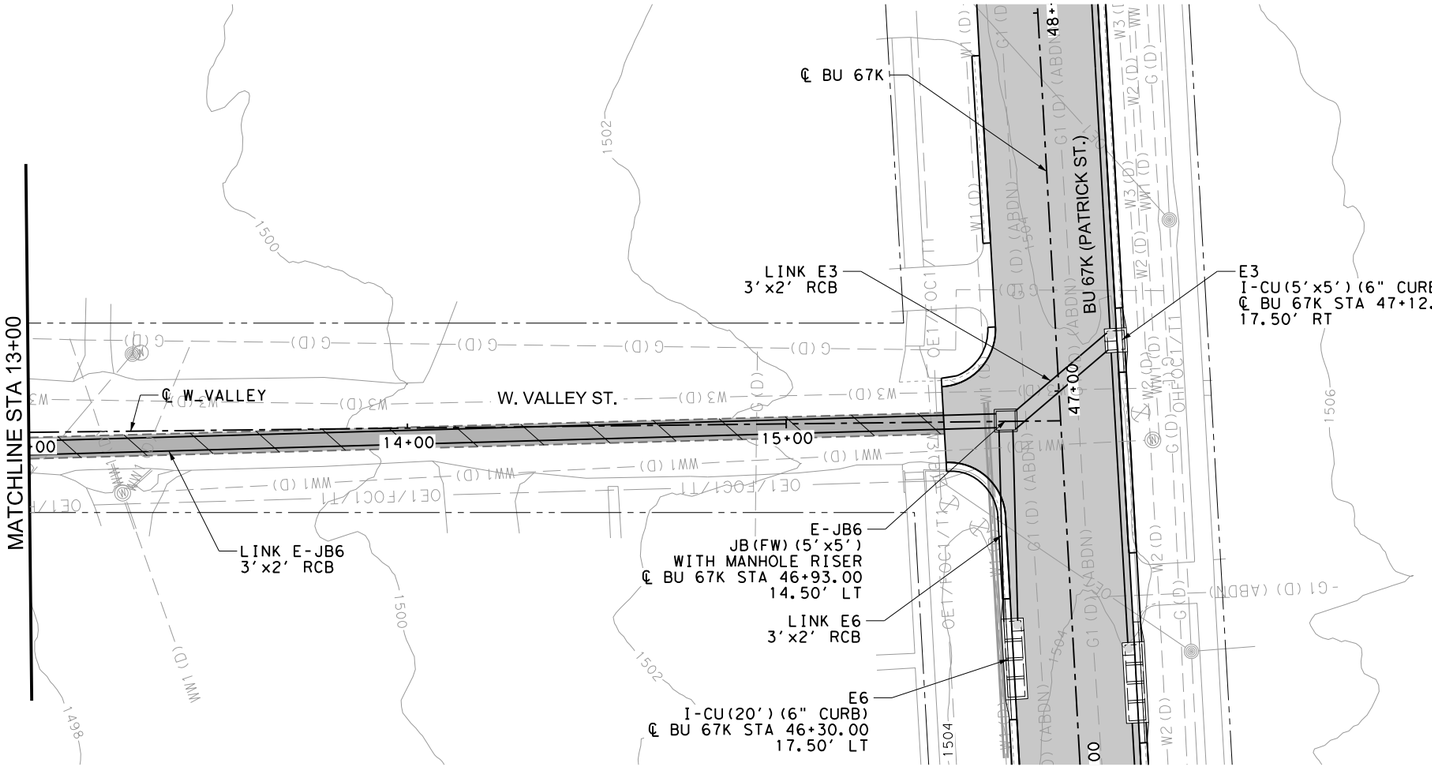

LEGEND

- EXIST R.O.W.
- DRAINAGE INLET
- DRAINAGE JUNCTION BOX
- DRAINAGE RCB
- TEMPORARY CONSTRUCTION EASEMENT
- 1490 EXIST CONTOUR
- CUT & RESTORE
- T1 (C) LUMEN/CENTURYLINK - OVERHEAD QLD
- OE ONCOR ELECTRIC - OVERHEAD QLC
- G1 (D) ATMOS ENERGY - GAS QLC
- W1 (D) CITY OF DUBLIN - WATER QLC
- WW1 CITY OF DUBLIN - WASTEWATER QLC
- W4 (ABDN) CITY OF DUBLIN - ABANDONED WATERLINE

NOTES:

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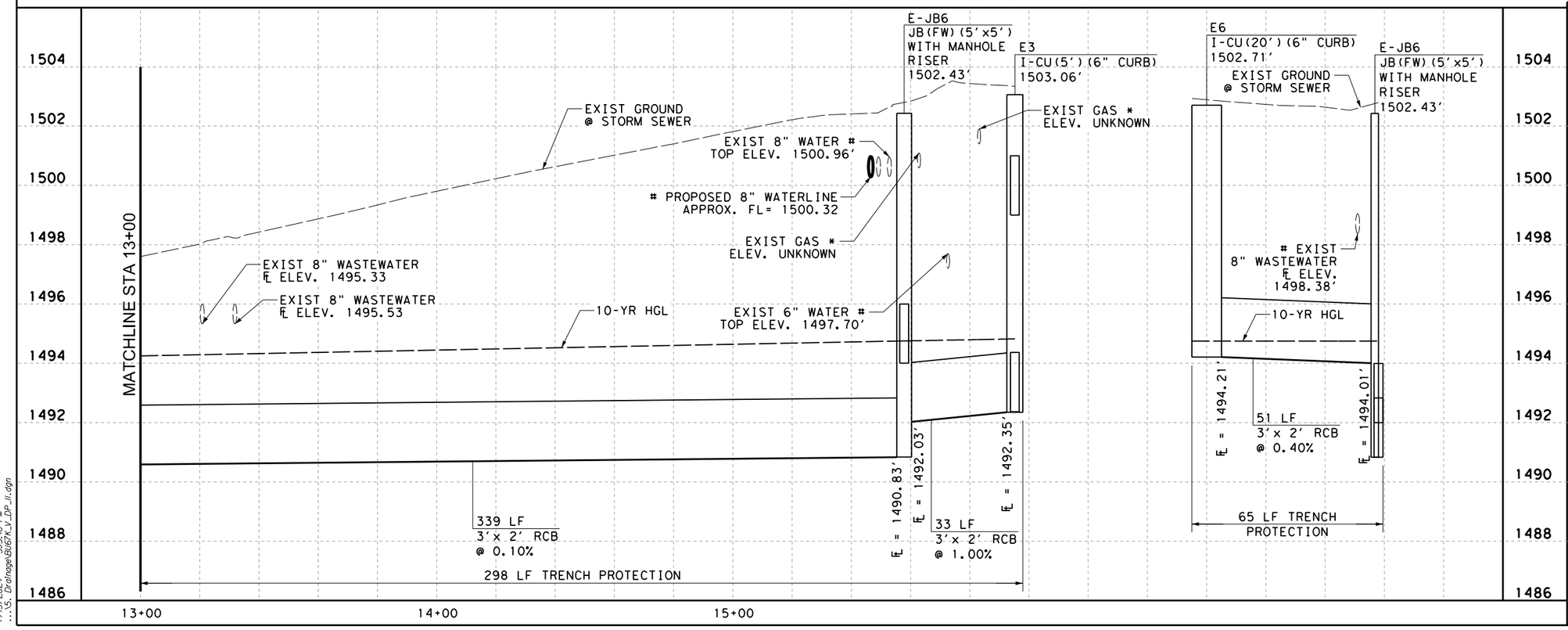

0 20' 40'

SCALE: 1" = 40' HORZ
1" = 4' VERT

STATE OF TEXAS
ANTHONY SCHNEIDER
71848
LICENSED
PROFESSIONAL ENGINEER

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

STORM SEWER PLAN & PROFILE SYSTEM "E" (W VALLEY STREET)

SHEET 4 OF 4

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	123
CONTROL	SECTION	JOB	
0079	04	049	

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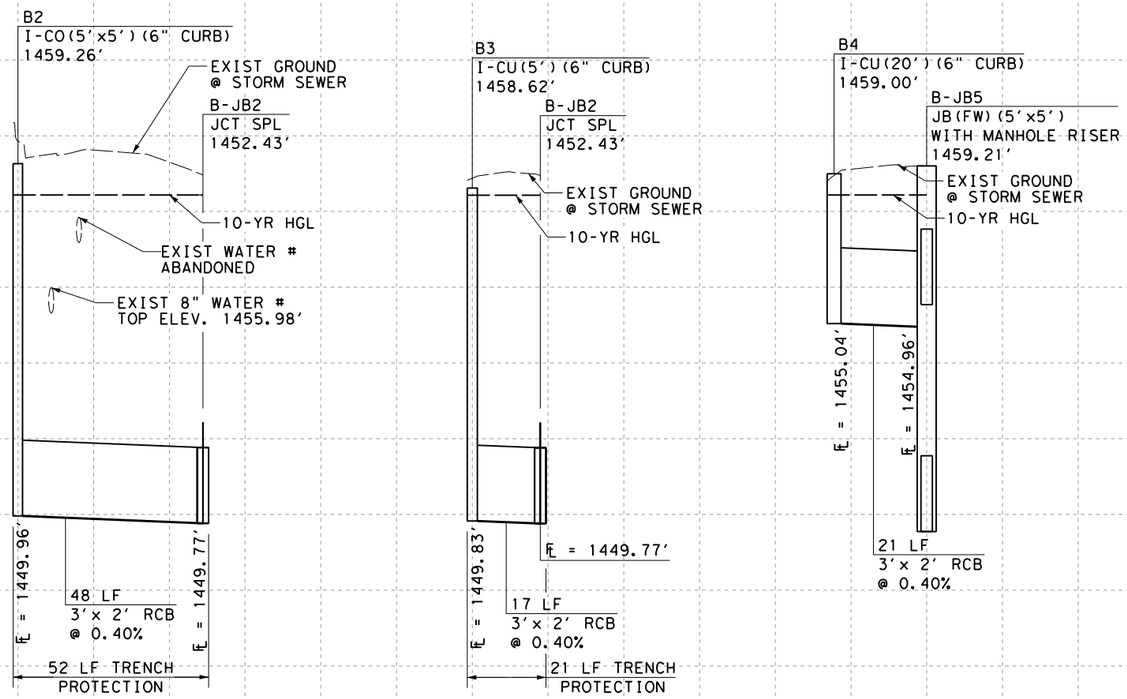

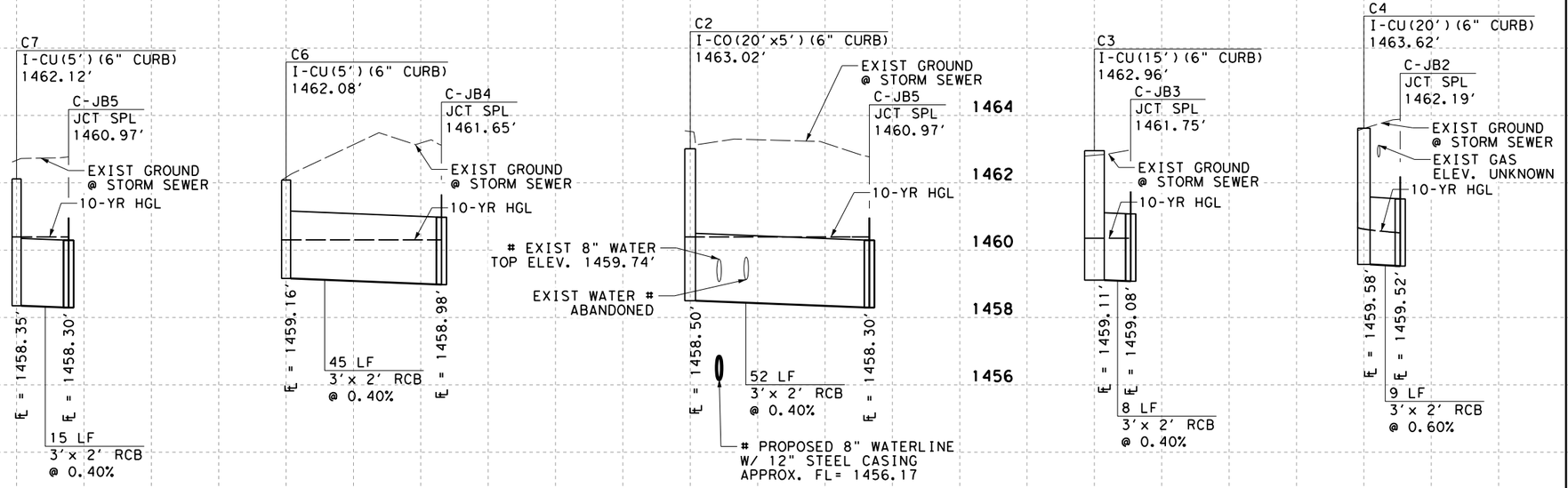

NOTES:

* EXISTING GAS (ABANDONED IN PLACE)

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0 20' 40'

SCALE: 1" = 40' HORZ
1" = 4' VERT

STATE OF TEXAS
ANTHONY SCHNEIDER
71848
LICENSED
PROFESSIONAL ENGINEER

Anthony Schneider

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

BU 67K

STORM SEWER PROFILE SYSTEM "B" (ELM ST.) & SYSTEM "C" (SH 6/BLACKJACK ST.)

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	124
CONTROL	SECTION	JOB	
0079	04	049	

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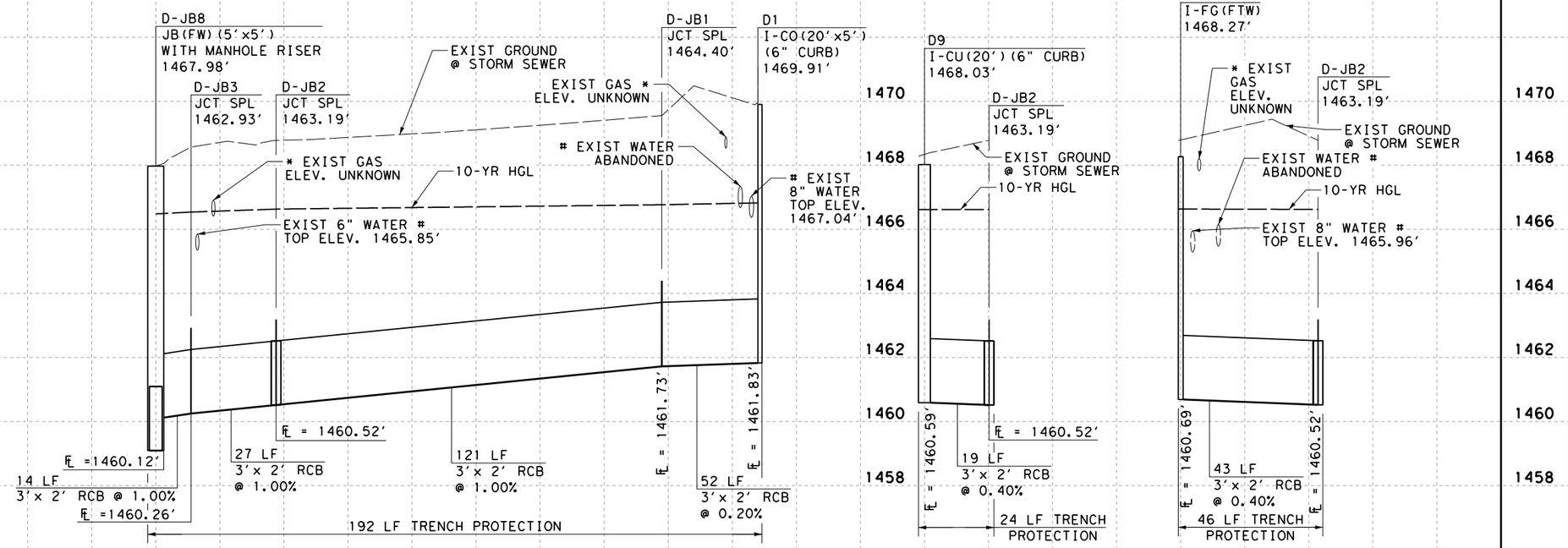

NOTES:

* EXISTING GAS (ABANDONED IN PLACE)

\# APPROXIMATE DEPTH TO TOP OF UTILITY PROVIDED BY CITY OF DUBLIN. TO BE VERIFIED BY CONTRACTOR PRIOR TO THE START OF CONSTRUCTION.

0 20' 40'

SCALE: 1" = 40' HORZ
1" = 4' VERT

STATE OF TEXAS
ANTHONY SCHNEIDER
71848
LICENSED PROFESSIONAL ENGINEER

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

STORM SEWER PROFILE
SYSTEM "D" (LIVE OAK ST.)

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	
CONTROL	SECTION	JOB	125
0079	04	049	

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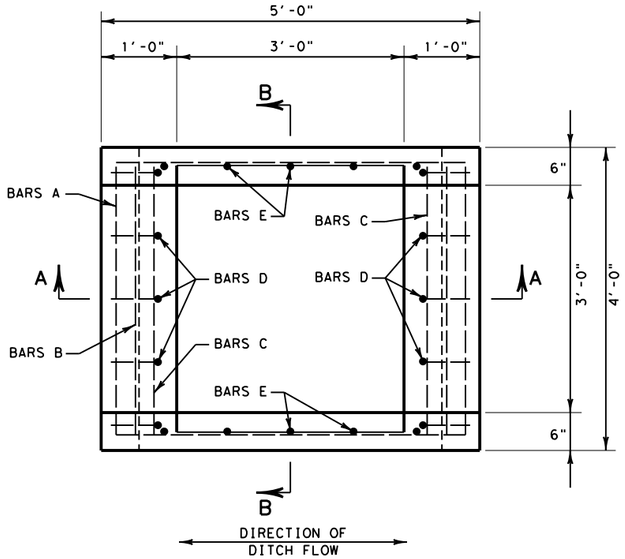
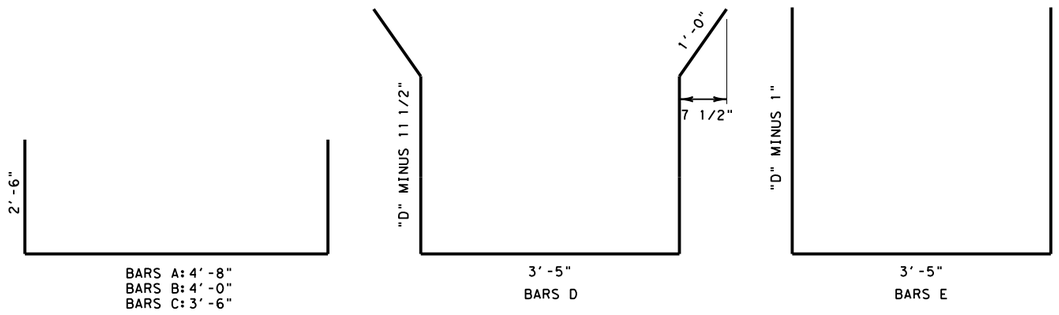


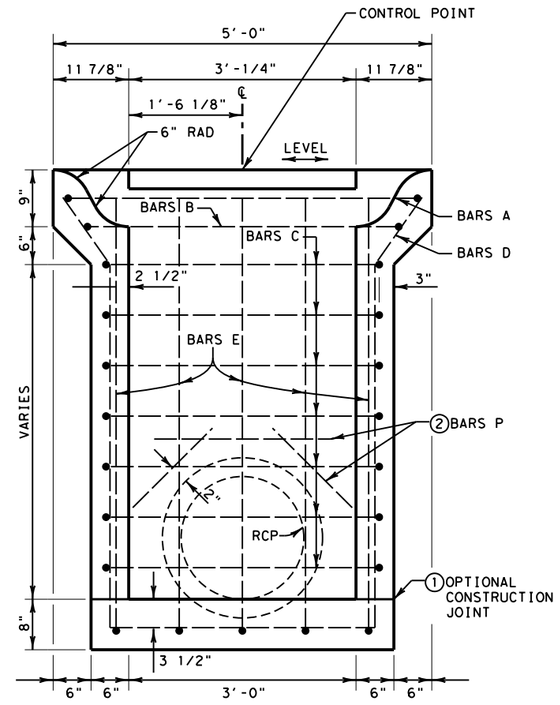
PLAN VIEW
N.T.S.



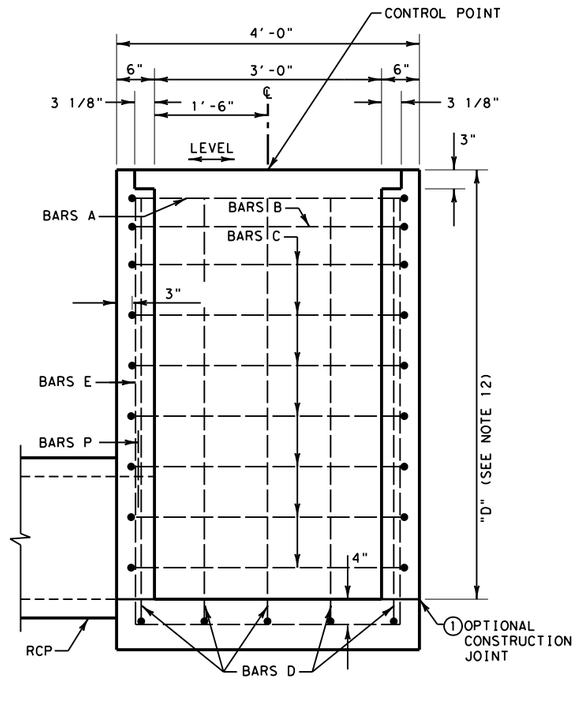
BILL OF REINFORCING STEEL FOR "D" = 4.00'					
BAR	SIZE	SPACING (in)	REINFORCING STEEL No	Length	Wt
A	#4	N/A	2	9.667	13
B	#4	N/A	2	9.000	12
C	#4	10"	8	8.500	45
D	#4	10"	5	11.583	39
E	#4	10"	5	11.250	38

SUMMARY OF QUANTITIES	
TOTAL STEEL - LBS	147
CLASS "C" CONCRETE - CY	1.52

ADDITIONAL QUANTITIES	
STEEL (LBS. P.L.F.)	28
CONCRETE (CY P.L.F.)	0.26



SECTION A-A

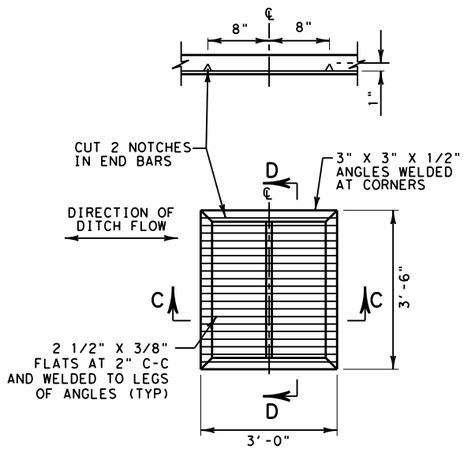


SECTION B-B

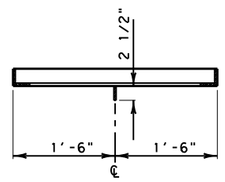
1 CIP CONSTRUCTION ONLY

2 BARS P LENGTH = PIPE O.D. + 9"
PLACE 3 BARS P AS SHOWN AT EACH PIPE OPENING WITH 2" CLEAR COVER OVER PIPE POSITIONED AS NEEDED TO PROVIDE 2" CLEAR COVER AT WALLS

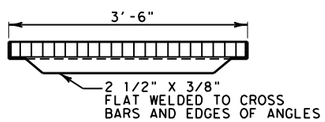
TYPE AD - FREE-STANDING INLET
MAXIMUM CONDUIT SIZE = 24" DIA
N.T.S.



PLAN VIEW



SECTION C-C



SECTION D-D

GRATE DETAIL
N.T.S.

GENERAL NOTES

1. DESIGNED FOR AASHTO LRFD HL 93 LOADING. TYPE AD INLETS ARE NOT INTENDED FOR USE IN AREAS DESIGNATED FOR TRAFFIC OR PEDESTRIAN ACCESS. INLETS MAY BE USED IN DITCHES LOCATED WITHIN THE ROADWAY CLEAR ZONE.
2. PRECAST UNITS WITH EQUIVALENT REINFORCING MAY BE FURNISHED. SUBMIT SEALED ENGINEERING CALCULATIONS AND DRAWINGS FOR APPROVAL PRIOR TO FABRICATION.
3. USE CLASS "C"CONCRETE FOR CAST-IN-PLACE STRUCTURES; USE CLASS "H" (MINIMUM 5000 PSI COMPRESSIVE STRENGTH) CONCRETE FOR PRECAST STRUCTURES.
4. USE GRADE 60 STEEL FOR ALL REINFORCING.
5. DIMENSIONS RELATING TO REINFORCING STEEL ARE TO THE CENTERS OF BARS.
6. FIELD CUT OR BEND BARS AS NECESSARY TO ACCOMMODATE STORM DRAIN PIPE. DO NOT USE WITH STORM DRAIN PIPE LARGER THAN 24" NOMINAL DIAMETER.
7. FABRICATE GRATES FROM WELDED STEEL, IN ACCORDANCE WITH ITEM 471.
8. LOCATION OF INLET AS SHOWN IN THE PLANS REFERS TO THE CONTROL POINT SHOWN ON THIS SHEET.
9. CONSTRUCT INLET WITH LEVEL TOP, TO ALIGN WITH DITCHES OR AS DIRECTED. ALIGN INLET SO THAT GRATE VANES ARE PARALLEL TO DITCH FLOW.
10. FABRICATE BOTTOM OF PRECAST INLET TOP TO MATCH BASE OR RISER.
11. FOR PLACEMENT ON BOX SEWER, SEE STANDARD MI-CBC (FTW). DO NOT USE WITH BOX CULVERTS WITH LESS THAN 4' SPAN. FOR USE WITH BOX CULVERTS LESS THAN 4' SPAN, BASE AND RISER MUST BE USED. SEE STANDARD MI-B&R (FTW) FOR ADDITIONAL INFORMATION.
12. MAXIMUM DEPTH FOR CAST-IN-PLACE INLET IS 15'; CONSTRUCTION JOINTS MAY BE PLACED AT 5' INTERVALS. FOR DEPTHS GREATER THAN 15', USE THE PRECAST INLET TOP (SEE SHEET 2 OF 2) IN CONJUNCTION WITH PRECAST RISER UNITS AS SHOWN ON STANDARD MI-B&R (FTW).
13. FOR PIPE CONNECTIONS TO PRECAST STRUCTURES, SEE STANDARD DETAIL SHEET, PBGC.

Texas Department of Transportation

Fort Worth District Standard

AREA-DITCH INLET TYPE AD
I-AD (FTW)

ORIGINAL DRAWING: 05/2019	iad-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
DATE	REVISIONS	6	SEE TITLE SHEET		126
05/2019	REPLACES DI-1-02(FW)	STATE	STATE DIST.NO.	COUNTY	
		TEXAS	FTW	ERATH	
		CONT.	SECT.	JOB	HIGHWAY NO.
		0079	04	049	BU 67K

http://www.dot.state.tx.us/ftw/specinfo/standard.htm
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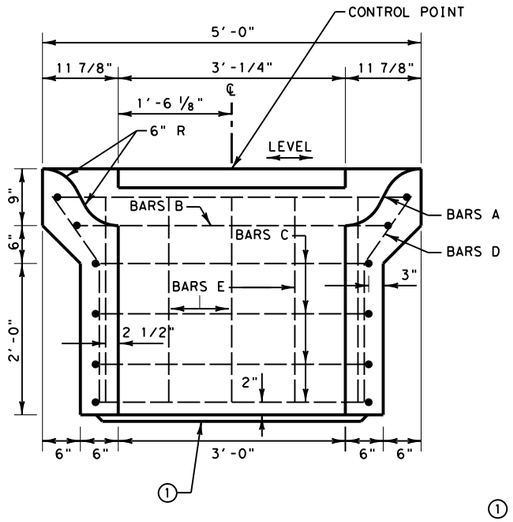
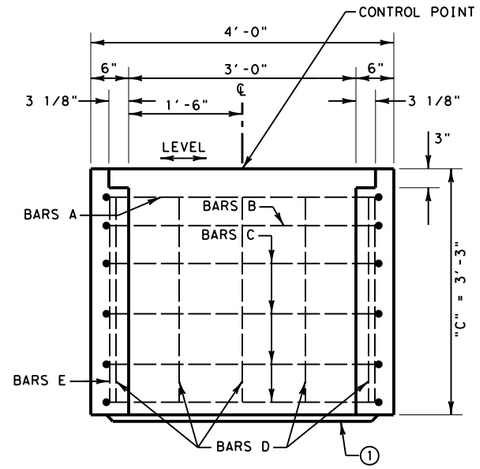


SECTION A-A



SECTION B-B

① SEE NOTE 10

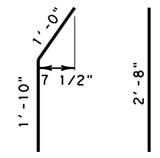
PRECAST INLET TOP

FOR USE WITH PRECAST RISER
SEE MI-B&R
N.T.S.

BILL OF REINFORCING STEEL FOR "C" = 3'-3"					
BAR	SIZE	SPACING (in)	REINFORCING STEEL No	Length	Wt
A	#4	N/A	2	9.667	13
B	#4	N/A	2	9.000	12
C	#4	10"	6	8.500	34
D	#4	10"	10	2.833	19
E	#4	10"	10	2.667	18

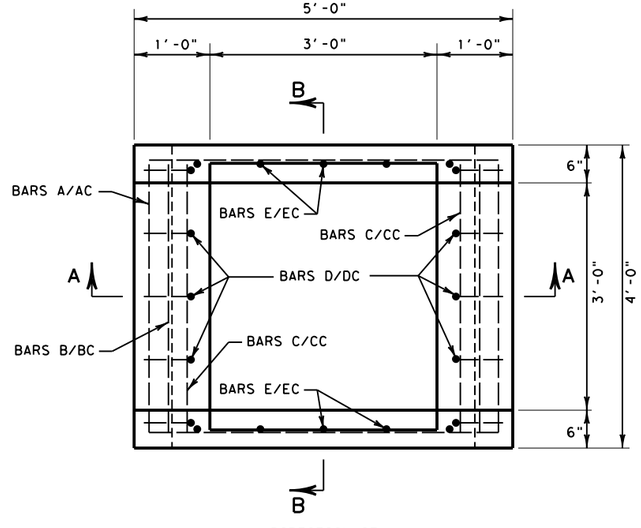
SUMMARY OF QUANTITIES	
TOTAL STEEL - LBS	96
CLASS "C" CONCRETE - CY	0.96

BARS A 4'-8"
BARS B 4'-0"
BARS C 3'-6"



BARS D

BARS E



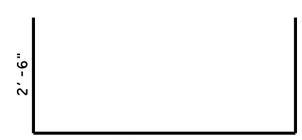
DIRECTION OF DITCH FLOW

PLAN VIEW
N.T.S.

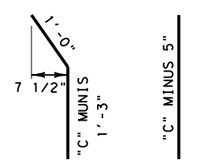
BILL OF REINFORCING STEEL FOR "C" = 1'-3"					
BAR	SIZE	SPACING (in)	REINFORCING STEEL No	Length	Wt
AC	#4	N/A	2	9.667	13
BC	#4	N/A	2	9.000	12
CC	#4	10"	2	8.500	11
DC	#4	10"	10	1.000	7
EC	#4	10"	10	0.833	6

SUMMARY OF QUANTITIES	
TOTAL STEEL - LBS	49
CLASS "C" CONCRETE - CY	0.41

ADDITIONAL QUANTITIES	
STEEL (LBS. P.L.F.)	28
CONCRETE (CY P.L.F.)	0.26

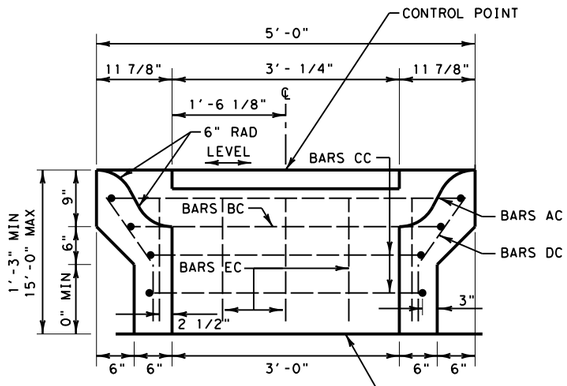


BARS AC 4'-8"
BARS BC 4'-0"
BARS CC 3'-6"



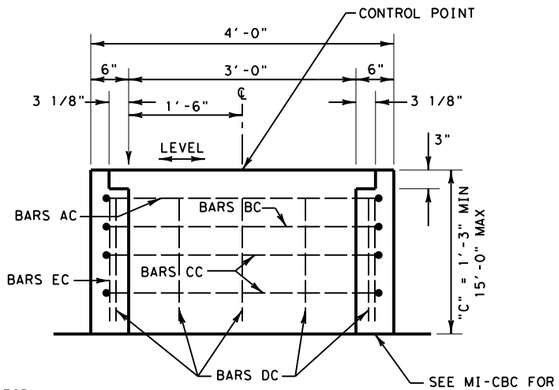
BARS DC

BARS EC



SEE STANDARD MI-CBC (FTW) FOR CONNECTION TO BOX CULVERT AND SUPPORT SLAB DETAILS.
SEE STANDARD MI-B&R (FTW) FOR CONNECTION TO BASE STRUCTURE.

SECTION A-A



SEE MI-CBC FOR CONNECTION TO BOX CULVERT
SEE MI-B&R FOR CONNECTION TO BASE

SECTION B-B

CAST-IN-PLACE INLET TOP

FOR PLACEMENT DIRECTLY ON BOX CULVERT OR BASE DO NOT USE WITH BOX CULVERT SPAN LESS THAN 4'
FOR BOX CULVERT LESS THAN 4' SPAN, SEE MI-B&R
N.T.S.

GENERAL NOTES

SEE SHEET 1 OF 2 FOR GENERAL NOTES.

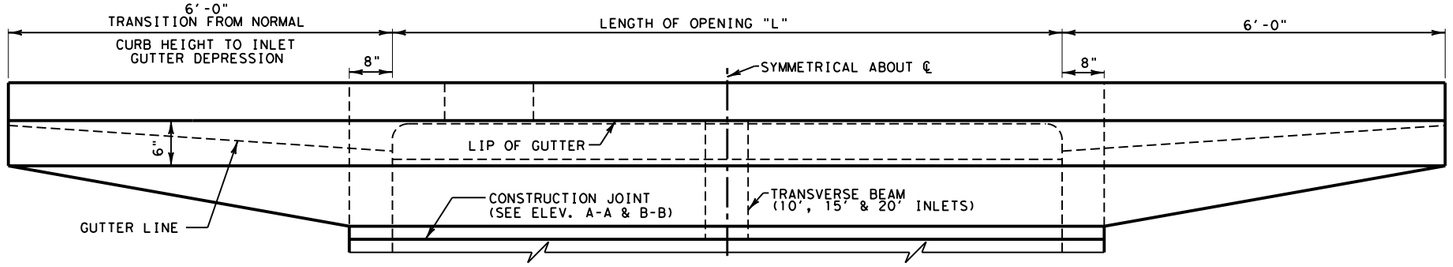
SHEET 2 OF 2 SHEETS

Texas Department of Transportation

Fort Worth District Standard

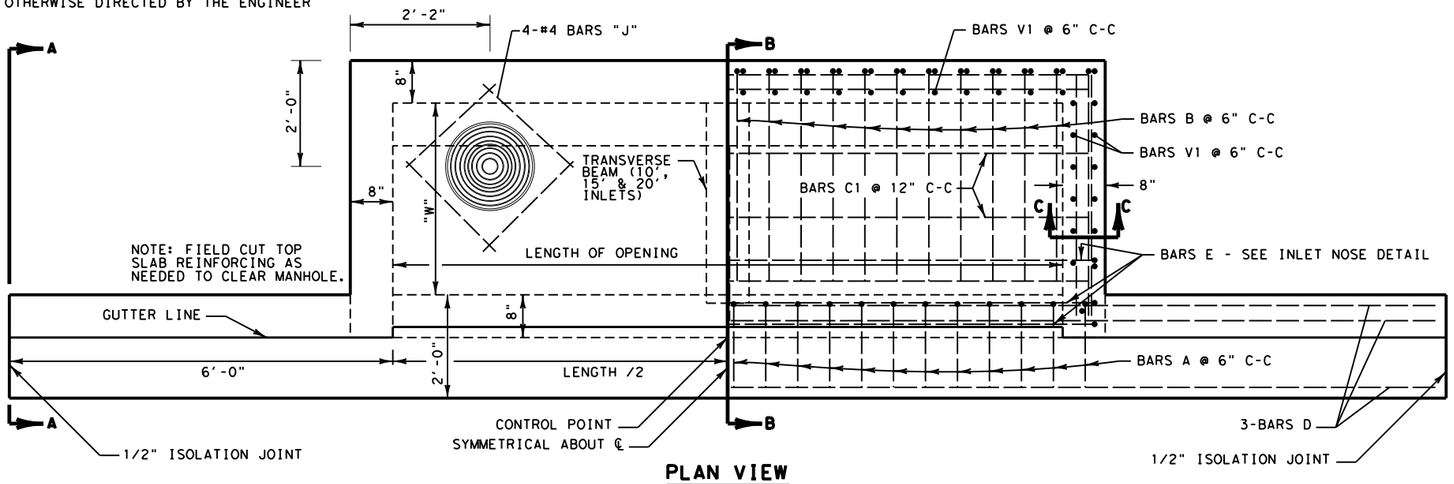
AREA-DITCH INLET TYPE AD
I-AD (FTW)

ORIGINAL DRAWING: 05/2019	iad-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
DATE	REVISIONS	6	SEE TITLE SHEET		127
05/2019	REPLACES DI-1-02(FW)	STATE	STATE DIST.NO.	COUNTY	
		TEXAS	FTW	ERATH	
		CONT.	SECT.	JOB	HIGHWAY NO.
		0079	04	049	BU 67K

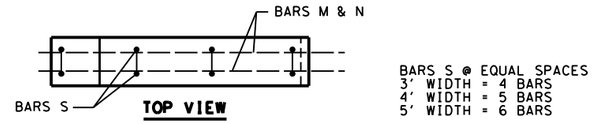


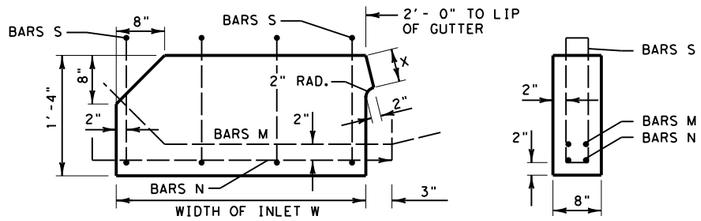
FRONT ELEVATION VIEW
N.T.S.

NOTE: LOCATION OF RING AND COVER TO BE AT OUTFALL END, UNLESS OTHERWISE DIRECTED BY THE ENGINEER

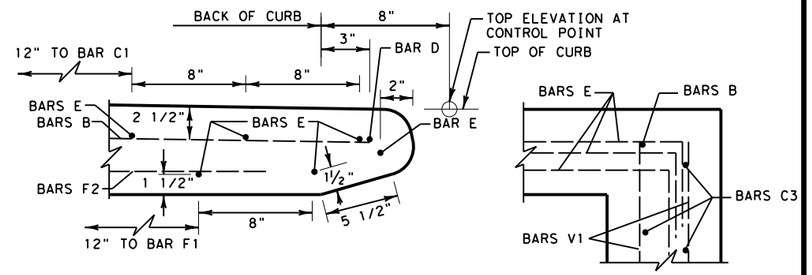


PLAN VIEW
(ONLY TOP LAYER OF SLAB REINFORCING SHOWN, FOR CLARITY)
N.T.S.



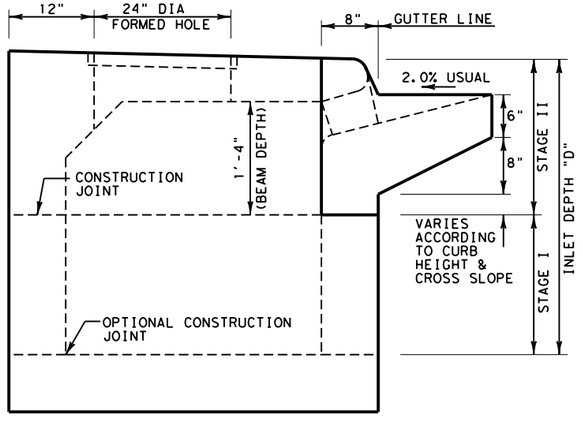


TRANSVERSE BEAM DETAIL
BEAMS AT 5' C - C (10', 15' & 20' INLETS)
N.T.S.

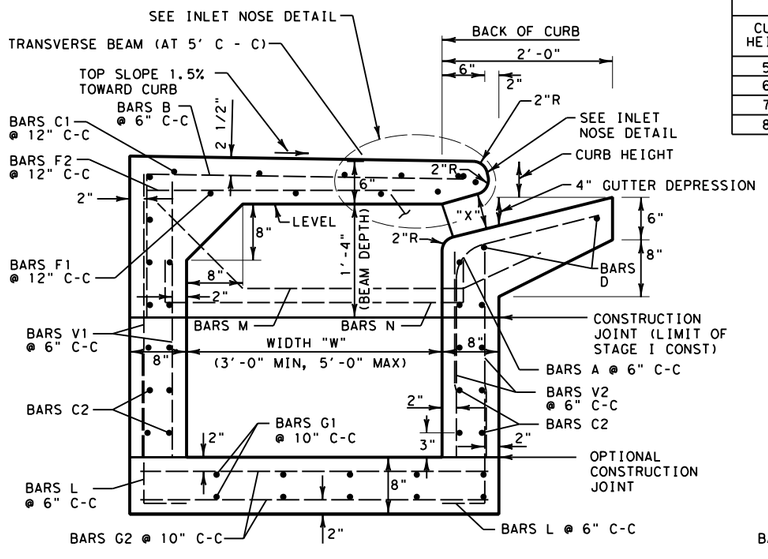


INLET NOSE DETAIL
N.T.S.

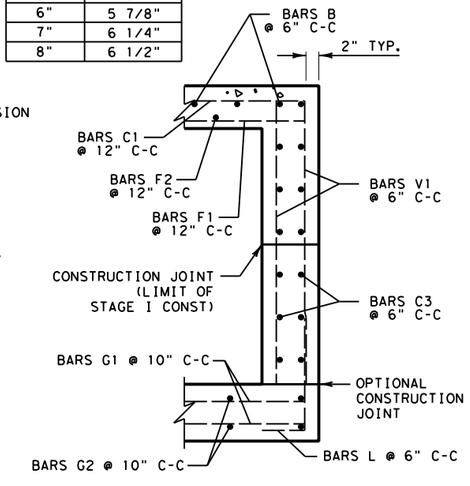
THROAT DIMENSION	
CURB HEIGHT	"X"
5"	5"
6"	5 7/8"
7"	6 1/4"
8"	6 1/2"



SIDE ELEVATION "A-A"
N.T.S.



SECTION "B-B"
N.T.S.



SECTION "C-C"
N.T.S.

SEE SHEET 2 OF 2 FOR DETAILS OF REINFORCING, BILL OF REINFORCING STEEL, SUMMARY OF QUANTITIES, TABLE OF MAXIMUM CONDUIT SIZES AND GENERAL NOTES.

SHEET 1 OF 2 SHEETS

Texas Department of Transportation | Fort Worth District Standard

CURB INLET OUTSIDE PAVEMENT FOR USE WITH TYPE II CURB
I-CO (FTW)

ORIGINAL DRAWING: 05/2019	ico-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
DATE	REVISIONS	6	SEE TITLE SHEET		128
05/2019	NEW STANDARD	STATE	STATE DIST.NO.	COUNTY	
04/2020	ADD MAX CONDUIT SIZE TABLE	TEXAS	FTW	ERATH	
11/2020	REVISED JOINT NOMENCLATURE	CONT.	SECT.	JOB	HIGHWAY NO.
		0079	04	049	BU 67K

http://www.dot.state.tx.us/ftw/specinfo/standard.htm
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BILL OF REINFORCING STEEL FOR "D" = 4'

Width "W"	Length "L"	Bars A		Bars B			Bars C1		Bars C2		Bars C3		Bars D		Bars E		Bars F1		Bars F2		Bars G1		Bars G2		Bars J	
		#4	at 6" Spa	#4		at 6" Spa	#5	at 12" Spa	#5	at 6" Spa	#5	at 6" Spa	#4		#5		#4	at 12" Spa	#4	at 12" Spa	#5	at 10" Spa	#5	at 10" Spa	#4	
(ft)	(ft)	No	Wt	No	Length	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt
3.0	5.0	13	37	10	5.417	36	2	13	29	181	27	113	3	33	6	48	1	4	7	12	10	63	14	58	4	8
4.0	5.0	13	37	10	6.417	43	3	19	29	181	27	141	3	33	6	48	2	8	7	16	12	75	14	73	4	8
5.0	5.0	13	37	10	7.417	50	4	25	29	181	27	169	3	33	6	48	3	12	7	21	14	88	14	88	4	8
3.0	10.0	23	65	20	5.417	72	2	23	29	333	27	113	3	43	6	80	1	7	12	20	10	115	26	108	4	8
4.0	10.0	23	65	20	6.417	86	3	34	29	333	27	141	3	43	6	80	2	15	12	28	12	138	26	136	4	8
5.0	10.0	23	65	20	7.417	99	4	46	29	333	27	169	3	43	6	80	3	22	12	36	14	161	26	163	4	8
3.0	15.0	33	94	30	5.417	109	2	33	29	484	27	113	3	53	6	111	1	11	17	28	10	167	38	159	4	8
4.0	15.0	33	94	30	6.417	129	3	50	29	484	27	141	3	53	6	111	2	21	17	40	12	200	38	198	4	8
5.0	15.0	33	94	30	7.417	149	4	67	29	484	27	169	3	53	6	111	3	32	17	51	14	234	38	238	4	8
3.0	20.0	43	122	40	5.417	145	2	44	29	635	27	113	3	63	6	142	1	14	22	37	10	219	50	209	4	8
4.0	20.0	43	122	40	6.417	171	3	66	29	635	27	141	3	63	6	142	2	28	22	51	12	263	50	261	4	8
5.0	20.0	43	122	40	7.417	198	4	88	29	635	27	169	3	63	6	142	3	42	22	66	14	307	50	313	4	8

BILL OF REINFORCING STEEL FOR "D" = 4' (CONTINUED)

Width "W"	Length "L"	Bars L		Bars M		Bars N		Bars S		Bars V1		Bars V2	
		#5	at 6" Spa	#4		#5		#4	at 12" Spa	#5	at 6" Spa	#5	at 6" Spa
(ft)	(ft)	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt
3.0	5.0	36	125	0	0	0	0	0	0	58	232	26	77
4.0	5.0	40	139	0	0	0	0	0	0	66	264	26	77
5.0	5.0	44	153	0	0	0	0	0	0	74	296	26	77
3.0	10.0	56	195	2	7	2	11	4	11	78	312	46	136
4.0	10.0	60	209	2	8	2	13	5	14	86	344	46	136
5.0	10.0	64	223	2	9	2	15	6	17	94	376	46	136
3.0	15.0	76	264	4	13	4	22	8	22	98	392	66	195
4.0	15.0	80	278	4	16	4	26	10	28	106	424	66	195
5.0	15.0	84	292	4	19	4	30	12	33	114	456	66	195
3.0	20.0	96	334	6	20	6	32	12	33	118	472	86	254
4.0	20.0	100	348	6	24	6	39	15	42	126	504	86	254
5.0	20.0	104	362	6	28	6	45	18	50	134	536	86	254

SUMMARY OF QUANTITIES

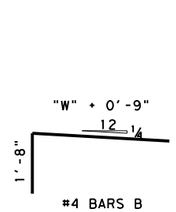
Total Reinf Weight	Steel Qty Adjust. P.L.F.	Class "C" Concrete	Concrete Qty Adjust. P.L.F.
(Lb)	(Lb)	(CY)	(CY)
1,040	171.1	3.8	0.46
1,163	187.7	4.3	0.51
1,286	204.4	4.8	0.56
1,659	254.5	5.9	0.71
1,829	271.2	6.6	0.76
2,000	287.9	7.3	0.81
2,278	337.9	7.9	0.95
2,496	354.6	8.9	1.00
2,714	371.3	9.8	1.05
2,896	421.4	9.9	1.20
3,162	438.1	11.2	1.25
3,428	454.7	12.4	1.30

MAXIMUM PARALLEL • CONDUIT SIZE		
INLET WIDTH	PIPE DIAMETER (IN)	BOX SPAN (FT)
3'	24	-
4'	36	3
5'	48	4

• PARALLEL TO ROADWAY

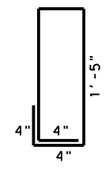
NOTE:
AT CONTRACTOR'S OPTION, BARS L MAY BE FABRICATED TO BE CONTINUOUS WITH BARS V1 AND/OR V2.

AT CONTRACTOR'S OPTION, BARS A MAY BE FABRICATED TO BE CONTINUOUS WITH BARS V2.



#4 BARS B

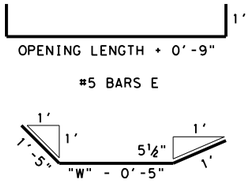
#5 BARS V1



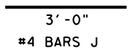
#4 BARS S

#5 BARS V2

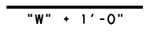
#5 BARS L



#5 BARS E
#4 BARS M

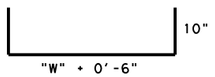


#4 BARS J

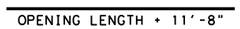


#5 BARS C3 & G2

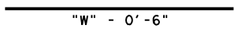
#5 BARS C1, C2 & G1
#4 BARS F1



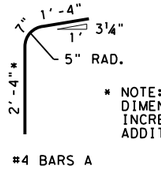
#5 BARS N



#4 BARS D



#4 BARS F2



#4 BARS A

* NOTE:
DIMENSION SHOWN FOR 5" CURB.
INCREASE LENGTH BY 1" FOR EACH ADDITIONAL 1" OF CURB HEIGHT.

GENERAL NOTES

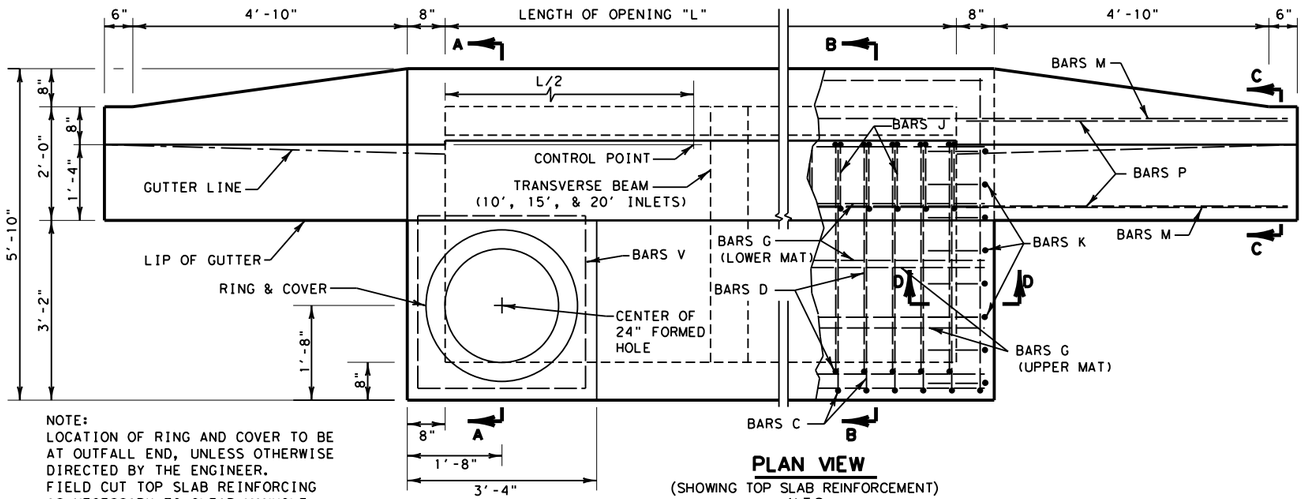
1. DESIGNED ACCORDING TO AASHTO LRFD SPECIFICATIONS FOR PEDESTRIAN LOADING AND HL-93 LOADING UNDER "EXTREME EVENT II" LOAD COMBINATION.
2. ALL CONCRETE FOR CAST-IN-PLACE STRUCTURES SHALL BE CLASS "C"; ALL CONCRETE FOR PRECAST STRUCTURES SHALL BE CLASS "H" (MINIMUM 5000 PSI DESIGN STRENGTH).
3. ALL REINFORCING STEEL SHALL BE GRADE 60.
4. STAGE I MAY BE EITHER CAST-IN-PLACE OR PRECAST. FABRICATE PRECAST STRUCTURES USING REBAR AS DETAILED HEREON, WITH BARS A, V1, AND V2 TO BE INCLUDED WITH STAGE I. SPLICING OF BARS WILL NOT BE PERMITTED, EXCEPT AS NOTED.
5. STAGE II SHALL BE CAST-IN-PLACE.
6. CHAMFER ALL EXPOSED CORNERS 3/4", EXCEPT WHERE NOTED OTHERWISE.
7. DIMENSIONS RELATING TO REINFORCING STEEL ARE TO THE CENTERS OF BARS
8. FIELD CUT AND BEND BARS AS NECESSARY TO ACCOMMODATE STORM DRAIN PIPE.
9. FOR PIPE AND BOX CONNECTIONS TO PRECAST INLETS, SEE STANDARD SHEET PPGC.
10. INSTALL RING AND COVER AT OUTFALL END OF INLET, UNLESS OTHERWISE DIRECTED. CAST IRON RING AND COVER SHALL CONFORM TO ITEM 471. SEE STANDARD MDD (FTW) FOR RING AND COVER DETAILS.
11. DEPTHS OTHER THAN THOSE SHOWN MAY BE USED WHENEVER NECESSARY, UP TO A MAXIMUM DEPTH OF 15'. QUANTITIES FOR OTHER DEPTHS MAY BE DETERMINED BY INTERPOLATION.
12. DO NOT COMMENCE WITH STAGE II CONSTRUCTION UNTIL CONCRETE PAVEMENT AND CURB, OR CONCRETE CURB AND GUTTER CONSTRUCTION IS COMPLETED AT THE INLET SITE.
13. INSTALL A TEMPORARY WOOD COVER AFTER STAGE I IS COMPLETED, TO REMAIN IN PLACE UNTIL STAGE II CONSTRUCTION BEGINS.
14. THE LOCATION OF INLET AS SHOWN IN THE PLAN REFERS TO THE CONTROL POINT AT THE FACE OF CURB AND MID-POINT OF THE INLET.
15. PLACE A SEALED 1/2" ISOLATION JOINT ALONG ALL VERTICAL FACES ABUTTING CONCRETE PAVEMENT, CURB, CURB AND GUTTER, OR SIDEWALK. USE CLASS 5 OR 8 JOINT SEALANT TO SEAL THE JOINT. SEE STANDARD JS (FTW) FOR ADDTIONAL INFORMATION.

Texas Department of Transportation

Fort Worth District Standard

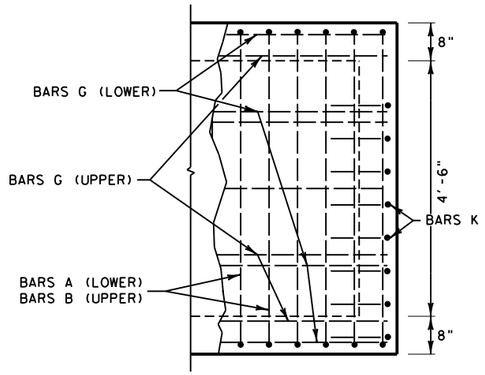
CURB INLET OUTSIDE PAVEMENT FOR USE WITH TYPE II CURB
I-CO (FTW)

ORIGINAL DRAWING: 05/2019	ico-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
DATE	REVISIONS	6	SEE TITLE SHEET		129
05/2019	NEW STANDARD	STATE	STATE DIST.NO.	COUNTY	
04/2020	ADD MAX CONDUIT SIZE TABLE	TEXAS	FTW	ERATH	
11/2020	REVISED JOINT NOMENCLATURE	CONT.	SECT.	JOB	HIGHWAY NO.
01/2021	REVISE MAX CONDUIT SIZE TABLE	0079	04	049	BU 67K

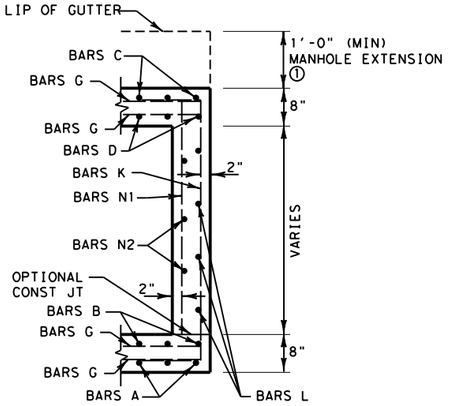


NOTE:
LOCATION OF RING AND COVER TO BE AT OUTFALL END, UNLESS OTHERWISE DIRECTED BY THE ENGINEER. FIELD CUT TOP SLAB REINFORCING AS NECESSARY TO CLEAR MANHOLE.

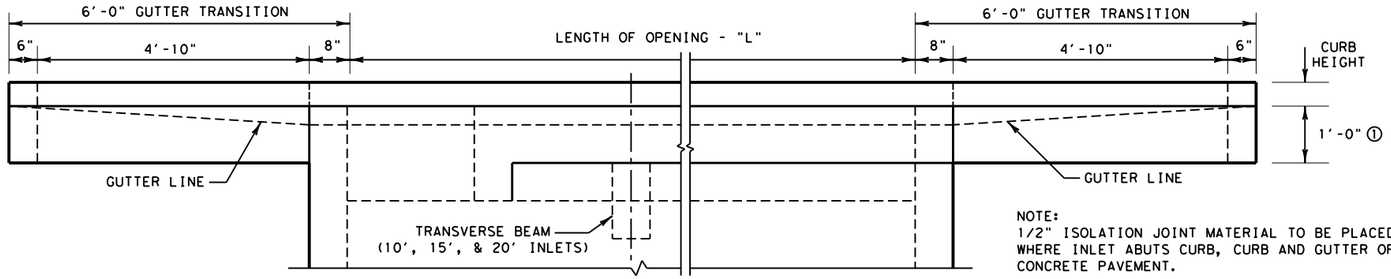
PLAN VIEW
(SHOWING TOP SLAB REINFORCEMENT)
N.T.S.



PARTIAL PLAN VIEW
(SHOWING BOTTOM SLAB REINFORCEMENT)
N.T.S.

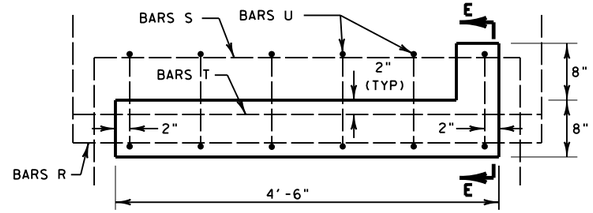


SECTION "D-D"
N.T.S.

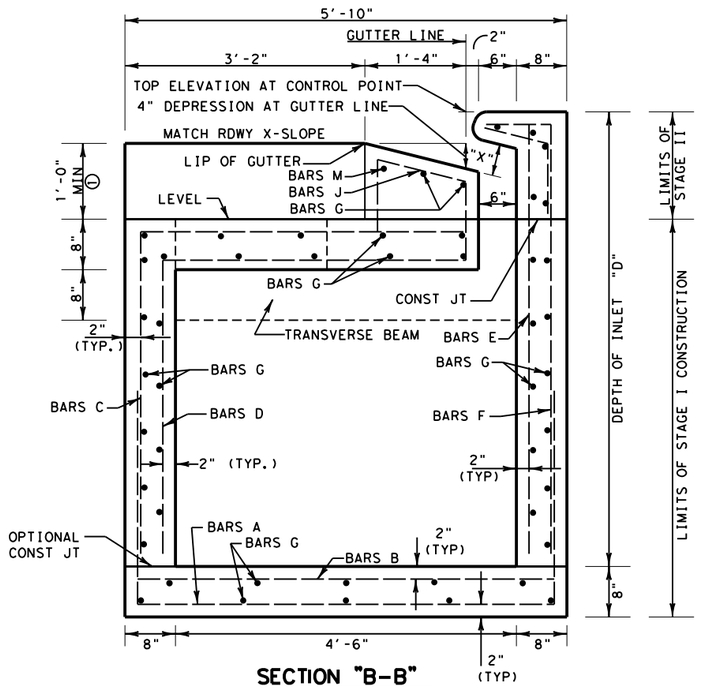


NOTE:
1/2" ISOLATION JOINT MATERIAL TO BE PLACED WHERE INLET ABUTS CURB, CURB AND GUTTER OR CONCRETE PAVEMENT.

FRONT ELEVATION VIEW
N.T.S.



TRANSVERSE BEAM DETAIL
BEAMS AT 5' C-C (10', 15', & 20' INLETS)
N.T.S.

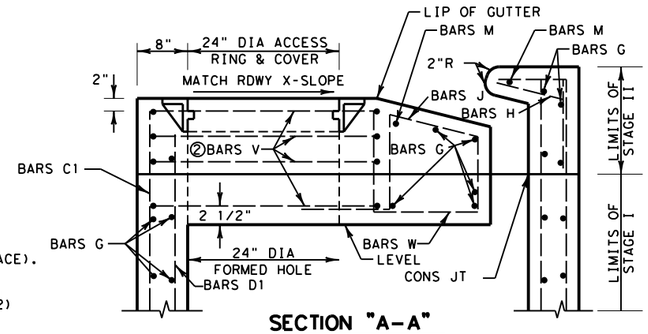


SECTION "B-B"
N.T.S.

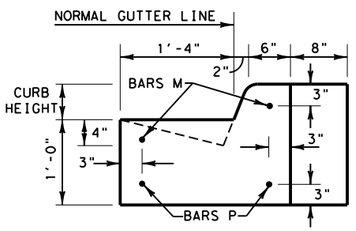
THROAT DIMENSION	
CURB HEIGHT (IN)	"X"
5	5"
6	5 7/8"
7	6 1/4"
8	6 1/2"

① MATCH DEPTH OF PAVEMENT STRUCTURE (BASE AND SURFACE). ADJUST BAR LENGTHS AS DIRECTED BY THE ENGINEER. (SEE DETAIL, SHEET 2 OF 2)

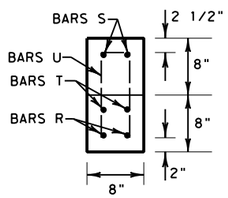
② STAGE II BARS V @ 3 EQUAL SPACES



SECTION "A-A"
N.T.S.



SECTION "C-C"
N.T.S.



SECTION "E-E"
N.T.S.

MAXIMUM PARALLEL • CONDUIT SIZE	
PIPE DIAMETER (IN)	BOX SPAN (FT)
42	3

• PARALLEL TO ROADWAY

NOTE:
SEE SHEET 2 OF 2 FOR DETAILS OF REINFORCING STEEL, ESTIMATED QUANTITIES, AND GENERAL NOTES.

SHEET 1 OF 2 SHEETS

Texas Department of Transportation

Fort Worth District Standard

CURB INLET UNDER PAVEMENT FOR USE WITH TYPE II CURB
I-CU (FTW)

ORIGINAL DRAWING: 05/2019	icu-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
DATE	REVISIONS	6	SEE TITLE SHEET		130
05/2019	NEW STANDARD	STATE	STATE DIST.NO.	COUNTY	
04/2020	ADD MAX CONDUIT SIZE TABLE	TEXAS	FTW	ERATH	
11/2020	REVISE JOINT NOMENCLATURE	CONT.	SECT.	JOB	HIGHWAY NO.
		0079	04	049	BU 67K

http://www.dot.state.tx.us/ftw/specinfo/standard.htm
7/13/2024 3:14:09 PM
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BILL OF REINFORCING STEEL FOR "D" = 6'

Length "L"	Bars A		Bars B		Bars C		Bars C1		Bars D		Bars D1		Bars E		Bars F		Bars G		Bars H		Bars J		Bars K		Bars L		Bars M		Bars N1		Bars N2	
	#5	at 6" Spa	#5	at 6" Spa	#5	at 6" Spa	#5	at 6" Spa	#5	at 6" Spa	#5	at 6" Spa	#5	at 6" Spa	#5	at 6" Spa	#5		#4	at 12" Spa	#4	at 12" Spa	#4	at 7" Spa	#5	at 6" Spa	#4		#4	at 12" Spa	#4	at 12" Spa
[ft]	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt
5.0	13	151	13	75	6	54	7	39	4	38	7	37	11	67	13	90	54	338	7	9	7	21	16	72	14	138	2	22	10	29	8	29
10.0	23	268	23	132	16	145	7	39	14	131	7	37	21	128	23	160	54	620	12	15	12	35	16	72	14	138	2	29	10	29	8	29
15.0	33	384	33	189	26	235	7	39	24	225	7	37	31	189	33	229	54	901	17	21	17	50	16	72	14	138	2	36	10	29	8	29
20.0	43	501	43	247	36	325	7	39	34	319	7	37	41	249	43	299	54	1183	22	27	22	65	16	72	14	138	2	42	10	29	8	29

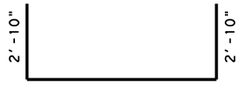
BILL OF REINFORCING STEEL FOR "D" = 6' (CONTINUED)

Length "L"	Bars P		Bars R		Bars S		Bars T		Bars U		Bars V		Bars W	
	#4		#6		#6		#6		#4	at 10" Spa	#4		#4	
[ft]	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt
5.0	4	15	0	0	0	0	0	0	0	0	4	35	6	11
10.0	4	15	2	23	2	21	2	17	6	13	4	35	6	11
15.0	4	15	4	45	4	43	4	33	12	26	4	35	6	11
20.0	4	15	6	68	6	64	6	50	18	39	4	35	6	11

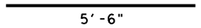
SUMMARY OF QUANTITIES

Total Reinf Steel	Steel Qty Adjust.	Class "C" Concrete	Concrete Qty Adjust.
Weight	P.L.F.		P.L.F.
[Lb]	[Lb]	[CY]	[CY]
1,269	157.9	5.43	0.54
2,139	236.1	8.31	0.78
3,010	314.3	11.19	1.03
3,881	392.5	14.07	1.28

* BASED ON 6" CURB HEIGHT. ADJUST FOR OTHER CURB HEIGHTS.



#5 BARS A



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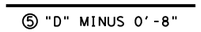
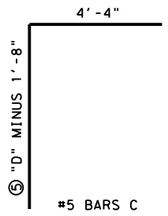


#5 BARS C1



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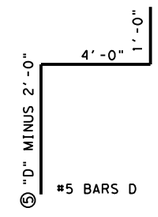
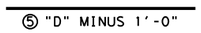
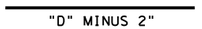


#5 BARS D



#5 BARS D1



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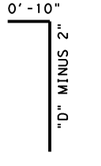
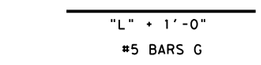


#5 BARS F

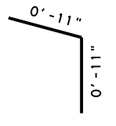


#5 BARS G

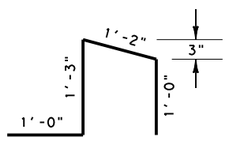
BAR G SPACING:

BOTTOM SLAB, LOWER MAT – 1'-4"
BOTTOM SLAB, UPPER MAT – 1'-2"
BACK WALL, OUTER MAT – 0'-6"
BACK WALL, INNER MAT – 0'-8"
FRONT WALL, OUTER MAT – 0'-6"
FRONT WALL, INNER MAT – 0'-8"
UPPER SLAB, LOWER MAT – 1'-0"
UPPER SLAB, UPPER MAT – 1'-0 3/4"
GUTTER – PLACE AS SHOWN

⑤ BASED ON 6" CURB HEIGHT. ADJUST FOR OTHER CURB HEIGHTS.

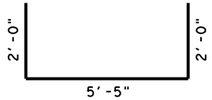


#4 BARS H

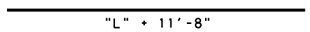


#4 BARS J

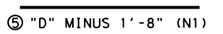
#4 BARS K



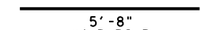
#5 BARS L



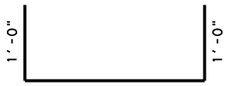
#4 BARS M
PLACE AS SHOWN



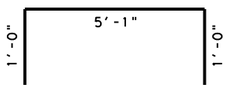
#4 BARS N



#4 BARS P
PLACE AS SHOWN

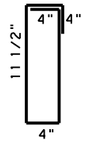


#6 BARS R
PLACE AS SHOWN

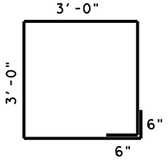


#6 BARS S
PLACE AS SHOWN

#6 BARS T
PLACE AS SHOWN



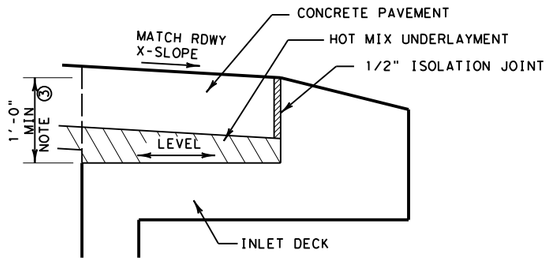
#4 BARS U



#4 BARS V

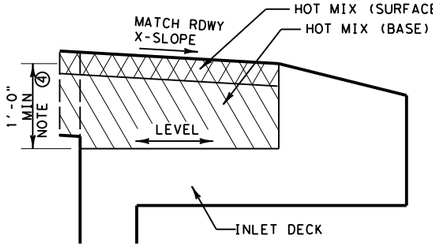
#4 BARS W

BARS W:
6 TOTAL TO BE PLACED AT 16" SPACING ALONG GUTTER SIDE AND INLET SIDE OF RING. (3 EACH SIDE)



③ THICKNESS OF CONCRETE PAVEMENT PLUS HOT MIX UNDERLAYMENT; IF LESS THAN 1'-0", INCREASE DEPTH OF HOT MIX UNDERLAYMENT.

INLET ADJACENT TO CONCRETE PAVEMENT



④ THICKNESS OF HOT MIX (SURFACE) PLUS HOT MIX (BASE) OR FLEX BASE. IF LESS THAN 1'-0", INCREASE DEPTH OF HOT MIX (BASE) OR FLEX BASE OVER INLET DECK.

MAXIMUM THICKNESS = 1'-6"

PLACE FLEX BASE IN MINIMUM 4" LIFTS

INLET ADJACENT TO HOT MIX PAVEMENT

GENERAL NOTES

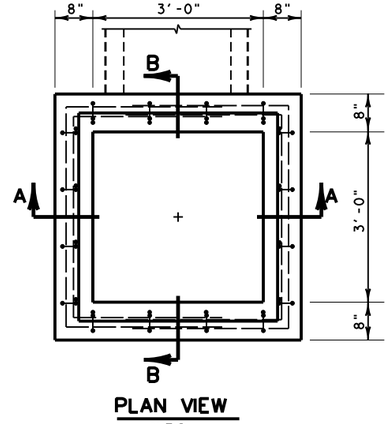
1. DESIGNED FOR AASHTO LRFD HL-93 LOADING.
2. ALL CONCRETE FOR CAST-IN-PLACE STRUCTURES SHALL BE CLASS "C"; ALL CONCRETE FOR PRECAST STRUCTURES SHALL BE CLASS "H" (MINIMUM 5000 PSI DESIGN STRENGTH).
3. ALL REINFORCING STEEL SHALL BE GRADE 60.
4. STAGE I MAY BE EITHER CAST-IN-PLACE OR PRECAST. FABRICATE PRECAST STRUCTURES USING REBAR AS DETAILED HEREON, WITH BARS C, D, E, F AND J TO BE INCLUDED WITH STAGE I. SPLICING OF BARS WILL NOT BE PERMITTED, EXCEPT AS NOTED.
5. STAGE II SHALL BE CAST-IN-PLACE.
6. CHAMFER ALL EXPOSED CORNERS 3/4", EXCEPT WHERE NOTED OTHERWISE.
7. DIMENSIONS RELATING TO REINFORCING STEEL ARE TO THE CENTERS OF BARS.
8. FIELD CUT AND BEND BARS AS NECESSARY TO ACCOMMODATE STORM DRAIN PIPE.
9. FOR PIPE AND BOX CONNECTIONS TO PRECAST INLETS, SEE STANDARD DETAIL SHEET PBGC.
10. INSTALL RING AND COVER AT OUTFALL END OF INLET, UNLESS OTHERWISE DIRECTED. CAST IRON RING AND COVER SHALL CONFORM TO ITEM 471. SEE STANDARD MDD (FTW) FOR RING AND COVER DETAILS.
11. DEPTHS OTHER THAN THOSE SHOWN MAY BE USED WHENEVER NECESSARY, UP TO A MAXIMUM DEPTH OF 15'. QUANTITIES FOR OTHER DEPTHS MAY BE DETERMINED BY INTERPOLATION.
12. DO NOT COMMENCE WITH STAGE II CONSTRUCTION UNTIL CONCRETE PAVEMENT AND CURB, OR CONCRETE CURB AND GUTTER CONSTRUCTION IS COMPLETED AT THE INLET SITE.
13. INSTALL A TEMPORARY WOOD COVER AFTER STAGE I IS COMPLETED, TO REMAIN IN PLACE UNTIL STAGE II CONSTRUCTION BEGINS.
14. THE LOCATION OF INLET AS SHOWN IN THE PLAN REFERS TO THE CONTROL POINT AT THE FACE OF CURB AND MID-POINT OF THE INLET.
15. IF CONCRETE PAVEMENT IS PLACED WITHOUT UNDERLAYMENT, PLACE BOND BREAKER (3 LAYERS OF 30# ROOFING FELT OR 1/2" EXPANSION JOINT MATERIAL) BETWEEN INLET DECK AND CONCRETE PAVEMENT.
16. PLACE A SEALED 1/2" ISOLATION JOINT ALONG ALL VERTICAL FACES ABUTTING CONCRETE PAVEMENT, CURB, CURB AND GUTTER, OR SIDEWALK. USE CLASS 5 OR 8 JOINT SEALANT TO SEAL THE JOINT. SEE STANDARD JS (FTW) FOR ADDTIONAL INFORMATION.

Texas Department of Transportation

Fort Worth District Standard

CURB INLET UNDER PAVEMENT FOR USE WITH TYPE II CURB I-CU (FTW)

ORIGINAL DRAWING: 05/2019	icu-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
DATE	REVISIONS	6	SEE TITLE SHEET		131
05/2019	REPLACES CI-2-08(FW)	STATE	STATE DIST.NO.	COUNTY	
04/2020	ADD MAX CONDUIT SIZE TABLE	TEXAS	FTW	ERATH	
11/2020	REVISE JOINT NOMENCLATURE	CONT.	SECT.	JOB	HIGHWAY NO.
		0079	04	049	BU 67K

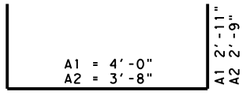


PLAN VIEW
N.T.S.

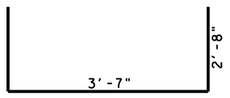
BILL OF REINFORCING STEEL - FREE-STANDING INLET												
DEPTH "D"	BARS A1			BARS A2			BARS B			BARS C		
	#5			#5		12" Spa	#5		12" Spa	#5		12" Spa
(ft)	No	Length	Wt	No	Length	Wt	No	Length	Wt	No	Length	Wt
4.0	2	9.833	21	8	9.167	76	8	8.917	74	16	3.833	64

SUMMARY OF QUANTITIES - INLET (RISER ONLY)			
FOR "D" = 4.00'			
TOTAL REINFORCING STEEL	ADDITIONAL REINFORCING STEEL	CLASS "C" CONCRETE	ADDITIONAL CONCRETE
Weight	P.L.F.		P.L.F.
(lb)	(lb)	(cy)	(cy)
235	35.8	1.2	0.18

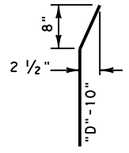
MAXIMUM DEPTH "D" = 30.00'



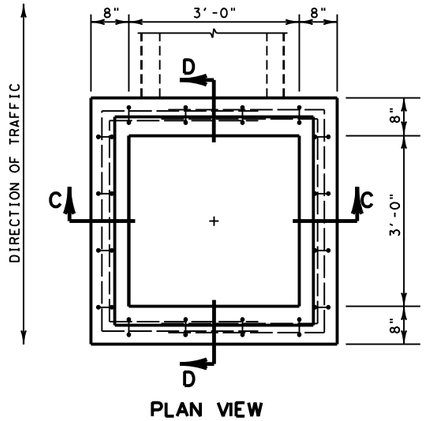
BARS A1 & A2



BARS B



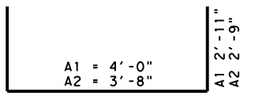
BARS C



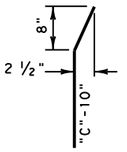
PLAN VIEW
N.T.S.

BILL OF REINFORCING STEEL - FREE-STANDING INLET									
DEPTH "C"	BARS A1			BARS A2			BARS C		
	#5			#5		12" Spa	#5		12" Spa
(ft)	No	Length	Wt	No	Length	Wt	No	Length	Wt
2.0	2	9.833	21	4	9.167	38	16	1.833	31

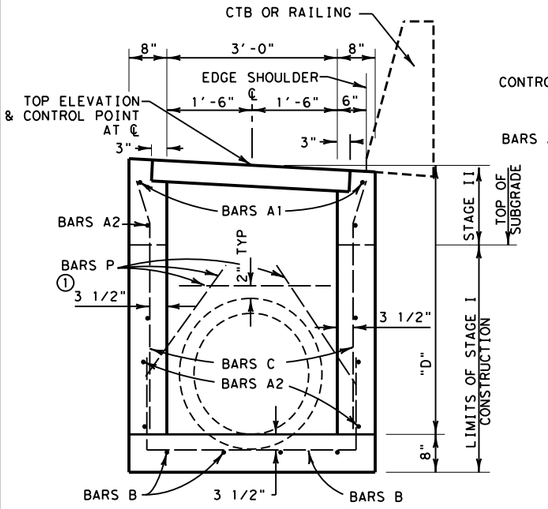
SUMMARY OF QUANTITIES - INLET (RISER ONLY)			
TOTAL REINFORCING STEEL	ADDITIONAL REINFORCING STEEL	CLASS "C" CONCRETE	ADDITIONAL CONCRETE
Weight	P.L.F.		P.L.F.
(Lb)	(Lb)	(CY)	(CY)
69	35.8	0.4	0.18



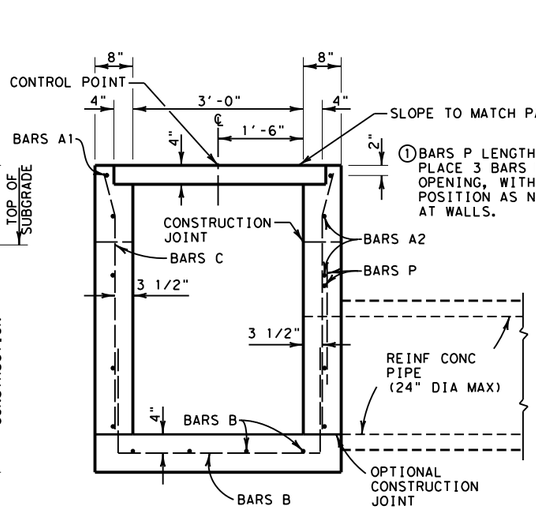
BARS A



BARS C



SECTION A-A

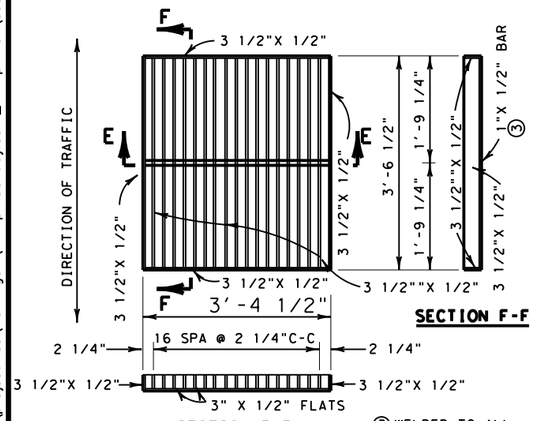


SECTION B-B

① BARS P LENGTH = PIPE O.D. + 0'-9" PLACE 3 BARS P AS SHOWN AT EACH PIPE OPENING, WITH 2"CLEAR COVER OVER PIPE. POSITION AS NEEDED TO PROVIDE 2" CLEAR AT WALLS.

TYPE FG INLET (FREE-STANDING)

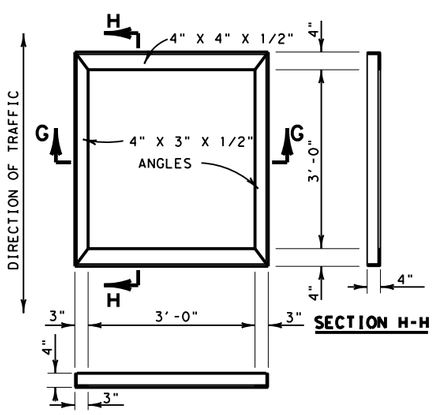
MAXIMUM PIPE SIZE – 24" DIAMETER
N.T.S.



SECTION E-E

GRATE DETAIL
N.T.S.

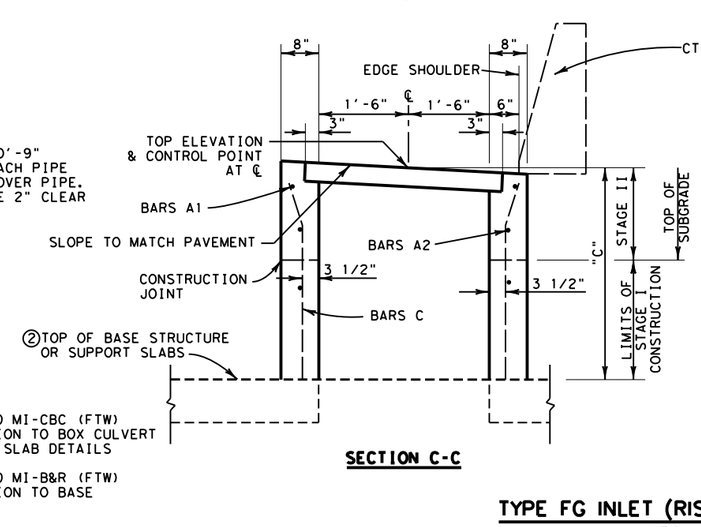
③ WELDED TO ALL TRANSVERSE FLATS



SECTION H-H

SECTION G-G

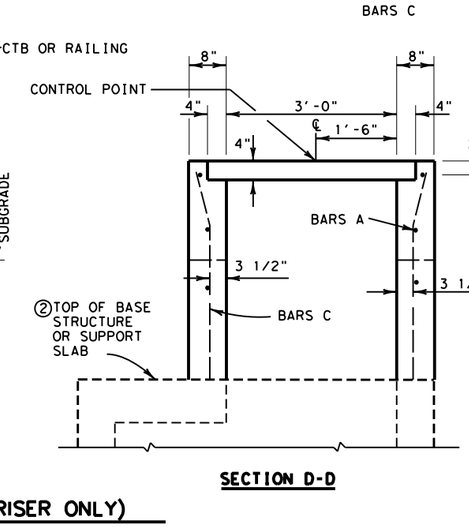
FRAME DETAIL
N.T.S.



SECTION C-C

② SEE STANDARD MI-CBC (FTW) FOR CONNECTION TO BOX CULVERT AND SUPPORT SLAB DETAILS

SEE STANDARD MI-B&R (FTW) FOR CONNECTION TO BASE STRUCTURE



SECTION D-D

TYPE FG INLET (RISER ONLY)

N.T.S.
FOR USE WITH BASE STRUCTURE OR BOX CULVERT
DO NOT USE WITH BOX CULVERT SPAN LESS THAN 4'

GENERAL NOTES

1. INLET (INCLUDING GRATE) DESIGNED FOR AASHTO LRFD HL 93 LOADING.
2. STAGE I MAY BE EITHER CAST-IN-PLACE OR PRECAST. FABRICATE PRECAST STRUCTURES WITH A MINIMUM 2' AT THE TOP OF STAGE I USING REBAR AS DETAILED HEREON. INCLUDE BARS C WITH STAGE I. SPLICING OF BARS WILL NOT BE PERMITTED. SUBMIT SEALED ENGINEERING CALCULATIONS AND DRAWINGS FOR APPROVAL PRIOR TO FABRICATION.
3. STAGE II SHALL BE CAST-IN-PLACE. CONSTRUCT TOP TO CONFORM TO SLOPE OF SURFACE. STAGE II MAY BE CAST MONOLITHICALLY WITH CONCRETE PAVEMENT. IF NOT CAST MONOLITHICALLY, PLACE A SEALED 1/2" ISOLATION JOINT AROUND THE TOP OF THE INLET STRUCTURE, TO THE DEPTH OF CONCRETE PAVEMENT. USE CLASS 5 OR 8 JOINT SEALANT TO SEAL THE JOINT. SEE STANDARD JS (FTW) FOR ADDITIONAL INFORMATION.
4. USE CLASS "C" CONCRETE FOR CAST-IN-PLACE STRUCTURES; USE CLASS "H" CONCRETE (MINIMUM 5000 PSI DESIGN STRENGTH) FOR PRECAST STRUCTURES.
5. USE GRADE 60 STEEL FOR ALL REINFORCING.
6. DIMENSIONS RELATING TO REINFORCING STEEL ARE TO THE CENTERS OF BARS.
7. FIELD CUT AND BEND BARS AS NECESSARY TO ACCOMMODATE STORM DRAIN PIPE.
8. FABRICATE FRAME AND GRATE FROM WELDED STEEL IN ACCORDANCE WITH ITEM 471.
9. FOR CAST-IN-PLACE STRUCTURES, A CONSTRUCTION JOINT MAY BE PLACED AT EACH 5'(MIN) INCREMENT OF DEPTH.
10. DO NOT USE INLET IN OR ADJACENT TO AREAS DESIGNATED FOR PEDESTRIAN OR BICYCLE ACCESS.
11. FOR PIPE OR BOX CONNECTIONS TO PRECAST STRUCTURES, SEE STANDARD PBGC.
12. DEPTHS OTHER THAN THOSE SHOWN MAY BE USED WHENEVER NECESSARY, UP TO A MAXIMUM DEPTH ("C" OR "D") OF 30'. DETERMINE QUANTITIES FOR OTHER DEPTHS BY INTERPOLATION.
13. DO NOT COMMENCE WITH STAGE II CONSTRUCTION UNTIL PERMISSION IS GRANTED BY THE ENGINEER.
14. INSTALL A TEMPORARY WOOD COVER AFTER STAGE I IS COMPLETED, TO REMAIN IN PLACE UNTIL STAGE II CONSTRUCTION BEGINS.
15. THE LOCATION OF INLET AS SHOWN IN THE PLAN REFERS TO THE CONTROL POINT SHOWN HEREON. FOR TYPE FG INLETS LOCATED ON BASE STRUCTURE, POSITION BASE AS NECESSARY TO ALIGN WITH STORM DRAINS, ROADWAYS AND OTHER FEATURES, AS DIRECTED. FOR TYPE FG INLETS LOCATED ON BOX CULVERT LESS THAN 4' SPAN, USE WITH BASE STRUCTURE. SEE MI-B&R FOR CONNECTION DETAILS.

Texas Department of Transportation

Fort Worth District Standard

GRATED INLET FOR PAVED SURFACES TYPE FG

I-FG (FTW)

ORIGINAL DRAWING: 05/2019	ifg-ftw.dgn	PROJECT NO.			SHEET NO.
DATE	REVISIONS	SEE TITLE SHEET			132
05/2019	REPLACES GI-1-02(FW)	STATE	STATE DIST. NO.	COUNTY	
09/2020	REVISED TITLE BLOCK TO INDICATE APPLICATION	TEXAS	FTW	ERATH	
11/2020	REVISE JOINT NOMENCLATURE	CONT.	SECT.	JOB	HIGHWAY NO.
		0079	04	049	BU 67K

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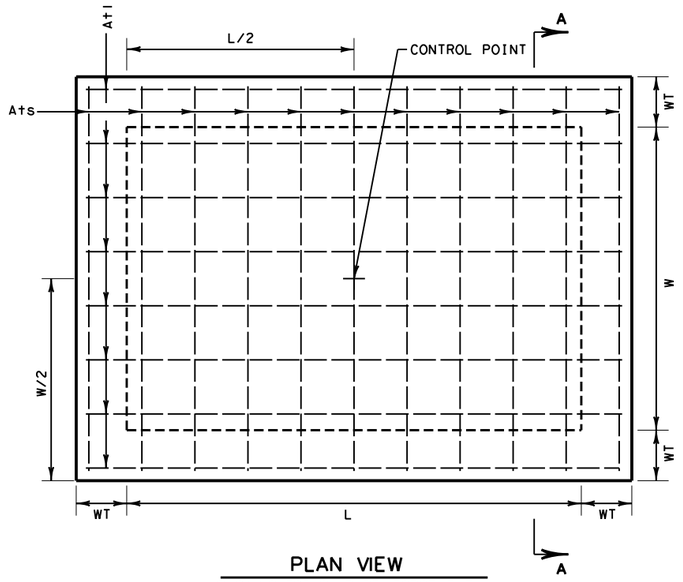
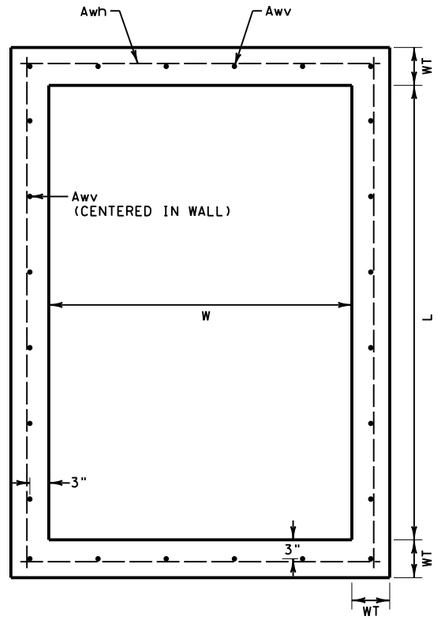
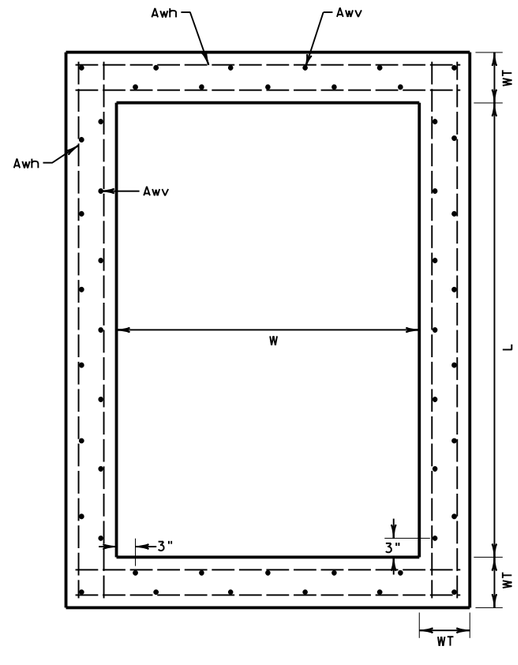


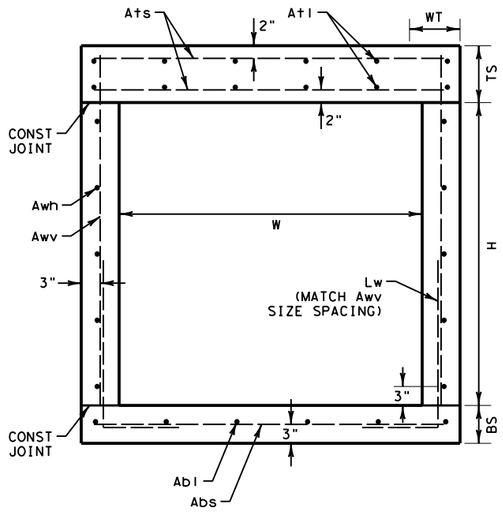
PLAN VIEW
SHOWING TOP SLAB REINFORCEMENT
N.T.S.



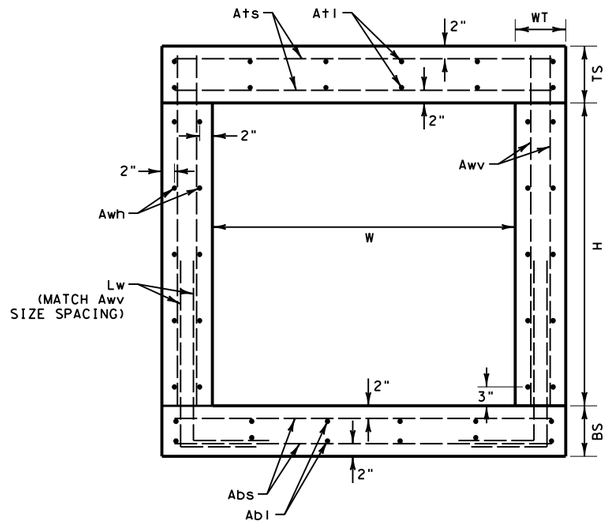
SINGLE LAYER REINFORCING
FOR WT = 6"



DOUBLE LAYER REINFORCING
FOR WT >/= 8"



SINGLE LAYER WALL REINFORCING
FOR BS = 6"
FOR WT = 6"



DOUBLE LAYER WALL REINFORCING
FOR BS >/= 8"
FOR WT >/= 8"

SECTION A-A
N.T.S.

PLAN VIEW
SHOWING WALL REINFORCEMENT
N.T.S.

BARS Lw

GENERAL NOTES

1. DESIGNED FOR AASHTO LRFD HL 93 LOADING.
2. STRUCTURES MAY BE EITHER CAST-IN-PLACE OR PRECAST. FOR PRECAST STRUCTURES, SUBMIT SEALED ENGINEERING CALCULATIONS AND DRAWINGS FOR APPROVAL PRIOR TO FABRICATION.
3. USE CLASS "C" CONCRETE FOR CAST-IN-PLACE STRUCTURES; USE CLASS "H" CONCRETE (MINIMUM 5000 PSI DESIGN STRENGTH) FOR PRECAST STRUCTURES.
4. USE GRADE 60 STEEL FOR ALL REINFORCING.
5. DIMENSIONS RELATING TO REINFORCING STEEL ARE TO THE CENTERS OF BARS.
6. FIELD CUT AND BEND BARS AS NECESSARY TO ACCOMMODATE STORM DRAIN PIPE.
7. FOR PIPE OR BOX CONNECTIONS TO PRECAST STRUCTURES, SEE STANDARD PBGC.
8. THE LOCATION OF JUNCTION BOX AS SHOWN IN THE PLANS REFERS TO THE CONTROL POINT SHOWN HEREON. POSITION JUNCTION BOX TO ALIGN WITH STORM DRAINS, ROADWAYS AND OTHER FEATURES, AS DIRECTED.

Texas Department of Transportation

Fort Worth District Standard

JUNCTION BOX WITHOUT RISER
JB (FTW)

ORIGINAL DRAWING: 05/2019	jb-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
DATE	REVISIONS	6	SEE TITLE SHEET		133
05/2019	NEW STANDARD	STATE	STATE DIST.NO.	COUNTY	
		TEXAS	FTW	ERATH	
		CONT.	SECT.	JOB	HIGHWAY NO.
		0079	04	049	BU 67K

BILL OF REINFORCING STEEL

SIZE			MAX DEPTH = 25' TO TOP OF BASE SLAB									MAX DEPTH = 15' TO TOP OF BASE SLAB								
			BASE SLAB			WALL			TOP SLAB			BASE SLAB			WALL			TOP SLAB		
L	W	H	BS*	Abs	Abl	WT*	Awh	Awv	TS*	Ats	Atl	BS*	Abs	Abl	WT*	Awh	Awv	TS*	Ats	Atl
8'	8'	8'	9"	#5 AT 9"	#5 AT 9"	10"	#5 AT 9"	#5 AT 9"	12"	#5 AT 9"	#5 AT 9"	9"	#5 AT 12"	#5 AT 12"	10"	#5 AT 12"	#5 AT 12"	12"	#5 AT 12"	#5 AT 12"
8'	<=6'	8'	9"	#5 AT 8"	#5 AT 8"	9"	#5 AT 8"	#5 AT 8"	12"	#5 AT 10"	#5 AT 10"	9"	#5 AT 10"	#5 AT 10"	9"	#5 AT 10"	#5 AT 10"	12"	#5 AT 12"	#5 AT 12"
8'	8'	<=6'	9"	#5 AT 9"	#5 AT 9"	9"	#5 AT 8"	#5 AT 8"	12"	#5 AT 9"	#5 AT 9"	9"	#5 AT 12"	#5 AT 12"	9"	#5 AT 10"	#5 AT 10"	12"	#5 AT 12"	#5 AT 12"
8'	<=6'	<=6'	9"	#5 AT 8"	#5 AT 8"	8"	#5 AT 8"	#5 AT 8"	12"	#5 AT 10"	#5 AT 10"	9"	#5 AT 10"	#5 AT 10"	8"	#5 AT 10"	#5 AT 10"	12"	#5 AT 12"	#5 AT 12"
7'	7'	7'	9"	#5 AT 9"	#5 AT 9"	9"	#5 AT 9"	#5 AT 9"	10"	#5 AT 7"	#5 AT 7"	9"	#4 AT 10"	#4 AT 10"	9"	#5 AT 10"	#5 AT 10"	10"	#5 AT 10"	#5 AT 10"
7'	<=5'	7'	8"	#5 AT 9"	#5 AT 9"	8"	#5 AT 9"	#5 AT 9"	10"	#5 AT 8"	#5 AT 8"	8"	#4 AT 9"	#4 AT 9"	8"	#4 AT 8"	#4 AT 8"	10"	#5 AT 12"	#4 AT 8"
7'	7'	<=5'	9"	#5 AT 9"	#5 AT 9"	8"	#5 AT 9"	#5 AT 9"	10"	#5 AT 7"	#5 AT 7"	9"	#4 AT 10"	#4 AT 10"	8"	#4 AT 8"	#4 AT 8"	10"	#5 AT 10"	#5 AT 10"
7'	<=5'	<=5'	8"	#5 AT 9"	#5 AT 9"	8"	#5 AT 9"	#5 AT 9"	10"	#5 AT 8"	#5 AT 8"	8"	#4 AT 9"	#4 AT 9"	8"	#4 AT 9"	#4 AT 9"	10"	#5 AT 12"	#4 AT 8"
6'	6'	6'	8"	#5 AT 9"	#5 AT 9"	8"	#5 AT 9"	#5 AT 9"	9"	#5 AT 8"	#5 AT 8"	8"	#4 AT 9"	#4 AT 9"	8"	#5 AT 10"	#5 AT 10"	9"	#5 AT 8"	#5 AT 8"
6'	<=4'	6'	8"	#5 AT 10"	#5 AT 10"	8"	#5 AT 10"	#5 AT 10"	9"	#5 AT 9"	#5 AT 9"	8"	#4 AT 10"	#4 AT 10"	8"	#4 AT 10"	#4 AT 10"	9"	#5 AT 10"	#5 AT 10"
6'	6'	<=4'	8"	#5 AT 9"	#5 AT 9"	8"	#5 AT 10"	#5 AT 10"	9"	#5 AT 8"	#5 AT 8"	8"	#4 AT 9"	#4 AT 9"	8"	#4 AT 10"	#4 AT 10"	9"	#5 AT 8"	#5 AT 8"
6'	<=4'	<=4'	8"	#5 AT 10"	#5 AT 10"	8"	#5 AT 12"	#5 AT 12"	9"	#5 AT 9"	#5 AT 9"	8"	#4 AT 10"	#4 AT 10"	8"	#4 AT 12"	#4 AT 12"	9"	#5 AT 10"	#5 AT 10"
5'	5'	5'	6"	#5 AT 7"	#5 AT 7"	6"	#5 AT 7"	#5 AT 7"	9"	#5 AT 8"	#5 AT 8"	6"	#5 AT 10"	#5 AT 10"	6"	#5 AT 10"	#5 AT 10"	9"	#5 AT 10"	#5 AT 10"
5'	3'	5'	6"	#5 AT 10"	#5 AT 10"	6"	#5 AT 10"	#5 AT 10"	9"	#4 AT 10"	#4 AT 10"	6"	#4 AT 10"	#4 AT 10"	6"	#4 AT 10"	#4 AT 10"	9"	#4 AT 12"	#4 AT 12"
4'	4'	4'	6"	#4 AT 10"	#4 AT 10"	6"	#4 AT 10"	#4 AT 10"	9"	#4 AT 12"	#4 AT 12"	6"	#4 AT 12"	#4 AT 12"	6"	#4 AT 12"	#4 AT 12"	9"	#4 AT 12"	#4 AT 12"
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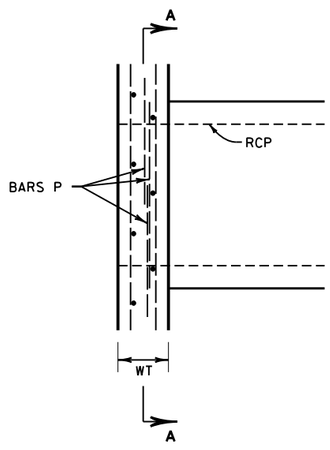
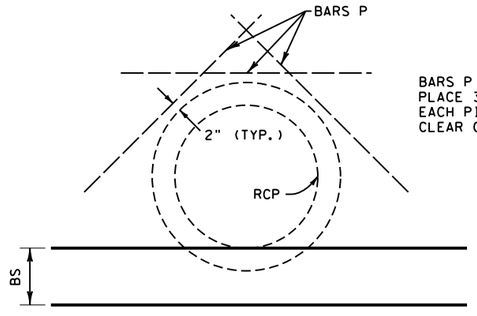
3'	3'	3'	6"	#4 AT 12"	#4 AT 12"	6"	#4 AT 12"	#4 AT 12"	9"	#4 AT 12"	#4 AT 12"	6"	#4 AT 12"	#4 AT 12"	6"	#4 AT 12"	#4 AT 12"	9"	#4 AT 12"	#4 AT 12"

*PLACE TWO LAYERS OF REINFORCING MAT IN CONCRETE THICKNESSES EQUAL OR GREATER THAN 8". PLACE ONE LAYER OF REINFORCING MAT IN 6" THICK WALL/SLAB.



PLAN VIEW



SHOWING ONLY BARS P FOR CLARITY

BARS P LENGTH = PIPE O.D. + 9"
PLACE 3 BARS P AS SHOWN AT EACH PIPE OPENING WITH 2" CLEAR COVER OVER PIPE.

SECTION A-A
N.T.S.

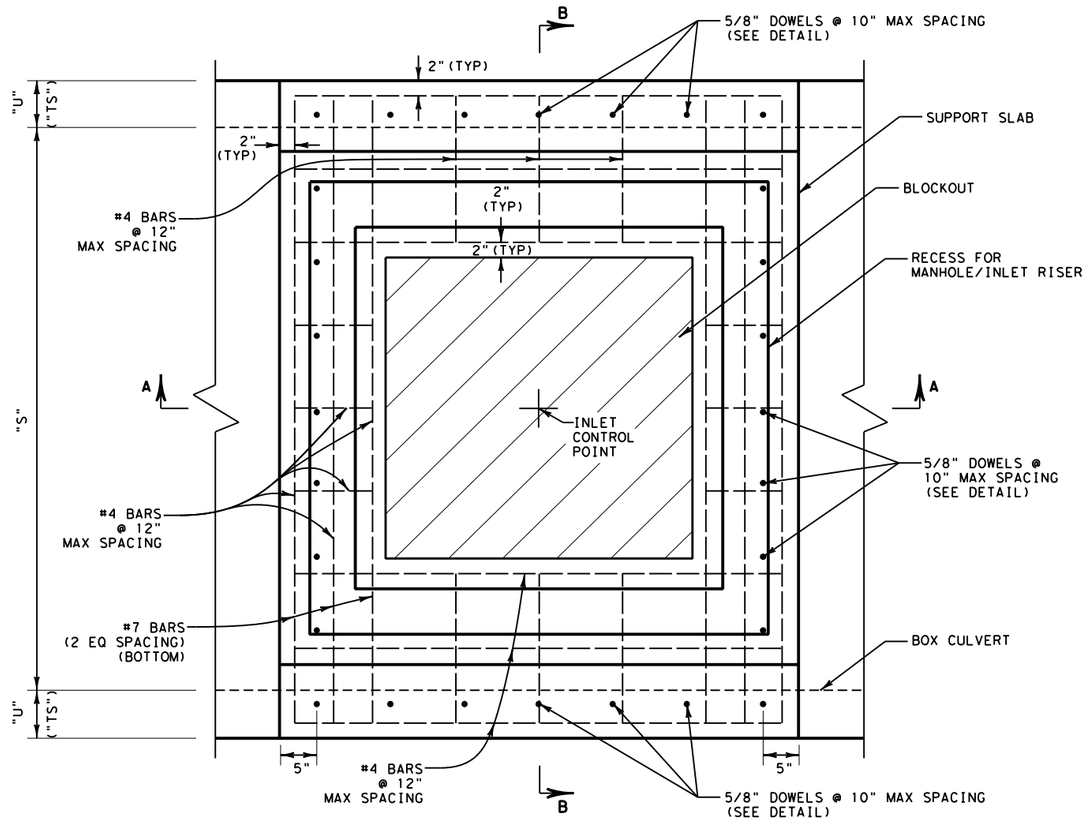
SUPPLEMENTAL REINFORCEMENT
RCP CONNECTION
(CAST-IN-PLACE ONLY)

Texas Department of Transportation

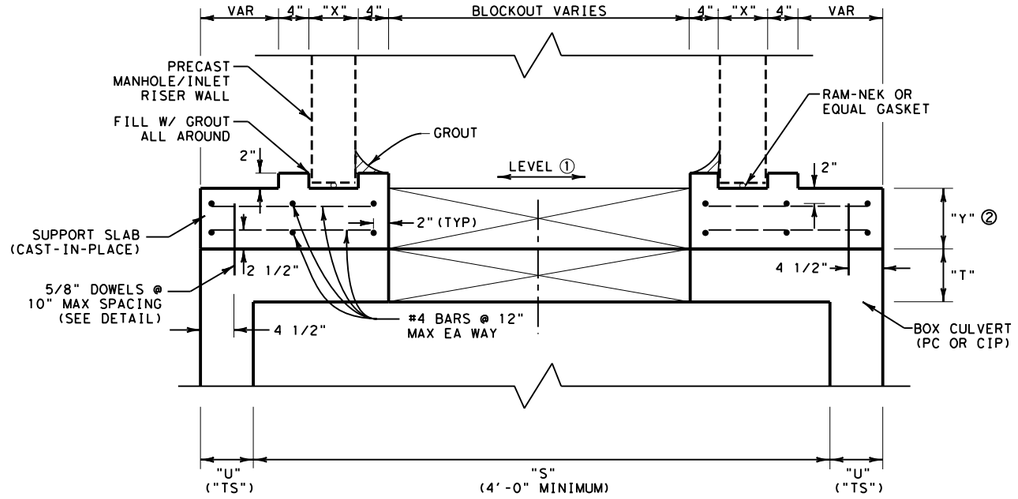
Fort Worth District Standard

JUNCTION BOX WITHOUT RISER
JB (FTW)

ORIGINAL DRAWING: 05/2019	jb-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
DATE	REVISIONS	6	SEE TITLE SHEET		134
05/2019	NEW STANDARD	STATE	STATE DIST.NO.	COUNTY	
		TEXAS	FTW	ERATH	
		CONT.	SECT.	JOB	HIGHWAY NO.
		0079	04	049	BU 67K



PLAN VIEW
N.T.S.



SECTION B-B
N.T.S.

NOTE:

"S" REFERS TO BOX CULVERT SPAN (4' MINIMUM)

"T" REFERS TO BOX CULVERT TOP SLAB THICKNESS

"U" AND "TS" REFERS TO BOX CULVERT WALL THICKNESS

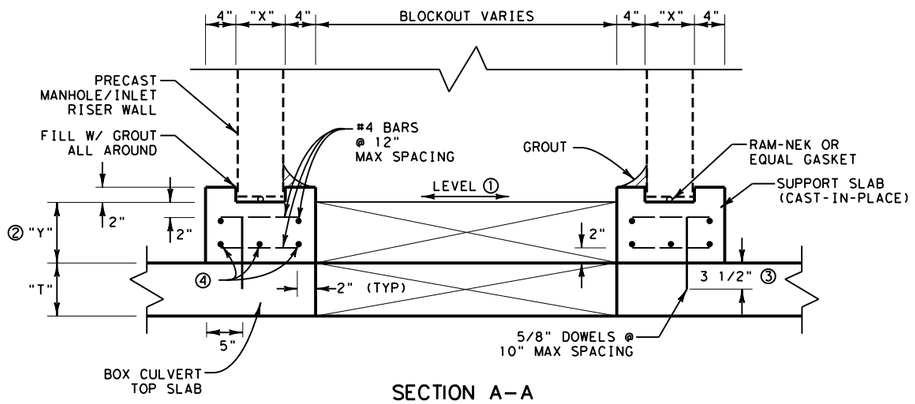
"X" = RISER WALL THICKNESS + 1/2"

① GRADE SUPPORT SLAB AND RECESS TO BE LEVEL, TO ENSURE THAT MANHOLE/INLET RISER IS PLUMB AND VERTICAL.

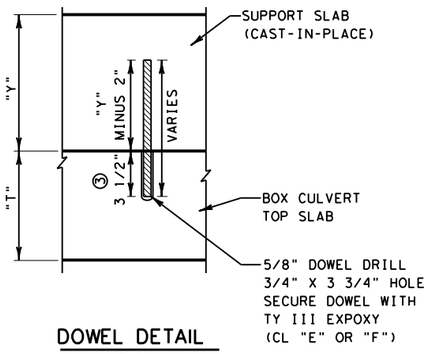
② FOR "S" </= 8', "Y" = 8" MIN
FOR 8' < "S" </= 10', "Y" = 10" MIN
FOR "S" > 10', "Y" = 12" MIN

③ FOR "T" LESS THAN 6", REDUCE TO 3".

④ 3 - #7 BARS @ EQUAL SPACING.



SECTION A-A
N.T.S.



DOWEL DETAIL
N.T.S.

GENERAL NOTES

1. SUPPORT SLAB TO BE CAST-IN-PLACE.
2. USE CLASS "C" CONCRETE FOR ALL SUPPORT SLABS.
3. USE GRADE 60 STEEL FOR ALL REINFORCING.
4. SEE CULVERT AND DRAINAGE LAYOUTS FOR LOCATION, TYPE, SIZE AND ORIENTAION OF INLET AND MANHOLE STRUCTURES.
5. CUT OR FORM BLOCKOUT IN TOP SLAB OF BOX CULVERT AS DIRECTED. CUT REINFORCING STEEL FLUSH WITH WALLS OF BLOCKOUT AND GROUT SMOOTH.
6. ADJUST LENGTHS OF REINFORCING BARS AS DIRECTED, TO ACCOMMODATE CULVERT SKEW.
7. SEE CULVERT STANDARDS FOR DIMENSIONS OF BOX CULVERTS.
8. MANHOLE AND INLET CONNECTIONS TO BOX CULVERTS WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE SUBSIDIARY TO ITEM 462 AND ITEM 465.

PRECAST MANHOLE & INLET RISER CONNECTION

Texas Department of Transportation | Fort Worth District Standard

MANHOLE/INLET CONNECTION TO BOX CULVERT MI-CBC (FTW)

ORIGINAL DRAWING: 05/2019	micbc-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
DATE	REVISIONS	6	SEE TITLE SHEET		135
05/2019		STATE	STATE DIST.NO.	COUNTY	
		TEXAS	FTW	ERATH	
		CONT.	SECT.	JOB	HIGHWAY NO.
		0079	04	049	BU 67K

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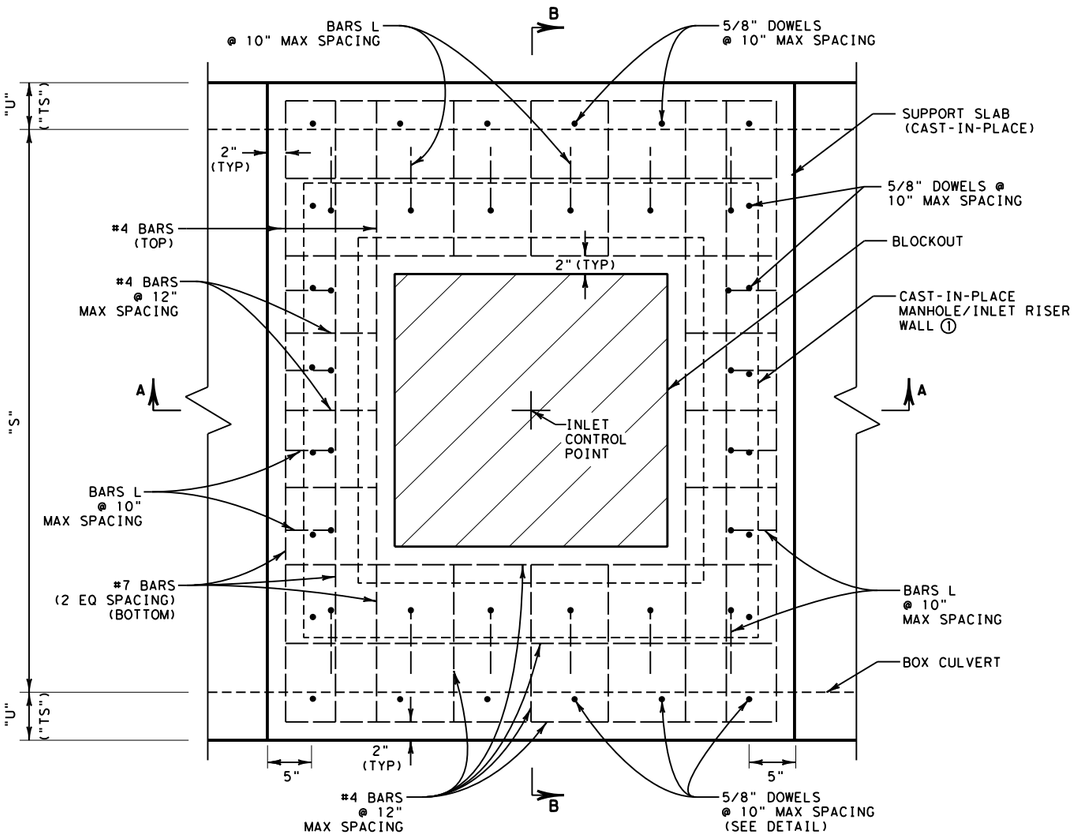
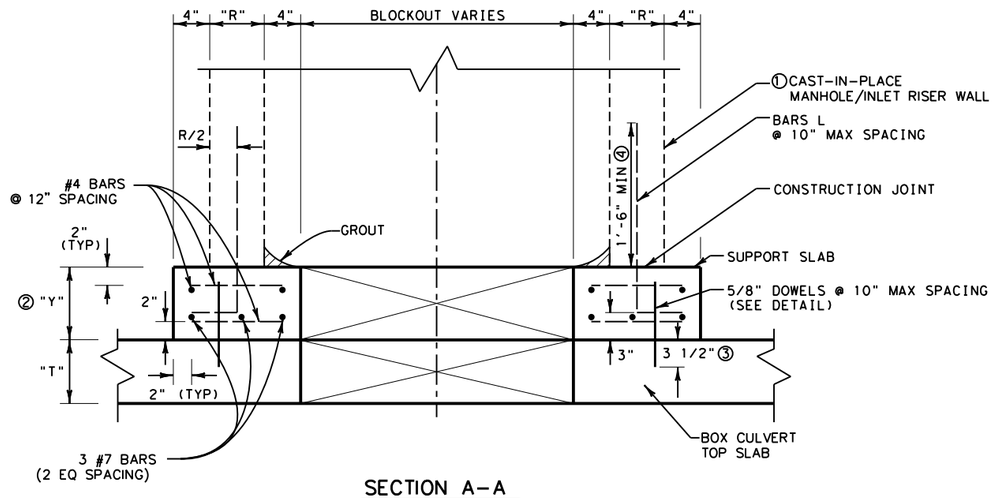
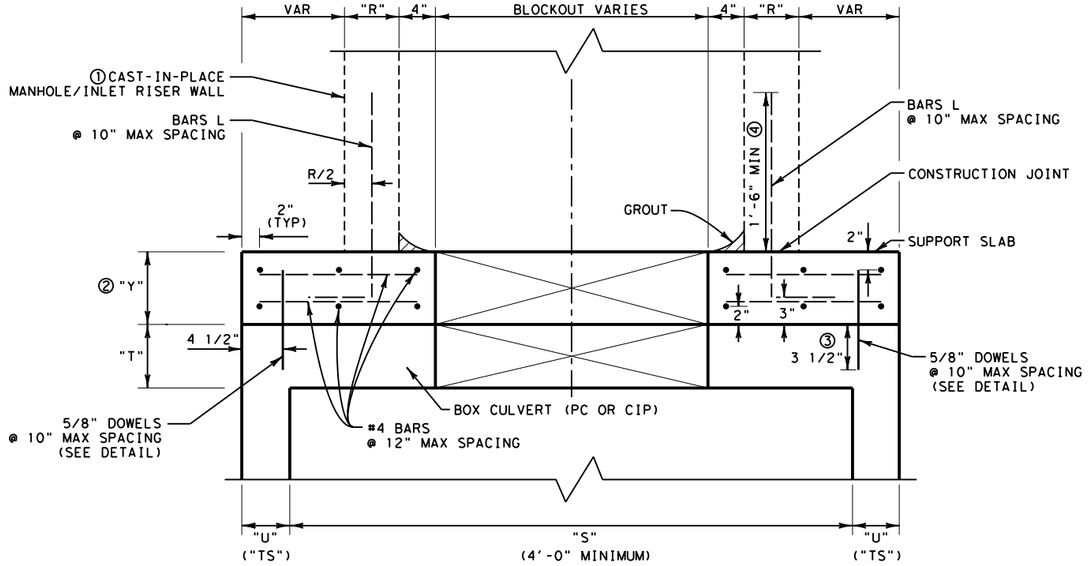


PLAN VIEW
N.T.S.



SECTION A–A
N.T.S.



SECTION B–B
N.T.S.

NOTE:

"R" = RISER WALL THICKNESS

"S" REFERS TO BOX CULVERT SPAN (4' MINIMUM)

"T" REFERS TO BOX CULVERT TOP SLAB THICKNESS

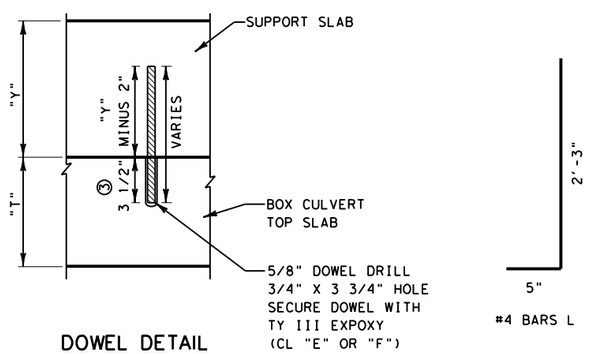
"U" AND "TS" REFERS TO BOX CULVERT WALL THICKNESS

① RISER WALL TO BE PLUMB AND VERTICAL.

② FOR "S" </= 8', "Y" = 8" MIN
FOR 8' < "S" </= 10', "Y" = 10" MIN
FOR "S" > 10', "Y" = 12" MIN

③ FOR "T" LESS THAN 6", REDUCE TO 3".

④ FOR STRUCTURE HEIGHT LESS THAN 1'-6", ADJUST AS DIRECTED.



DOWEL DETAIL
N.T.S.

GENERAL NOTES

1. SUPPORT SLAB TO BE CAST-IN-PLACE.
2. USE CLASS "C" CONCRETE FOR ALL SUPPORT SLABS.
3. USE GRADE 60 STEEL FOR ALL REINFORCING.
4. SEE CULVERT AND DRAINAGE LAYOUTS FOR LOCATION, TYPE, SIZE AND ORIENTAION OF INLET AND MANHOLE STRUCTURES.
5. CUT OR FORM BLOCKOUT IN TOP SLAB OF BOX CULVERT AS DIRECTED. CUT REINFORCING STEEL FLUSH WITH WALLS OF BLOCKOUT AND GROUT SMOOTH.
6. ADJUST LENGTHS OF REINFORCING BARS AS DIRECTED, TO ACCOMMODATE CULVERT SKEW.
7. SEE CULVERT STANDARDS FOR DIMENSIONS OF BOX CULVERTS.
8. MANHOLE AND INLET CONNECTIONS TO BOX CULVERTS WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE SUBSIDIARY TO ITEM 462 AND ITEM 465.

CAST–IN–PLACE MANHOLE/INLET RISER CONNECTION

Texas Department of Transportation

Fort Worth District Standard

MANHOLE/INLET CONNECTION TO BOX CULVERT MI-CBC (FTW)

ORIGINAL DRAWING: 05/2019	micbc-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
DATE	REVISIONS	6	SEE TITLE SHEET	136
05/2019		STATE	STATE DIST.NO.	COUNTY
		TEXAS	FTW	ERATH
		CONT.	SECT.	JOB	HIGHWAY NO.
		0079	04	049	BU 67K

http://www.dot.state.tx.us/ftw/specinfo/standard.htm
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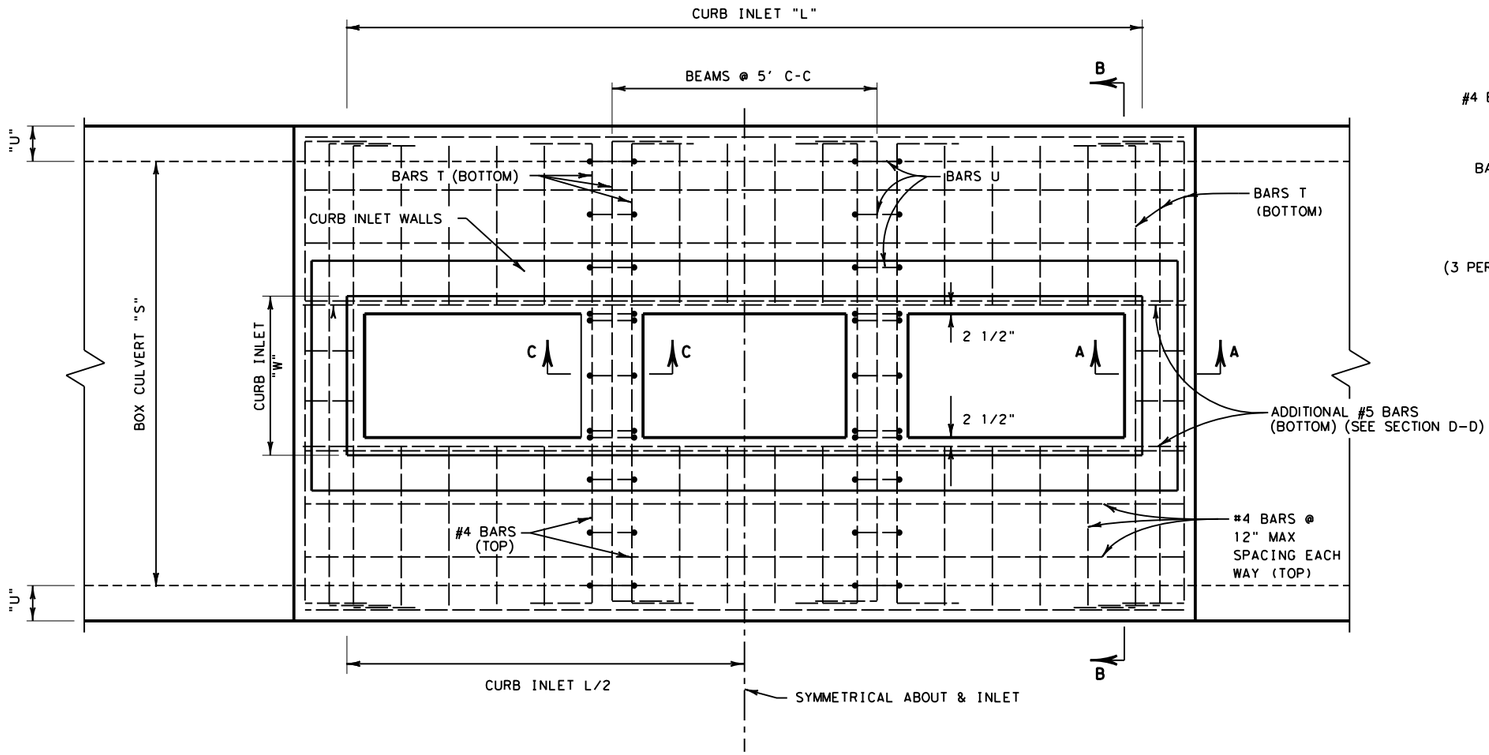
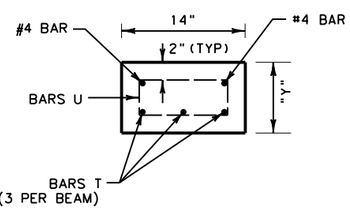
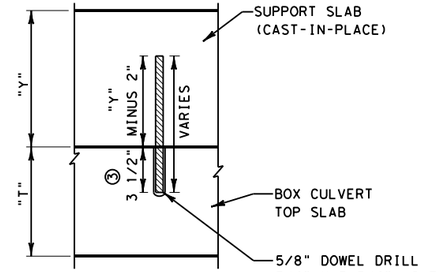


PLAN VIEW
N.T.S.



SECTION C-C
N.T.S.



DOWEL DETAIL
N.T.S.

NOTE:

"R" REFERS TO INLET WALL THICKNESS

"S" REFERS TO BOX CULVERT SPAN (4' MINIMUM)

"T" REFERS TO BOX CULVERT TOP SLAB THICKNESS

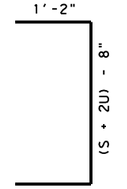
"U" AND "TS" REFER TO BOX CULVERT WALL THICKNESS

① GRADE SUPPORT SLAB AND RECESS TO BE LEVEL, TO ENSURE THAT INLET WALL IS PLUMB AND VERTICAL.

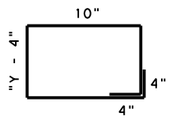
② FOR "S" </= 8', "Y" = 8" MIN
FOR 8' < "S" < 10', "Y" = 10" MIN
FOR "S" > 10', "Y" = 12" MIN

③ FOR "T" LESS THAN 6", REDUCE TO 3".

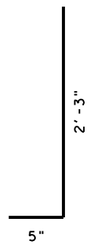
④ BARS P LENGTH = PIPE O.D. +9"; PLACE AS SHOWN.



#7 BARS T
AS SHOWN



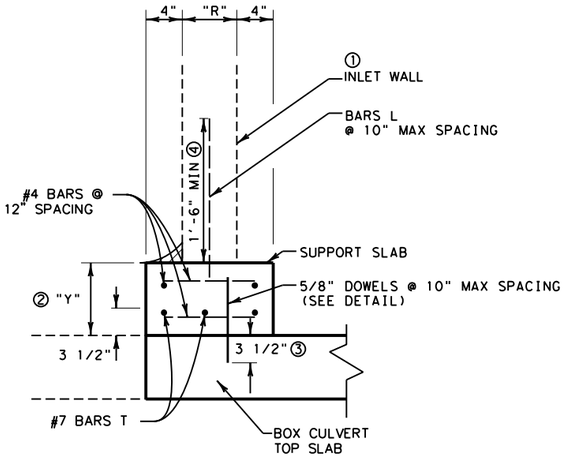
#3 BARS U
@ 12" MAX SPACING
PAIR OF BARS AT
CORNERS OF BLOCKOUTS



#4 BARS L

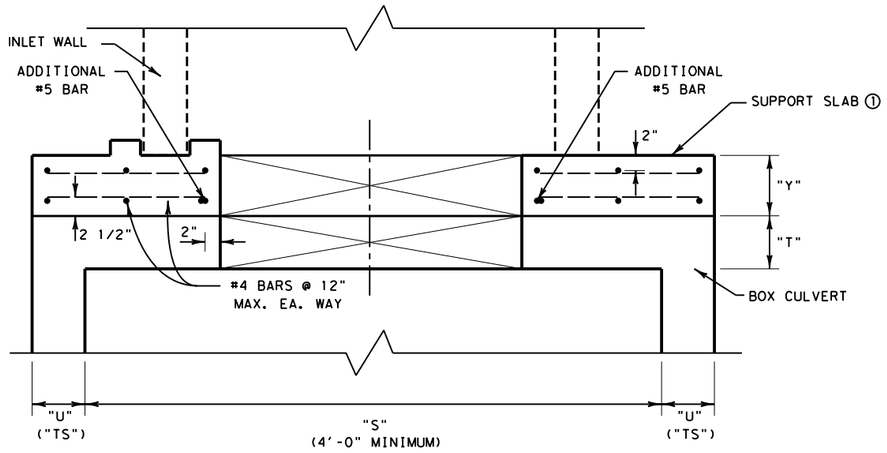
GENERAL NOTES

1. SUPPORT SLAB TO BE CAST-IN-PLACE.
2. USE CLASS "C" CONCRETE FOR ALL SUPPORT SLABS.
3. USE GRADE 60 STEEL FOR ALL REINFORCING.
4. SEE CULVERT AND DRAINAGE LAYOUTS FOR LOCATION, TYPE, SIZE AND ORIENTAION OF INLET AND MANHOLE STRUCTURES.
5. CUT OR FORM BLOCKOUT IN TOP SLAB OF BOX CULVERT AS DIRECTED. CUT REINFORCING STEEL FLUSH WITH WALLS OF BLOCKOUT AND GROUT SMOOTH.
6. ADJUST LENGTHS OF REINFORCING BARS AS DIRECTED, TO ACCOMMODATE CULVERT SKEW.
7. SEE CULVERT STANDARDS FOR DIMENSIONS OF BOX CULVERTS.
8. MANHOLE AND INLET CONNECTIONS TO BOX CULVERTS WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE SUBSIDIARY TO ITEM 462 AND ITEM 465.
9. USE BASE STRUCTURE AND RISER WITH BOX CULVERTS WHERE SPAN IS LESS THAN 4'.



SECTION A-A
N.T.S.
(SHOWING C.I.P. CONNECTION)
(SEE SHEET 1 OF 4 FOR PRECAST CONNECTION)

PLAN VIEW
N.T.S.



SHOWING SLAB FOR PRECAST INLET | SHOWING SLAB FOR CIP INLET

SECTION B-B
N.T.S.
(SEE SHEETS 1 & 2 FOR ADDITIONAL INFORMATION
RELATED TO PRECAST OR CAST-IN-PLACE CONNECTIONS)

SUPPORT SLAB INTERMEDIATE BEAMS FOR USE WITH CURB INLETS WHEN "L" > 5'

Texas Department of Transportation | Fort Worth District Standard

MANHOLE/INLET CONNECTION TO BOX CULVERT MI-CBC (FTW)

ORIGINAL DRAWING: 05/2019	micbc-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
DATE	REVISIONS	6	SEE TITLE SHEET		137
05/2019		STATE	STATE DIST.NO.	COUNTY	
		TEXAS	FTW	ERATH	
		CONT.	SECT.	JOB	HIGHWAY NO.
		0079	04	049	BU 67K

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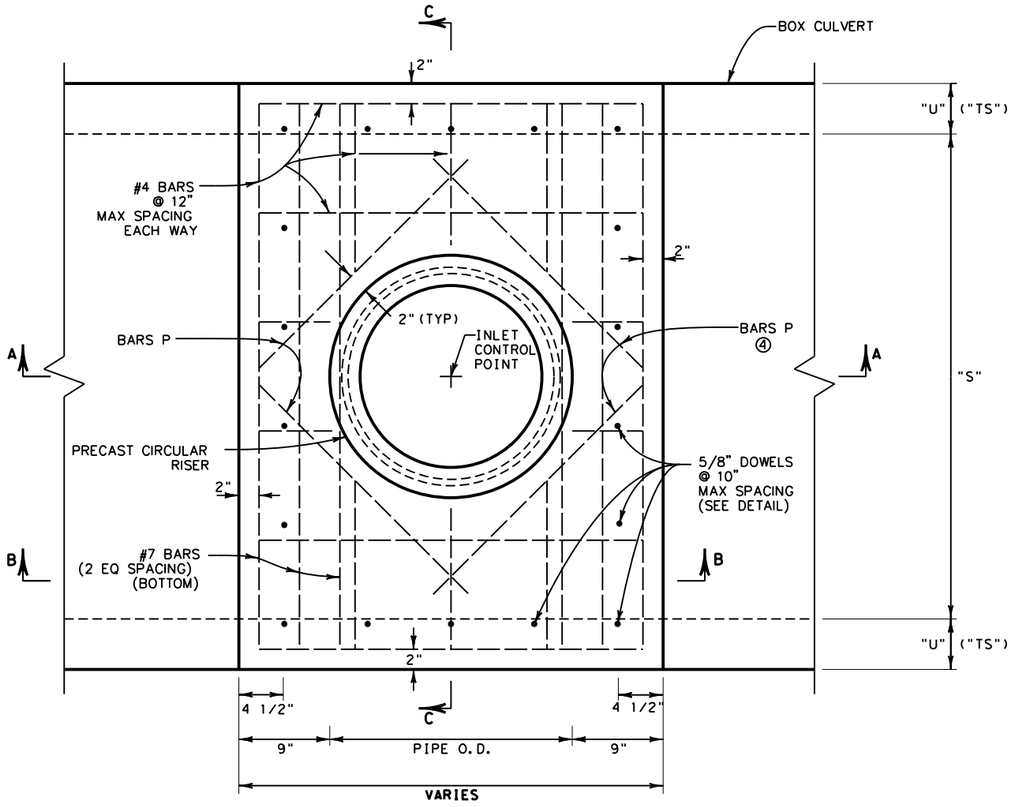
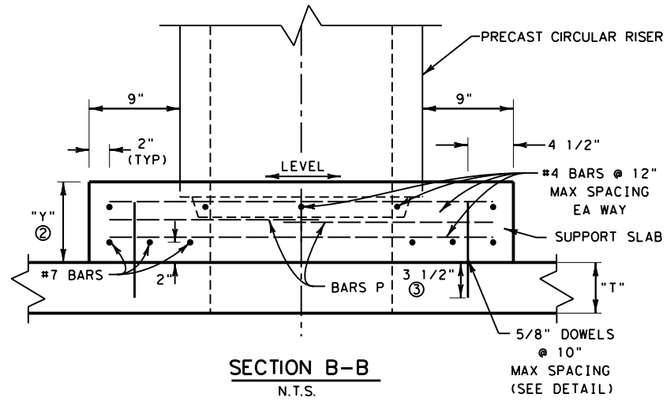
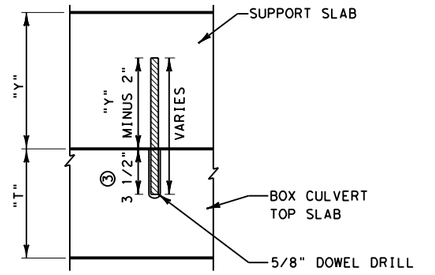


PLAN VIEW
N.T.S.



SECTION B-B
N.T.S.



DOWEL DETAIL
N.T.S.

NOTE:

"S" REFERS TO BOX CULVERT SPAN (4' MINIMUM)

"T" REFERS TO BOX CULVERT TOP SLAB THICKNESS

"U" AND "TS" REFERS TO BOX CULVERT WALL THICKNESS

① GRADE SUPPORT SLAB AND RECESS TO BE LEVEL, TO ENSURE THAT PRECAST RISER IS PLUMB AND VERTICAL.

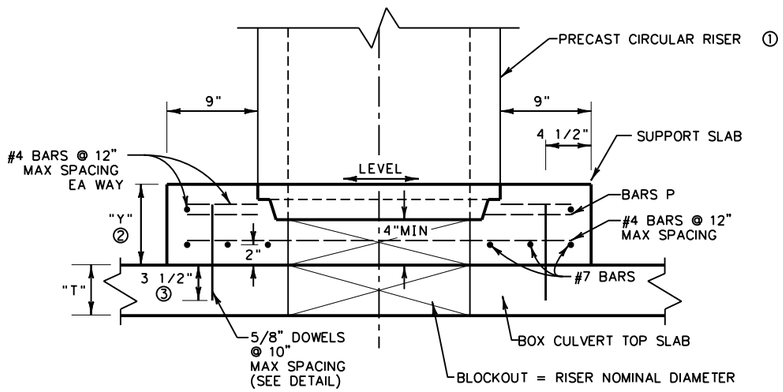
② FOR "S" </= 8', "Y" = 8" MIN
FOR 8' < "S" </= 10', "Y" = 10" MIN
FOR "S" > 10', "Y" = 12" MIN

③ FOR "T" LESS THAN 6", REDUCE TO 3".

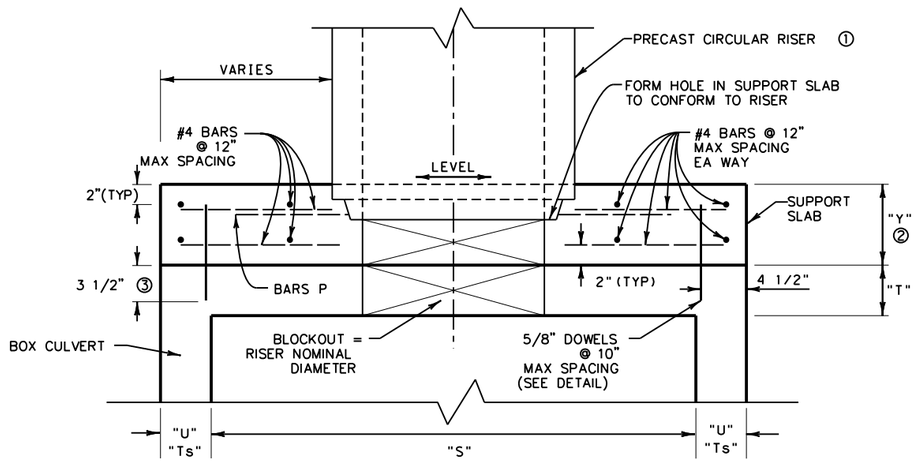
④ BARS P LENGTH = PIPE O.D. +9"
PLACE AS SHOWN.

GENERAL NOTES

1. SUPPORT SLAB TO BE CAST-IN-PLACE.
2. USE CLASS "C" CONCRETE FOR ALL SUPPORT SLABS.
3. USE GRADE 60 STEEL FOR ALL REINFORCING.
4. FOR PIPE RISER NOT CENTERED ON BOX CULVERT, ADJUST LENGTHS OF BARS P ON SHORT SIDE AS DIRECTED, TO PROVIDE MINIMUM 2" CLEAR COVER.
5. CUT OR FORM BLOCKOUT IN TOP SLAB OF BOX CULVERT AS DIRECTED. CUT REINFORCING STEEL FLUSH WITH WALLS OF BLOCKOUT AND GROUT SMOOTH.
6. SEE CULVERT STANDARDS FOR DIMENSIONS OF BOX CULVERT.
7. RISER CONNECTIONS TO BOX CULVERTS WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE SUBSIDIARY TO ITEM 462 AND ITEM 465.



SECTION A-A
N.T.S.



SECTION C-C
N.T.S.

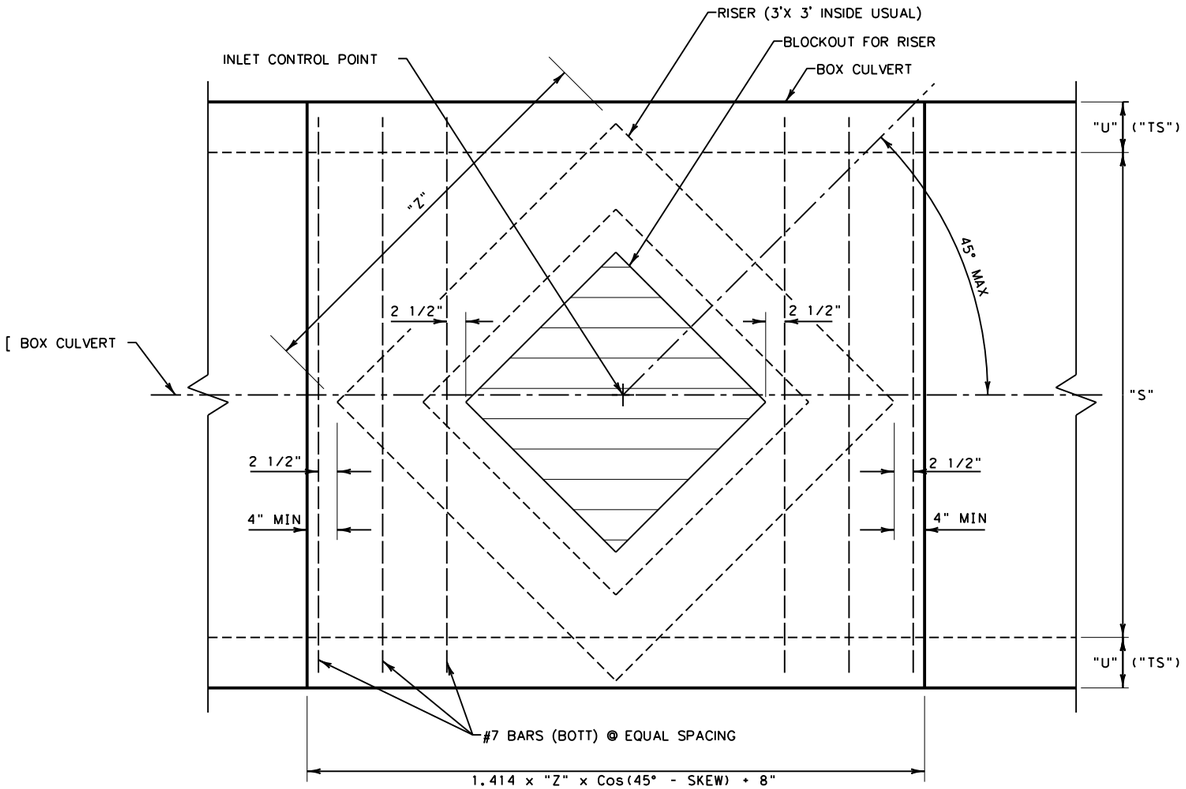
PRECAST CIRCULAR RISER CONNECTION

Texas Department of Transportation

Fort Worth District Standard

MANHOLE/INLET CONNECTION TO BOX CULVERT MI-CBC (FTW)

ORIGINAL DRAWING: 05/2019	micbc-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
DATE	REVISIONS	6	SEE TITLE SHEET		138
05/2019		STATE	STATE DIST.NO.	COUNTY	
		TEXAS	FTW	ERATH	
		CONT.	SECT.	JOB	HIGHWAY NO.
		0079	04	049	BU 67K



PLAN VIEW

TREATMENT FOR SKEWED RISERS

TYPICAL SUPPORT SLAB REINFORCING NOT SHOWN FOR CLARITY. PROVIDE #4 BARS AT 12" MAX SPA. IN BOTH DIRECTIONS AND DOWELS AS DETAILED ON SHEET 1 & 2.

Texas Department of Transportation

Fort Worth District Standard

MANHOLE/INLET CONNECTION TO BOX CULVERT MI-CBC (FTW)

ORIGINAL DRAWING: 05/2019	micbc-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
DATE	REVISIONS	6	SEE TITLE SHEET		139
05/2019		STATE	STATE DIST.NO.	COUNTY	
		TEXAS	FTW	ERATH	
		CONT.	SECT.	JOB	HIGHWAY NO.
		0079	04	049	BU 67K

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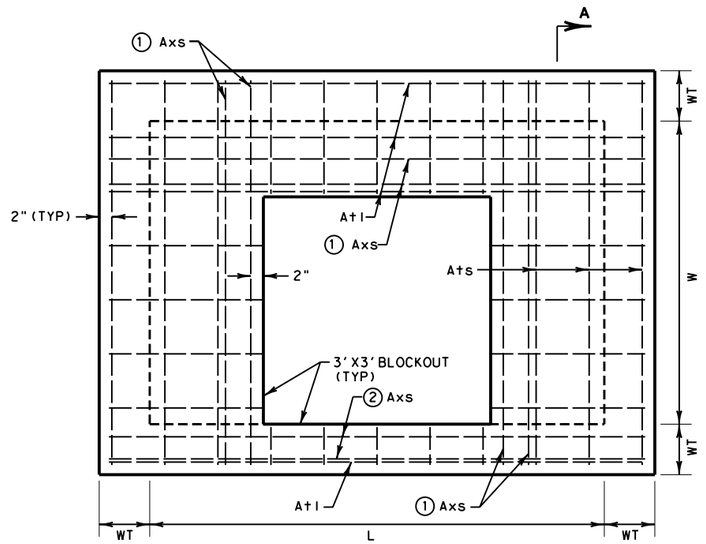
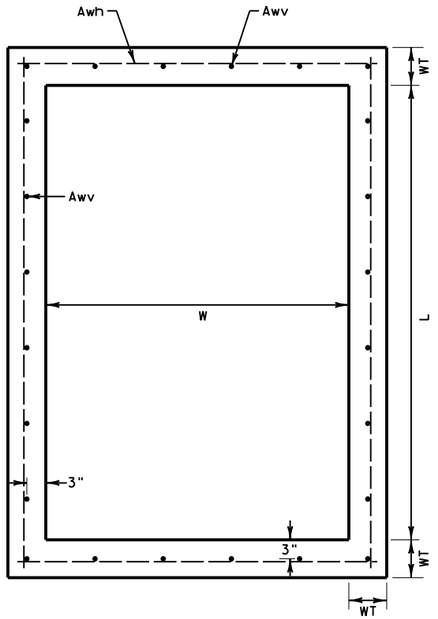
① FOR STRUCTURES WHERE W=L PROVIDE BARS Axs IN BOTH LONG AND SHORT (L AND W) DIRECTIONS AS SHOWN, FOR L>W, BARS Axs ONLY REQUIRED.

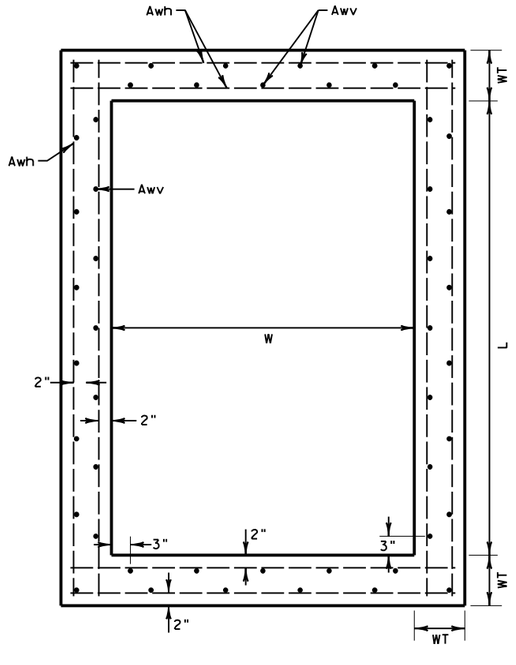
② BARS Axs MAY BE OMITTED IF DIRECTLY ABOVE THE WALL.



PLAN VIEW
SHOWING TOP SLAB REINFORCEMENT
N.T.S.

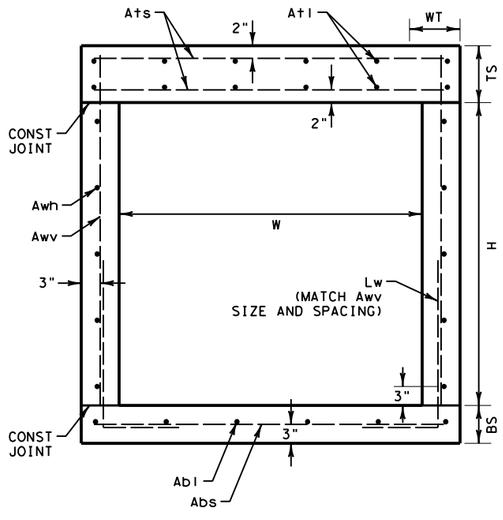


SINGLE LAYER REINFORCING
FOR WT = 6"

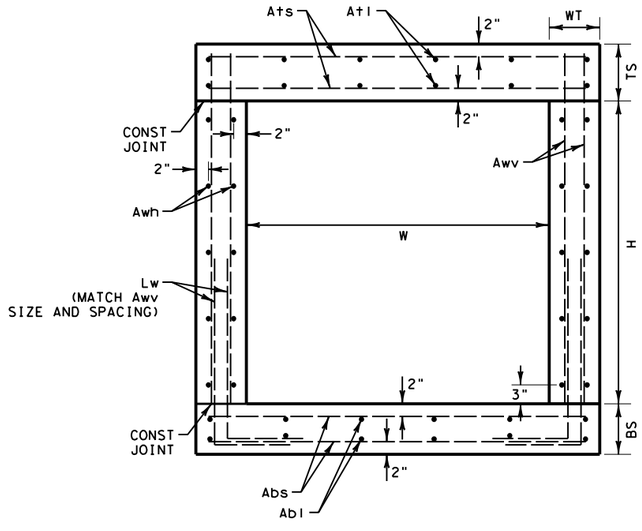


DOUBLE LAYER REINFORCING
FOR WT >/= 8"

PLAN VIEW
SHOWING WALL REINFORCEMENT
N.T.S.



SINGLE LAYER WALL REINFORCING
FOR BS = 6"
FOR WT = 6"



DOUBLE LAYER WALL REINFORCING
FOR BS >/= 8"
FOR WT >/= 8"

SECTION A-A
N.T.S.

GENERAL NOTES

1. DESIGNED FOR AASHTO LRFD HL 93 LOADING.
2. STRUCTURES MAY BE EITHER CAST-IN-PLACE OR PRECAST. FOR PRECAST STRUCTURES, SUBMIT SEALED ENGINEERING CALCULATIONS AND DRAWINGS FOR APPROVAL PRIOR TO FABRICATION.
3. USE CLASS "C" CONCRETE FOR CAST-IN-PLACE STRUCTURES; USE CLASS "H" CONCRETE (MINIMUM 5000 PSI DESIGN STRENGTH) FOR PRECAST STRUCTURES.
4. USE GRADE 60 STEEL FOR ALL REINFORCING.
5. DIMENSIONS RELATING TO REINFORCING STEEL ARE TO THE CENTERS OF BARS.
6. FIELD CUT AND BEND BARS AS NECESSARY TO ACCOMMODATE STORM DRAIN PIPE.
7. FOR PIPE OR BOX CONNECTIONS TO PRECAST STRUCTURES, SEE STANDARD PBGC.
8. CONTROL POINTS ARE DEFINED FOR INLET OR MANHOLE STRUCTURES. POSITION BASE AS NECESSARY TO ALIGN WITH STORM DRAINS, ROADWAYS AND OTHER FEATURES, AS DIRECTED.

Texas Department of Transportation

Fort Worth District Standard

MANHOLE AND INLET BASE AND RISER
MI-B&R (FTW)

ORIGINAL DRAWING: 05/2019	mibr-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
DATE	REVISIONS	6	SEE TITLE SHEET		140
05/2019	NEW STANDARD	STATE	STATE DIST.NO.	COUNTY	
		TEXAS	FTW	ERATH	
		CONT.	SECT.	JOB	HIGHWAY NO.
		0079	04	049	BU 67K

BILL OF REINFORCING STEEL

SIZE			MAX DEPTH = 25' TO TOP OF BASE SLAB										MAX DEPTH = 15' TO TOP OF BASE SLAB									
			BASE SLAB			WALL			TOP SLAB				BASE SLAB			WALL			TOP SLAB			
L	W	H	BS*	Abs	Abl	WT*	Awh	Awv	TS*	Ats	Axs**	Atl	BS*	Abs	Abl	WT*	Awh	Awv	TS*	Ats	Axs**	Atl
8'	8'	8'	9"	#5 AT 9"	#5 AT 9"	10"	#5 AT 9"	#5 AT 9"	12"	#5 AT 9"	2~ #5	#5 AT 9"	9"	#5 AT 12"	#5 AT 12"	10"	#5 AT 12"	#5 AT 12"	12"	#5 AT 12"	2~ #5	#5 AT 12"
8'	<=6'	8'	9"	#5 AT 8"	#5 AT 8"	9"	#5 AT 8"	#5 AT 8"	12"	#5 AT 10"	1~ #5	#5 AT 10"	9"	#5 AT 10"	#5 AT 10"	9"	#5 AT 10"	#5 AT 10"	12"	#5 AT 12"	1~ #5	#5 AT 12"
8'	8'	<=6'	9"	#5 AT 9"	#5 AT 9"	9"	#5 AT 8"	#5 AT 8"	12"	#5 AT 9"	1~ #5	#5 AT 9"	9"	#5 AT 12"	#5 AT 12"	9"	#5 AT 10"	#5 AT 10"	12"	#5 AT 12"	1~ #5	#5 AT 12"
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7'	7'	7'	9"	#5 AT 9"	#5 AT 9"	9"	#5 AT 9"	#5 AT 9"	10"	#5 AT 7"	2~ #5	#5 AT 7"	9"	#4 AT 10"	#4 AT 10"	9"	#5 AT 10"	#5 AT 10"	10"	#5 AT 10"	2~ #5	#5 AT 10"
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6'	6'	6'	8"	#5 AT 9"	#5 AT 9"	8"	#5 AT 9"	#5 AT 9"	9"	#5 AT 8"	2~ #5	#5 AT 8"	8"	#4 AT 9"	#4 AT 9"	8"	#5 AT 10"	#5 AT 10"	9"	#5 AT 8"	2~ #4	#5 AT 8"
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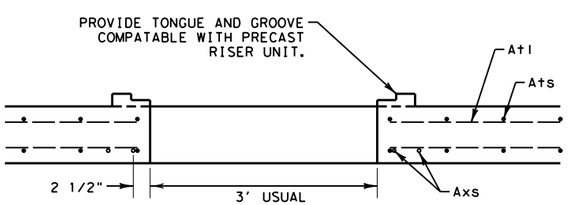
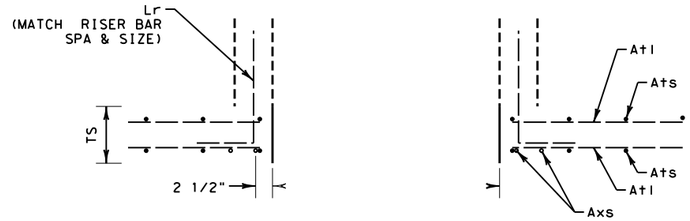
4'	3'	4'	6"	#4 AT 10"	#4 AT 10"	6"	#4 AT 10"	#4 AT 10"	9"	#4 AT 12"	1~ #4	#4 AT 12"	6"	#4 AT 12"	#4 AT 12"	6"	#4 AT 12"	#4 AT 12"	9"	#4 AT 12"	1~ #4	#4 AT 12"
3'	3'	3'	6"	#4 AT 12"	#4 AT 12"	6"	#4 AT 12"	#4 AT 12"	9"	#4 AT 12"	1~ #4	#4 AT 12"	6"	#4 AT 12"	#4 AT 12"	6"	#4 AT 12"	#4 AT 12"	9"	#4 AT 12"	1~ #4	#4 AT 12"

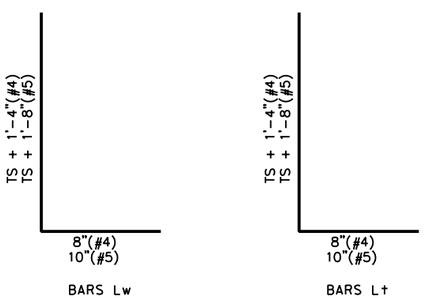
*PLACE TWO LAYERS OF REINFORCING MAT IN CONCRETE THICKNESSES EQUAL OR GREATER THAN 8". PLACE ONE LAYER OF REINFORCING MAT IN 6" THICK WALL/SLAB.
** ADDITIONAL REINFORCING BAR(S), Axs, REQUIRED AROUND BLOCKOUT PERIMETER. PLACE BARS Axs PARELLEL WITH BARS Ats IN THE SHORT DIRECTION. AND PLACE BARS Axs PARALLEL WITH BARS Atl IN THE LONG DIRECTION ONLY AS REQUIRED.
FOR TOP SLAB W=L, BAR(S) Axs ARE REQUIRED IN BOTH SHORT AND LONG DIRECTION.
IF TWO ADDITIONAL Axs BARS REQUIRED PER TABLE, PLACE THE SECOND Axs BAR AT 4" SPACING FROM THE FIRST Axs BAR IF THE Ats SPACING IS 8" OR GREATER, OTHERWISE BUNDLE WITH THE SECOND Ats BAR.

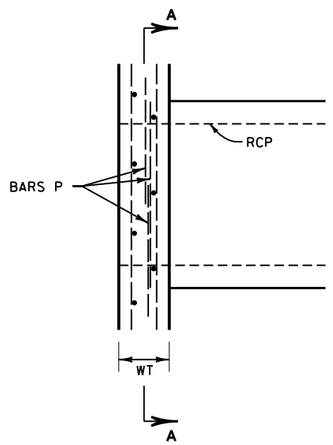


CONNECTION FOR PRECAST RISER
N.T.S.

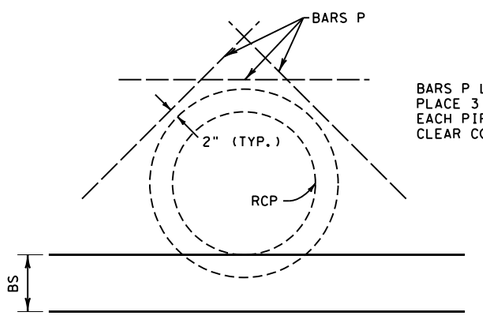


CONNECTION FOR CAST-IN-PLACE RISER
N.T.S.





PLAN VIEW



SHOWING ONLY BARS P FOR CLARITY

BARS P LENGTH = PIPE O.D. + 9"
PLACE 3 BARS P AS SHOWN AT EACH PIPE OPENING WITH 2" CLEAR COVER OVER PIPE.

SECTION A-A
N.T.S.

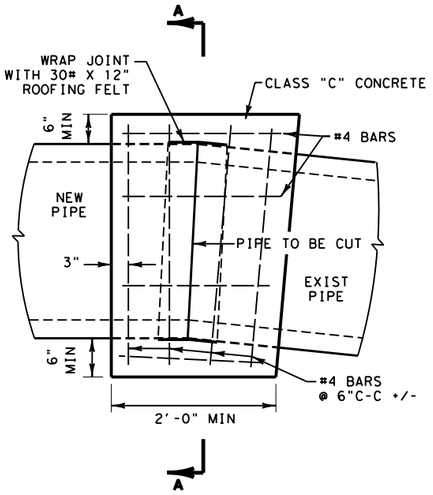
SUPPLEMENTAL REINFORCEMENT
RCP CONNECTION
(CAST-IN-PLACE ONLY)

Texas Department of Transportation

Fort Worth District Standard

MANHOLE AND INLET BASE AND RISER
MI-B&R (FTW)

ORIGINAL DRAWING: 05/2019	mibr-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
DATE	REVISIONS	6	SEE TITLE SHEET		141
05/2019	NEW STANDARD	STATE	STATE DIST.NO.	COUNTY	
		TEXAS	FTW	ERATH	
		CONT.	SECT.	JOB	HIGHWAY NO.
		0079	04	049	BU 67K



PLAN/ELEVATION

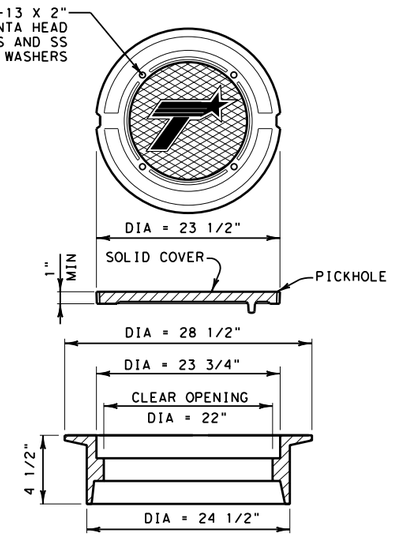
SECTION A-A

PIPE COLLAR DETAIL

FOR HORIZONTAL OR VERTICAL PLACEMENT
N.T.S.

PIPE COLLAR GENERAL NOTES

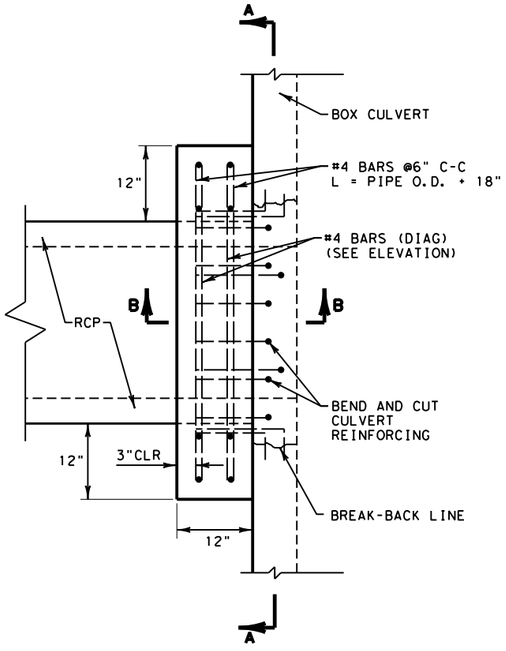
1. THE CONTRACTOR SHALL TAKE STEPS TO ENSURE A SMOOTH JOINT ALONG THE INSIDE WALL OF PIPE.
2. ANY SPILLAGE OF CONCRETE THROUGH THE JOINT SHALL BE REMOVED AND THE INSIDE PIPE SURFACES SMOOTHED AS DIRECTED BY THE ENGINEER.
3. PIPE COLLARS WILL NOT BE PAID FOR DIRECTLY, BUT SHALL BE CONSIDERED SUBSIDIARY TO ITEM 464.



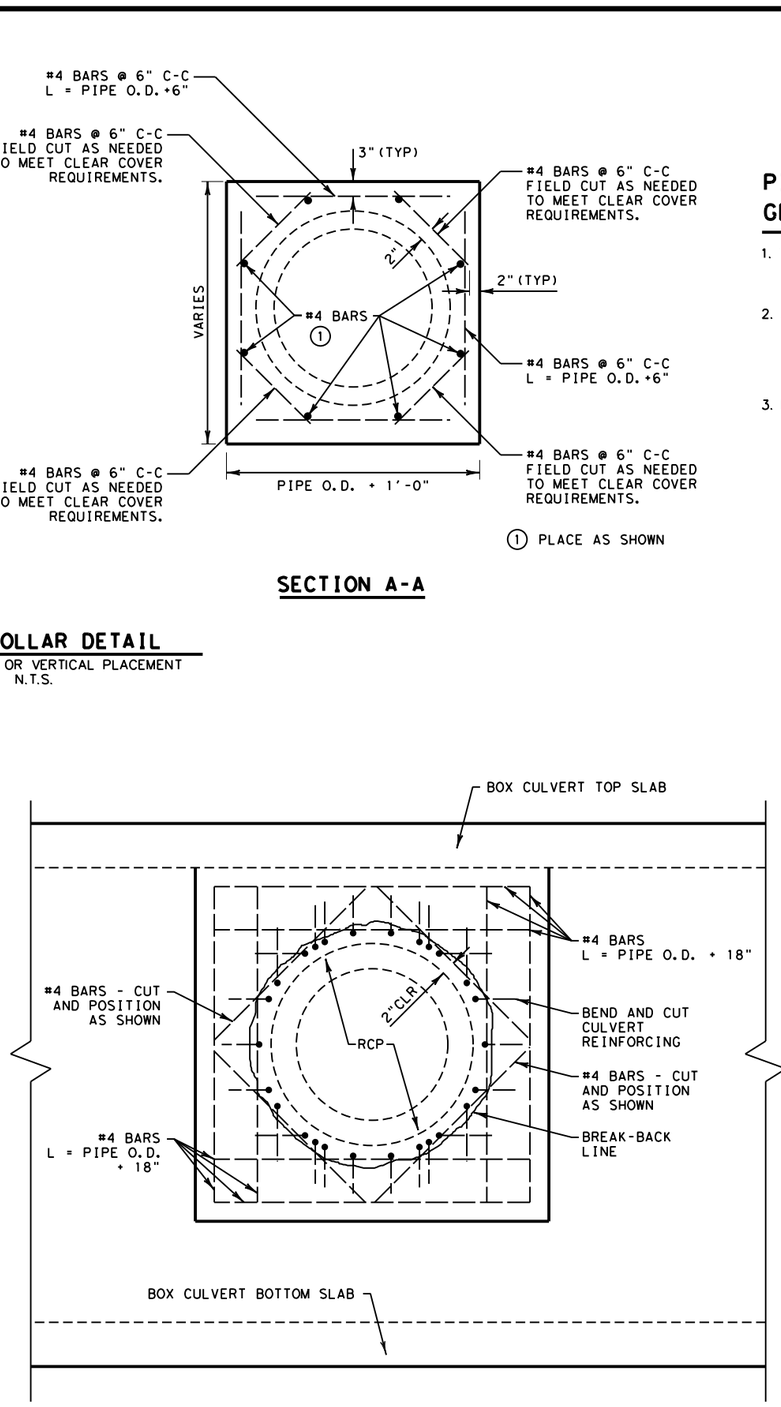
RING AND COVER DETAILS

MANHOLES AND CURB INLETS
N.T.S.

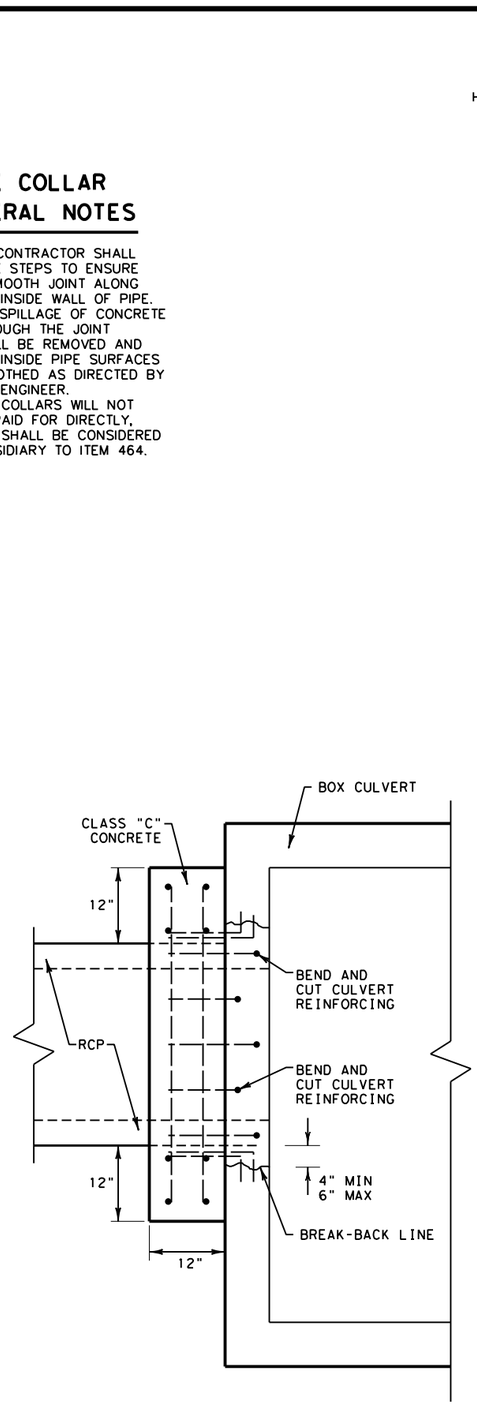
RING AND COVER SHALL CONFORM TO THE REQUIREMENTS OF ITEM 471 AND SHALL BE INCLUDED IN THE CURRENT TXDOT "APPROVED CAST IRON PRODUCTS SHEETS"



PLAN VIEW



SECTION A-A



SECTION B-B

PIPE STUB-IN CONNECTION TO BOX CULVERT OR EXISTING DRAINAGE STRUCTURE

N.T.S.

PIPE STUB-IN GENERAL NOTES

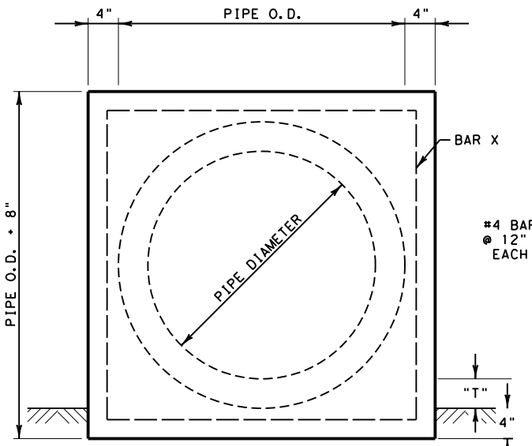
1. SAW CUT A MAXIMUM 1/2" DEPTH AT BREAK-BACK LINE. USE REMOVAL METHODS THAT WILL NOT DAMAGE REMAINING CONCRETE OR CULVERT REINFORCING.
2. EXPOSE AND CLEAN BOX CULVERT REINFORCING. BEND BARS INTO PROPOSED CONNECTION AND TIE TO CONNECTION REINFORCING.
3. ROUGHEN AND CLEAN EXISTING CONCRETE SURFACES THAT ARE IN CONTACT WITH NEW CONCRETE BEFORE PLACING FORMS.
4. MATERIAL & LABOR FOR PIPE/BOX CONNECTIONS WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE SUBSIDIARY TO ITEMS 462 AND 464.

Texas Department of Transportation

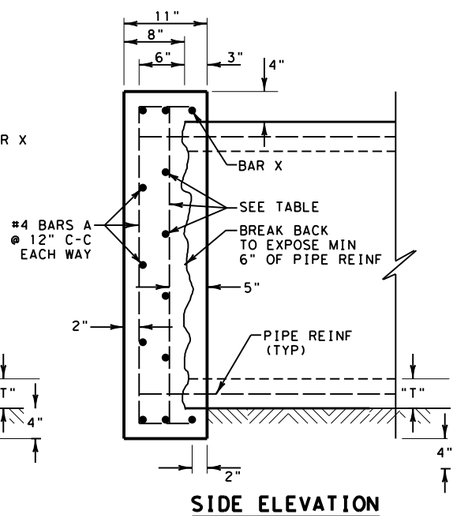
Fort Worth District Standard

MISCELLANEOUS DRAINAGE DETAILS
MDD(FTW)(MOD)

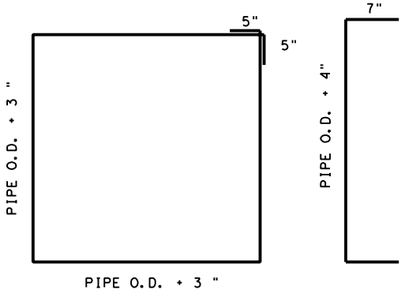
ORIGINAL DRAWING: 05/2019	mdd-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
DATE	REVISIONS	6	SEE TITLE SHEET		142
05/2019	NEW STANDARD	STATE	STATE DIST.NO.	COUNTY	
		TEXAS	FTW	ERATH	
		CONT.	SECT.	JOB	HIGHWAY NO.
		0079	04	049	BU 67K



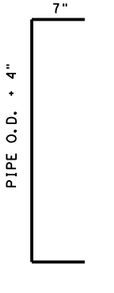
FRONT ELEVATION



SIDE ELEVATION



#4 BAR X



#4 BAR A

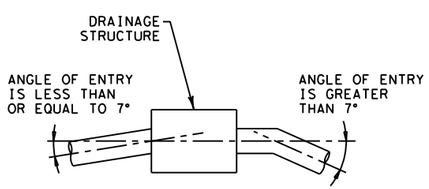
INNER REINFORCING SIZE/SPACING		
PIPE DIA(IN)	MAXIMUM DEPTH	
	15'	30'
<48	#4 @ 12" C-C	#4 @ 12" C-C
60	#4 @ 12" C-C	#4 @ 10" C-C
72	#4 @ 12" C-C	#5 @ 10" C-C
84	#4 @ 10" C-C	#5 @ 8" C-C

PIPE END CAP GENERAL NOTES

1. "T" = PIPE WALL THICKNESS.
2. ALL CONCRETE SHALL BE CLASS "C".
3. ALL REINFORCING STEEL SHALL BE GRADE 60.
4. OCTAGONAL PLUG MAY BE USED IN LIEU OF SQUARE. PROVIDE 4" MINIMUM COVER OVER OUTSIDE OF PIPE. DIMENSIONS OF PIPE PLUG AND REINFORCING TO BE AS APPROVED.

DRAINAGE PIPE END CAP OR PLUG DETAILS

N.T.S.



CONNECT PIPES WITHIN 7° OF NORMAL TO INLET OR MANHOLE. IF NECESSARY, USE PIPE ELBOW OR CURVED APPROACH ALIGNMENT TO STAY WITHIN THIS LIMIT.

PIPE CONNECTION

N.T.S.

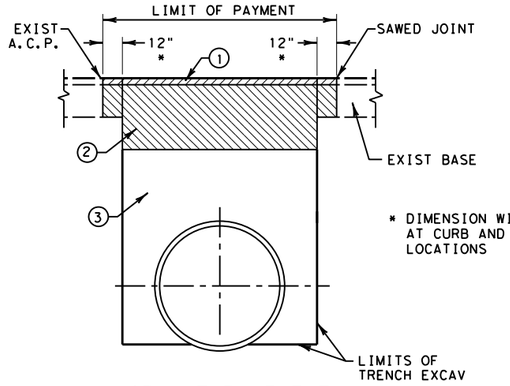
CUTTING AND RESTORING PAVEMENT GENERAL NOTES

1. REMOVAL AND INSTALLATION OF HOT MIX, BRICK PAVERS, CONCRETE PAVEMENT, DRIVEWAYS, AND SIDEWALKS WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE SUBSIDIARY TO CUTTING AND RESTORING PAVEMENT. RETURN SALVAGED BRICK (BASE COURSE – TO BE VERIFIED) TO THE CITY OF DUBLIN.
2. CONCRETE CURB OR CURB AND GUTTER WILL BE INCLUDED IN AREA OF "CUTTING AND RESTORING PAVEMENT". CONSTRUCT CURB OR CURB AND GUTTER ACCORDING TO PLAN DETAILS, OR AS DIRECTED. REMOVAL AND REPLACMENT OF CONCRETE CURB OR CURB AND GUTTER WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE SUBSIDIARY TO CUTTING AND RESTORING PAVEMENT.
3. CEMENT STABILIZED BACKFILL WILL BE MEASURED AND PAID FOR IN ACCORDANCE WITH ITEM 400.
4. SEE STANDARD JS (FTW) FOR JOINT SEALING DETAILS.
5. "NON-EXCAVATABLE" FLOWABLE BACKFILL, AS DEFINED BY ITEM 401, TABLE 2, MAY BE USED AS A SUBSITITUTE FOR CEMENT STABILIZED BACKFILL, WITH THE FOLLOWING CONSTRAINTS:
   a). PLACE FLOWABLE FILL IN LIFTS NOT EXCEEDING 2 FEET IN DEPTH; PLACE EACH SUCCESSIVE LIFT WHEN THE PREVIOUS LIFT HAS STIFFENED/HARDENED (HAS LOST ITS FLOWABILITY).
   b). NO ADJUSTMENT IN PAYMENT WILL BE MADE FOR SUBSTITUTION OF FLOWABLE FILL IN LIEU OF CEMENT STABILIZED BACKFILL.
6. NEW BRICK PAVERS, THAT MAY BE NEEDED TO REPLACE DAMAGED EXISTING BRICK PAVERS, SHALL BE CONSTRUCTED PER SPECIAL SPECIFICATION ITEM 105 UNLESS DIRECTED OTHERWISE BY THE ENGINEER. CONTRACTOR SHALL MATCH THE COLOR OF NEW BRICK AS MUCH AS POSSIBLE TO THE EXISTING AND GET APPROVAL FROM ENGINEER BEFORE PLACEMENT.
7. CONTRACTOR SHALL PLACE PERMANENT/TEMPORARY PAVEMENT MARKING, AS DIRECTED BY THE ENGINEER, THAT IS OBLITERATED BY CUT AND RESTORE WORK. THIS WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE SUBSIDIARY TO CUTTING AND RESTORING PAVEMENT.

CUTTING AND RESTORING PAVEMENT DETAILS

N.T.S.

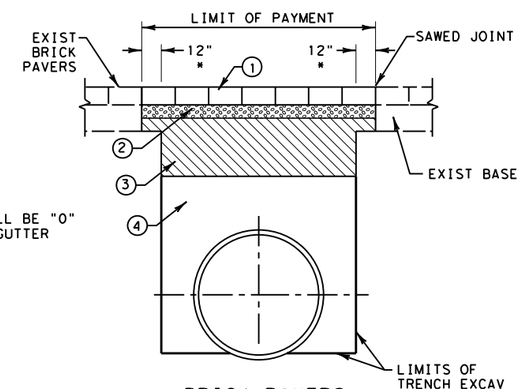
(1) APPROX 2" HOT MIX, TYPE C, OR AS DIRECTED.
(2) APPROX 10" HOT MIX BASE, TYPE B, OR AS DIRECTED.
(3) CEMENT STABILIZED BACKFILL IN ACCORDANCE WITH ITEM 400.3.3.1, 400.3.3.2, 400.3.3.3., AND 400.3.3.4.



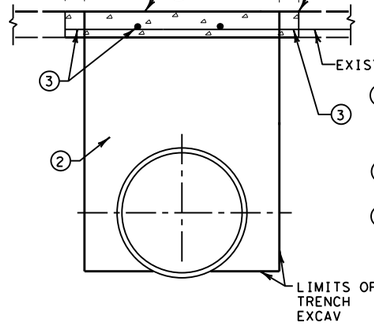
* DIMENSION WILL BE "0" AT CURB AND GUTTER LOCATIONS

ASPHALT PAVEMENT
E. & W. BLACKJACK ST., W. LIVE OAK ST., & W. VALLEY ST.

(1) USE EXIST SALVAGED/NEW BRICK PAVERS
(2) LEVELING SAND, THICKNESS AS DIRECTED.
(3) APPROX 10" HOT MIX BASE, TYPE B, OR AS DIRECTED.
(4) CEMENT STABILIZED BACKFILL IN ACCORDANCE WITH ITEM 400.3.3.1, 400.3.3.2, 400.3.3.3., AND 400.3.3.4.



BRICK PAVERS
E. & W. ELM ST. & E. LIVE OAK ST.



(1) CLASS "A", "P", OR "HES" CONCRETE DRIVEWAY AND CONCRETE SIDEWALK. MATCH EXISTING THICKNESS. USE CLASS "HES" IF OPENING TO TRAFFIC LESS THAN 72 HOURS AFTER PLACEMENT.
(2) CEMENT STABILIZED BACKFILL IN ACCORDANCE WITH ITEM 400.3.3.1, 400.3.3.2, 400.3.3.3., AND 400.3.3.4.
(3) MATCH EXISTING REBAR SIZE AND SPACING OR AS DIRECTED BY THE ENGINEER. INSTALL DOWEL BARS, IF NEEDED, AS DIRECTED BY THE ENGINEER.

CONCRETE DRIVEWAY AND SIDEWALK CUTTING AND RESTORING DETAILS

N.T.S.

STATE OF TEXAS
ANTHONY SCHNEIDER
71848
LICENSED
PROFESSIONAL ENGINEER

7/18/2024

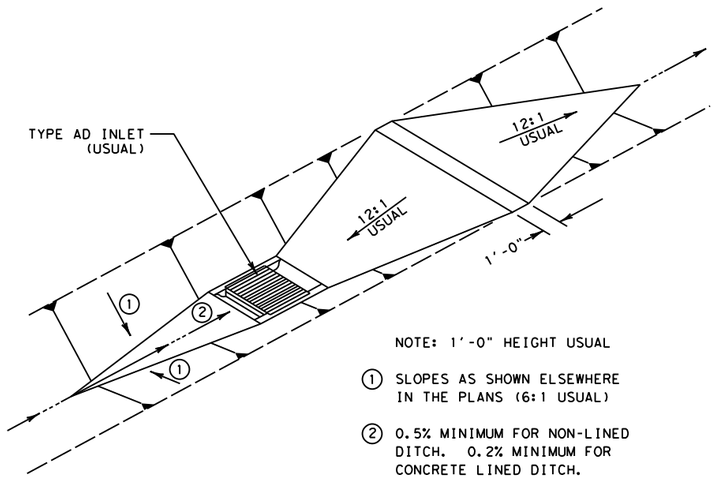
NOTE: SEAL IS FOR CLOUDED SECTIONS ONLY

Texas Department of Transportation

Fort Worth District Standard

MISCELLANEOUS DRAINAGE DETAILS
MDD(FTW)(MOD)

ORIGINAL DRAWING: 05/2019	mdd-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
DATE	REVISIONS	6	SEE TITLE SHEET		143
05/2019	NEW STANDARD	STATE	STATE DIST.NO.	COUNTY	
07/2020	REVISE CUT & RESTORE PAVEMENTS FOR CSB & FLOWABLE FILL; ALLOW OCTAGONAL PIPE PLUG; EDIT GENERAL NOTES	TEXAS	FTW	ERATH	
		CONT.	SECT.	JOB	HIGHWAY NO.
		0079	04	049	BU 67K

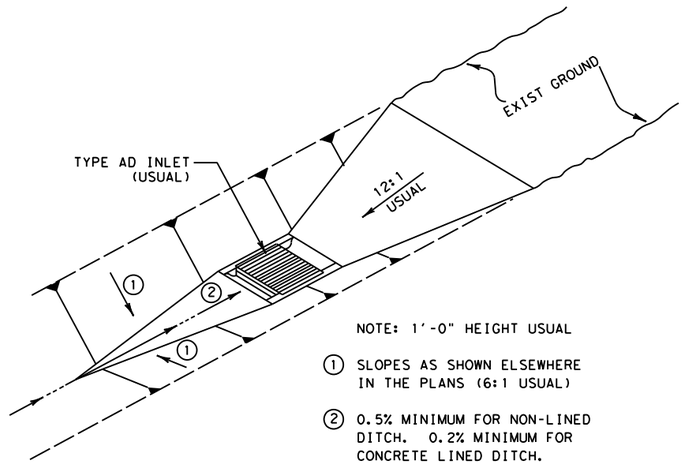


NOTE: 1'-0" HEIGHT USUAL

① SLOPES AS SHOWN ELSEWHERE IN THE PLANS (6:1 USUAL)

② 0.5% MINIMUM FOR NON-LINED DITCH. 0.2% MINIMUM FOR CONCRETE LINED DITCH.

CONTINUOUS DITCH

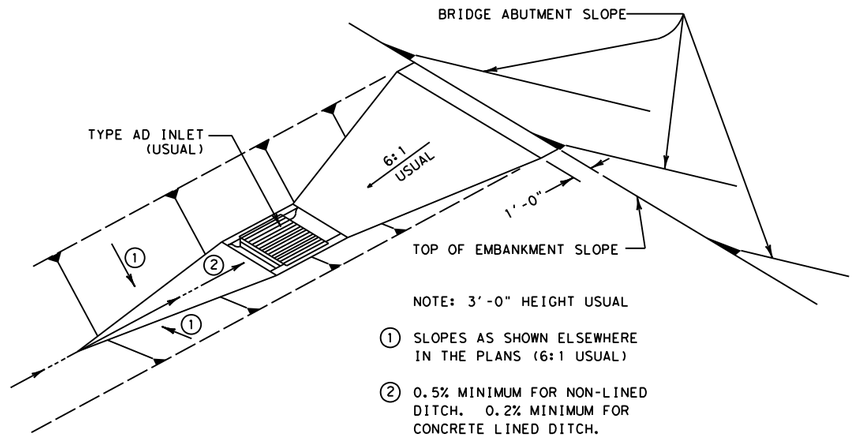


NOTE: 1'-0" HEIGHT USUAL

① SLOPES AS SHOWN ELSEWHERE IN THE PLANS (6:1 USUAL)

② 0.5% MINIMUM FOR NON-LINED DITCH. 0.2% MINIMUM FOR CONCRETE LINED DITCH.

DITCH TERMINATION



NOTE: 3'-0" HEIGHT USUAL

① SLOPES AS SHOWN ELSEWHERE IN THE PLANS (6:1 USUAL)

② 0.5% MINIMUM FOR NON-LINED DITCH. 0.2% MINIMUM FOR CONCRETE LINED DITCH.

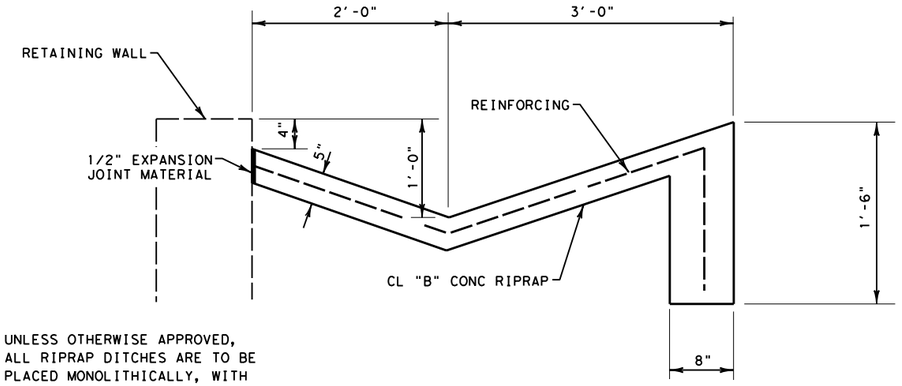
DITCH TERMINATION AT BRIDGE END

DITCH BLOCK GENERAL NOTES

1. DITCH BLOCK AND INLET LOCATIONS SHOWN ELSEWHERE IN THE PLANS.
2. DITCH BLOCKS WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE SUBSIDIARY TO THE VARIOUS BID ITEMS.

DITCH BLOCK DETAILS

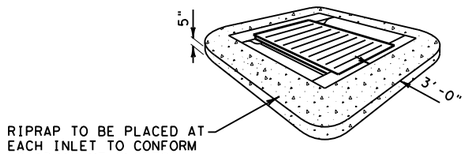
N.T.S.



UNLESS OTHERWISE APPROVED, ALL RIPRAP DITCHES ARE TO BE PLACED MONOLITHICALLY, WITH NO CONSTRUCTION JOINTS.

RIPRAP DITCH AT RETAINING WALL

N.T.S.



RIPRAP TO BE PLACED AT EACH INLET TO CONFORM TO ADJACENT SLOPES.
SINGLE INLET: 1 CY
DOUBLE INLET: 2 CY

TYPICAL RIPRAP APRON DETAIL

TYPE AD INLET SHOWN
TYPE AD-2 INLET IS SIMILAR

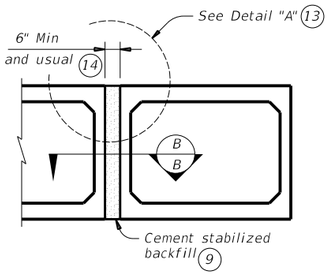
Texas Department of Transportation

Fort Worth District Standard

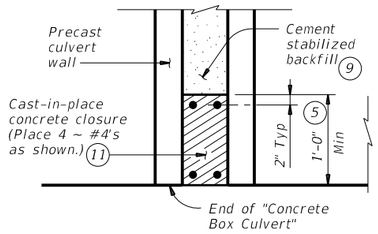
MISCELLANEOUS DRAINAGE DETAILS
MDD(FTW)(MOD)

ORIGINAL DRAWING: 05/2019	mdd-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
DATE	REVISIONS	6	SEE TITLE SHEET		144
05/2019	NEW STANDARD	STATE	STATE DIST.NO.	COUNTY	
11/2020	ADD NOTE FOR MONOLITHIC PLACEMENT OF RIPRAP DITCHES	TEXAS	FTW	ERATH	
		CONT.	SECT.	JOB	HIGHWAY NO.
		0079	04	049	BU 67K

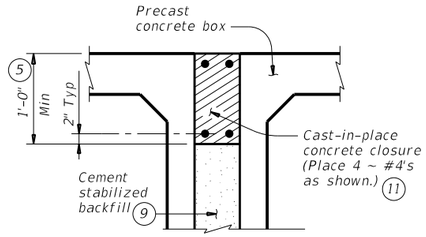
DATE:
FILE:



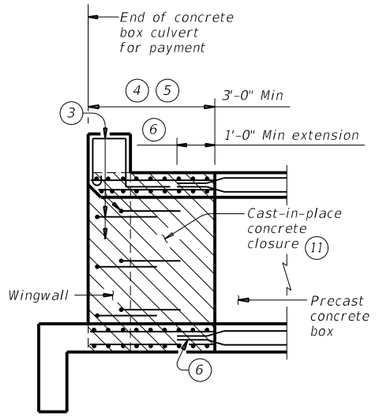
MULTIPLE UNIT PLACEMENT



SECTION B-B

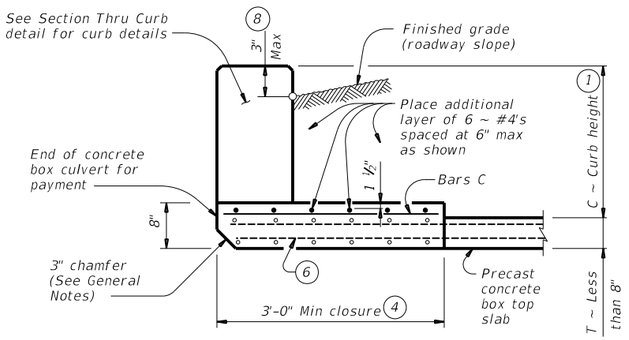


DETAIL "A" (13)

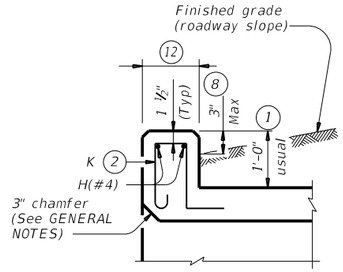


WINGWALL CONNECTION

(Also applies to safety end treatment.)

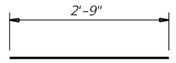


SECTION THRU TOP SLABS LESS THAN 8"

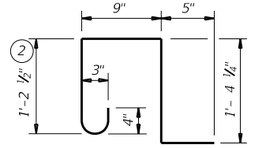


SECTION THRU CURB

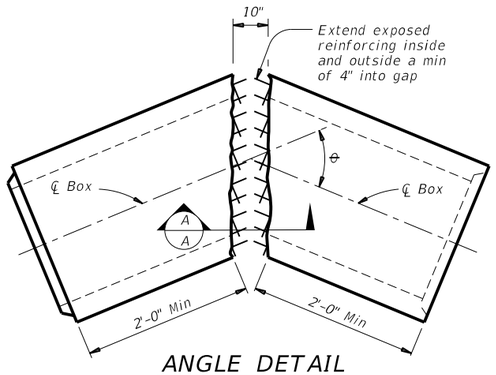
QUANTITIES PER FOOT OF CURB (10)	
Reinforcing Steel	4.12 Lb
Concrete	0.037 CY



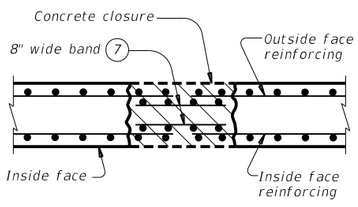
BARS C (#4)
(Spa = 1'–0" Max)



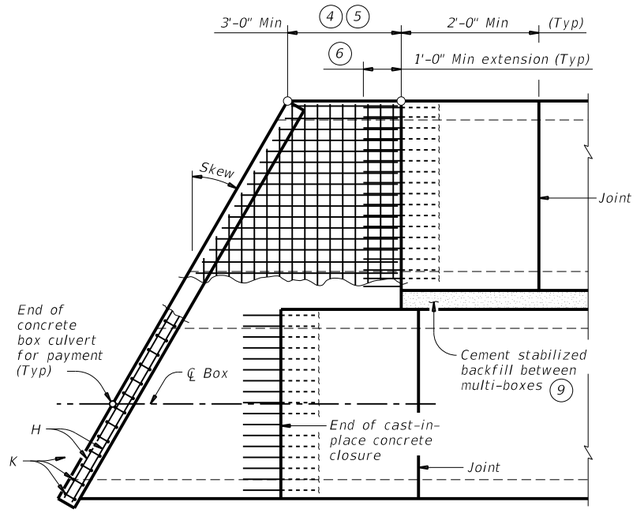
BARS K (#4)
(Spa = 1'–0" Max)
(Length = 4'–2")



ANGLE DETAIL



SECTION A-A



PLAN OF SKEWED ENDS

(Showing multi–box placement.)

1. 0" Min to 5'–0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail, bicycle rail, or curbs taller than 1'–0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631–CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.
2. For curbs less than 1'–0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.
3. Extend curb, wingwall, or safety end treatment reinforcing into concrete closure. Bend or trim, as necessary, any reinforcing that does not fit into closure area.
4. Provide a 3'–0" Min cast–in–place concrete closure. Break back boxes in the field or cast boxes short. Provide bands of reinforcing in the closure that are the same size and spacing as in the precast box section. Provide #4 longitudinal reinforcement spaced at 12 inches Max within the closure. Except where shown otherwise, construct the cast–in–place closure flush with the inside and outside faces of the precast box section.
5. For multiple unit placements, adjust the length of the closure for the interior walls as necessary. Provide a 3'–0" Min cast–in–place closure in the top slab, bottom slab, and exterior wall. See Section B–B detail when interior walls are cast full length.
6. Extend precast box reinforcing a minimum of 1'–0" into concrete closure (Typ).
7. Place bands of reinforcing matching the inside and outside face reinforcing in the gaps of the top and bottom slabs. Place a band matching the outside face reinforcing of the wall in the gaps of the walls (placed in the outside face only). Tack weld the bands to the exposed reinforcing at each point of contact.
8. For vehicle safety, the following requirements must be met:
   - For structures without bridge rail, construct curbs no more than 3" above finished grade.
   - For structures with bridge rail, construct curbs flush with finished grade.

   Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
9. Cement stabilized backfill between boxes is considered part of the box culvert for payment.
10. All curb concrete and reinforcing is considered part of the box culvert for payment.
11. Any additional concrete and reinforcing required for the closures will be considered subsidiary to the box culvert for payment.
12. 1'–0" typical. 2'–3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elsewhere in the plans.
13. For multiple unit placement with overlay, with 1 to 2 course surface treatment, or with the top slab as the final riding surface, provide wall closure as shown in Detail "A".
14. This dimension may be increased with approval of the Engineer to allow the precast boxes to be tunneled or jacked in accordance with Item 476, "Jacking, Boring, or Tunneling Pipe or Box". No payment will be made for any additional material in the gap between adjacent boxes.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide ASTM A1064 welded wire reinforcement.
Provide Class C concrete (f'c = 3,600 psi) for the closures.
Provide cement stabilized backfill meeting the requirements of Item 400, "Excavation and Backfill for Structures."
Any additional concrete required for the closures will be considered subsidiary to the box culvert.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Refer to the Single Box Culverts Precast (SCP) standard sheets for details and notes not shown.
Chamfer the bottom edge of the top slab closure 3 inches at culvert closure ends.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bars dimensions are out–to–out of bars.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

BOX CULVERTS PRECAST MISCELLANEOUS DETAILS

SCP-MD

FILE: scpmdsts-20.dgn	DN: GAF	CK: LMW	DW: BWH/TxDOT	CK: GAF
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REVISIONS	0079	04	049	BU 67K
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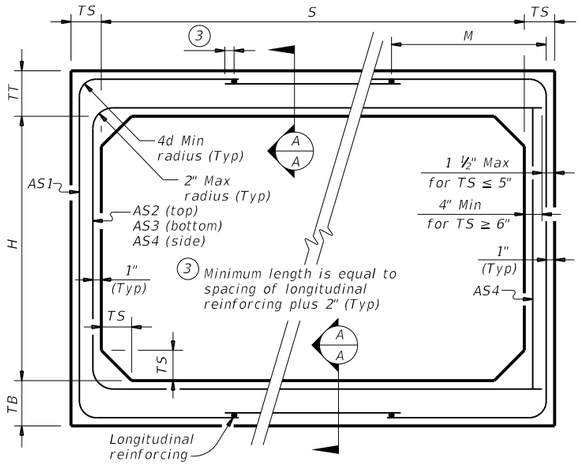
FILE:

BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) (2)							(1) Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
3	2	7	6	4	< 2	–	0.17	0.25	0.16	0.10	0.17	0.17	0.14	3.3
3	2	4	4	4	2 < 3	31	0.13	0.19	0.18	0.10	–	–	–	2.4
3	2	4	4	4	3 – 5	31	0.10	0.11	0.12	0.10	–	–	–	2.4
3	2	4	4	4	10	31	0.10	0.10	0.10	0.10	–	–	–	2.4
3	2	4	4	4	15	31	0.10	0.13	0.13	0.10	–	–	–	2.4
3	2	4	4	4	20	31	0.11	0.17	0.17	0.10	–	–	–	2.4
3	2	4	4	4	25	31	0.14	0.21	0.21	0.10	–	–	–	2.4
3	2	4	4	4	30	31	0.17	0.25	0.25	0.10	–	–	–	2.4
3	2	4	4	4	35	31	0.20	0.29	0.30	0.10	–	–	–	2.4
3	3	7	6	4	< 2	–	0.17	0.27	0.17	0.10	0.17	0.17	0.14	3.7
3	3	4	4	4	2 < 3	31	0.10	0.22	0.21	0.10	–	–	–	2.8
3	3	4	4	4	3 – 5	31	0.10	0.14	0.14	0.10	–	–	–	2.8
3	3	4	4	4	10	31	0.10	0.11	0.11	0.10	–	–	–	2.8
3	3	4	4	4	15	31	0.10	0.14	0.15	0.10	–	–	–	2.8
3	3	4	4	4	20	31	0.10	0.18	0.19	0.10	–	–	–	2.8
3	3	4	4	4	25	31	0.10	0.23	0.23	0.10	–	–	–	2.8
3	3	4	4	4	30	31	0.12	0.27	0.28	0.10	–	–	–	2.8
3	3	4	4	4	35	31	0.14	0.32	0.32	0.10	–	–	–	2.8

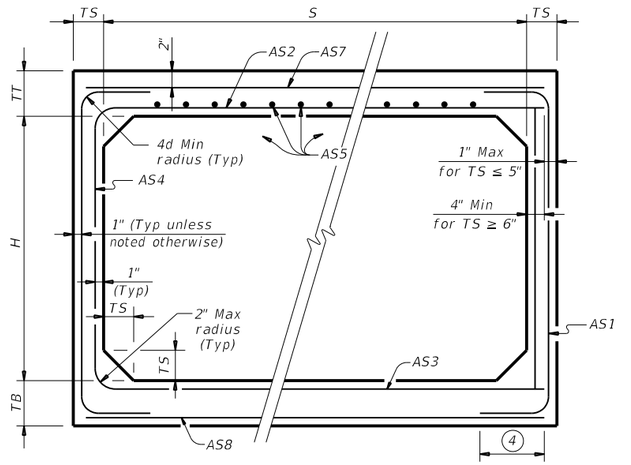
(1) For box length = 8'-0"

(2) AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.



CORNER OPTION "A" CORNER OPTION "B"

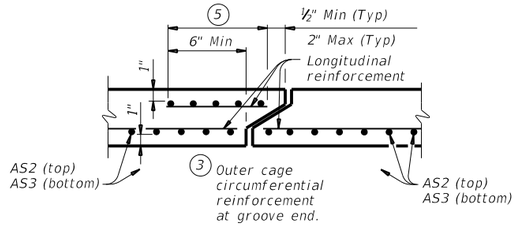
FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

(4) Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



SECTION A-A

(Showing top and bottom slab joint reinforcement.)

MATERIAL NOTES:

Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.

Provide Class H concrete (f`c = 5,000 psi).

GENERAL NOTES:

Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.

See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.

In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)".

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS PRECAST

3'-0" SPAN

SCP-3

FILE: scp03sts-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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	DIST	COUNTY		SHEET NO.
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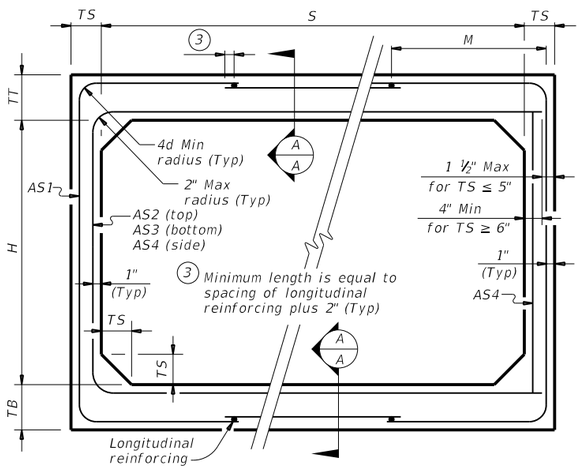
BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) (2)							(1) Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
4	2	7.5	6	5	< 2	–	0.18	0.27	0.15	0.12	0.18	0.18	0.14	4.5
4	2	5	5	5	2 < 3	38	0.18	0.19	0.17	0.12	–	–	–	3.6
4	2	5	5	5	3 – 5	38	0.13	0.13	0.13	0.12	–	–	–	3.6
4	2	5	5	5	10	38	0.12	0.12	0.12	0.12	–	–	–	3.6
4	2	5	5	5	15	38	0.14	0.16	0.16	0.12	–	–	–	3.6
4	2	5	5	5	20	38	0.18	0.20	0.21	0.12	–	–	–	3.6
4	2	5	5	5	25	38	0.23	0.25	0.25	0.12	–	–	–	3.6
4	2	5	5	5	30	38	0.28	0.30	0.30	0.12	–	–	–	3.6
4	3	7.5	6	5	< 2	–	0.18	0.31	0.18	0.12	0.18	0.18	0.14	5.0
4	3	5	5	5	2 < 3	38	0.15	0.23	0.20	0.12	–	–	–	4.1
4	3	5	5	5	3 – 5	38	0.12	0.16	0.16	0.12	–	–	–	4.1
4	3	5	5	5	10	38	0.12	0.14	0.14	0.12	–	–	–	4.1
4	3	5	5	5	15	38	0.12	0.18	0.18	0.12	–	–	–	4.1
4	3	5	5	5	20	38	0.14	0.23	0.24	0.12	–	–	–	4.1
4	3	5	5	5	25	38	0.17	0.29	0.29	0.12	–	–	–	4.1
4	3	5	5	5	30	38	0.21	0.35	0.35	0.12	–	–	–	4.1
4	4	7.5	6	5	< 2	–	0.18	0.33	0.20	0.12	0.18	0.18	0.14	5.5
4	4	5	5	5	2 < 3	38	0.12	0.26	0.23	0.12	–	–	–	4.6
4	4	5	5	5	3 – 5	38	0.12	0.18	0.18	0.12	–	–	–	4.6
4	4	5	5	5	10	38	0.12	0.15	0.15	0.12	–	–	–	4.6
4	4	5	5	5	15	38	0.12	0.19	0.20	0.12	–	–	–	4.6
4	4	5	5	5	20	38	0.12	0.25	0.25	0.12	–	–	–	4.6
4	4	5	5	5	25	38	0.14	0.31	0.31	0.12	–	–	–	4.6
4	4	5	5	5	30	38	0.17	0.37	0.37	0.12	–	–	–	4.6

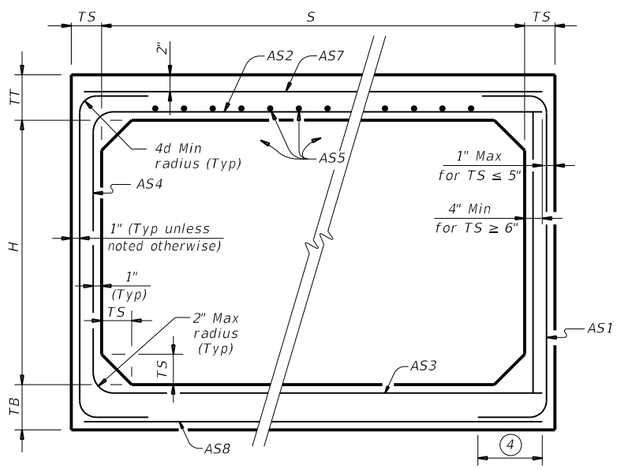
(1) For box length = 8'-0"

(2) AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.



CORNER OPTION "A" CORNER OPTION "B"

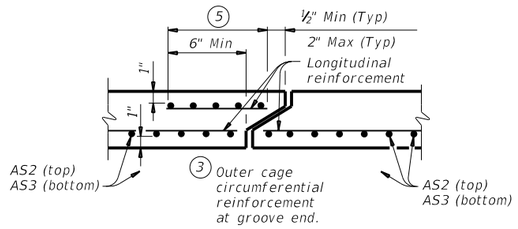
FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

(4) Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



SECTION A-A

(Showing top and bottom slab joint reinforcement.)

MATERIAL NOTES:

Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.

Provide Class H concrete (f`c = 5,000 psi).

GENERAL NOTES:

Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.

See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.

In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)".

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS PRECAST

4'-0" SPAN

SCP-4

FILE: scp04sts-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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Culvert Station and/or Creek Name followed by applicable end (Lt, Rt or Both)	Description of Box Culvert No. Spans ~ Span X Height	Max Fill Height (Ft)	Applicable Box Culvert Standard (4)	Applicable Wingwall or End Treatment Standard	Skew Angle (0°,15°, 30° or 45°)	Side Slope or Channel Slope Ratio (SL:1)	T Culvert Top Slab Thickness (In)	U Culvert Wall Thickness (In)	C Estimated Curb Height (Ft)	Hw (1) Height of Wingwall (Ft)	A Curb to End of Wingwall (Ft)	B Offset of End of Wingwall (Ft)	Lw Length of Longest Wingwall (Ft)	Ltw Culvert Toewall Length (Ft)	Atw Anchor Toewall Length (Ft)	Riprap Apron (CY)	Class "C" Conc (Curb) (2) (CY)	Class "C" Conc (Wingwall) (3) (CY)	Total Wingwall Area (SF)
North of Railroad Crossing - System A (Lt)	1-3'X2'	3'	SCP-3	PW-1	15°	2:1	7"	4"	0.5	5	13.75	N/A	4.18	3.80	N/A	0	N/A	0.90	41.80
Elm Street Outfall - System B (Rt)	1-3'X2'	3'	SCP-3	PW-1	30°	2:1	7"	4"	0.5	5	3.00	N/A	4.68	4.56	N/A	2	N/A	0.83	46.80
Live Oak Street - System D (Rt)	1-4'X2'	3'	SCP-4	PW-1	45°	2:1	7.5"	5"	0.5	5	7.00	N/A	4.36	4.83	N/A	5	N/A	0.98	43.60
West Valley Street Outfall - System E (Rt)	1-3'X2'	2'	SCP-3	SETB-PD	0°	4:1	7"	4"	0.5	5	14.00	9.94	9.94	N/A	3.67	0	N/A	1.43	26.10

DATE:
FILE:

NOTES:
Skew = 0° on SW-0, FW-0, SETB-CD, SETB-SW-0, and SETB-FW-0 standard sheets;
30° maximum for safety end treatment

SL:1 = Horizontal : 1 Vertical
- Side slope at culvert for flared or straight wingwalls.
- Channel slope for parallel wingwalls.
- Slope must be 3:1 or flatter for safety end treatments.

T = Box culvert top slab thickness. Dimension can be found on the applicable box culvert standard sheet.

U = Box culvert wall thickness. Dimension can be found on the applicable box culvert standard sheet.

C = Curb height

See applicable wing or end treatment standard sheets for calculations of Hw, A, B, Lw, Ltw, Atw, and Total Wingwall Area.

Hw = Height of wingwall

A = Distance from face of curb to end of wingwall (not applicable to parallel or straight wingwalls)

B = Offset of end of wingwall (not applicable to parallel or straight wingwalls)

Lw = Length of longest wingwall.

Ltw = Length of culvert toewall (not applicable when using riprap apron)

Atw = Length of anchor toewall (applicable to safety end treatment only)
Total Wingwall Area = Wingwall area in sq. ft. for two wingwalls (one structure end) if Lt or Rt.
Area for four wingwalls (two structure ends) if Both.

(1) Round the wall heights shown to the nearest foot for bidding purposes.

(2) Concrete volume shown is for box culvert curb only. For curbs using the Box Culvert Rail Mounting Details (RAC) standard sheet quantities shown must be increased by a factor of 2.25. If Class S concrete is required for the top slab of the culvert, also provide Class S concrete for the curb. Curb concrete is considered part of the Box Culvert for payment.

(3) Concrete volume shown is total of wings, footings, culvert toewall (if any), anchor toewalls (if any) and wingwall toewalls. Riprap aprons, culverts, and curb quantities are not included.

(4) Regardless of the type of culvert shown on this sheet, the Contractor has the option of furnishing cast-in-place or precast culverts unless otherwise shown elsewhere on the plans. If the Contractor elects to provide culverts of a different type than those shown on this sheet, it is the Contractor's responsibility to make the necessary adjustments to the dimensions and quantities shown.

SPECIAL NOTE:

This sheet is a supplement to the box culvert standards. It is to be filled out by the culvert specifier and provides dimensions for the construction of the box culvert wingwalls and safety end treatments.

An Excel 2010 spreadsheet to assist in completing this table can be downloaded from the Bridge Standards (English) web page on the TxDOT web site. The completed sheet must be signed, sealed, and dated by a licensed Professional Engineer.

Texas Department of Transportation

Bridge Division Standard

BOX CULVERT SUPPLEMENT
WINGS AND END TREATMENTS

BCS

FILE: bcsstde1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0079	04	049	BU 67K
	DIST	COUNTY		SHEET NO.
	FTW	ERATH		148

DATE:
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TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for one structure end)

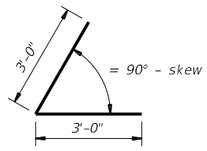
Dimensions					Variable Reinforcing				Estimated Quantities per ft of wing (2~wings) (4)		Estimated Quantities per ft of Toewall (1~toewall)	
					Bars J1		Bars J2					
Maximum Wingwall Height Hw	W	X	Y	Z	Size	Spa	Size	Spa	Reinf (Lb/Ft)	Conc (CY/Ft)	Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	48.64	0.406	6.85	0.071
2'-9"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	49.31	0.424	6.85	0.071
3'-0"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	49.98	0.444	6.85	0.071
3'-3"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	53.32	0.462	6.85	0.071
3'-6"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	53.98	0.480	6.85	0.071
4'-0"	3'-2"	1'-2"	1'-0"	7"	#4	1'-0"	#4	1'-0"	55.77	0.532	6.85	0.071
4'-6"	3'-2"	1'-2"	1'-0"	7"	#4	1'-0"	#4	1'-0"	59.77	0.568	6.85	0.071
5'-0"	3'-9"	1'-7"	1'-2"	7"	#4	1'-0"	#4	1'-0"	63.45	0.632	6.96	0.075
5'-6"	3'-9"	1'-7"	1'-2"	7"	#4	1'-0"	#4	1'-0"	67.46	0.668	6.96	0.075
6'-0"	4'-4"	2'-0"	1'-4"	7"	#5	1'-0"	#5	1'-0"	80.67	0.730	7.07	0.078
6'-6"	4'-4"	2'-0"	1'-4"	7"	#5	1'-0"	#5	1'-0"	85.05	0.768	7.07	0.078
7'-0"	5'-0"	2'-3"	1'-9"	8"	#5	1'-0"	#5	1'-0"	92.15	0.864	8.07	0.093
7'-6"	5'-0"	2'-3"	1'-9"	8"	#5	1'-0"	#5	1'-0"	96.54	0.902	8.07	0.093
8'-0"	5'-6"	2'-8"	1'-10"	8"	#5	6"	#5	6"	139.04	0.962	8.13	0.095
8'-6"	5'-6"	2'-8"	1'-10"	8"	#5	6"	#5	6"	144.47	1.000	8.13	0.095
9'-6"	6'-0"	2'-10"	2'-2"	9"	#5	6"	#5	6"	156.93	1.136	8.41	0.110
10'-6"	6'-5"	3'-0"	2'-5"	9"	#6	6"	#5	6"	196.27	1.234	8.57	0.117
11'-6"	7'-2"	3'-6"	2'-8"	11"	#6	6"	#6	6"	230.13	1.438	9.52	0.140
12'-6"	7'-8"	3'-9"	2'-11"	1'-0"	#7	6"	#6	6"	283.41	1.592	9.74	0.157
13'-6"	8'-2"	4'-0"	3'-2"	1'-2"	#8	6"	#6	6"	348.72	1.804	10.02	0.186
14'-6"	8'-10"	4'-5"	3'-5"	1'-4"	#9	6"	#6	6"	432.94	2.046	10.30	0.218
15'-6"	9'-6"	4'-10"	3'-8"	1'-6"	#9	6"	#7	6"	489.52	2.302	11.24	0.253
16'-0"	9'-11"	5'-0"	3'-11"	1'-7"	#9	6"	#7	6"	505.72	2.448	11.47	0.279

TABLE OF WINGWALL REINFORCING
(2~wings)

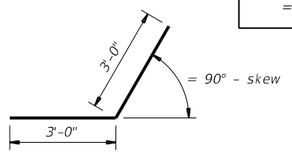
Bar	Size	No.	Spa
D1	#6	~	1'-0"
D2	#6	~	1'-0"
E1	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	~	8"
M1	#4	4	~
P	#4	~	1'-0"
V	#4	~	1'-0"

TABLE OF TOEWALL REINFORCING

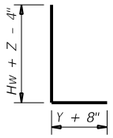
Bar	Size	No.	Spa
J3	#4	~	1'-0"
M2	#4	2	~
E2	#4	~	1'-0"



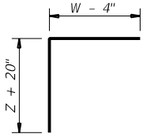
BARS D1



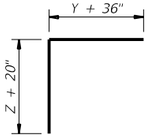
BARS D2



BARS J1



BARS J2



BARS J3

BARS V

WING DIMENSION FORMULAS:

(All values are in feet.)

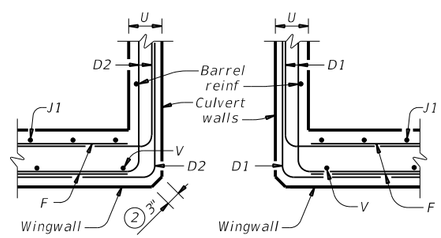
Hw = H + T + C
Lw = (Hw) (SL) ÷ cosine (θ) for Type PW-1
= (Hw - 1') (SL) ÷ cosine (θ) for Type PW-2 and Hw ≥ 4'
= (Hw - 0.5') (SL) ÷ cosine (θ) for Type PW-2 and Hw < 4'

For cast-in-place culverts:
Ltw = [(N) (S) + (N + 1) (U)] ÷ cosine (θ)

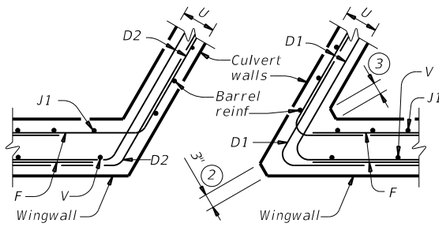
For precast culverts:
Ltw = [(N) (2 U + S) + (N - 1) (0.5')] ÷ cosine (θ)
Total Wingwall Area (two wings ~ SF)
= (2)(Hw)(Lw) for Type PW-1
= (2)(Hw)(Lw) - 6 SF for Type PW-2 and Hw ≥ 4'
= (2)(Hw)(Lw) - 1.5 SF for Type PW-2 and Hw < 4'

Hw = Height of wingwall
Lw = Length of wingwall
Ltw = Culvert toewall ratio. (horizontal:
1 vertical, usual value is 2:1)
N = Number of culvert spans
SL:1 = Channel slope ratio.
θ = Culvert skew

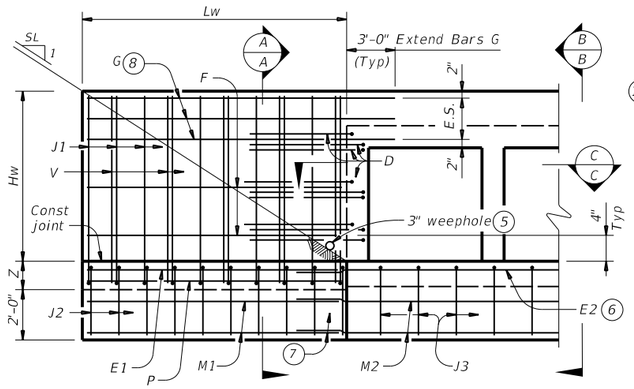
See applicable box culvert standard sheet for S, H, T, and U values.



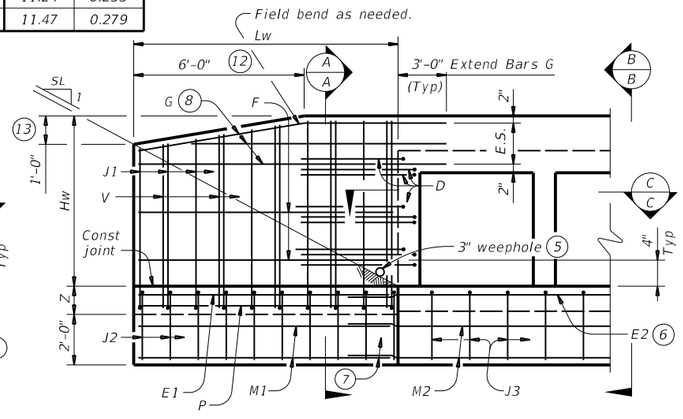
SECTION C-C - PW-1



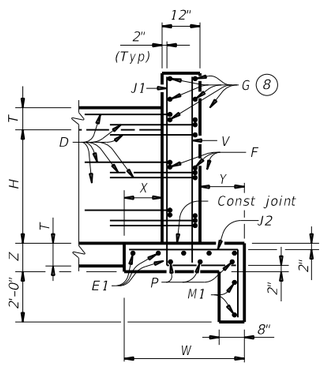
SECTION C-C - PW-2



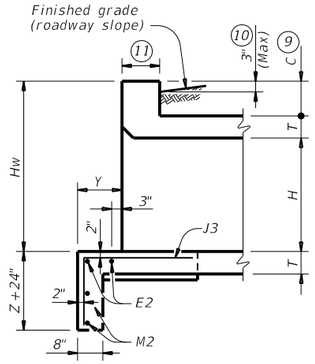
PARTIAL ELEVATION - PW-1



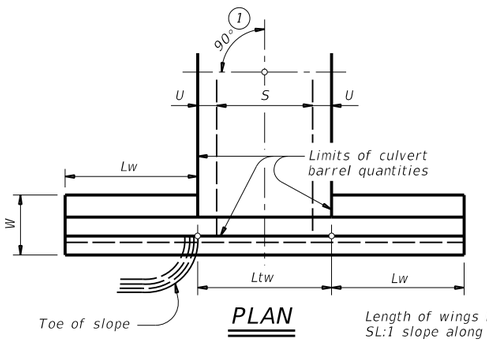
PARTIAL ELEVATION - PW-2



SECTION A-A
(Showing wing reinforcement.)

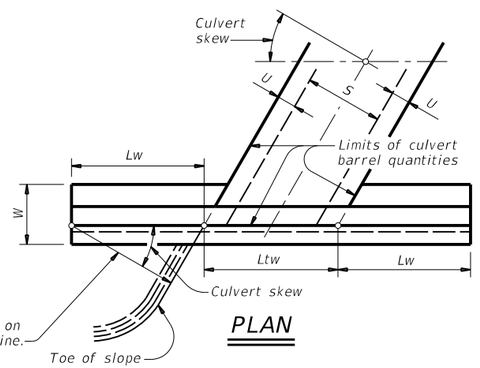


SECTION B-B
(Showing wing reinforcement.)



PLAN

DETAILS FOR NON-SKEWED BOX CULVERTS



PLAN

DETAILS FOR SKEWED BOX CULVERTS
(Showing 30° skew.)

1. Skew = 0°
2. At discharge end, chamfer may be ¾" minimum.
3. For 15° skew ~ 1"
For 30° skew ~ 2"
For 45° skew ~ 3"
4. Quantities shown are for two Type PW-1 wings. Adjust concrete volume for Type PW-2 wings. To determine estimated quantities for two wings, multiply the tabulated values by Lw. Quantities shown do not include weight of Bars D.
5. Provide weepholes for Hw = 5'-0" and greater. Fill around weepholes with coarse gravel.
6. Extend Bars E2 1'-6" minimum into the wingwall footing.
7. Lap Bars M1 1'-6" minimum with Bars M2.
8. Place Bars G as shown, equally spaced at 8" maximum. Provide at least two pairs of Bars G per wing.
9. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.
10. For vehicle safety, the following requirements must be met:
   - For structures without bridge rail, construct curbs no more than 3" above finished grade.
   - For structures with bridge rail, construct curbs flush with finished grade.

   Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
11. 1'-0" typical. 2'-3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elswhere in the plans.
12. 3'-0" for Hw < 4'.
13. 6" for Hw < 4'.

DESIGNER NOTES:

Type PW-1 can be used for all applications and must be used if railing is to be mounted to the wingwall.
Type PW-2 can only be used for applications without a railing mounted to the wingwall.

MATERIAL NOTES:

Provide Class C concrete (f'c=3,600 psi).
Provide Grade 60 reinforcing steel.
Provide galvanized reinforing steel if required elsewhere in the plans.

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.
Depth of toewalls for wingwalls and culverts may be reduced or eliminated when founded on solid rock, when directed by the Engineer.
See Box Culvert Supplement (BCS) standard sheet for wingwall type and additional dimensions and information.
Quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for the Contractor's information only.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing dimensions are out-to-out of bars.

Texas Department of Transportation

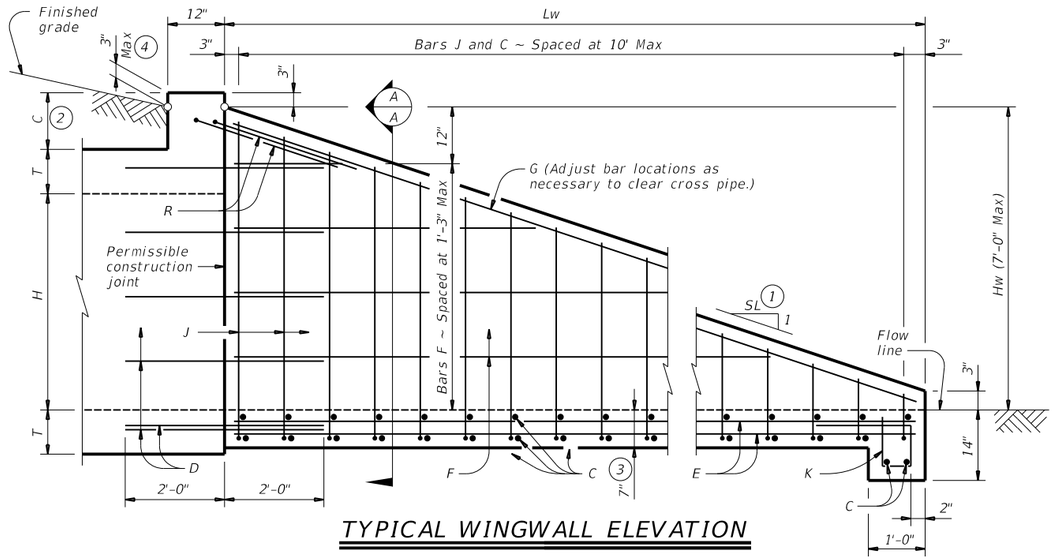
Bridge Division Standard

CONCRETE WINGWALLS
WITH PARALLEL WINGS FOR BOX CULVERTS
TYPES PW-1 AND PW-2

PW

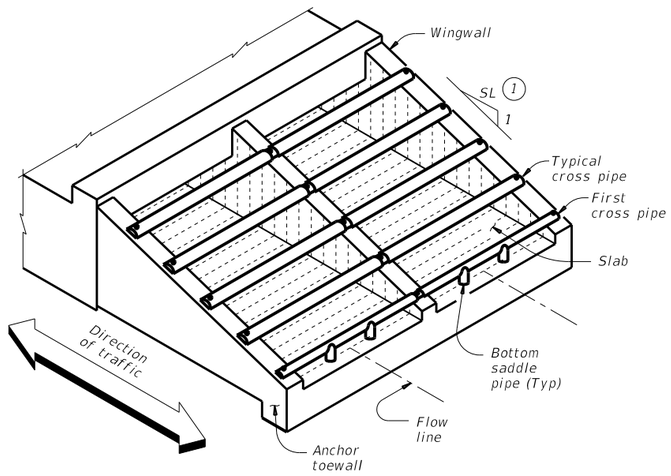
FILE: pwstde01-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0079	04	049	BU 67K
	DIST	COUNTY		SHEET NO.
	FTW	ERATH		149

DATE:
FILE:



TYPICAL WINGWALL ELEVATION

(Cross pipes not shown for clarity.)



ISOMETRIC VIEW OF TYPICAL INSTALLATION

(Showing bolted anchor option.)

WING DIMENSION CALCULATIONS:

$Hw = H + T + C - 0.250'$

$Lw = (Hw - 0.250')\ (SL)$

For cast-in-place culverts:

$Atw = (N)\ (S) + (N + 1)\ (U)$

For precast culverts:

$Atw = (N)\ (2U + S) + (N - 1)\ (0.500')$

Total Wingwall Area (SF)
$= (0.5)\ (Hw + 0.250')\ (Lw)\ (N - 1)$

Total Concrete Volume (CY)
$= [(\text{Wingwall Area})\ (0.583') +$
$(Lw)\ (Atw)\ (0.583') +$
$(Atw)\ (1.000')\ (1.167' - 0.583')] \div (27)$

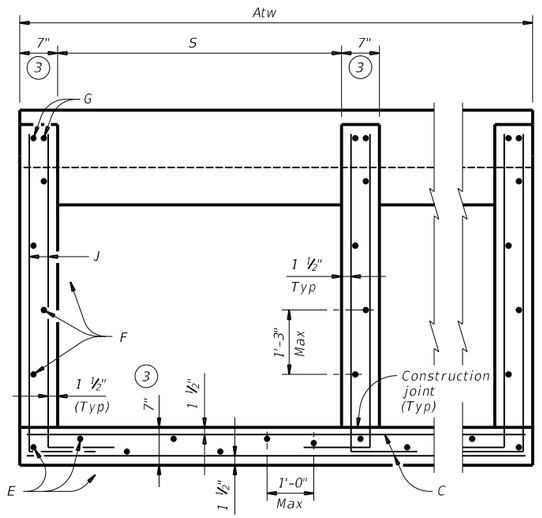
Total Reinforcing (Lb)
$= (1.55)\ (Lw)\ (Atw) +$
$(4.43)\ (Atw) +$
$(K)\ (Hw)\ (N + 1)\ (\sqrt{Lw})$

C = Height of curb above top of top slab (feet)
Hw = Height of wingwall (feet)
K = Constant value for use in formulas

Slope SL:1	K
6:1 ~	10.41

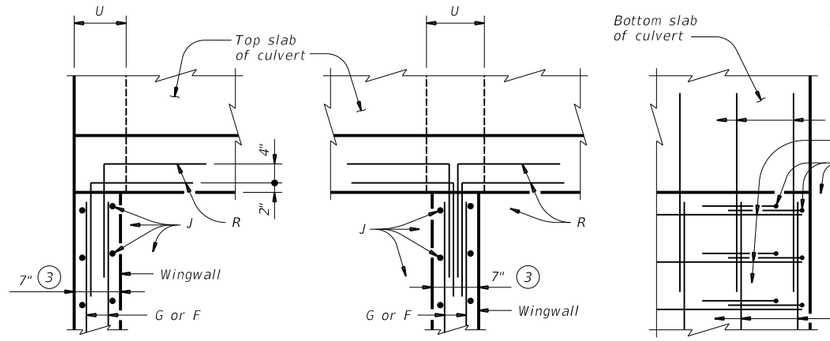
Atw = Anchor toewall length (feet)
Lw = Length of wingwall (feet)
N = Number of culvert barrels
SL:1 = Side slope ratio (horizontal : 1 vertical)

See applicable box culvert standard for H, S, T, and U values.



SECTION A-A

(Showing typical wingwall and wing slab reinforcing. Pipe runners not shown for clarity.)

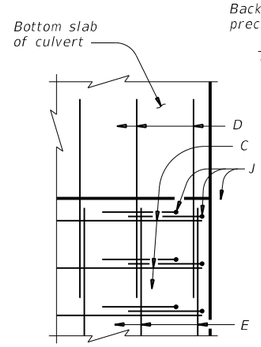


AT TOP OF EXTERIOR WINGWALL

(Cast-in-place culvert)

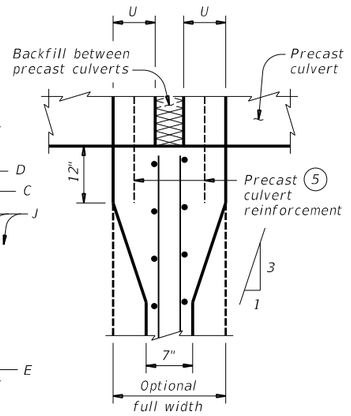
AT TOP OF INTERIOR WINGWALL

(Cast-in-place culvert)



AT OUTSIDE OF BOTTOM SLAB

(Cast-in-place culvert)



AT INTERIOR WINGWALL

(Precast culvert)

PLAN VIEWS OF CORNER DETAILS

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Adjust reinforcing as necessary to provide a minimum clear cover of 1½".
Provide Class "C" concrete (f`c = 3,600 psi).
Provide pipe runners, cross pipes, and anchor pipes meeting the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.
Provide ASTM A307 bolts.
Galvanize all steel components, except the concrete reinforcing, unless required elsewhere in the plans, after fabrication.
Repair galvanizing damaged during transport or construction in accordance with Item 445, "Galvanizing."

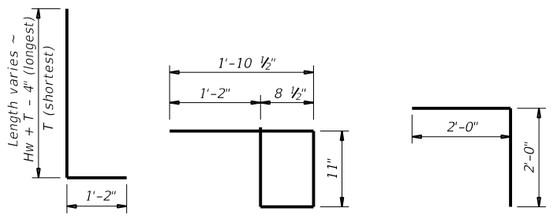
GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
The safety end treatments shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the cross pipes.
Cross pipes are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.
The quantities for concrete, reinforcing steel, and cross pipes resulting from the formulas given herein are for Contractor's information only.
See the Box Culvert Supplement (BCS) standard sheet for additional dimensions and information.
Alternate design drawings bearing the seal of a professional engineer will be acceptable for precast construction of the safety end treatments.

Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing dimensions are out-to-out of bars.

TABLE OF REINFORCING BAR SIZES AND SPACING

Bar	Size	Spacing
C	#4	10" Max
D	#4	Match F and E
E	#4	1'- 0" Max
F	#4	1'- 3" Max
G	#6	As shown
J	#4	10" Max
K	#4	1'- 0" Max
R	#4	As shown



BARS J BARS K BARS R

(Length = 4'-3")

1. Provide 6:1 or flatter slope.
2. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures without railing and curbs taller than 1'-0", refer to Extended Curb Details the Extended Curb Details (ECD) standard sheet.
3. Wingwall and slab thicknesses may be the same as the adjacent culvert wall and slab thicknesses (7" Minimum). If thicknesses greater than the minimum (7") are used, no changes will be made in quantities and no additional compensation will be allowed.
4. For vehicle safety, reduce height, if necessary, to provide a maximum 3" projection above finished grade. No changes will be made in quantities and no additional compensation will be allowed for this work.
5. For culverts with C = 0", the precast culvert reinforcing may extend 1'-0" minimum into wingwall. Wingwall bars D and R may be omitted. Otherwise, refer to the Wingwall Connection detail on the Box Culvert Precast Miscellaneous Details (SCP-MD) standard sheet.

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

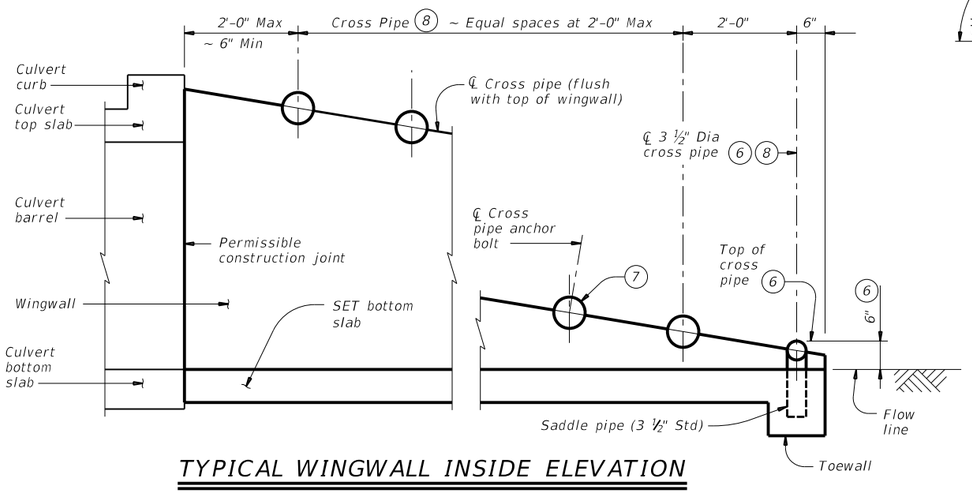
SAFETY END TREATMENT

FOR BOX CULVERTS (MAXIMUM Hw = 7'-0") TYPE I ~ PARALLEL DRAINAGE

SETB-PD

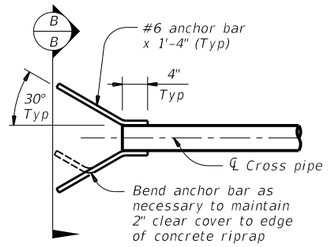
FILE: setbpdse-22.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 06-2022 ~ Wing dimesions	0079	04	049	BU 67K
	DIST	COUNTY		SHEET NO.
	FTW	ERATH		150

DATE:
FILE:

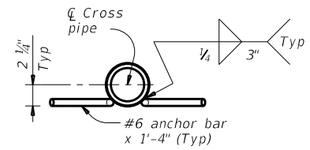


TYPICAL WINGWALL INSIDE ELEVATION

(Showing installation of cross pipes.)



PART PLAN



SECTION B-B

OPTIONAL ANCHOR BAR DETAILS

REQUIRED PIPE SIZES (8)		
Culvert Span Sizes	Cross Pipe Size	Sleeve Pipe Size (9)
First Pipe	3 ½" STD	2 ½" STD
30" to 42"	4" STD	3" STD
48" to 72"	5" STD	4" STD
78" to 120"	6" STD	5" STD

STANDARD PIPE SIZES		
Pipe Size	Pipe O.D.	Pipe I.D.
2 ½" STD	2.875"	2.469"
3" STD	3.500"	3.068"
3 ½" STD	4.000"	3.548"
4" STD	4.500"	4.026"
5" STD	5.563"	5.047"
6" STD	6.625"	6.065"

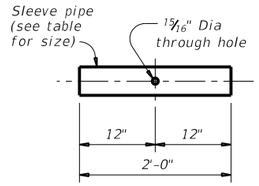
(6) The proper installation of the first cross pipe is critical for vechicle saftey. Place the top of the first cross pipe at no more than 6" above the flow line.

(7) Always install the third cross pipe from the bottom of the culvert using a bolted connection. Take care to ensure that concrete does not flow into this cross pipe so as to permit disassembly of the bolted connection to allow cleanout access.

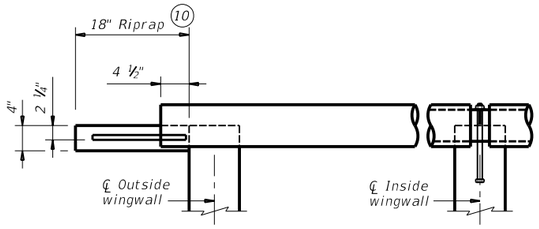
(8) Provide cross pipes and sleeve pipes (if required) as shown in the Required Pipe Sizes table. Provide 3 1#2" saddle pipes for the 3 1#2" first cross pipe.

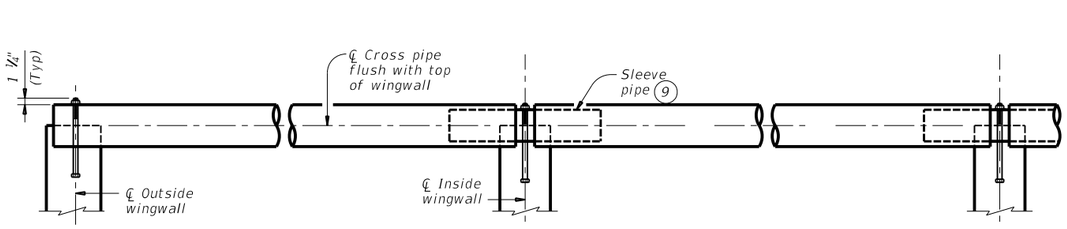
(9) At Contractor's option, make the cross pipe continuous across the inside wingwalls. If this option is selected, omit the sleeve pipe and make a 15#16" diameter throughhole in the cross pipe to accept the anchor bolt at the centerline of each interior wingwall.

(10) Provide riprap when using the Optional Anchor Bar details. Riprap is included in the bid price for Safety End Treatment. Provide riprap in accordance with Item 432, "Riprap".



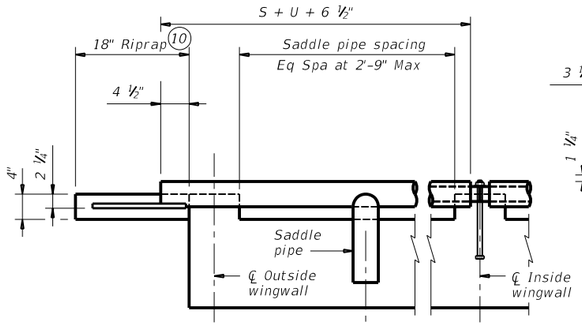
SLEEVE PIPE DETAILS (9)

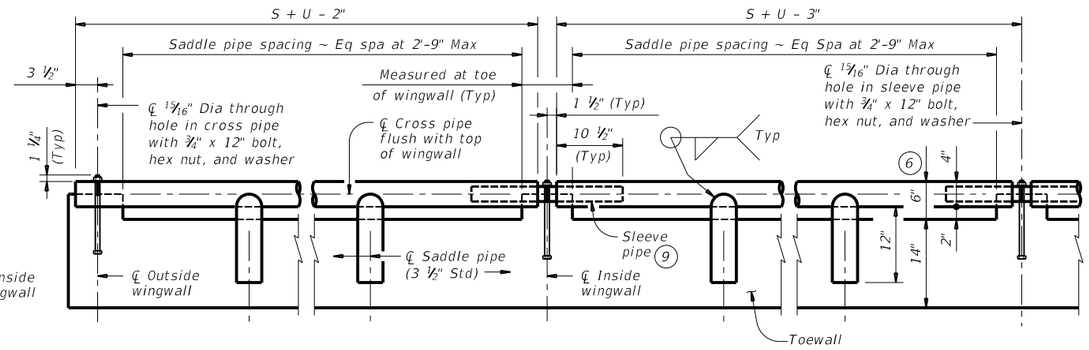




SECTION THROUGH INSTALLATION OF TYPICAL FULL CROSS PIPE

(Anchor details and dimensions are similar to those shown below in Section Through Installation of 3 ½" First Cross Pipe detail.)





SECTION THROUGH INSTALLATION OF 3 ½" FIRST CROSS PIPE

OUTSIDE CULVERT BARREL WITH OPTIONAL ANCHOR BARS & RIPRAP

OUTSIDE CULVERT BARREL WITH BOLTED ANCHOR

INSIDE CULVERT BARREL

CROSS PIPE INSTALLATION DETAILS

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

FOR BOX CULVERTS
(MAXIMUM Hw = 7'-0")
TYPE I ~ PARALLEL DRAINAGE

SETB-PD

FILE: setbpdse-22.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 06-2022 ~ Wing dimesions	0079	04	049	BU 67K
	DIST	COUNTY		SHEET NO.
	FTW	ERATH		151

EXISTING UTILITY NOTES:

1. ALL UTILITIES SHOWN ARE DEPICTED AT QUALITY LEVEL B(QLB), QUALITY LEVEL C(QLC) AND QUALITY LEVEL D(QLD) PER ASCE CI/ASCE 3802, STANDARD GUIDELINE FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA, AS FOLLOWS:

   - QUALITY LEVEL B (QLB): INFORMATION OBTAINED THROUGH THE APPLICATION OF APPROPRIATE SURFACE GEOPHYSICAL METHODS TO DETERMINE THE EXISTENCE AND APPROXIMATE HORIZONTAL POSITION OF SUBSURFACE UTILITIES. QUALITY LEVEL B DATA SHOULD BE REPRODUCIBLE BY SURFACE GEOPHYSICS AT ANY POINT OF THEIR DEPICTION. THIS INFORMATION IS SURVEYED TO APPLICABLE TOLERANCES DEFINED BY THE PROJECT AND REDUCED ONTO PLAN DOCUMENTS.

   - QUALITY LEVEL C (QLC): INFORMATION OBTAINED BY SURVEYING AND PLOTTING VISIBLE ABOVE-GROUND UTILITY FEATURES AND BY USING PROFESSIONAL JUDGMENT IN CORRELATING THIS INFORMATION TO QUALITY LEVEL D (QLD) INFORMATION.

   - QUALITY LEVEL D (QLD): INFORMATION DERIVED FROM EXISTING RECORDS OR ORAL RECOLLECTIONS.

2. THE INFORMATION SHOWN ON THESE DRAWINGS CONCERNING TYPE AND LOCATION OF UNDERGROUND UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. THE CONTRACTOR IS RESPONSIBLE FOR MAKING HIS OWN DETERMINATIONS AS TO TYPE AND LOCATION OF UNDERGROUND UTILITIES AS MAY BE NECESSARY TO AVOID DAMAGE THERE TO. THE CONTRACTOR SHALL VERIFY LOCATION (HORIZONTAL AND VERTICAL) OF UNDERGROUND PIPELINE, CONDUITS, AND STRUCTURES BY CONTACTING OWNERS OF UNDERGROUND UTILITIES AND BY PROSPECTING IN ADVANCE OF EXCAVATING OPERATIONS.

3. ACTIVE SERVICE LINE UTILITIES INCLUDING WATER AND SANITARY SEWER, WHETHER OR NOT SHOWN ON THE DRAWINGS, SHALL BE ADEQUATELY PROTECTED FROM DAMAGE. ANY DAMAGED UTILITIES SHALL BE REPAIRED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER. SERVICE MUST BE PROVIDED AT ALL TIMES.

4. INACTIVE OR ABANDONED UTILITIES ENCOUNTERED DURING CONSTRUCTION SHALL BE REMOVED, CAPPED, OR PLUGGED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER. IN THE ABSENCE OF SPECIFIC REQUIREMENTS, ALL WORK UNDER THIS HEADING SHALL BE DONE IN ACCORDANCE WITH LOCAL CODES OR REGULATIONS OR AS DIRECTED BY THE CITY ENGINEER OR DESIGNATED REPRESENTATIVE.

5. EXISTING GAS MAINS CURRENTLY IN SERVICE MUST REMAIN IN SERVICE THROUGHOUT CONSTRUCTION. CONTRACTOR IS RESPONSIBLE FOR PROTECTING EXISTING GAS MAINS, INCLUDING SERVICE LINES, FROM DAMAGE AS A RESULT OF THE CONSTRUCTION ACTIVITIES.

6. CALL FOR LINE SPOT BEFORE BEGINNING CONSTRUCTION OR EXCAVATION. GAS COMPANIES RECOMMEND THAT CONTRACTOR CALL FOR LINE SPOTS PRIOR TO EXCAVATING IN THE AREA. IT IS REQUIRED THAT CONTRACTOR CALL ATMOS GAS 48 HOURS PRIOR TO EXCAVATING THE AREA NEAR HIGH PRESSURE AND INTERMEDIATE PRESSURE GAS MAINS.

7. THE CONTRACTOR SHALL NOT INTERRUPT THE SERVICE FUNCTION OR DISTURB THE SUPPORT OF ANY UTILITY WITHOUT AUTHORITY FROM THE OWNER OR ORDER FROM THE CITY ENGINEER OR DESIGNATED REPRESENTATIVE. ALL VALVES, SWITCHES, VAULTS, AND METERS SHALL BE MAINTAINED READILY ACCESSIBLE FOR EMERGENCY SHUTOFF.

8. WHEN NECESSARY, THE CONTRACTOR SHALL CONDUCT ITS OPERATIONS AS TO PERMIT ACCESS TO THE WORK SITE AND PROVIDE TIME FOR UTILITY WORK TO BE ACCOMPLISHED DURING THE PROGRESS OF THE WORK.

9. ACTIVE WATER AND SANITARY SEWER MAIN LINE UTILITIES (INCLUDING SERVICE LINES), WHETHER OR NOT SHOWN ON THESE DRAWINGS, SHALL BE ADEQUATELY PROTECTED WITH BERMS AND/OR BRIDGING DURING CONSTRUCTION SO AS NOT TO DAMAGE THE EXISTING MAINS. ANY DAMAGES CAUSED BY THE CONTRACTOR WILL BE REPAIRED AS NECESSARY IN ACCORDANCE WITH THE CITY OF DUBLIN UTILITIES STANDARDS AND SPECIFICATIONS, AT NO ADDITIONAL COST TO THE OWNER.

WARNING! CALL BEFORE YOU DIG.

COORDINATION WITH UTILITIES:

CONTRACTOR SHALL CONTACT ALL UTILITY COMPANIES PRIOR TO ANY EXCAVATION AND/OR RELOCATION OF EXISTING UTILITIES ENCOUNTERED DURING CONSTRUCTION WORK.

CALL TEXAS811 AT LEAST TWO BUSINESS DAYS BEFORE YOU DIG ANYWHERE IN TEXAS FOR UTILITY LOCATES

UTILITY CONTACTS:

CITY OF DUBLIN
CORY JAMES
254-434-1082

BRIGHTSPEED
JAMES CARTER
980-376-1468

ATMOS
MATTHEW CUMMINGHAM
325-203-2992

ONCOR
JOHN WATSON
405-268-2602

VYVE
JESSE GAITAN
254-485-1622

LEGEND

	EXIST R.O.W.	
	PROP DRAINAGE	
	PROP PAVEMENT	
OVERHEAD TELEPHONE (QLC)	T1(C)	BRIGHTSPEED
OVERHEAD FIBER OPTIC (QLC)	FO(C)	BRIGHTSPEED
OVERHEAD ELECTRIC (QLC)	OE1	ONCOR
OVERHEAD FIBER OPTIC/TELEPHONE (QLC)	OHFOC1/T1	BRIGHTSPEED/ VYVE
OVERHEAD ELECTRIC/FIBER OPTIC (QLC)	OE1/FOC1	ONCOR/ BRIGHTSPEED
OVERHEAD ELECTRIC/FIBER OPTIC/TELEPHONE (QLC)	OE1/FOC1/T1	ONCOR/ BRIGHTSPEED / VYVE
POWERPOLE		ONCOR/ BRIGHTSPEED
ELECTRIC - METER	Ⓔ	ONCOR
GAS (QLD)	G1(D)	ATMOS ENERGY
GAS (QLD)(ABANDONED)	G1(D)(ABDN)	ATMOS ENERGY
GAS METER	Ⓖ	ATMOS ENERGY
8" PVC WATER (QLD)	W1(D)	CITY OF DUBLIN
2" PVC WATER (QLD)	W2(D)	CITY OF DUBLIN
6" PVC WATER (QLD)	W3(D)	CITY OF DUBLIN
8" CAST IRON WATER ABANDONED (QLD)	W4(ABDN)	CITY OF DUBLIN
WATER (QLD) (UNKNOWN SIZE)	W5(D)	CITY OF DUBLIN
8" PVC WASTEWATER (QLD)	WW1(D)	CITY OF DUBLIN
WASTEWATER (QLD) (UNKNOWN SIZE)	WW2(D)	CITY OF DUBLIN
WATER METER	Ⓦ	CITY OF DUBLIN
WATER VALVE		CITY OF DUBLIN
WASTEWATER MANHOLE	Ⓜ	CITY OF DUBLIN
PROPOSED WATER LINE RELOCATION		CITY OF DUBLIN

STATE OF TEXAS
JON C. KING
96780
LICENSED
PROFESSIONAL ENGINEER

7/12/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

EXISTING UTILITY NOTES

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	
CONTROL	SECTION	JOB	152
0079	04	049	

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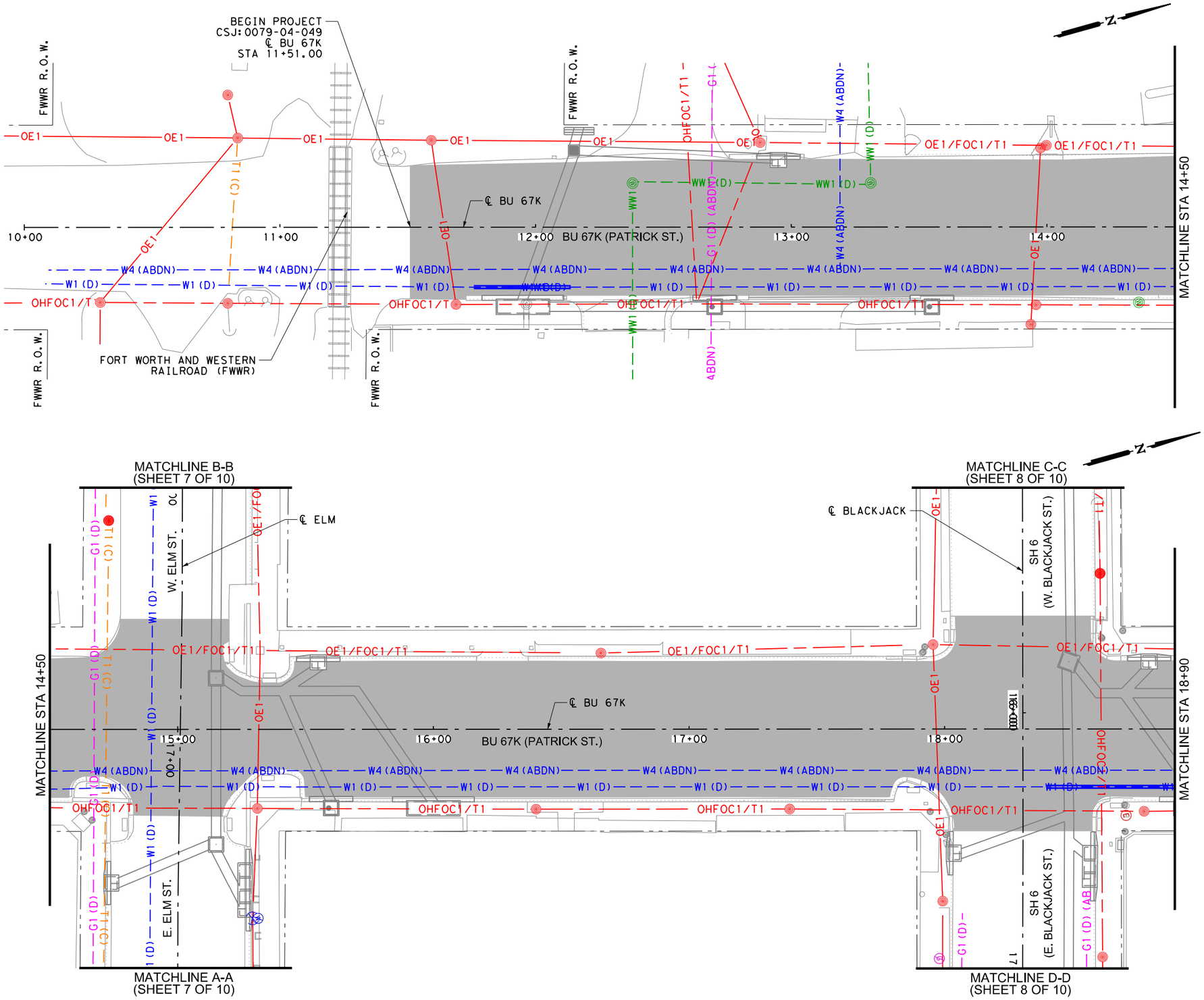

NOTES:

1. REFER TO "HORIZONTAL DATA" SHEET FOR ALIGNMENT DETAILS FOR BU 67K AND SIDE STREETS.
2. REFER TO TYPICAL SECTION, ROADWAY AND DRAINAGE SHEETS FOR MORE INFORMATION.

0 20' 40'

SCALE: 1" = 40'

STATE OF TEXAS
JON C. KING
96780
PROFESSIONAL ENGINEER

7/12/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

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BU 67K

EXISTING UTILITY LAYOUT

SHEET 1 OF 10

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	
CONTROL	SECTION	JOB	153
0079	04	049	

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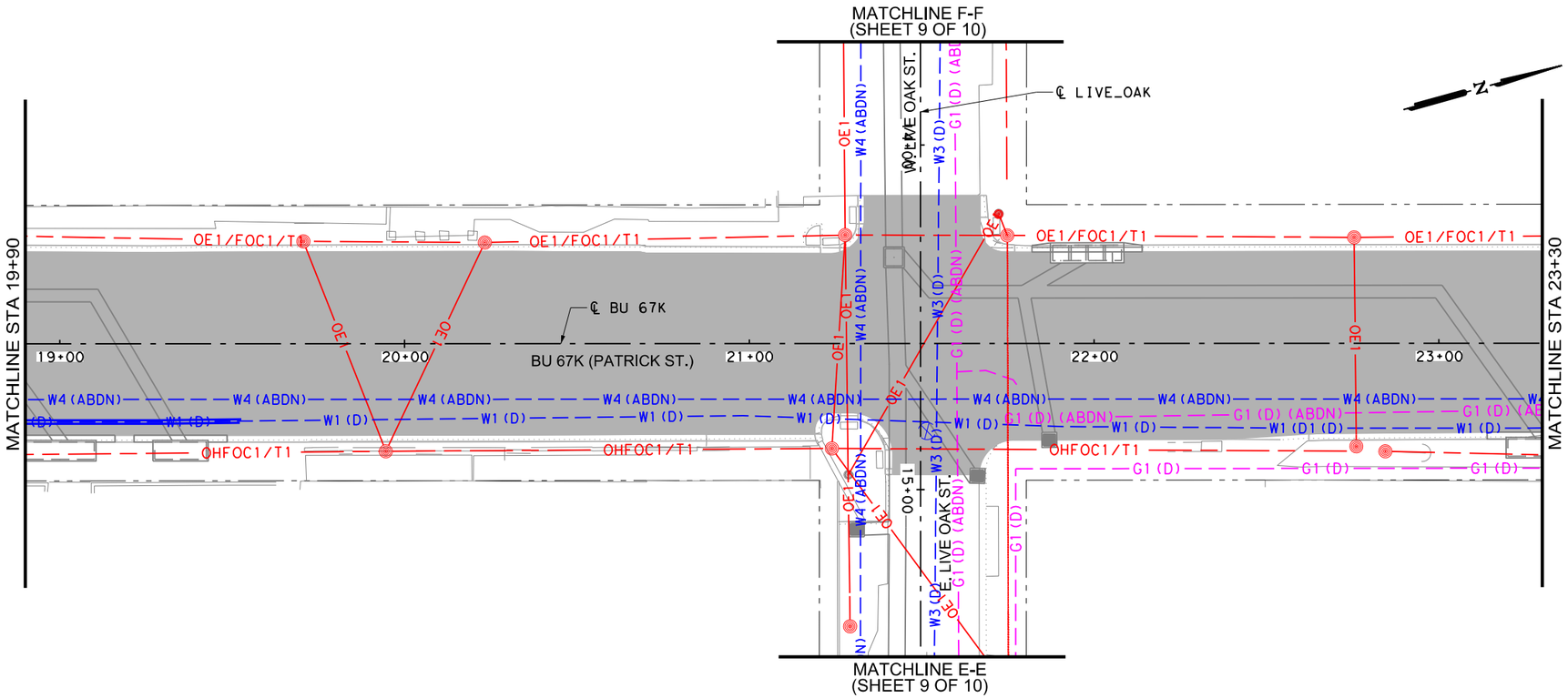

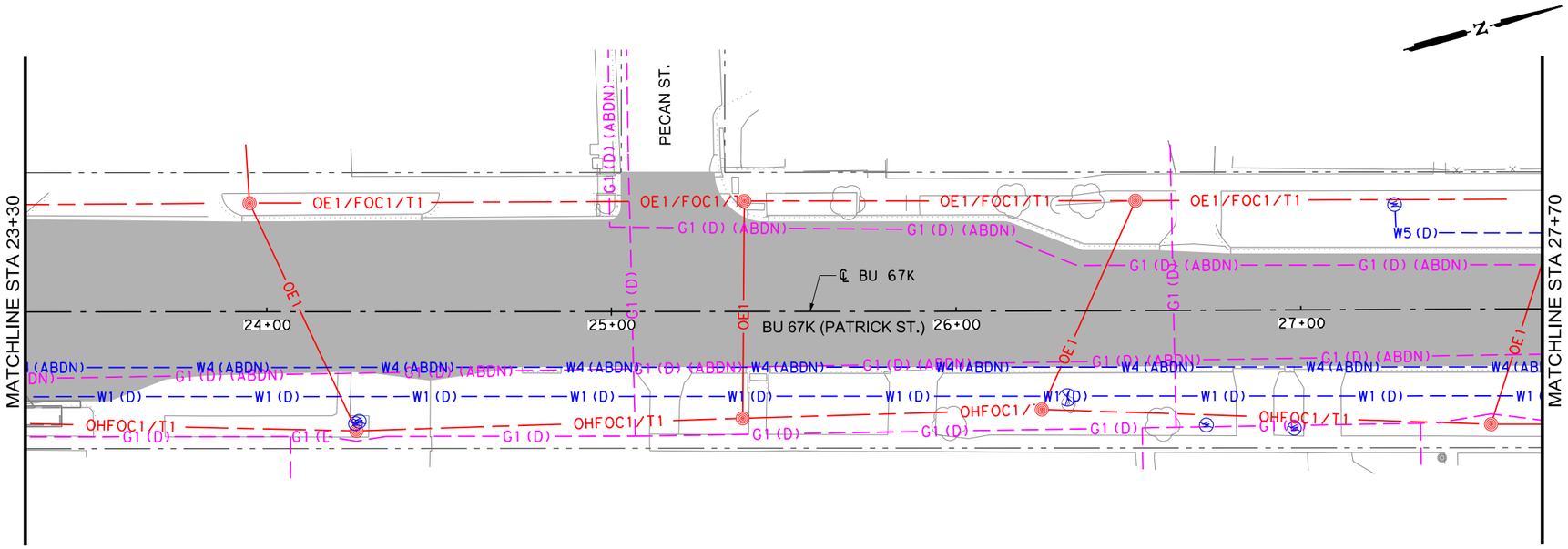

NOTES:

1. REFER TO "HORIZONTAL DATA" SHEET FOR ALIGNMENT DETAILS FOR BU 67K AND SIDE STREETS.
2. REFER TO TYPICAL SECTION, ROADWAY AND DRAINAGE SHEETS FOR MORE INFORMATION.

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

STATE OF TEXAS
JON C. KING
96780
LICENSED
PROFESSIONAL ENGINEER

7/12/2024

NO.	DATE	REVISION	APPROVED

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Texas Department of Transportation

BU 67K

EXISTING UTILITY LAYOUT

SHEET 2 OF 10

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	154
CONTROL	SECTION	JOB	
0079	04	049	

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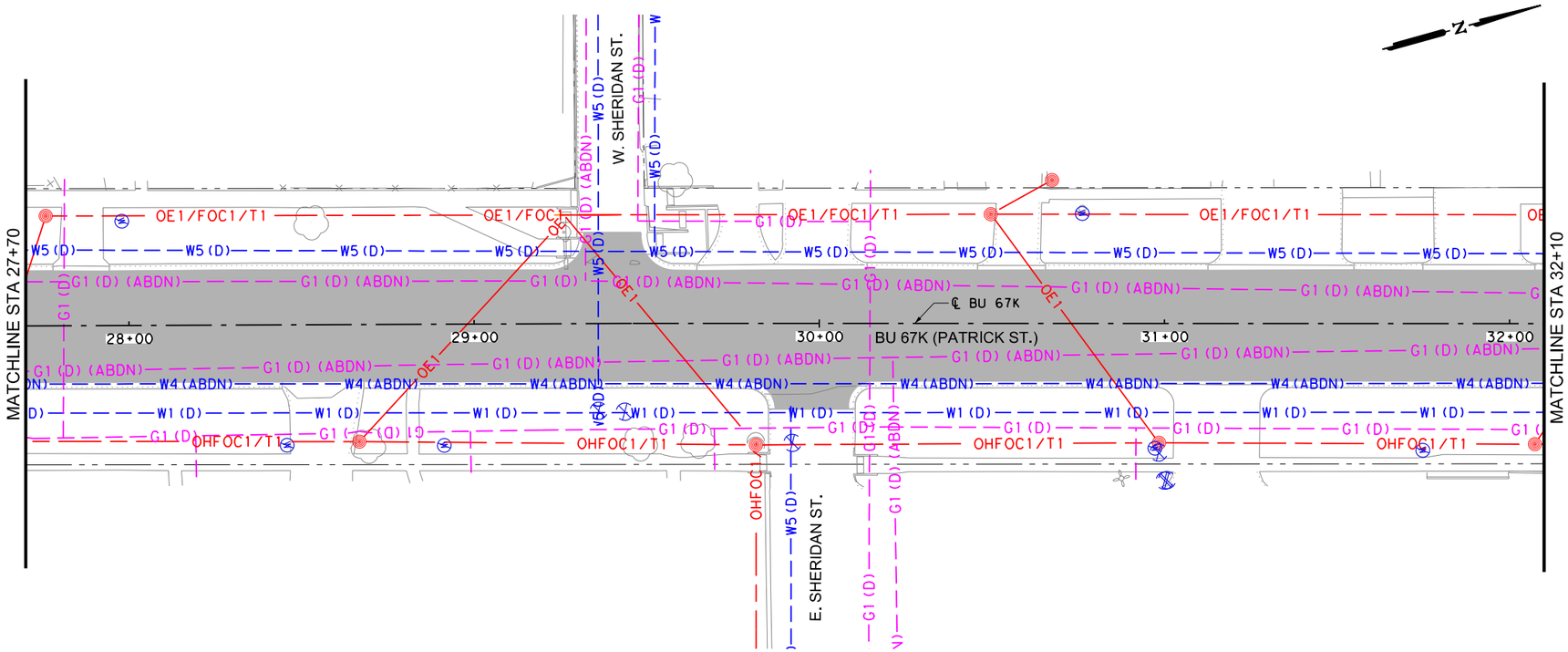

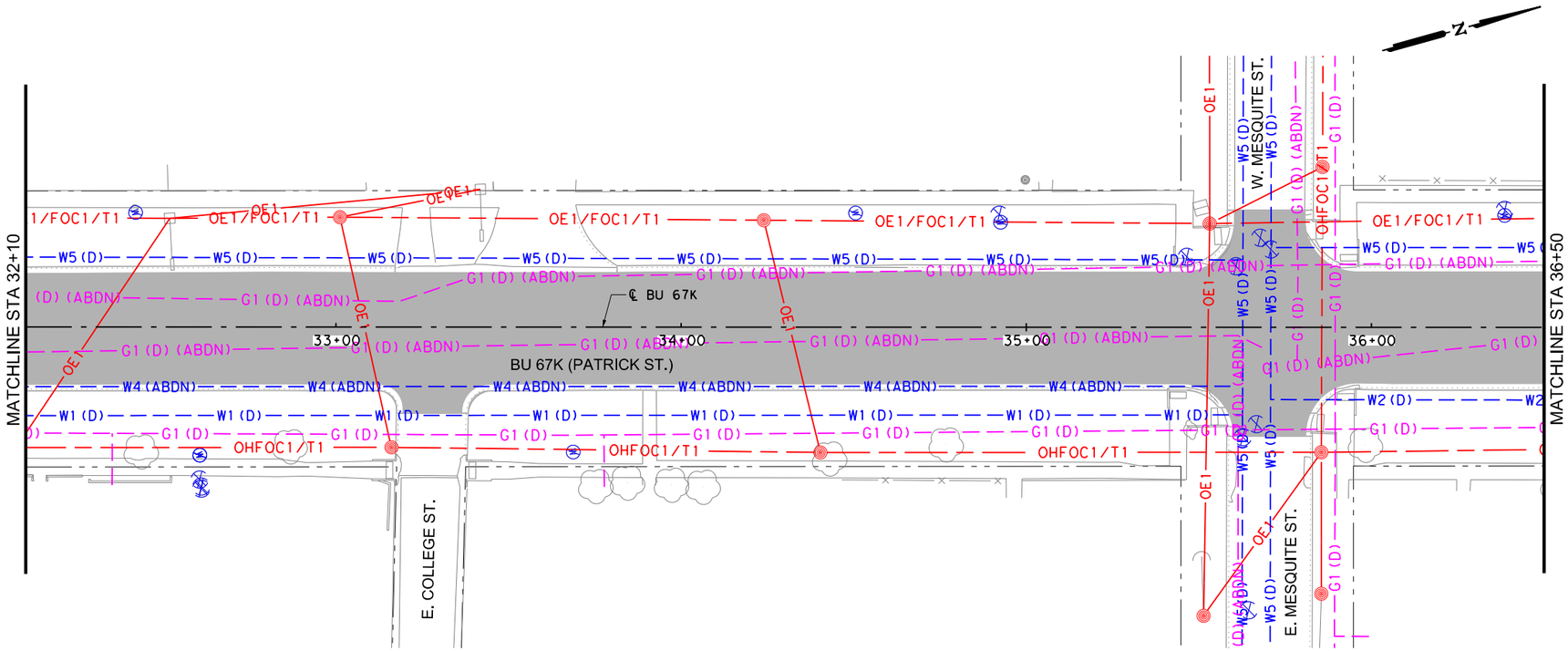

NOTES:

1. REFER TO "HORIZONTAL DATA" SHEET FOR ALIGNMENT DETAILS FOR BU 67K AND SIDE STREETS.
2. REFER TO TYPICAL SECTION, ROADWAY AND DRAINAGE SHEETS FOR MORE INFORMATION.

0 20' 40'

SCALE: 1" = 40'

STATE OF TEXAS
JON C. KING
96780
LICENSED
PROFESSIONAL ENGINEER

7/12/2024

NO.	DATE	REVISION	APPROVED

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Texas Department of Transportation

BU 67K

EXISTING UTILITY LAYOUT

SHEET 3 OF 10

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	155
CONTROL	SECTION	JOB	
0079	04	049	

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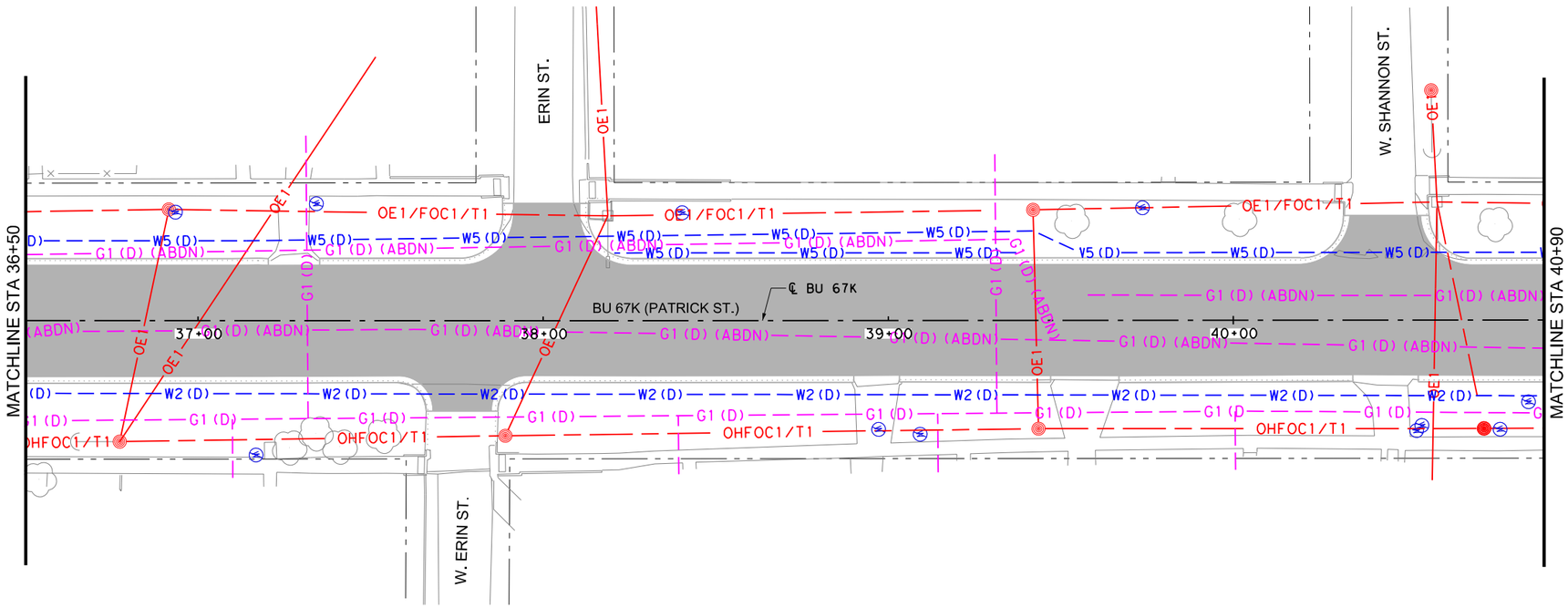

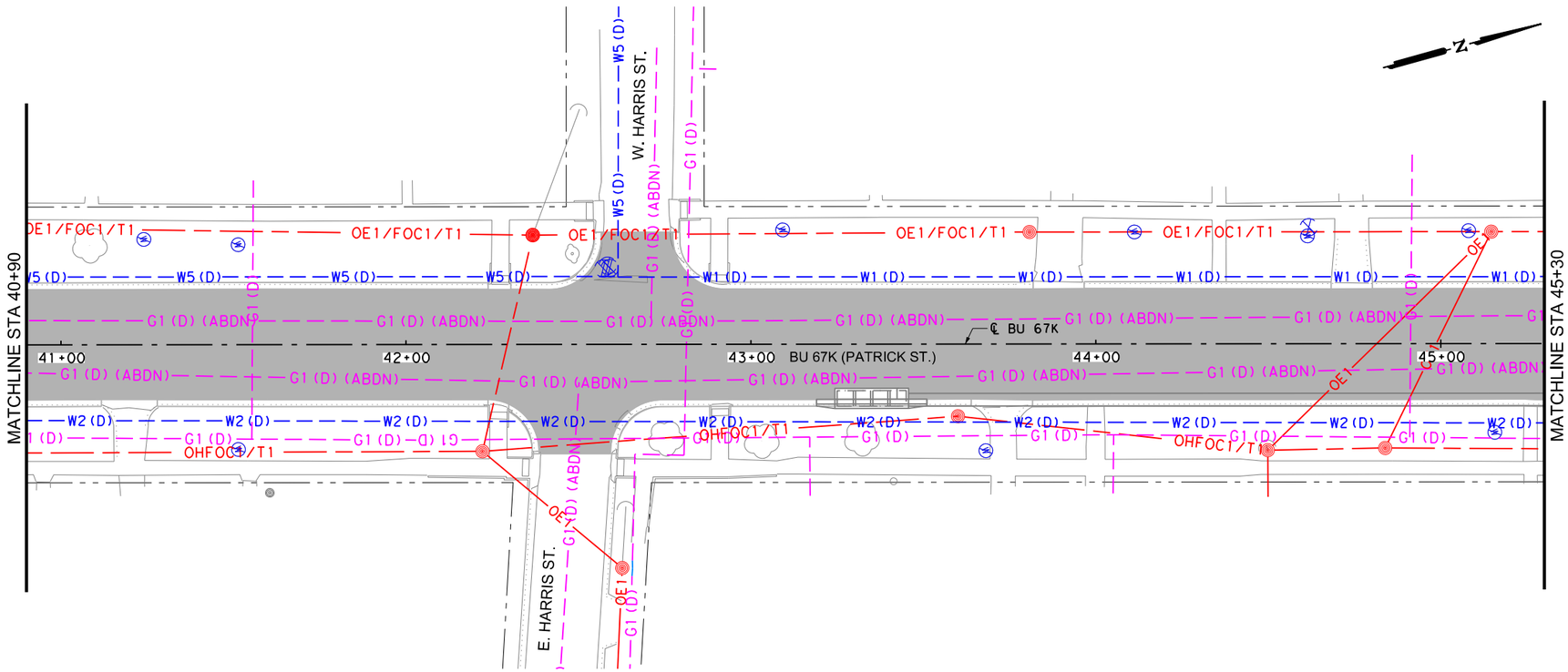

NOTES:

1. REFER TO "HORIZONTAL DATA" SHEET FOR ALIGNMENT DETAILS FOR BU 67K AND SIDE STREETS.
2. REFER TO TYPICAL SECTION, ROADWAY AND DRAINAGE SHEETS FOR MORE INFORMATION.

0 20' 40'

SCALE: 1" = 40'

STATE OF TEXAS
JON C. KING
96780
LICENSED
PROFESSIONAL ENGINEER

7/12/2024

NO.	DATE	REVISION	APPROVED

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Texas Department of Transportation

BU 67K

EXISTING UTILITY LAYOUT

SHEET 4 OF 10

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	156
CONTROL	SECTION	JOB	
0079	04	049	

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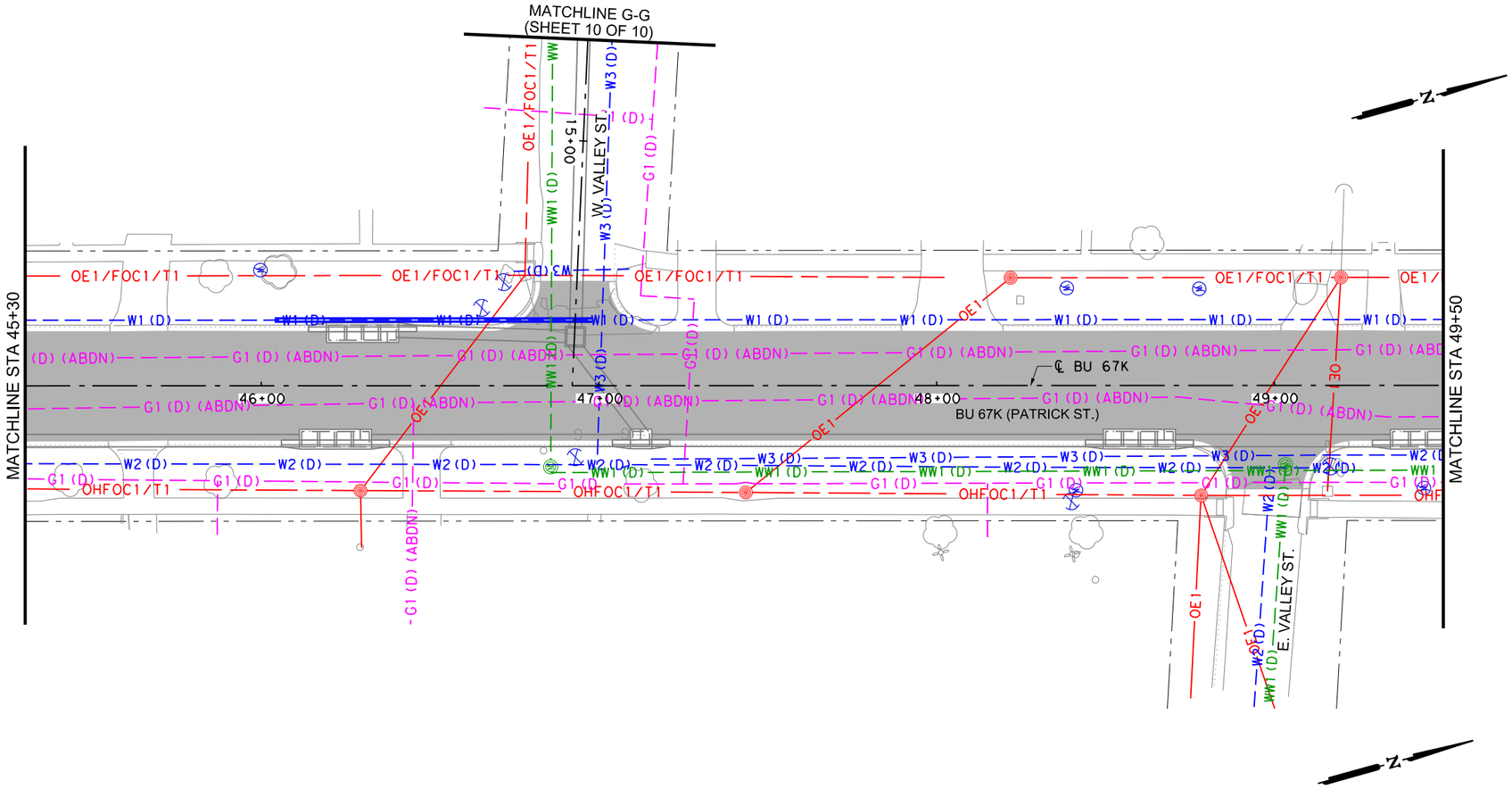

NOTES:

1. REFER TO "HORIZONTAL DATA" SHEET FOR ALIGNMENT DETAILS FOR BU 67K AND SIDE STREETS.
2. REFER TO TYPICAL SECTION, ROADWAY AND DRAINAGE SHEETS FOR MORE INFORMATION.

0 20' 40'

SCALE: 1" = 40'

STATE OF TEXAS
JON C. KING
96780
LICENSED
PROFESSIONAL ENGINEER

7/12/2024

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BU 67K

EXISTING UTILITY LAYOUT

SHEET 5 OF 10

FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	
CONTROL	SECTION	JOB	157
0079	04	049	

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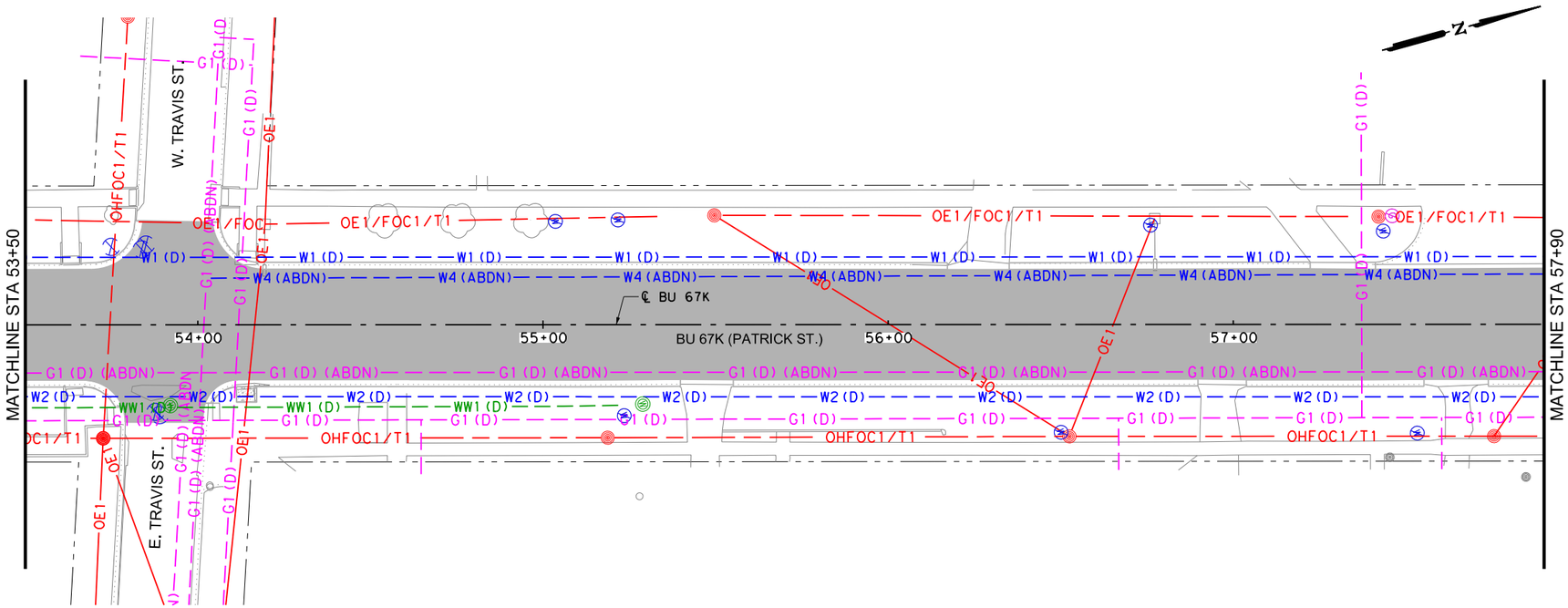

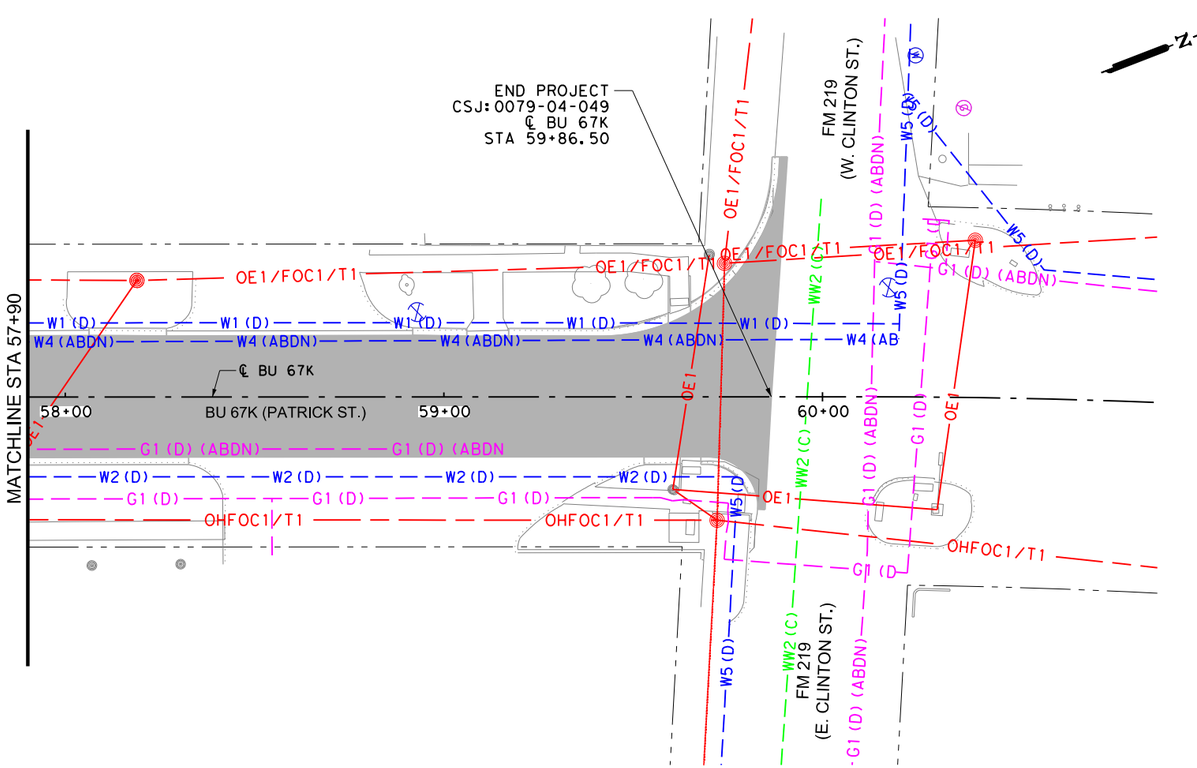

NOTES:

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2. REFER TO TYPICAL SECTION, ROADWAY AND DRAINAGE SHEETS FOR MORE INFORMATION.

0 20' 40'

SCALE: 1" = 40'

STATE OF TEXAS
JON C. KING
96780
LICENSED
PROFESSIONAL ENGINEER

7/12/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

EXISTING UTILITY LAYOUT

SHEET 6 OF 10

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	158
CONTROL	SECTION	JOB	
0079	04	049	

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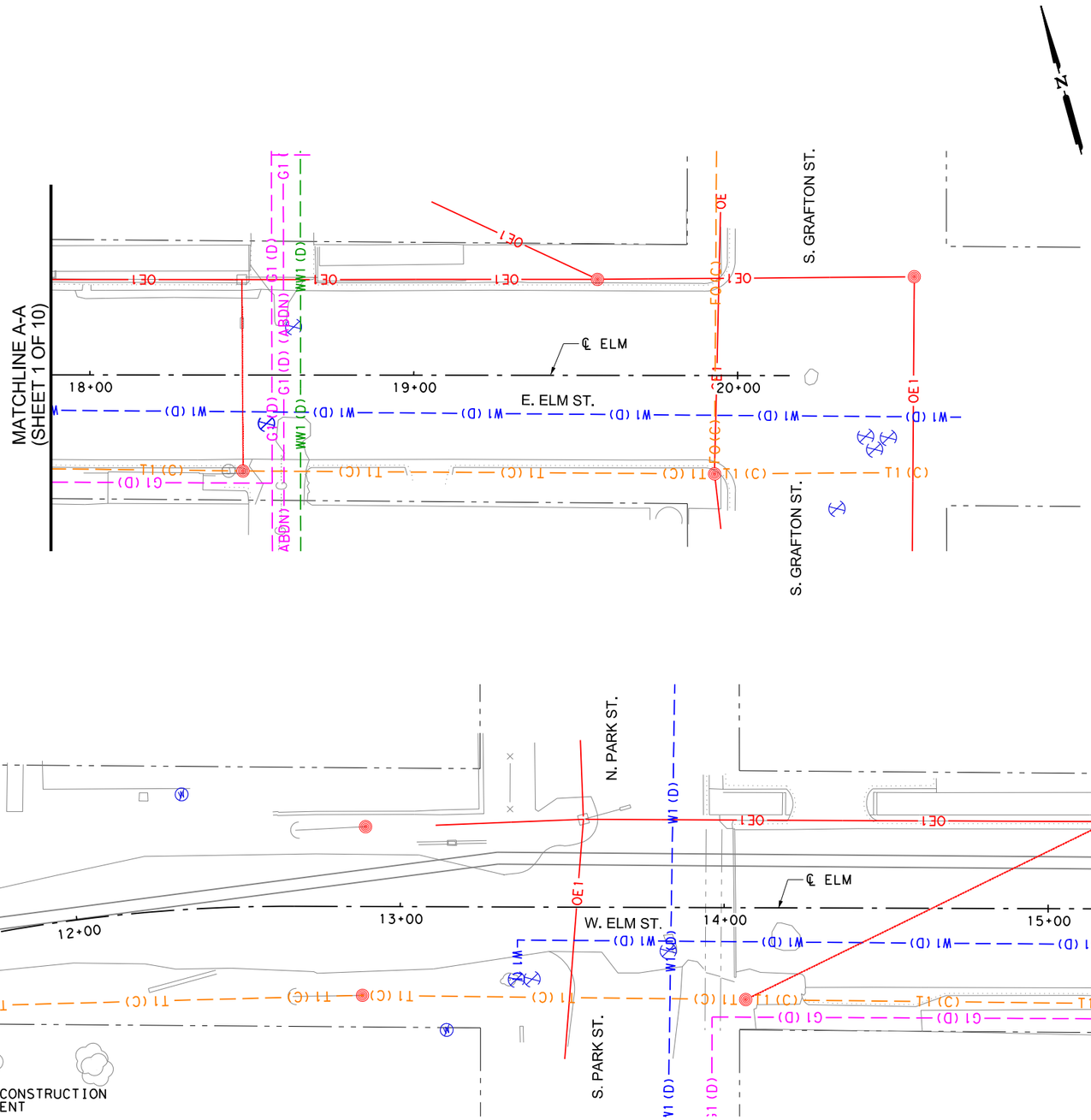

NOTES:

1. REFER TO "HORIZONTAL DATA" SHEET FOR ALIGNMENT DETAILS FOR BU 67K AND SIDE STREETS.
2. REFER TO TYPICAL SECTION, ROADWAY AND DRAINAGE SHEETS FOR MORE INFORMATION.

0 20' 40'

SCALE: 1" = 40'

STATE OF TEXAS
JON C. KING
96780
LICENSED
PROFESSIONAL ENGINEER

7/12/2024

NO.	DATE	REVISION	APPROVED

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Texas Department of Transportation

BU 67K

EXISTING UTILITY LAYOUT

SHEET 7 OF 10

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	159
CONTROL	SECTION	JOB	
0079	04	049	

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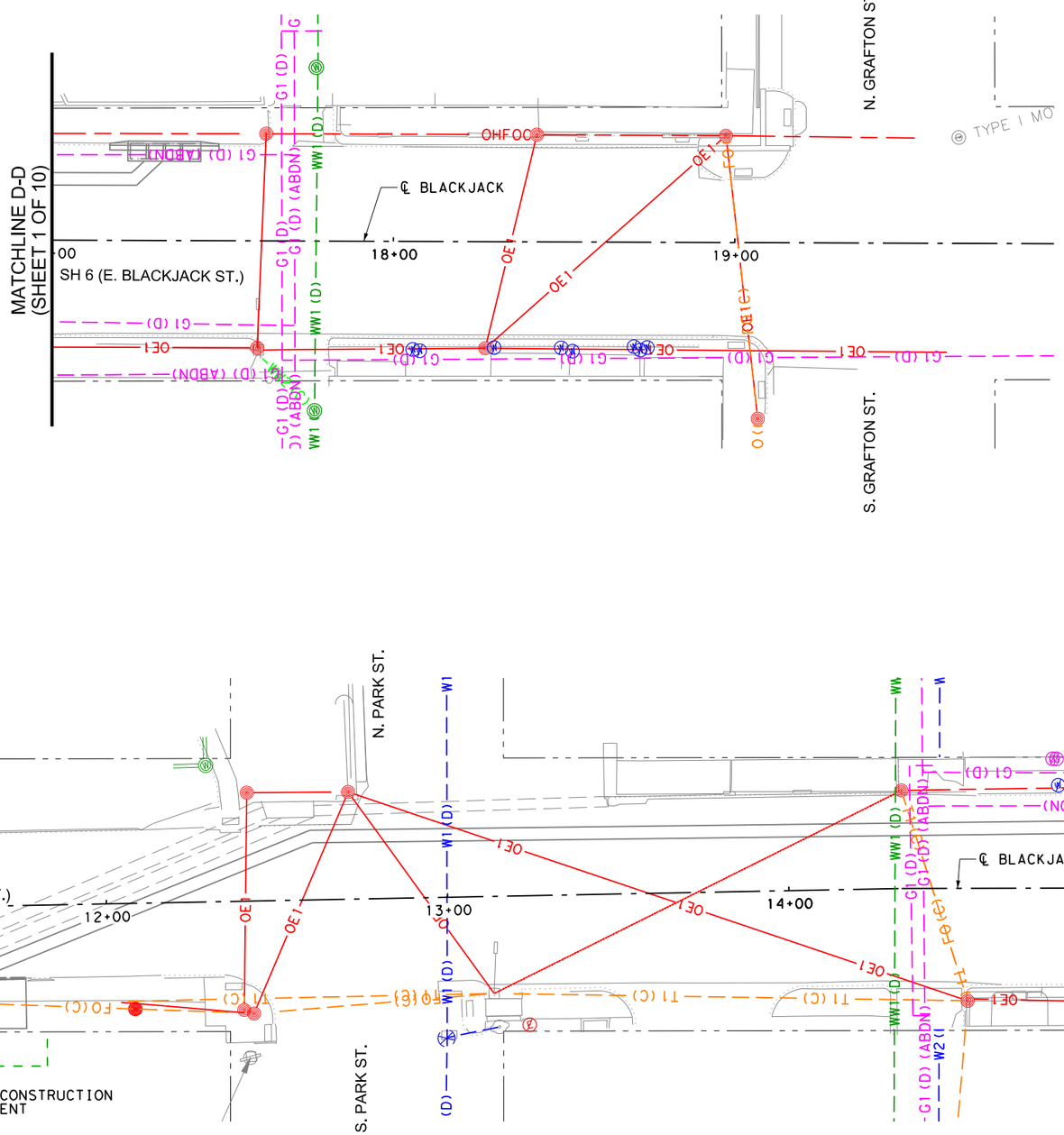

NOTES:

1. REFER TO "HORIZONTAL DATA" SHEET FOR ALIGNMENT DETAILS FOR BU 67K AND SIDE STREETS.
2. REFER TO TYPICAL SECTION, ROADWAY AND DRAINAGE SHEETS FOR MORE INFORMATION.

SCALE: 1" = 40'

STATE OF TEXAS
JON C. KING
96780
LICENSED
PROFESSIONAL ENGINEER

7/12/2024

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BU 67K

EXISTING UTILITY LAYOUT

SHEET 8 OF 10

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	
CONTROL	SECTION	JOB	160
0079	04	049	

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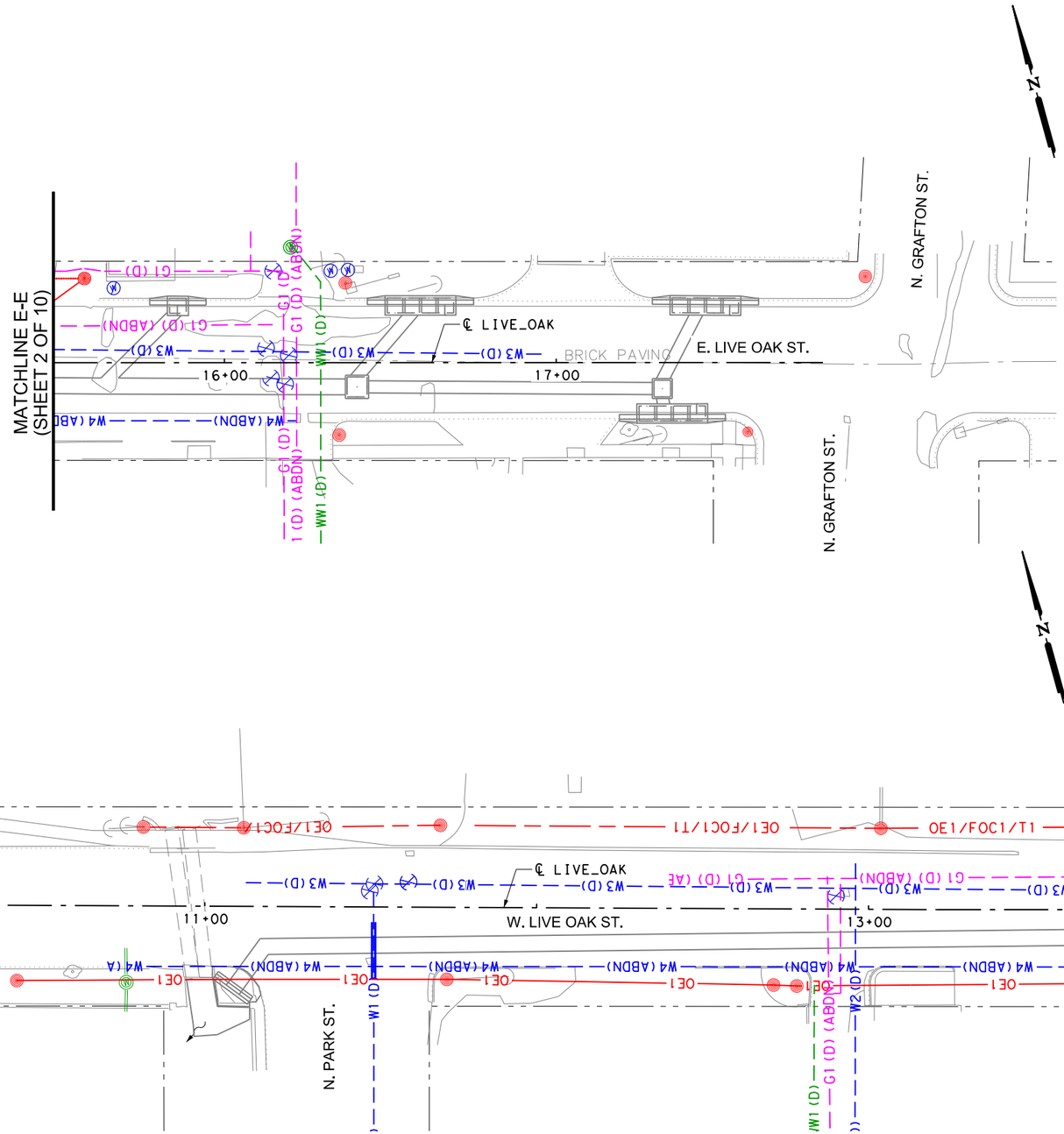

NOTES:

1. REFER TO "HORIZONTAL DATA" SHEET FOR ALIGNMENT DETAILS FOR BU 67K AND SIDE STREETS.
2. REFER TO TYPICAL SECTION, ROADWAY AND DRAINAGE SHEETS FOR MORE INFORMATION.

0 20' 40'

SCALE: 1" = 40'

STATE OF TEXAS
JON C. KING
96780
LICENSED
PROFESSIONAL ENGINEER

7/12/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

EXISTING UTILITY LAYOUT

SHEET 9 OF 10

FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	
CONTROL	SECTION	JOB	161
0079	04	049	

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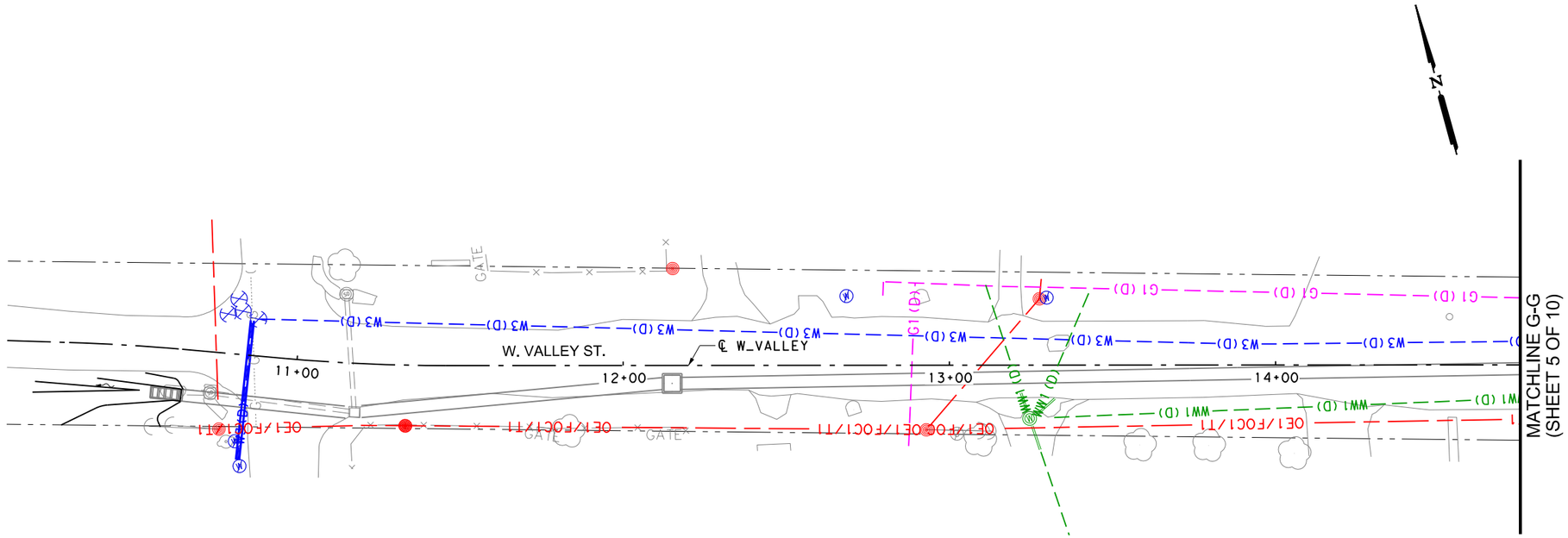

NOTES:

1. REFER TO "HORIZONTAL DATA" SHEET FOR ALIGNMENT DETAILS FOR BU 67K AND SIDE STREETS.
2. REFER TO TYPICAL SECTION, ROADWAY AND DRAINAGE SHEETS FOR MORE INFORMATION.

0 20' 40'

SCALE: 1" = 40'

STATE OF TEXAS
JON C. KING
96780
LICENSED
PROFESSIONAL ENGINEER

7/12/2024

NO.	DATE	REVISION	APPROVED

VRX

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Texas Department of Transportation

BU 67K

EXISTING UTILITY LAYOUT

SHEET 10 OF 10

FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	162
CONTROL	SECTION	JOB	
0079	04	049	

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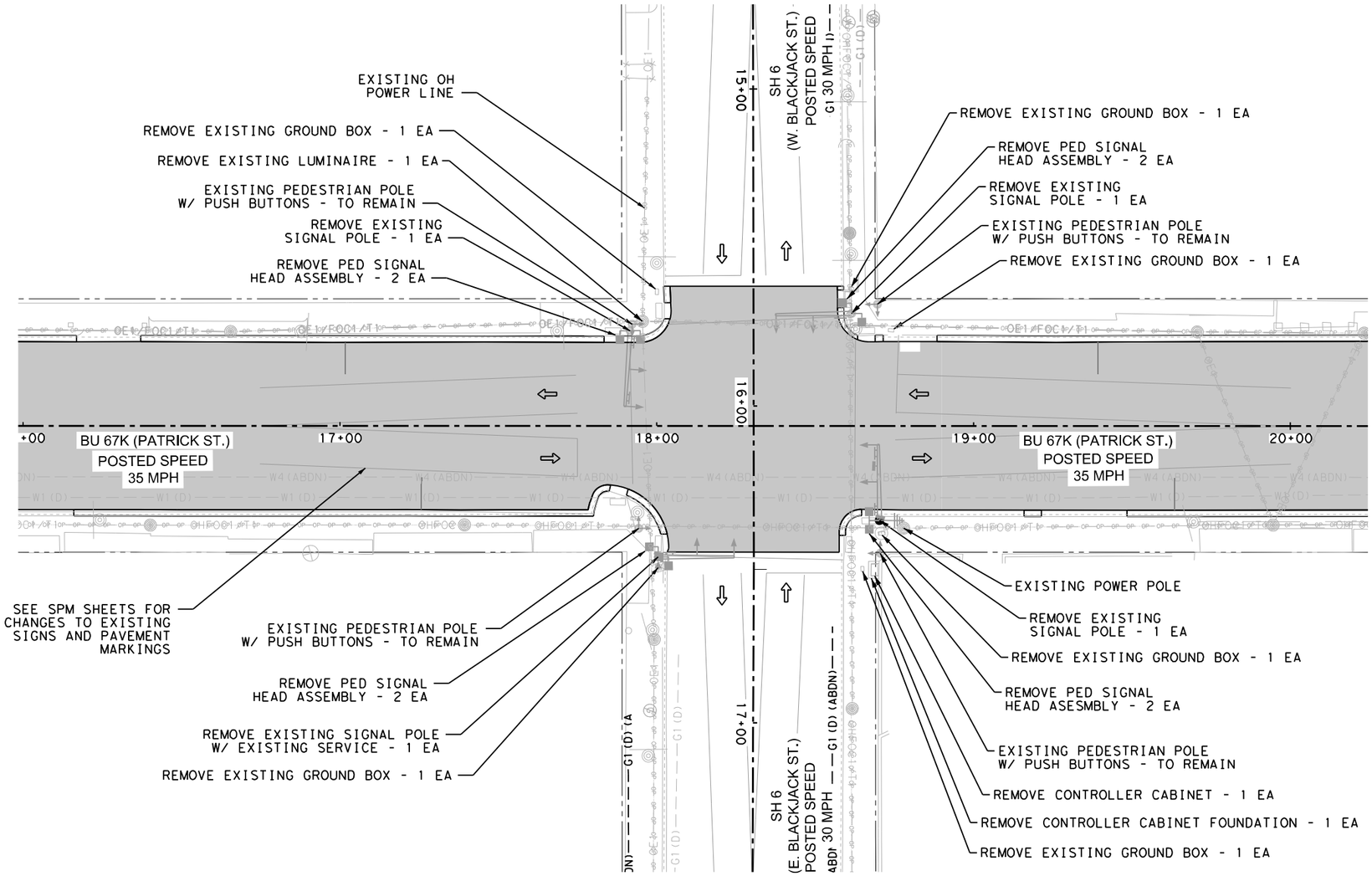

LEGEND

- EXISTING TRAFFIC FLOW
- EXIST R.O.W.
- EXISTING PEDESTRIAN LED SIGNAL HEAD (RELOCATED)
- EXISTING PEDESTRIAN PUSHBUTTON AND SIGN
- EXISTING GROUND BOX
- EXISTING SIGNAL HEAD
- EXISTING CONTROLLER
- EXISTING SIGNAL POLE W/ MAST ARM
- EXISTING SIGN
- EXISTING PEDESTRIAN POLE
- EXISTING RADAR DETECTION
- EXISTING ELECTRICAL SERVICE

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

STATE OF TEXAS
JOHN D. RILEY
120572
LICENSED
PROFESSIONAL ENGINEER
07/12/2024

NO.	DATE	REVISION	APPROVED

TBPE REGISTRATION NO. F-16341

Texas Department of Transportation
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BU 67K

BU 67K (PATRICK ST.)
@ SH 6 (BLACKJACK ST.)
CONDITION DIAGRAM

FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	163
CONTROL	SECTION	JOB	
0079	04	049	

NOTES:

1. CONTRACTOR SHALL VERIFY UTILITY LOCATIONS.

2. REMOVAL OF GROUND BOXES SHALL BE CONSIDERED SUBSIDIARY TO ITEM 680 7004 REMOVING TRAFFIC SIGNALS.

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PROPOSED SIGNS

LEFT ON GREEN ARROW ONLY

S-1
R10-5L
30" x 36"

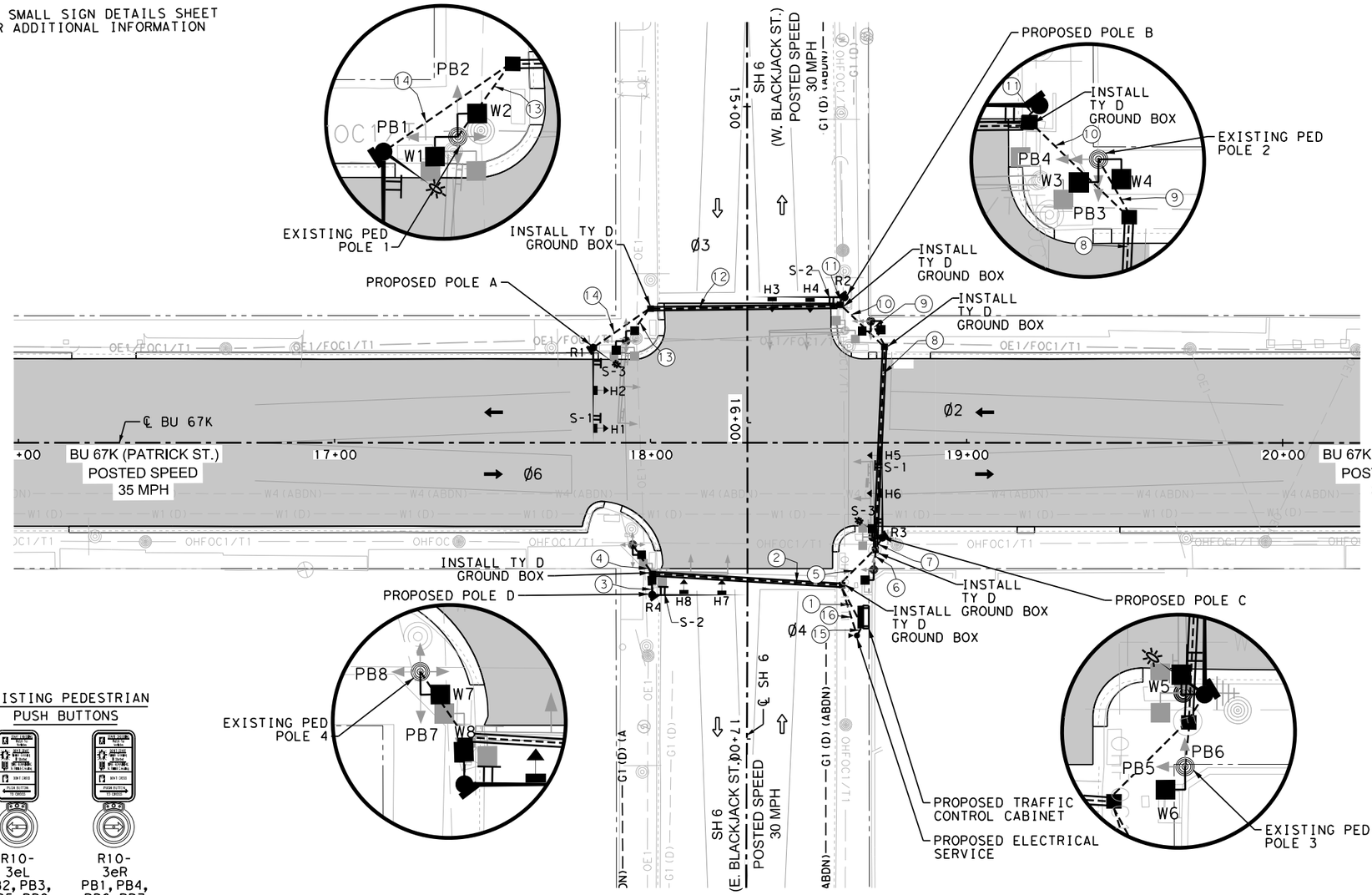
Patrick St.

S-2
*GUIDE SIGN
84" x 18"

Blackjack St.

S-3
*GUIDE SIGN
102" x 18"

*SEE SMALL SIGN DETAILS SHEET FOR ADDITIONAL INFORMATION



EXISTING PEDESTRIAN PUSH BUTTONS

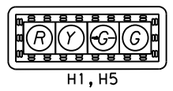
R10-3eL
PB2, PB3, PB5, PB8

R10-3eR
PB1, PB4, PB6, PB7

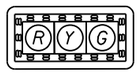
PROPOSED PEDESTRIAN SIGNAL HEADS

W1, W2, W3
W4, W5, W6
W7, W8
LED COUNTDOWN PEDESTRIAN SIGNAL

PROPOSED SIGNAL HEADS



H1, H5



H2, H3, H4, H6, H7, H8

NOTES:

1. CONTRACTOR SHALL VERIFY UTILITY LOCATIONS.
2. EXACT LOCATION OF SIGNAL POLES AND PED POLES SHALL BE STAKED BY CONTRACTOR AND APPROVED BY TXDOT PRIOR TO DRILLING.
3. ADJUST SIGNAL HEADS AND SIGNAL TIMING FOR EACH CONSTRUCTION STEP, AS DIRECTED BY THE ENGINEER. CONTRACTOR SHALL SUBMIT PLANS SHOWING THESE ADJUSTMENTS FOR EACH STEP FOR ENGINEER'S APPROVAL BEFORE BEGINNING THIS WORK. ANY ADDITIONAL WORK (MATERIAL AND LABOR) FOR THESE WILL NOT BE PAID FOR DIRECTLY BUT WILL BE SUBSIDIARY TO ITEM 502.

LEGEND

- PROPOSED SIGNAL HEAD AND NUMBER
- PROPOSED CONTROLLER
- S-# PROPOSED SIGN
- PX POLE NUMBER
- PROPOSED ELECTRICAL SERVICE
- PROPOSED LUMINAIRE
- PROPOSED SIGNAL POLE W/ MAST ARM
- PROPOSED CONDUIT (TRENCH)
- PROPOSED CONDUIT (BORE)
- PROPOSED GROUND BOX TYPE D
- PROPOSED CABLE RUN
- PROPOSED DAMPING PLATE
- EXISTING TRAFFIC FLOW
- PROPOSED TRAFFIC FLOW
- EXISTING GROUND BOX
- PROP PAVEMENT
- EXIST R.O.W.
- PROPOSED PEDESTRIAN LED SIGNAL HEAD
- EXISTING PEDESTRIAN PUSHBUTTON AND SIGN
- EXISTING PEDESTRIAN POLE
- RPDD

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

STATE OF TEXAS
JOHN D. RILEY
120572
LICENSED
PROFESSIONAL ENGINEER
07/12/2024

NO.	DATE	REVISION	APPROVED

JMT TBPE REGISTRATION NO. F-16341

Texas Department of Transportation
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BU 67K

BU 67K (PATRICK ST.)
@ SH 6 (BLACKJACK ST.)
PROPOSED SIGNAL LAYOUT

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	164
CONTROL	SECTION	JOB	
0079	04	049	

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LEGEND OF CONDUIT									
RUN NO.	CONDUIT (618)		NUMBER OF CABLES, T = TRENCH, B = BORE, EX = EXISTING						
	SIZE	LENGTH IN FEET	2/C #12 TY C PED BUTTON	7/C #14 AWG PED SIGNAL	16/C #14 AWG SIGNAL	4/C #12 AWG TRAY LUM	1/C #6 AWG (BARE) GROUND	RPD CABLE DETECTION (PRESENCE)	1/C #6 AWG SERV
1	4x3-T	10	8	4	4		1	4	
2	3-B	60	2	1	1		1	1	
3	3-T	10			1		1	1	
4	3-T	15	2	1			1		
5	3x3-T	15	6	3	3	2	1	3	
6	3-T	10	2	1			1		
7	3-T	5			1	1	1	1	
8	2x3-B	65	4	2	2	1	1	2	
9	3-T	10	2	1			1		
10	2x3-T	20	2	1	2	1	1	2	
11	3-T	5			1		1	1	
12	2x3-B	60	2	1	1	1	1	1	
13	3-T	15	2	1			1		
14	3-T	25			1	1	1	1	
15	3-T	5							2
16	3-T	20				2			
TOTAL			1010	505	565	310	320	415	10

CABLE IN POLE AND ARM					
SIGNAL POLE NUMBER	2/C #12 AWG PED BUTTON	7/C #14 AWG PED SIGNAL	16/C #14 AWG SIGNAL	4/C #12 AWG TRAY LUM	RPD CABLE DETECTION (PRESENCE)
POLE A			45	40	20
POLE B			45		20
POLE C			45	40	20
POLE D			45		20
PED-1*	5	10			
PED-2*	5	10			
PED-3*	5	10			
PED-4*	5	10			
TOTAL	20	40	180	80	80

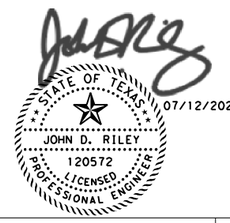
*EXISTING

MINIMUM PEDESTRIAN TIMING				
PED PHASE	SIGNAL HEAD NUMBERS	WALK TIME (SECONDS)	FLASHING DON'T WALK TIME (SECONDS)	TOTAL PED TIMING (SECONDS)
PH 2, W	W2, W3	7	11	18
PH 3, W	W1, W8	7	8	15
PH 4, W	W5, W4	7	11	18
PH 6, W	W6, W7	7	11	18

SIGNAL POLE CHART																
POLE NUMBER	POLE A		POLE B		POLE C			POLE D			PED-1*		PED-2*		PED-3*	PED-4*
MAST ARM LENGTH	32'		32'		32'			32'								
FOUNDATION TYPE	30-A		30-A		30-A			30-A			*		*		*	*
WITH LUNIMAIRES	YES		NO		YES			NO			NO		NO		NO	NO
MAST ARM SIGNS	ST. NAME, R10-5L		ST. NAME		ST. NAME, R10-5L			ST. NAME			*		*		*	*
SIZE OF LENS	12"		12"		12"			12"								
SIGNAL TYPE	A	B	B	B	A	B	C	B	B	C	C	C	C	C	C	C
SIGNAL FACE NO.	H1	H2	H3	H4	H5	H6	W5	H7	H8	W8	W1	W2	W3	W4	W6	W7
LED SIGNAL INDICATIONS	R	R	R	R	R	R	W	R	R	W	W	W	W	W	W	W
	Y	Y	Y	Y	Y	Y	DW	Y	Y	DW	DW	DW	DW	DW	DW	DW
	<G	G	G	G	<G	G		G	G							
	G				G											

*EXISTING
R = RED BALL, Y = YELLOW BALL, G = GREEN BALL, <G = GREEN ARROW,
PB = PUSH BUTTON, W = WALK, DW = DON'T WALK
ALL SIGNAL HEADS SHALL HAVE VENTED BACK PLATES WITH RETROREFLECTIVE BORDER.

ELECTRICAL SERVICE DESCRIPTION (see ED (4) & (5) - 03)	SERVICE CONDUIT SIZE	SERVICE CONDUCTORS NO./SIZE	SAFTEY SWITCH AMPS	MAIN CKT. BKR. POLE/AMP	TWO-POLE CONTACTOR AMPS	PANELBD/ LOADCENTER AMP RATING	CIRCUIT NO.	BRANCH CKT. BKR. POLE/AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
ELC SRV TY D 120/240 060 (NS)SS(E)SP(O)	1 1/4"	3/#6	N/A	2P/60	N/A	100	T.S LUM	1P/30 1P/15	24 1.42	3.2



NO.	DATE	REVISION	APPROVED

TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

BU 67K

BU 67K (PATRICK ST.)
@ SH 6 (BLACKJACK ST.)
SIGNAL SUMMARY

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	165
CONTROL	SECTION	JOB	
0079	04	049	

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CABLE TERMINATION CHART									
CONDUCTOR NUMBER	CONDUCTOR COLOR	CABLE 1 FROM POLE A TO CNTRL 16 CNDR	CABLE 2 FROM POLE B TO CNTRL 16 CNDR	CABLE 3 FROM POLE C TO CNTRL 16 CNDR	CABLE 4 FROM POLE D TO CNTRL 16 CNDR	CABLE 5 FROM PED-1* TO CNTRL 7 CNDR	CABLE 6 FROM PED-2* TO CNTRL 7 CNDR	CABLE 7 FROM PED-3* TO CNTRL 7 CNDR	CABLE 8 FROM PED-4* TO CNTRL 7 CNDR
1	BLACK	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE
2	WHITE	SIG COMM	SIG COMM	SIG COMM	SIG COMM	PED COMM	PED COMM	PED COMM	PED COMM
3	RED	H2 - R	H3 & H4 - R	H6 - R	H7 & H8 - R	W1 DW	W3 DW	W6 DW	W7 DW
4	GREEN	H2 - G	H3 & H4 - G	H6 - G	H7 & H8 - G	W1 W	W3 W	W6 W	W7 W
5	ORANGE	H2 - Y	H3 & H4 - Y	H6 - Y	H7 & H8 - Y	SPARE	SPARE	SPARE	SPARE
6	BLUE	SPARE	SPARE	W5 W	W8 W	W2 DW	W4 DW	SPARE	SPARE
7	WHITE/BLACK	SPARE	SPARE	PED COMM	PED COMM	W2 W	W4 W	SPARE	SPARE
8	RED/BLACK	H1 - R	SPARE	H5 - R	SPARE	N/A	N/A	N/A	N/A
9	GREEN/BLACK	H1 - G	SPARE	H5 - G	SPARE	N/A	N/A	N/A	N/A
10	ORANGE/BLACK	H1 - Y	SPARE	H5 - Y	SPARE	N/A	N/A	N/A	N/A
11	BLUE/BLACK	SPARE	SPARE	SPARE	SPARE	N/A	N/A	N/A	N/A
12	BLACK/WHITE	SPARE	SPARE	W5 DW	W8 DW	N/A	N/A	N/A	N/A
13	RED/WHITE	SPARE	SPARE	SPARE	SPARE	N/A	N/A	N/A	N/A
14	GREEN/WHITE	H1-G ARW	SPARE	H5-G ARW	SPARE	N/A	N/A	N/A	N/A
15	BLUE/WHITE	SPARE	SPARE	SPARE	SPARE	N/A	N/A	N/A	N/A
16	BLACK/RED	SPARE	SPARE	SPARE	SPARE	N/A	N/A	N/A	N/A

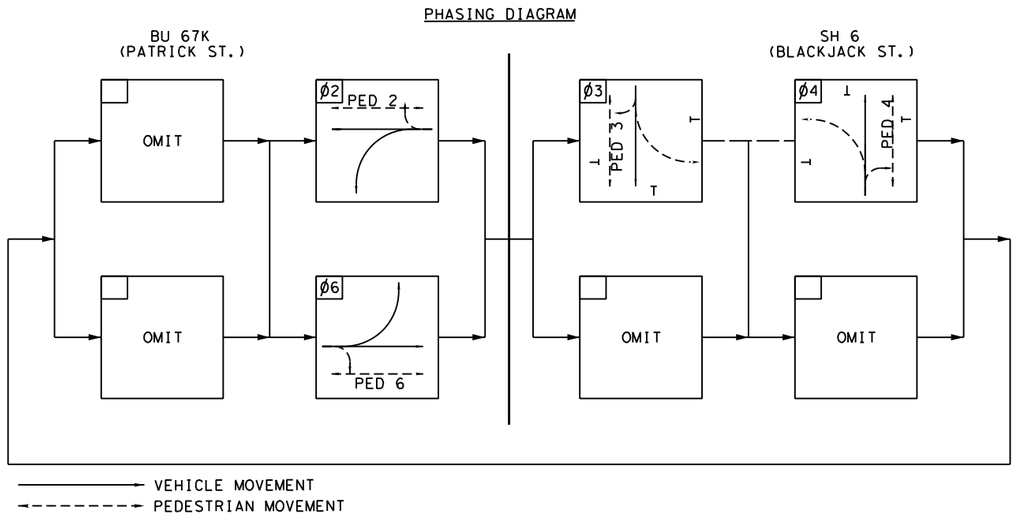
RPD PRESENCE & RAD ADVANCED DETECTION

	CLICK 656 (RPD)	
SENSOR 1	Ø6	RPD
SENSOR 2	Ø2	RPD
SENSOR 3	Ø3	RPD
SENSOR 4	Ø4	RPD
SENSOR 5		
SENSOR 6		

CONTROLLER (BIU 9)

DETECTOR CHANNEL	1	2	3	4	5	6	7	8
PHASE ASSIGNMENT		Ø2	Ø3	Ø4		Ø6		
MATRIX OUTPUT CHANNEL		2	3	4		6		
DETECTOR CHANNEL	9	10	11	12	13	14	15	16
PHASE ASSIGNMENT								
MATRIX OUTPUT CHANNEL								

PHASING DIAGRAM



COLOR SEQUENCE CHART						
SIGNAL	PHASES				COMBINATIONS	FLASH
	2	3	4	6	3+4	
H1	<G / G					Y
H2	G					Y
H3			G		G	
H4			G		G	
H5				<G / G		Y
H6				G		Y
H7		G			G	
H8		G			G	
W1	DW	W	W	DW	W	BLANK
W2	W	DW	DW	DW	DW	BLANK
W3	W	DW	DW	DW	DW	BLANK
W4	DW	W	W	DW	W	BLANK
W5	DW	W	W	DW	W	BLANK
W6	DW	DW	DW	W	DW	BLANK
W7	DW	DW	DW	W	DW	BLANK
W8	DW	W	W	DW	W	BLANK

EMPTY BOX DENOTES RED INDICATION.

DW DENOTES DON'T WALK INDICATION
W DENOTES WALK INDICATION

STATE OF TEXAS
JOHN D. RILEY
120572
LICENSED PROFESSIONAL ENGINEER
07/12/2024

NO.	DATE	REVISION	APPROVED

TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

BU 67K

BU 67K (PATRICK ST.) @ SH 6 (BLACKJACK ST.) SIGNAL TERMINATION AND PHASING

FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	166
CONTROL	SECTION	JOB	
0079	04	049	

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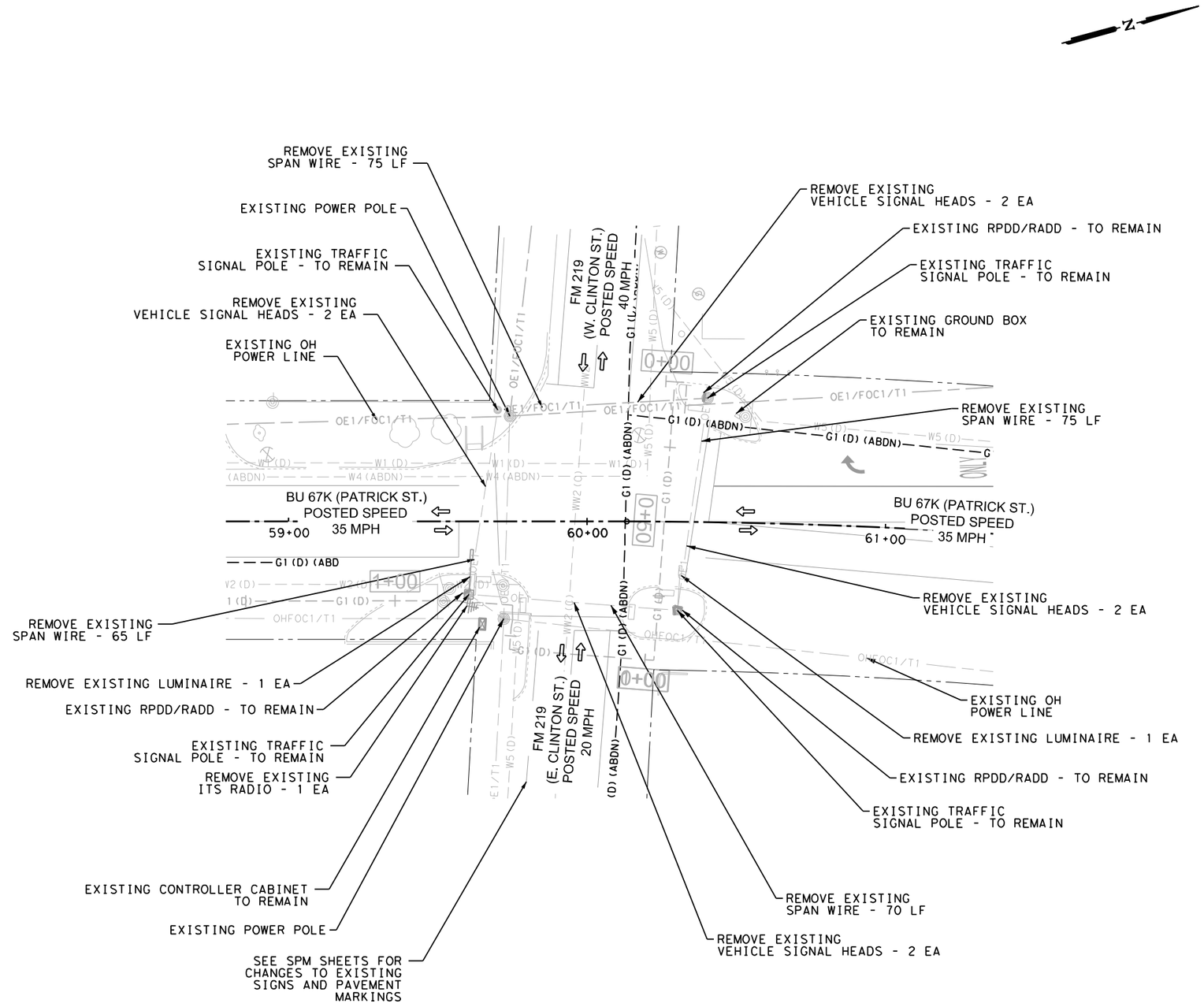

LEGEND

- EXISTING TRAFFIC FLOW
- EXIST R.O.W.
- EXISTING GROUND BOX
- EXISTING SIGNAL HEAD
- EXISTING CONTROLLER
- EXISTING SIGNAL POLE
- EXISTING SIGN
- EXISTING RADAR DETECTION
- EXISTING LUMINAIRE
- EXISTING SPAN WIRE
- EXISTING ITS RADIO

NOTES:

1. CONTRACTOR SHALL VERIFY UTILITY LOCATIONS.
2. ELIMINATE EXISTING PAVEMENT MARKINGS WHICH CONFLICT WITH PROPOSED MARKINGS. REFER TO STRIPING LAYOUT FOR ADDITIONAL INFORMATION.

0 20' 40'

SCALE: 1" = 40'

STATE OF TEXAS
JOHN D. RILEY
120572
LICENSED PROFESSIONAL ENGINEER
07/12/2024

NO.	DATE	REVISION	APPROVED

JMT TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

BU 67K

BU 67K (PATRICK ST.)
@ FM 219 (CLINTON ST.)
CONDITION DIAGRAM

FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	
CONTROL	SECTION	JOB	167
0079	04	049	

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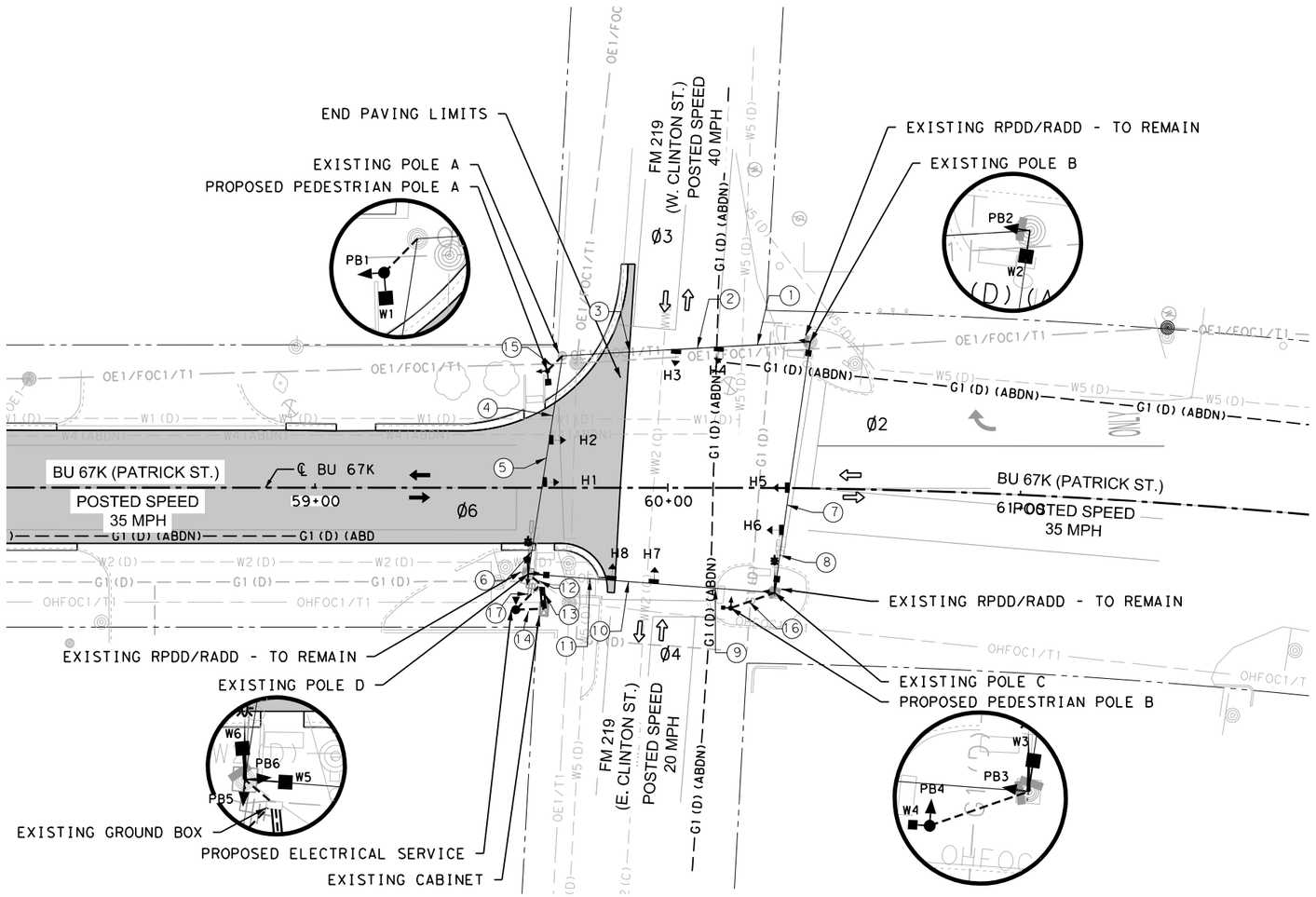
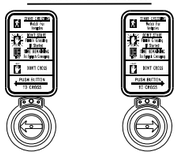


LEGEND

- PROPOSED SIGNAL HEAD AND NUMBER
- PROPOSED SIGN
- PX — POLE NUMBER
- PROPOSED ELECTRICAL SERVICE
- EXISTING CONDUIT
- PROPOSED CONDUIT (TRENCH)
- PROPOSED CONDUIT (BORE)
- PROPOSED CABLE RUN
- EXISTING TRAFFIC FLOW
- PROPOSED TRAFFIC FLOW
- EXISTING GROUND BOX
- PROP PAVEMENT
- EXIST R.O.W.
- PROPOSED PEDESTRIAN LED SIGNAL HEAD
- PROPOSED PEDESTRIAN PUSHBUTTON AND SIGN
- PROPOSED PEDESTRIAN POLE
- RPDD
- ITS RADIO
- PROPOSED SPAN WIRE
- EXISTING RADAR DETECTION
- EXISTING CONTROLLER

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

PROPOSED PEDESTRIAN PUSH BUTTONS

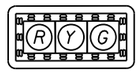


R10-3eL PB3 — R10-3eR PB1, PB2, PB4, PB5, PB6

PROPOSED PEDESTRIAN SIGNAL HEADS

W1, W2, W3
W4, W5, W6
LED COUNTDOWN
PEDESTRIAN
SIGNAL

PROPOSED SIGNAL HEADS



H1, H2, H3, H4
H5, H6, H7, H8

NOTES:

1. CONTRACTOR SHALL VERIFY UTILITY LOCATIONS.
2. POLICE TRAFFIC CONTROL SHALL BE USED WHEN INSTALLING PROPOSED SPAN WIRE AND SIGNAL HEADS.
3. ADJUST SIGNAL HEADS AND SIGNAL TIMING FOR EACH CONSTRUCTION STEP, AS DIRECTED BY THE ENGINEER. CONTRACTOR SHALL SUBMIT PLANS SHOWING THESE ADJUSTMENTS FOR EACH STEP FOR ENGINEER'S APPROVAL BEFORE BEGINNING THIS WORK. ANY ADDITIONAL WORK (MATERIAL AND LABOR) FOR THESE WILL NOT BE PAID FOR DIRECTLY BUT WILL BE SUBSIDIARY TO ITEM 502.

STATE OF TEXAS
JOHN D. RILEY
120572
LICENSED
PROFESSIONAL ENGINEER
07/12/2024

NO.	DATE	REVISION	APPROVED

JMT TBPE REGISTRATION NO. F-16341

Texas Department of Transportation
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BU 67K

BU 67K (PATRICK ST.) @ FM 219 (CLINTON ST.) PROPOSED SIGNAL LAYOUT

FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	168
CONTROL	SECTION	JOB	
0079	04	049	

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LEGEND OF CONDUIT									
RUN NO.	CONDUIT (618)		NUMBER OF CABLES, T = TRENCH, B = BORE, EX = EXISTING						
	SIZE	LENGTH IN FEET	2/C #12 TY C PED BUTTON	7/C #14 AWG PED SIGNAL	7/C #14 AWG 3-SEC SIGNAL	4/C #12 AWG TRAY LUM	1/C #6 AWG (BARE) GROUND	RPD CABLE DETECTION (PRESENCE)	1/C #6 AWG SERV
1	O.H.	26	1	1				1	
2	O.H.	12	1	1	1			1	
3	O.H.	33	1	1	2			1	
4	O.H.	24	2	2	2			1	
5	O.H.	12	2	2	3			1	
6	O.H.	27	2	2	4			1	
7	O.H.	12			1				
8	O.H.	18			2				
9	O.H.	35	2	2	2	1		2	
10	O.H.	12	2	2	3	1		2	
11	O.H.	24	2	2	4	1		2	
12	4x3-T	5	6	6	8	2	1	3	
13	4x3-B	10	6	6	8	2	1	3	
14	3-T	10					1		2
15	3-T	10	1	1			1		
16	3-T	15	1	1			1		
17	3-T	15				2			
TOTAL			614	614	855	181	50	321	20

CABLE IN POLE AND ARM					
SIGNAL POLE NUMBER	2/C #12 TY C PED BUTTON	7/C #14 AWG PED SIGNAL	7/C #14 AWG 3-SEC SIGNAL	4/C #12 AWG TRAY LUM	RPD CABLE DETECTION (PRESENCE)
POLE A*					
POLE B*	5	10			10
POLE C*	5	10		10	10
POLE D*	10	10	160	50	90
PED-A	5	10			
PED-B	5	10			
TOTAL	30	60	160	60	110

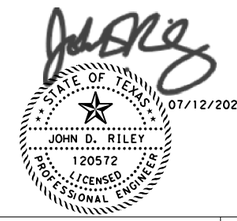
*EXISTING

MINIMUM PEDESTRIAN TIMING				
PED PHASE	SIGNAL HEAD NUMBERS	WALK TIME (SECONDS)	FLASHING DON'T WALK TIME (SECONDS)	TOTAL PED TIMING (SECONDS)
PH 4, W	W2, W3	7	13	20
PH 6, W	W4, W5	7	4	11
PH 8, W	W1, W6	7	7	14

SIGNAL POLE CHART														
POLE NUMBER	POLE A*		POLE B*			POLE C*			POLE D*				PED POLE A	PED POLE B
MAST ARM LENGTH														
FOUNDATION TYPE	*		*			*			*				24-A	24-A
WITH LUMINAIRES	NO		NO			YES			YES				NO	NO
SIZE OF LENS	12"		12"			12"			12"					
SIGNAL TYPE	B	B	B	B	C	B	B	C	B	B	C	C	C	C
SIGNAL FACE NO.	H1	H2	H3	H4	W2	H5	H6	W3	H7	H8	W5	W6	W1	W4
LED SIGNAL INDICATIONS	R	R	R	R	W	R	R	W	R	R	W	W	W	W
	Y	Y	Y	Y	DW	Y	Y	DW	Y	Y	DW	DW	DW	DW
	G	G	G	G		G	G		G	G				

*EXISTING
R = RED BALL, Y = YELLOW BALL, G = GREEN BALL, <G = GREEN ARROW,
PB = PUSH BUTTON, W = WALK, DW = DON'T WALK
ALL SIGNAL HEADS SHALL HAVE VENTED BACK PLATES WITH RETROREFLECTIVE BORDER.

ELECTRICAL SERVICE DESCRIPTION (see ED (4) & (5) - 03)	SERVICE CONDUIT SIZE	SERVICE CONDUCTORS NO./SIZE	SAFTEY SWITCH AMPS	MAIN CKT. BKR. POLE/AMP	TWO-POLE CONTACTOR AMPS	PANELBD/ LOADCENTER AMP RATING	CIRCUIT NO.	BRANCH CKT. BKR. POLE/AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
ELC SRV TY D 120/240 060 (NS)SS(E)SP(O)	1 1/4"	3/#6	N/A	2P/60	N/A	100	T.S LUM	1P/30 1P/15	24 1.42	3.2



NO.	DATE	REVISION	APPROVED

JMT TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

BU 67K

BU 67K (PATRICK ST.)
@ FM 219 (CLINTON ST.)
SIGNAL SUMMARY

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	169
CONTROL	SECTION	JOB	
0079	04	049	

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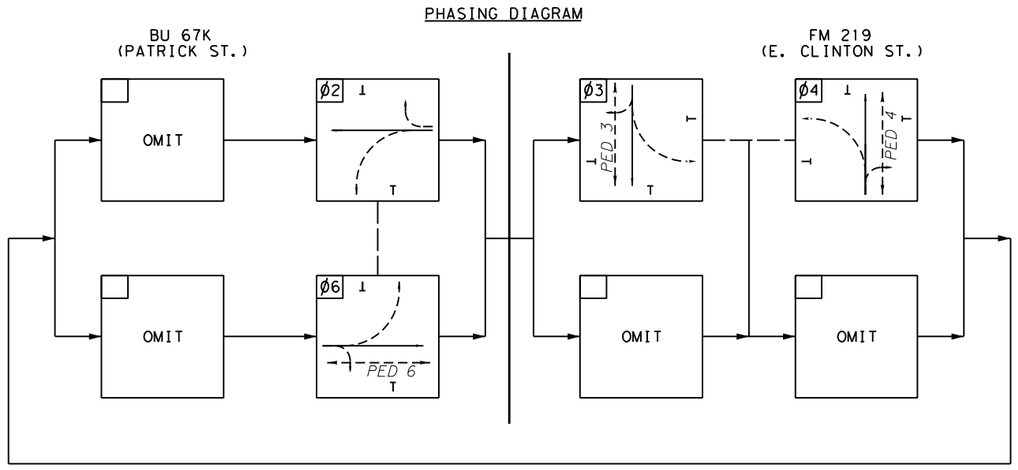
CABLE TERMINATION CHART														
CONDUCTOR NUMBER	CONDUCTOR COLOR	CABLE 1 FROM H4 TO CNTRL 7 CNDR	CABLE 2 FROM H3 TO CNTRL 7 CNDR	CABLE 3 FROM H2 TO CNTRL 7 CNDR	CABLE 4 FROM H1 TO CNTRL 7 CNDR	CABLE 5 FROM H5 TO CNTRL 7 CNDR	CABLE 6 FROM H6 TO CNTRL 7 CNDR	CABLE 7 FROM H7 TO CNTRL 7 CNDR	CABLE 8 FROM H8 TO CNTRL 7 CNDR	CABLE 9 FROM PED POLE A TO CNTRL 7 CNDR	CABLE 10 FROM POLE B TO CNTRL 7 CNDR	CABLE 11 FROM POLE C TO CNTRL 7 CNDR	CABLE 12 FROM PED POLE B TO CNTRL 7 CNDR	CABLE 13 FROM POLE D TO CNTRL 7 CNDR
1	BLACK	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE
2	WHITE	SIG COMM	SIG COMM	SIG COMM	SIG COMM	SIG COMM	SIG COMM	SIG COMM	SIG COMM	PED COMM	PED COMM	PED COMM	PED COMM	PED COMM
3	RED	H4 - R	H3 - R	H2 - R	H1 - R	H5 - R	H6 - R	H7 - R	H8 - R	W1 DW	W2 DW	W3 DW	W4 DW	W5 DW
4	GREEN	H4 - G	H3 - G	H2 - G	H1 - G	H5 - G	H6 - G	H7 - G	H8 - G	W1 W	W2 W	W3 W	W4 W	W5 W
5	ORANGE	H4 - Y	H3 - Y	H2 - Y	H1 - Y	H5 - Y	H6 - Y	H7 - Y	H8 - Y	SPARE	SPARE	SPARE	SPARE	SPARE
6	BLUE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	W6 W
7	WHITE/BLACK	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	W6 DW

PHASING DIAGRAM



RPD PRESENCE & RAD ADVANCED DETECTION

	CLICK 656 (RPD)	
SENSOR 1	Ø6	RPD
SENSOR 2	Ø2	RPD
SENSOR 3	Ø3	RPD
SENSOR 4	Ø4	RPD
SENSOR 5		
SENSOR 6		

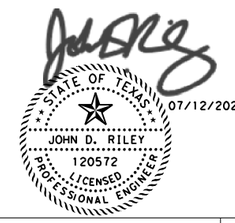
CONTROLLER (BIU 9)

DETECTOR CHANNEL	1	2	3	4	5	6	7	8
PHASE ASSIGNMENT		Ø2	Ø3	Ø4		Ø6		
MATRIX OUTPUT CHANNEL		2	3	4		6		
DETECTOR CHANNEL	9	10	11	12	13	14	15	16
PHASE ASSIGNMENT								
MATRIX OUTPUT CHANNEL								

COLOR SEQUENCE CHART							
SIGNAL	PHASES				COMBINATIONS		FLASH
	2	3	4	6	2+6	3+4	
H1	G				G		Y
H2	G				G		Y
H3			G			G	
H4			G			G	
H5				G	G		Y
H6				G	G		Y
H7		G				G	
H8		G				G	
W1	DW	W	DW	DW	DW	W	BLANK
W2	DW	DW	W	DW	DW	W	BLANK
W3	DW	DW	W	DW	DW	W	BLANK
W4	DW	DW	DW	W	W	DW	BLANK
W5	DW	DW	DW	W	W	DW	BLANK
W6	DW	W	DW	DW	DW	W	BLANK

EMPTY BOX DENOTES RED INDICATION.

DW DENOTES DON'T WALK INDICATION.
W DENOTES WALK INDICATION.



NO.	DATE	REVISION	APPROVED

TBPE REGISTRATION NO: F-16341

Texas Department of Transportation

BU 67K

BU 67K (PATRICK ST.)
@ FM 219 (CLINTON ST.)
SIGNAL TERMINATION
AND PHASING

FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	170
CONTROL	SECTION	JOB	
0079	04	049	

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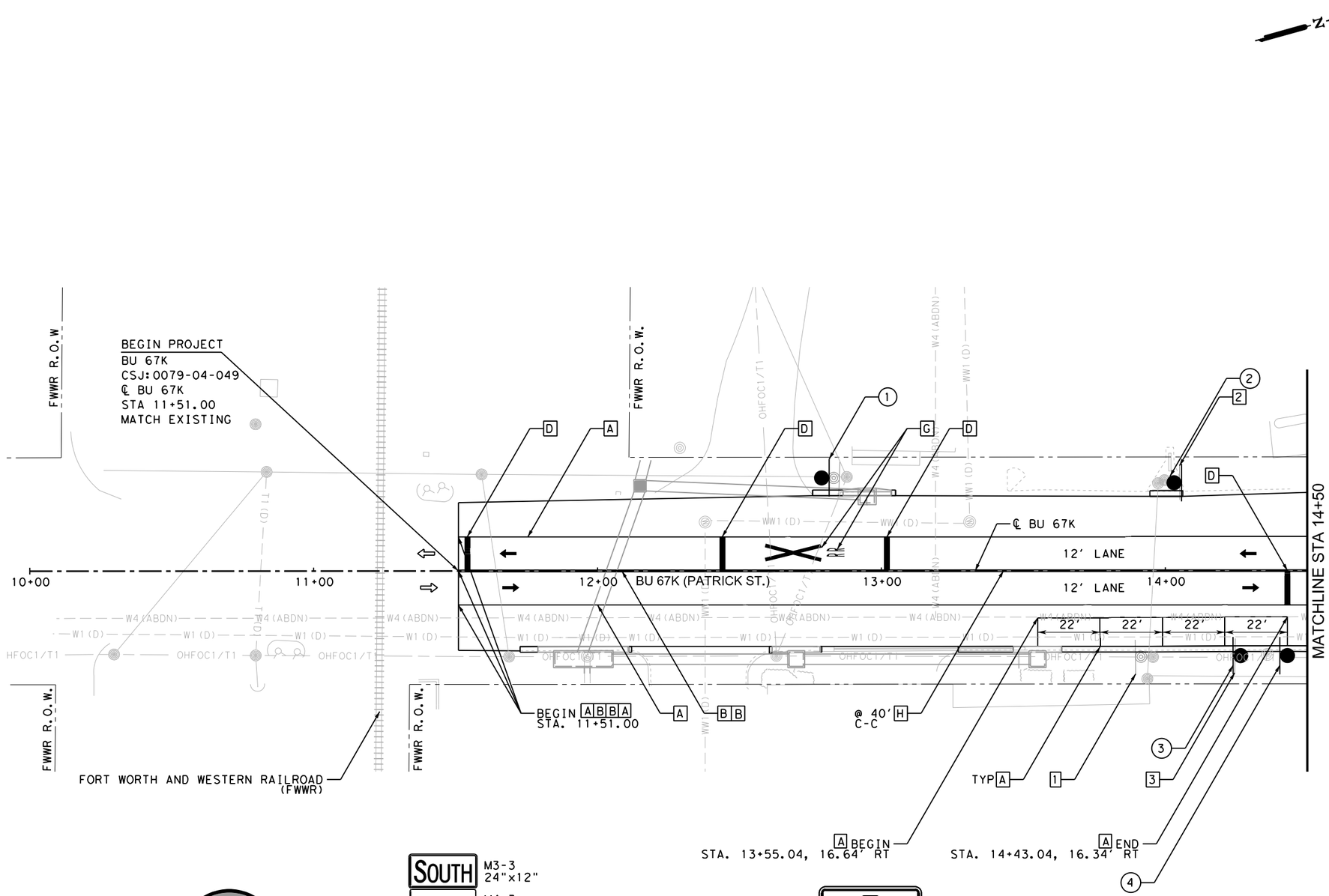
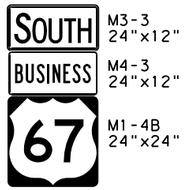


W10-1
36" DIA.

①



M3-3
24"x12"

M4-3
24"x12"

M1-4B
24"x24"

②

R10-7
24"x30"

③

R1-5bL
36"x36"

④

LEGEND

- A REFL PAV MRK TY I (W)6"(SLD)(100MIL)
- B REFL PAV MRK TY I (Y)6"(SLD)(100MIL)
- C REFL PAV MRK TY I (W)8"(SLD)(100MIL) W/ REFL PAV MRKR TY I-C
- D REFL PAV MRK TY I (W)24"(SLD)(100MIL)
- E REFL PAV MRK TY I (W)(ARROW)(100MIL)
- F REFL PAV MRK TY I (W)(WORD)(100MIL)
- G REFL PAV MRK TY I (W)(RR XING)(100MIL)
- H REFL PAV MRKR TY II-A-A
- EXIST SIGN TO BE REMOVED
- EXISTING SMALL SIGN TO BE RELOCATED
- PROPOSED SMALL SIGN
- PROPOSED TRAFFIC FLOW
- EXIST TRAFFIC FLOW
- EXIST R.O.W.

NOTES:

1. ALL STATIONING IS TO BU 67K UNLESS OTHERWISE NOTED.
2. ALL EDGE LINES ARE 12' OFFSET FROM YELLOW CENTERLINE UNLESS OTHERWISE NOTED.
3. ON STREET PARKING TYPICALLY 10' WIDE.
4. REFER TO STANDARD(S) "PM(1)-22 TO PM(4)-22A AND RCD(2)-22" FOR DETAILS.
5. CONTRACTOR SHALL FIELD VERIFY UTILITIES PRIOR TO CONSTRUCTION.

0 20' 40'

SCALE: 1" = 40'

LISA M. DEITEMEYER
STATE OF TEXAS
83758
LICENSED PROFESSIONAL ENGINEER
7/11/2024

NO.	DATE	REVISION	APPROVED

JMT TBPE REGISTRATION NO. F-16341

Texas Department of Transportation
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BU 67K

SIGNING AND PAVEMENT MARKING LAYOUT

SHEET 1 OF 12

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	171
CONTROL	SECTION	JOB	
0079	04	049	

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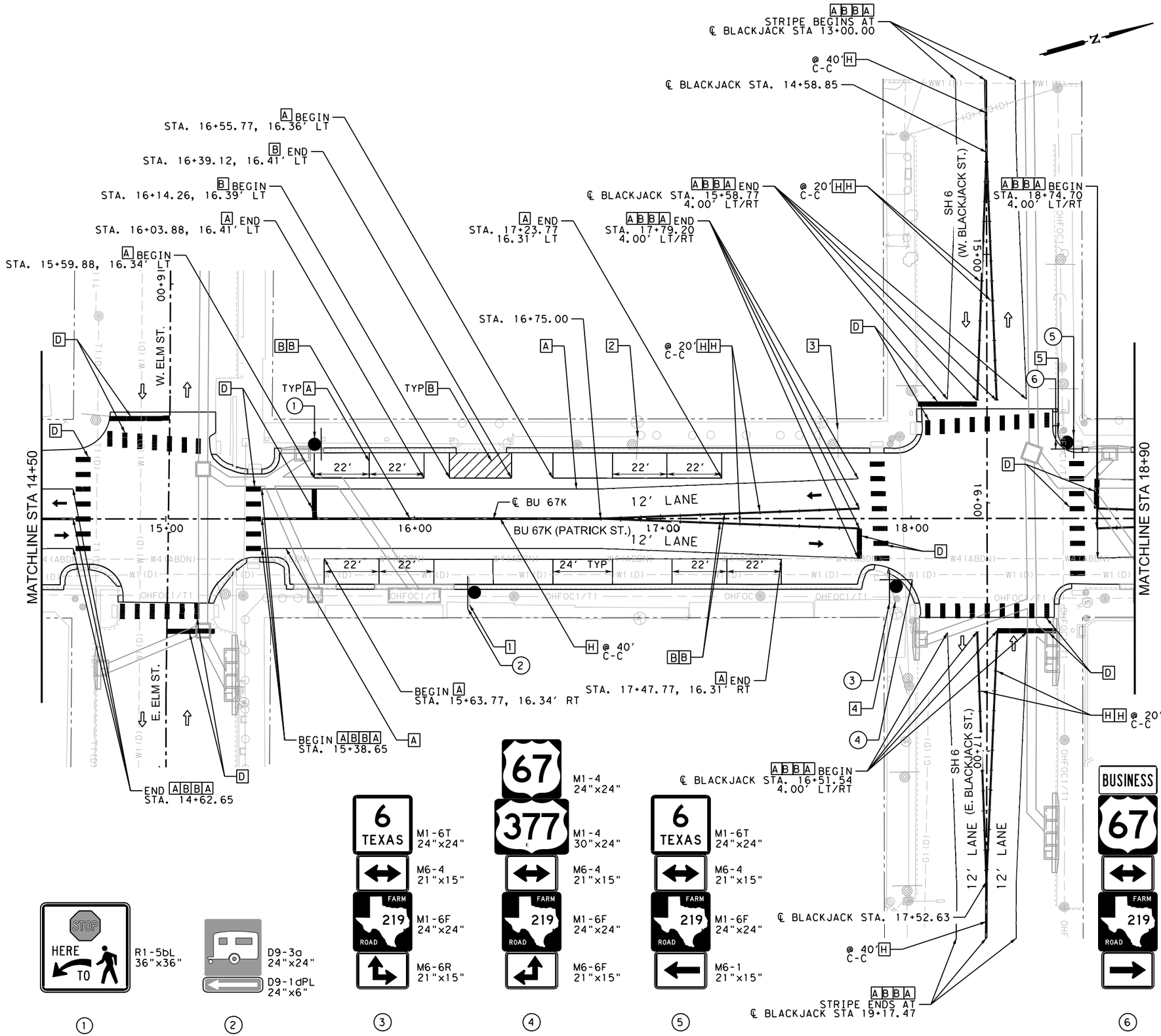

LEGEND

- A REFL PAV MRK TY I (W)6"(SLD)(100MIL)
- B REFL PAV MRK TY I (Y)6"(SLD)(100MIL)
- C REFL PAV MRK TY I (W)8"(SLD)(100MIL) W/ REFL PAV MRKR TY I-C
- D REFL PAV MRK TY I (W)24"(SLD)(100MIL)
- E REFL PAV MRK TY I (W)(ARROW)(100MIL)
- F REFL PAV MRK TY I (W)(WORD)(100MIL)
- G REFL PAV MRK TY I (W)(RR XING)(100MIL)
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- EXIST R.O.W.

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LISA M. DEITEMEYER
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Texas Department of Transportation

BU 67K

SIGNING AND PAVEMENT MARKING LAYOUT

SHEET 2 OF 12

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	172
CONTROL	SECTION	JOB	
0079	04	049	

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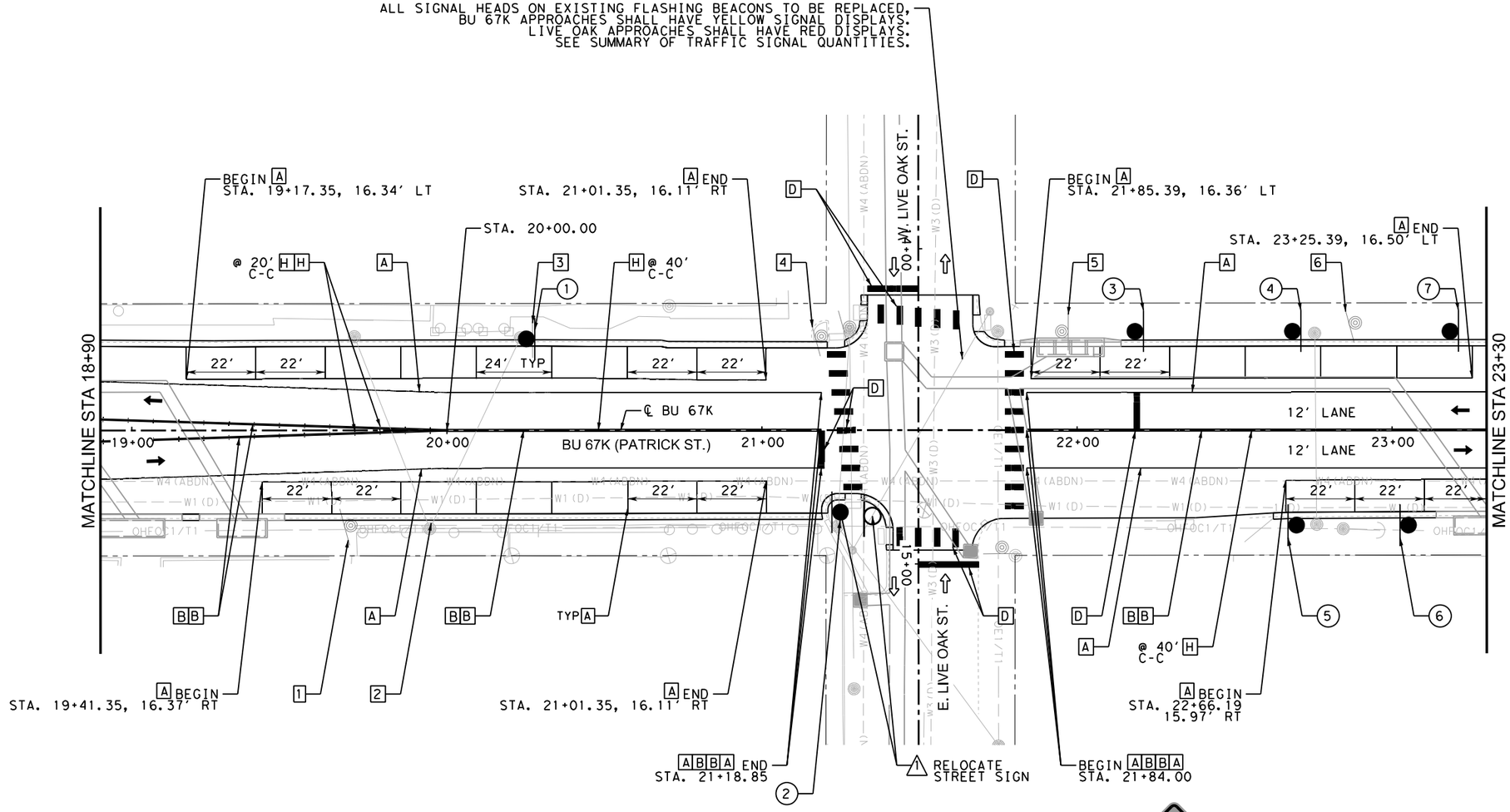
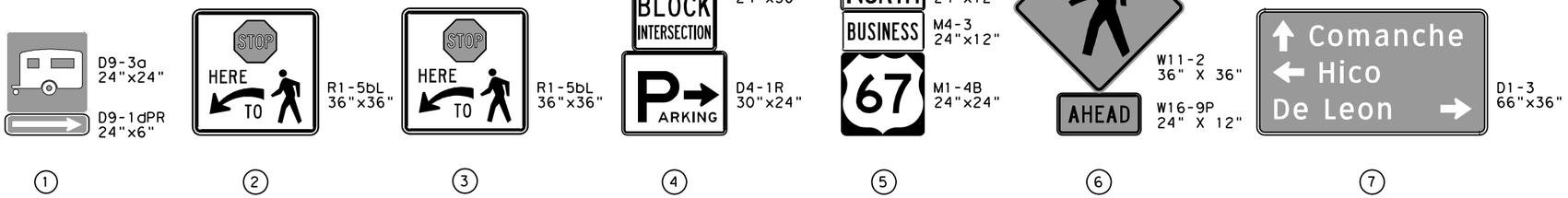
ALL SIGNAL HEADS ON EXISTING FLASHING BEACONS TO BE REPLACED.
BU 67K APPROACHES SHALL HAVE YELLOW SIGNAL DISPLAYS.
LIVE OAK APPROACHES SHALL HAVE RED DISPLAYS.
SEE SUMMARY OF TRAFFIC SIGNAL QUANTITIES.





LEGEND

- A REFL PAV MRK TY I (W)6"(SLD)(100MIL)
- B REFL PAV MRK TY I (Y)6"(SLD)(100MIL)
- C REFL PAV MRK TY I (W)8"(SLD)(100MIL) W/ REFL PAV MRKR TY I-C
- D REFL PAV MRK TY I (W)24"(SLD)(100MIL)
- E REFL PAV MRK TY I (W)(ARROW)(100MIL)
- F REFL PAV MRK TY I (W)(WORD)(100MIL)
- G REFL PAV MRK TY I (W)(RR XING)(100MIL)
- H REFL PAV MRKR TY II-A-A
- EXIST SIGN TO BE REMOVED
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- PROPOSED SMALL SIGN
- PROPOSED TRAFFIC FLOW
- EXIST TRAFFIC FLOW
- EXIST R.O.W.

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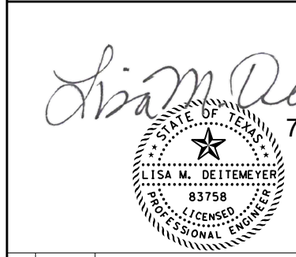
4. REFER TO STANDARD(S) "PM(1)-22 TO PM(4)-22A AND RCD(2)-22" FOR DETAILS.
5. CONTRACTOR SHALL FIELD VERIFY UTILITIES PRIOR TO CONSTRUCTION.

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



NO.	DATE	REVISION	APPROVED

TBPE REGISTRATION NO. F-16341

BU 67K

SIGNING AND PAVEMENT MARKING LAYOUT

SHEET 3 OF 12

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	173
CONTROL	SECTION	JOB	
0079	04	049	

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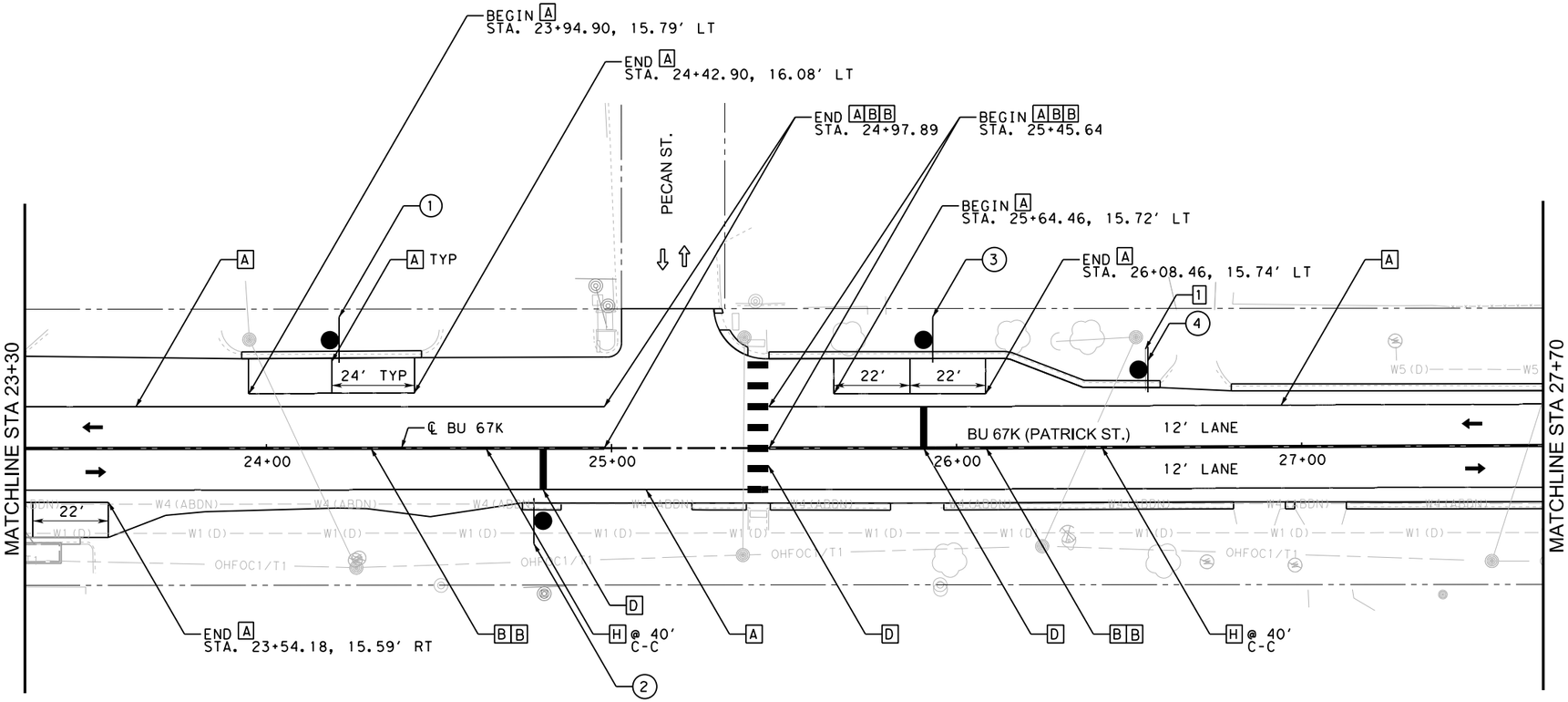

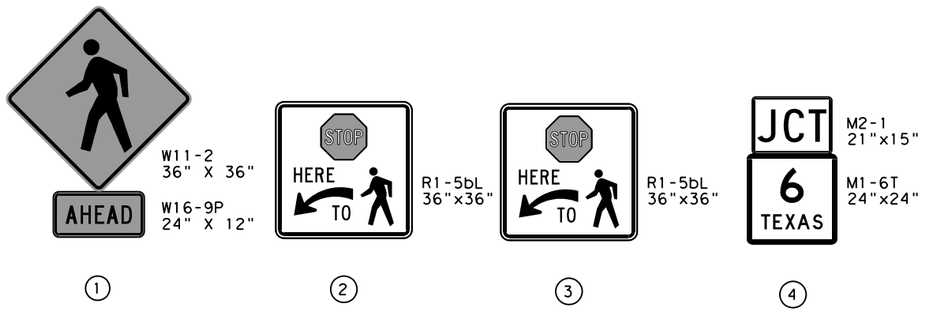

① ② ③ ④

LEGEND

- A REFL PAV MRK TY I (W)6"(SLD)(100MIL)
- B REFL PAV MRK TY I (Y)6"(SLD)(100MIL)
- C REFL PAV MRK TY I (W)8"(SLD)(100MIL) W/ REFL PAV MRKR TY I-C
- D REFL PAV MRK TY I (W)24"(SLD)(100MIL)
- E REFL PAV MRK TY I (W)(ARROW)(100MIL)
- F REFL PAV MRK TY I (W)(WORD)(100MIL)
- G REFL PAV MRK TY I (W)(RR XING)(100MIL)
- H REFL PAV MRKR TY II-A-A
- EXIST SIGN TO BE REMOVED
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- PROPOSED SMALL SIGN
- PROPOSED TRAFFIC FLOW
- EXIST TRAFFIC FLOW
- EXIST R.O.W.

NOTES:

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2. ALL EDGE LINES ARE 12' OFFSET FROM YELLOW CENTERLINE UNLESS OTHERWISE NOTED.
3. ON STREET PARKING TYPICALLY 10' WIDE.
4. REFER TO STANDARD(S) "PM(1)-22 TO PM(4)-22A AND RCD(2)-22" FOR DETAILS.
5. CONTRACTOR SHALL FIELD VERIFY UTILITIES PRIOR TO CONSTRUCTION.

0 20' 40'

SCALE: 1" = 40'

STATE OF TEXAS
LISA M. DEITEMEYER
83758
LICENSED PROFESSIONAL ENGINEER

7/11/2024

NO.	DATE	REVISION	APPROVED

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BU 67K

SIGNING AND PAVEMENT MARKING LAYOUT

SHEET 4 OF 12

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	174
CONTROL	SECTION	JOB	
0079	04	049	

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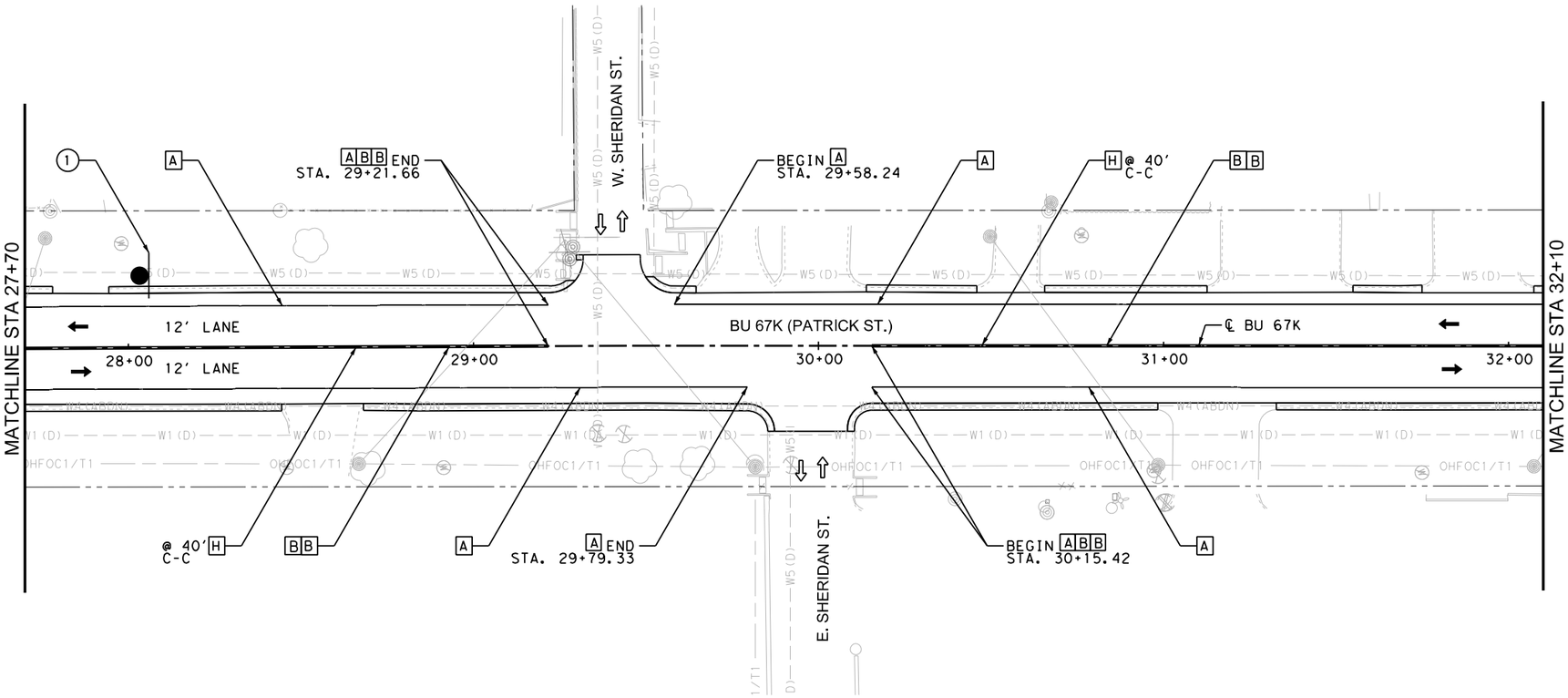

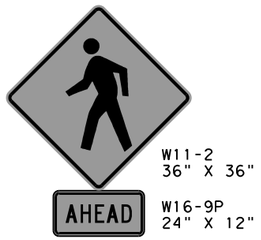

W11-2
36" X 36"

W16-9P
24" X 12"

①

LEGEND

- A REFL PAV MRK TY I (W)6"(SLD)(100MIL)
- B REFL PAV MRK TY I (Y)6"(SLD)(100MIL)
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- E REFL PAV MRK TY I (W)(ARROW)(100MIL)
- F REFL PAV MRK TY I (W)(WORD)(100MIL)
- G REFL PAV MRK TY I (W)(RR XING)(100MIL)
- H REFL PAV MRKR TY II-A-A
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- PROPOSED TRAFFIC FLOW
- EXIST TRAFFIC FLOW
- EXIST R.O.W.

NOTES:

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

STATE OF TEXAS
LISA M. DEITEMEYER
83758
LICENSED PROFESSIONAL ENGINEER
7/11/2024

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BU 67K

SIGNING AND PAVEMENT MARKING LAYOUT

SHEET 5 OF 12

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	175
CONTROL	SECTION	JOB	
0079	04	049	

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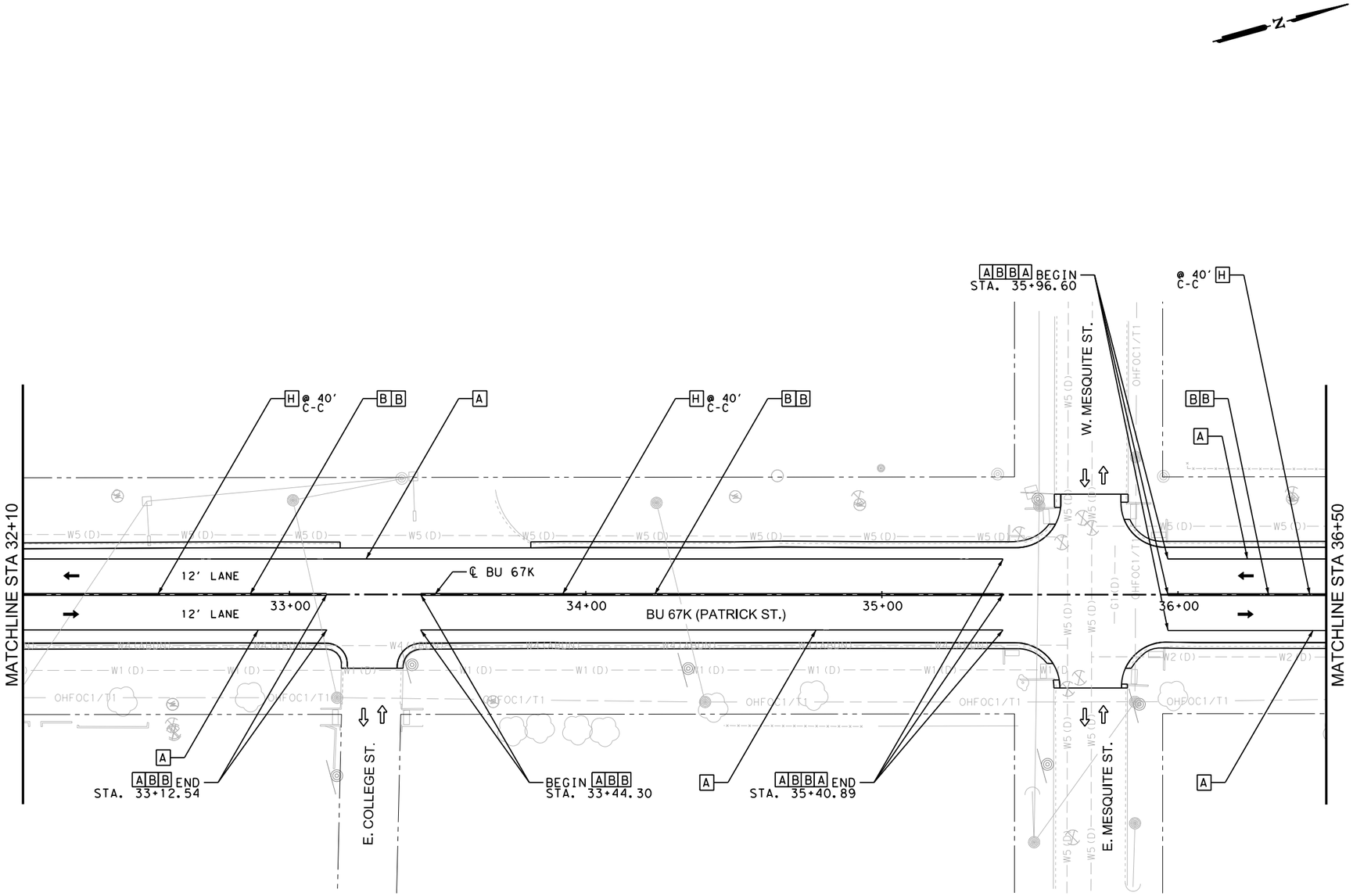

NOTES:

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STATE OF TEXAS
LISA M. DEITEMEYER
83758
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7/11/2024

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Texas Department of Transportation

BU 67K

SIGNING AND PAVEMENT MARKING LAYOUT

SHEET 6 OF 12

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	176
CONTROL	SECTION	JOB	
0079	04	049	

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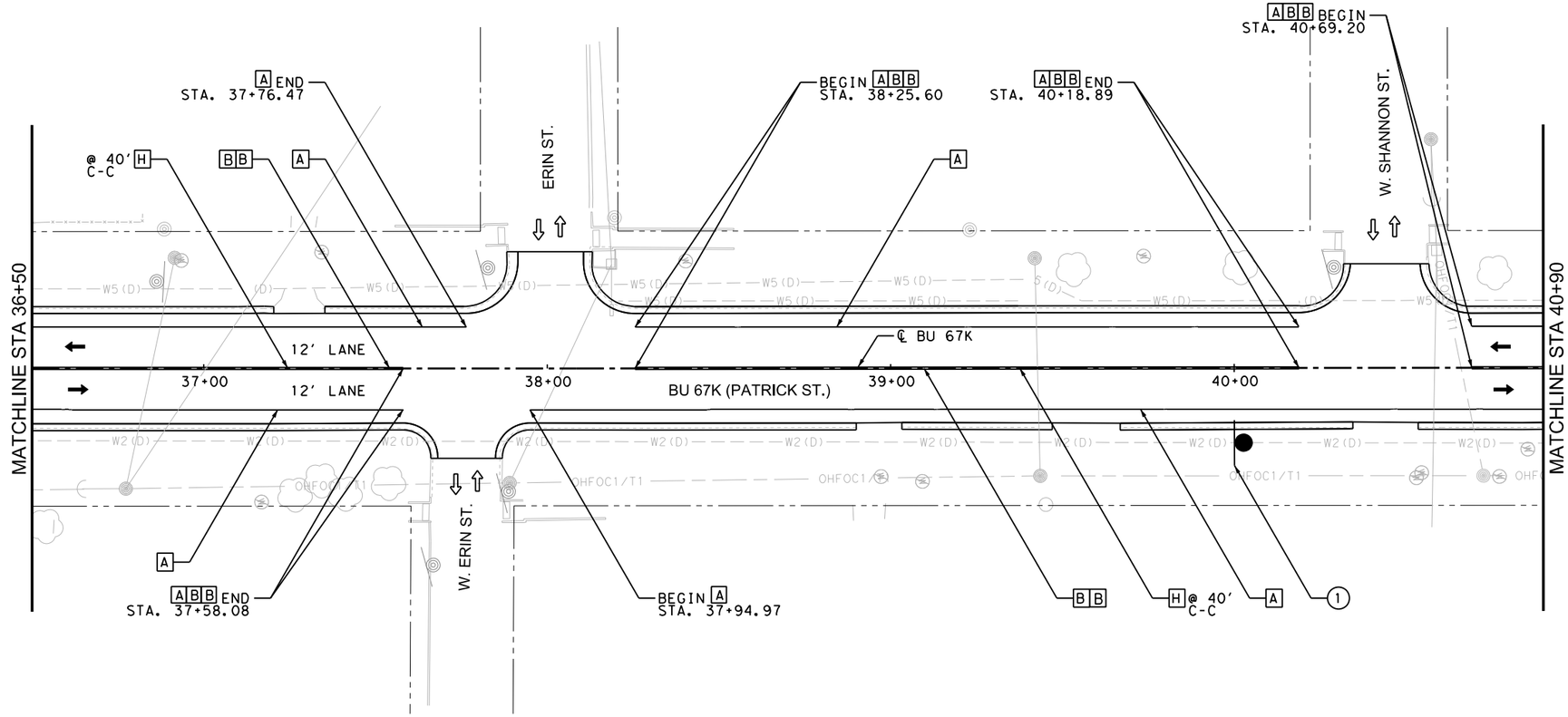

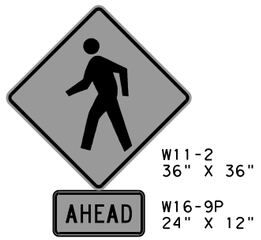

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LEGEND

- A REFL PAV MRK TY I (W)6"(SLD)(100MIL)
- B REFL PAV MRK TY I (Y)6"(SLD)(100MIL)
- C REFL PAV MRK TY I (W)8"(SLD)(100MIL) W/ REFL PAV MRKR TY I-C
- D REFL PAV MRK TY I (W)24"(SLD)(100MIL)
- E REFL PAV MRK TY I (W)(ARROW)(100MIL)
- F REFL PAV MRK TY I (W)(WORD)(100MIL)
- G REFL PAV MRK TY I (W)(RR XING)(100MIL)
- H REFL PAV MRKR TY II-A-A
- EXIST SIGN TO BE REMOVED
- EXISTING SMALL SIGN TO BE RELOCATED
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STATE OF TEXAS
LISA M. DEITEMEYER
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Texas Department of Transportation

BU 67K

SIGNING AND PAVEMENT MARKING LAYOUT

SHEET 7 OF 12

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	177
CONTROL	SECTION	JOB	
0079	04	049	

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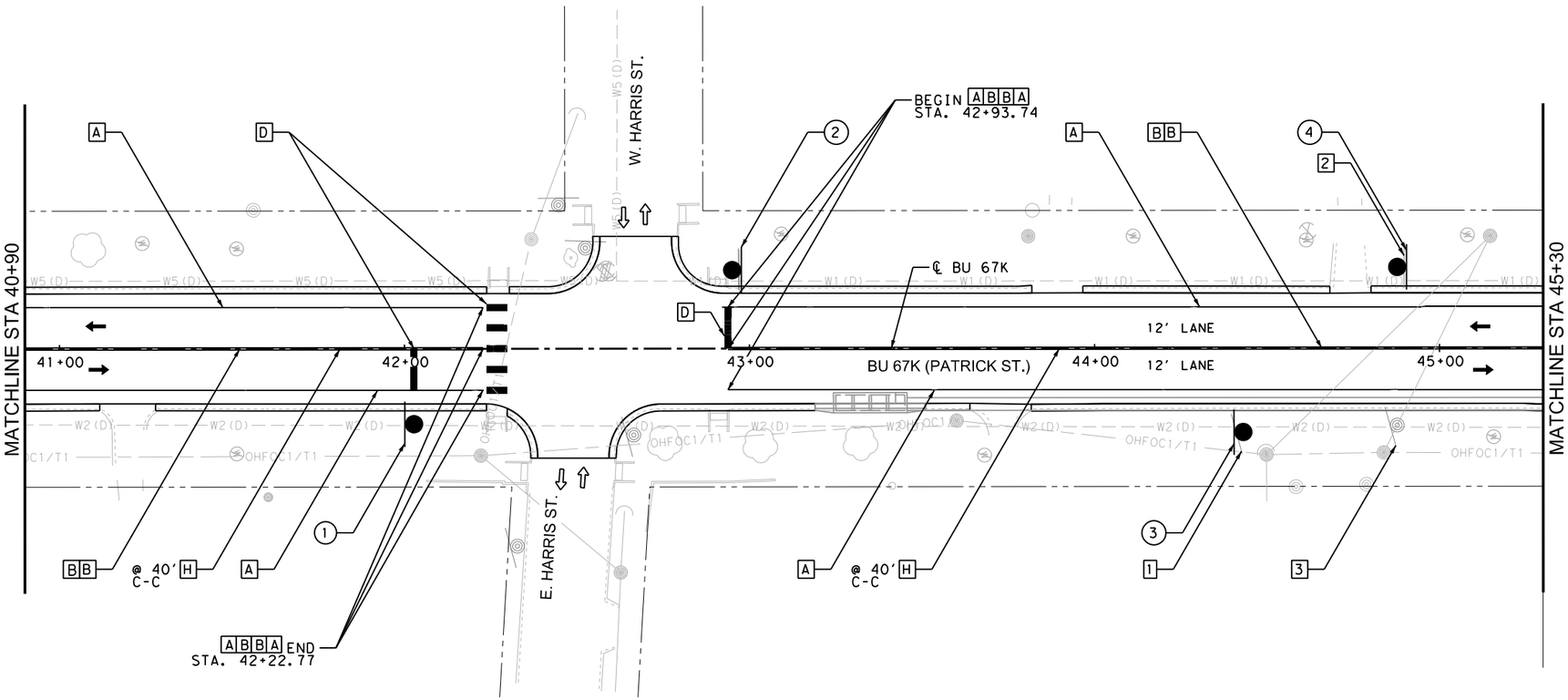

R1-5bL
36"x36"

①

R1-5bL
36"x36"

②

R2-1
30"x36"

③

R2-1
30"x36"

④

LEGEND

- A REFL PAV MRK TY I (W)6"(SLD)(100MIL)
- B REFL PAV MRK TY I (Y)6"(SLD)(100MIL)
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Texas Department of Transportation

BU 67K

SIGNING AND PAVEMENT MARKING LAYOUT

SHEET 8 OF 12

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	178
CONTROL	SECTION	JOB	
0079	04	049	

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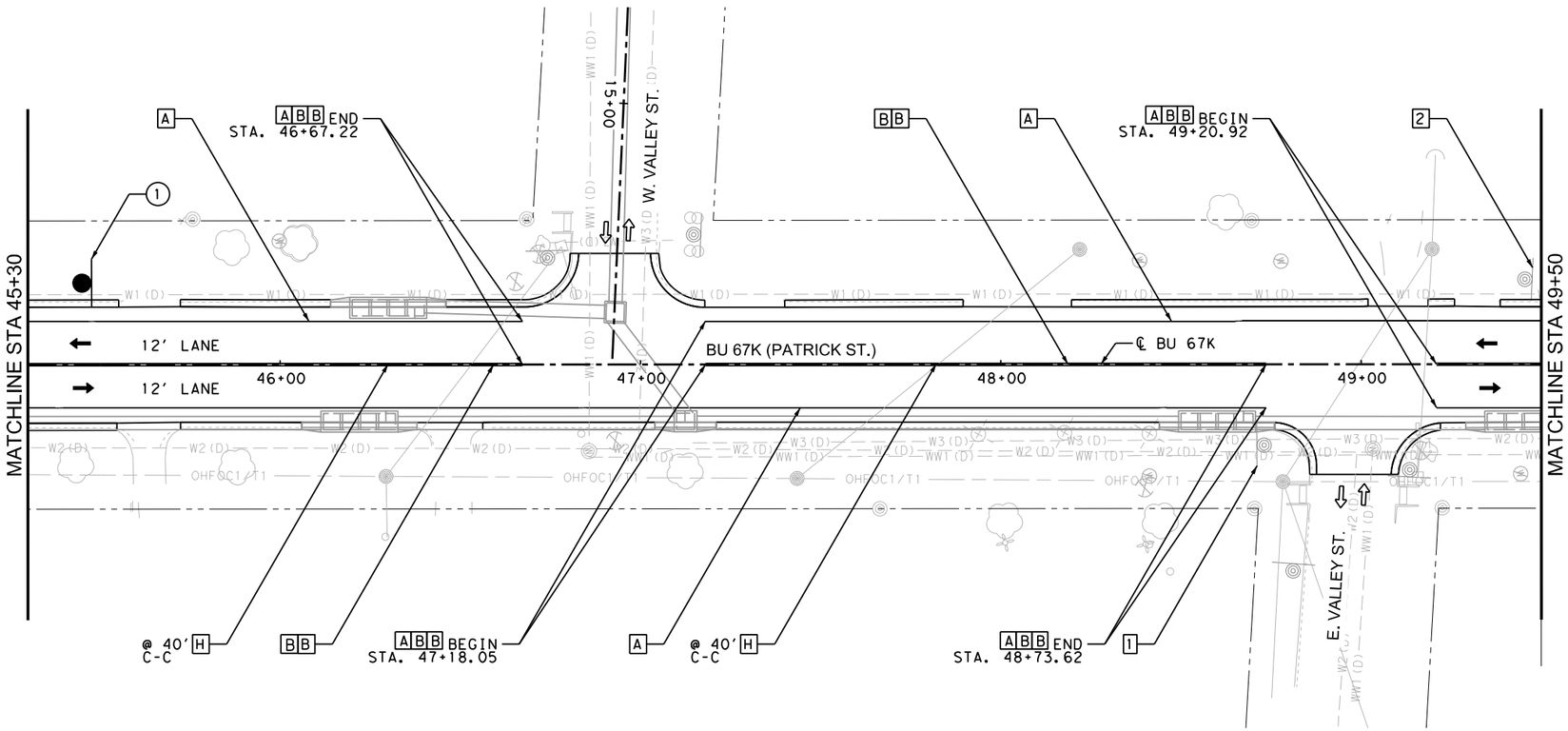

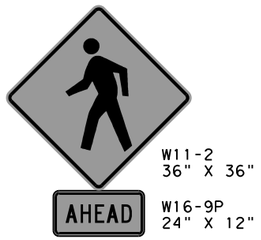

W11-2
36" X 36"

W16-9P
24" X 12"

①

LEGEND

- A REFL PAV MRK TY I (W)6"(SLD)(100MIL)
- B REFL PAV MRK TY I (Y)6"(SLD)(100MIL)
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Texas Department of Transportation

BU 67K

SIGNING AND PAVEMENT MARKING LAYOUT

SHEET 9 OF 12

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	
CONTROL	SECTION	JOB	179
0079	04	049	

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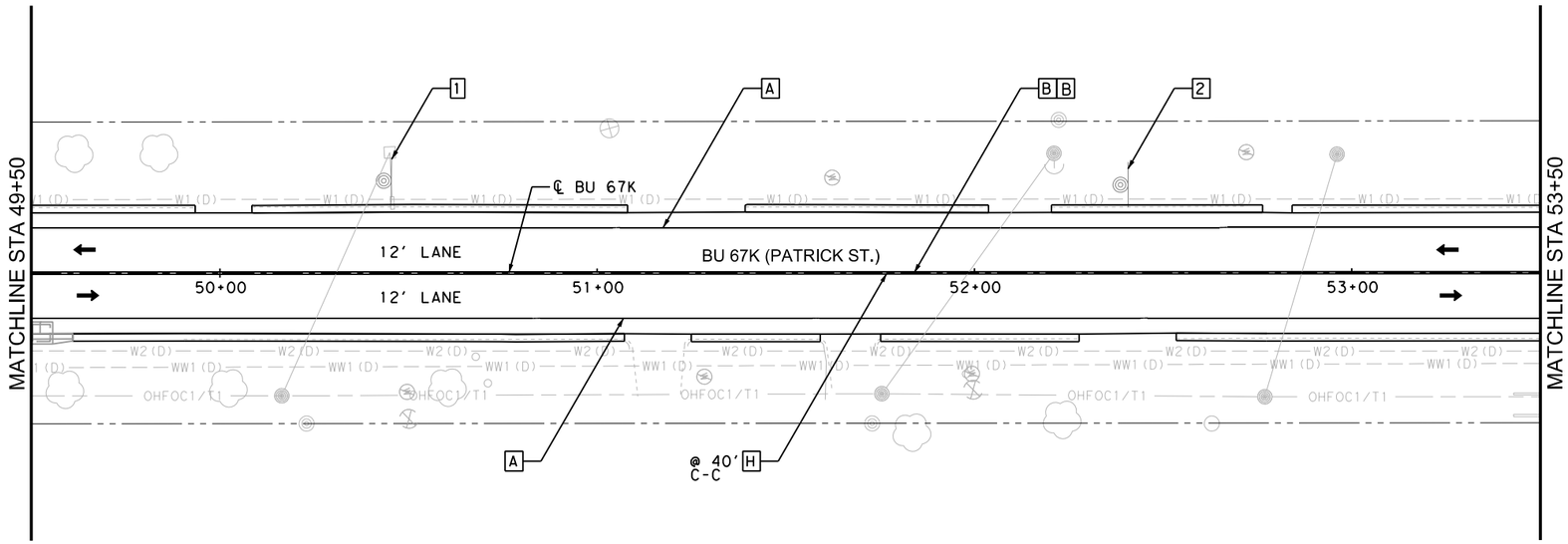

LEGEND

- A REFL PAV MRK TY I (W)6"(SLD)(100MIL)
- B REFL PAV MRK TY I (Y)6"(SLD)(100MIL)
- C REFL PAV MRK TY I (W)8"(SLD)(100MIL) W/ REFL PAV MRKR TY I-C
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- F REFL PAV MRK TY I (W)(WORD)(100MIL)
- G REFL PAV MRK TY I (W)(RR XING)(100MIL)
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7/11/2024

NO.	DATE	REVISION	APPROVED

TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

BU 67K

SIGNING AND PAVEMENT MARKING LAYOUT

SHEET 10 OF 12

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	180
CONTROL	SECTION	JOB	
0079	04	049	

7/11/2024 1:51:36 PM
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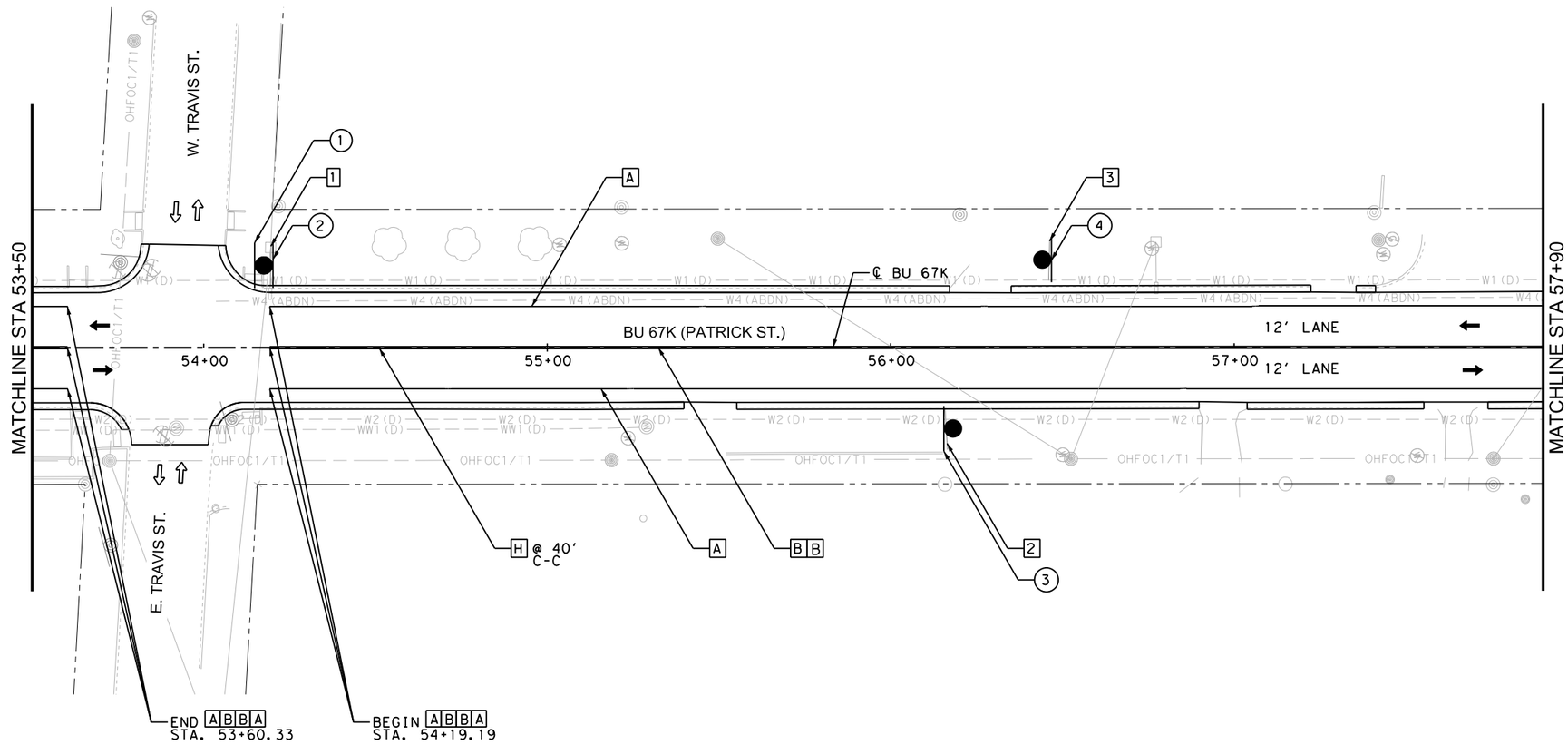


LEGEND

- A REFL PAV MRK TY I (W)6"(SLD)(100MIL)
- B REFL PAV MRK TY I (Y)6"(SLD)(100MIL)
- C REFL PAV MRK TY I (W)8"(SLD)(100MIL) W/ REFL PAV MRKR TY I-C
- D REFL PAV MRK TY I (W)24"(SLD)(100MIL)
- E REFL PAV MRK TY I (W)(ARROW)(100MIL)
- F REFL PAV MRK TY I (W)(WORD)(100MIL)
- G REFL PAV MRK TY I (W)(RR XING)(100MIL)
- H REFL PAV MRKR TY II-A-A
- EXIST SIGN TO BE REMOVED
- EXISTING SMALL SIGN TO BE RELOCATED
- PROPOSED SMALL SIGN
- PROPOSED TRAFFIC FLOW
- EXIST TRAFFIC FLOW
- EXIST R.O.W.

NOTES:

1. ALL STATIONING IS TO BU 67K UNLESS OTHERWISE NOTED.
2. ALL EDGE LINES ARE 12' OFFSET FROM YELLOW CENTERLINE UNLESS OTHERWISE NOTED.
3. ON STREET PARKING TYPICALLY 10' WIDE.
4. REFER TO STANDARD(S) "PM(1)-22 TO PM(4)-22A AND RCD(2)-22" FOR DETAILS.
5. CONTRACTOR SHALL FIELD VERIFY UTILITIES PRIOR TO CONSTRUCTION.

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

D3-3bTR 90"x30"

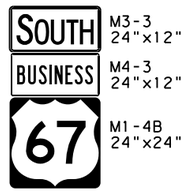
①

D3-3bTL 90"x30"

②

D1-2 102"x30"

③



M3-3 24"x12"
M4-3 24"x12"
M1-4B 24"x24"

④

7/11/2024
STATE OF TEXAS
LISA M. DEITEMEYER
83758
LICENSED PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROVED

JMT TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

BU 67K

SIGNING AND PAVEMENT MARKING LAYOUT

SHEET 11 OF 12

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	
CONTROL	SECTION	JOB	181
0079	04	049	

7/11/2024 15202 PM
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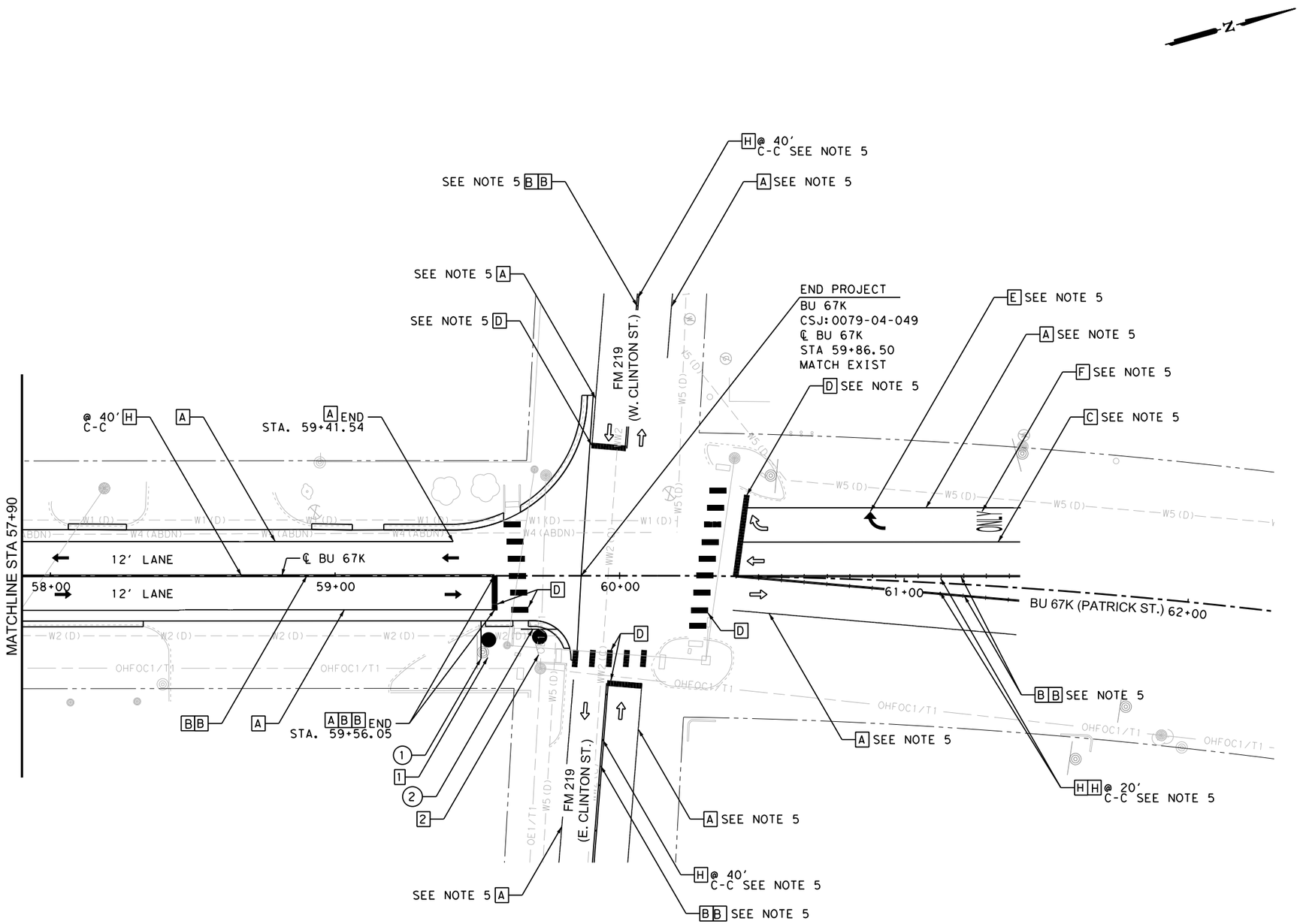

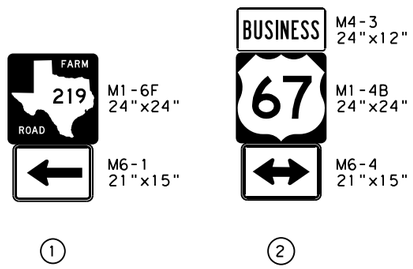

LEGEND

- A REFL PAV MRK TY I (W)6"(SLD)(100MIL)
- B REFL PAV MRK TY I (Y)6"(SLD)(100MIL)
- C REFL PAV MRK TY I (W)8"(SLD)(100MIL) W/ REFL PAV MRKR TY I-C
- D REFL PAV MRK TY I (W)24"(SLD)(100MIL)
- E REFL PAV MRK TY I (W)(ARROW)(100MIL)
- F REFL PAV MRK TY I (W)(WORD)(100MIL)
- G REFL PAV MRK TY I (W)(RR XING)(100MIL)
- J REFL PAV MRKR TY II-A-A
- EXIST SIGN TO BE REMOVED
- EXISTING SMALL SIGN TO REMAIN
- PROPOSED SMALL SIGN
- PROPOSED TRAFFIC FLOW
- EXIST TRAFFIC FLOW
- EXIST R.O.W.

NOTES:

1. ALL STATIONING IS TO BU 67K UNLESS OTHERWISE NOTED.
2. ALL EDGE LINES ARE 12′ OFFSET FROM YELLOW CENTERLINE UNLESS OTHERWISE NOTED.
3. ON STREET PARKING TYPICALLY 10′ WIDE.
4. REFER TO STANDARD(S) "PM(1)-22 TO PM(4)-22A AND RCD(2)-22" FOR DETAILS.
5. MARKINGS ARE FOR REFERENCE ONLY. REFRESH EXISTING MARKINGS FOR 100′.

0 20′ 40′
SCALE: 1" = 40′

7/11/2024

STATE OF TEXAS
LISA M. DEITEMEYER
83758
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROVED

JMT TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

BU 67K

SIGNING AND PAVEMENT MARKING LAYOUT

SHEET 12 OF 12

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	182
CONTROL	SECTION	JOB	
0079	04	049	

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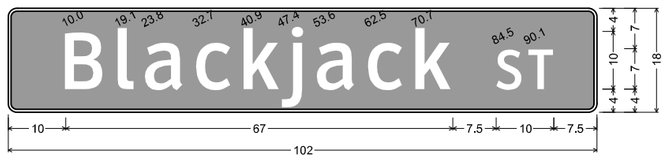
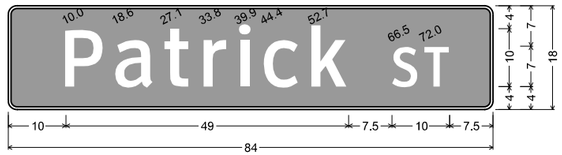
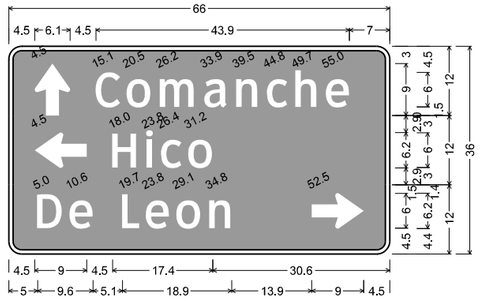


D3-1G(7) 10in;
1.5" Radius, 0.5" Border, White on, Green;
"Blackjack", ClearviewHwy-3-W; "ST", ClearviewHwy-3-W;



D3-1G(7) 10in;
1.5" Radius, 0.5" Border, White on, Green;
"Patrick", ClearviewHwy-3-W; "ST", ClearviewHwy-3-W;

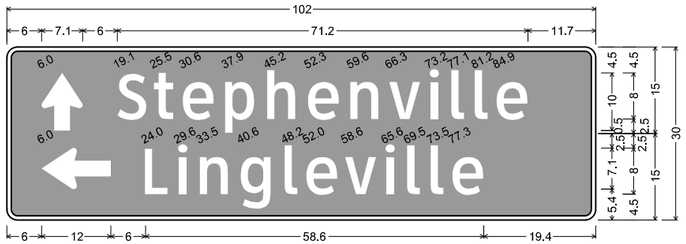


D3-3 6in UP-LT-RT;

2.3" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 9.0" X 6.1" 90';
"Comanche", ClearviewHwy-3-W;

2.3" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 9.0" X 6.1" 180';
"Hico", ClearviewHwy-3-W;

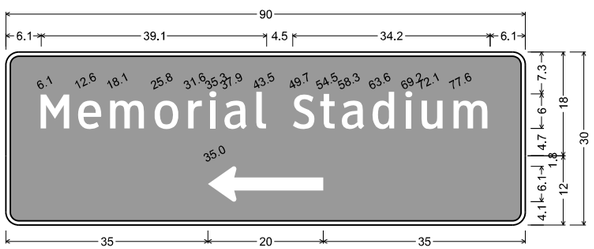
2.3" Radius, 0.8" Border, White on, Green;
"De Leon", ClearviewHwy-3-W;
Standard Arrow Custom 9.0" X 6.1" 0';



D1-2 8in UP-LT;

1.9" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 10.0" X 7.1" 90'; "Stephenville", ClearviewHwy-3-W;

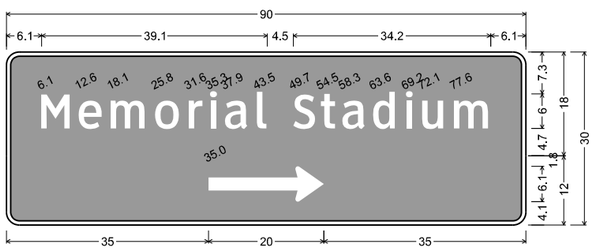
1.9" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 12.0" X 7.1" 180'; "Lingleville", ClearviewHwy-3-W;



D3-3bTL 6in;

2.3" Radius, 0.8" Border, White on, Green;
"Memorial Stadium", ClearviewHwy-3-W;

2.3" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 20.0" X 6.1" 180';



D3-3bTR 6in;

2.3" Radius, 0.8" Border, White on, Green;
"Memorial Stadium", ClearviewHwy-3-W;

2.3" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 20.0" X 6.1" 0';

SCALE = N.T.S

7/11/2024

NO.	DATE	REVISION	APPROVED

TBPE REGISTRATION NO. F-16341

Texas Department of Transportation

BU 67K

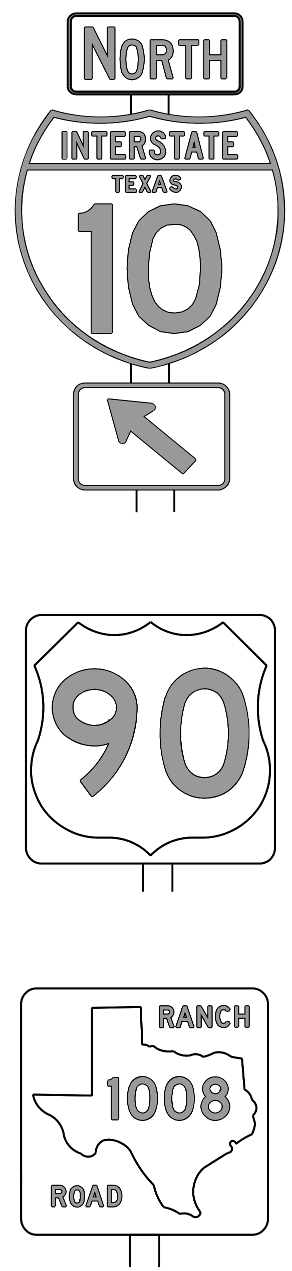
SMALL SIGN DETAILS

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	183
CONTROL	SECTION	JOB	
0079	04	049	

7/11/2024 i5302 PM
...\Plan Set\JMT\BU67K_SD_01.dgn

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

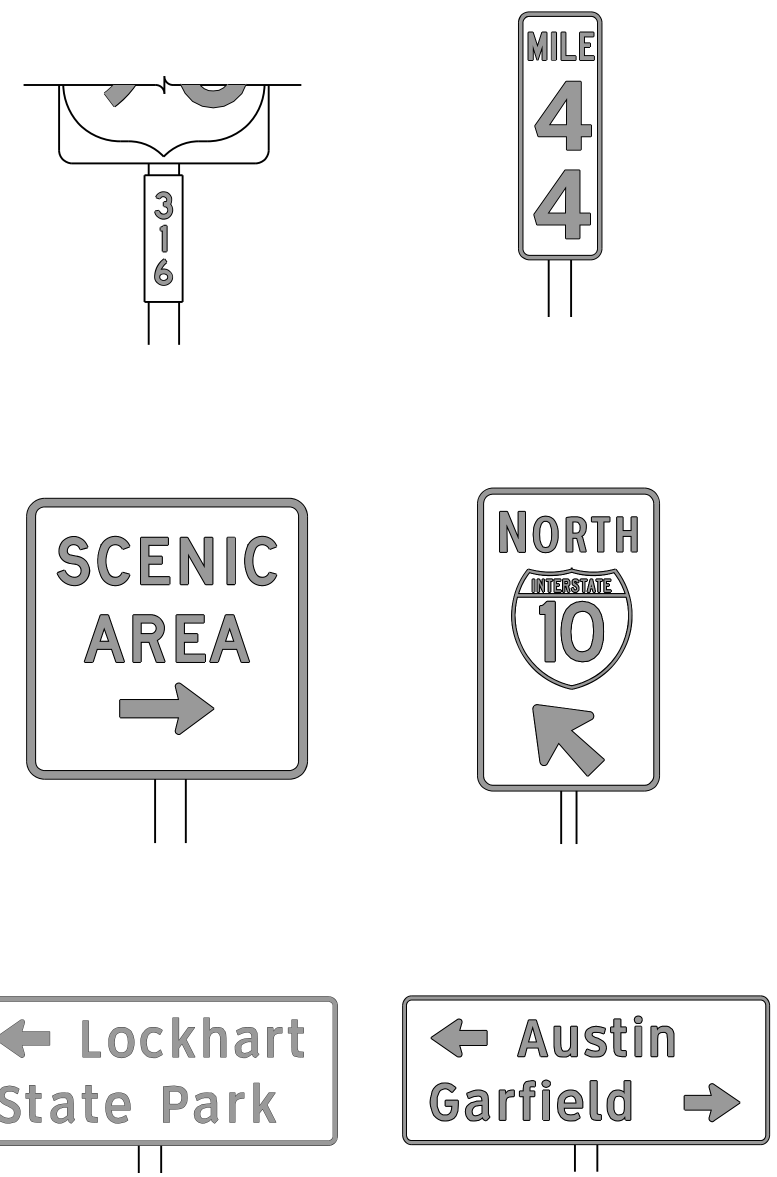
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



TYPICAL EXAMPLES

REQUIREMENTS FOR BLUE, BROWN & GREEN D AND I SERIES GUIDE SIGNS

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND, SYMBOLS & BORDERS	ALL OTHERS	TYPE B OR C SHEETING



TYPICAL EXAMPLES

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).

2. White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white Federal Highway Administration (FHWA) Standard Highway Alphabets, when not specified in the SHSD, or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

3. Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).

4. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.

5. Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.

6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.

7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.

8. Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

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

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

Texas Department of Transportation — Traffic Operations Division Standard

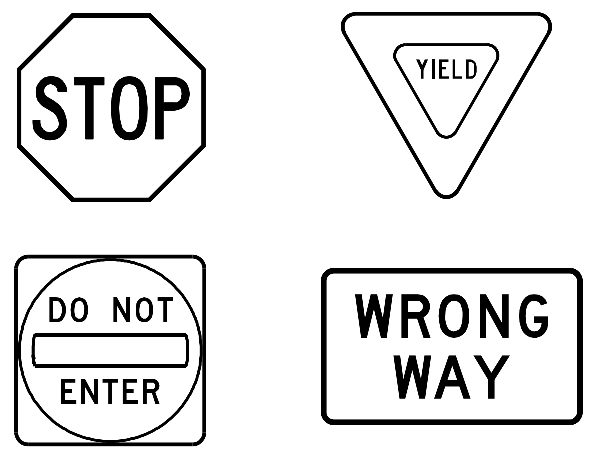
TYPICAL SIGN REQUIREMENTS

TSR(3)-13

FILE: tsr3-13.dgn		DN: TxDOT	CK: TxDOT	DW: TxDOT		CK: TxDOT
©TxDOT October 2003		CONT	SECT	JOB		HIGHWAY
REVISIONS		0079	04	049		BU 67K
12-03 7-13	9-08	DIST		COUNTY		SHEET NO.
		FTW		ERATH		184

3

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS
(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

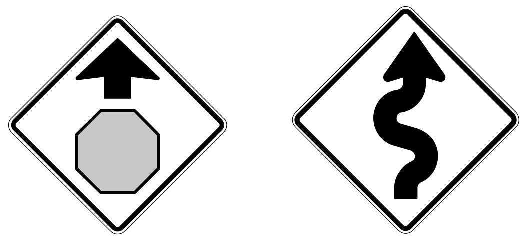
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS
(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND, BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

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

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.
http://www.txdot.gov/

Texas Department of Transportation
Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

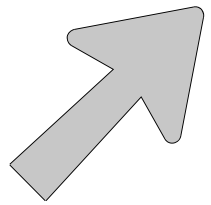
TSR(4)-13

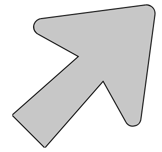
FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0079	04	049	BU 67K
12-03 7-13 9-08	DIST		COUNTY	SHEET NO.
	FTW		ERATH	185

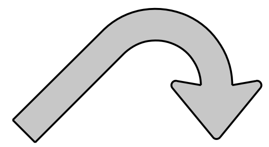
DATE: 7/12/2024 4:41:57 PM
FILE: c:\bentley\projectwise\workingdir\vrx-pw.bentley.com_vrx-pw-01\brandon.morse\d0299001\tsr5-13.dgn

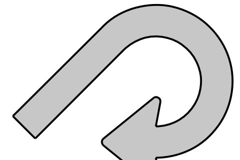
ARROW DETAILS

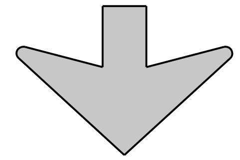
for Large Ground-Mounted and Overhead Guide Signs


Type A


Type B


E-3


E-4


Down Arrow

TYPE	LETTER SIZE	USE
A-1	10.67" U/L and 10" Caps	Single Lane Exits
A-2	13.33" U/L and 12" Caps	
A-3	16" & 20" U/L	
B-1	10.67" U/L and 10" Caps	Multiple Lane Exits
B-2	13.33" U/L and 12" Caps	
B-3	16" & 20" U/L	

CODE	USED ON SIGN NO.
E-3	E5-1aT
E-4	E5-1bT

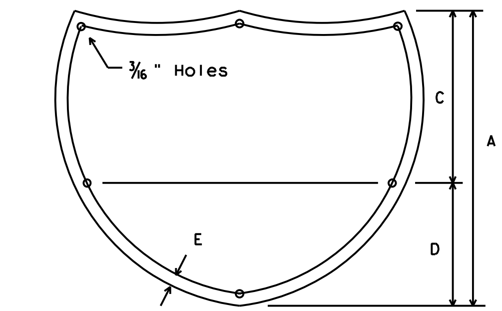
NOTE

Arrow dimensions are shown in the "Standard Highway Sign Designs for Texas" manual.

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

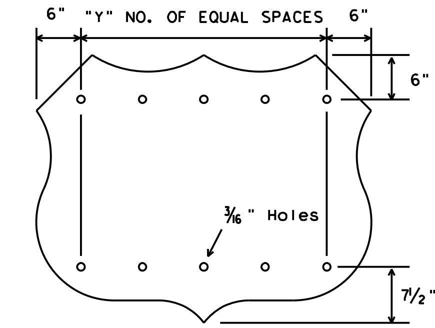
http://www.txdot.gov/

SIGN BLANK PUNCHING DETAILS FOR ATTACHMENTS WHEN SPECIFIED TO BE TYPE A ALUMINUM SIGNS (FOR MOUNTING TO GUIDE SIGN FACE)



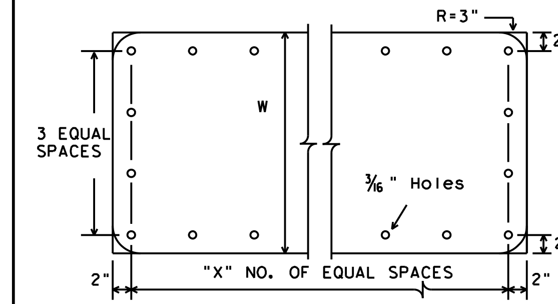
INTERSTATE ROUTE MARKERS

A	C	D	E
36	21	15	1 1/2
48	28	20	1 3/4



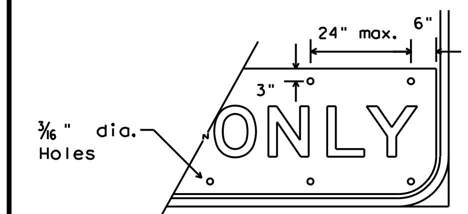
U.S. ROUTE MARKERS

Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



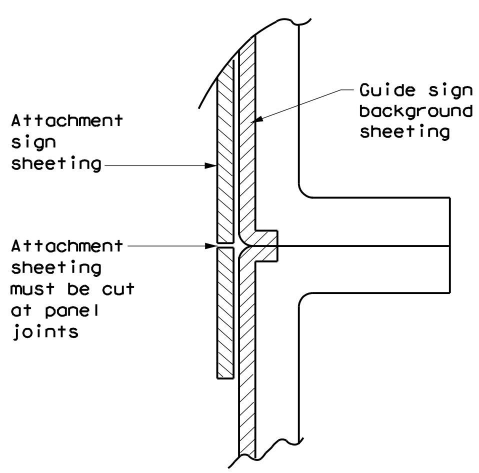
STATE ROUTE MARKERS

No. of Digits	W	X
4	24	4
4	36	5
4	48	6
3	24	3
3	36	4
3	48	5

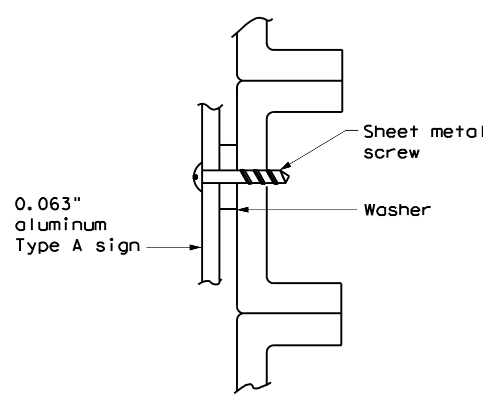


EXIT ONLY PANEL

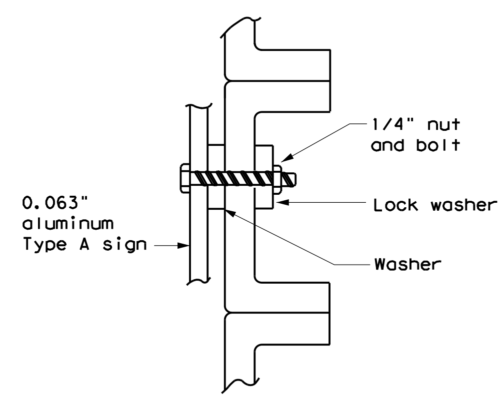
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



DIRECT APPLIED ATTACHMENT



SCREW ATTACHMENT



NUT/BOLT ATTACHMENT

NOTE:

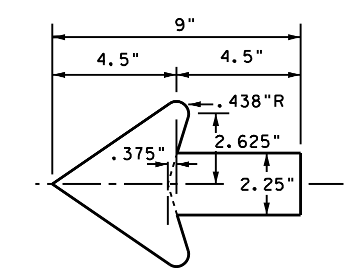
1. Sheeting for legend, symbols, and borders must be cut at panel joints.
2. Direct applied attachment signs will be subsidiary to "Aluminum Signs" or "Fiberglass Signs".

NOTE:

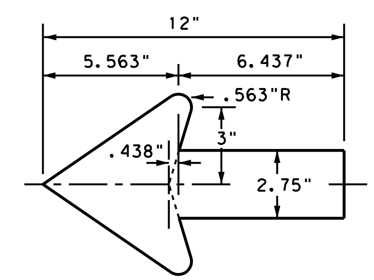
Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

ARROW DETAILS

for Destination Signs (Type D)



Standard arrow to be used with 6 inch letters.



Standard arrow to be used with 8 inch letters.

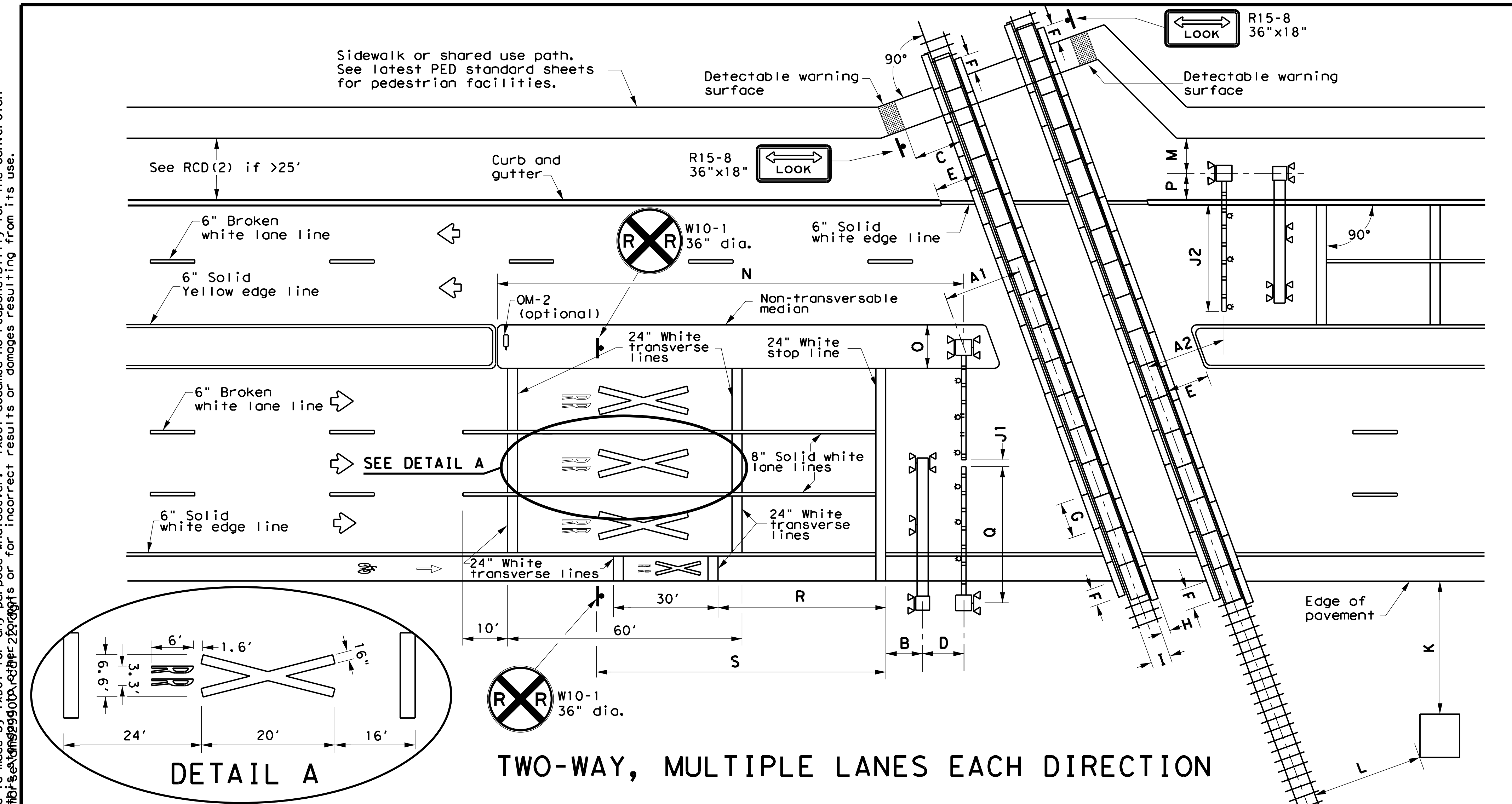
Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(5)-13

FILE: tsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0079	04	049	BU 67K
12-03 7-13 9-08	DIST		COUNTY	SHEET NO.
	FTW		ERATH	186



NOTES

A1: Center of RR mast to center of rail: 12' minimum, 15' typical.

A2: Tip of gate to center of rail: 12' minimum, 15' typical.

B: Center of mast (cantilever, gate, or mast flasher) of nearest active traffic control device to stop line: 8' (NOTE: Stop line may be moved as needed, but should be at least 8' back from gates, if present).

C: Near edge of detectable warning surface to nearest rail: 12' minimum.

D: Center of gate mast to center of cantilever mast: 6' typical. NOTE: Cantilever may be located in front or behind gates.

E: Edge of median or curb to nearest rail: 10' typical. NOTE: Design median edge to be parallel with rail.

F: Edge of planking panel from edge of pavement or sidewalk: 3' minimum. NOTE: Field panels need not be in line with gauge panels.

G: Length of panels along rail: 8' typical.

H: Width of field panel: 2' typical (check with railroad company).

I: Distance between rails: 4'- 8'1/2".

J1: Tip of gate to tip of gate: 2' maximum.

J2: 90% of traveled roadway to be covered by gate.

K: Nearest edge of RR cabinet from edge of pavement: 30' typical. NOTE: Cabinet not required to be parallel to edge of pavement.

L: Nearest edge of RR cabinet from nearest rail: 25' typical.

M: Center of RR mast to edge of sidewalk: 6' minimum.

N: Center of gate mast to leading edge of non-traversable median: 100' minimum to qualify as a Quiet Zone SSM. NOTE: 60' will suffice if there is a street intersection within the 100' and all street intersections within 60' are closed.

O: Width of median for RR gate assembly: 8'-6" minimum, 10' typical when using median gates. NOTE: Center of gate mast minimum 4'-3" from face of curb.

P: Center of RR mast to face of curb: 5'-3" minimum.
Center of RR mast to edge of pavement (with shoulder): 7' minimum.
Center of RR mast to edge of pavement (no shoulder): 9'-3" minimum.
NOTE: Final location determined by the railroad company.

Q: Gate length: 28' or less typical, but railroad company may allow up to 32' under special circumstances.

R: Stop line to first RR Crossing transverse line (bike lane): 50' typical.

S: Stop line to GRADE CROSSING ADVANCE WARNING (W10-1) sign and adjacent RR Crossing pavement markings. See Table 1. See RCD(2) for other signs.

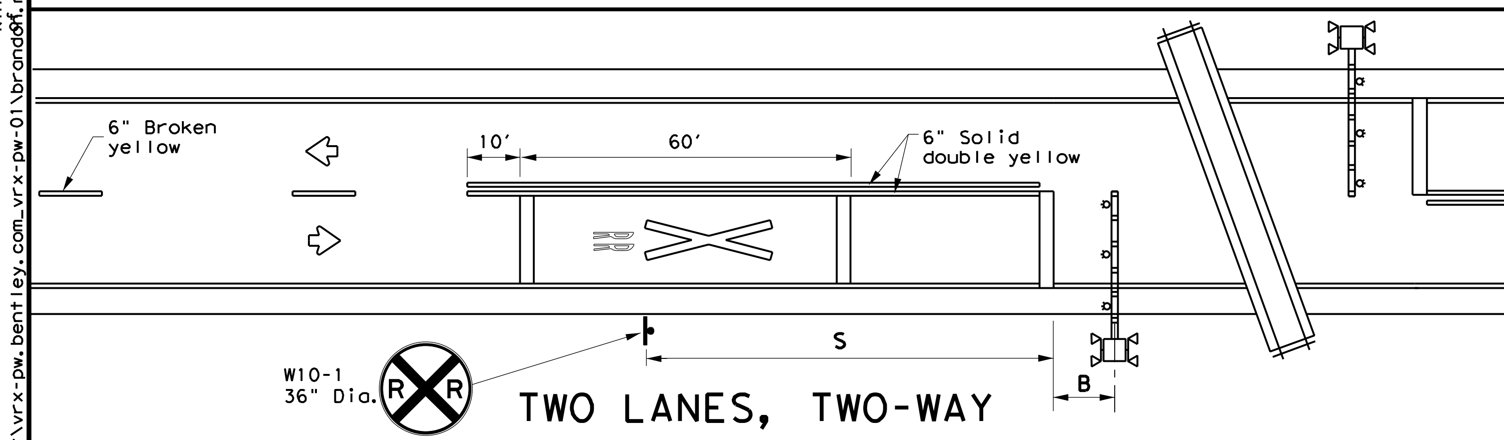
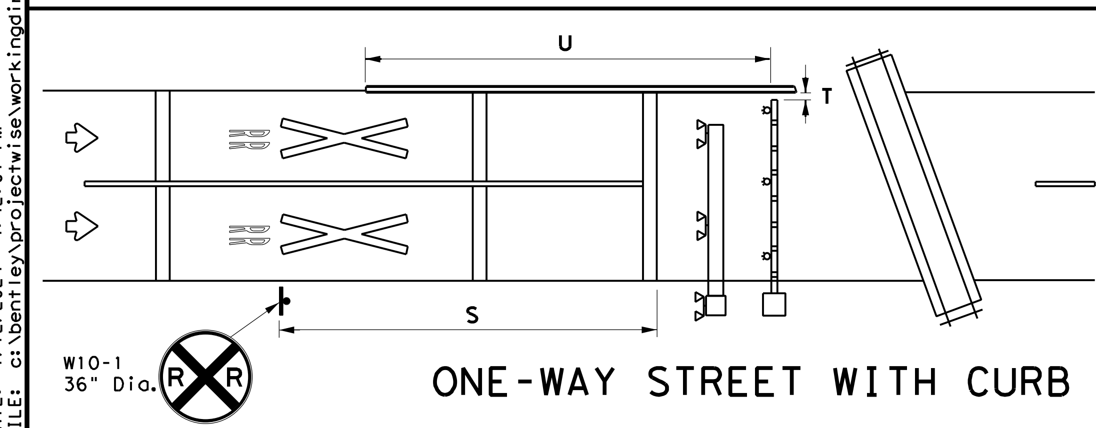


TABLE 1	
Approach Speed (mph)	Desirable Placement (feet)
20	100
25	100
30	100
35	100
40	125
45	175
50	250
55	325
60	400
65	475
70	550
75	650

LEGEND	
	Sign
	Object Marker
	Traffic Flow
	Cantilever
	Gate Assembly
	Mast Flasher Pair

GENERAL NOTES

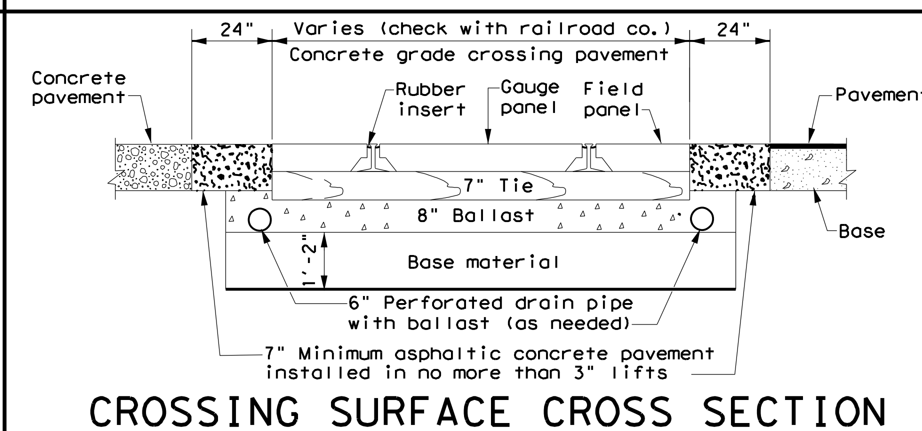
1. Medians and curbs must be non-traversable to qualify as a Quiet Zone Supplementary Safety Measure (SSM). Non-traversable curbs in Quiet Zones are 6" tall minimum and used on roadways where speed does not exceed 40 mph.
2. Raised pavement markers may be used to supplement striping. See PM(2) and PM(3) standard sheets.
3. Medians preferred whenever possible to prevent vehicles from driving around gates.
4. Longitudinal edge striping may be continued thru crossing as needed. Illumination may also be considered for nighttime visibility.
5. See SMD standard sheets for sign mounting details.
6. See the Standard Highway Sign Design for Texas (SHSD) manual for sign and pavement marking details.



NOTES

T: Tip of gate to edge of curb: 1' maximum for Quiet Zone SSM, 90% of traveled way covered by gates for all other locations.

U: Non-traversable curb length from gate: 100' minimum for a Quiet Zone SSM, 10' minimum for all other locations.



Texas Department of Transportation

Traffic Safety Division Standard

RAILROAD CROSSING DETAILS SIGNING, STRIPING, AND DEVICE PLACEMENT RCD(1)-22

FILE: rcd1-22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2022	CONT 0079	SECT 04	JOB 049	HIGHWAY BU 67K
REVISIONS 2-16 11-22	DIST FTW		COUNTY ERATH	SHEET NO. 187

14

DATE: 7/12/2024 4:42:01 PM
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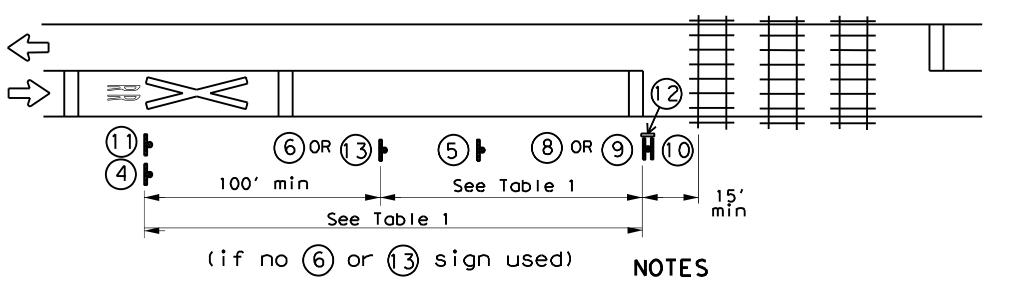
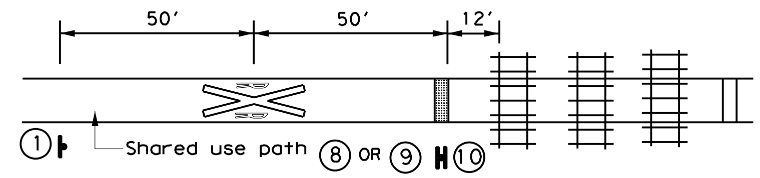


PASSIVE CROSSING

NOTES

1. STOP or YIELD sign may also be installed to the left of the crossbuck sign, rather than below it.
2. A 2" white retroreflective strip shall be installed on front and back of crossbuck sign post.
3. See the Crossbuck Assemblies with YIELD or STOP Signs at Passive Grade Crossings section of the TMUTCD for further details about sign mounting arrangements.



NOTES

1. A shared use path is considered a separate pathway crossing when more than 25' from traveled way of adjacent roadway.
2. Detectable warning used at stop bar.
3. Smaller signs preferred. See the Design of Bicycle Signs section within the TMUTCD for sizing details.

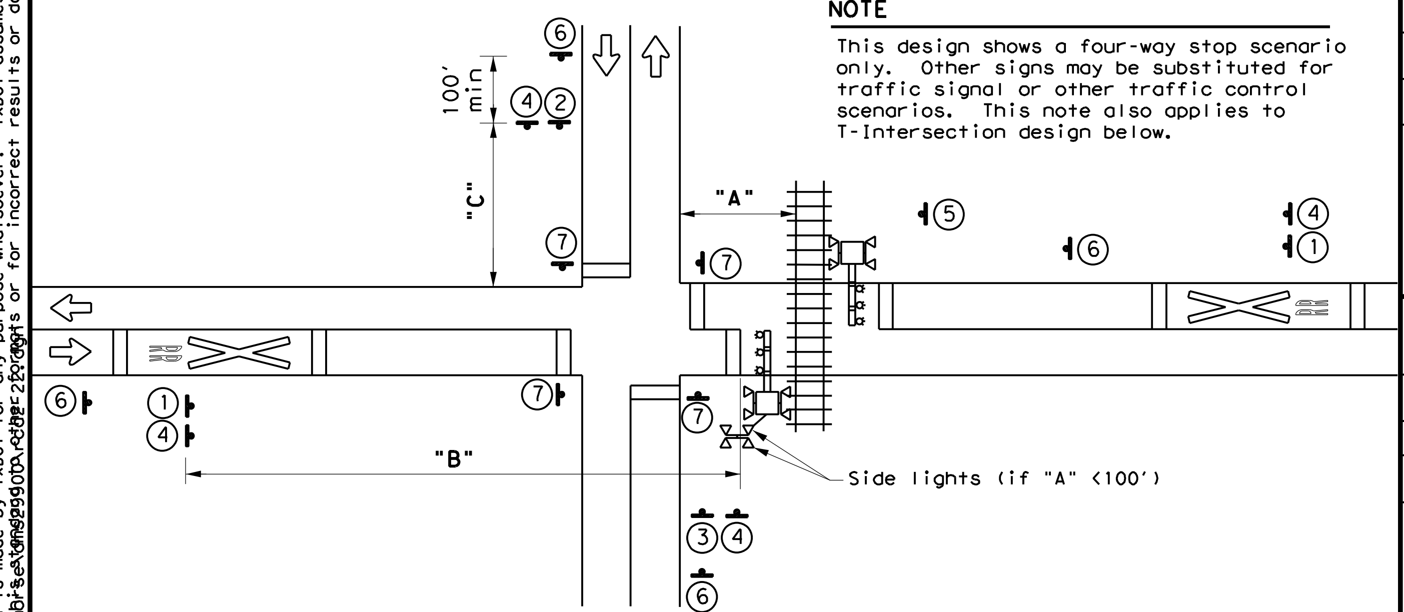
PATHWAY CROSSING

TABLE 1

Approach Speed (mph)	Desirable Placement (feet)
20	100
25	100
30	100
35	100
40	125
45	175
50	250
55	325
60	400
65	475
70	550
75	650

GENERAL NOTES

1. Railroad company to provide active traffic control devices, CROSSBUCK (R15-1), NUMBER OF TRACKS (R15-2P) plaque (if more than 1 track), and EMERGENCY NOTIFICATION (I-13) signs.
2. LOW GROUND CLEARANCE (W10-5) signs may be relocated further upstream of crossing to provide advance warning of alternate route.
3. GRADE CROSSING AND INTERSECTION ADVANCE WARNING (W10-2) signs may be modified as needed to fit roadway geometry.
4. Table 1 placement distances may vary per the Placement of Warning Signs section of the TMUTCD.
5. See Table 1 to determine placement of STOP AHEAD (W3-1) and YIELD AHEAD (W3-2) signs unless shown otherwise.
6. DO NOT STOP ON TRACKS (R8-8) signs installed when potential for vehicles stopping on tracks is significant as determined by sealing engineer. Install so sign does not block view of RR mast.
7. See the Standard Highway Sign Design for Texas (SHSD) manual for sign and pavement marking details.

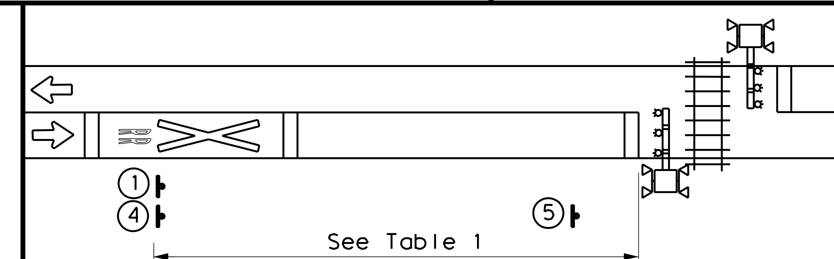


NOTE

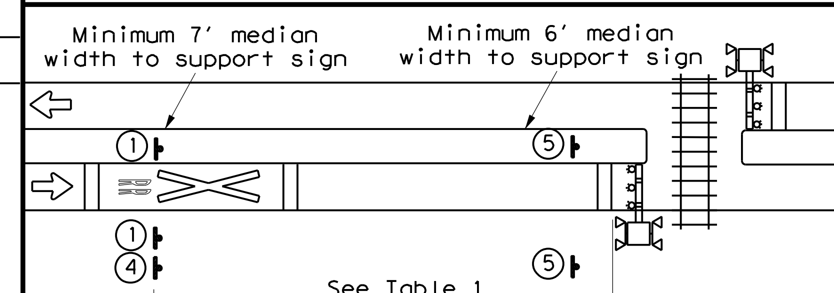
This design shows a four-way stop scenario only. Other signs may be substituted for traffic signal or other traffic control scenarios. This note also applies to T-Intersection design below.

	"A" <100'	"A" ≥100'
"B"	See Table 1. Place pavement markings and signs on opposite side of intersection from rail if spacing from Table 1 would put markings within intersection.	See Table 1. Place pavement markings and signs between rail and intersection if spacing from Table 1 would put markings within intersection.
"C"	See Table 1.	GRADE CROSSING AND INTERSECTION ADVANCE WARNING (W10-2, W10-3, W10-4) signs should only be installed if W10-1 sign is not between intersection and railroad crossing. If needed, see Table 1.

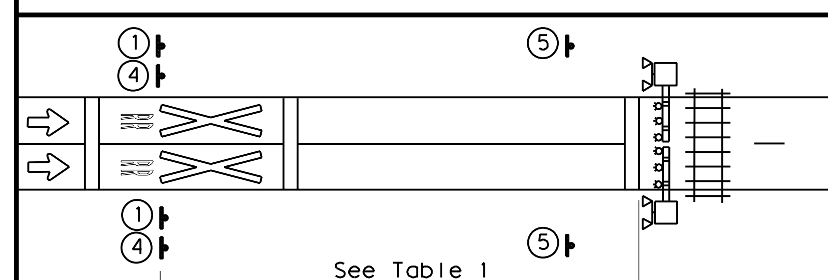
GRADE CROSSING NEAR A PARALLEL STREET



TWO-WAY

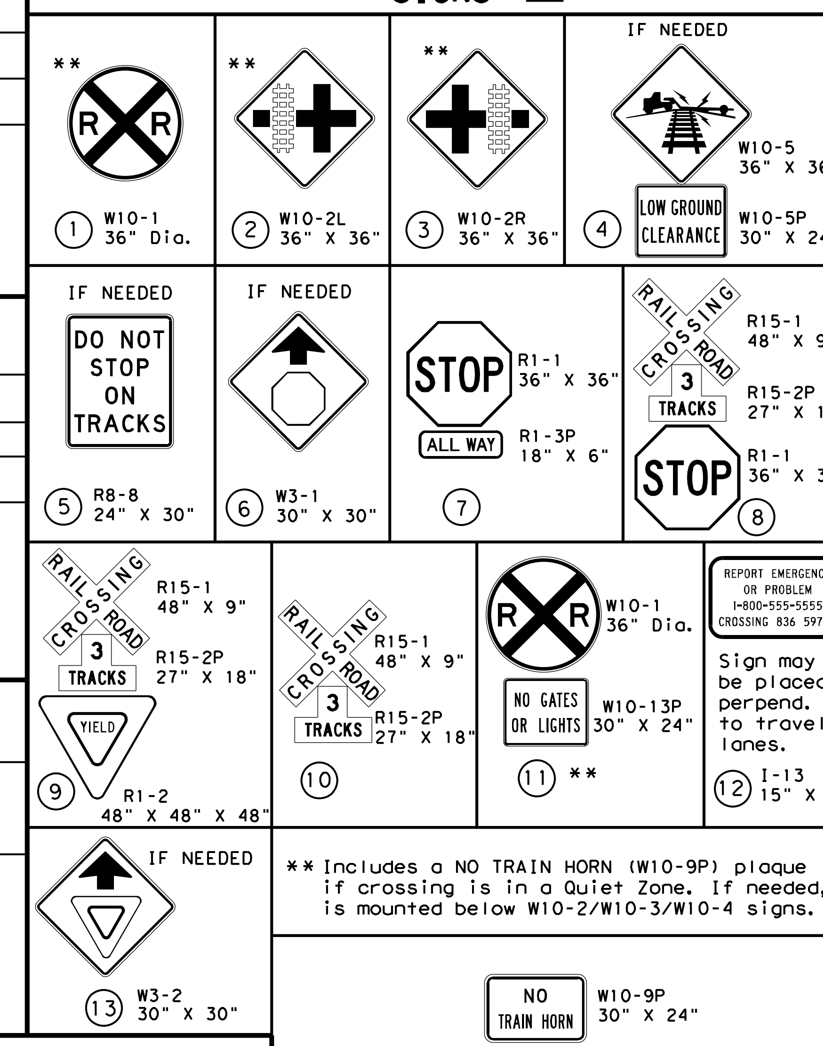


TWO-WAY WITH MEDIAN

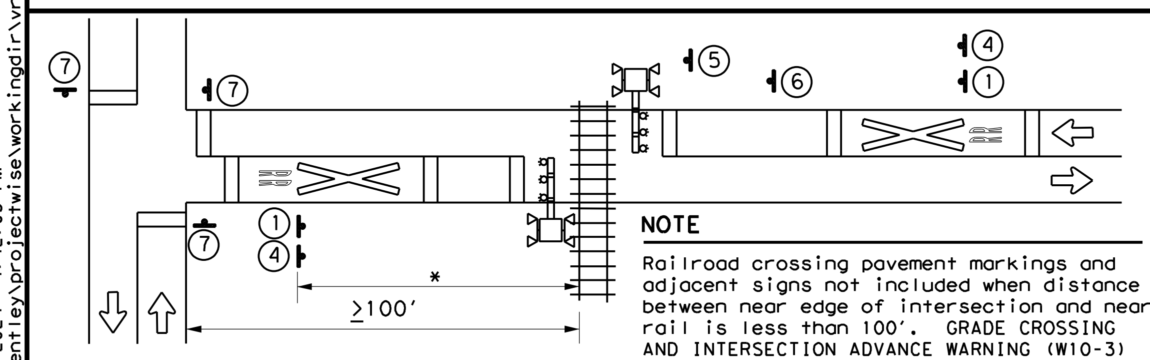


ONE-WAY

SIGNS



** Includes a NO TRAIN HORN (W10-9P) plaque if crossing is in a Quiet Zone. If needed, is mounted below W10-2/W10-3/W10-4 signs.

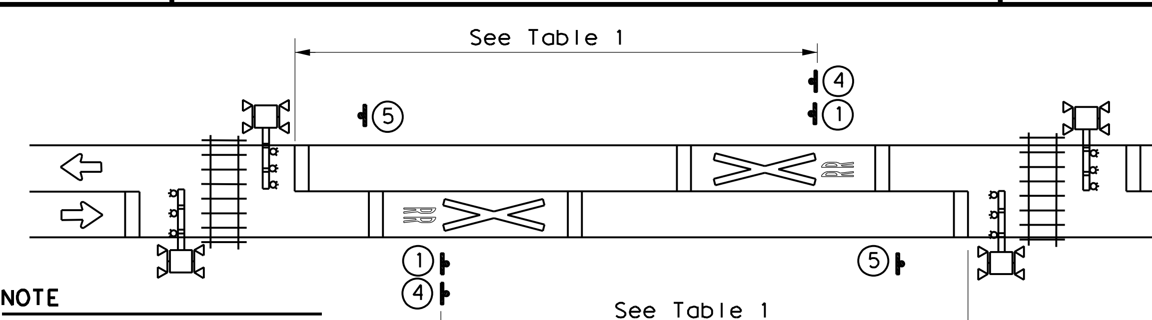


*Use Table 1 if sufficient space exists.

NOTE

Railroad crossing pavement markings and adjacent signs not included when distance between near edge of intersection and near rail is less than 100'. GRADE CROSSING AND INTERSECTION ADVANCE WARNING (W10-3) signs installed on roadway parallel with rail in this case.

T-INTERSECTION



NOTE

Separate active traffic control devices, railroad crossing pavement markings, and adjacent signs required when tracks are more than 100' apart.

TWO ADJACENT CROSSINGS

Texas Department of Transportation

Traffic Safety Division Standard

RAILROAD CROSSING DETAILS SIGNING & STRIPING

RCD(2)-22

FILE: rcd2-22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2022	CONT	SECT	JOB	HIGHWAY
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	FTW		ERATH	188

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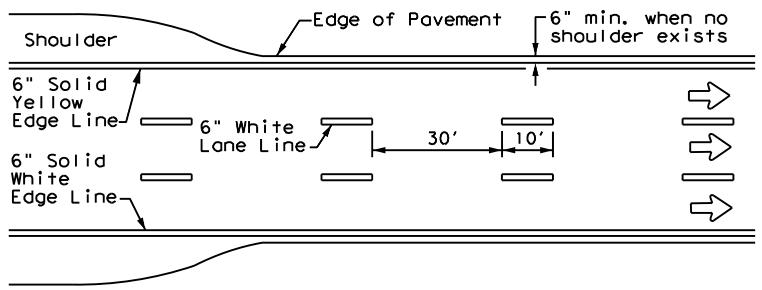
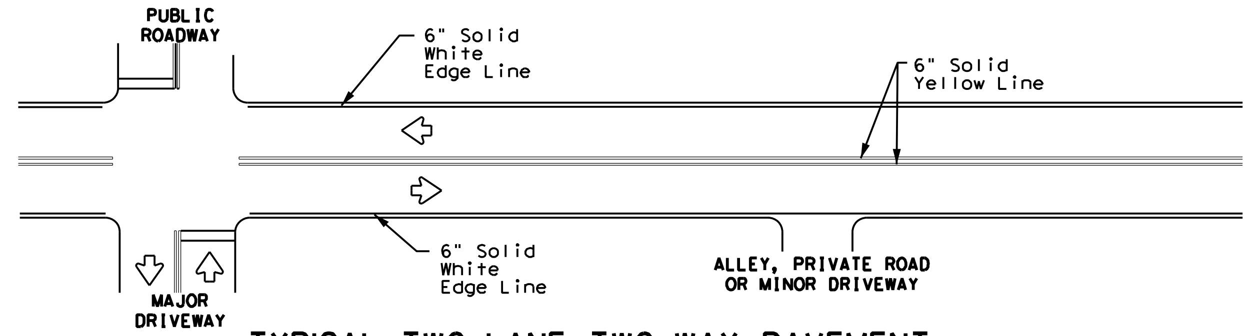
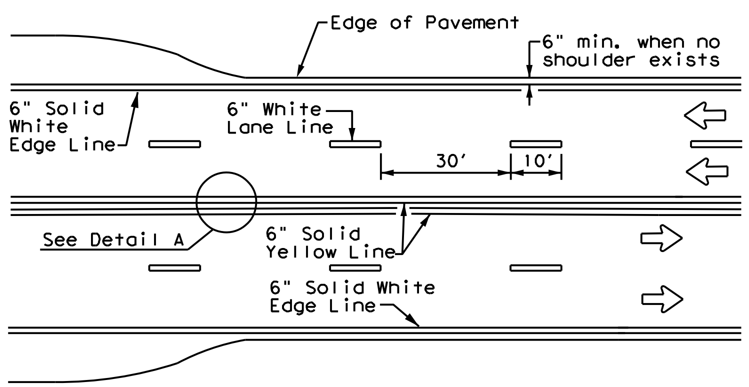
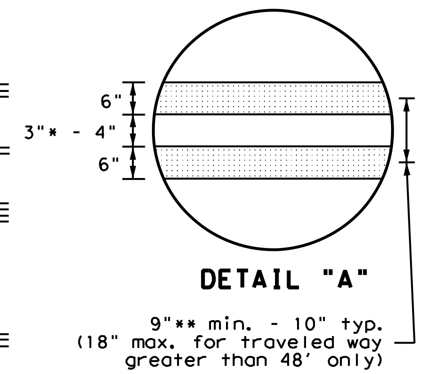


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



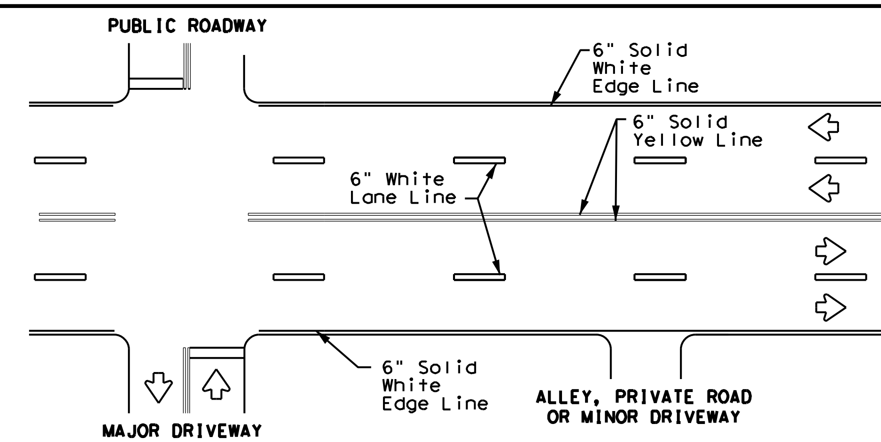


DETAIL "A"

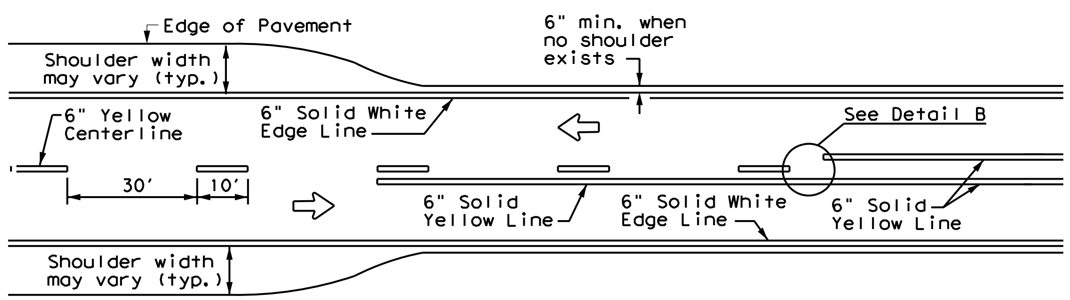
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

* 2" minimum for restripe projects when approved by the Engineer.

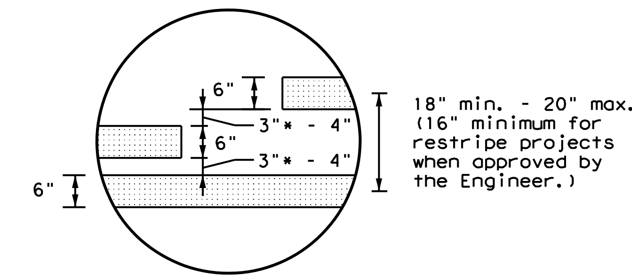
** 8" minimum for restripe projects when approved by the Engineer.



TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

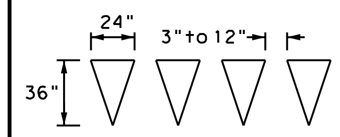


TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



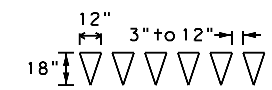
DETAIL "B"

* 2" minimum for restripe projects when approved by the Engineer.

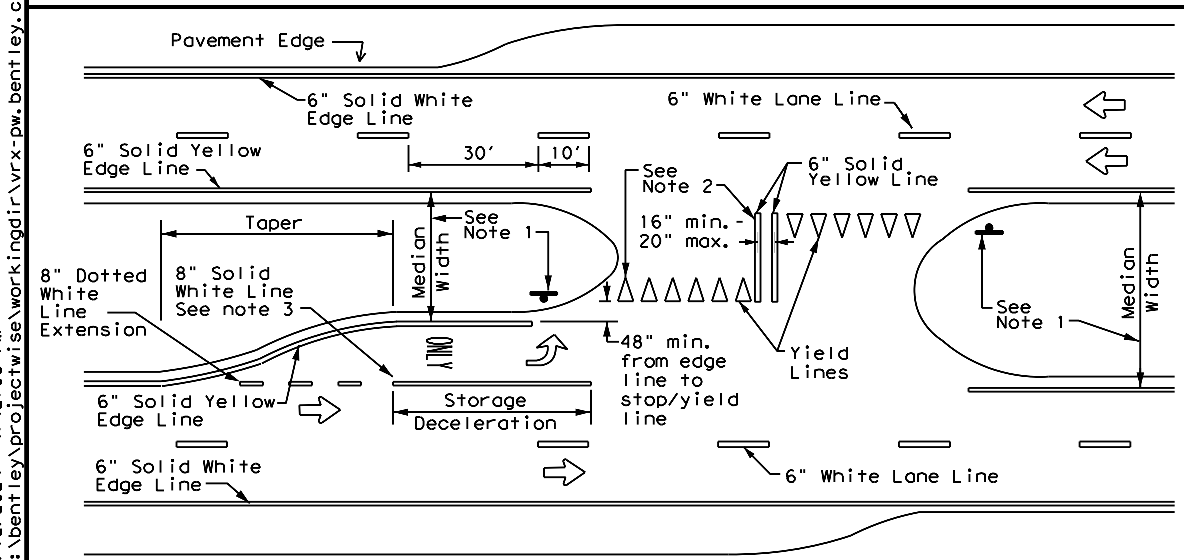


For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES



For posted speed on road being marked equal to or less than 40 MPH.



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.

2. Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines shall only be used with yield signs.

3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

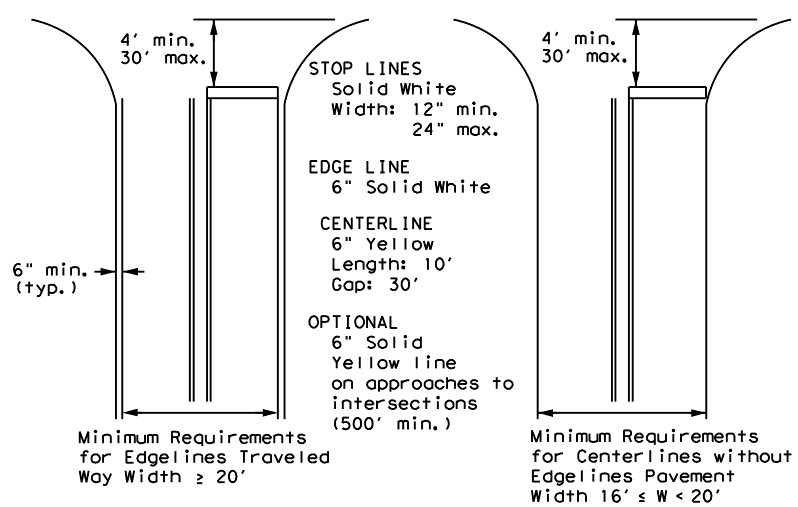
GENERAL NOTES

1. Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines are not required in curb and gutter sections of roadways.

2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the center of edge line to the center of edge line of a two lane roadway.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



NOTE: Traveled way is exclusive of shoulder widths. Refer to General Note 2 for additional details.

GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Roadways

Texas Department of Transportation

Traffic Safety Division Standard

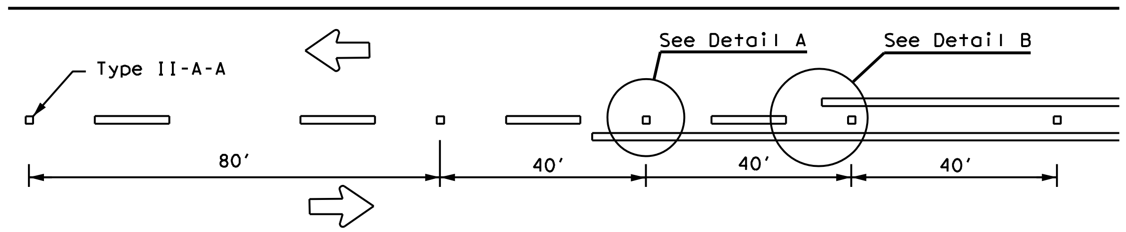
TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-22

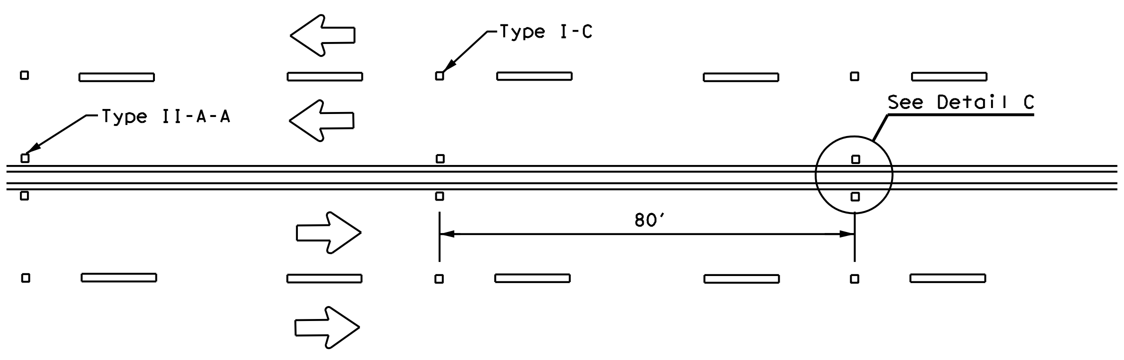
FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 11-78 8-00 6-20 8-95 3-03 12-22 5-00 2-12	0079	04	049	BU 67K
	DIST		COUNTY	SHEET NO.
	FTW		ERATH	189

22A

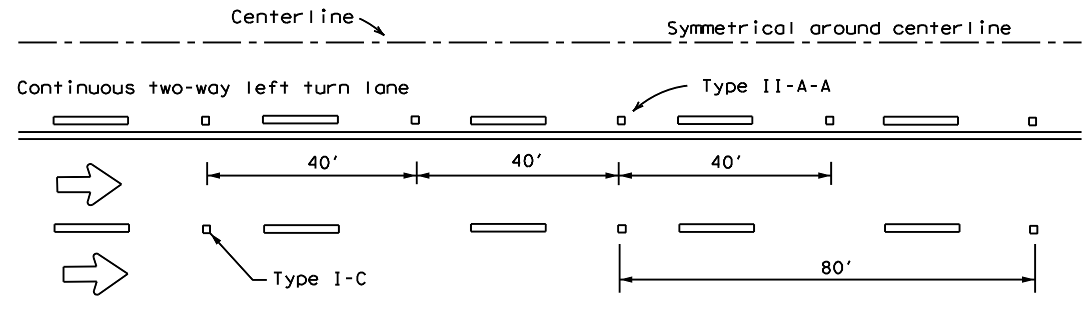
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



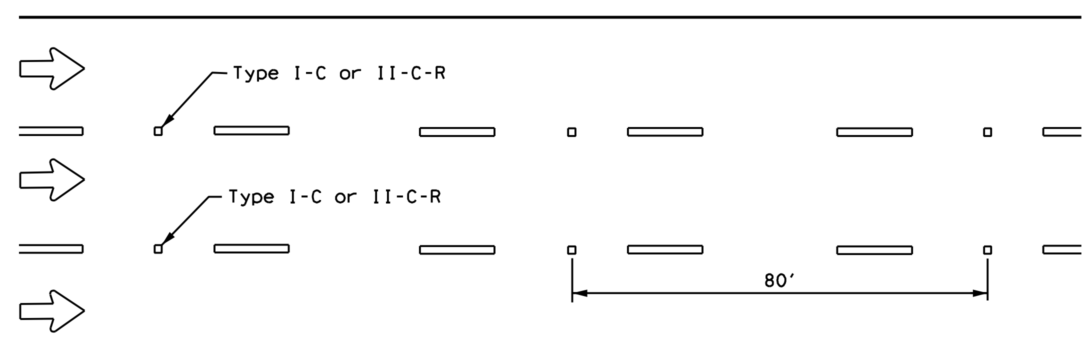
CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS



CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS



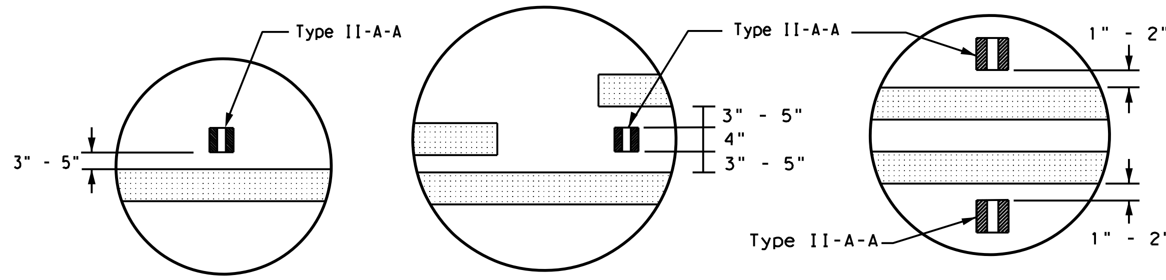
CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



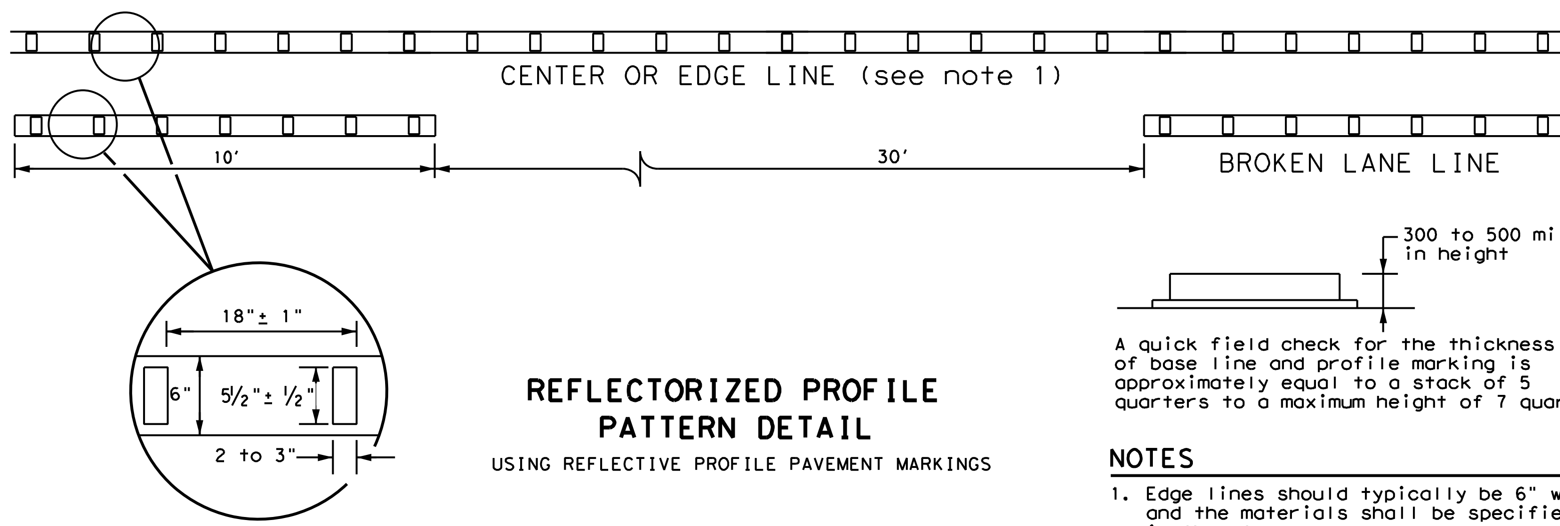
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.

See Note 3.



DETAIL "A" DETAIL "B" DETAIL "C"



6" EDGE LINE, 6" CENTERLINE OR 6" LANE LINE

REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

300 to 500 mil in height

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTES

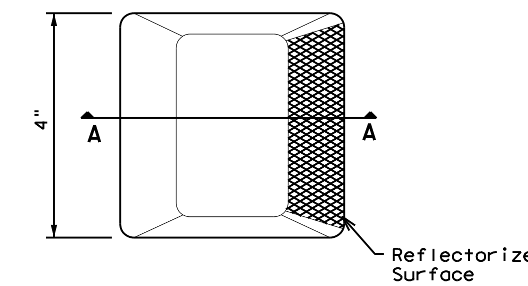
1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

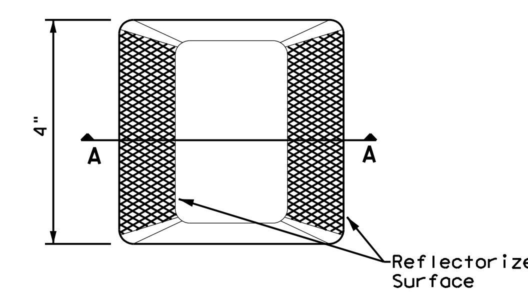
1. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements, the raised pavement markers should be placed to one side of the longitudinal joints.
3. Use raised pavement marker Type I-C with undivided roadways, flush medians, and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

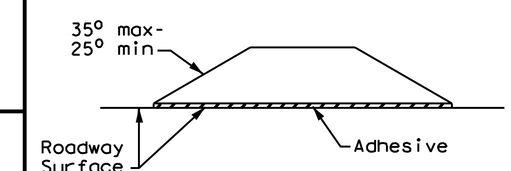
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS

Texas Department of Transportation

Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS REFLECTORIZED PROFILE MARKINGS PM(2)-22

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228

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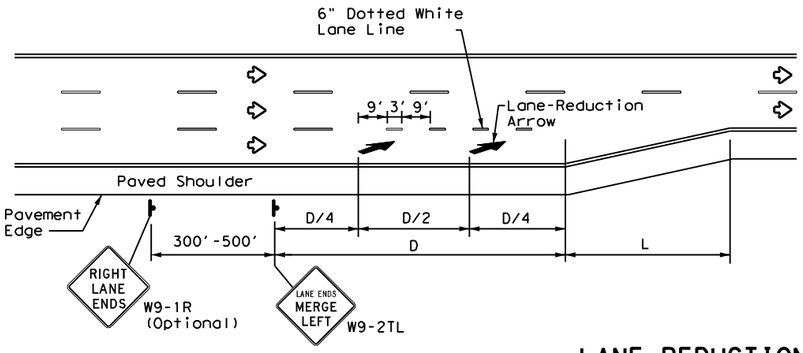


LANE REDUCTION

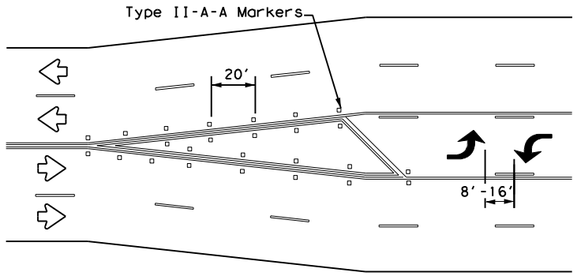
NOTES

1. Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. For Texas Super 2 Passing Lanes, see TS2(PL) standard sheets.
2. On divided highways, an additional RIGHT LANE ENDS (W9-1R) sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
3. Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.

ADVANCED WARNING SIGN DISTANCE (D)		
Posted Speed	D (ft)	L (ft)
30 MPH	460	$L=\frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	

GENERAL NOTES

1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
2. When lane-use words and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow or word and arrow marking is used for a short turn lane, it should be located at or near the upstream end of the full-width turn lane.
3. Use raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.
4. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer. See Chapter 3 of the Roadway Design Manual for additional information on turning lanes or storage lengths.

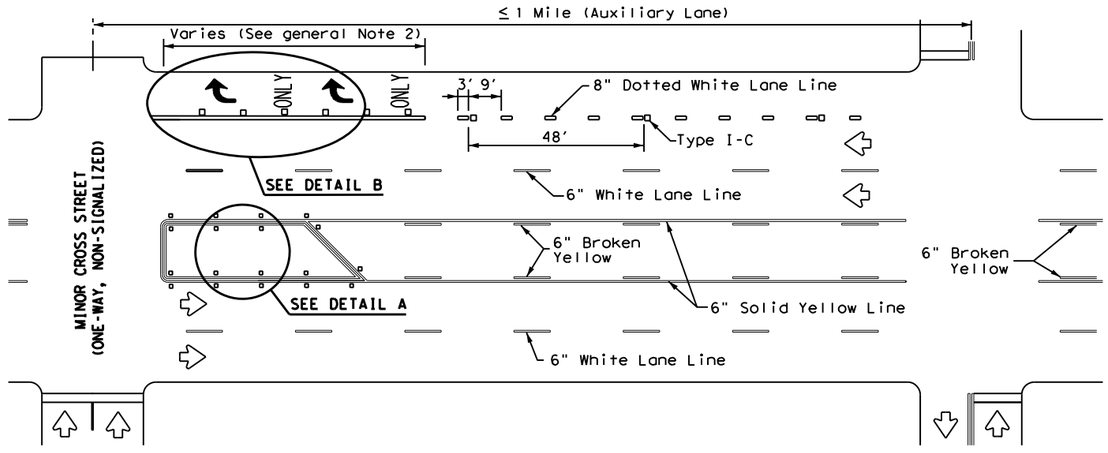


A two-way left-turn (TWLT) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

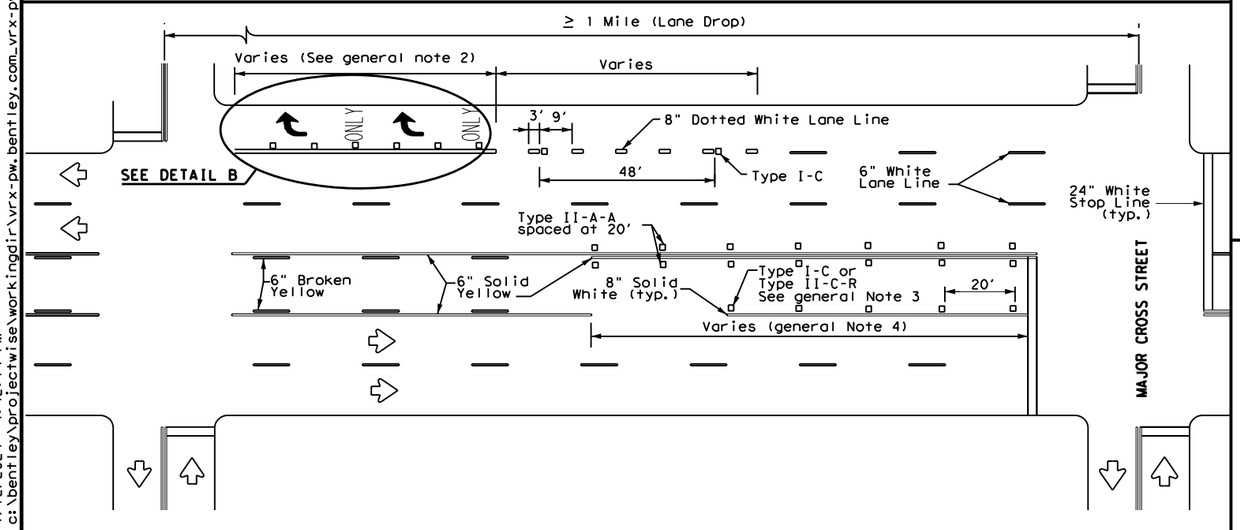
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

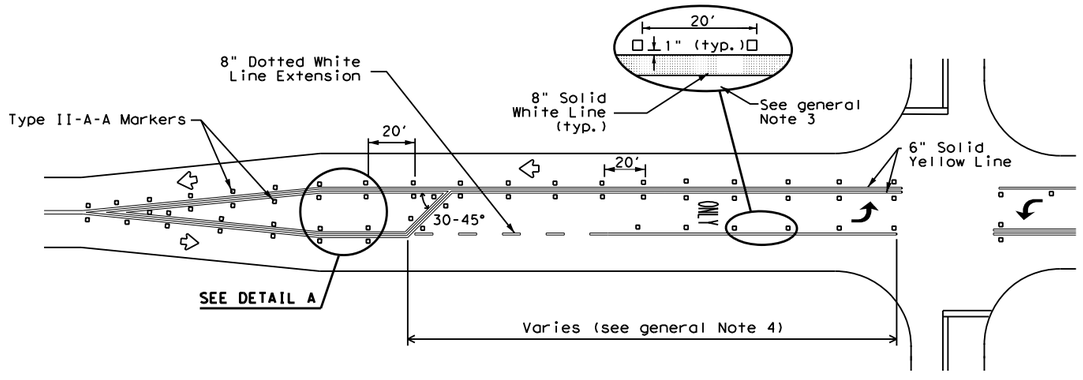
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



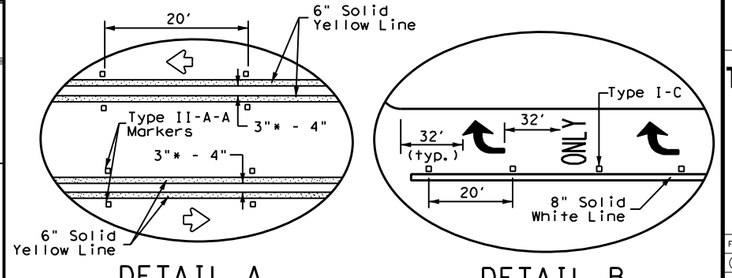
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP



TYPICAL TWO-LANE ROADWAY INTERSECTION WITH LEFT TURN BAYS



* 2" minimum allowed for restripe projects when approved by the Engineer.

Texas Department of Transportation

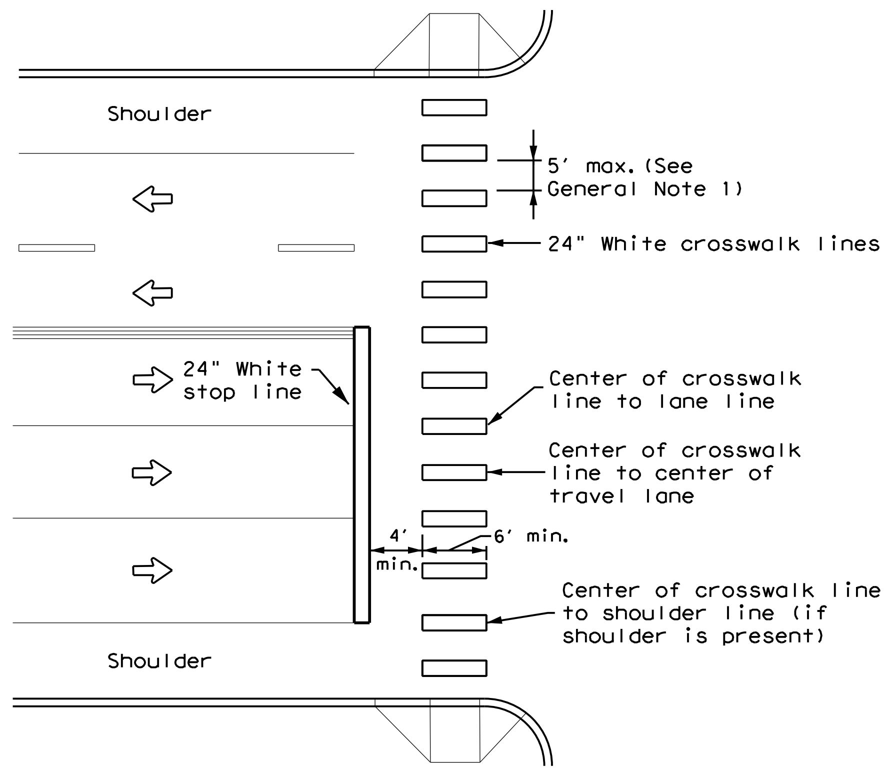
Traffic Safety Division Standard

TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS

PM(3)-22

FILE: pm3-22.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-98 3-03 6-20 5-00 2-10 12-22 8-00 2-12	0079	04	049	BU 67K
	DIST	COUNTY		SHEET NO.
	FTW	ERATH		191

22C



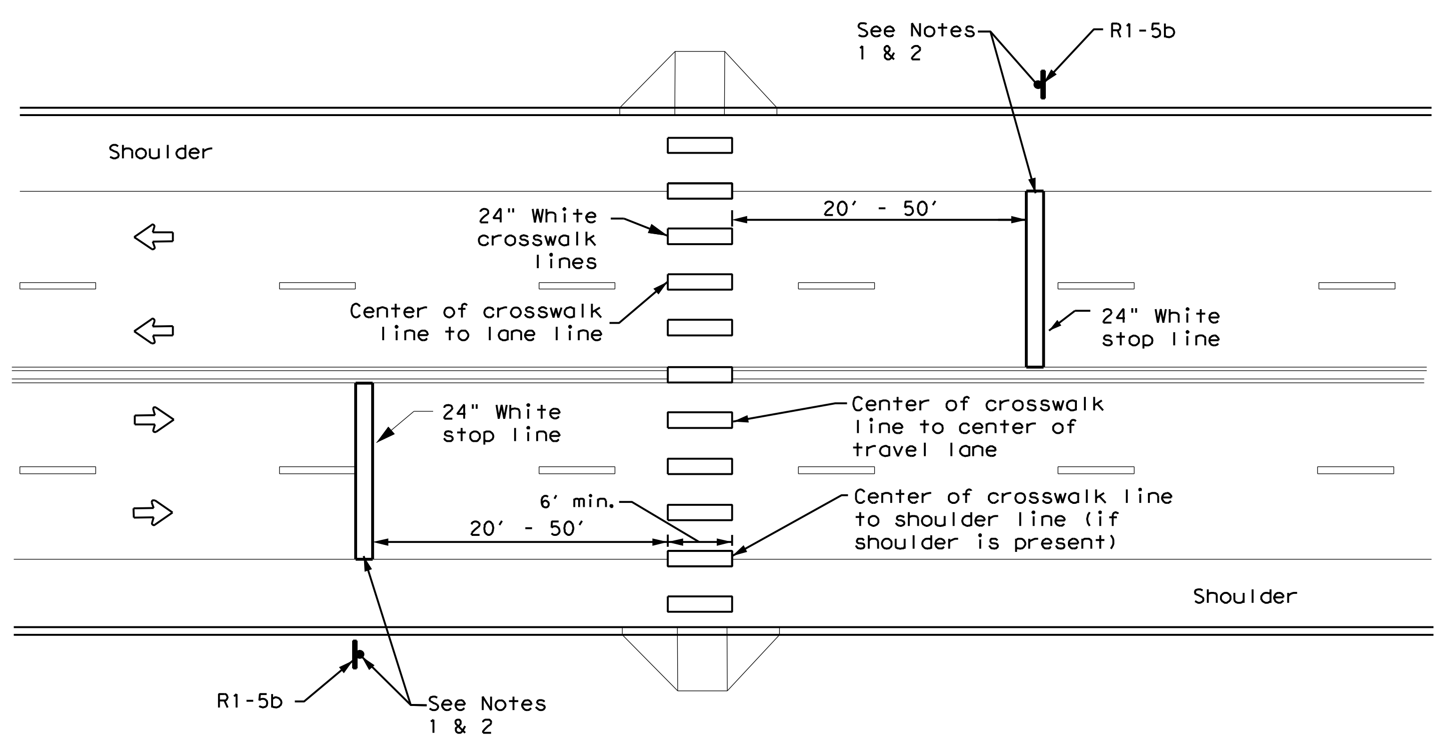
HIGH-VISIBILITY LONGITUDINAL CROSSWALK AT CONTROLLED APPROACH

GENERAL NOTES

1. Longitudinal crosswalk lines should not be placed in the wheel path of vehicles. Center the crosswalk lines on travel lanes, lane lines, and shoulder lines (if present).
2. A minimum 6" clear distance shall be provided to the curb face. If the last crosswalk line falls into this distance it must be omitted.
3. For divided roadways, adjustments in spacing of the crosswalk lines should be made in the median so that the crosswalk lines are maintained in their proper location across the travel portion of the roadway.
4. At skewed crosswalks, the crosswalk lines are to remain parallel to the lane lines.
5. Each crosswalk shall be a minimum of 6′ wide.
6. The High-Visibility Longitudinal Crosswalk is the preferred crosswalk pattern on State Highways. Other crosswalk patterns as shown in the "Texas Manual on Uniform Traffic Control Devices" may be used. All crosswalk designs and dimension shall comply with the "Texas Manual on Uniform Traffic Control Devices."
7. Final placement of Stop Bar and Crosswalk shall be approved by the Engineer in the field.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



UNSIGNALIZED MIDBLOCK HIGH-VISIBILITY LONGITUDINAL CROSSWALK

NOTES:

1. Use stop bars with Stop Here For Pedestrians (R1-5b) signs at unsignalized midblock cross walks.
2. Use stop bars with STOP HERE ON RED (R10-6 or R10-6a) signs at mid block crosswalks controlled by traffic signals or pedestrian hybrid beacons.

Texas Department of Transportation

Traffic Safety Division Standard

CROSSWALK PAVEMENT MARKINGS

PM(4)-22A

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© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 6-20 6-22 12-22 22C	0079	04	049	BU 67K
	DIST		COUNTY	SHEET NO.
	FTW		ERATH	192

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

SM RD SGN ASSM TY XXXXX(X)XX(X-XXXX)

Post Type

- FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
- TWT = Thin-Walled Tubing (see SMD(TWT))
- 10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
- S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

Anchor Type

- UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
- UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
- WS = Wedge Anchor Steel - (see SMD(TWT))
- WP = Wedge Anchor Plastic (see SMD(TWT))
- SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
- SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

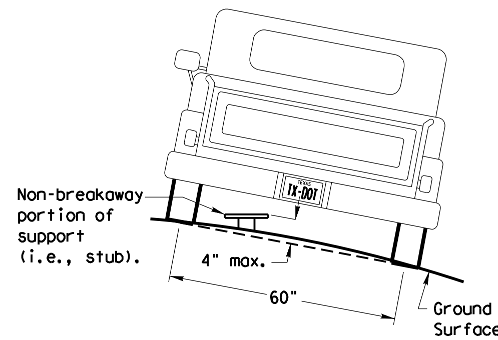
Sign Mounting Designation

- P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
- T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
- U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))

IF REQUIRED

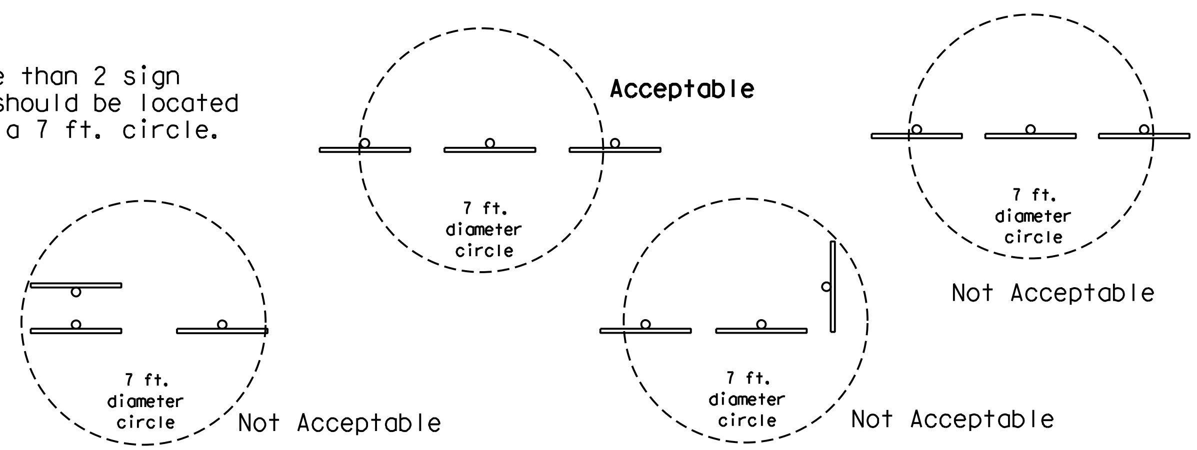
- 1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
- BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
- WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
- EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-3))

REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



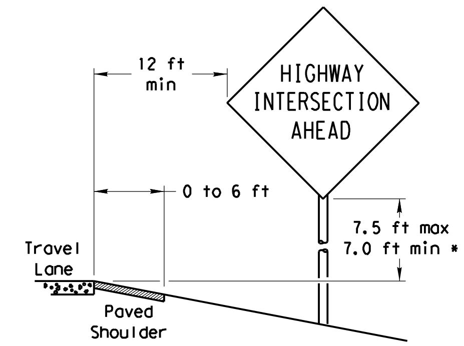
To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

No more than 2 sign posts should be located within a 7 ft. circle.



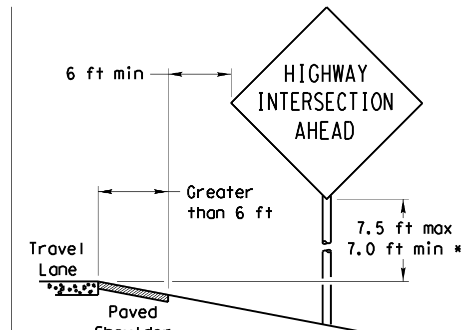
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

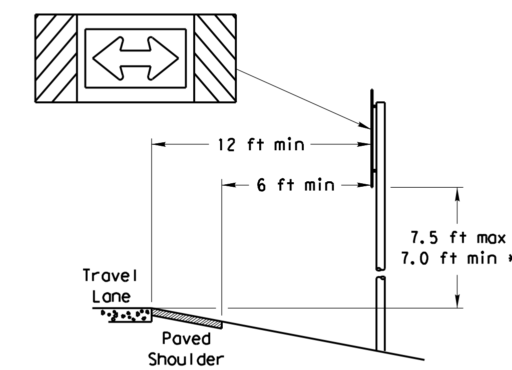
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



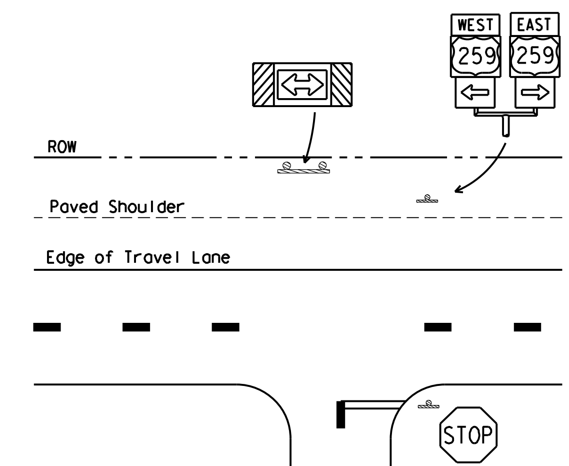
GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

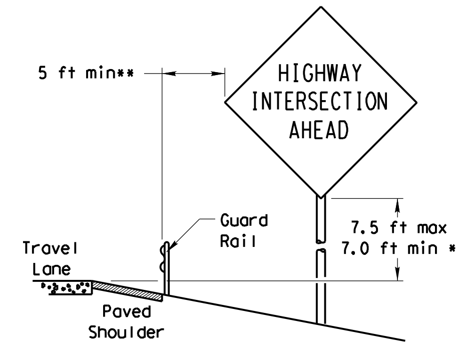
T-INTERSECTION



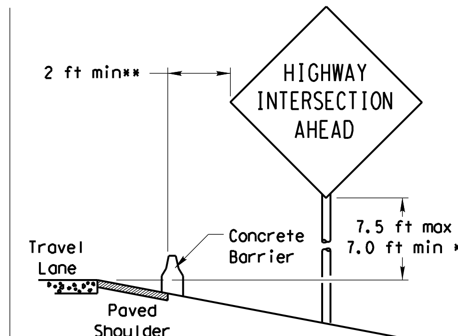
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

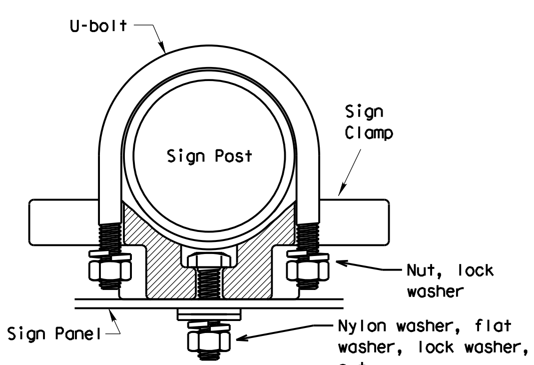
The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

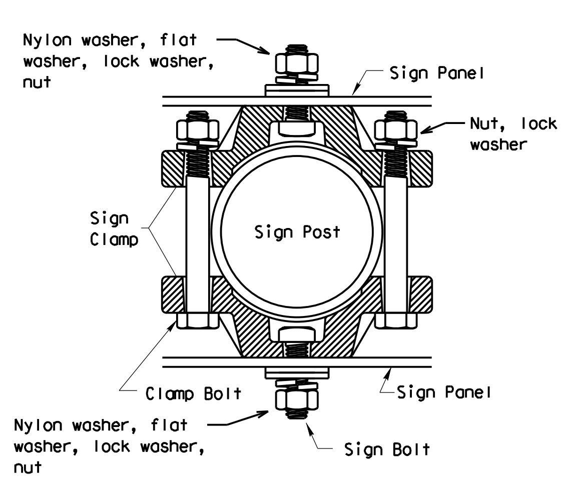
The website address is:
http://www.txdot.gov/publications/traffic.htm

TYPICAL SIGN ATTACHMENT DETAIL

Single Signs



Back-to-Back Signs



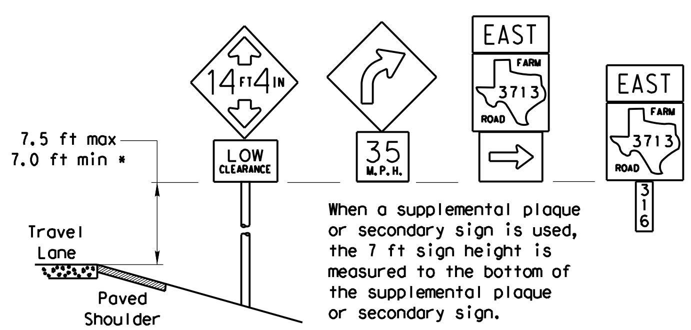
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

Sign clamps may be either the specific size clamp or the universal clamp.

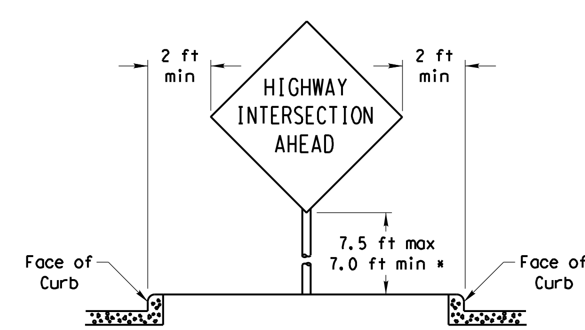
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



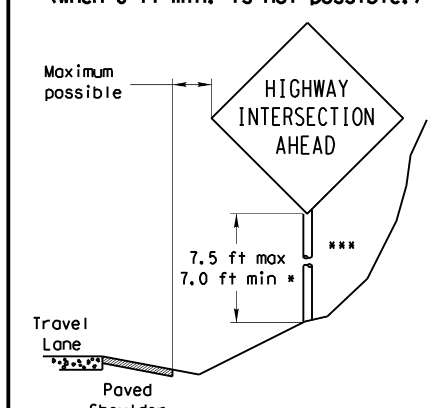
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
REVISIONS: 9-08			
CONT 0079	SECT 04	JOB 049	HIGHWAY BU 67K
DIST FTW	COUNTY ERATH		SHEET NO. 193

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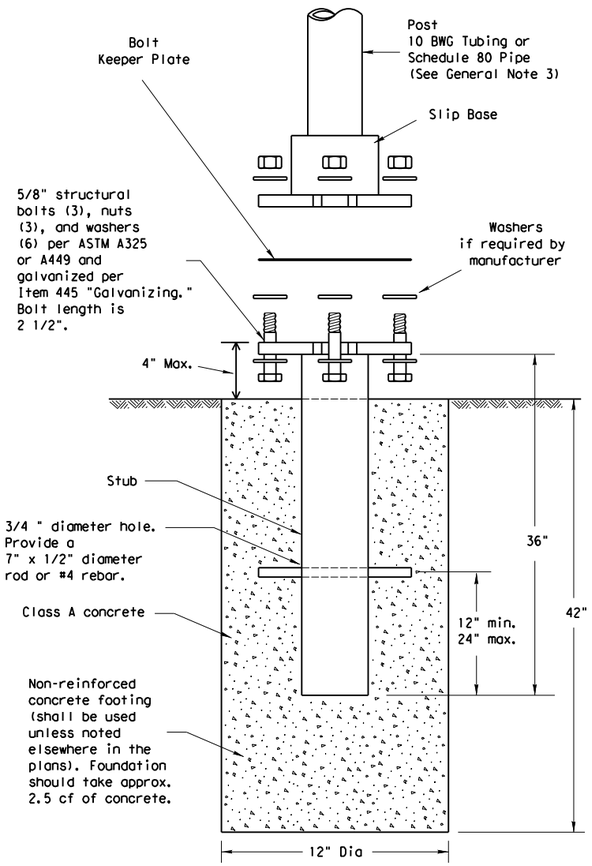
TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



SM RD SGN ASSM TY XXXXX(X)SA(X-XXXX)

NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.txdot.gov/business/producer_list.htm The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   - 0.134" nominal wall thickness
   - Seamless or electric-resistance welded steel tubing or pipe
   - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   - Other steels may be used if they meet the following:
     - 55,000 PSI minimum yield strength
     - 70,000 PSI minimum tensile strength
     - 20% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
   - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
   - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.

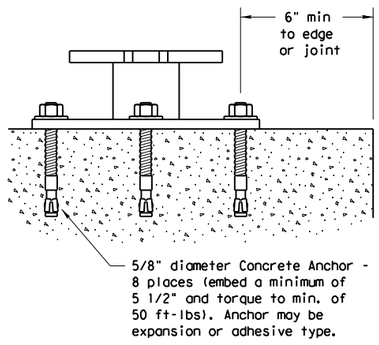
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum yield strength
     - 62,000 PSI minimum tensile strength
     - 21% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
   - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
   - Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

Foundation
1. Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
4. Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
5. The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support
1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



SM RD SGN ASSM TY XXXXX(X)SB(X-XXXX)

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS 9-08

CONT	SECT	JOB	HIGHWAY
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DIST	COUNTY	SHEET NO.
FTW	ERATH	194

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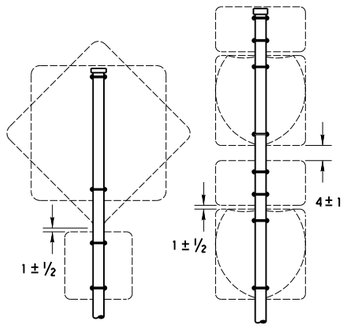

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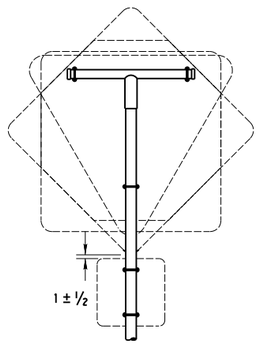

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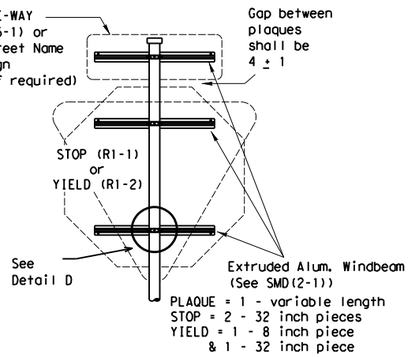

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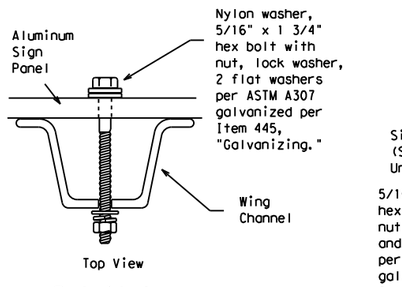
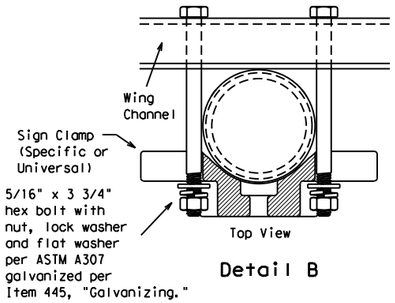


Top View

Detail A



Top View

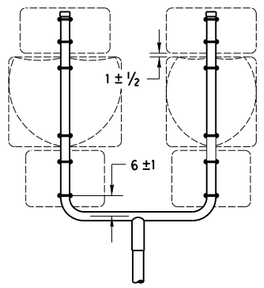
Detail B

GENERAL NOTES:

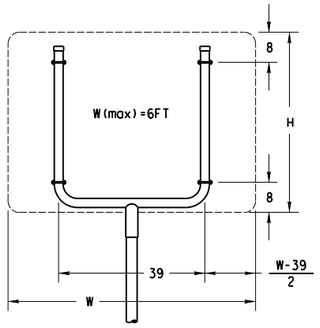
1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.



SM RD SGN ASSM TY XXXXX(1)XX(U)



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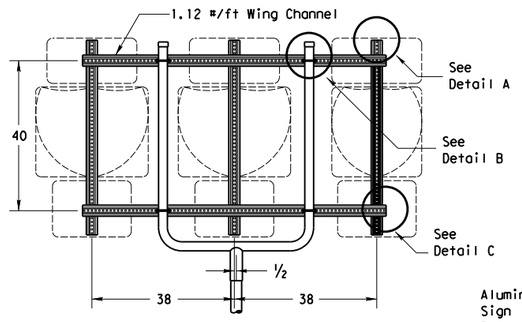


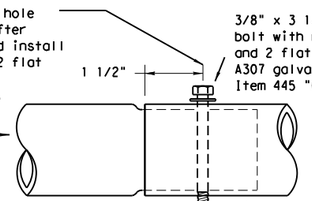
SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

Drill 7/16" hole (through) after assembly and install bolt, nut, 2 flat washers and lock washer.

3/8" x 3 1/2" heavy hex bolt with nut, lock washer and 2 flat washers per ASTM A307 galvanized per Item 445 "Galvanizing."

1 1/2"

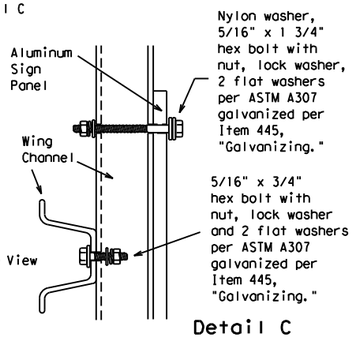
Extender



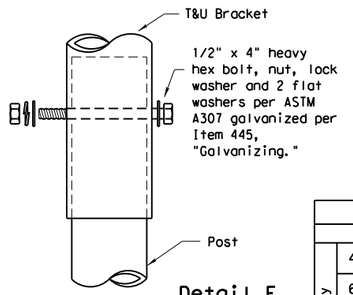
U-Bracket

Detail F

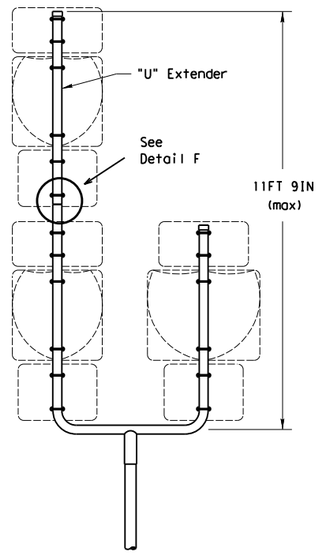
Splices shall only be allowed behind the sign substrate.



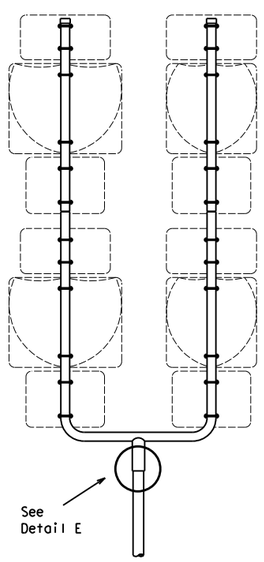
Detail C



Detail E



SM RD SGN ASSM TY S80(1)XX(U-1EXT)



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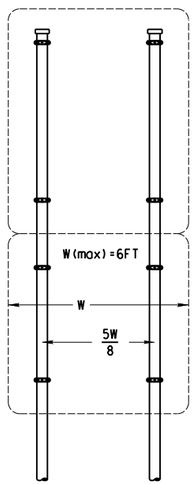
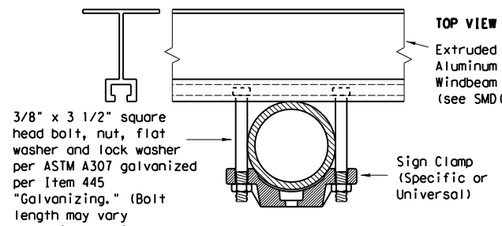
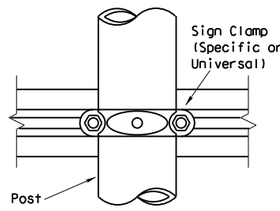


SM RD SGN ASSYM TY XXXXX(2)XX(P)

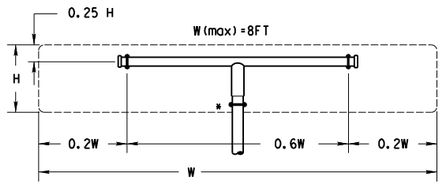
SIDE VIEW



Detail D



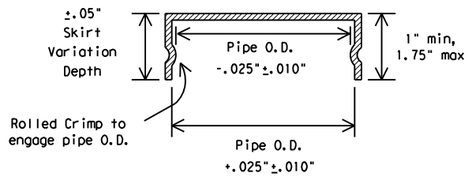
REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)



SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

All dimensions are in english unless detailed otherwise.

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

9-08 REVISIONS

CONT	SECT	JOB	HIGHWAY
0079	04	049	BU 67K

DIST	COUNTY	SHEET NO.
FTW	ERATH	195

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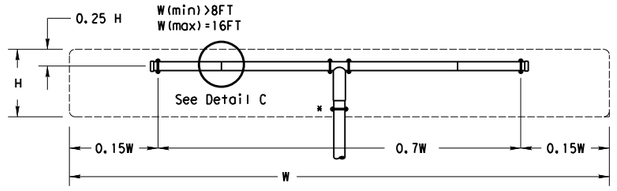
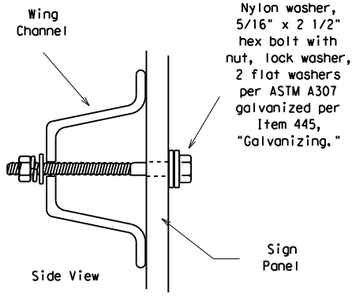
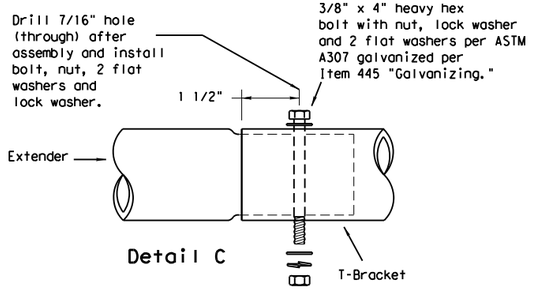


SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



Detail B



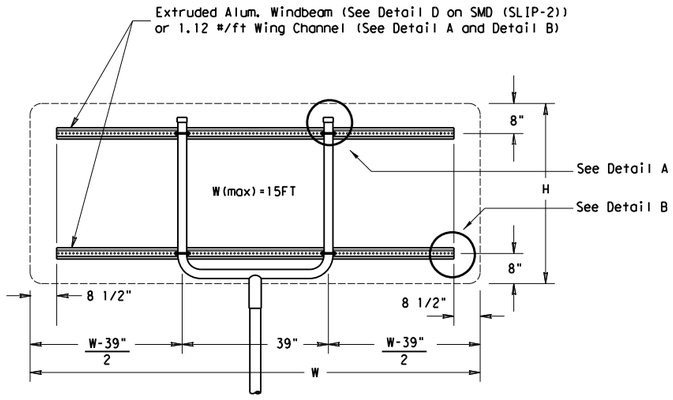
Detail C

Splices shall only be allowed behind the sign substrate.

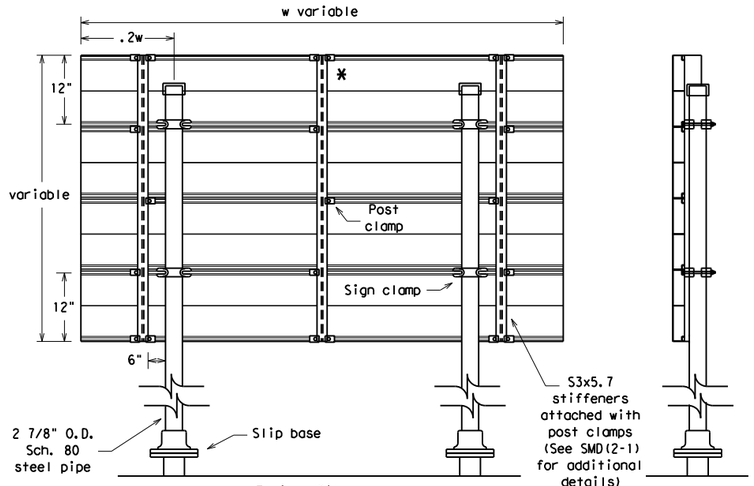
GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Sign blanks shall be the sizes and shapes shown on the plans.
11. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.



SM RD SGN ASSM TY XXXXX(1)XX(U-XX)

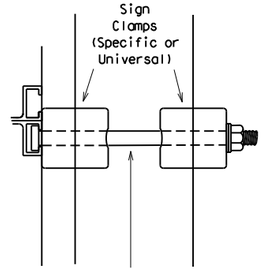


Typical Sign Mount

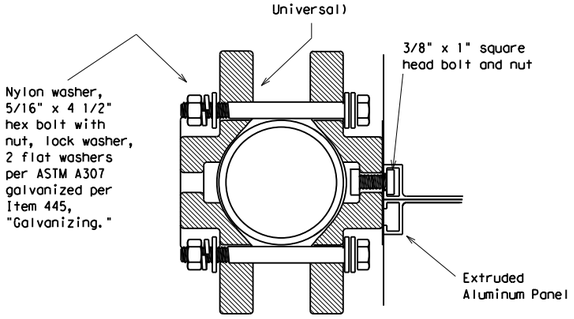
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

See Detail E
for clamp installation

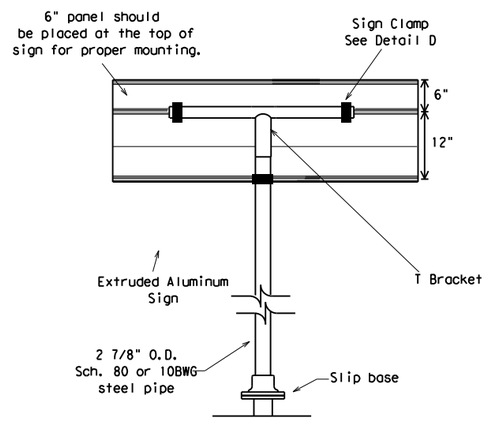


Detail E

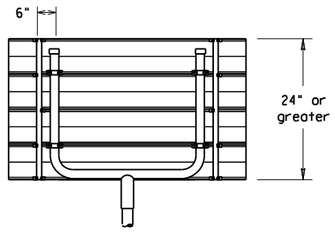


Detail A

Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
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	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0079	04	049	BU 67K
	DIST	COUNTY		SHEET NO.
	FTW	ERATH		196

APPLICABLE STANDARDS SHEETS

OVERHEAD SIGN BRIDGE STANDARDS:

OSB-SE
OSB-Z#
OSB-Z#1
HOSB-Z#
HOSB-Z1L
HOSB-Z#1
OSBT
OSBC
OSBC-SC-Z#
OSBS-SC
OSB-FD
OSB-FD-SC

CANTILEVER OVERHEAD SIGN SUPPORT STANDARDS:

COSS-SE
COSS-Z#-10
HCOSS-Z#-10
COSS-Z21-10
COSS-Z#&Z#1-10
COSSD
COSSF
COSS-FD

Note: # = Wind Zone number 1, 2, 3 or 4

HIGH MAST ILLUMINATION POLE STANDARDS:

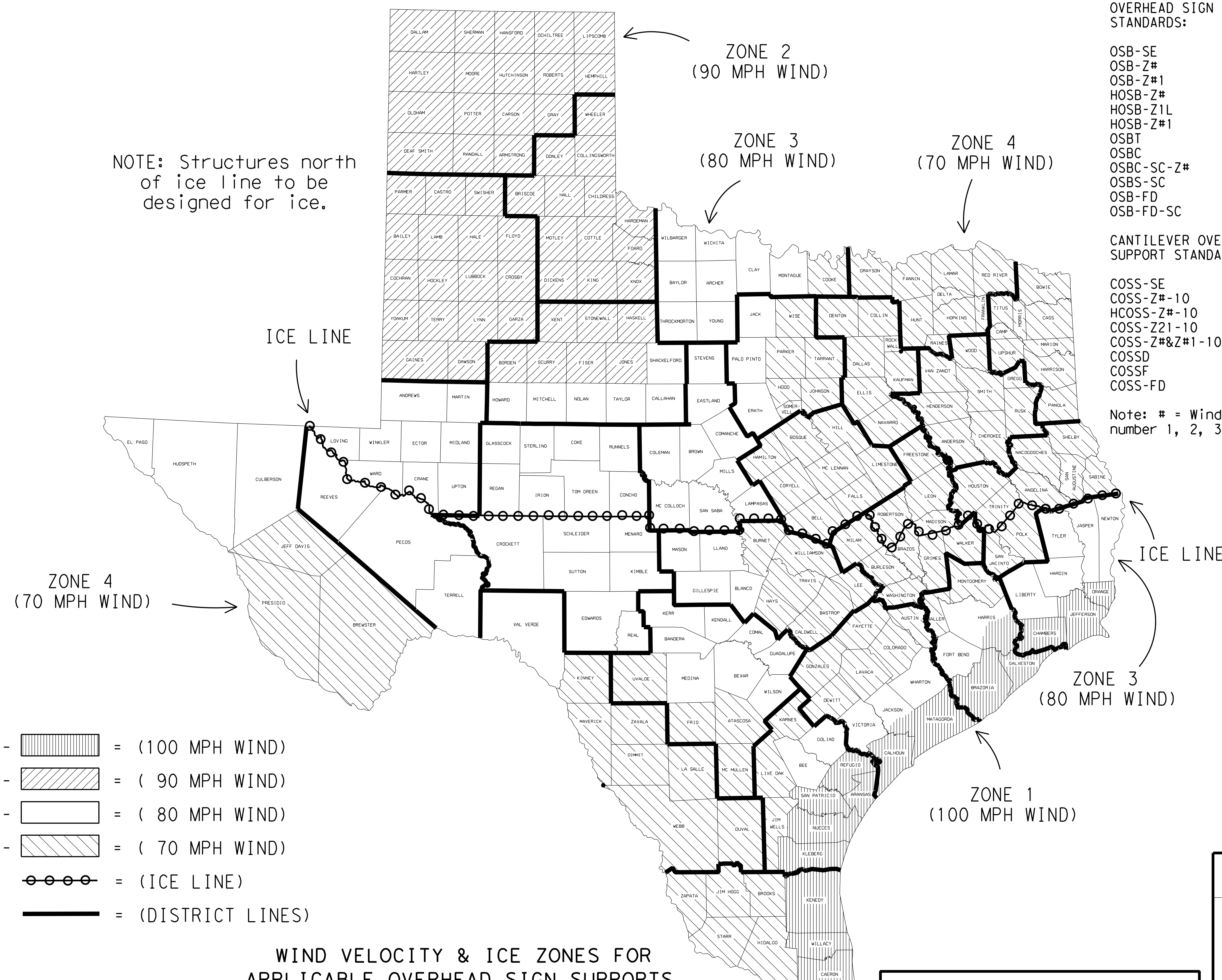
HMIP-98
HMIF-98

WALKWAYS AND BRACKETS STANDARDS:

SWW
SB(SWL-1)

TRAFFIC SIGNAL POLE STANDARDS:

SP-80
SP-100
SMA-80
SMA-100
DMA-80
DMA-100
MA-C
MAC(ILSN)
MAD-D
TS-FD
LUM-A
CFA
LMA
TS-C
MA-DPD



FOR HARRIS CO. ONLY
Zone line is just North of US 90, around on the North, West and South sides of IH 610 and down the West side of SH 288.

FOR JACKSON CO. ONLY
Zone line is just North of SH 616.

LEGEND

ZONE 1 - = (100 MPH WIND)
ZONE 2 - = (90 MPH WIND)
ZONE 3 - = (80 MPH WIND)
ZONE 4 - = (70 MPH WIND)
= (ICE LINE)
= (DISTRICT LINES)

WIND VELOCITY & ICE ZONES FOR APPLICABLE OVERHEAD SIGN SUPPORTS, HIGH MAST POLES, AND TRAFFIC SIGNAL POLES

Based on 50 Year Mean Recurrence Interval of Fastest Mile Wind Velocity at 33 feet height.

THIS SHEET TO BE INCLUDED IN ALL P.S.&E. PACKAGES CONTAINING ONE OR MORE OF THE APPLICABLE STANDARD SHEETS LISTED HEREON

Texas Department of Transportation

Traffic Operations Division Standard

WIND VELOCITY AND ICE ZONES

WV & IZ-14

FILE: windice.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1996	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-14-Added list of applicable standards, restricting use to structures designed for fastest mile wind speeds.	0079	04	049	BU 67K
	DIST		COUNTY	SHEET NO.
	FTW		ERATH	197

30

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.

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ROADWAY ILLUMINATION ASSEMBLY NOTES

1. Details apply to roadway lighting installations bid or referenced under Item 610, "Roadway Illumination Assemblies." Provide, furnish, and install all other materials not shown on the plans which may be necessary for complete and proper construction. Where manufacturers provide warranties or guarantees as a customary trade practice, furnish to the State such warranties or guarantees.

2. The locations of poles and fixtures may be shifted by the Engineer to accommodate local conditions. Install or remove poles and luminaires located near overhead electrical lines using established industry and utility safety practices and in accordance with laws governing such work. Consult with the appropriate utility company prior to beginning such work.

3. Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC),TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA),and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association, Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection.

4. Provide Roadway Illumination Light Fixtures as per TxDOT Departmental Material Specification (DMS) 11010, Item 610, and as shown on the Material Producers List (MPL) for Roadway Illumination and Electrical Supplies.

5. Fabricate steel roadway illumination poles in accordance with Roadway Illumination Poles (RIP) standards and Item 610. Poles fabricated according to RIP standards do not require shop drawing submittals.

   a. Alternate designs to RIP standards or the use of aluminum to fabricate poles will require the submission of shop drawings electronically. For instructions on submitting shop drawings electronically see "Guide to Electronic Shop Drawing Submittal" on the TxDOT web site.

   b. Limitations on use of the RIP standard: The RIP standard details were developed for installations in locations where the 3-second gust basic maximum wind speed is 110 mph, and where the elevation of the base of the pole is less than (i.e. not more than) 25' above the elevation of the surrounding terrain, in accordance with the "AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals," 6th Edition (2013) of the AASHTO Design Specifications. For poles to be installed in regions where the maximum basic wind speed exceeds 110 mph or to be mounted more than 25' above the surrounding terrain, provide poles meeting the following requirements:

      i. Submittals. Following the electronic shop drawing submittal process (see Guide to Electronic Shop Drawing Submittal on the TxDOT web site), submit to the Engineer for approval fabrication drawings and calculations for the poles, sealed by a Texas licensed professional engineer (P.E.).

      ii. Luminaire Structural Support Requirements. Provide light poles, arms, and anchor bolt assemblies with a 25 year design life to safely resist dead loads, ice loads and the required basic wind speeds at the location of installation in accordance with the 6th edition (2013) of the AASHTO Design Specifications. For transformer base poles, include transformer base and connecting hardware in calculations and shop drawing submittals. Structurally test all transformer bases to resist the theoretical plastic moment capacity of the pole. Submit certification of the plastic moment load test and FHWA breakaway requirement test of the model of base being furnished with the shop drawings. Show breakaway base model number, manufacturer's name, and logo on shop drawings. Include on manufacturer's shop drawings the ASTM designations for all materials to be used.

6. For both transformer and shoe-base type illumination poles, provide and install double-pole breakaway fuse holders as specified by DMS-11040. Breakaway fuse holders are listed on the MPL for Roadway Illumination and Electrical Supplies under Items 610 & 620. Provide 10 amp time delay fuses for breakaway connectors in light poles, or inside the light fixture for underpass luminaires. In each pole, connect luminaires to the breakaway connector with continuous stranded 12 AWG copper conductors as listed on the MPL. Bond all equipment grounding conductors together and to the ground lug in the transformer base or hand hole.

7. Tighten anchor bolts for shoe base, concrete traffic barrier base, and bridge mount roadway illumination poles, in accordance with Item 449.

8. Install T-Base with following procedure:

   a. Anchor Bolt Tightening.

      i. Coat the threads of the anchor bolts with electrically conductive lubricant.

      ii. Place the T-base over the anchor bolts. Foundation must be level and flat. The maximum permissible gap under any one corner of the t-base is 1/8" before nuts are tightened.

      iii. Coat the bearing surfaces of the nuts and washers with electrically conductive lubricant. Install (1) 1/2" hold down washer, (1) lock washer, and (1) nut on each anchor bolt. Turn the nuts onto the bolts so that each is hand-tight against the washer.

      iv. Using a torque wrench, tighten each nut to 150 ft-lb. Uniform contact is required between the foundation and the T-base in the corner regions of the T-base, and all corner gaps must be closed after applying torque. If a gap still exists after torquing to 150 ft-lbs, continue torquing each bolt incrementally until gap is closed or maximum allowable torque of 250 ft. pound is reached, whichever comes first. If 250 ft-lbs is not enough to close the gap the foundation must be leveled. Gaps along the straight sides of the T-bases and the foundation are permissible. Ensure that no high point of contact occurs between the straight sides of the T-base and the foundation.

      v. Check top of T-base for level. If not level then foundation must be leveled.

   b. Top Bolt Procedure

      i. Erect pole over T-base with crane. Coat bolts, nuts, washers, and lock washers with electrically conductive lubricant.

      ii. Install bolts and 1/2" connecting washers from the inside of the T-base, thread up through the pole base. Install flat washers, lock washers and nuts snug tight according to Item 447, "Structural Bolting."

      iii. Tighten each nut to 150 ft-lb. using a torque wrench.

   c. Level and Plumb

      i. Ensure pole is plumb and mast arm is perpendicular to the roadway according to plans to within 5 degrees.

9. Construct luminaire pole foundations in accordance with Item 416, "Drilled Shaft Foundations," and TxDOT standard sheet RID(2).

10. Provide and install underpass luminaires in accordance with Item 610, DMS-11010, and TxDOT standard sheet RID(3). Typical luminaire size for underpass luminaires is 150W HPS or 150W EQ LED.

11. Mount luminaires on arms level as shown by the luminaire level indicator.

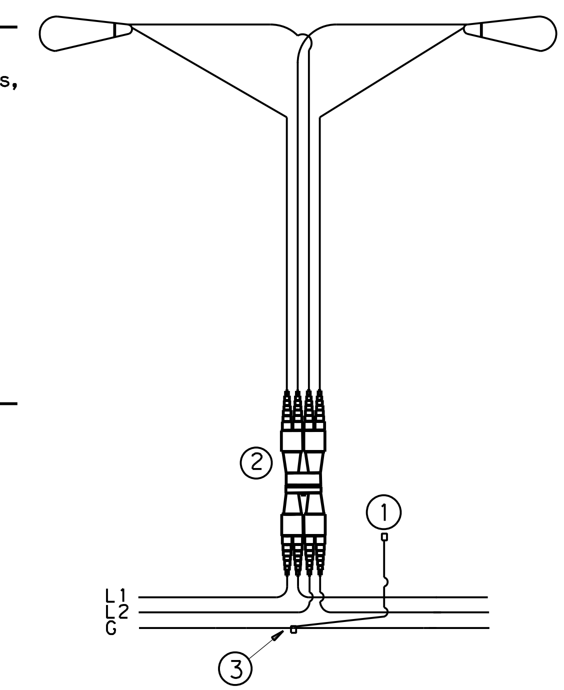
12. Orient luminaires perpendicular to the roadway intended to be lit unless otherwise shown on the plans.

Wiring Diagram Notes:

(1) Use 1/2 in.-13 UNC threaded, copper or tin-plated copper, pole bonding connector, sized appropriately for conductors, bonded to T-base, or use ground lug in handhole as available.

(2) Use pre-qualified two-pole breakaway connectors for all luminaire pole installations. For luminaires fed by a circuit with a neutral conductor, use double pole breakaway connectors with the neutral side unfused and marked white.

(3) Split Bolt or other connector.



L1,L2 = Hot Conductors
G = Grounding Conductor

TYPICAL WIRING DIAGRAM

LUMINAIRES SERVED AT 480V ON 240/480 VOLT SERVICE OR LUMINAIRES SERVED AT 240V FOR 120/240 VOLT SERVICE.

Decorative LED Lighting Notes:

1. LED Drivers in Remote Outdoor enclosures (for drivers that do not include an enclosure as part of a factory assembly):

   a. Provide NEMA 3R outdoor enclosure or as approved.

   b. Install enclosure at least 12" above ground or other horizontal surface. Mount vertically or on ceiling, and avoid direct sun where possible.

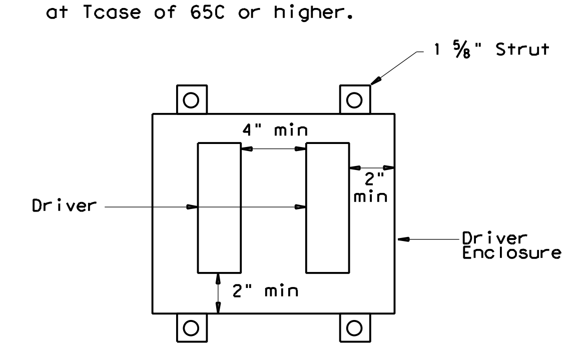
   c. Install drivers with at least 2 inches of space from enclosure walls.

   d. For multiple drivers in an enclosure, provide at least 4 inches side to side and 1 inch end to end from other drivers or electronic equipment

   e. For drivers mounted on back wall of enclosure, mount enclosure on 1 5/8" strut or other standoff to dissipate heat, or mount driver to side of the enclosure or to the metal cover.

   f. Provide remote drivers with a maximum of 100 watts

   g. Provide drivers with documentation of 100,000 hr lifetime at Tcase of 65C or higher.



Driver Spacing In Remote Enclosure

Texas Department of Transportation | Traffic Safety Division Standard

ROADWAY ILLUMINATION DETAILS

RID(1)-20

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© TxDOT January 2007	CONT	SECT	JOB	HIGHWAY
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GENERAL NOTES FOR ALL ELECTRICAL WORK

1. The location of all conduits, junction boxes, ground boxes, and electrical services is diagrammatic and may be shifted to accommodate field conditions.

2. Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC), TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA), and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association (CSA), Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Where reference is made to NEMA listed devices, International Electrotechnical Commission (IEC) listed devices will not be considered an acceptable equal to a NEMA listed device. Acceptable devices may have both a NEMA and IEC listing. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection. Replace or reinstall rejected material or equipment at no additional cost to the Department.

3. Miscellaneous nuts, bolts and hardware, except for high strength bolts, may be stainless steel when plans specify galvanized, provided the bolt size is ½ in. or less in diameter.

4. Provide the following test equipment as required by the Engineer to confirm compliance with the contract and the NEC: voltmeter, ammeter, megohm meter (1000 volt DC), ground resistance tester, torque wrenches, and torque screwdrivers. Ensure all equipment has been properly calibrated within the last year. Provide calibration certification to the Engineer upon request. Operate test equipment during inspection as requested by the Engineer.

5. Install grounding as shown on the plans and in accordance with the NEC. Ensure all metallic conduits; metal poles; luminaires; and metal enclosures are bonded to the equipment grounding conductor. Provide stranded bare copper or green insulated grounding conductors. Ground rods, connectors, and bonding jumpers are subsidiary to the various bid items.

6. When required by the Engineer, notify the Department in writing of materials from the Material Producers List (MPL) intended for use on each project. Prequalified materials are listed on the MPL on TxDOT's website under "Roadway Illumination and Electrical Supplies." No substitutions will be allowed for materials on this list.

CONDUIT

A. MATERIALS

1. Provide conduit, junction boxes, fittings, and hardware as per TxDOT Departmental Material Specification (DMS) 11030 "Conduit" and Item 618 "Conduit" of TxDOT's "Standard Specifications For Construction And Maintenance Of Highways, Streets, And Bridges," latest edition. Provide conduits listed under Item 618 on the MPL under "Roadway Illumination and Electrical Supplies." Provide conduit types according to the descriptive code or as shown on the plans. Do not substitute other types of conduits for those shown. Provide liquidtight flexible metal conduit (LFMC) when flexible conduit is called for on galvanized steel rigid metallic conduit (RMC) systems. Provide liquidtight flexible nonmetallic conduit (LFNC) when flexible conduit is called for on polyvinyl chloride (PVC) systems.

2. Provide galvanized steel RMC for all exposed conduits, unless otherwise shown on the plans. Properly bond all metal conduits.

3. Unless otherwise shown on the plans, provide junction boxes with a minimum size as shown in the following table, which applies to the greatest number of conductors entering the box through one conduit with no more than four conduits per box. When a mixture of conductor sizes is present, count the conductors as if all are of the larger size. For situations not applicable to the table, size junction boxes in accordance with NEC.

AWG	3 CONDUCTORS	5 CONDUCTORS	7 CONDUCTORS
#1	10" x 10" x 4"	12" x 12" x 4"	16" x 16" x 4"
#2	8" x 8" x 4"	10" x 10" x 4"	12" x 12" x 4"
#4	8" x 8" x 4"	10" x 10" x 4"	10" x 10" x 4"
#6	8" x 8" x 4"	8" x 8" x 4"	10" x 10" x 4"
#8	8" x 8" x 4"	8" x 8" x 4"	8" x 8" x 4"

4. Junction boxes with an internal volume of less than 100 cu. in. and supported by entering raceways must have threaded entries or hubs identified for the intended purpose and supported by connection of two or more rigid metal conduits. Secure conduit within 3 ft. of the enclosure or within 18 in. of the enclosure if all conduit entries are on the same side. Mechanically secure all junction boxes with an internal volume greater than 100 cu. inches.

5. Provide hot dipped galvanized cast iron or sand cast aluminum outlet boxes for junction boxes containing only 10 AWG or 12 AWG conductors. Do not use die cast aluminum boxes. Size outlet boxes according to the NEC.

6. Do not use intermediate metal conduit (IMC) or electrical metallic tubing (EMT) unless specifically required by the plan sheets. When EMT is called for, provide junction boxes made from galvanized steel sheeting, listed and approved for outdoor use, unless otherwise noted on the plans. Size all galvanized steel junction boxes in accordance with the NEC. Provide junction boxes for IMC conduit systems that meet the same requirements for junction boxes used with RMC systems.

7. Provide PVC junction boxes intended for outdoor use on PVC conduit systems, unless otherwise noted on the plans.

8. Provide PVC elbows in PVC conduit systems, unless otherwise shown on the plans. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the PVC conduit system. When galvanized steel RMC elbows are specifically called for in the plans and any portion of the RMC elbow is buried less than 18 in., ground the RMC elbow by means of a grounding bushing on a rigid metal extension. Grounding of the rigid metal elbow is not required if the entire RMC elbow is encased in a minimum of 2 in. of concrete. PVC extensions are allowed on these concrete encased rigid metal elbows. RMC or PVC elbows are subsidiary to various bid items.

9. When required, provide High-Density Polyethylene (HDPE) conduit with factory installed internal conductors according to Item 622 "Duct Cable." At the Contractor's request and with approval by the Engineer, substitute HDPE conduit with no conductors for bored schedule 40 or schedule 80 PVC conduit bid under Item 618. Ensure bored HDPE substituted for PVC is schedule 40 and of the same size PVC called for in the plans. Ensure the substituted HDPE meets the requirements of Item 622, except that the conduit is supplied without factory-installed conductors. Make the transition of the HDPE conduit to PVC (or RMC elbow when required) at the bore pit. Provide conduit of the size and schedule as shown on the plans. Do not extend substituted conduit into ground boxes or foundations. Provide PVC or galvanized steel RMC elbows as called for at all ground boxes and foundations.

10. Use two-hole straps when supporting 2 in. and larger conduits. On electrical service poles, properly sized stainless steel or hot dipped galvanized one-hole standoff straps are allowed on the service riser conduit.

B. CONSTRUCTION METHODS

1. Provide and install expansion joint conduit fittings on all structure-mounted conduits at the structure's expansion joints to allow for movement of the conduit. In addition, provide and install expansion joint fittings on all continuous runs of galvanized steel RMC conduit externally exposed on structures such as bridges at maximum intervals of 150 ft. When requested by the project Engineer, supply manufacturer's specification sheet for expansion joint conduit fittings. Repair or replace expansion joint fittings that do not allow for movement at no additional cost to the Department. Provide the method of determining the amount of expansion to the Engineer upon request. Do not use LFMC or LFNC as a substitute for the required expansion conduit fittings.

2. Space all conduit supports at maximum intervals of 5 ft. Install conduit spacers when attaching metal conduit to surface of concrete structures. See "Conduit Mounting Options" on ED(2). Install conduit support within 3 ft. of all enclosures and conduit terminations.

3. Do not attach conduit supports directly to pre-stressed concrete beams except as shown specifically in the plans or as approved by the Engineer.

4. Unless otherwise shown on the plans, jack or bore conduit placed beneath existing roadways, driveways, sidewalks, or after the base or surfacing operation has begun. Backfill and compact the bore pits below the conduit per Item 476 "Jacking, Boring, or Tunneling Pipe or Box" prior to installing conduit or duct cable to prevent bending of the connections.

5. When placing conduit in the sub-grade of new roadways, backfill all trenches with excavated material unless otherwise noted on the plans. When placing conduit in the sub-base of new roadways, backfill all trenches with cement-stabilized base as per requirements of Items 110 "Excavation", 400 "Excavation and Backfill for Structures", 401 "Flowable Backfill", 402 "Trench Excavation Protection", and 403 "Temporary Special Shoring."

6. Provide and place warning tape approximately 10 in. above all trenched conduit as per Item 618.

7. During construction, temporarily cap or plug open ends of all conduit and raceways immediately after installation to prevent entry of dirt, debris and animals. Temporary caps constructed of durable duct tape are allowed. Tightly fix the tape to the conduit opening. Clean out the conduit and prove it clear in accordance with Item 618 prior to installing any conductors.

8. Ensure conduit entry into the top of any enclosure is waterproof by installing conduit sealing hubs or using boxes with threaded bosses. This includes surface mounted safety switches, meter cans, service enclosures, auxiliary enclosures and junction boxes. Grounding bushings on water tight sealing hubs are not required.

9. Fit the ends of all PVC conduit terminations with bushings or bell end fittings. Provide and install a grounding type bushing on all metal conduit terminations.

10. Install a bonding jumper from each grounding bushing to the nearest ground rod, grounding lug, or equipment grounding conductor. Ensure all bonding jumpers are the same size as the equipment grounding conductor. Bonding of conduit used as a casing under roadways for duct cable is not required, if the duct extends the full length through the casing.

11. At all electrical services, install a 6 AWG solid copper grounding electrode conductor.

12. Place conduits entering ground boxes so that the conduit openings are between 3 in. and 6 in. from the bottom of the box. See the ground box detail on sheet ED(4).

13. Seal ends of all conduits with duct seal, expandable foam, or by other methods approved by the Engineer. Seal conduit immediately after completion of conductor installation and pull tests. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a conduit sealant.

14. File smooth the cut ends of all mounting strut and conduit. Before installing, paint the field cut ends of all mounting strut and RMC (threaded or non-threaded) with zinc rich paint (94% or more zinc content) to alleviate overspray. Use zinc rich paint to touch up galvanized material as allowed under Item 445 "Galvanizing." Do not paint non-galvanized material with a zinc rich paint as an alternative for materials required to be galvanized.

Texas Department of Transportation — Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUITS & NOTES

ED(1)-14

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ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

1. Provide Type XHHW insulated conductors in accordance with Departmental Material Specification (DMS)11040 "Conductors" and Item 620 "Electrical Conductors." Provide conductors as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies" Item 620. Color code insulated conductors in conformance with the NEC. Identify grounded (neutral) conductors with white insulation. Identify grounding conductors (ground wires) with green insulation or bare conductors. Identify ungrounded (hot) conductors with any color insulation except green, white, or gray. Keep color scheme consistent throughout the wiring system. Identify conductors 6 American Wire Gauge (AWG) and smaller by continuous color jacket. Identify electrical conductors 4 AWG and larger by continuous color jacket or by colored tape. When identifying conductors with colored tape, mark at least 6 in. of the conductor's insulation with half laps of tape.
2. Provide a solid copper 6 AWG grounding electrode conductor to bond the electrical service equipment to the concrete encased grounding electrode or the ground rod at the service location. Connect the grounding electrode conductor to the ground rod with a UL listed connector in accordance with DMS 11040. Connect the grounding electrode conductor to the concrete encased grounding electrode as shown in the plans.
3. Where two or more circuits are present in one conduit or enclosure, permanently identify the conductors of each branch circuit by attaching a non-metallic tag around both circuit conductors at each accessible location. Provide tags with two straps, large enough to indicate circuit number, letter, or other identification as shown in the plans. Print circuit identification on the tag with a permanent marker.
4. Use listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors for splicing as specified in DMS 11040. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Provide UL listed gel-filled insulating splice covers. Splicing materials, insulating materials, breakaway disconnects, splice covers, and fuse holders are subsidiary to various bid items.

B. CONSTRUCTION METHODS

1. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the conduit system. After installing conductors in conduit, perform conductor pull test. If a conductor cannot be freely pulled, make any needed alterations or repairs at no additional cost to the department. Perform insulation resistance tests in accordance with Item 620. Coordinate with the Engineer to witness the tests.
2. Leave 2 ft. minimum, 3 ft. maximum length for each conductor up to the splice in ground boxes. Leave 3 ft. minimum, 4 ft. maximum length of conductor in ground boxes when pulled through with no splice. Leave 1 ft. minimum, 1.5 ft. maximum length of conductor at enclosures, weatherheads and pole bases.
3. Make splices only in junction boxes, ground boxes, pole bases, or electrical enclosures and use only listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors. Insulate splices with heavy wall heat shrink tubing or gel-filled insulating splice covers to provide a watertight splice. Overlap conductor insulation with heat shrink tubing a minimum of 2 in. past both sides of the splice. Where heat shrink tubing may not shrink sufficiently to provide a watertight seal around the individual conductors, prior to heating the tubing, increase the diameter of the conductor insulation using hot melt adhesive tape to provide a watertight seal between the individual conductors and the heat shrink tubing. Ensure the tape extends past the heat shrink tubing. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Heat shrink tubing that appears to have been burned, or overheated, is considered defective and must be replaced.
4. Size and install gel-filled insulating splice covers according to manufacturer's specifications when used in place of heat shrink tubing.
5. Wire nuts with factory applied waterproof sealant may be used for 8 AWG or smaller conductors in above ground junction boxes, but not in pole bases or ground boxes. Install wire nuts in an upright position to prevent the accumulation of water.
6. Support conductors in illumination poles with a J-hook at the top of the pole.
7. When terminating conductors, remove the insulation and jacketing material without nicking the individual strands of the conductor. Conductors with nicked individual conductor strands or removed strands will be considered damaged.
8. Replace conductors and cables that are damaged beyond repair or that fail an insulation resistance test at no additional cost to the department.
9. Do not repair damaged conductors with duct tape, electrical tape, or wire nuts. Use only approved splicing methods.
10. Do not terminate more than one conductor under a single connector, unless the connector is rated for multiple conductors. Do not exceed the pressure connector's listing for maximum number and size of conductors allowed.
11. Install breakaway connectors on conductors bid under Item 620 whenever those conductors pass through a breakaway support device. Follow manufacturer's instructions when terminating conductors to breakaway connectors. Properly torque threaded connections. Proper terminations are critical to the safe operation of breakaway devices. Trim waterproofing boots on breakaway connectors to fit snugly around the conductor to ensure waterproof connection. Only one conductor may enter a single opening in a boot. Provide waterproof boots with the correct number of openings. Leave unused openings factory sealed. Use prequalified breakaway connectors as shown on the MPL.
12. Provide and install a separate stranded equipment grounding conductor (EGC) in all conduits that contain circuit wiring of 50 volts or more. Unless shown elsewhere, size the EGC to be the same size as the largest current carrying conductor contained in the conduit. Ensure all EGCs are bonded together at every accessible location. For traffic signal installations, provide a minimum size 8 AWG EGC. The EGC is paid for under Item 620.

C. TEMPORARY WIRING

1. Install temporary conductors and electrical equipment in accordance with the NEC article "Temporary Installations" and Department standard sheets.
2. Provide a ground fault circuit interrupter (GFCI) for power outlets for portable electrical equipment, power tools, ice machines, ice storage bins and refrigerators located outdoors at grade. GFCI may be any one of the following: molded cord and plug set, receptacle, or circuit breaker type.
3. Use listed wire nuts with factory applied sealant for temporary wiring where approved.
4. Enclose conductor splices within a listed enclosure or ground box, or ensure the splices are more than 10 ft. above grade vertically and more than 5 ft. horizontally from any metal structure. Where installing temporary conductors in areas subject to vehicle traffic or mobile construction equipment, ensure the vertical clearance to ground is at least 18 ft. when measured at the lowest point. Ground messenger wires that support power conductors in conformance with the NEC.
5. Protect and when necessary repair any existing electrical conduits uncovered during the construction process in a timely manner and in conformance with the NEC.

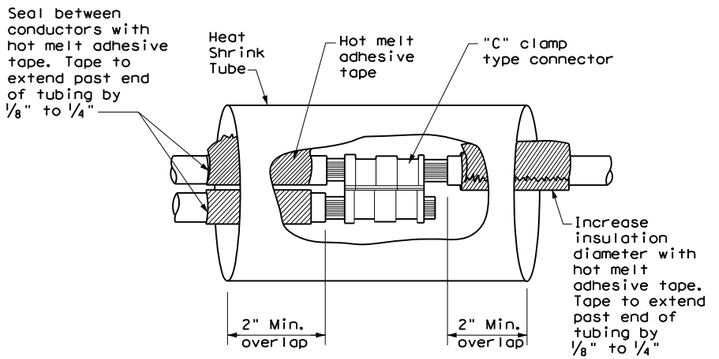
GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

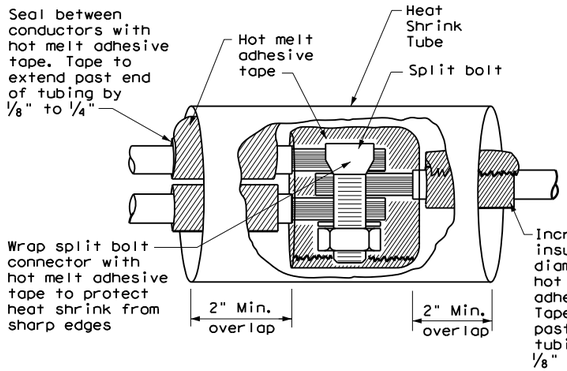
1. Provide and install a grounding electrode at electrical services. Provide ground rods according to DMS 11040 and the plans. Larger diameter or longer length rods may be called for in some specific locations, see the individual plans sheets. Concrete encased grounding electrodes may be called for in specific locations including electrical service, see individual plan sheets.

B. CONSTRUCTION METHODS

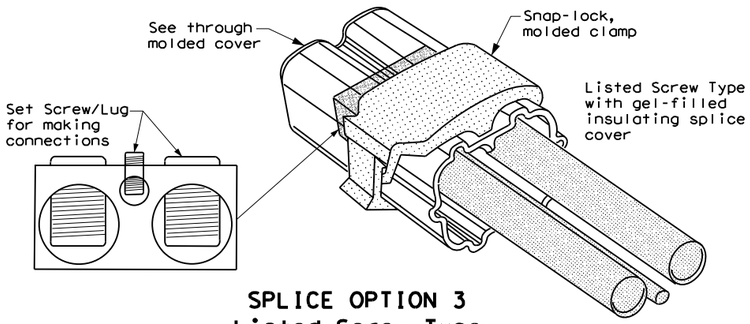
1. Furnish auxiliary ground rods for lightning protection and install in soil, concrete, or both, as called for in the plans. For ground rods installed in concrete, ensure the connection of the conductor to the ground rod is readily accessible for inspection or repairs. For ground rods installed in soil, ensure that the upper end is between 2 to 4 in. below finished grade.
2. Do not place ground rods in the same drilled hole as a timber pole.
3. Install ground rods so the imprinted part number is at the upper end of the rod.
4. Remove all non-conductive coatings such as concrete splatter from the rod at the clamp location.
5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.
6. Unless otherwise called for in the plans, protect grounding electrode conductors with non-metallic conduit. When protecting grounding electrode conductors with metal conduit, provide and install a grounding type bushing and properly sized bonding jumper on each end of the metal conduit.
7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.



SPLICE OPTION 1
Compression Type



SPLICE OPTION 2
Split Bolt Type



SPLICE OPTION 3
Listed Screw Type

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUCTORS

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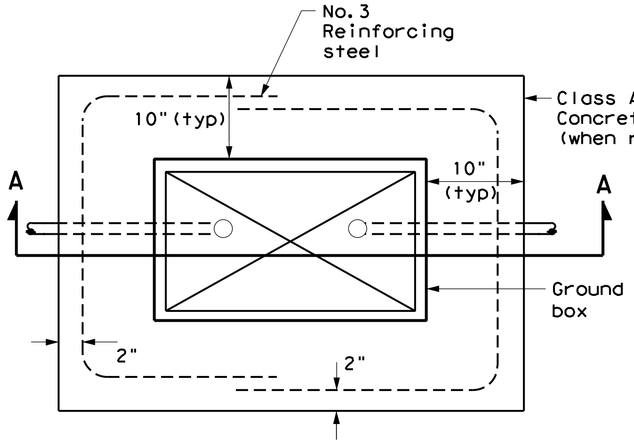
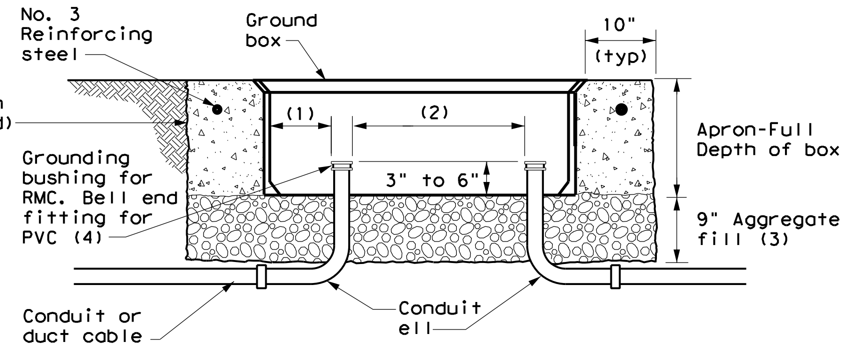


PLAN VIEW



SECTION A - A

APRON FOR GROUND BOX

(1) Uniformly space ends of conduits within the ground box. Position ends of conduits so that ground box walls do not interfere with the installation of grounding bushings or bell end fittings.

(2) Maintain sufficient space between conduits to allow for proper installation of bushing.

(3) Place aggregate under the box, not in the box. Aggregate should not encroach on the interior volume of the box.

(4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

GROUND BOXES

A. MATERIALS

1. Provide polymer concrete ground boxes measuring 16x30x24 in. (WxLxD) or smaller in accordance with Departmental Material Specification (DMS) 11070 "Ground Boxes" and Item 624 "Ground Boxes."

2. Provide Type A, B, C, D, and E ground boxes as shown in the plans, and as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 624.

3. Ensure ground box cover is correctly labeled in accordance with DMS 11070.

4. Provide larger ground boxes in accordance with Item 624 and as shown in the plans.

B. CONSTRUCTION METHODS

1. Remove all gravel and dirt from conduit. Cap all conduits prior to placing aggregate and setting ground box. Provide Grade 3 or 4 coarse aggregate as shown on Table 2 of Item 302 "Aggregates for Surface Treatments." Ensure aggregate bed is in place and at least 9 inches deep, prior to setting the ground box. Install ground box on top of aggregate.

2. Cast ground box aprons in place. Reinforcing steel may be field bent. Ensure the depth of concrete for the apron extends from finished grade to the top of the aggregate bed under the box. Ground box aprons, including concrete and reinforcing steel, are subsidiary to ground boxes when called for by descriptive code.

3. Keep bolt holes in the box clear of dirt. Bolt covers down when not working in ground boxes.

4. Install all conduits and ells in a neat and workmanlike manner. Uniformly space conduits so grounding bushings and bell end fittings can easily be installed.

5. Temporarily seal all conduits in the ground box until conductors are installed.

6. Permanently seal conduits immediately after the completion of conductor installation and pull tests. Permanently seal the ends of all conduits with duct seal, expandable foam, or other method as approved. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a sealant.

7. When a ground rod is present in a ground box, bond all equipment grounding conductors together and to the ground rod with listed connectors.

8. When a type B or D ground box is stacked to meet volume requirements, it is allowable to cut an appropriately sized hole for conduit entry in the side wall at least 18 inches below grade.

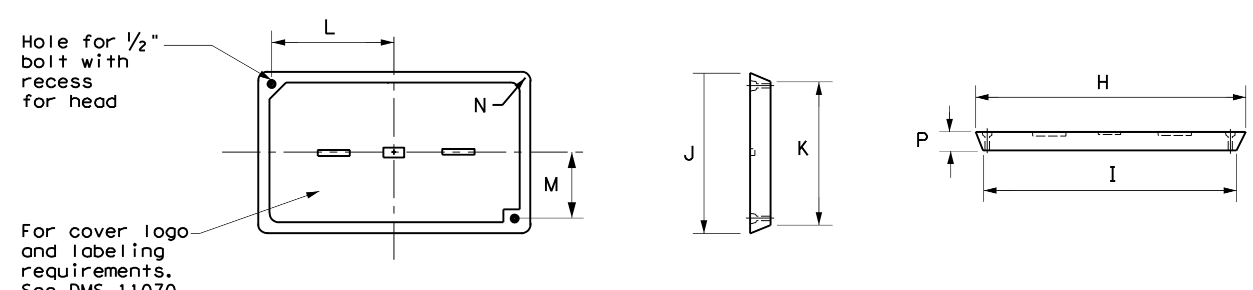
9. If an existing ground box in the contract has a metal cover, bond the cover to the equipment grounding conductor with a 3 ft. long stranded bonding jumper the same size as the grounding conductor. The bonding jumper is subsidiary to various bid items. Verify existing ground boxes with metal covers are shown on the plans, with notes fully describing the work required.

10. If other ground boxes with metal covers are within the project limits but are not part of the contract, the Engineer may direct the Contractor to bond the metal covers, identifying the specific boxes in writing. This work will be paid for separately.

11. Bond metal ground box covers to the grounding conductor with a tank ground type lug.

GROUND BOX DIMENSIONS	
TYPE	OUTSIDE DIMENSIONS (INCHES) (Width x Length X Depth)
A	12 X 23 X 11
B	12 X 23 X 22
C	16 X 29 X 11
D	16 X 29 X 22
E	12 X 23 X 17

GROUND BOX COVER DIMENSIONS								
TYPE	DIMENSIONS (INCHES)							
	H	I	J	K	L	M	N	P
A, B & E	23 1/4	23	13 3/4	13 1/2	9 7/8	5 1/8	1 3/8	2
C & D	30 1/2	30 1/4	17 1/2	17 1/4	13 1/4	6 3/4	1 3/8	2



PLAN VIEW END SIDE

GROUND BOX COVER

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS GROUND BOXES

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ELECTRICAL SERVICES NOTES

1. Provide new materials. Ensure installation and materials comply with the applicable provisions of the National Electrical Code (NEC) and National Electrical Manufacturers Association (NEMA) standards. Ensure material is Underwriters Laboratories (UL) listed. Provide and install electrical service conduits, conductors, disconnects, contactors, circuit breaker panels, and branch circuit breakers as shown on the Electrical Service Data chart in the plans. Faulty fabrication or poor workmanship in material, equipment, or installation is justification for rejection. Where manufacturers provide warranties and guarantees as a customary trade practice, furnish these to the State.

2. Provide electrical services in accordance with Electrical Details standard sheets, Departmental Material Specification (DMS) 11080 "Electrical Services," DMS 11081 "Electrical Services-Type A," DMS 11082 "Electrical Services-Type C," DMS 11083 "Electrical Services-Type D," DMS 11084 "Electrical Services-Type T," DMS 11085 "Electrical Services-Pedestal (PS)", and Item 628 "Electrical Services" of the Standard Specifications. Provide electrical service types A, C, and D, as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 628. Provide other service types as detailed on the plans.

3. Provide all work, materials, services, and any incidentals needed to install a complete electrical service as specified in the plans.

4. Coordinate with the Engineer and the utility provider for metering and compliance with utility requirements. Primary line extensions, connection charges, meter charges, and other charges by the utility company to provide power to the location are paid for in accordance with Item 628. Get approval for the costs associated with these charges prior to engaging the utility company to do the work. Consult with the utility provider to determine costs and requirements, and coordinate the work as approved.

5. The enclosure manufacturer will provide Master Lock Type 2 with brass tumblers keyed #2195 for all custom electrical enclosures. Installing Contractor is to provide Master Lock #2195 Type 2 with brass tumblers for "off the shelf" enclosures. Master Lock #2195 keys and locks become property of the State. Unless otherwise approved, do not energize electrical service equipment until locks are installed.

6. Enclosures with external disconnects that de-energize all equipment inside the enclosure do not need a dead front trim. Protect incoming line terminations from incidental contact as required by the NEC.

7. When galvanized is specified for nuts, screws, bolts or miscellaneous hardware, stainless steel may be used.

8. Provide wiring and electrical components rated for 75°C. Provide red, black, and white colored XHHW service entrance conductors of minimum size 6 American Wire Gauge (AWG). Identify size 6 AWG conductors by continuous color jacket. Identify electrical conductors sized 4 AWG and larger by continuous color jacket or by colored tape. Mark at least 6 inches of the conductor's insulation with half laps of colored tape, when identifying conductors. Ensure each service entrance conductor exits through a separately bushed non-metallic opening in the weatherhead. The lengths of the conductors outside the weatherhead are to be 12 inches minimum, 18 inches maximum, or as required by utility.

9. All electrical service conduit and conductors attached to the electrical service including the riser or the elbow below ground are subsidiary to the electrical service. For an underground utility feed, all service conduit and conductors after the elbow, including service conduit and conductors for the utility pole riser when furnished by the Contractor, will be paid for separately.

10. Provide rigid metal conduit (RMC) for all conduits on service, except for the ½ in. PVC conduit containing the electrical service grounding electrode conductor. Size the service entrance conduit as shown in the plans. Ensure conduit for branch circuit entry to enclosure is the same size as that shown on the layout sheets for branch circuit conduit. Extend all rigid metal conduits a minimum of 6 inches underground and then couple to the type and schedule of the conduit shown on the layout for that particular branch circuit. Install a grounding bushing on the RMC where it terminates in the service enclosure.

11. Use of liquidtight flexible metal conduit (LFMC) is allowed between the meter and service enclosure when they are mounted 90 to 180 degrees to each other. Size the LFMC the same size as service entrance conduit. LFMC must not exceed 3 feet in length. Strap LFMC within 1 foot of each end. LFMC less than 12 inches in length need not be strapped. Each end of LFMC must have a grounding bushing or be terminated with a grounding fitting. The LFMC must contain a grounded (neutral) conductor. Ensure any bend in LFMC never exceeds 180 degrees. A pull test is required on all installed conductors, with at least six inches of free conductor movement demonstrated to the satisfaction of the Engineer.

12. Ensure all mounting hardware and installation details of services conform to utility company specifications.

13. For all electrical service enclosures listed under Item 628 on the MPL, the UL 508 enclosure manufacturers will prepare and submit a schematic drawing unique to each service. Before shipment to the job site, place the applicable laminated schematic drawings and the laminated plan sheet showing the electrical service data chart used to build the enclosure in the enclosure's data pocket. The installing contractor will copy and laminate the actual project plan sheets detailing all equipment and branch circuits supplied by that service. The laminated plan sheets are to be placed in the service enclosure's document pocket. Reduce 11 in. x 17 in. plan sheets to 8 ½ in. x 11 in. before laminating. If the installation differs from the plan sheets, the installing contractor is to redline plan sheets before laminating.

14. When providing an "Off The Shelf" Type D or Type T service, provide laminated plan sheets detailing equipment and branch circuits supplied by that service. Reduce 11 in. x 17 in. plan sheets to 8 ½ in. x 11 in before laminating. Deliver these drawings before completion of the work to the Engineer, instead of placing in enclosure that has no door pocket.

15. Do not install conduit in the back wall of a service enclosure where it would penetrate the equipment mounting panel inside the enclosure. Provide grounding bushings on all metal conduits, and terminate bonding jumpers to grounding bus. Grounding bushings are not required when the end of the metal conduit is fitted with a conduit sealing hub or threaded boss, such as a meter base hub.

SERVICE ASSEMBLY ENCLOSURE

1. Provide threaded hub for all conduit entries into the top of enclosure.

2. Type galvanized steel (GS) enclosures may be used for Type C panelboards and for Type D and T services that do not use an enclosure mounted photocell or lighting contactor. Provide GS enclosures in accordance with DMS 11080, 11082, 11083, and 11084.

3. Provide aluminum (AL) and stainless steel (SS) enclosures for Types A, C, and D in accordance with DMS 11080, 11081, 11082, 11083, and 11084. Do not paint stainless steel.

4. Provide pedestal service (PS) enclosures in accordance with ED(9) and DMS 11080 and 11085. Do not provide GS pedestal services. If GS is shown in the PS descriptive code, provide an AL enclosure.

MAIN DISCONNECT & BRANCH CIRCUIT BREAKERS

1. Field drill flange-mounted remote operator handle if needed, to ensure handle is lockable in both the "On" and "Off" positions.

2. When the utility company provides a transformer larger than 50 KVA, verify that the available fault current is less than the circuit breaker's ampere interrupting capacity (AIC) rating and provide documentation from the electric utility provider to the Engineer.

PHOTOELECTRIC CONTROL

1. Provide photocell as listed on the MPL. Move, adjust, or shield the photocell from stray or ambient night time light to ensure proper operation. Mount photocell facing north when practical. Mount top of pole photocells as shown on Top Mounted Photocell Detail.

* ELECTRICAL SERVICE DATA

Elec. Service ID	Plan Sheet Number	Electrical Service Description	Service Conduit **Size	Service Conductors No./Size	Safety Switch Amps	Main Ckt. Bkr. Pole/Amps	Two-Pole Contractor Amps	Panelbd/ Loadcenter Amp Rating	Branch Circuit ID	Branch Ckt. Bkr. Pole/Amps	Branch Circuit Amps	KVA Load
SB 183	289	ELC SRV TY A 240/480 100(SS)AL(E)SF(U)	2"	3/#2	100	2P/100	100	N/A	Lighting NB	2P/40	26	28.1
									Lighting SB	2P/40	25	
									Underpass	1P/20	15	
NB Access	30	ELC SRV TY D 120/240 060(NS)SS(E)TS(O)	1 ¼"	3/#6	N/A	2P/60		100	Sig. Controller	1P/30	23	5.3
							30		Luminaires	2P/20	9	
									CCTV	1P/20	3	
2nd & Main	58	ELC SRV TY T 120/240 000(NS)GS(N)SP(O)	1 ¼"	3/#6	N/A	N/A	N/A	70	Flashing Beacon 1	1P/20	4	1.0
									Flashing Beacon 2	1P/20	4	

* Example only, not for construction. All new electrical services must have electrical service data chart specific to that service as shown in the plans.

** Verify service conduit size with utility. Size may change due to utility meter requirements. Ensure conduit size meets the National ELectrical Code.

EXPLANATION OF ELECTRICAL SERVICE DESCRIPTIVE CODE

ELEC SERV TY X XXX/XXX XXX (XX) XX (X) XX (X)

Schematic Type

Service Voltage V / V

Disconnect Amp Rating
000 indicates main lug only/
Typically Type T

(SS)= Safety Switch Ahead of Meter-Check with Utility
(NS)= No safety Switch Ahead of Meter-Check with Utility

Enclosure Type
GS= Galvanized steel("off the shelf")
SS= Stainless steel(Custom Enclosure)See MPL
AL= Aluminum (Custom Enclosure)See MPL

Photocell Mounting Location
(E)= Inside Service/Enclosure Mounted
(T)= Top of pole
(L)= Luminaire mounted
(N)= None/No Photocell or Lighting Contactor Required

Service Support Type
GC= Granite concrete
OC= Other concrete
TP= Timber pole
SP= Steel pole
SF= Steel frame
OT= Pole by others or paid for separately
EX= Existing pole
TS= Service on traffic signal pole
PS= Pedestal Service

O= Overhead Service Feed from Utility
U= Underground Service Feed from Utility

TOP MOUNTED PHOTOCELL

Install conduit strap maximum 3 feet from box. 5 foot maximum spacing between straps supporting conduit.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE NOTES & DATA

ED(5)-14

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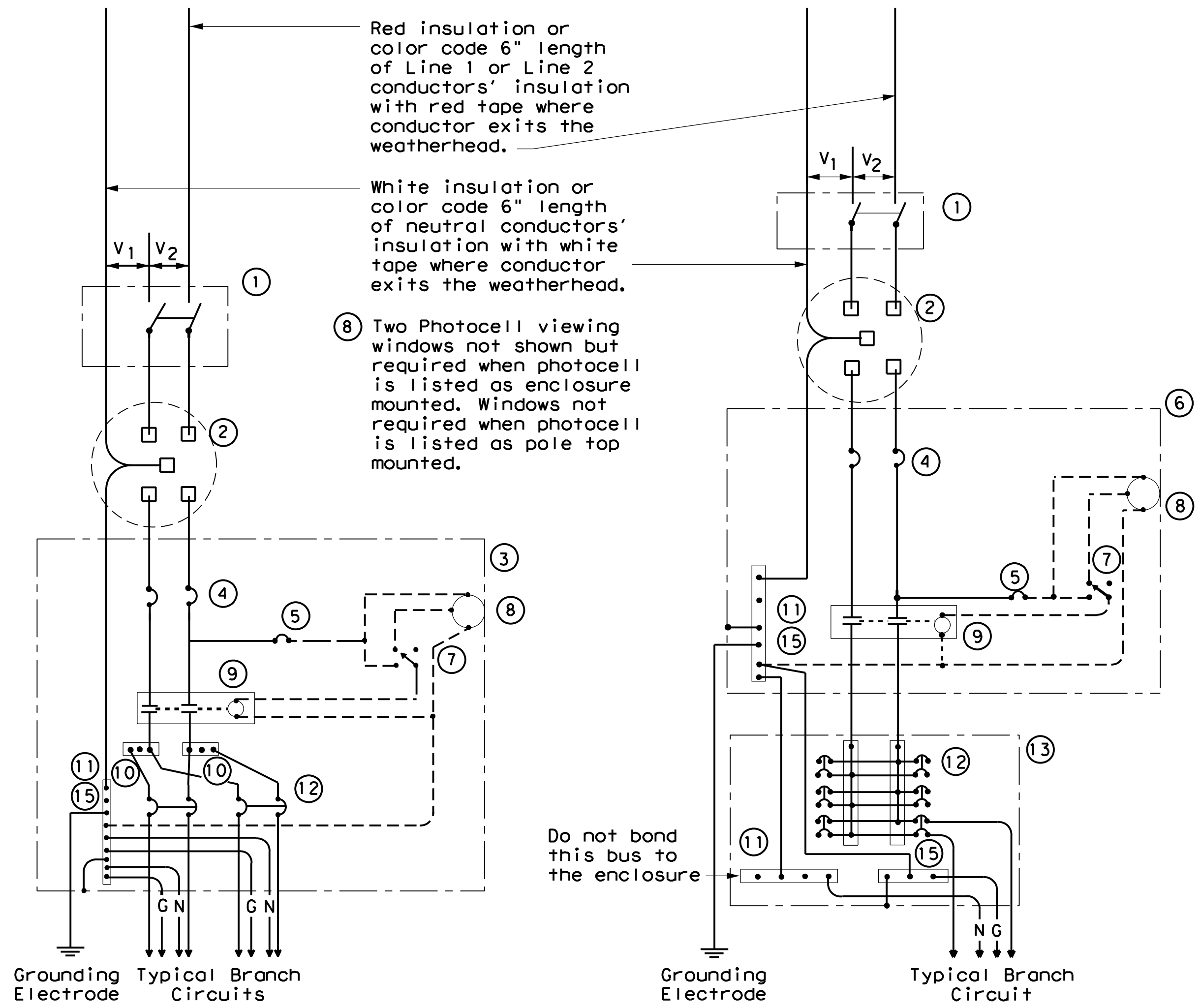
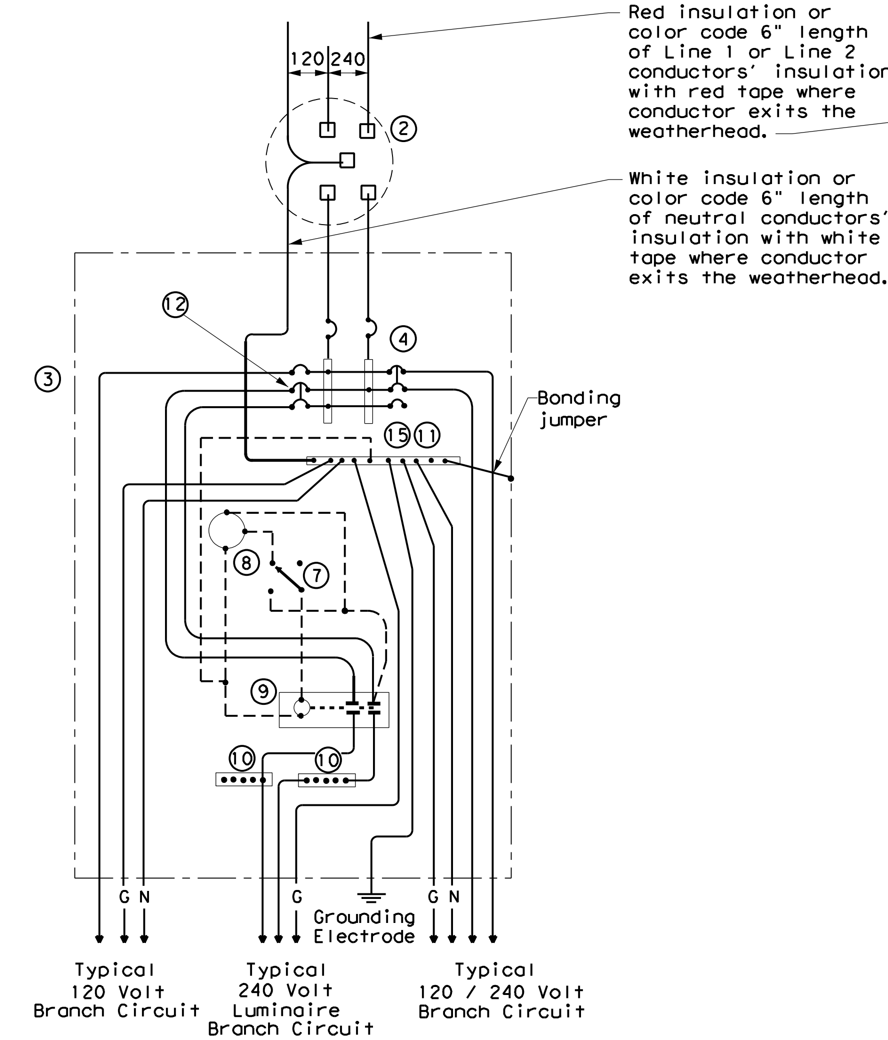
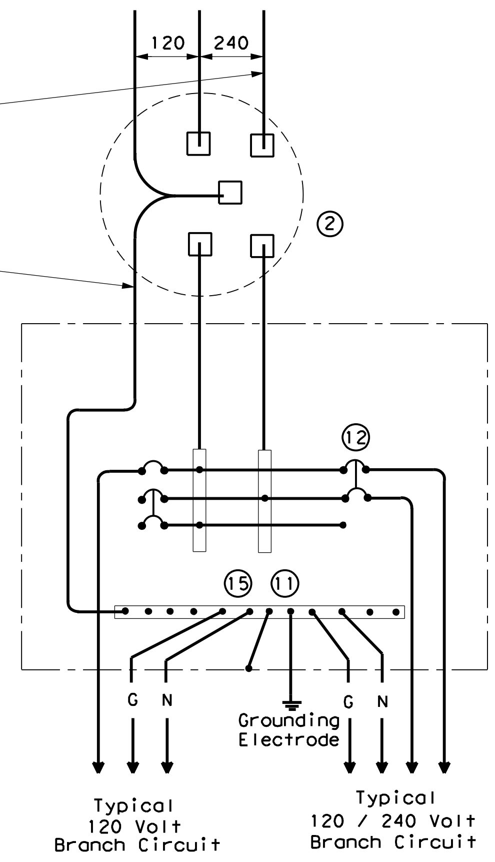


SCHEMATIC TYPE A
THREE WIRE

SCHEMATIC TYPE C
THREE WIRE



SCHEMATIC TYPE D - CUSTOM
120/240 VOLTS - THREE WIRE



SCHEMATIC TYPE T

120/240 VOLTS - THREE WIRE

Galvanized steel-"Buy Off The Shelf" only. When required install photocell top of the pole or on luminaire only, no lighting contractor will be installed.

WIRING LEGEND	
———	Power Wiring
- - - - -	Control Wiring
—N—	Neutral Conductor
—G—	Equipment grounding conductor-always required

SCHEMATIC LEGEND	
1	Safety Switch (when required)
2	Meter (when required-verify with electric utility provider)
3	Service Assembly Enclosure
4	Main Disconnect Breaker (See Electrical Service Data)
5	Circuit Breaker, 15 Amp (Control Circuit)
6	Auxiliary Enclosure
7	Control Station ("H-O-A" Switch)
8	Photo Electric Control (enclosure-mounted shown)
9	Lighting Contactor
10	Power Distribution Terminal Blocks
11	Neutral Bus
12	Branch Circuit Breaker (See Electrical Service Data)
13	Separate Circuit Breaker Panelboard
14	Load Center
15	Ground Bus

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE ENCLOSURE AND NOTES

ED(6)-14

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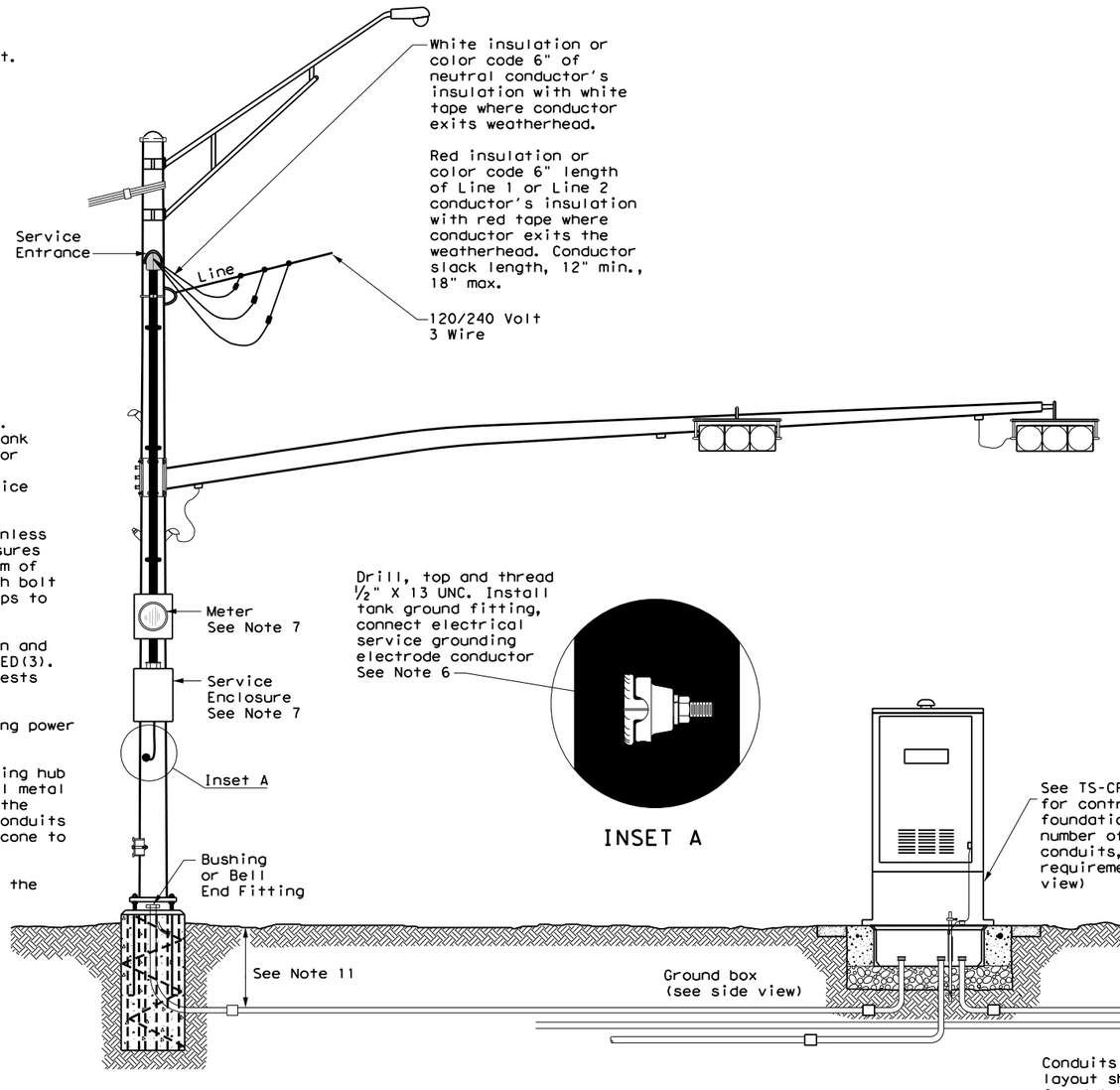
TRAFFIC SIGNAL NOTES

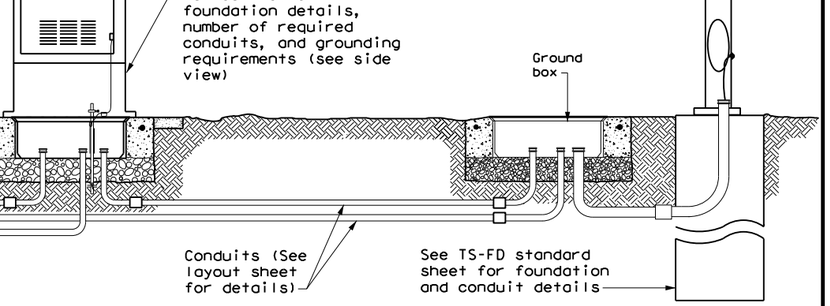
1. Do not pass luminaire conductors through the signal controller cabinet.
2. Include an equipment grounding conductor in all conduits throughout the electrical system. Bond all exposed metal parts to the grounding conductor.
3. Provide roadway luminaires, when required, in accordance with the material and construction sections of Item 610, "Roadway Illumination Assemblies," except for performance testing of luminaires. Test installed roadway luminaires for proper operation as a part of the associated traffic signal system test.
4. If internally illuminated street name signs are approved for use, ground the fixture to the pole with a 12 AWG green XHHW conductor.
5. Bond anchor bolts to rebar cage in two locations using #3 bars or 6 AWG stranded copper conductors. Use listed mechanical connectors rated for embedment in concrete. See TXDOT standard TS-FD for further details.
6. Drill and tap signal poles for ½ in. X 13 UNC tank ground fitting. Provide and install tank ground fitting 4 in. to 6 in. directly below electrical service enclosure. Provide properly sized hole through the bottom of the enclosure for the service grounding electrode conductor. Connect the electrical service grounding electrode conductor to the tank ground fitting. Ensure electrical service grounding electrode conductor is as short and straight as possible from the enclosure to the tank ground fitting. See Inset A detail for further information. Size service entrance conduit and branch circuit conduit as shown in the plans.
7. Mount electrical service enclosure and meter to signal pole with stainless steel bands. Ensure bands are a minimum width of ¾ in. Secure enclosures to bands using two-bolt brackets. Install brackets near top and bottom of each enclosure. Install properly sized stainless steel washers on each bolt in the enclosure. Band or drill and tap properly sized stand-off straps to signal pole for attaching conduit.
8. Conduct pull tests and insulation resistance tests on all illumination and power conductors as required in Item 620 "Electrical Conductors" and ED(3). To prevent electronics damage, do not conduct insulation resistance tests on traffic signal cables after termination.
9. Lock all enclosures and bolt down all ground box covers before applying power to the signal installation.
10. Terminate conduits entering the top of enclosures with a conduit-sealing hub or threaded boss such as meter hub. Install a grounding bushing on all metal conduits not connected to conduit-sealing hub or threaded boss. Bond the grounding bushing to the ground bus with a bonding jumper. Seal all conduits entering enclosures with duct seal or expanding foam. Do not use silicone to seal conduit ends.
11. For all conduits, ensure the burial depth is a minimum of 18". Ensure the minimum burial depth for conduit placed under a roadway is 24".



SIGNAL POLE WITH SERVICE

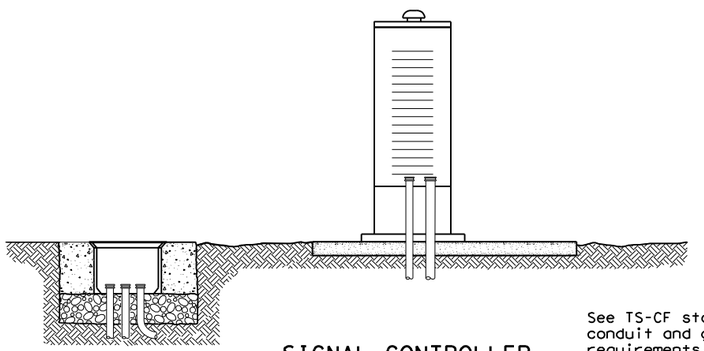
Type T electrical service mounted on signal pole shown as an example. See electrical details, layout sheets, and electrical service data chart for additional details.

INSET A



SIGNAL CONTROLLER FRONT VIEW

SIGNAL POLE



SIGNAL CONTROLLER SIDE VIEW

See TS-CF standard for conduit and grounding requirements. See layout sheets for ground box locations and any additional conduits that are required.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS TYPICAL TRAFFIC SIGNAL SYSTEM DETAILS

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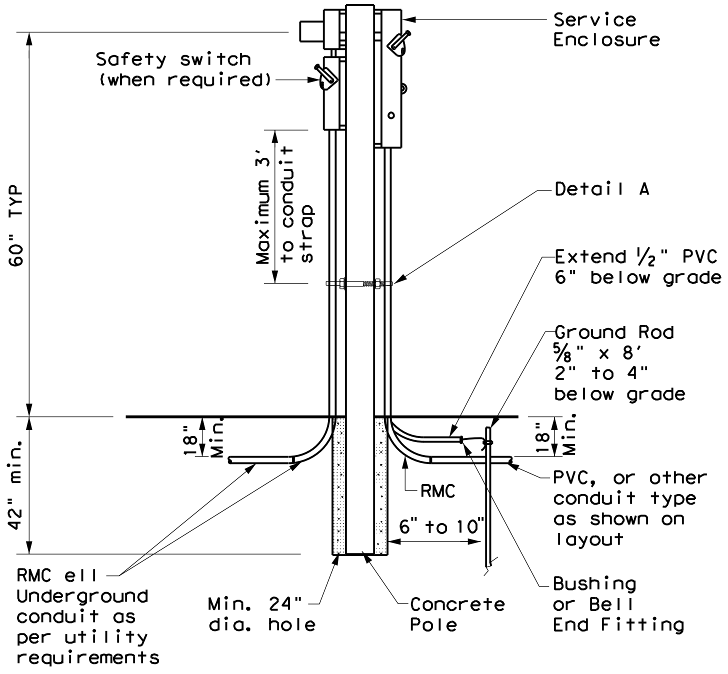
TIMBER POLE (TP) SERVICE SUPPORT NOTES

1. Ensure electrical service support is a class 5 treated timber pole as per Item 627 "Treated Timber Poles." Embed timber pole to depth required in Item 627.
2. Conduit and electrical conductors attached to the electrical service pole and underground within 12 in. of service pole are not paid for directly but are subsidiary to the electrical service.
3. Install pole-top mounted photocell (T) on north side of pole, or in service enclosure (E) as required. See Electrical Service Data chart in plan set.
4. Gain pole as required to provide flat surface for each channel. Gain timber pole to 5/8 in. max. depth and 1 7/8 in. max. height. Gain pole in a neat and workmanlike manner.
5. Mount meter and service equipment on stainless steel or galvanized channel (Unistrut, Kindorf, or equal). Provide channel sized 1 in. to 3 3/4 in. maximum depth, and 1 1/2 in. to 1 5/8 in. maximum width. File smooth the cut ends of galvanized channel and paint with zinc rich paint before installing on pole. Secure each channel section to timber pole with two galvanized or SS lag bolts, 1/4 in. minimum diameter by 1 1/2 in. minimum length. Use a galvanized or SS flat washer on each lag bolt. Do not stack channel.
6. When excess length must be trimmed from poles, trim from the top end only.

GRANITE CONCRETE (GC) & OTHER CONCRETE (OC) NOTES

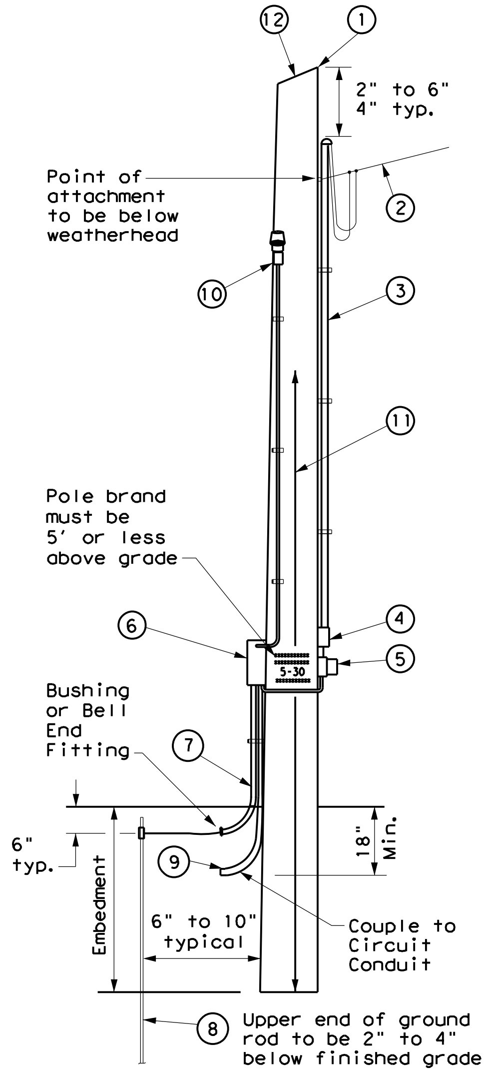
Ensure electrical service support structures bid as type Granite Concrete (GC) or Other Concrete (OC) meet the following requirements.

1. Provide GC and OC poles that meet the requirements of DMS 11080 "Electrical Services."
2. Provide prestressed concrete poles suitable for direct embedment into the ground without special foundations.
3. Verify poles are marked as required on DMS 11080. Location of marking should be approximately 4' above final grade. Use the two-point pickup locations when handling pole in horizontal position, and one-point pickup location for use in raising the pole to a vertical position. These marks are small but conspicuous.
4. Embed poles 42 in. or 10% of the length plus 2 ft., whichever is greater.
5. Ensure all installation details of services are in accordance with utility company specifications.
6. Install a one point rack or eye bolt bracket 6 inches to 12 inches below the weatherhead as an overhead service drop anchoring point for the electric utility.
7. Furnish and install galvanized or stainless steel channel strut 1 1/2 in. or 1 5/8 in. wide by 1 in. up to 3 3/4 in. deep (Unistrut, Kindorf, B-line or equal). Attach channel strut with stainless steel concrete anchors (max. 1" depth), square U-bolts or back to back channel strut with long bolts, or other secure mounting as approved by the Engineer. Ensure bolts are galvanized in accordance with ASTM A153. Do not stack channel struts.
8. Backfill the holes thoroughly by tamping in 6 in. lifts. After tamping to grade, place additional backfill material in a 6 inch high cone around the pole to allow for settling. Use material equal in composition and density to the surrounding area. Backfilling will not be paid for directly but is subsidiary to various bid items.

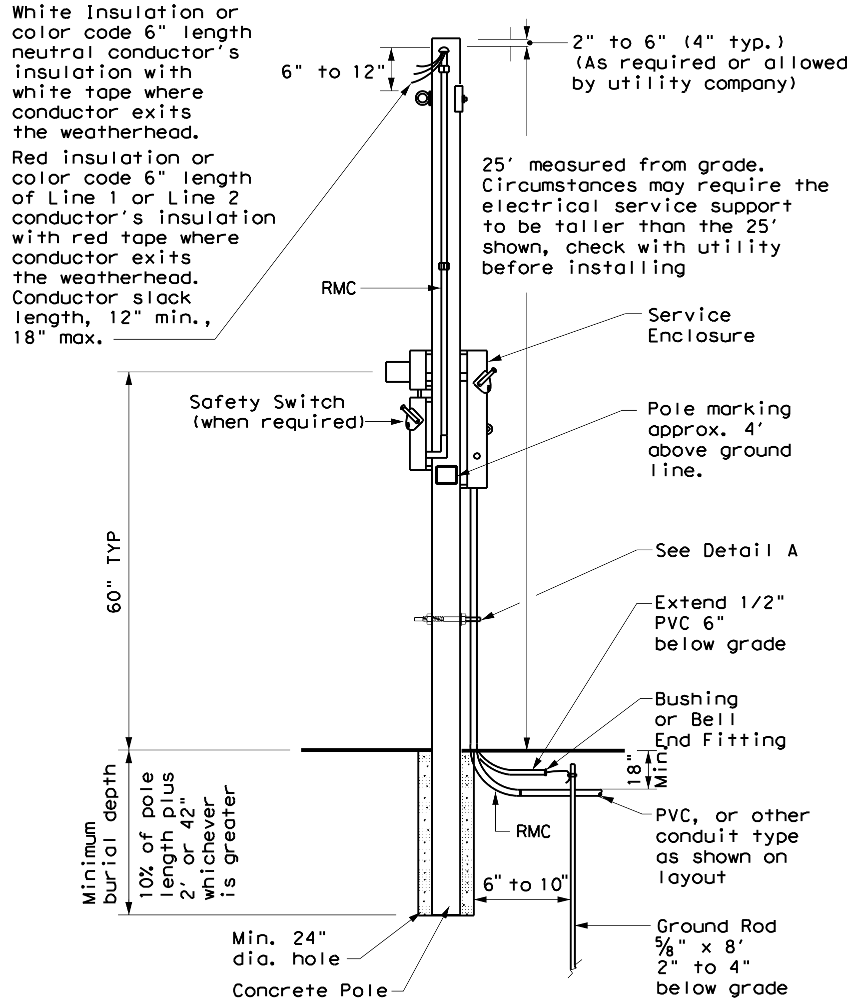


CONCRETE SERVICE SUPPORT
Underground (U)

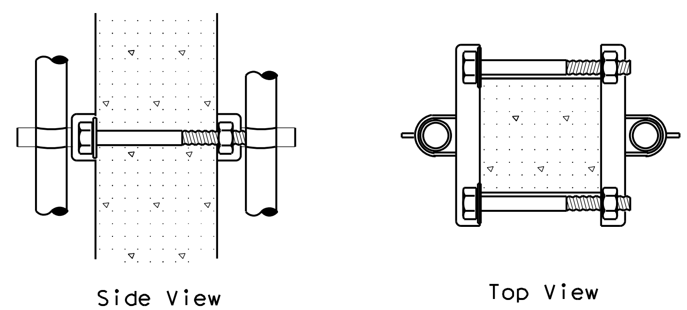
1. Class 5 pole, height as required
2. Service drop from utility company (attached below weatherhead)
3. Service conduit (RMC) and service entrance conductors - One Red, One Black, One White (See Electrical Service Data)
4. Safety switch (when required)
5. Meter (when required)
6. Service enclosure
7. 6 AWG bare grounding electrode conductor in 1/2 in. PVC to ground rod - extend 1/2 in. PVC 6 in. underground.
8. 5/8 in. x 8 ft. Copper clad ground rod - drive ground rod to a depth of 2 in. to 4 in. below grade.
9. RMC same size as branch circuit conduit.
10. See pole-top mounted photocell detail on ED(5).
11. When required by the serving utility provide bare 6 AWG copper conductor. Run wire from pole top to butt wrap or copper butt plate. Protect conductor with non-conductive material to a height of 8 ft. above finished grade.
12. When required by utility, cut top of pole at an angle to enhance rain run off.



SERVICE SUPPORT TYPE TP (O)



CONCRETE SERVICE SUPPORT
Overhead (O)



DETAIL A

See Note 7. Before installing channel that has been cut, file sharp edges and paint with zinc-rich paint. Ensure there is no paint splatter on the pole.

Texas Department of Transportation
Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE SUPPORT TYPES GC, OC, & TP

ED(10)-14

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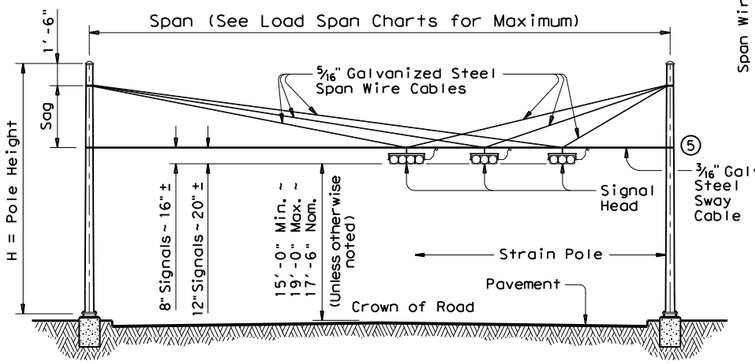
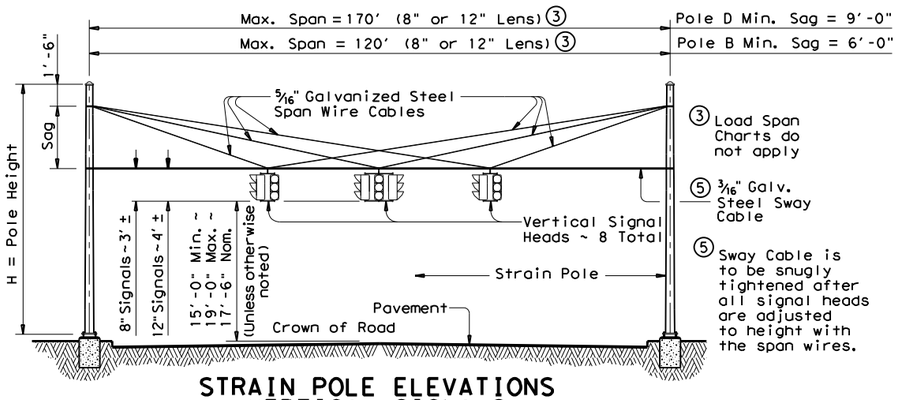
STRAIN POLE DESCRIPTION	Pole Type	Found-ation Type	Maximum Permissible Span Wire Load (lbs.)
26′ Pole	A	36-A	5200
30′ Pole	B	36-A	4600
30′ Pole with Lum.	B	36-A	4400
30′ Pole with 20′ Mast Arm	C	36-B	5600
30′ Pole with 24′ Mast Arm	C	36-B	5500
30′ Pole with 28′ Mast Arm	C	36-B	5300
30′ Pole with 32′ Mast Arm	C	36-B	5100
30′ Pole with 36′ Mast Arm	C	36-B	4900
30′ Pole with 20′ Mast Arm & Lum.	C	36-B	5300
30′ Pole with 24′ Mast Arm & Lum.	C	36-B	5200
30′ Pole with 28′ Mast Arm & Lum.	C	36-B	5000
30′ Pole with 32′ Mast Arm & Lum.	C	36-B	4800
30′ Pole with 36′ Mast Arm & Lum.	C	36-B	4500
34′ Pole	D	36-B	5600
34′ Pole with Lum.	D	36-B	5400

② Numbers on Load Span Charts indicate the number of signal heads on the span. The total span wire design load is based on one 5-section head and one or more additional 3-section head(s). Design wind pressures on cables are assumed as 1.0 lb/ft. Weight of span wire cables (one per signal head) is assumed as 0.65 lb/ft which includes an allowance for conductor cables and miscellaneous hardware. The effect of the sway cable on load distribution is ignored as it is assumed to break at design wind conditions. When a pole supports 2 spans, the span wire design loads for both spans should be added vectorially to determine the design load for that pole.

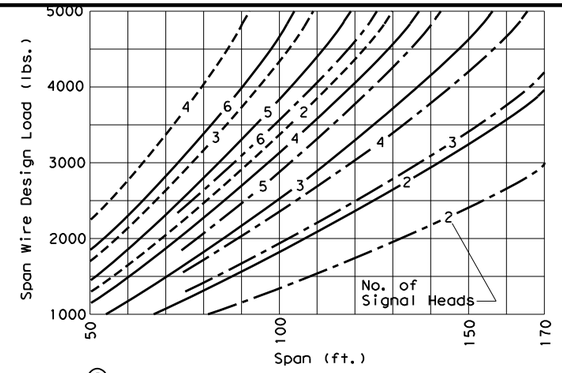


STRAIN POLE ELEVATIONS HORIZONTAL SIGNALS

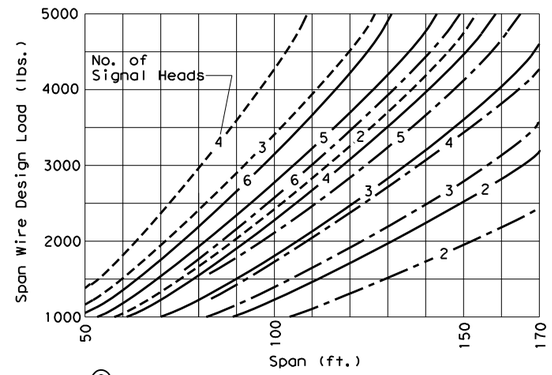


STRAIN POLE ELEVATIONS VERTICAL SIGNALS

(Mast arms are not used with vertical signals)



② SIGNALS WITH 12-INCH LENS



② SIGNALS WITH 8-INCH LENS

Signal Head Type	Wt. Per Head	Wind Area ⬙
5-Section, 12" Lens	125 lbs	9.6 sq. ft.
5-Section, 8" Lens	70 lbs	4.8 sq. ft.
3-Section, 12" Lens	75 lbs	5.64 sq. ft.
3-Section, 8" Lens	45 lbs	3.0 sq. ft.

⬙ Effective projected design wind area (actual area times drag coefficient)

---------- Sag = 4′-6" (26′ or 30′ Pole)
———— Sag = 8′-0" (30′ or 34′ Pole)
—·—·— Sag = 11′-6" (34′ Pole)

SHIPPING PARTS LIST

Poles (Without Traffic Signal Arm)

Pole Type	Strain poles with Luminaire: Ship each pole with the following hardware attached: handhole at base, pole cap, 2 clamp-on simplex and 1 pipe plug.			Strain poles without Luminaire: Ship each pole with the following hardware attached: handhole at base, pole cap and 1 pipe plug.		
	Description	Designation	Quantity	Description	Designation	Quantity
A				26′ Strain Pole	SP 26 A-80	
B	30′ Strain Pole	SPL 30 B-80		30′ Strain Pole	SP 30 B-80	
D	34′ Strain Pole	SPL 34 D-80		34′ Strain Pole	SP 34 D-80	

Poles (With Traffic Signal Arm)

Pole Type	Strain poles with Luminaire: Ship each pole with the following hardware attached: handhole at base, pole cap, clamp-on simplex and 3 pipe plugs.			Strain poles without Luminaire: Ship each pole with the following hardware attached: handhole at base, pole cap and 3 pipe plugs.		
	Description	Designation	Quantity	Description	Designation	Quantity
C	30′ SPw/TS Arm	SPL 30 C-80		30′ SPw/TS Arm	SP 30 C-80	

Traffic Signal Arms (For Type C poles)

Nominal Arm Length	Type I Arm (1 Signal): Ship each Type I Arm with the following hardware attached: 2 CGB Connectors, 1 clamp with bolts and washers		Type II Arm (2 Signals): Ship each Type II Arm with the following hardware attached: 1 Bracket Assembly ①, 3 CGB Connectors and 1 clamp with bolts and washers		Type III Arm (3 Signals): Ship each Type III Arm with the following hardware attached: 2 Bracket Assemblies ①, 4 CGB Connectors and 1 clamp with bolts and washers	
ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20I-80					
24	24I-80		24 II -80			
28	28I-80		28 II -80			
32			32 II -80		32 III -80	
36			36 II -80		36 III -80	

Anchor Bolt Assemblies (1 per pole)

Templates may be removed for shipment.

Anchor Bolt Diameter	Anchor Bolt Length	Quantity
1 3/4"	3′-10"	
2"	4′-3"	

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

Luminaire Arms

Nominal Arm Length	Quantity
8′ Arm	

① See Sheet "DMA-80"

Pole Type	ROUND POLES D_B in.	D_T in.	④thk in.	H ft.	POLYGONAL POLES D_B in.	D_T in.	④thk in.	H ft.
A	12.5	8.9	.239	26	13.0	9.0	.239	26
B	13.5	9.3	.239	30	14.0	9.0	.239	30
C	15.5	11.3	.239	30	16.0	11.0	.239	30
D	15.5	10.7	.239	34	16.0	11.0	.239	34

④ Thickness shown are minimum, thicker materials may be used.

D_B = Pole Base O.D. D_T = Pole Top O.D. H = Pole Height

SHEET 1 OF 2

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES STRAIN POLE ASSEMBLIES

(80 MPH WIND ZONE)

SP-80(1)-12

DN: MS	CK: JSY	DW: BR	CK: JSY

REVISIONS: 6-96, 1-12

CONT	SECT	JOB	HIGHWAY
0079	04	049	BU 67K
DIST	COUNTY		SHEET NO.
FTW	ERATH		206

120A

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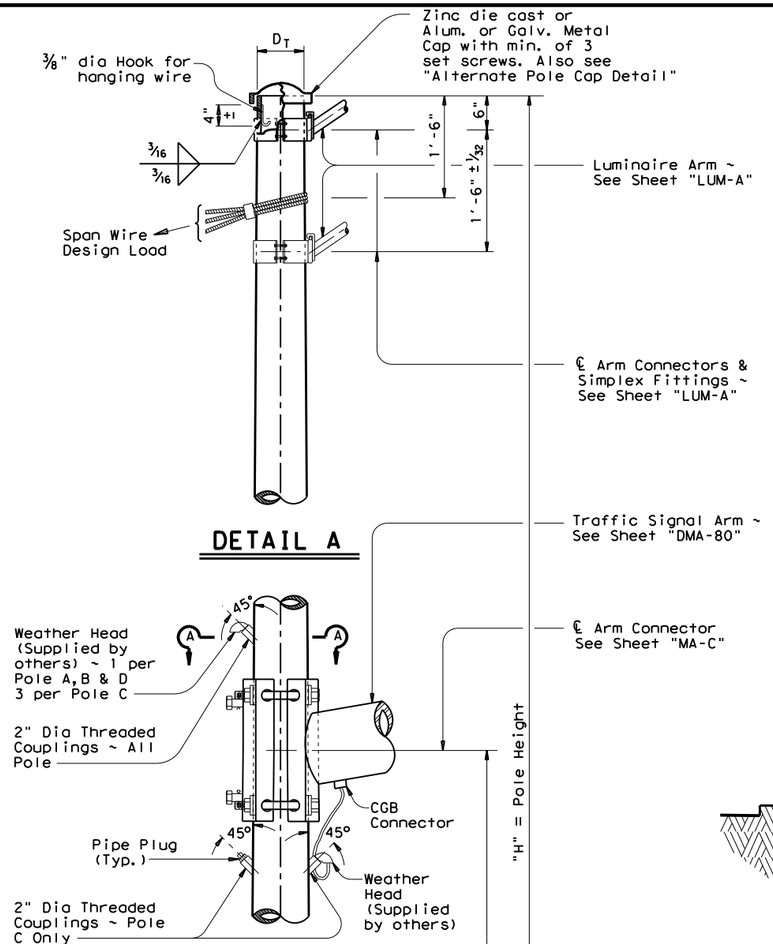
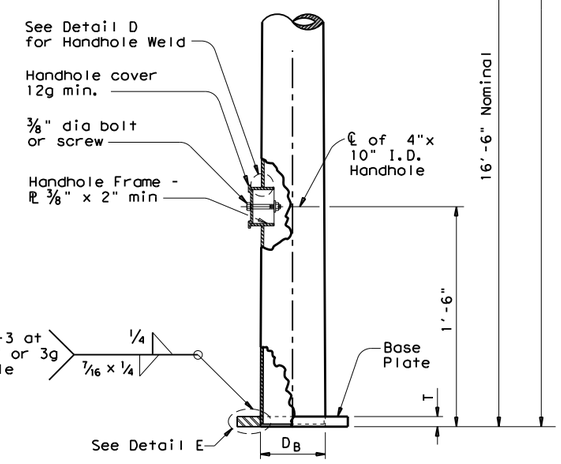


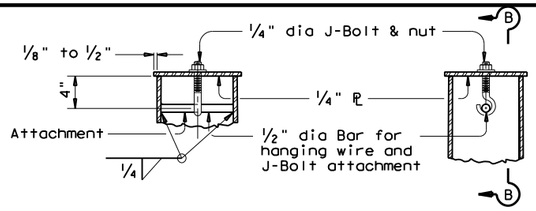
DETAIL A

DETAIL B



DETAIL C

POLE ELEVATION



SECTION B-B

ALTERNATE POLE CAP DETAIL

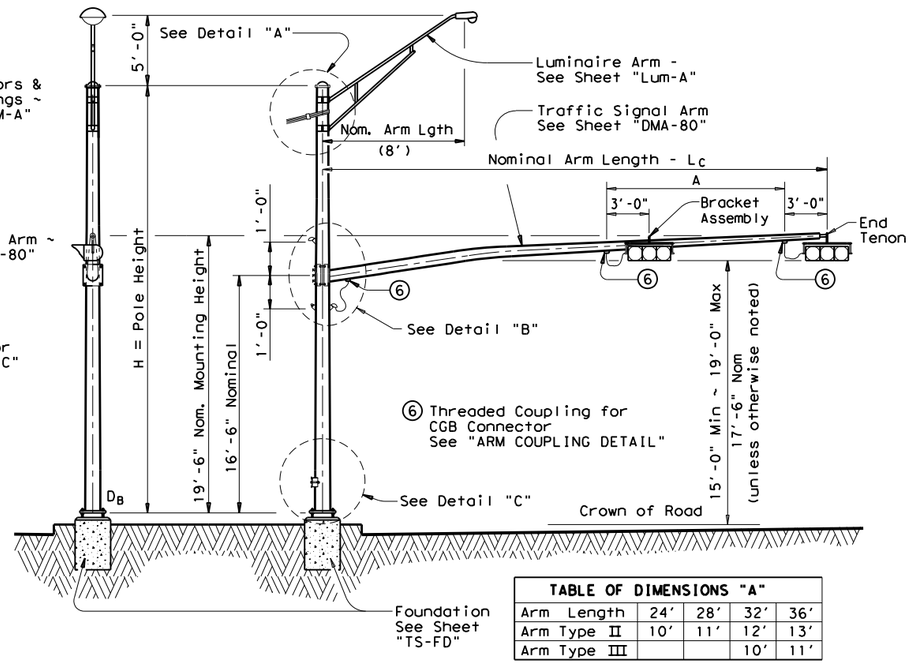
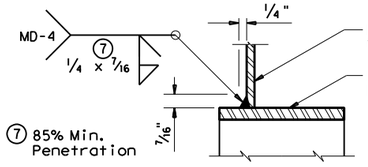
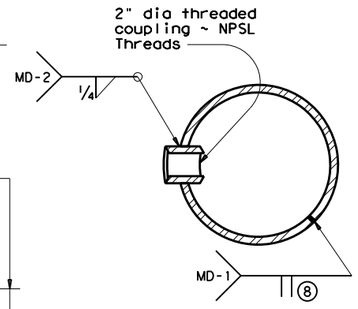


TABLE OF DIMENSIONS "A"				
Arm Length	24'	28'	32'	36'
Arm Type II	10'	11'	12'	13'
Arm Type III			10'	11'

STRUCTURE ASSEMBLY

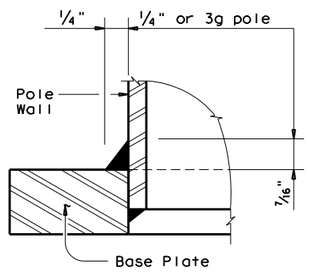


DETAIL D



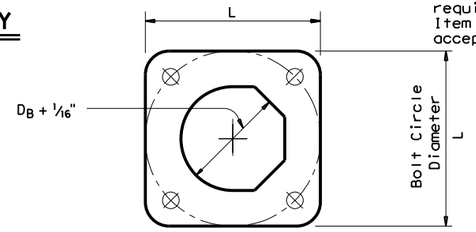
SECTION A-A

(Pole Coupling and Seam Weld Details)

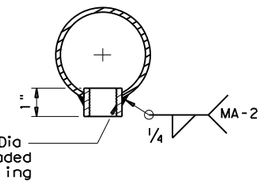


DETAIL E

⑧ 60% Min. penetration, except 100% penetration within 6" of circumferential base welds.



BASE PLATE PLAN



ARM COUPLING DETAIL

MATERIALS	
Round Shafts or Polygonal Shafts ⑨	ASTM A595 Gr.A, A588, A1008 HSLAS Gr.50 Class 2, A1011 HSLAS Gr.50 Class 2, A572 Gr.50 or A1011 SS Gr.50 ⑩
Plates ⑨	ASTM A36, A588, or A572 Gr.50
Connection Bolts	ASTM A325 except where noted
Pin Bolts	ASTM A325
Pipe ⑨	ASTM A53 Gr.B, A501, A1008 HSLAS-F Gr.50, A1011 HSLAS-F Gr.50
Steel Cable	ASTM A475, 7 Wire Utilities Grade
Misc. Hardware	Galvanized steel or stainless steel or as noted

⑨ ASTM A572, A1008 HSLAS, A1011 HSLAS, A1008 HSLAS-F, A1011 HSLAS-F, or A1011 SS may have higher yield strengths but shall not have less elongation than the grade indicated.

⑩ ASTM A1011 SS Gr.50 shall also have a minimum elongation of 18 percent in 8 inches or 23 percent in 2 inches. Material thickness in excess of those stipulated under A1011 SS will be acceptable providing the material meets all other A1011 SS requirements and the requirements of this item.

GENERAL NOTES

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design Wind Speed equals 80 mph plus a 1.3 gust factor. The maximum permissible span wire design loads tabulated are calculated at a stress load of 1.4 times the basic allowable stress. A simultaneous wind on the pole, mast arm, and luminaire is also included.

See standard sheet "DMA-80" for details of clamp-on traffic signal arms, sheet "MA-C" for traffic signal arm connection details, sheet "LUM-A" for luminaire arm and connection details, and sheet "TS-FD" for anchor bolt and foundation details.

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

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

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

Foundation Type	Anchor Bolt Diameter	Bolt Hole Diameter	Bolt Circle Diameter	Base ℞ Dim. L x T
36-A	1 3/4"	2"	19"	19" x 1 3/4"
36-B	2"	2 1/4"	21"	21" x 2"

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES STRAIN POLE ASSEMBLIES

(80 MPH WIND ZONE)

SP-80(2)-12

DN: MS	CK: JSY	DW: BR	CK: JSY

REVISIONS
6-96
1-12

CONT	SECT	JOB	HIGHWAY
0079	04	049	BU 67K

DIST	COUNTY	SHEET NO.
FTW	ERATH	207

120B

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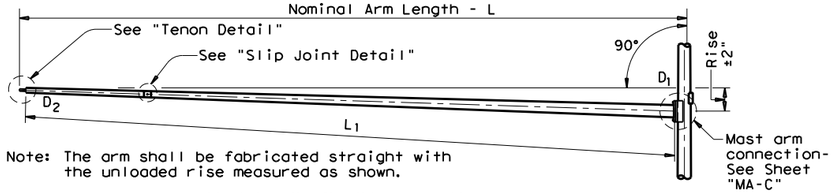
Arm Length	ROUND POLES					POLYGONAL POLES					Foundation Type
	D_B	D_{19}	D_{24}	D_{30}	① thk	D_B	D_{19}	D_{24}	D_{30}	① thk	
ft.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	
20	10.5	7.8	7.1	6.3	.179	11.5	8.5	7.7	6.8	.179	30-A
24	11.0	8.3	7.6	6.8	.179	12.0	9.0	8.2	7.3	.179	30-A
28	11.5	8.8	8.1	7.3	.179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

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

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

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

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



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

TRAFFIC SIGNAL ARM

(Fixed Mount)

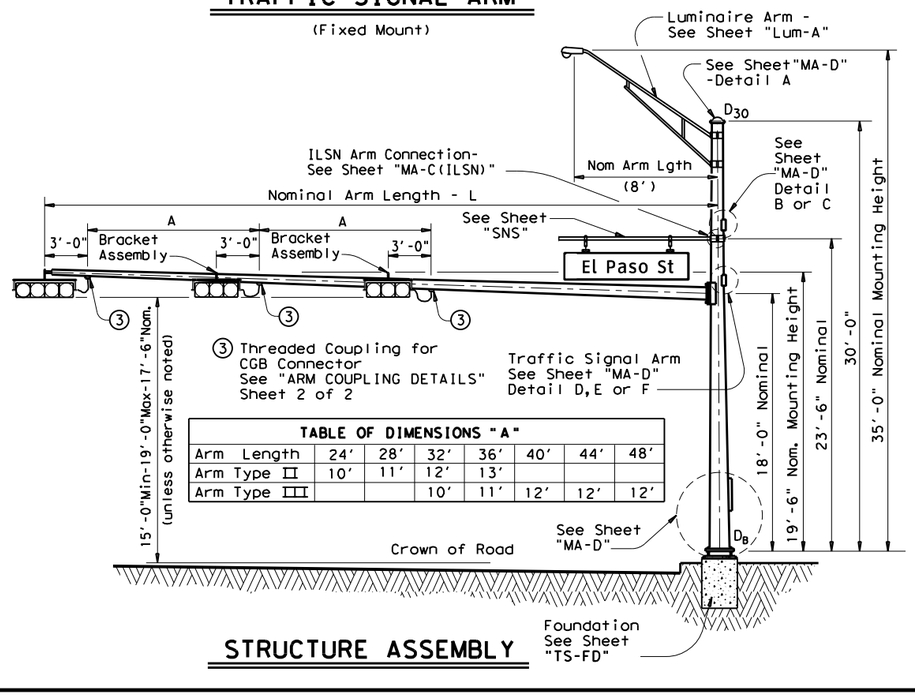


TABLE OF DIMENSIONS "A"

Arm Length	24'	28'	32'	36'	40'	44'	48'
Arm Type II	10'	11'	12'	13'			
Arm Type III			10'	11'	12'	12'	12'

STRUCTURE ASSEMBLY

SHIPPING PARTS LIST

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

Nominal Arm Length	30' Poles With Luminaire		24' Poles With ILSN		19' Poles With No Luminaire and No ILSN	
	Above hardware plus: One (or two if ILSN attached) small hand hole, clamp-on simplex		Above hardware plus one small hand hole		See note above	
ft	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20L-80		20S-80		20-80	
24	24L-80		24S-80		24-80	
28	28L-80		28S-80		28-80	
32	32L-80	2	32S-80		32-80	2
36	36L-80		36S-80		36-80	
40	40L-80		40S-80		40-80	
44	44L-80		44S-80		44-80	
48	48L-80		48S-80		48-80	

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

Nominal Arm Length	Type I Arm (1 Signal)		Type II Arm (2 Signals)		Type III Arm (3 Signals)	
	1 CGB connector		1 Bracket Assembly and 2 CGB Connectors		2 Bracket Assemblies and 3 CGB Connectors	
ft	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20I-80					
24	24I-80		24II-80			
28	28I-80		28II-80			
32			32II-80	4	32III-80	
36			36II-80		36III-80	
40					40III-80	
44					44III-80	
48					48III-80	

Luminaire Arms (1 per 30' pole)

Nominal Arm Length	Quantity
8' Arm	2

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

Nominal Arm Length	Quantity
7' Arm	
9' Arm	

Anchor Bolt Assemblies (1 per pole)

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

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

Templates may be removed for shipment.

SHEET 1 OF 2

STATE OF TEXAS
JOHN D. RILEY
120572
LICENSED PROFESSIONAL ENGINEER
07/12/2024

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES

SINGLE MAST ARM ASSEMBLY (80 MPH WIND ZONE)

SMA-80(1)-12

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

REVISIONS
5-96
11-99
1-12

CONT	SECT	JOB	HIGHWAY
0079	04	049	BU 67K
DIST	COUNTY		SHEET NO.
FTW	ERATH		208

122A

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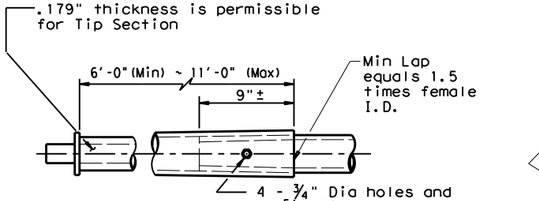
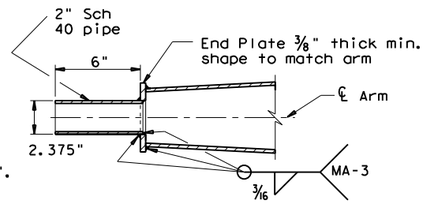


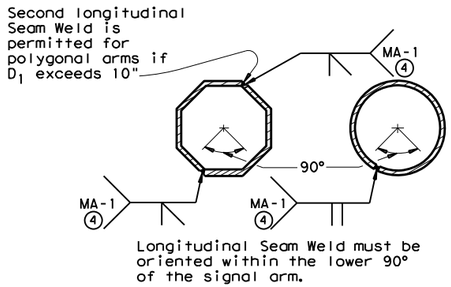
SLIP JOINT DETAIL



TENON DETAIL

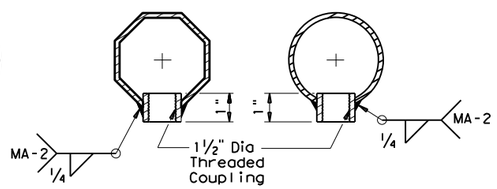
Stainless steel bands (or Cables) and cast bracket as in "Astro-Brac", "Sky Bracket" or "Easy Bracket" with 1 ½" Dia Threaded Coupling.

BRACKET ASSEMBLY



ARM WELD DETAIL

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



ARM COUPLING DETAILS

VIBRATION WARNING

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

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

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

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

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

GENERAL NOTES:

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

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

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

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

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

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

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES

SINGLE MAST ARM ASSEMBLY

(80 MPH WIND ZONE)

SMA-80(2)-12

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

REVISIONS
5-96
1-12

CONT	SECT	JOB	HIGHWAY
0079	04	049	BU 67K

DIST	COUNTY	SHEET NO.
FTW	ERATH	209

122B

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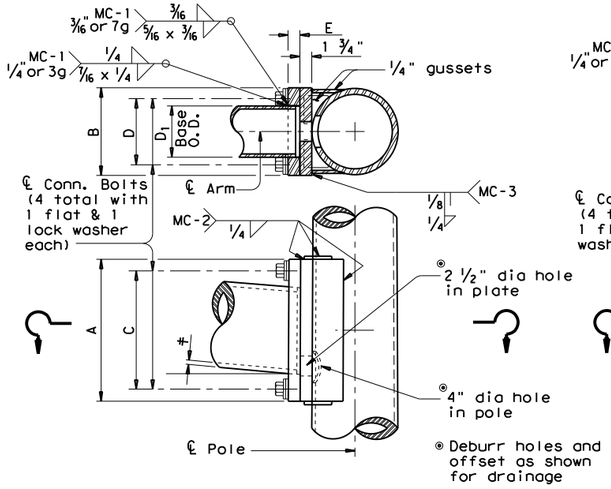
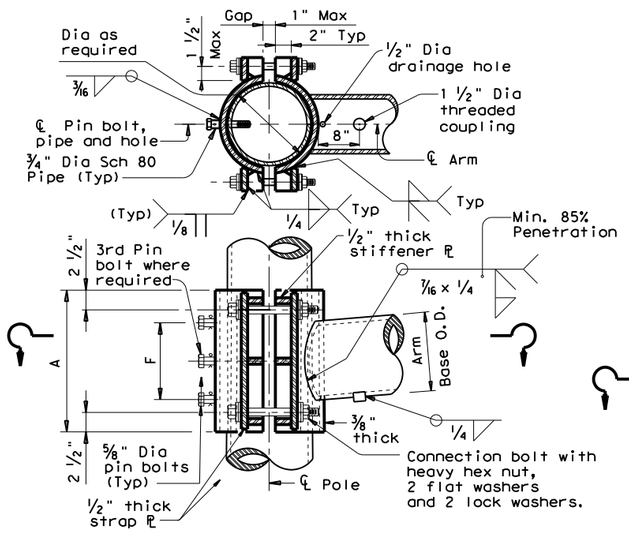
ARM SIZE D_1 in.	ARM SIZE ≠ in.	A in.	B in.	C in.	D in.	E in.	CONN BOLT DIA in.
6.5	.179	12	9	9	6	1 3/4	1
7.5	.179	13	9	10	6	1 3/4	1
8.0	.179	14	10	11	7	2	1 1/4
9.0	.179	16	11	13	8	2	1 1/4
9.5	.179	17	12	14	9	2	1 1/4
9.5	.239	18	12	15	9	2	1 1/4
10.0	.239	18	12	15	9	2	1 1/4
10.5	.239	18	13	15	10	3	1 1/2
11.0	.239	18	13	15	10	3	1 1/2



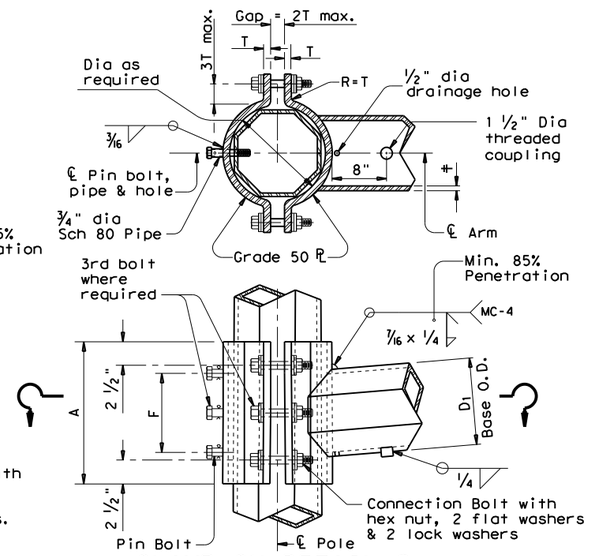
FIXED MOUNT DETAIL 1

ARM SIZE D_1 in.	ARM SIZE ≠ in.	A in.	F in.	CONN. BOLTS No. ea.	CONN. BOLTS Dia in.	PIN BOLTS No. ea.	PIN BOLTS Dia in.
6.5	.179	12	6	4	1	2	5/8
7.5	.179	14	8	4	1	2	5/8
8.0	.179	14	8	4	1	2	5/8
9.0	.179	16	10	4	1	2	5/8
9.5	.179	18	12	4	1 1/4	3	5/8
9.5	.239	18	12	4	1 1/4	3	5/8
10.0	.239	18	12	4	1 1/4	3	5/8



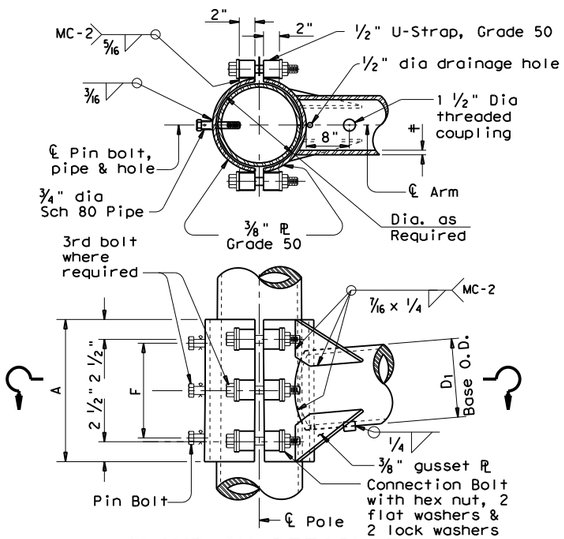
CLAMP-ON DETAIL 1

ARM SIZE D_1 in.	ARM SIZE ≠ in.	A in.	F in.	CONN. BOLTS No. ea.	CONN. BOLTS Dia in.	PIN BOLTS No. ea.	PIN BOLTS Dia in.
7.0	.179	12	6	3/4	4	3/4	2	5/8
7.5	.179	14	8	3/4	4	3/4	2	5/8
8.0	.179	14	8	3/4	4	3/4	2	5/8
9.0	.179	16	10	7/8	4	1	2	5/8
10.0	.179	18	10	7/8	4	1	2	5/8
9.5	.239	18	10	1	6	1	3	5/8
10.0	.239	18	10	1	6	1	3	5/8

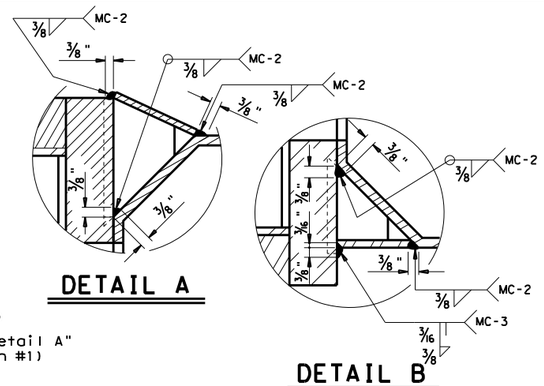


CLAMP-ON DETAIL 2

ARM SIZE D_1 in.	ARM SIZE ≠ in.	A in.	F in.	CONN. BOLTS No. ea.	CONN. BOLTS Dia in.	PIN BOLTS No. ea.	PIN BOLTS Dia in.
6.5	.179	12	6	4	1	2	5/8
7.5	.179	14	8	4	1	2	5/8
8.0	.179	14	8	4	1	2	5/8
9.0	.179	16	10	4	1	2	5/8
9.5	.179	18	12	6	1	3	5/8
9.5	.239	18	12	6	1	3	5/8
10.0	.239	18	12	6	1	3	5/8

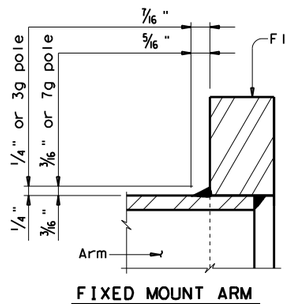


CLAMP-ON DETAIL 3

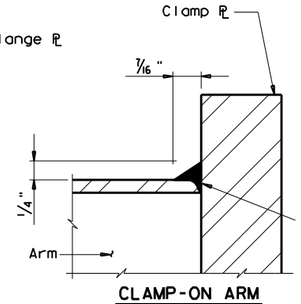


DETAIL A

DETAIL B



FIXED MOUNT ARM



CLAMP-ON ARM

ARM BASE WELD DETAILS

ARM SIZE D_1 in.	ARM SIZE ≠ in.	A in.	F in.	CONN. BOLTS No. ea.	CONN. BOLTS Dia in.	PIN BOLTS No. ea.	PIN BOLTS Dia in.
6.5	.179	12	6	4	1	2	5/8
7.5	.179	14	8	4	1	2	5/8
8.0	.179	14	8	4	1	2	5/8
9.0	.179	16	10	4	1	2	5/8
9.5	.179	18	12	6	1	3	5/8
9.5	.239	18	12	6	1	3	5/8
10.0	.239	18	12	6	1	3	5/8

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

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

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

GENERAL NOTES:

Clamp-on details are used for the second arm on dual mast arm assemblies. A Maximum 1 1/2" wide vertical slotted hole shall be cut in the front clamp plate to facilitate drainage during galvanizing. The slot shall be centered behind the arm and shall be no longer than the arm diameter minus 1"

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

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

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

NOTE:

Pin bolts shall be A325 with threads excluded from the shear plane. Pin bolt and 3/4" dia pipe shall have 3/16" dia holes for a 1/8" dia galvanized cotter pin. Back clamp plate shall be furnished with a 3/4" dia hole for each pin bolt. An 11/16" dia hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.

Texas Department of Transportation
Traffic Operations Division

STANDARD ASSEMBLY FOR TRAFFIC SIGNAL SUPPORT STRUCTURES

MAST ARM CONNECTIONS

MA-C-12

DN: MS	CK: JSY	DW: MMF	CK: JSY
REVISIONS	CONT	SECT	JOB	HIGHWAY
5-96	0079	04	049	BU 67K
5-09	DIST	COUNTY		SHEET NO.
1-12	FTW	ERATH		210

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Zinc die cast or Alum. or Galv. Metal Cap with min. of 3 set screws

D_{30}

See Detail F for alternate Pole Cap

⅜" dia Hook for hanging wire

6"

℄ Clamp

4" ±

Luminaire Arm

⅜

DETAIL A

(for pole with luminaire)

45°

2" dia threaded Coupling ~ NPSL threads

Pipe Plug

Pole

POLE COUPLING DETAIL

Pole

Handhole Frame

¼"

¼ x 7/16 ①

MD-4

7/16"

DETAIL G

⅛

5/16" 1 3/16"

Slot ⅜"

1¼"

⅝"

See Detail J

Tab ¼" dia x ⅜" out

¼ x 7/16 ①

MD-4

SECTION X-X

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

Back plate

Access Compartment

¼"

7/16"

Round Pole

Back plate

Access Compartment

¼"

7/16"

Polygonal Pole

DETAIL J

⅜" dia Hook for hanging wire

See Detail G for Handhole Weld

℄ of 4"x 6" I.D. Handhole

⅜" Dia. Bolt or Screw

Clamp-on arm for ILSN

Handhole Frame ⅜"x 2" Min.

4" ±

⅜

9"

11"

DETAIL B

(If ILSN applied)

Zinc die cast or Alum. or Galv. Metal Cap with min. of 3 set screws

See Detail F for alternate Pole Cap

⅜" dia Hook for hanging wire

6"

11"

⅜

DETAIL C

Burndy #KC22J12T13, Blackburn TTC, or approved equal. Will accept 4-#8, 2-#6 or 1-#4 max.

Split lockwasher, ½" stainless

Hex. nut, ½" - 13NC stainless

COPPER GROUND CONNECTOR

Tab and slot

Ring, ⅜" x 2 ½" ASTM A572 Gr 50

Back plate ⅛" x 4½" x 1'-6 ⅜" steel strip M-1020 or sheet A-569

MD-5

1⅞"

12 circuit 600 volt compression Type HD terminal block (2 req'd)

#8-32 mtg. holes for optional 6 circuit terminal block

Phil. Pan HD. scres, #8-32 x 1¼" self-tap Type "F", stainless steel (4 req'd)

27"

½" clearance hole for copper ground connector

6"

#10-32 mtg. holes for luminaire double fuse block (see notes 3 & 4)

4" x 6" hand hole opening

Tab and slot

4¾"

ACCESS COMPARTMENT

See Detail A for regular Pole Cap

D_{19}

¼" dia J-Bolt & Nut

SECTION Y-Y

⅜" dia Hook (optional)

℄ of 4"x 6" I.D. Handhole

Threaded Strap ⅜" x 1" ℞ Min

See Detail G for Handhole Weld

Handhole cover 12g min.

⅜" dia bolt or screw

Handhole Frame - ℞ ⅜" x 2 min

Fixed mount arm for single mast arm assemblies or first arm on dual mast arm assemblies

Clamp-on arm for second arm on dual mast arm assemblies

2" dia threaded coupling - 2 per dual mast arm assembly

9"

6"

1'-6"

2'-6"

30'-0" ±1"

23'-6" ±1"

18'-0" ±1"

DETAIL D

(for 30' pole with luminaire and ILSN sign)

℄ of 4"x 6" I.D. Handhole

See Detail G for Handhole Weld

Handhole cover 12g min.

⅜" dia bolt or screw

Handhole Frame- ℞ ⅜" x 2 min

Fixed mount arm for single mast arm assemblies or first arm on dual mast arm assemblies

Clamp-on arm for second arm on dual mast arm assemblies

2" dia threaded coupling - 2 per dual mast arm assembly

DETAIL E

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

⅛" to ½"

Y

¼" ℞

½" dia Bar for hanging wire and J-Bolt attachment

4" ±

1'-0"

¼

DETAIL F

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

MD-2

pole thickness

2" dia threaded coupling - 2 per dual mast arm assembly

MD-1

②

SECTION V-V

Anchor Bolt Diameter	Bolt Hole Diameter	Slot Length	Bolt Circle Diameter	Base ℞ Dim. L x T	Adjust. Range
1 ½"	1 ¾"	3 ½"	17"	18" x 1 ½"	13.4°
1 ¾"	2"	4"	19"	20" x 1 ¾"	13.5°
2"	2 ¼"	4 ½"	21"	22" x 2"	13.6°
2 ¼"	2 ½"	5"	23"	24" x 2 ¼"	13.7°

Access Compartment

2'-3"

12" ± ¼"

Base Plate

T

D_B

¼ 7/16 x ¼ MD-3 at ¼" or 3g pole

⅜ ⅝ x ⅜ MD-3 at ⅜" or 7g pole

See Detail H

POLE ELEVATION

L

R = 3" ±1"

D_B +1/16"

Bolt Hole Diameter

Slot Length

Bolt Circle Diameter

L

Adjustment Range

BASE PLATE PLAN

¼" or 3g pole

⅜" or 7g pole

¼"

⅜"

7/16"

5/16"

DETAIL H

① 85% Min. penetration

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

NOTES:

1. The cover shall be one piece formed from ABS plastic, shall be a pearl gray color, and shall be suitable for exposure to harsh sunlight and extreme weather. Cover shall latch with two screw latches and shall fit tightly to the enclosure ring to create a rainproof seal. Latch screws shall be 1/4-20 stainless flat socket head screws with tamper proof feature.
2. The pole manufacturer shall provide with each pole a separate kit consisting of: one cover with two latching assemblies, two terminal strips (Marathon #985GP12CU or approved equal), four #8-32 x 1 ¼" self tapping type "F" stainless steel pan head screws, and one ground connector (Blackburn TTC, Burndy KC22J12T13, or Ilsco SSS-5). The traffic signal contractor shall install the kit items in the field.
3. The screw hole spacing on the enclosure back plate shall be for two Marathon #985GP12 terminal strips, one Marathon #985GP06CU terminal strip, and one Bussmann #BM6032B fuse block.
4. Install one Bussmann #BM6032B, Littelfuse #L60030M-2C, or Ferraz-Shawmut #30352 fuse block for poles where luminaires are to be installed.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES MAST ARM POLE DETAILS

MA-D-12

REVISIONS
8-99
1-12

DN: MS	CK: JSY	DW: FDN	CK: CAL
CONT	SECT	JOB	HIGHWAY
0079	04	049	BU 67K
DIST	COUNTY		SHEET NO.
FTW	ERATH		211

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FOUNDATION DESIGN TABLE

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

NOTES:

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

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

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

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

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

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

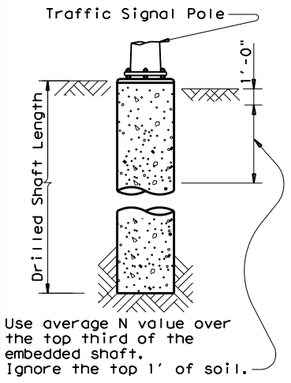
⑧ Subsidiary to Item 687

FOUNDATION SUMMARY TABLE ③

LOCATION IDENTIFICATION	AVG. N BLOW /ft.	FDN TYPE	NO. EA	DRILLED SHAFT LENGTH ⑥ (FEET)				
				24-A ⑧	30-A	36-A	36-B	42-A
POLE A	15	30-A	1		11			
POLE B	15	30-A	1		11			
POLE C	15	30-A	1		11			
POLE D	15	30-A	1		11			
PED POLE A	16	24-A	1	6				
PED POLE B	16	24-A	1	6				
TOTAL DRILLED SHAFT LENGTHS				12	44			

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

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



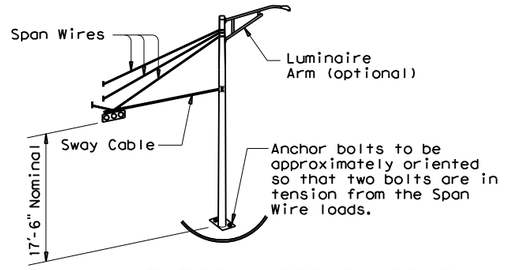
Use average N value over the top third of the embedded shaft. Ignore the top 1' of soil.

ANCHOR BOLT & TEMPLATE SIZES

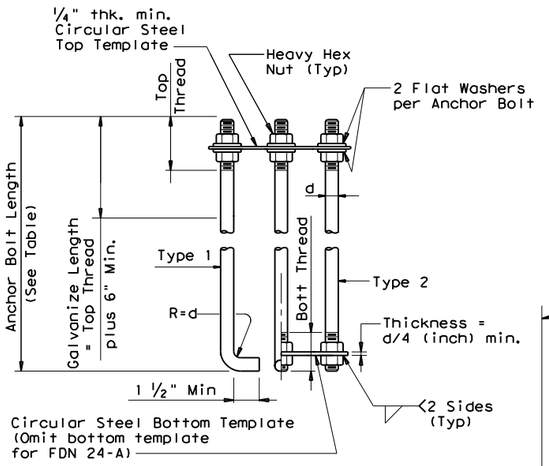
BOLT DIA IN.	⑦ BOLT LENGTH	TOP THREAD	BOTTOM THREAD	BOLT CIRCLE	R2	R1
¾"	1'-6"	3"	—	12 ¾"	7 ⅛"	5 ⅝"
1 ½"	3'-4"	6"	4"	17"	10"	7"
1 ¾"	3'-10"	7"	4 ½"	19"	11 ¼"	7 ¾"
2"	4'-3"	8"	5"	21"	12 ½"	8 ½"
2 ¼"	4'-9"	9"	5 ½"	23"	13 ¾"	9 ¼"

⑦ Min dimensions given, longer bolts are acceptable.

EXAMPLE:
1. For 80mph design wind speed, foundation 30-A can support up to a 32' arm with another arm up to 28'
2. For 100mph design wind speed, foundation 36-A can support a single 36' mast arm.



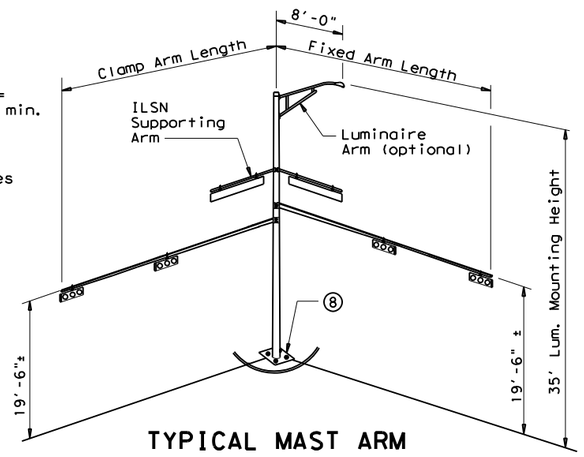
TYPICAL STRAIN POLE ASSEMBLY



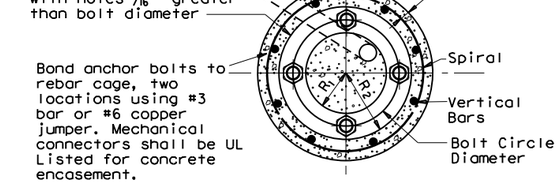
HOOKED ANCHOR (TYPE 1) NUT ANCHOR (TYPE 2)

ANCHOR BOLT ASSEMBLY

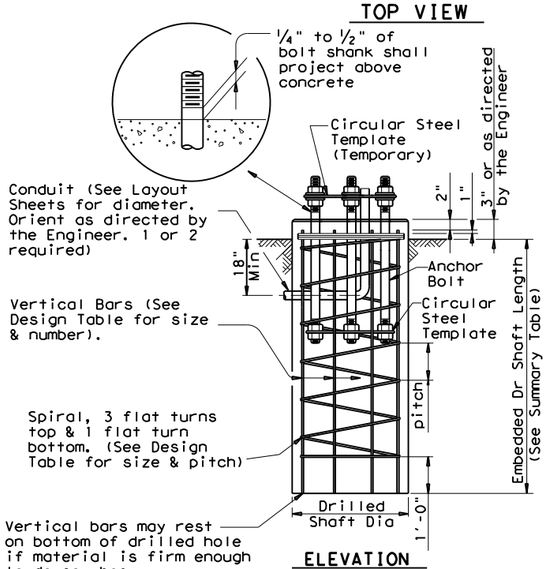
⑧ Orient anchor bolts orthogonal with the fixed arm direction to ensure that two bolts are in tension under dead load.



TYPICAL MAST ARM ASSEMBLY



TOP VIEW



ELEVATION

FOUNDATION DETAILS

GENERAL NOTES:

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

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

Concrete shall be Class "C".

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

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

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

STATE OF TEXAS * JOHN D. RILEY 120572 LICENSED PROFESSIONAL ENGINEER * 07/12/2024

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL POLE FOUNDATION

TS-FD-12

REVISIONS	DN: MS	CK: JSY	DW: MAO/MMF	CK: JSY/TEB
5-96 11-98 1-12	CONT	SECT	JOB	HIGHWAY
	0079	04	049	BU 67K
	DIST	COUNTY		SHEET NO.
	FTW	ERATH		212

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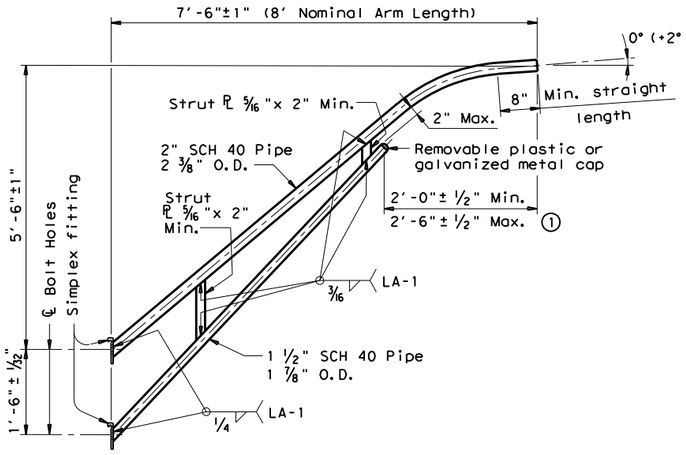
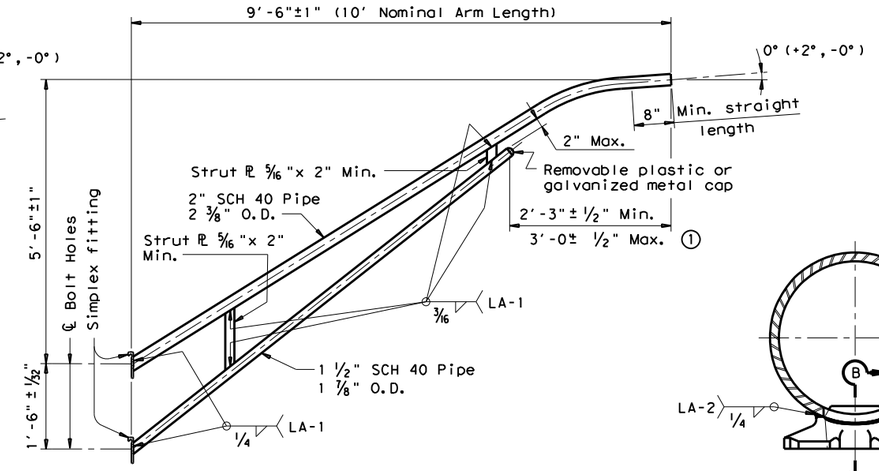
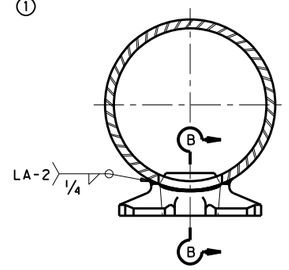


8-FOOT LUMINAIRE ARM



10-FOOT LUMINAIRE ARM



DIRECT ATTACHMENT DETAIL

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

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

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

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

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

GENERAL NOTES:

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

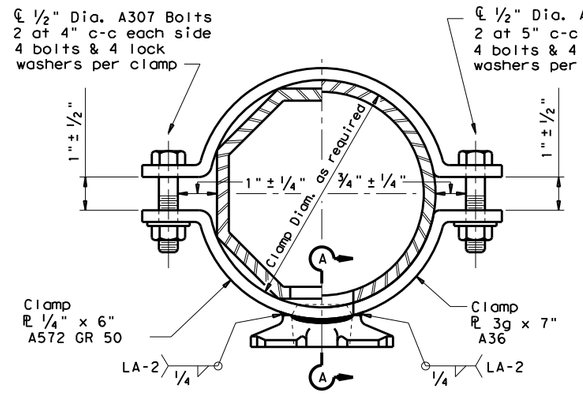
Materials and fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. In the absense of specified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

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

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

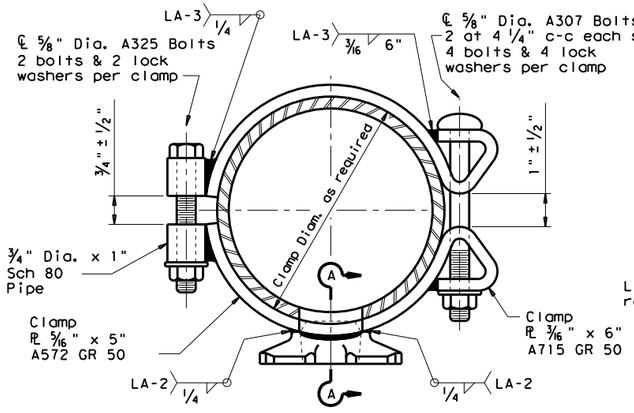
Each pole simplex fitting shall be supplied with 2 ASTM A325 bolts and 2 lock washers of the size specified. The bolts and lock washers shall be secured to the pole with the other hardware items called for in the plans. When clamp attachment is specified, the Fabricator shall ship the clamp assembly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

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



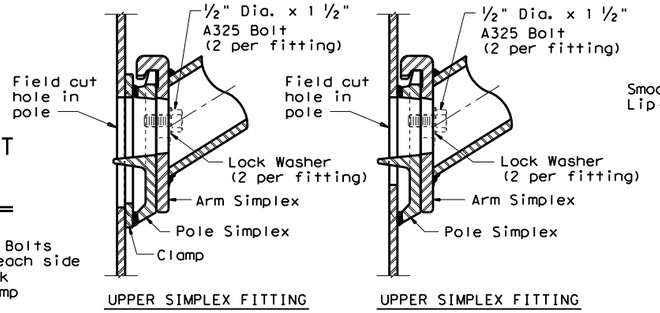
CLAMP ATTACHMENT DETAIL NO. 1 (HALF SECTION)

CLAMP ATTACHMENT DETAIL NO. 2 (HALF SECTION)



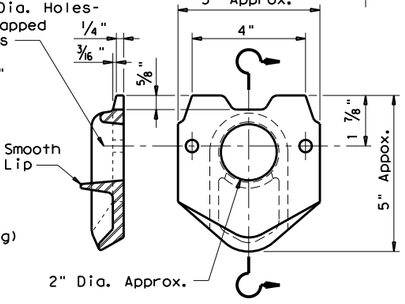
CLAMP ATTACHMENT DETAIL NO. 3 (HALF SECTION)

CLAMP ATTACHMENT DETAIL NO. 4 (HALF SECTION)

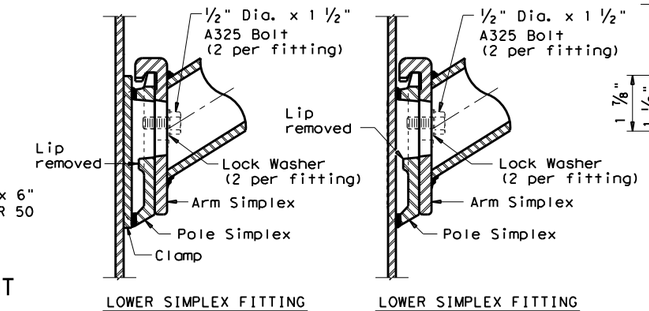


UPPER SIMPLEX FITTING

UPPER SIMPLEX FITTING



POLE SIMPLEX DETAIL

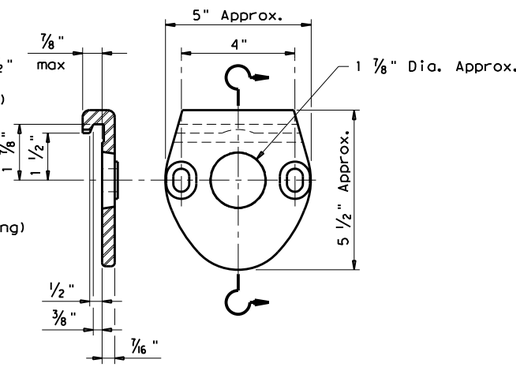


LOWER SIMPLEX FITTING

LOWER SIMPLEX FITTING

SECTON A-A

SECTON B-B



ARM SIMPLEX DETAIL

Texas Department of Transportation
Traffic Operations Division

STANDARD ASSEMBLY DRAWINGS FOR LUMINAIRE SUPPORT STRUCTURES

ARM DETAILS

LUM-A-12

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

REVISIONS
5-96
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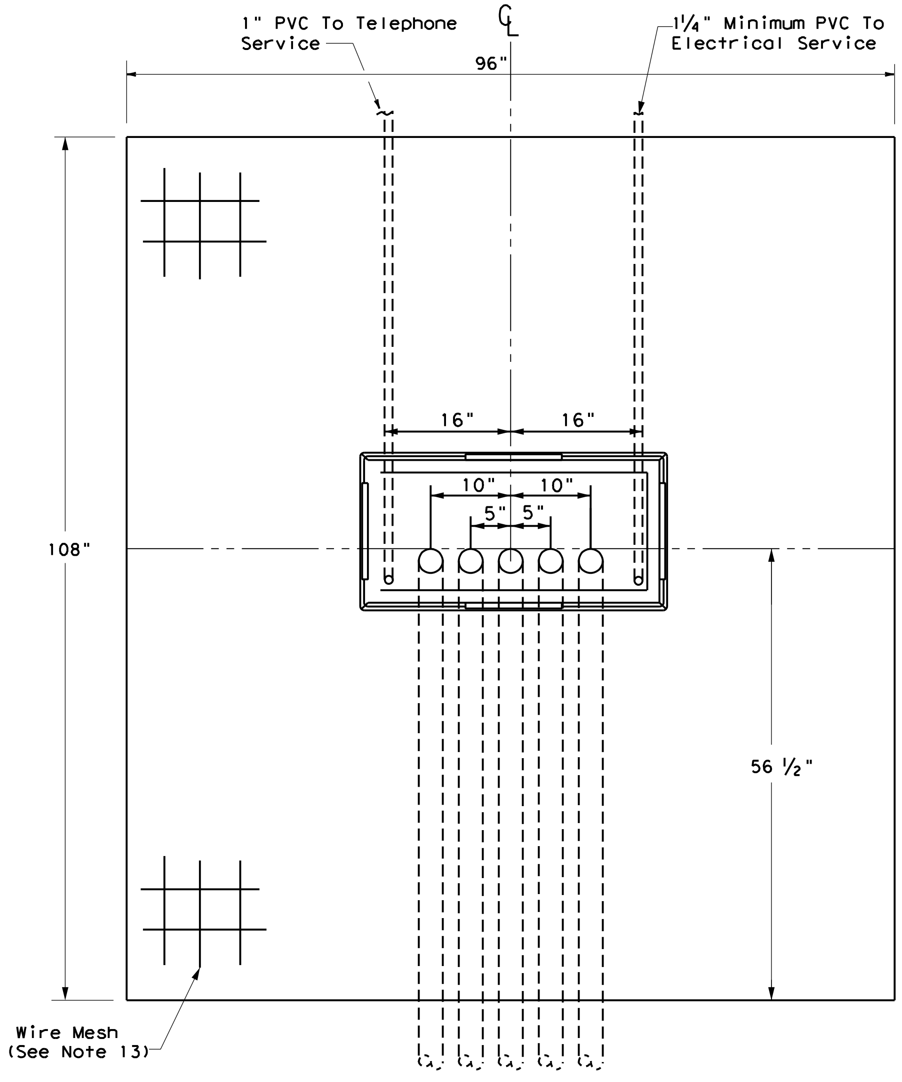
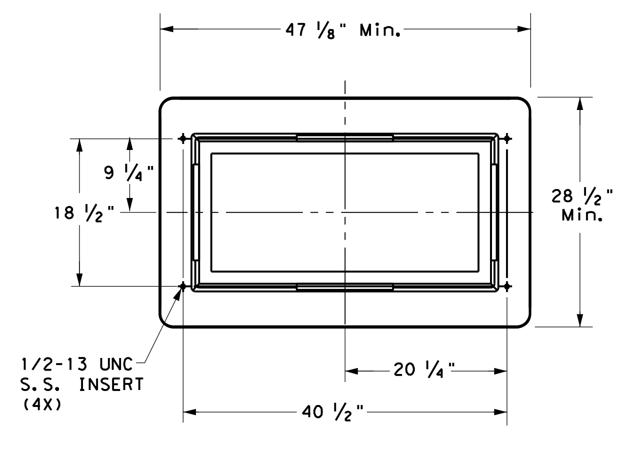
1-12

CONT	SECT	JOB	HIGHWAY
0079	04	049	BU 67K

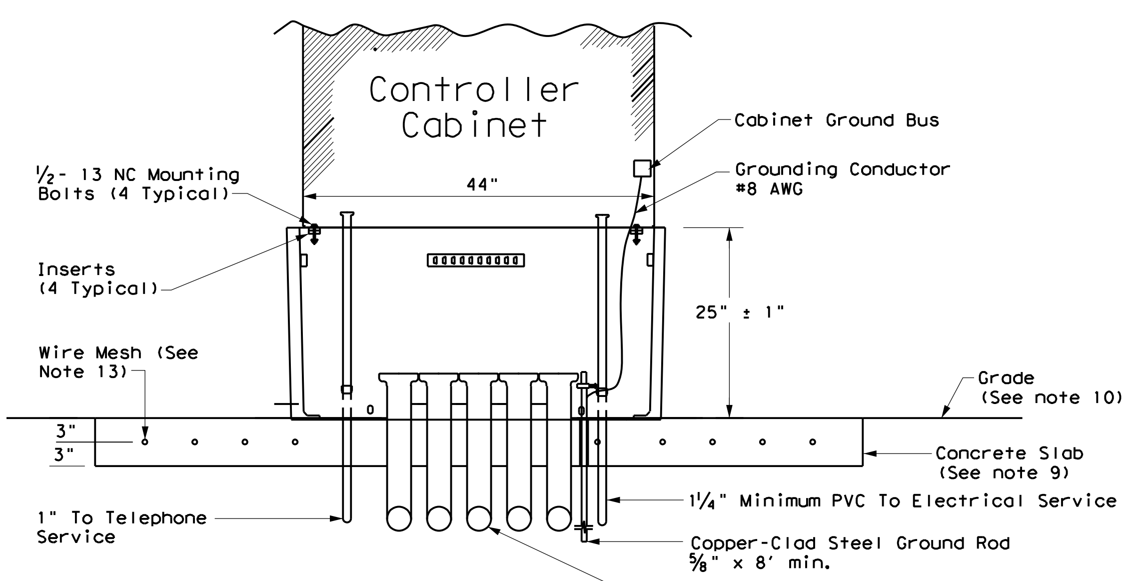
DIST	COUNTY	SHEET NO.
FTW	ERATH	213



TOP VIEW



CABINET BASE



SIDE VIEW

TRAFFIC SIGNAL CONTROLLER BASE:

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

CONCRETE SLAB:

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

CONDUITS:

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

CONTROLLER CABINET:

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

PAYMENT:

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

Texas Department of Transportation

Traffic Safety Division Standard

TRAFFIC SIGNAL CONTROLLER CABINET BASE AND PAD

TS-CF-21

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© TxDOT October 2000	CONT	SECT	JOB		HIGHWAY	
REVISIONS 12-04 2-21	0079	04	049		BU 67K	
	DIST		COUNTY		SHEET NO.	
	FTW		ERATH		214	

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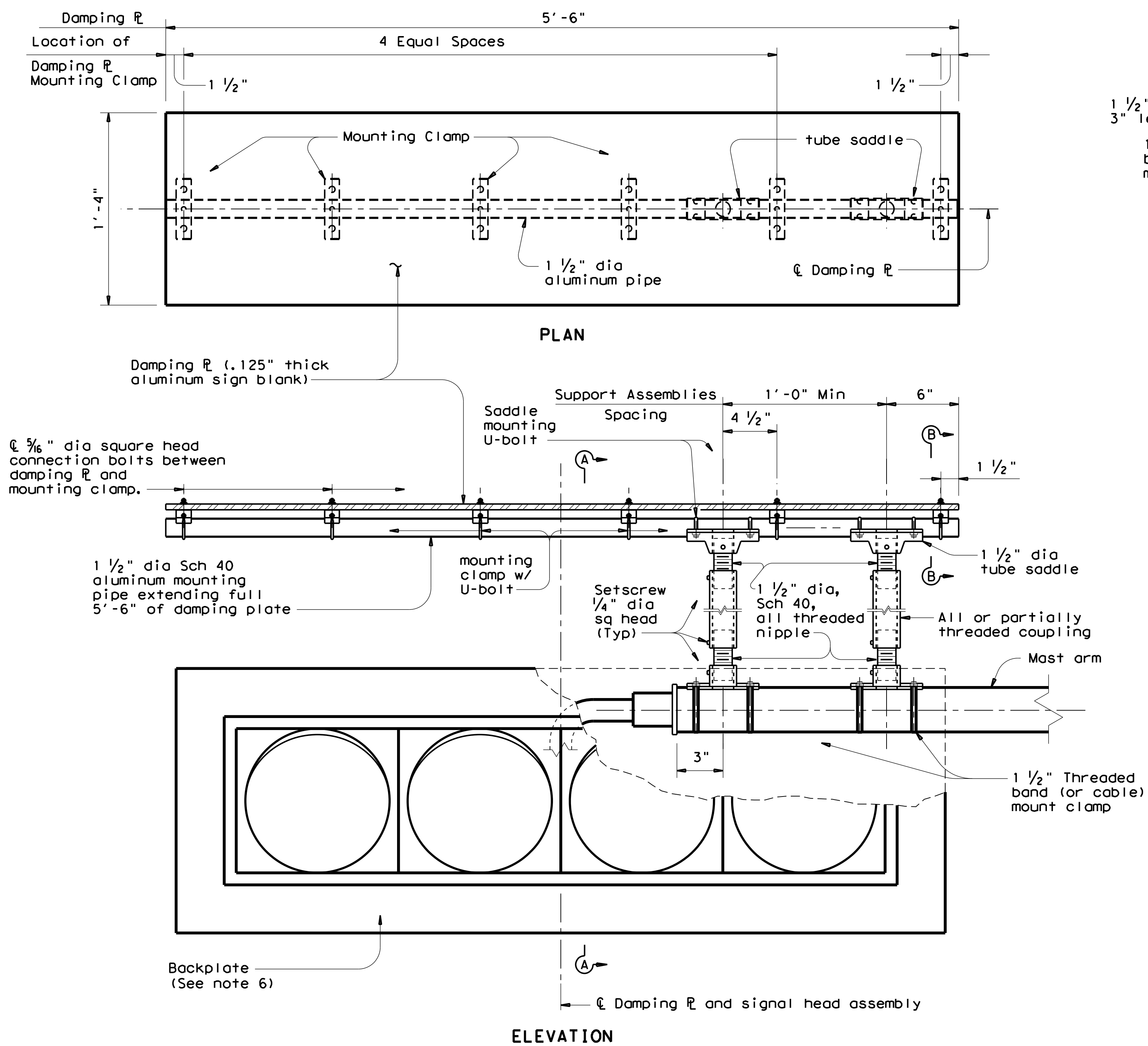
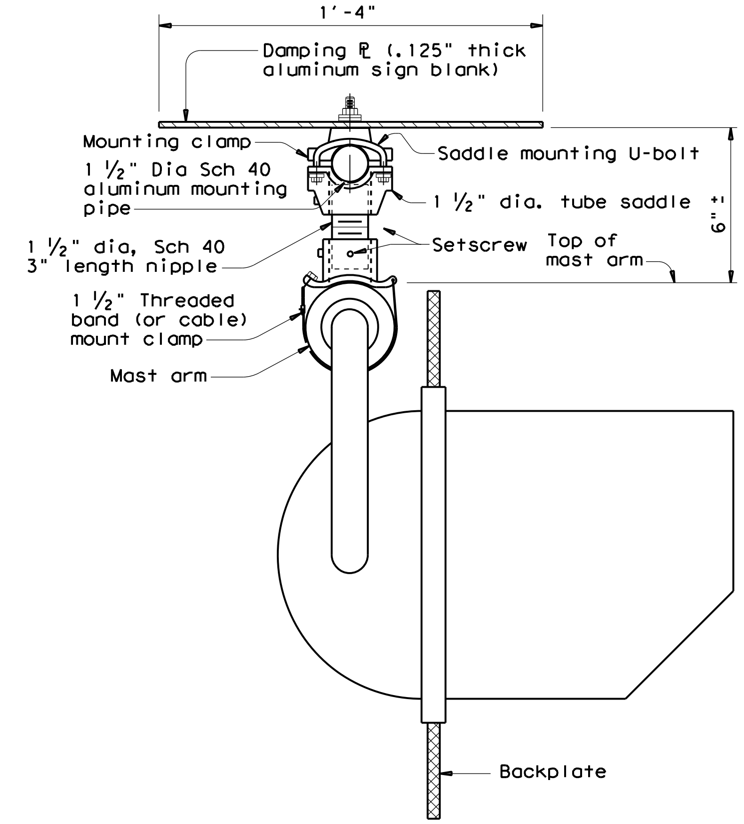


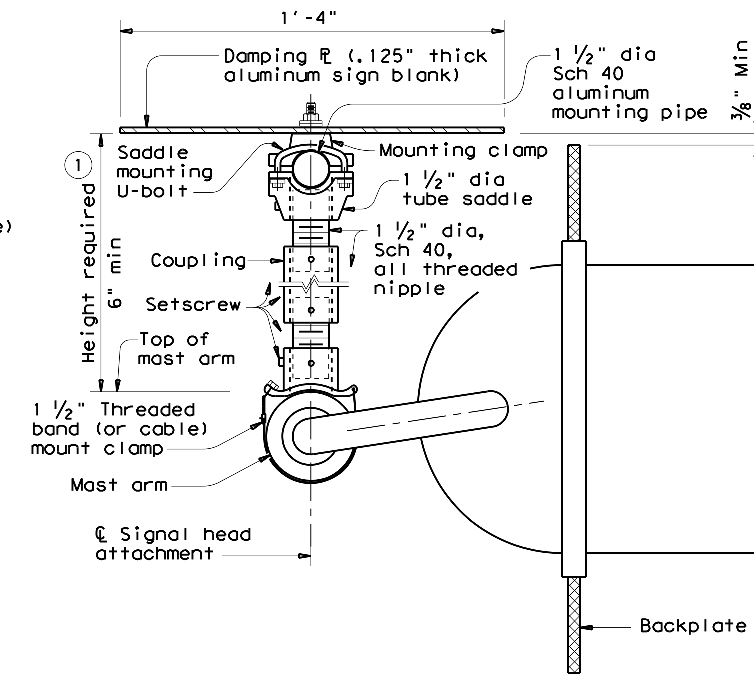
DAMPING PLATE MOUNTING DETAILS

(Showing alternate placement of signal head)



SECTION A-A

(Showing standard placement of signal head)
(Mounting clamp U-bolt is not shown for clarity)



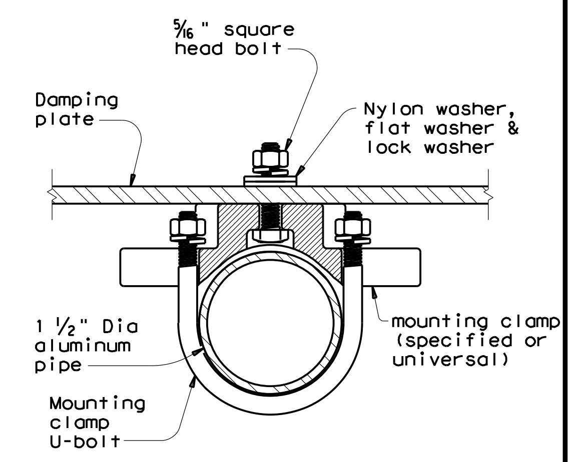
SECTION A-A

(Showing alternate placement of signal head)
(Mounting clamp U-bolt is not shown for clarity)

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

GENERAL NOTES:

1. In accordance with the findings of TxDOT sponsored research, the installation of a damping plate in accordance with the details shown here at the end of signal mast arms of SMA and DMA standard structures reduces excessive harmonic vertical vibration, and thus fatigue damage. Any deviation from these details may reduce the effectiveness of this damping device.
2. Aluminum sign blank for damping plate will conform to Departmental Material Specifications DMS-7110. Materials for mast arm mounting clamp and tube saddle will be aluminum castings or aluminum alloys as in accordance with manufacturers' stipulations. Mounting pipe, pipe nipple and coupling will be aluminum alloy 6061-T6 or 6063-T6. Damping plate mounting clamp and u-bolt assemblies will conform to Standard sheet SMD(GEN). U-bolts for saddle mounting will have a minimum yield strength of 36 ksi.
3. Damping plate will be mounted horizontally. Position centerline of damping plate to align with centerline of mast arm or horizontal signal head assembly. Vertical clearance between signal head (with or without backing plate) and bottom of damping plate will be maintained as shown. The attachments shown here are examples only, other supporting details which meet both alignment and vertical clearance requirements are also acceptable.
4. Unless stipulated by the manufacturers, all steel parts will be galvanized finish in accordance with Standard Specification Item 445, "Galvanizing".
5. Contractor will verify applicable field dimensions before the installation.
6. Backplates are optional for traffic signals. When backplates are used, Backplates will have a 2-inch fluorescent yellow AASHTO Type B_{FL} or C_{FL} retroreflective border conforming to TxDOT DMS-8300 "Sign Face Materials." See Sheet TS-BP-20 for backplate details.



SECTION B-B

(Showing damping plate attachment)

Texas Department of Transportation — Traffic Safety Division Standard

MAST ARM DAMPING PLATE DETAILS

MA-DPD-20

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©TxDOT January 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS	0079	04	049	BU 67K
6-20	DIST		COUNTY	SHEET NO.
	FTW		ERATH	215

134

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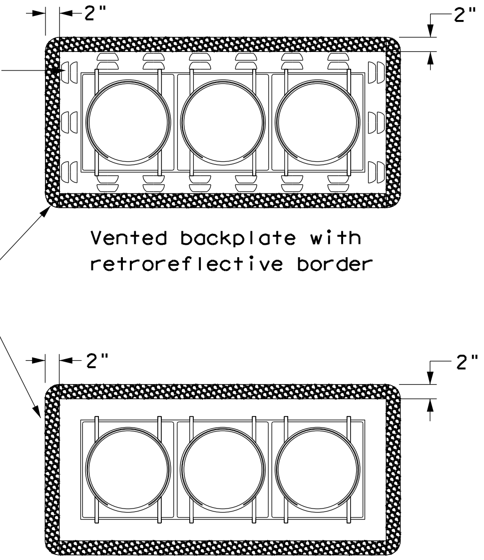
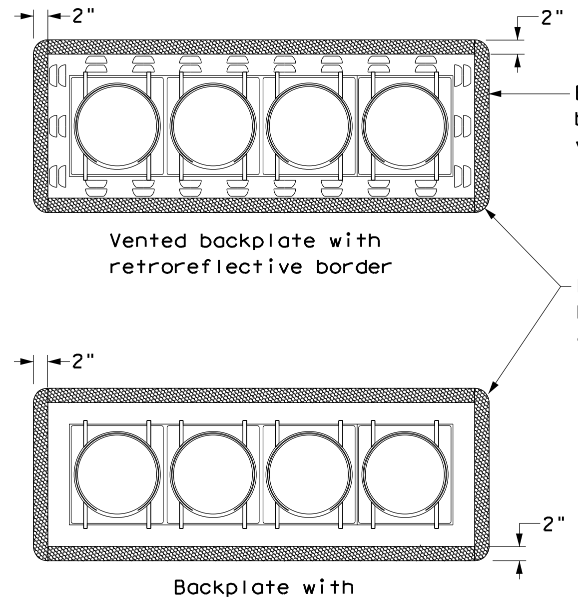


THREE-SECTION HEAD

HORIZONTAL OR VERTICAL

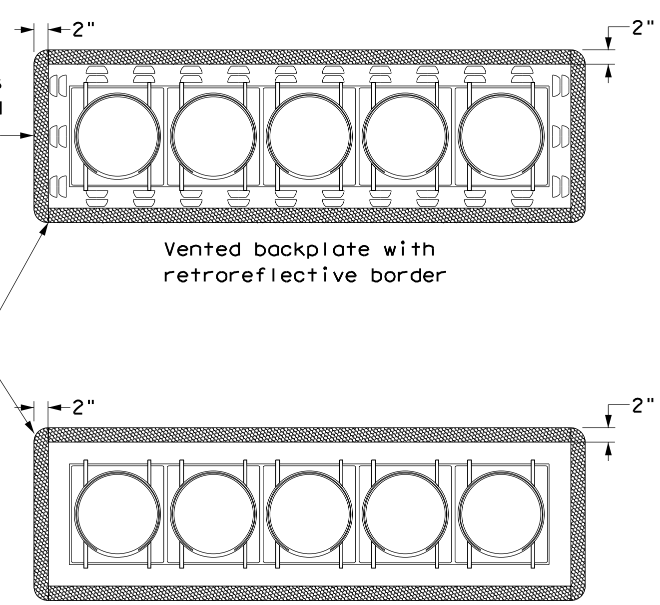


FOUR-SECTION HEAD

HORIZONTAL OR VERTICAL

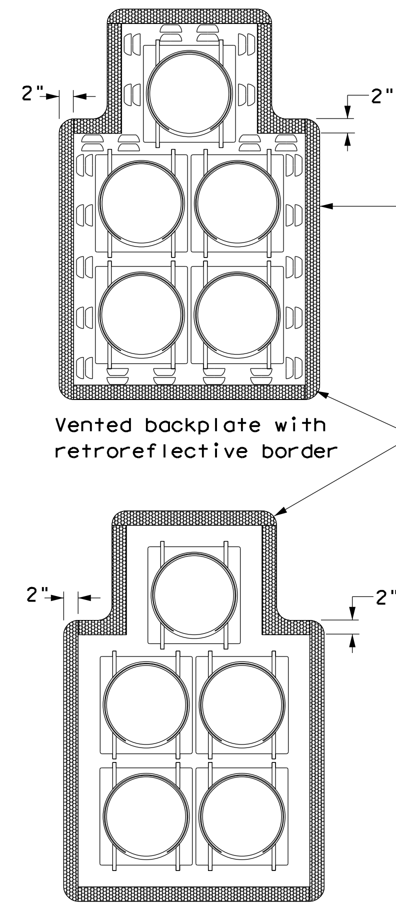
GENERAL NOTES:

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



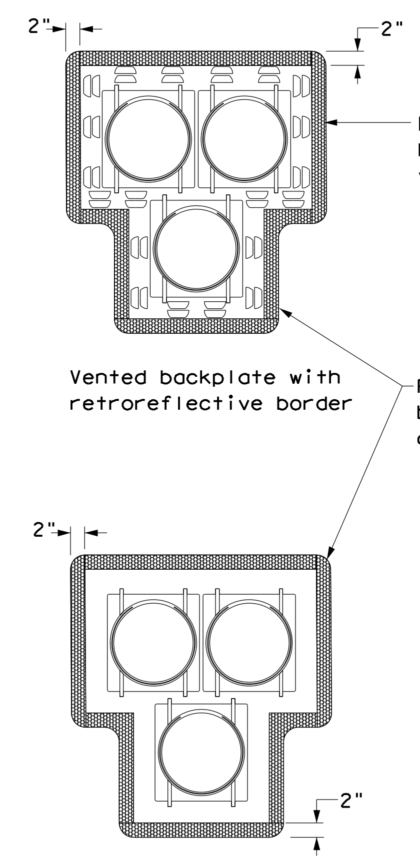
FIVE-SECTION HEAD

HORIZONTAL OR VERTICAL



FIVE-SECTION HEAD

CLUSTER



PEDESTRIAN HYBRID

BEACON

Texas Department of Transportation

Traffic Safety Division Standard

TRAFFIC SIGNAL HEAD WITH BACKPLATE

TS-BP-20

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© TxDOT June 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0079	04	049	BU 67K
	DIST		COUNTY	SHEET NO.
	FTW		ERATH	216

134

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I. WORK AT CROSSING LOCATIONS (AT GRADE, HIGHWAY OVERPASS, HIGHWAY UNDERPASS, PEDESTRIAN, OR CLOSED/ABANDONED)

☐ This project is adjacent or parallel work, not within RR ROW:

DOT No.: 312 372 E
Crossing Type: ** AT GRADE
RR Company Operating Track at Crossing: FORT WORTH AND WESTERN RAILROAD (FWWR)
RR Company Owning Track at Crossing: FWWR
RR MP: 0.4
RR Subdivision: GORMAN
City: DUBLIN
County: ERATH
CSJ at this Crossing: 0079-04-049
Latitude: 32.083334 degrees
Longitude: -98.34016 degrees

Scope of Work, including any TCP, to be performed by State Contractor:

MILL AND RECONSTRUCTION OF PAVEMENT, HMAC OVERLAY, STORM SEWER SYSTEMS, REPLACE CURB & GUTTER, SIGNING AND STRIPING

Scope of Work to be performed by Railroad Company:

RAILROAD TO PROVIDE FLAGGING, THREE (3) DAYS OF FLAGGING ESTIMATED.

II. FLAGGING & INSPECTION

No. of Days of Railroad Flagging Expected: 3

On this project, night or weekend flagging is:

☑ Expected
☐ Not Expected

Flagging services will be provided by:

☑ Railroad Company: 1) Txdot will pay flagging invoices. Flagging Agreement with railroad will be needed or, 2) Permitted crossing. Railroad company to provide flagging.
☐ Outside Party: Contractor will pay flagging invoices to be reimbursed by TxDOT

Contractor must incorporate flaggers into anticipated construction schedule. The Railroad requires a 30-day notice if their flaggers are to be utilized. If Contractor falls behind schedule due to their own negligence and is not ready for scheduled flaggers, any flagging charges will be paid by Contractor.

Contact Information for Flagging:

☐ **UPRR** UP.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
UP.request@nrssinc.net
Call Center 877-984-6777

☐ **BNSF** BNSFinfo@railprosfs.com
Call Center 877-315-0513, Select #1 for flagging

☐ **CPKCR** KCS.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
Bottom Line On-Track Safety Services
bottomline076@aol.com, 903-767-7630

☑ OTHERS:

Mr. William "Bill" Parker - Director of Planning
Fort Worth & Western Railroad
2495 East Long Avenue
Fort Worth, TX 76106
email: wrp@fwwr.net

Contractor must incorporate railroad construction inspection into anticipated construction schedule.

☐ Not Required
☑ Required. Contact Information for Construction Inspection:

TBD

III. CONSTRUCTION WORK TO BE PERFORMED BY THE RAILROAD

☐ Required.
☑ Not Required

Railroad Point of Contact: _____

Coordinate with TxDOT for any work to be performed by the Railroad Company. TxDOT must issue a work order for any work done by the Railroad Company prior to the work being performed.

IV. RAILROAD INSURANCE REQUIREMENTS

The Contractor shall confirm the insurance requirements with the Railroad as the insurance limits are subject to change without notice.

Insurance policies and corresponding certificates of insurance must be issued by the contractor on behalf of the Railroad. Separate insurance policies and certificates are required when more than one Railroad Company is operating on the same right of way, or when several Railroad Companies are involved and operate on their own separate right of ways.

No direct compensation will be made to the Contractor for providing the insurance coverages shown below or any deductibles. These costs are incidental to the various bid items.

Escalated Limits

Type of Insurance	Amount of Coverage (Minimum)
Workers Compensation	$500,000 / $500,000 / $500,000
Commercial General Liability	$2,000,000 / $4,000,000
Business Automobile	$2,000,000

Railroad Protective Liability Limits

☐ Not Required	
☐ Non - Bridge/Typical Maintenance Projects. Includes repairs to overpass/underpass and culvert structures	$2,000,000 / $6,000,000
☐ Bridge Structure Projects. Includes new construction or replacement of overpass/ underpass structures	$5,000,000 / $10,000,000
☐ Other: _____	

V. CONTRACTOR'S RIGHT OF ENTRY (CROE)

☐ Not Required
☐ Required: UPRR Maintenance Consent Letter. TxDOT to assist
☐ Required: TxDOT to assist in obtaining the UPRR CROE
☑ Required: Contractor to obtain
- ☐ BNSF: _____
  https://bnsf.railpermitting.com
- ☐ CPKCR
  https://jllrpg.360works.com/fmi/webd/rpo_web_kcs.fmp12
- ☑ Other Railroads: FORT WORTH & WESTERN RAILROAD

To view previously approved CROE templates agreed upon between the State and Railroad, see: https://www.txdot.gov/business/resources/railroad-highway-crossing/sample-right-of-entry-agreements.html

Approved CROE templates are not to be modified by the Contractor.

Contractor shall not operate within Railroad Right of Way without an executed Construction & Maintenance Agreement between the State and the Railroad and an executed CROE between the Contractor and the Railroad if required on project.

VI. RAILROAD COORDINATION MEETING

A Railroad Coordination Meeting is required. See item 5, Article 8.1, of the Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges Manual for more details.

VII. RAILROAD SAFETY ORIENTATION

A. Complete the Railroad's course "Orientation for Contractor's Safety," and maintain registration prior to working on the Railroad's property. This course is required to be completed annually by Contractor and Subcontractor personnel working on site.

UPRR, BNSF, CPKCR will not accept on-track safety training certificates from other Railroads. Refer to each Railroad's specific contractor right of entry for training information.

Know and follow the Contractor's Right of Entry Agreement EXHIBIT D, MINIMUM SAFETY REQUIREMENTS regarding clothing, personal protective equipment, and general safety requirements.

VIII. SUBCONTRACTORS

Contractor shall not subcontract work without written consent of TxDOT. Subcontractors are subject to the same insurance requirements as the Prime Contractor.

IX. EMERGENCY NOTIFICATION

In Case of Railroad Emergency

Call: Fort Worth & Western Railroad
Railroad Emergency Line at: 817-731-1180
Location: DOT 312 372 E*
RR Milepost: 0.4
Subdivision: Gorman

RRD Review Only

Initials: _____
Date: _____

Texas Department of Transportation — Rail Division

RAILROAD SCOPE OF WORK
PROJECT SPECIFIC DETAILS

FILE: rr-scope-of-work.pdf		DN: TxDOT	CK:	DW:		CK:	
© TxDOT June 2014		CONT	SECT	JOB		HIGHWAY	
REVISIONS		0079	04	049		BU 67K	
6/2023		DIST	COUNTY			SHEET NO.	
		FTW	ERATH			217	

PART 1 - GENERAL

1.01 DESCRIPTION

This project includes construction work within the right of way and/or properties of the Railroad and adjacent to its tracks, wire lines and other facilities. These sheets describe the minimum special requirements for coordination with the Railroad when working upon, over or under Railroad Right of Way or when impacting current or future Railroad operations. Coordinate with the Railroad while performing the work outlined herein, and afford the same cooperation with the Railroad as with TxDOT. Complete all submittals and work in accordance with TxDOT Standard Specifications, Railroad Guidelines and AREMA recommendations as modified by these minimum special requirements or as directed in writing by the Railroad Designated Representative.

For purposes of this project, the Railroad Designated Representative is the person or persons designated by the Railroad Manager of Industry and Public Projects to handle specific tasks related to the project.

1.02 REQUEST FOR INFORMATION / CLARIFICATION

Submit Requests for Information ("RFI") involving work within any Railroad Right of Way to the TxDOT Engineer. The TxDOT Engineer will submit the RFI to the Railroad Designated Representative for review and approval for RFI's corresponding to work within Railroad Right of Way. Allow six (6) weeks total time for review and approval, which includes four (4) weeks for review and approval by the Railroad.

1.03 PLANS / SPECIFICATIONS

TxDOT has received written Railroad approval of the plans and specifications for this project. Any revisions or changes in the plans after award of the Contract must have the approval of TxDOT and the Railroad.

PART 2 - UTILITIES AND FIBER OPTIC

Construct all utility installations in accordance with current AREMA recommendations, Railroad, TxDOT and owning utility specifications and requirements. Railroad general guidelines can be found on the Railroad website or by contacting the Railroad Designated Representative.

PART 3 - CONSTRUCTION

3.01 GENERAL

A. Perform all work in compliance with all applicable Railroad, Federal Railroad Administration (FRA), and TxDOT rules and regulations. Arrange and conduct work in a manner that does not endanger or interfere with the safe operation of the tracks and property of the Railroad and the traffic moving on such tracks, or the wires, signals and other property of the Railroad, its tenants or licensees, at or in the vicinity of the Work. The safe operation of railroad train movements takes precedence over any work to be performed by the Contractor. The Contractor is responsible for train delay cost and lost revenue claims due to any delays or interruption of train operations resulting from Contractor's construction or other activities.

B. Construction activities within 15 feet of the operational tracks will only be allowed if absolutely necessary and the Railroad's Designated Representative grants approval. Construction activities within 15 feet of the operational track(s) preferably allow the tracks to stay operational. In such cases, coordination and approval by the Railroad Track Manager is required with regard to schedule, flagging, and slow orders. See Sections 3.07 and 3.08 for additional information.

C. Provide track protection for all work equipment (including rubber tired equipment) operating within 25 feet from nearest rail. When not in use, keep Contractor machinery and materials at least 50 feet from the Railroad's nearest track.

D. Vehicular crossings of railroad track are allowed only at existing crossings, or haul road crossings developed with Railroad approval.

E. The Contractor is also advised that new railroad facilities within the project may be built by the Railroad. If applicable, these facilities are delineated in the plans. Be aware of the limits of responsibilities and coordinate efforts with the Railroad and TxDOT.

F. Railroad requirements do not allow work within 50 feet of track centers when a train passes the work site and all personnel must clear the area within 50 feet of the track centerline and secure all equipment. Additional allowances may be pursued as outlined in 3.02 and 3.03.

G. All permanent clearances shall be verified before project closing.

3.02 RAILROAD OPERATIONS

A. Trains and/or equipment are expected on any track, at any time, in either direction. Become familiar with the train schedules in this location and structure bid assuming intermittent track windows in this period, as defined in Paragraph B that follows.

B. All railroad tracks within and adjacent to the contract site are active, and rail traffic over these facilities shall be maintained throughout the Project. Activities may include both through moves and switching moves to local customers. railroad traffic and operations will occur continuously throughout the day and night on these tracks and shall be maintained at all times as defined herein. Coordinate and schedule the work so that construction activities do not interfere with railroad operations.

C. Coordinate work windows with TxDOT and the Railroad's Designated Representative. Types of work windows include Conditional Work Windows and Absolute Work Windows, as defined below:

1. Conditional Work Window: A Conditional Work Window is a period of time that railroad operations have priority over construction activities. When construction activities may occur on and/or adjacent to the railroad tracks within 25 feet of the nearest track, a railroad flag person will be required. At the direction of the railroad flag person, upon approach of a train, and when trains are present on the tracks, the tracks must be cleared (i.e., no construction equipment, materials or personnel within 25 feet, or as directed by the Railroad Designated Representative, from the tracks). Conditional Work Windows are available for the Project.

2. Absolute Work Window: An Absolute Work Window is a period of time that construction activities are given priority over railroad operations. During this time frame, the designated railroad track(s) will be inactive for train movements and may be fouled by the Contractor. At the end of an Absolute Work Window, the railroad tracks and/or signals must be completely operational for train operations and all Railroad, Public Utilities Commission (PUC) and FRA requirements, codes and regulations for operational tracks must be satisfied. In the situation where the operating tracks and/or signals have been affected, the Railroad will perform inspections of the work prior to placing that track back into service. Railroad flag persons will be required for construction activities requiring an Absolute Work Window. Absolute Work Windows will not generally be granted. Any request will require a detailed explanation for Railroad review.

3.03 RIGHT OF ENTRY, ADVANCE NOTICE AND WORK STOPPAGES

A. Do not perform any work within Railroad Right of Way without a valid executed Right of Entry Agreement if required on this project.

B. Give advance notice to the Railroad as required in the "Contractor's Right of Entry Agreement" before commencing work in connection with construction upon or over Railroad Right of Way and observe the Railroad's rules and regulations with respect thereto.

C. Perform all work upon Railroad Right of Way in a manner to avoid interference with or endanger the operations of the Railroad. Whenever work may affect the operations or safety of trains, submit the work method to the Railroad Designated Representative for approval. Approval does not relieve the Contractor from liability. Do not commence any work which requires flagging service or inspection service until the flagging protection required by the Railroad is available at the job site. See Section 3.15 for railroad flagging requirements.

D. Make requests in writing for both Absolute and Conditional Work Windows, at least 30 days in advance of any work. Include in the written request:
1. Exactly what the work entails.
2. The days and hours that work will be performed.
3. The exact location of work, and proximity to the tracks.
4. The type of window requested and the amount of time requested.
5. The designated contact person.

Provide a written confirmation notice to the Railroad at least 48 hours before commencing work in connection with approved work windows when work is within 25 feet of nearest rail. Perform all work in accordance with previously approved work plans.

E. Make provisions to protect operations and property of the Railroad should a condition arising from, or in connection with the work, require immediate and unusual action. If in the judgment of the Railroad Designated Representative such provisions are insufficient, the Railroad Designated Representative may require or provide such provisions as deemed necessary. In any event, such provisions shall be at the Contractor's expense and without cost to the Railroad or TxDOT. The Railroad or TxDOT shall have the right to order the Contractor to temporarily cease operations in the event of an emergency or, if in the opinion of the Railroad Designated Representative, the Contractor's operations could endanger railroad operations. In the event of such an order, immediately notify TxDOT of the order.

3.04 INSURANCE

Do not begin work upon or over Railroad Right of Way until furnishing the Railroad with the insurance policies, binders, certificates and endorsements required by the "Contractor's Right of Entry Agreement", and until the Railroad Designated Representative has advised TxDOT that such insurance is in accordance with the Agreement.

3.05 RAILROAD SAFETY ORIENTATION

A. Complete the railroad course "Orientation for Contractor's Safety", and maintain current registration prior to working on railroad property. This course is required to be completed annually by Contractor and Subcontractor personnel working on site.

"UPRR, BNSF, KCS/TEXMEX will not accept on-track safety training certificates from other railroads. Refer to Railroad specific contractor right of entry for training information."

B. Know and follow the "Contractor's Right of Entry Agreement" EXHIBIT D, MINIMUM SAFETY REQUIREMENTS regarding clothing, personal protective equipment, and general safety requirements.

3.06 COOPERATION

The Railroad will cooperate with Contractor so that work may be conducted in an efficient manner, and will cooperate with Contractor in enabling use of Railroad Right of Way in performing the work.

3.07 MINIMUM CONSTRUCTION CLEARANCES FOR FALSEWORK AND OTHER TEMPORARY STRUCTURES

Abide by the following minimum temporary clearances during the course of construction:
A. 15' - 0" (BNSF)(UPRR)and 14'-0" (KCS) horizontal from centerline of track
B. 22' (KCS) and 21' - 6" (UPRR & BNSF) vertically above top of rail.

For construction clearance less than listed above, obtain local Railroad Operating Unit review and approval.

3.08 APPROVAL OF REDUCED CLEARANCES

A. Maintain minimum track clearances during construction as specified in Section 3.07.

B. Submit any proposed infringement on the specified minimum clearances to the Railroad Designated Representative through TxDOT at least 30 days in advance of the work. Do not proceed with such infringement without written approval by the Railroad Designated Representative.

C. Do not commence work involving an approved infringement without receiving written assurance from the Railroad Designated Representative that arrangements have been made for any necessary flagging service.

EXHIBIT "A"

SHEET 1 OF 2

Texas Department of Transportation — Rail Division

RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS March 2020	0079	04	049	BU 67K
	DIST	COUNTY		SHEET NO.
	FTW	ERATH		218

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3.09 MAINTENANCE OF RAILROAD FACILITIES

A. Maintain all ditches and drainage structures free of silt or other obstructions resulting from Contractor's operations. Repair eroded areas and any other damage within Railroad Right of Way and repair any other damage to the property of the Railroad, or its tenants.

B. Perform all such maintenance and repair of damages due to the Contractors's operations at Contractor's expense.

C. Submit a proposed method of erosion control for review by the Railroad prior to beginning any grading on the project site. Comply with all applicable local, state and federal regulations when developing and implementing such erosion control.

3.10 SITE INSPECTIONS BY RAILROAD's DESIGNATED REPRESENTATIVE

A. In addition to the office reviews of construction submittals, site inspections may be performed by the Railroad Designated Representative at significant points during construction, including the following if applicable:
   1. Pre-construction meetings.
   2. Pile driving/drilling of caissons or drilled shafts.
   3. Reinforcement and concrete placement for railroad bridge substructure and/or superstructure.
   4. Erection of precast concrete or steel bridge superstructure.
   5. Placement of waterproofing (prior to placing ballast on bridge deck).
   6. Completion of the bridge structure.

B. Site inspection is not limited to the milestone events listed above. Site visits to check progress of the work may be performed at any time throughout the construction as deemed necessary by the Railroad.

C. Provide a detailed construction schedule, including the proposed temporary horizontal and vertical clearances and construction sequence for all work to TxDOT for submittal to the Railroad Designated Representative for review prior to commencement of work. Include the anticipated dates when the above listed events will occur. Update this schedule for the above listed events as necessary and each month at a minimum to allow the Railroad to schedule site inspections.

3.11 RAILROAD REPRESENTATIVES

Railroad representatives, conductors, flag person or watch person will be provided by the Railroad at expense of TxDOT to protect Railroad facilities, property and movements of its trains or engines. In general, the Railroad will furnish such personnel or other protective services as follows:

A. When any part of any equipment is standing or being operated within 25 feet, measured horizontally, from nearest rail of any track on which trains may operate, or when any object is off the ground and any dimension thereof could extend inside the 25 foot limit, or when any erection or construction activities are in progress within such limits, regardless of elevation above or below track.

B. For any excavation below elevation of track subgrade if, in the opinion of the Railroad Designated Representative, track or other railroad facilities may be subject to settlement or movement.

C. During any clearing, grubbing, excavation or grading in proximity to railroad facilities, which, in the opinion of the Railroad Designated Representative, may endanger railroad facilities or operations.

D. During any Contractor's operations when, in the opinion of the Railroad Designated Representative, railroad facilities, including, but not limited to, tracks, buildings, signals, wire lines, or pipe lines, may be endangered.

E. Arrange with the Railroad Designated Representative to provide the adequate number of flag persons to accomplish the work.

3.12 COMMUNICATIONS AND SIGNAL LINES

If required, the Railroad will rearrange its communications and signal lines, its grade crossing warning devices, train signals and tracks, and facilities that are in use and maintained by the Railroad's forces in connection with its operation at expense of TxDOT. This work by the Railroad will be done by its own forces and it is not a part of the Work under this Contract.

3.13 TRAFFIC CONTROL

Coordinate any operations that control traffic across or around railroad facilities with the Railroad Designated Representative.

3.14 CONSTRUCTION EXCAVATIONS AND BORING ACTIVITIES UNDER TRACK

A. Take special precaution and care in connection with excavating and shoring. Excavations for construction of footings, piers, columns, walls or other facilities that require shoring shall comply with requirements of TxDOT, OSHA, AREMA and Railroad "Guidelines for Temporary Shoring".

B. The project plans indicate whether there are fiber optic lines or other such telecommunications systems that require consideration. Regardless, contact the necessary call center to determine if such cable systems are present:

   UPRR 1-800-336-9193
   7:00 AM to 9:00 PM CST Monday-Friday except holidays,
   staffed 24 hrs/day for emergencies
   48 hrs notice required

   BNSF 1-800-533-2891
   24 hour number
   5 working days notice required

   KCS 1-800-344-8377
   Texas One Call, a 24 hour number
   48 hrs notice required, excluding weekends and holidays

   If a telecommunications system is buried anywhere on or near railroad property, coordinate with TxDOT, the Railroad and the Telecommunication Company(ies) to arrange for relocation or protective measures prior to beginning work on or near railroad property. Refer to the project General Notes for additional information.

C. Projects involving a boring or jack and bore operation under track such as drainage pipes or culverts and utilities require an installation plan reviewed and approved by the Railroad and TxDOT prior to proceeding with such construction. A railroad inspector and contractor assisted monitoring of ground and track movement is required to maintain safe passage of rail traffic. Stop installation and do not allow passage of trains if movements in excess of 1/4 inch vertical or horizontal is detected in the tracks. Immediately repair the damage to the satisfaction of TxDOT and the Railroad before proceeding.

3.15 RAILROAD FLAGGING

Per the Right of Entry Agreement for flagging, notify the Railroad Representative at least 10 working days in advance of Contractor's work and at least 30 working days in advance of any Contractor's work in which any person or equipment will be within 25 feet of nearest rail or as specified in the Contractor Right of Entry (CROE).

3.16 CLEANING OF RIGHT-OF-WAY

When work is complete, remove all tools, implements, and other materials brought into Railroad Right of Way and leave the right of Way in a clean and presentable condition to the satisfaction of TxDOT and the Railroad.

EXHIBIT "A"

SHEET 2 OF 2

Texas Department of Transportation | Rail Division

RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS March 2020	0079	04	049	BU 67K
	DIST	COUNTY		SHEET NO.
	FTW	ERATH		219

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STORMWATER POLLUTION PREVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with the TPDES Construction General Permit TXR150000 (CGP). The Texas Department of Transportation (TxDOT) ensures that project specifications include adequate best management practices (BMPs) for this project.

For all projects with soil disturbing activity and for projects that have Environmental, Permits, Issues, and Commitments (EPICs) dependent on stormwater controls and water quality measures TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office, Area Office, or electronically.

This SWP3 is consistent with requirements specified in applicable stormwater plans and the projects environmental permits, issues, and commitments (EPICs). A copy of the CGP is included in Attachment 2.12 of the SWP3 binder.

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
0079-04-049

1.2 PROJECT LIMITS:
From: Fort Worth and Western Railroad

To: FM 219

1.3 PROJECT COORDINATES:
BEGIN: (Lat) 32.083408° ,(Long) -98.342992°

END: (Lat) 32.096217° ,(Long) -98.338853°

1.4 TOTAL PROJECT AREA (Acres): 12.81

1.5 TOTAL AREA TO BE DISTURBED (Acres): 5.81

1.6 NATURE OF CONSTRUCTION ACTIVITY:
The construction activity includes repair base failures, remove brick, mill, HMAC overlay, storm sewer systems, pavement markings and replace curb & gutter.

1.7 MAJOR SOIL TYPES:

Soil Type	Description
Purves clay, 1 to 3 percent slopes	0 to 8 inches: clay; 8 to 12 inches: clay; 12 to 14 inches: extremely gravelly clay; 14 to 40 inches: bedrock
Slidell clay, 1 to 3 percent slopes	0 to 19 inches: clay; 19 to 32 inches: clay; 32 to 49 inches: clay; 49 to 80 inches: clay

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):
PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

☒ PSLs determined during preconstruction meeting
☐ PSLs determined during construction
☐ No PSLs planned for construction

Type	Sheet #s

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

1.9 CONSTRUCTION ACTIVITIES:
(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.5.)

☒ Mobilization
☒ Install sediment and erosion controls
☐ Blade existing topsoil into windrows, prep ROW, clear and grub
☒ Remove existing pavement
☒ Grading operations, excavation, and embankment
☐ Excavate and prepare subgrade for proposed pavement widening
☐ Remove existing culverts, safety end treatments (SETs)
☐ Remove existing metal beam guard fence (MBGF), bridge rail
☒ Install proposed pavement per plans
☒ Install culverts, culvert extensions, SETs
☐ Install mow strip, MBGF, bridge rail
☐ Place flex base
☒ Rework slopes, grade ditches
☐ Blade windrowed material back across slopes
☒ Revegetation of unpaved areas
☒ Achieve site stabilization and remove sediment and erosion control measures
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

☐ Sediment laden stormwater from stormwater conveyance over disturbed area
☐ Fuels, oils, and lubricants from construction vehicles, equipment, and storage
☐ Solvents, paints, adhesives, etc. from various construction activities
☐ Transported soils from offsite vehicle tracking
☐ Construction debris and waste from various construction activities
☒ Contaminated water from excavation or dewatering pump-out water
☐ Sanitary waste from onsite restroom facilities
☐ Trash from various construction activities/receptacles
☐ Long-term stockpiles of material and waste
☐
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.11 RECEIVING WATERS:
Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody
Resley Creek	Seg # 1221A

* Add (*) for impaired waterbodies with pollutant in ().

1.12 ROLES AND RESPONSIBILITIES: TxDOT

☒ Development of plans and specifications
☒ Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
☒ Post Construction Site Notice
☒ Submit NOI/CSN to local MS4
☒ Perform SWP3 inspections
☒ Maintain SWP3 records and update to reflect daily operations
☒ Complete and submit Notice of Termination to TCEQ
☒ Maintain SWP3 records for 3 years
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

☒ Day To Day Operational Control
☒ Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
☒ Post Construction Site Notice
☒ Submit NOI/CSN to local MS4
☒ Maintain schedule of major construction activities
☒ Install, maintain and modify BMPs
☒ Complete and submit Notice of Termination to TCEQ
☒ Maintain SWP3 records for 3 years
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.14 LOCAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) OPERATOR COORDINATION:

MS4 Entity

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED
PROFESSIONAL ENGINEER

Abulkhair M. Zobayed

7/13/2024

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

July 2023 Sheet 1 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
	SEE TITLE SHEET		220
STATE	STATE DIST.	COUNTY	
TEXAS	FTW	ERATH	
CONT.	SECT.	JOB	HIGHWAY NO.
0079	04	049	BU 67K

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

- ☒ ☐ Protection of Existing Vegetation
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Soil Retention Blankets
- ☐ ☐ Geotextiles
- ☐ ☐ Mulching/ Hydromulching
- ☐ ☐ Soil Surface Treatments
- ☐ ☐ Temporary Seeding
- ☐ ☒ Permanent Planting, Sodding or Seeding
- ☐ ☐ Biodegradable Erosion Control Logs
- ☒ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Vertical Tracking
- ☐ ☐ Interceptor Swale
- ☐ ☒ Riprap
- ☐ ☐ Diversion Dike
- ☐ ☐ Temporary Pipe Slope Drain
- ☐ ☐ Embankment for Erosion Control
- ☐ ☐ Paved Flumes
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

- ☒ ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Dewatering Controls
- ☒ ☐ Inlet Protection
- ☒ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Sandbag Berms
- ☒ ☐ Sediment Control Fence
- ☒ ☐ Stabilized Construction Exit
- ☐ ☐ Floating Turbidity Barrier
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Vegetated Filter Strips
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

Sediment control BMPs requiring design capacity calculations (See SWP3 Attachment 1.3.):

T / P

- ☐ ☐ Sediment Trap
  - ☐ Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
  - ☐ 3,600 cubic feet of storage per acre drained
- ☐ ☐ Sedimentation Basin
  - ☒ Not required (<10 acres disturbed)
  - ☐ Required (>10 acres) and implemented.
    - ☐ Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
    - ☐ 3,600 cubic feet of storage per acre drained
  - ☐ Required (>10 acres), but not feasible due to:
    - ☐ Available area/Site geometry
    - ☐ Site slope/Drainage patterns
    - ☐ Site soils/Geotechnical factors
    - ☐ Public safety
    - ☐ Other: _____

2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To
TBD		

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- ☒ Excess dirt/mud on road removed daily
- ☐ Haul roads dampened for dust control
- ☐ Loaded haul trucks to be covered with tarpaulin
- ☐ Stabilized construction exit
- ☐ Daily street sweeping
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- ☐ Chemical Management
- ☐ Concrete and Materials Waste Management
- ☒ Debris and Trash Management
- ☒ Dust Control
- ☐ Sanitary Facilities
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To
TBD		

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- ☒ Fire hydrant flushings
- ☒ Irrigation drainage
- ☒ Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- ☒ Potable water sources
- ☒ Springs
- ☒ Uncontaminated groundwater
- ☒ Water used to wash vehicles or control dust
- ☒ Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 DEWATERING:

Dewatering discharges of accumulated stormwater, groundwater, and surface water including discharges from dewatering of trenches, excavations, foundations, vaults, and other points of accumulation are prohibited unless managed by appropriate controls to prevent and minimize the offsite discharge of sediment and other pollutants.

2.9 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

When dewatering activities are present, a daily inspection will be conducted once per day during those activities and documented in accordance with CGP and TxDOT requirements.

2.10 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED
PROFESSIONAL ENGINEER

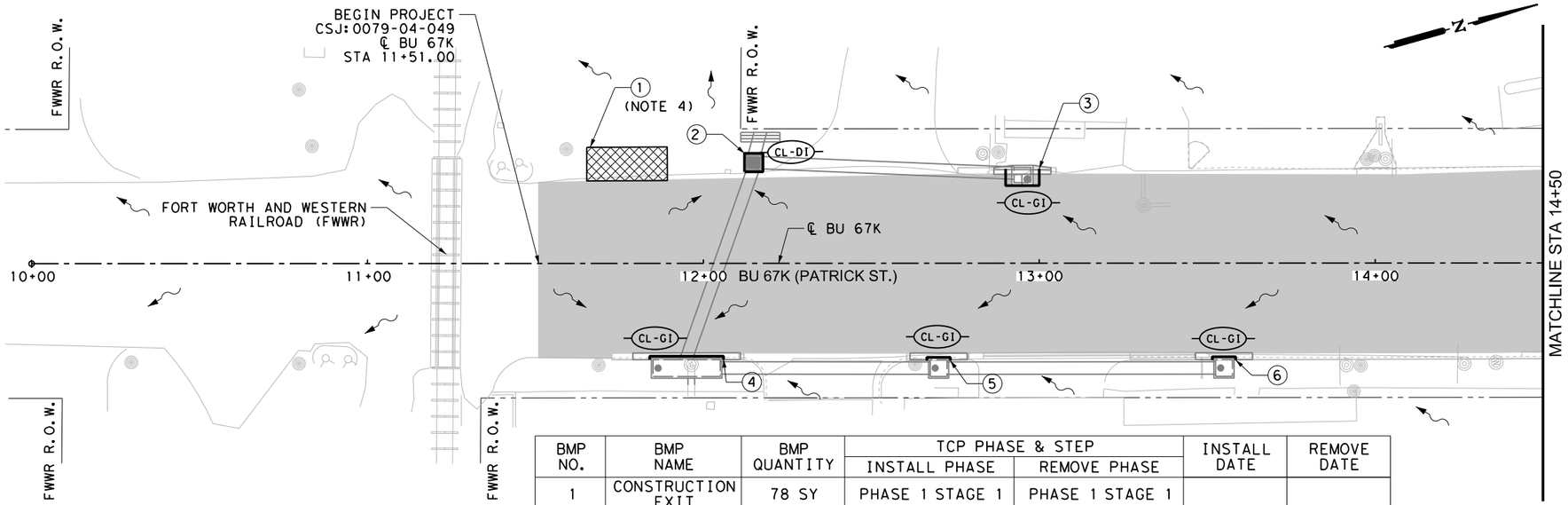
7/13/2024

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

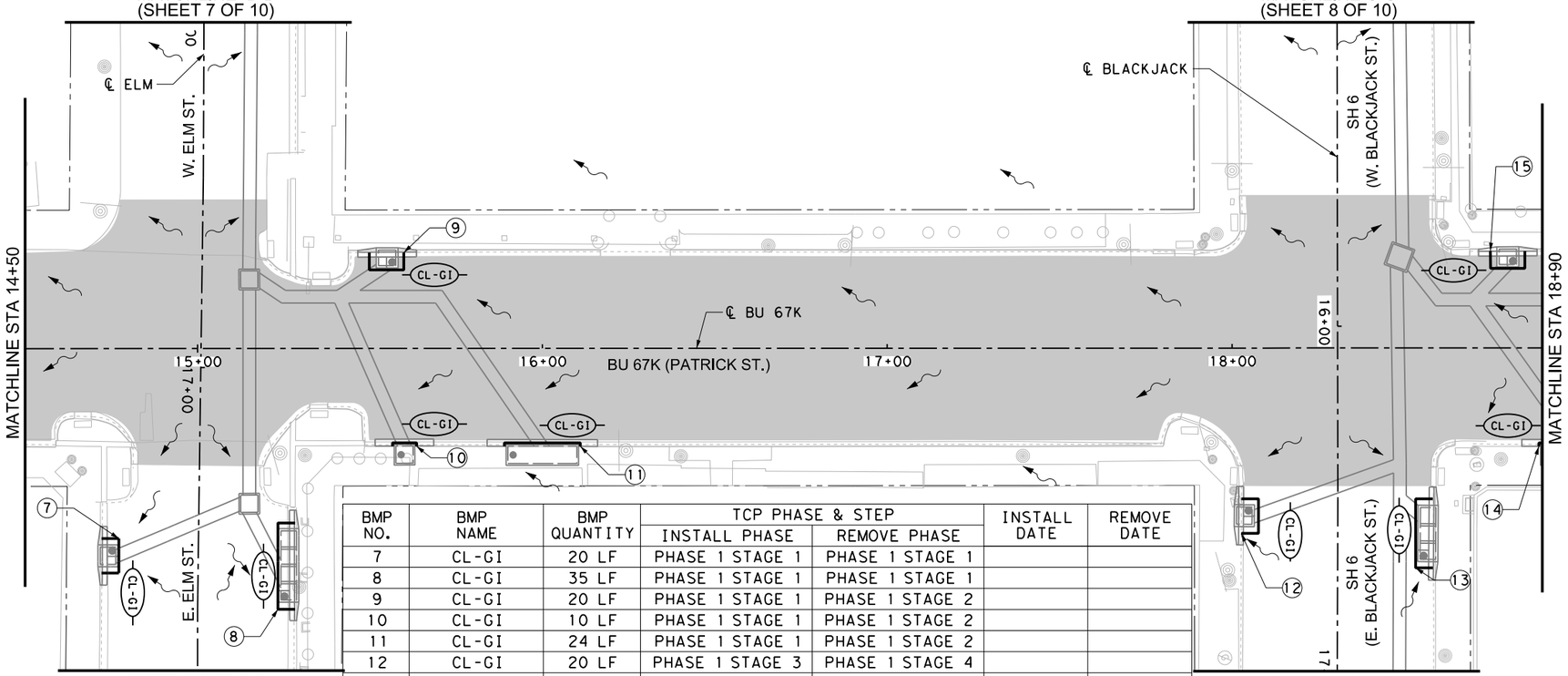
July 2023 Sheet 2 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
	SEE TITLE SHEET		221
STATE	STATE DIST.	COUNTY	
TEXAS	FTW	ERATH	
CONT.	SECT.	JOB	HIGHWAY NO.
0079	04	049	BU 67K



BMP NO.	BMP NAME	BMP QUANTITY	TCP PHASE & STEP		INSTALL DATE	REMOVE DATE
			INSTALL PHASE	REMOVE PHASE		
1	CONSTRUCTION EXIT	78 SY	PHASE 1 STAGE 1	PHASE 1 STAGE 1		
2	CL-DI	22 LF	PHASE 1 STAGE 1	PHASE 1 STAGE 1		
3	CL-GI	20 LF	PHASE 1 STAGE 1	PHASE 1 STAGE 1		
4	CL-GI	24 LF	PHASE 1 STAGE 1	PHASE 1 STAGE 1		
5	CL-GI	10 LF	PHASE 1 STAGE 1	PHASE 1 STAGE 1		
6	CL-GI	10 LF	PHASE 1 STAGE 1	PHASE 1 STAGE 1		



BMP NO.	BMP NAME	BMP QUANTITY	TCP PHASE & STEP		INSTALL DATE	REMOVE DATE
			INSTALL PHASE	REMOVE PHASE		
7	CL-GI	20 LF	PHASE 1 STAGE 1	PHASE 1 STAGE 1		
8	CL-GI	35 LF	PHASE 1 STAGE 1	PHASE 1 STAGE 1		
9	CL-GI	20 LF	PHASE 1 STAGE 1	PHASE 1 STAGE 2		
10	CL-GI	10 LF	PHASE 1 STAGE 1	PHASE 1 STAGE 2		
11	CL-GI	24 LF	PHASE 1 STAGE 1	PHASE 1 STAGE 2		
12	CL-GI	20 LF	PHASE 1 STAGE 3	PHASE 1 STAGE 4		
13	CL-GI	30 LF	PHASE 1 STAGE 3	PHASE 1 STAGE 4		
14	CL-GI	24 LF	PHASE 1 STAGE 4	PHASE 1 STAGE 4		
15	CL-GI	20 LF	PHASE 1 STAGE 4	PHASE 1 STAGE 4		

LEGEND

- PROP PAVEMENT
- PROP DRAINAGE
- EXIST R.O.W.
- DIRECTION OF FLOW
- SCF — SEDIMENT CONTROL FENCE
- CL-DI — EROSION CONTROL LOG AT DROP INLET (8")
- CL-GI — EROSION CONTROL LOG AT CURB & GRATE INLET (8")
- CL-CI — EROSION CONTROL LOG AT CURB INLET (8")
- RFD2 — ROCK FILTER DAM (TYPE 2)
- PERMANENT BLOCK SODDING
- CONSTRUCTION EXIT
- (4) BMP NUMBER

NOTES:

1. ALL EROSION CONTROL DEVICES SHALL REMAIN IN PLACE UNTIL EACH DRAINAGE SYSTEM IN THAT PHASE IS CONSTRUCTED. FOR ANY DRAINAGE SYSTEMS CAPPED FOR CONSTRUCTION IN NEXT PHASE, THE EROSION CONTROL DEVICES SHALL REMAIN IN PLACE UNTIL NEXT PHASE WHEN CONSTRUCTION IN THAT PHASE IS COMPLETE.
2. REFER TO TRAFFIC CONTROL PLANS FOR CONSTRUCTION PHASING INFORMATION.
3. REFER TO TRAFFIC CONTROL, ROADWAY, REMOVAL, DRAINAGE, UTILITY, TYPICAL SECTIONS FOR MORE INFORMATION.
4. CONSTRUCTION EXIT LOCATIONS TO BE ADJUSTED AS REQUIRED WITH THE APPROVAL OF THE ENGINEER.
5. REFER TO BMP TABLE FOR EROSION CONTROL QUANTITY AND TCP PHASING THE BMPS ARE TO BE INSTALLED IN.

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

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED PROFESSIONAL ENGINEER
7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

BU 67K

SW3P LAYOUT

SHEET 1 OF 10

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	
CONTROL	SECTION	JOB	222
0079	04	049	

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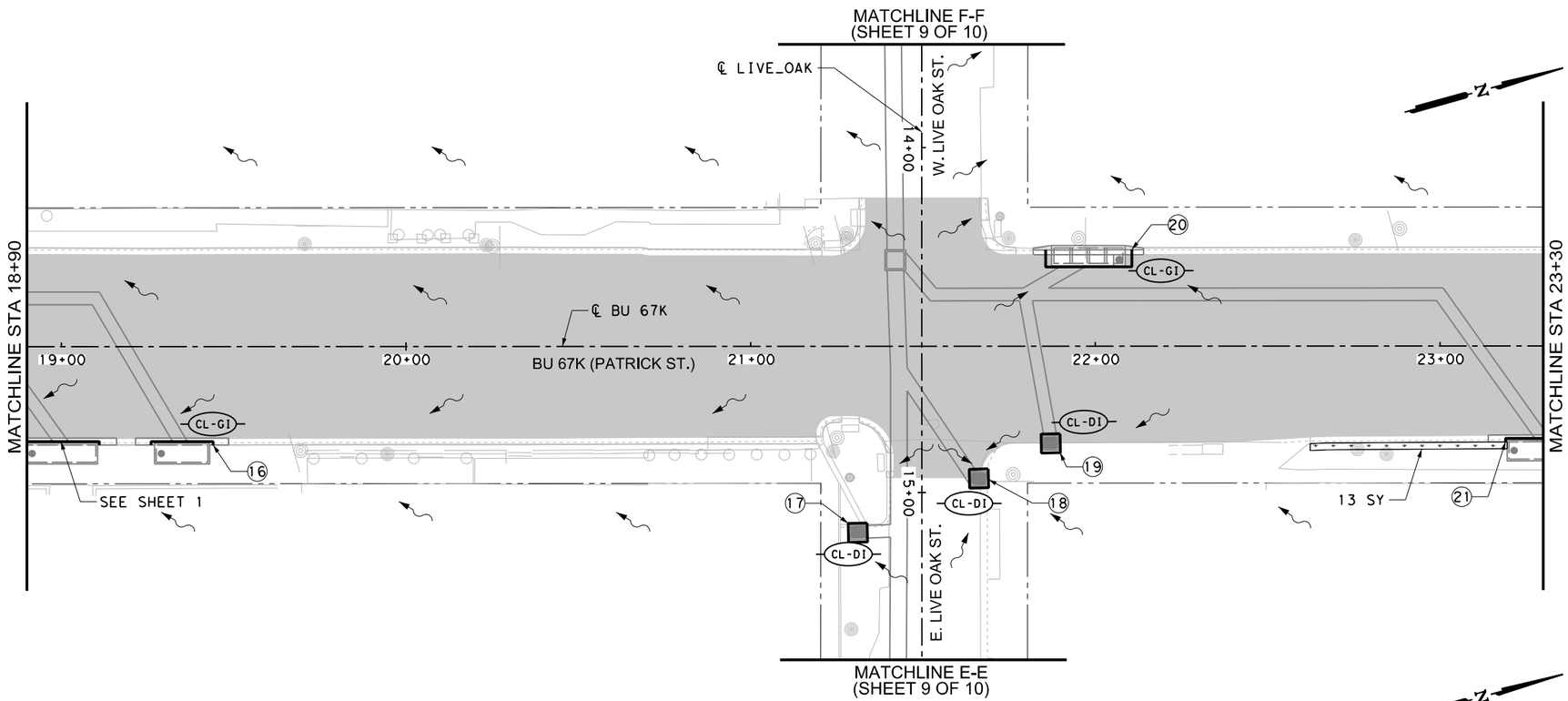

LEGEND

- PROP PAVEMENT
- PROP DRAINAGE
- EXIST R.O.W.
- DIRECTION OF FLOW
- SCF — SEDIMENT CONTROL FENCE
- CL-DI — EROSION CONTROL LOG AT DROP INLET (8")
- CL-GI — EROSION CONTROL LOG AT CURB & GRATE INLET (8")
- CL-CI — EROSION CONTROL LOG AT CURB INLET (8")
- RFD2 — ROCK FILTER DAM (TYPE 2)
- PERMANENT BLOCK SODDING
- CONSTRUCTION EXIT
- (4) — BMP NUMBER

NOTES:

1. ALL EROSION CONTROL DEVICES SHALL REMAIN IN PLACE UNTIL EACH DRAINAGE SYSTEM IN THAT PHASE IS CONSTRUCTED. FOR ANY DRAINAGE SYSTEMS CAPPED FOR CONSTRUCTION IN NEXT PHASE, THE EROSION CONTROL DEVICES SHALL REMAIN IN PLACE UNTIL NEXT PHASE WHEN CONSTRUCTION IN THAT PHASE IS COMPLETE.
2. REFER TO TRAFFIC CONTROL PLANS FOR CONSTRUCTION PHASING INFORMATION.
3. REFER TO TRAFFIC CONTROL, ROADWAY, REMOVAL, DRAINAGE, UTILITY, TYPICAL SECTIONS FOR MORE INFORMATION.
4. CONSTRUCTION EXIT LOCATIONS TO BE ADJUSTED AS REQUIRED WITH THE APPROVAL OF THE ENGINEER.
5. REFER TO BMP TABLE FOR EROSION CONTROL QUANTITY AND TCP PHASING THE BMPS ARE TO BE INSTALLED IN.

BMP NO.	BMP NAME	BMP QUANTITY	TCP PHASE & STEP		INSTALL DATE	REMOVE DATE
			INSTALL PHASE	REMOVE PHASE		
16	CL-GI	20 LF	PHASE 1 STAGE 4	PHASE 1 STAGE 4		
17	CL-DI	22 LF	PHASE 1 STAGE 4	PHASE 1 STAGE 5		
18	CL-DI	22 LF	PHASE 1 STAGE 4	PHASE 1 STAGE 5		
19	CL-DI	22 LF	PHASE 1 STAGE 5	PHASE 1 STAGE 5		
20	CL-GI	35 LF	PHASE 1 STAGE 5	PHASE 1 STAGE 5		
21	CL-GI	24 LF	PHASE 1 STAGE 5	PHASE 1 STAGE 5		

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

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED
PROFESSIONAL ENGINEER

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

SW3P LAYOUT

SHEET 2 OF 10

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	
CONTROL	SECTION	JOB	223
0079	04	049	

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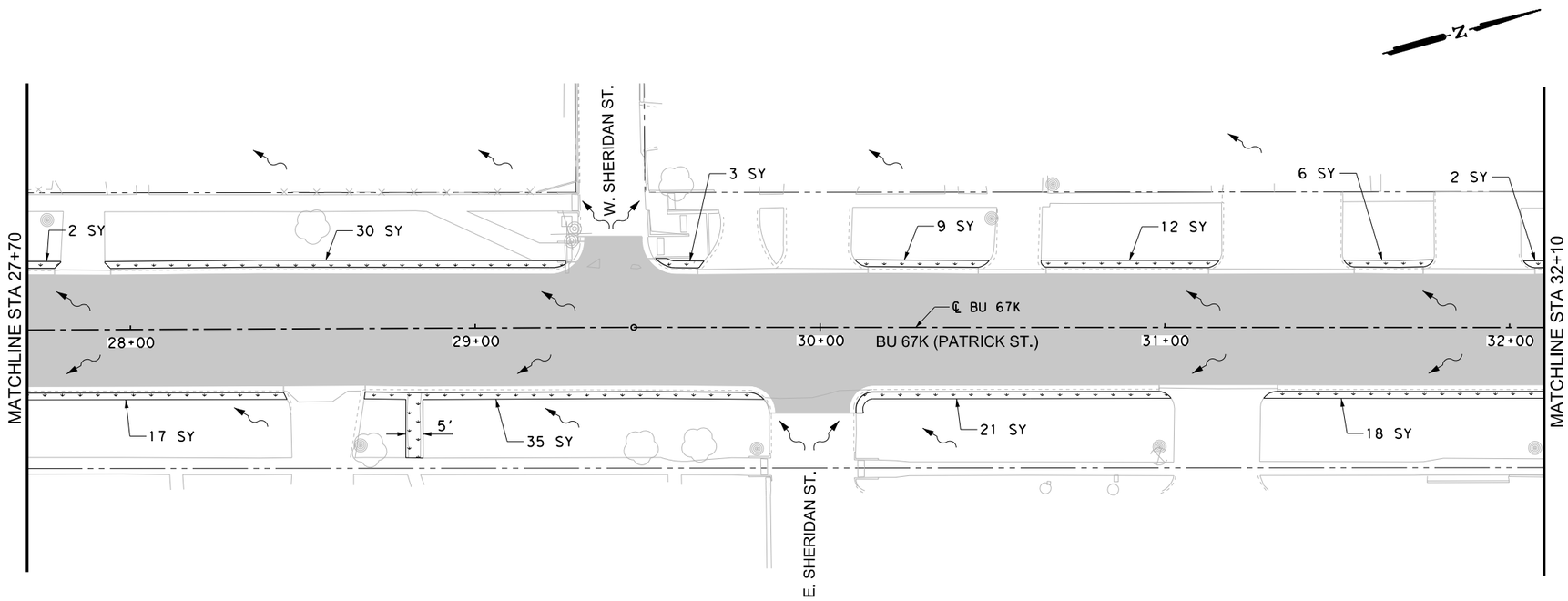

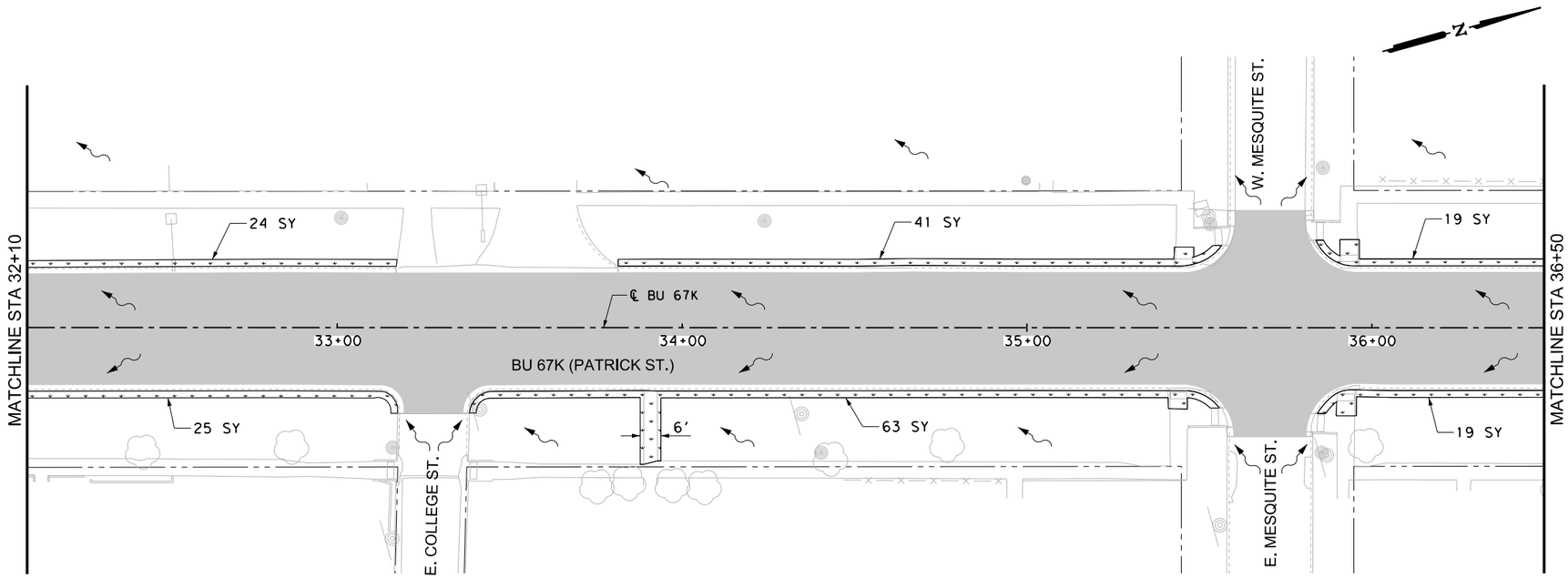

LEGEND

- PROP PAVEMENT
- PROP DRAINAGE
- EXIST R.O.W.
- DIRECTION OF FLOW
- (SCF) SEDIMENT CONTROL FENCE
- (CL-DI) EROSION CONTROL LOG AT DROP INLET (8")
- (CL-GI) EROSION CONTROL LOG AT CURB & GRATE INLET (8")
- (CL-CI) EROSION CONTROL LOG AT CURB INLET (8")
- (RFD2) ROCK FILTER DAM (TYPE 2)
- PERMANENT BLOCK SODDING
- CONSTRUCTION EXIT
- (4) BMP NUMBER

NOTES:

1. ALL EROSION CONTROL DEVICES SHALL REMAIN IN PLACE UNTIL EACH DRAINAGE SYSTEM IN THAT PHASE IS CONSTRUCTED. FOR ANY DRAINAGE SYSTEMS CAPPED FOR CONSTRUCTION IN NEXT PHASE, THE EROSION CONTROL DEVICES SHALL REMAIN IN PLACE UNTIL NEXT PHASE WHEN CONSTRUCTION IN THAT PHASE IS COMPLETE.
2. REFER TO TRAFFIC CONTROL PLANS FOR CONSTRUCTION PHASING INFORMATION.
3. REFER TO TRAFFIC CONTROL, ROADWAY, REMOVAL, DRAINAGE, UTILITY, TYPICAL SECTIONS FOR MORE INFORMATION.
4. CONSTRUCTION EXIT LOCATIONS TO BE ADJUSTED AS REQUIRED WITH THE APPROVAL OF THE ENGINEER.
5. REFER TO BMP TABLE FOR EROSION CONTROL QUANTITY AND TCP PHASING THE BMPS ARE TO BE INSTALLED IN.

0 20' 40'

SCALE: 1" = 40'

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED
PROFESSIONAL ENGINEER

Abulkhair M. Zobayed

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

SW3P LAYOUT

SHEET 3 OF 10

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	
CONTROL	SECTION	JOB	224
0079	04	049	

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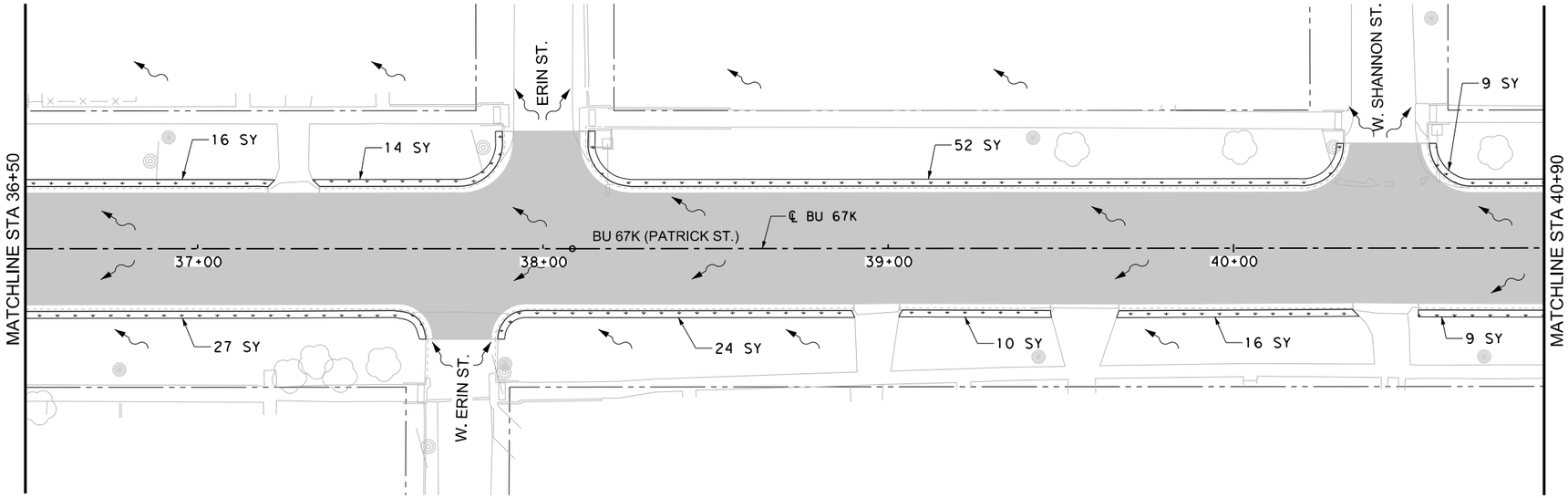

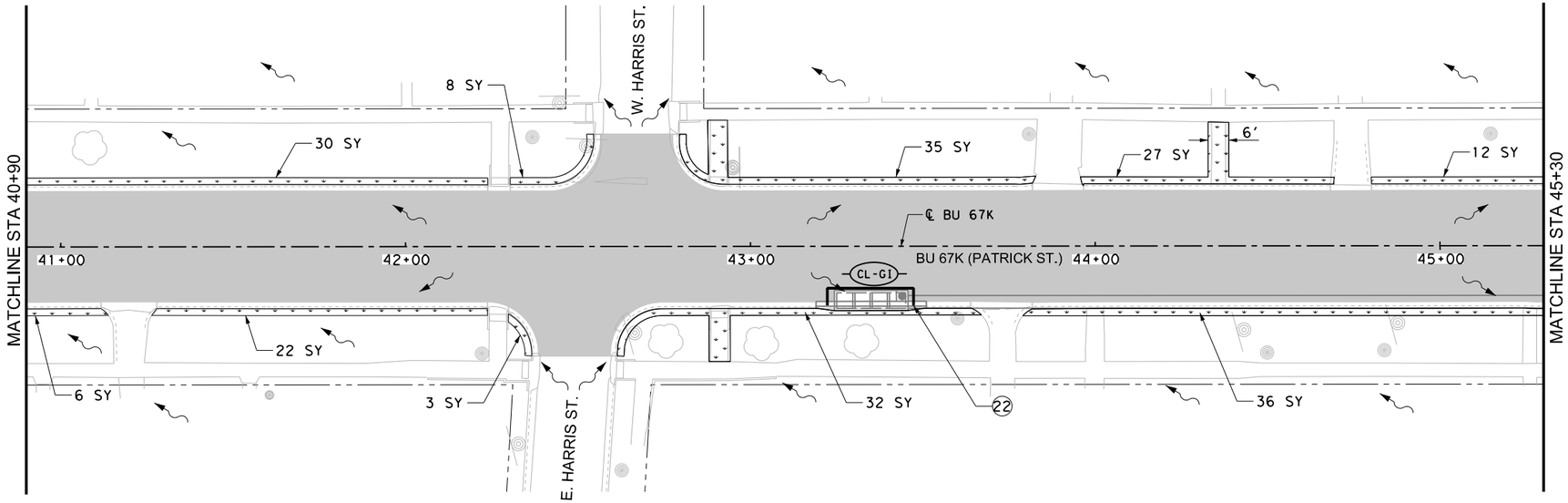

LEGEND

- PROP PAVEMENT
- PROP DRAINAGE
- EXIST R.O.W.
- DIRECTION OF FLOW
- (SCF) SEDIMENT CONTROL FENCE
- (CL-DI) EROSION CONTROL LOG AT DROP INLET (8")
- (CL-GI) EROSION CONTROL LOG AT CURB & GRATE INLET (8")
- (CL-CI) EROSION CONTROL LOG AT CURB INLET (8")
- (RFD2) ROCK FILTER DAM (TYPE 2)
- PERMANENT BLOCK SODDING
- CONSTRUCTION EXIT
- (4) BMP NUMBER

NOTES:

1. ALL EROSION CONTROL DEVICES SHALL REMAIN IN PLACE UNTIL EACH DRAINAGE SYSTEM IN THAT PHASE IS CONSTRUCTED. FOR ANY DRAINAGE SYSTEMS CAPPED FOR CONSTRUCTION IN NEXT PHASE, THE EROSION CONTROL DEVICES SHALL REMAIN IN PLACE UNTIL NEXT PHASE WHEN CONSTRUCTION IN THAT PHASE IS COMPLETE.
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5. REFER TO BMP TABLE FOR EROSION CONTROL QUANTITY AND TCP PHASING THE BMPS ARE TO BE INSTALLED IN.

BMP NO.	BMP NAME	BMP QUANTITY	TCP PHASE & STEP		INSTALL DATE	REMOVE DATE
			INSTALL PHASE	REMOVE PHASE		
22	CL-GI	35 LF	PHASE 1 STAGE 8	PHASE 1 STAGE 9		

0 20' 40'

SCALE: 1" = 40'

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED
PROFESSIONAL ENGINEER

Abulkhair M. Zobayed

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

SW3P LAYOUT

SHEET 4 OF 10

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	225
CONTROL	SECTION	JOB	
0079	04	049	

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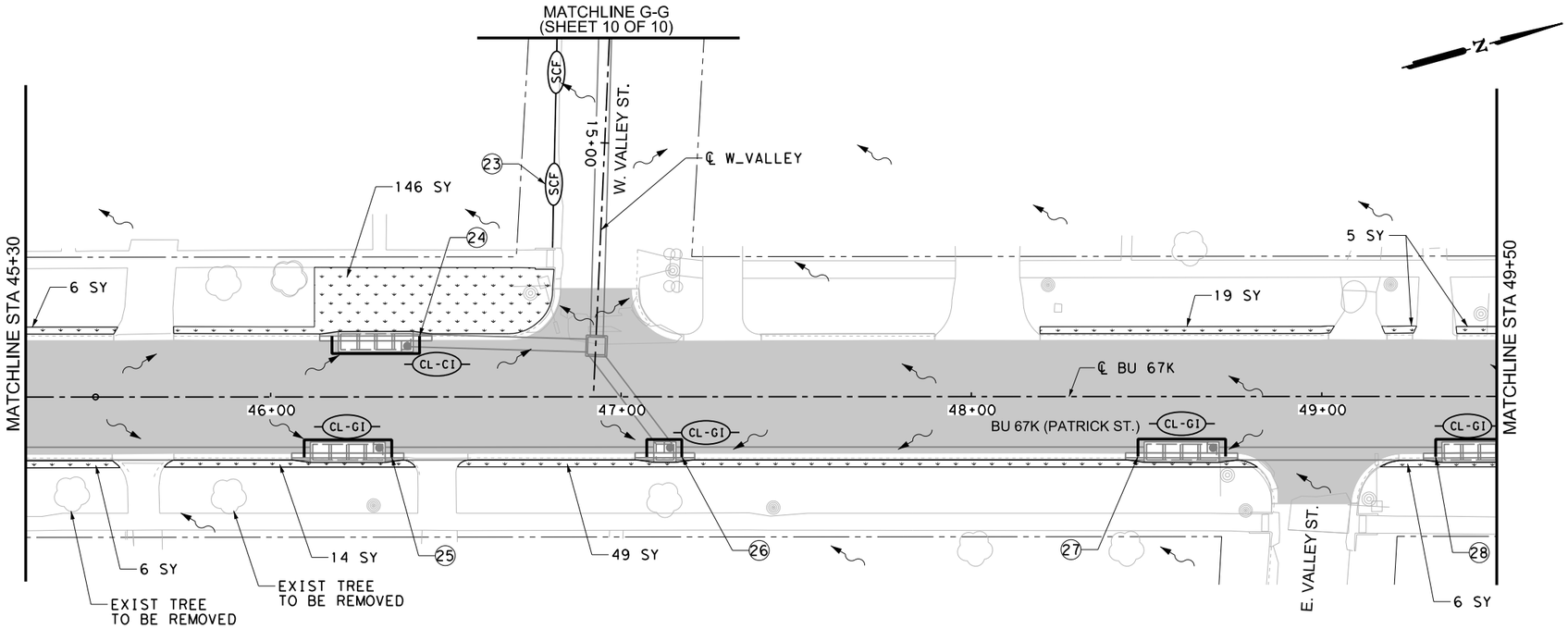
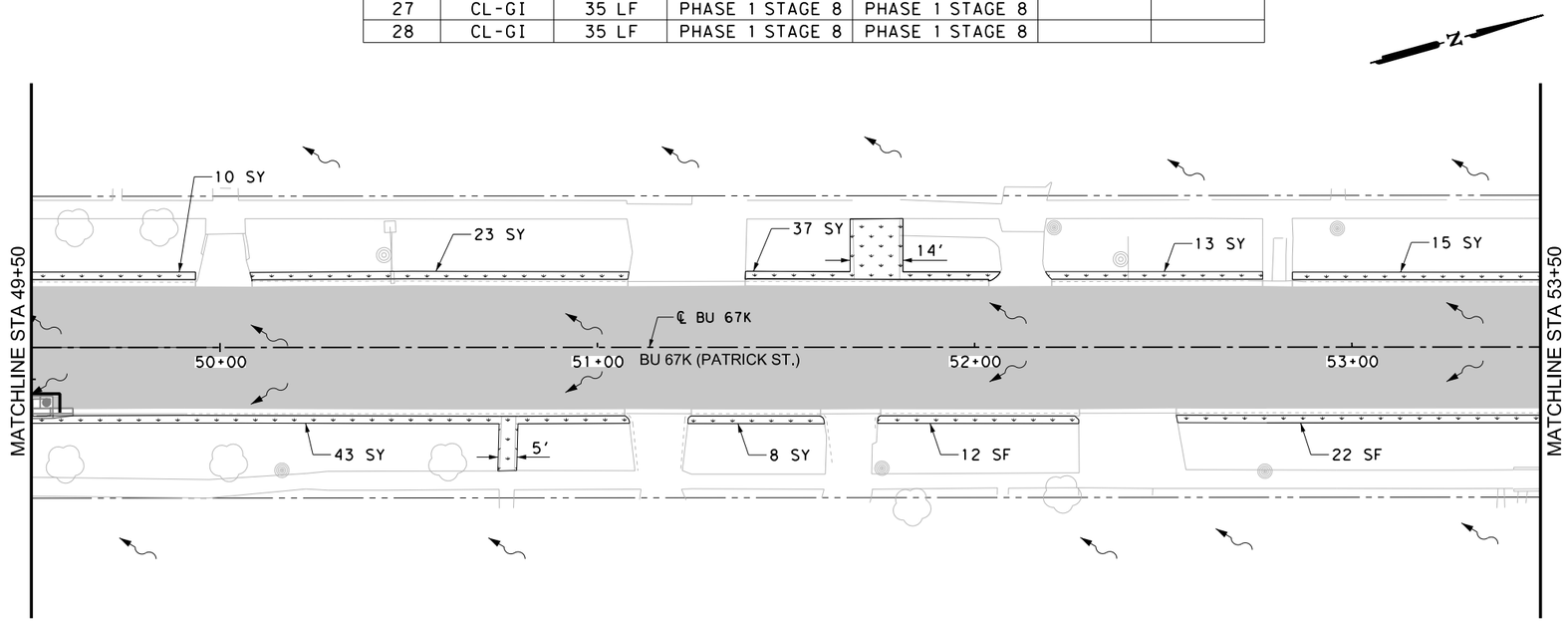


BMP NO.	BMP NAME	BMP QUANTITY	TCP PHASE & STEP		INSTALL DATE	REMOVE DATE
			INSTALL PHASE	REMOVE PHASE		
23	SCF	60 LF	PHASE 1 STAGE 8	PHASE 1 STAGE 8		
24	CL-CI	35 LF	PHASE 1 STAGE 8	PHASE 1 STAGE 8		
25	CL-GI	35 LF	PHASE 1 STAGE 8	PHASE 1 STAGE 8		
26	CL-GI	20 LF	PHASE 1 STAGE 8	PHASE 1 STAGE 8		
27	CL-GI	35 LF	PHASE 1 STAGE 8	PHASE 1 STAGE 8		
28	CL-GI	35 LF	PHASE 1 STAGE 8	PHASE 1 STAGE 8		



LEGEND

- PROP PAVEMENT
- PROP DRAINAGE
- EXIST R.O.W.
- DIRECTION OF FLOW
- SCF — SEDIMENT CONTROL FENCE
- CL-DI — EROSION CONTROL LOG AT DROP INLET (8")
- CL-GI — EROSION CONTROL LOG AT CURB & GRATE INLET (8")
- CL-CI — EROSION CONTROL LOG AT CURB INLET (8")
- RFD2 — ROCK FILTER DAM (TYPE 2)
- PERMANENT BLOCK SODDING
- CONSTRUCTION EXIT
- (4) — BMP NUMBER

NOTES:

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3. REFER TO TRAFFIC CONTROL, ROADWAY, REMOVAL, DRAINAGE, UTILITY, TYPICAL SECTIONS FOR MORE INFORMATION.
4. CONSTRUCTION EXIT LOCATIONS TO BE ADJUSTED AS REQUIRED WITH THE APPROVAL OF THE ENGINEER.
5. REFER TO BMP TABLE FOR EROSION CONTROL QUANTITY AND TCP PHASING THE BMPS ARE TO BE INSTALLED IN.

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

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED
PROFESSIONAL ENGINEER
Abulkhair M. Zobayed
7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

SW3P LAYOUT

SHEET 5 OF 10

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	
CONTROL	SECTION	JOB	226
0079	04	049	

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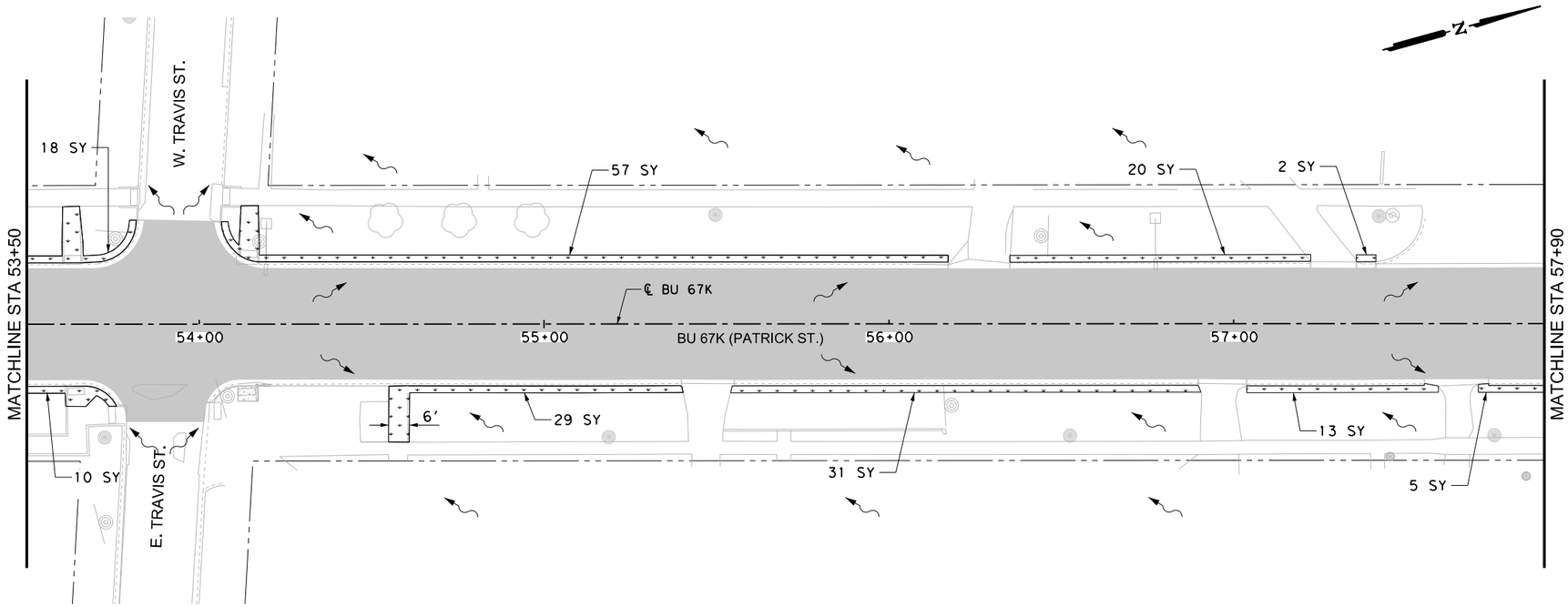

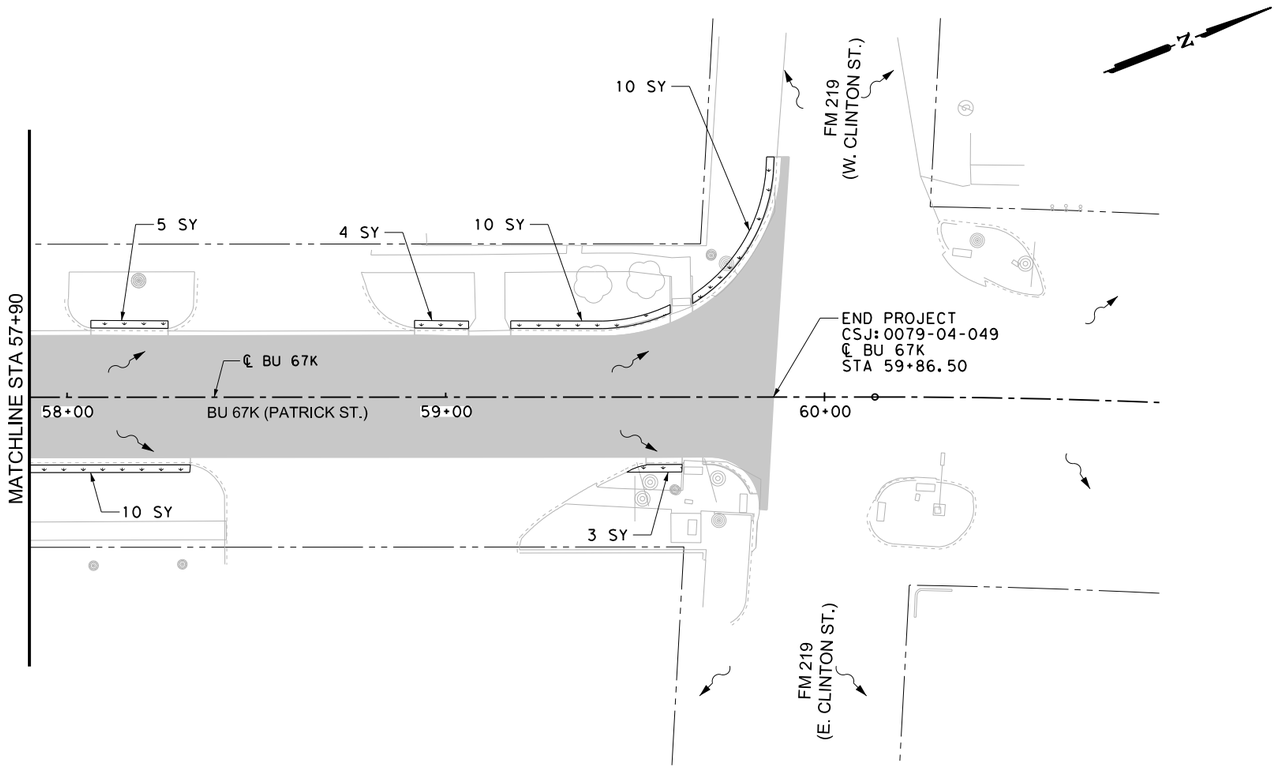

LEGEND

- PROP PAVEMENT
- PROP DRAINAGE
- EXIST R.O.W.
- DIRECTION OF FLOW
- (SCF) SEDIMENT CONTROL FENCE
- (CL-DI) EROSION CONTROL LOG AT DROP INLET (8")
- (CL-GI) EROSION CONTROL LOG AT CURB & GRATE INLET (8")
- (CL-CI) EROSION CONTROL LOG AT CURB INLET (8")
- (RFD2) ROCK FILTER DAM (TYPE 2)
- PERMANENT BLOCK SODDING
- CONSTRUCTION EXIT
- (4) BMP NUMBER

NOTES:

1. ALL EROSION CONTROL DEVICES SHALL REMAIN IN PLACE UNTIL EACH DRAINAGE SYSTEM IN THAT PHASE IS CONSTRUCTED. FOR ANY DRAINAGE SYSTEMS CAPPED FOR CONSTRUCTION IN NEXT PHASE, THE EROSION CONTROL DEVICES SHALL REMAIN IN PLACE UNTIL NEXT PHASE WHEN CONSTRUCTION IN THAT PHASE IS COMPLETE.
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4. CONSTRUCTION EXIT LOCATIONS TO BE ADJUSTED AS REQUIRED WITH THE APPROVAL OF THE ENGINEER.
5. REFER TO BMP TABLE FOR EROSION CONTROL QUANTITY AND TCP PHASING THE BMPS ARE TO BE INSTALLED IN.

0 20' 40'

SCALE: 1" = 40'

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED
PROFESSIONAL ENGINEER

Abulkhair M. Zobayed

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

SW3P LAYOUT

SHEET 6 OF 10

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	227
CONTROL	SECTION	JOB	
0079	04	049	

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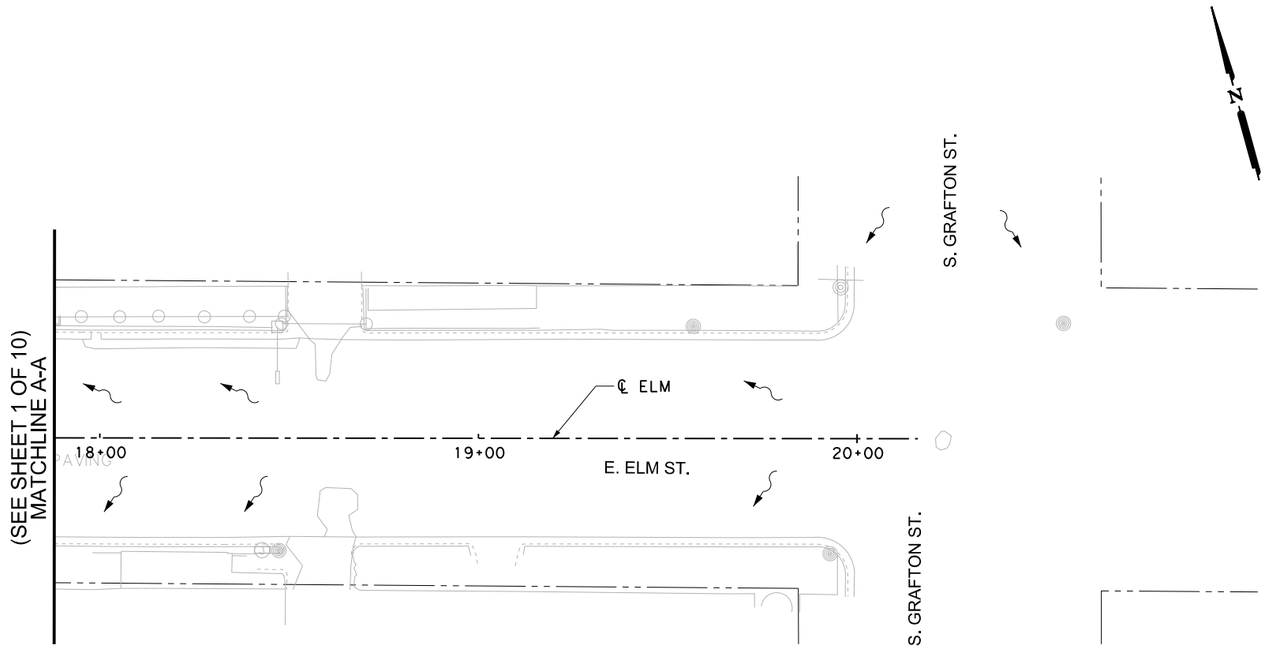

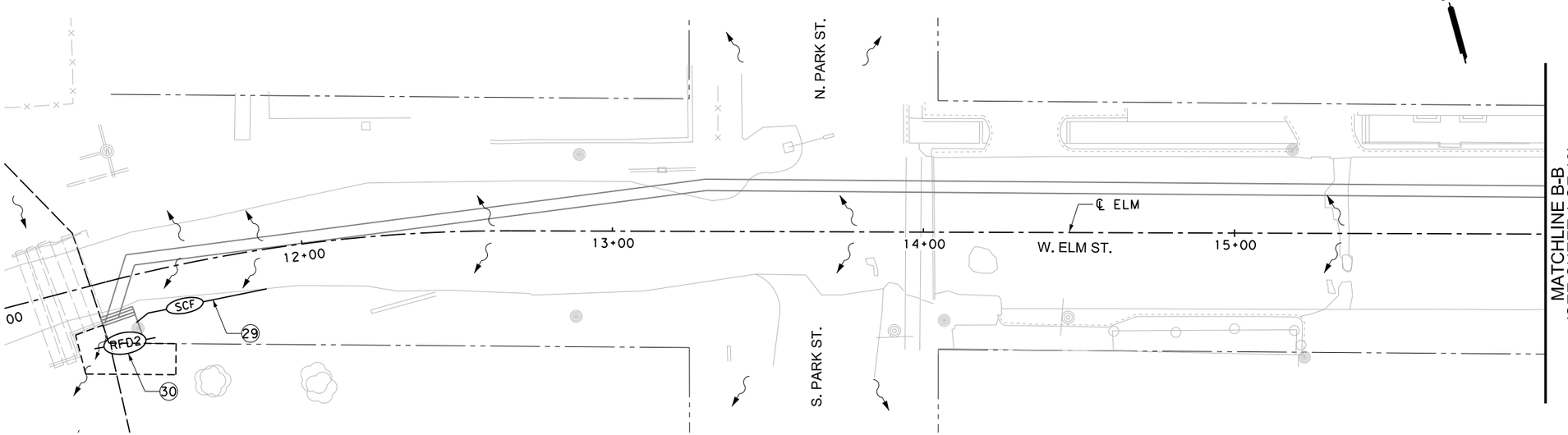

LEGEND

- PROP PAVEMENT
- PROP DRAINAGE
- EXIST R.O.W.
- DIRECTION OF FLOW
- SCF — SEDIMENT CONTROL FENCE
- CL-DI — EROSION CONTROL LOG AT DROP INLET (8")
- CL-GI — EROSION CONTROL LOG AT CURB & GRATE INLET (8")
- CL-CI — EROSION CONTROL LOG AT CURB INLET (8")
- RFD2 — ROCK FILTER DAM (TYPE 2)
- PERMANENT BLOCK SODDING
- CONSTRUCTION EXIT
- (4) BMP NUMBER

NOTES:

1. ALL EROSION CONTROL DEVICES SHALL REMAIN IN PLACE UNTIL EACH DRAINAGE SYSTEM IN THAT PHASE IS CONSTRUCTED. FOR ANY DRAINAGE SYSTEMS CAPPED FOR CONSTRUCTION IN NEXT PHASE, THE EROSION CONTROL DEVICES SHALL REMAIN IN PLACE UNTIL NEXT PHASE WHEN CONSTRUCTION IN THAT PHASE IS COMPLETE.
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4. CONSTRUCTION EXIT LOCATIONS TO BE ADJUSTED AS REQUIRED WITH THE APPROVAL OF THE ENGINEER.
5. REFER TO BMP TABLE FOR EROSION CONTROL QUANTITY AND TCP PHASING THE BMPS ARE TO BE INSTALLED IN.

BMP NO.	BMP NAME	BMP QUANTITY	TCP PHASE & STEP		INSTALL DATE	REMOVE DATE
			INSTALL PHASE	REMOVE PHASE		
29	SCF	45 LF	PHASE 1 STAGE 1	PHASE 1 STAGE 2		
30	RFD2	20 LF	PHASE 1 STAGE 1	PHASE 1 STAGE 2		

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

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED
PROFESSIONAL ENGINEER
Abulkhair M. Zobayed
7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

SW3P LAYOUT

SHEET 7 OF 10

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	228
CONTROL	SECTION	JOB	
0079	04	049	

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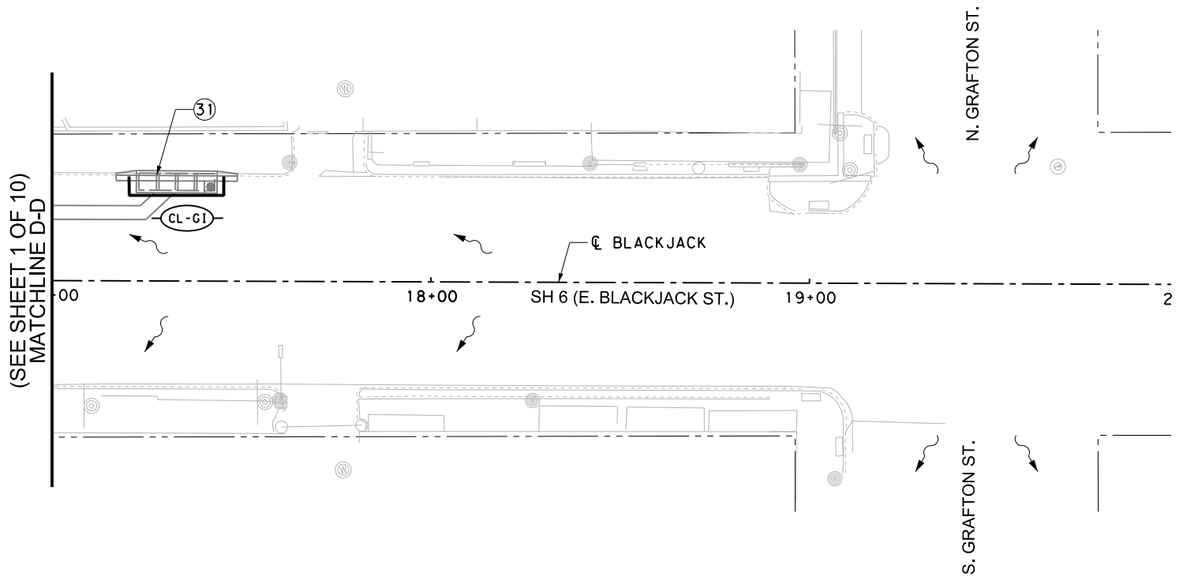
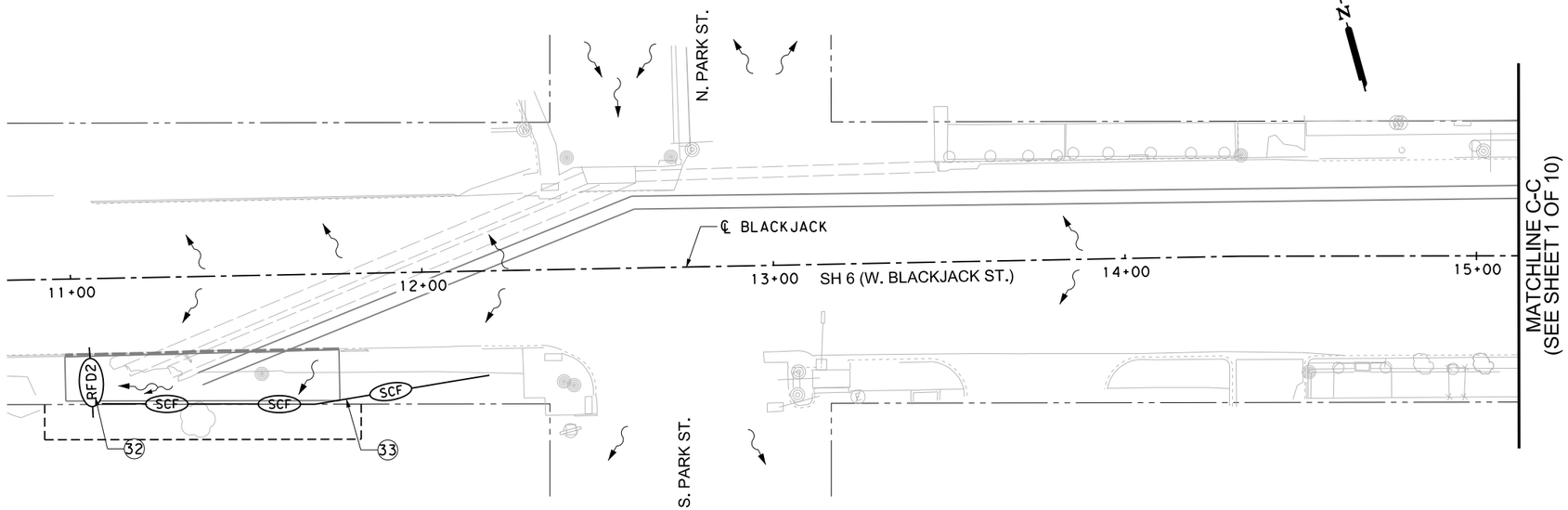


BMP NO.	BMP NAME	BMP QUANTITY	TCP PHASE & STEP		INSTALL DATE	REMOVE DATE
			INSTALL PHASE	REMOVE PHASE		
31	CL-GI	35 LF	PHASE 1 STAGE 3	PHASE 1 STAGE 4		



BMP NO.	BMP NAME	BMP QUANTITY	TCP PHASE & STEP		INSTALL DATE	REMOVE DATE
			INSTALL PHASE	REMOVE PHASE		
32	SCF	111 LF	PHASE 1 STAGE 3	PHASE 1 STAGE 4		
33	RFD2	20 LF	PHASE 1 STAGE 3	PHASE 1 STAGE 4		

LEGEND

- PROP PAVEMENT
- PROP DRAINAGE
- EXIST R.O.W.
- DIRECTION OF FLOW
- SCF — SEDIMENT CONTROL FENCE
- CL-DI — EROSION CONTROL LOG AT DROP INLET (8")
- CL-GI — EROSION CONTROL LOG AT CURB & GRATE INLET (8")
- CL-CI — EROSION CONTROL LOG AT CURB INLET (8")
- RFD2 — ROCK FILTER DAM (TYPE 2)
- PERMANENT BLOCK SODDING
- CONSTRUCTION EXIT
- (4) BMP NUMBER

NOTES:

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

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED
PROFESSIONAL ENGINEER
7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

SW3P LAYOUT

SHEET 8 OF 10

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	229
CONTROL	SECTION	JOB	
0079	04	049	

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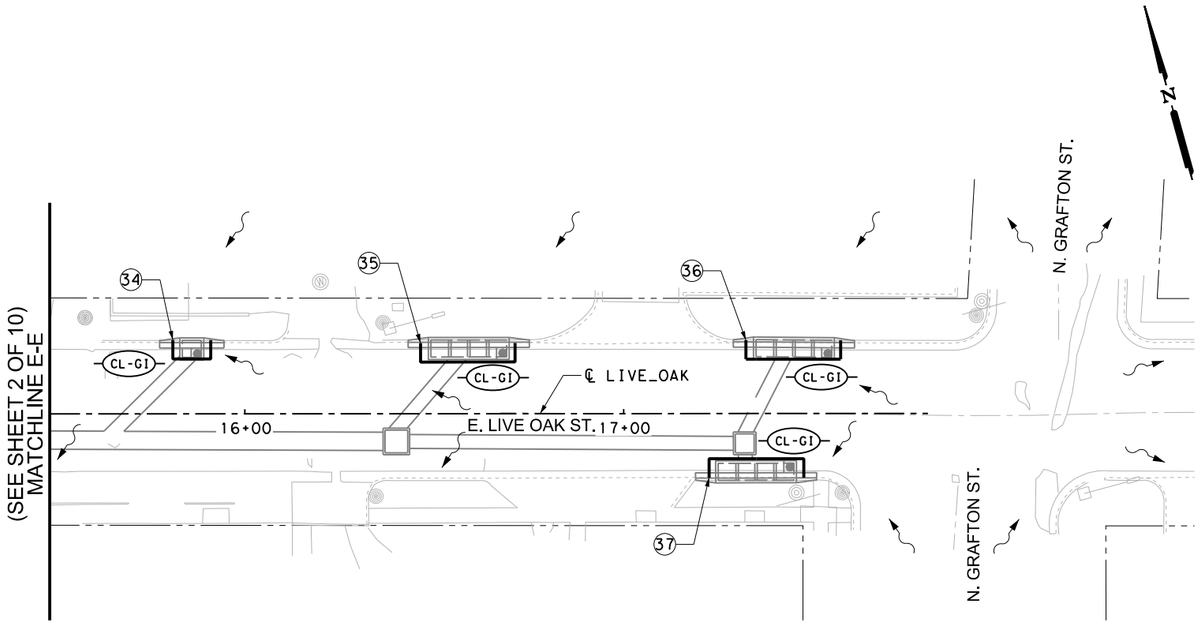
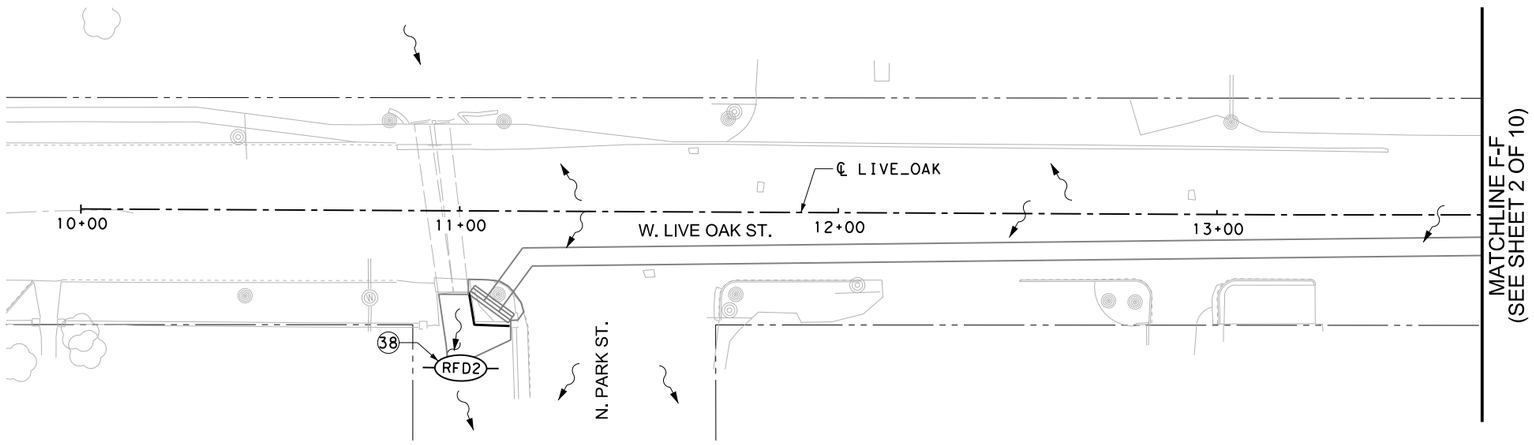


BMP NO.	BMP NAME	BMP QUANTITY	TCP PHASE & STEP		INSTALL DATE	REMOVE DATE
			INSTALL PHASE	REMOVE PHASE		
34	CL-GI	20 LF	PHASE 1 STAGE 4	PHASE 1 STAGE 5		
35	CL-GI	35 LF	PHASE 1 STAGE 4	PHASE 1 STAGE 5		
36	CL-GI	35 LF	PHASE 1 STAGE 4	PHASE 1 STAGE 5		
37	CL-GI	35 LF	PHASE 1 STAGE 4	PHASE 1 STAGE 5		



BMP NO.	BMP NAME	BMP QUANTITY	TCP PHASE & STEP		INSTALL DATE	REMOVE DATE
			INSTALL PHASE	REMOVE PHASE		
38	RFD2	25 LF	PHASE 1 STAGE 4	PHASE 1 STAGE 5		

LEGEND

- PROP PAVEMENT
- PROP DRAINAGE
- EXIST R.O.W.
- DIRECTION OF FLOW
- SCF — SEDIMENT CONTROL FENCE
- CL-DI — EROSION CONTROL LOG AT DROP INLET (8")
- CL-GI — EROSION CONTROL LOG AT CURB & GRATE INLET (8")
- CL-CI — EROSION CONTROL LOG AT CURB INLET (8")
- RFD2 — ROCK FILTER DAM (TYPE 2)
- PERMANENT BLOCK SODDING
- CONSTRUCTION EXIT
- (4) BMP NUMBER

NOTES:

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

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED PROFESSIONAL ENGINEER
Abulkhair M. Zobayed
7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

SW3P LAYOUT

SHEET 9 OF 10

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	230
CONTROL	SECTION	JOB	
0079	04	049	

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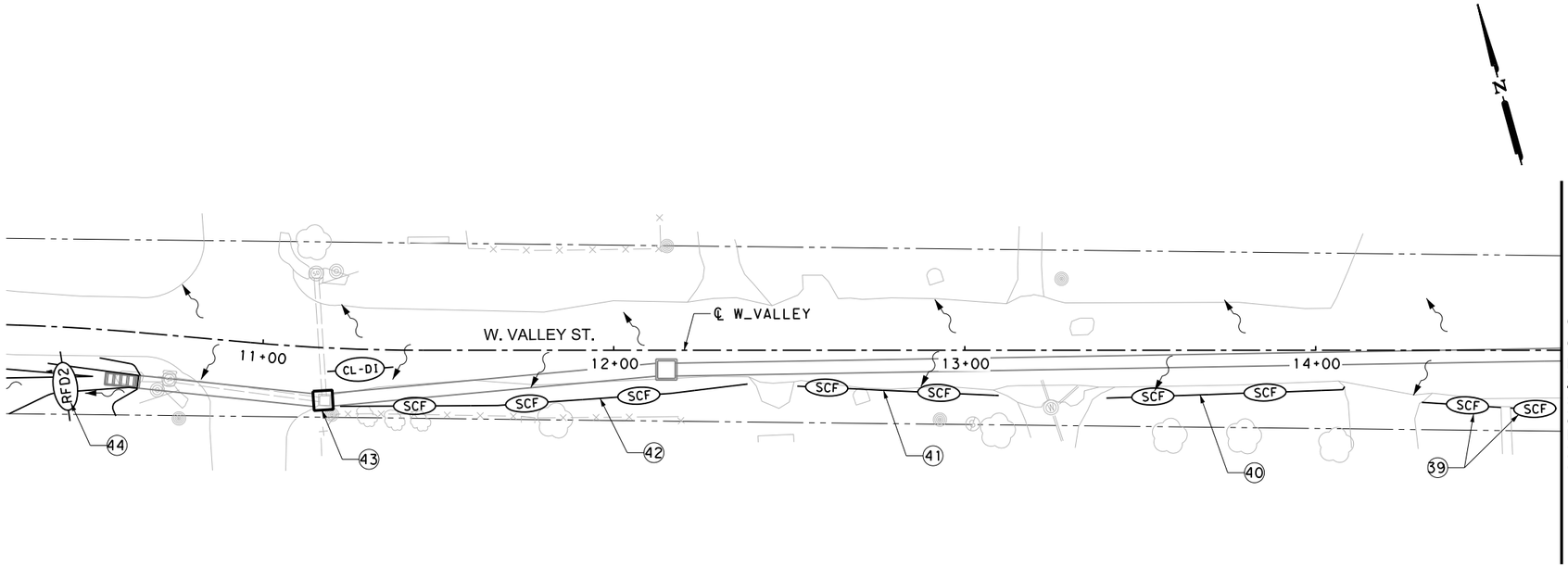

LEGEND

- PROP PAVEMENT
- PROP DRAINAGE
- EXIST R.O.W.
- DIRECTION OF FLOW
- SCF — SEDIMENT CONTROL FENCE
- CL-DI — EROSION CONTROL LOG AT DROP INLET (8")
- CL-GI — EROSION CONTROL LOG AT CURB & GRATE INLET (8")
- CL-CI — EROSION CONTROL LOG AT CURB INLET (8")
- RFD2 — ROCK FILTER DAM (TYPE 2)
- PERMANENT BLOCK SODDING
- CONSTRUCTION EXIT
- (4) — BMP NUMBER

NOTES:

1. ALL EROSION CONTROL DEVICES SHALL REMAIN IN PLACE UNTIL EACH DRAINAGE SYSTEM IN THAT PHASE IS CONSTRUCTED. FOR ANY DRAINAGE SYSTEMS CAPPED FOR CONSTRUCTION IN NEXT PHASE, THE EROSION CONTROL DEVICES SHALL REMAIN IN PLACE UNTIL NEXT PHASE WHEN CONSTRUCTION IN THAT PHASE IS COMPLETE.
2. REFER TO TRAFFIC CONTROL PLANS FOR CONSTRUCTION PHASING INFORMATION.
3. REFER TO TRAFFIC CONTROL, ROADWAY, REMOVAL, DRAINAGE, UTILITY, TYPICAL SECTIONS FOR MORE INFORMATION.
4. CONSTRUCTION EXIT LOCATIONS TO BE ADJUSTED AS REQUIRED WITH THE APPROVAL OF THE ENGINEER.
5. REFER TO BMP TABLE FOR EROSION CONTROL QUANTITY AND TCP PHASING THE BMPS ARE TO BE INSTALLED IN.

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

BMP NO.	BMP NAME	BMP QUANTITY	TCP PHASE & STEP		INSTALL DATE	REMOVE DATE
			INSTALL PHASE	REMOVE PHASE		
39	SCF	36 LF	PHASE 1 STAGE 8	PHASE 1 STAGE 8		
40	SCF	69 LF	PHASE 1 STAGE 8	PHASE 1 STAGE 8		
41	SCF	58 LF	PHASE 1 STAGE 8	PHASE 1 STAGE 8		
42	SCF	117 LF	PHASE 1 STAGE 8	PHASE 1 STAGE 8		
43	CL-DI	22 LF	PHASE 1 STAGE 8	PHASE 1 STAGE 8		
44	RFD2	15 LF	PHASE 1 STAGE 8	PHASE 1 STAGE 8		

STATE OF TEXAS
ABULKHAIR M. ZOBAYED
87951
LICENSED
PROFESSIONAL ENGINEER

7/13/2024

NO.	DATE	REVISION	APPROVED

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

BU 67K

SW3P LAYOUT

SHEET 10 OF 10

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		BU 67K
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	ERATH	231
CONTROL	SECTION	JOB	
0079	04	049	

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I. STORM WATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Storm water 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.

[x] No Action Required [ ] Required Action

Action No.

1. The project disturbs five or more acres of surface area: TxDOT must file a NOI and coordinate with TCEQ for CGP. The contractor is responsible for the PSL as defined in the Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges (2014 Edition, Section 7.6., Page 44). The total disturbed acreage is the combined acreage to be disturbed on the project and the contractors PSL. This includes, as required, posting a site notice and NOI for the PSL.
2. TxDOT must file a NOT for the project when final stabilization has been achieved.
3. Prevent storm water pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
4. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
5. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.

II. WORK IN OR NEAR STREAMS, WATER BODIES 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
[x] 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.

1. Resley Creek, ELM STA 11+45

2.

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
[ ] Temporary Vegetation	[x] Silt Fence	[ ] Vegetative Filter Strips
[ ] Blankets/Matting	[ ] Rock Berm	[ ] Retention/Irrigation Systems
[ ] Mulch	[ ] Triangular Filter Dike	[ ] Sedimentation Basin
[ ] Sodding	[ ] Sand Bag Berm	[ ] Constructed Wetlands
[ ] Interceptor Swale	[ ] Straw & Hay Bale Dike	[ ] Wet Basin
[ ] Diversion Dike	[ ] Brush Berms	[ ] Erosion Control Compost & Mulch
[x] Erosion Control Compost	[x] Erosion Control Compost	[ ] Compost Filter Berm and Socks
[ ] Compost Filter Berm and Socks	[ ] Compost Filter Berm and Socks	[ ] Sand Filter Systems
[x] Temporary Erosion Control Logs (BIOLOGS)	[x] Temporary Erosion Control Logs (BIOLOGS)	[ ] Temporary Erosion Control Logs (BIOLOGS)
[ ] Preservation of Natural Resources	[ ] Sediment Traps	[x] Permanent Vegetation (Planting, Sodding, or Seeding)
[x] Construction Exits	[ ] Sediment Basins	[ ] 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.

[x] No Action Required [ ] Required Action

Action No.

1.

2.

3.

4.

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.

[x] No Action Required [ ] Required Action

Action No.

1.

2.

3.

4.

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

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.

[x] No Action Required [ ] Required Action

Action No.

1.

2.

3.

4.

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 Storm water 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 [x] 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 [x] 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:

[x] No Action Required [ ] Required Action

Action No.

1.

2.

3.

VII. OTHER ENVIRONMENTAL ISSUES

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

[x] No Action Required [ ] Required Action

Action No.

1.

2.

3.

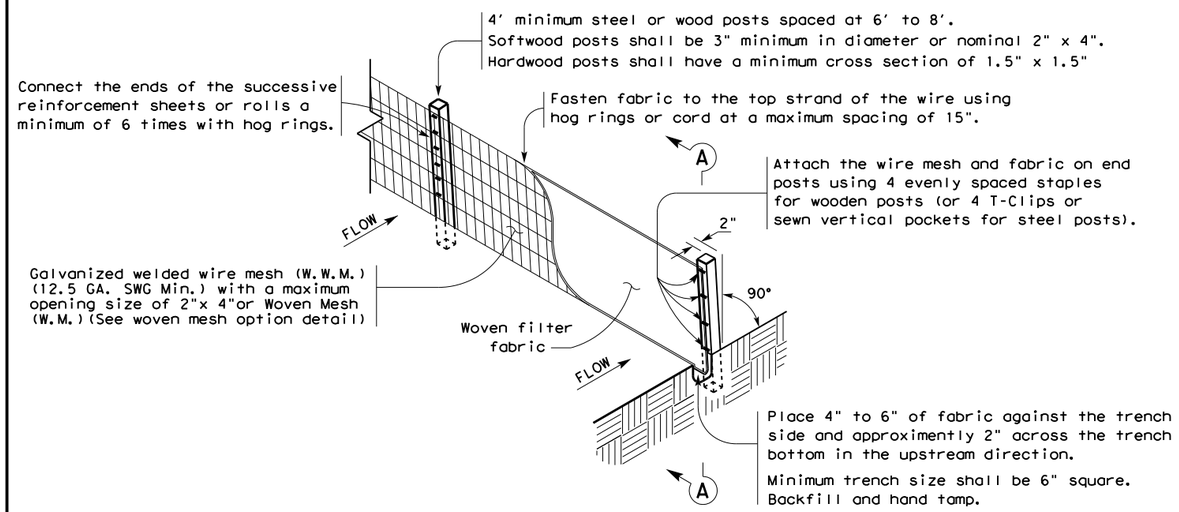
BU 67K
ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS
EPIC

NO SCALE SHEET 1 OF 1

FHWA DIVISION	PROJECT NO.			HIGHWAY NO.
6	SEE TITLE SHEET			US 67
STATE	COUNTY			SHEET NO.
TEXAS	ERATH			232
DISTRICT	CONTROL	SECTION	JOB	
FTW	0079	04	049	

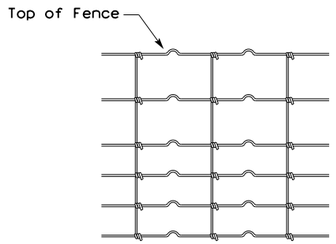
PREPARED BY (NAME OF DESIGNER)
DATE: 7/13/2024
FILE: c:\bentley\projectwise\workingdir\vrx-pw.bentley.com*vrx-...

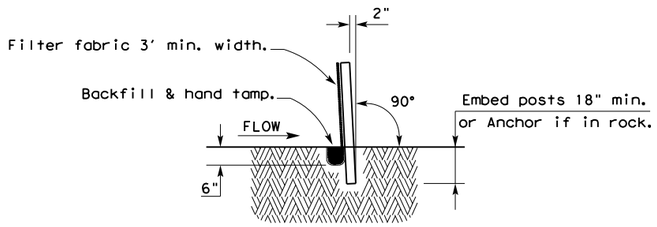
REV. DATE: 02/2015



TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

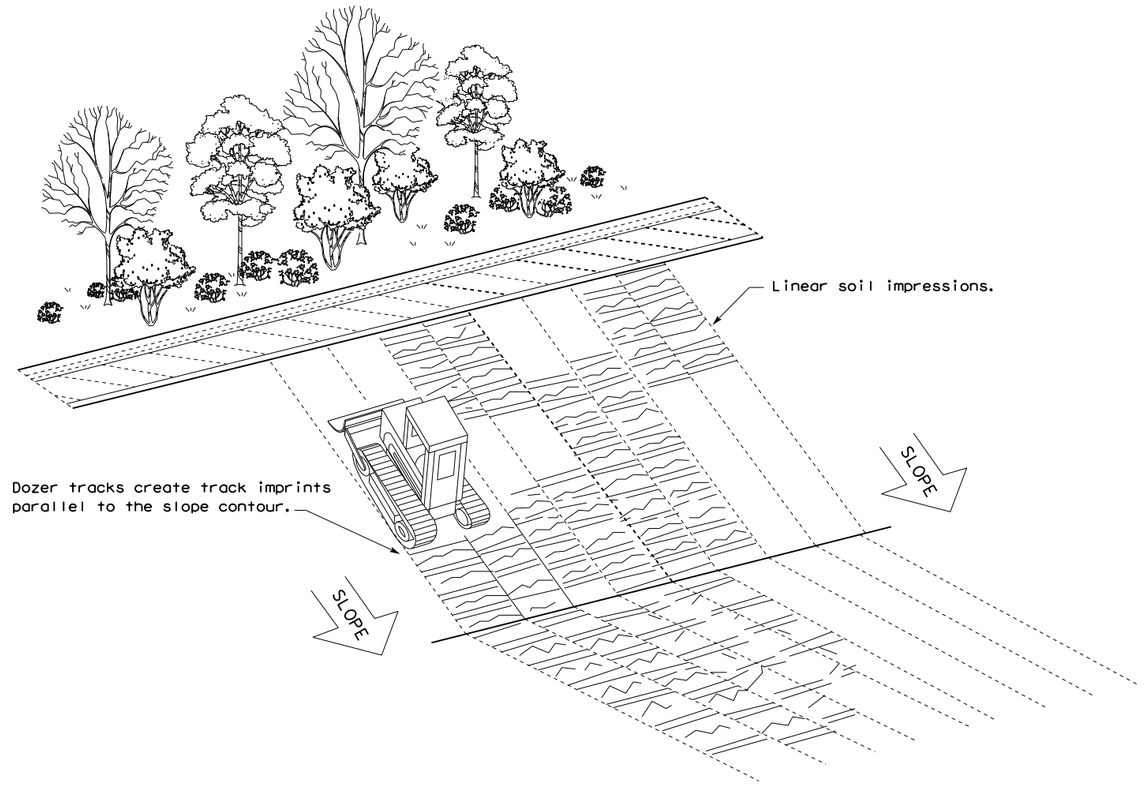
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT		CK: KM		DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
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	DIST	COUNTY			SHEET NO.	
	FTW	ERATH			233	

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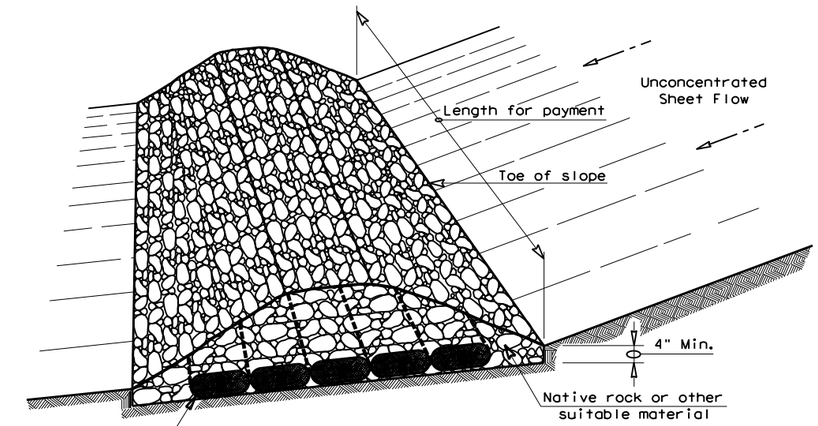
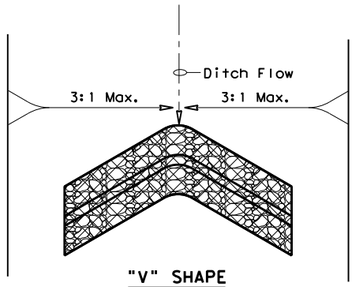
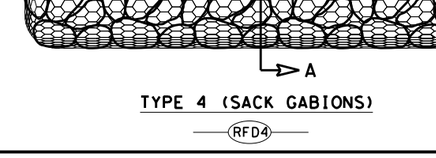


FILTER DAM AT TOE OF SLOPE

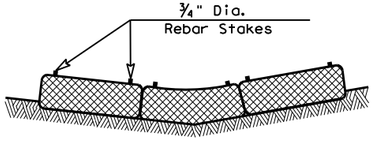
RFD1



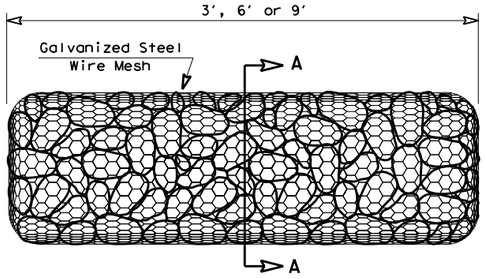
"V" SHAPE PLAN VIEW



PLAN VIEW

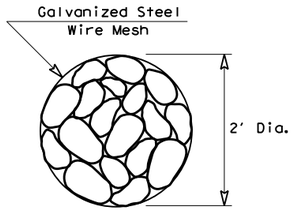


SECTION B-B

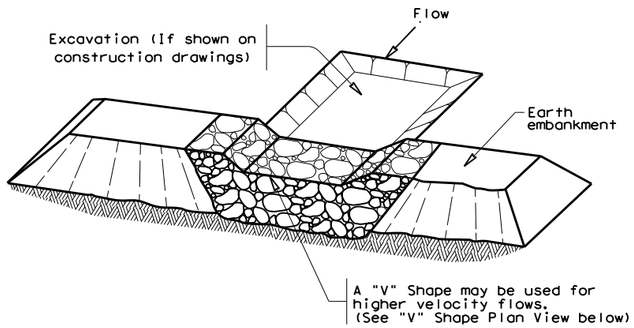


TYPE 4 (SACK GABIONS)

RFD4

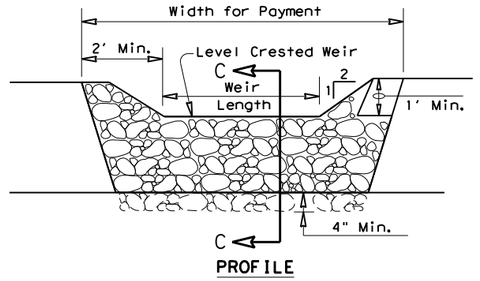


SECTION A-A

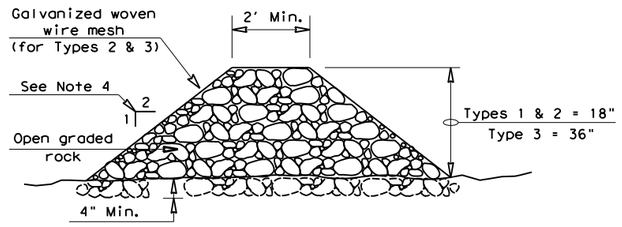


FILTER DAM AT SEDIMENT TRAP

RFD1 OR RFD2



PROFILE



SECTION C-C

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

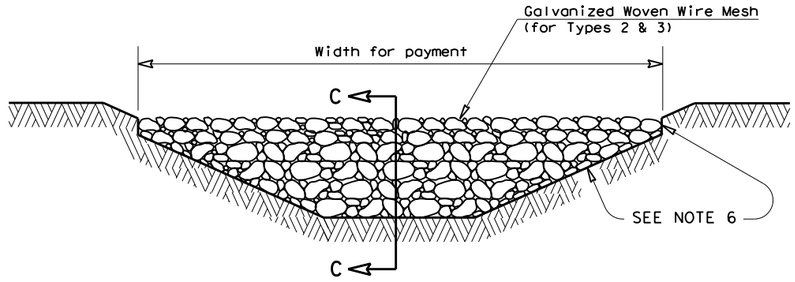
Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.



FILTER DAM AT CHANNEL SECTIONS

RFD1 OR RFD2 OR RFD3

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with 3/4" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 1/2" x 3 1/4"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam — RFD1
Type 2 Rock Filter Dam — RFD2
Type 3 Rock Filter Dam — RFD3
Type 4 Rock Filter Dam — RFD4

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS	
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0079	04	049	BU 67K	
	DIST	COUNTY		SHEET NO.	
	FTW	ERATH		234	

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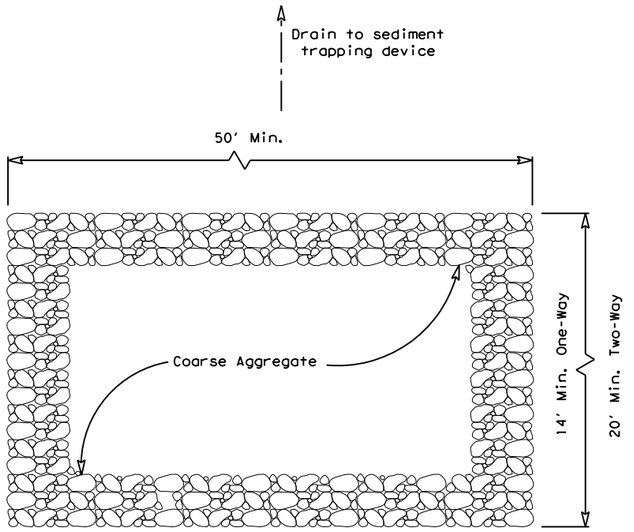
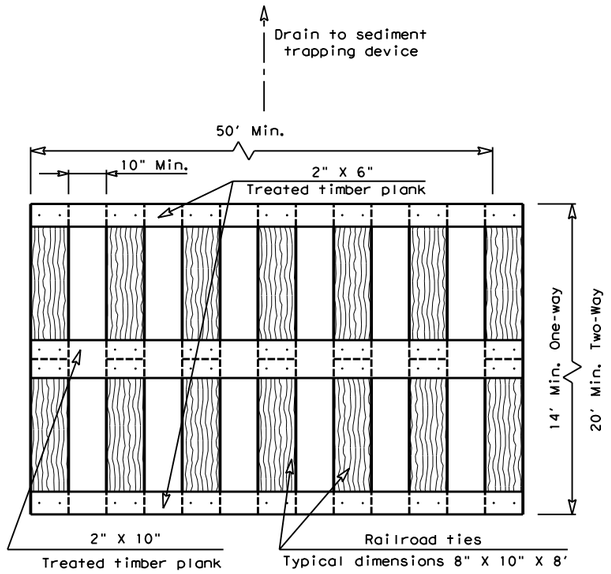
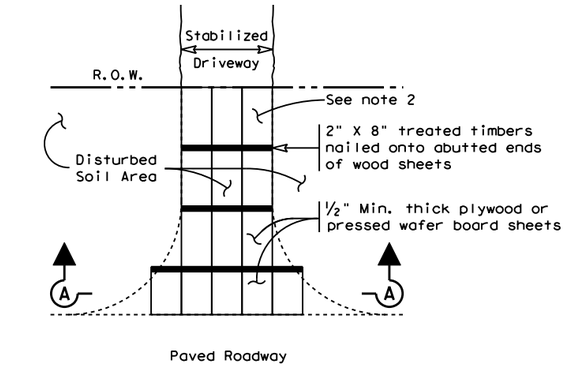


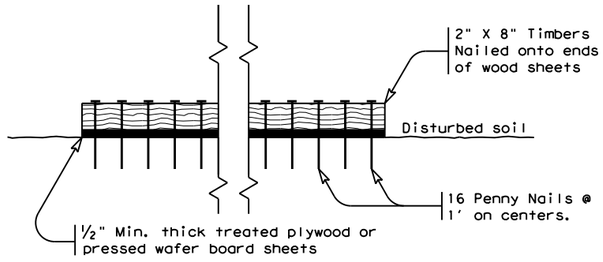
PLAN VIEW



PLAN VIEW



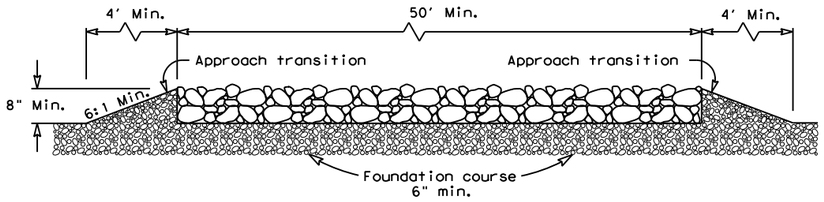
PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

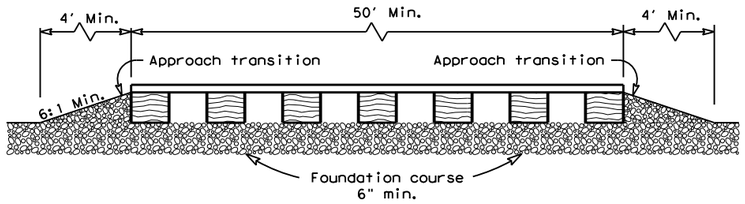
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50'.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

Design Division Standard

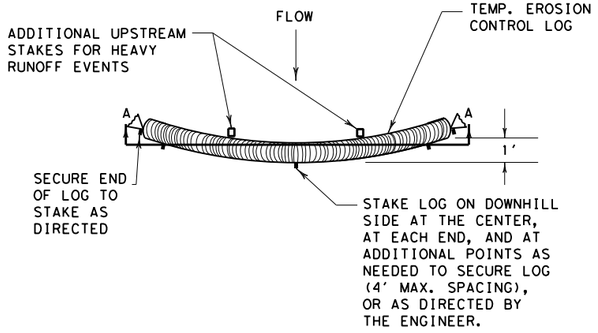
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

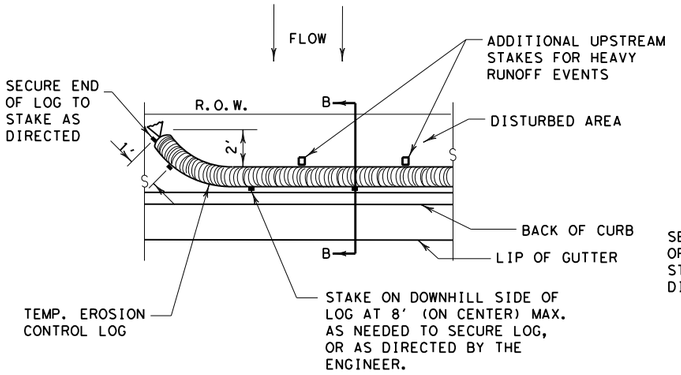
EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
	CONT	SECT	JOB	HIGHWAY
REVISIONS	0079	04	049	BU 67K
	DIST	COUNTY		SHEET NO.
	FTW	ERATH		235

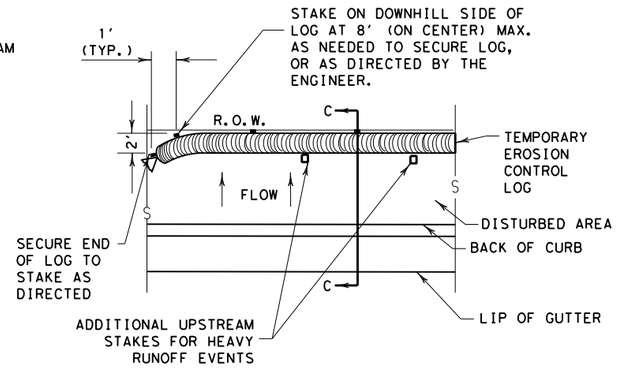
DATE:
FILE:



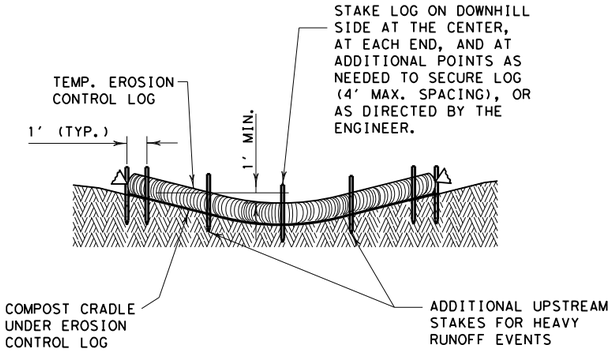
PLAN VIEW



PLAN VIEW



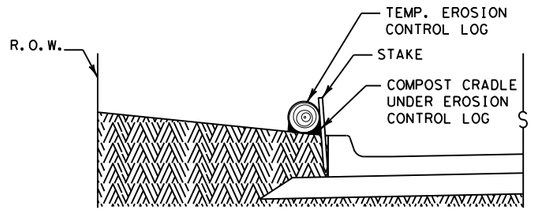
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

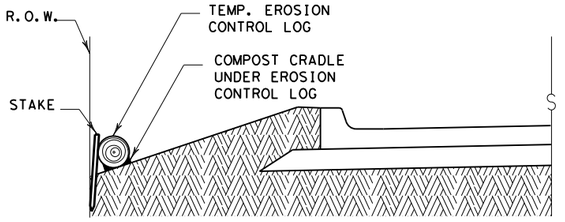
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

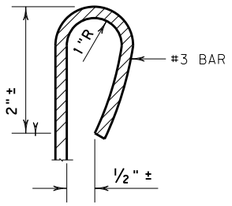
CL-BOC



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



REBAR STAKE DETAIL

LEGEND

- CL-D — EROSION CONTROL LOG DAM
- CL-BOC — EROSION CONTROL LOG AT BACK OF CURB
- CL-ROW — EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
- CL-SST — EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
- CL-SSL — EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
- CL-DI — EROSION CONTROL LOG AT DROP INLET
- CL-CI — EROSION CONTROL LOG AT CURB INLET
- CL-GI — EROSION CONTROL LOG AT CURB & GRATE INLET

GENERAL NOTES:

1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.

SEDIMENT BASIN & TRAP USAGE GUIDELINES

An erosion control log sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

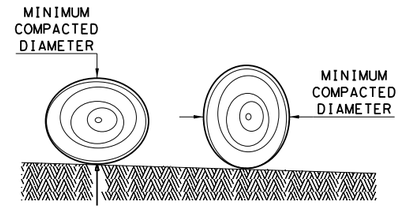
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

Texas Department of Transportation

Design Division Standard

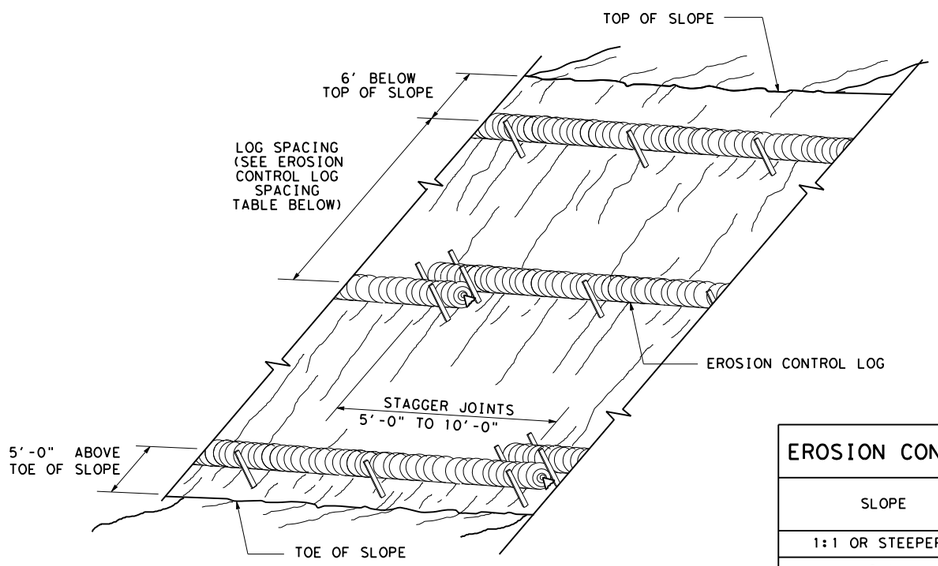
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

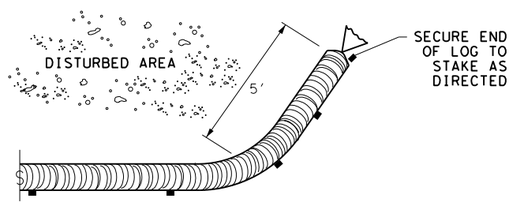
FILE: ec916		DN: TxDOT		CK: KM	DW: LS/PT		CK: LS
© TxDOT: JULY 2016		CONT	SECT	JOB		HIGHWAY	
REVISIONS		0079	04	049		BU 67K	
		DIST		COUNTY			SHEET NO.
		FTW		ERATH			236

DATE:
FILE:



EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

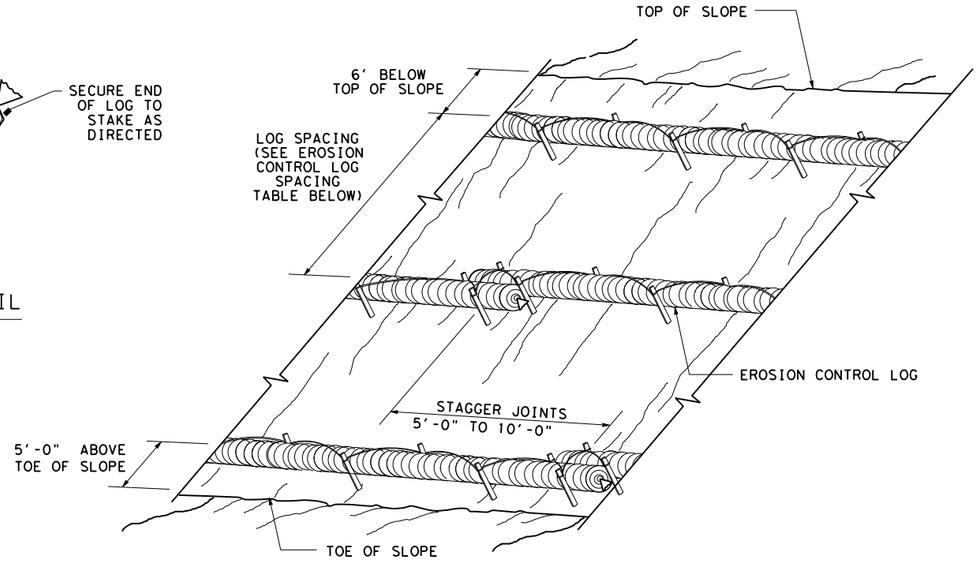
CL-SST



END SECTION RAP DETAIL

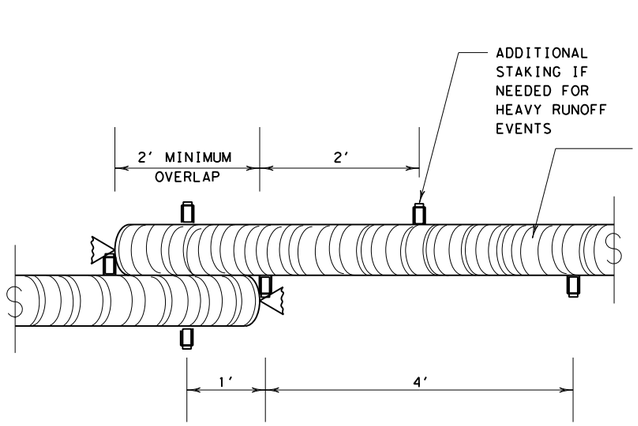
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

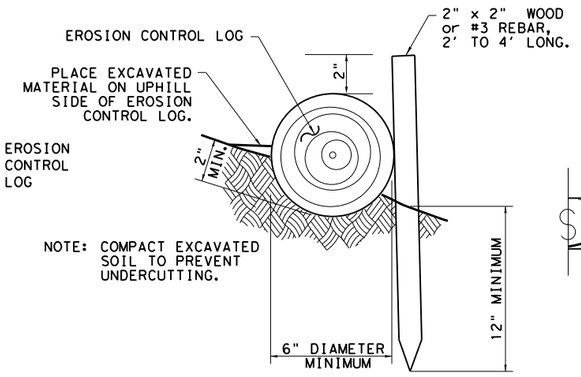
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

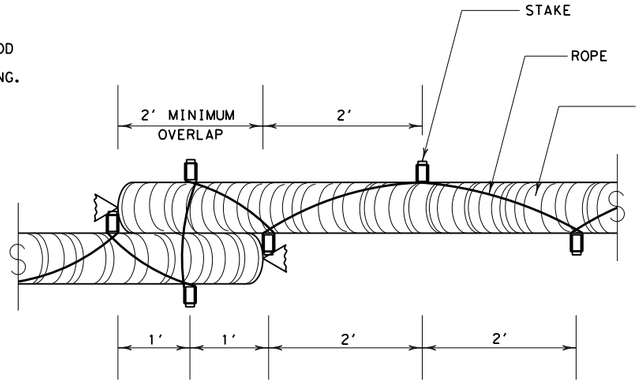


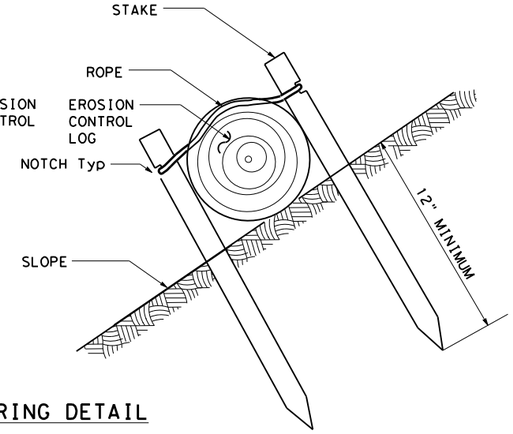


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

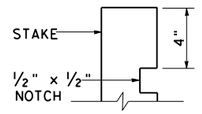
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



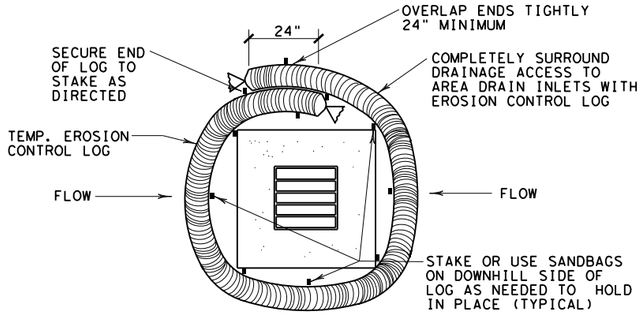
STAKE NOTCH DETAIL

Texas Department of Transportation | Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16

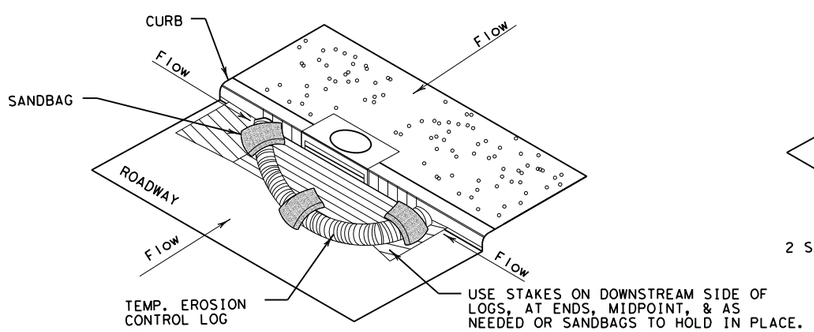
FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0079	04	049	BU 67K
	DIST	COUNTY		SHEET NO.
	FTW	ERATH		237

DATE:
FILE:



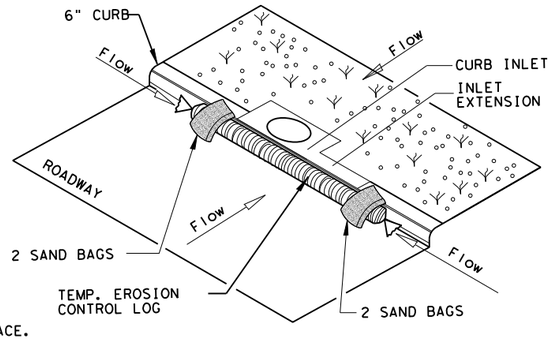
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

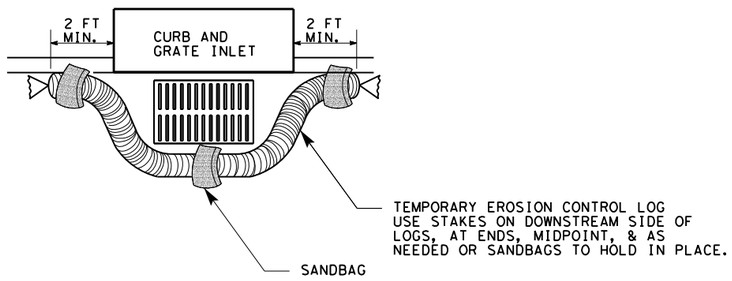
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

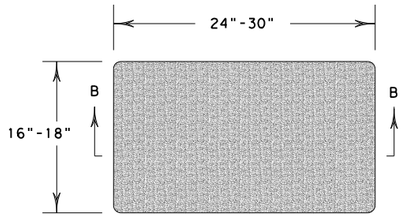
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT		CK: KM		DW: LS/PT		CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY		
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	FTW	ERATH			238		