DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
AECOM	6	BR 2022 (867)		IH 35W
GRAPHICS AECOM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK AECOM	TEXAS	FTW	JOHNSON	1
CHECK AECOM	CONTROL 0014	SECTION 03	JOB 087	

INDEX OF SHEETS

SEE NEXT SHEET FOR INDEX

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FEDERAL-AID PROJECT
PROJECT NO. BR 2022 (867)
CSJ: 0014-03-087

IH 35W

JOHNSON COUNTY

LIMITS: FROM CR 604/ CR 707 TO US 67

TOTAL LENGTH OF PROJECT =

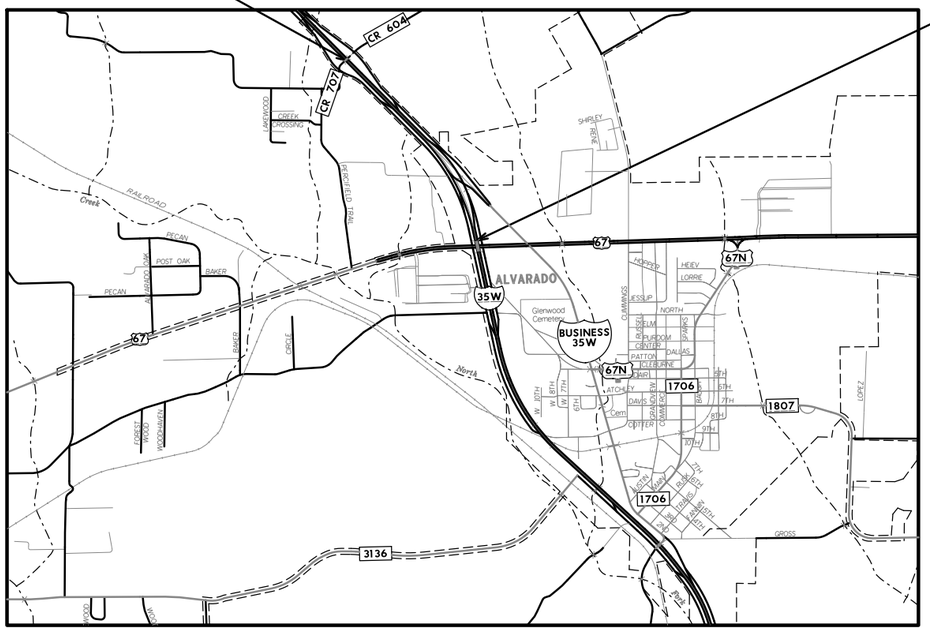
ROADWAY	= 6,068.10 FT	= 1.149 MI
BRIDGE	= 0,000.00 FT	= 0.000 MI
TOTAL	= 6,068.10 FT	= 1.149 MI

TYPE OF WORK: URBAN FREEWAY
FOR THE RECONSTRUCTION OF: FREEWAY OPERATIONAL IMPROVEMENTS

CONSISTING OF: REALIGNMENT OF IH 35W NB MAINLANES, REMOVAL OF SB IH 35W LEFT EXIT RAMP, EXISTING EXIT AND ENTRANCE RAMP RELOCATION, ADDITION OF A NB ONE-WAY FTG ROAD FROM US 67 TO CR 604/707 AND REALIGNMENT OF EXISTING BUS 35W TO T-INTERSECTION TO PROPOSED FTG ROAD.

BEGIN PROJECT
CSJ 0014-03-087
IH 35W
STA 522+05.91
TRM = 27+0.685

END PROJECT
CSJ 0014-03-087
IH 35W
STA 582+74.01
TRM = 26+0.543



LETTING DATE: _____
CONTRACTOR: _____
_____
WORK BEGAN: _____
WORK COMPLETED: _____
WORK ACCEPTED: _____
CHANGE ORDERS: _____

DESIGN SPEED & FUNCTIONAL CLASS:
IH 35W (URBAN INTERSTATE) = 65 MPH
RAMPS(URBAN INTERSTATE) = 50 MPH
FRONTAGE RD(URBAN COLLECTOR) = 40 MPH
BUS 35W(URBAN COLLECTOR) = 30 MPH

ADT (2025) = 19550 (NBML)
ADT (2045) = 26200 (NBML)
ADT (2055) = 29500 (NBML)

STATE OF TEXAS
SRIKRISHNA PEAPULLY
84772
LICENSED
PROFESSIONAL ENGINEER
6/1/2022

AECOM
AECOM Technical Services Inc. F-3580
13355 Noel Road, Suite 400
Dallas, Texas 75240
(214) 741-7777

SUBMITTED FOR LETTING 6/1/2022 DATE
_____, P.E.
PROJECT MANAGER, AECOM

N
0' 2000' 4000'
SCALE IN FEET
FORT WORTH DISTRICT

REGISTERED ACCESSIBILITY SPECIALIST (RAS)
INSPECTION REQUIRED TDLR NO. EABPRJ: TABS2022016863

NOTE:

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014, AND THE CONTRACT PROVISIONS LISTED AND DATED AS FOLLOWS SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, MAY 1ST, 2012).

WORK WAS COMPLETED ACCORDING TO THE PLANS AND CONTRACT.

_____, P.E.
Signature of Registrant & Date

EQUATIONS: NONE
EXCEPTIONS: NONE
RAILROAD CROSSINGS: NONE

TEXAS DEPARTMENT OF TRANSPORTATION

APPROVED FOR LETTING: 6/1/2022, 20
DocuSigned by: Janet Crawford, P.E.
1FDBBDF41B5E486...
AREA ENGINEER

RECOMMENDED FOR LETTING 6/2/2022, 20
DocuSigned by: _____, P.E.
7879B0B92ED0403...
DIRECTOR OF TRANSPORTATION PLANNING & DEVELOPMENT

APPROVED FOR LETTING: 6/3/2022, 20
DocuSigned by: Carl L. Johnson, PE, P.E.
2FE36139F0614C3...
DISTRICT ENGINEER

TEMPLATE REVISED: 10-23-02 c:\pwworking\aecom#ds20#na#2019\subash.poudel@aecom.com\dms62676\135W@N#TTL#001.dgn 6/1/2022

INDEX OF SHEETS

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED WITH A " # " HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

NAME

6/16/2022
DATE

STATE OF TEXAS
SRIKRISHNA PEAPULLY
84772
LICENSED
PROFESSIONAL ENGINEER

6/16/2022

AECOM
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

INDEX OF SHEETS

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		2

DATE: 6/16/2022 10:37:00 PM
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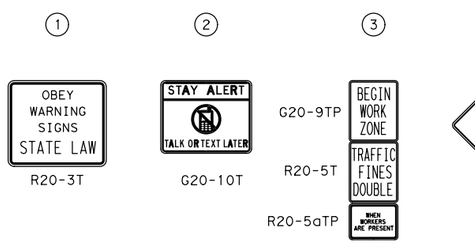
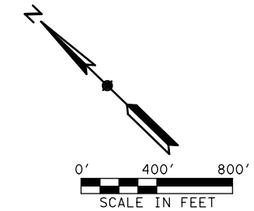
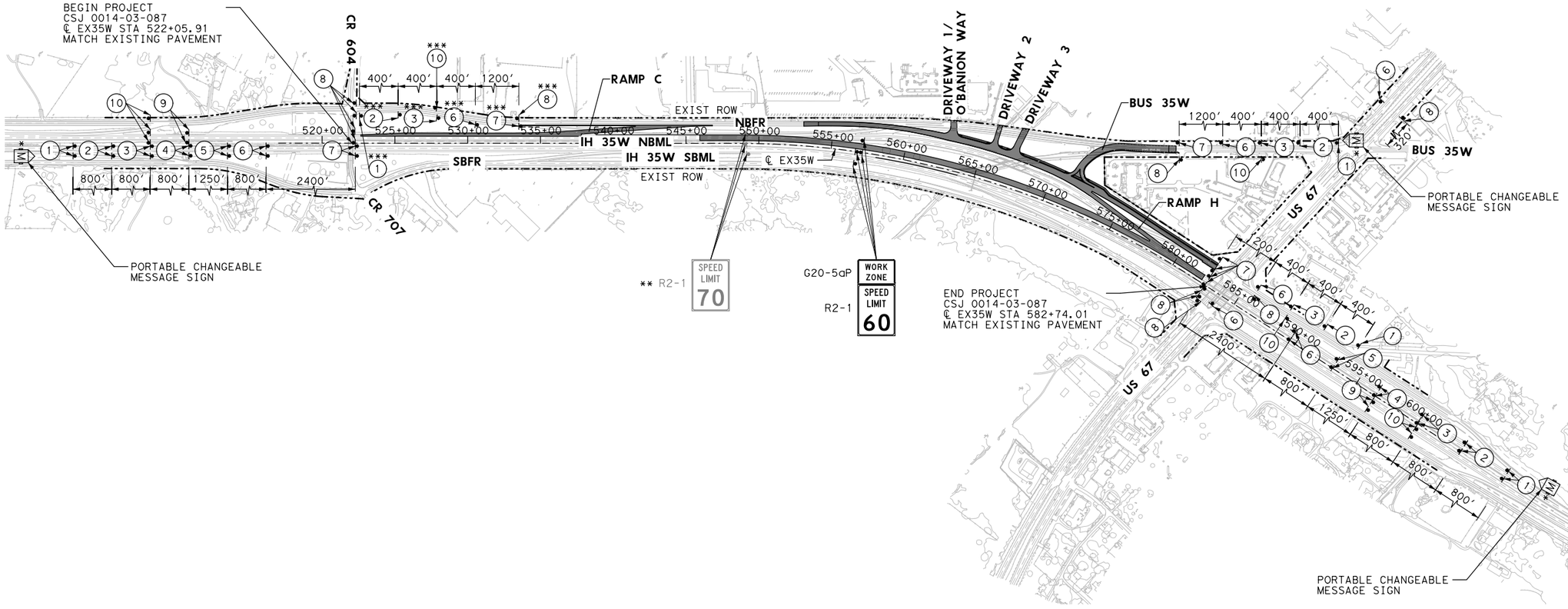
subash.paudel





LEGEND

LIMITS OF PROPOSED WORK



* CONTRACTOR TO COORDINATE WITH THE ENGINEER TO LOCATE PCMS IN THE FIELD AND DETERMINE TEXT.

** EXISTING SPEED LIMIT SIGN TO BE COVERED/REMOVED

*** APPLICABLE SIGN ON SOUTH OF CR 604 ON NBFR WILL APPLY ON PHASE 1 STAGE 1

STATE OF TEXAS
MARIA XIMENA MEDERO
107551
LICENSED
PROFESSIONAL ENGINEER
5/23/2022

AECOM
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

PROJECT LAYOUT WITH ADVANCE WARNING SIGN

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		3

DATE: 5/23/2022 10:37:48 AM
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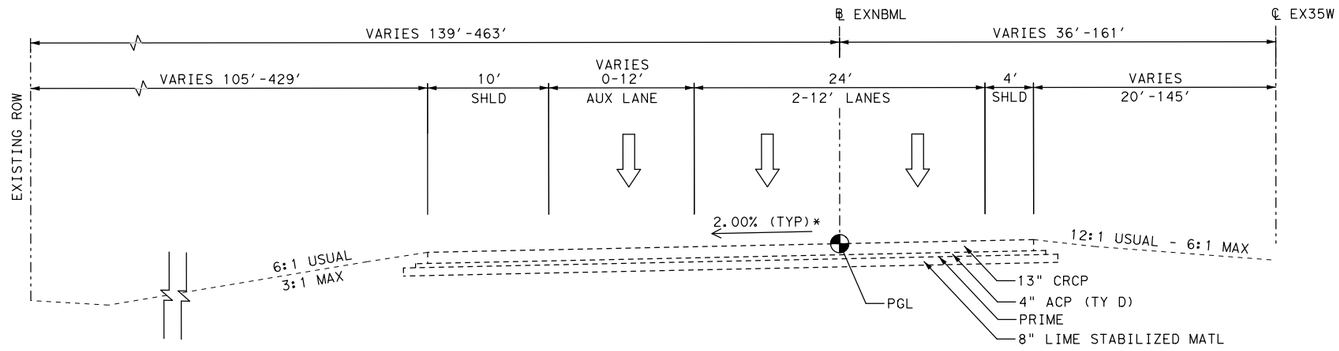
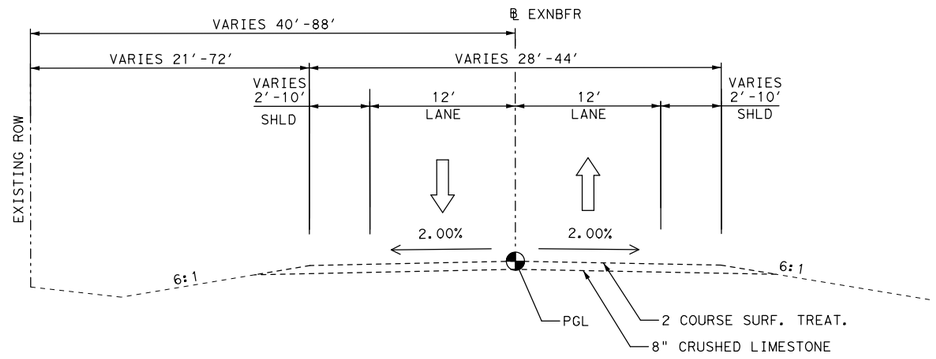


NBML TYPICAL SECTION

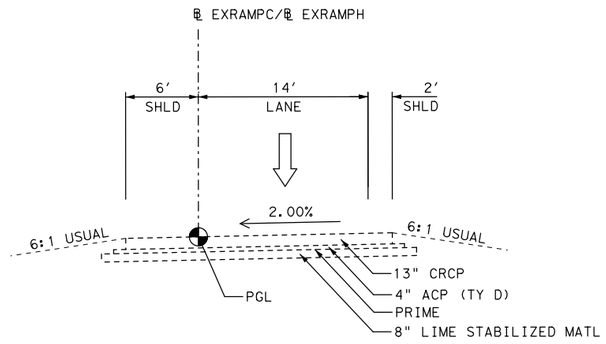
℄ EXNBML STA 522+05.91 TO STA 583+42.67

* +2.00% TO -4.00% FROM STA 555+30.00 TO STA 558+30.00
* -4.00% TO +2.00% FROM STA 572+85.00 TO STA 575+85.00
NOT TO SCALE



NBFR TYPICAL SECTION

℄ EXNBFR STA 522+12.54 TO STA 579+11.81
NOT TO SCALE



RAMP C & H TYPICAL SECTION

NOT TO SCALE

STATE OF TEXAS
MARIA XIMENA MEDERO
107551
LICENSED
PROFESSIONAL ENGINEER

5/23/2022

AECOM
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

EXISTING TYPICAL SECTIONS

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		4

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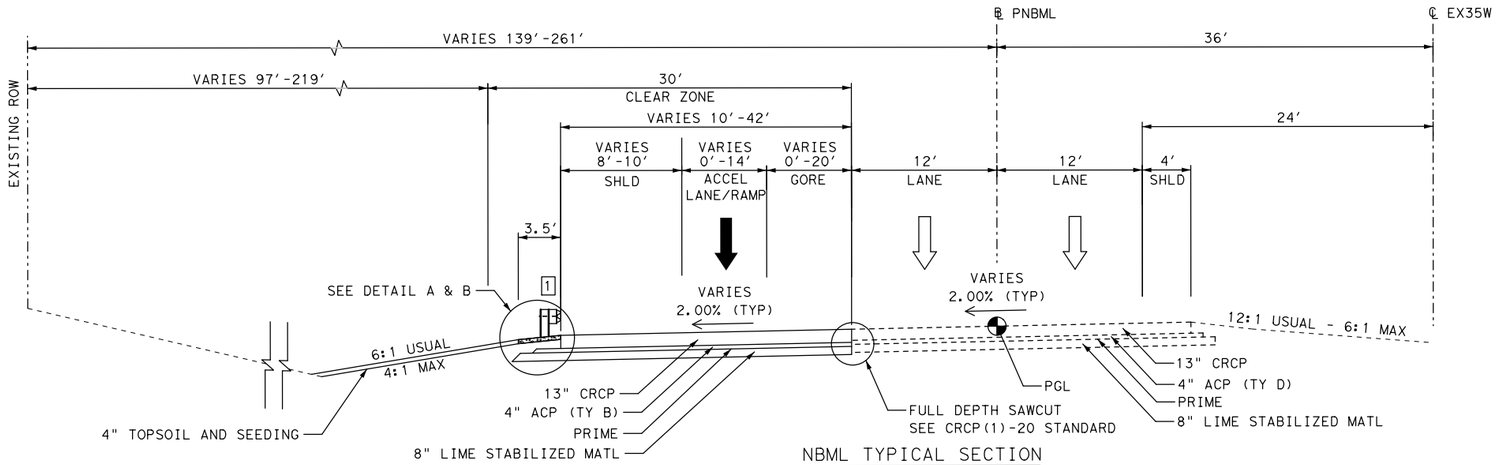
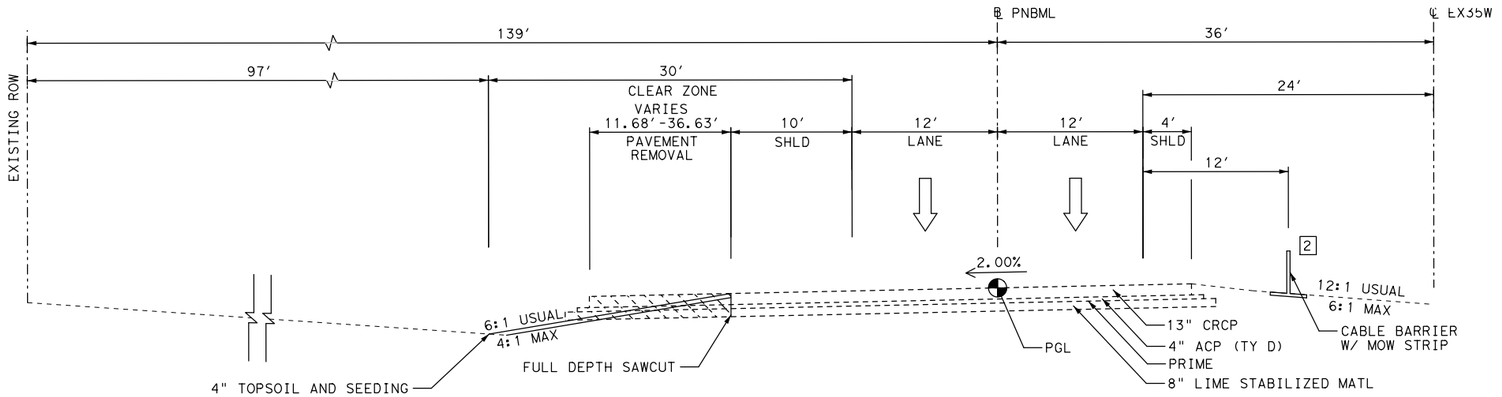
subash.paudel



NBML TYPICAL SECTION

℄ PNBML STA 522+65.86 TO STA 537+81.04
NOT TO SCALE

1 MBGF - ℄ PNBML STA 522+69.44 TO STA 523+63.12

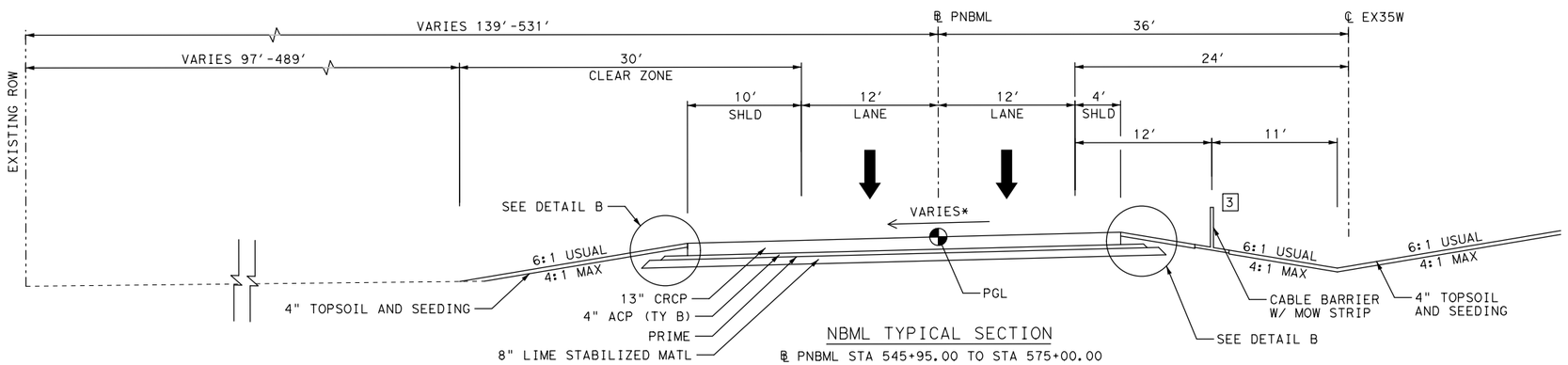


NBML TYPICAL SECTION

℄ PNBML STA 538+81.65 TO STA 545+95.00
NOT TO SCALE

2 CABLE BARRIER SYSTEM - ℄ PNBML STA 545+45.00 TO STA 545+95.00

NO PROPOSED WORK FROM ℄ PNBML STA 537+81.04 TO STA 538+81.65



NBML TYPICAL SECTION

℄ PNBML STA 545+95.00 TO STA 575+00.00

* +2.46% TO +2.00% FROM STA 545+95.00 TO STA 546+09.00
* +2.00% TO -3.31% FROM STA 547+60.00 TO STA 549+20.00
NOT TO SCALE

3 CABLE BARRIER SYSTEM - ℄ PNBML STA 545+95.00 TO STA 575+00.00

NOTES:

1. SEE DETAIL A FOR SECTION AT MBGF POST.
2. SEE DETAIL B, C, D AND E FOR EDGE DETAILS.
3. SEE DETAIL E FOR ASPHALT TRANSITION PAVEMENT STRUCTURE.
4. SEE PLAN AND PROFILE SHEETS FOR EDGE CONDITION LIMITS.
5. CABLE BARRIER MAY BE ADJUSTED IN THE FIELD AS DIRECTED BY THE ENGINEER.

STATE OF TEXAS
MARIA XIMENA MEDERO
107551
LICENSED PROFESSIONAL ENGINEER

6/13/2022

AECOM
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

PROPOSED TYPICAL SECTIONS

SHEET 1 OF 5

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		5

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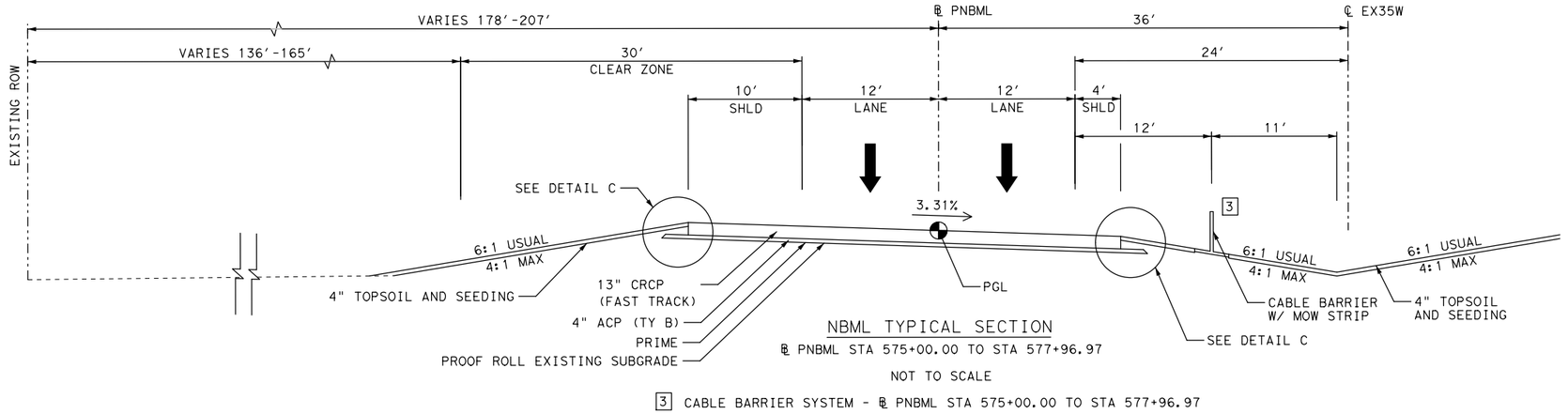
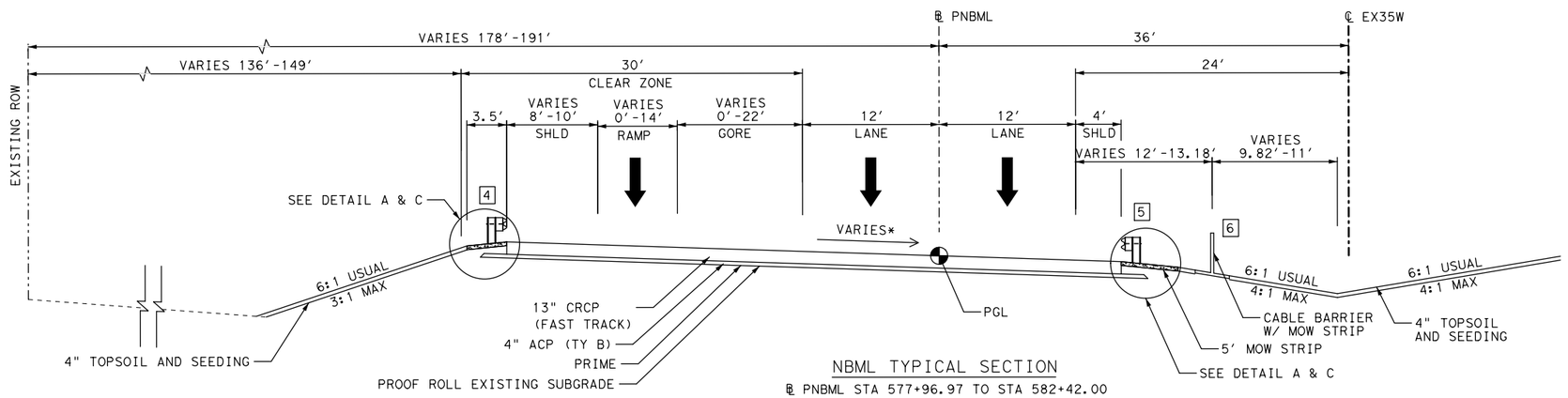


NBML TYPICAL SECTION

℄ PNBML STA 575+00.00 TO STA 577+96.97

NOT TO SCALE

3 CABLE BARRIER SYSTEM - ℄ PNBML STA 575+00.00 TO STA 577+96.97



NBML TYPICAL SECTION

℄ PNBML STA 577+96.97 TO STA 582+42.00

* -3.31% TO +1.76% FROM STA 580+89.00 TO STA 582+42.00
NOT TO SCALE

4 MBGF - ℄ PNBML STA 577+96.97 TO STA 582+94.76

5 MBGF - ℄ PNBML STA 581+34.39 TO STA 582+87.71

6 CABLE BARRIER SYSTEM - ℄ PNBML STA 577+96.97 TO STA 581+97.00

NOTES:

1. SEE DETAIL A FOR SECTION AT MBGF POST.
2. SEE DETAIL B, C, D AND E FOR EDGE DETAILS.
3. SEE DETAIL E FOR ASPHALT TRANSITION PAVEMENT STRUCTURE.
4. SEE PLAN AND PROFILE SHEETS FOR EDGE CONDITION LIMITS.
5. CABLE BARRIER MAY BE ADJUSTED IN THE FIELD AS DIRECTED BY THE ENGINEER.

STATE OF TEXAS
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107551
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PROFESSIONAL ENGINEER

5/23/2022

AECOM
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

PROPOSED TYPICAL SECTIONS

SHEET 2 OF 5

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		6

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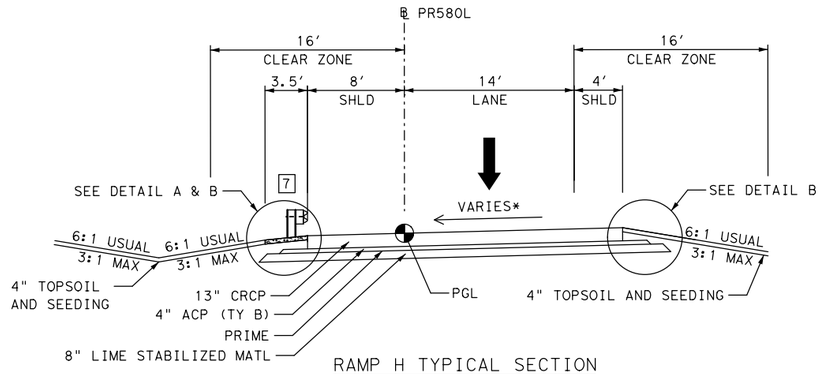
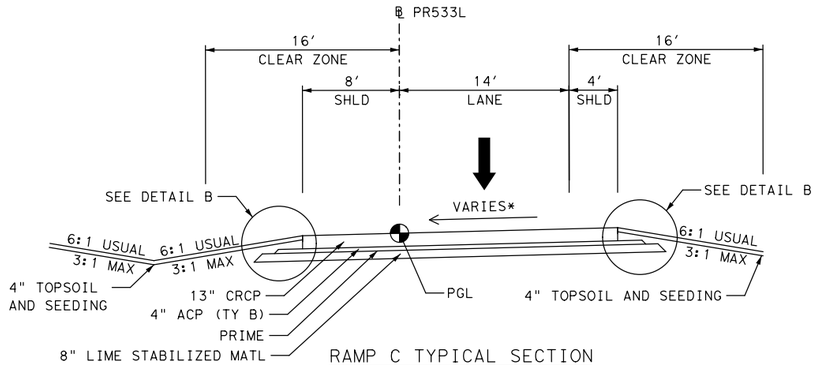


RAMP H TYPICAL SECTION

℄ PR580L STA 13+39.01 TO STA 18+54.34

* +2.00% TO -3.31% FROM STA 17+05.00 TO STA 18+54.34
NOT TO SCALE

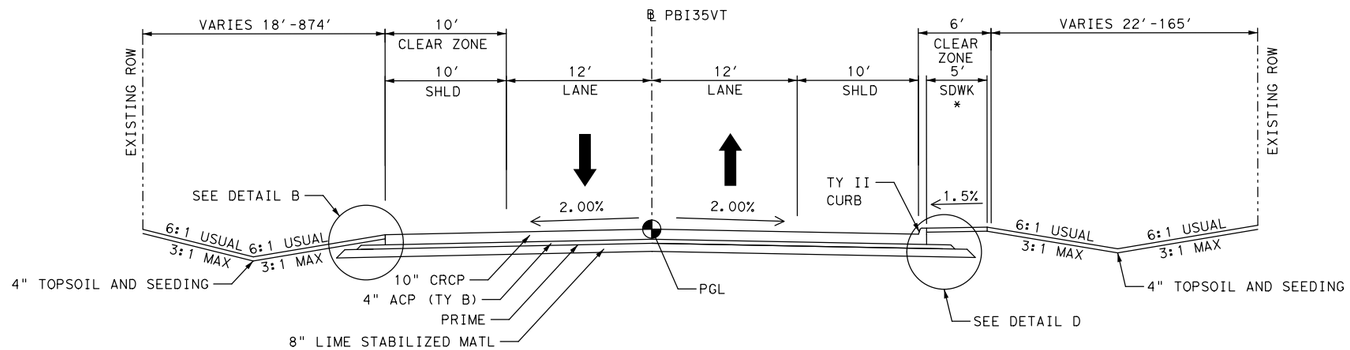
7 MBGF - ℄ PR580L STA 17+77.10 TO STA 18+54.34



RAMP C TYPICAL SECTION

℄ PR533L STA 15+15.79 TO STA 18+88.03

* +1.83% TO +2.00% FROM STA 15+15.79 TO STA 15+21.00
* +2.00% TO +0.27% FROM STA 18+39.00 TO STA 18+88.03
NOT TO SCALE



BUS 35W TYPICAL SECTION

℄ PBI35VT STA 10+14.00 TO STA 17+50.00
NOT TO SCALE

* END 5′ SIDEWALK AT STA 18+20.17

NOTES:

1. SEE DETAIL A FOR SECTION AT MBGF POST.
2. SEE DETAIL B, C, D AND E FOR EDGE DETAILS.
3. SEE DETAIL E FOR ASPHALT TRANSITION PAVEMENT STRUCTURE.
4. SEE PLAN AND PROFILE SHEETS FOR EDGE CONDITION LIMITS.
5. CABLE BARRIER MAY BE ADJUSTED IN THE FIELD AS DIRECTED BY THE ENGINEER.

STATE OF TEXAS
MARIA XIMENA MEDERO
107551
LICENSED
PROFESSIONAL ENGINEER

5/23/2022

AECOM
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

PROPOSED TYPICAL SECTIONS

SHEET 3 OF 5

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		7

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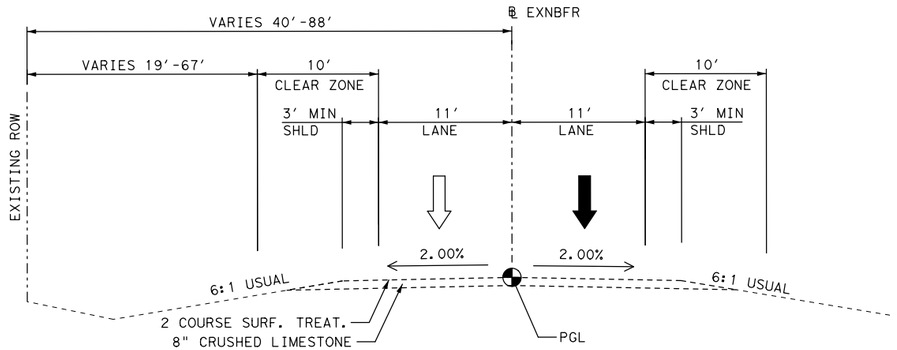
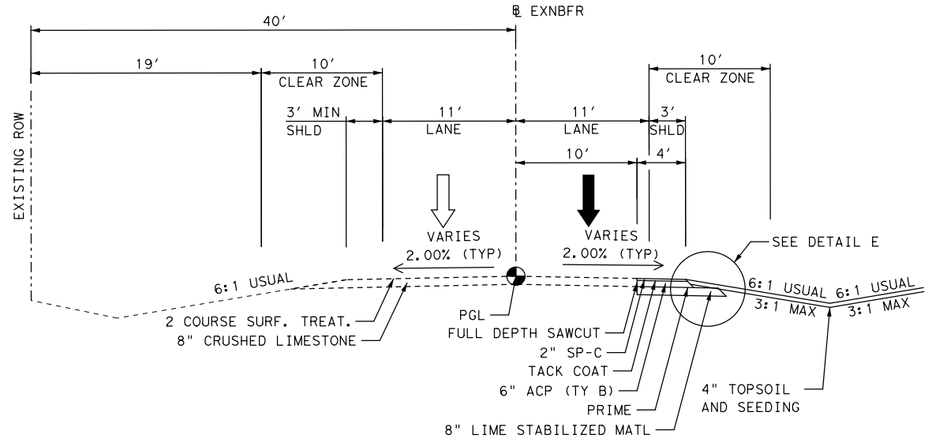


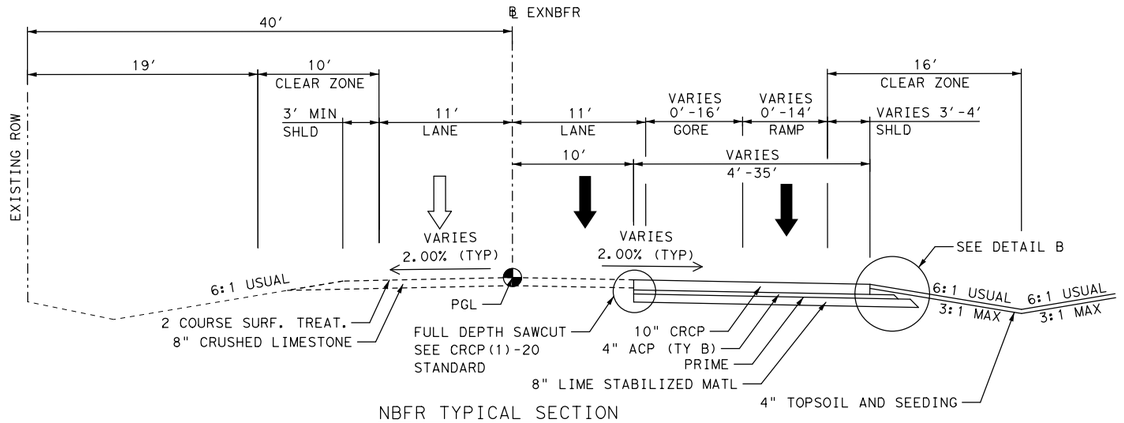
NBFR TYPICAL SECTION

℄ EXNBFR STA 522+12.54 TO STA 533+76.00
℄ EXNBFR STA 546+94.69 TO STA 554+23.00
NOT TO SCALE



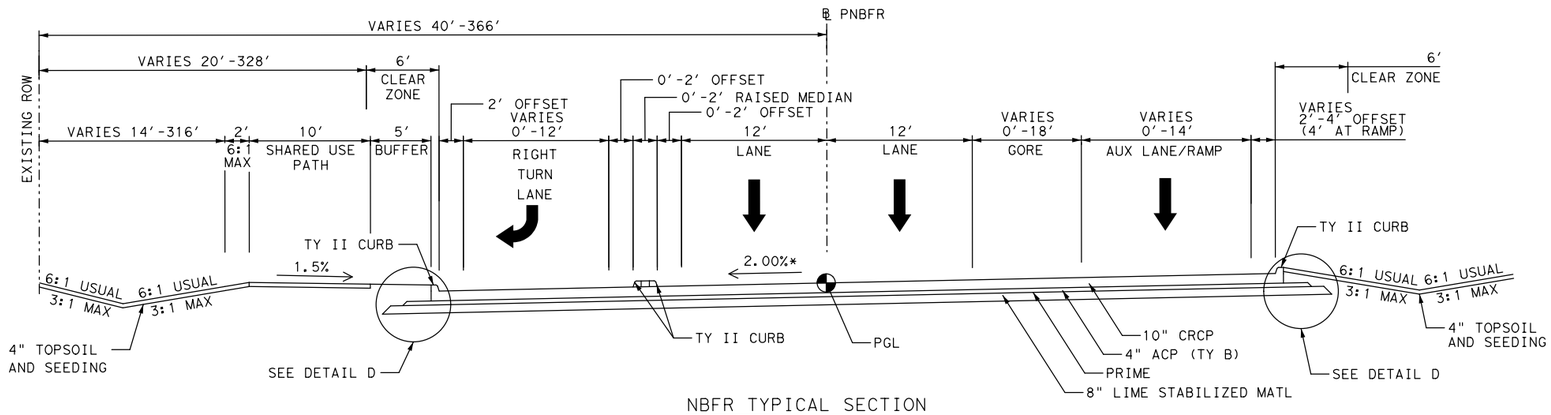
NBFR TYPICAL SECTION - WIDENING

℄ EXNBFR STA 533+76.00 TO STA 541+65.63
NOT TO SCALE



NBFR TYPICAL SECTION

℄ EXNBFR STA 541+65.63 TO STA 546+94.69
NOT TO SCALE



NBFR TYPICAL SECTION

℄ PNBFR STA 554+23.00 TO STA 583+85.00

* +2.00% TO -1.75% FROM STA 583+07.00 TO STA 583+85.00
NOT TO SCALE

SHARED USE PATH FROM STA 563+82.08 TO STA 583+85.00

NOTES:

1. SEE DETAIL A FOR SECTION AT MBGF POST.
2. SEE DETAIL B, C, D AND E FOR EDGE DETAILS.
3. SEE DETAIL E FOR ASPHALT TRANSITION PAVEMENT STRUCTURE.
4. SEE PLAN AND PROFILE SHEETS FOR EDGE CONDITION LIMITS.
5. CABLE BARRIER MAY BE ADJUSTED IN THE FIELD AS DIRECTED BY THE ENGINEER.

6/13/2022

AECOM
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

PROPOSED TYPICAL SECTIONS

SHEET 4 OF 5

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		8

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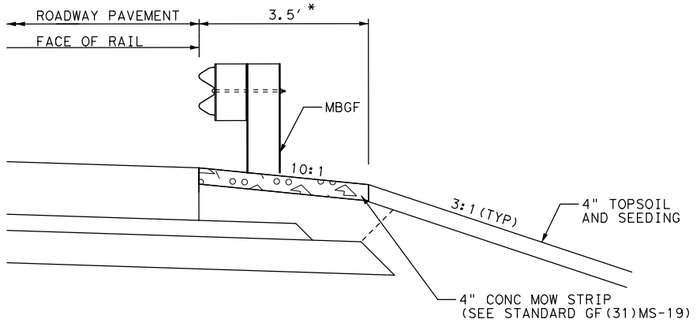
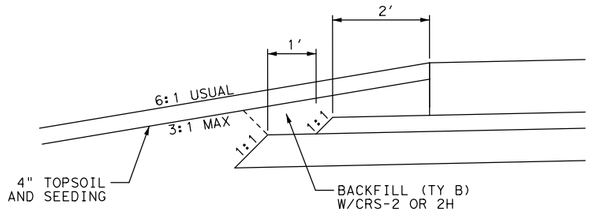
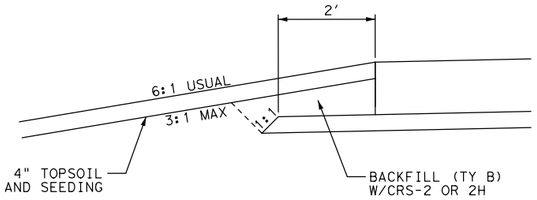


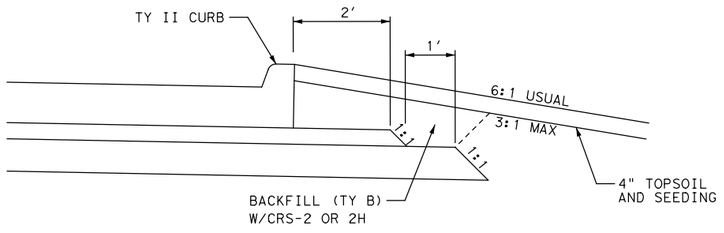
DETAIL A
SECTION AT MBGF POST
NOT TO SCALE
* 5' MOW STRIP AT NBML MBGF [5]



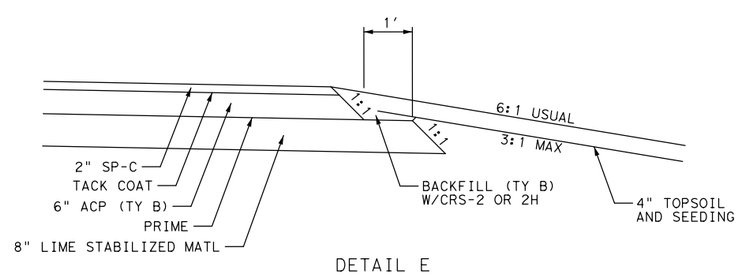
DETAIL B
EDGE DETAIL AT NBML, RAMPS
AND BUS 35W LT SIDE
NOT TO SCALE



DETAIL C
EDGE DETAIL AT NBML
NOT TO SCALE



DETAIL D
EDGE DETAIL AT NBFR AND BUS 35W RT SIDE
NOT TO SCALE



DETAIL E
EDGE DETAIL AT NBFR WIDENING
AND ASPHALT TRANSITIONS
NOT TO SCALE

STATE OF TEXAS
MARIA XIMENA MEDERO
107551
LICENSED
PROFESSIONAL ENGINEER

5/23/2022

AECOM
13355 Noel Road
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Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

PROPOSED TYPICAL SECTIONS

SHEET 5 OF 5

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		9

DATE: 5/23/2022 3:55:39 PM
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maria.medero

County: JOHNSON **Control:** 0014-03-087

Highway: IH 35W

Basis of Estimate

Item	Description	Rate	Unit
168	Vegetative Watering	169,400 gal./acre	1,000 gal.
216	Roll (Proof) Subgrade	1 hr./10000 sq. yd./crse	hr.
260	Lime (Hydrated Lime)(Slry)	150 lb./cu. yd.	ton
310	Asph Mat'l (MC-30, EC-30, or CBSMS-1S) (Subgrade)(Priming)	0.20 gal./sq. yd.*	gal.
316	Backfill w/CRS-2 or 2H	0.40 gal./sq. yd.	gal.
3076	Hot Mix (All Types)	115 lb./sq. yd.-in.	ton
3077	Hot Mix (All Types)	115 lb./sq. yd.-in.	ton
3077	Tack Coat - CSS-1P	0.20 gal./sq. yd.	gal.
3077	Tack Coat - Trackless Tack	0.15-0.22 gal./sq. yd.	gal.

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

Compaction Requirements for Base Courses

Item	Material	Course	Min. Density
247	Foundation Course	All	95 %
260	Lime Treat.	All	95 %

(Minimum Density is the percentage of density required based on results of Tex-113-E, Tex-114-E, Tex-120-E, and/or Tex-121-E)

Special Notes

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

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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: Janet.Crawford@txdot.gov
Assistant Area Engineer's Email: Peter.Ross@txdot.gov
Design Manager's Email: Alfredo.Luera@txdot.gov

Contractor questions will be accepted through email, phone, and in person by the above individuals.

All contractor questions will be reviewed by the Engineer. Once a response is developed, it will be posted to TxDOT's Public FTP at the following Address:
https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting%20 Responses/

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.

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

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:

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 manufacture. Night Time Work Safety Clothing:Department approved safety hats and safety 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, night pants (Class 3 with retro-reflective striping) shall be worn by all workers and visitors when at the work sites.
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.

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.

Where necessary, the governing slopes indicated herein may be varied from the limits shown, to the extent approved.

On superelevated curves the shoulders will have the same cross-slope as the pavement, unless otherwise indicated.

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On superelevated curves where the grade line is in a sag or on a flat grade, overlay the shoulders to the extent necessary to prevent trapping of water on the high side.

All driveway openings will be determined by the Engineer and will conform with Texas Department of Transportation "Regulations for Access Driveways to State Highways" adopted September 1953, and revised June 2004.

Locations and lengths of all private entrances are approximate only. The actual locations, lengths, lines, and grades are to be established in the field.

Locations and lengths of all private entrances are approximate only. The actual locations, lengths, lines and grades are to be determined by the Engineer and shall conform to the regulations of The City of _____Alvarado_____ .

Do not discolor or damage existing curb and curb and gutter during construction operations. In the event of discoloration or damage, clean or repair as directed.

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 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.

Install all required concrete riprap flumes immediately following the construction of ditches in which they are to be placed. In addition, apply all erosion control measures as shown on the

plans or as directed, immediately following construction of channels to their required line, grade, and section.

Item 4 – Scope of Work

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

Item 5. Control of the Work

When supplementary bridge plans, shop drawings, shop details, erection drawings, working drawings, forming plans, or other drawings are required, prepare and submit drawings on sheets 8-1/2 by 11 inches, 17 by 22 inches, or full size drawings reduced to half scale if completely legible. If, in the opinion of the Engineer, the drawings are not completely legible, prepare and submit on sheets 22 by 34 inches, with a 1-1/2 inch left margin, and 1/2 inch top, right, and bottom margins.

Submit all sheets with a title in the lower right hand corner. The title must include the sheet index data shown on the lower right corner of the project plans, name of the structure or element or stream, sheet numbering for the shop drawings, name of the fabricator and the name of the Contractor.

Prior to contract letting, bidders may obtain a free computer diskette or a computerized transfer of files (from the Engineer's office) that contains the earthwork information in ASCII format, plain text files. If copies of the actual cross-sections are requested, in addition to, or instead of the diskette, they will be available at the Engineers office for borrowing by copying companies for the purpose of making copies for the bidder, at the bidder's expense.

Standard Operating Procedure for Alternate Precast Proposal Submission" found online at https://www.txdot.gov/inside-txdot/forms-publications/consultants-contractors/publications/bridge.html#design. Acceptance or denial of an alternate is at the sole discretion of the Engineer. Impacts to the project schedule and any additional costs resulting from the use of alternates are the sole responsibility of the Contractor.

Item 7. Legal Relations and Responsibilities

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

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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 31.26 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.

When a bridge deck is milled, seal coated and overlaid, remove excess material. Do not just broom to the sides of the bridge, under guardrail, etc. Cover or protect all sealed expansion joints and rails on bridges and all railroad tracks encountered as approved. Clean and repair all of these features if they weren't properly protected at contractor's expense. This work is subsidiary work to applicable bid items.

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 bridge and 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 bridges and culverts, maintain the existing nesting deterrent to prevent swallow nesting until October 1 or completion of the bridge and 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 bridge and culverts. The Engineer will inspect the bridges and 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 bridge and culvert construction operations are completed.

2. By February 15 place a nesting deterrent (which prevents access to the bridge and culvert by swallows) on the entire bridge (except deck and railing) and 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.

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.

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Roadway closures during the following key dates and/or special events are prohibited.

Holiday Lane/Roadway 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.

Item 8. Prosecution and Progress

Working days will be computed and charged in accordance with Section 8.3.1.1, 'Five-Day Workweek.'

The total Contract Time Working Days for this project is 231 days.

Prepare the progress schedule as a bar chart or 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 road-user cost liquidated damages are $__3,627__ per day.

Incentive using road-user cost or contract administration liquidated damage values will be paid in accordance with special provision 008---006.

Working days for Milestone 1, TCP Phase 1 Stage 3, IH 35W NBML, Sta. 575+00 to Sta. 582+42, will be computed and charged in accordance with Article 8.3.1.3, 'Seven-Day Workweek.'

Substantially complete Milestone 1 in 16 working days.

The daily incentive and disincentive for substantial completion of Milestone 1 is $18,135.

The maximum number of working days for computing the Milestone 1 incentive credit is 5 days, maximum credit for early completion is $90,675

The time charges for Milestone 1 will begin when traffic on IH 35W NBML is reduced to one lane, TCP Phase 1 Stage 3, Sta. 575+00 to Sta. 582+42.

The time charges for Milestone 1 will end upon substantial completion, two IH 35W NBML open to traffic, TCP Phase 1 Stage 3, Sta. 575+00 to Sta. 582+42, with temporary pavement markings and appropriate TCP barricades and signs.

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.

Removal of existing concrete pavement will be in accordance with Item 104, "Removing Concrete" except that this work will not be paid for directly, but will be subsidiary to Item 100, "Preparing Right of Way."

Item 104. Removing Concrete

When associated with a structure to be removed, removal of riprap as required, approach slabs, and shoulder drains are to be included in the unit price bid for Item 496, "Removing Structures."

Item 105. Removing Treated and Untreated Base and Asphalt Pavement

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

Item 110. Excavation

Cross-sections for pay quantity determination of earthwork may be developed photogrammetrically.

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

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(NFIP) regulations. Ensure that the owner of the property receiving the waste has obtained the necessary permit.

Items 110, 112, and 132. Excavation, Subgrade Widening, and Embankment

Sulfate-laden subgrade material that is to be treated with either lime or cement, including material up to one foot outside the proposed treatment limits, is susceptible to sulfate heave. It has been determined that an excessive concentration of sulfate in the soils (>3,000 PPM by dry weight of the soil) exists for given areas of excavation and/or proposed treated subgrade within the project limits. The areas of moderate to high concentrations are as follows:

Areas of subgrade to be treated (3,001–7,000 PPM—moderate concentration)

No areas identified with moderate concentration.

Areas of excavation (>7,000 PPM—high concentration)

Proposed BUS 35W Station 10+14 to Station 18+00
Proposed NBFR Station 553+23 to Station 583+85

Moderate sulfate levels are those defined from 3,001 PPM to 7,000 PPM. Treat these soils with lime at the full 150 lb./cu. yd. rate or cement at the full 125 lb./cu. yd. rate. Do not split the rates to ensure complete reaction and mitigation of sulfate heaves. Allow the mixture to mellow for 7 days to provide for complete reaction.

High sulfate levels are not allowed within the treatment and surrounding areas as defined above.

Test soils for soluble sulfates in accordance with Test Method Tex-145 and Tex-146-E.

Treat moderate sulfate or excavate high sulfate areas identified above and other subgrade areas that may be identified during construction as having moderate to high sulfate concentrations to a depth of one foot below and laterally to one foot outside the proposed treatment limits. Treatment of the moderate level material will be paid for under Item 260, "Lime Treatment (Road Mixed)" or Item 275, "Cement Treatment (Road Mixed)." Removal of the high level material will be measured and paid for in accordance with Item 110, "Excavation" and replacement with suitable material will be measured and paid for in accordance with Item 132, "Embankment."

Any excavated sulfate-laden material will be acceptable for use in fill areas. Do not place within previously specified section boundaries of subgrade to be treated with either lime or cement.

Off-Site Borrow Sources. In addition to meeting pertinent specification requirements, test off-site borrow sources for sulfate content. Test soils for soluble sulfates in accordance with Test

Method Tex-145 and Tex-146-E and provide documentation that supports compliance with previously stated requirements. The Engineer will perform additional testing for sulfates of this material upon delivery to the project. Only material that is placed within one foot vertically or laterally of subgrade treatment will require testing for sulfates. Remove and replace failing material (sulfate concentrations >7,000 PPM by dry weight).

Item 132. Embankment

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.

When embankment is placed as a bridge header bank, test each lift for compliance with density requirements, near the center of each travel lane at the following locations:

1. At the “beginning of bridge” or “end of bridge” station (if abutment is on retaining wall, location may be adjusted by not more than 5 feet.)
2. At 25-foot intervals for a distance of 150 feet in advance of the “beginning of bridge” station.
3. At 25-foot intervals for a distance of 150 feet after the “end of bridge” station.

Density tests must be conducted by a department-certified independent testing laboratory. Results of tests will be furnished to TxDOT within 24 hours after testing; a final copy of all test reports must be signed and sealed by a Professional Engineer in the State of Texas and furnished within five (5) working days after testing. Areas which do not meet minimum density requirements will be removed, re-compacted, and re-tested for compliance at the contractor’s entire expense. Testing and reporting of test results will not be paid for directly, but will be subsidiary to this item.

Construct embankments for bridge header banks to final subgrade elevation prior to excavation for abutment caps and placement of foundation course at approach slabs. Payment for structural excavation and/or excavation for placement of foundation course will not be paid for directly, but will be subsidiary to the pertinent bid items.

At all locations where guardrail is shown to flare, widen the embankment as necessary to accommodate the guardrail.

Item 134. Backfilling Pavement Edges

Backfill the pavement edge with salvaged asphaltic pavement from RAP, planning, or other material specified by the Engineer. Salvaged material must pass through a 2 in sieve. Place

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salvaged material as shown on the plans and treat with CRS-2 or CRS-2H emulsified asphalt at the rate of 0.4 gal/SY.

Item 161. Compost

Place approximately 4" of compost manufactured topsoil (CMT) on all cut and fill slopes (except drainage channels where flexible channel liners are indicated), at other locations shown on the plans, or as directed.

Where “blended on-site” CMT is specified, produce the compost manufactured topsoil by incorporating 1" of compost with 3" of furnished topsoil as shown on the plans.

Where “pre-blended” CMT is specified, amend suitable soil material, as directed, with 25% compost, by volume, to produce the compost manufactured topsoil. Place the compost manufactured topsoil in a loose layer approximately 4" thick, as shown on the plans.

Use the processed material from Item 100 as the wood chips to blend with the compost to produce the Erosion Control Compost required for this project. This is considered subsidiary to Item 161.

Item 164. Seeding for Erosion Control

Apply seeding required between December 1 and January 31 using seed types and mixtures as shown in Item 164.2.1, Table 3. If, in the opinion of the Engineer, this does not provide an effective vegetative cover, apply “straw or hay mulch” as specified in Article 164.3.2, “Straw or Hay Mulch Seeding” as soon as possible. After February 1, apply warm season seeding in order to establish a permanent protective vegetative cover.

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)

Apply lime by the "slurry placement" method. Allow the mixture to mellow for a minimum of 4 days after initial mixing. If moderate sulfates are present, or for other extenuating circumstances as determined by the Engineer, allow the mixture to mellow for 7 days after initial mixing.

Except as noted below, treat the raw subgrade to a depth of 8".

Treat the raw subgrade with lime to a depth of 18" for:

- Fills equal to or greater than 18"—soil PI > 39
- Fills <18"—soil PI >29
- All cuts—soil PI > 29
- Any location directed by the Engineer

Treat the raw subgrade with lime to a depth of 36" for:

- Fills equal to or greater than 36"—soil PI > 59
- Fills < 36"—soil PI > 49
- All cuts—soil PI > 49
- Any location directed by the Engineer

Item 310. Prime Coat

Provide an EC-30, or CBSMS-1S for this Item.

Item 360. Concrete Pavement

When using the Hardy Chair-Lok to support reinforcing steel, chair spacing may be increased to 1.67 sq. yd. per chair, placed in a diamond or square pattern. Do not exceed 60" longitudinal spacing.

Include the approved mix design number on each delivery ticket.

Refer to plans for limits of fast track concrete. Slip forming the concrete will be required on this project. No hand pour is acceptable on the project in areas that can be slip formed.

Item 400. Excavation and Backfill for Structures

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Class B bedding will be permitted in lieu of Class C bedding.

Recycled flex base and RAP are allowed individually or combined for use as granular material and backfill in Class B and C bedding at the discretion of the Engineer. These materials must meet the requirements of Table 1. The Engineer may require the mixing of one or both of these materials with the local soil to provide a cohesive material for compaction and stability of the backfill around the pipe or box culvert.

Item 421. Hydraulic Cement Concrete

For Class P (Item 360) and S (Item 421) Concrete Only: For concrete plants equipped with 2 aggregate bins or no calibrated metering system, blend manufactured and natural sand at the aggregate source only. For concrete plants equipped with a minimum of 3 bins and a calibrated metering system, blending of the separate sands on-site is permitted to meet gradation and AIR requirements.

Strength/cylinder testing equipment must be equipped with a printer for an electronic print out of all test results.

Air entrainment requirements are waived for all classes of concrete except all Class S and all Class P concrete.

Concrete will not be rejected for low air content. Adjustment to the dosage of air entrainment will be as directed or allowed by the Engineer.

Include the approved mix design number on each delivery ticket.

Ensure that Contractor personnel performing job-control (QC) testing on concrete are ACI certified and maintain certification with annual proficiency/split tests performed with TxDOT. Provide a copy of all personnel certification papers to the Engineer at the preconstruction meeting. The Engineer may require the Contractor's testers to provide the certification papers upon arrival and before testing at the job site. Certified testers will be required to participate with certified TxDOT personnel annually for compression testing (Tex-418-A) and capping cylinders (Tex-450-A) to retain their certification on TxDOT projects.

Furnish a hard copy of all testing equipment calibration reports at the preconstruction meeting when non-TxDOT equipment is used to test concrete. Furnish updated reports as equipment is calibrated through the project contract. The calibration frequency will match TxDOT's and will apply for each piece of equipment as follows:

Slump Cone - Annual
Air Meter - Every 3 months
Compression Tester - Annual

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Beam breaker - Annual

The Engineer may allow the use of local commercial laboratories under contract to provide these services. The Commercial Laboratory must fulfill requirements listed above prior to performing any work.

Item 432. Riprap

Provide weep holes as directed.

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 4” (0.33’) or 5" (.42') in thickness, as 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.

Provide a toe wall at all exposed edges of all protection stone riprap, unless otherwise directed.

Locations and lengths of riprap flumes shown on the plans are approximate. Actual lengths and locations are to be determined in the field.

When synthetic fiber reinforcement concrete option is chosen provide the following:

- At all construction joints (vertical or horizontal) provide #3 bars 24 in. long and placed on 18 in. centers along joint length. Bars should be centered in concrete cross section.

- At all toe wall locations #3 L-bars will be required on 18 in. centers with a length 2 times the depth of the toe wall. Place three #3 bars the length of the toe wall and equally spaced on the L-bars.

Welded Wire Reinforcement (WWR) may be used for construction joint and toe wall reinforcing with the approval of the Engineer.

Item 464. Reinforced Concrete Pipe

All bends and connections in pipe must be prefabricated.

Item 466. Headwalls and Wingwalls

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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.

Required on all projects removing or replace a bridge structure.

The structure(s) to be removed have surface coatings that contain hazardous materials as follows:
Notify the Texas Department of State Health Services (DSHS) prior to demolition or renovation of bridges or other structures, using DSHS Form APB#5, “Demolition/Renovation Notification Form”. The form and instructions may be found on the DSHS Asbestos Programs Branch web page at http://www.dshs.state.tx.us/asbestos/notification.shtm. The DSHS notification form must be hand-delivered or mailed to (received at) the DSHS Austin office at least ten working days (10) days prior to commencing demolition or renovation. Fax or e-mail notifications will not be accepted. For projects with multiple bridges, a single notification, with a listing of all bridges or structures to be demolished or renovated and the expected start dates of their demolition or renovation (the start date is defined as the first date of visible demolition activities). Notify the DSHS Regional or Local inspector of all start date changes. The expected project completion date may be used as the “end” date.

Removal of riprap as required, approach slabs and shoulder drains to be included in the unit price bid.

The structure(s) to be removed have surface coatings which may contain hazardous materials. Provide for the safety and health of employees and abide by all OSHA standards and regulations.

To allow for disassembly, the Department will remove paint containing hazardous materials off the steel during the Contract in accordance with the following:

- For simple steel I-beam spans less than 80’ in length, a four inch wide strip around the perimeter of the diaphragm member or members at each attachment location to the beams.
- For continuous I-beam units or simple spans more than 80’ in length, a six inch wide strip around the perimeter of the beam cross-section for each beam at each cut location. A four inch wide strip around the perimeter of the diaphragm member or members at each attachment location to the beams.
- A four inch wide strip around bearing attachments and at the anchor bolts.

- As requested elsewhere and approved by the Engineer. Paint removal requested beyond that listed herein will be at the Contractor's expense.

Provide to the Engineer a detailed plan of the locations of paint removal at least 60 days prior to start of steel structure removal.

Do not cut simple I-beams less than 80' in length.

Cut continuous I-beams or simple I-beams more than 80' in length, into sections not less than 40' in length or more than 70' in length, as directed. Contact the District BRINSAP Coordinator, Mark Burwell, at 817-370-6882 for information on lengths needed.

Salvage and transport the following items to the storage area or maintenance barn located at the Keene (Johnson County) Area Office, or as directed:

STEEL I-BEAMS
SHOES
DIAPHRAGMS

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.

Maintenance of roadways, not paid as Item 508, "Constructing Detours," and designated in the traffic control plan to carry traffic, will be the responsibility of the Contractor and will be paid for by "Contractor Force Account or Agreed Unit Price".

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".

Sheet 10H

County: JOHNSON **Control:** 0014-03-087

Highway: IH 35W

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.

Item 504. Field Office and Laboratory

Furnish the following structures for this project:

Type	No.
Field Lab (Ty. A)	1
Field Office (Ty. C)	1
Field Lab (Ty. D)	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 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 Concrete Safety Barrier (CSB), Single-Slope Concrete Barrier (SSCB), or Low Profile Concrete Barrier (LPCB) standards as shown on the plans.

Furnish Class H Concrete with a minimum 28 day compressive strength of 3,600 psi.

Used barrier will be inspected and approved by the engineer prior to using, in accordance with Item 512.2.1.3.

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 and replace the traffic barrier damaged by the traveling public in accordance with Item 512. Portable Traffic Barrier.

Items 530 And 531. Intersections, Driveways and Turnouts, and Sidewalks

The furnishing and installation of the sand cushion in proposed sidewalks, sidewalk ramps, and driveways will not be paid for directly but will be subsidiary to this bid item.

Item 540. Metal Beam Guard Fence

The locations and lengths of guard fence shown on the plans are approximate. Actual lengths and locations are to be determined in the field.

The tops of timber posts will be domed. Beveled tops will not be permitted for timber or steel posts.

When holes for timber posts are drilled below bottom of proposed grade, backfill the excessive depth with an acceptable sand. The furnishing and installation of the sand backfill will not be paid for directly but will be subsidiary to this Item.

When guardrail posts are placed in a finished surface, backfill the top 4 inches with an asphaltic material, domed to carry water away from the posts or as shown on the plans. The furnishing and installation of the asphaltic material backfill will not be paid for directly but will be subsidiary to this Item.

When connecting a Thrie-Beam to a concrete wingwall, bridge rail, CTB, etc., drill the holes for bolt placement using rotary or core type equipment. Use a core type drill when reinforcing steel is encountered. Do not use percussion or impact drilling. Repair damage to the concrete and spalls exceeding ½" from the edge of the hole.

Sheet 10I

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Highway: IH 35W

Item 542. Removing Metal Beam Guard Fence

Remove existing metal beam guard fence only when authorized.

Item 543. Cable Barrier System

Driven posts will not be permitted.

The following products are approved for use on this project:
Trinity Industries CASS (TL-3) System
Gibraltar Cable Barrier (TL-3) System

Item 545. Crash Cushion Attenuators

Remove salvageable units and stockpile at 2200 FM 2280, Cleburne, TX 76033.

Item 585. Ride Quality for Pavement Surfaces

Use Surface Test Type A to evaluate ride quality of travel lanes in accordance with Item 585, "Ride Quality for Pavement Surfaces."

Item 662. Work Zone Pavement Non-Markings Removable

Paint and Beads may be used for Non-Removable Work Zone Pavement Markings, if TxDOT tested materials are used, paint and beads.

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 666. Reflectorized Pavement Markings with Retroreflective Requirements

Collection of retroreflectivity readings using a mobile retroreflectometer is the preferred method. If retroreflectivity readings are collected using a portable or handheld unit, then measurement is defined as a collective average of at least 20 readings taken along a 200-foot test section. A minimum of three measurements will be required per mile of roadway. Measurements collected on a centerline stripe will be averaged separately for stripe in each direction of travel. A TxDOT inspector must witness the calibration and collection of all retro-reflectivity data.

Items 730, 734, 738 and 764. Roadside Mowing, Litter Removal, Cleaning and Sweeping Highways and Pump Station and Drainage System Cleaning

Mowing height will be approximately 7 inches.

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Highway: IH 35W

For this project, project maintenance will be done at the following rates:

Mowing	4 cycles/year
Litter Pickup	1 cycle/month
Sweeping	1 cycle/month

Adhere to these rates unless permission to deviate is granted in writing by the Engineer.

Item 3076. Dense-Graded Hot-Mix Asphalt

RAP aggregate must meet the requirements of Table 1.

No blending, of the material retained on the No. 4 sieve, to meet SAC A will be allowed for surface mixes.

Natural (field) sands are not allowed.

Provide a PG 64-22 asphalt for the base course.

Provide a PG 64-22 asphalt for the concrete underlayment course.

Provide a PG 70-28 asphalt for the surface course and levelup course, if applicable.

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.

Grade substitution per Table 5 is not allowed.

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.

Sheet 10J

County: JOHNSON **Control:** 0014-03-087

Highway: IH 35W

Stop production after Lot 1. Review all test data and confirm any changes with the Engineer. Do not start production and placement on subsequent Lots until approved by the Engineer.

Shoulders, crossovers, 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.

Ride quality is not required on this project.

Item 3077. Superpave Mixtures

RAP aggregate must meet the requirements of Table 1.

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

No blending, of the material retained on the No. 4 sieve, to meet SAC A will be allowed for surface mixes.

Natural (field) sands are not allowed.

Provide a PG 70-28 asphalt for the surface course and levelup course, if applicable.

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.

Grade substitution per Table 5 is not allowed.

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.

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Highway: IH 35W

Stop production after Lot 1. Review all test data and confirm any changes with the Engineer. Do not start production and placement on subsequent Lots until approved by the Engineer.

Shoulders, crossovers, 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.

Ride quality is not required on this project.

Item 6001. 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 units 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 6185. Truck Mounted Attenuator (TMA) and Trailer Attenuator (TA)

Sheet 10K

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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 _1_ additional shadow vehicle(s) with TMA for TCP (_6-1_)-12_ as detailed on General Note of this standard sheet.

Therefore, _2_ 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.

General Notes Sheet 10K

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0014-03-087 **DISTRICT** Fort Worth **COUNTY** Johnson
HIGHWAY IH 35W

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0014-03-087**			
		PROJECT ID		**A00008198**			
		COUNTY		**Johnson**			
		HIGHWAY		**IH 35W**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	100-6002	PREPARING ROW	STA	61.000		61.000	
	104-6001	REMOVING CONC (PAV)	SY	24,941.000		24,941.000	
	104-6009	REMOVING CONC (RIPRAP)	SY	482.000		482.000	
	104-6017	REMOVING CONC (DRIVEWAYS)	SY	304.000		304.000	
	104-6022	REMOVING CONC (CURB AND GUTTER)	LF	1,748.000		1,748.000	
	104-6023	REMOVING CONC (CTB)	LF	889.000		889.000	
	104-6054	REMOVING CONCRETE(MOW STRIP)	LF	125.000		125.000	
	105-6014	REMOVING STAB BASE & ASPH PAV (7"-12")	SY	39,163.000		39,163.000	
	110-6001	EXCAVATION (ROADWAY)	CY	72,335.000		72,335.000	
	132-6008	EMBANKMENT (FINAL)(DENS CONT)(TY D)	CY	34,375.000		34,375.000	
	134-6002	BACKFILL (TY B)	STA	214.440		214.440	
	161-6017	COMPOST MANUF TOPSOIL (4")	SY	104,691.000		104,691.000	
	164-6007	BROADCAST SEED (PERM) (URBAN) (CLAY)	SY	104,691.000		104,691.000	
	164-6041	DRILL SEEDING (TEMP) (WARM)	SY	52,345.500		52,345.500	
	164-6043	DRILL SEEDING (TEMP) (COOL)	SY	52,345.500		52,345.500	
	168-6001	VEGETATIVE WATERING	MG	3,671.000		3,671.000	
	216-6001	PROOF ROLLING	HR	10.000		10.000	
	260-6002	LIME (HYDRATED LIME (SLURRY))	TON	728.000		728.000	
	260-6027	LIME TRT (EXST MATL)(8")	SY	43,406.000		43,406.000	
	310-6001	PRIME COAT (MULTI OPTION)	GAL	9,549.000		9,549.000	
	360-6004	CONC PVMT (CONT REINF - CRCP) (10")	SY	16,208.000		16,208.000	
	360-6007	CONC PVMT (CONT REINF - CRCP) (13")	SY	18,706.000		18,706.000	
	360-6043	CONC PVMT (CONT REINF)(FAST TRK)(13")	SY	3,713.000		3,713.000	
	400-6005	CEM STABIL BKFL	CY	98.000		98.000	
	402-6001	TRENCH EXCAVATION PROTECTION	LF	2,120.000		2,120.000	
	403-6001	TEMPORARY SPL SHORING	SF	1,258.000		1,258.000	
	416-6016	DRILL SHAFT (SIGN MTS) (12 IN)	LF	7.000		7.000	
	416-6018	DRILL SHAFT (SIGN MTS) (24 IN)	LF	18.000		18.000	
	416-6022	DRILL SHAFT (SIGN MTS) (48 IN)	LF	24.000		24.000	
	416-6023	DRILL SHAFT (SIGN MTS) (54 IN)	LF	26.000		26.000	
	432-6001	RIPRAP (CONC)(4 IN)	CY	20.000		20.000	
	432-6002	RIPRAP (CONC)(5 IN)	CY	696.000		696.000	
	432-6009	RIPRAP (CONC) (CL B) (4")	CY	4.000		4.000	
	432-6033	RIPRAP (STONE PROTECTION)(18 IN)	CY	89.000		89.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	208.000		208.000	
	464-6005	RC PIPE (CL III)(24 IN)	LF	2,831.000		2,831.000	
	464-6008	RC PIPE (CL III)(36 IN)	LF	27.000		27.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0014-03-087 **DISTRICT** Fort Worth **COUNTY** Johnson
HIGHWAY IH 35W

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0014-03-087**			
		PROJECT ID		**A00008198**			
		COUNTY		**Johnson**			
		HIGHWAY		**IH 35W**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	464-6018	RC PIPE (CL IV)(24 IN)	LF	337.000		337.000	
	465-6416	INLET (COMPL)(CO)(10 FT)(FTW)	EA	8.000		8.000	
	465-6418	INLET (COMPL)(CO)(20 FT)(FTW)	EA	1.000		1.000	
	465-6424	INLET (COMPL)(CU)(10 FT)(FTW)	EA	4.000		4.000	
	465-6439	INLET (COMPL)(FG)(3FT X 3FT)(FTW)	EA	2.000		2.000	
	465-6465	INLET (COMPL)(AD)(3FT X 3FT)(FTW)	EA	3.000		3.000	
	465-6490	MANH (COMPL)(TY SD)(3FT X 3FT)(FTW)	EA	1.000		1.000	
	466-6005	HEADWALL (CH - FW - 0) (DIA= 24 IN)	EA	1.000		1.000	
	467-6388	SET (TY II) (24 IN) (RCP) (3: 1) (C)	EA	1.000		1.000	
	467-6390	SET (TY II) (24 IN) (RCP) (4: 1) (C)	EA	1.000		1.000	
	467-6394	SET (TY II) (24 IN) (RCP) (6: 1) (C)	EA	1.000		1.000	
	467-6395	SET (TY II) (24 IN) (RCP) (6: 1) (P)	EA	4.000		4.000	
	467-6454	SET (TY II) (36 IN) (RCP) (6: 1) (P)	EA	1.000		1.000	
	479-6007	ADJUSTING MANHOLES(CAP)	EA	1.000		1.000	
	480-6001	CLEAN EXIST CULVERTS	EA	2.000		2.000	
	496-6002	REMOV STR (INLET)	EA	8.000		8.000	
	496-6003	REMOV STR (MANHOLE)	EA	1.000		1.000	
	496-6004	REMOV STR (SET)	EA	8.000		8.000	
	496-6007	REMOV STR (PIPE)	LF	2,356.000		2,356.000	
	496-6010	REMOV STR (BRIDGE 100 - 499 FT LENGTH)	EA	1.000		1.000	
	496-6040	REMOV STR (RET WALL)	LF	255.000		255.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	13.000		13.000	
	506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	100.000		100.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	100.000		100.000	
	506-6021	CONSTRUCTION EXITS (INSTALL) (TY 2)	SY	312.000		312.000	
	506-6024	CONSTRUCTION EXITS (REMOVE)	SY	312.000		312.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	4,376.000		4,376.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	4,376.000		4,376.000	
	506-6042	BIODEG EROSN CONT LOGS (INSTL) (18")	LF	665.000		665.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	665.000		665.000	
	508-6001	CONSTRUCTING DETOURS	SY	4,505.000		4,505.000	
	512-6001	PORT CTB (FUR & INST)(SGL SLOPE)(TY 1)	LF	12,660.000		12,660.000	
	512-6025	PORT CTB (MOVE)(SGL SLP)(TY 1)	LF	16,890.000		16,890.000	
	512-6049	PORT CTB (REMOVE)(SGL SLP)(TY 1)	LF	12,660.000		12,660.000	
	529-6005	CONC CURB (MONO) (TY II)	LF	6,873.000		6,873.000	
	529-6008	CONC CURB & GUTTER (TY II)	LF	48.000		48.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0014-03-087 **DISTRICT** Fort Worth **COUNTY** Johnson
HIGHWAY IH 35W

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0014-03-087**			
		PROJECT ID		**A00008198**			
		COUNTY		**Johnson**			
		HIGHWAY		**IH 35W**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	530-6004	DRIVEWAYS (CONC)	SY	2,120.000		2,120.000	
	531-6001	CONC SIDEWALKS (4")	SY	2,150.000		2,150.000	
	531-6008	CURB RAMPS (TY 5)	EA	1.000		1.000	
	531-6010	CURB RAMPS (TY 7)	EA	7.000		7.000	
	531-6013	CURB RAMPS (TY 10)	EA	2.000		2.000	
	531-6016	CURB RAMPS (TY 21)	EA	1.000		1.000	
	533-6001	RUMBLE STRIPS (SHOULDER)	LF	8,656.000		8,656.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	1,050.000		1,050.000	
	540-6005	TERMINAL ANCHOR SECTION	EA	3.000		3.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	3.000		3.000	
	540-6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	3.000		3.000	
	540-6041	MTL W-BEAM GD FEN (NESTED)(TIM POST)	LF	25.000		25.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	1,637.500		1,637.500	
	542-6002	REMOVE TERMINAL ANCHOR SECTION	EA	7.000		7.000	
	542-6003	REMOVE DOWNSTREAM ANCHOR TERMINAL	EA	1.000		1.000	
	542-6004	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	EA	3.000		3.000	
	543-6001	CABLE BARRIER SYSTEM (TL-3)	LF	3,611.000		3,611.000	
	543-6019	CABLE BARRIER TERMINAL SECTION (TL-3)	EA	1.000		1.000	
	543-6021	REMOVE CABLE BARRIER	LF	1,714.000		1,714.000	
	543-6022	REMOVE CABLE BARRIER TERMINAL SECTION	EA	3.000		3.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA	6.000		6.000	
	545-6003	CRASH CUSH ATTEN (MOVE & RESET)	EA	14.000		14.000	
	545-6005	CRASH CUSH ATTEN (REMOVE)	EA	10.000		10.000	
	545-6019	CRASH CUSH ATTEN (INSTL)(S)(N)(TL3)	EA	8.000		8.000	
	636-6001	ALUMINUM SIGNS (TY A)	SF	2.250		2.250	
	636-6002	ALUMINUM SIGNS (TY G)	SF	218.250		218.250	
	636-6003	ALUMINUM SIGNS (TY O)	SF	552.250		552.250	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	17.000		17.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	23.000		23.000	
	644-6030	IN SM RD SN SUP&AM TYS80(1)SA(T)	EA	3.000		3.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	40.000		40.000	
	647-6001	INSTALL LRSS (STRUCT STEEL)	LB	879.200		879.200	
	647-6003	REMOVE LRSA	EA	5.000		5.000	
	650-6032	INS OH SN SUP(30 FT CANT)	EA	1.000		1.000	
	650-6045	INS OH SN SUP(40 FT CANT)	EA	1.000		1.000	
	658-6015	INSTL DEL ASSM (D-SW)SZ (BRF)GF1	EA	4.000		4.000	
	658-6028	INSTL DEL ASSM (D-SY)SZ (BRF)GF1	EA	7.000		7.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0014-03-087 **DISTRICT** Fort Worth **COUNTY** Johnson
HIGHWAY IH 35W

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0014-03-087**			
		PROJECT ID		**A00008198**			
		COUNTY		**Johnson**			
		HIGHWAY		**IH 35W**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	658-6067	INSTL DEL ASSM (D-DW)SZ 1(BRF)GF2	EA	7.000		7.000	
	658-6080	INSTL DEL ASSM (D-SW)SZ 1(WFLX)GND	EA	27.000		27.000	
	658-6081	INSTL DEL ASSM (D-SW)SZ 1(WFLX)GND(BI)	EA	14.000		14.000	
	658-6092	INSTL DEL ASSM (D-DW)SZ 1(WFLX)GND	EA	14.000		14.000	
	658-6099	INSTL OM ASSM (OM-2Z)(WFLX)GND	EA	14.000		14.000	
	662-6001	WK ZN PAV MRK NON-REMOV (W)4"(BRK)	LF	940.000		940.000	
	662-6004	WK ZN PAV MRK NON-REMOV (W)4"(SLD)	LF	6,985.000		6,985.000	
	662-6012	WK ZN PAV MRK NON-REMOV (W)8"(SLD)	LF	1,085.000		1,085.000	
	662-6016	WK ZN PAV MRK NON-REMOV (W)24"(SLD)	LF	25.000		25.000	
	662-6034	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	LF	9,545.000		9,545.000	
	662-6060	WK ZN PAV MRK REMOV (W)4"(BRK)	LF	1,050.000		1,050.000	
	662-6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF	22,788.000		22,788.000	
	662-6071	WK ZN PAV MRK REMOV (W)8"(SLD)	LF	998.000		998.000	
	662-6075	WK ZN PAV MRK REMOV (W)24"(SLD)	LF	26.000		26.000	
	662-6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF	21,303.000		21,303.000	
	666-6006	REFL PAV MRK TY I (W)4"(DOT)(100MIL)	LF	189.000		189.000	
	666-6018	REFL PAV MRK TY I (W)6"(DOT)(100MIL)	LF	69.000		69.000	
	666-6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	2,033.000		2,033.000	
	666-6042	REFL PAV MRK TY I (W)12"(SLD)(100MIL)	LF	410.000		410.000	
	666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	136.000		136.000	
	666-6054	REFL PAV MRK TY I (W)(ARROW)(100MIL)	EA	1.000		1.000	
	666-6075	REFL PAV MRK TY I (W)(NUMBER)(100MIL)	EA	1.000		1.000	
	666-6078	REFL PAV MRK TY I (W)(WORD)(100MIL)	EA	1.000		1.000	
	666-6162	RE PV MRK TY I(BLACK)6"(SHADOW)(100MIL)	LF	2,000.000		2,000.000	
	666-6167	REFL PAV MRK TY II (W) 4" (BRK)	LF	1,460.000		1,460.000	
	666-6168	REFL PAV MRK TY II (W) 4" (DOT)	LF	189.000		189.000	
	666-6170	REFL PAV MRK TY II (W) 4" (SLD)	LF	10,297.000		10,297.000	
	666-6171	REFL PAV MRK TY II (W) 6" (BRK)	LF	2,000.000		2,000.000	
	666-6172	REFL PAV MRK TY II (W) 6" (DOT)	LF	69.000		69.000	
	666-6174	REFL PAV MRK TY II (W) 6" (SLD)	LF	7,073.000		7,073.000	
	666-6178	REFL PAV MRK TY II (W) 8" (SLD)	LF	2,033.000		2,033.000	
	666-6180	REFL PAV MRK TY II (W) 12" (SLD)	LF	410.000		410.000	
	666-6182	REFL PAV MRK TY II (W) 24" (SLD)	LF	136.000		136.000	
	666-6184	REFL PAV MRK TY II (W) (ARROW)	EA	1.000		1.000	
	666-6185	REFL PAV MRK TY II (W) (DBL ARROW)	EA	2.000		2.000	
	666-6191	REFL PAV MRK TY II (W) (NUMBER)	EA	1.000		1.000	
	666-6192	REFL PAV MRK TY II (W) (WORD)	EA	1.000		1.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0014-03-087 **DISTRICT** Fort Worth **COUNTY** Johnson
HIGHWAY IH 35W

		CONTROL SECTION JOB		**0014-03-087**		TOTAL EST.	TOTAL FINAL
		PROJECT ID		**A00008198**			
		COUNTY		**Johnson**			
		HIGHWAY		**IH 35W**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	666-6207	REFL PAV MRK TY II (Y) 4" (SLD)	LF	9,941.000		9,941.000	
	666-6210	REFL PAV MRK TY II (Y) 6" (SLD)	LF	7,980.000		7,980.000	
	666-6219	REFL PAV MRK TY II (BLACK) 6"(SHADOW)	LF	2,000.000		2,000.000	
	666-6300	RE PM W/RET REQ TY I (W)4"(BRK)(100MIL)	LF	740.000		740.000	
	666-6303	RE PM W/RET REQ TY I (W)4"(SLD)(100MIL)	LF	5,464.000		5,464.000	
	666-6306	RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)	LF	2,000.000		2,000.000	
	666-6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	LF	7,073.000		7,073.000	
	666-6315	RE PM W/RET REQ TY I (Y)4"(SLD)(100MIL)	LF	6,753.000		6,753.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	33.000		33.000	
	672-6010	REFL PAV MRKR TY II-C-R	EA	300.000		300.000	
	677-6001	ELIM EXT PAV MRK & MRKS (4")	LF	19,831.000		19,831.000	
	677-6003	ELIM EXT PAV MRK & MRKS (8")	LF	524.000		524.000	
	677-6007	ELIM EXT PAV MRK & MRKS (24")	LF	11.000		11.000	
	677-6019	ELIM EXT PAV MRK & MRKS (36")(YLD TRI)	EA	4.000		4.000	
	678-6001	PAV SURF PREP FOR MRK (4")	LF	21,887.000		21,887.000	
	678-6002	PAV SURF PREP FOR MRK (6")	LF	17,122.000		17,122.000	
	678-6004	PAV SURF PREP FOR MRK (8")	LF	2,033.000		2,033.000	
	678-6006	PAV SURF PREP FOR MRK (12")	LF	410.000		410.000	
	678-6008	PAV SURF PREP FOR MRK (24")	LF	136.000		136.000	
	678-6009	PAV SURF PREP FOR MRK (ARROW)	EA	1.000		1.000	
	678-6010	PAV SURF PREP FOR MRK (DBL ARROW)	EA	2.000		2.000	
	678-6015	PAV SURF PREP FOR MRK (NUMBER)	EA	1.000		1.000	
	678-6016	PAV SURF PREP FOR MRK (WORD)	EA	1.000		1.000	
	3076-6001	D-GR HMA TY-B PG64-22	TON	10,350.000		10,350.000	
	3077-6027	SP MIXESSP-CSAC-A PG70-28	TON	109.000		109.000	
	3077-6075	TACK COAT	GAL	190.000		190.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	7.000		7.000	
	6185-6002	TMA (STATIONARY)	DAY	20.000		20.000	
	18	LAW ENFORCEMENT: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	

SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS

LOCATION	403 6001	502 6001	508 6001	512 6001	512 6025	512 6049	545 6003	545 6005	545 6019	662 6001	662 6004	662 6012	662 6016
	TEMPORARY SPL SHORING	BARRICADES, SIGNS AND TRAFFIC HANDLING	CONSTRUCTING DETOURS	PORT CTB (FUR & INST)(SGL SLOPE)(TY 1)	PORT CTB (MOVE)(SGL SLP)(TY 1)	PORT CTB (REMOVE)(SGL SLP)(TY 1)	CRASH CUSH ATTEN (MOVE & RESET)	CRASH CUSH ATTEN (REMOVE)	CRASH CUSH ATTEN (INSTL)(S)(N)(TL3)	WK ZN PAV MRK NON-REMOV (W)4"(BRK)	WK ZN PAV MRK NON-REMOV (W)4"(SLD)	WK ZN PAV MRK NON-REMOV (W)8"(SLD)	WK ZN PAV MRK NON-REMOV (W)24"(SLD)
	SF	MO	SY	LF	LF	LF	EA	EA	EA	LF	LF	LF	LF
IH 35W													
PHASE 1 STAGE 1 SHEET 1 OF 5	247		480	748					1				
PHASE 1 STAGE 1 SHEET 2 OF 5	1011		1884	1731					3				
PHASE 1 STAGE 1 SHEET 3 OF 5			245	611					2				
PHASE 1 STAGE 1 SHEET 4 OF 5			938	304							69		
PHASE 1 STAGE 1 SHEET 5 OF 5			208	236				1	1		180		
PHASE 1 STAGE 2 SHEET 1 OF 6													
PHASE 1 STAGE 2 SHEET 2 OF 6					1715		1			100	775	312	
PHASE 1 STAGE 2 SHEET 3 OF 6				2062	1915		1			280	1622		
PHASE 1 STAGE 2 SHEET 4 OF 6				3175			1			310	1732		
PHASE 1 STAGE 2 SHEET 5 OF 6				3424			2			250	691		
PHASE 1 STAGE 2 SHEET 6 OF 6				369			1						
PHASE 1 STAGE 3 SHEET 1 OF 7													
PHASE 1 STAGE 3 SHEET 2 OF 7						322							
PHASE 1 STAGE 3 SHEET 3 OF 7						1192		1					
PHASE 1 STAGE 3 SHEET 4 OF 7		13				226	1	1					
PHASE 1 STAGE 3 SHEET 5 OF 7			615		424						232		
PHASE 1 STAGE 3 SHEET 6 OF 7			135		836		1	1			142		
PHASE 1 STAGE 3 SHEET 7 OF 7													
PHASE 2 STAGE 1 SHEET 1 OF 5						1392					674	773	
PHASE 2 STAGE 1 SHEET 2 OF 5						2785							
PHASE 2 STAGE 1 SHEET 3 OF 5					945	893							
PHASE 2 STAGE 1 SHEET 4 OF 5					4167		1				650		25
PHASE 2 STAGE 1 SHEET 5 OF 5					1038		2				218		
PHASE 2 STAGE 2 SHEET 1 OF 6					1211	1211							
PHASE 2 STAGE 2 SHEET 2 OF 6					2400	2400							
PHASE 2 STAGE 2 SHEET 3 OF 6					1079	1079	2	2					
PHASE 2 STAGE 2 SHEET 4 OF 6					290	290	1	1					
PHASE 2 STAGE 2 SHEET 5 OF 6					690	690							
PHASE 2 STAGE 2 SHEET 6 OF 6					180	180		1	1				
PROJECT TOTAL:	1258	13	4505	12660	16890	12660	14	8	8	940	6985	1085	25

SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS

LOCATION	662 6034	662 6060	662 6063	662 6071	662 6075	662 6095	6001 6002	6185 6002
	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	WK ZN PAV MRK REMOV (W)4"(BRK)	WK ZN PAV MRK REMOV (W)4"(SLD)	WK ZN PAV MRK REMOV (W)8"(SLD)	WK ZN PAV MRK REMOV (W)24"(SLD)	WK ZN PAV MRK REMOV (Y)4"(SLD)	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)
	LF	LF	LF	LF	LF	LF	EA	DAY
IH 35W								
PHASE 1 STAGE 1 SHEET 1 OF 5						537		
PHASE 1 STAGE 1 SHEET 2 OF 5			1403		11	1404		
PHASE 1 STAGE 1 SHEET 3 OF 5			925	82		838		
PHASE 1 STAGE 1 SHEET 4 OF 5								
PHASE 1 STAGE 1 SHEET 5 OF 5								
PHASE 1 STAGE 2 SHEET 1 OF 6		20	68			70		
PHASE 1 STAGE 2 SHEET 2 OF 6	1423	470	1200			1057		
PHASE 1 STAGE 2 SHEET 3 OF 6	1799	140	810			630		
PHASE 1 STAGE 2 SHEET 4 OF 6	2497							
PHASE 1 STAGE 2 SHEET 5 OF 6	1689	50	315			501		
PHASE 1 STAGE 2 SHEET 6 OF 6								
PHASE 1 STAGE 3 SHEET 1 OF 7								
PHASE 1 STAGE 3 SHEET 2 OF 7								
PHASE 1 STAGE 3 SHEET 3 OF 7								
PHASE 1 STAGE 3 SHEET 4 OF 7							7	20
PHASE 1 STAGE 3 SHEET 5 OF 7	408							
PHASE 1 STAGE 3 SHEET 6 OF 7	143		673			1059		
PHASE 1 STAGE 3 SHEET 7 OF 7						800		
PHASE 2 STAGE 1 SHEET 1 OF 5		270	100			1045		
PHASE 2 STAGE 1 SHEET 2 OF 5		100	782	500		1030		
PHASE 2 STAGE 1 SHEET 3 OF 5			1242			1240		
PHASE 2 STAGE 1 SHEET 4 OF 5	1228		3348			2235		
PHASE 2 STAGE 1 SHEET 5 OF 5	358		1694			904		
PHASE 2 STAGE 2 SHEET 1 OF 6			2406			1185		
PHASE 2 STAGE 2 SHEET 2 OF 6			3600			2400		
PHASE 2 STAGE 2 SHEET 3 OF 6			1763			1490		
PHASE 2 STAGE 2 SHEET 4 OF 6			891			1235		
PHASE 2 STAGE 2 SHEET 5 OF 6			1371	416	15	1446		
PHASE 2 STAGE 2 SHEET 6 OF 6			197			197		
PROJECT TOTAL:	9545	1050	22788	998	26	21303	7	20

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IH 35W
FROM CR 604/ CR 707 TO US 67

QUANTITY SUMMARY

TCP
SUMMARY

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		12

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SUMMARY OF REMOVAL

LOCATION	104 6001	104 6009	104 6017	104 6022	104 6023	104 6054	105 6014	479 6007	496 6002	496 6003	496 6004	496 6007	496 6010
	REMOVING CONC (PAV)	REMOVING CONC (RIPRAP)	REMOVING CONC (DRIVEWAYS)	REMOVING CONC (CURB AND GUTTER)	REMOVING CONC (CTB)	REMOVING CONCRETE(MOW STRIP)	REMOVING STAB BASE & ASPH PAV (7"-12")	ADJUSTING MANHOLES(CAP)	REMOV STR (INLET)	REMOV STR (MANHOLE)	REMOV STR (SET)	REMOV STR (PIPE)	REMOV STR (BRIDGE 100 - 499 FT LENGTH)
	SY	SY	SY	LF	LF	LF	SY	EA	EA	EA	EA	LF	EA
REMOVAL SHEET 1 OF 4	4277					125	4809		1		2	277	
REMOVAL SHEET 2 OF 4	12612	482	304	704	727		21476	1	3	1	6	1180	1
REMOVAL SHEET 3 OF 4	7577			966	162		12403		4			899	
REMOVAL SHEET 4 OF 4	475			78			475						
PROJECT TOTAL:	24941	482	304	1748	889	125	39163	1	8	1	8	2356	1

SUMMARY OF REMOVAL

LOCATION	496 6040	542 6001	542 6002	542 6003	542 6004	543 6021	543 6022	544 6003	545 6005	644 6076	647 6003	677 6001	677 6003	677 6007	677 6019
	REMOV STR (RET WALL)	REMOVE METAL BEAM GUARD FENCE	REMOVE TERMINAL ANCHOR SECTION	REMOVE DOWNSTREAM ANCHOR TERMINAL	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	REMOVE CABLE BARRIER	REMOVE CABLE BARRIER TERMINAL SECTION	GUARDRAIL END TREATMENT (REMOVE)	CRASH CUSH ATTEN (REMOVE)	REMOVE SM RD SN SUP&AM	REMOVE LRSA	ELIM EXT PAV MRK & MRKS (4")	ELIM EXT PAV MRK & MRKS (8")	ELIM EXT PAV MRK & MRKS (24")	ELIM EXT PAV MRK & MRKS (36")(YLD TRI)
	LF	LF	EA	EA	EA	LF SP REQUIRED	EA SP REQUIRED	EA	EA	EA	EA	LF	LF	LF	EA
REMOVAL SHEET 1 OF 4		275	1		1	55		2		10	2	11443	524	11	4
REMOVAL SHEET 2 OF 4	154	825	4	1	2	798	1	3	1	16	1	2758			
REMOVAL SHEET 3 OF 4	23	362.5	2			861	2		1	14		2367			
REMOVAL SHEET 4 OF 4	78	175						1			2	3263			
PROJECT TOTAL:	255	1637.5	7	1	3	1714	3	6	2	40	5	19831	524	11	4

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IH 35W
FROM CR 604/ CR 707 TO US 67

QUANTITY SUMMARY

REMOVAL SUMMARY

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		13

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SUMMARY OF ROADWAY ITEMS

LOCATION	100 6002 PREPARING ROW	110 6001 EXCAVATION (ROADWAY)	132 6008 EMBANKMENT (FINAL) (DENS CONT) (TY D)	134 6002 BACKFILL (TY B)	216 6001 PROOF ROLLING	260 6002 LIME (HYDRATED LIME (SLURRY))	260 6027 LIME TRT (EXST MATL) (8")	310 6001 PRIME COAT (MULTI OPTION)	360 6004 CONC PVMT (CONT REINF - CRCP) (10")	360 6007 CONC PVMT (CONT REINF - CRCP) (13")	360 6043 CONC PVMT (CONT REINF) (FAST TRK) (13")	432 6001 RIPRAP (CONC) (4 IN)	432 6045 RIPRAP (MOW STRIP) (4 IN)	529 6005 CONC CURB (MONO) (TY II)	529 6008 CONC CURB & GUTTER (TY II)	530 6004 DRIVEWAYS (CONC)
	STA	CY	CY	STA	HR	TON	SY	GAL	SY	SY	SY	CY	CY	LF	LF	SY
DEPTH						8"	8"		10"	13"	13"					
RATE						150 LB/CY		0.2 GAL/SY								
NBML WIDENING SHEET 1 OF 1				10.00		45	2649	530		2241			8			
IH 35W NBML SHEET 1 OF 4				29.25		93	5569	1114		4668			43			
IH 35W NBML SHEET 2 OF 4				29.74		101	6048	1210		5070			60			
IH 35W NBML SHEET 3 OF 4				24.04		51	3024	1324		2535	3104		61			
IH 35W NBML SHEET 4 OF 4				2.84				145			609		36	6		
NBFR WIDENING SHEET 1 OF 1				7.90		9	528	106								
NBFR SHEET 1 OF 3				20.35		77	4613	923	3350					1835		
NBFR SHEET 2 OF 3				19.49		111	6627	1326	5589			20		2181		
NBFR SHEET 3 OF 3	61	72335	34375	15.75	10	55	3259	652	2503					1570		
RAMP C SHEET 1 OF 2				13.84		61	3650	730	388	2703						
RAMP C SHEET 2 OF 2				4.17		14	807	162	637							
RAMP H SHEET 1 OF 1				10.46		32	1909	382		1489						
RAMP H SHEET 2 OF 2																
BUS 35W SHEET 1 OF 1				16.49		79	4723	945	3741					939	48	
DRIVEWAY SHEET 1 OF 3				2.53										124		586
DRIVEWAY SHEET 2 OF 3				3.46										109		588
DRIVEWAY SHEET 3 OF 3				4.13										109		946
PROJECT TOTAL:	61	72335	34375	214.44	10	728	43406	9549	16208	18706	3713	20	208	6873	48	2120

SUMMARY OF ROADWAY ITEMS

LOCATION	531 6001 CONC SIDEWALKS (4")	531 6008 CURB RAMPS (TY 5)	531 6010 CURB RAMPS (TY 7)	531 6013 CURB RAMPS (TY 10)	531 6016 CURB RAMPS (TY 21)	540 6001 MTL W-BEAM GD FEN (TIM POST)	540 6005 TERMINAL ANCHOR SECTION	540 6006 MTL BEAM GD FEN TRANS (THRIE-BEAM)	540 6016 DOWNSTREAM ANCHOR TERMINAL SECTION	540 6041 MTL W-BEAM GD FEN (NESTED) (TIM POST)	543 6001 CABLE BARRIER SYSTEM (TL-3)	543 6019 CABLE BARRIER TERMINAL SECTION (TL-3)	3076 6001 D-GR HMA TY-B PG64-22	3076 6001 D-GR HMA TY-B PG64-22	3077 6027 SP MIXES SP-C SAC-A PG70-28	3077 6075 TACK COAT
	SY	EA	EA	EA	EA	LF	EA	EA	EA	LF	LF	EA	TON	TON	TON	GAL
DEPTH													6"	4"	2"	
RATE													115 LB/SY-IN	115 LB/SY-IN	115 LB/SY-IN	0.2 GAL/SY
NBML WIDENING SHEET 1 OF 1						25	1	1						571		
IH 35W NBML SHEET 1 OF 4											1152			1196		
IH 35W NBML SHEET 2 OF 4						200	1		1		1195			1299		
IH 35W NBML SHEET 3 OF 4						375			1		1195			1430		
IH 35W NBML SHEET 4 OF 4						450	1	2	1	25	69	1		156		
NBFR WIDENING SHEET 1 OF 1													135		42	74
NBFR SHEET 1 OF 3			1										119	904	39	68
NBFR SHEET 2 OF 3	884	1	6	1	1									1443		
NBFR SHEET 3 OF 3	873													690		
RAMP C SHEET 1 OF 2														787		
RAMP C SHEET 2 OF 2														170		
RAMP H SHEET 1 OF 1														400		
RAMP H SHEET 1 OF 2																
BUS 35W SHEET 1 OF 1	393			1									83	967	28	48
DRIVEWAY SHEET 1 OF 3																
DRIVEWAY SHEET 2 OF 3																
DRIVEWAY SHEET 3 OF 3																
PROJECT TOTAL:	2150	1	7	2	1	1050	3	3	3	25	3611	1	337	10013	109	190

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IH 35W
FROM CR 604/ CR 707 TO US 67

QUANTITY SUMMARY

ROADWAY
SUMMARY

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		14

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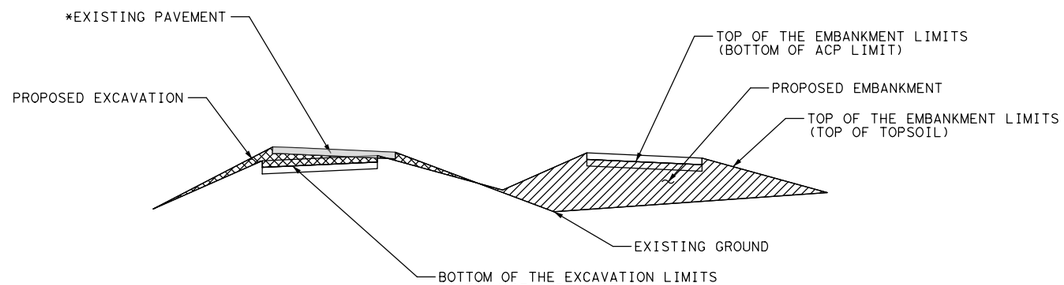
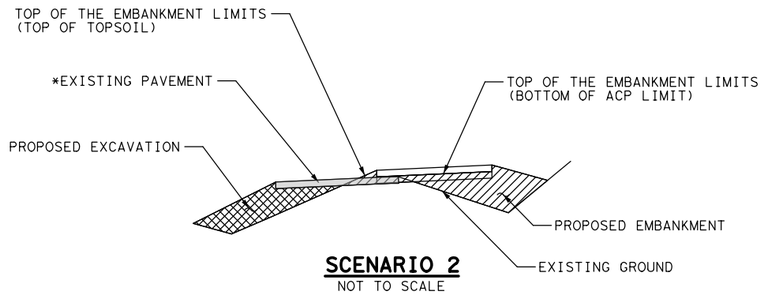
IH 35W (PNBML)		
STATION	EXCAVATION VOLUME (CY)	EMBANKMENT VOLUME (CY)
522+50.00	0.00	0.00
522+65.86	3.25	2.53
523+00.00	13.12	6.85
524+00.00	51.07	6.11
525+00.00	379.46	18.19
526+00.00	923.28	53.60
527+00.00	996.48	56.54
528+00.00	927.30	38.16
529+00.00	993.51	31.10
530+00.00	830.40	18.23
531+00.00	581.90	15.15
532+00.00	537.31	24.59
533+00.00	590.29	30.92
534+00.00	558.88	27.14
535+00.00	436.75	41.03
536+00.00	261.68	47.73
537+00.00	211.47	28.32
538+00.00	165.14	45.33
539+00.00	86.09	44.06
540+00.00	155.51	28.36
541+00.00	260.35	40.57
542+00.00	323.07	36.37
543+00.00	355.13	30.93
544+00.00	270.31	47.82
545+00.00	123.24	60.43
545+95.00	118.03	96.18
546+00.00	9.89	7.57
547+00.00	218.41	150.18
548+00.00	187.68	164.95
548+50.00	70.06	101.29
548+72.05	31.62	49.82
549+00.00	43.18	68.65
550+00.00	178.58	304.09
551+00.00	175.99	390.05
551+50.00	91.74	222.39
552+00.00	115.50	230.62
553+00.00	261.23	402.92
554+00.00	513.82	294.52
555+00.00	845.02	176.96
556+00.00	1068.99	77.86
557+00.00	1485.81	91.37
558+00.00	1967.88	241.74
559+00.00	2305.19	407.07
560+00.00	2782.52	509.84
561+00.00	3375.90	475.74
562+00.00	3678.59	340.92
563+00.00	3647.01	382.99
564+00.00	3537.96	382.96
565+00.00	3388.30	789.05
566+00.00	2537.16	1620.71
567+00.00	1955.33	2771.91
568+00.00	3365.62	4570.38
569+00.00	4580.12	4770.38
570+00.00	4100.85	3175.48
571+00.00	3250.73	1183.11
572+00.00	2368.72	29.02
573+00.00	1732.31	207.06
574+00.00	1224.65	470.98
575+00.00	687.83	581.87
576+00.00	423.55	618.21
577+00.00	352.17	894.47
578+00.00	331.86	1231.60
579+00.00	296.10	1291.80
580+00.00	278.08	1173.49
580+45.00	110.76	449.99
581+00.00	113.43	450.96
581+95.87	196.48	738.17
582+00.00	8.42	33.27
582+41.99	131.70	305.08
582+77.82	140.59	195.68
TOTAL VOLUME	68320.35	33903.41

BUS 35W (PBI35VT)		
STATION	EXCAVATION VOLUME (CY)	EMBANKMENT VOLUME (CY)
10+00.000	0.00	0.00
10+14.000	96.30	0.00
10+45.210	444.93	0.00
10+50.000	73.88	0.00
11+00.000	709.40	0.00
11+50.000	457.31	41.87
12+00.000	315.77	84.75
13+00.000	588.25	107.82
14+00.000	453.79	52.70
14+42.820	158.78	24.00
15+00.000	173.91	23.73
16+00.000	239.24	27.49
17+00.000	194.57	41.85
17+49.999	71.81	41.20
18+00.000	36.08	25.97
TOTAL VOLUME	4014.02	471.38



SCENARIO 1
NOT TO SCALE



SCENARIO 2
NOT TO SCALE

LEGEND

EXISTING PAVEMENT

EXCAVATION

EMBANKMENT

* INCLUDES CONCRETE PAVEMENT, ACP AND STAB BASE AS PART OF REMOVAL ITEMS FOR MAINLANE AND RAMPS AND EXCLUDED FROM EARTHWORK CALCULATION. ALSO,INCLUDES 2 COURSE SURFACE TREAT AND CRUSHED LIMESTONE AS PART OF REMOVAL ITEMS FOR FRONTAGE ROAD AND BUS 35W AND EXCLUDED FROM EARTHWORK CALCULATION. SEE REMOVAL PLANS FOR MORE INFORMATION.

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IH 35W
FROM CR 604/ CR 707 TO US 67

QUANTITY SUMMARY

EARTHWORK SUMMARY

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		15

DATE: 5/23/2022 10:38:51 AM
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subash.paude1

SUMMARY OF DRAINAGE ITEMS													
LOCATION	400 6005	402 6001	432 6002	432 6009	432 6033	464 6005	464 6008	464 6018	465 6416	465 6418	465 6424	465 6439	465 6465
	CEM STABIL BKFL	TRENCH EXCAVATION PROTECTION	RIPRAP (CONC) (5 IN)	RIPRAP (CONC) (CL B) (4")	RIPRAP (STONE PROTECTION) (18 IN)	RC PIPE (CL III) (24 IN)	RC PIPE (CL III) (36 IN)	RC PIPE (CL IV) (24 IN)	INLET (COMPL) (CO) (10 FT) (FTW)	INLET (COMPL) (CO) (20 FT) (FTW)	INLET (COMPL) (CU) (10 FT) (FTW)	INLET (COMPL) (FG) (3FT X 3FT) (FTW)	INLET (COMPL) (AD) (3FT X 3FT) (FTW)
	CY	LF	CY	CY	CY	LF	LF	LF	EA	EA	EA	EA	EA
IH 35W													
SHEET 1 OF 6													
SHEET 2 OF 6	20	77	3				27	152					1
SHEET 3 OF 6		351	2			345					2		
SHEET 4 OF 6	56	760				959		127	2		2		
SHEET 5 OF 6	20	606	1			1165		58	5	1		1	1
SHEET 6 OF 6	1	326	1	4		362			1			1	1
			689		89								
PROJECT TOTAL:	98	2120	696	4	89	2831	27	337	8	1	4	2	3

SUMMARY OF DRAINAGE ITEMS								
LOCATION	465 6490	466 6005	467 6388	467 6390	467 6394	467 6395	467 6454	480 6001
	MANH (COMPL) (TY SD) (3FT X 3FT) (FTW)	HEADWALL (CH - FW - 0) (DIA= 24 IN)	SET (TY II) (24 IN) (RCP) (3: 1) (C)	SET (TY II) (24 IN) (RCP) (4: 1) (C)	SET (TY II) (24 IN) (RCP) (6: 1) (C)	SET (TY II) (24 IN) (RCP) (6: 1) (P)	SET (TY II) (36 IN) (RCP) (6: 1) (P)	CLEAN EXIST CULVERTS
	EA	EA	EA	EA	EA	EA	EA	EA
IH 35W								
SHEET 1 OF 6								
SHEET 2 OF 6			1				1	
SHEET 3 OF 6					1			
SHEET 4 OF 6						4		
SHEET 5 OF 6		1		1				
SHEET 6 OF 6	1							
								2
PROJECT TOTAL:	1	1	1	1	1	4	1	2

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IH 35W
FROM CR 604/ CR 707 TO US 67

QUANTITY SUMMARY

DRAINAGE SUMMARY

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		16

SUMMARY OF SIGN , DELINEATOR AND OBJECT MARKER													
LOCATION	416 6016 DRILL SHAFT (SIGN MTS) (12 IN)	416 6018 DRILL SHAFT (SIGN MTS) (24 IN)	416 6022 DRILL SHAFT (SIGN MTS) (48 IN)	416 6023 DRILL SHAFT (SIGN MTS) (54 IN)	636 6001 ALUMINUM SIGNS (TY A)	636 6002 ALUMINUM SIGNS (TY G)	636 6003 ALUMINUM SIGNS (TY O)	644 6001 IN SM RD SN SUP&AM TY10BWG(1)SA(P)	644 6004 IN SM RD SN SUP&AM TY10BWG(1)SA(T)	644 6030 IN SM RD SN SUP&AM TYS80(1)SA(T)	647 6001 INSTALL LRSS (STRUCT STEEL)	650 6032 INS OH SN SUP(30 FT CANT)	650 6045 INS OH SN SUP(40 FT CANT)
	LF	LF	LF	LF	SF	SF	SF	EA	EA	EA	LB	EA	EA
IH 35W													
BEGIN TO STA 533+00					2.25			5	7	2			
STA 533+00 TO STA 545+00								1	1				
STA 545+00 TO STA 557+00								1	4				
STA 557+00 TO STA 569+00								3	4				
STA 569+00 TO STA 581+00	7		24			45	201.75	6	6		310.7	1	
STA 581+00 TO STA 593+00								1	1	1			
STA 593+00 TO END		18				173.25					568.5		
RAMP J				26			350.5						1
PROJECT TOTAL:	7	18	24	26	2.25	218.25	552.25	17	23	3	879.2	1	1

SUMMARY OF SIGN , DELINEATOR AND OBJECT MARKER							
LOCATION	658 6015 INSTL DEL ASSM (D-SW)SZ (BRF)GF1	658 6028 INSTL DEL ASSM (D-SY)SZ (BRF)GF1	658 6067 INSTL DEL ASSM (D-DW)SZ 1(BRF)GF2	658 6080 INSTL DEL ASSM (D-SW)SZ 1(WFLX)GND	658 6081 INSTL DEL ASSM (D-SW)SZ 1(WFLX)GND(BI)	658 6092 INSTL DEL ASSM (D-DW)SZ 1(WFLX)GND	658 6099 INSTL OM ASSM (OM-2Z)(WFLX)GND
	EA	EA	EA	EA	EA	EA	EA
IH 35W							
BEGIN TO STA 533+00			2			9	
STA 533+00 TO STA 545+00				6		5	3
STA 545+00 TO STA 557+00				4			2
STA 557+00 TO STA 569+00		4		6			4
STA 569+00 TO STA 581+00	1		3	8	14		4
STA 581+00 TO STA 593+00		3	2	2			1
STA 593+00 TO END				1			
RAMP J	3						
PROJECT TOTAL:	4	7	7	27	14	14	14

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IH 35W
FROM CR 604/ CR 707 TO US 67

QUANTITY SUMMARY

SIGN , DELINEATOR AND OBJECT MARKER SUMMARY

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		17

DATE: 5/23/2022 10:39:02 AM
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subash.paudel

SUMMARY OF PAVEMENT MARKING

LOCATION	533 6001	666 6006	666 6018	666 6036	666 6042	666 6048	666 6054	666 6075	666 6078	666 6162	666 6300	666 6303	666 6306	666 6309	666 6315	666 6321
	RUMBLE STRIPS (SHOULDER)	REFL PAV MRK TY I (W)4" (DOT) (100MIL)	REFL PAV MRK TY I (W)6" (DOT) (100MIL)	REFL PAV MRK TY I (W)8" (SLD) (100MIL)	REFL PAV MRK TY I (W)12" (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)(NUMBER) (100MIL)	REFL PAV MRK TY I (W)(WORD) (100MIL)	RE PV MRK TY I(BLACK)6" (SHADOW) (100MIL)	RE PM W/RET REQ TY I (W)4" (BRK) (100MIL)	RE PM W/RET REQ TY I (W)4" (SLD) (100MIL)	RE PM W/RET REQ TY I (W)6" (BRK) (100MIL)	RE PM W/RET REQ TY I (W)6" (SLD) (100MIL)	RE PM W/RET REQ TY I (Y)4" (SLD) (100MIL)	RE PM W/RET REQ TY I (Y)6" (SLD)(100MIL)
	LF	LF	LF	LF	LF	LF	EA	EA	EA	LF	LF	LF	LF	LF	LF	LF
IH 35W																
BEGIN TO STA 533+00			69		183	23				300			300	1185		1185
STA 533+00 TO STA 545+00	719			1186	117					300		373	300	1200	1511	1200
STA 545+00 TO STA 557+00	2420									300	70	311	300	1202	488	1199
STA 557+00 TO STA 569+00	3250	162				26				300	310	1107	300	1203	1235	1198
STA 569+00 TO STA 581+00	2097	27		847	110	87	1	1	1	300	310	3493	300	1201	3339	1198
STA 581+00 TO STA 593+00	170									300	50	180	300	1082	180	1200
STA 593+00 TO END										200			200			800
RAMP J																
PROJECT TOTAL:	8656	189	69	2033	410	136	1	1	1	2000	740	5464	2000	7073	6753	7980

SUMMARY OF PAVEMENT MARKING

LOCATION	666 6167	666 6168	666 6170	666 6171	666 6172	666 6174	666 6178	666 6180	666 6182	666 6184	666 6185	666 6191	666 6192	666 6207	666 6210
	REFL PAV MRK TY II (W) 4" (BRK)	REFL PAV MRK TY II (W) 4" (DOT)	REFL PAV MRK TY II (W) 4" (SLD)	REFL PAV MRK TY II (W) 6" (BRK)	REFL PAV MRK TY II (W) 6" (DOT)	REFL PAV MRK TY II (W) 6" (SLD)	REFL PAV MRK TY II (W) 8" (SLD)	REFL PAV MRK TY II (W) 12" (SLD)	REFL PAV MRK TY II (W) 24" (SLD)	REFL PAV MRK TY II (W) (ARROW)	REFL PAV MRK TY II (W) (DBL ARROW)	REFL PAV MRK TY II (W) (NUMBER)	REFL PAV MRK TY II (W) (WORD)	REFL PAV MRK TY II (Y) 4" (SLD)	REFL PAV MRK TY II (Y) 6" (SLD)
	LF	LF	LF	LF	LF	LF	LF	LF	LF	EA	EA	EA	EA	LF	LF
IH 35W															
BEGIN TO STA 533+00	190		1445	300	69	1185		183	23		2			1118	1185
STA 533+00 TO STA 545+00	300		1573	300		1200	1186	117						1574	1200
STA 545+00 TO STA 557+00	300		1221	300		1202								1217	1199
STA 557+00 TO STA 569+00	310	162	1107	300		1203			26					1235	1198
STA 569+00 TO STA 581+00	310	27	4771	300		1201	847	110	87	1		1	1	4617	1198
STA 581+00 TO STA 593+00	50		180	300		1082								180	1200
STA 593+00 TO END				200											800
RAMP J															
PROJECT TOTAL:	1460	189	10297	2000	69	7073	2033	410	136	1	2	1	1	9941	7980

SUMMARY OF PAVEMENT MARKING

LOCATION	666 6219	672 6009	672 6010	678 6001	678 6002	678 6004	678 6006	678 6008	678 6009	678 6010	678 6015	678 6016
	REFL PAV MRK TY II (BLACK) 6"(SHADOW)	REFL PAV MRKR TY II-A-A	REFL PAV MRKR TY II-C-R	PAV SURF PREP FOR MRK (4")	PAV SURF PREP FOR MRK (6")	PAV SURF PREP FOR MRK (8")	PAV SURF PREP FOR MRK (12")	PAV SURF PREP FOR MRK (24")	PAV SURF PREP FOR MRK (ARROW)	PAV SURF PREP FOR MRK (DBL ARROW)	PAV SURF PREP FOR MRK (NUMBER)	PAV SURF PREP FOR MRK (WORD)
	LF	EA	EA	LF	LF	LF	LF	LF	EA	EA	EA	EA
IH 35W												
BEGIN TO STA 533+00	300		41	2753	2739		183	23		2		
STA 533+00 TO STA 545+00	300		81	3447	2700	1186	117					
STA 545+00 TO STA 557+00	300		30	2738	2701							
STA 557+00 TO STA 569+00	300		44	2814	2701			26				
STA 569+00 TO STA 581+00	300	33	76	9725	2699	847	110	87	1		1	1
STA 581+00 TO STA 593+00	300		18	410	2582							
STA 593+00 TO END	200		10		1000							
RAMP J												
PROJECT TOTAL:	2000	33	300	21887	17122	2033	410	136	1	2	1	1

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IH 35W
FROM CR 604/ CR 707 TO US 67

QUANTITY SUMMARY

PAVEMENT MARKING SUMMARY

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		18

DATE: 5/23/2022 10:39:07 AM
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SUMMARY OF SW3P													
LOCATION	161 6017	164 6007	164 6041	164 6043	168 6001	506 6002	506 6011	506 6021	506 6024	506 6038	506 6039	506 6042	506 6043
	COMPOST MANUF TOPSOIL (4")	BROADCAST SEED (PERM) (URBAN) (CLAY)	DRILL SEEDING (TEMP) (WARM)	DRILL SEEDING (TEMP) (COOL)	VEGETATIVE WATERING	ROCK FILTER DAMS (INSTALL) (TY 2)	ROCK FILTER DAMS (REMOVE)	CONSTRUCTION EXITS (INSTALL) (TY 2)	CONSTRUCTION EXITS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (18")	BIODEG EROSN CONT LOGS (REMOVE)
	SY	SY	SY	SY	MG	LF	LF	SY	SY	LF	LF	LF	LF
IH 35W													
PHASE 1 SHEET 1 OF 5												50	50
PHASE 1 SHEET 2 OF 5	4699	4699	2350	2350	165	25	25	78	78	581	581	95	95
PHASE 1 SHEET 3 OF 5	4954	4954	2477	2477	174					1166	1166	120	120
PHASE 1 SHEET 4 OF 5	6292	6292	3146	3146	221			78	78	2338	2338	115	115
PHASE 1 SHEET 5 OF 5										291	291	50	50
PHASE 2 SHEET 1 OF 6	8935	8935	4468	4468	313	25	25						
PHASE 2 SHEET 2 OF 6	5590	5590	2795	2795	196							40	40
PHASE 2 SHEET 3 OF 6	11732	11732	5866	5866	411			78	78			60	60
PHASE 2 SHEET 4 OF 6	31004	31004	15502	15502	1087								
PHASE 2 SHEET 5 OF 6	27409	27409	13705	13705	961	25	25	78	78			70	70
PHASE 2 SHEET 6 OF 6	4076	4076	2038	2038	143	25	25					65	65
PROJECT TOTAL:	104691	104691	52346	52346	3671	100	100	312	312	4376	4376	665	665

CONTRACTOR SHALL USE FORCE ACCOUNT FOR EROSION CONTROL MAINTENANCE.

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QUANTITY SUMMARY

SW3P
SUMMARY

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		19

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	R5-1a	WRONG WAY	42X30	✓		10BWG	1	SA	T		
1	1A	R3-2	NO LEFT TURN	36X36	✓		10BWG	1	SA	P		
1	1B	R6-1L	ONE WAY	54X18	✓		10BWG	1	SA	T		
1	1C	R6-1R	ONE WAY	54X18	✓		10BWG	1	SA	T		
1	1D	R3-1	NO RIGHT TURN	36X36	✓		10BWG	1	SA	P		
1	1E	R5-1	DO NOT ENTER	36X36	✓		10BWG	1	SA	P		
1	1F	R5-1	DO NOT ENTER	36X36	✓		10BWG	1	SA	P		
1	2	R5-1a	WRONG WAY	42X30	✓		10BWG	1	SA	T		
1	3	R6-1R	ONE WAY	54X18	✓		10BWG	1	SA	T		
1	4	R6-1R	ONE WAY	54X18	✓		10BWG	1	SA	T		
1	5	R2-1	SPEED LIMIT 70	48X60	✓		S80	1	SA	T		
1	6	R2-1	SPEED LIMIT 70	48X60	✓		S80	1	SA	T		
1	7	R6-1R	ONE WAY	54X18	✓		10BWG	1	SA	T		
1	8	R3-1	STOP	36X36	✓		10BWG	1	SA	P		
		R1-3P	ALL WAY	18X6	✓							
2	9	W4-1R	TRAFFIC MERGE RIGHT	48X48	✓		10BWG	1	SA	T		
2	10	M3-1B	NORTH	24X12	✓		10BWG	1	SA	P		
		M1-1T	INTERSTATE 35W	30X24	✓							
		M6-2BL	ARROW UP LEFT	21X15	✓							
3	11	M3-1B	NORTH	24X12	✓		10BWG	1	SA	P		
		M1-1T	INTERSTATE 35W	30X24	✓							
		M6-2BL	ARROW UP LEFT	21X15	✓							
3	12	R6-1R	ONE WAY	54X18	✓		10BWG	1	SA	T		
3	13	R6-1R	ONE WAY	54X18	✓		10BWG	1	SA	T		
3	14	R6-1R	ONE WAY	54X18	✓		10BWG	1	SA	T		
3	15	R6-1R	ONE WAY	54X18	✓		10BWG	1	SA	T		
4	16	D10-2	MILE MARKER	12X36	✓		10BWG	1	SA	P		
4	17	D3-1G	STREET NAME (O'BANION WAY)	60X12	✓		10BWG	1	SA	T		
		R1-1	STOP	36X36	✓							
4	18	R6-1R	ONE WAY	54X18	✓		10BWG	1	SA	T		
4	19	R6-1R	ONE WAY	54X18	✓		10BWG	1	SA	T		
4	20	R6-1R	ONE WAY	54X18	✓		10BWG	1	SA	T		
4	21	R2-1	SPEED LIMIT XX	30X36	✓		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"

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).

STATE OF TEXAS
MARIA XIMENA MEDERO
107551
LICENSED
PROFESSIONAL ENGINEER
5/23/2022

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

SHEET 1 OF 2

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT 0014	SECT 03	JOB 087	HIGHWAY IH 35W
REVISIONS 4-16 8-16	DIST FTW	COUNTY JOHNSON		SHEET NO. 20

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
4	22	R2-1	SPEED LIMIT XX	30X36	✓		10BWG	1	SA	P		
5	23	R6-1R	ONE WAY	54X18	✓		10BWG	1	SA	P		
		R1-1	STOP	36X36	✓							
5	24	W3-1	STOP AHEAD	30X30	✓		10BWG	1	SA	P		
5	25	R2-1	SPEED LIMIT XX	30X36	✓		10BWG	1	SA	P		
5	26	W9-2TR	LANE ENDS MERGE RIGHT	36X36	✓		10BWG	1	SA	T		
5	27	R6-1R	ONE WAY	54X18	✓		10BWG	1	SA	T		
5	28	R5-1	DO NOT ENTER (BACK TO BACK)	36X36	✓		10BWG	1	SA	T		
		R4-3bT	DO NOT CROSS DOUBLE WHITE LINE (BACK TO BACK)	36X36	✓							
5	29	R5-1	DO NOT ENTER (BACK TO BACK)	36X36	✓		10BWG	1	SA	T		
		R4-3bT	DO NOT CROSS DOUBLE WHITE LINE (BACK TO BACK)	36X36	✓							
5	30	R5-1a	WRONG WAY	42X30	✓		10BWG	1	SA	T		
5	31	R5-1a	WRONG WAY (BACK TO BACK)	42X30	✓		10BWG	1	SA	T		
		W4-1L	TRAFFIC MERGE LEFT (BACK TO BACK)	48X48	✓							
5	32	M3-3G	SOUTH	24X12	✓		10BWG	1	SA	P		
		M1-2G	BUSINESS LOOP 35	24X24	✓							
		M6-1G	ARROW RIGHT	21X15	✓							
5	33	R2-1	SPEED LIMIT XX	30X36	✓		10BWG	1	SA	P		
5	34	R7-1L	NO PARKING ANY TIME (ARROW LEFT)	12X18	✓		10BWG	1	SA	P		
6	35	R2-1	SPEED LIMIT XX	30X36	✓		10BWG	1	SA	P		
6	36	W13-2	ADVISORY EXIT RAMP SPEED XX	48X60	✓		S80	1	SA	T		
6	37	W12-2	BRIDGE CLEARANCE	48X48	✓		10BWG	1	SA	T		

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).

STATE OF TEXAS
MARIA XIMENA MEDERO
107551
LICENSED
PROFESSIONAL ENGINEER
5/23/2022

Texas Department of Transportation
Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

SHEET 2 OF 2

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT 0014	SECT 03	JOB 087	HIGHWAY IH 35W
REVISIONS 4-16 8-16	DIST FTW		COUNTY JOHNSON	SHEET NO. 21

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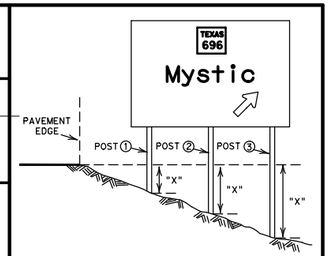
SUMMARY OF LARGE SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN BACK-GROUND COLOR	SIGN TEXT	SIGN DIMENSIONS	PLAQUES, & OTHER ATTACHMENTS		BACKGROUND SUBSTRATE (SQ FT)		TYPE OF MOUNT	"X" DIMENSION ◒			GALVANIZED STRUCTURAL STEEL					DRILLED SHAFT			
					DIRECT APPLY	✕ ALUMINUM (TYPE A)	GROUND MOUNT (TYPE G)	OVERHEAD (TYPE O)		post ①	post ②	post ③	SIZE	LINEAR FEET post ①	post ②	post ③	TOTAL WEIGHT LBS.	NON-REINF 12"ϕ	LINEAR FEET REINFORCED 24"ϕ	48"ϕ	54"ϕ
5	1	GREEN	EXIT 26 B ↗	6.0′X 7.5′			45.00		321	0.7	0.7		S4X7.7	15.6	15.6		310.7	7.0			
5	2	GREEN	EXIT 26 B COUNTY RD 707 COUNTY RD 604 ↗	8.5′ X 2.5′ 19.0′ x 9.5′				21.25 180.5	COSS	30′ SPAN(TxDOT STANDARD: COSS-Z3 & Z3I-10)										24.0	
7	3	GREEN	EXIT 26 B COUNTY RD 707 COUNTY RD 604 1/4 MILE	8.5′ X 2.5′ 19.0′ x 8.0′			21.25 152.0		331	0.5	-0.9	-2.7	W6X9	18.9	17.5	15.7	568.5		18.0		
8	4	GREEN	EXIT 26 B COUNTY RD 707 COUNTY RD 604 1/2 MILE	8.5′ X 2.5′ 19.0′ x 8.0′				21.25 152.0													
			EXIT 26 A US 67 CLEBURNE DALLAS ↗	8.5′ X 2.5′ 12.0′ x 13.0′	9.00			21.25 156.00	COSS	40′ SPAN(TxDOT STANDARD: COSS-Z4 & Z4I-10)											26.0
			PAGE TOTALS				218.25	552.25									879.2	7.0	18.0	24.0	26.0



◒ The "X" dimension is the elevation difference at the post between the ground and the edge of pavement or top of curb.

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.

The post lengths listed here are approximations, The corrected post lengths will be furnished by the Contractor after the stud posts are placed.

Tower heights shall be verified with the Engineer before fabrication.

✕ This column is for aluminum Type A and not direct apply. Direct apply is subsidiary to the sign.

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5/23/2022

SIGN TYPE

SIGN TYPE 1 3 0
- 1 — Wind Design Zone
- 3 — No. of Posts
- 0 — Series No.: 0 Aluminum/Fiberglass, 1 Aluminum, 2 Fiberglass

See sheet SMD(8W1)

SUMMARY OF LARGE SIGNS

SHEET 1 OF 1 — SOLS

DN.: TxDOT	REVISIONS		
CK.: TxDOT	11-93	1-04	
DW.: TxDOT	8-95	9-08	
CK.: TxDOT	5-01		

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		22

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SEQUENCE OF CONSTRUCTION

ABBREVIATIONS:
NBML - NORTHBOUND MAINLANE
NBFR - NORTHBOUND FRONTAGE ROAD
SBML -SOUTHBOUND MAINLANE

INSTALL SIGNS, BARRICADES AND WORK ZONE MARKINGS.

PHASE 1 STAGE 1

TRAFFIC:

1. INSTALL ADVANCE WARNING SIGNS ON IH 35W NBML,SBML AND NBFR.
2. SET UP TCP SIGNING AND BARRICADES ALONG NBFR AND NBML.
3. INSTALL PCTB WITH ATTENUATORS AS SHOWN AT ALL LOCATIONS.
4. MAINTAIN IH 35W TRAFFIC AT EXISTING LOCATIONS.

CONSTRUCTION:

1. CONSTRUCT TEMPORARY PAVEMENT AND TEMPORARY SHORING AS SHOWN.

PHASE 1 STAGE 2

TRAFFIC:

1. SET UP TCP SIGNING AND BARRICADES ALONG NBFR AND NBML.
2. SET UP APPROPRIATE SIGNS TO LIMIT NBFR TO ONE WAY CONFIGURATION BETWEEN CR 604/CR 707 AND BUS 35W. CLOSE SB BUS 35W AS SHOWN ON PLAN.
3. INSTALL PCTB WITH ATTENUATORS AS SHOWN AT ALL LOCATIONS.
4. CLOSE EXISTING NB ENTRANCE RAMP AT NBML STA 556+00.00.
5. SHIFT NBML AND NBFR TRAFFIC TO TEMPORARY PAVEMENT CONSTRUCTED IN PREVIOUS PHASE.

CONSTRUCTION:

1. CONSTRUCT PART OF NBML, NBFR AND BUS 35W AS SHOWN ON PLAN.

PHASE 1 STAGE 3

TRAFFIC:

1. SET UP TCP SIGNING AND BARRICADES ALONG NBFR AND NBML.
2. INSTALL PCTB WITH ATTENUATORS AS SHOWN AT ALL LOCATIONS.
3. MAINTAIN TRAFFIC AS SHOWN ON PERVIOUS STAGE EXCEPT CLOSING INSIDE NBML LANE AS SHOWN.

CONSTRUCTION:

1. CONSTRUCT PART OF NBML AND TEMPORARY PAVEMENT AS SHOWN.

PHASE 2 STAGE 1

TRAFFIC:

1. SET UP TCP SIGNING AND BARRICADES ALONG NBFR AND NBML.
2. INSTALL PCTB WITH ATTENUATORS AS SHOWN AT ALL LOCATIONS.
3. SHIFT NBML TRAFFIC TOWARDS THE MEDIAN ALONG THE PERMANENT AND TEMPORARY PAVEMENT CONSTRUCTED ON PREVIOUS PHASE.
4. AT US 67 AND EXISTING NB ENTRANCE RAMP INTERSECTION, SHIFT THE NBFR. TRAFFIC TOWARDS THE ROW ALONG TEMPORARY PAVEMENT CONSTRUCTED IN PREVIOUS PHASE.
5. ALL TRAFFIC ENTERING IH 35W NB TO USE THE NB ENTRANCE RAMP JUST NORTH OF CR 604.

CONSTRUCTION:

1. CONSTRUCT REMAINING NBML PAVEMENT AND NB EXIT RAMP H PAVEMENT AS SHOWN ON PLAN.
2. CONSTRUCT REMAINING PORTION OF BUS 35W.

PHASE 2 STAGE 2

TRAFFIC:

1. SET UP TCP SIGNING AND BARRICADES ALONG NBFR AND NBML.
2. INSTALL PCTB WITH ATTENUATORS AS SHOWN AT ALL LOCATIONS.
3. SHIFT NBFR TRAFFIC TO THE INSIDE LANE.
4. CLOSE EXISTING NB ENTRANCE RAMP, DETOUR TRAFFIC TO USE THE NB ENTRANCE RAMP JUST NORTH OF CR 604.

CONSTRUCTION:

1. CONSTRUCT REMAINING PORTION OF NBFR AND DRIVEWAYS AS SHOWN ON PLAN.
2. CONSTRUCT RAMP C, NBML WIDENING, NBFR WIDENING.

PHASE 3 STAGE 1

1. INSTALL PERMANENT PAVEMENT MARKINGS AND MARKERS.
2. REMOVE TEMPORARY PAVEMENT MARKINGS AND MARKERS.
3. INSTALL FINAL SIGNS AND RUMBLE STRIPS.
4. ENSURE THAT ALL TRAFFIC HAS BEEN SHIFTED TO THE FINAL LANE POSITIONS ON THE IH 35W MAINLANES AND NORTHBOUND FRONTAGE ROAD.
5. PERFORM FINAL CLEANUP AS DIRECTED BY THE ENGINEER.

GENERAL NOTES

1. THE TRAFFIC CONTROL PLAN SHOWN HEREIN IS A SUGGESTED METHOD FOR ACCOMPLISHING THE WORK. THE CONTRACTOR MAY MODIFY OR DEVIATE FROM THE PLAN AS LONG AS A REVISED TCP, SIGNED AND SEALED BY A PROFESSIONAL ENGINEER, IS APPROVED BY THE ENGINEER.

2. IN GENERAL, WORK MAY PROGRESS IN EACH AREA INDEPENDENT OF THE OTHER AREAS AS LONG AS THE VARIOUS SAFETY AND SCHEDULE REQUIREMENTS ARE MET.

3. THE CONTRACTOR SHALL INSTALL ALL SIGNS, DELINEATORS, PAVEMENT MARKINGS, BARRICADES AND CHANNELIZING DEVICES PER THE CURRENT TEXAS MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD) AND/OR ITS APPLICABLE REVISIONS. THE CONTRACTOR SHALL MAINTAIN EXISTING ONE WAY, DO NOT ENTER, WRONG WAY AND STOP SIGNS UNTIL PERMANENT SIGNS HAVE BEEN INSTALLED. THE INSTALLATION OF ANY SPECIAL SIGNS SHALL BE COORDINATED THROUGH THE ENGINEER FOR CONFORMANCE AND APPROVAL.

4. THE CONTRACTOR SHALL INSTALL AND MAINTAIN ALL PAVEMENT MARKINGS, SIGNS, BARRICADES AND CHANNELIZING DEVICES IN EACH PHASE/STAGE AS SHOWN IN THE PLANS OR AS APPROVED BY THE ENGINEER.

5. IT IS THE CONTRACTOR'S RESPONSIBILITY TO MAINTAIN DRAINAGE DURING ALL PHASES OF CONSTRUCTION. TEMPORARY DRAINAGE STRUCTURES MAY BE INSTALLED AS SHOWN ON THE PLANS OR AS APPROVED BY THE ENGINEER.

6. PERMANENT SIGNS AND PAVEMENT MARKINGS SHALL BE INSTALLED AS APPROPRIATE PRIOR TO OPENING COMPLETED SECTIONS OF THE ROADWAY. IN ADDITION, CHANNELIZING DEVICES AND BARRICADES SHALL BE INSTALLED AND REMAIN IN PLACE TO CLOSE ROADWAYS NOT OPEN TO TRAFFIC AS SHOWN ON THE PLANS OR AS APPROVED BY THE ENGINEER.

7. WHERE PORTABLE CONCRETE TRAFFIC BARRIER IS CALLED OUT IN THE PLANS, THE ADJACENT ROADWAY SHALL NOT BE OPENED TO TRAFFIC PRIOR TO THE INSTALLATION OF AN APPROPRIATE ATTENUATOR.

8. UNLESS SHOWN OTHERWISE, DRAINAGE CONSTRUCTION SHALL BE CONCURRENT WITH ROADWAY CONSTRUCTION.

9. USE TXDOT STANDARD TCP (5-1)-18 FOR TRAFFIC CONTROL SET UP DURING THE PLACEMENT OF THE LARGE CANTILEVER OVERHEAD SIGN AT ℄ PNBML STATION 611+46.

10. THE CONTRACTOR SHALL MAINTAIN ACCESS TO ADJACENT PROPERTY AT ALL TIMES DURING CONSTRUCTION. DRUMS AND SIGNS SHALL BE PLACED IN SUCH A MANNER THAT THEY DO NOT BLOCK THE DRIVEWAY OPERATIONS.

11. IF, AT THE END OF EACH WORK DAY, REQUIRED EXCAVATION NEXT TO A PAVEMENT LANE HAS LEFT A DROP OFF PARALLEL AND ADJACENT TO A LANE USED BY TRAFFIC, THE CONTRACTOR WILL BE REQUIRED TO PLACE SUFFICIENT BACKFILL OF A TYPE ACCEPTABLE TO THE ENGINEER AGAINST THE EDGE OF PAVEMENT TO PROVIDE A USUAL 3:1 SLOPE SUFFICIENT TO ADEQUATELY SUPPORT VEHICULAR TRAFFIC. AT THE BEGINNING OF THE FOLLOWING WORK DAY THIS BACKFILL SHALL BE CAREFULLY REMOVED AND STOCKPILED BY THE CONTRACTOR AT LOCATIONS APPROVED BY THE ENGINEER FOR USE AT THE END OF THAT WORK DAY. THIS PROCESS SHALL CONTINUE UNTIL IT IS NO LONGER REQUIRED AT WHICH TIME THE BACKFILL SHALL BE REMOVED AND DISPOSED OF BY THE CONTRACTOR. MATERIALS AND LABOR FOR THIS WORK WILL NOT BE PAID FOR DIRECTLY BUT SHALL BE CONSIDERED SUBSIDIARY TO ITEM 502, "BARRICADES, SIGNS AND TRAFFIC HANDLING".

12. WHEN BARRIER IS TYPICALLY LESS THAN 2′ AWAY FROM TRAFFIC AND SPACE PERMITS, A TAPER SHALL BE USED TO MOVE THE CRASH CUSHION AWAY FROM TRAFFIC AND PROVIDE A TRANSITION INTO THE BARRIER SECTION. USE A 90-FT @ 45:1 TAPER + 30′ PARALLEL BARRIER BEFORE THE CRASH CUSHION.

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TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

TRAFFIC CONTROL NARRATIVE

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		23

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℄ TDNBFRP1S1 (TEMPORARY DETOUR AT NBFR)

Beginning chain TDNBFRP1S1 description

				Curve Data			
Curve	TDNBFRP1S1-1						
P.I.	Station		11+03.31	N	6,838,432.6993	E	2,361,475.0202
Delta	=	3° 05′ 26.02"	(RT)				
Degree	=	1° 29′ 45.90"					
Tangent	=	103.3134					
Length	=	206.5768					
Radius	=	3,829.7186					
External	=	1.3933					
Long Chord	=	206.5518					
Mid. Ord.	=	1.3928					
P.C.	Station		10+00.00	N	6,838,532.9089	E	2,361,449.8863
P.T.	Station		12+06.58	N	6,838,331.2805	E	2,361,494.7148
C.C.				N	6,837,601.2221	E	2,357,735.2255
Back	= S	14° 04′ 48.36" E					
Ahead	= S	10° 59′ 22.34" E					
Chord Bear	= S	12° 32′ 05.35" E					

Course from PT TDNBFRP1S11 to TDNBFRPS1101 S 10° 59′ 22.34" E Dist 771.5338

Point TDNBFRPS1101 N 6,837,573.8951 E 2,361,641.7921 Sta 19+78.11

Ending chain TDNBFRP1S1 description

℄ TSHOREP1S1 (TEMPORARY SHORING AT NBML)

Beginning chain TSHOREP1S1 description

Point PS11100 N 6,841,008.3522 E 2,359,681.7435 Sta 10+00.00

Course from PS11100 to PS11101 S 45° 52′ 50.25" E Dist 195.0379

Point PS11101 N 6,840,872.5755 E 2,359,821.7594 Sta 11+95.04

Course from PS11101 to PS11102 S 44° 01′ 12.80" E Dist 105.0649

Point PS11102 N 6,840,797.0238 E 2,359,894.7703 Sta 13+00.10

Ending chain TSHOREP1S1 description

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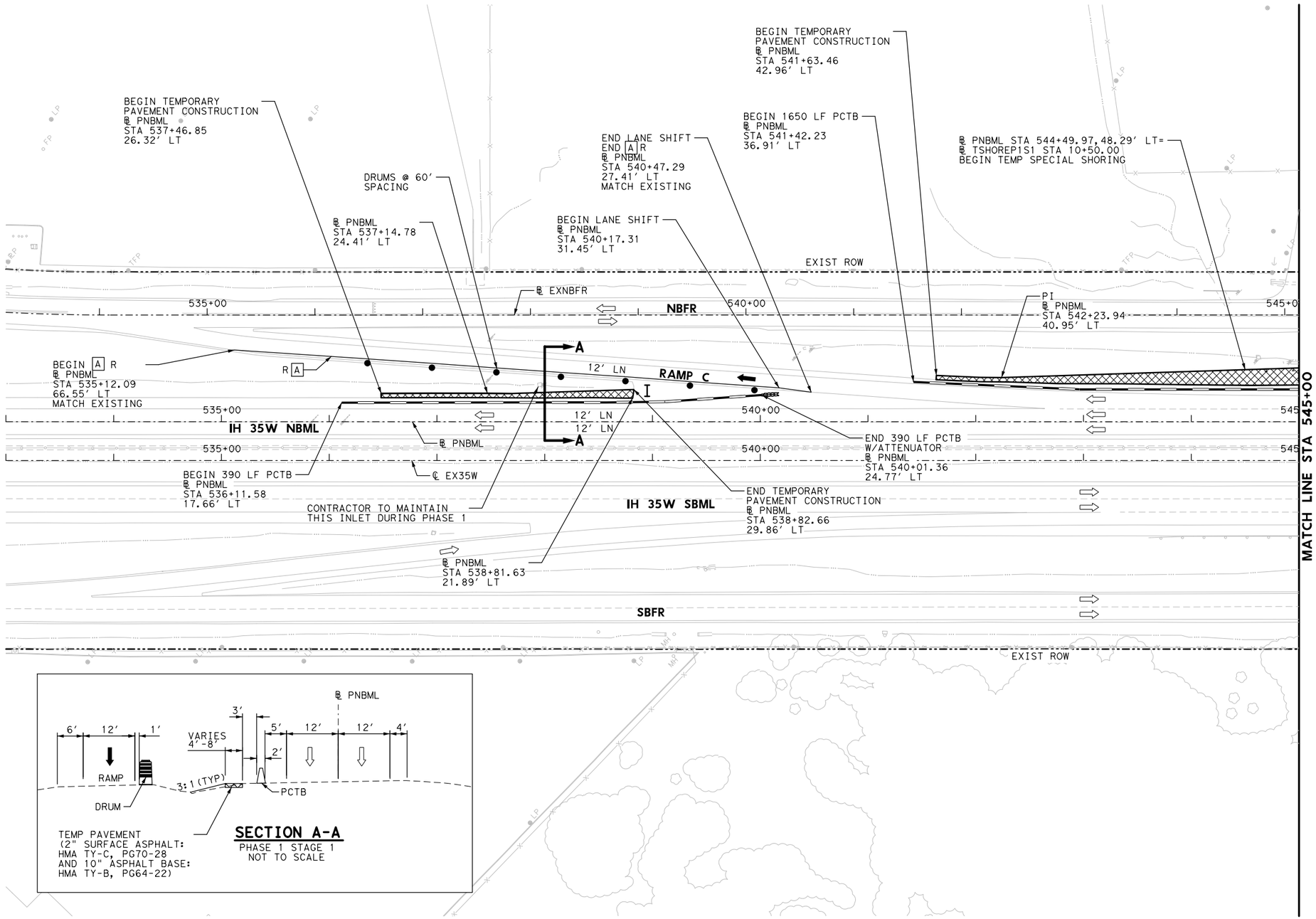
IH 35W
FROM CR 604/ CR 707 TO US 67

TCP HORIZONTAL ALIGNMENT DATA

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		24



0′ 50′ 100′
SCALE IN FEET

LEGEND

- PERMANENT CONSTRUCTION IN THIS PHASE
- TEMPORARY PAVEMENT
- TEMPORARY PAVEMENT PREVIOUS PHASE(S)
- PERM PAVEMENT CONSTRUCTED IN PREVIOUS PHASE(S)
- PROPOSED TRAFFIC FLOW
- EXISTING TRAFFIC FLOW
- CHANNELIZING DRUMS
- TYPE III BARRICADE
- PORTABLE CONCRETE TRAFFIC BARRIER (PCTB)
- CRASH ATTENUATOR
- TEMPORARY SPECIAL SHORING
- PORTABLE CHANGEABLE MESSAGE SIGN
- TRAILER MOUNTED FLASHING WITH ARROW BOARD
- [A] WRK ZN PAV MRK (Y) (4") (SLD)
- [B] WRK ZN PAV MRK (W) (4") (SLD)
- [C] WRK ZN PAV MRK (W) (4") (BRK)
- [D] WRK ZN PAV MRK (W) (24") (SLD)
- [E] WRK ZN PAV MRK (W) (8") (SLD)

R - REMOVABLE
NR - NON REMOVABLE

NOTES:

1. SEE PROJECT LAYOUT FOR ADVANCE WARNING SIGN PLACEMENT.
2. SEE SIGNING AND PAVEMENT MARKING SHEETS FOR PERMANENT MARKINGS AND SIGNS.

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IH 35W
FROM CR 604/ CR 707 TO US 67

TRAFFIC CONTROL PLAN

PHASE 1 STAGE 1
STA 533+00 TO STA 545+00

SHEET 1 OF 5

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		25

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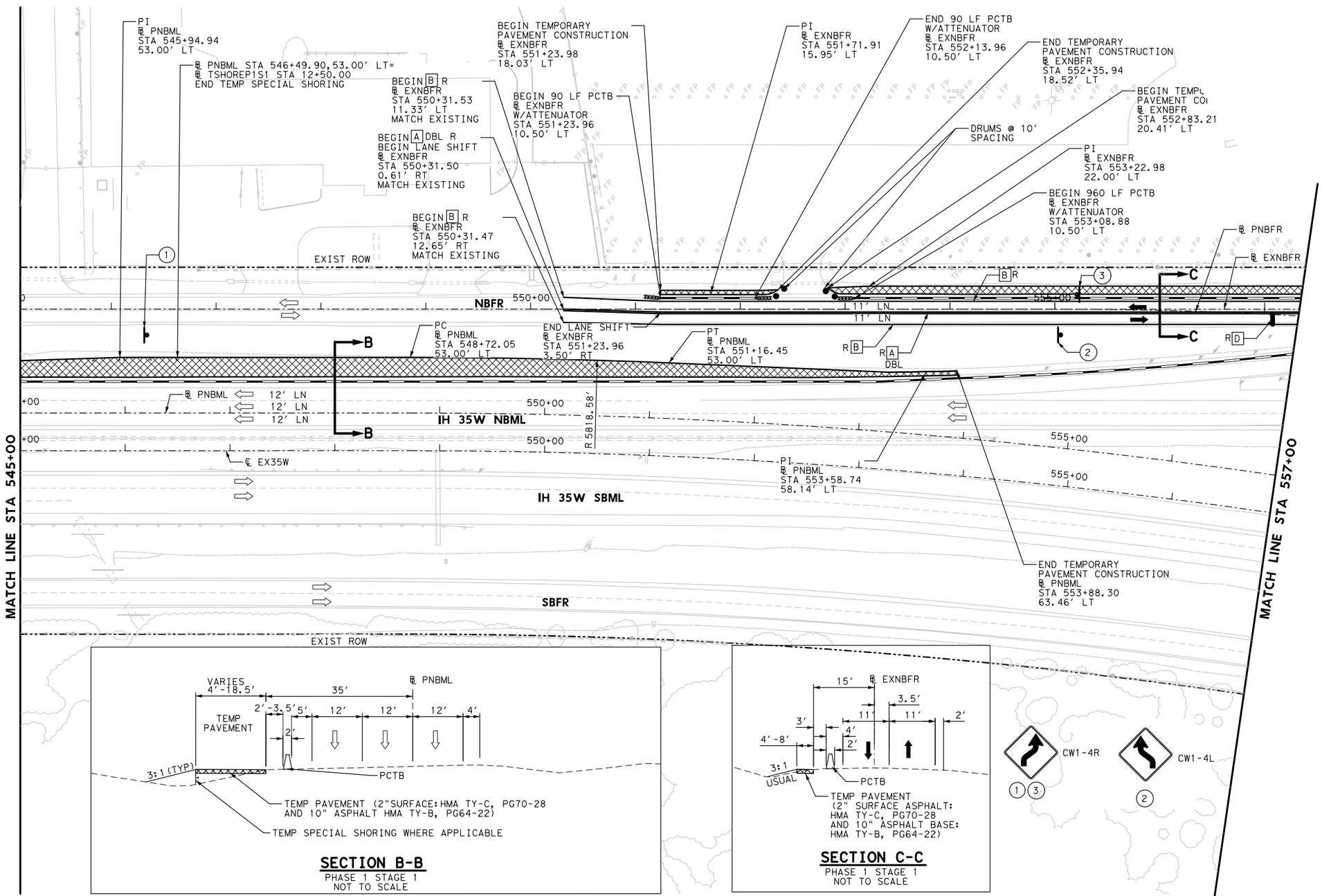

NOTES:

1. SEE PROJECT LAYOUT FOR ADVANCE WARNING SIGN PLACEMENT.
2. SEE SIGNING AND PAVEMENT MARKING SHEETS FOR PERMANENT MARKINGS AND SIGNS.

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TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

TRAFFIC CONTROL PLAN

PHASE 1 STAGE 1
STA 545+00 TO STA 557+00
SHEET 2 OF 5

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		26

DATE: 5/23/2022 10:39:48 AM
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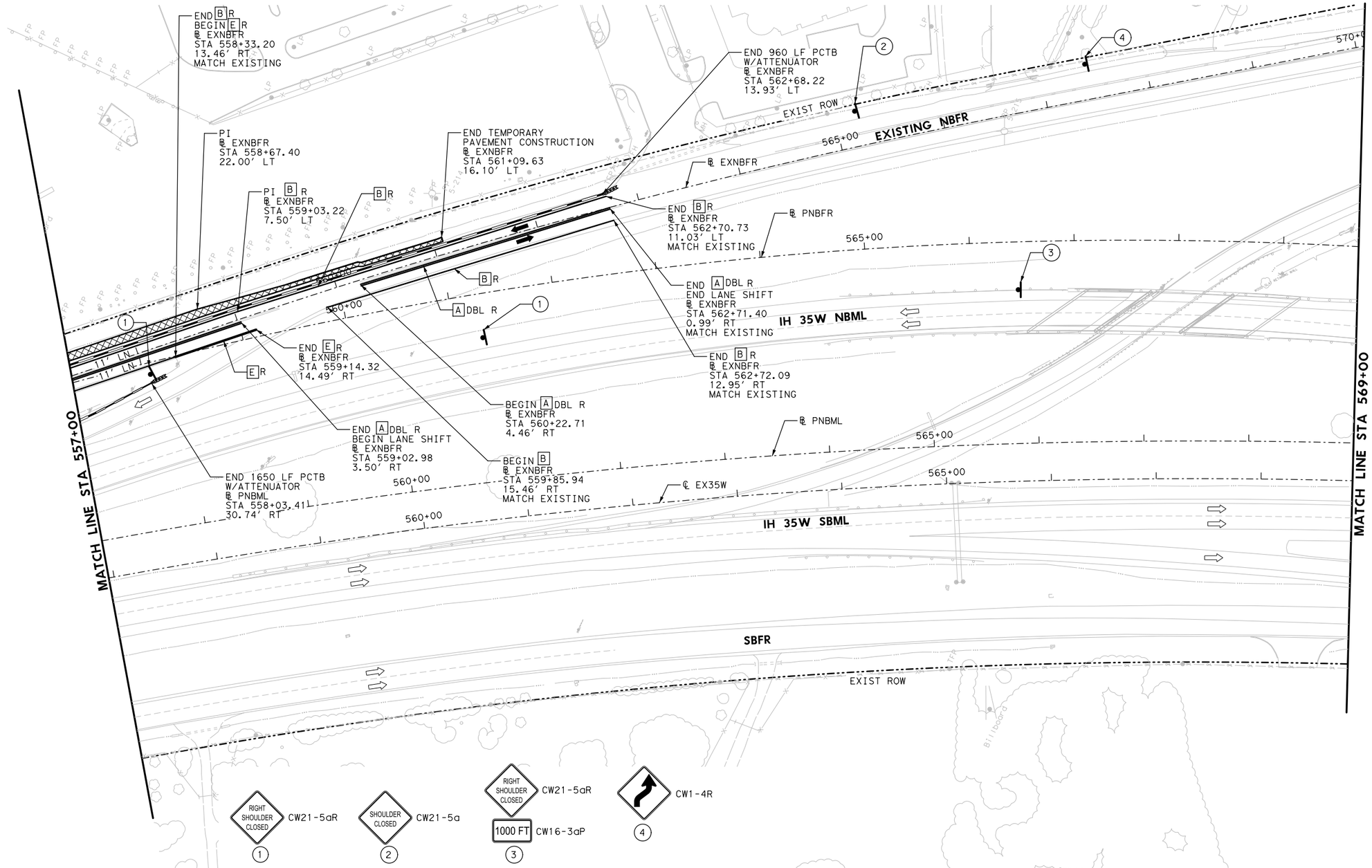

0' 50' 100'
SCALE IN FEET

LEGEND

- PERMANENT CONSTRUCTION IN THIS PHASE
- TEMPORARY PAVEMENT
- TEMPORARY PAVEMENT PREVIOUS PHASE(S)
- PERM PAVEMENT CONSTRUCTED IN PREVIOUS PHASE(S)
- PROPOSED TRAFFIC FLOW
- EXISTING TRAFFIC FLOW
- CHANNELIZING DRUMS
- TYPE III BARRICADE
- PORTABLE CONCRETE TRAFFIC BARRIER (PCTB)
- CRASH ATTENUATOR
- TEMPORARY SPECIAL SHORING
- PORTABLE CHANGEABLE MESSAGE SIGN
- TRAILER MOUNTED FLASHING WITH ARROW BOARD
- [A] WRK ZN PAV MRK (Y) (4") (SLD)
- [B] WRK ZN PAV MRK (W) (4") (SLD)
- [C] WRK ZN PAV MRK (W) (4") (BRK)
- [D] WRK ZN PAV MRK (W) (24") (SLD)
- [E] WRK ZN PAV MRK (W) (8") (SLD)

R - REMOVABLE
NR - NON REMOVABLE

NOTES:

1. SEE PROJECT LAYOUT FOR ADVANCE WARNING SIGN PLACEMENT.
2. SEE SIGNING AND PAVEMENT MARKING SHEETS FOR PERMANENT MARKINGS AND SIGNS.

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IH 35W
FROM CR 604/ CR 707 TO US 67

TRAFFIC CONTROL PLAN

PHASE 1 STAGE 1
STA 557+00 TO STA 569+00
SHEET 3 OF 5

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		27

DATE: 5/23/2022 10:39:54 AM
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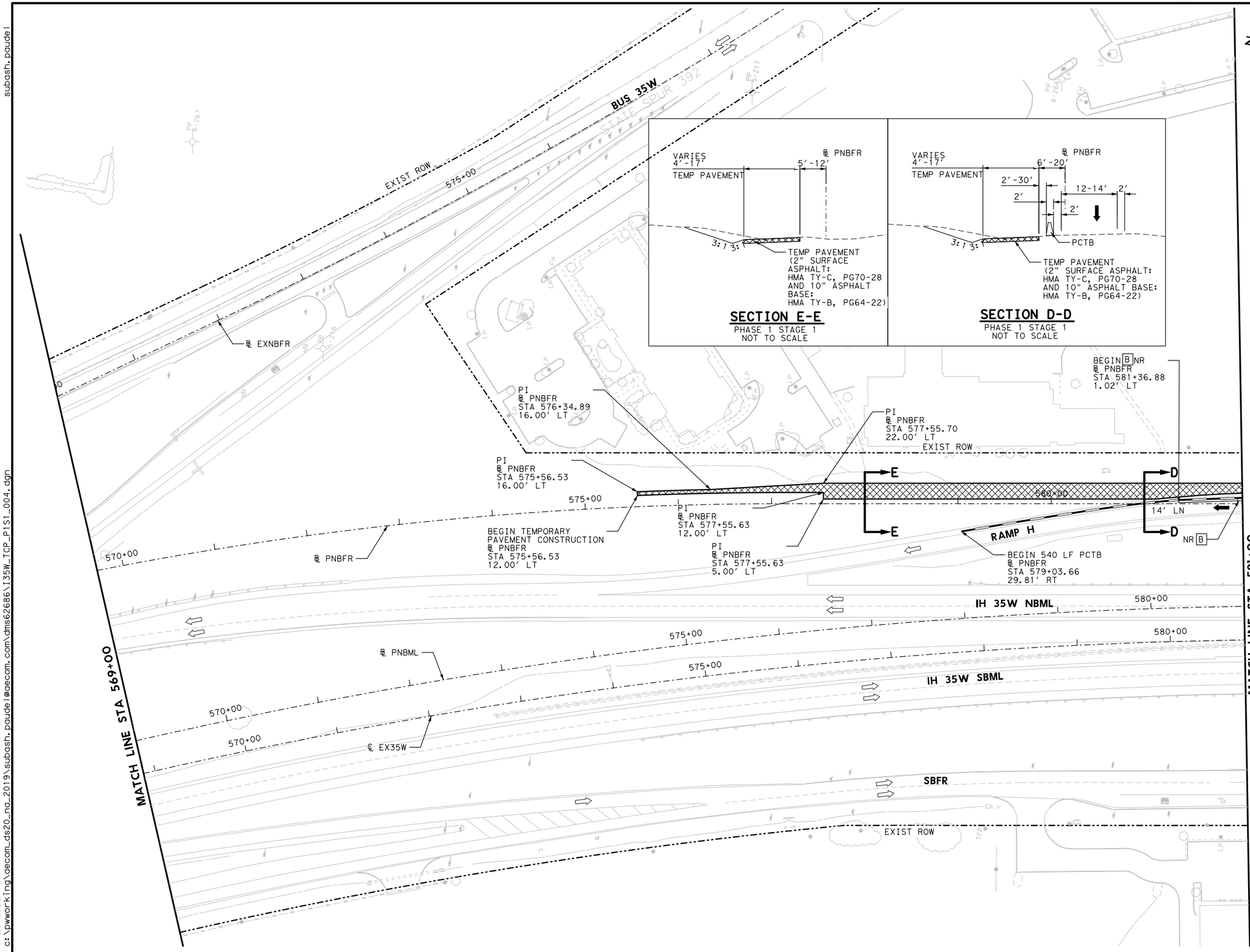

0′ 50′ 100′
SCALE IN FEET

N

LEGEND

- PERMANENT CONSTRUCTION IN THIS PHASE
- TEMPORARY PAVEMENT
- TEMPORARY PAVEMENT PREVIOUS PHASE(S)
- PERM PAVEMENT CONSTRUCTED IN PREVIOUS PHASE(S)
- PROPOSED TRAFFIC FLOW
- EXISTING TRAFFIC FLOW
- CHANNELIZING DRUMS
- TYPE III BARRICADE
- PORTABLE CONCRETE TRAFFIC BARRIER (PCTB)
- CRASH ATTENUATOR
- TEMPORARY SPECIAL SHORING
- PORTABLE CHANGEABLE MESSAGE SIGN
- TRAILER MOUNTED FLASHING WITH ARROW BOARD
- A WRK ZN PAV MRK(Y)(4")(SLD)
- B WRK ZN PAV MRK (W)(4")(SLD)
- C WRK ZN PAV MRK (W)(4")(BRK)
- D WRK ZN PAV MRK (W)(24")(SLD)
- E WRK ZN PAV MRK (W)(8")(SLD)

R - REMOVABLE
NR - NON REMOVABLE

NOTES:

1. SEE PROJECT LAYOUT FOR ADVANCE WARNING SIGN PLACEMENT.
2. SEE SIGNING AND PAVEMENT MARKING SHEETS FOR PERMANENT MARKINGS AND SIGNS.

STATE OF TEXAS
IRENE ALANIS
116808
LICENSED PROFESSIONAL ENGINEER
5/23/2022

AECOM
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

TRAFFIC CONTROL PLAN

PHASE 1 STAGE 1
STA 569+00 TO STA 581+00

SHEET 4 OF 5

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		28

DATE: 5/23/2022 10:40:00 AM
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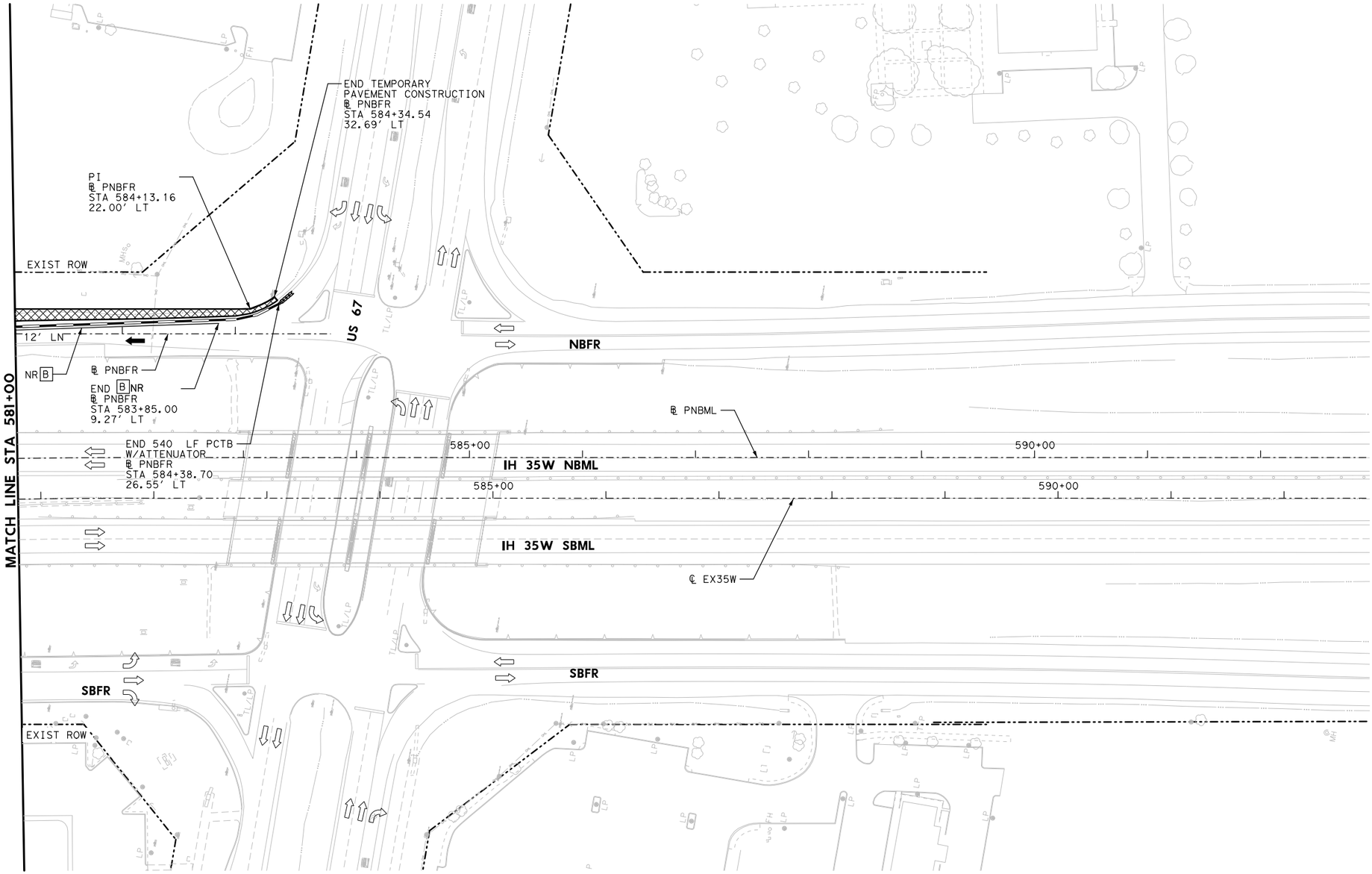

0' 50' 100'
SCALE IN FEET

N

LEGEND

- PERMANENT CONSTRUCTION IN THIS PHASE
- TEMPORARY PAVEMENT
- TEMPORARY PAVEMENT PREVIOUS PHASE(S)
- PERM PAVEMENT CONSTRUCTED IN PREVIOUS PHASE(S)
- PROPOSED TRAFFIC FLOW
- EXISTING TRAFFIC FLOW
- CHANNELIZING DRUMS
- TYPE III BARRICADE
- PORTABLE CONCRETE TRAFFIC BARRIER (PCTB)
- CRASH ATTENUATOR
- TEMPORARY SPECIAL SHORING
- PORTABLE CHANGEABLE MESSAGE SIGN
- TRAILER MOUNTED FLASHING WITH ARROW BOARD
- [A] WRK ZN PAV MRK (Y) (4") (SLD)
- [B] WRK ZN PAV MRK (W) (4") (SLD)
- [C] WRK ZN PAV MRK (W) (4") (BRK)
- [D] WRK ZN PAV MRK (W) (24") (SLD)
- [E] WRK ZN PAV MRK (W) (8") (SLD)

R - REMOVABLE
NR - NON REMOVABLE

NOTES:

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2. SEE SIGNING AND PAVEMENT MARKING SHEETS FOR PERMANENT MARKINGS AND SIGNS.

STATE OF TEXAS
IRENE ALANIS
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LICENSED
PROFESSIONAL ENGINEER
5/23/2022

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(214) 741-7777
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IH 35W
FROM CR 604/ CR 707 TO US 67

TRAFFIC CONTROL PLAN

PHASE 1 STAGE 1
STA 581+00 TO END PROJECT

SHEET 5 OF 5

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		29

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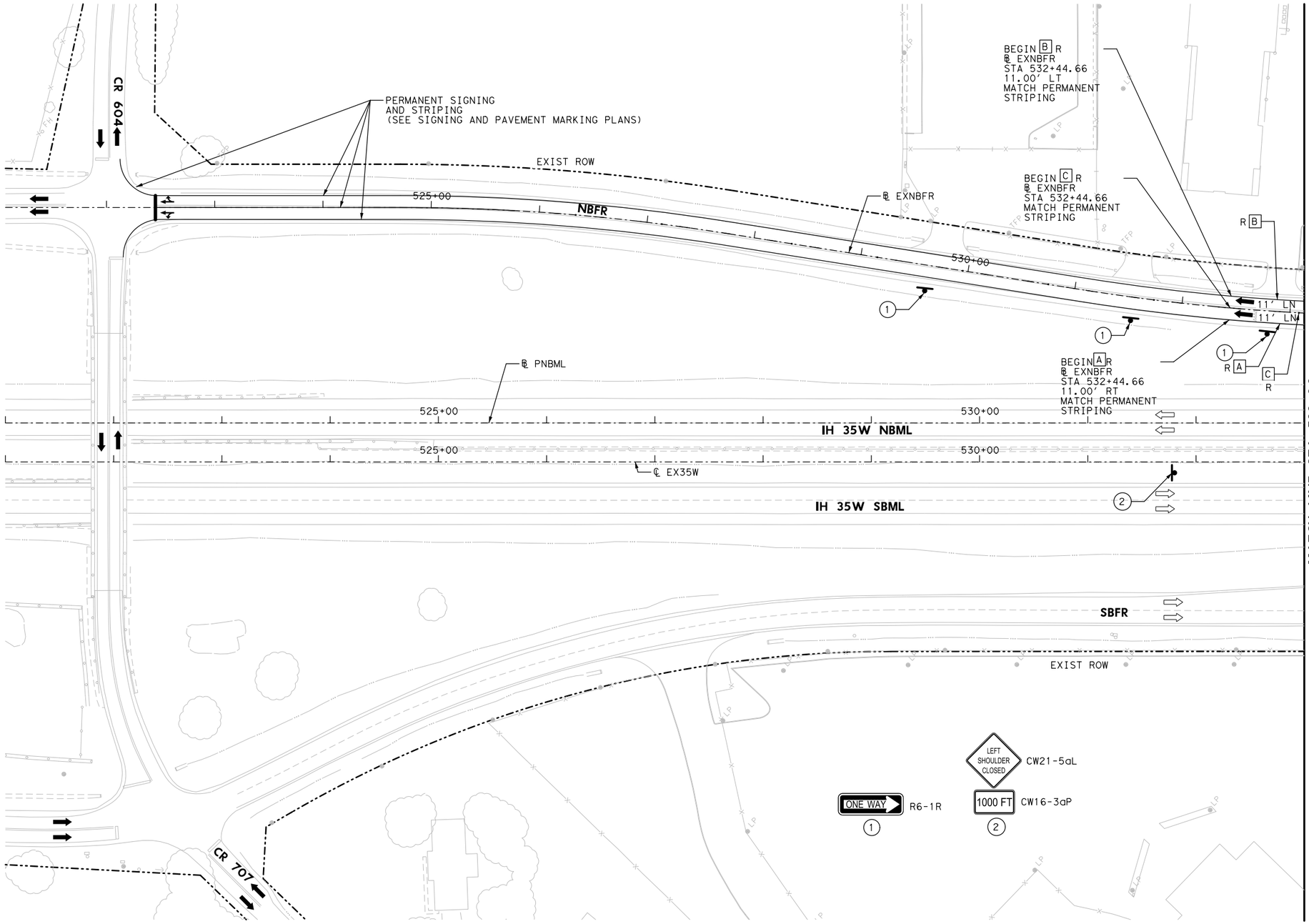

0' 50' 100'
SCALE IN FEET

LEGEND

- PERMANENT CONSTRUCTION IN THIS PHASE
- TEMPORARY PAVEMENT
- TEMPORARY PAVEMENT PREVIOUS PHASE(S)
- PERM PAVEMENT CONSTRUCTED IN PREVIOUS PHASE(S)
- PROPOSED TRAFFIC FLOW
- EXISTING TRAFFIC FLOW
- CHANNELIZING DRUMS
- TYPE III BARRICADE
- PORTABLE CONCRETE TRAFFIC BARRIER (PCTB)
- CRASH ATTENUATOR
- TEMPORARY SPECIAL SHORING
- PORTABLE CHANGEABLE MESSAGE SIGN
- TRAILER MOUNTED FLASHING WITH ARROW BOARD
- [A] WRK ZN PAV MRK(Y)(4")(SLD)
- [B] WRK ZN PAV MRK (W)(4")(SLD)
- [C] WRK ZN PAV MRK (W)(4")(BRK)
- [D] WRK ZN PAV MRK (W)(24")(SLD)
- [E] WRK ZN PAV MRK (W)(8")(SLD)

R - REMOVABLE
NR - NON REMOVABLE

NOTES:

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2. SEE SIGNING AND PAVEMENT MARKING SHEETS FOR PERMANENT MARKINGS AND SIGNS.

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Dallas, Texas 75240
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IH 35W
FROM CR 604/ CR 707 TO US 67

TRAFFIC CONTROL PLAN

PHASE 1 STAGE 2
BEGIN PROJECT TO STA 533+00
SHEET 1 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		30

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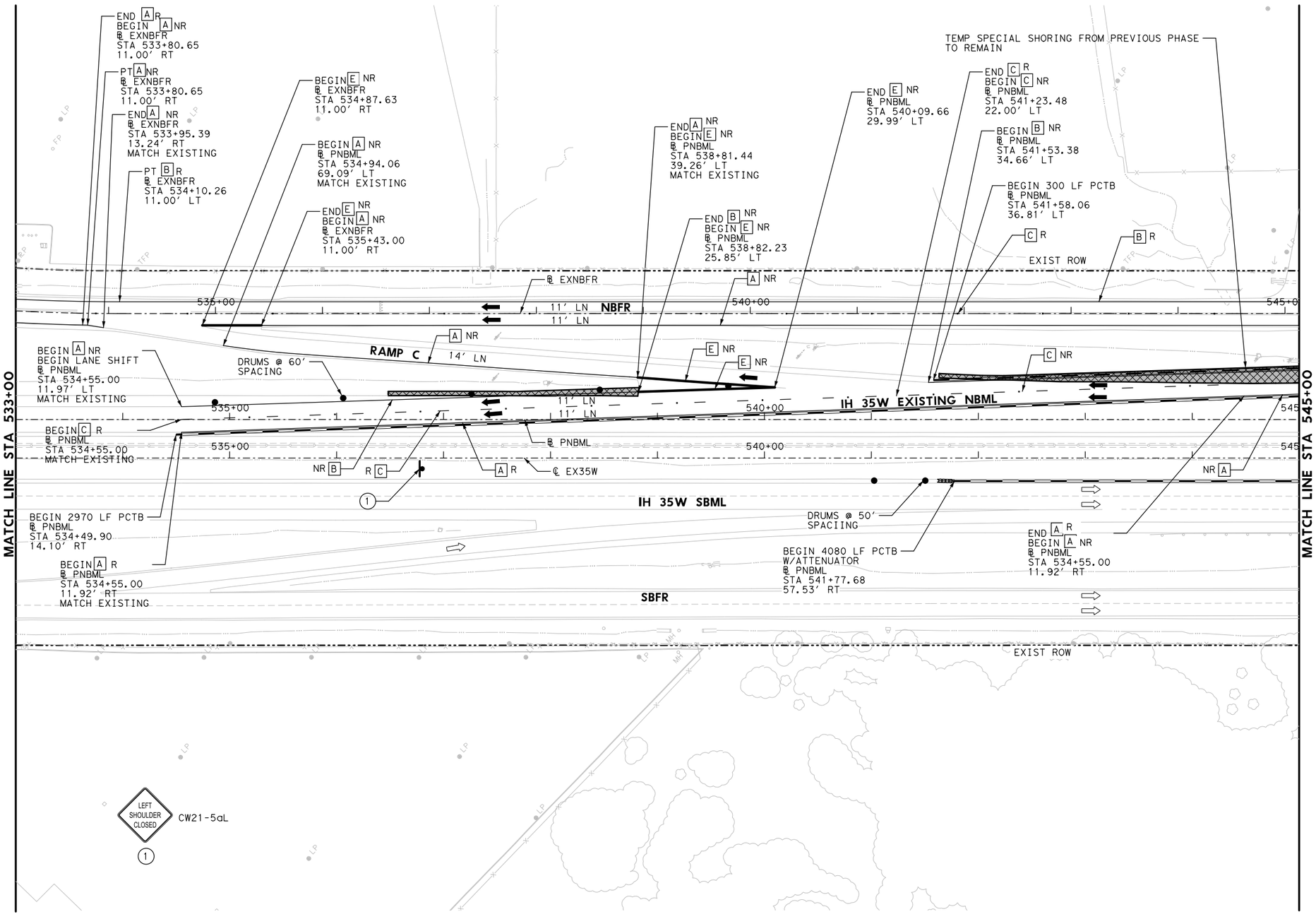

0' 50' 100'
SCALE IN FEET

LEGEND

- PERMANENT CONSTRUCTION IN THIS PHASE
- TEMPORARY PAVEMENT
- TEMPORARY PAVEMENT PREVIOUS PHASE(S)
- PERM PAVEMENT CONSTRUCTED IN PREVIOUS PHASE(S)
- PROPOSED TRAFFIC FLOW
- EXISTING TRAFFIC FLOW
- CHANNELIZING DRUMS
- TYPE III BARRICADE
- PORTABLE CONCRETE TRAFFIC BARRIER (PCTB)
- CRASH ATTENUATOR
- TEMPORARY SPECIAL SHORING
- PORTABLE CHANGEABLE MESSAGE SIGN
- TRAILER MOUNTED FLASHING WITH ARROW BOARD
- A WRK ZN PAV MRK (Y) (4") (SLD)
- B WRK ZN PAV MRK (W) (4") (SLD)
- C WRK ZN PAV MRK (W) (4") (BRK)
- D WRK ZN PAV MRK (W) (24") (SLD)
- E WRK ZN PAV MRK (W) (8") (SLD)

R - REMOVABLE
NR - NON REMOVABLE

NOTES:

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2. SEE SIGNING AND PAVEMENT MARKING SHEETS FOR PERMANENT MARKINGS AND SIGNS.

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IH 35W
FROM CR 604/ CR 707 TO US 67

TRAFFIC CONTROL PLAN

PHASE 1 STAGE 2
STA 533+00 TO STA 545+00

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		31

DATE: 5/23/2022 10:40:17 AM
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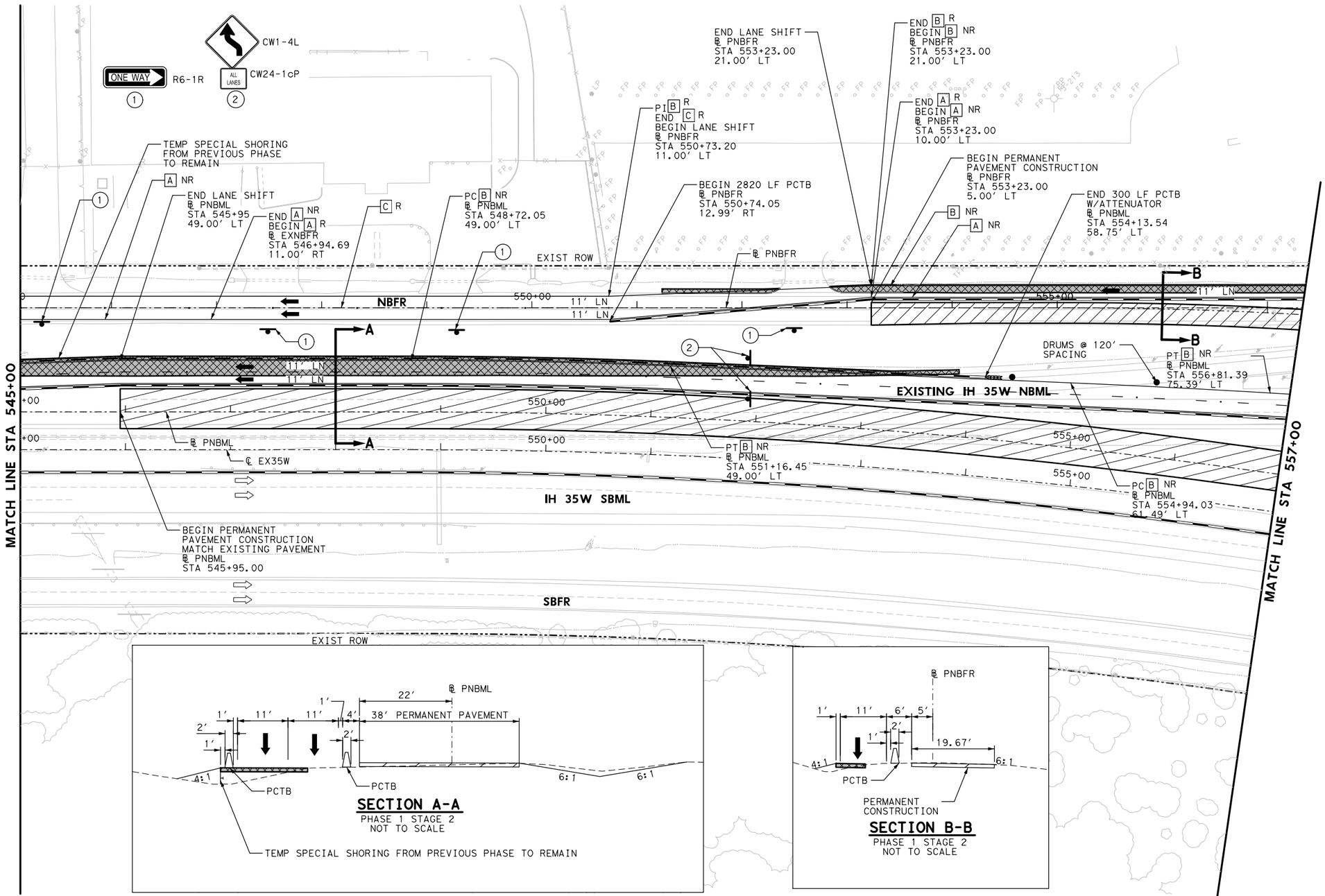

0' 50' 100'
SCALE IN FEET

LEGEND

- PERMANENT CONSTRUCTION IN THIS PHASE
- TEMPORARY PAVEMENT
- TEMPORARY PAVEMENT PREVIOUS PHASE(S)
- PERM PAVEMENT CONSTRUCTED IN PREVIOUS PHASE(S)
- PROPOSED TRAFFIC FLOW
- EXISTING TRAFFIC FLOW
- CHANNELIZING DRUMS
- TYPE III BARRICADE
- PORTABLE CONCRETE TRAFFIC BARRIER (PCTB)
- CRASH ATTENUATOR
- TEMPORARY SPECIAL SHORING
- PORTABLE CHANGEABLE MESSAGE SIGN
- TRAILER MOUNTED FLASHING WITH ARROW BOARD
- A WRK ZN PAV MRK (Y) (4") (SLD)
- B WRK ZN PAV MRK (W) (4") (SLD)
- C WRK ZN PAV MRK (W) (4") (BRK)
- D WRK ZN PAV MRK (W) (24") (SLD)
- E WRK ZN PAV MRK (W) (8") (SLD)

R - REMOVABLE
NR - NON REMOVABLE

NOTES:

1. SEE PROJECT LAYOUT FOR ADVANCE WARNING SIGN PLACEMENT.
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STATE OF TEXAS
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IH 35W
FROM CR 604/ CR 707 TO US 67

TRAFFIC CONTROL PLAN

PHASE 1 STAGE 2
STA 545+00 TO STA 557+00
SHEET 3 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		32

DATE: 5/23/2022 10:40:23 AM
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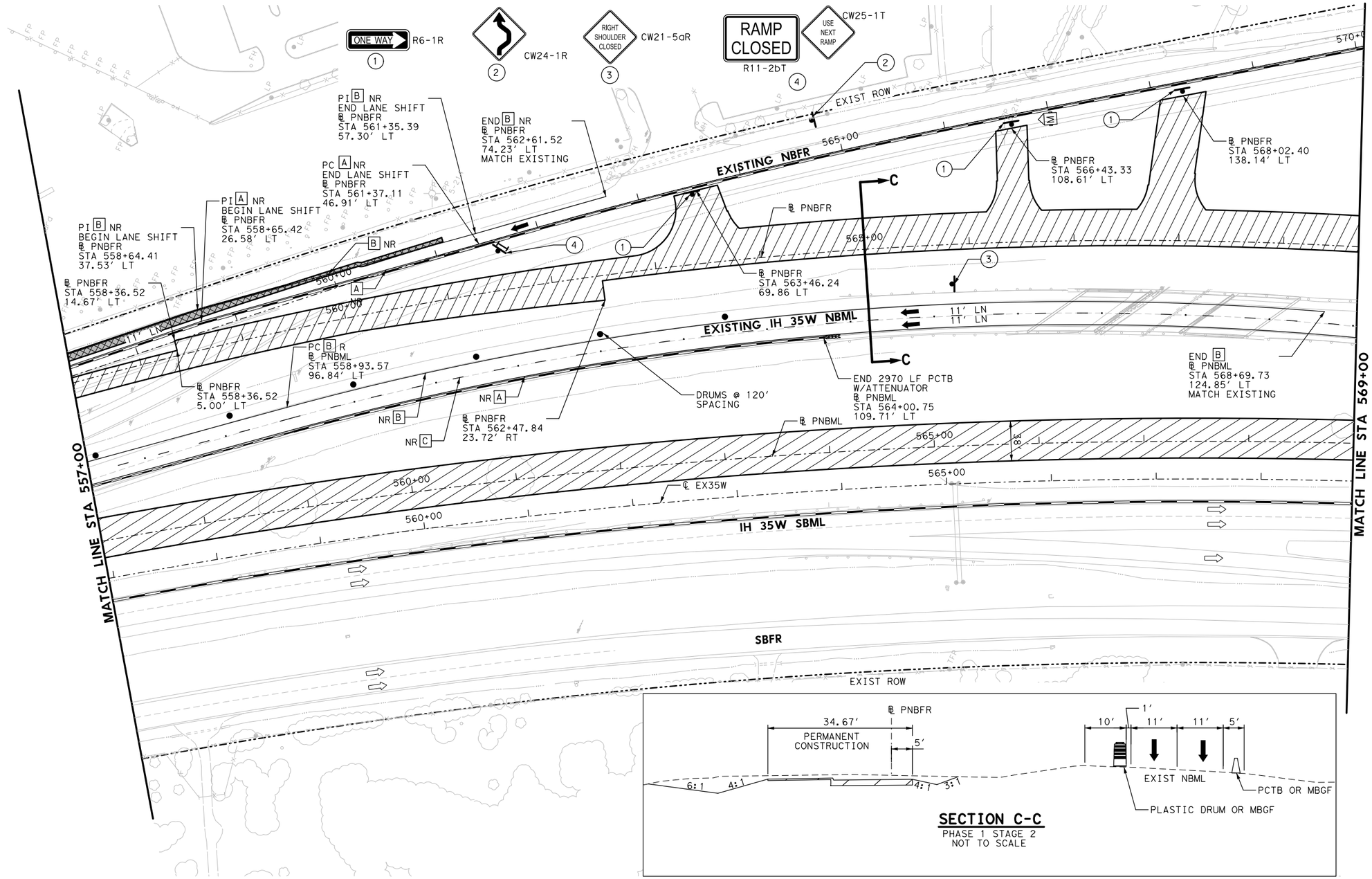

SECTION C-C
PHASE 1 STAGE 2
NOT TO SCALE

0' 50' 100'
SCALE IN FEET

N

LEGEND

- PERMANENT CONSTRUCTION IN THIS PHASE
- TEMPORARY PAVEMENT
- TEMPORARY PAVEMENT PREVIOUS PHASE(S)
- PERM PAVEMENT CONSTRUCTED IN PREVIOUS PHASE(S)
- PROPOSED TRAFFIC FLOW
- EXISTING TRAFFIC FLOW
- CHANNELIZING DRUMS
- TYPE III BARRICADE
- PORTABLE CONCRETE TRAFFIC BARRIER (PCTB)
- CRASH ATTENUATOR
- TEMPORARY SPECIAL SHORING
- PORTABLE CHANGEABLE MESSAGE SIGN
- TRAILER MOUNTED FLASHING WITH ARROW BOARD
- A WRK ZN PAV MRK (Y) (4") (SLD)
- B WRK ZN PAV MRK (W) (4") (SLD)
- C WRK ZN PAV MRK (W) (4") (BRK)
- D WRK ZN PAV MRK (W) (24") (SLD)
- E WRK ZN PAV MRK (W) (8") (SLD)

R - REMOVABLE
NR - NON REMOVABLE

NOTES:

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IH 35W
FROM CR 604/ CR 707 TO US 67

TRAFFIC CONTROL PLAN

PHASE 1 STAGE 2
STA 557+00 TO STA 569+00
SHEET 4 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		33

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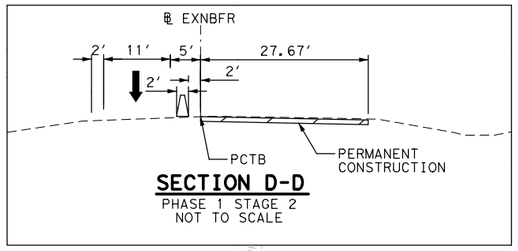
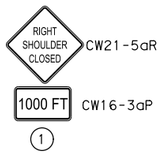
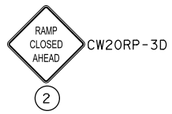
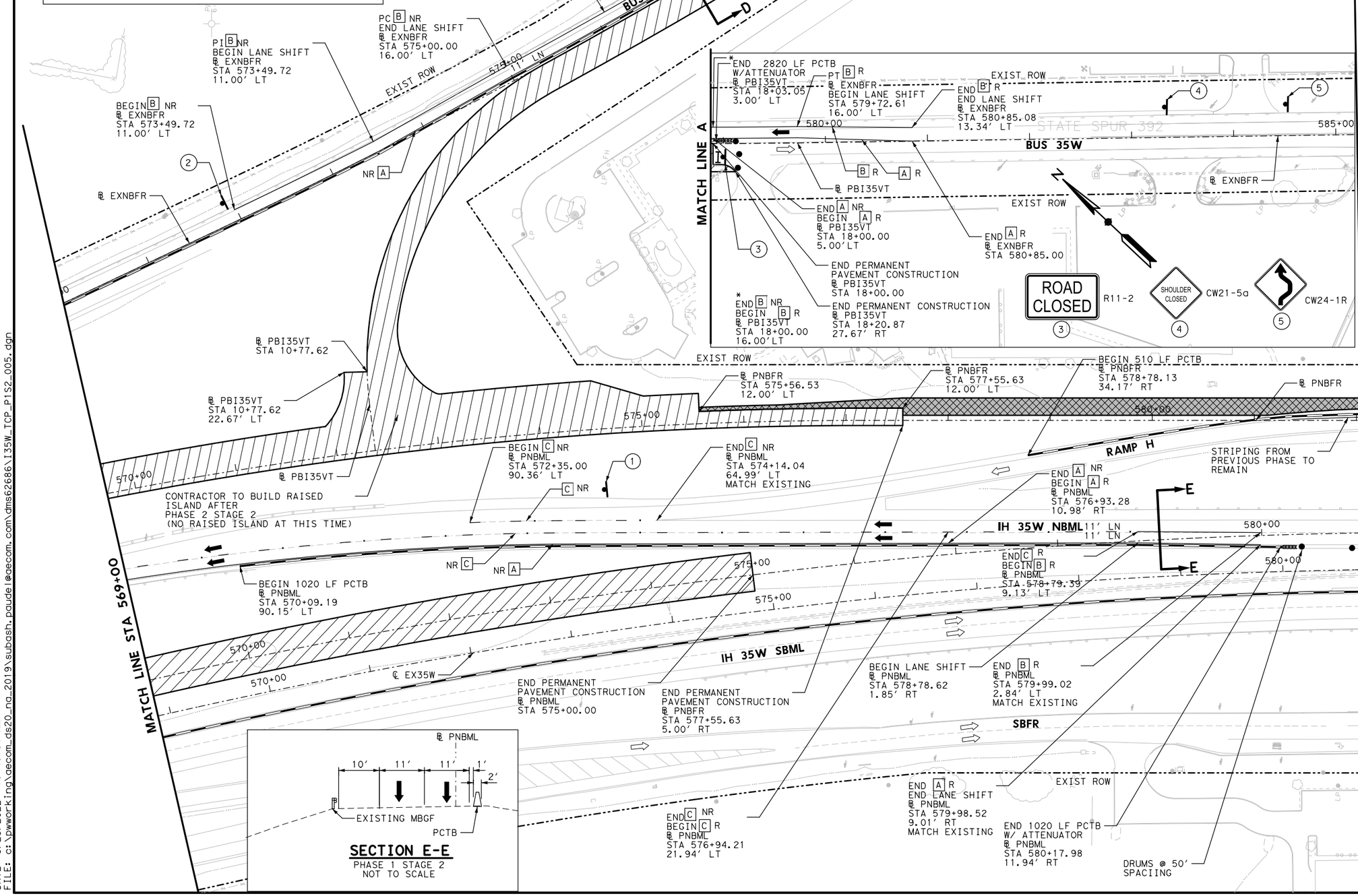


SECTION D-D
PHASE 1 STAGE 2
NOT TO SCALE







SECTION E-E
PHASE 1 STAGE 2
NOT TO SCALE

0′ 50′ 100′
SCALE IN FEET

N

LEGEND

- PERMANENT CONSTRUCTION IN THIS PHASE
- TEMPORARY PAVEMENT
- TEMPORARY PAVEMENT PREVIOUS PHASE(S)
- PERM PAVEMENT CONSTRUCTED IN PREVIOUS PHASE(S)
- PROPOSED TRAFFIC FLOW
- EXISTING TRAFFIC FLOW
- CHANNELIZING DRUMS
- TYPE III BARRICADE
- PORTABLE CONCRETE TRAFFIC BARRIER (PCTB)
- CRASH ATTENUATOR
- TEMPORARY SPECIAL SHORING
- PORTABLE CHANGEABLE MESSAGE SIGN
- TRAILER MOUNTED FLASHING WITH ARROW BOARD
- [A] WRK ZN PAV MRK(Y)(4")(SLD)
- [B] WRK ZN PAV MRK (W)(4")(SLD)
- [C] WRK ZN PAV MRK (W)(4")(BRK)
- [D] WRK ZN PAV MRK (W)(24")(SLD)
- [E] WRK ZN PAV MRK (W)(8")(SLD)

R - REMOVABLE
NR - NON REMOVABLE

NOTES:

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5/23/2022

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Dallas, Texas 75240
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TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

TRAFFIC CONTROL PLAN

PHASE 1 STAGE 2
STA 569+00 TO STA 581+00
SHEET 5 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		34

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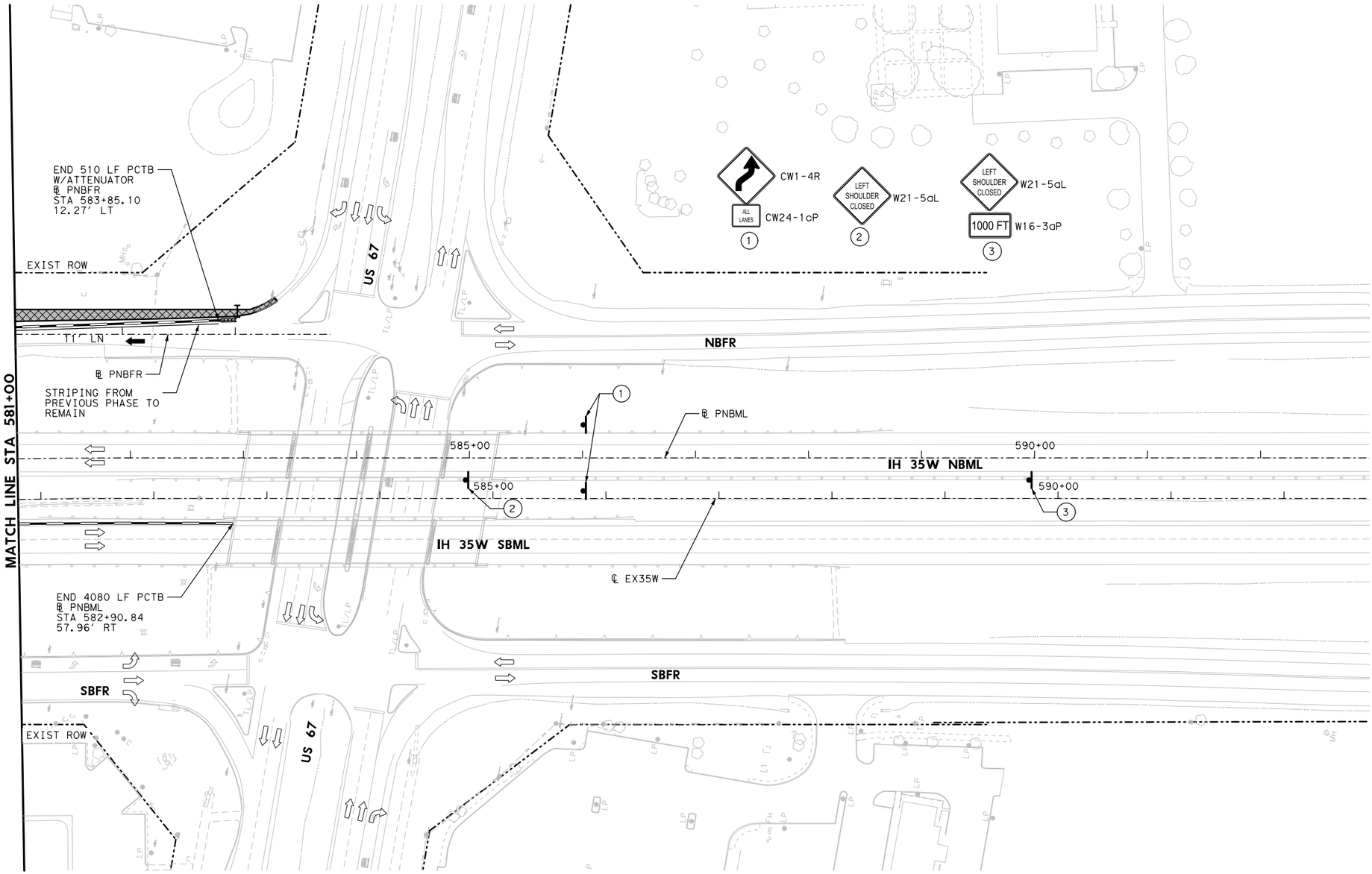

0' 50' 100'
SCALE IN FEET

N

LEGEND

- PERMANENT CONSTRUCTION IN THIS PHASE
- TEMPORARY PAVEMENT
- TEMPORARY PAVEMENT PREVIOUS PHASE(S)
- PERM PAVEMENT CONSTRUCTED IN PREVIOUS PHASE(S)
- PROPOSED TRAFFIC FLOW
- EXISTING TRAFFIC FLOW
- CHANNELIZING DRUMS
- TYPE III BARRICADE
- PORTABLE CONCRETE TRAFFIC BARRIER (PCTB)
- CRASH ATTENUATOR
- TEMPORARY SPECIAL SHORING
- PORTABLE CHANGEABLE MESSAGE SIGN
- TRAILER MOUNTED FLASHING WITH ARROW BOARD
- [A] WRK ZN PAV MRK(Y)(4")(SLD)
- [B] WRK ZN PAV MRK (W)(4")(SLD)
- [C] WRK ZN PAV MRK (W)(4")(BRK)
- [D] WRK ZN PAV MRK (W)(24")(SLD)
- [E] WRK ZN PAV MRK (W)(8")(SLD)

R - REMOVABLE
NR - NON REMOVABLE

NOTES:

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5/23/2022

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Suite 400
Dallas, Texas 75240
(214) 741-7777
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IH 35W
FROM CR 604/ CR 707 TO US 67

TRAFFIC CONTROL PLAN

PHASE 1 STAGE 2
STA 581+00 TO END PROJECT

SHEET 6 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		35

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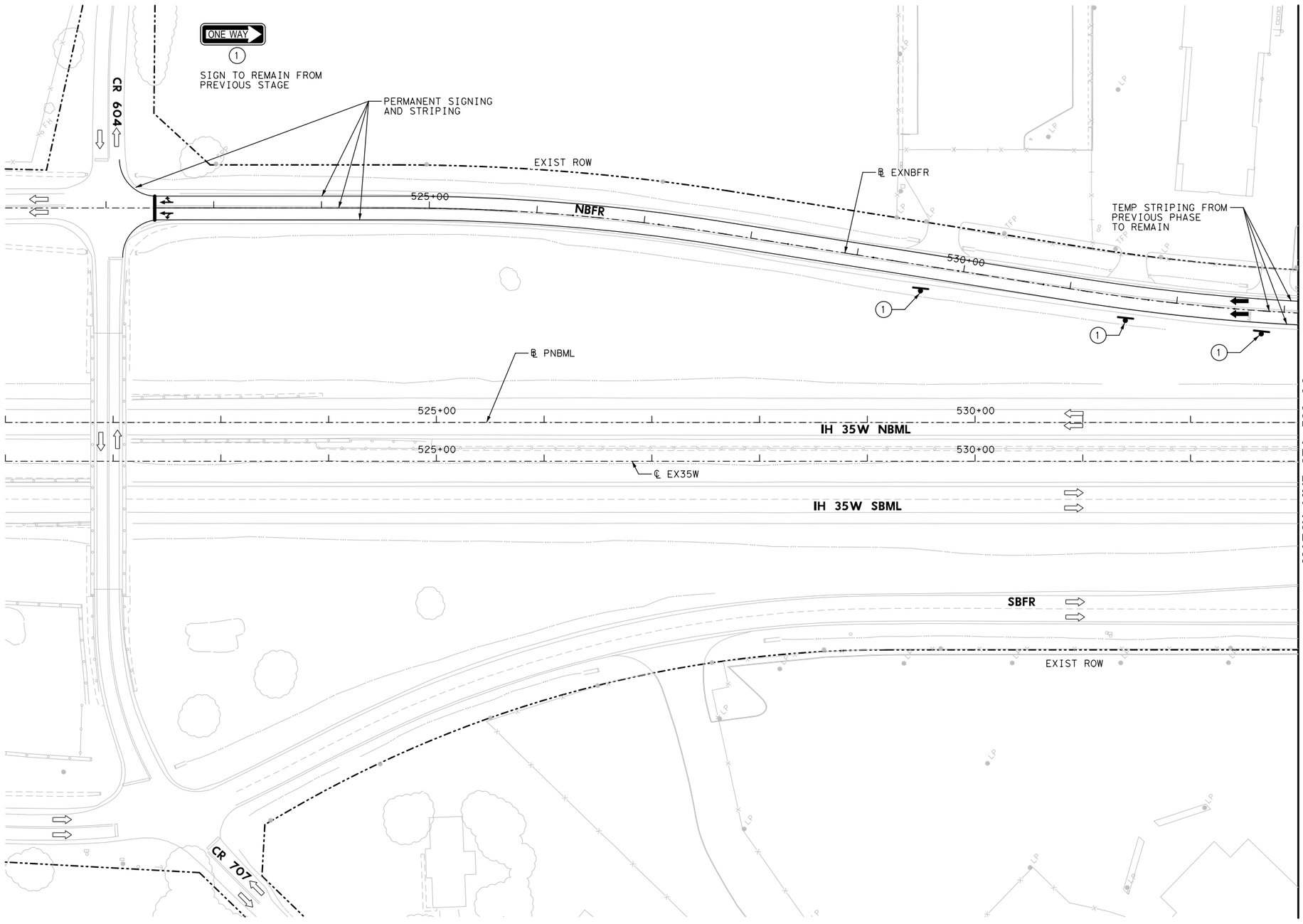

0′ 50′ 100′
SCALE IN FEET

LEGEND

- PERMANENT CONSTRUCTION IN THIS PHASE
- TEMPORARY PAVEMENT
- TEMPORARY PAVEMENT PREVIOUS PHASE(S)
- PERM PAVEMENT CONSTRUCTED IN PREVIOUS PHASE(S)
- PROPOSED TRAFFIC FLOW
- EXISTING TRAFFIC FLOW
- CHANNELIZING DRUMS
- TYPE III BARRICADE
- PORTABLE CONCRETE TRAFFIC BARRIER (PCTB)
- CRASH ATTENUATOR
- TEMPORARY SPECIAL SHORING
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- A WRK ZN PAV MRK(Y)(4")(SLD)
- B WRK ZN PAV MRK (W)(4")(SLD)
- C WRK ZN PAV MRK (W)(4")(BRK)
- D WRK ZN PAV MRK (W)(24")(SLD)
- E WRK ZN PAV MRK (W)(8")(SLD)

R - REMOVABLE
NR - NON REMOVABLE

NOTES:

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5/23/2022

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Suite 400
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TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

TRAFFIC CONTROL PLAN

PHASE 1 STAGE 3

BEGIN PROJECT TO STA 533+00

SHEET 1 OF 7

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		36

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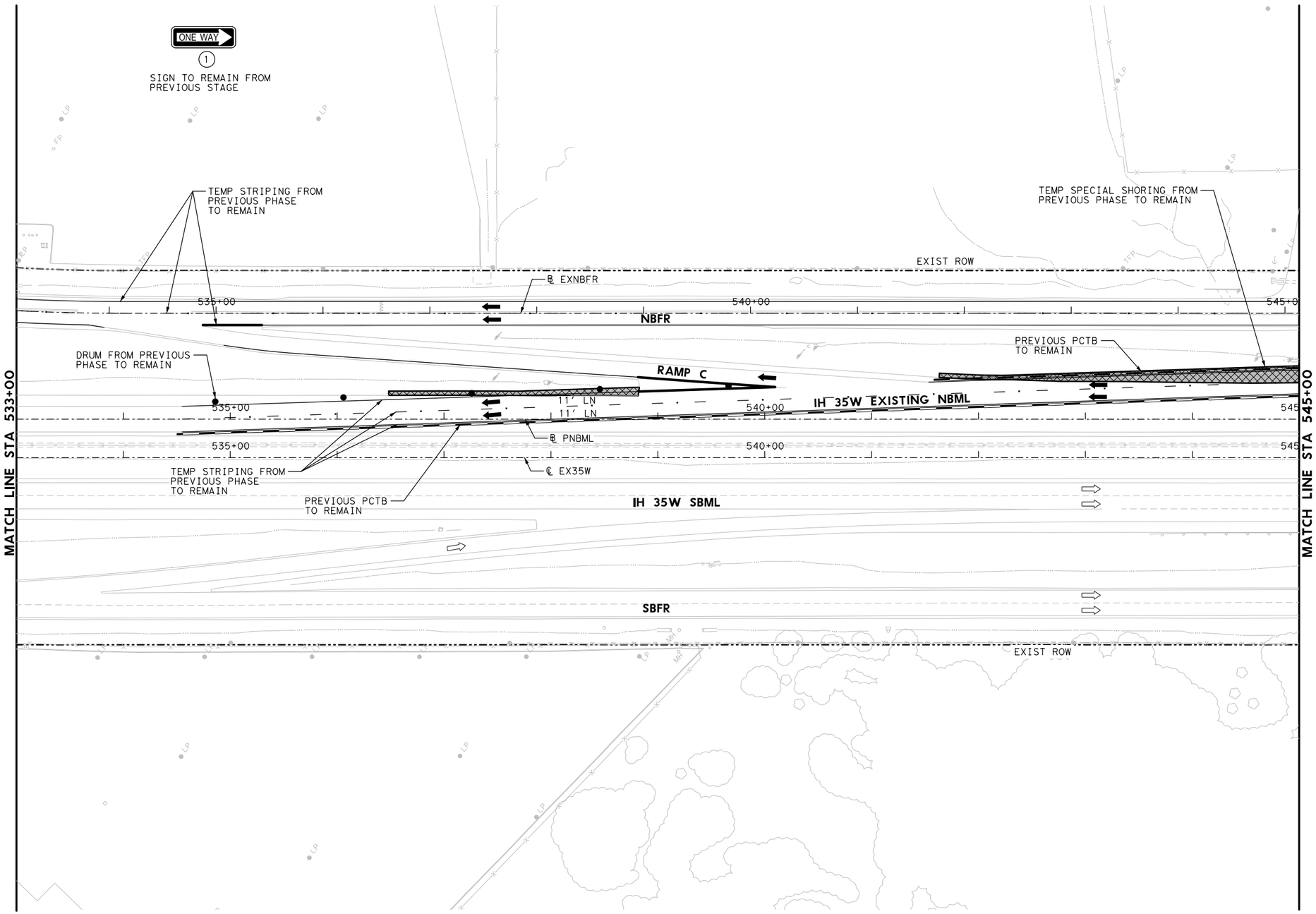

0′ 50′ 100′
SCALE IN FEET

LEGEND

- PERMANENT CONSTRUCTION IN THIS PHASE
- TEMPORARY PAVEMENT
- TEMPORARY PAVEMENT PREVIOUS PHASE(S)
- PERM PAVEMENT CONSTRUCTED IN PREVIOUS PHASE(S)
- PROPOSED TRAFFIC FLOW
- EXISTING TRAFFIC FLOW
- CHANNELIZING DRUMS
- TYPE III BARRICADE
- PORTABLE CONCRETE TRAFFIC BARRIER (PCTB)
- CRASH ATTENUATOR
- TEMPORARY SPECIAL SHORING
- PORTABLE CHANGEABLE MESSAGE SIGN
- TRAILER MOUNTED FLASHING WITH ARROW BOARD
- [A] WRK ZN PAV MRK (Y) (4") (SLD)
- [B] WRK ZN PAV MRK (W) (4") (SLD)
- [C] WRK ZN PAV MRK (W) (4") (BRK)
- [D] WRK ZN PAV MRK (W) (24") (SLD)
- [E] WRK ZN PAV MRK (W) (8") (SLD)

R - REMOVABLE
NR - NON REMOVABLE

NOTES:

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FROM CR 604/ CR 707 TO US 67

TRAFFIC CONTROL PLAN

PHASE 1 STAGE 3
STA 533+00 TO STA 545+00

SHEET 2 OF 7

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		37

DATE: 5/23/2022 10:40:57 AM
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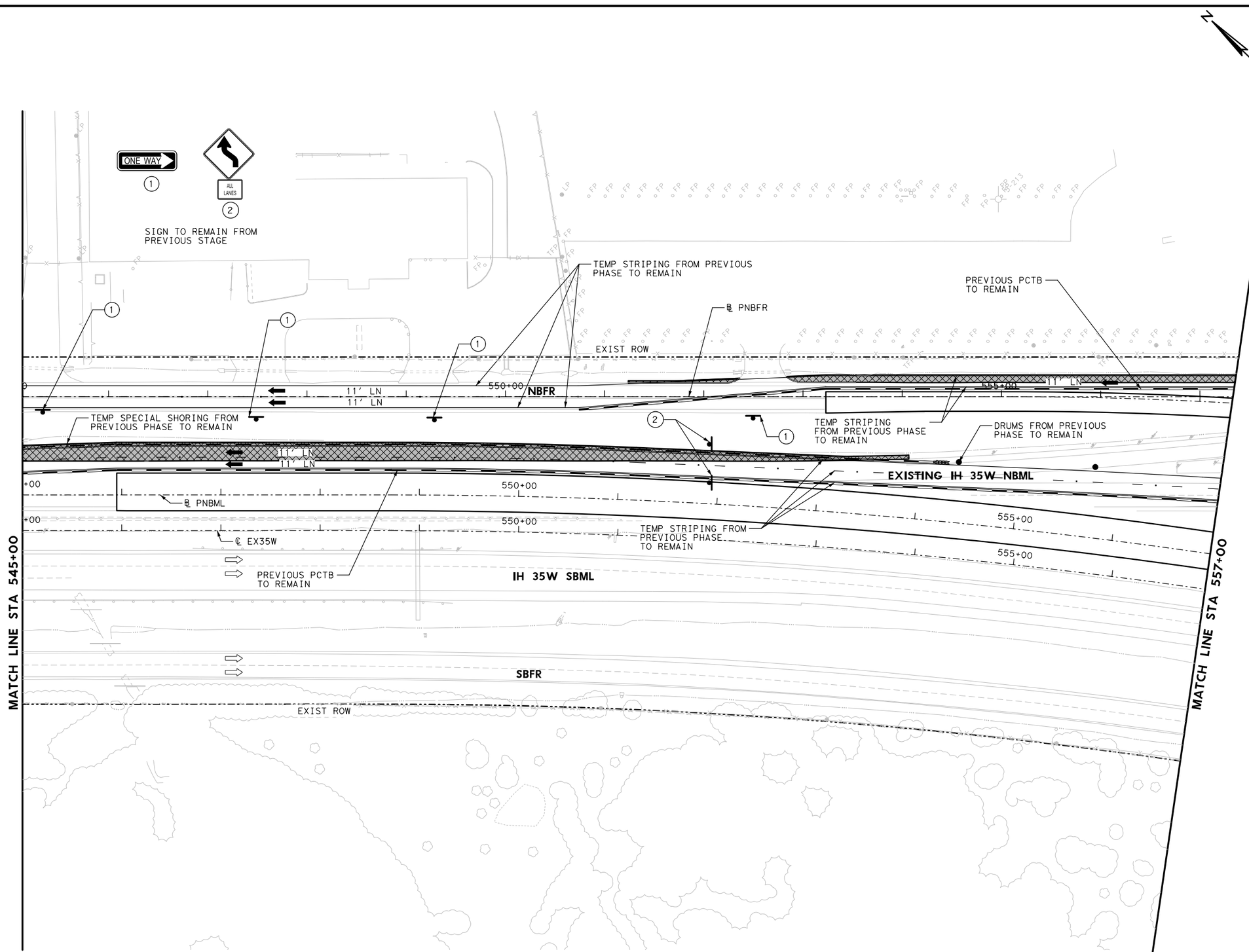
subash.paude1



0′ 50′ 100′
SCALE IN FEET

LEGEND

- PERMANENT CONSTRUCTION IN THIS PHASE
- TEMPORARY PAVEMENT
- TEMPORARY PAVEMENT PREVIOUS PHASE(S)
- PERM PAVEMENT CONSTRUCTED IN PREVIOUS PHASE(S)
- PROPOSED TRAFFIC FLOW
- EXISTING TRAFFIC FLOW
- CHANNELIZING DRUMS
- TYPE III BARRICADE
- PORTABLE CONCRETE TRAFFIC BARRIER (PCTB)
- CRASH ATTENUATOR
- TEMPORARY SPECIAL SHORING
- PORTABLE CHANGEABLE MESSAGE SIGN
- TRAILER MOUNTED FLASHING WITH ARROW BOARD
- A WRK ZN PAV MRK (Y) (4") (SLD)
- B WRK ZN PAV MRK (W) (4") (SLD)
- C WRK ZN PAV MRK (W) (4") (BRK)
- D WRK ZN PAV MRK (W) (24") (SLD)
- E WRK ZN PAV MRK (W) (8") (SLD)

R - REMOVABLE
NR - NON REMOVABLE

NOTES:

1. SEE PROJECT LAYOUT FOR ADVANCE WARNING SIGN PLACEMENT.
2. SEE SIGNING AND PAVEMENT MARKING SHEETS FOR PERMANENT MARKINGS AND SIGNS.

STATE OF TEXAS
IRENE ALANIS
116808
LICENSED PROFESSIONAL ENGINEER
5/23/2022

AECOM
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

TRAFFIC CONTROL PLAN

PHASE 1 STAGE 3
STA 545+00 TO STA 557+00
SHEET 3 OF 7

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		38

DATE: 5/23/2022 10:41:04 AM
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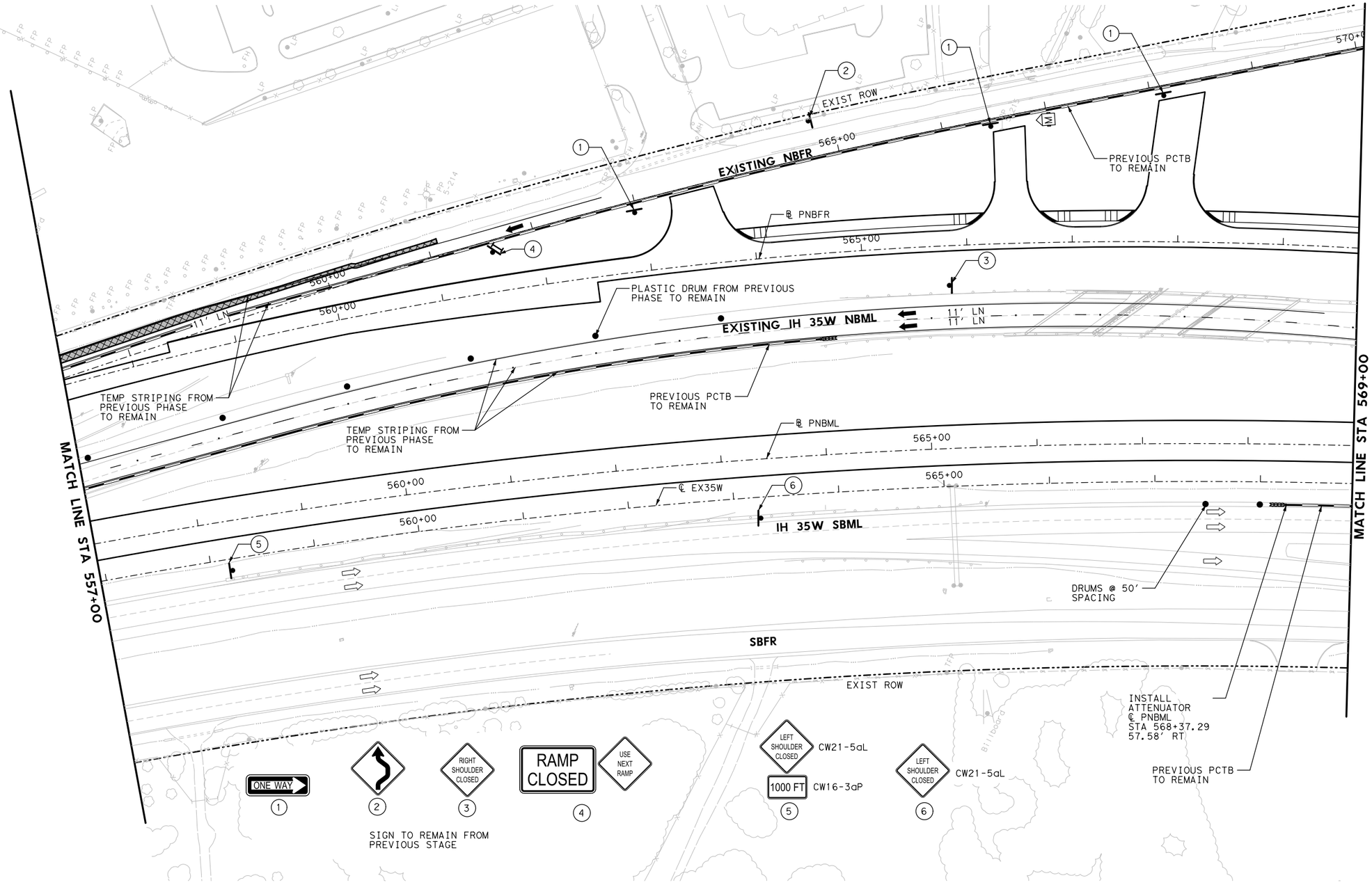

0' 50' 100'
SCALE IN FEET

LEGEND

- PERMANENT CONSTRUCTION IN THIS PHASE
- TEMPORARY PAVEMENT
- TEMPORARY PAVEMENT PREVIOUS PHASE(S)
- PERM PAVEMENT CONSTRUCTED IN PREVIOUS PHASE(S)
- PROPOSED TRAFFIC FLOW
- EXISTING TRAFFIC FLOW
- CHANNELIZING DRUMS
- TYPE III BARRICADE
- PORTABLE CONCRETE TRAFFIC BARRIER (PCTB)
- CRASH ATTENUATOR
- TEMPORARY SPECIAL SHORING
- PORTABLE CHANGEABLE MESSAGE SIGN
- TRAILER MOUNTED FLASHING WITH ARROW BOARD
- [A] WRK ZN PAV MRK(Y)(4")(SLD)
- [B] WRK ZN PAV MRK (W)(4")(SLD)
- [C] WRK ZN PAV MRK (W)(4")(BRK)
- [D] WRK ZN PAV MRK (W)(24")(SLD)
- [E] WRK ZN PAV MRK (W)(8")(SLD)

R - REMOVABLE
NR - NON REMOVABLE

NOTES:

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IH 35W
FROM CR 604/ CR 707 TO US 67

TRAFFIC CONTROL PLAN

PHASE 1 STAGE 3
STA 557+00 TO STA 569+00

SHEET 4 OF 7

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		39

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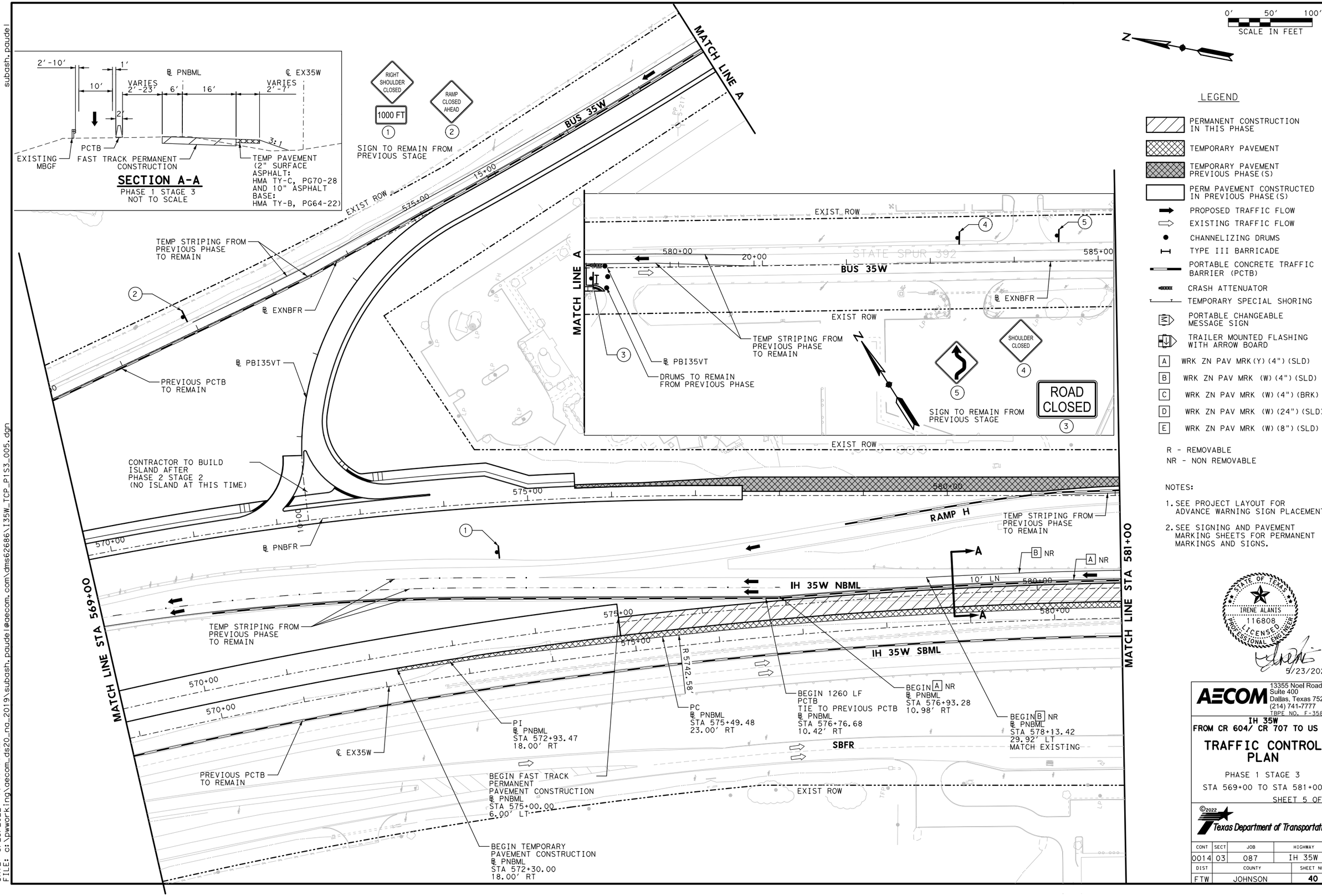
SECTION A-A

PHASE 1 STAGE 3
NOT TO SCALE

SIGN TO REMAIN FROM PREVIOUS STAGE



0' 50' 100'
SCALE IN FEET

N

LEGEND

- PERMANENT CONSTRUCTION IN THIS PHASE
- TEMPORARY PAVEMENT
- TEMPORARY PAVEMENT PREVIOUS PHASE(S)
- PERM PAVEMENT CONSTRUCTED IN PREVIOUS PHASE(S)
- PROPOSED TRAFFIC FLOW
- EXISTING TRAFFIC FLOW
- CHANNELIZING DRUMS
- TYPE III BARRICADE
- PORTABLE CONCRETE TRAFFIC BARRIER (PCTB)
- CRASH ATTENUATOR
- TEMPORARY SPECIAL SHORING
- PORTABLE CHANGEABLE MESSAGE SIGN
- TRAILER MOUNTED FLASHING WITH ARROW BOARD
- [A] WRK ZN PAV MRK (Y) (4") (SLD)
- [B] WRK ZN PAV MRK (W) (4") (SLD)
- [C] WRK ZN PAV MRK (W) (4") (BRK)
- [D] WRK ZN PAV MRK (W) (24") (SLD)
- [E] WRK ZN PAV MRK (W) (8") (SLD)

R - REMOVABLE
NR - NON REMOVABLE

NOTES:

1. SEE PROJECT LAYOUT FOR ADVANCE WARNING SIGN PLACEMENT.
2. SEE SIGNING AND PAVEMENT MARKING SHEETS FOR PERMANENT MARKINGS AND SIGNS.

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IH 35W
FROM CR 604/ CR 707 TO US 67

TRAFFIC CONTROL PLAN

PHASE 1 STAGE 3
STA 569+00 TO STA 581+00
SHEET 5 OF 7

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		40

DATE: 5/23/2022 10:41:17 AM
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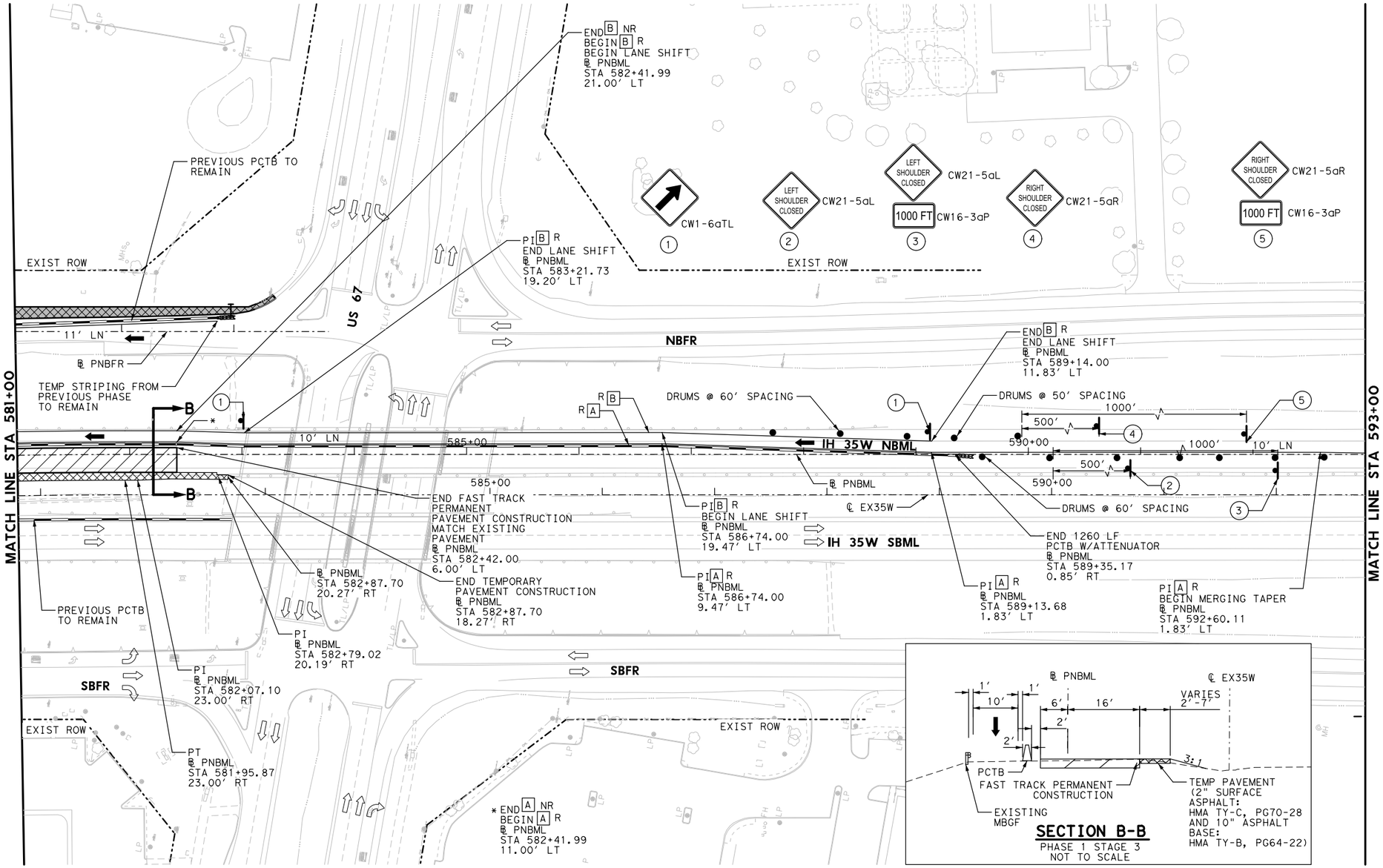

SECTION B-B
PHASE 1 STAGE 3
NOT TO SCALE

0' 50' 100'
SCALE IN FEET

N

LEGEND

- PERMANENT CONSTRUCTION IN THIS PHASE
- TEMPORARY PAVEMENT
- TEMPORARY PAVEMENT PREVIOUS PHASE(S)
- PERM PAVEMENT CONSTRUCTED IN PREVIOUS PHASE(S)
- PROPOSED TRAFFIC FLOW
- EXISTING TRAFFIC FLOW
- CHANNELIZING DRUMS
- TYPE III BARRICADE
- PORTABLE CONCRETE TRAFFIC BARRIER (PCTB)
- CRASH ATTENUATOR
- TEMPORARY SPECIAL SHORING
- PORTABLE CHANGEABLE MESSAGE SIGN
- TRAILER MOUNTED FLASHING WITH ARROW BOARD
- [A] WRK ZN PAV MRK(Y)(4")(SLD)
- [B] WRK ZN PAV MRK (W)(4")(SLD)
- [C] WRK ZN PAV MRK (W)(4")(BRK)
- [D] WRK ZN PAV MRK (W)(24")(SLD)
- [E] WRK ZN PAV MRK (W)(8")(SLD)

R - REMOVABLE
NR - NON REMOVABLE

NOTES:

1. SEE PROJECT LAYOUT FOR ADVANCE WARNING SIGN PLACEMENT.
2. SEE SIGNING AND PAVEMENT MARKING SHEETS FOR PERMANENT MARKINGS AND SIGNS.

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IH 35W
FROM CR 604/ CR 707 TO US 67

TRAFFIC CONTROL PLAN

PHASE 1 STAGE 3
STA 581+00 TO 593+00
SHEET 6 OF 7

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		41

DATE: 5/23/2022 10:41:25 AM
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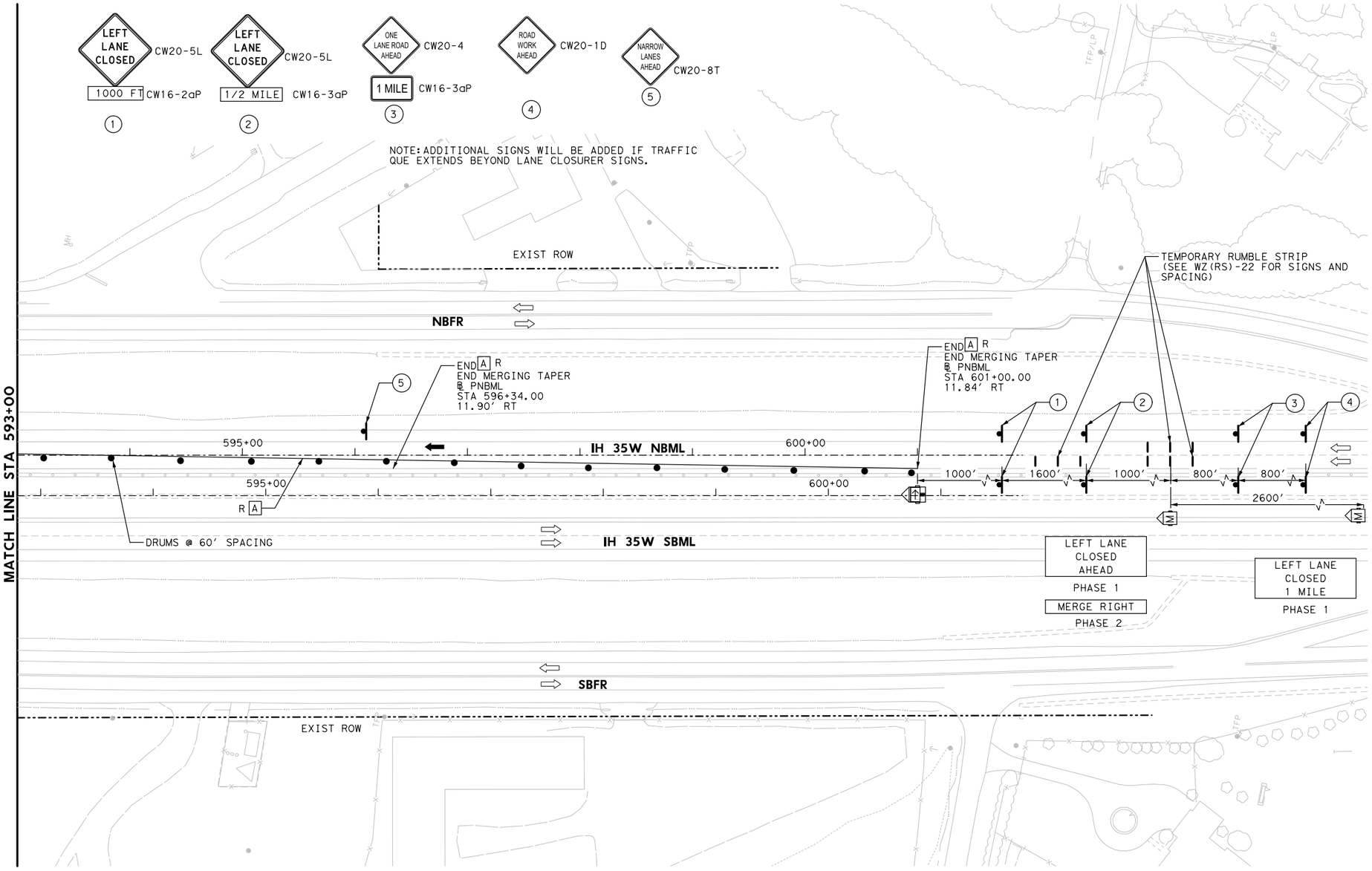

0' 50' 100'
SCALE IN FEET

N

LEGEND

- PERMANENT CONSTRUCTION IN THIS PHASE
- TEMPORARY PAVEMENT
- TEMPORARY PAVEMENT PREVIOUS PHASE(S)
- PERM PAVEMENT CONSTRUCTED IN PREVIOUS PHASE(S)
- PROPOSED TRAFFIC FLOW
- EXISTING TRAFFIC FLOW
- CHANNELIZING DRUMS
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- E WRK ZN PAV MRK (W)(8")(SLD)

R - REMOVABLE
NR - NON REMOVABLE

NOTES:

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5/23/2022

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IH 35W
FROM CR 604/ CR 707 TO US 67

TRAFFIC CONTROL PLAN

PHASE 1 STAGE 3
STA 593+00 TO END PROJECT

SHEET 7 OF 7

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		42

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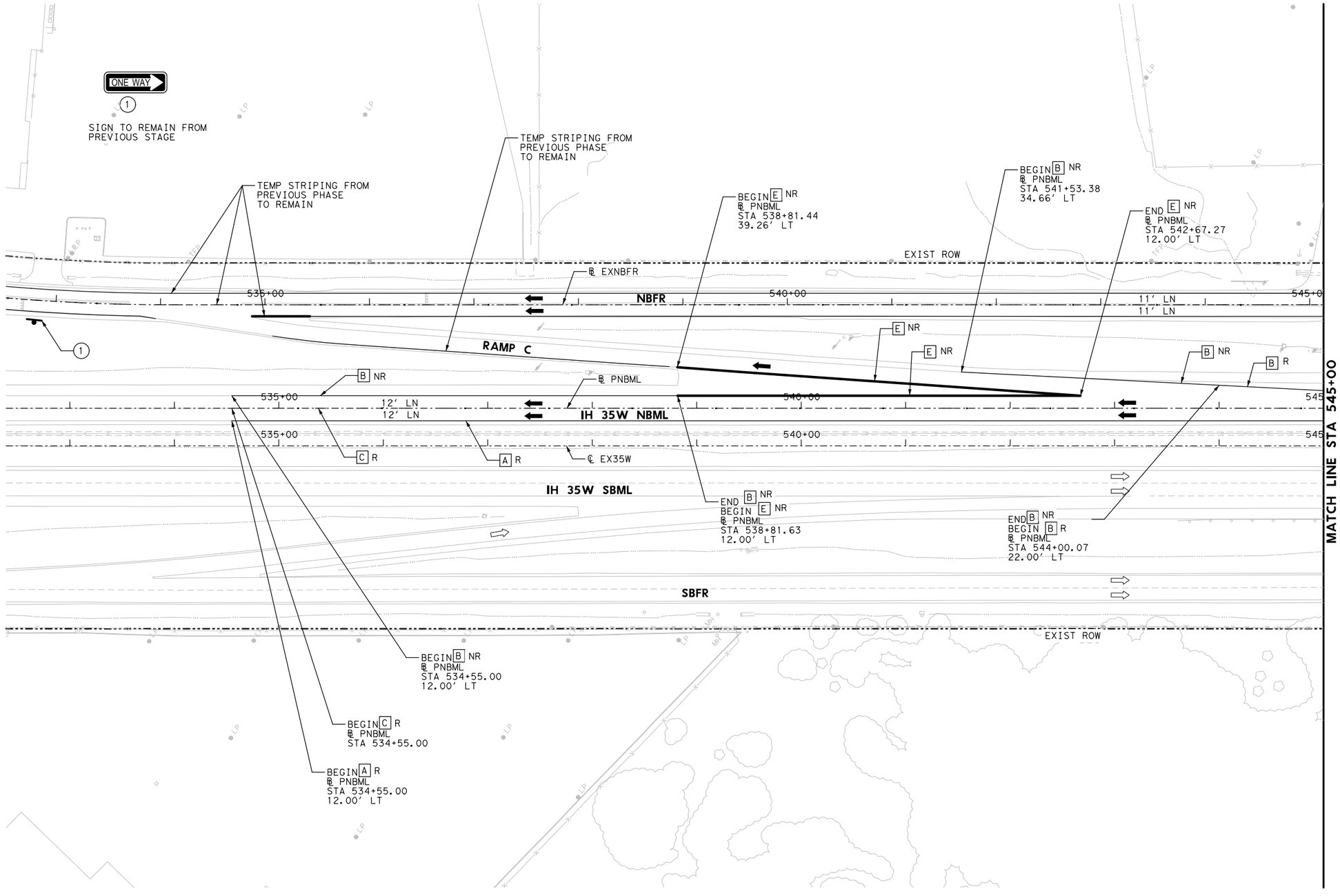

0' 50' 100'
SCALE IN FEET

LEGEND

- PERMANENT CONSTRUCTION IN THIS PHASE
- TEMPORARY PAVEMENT
- TEMPORARY PAVEMENT PREVIOUS PHASE(S)
- PERM PAVEMENT CONSTRUCTED IN PREVIOUS PHASE(S)
- PROPOSED TRAFFIC FLOW
- EXISTING TRAFFIC FLOW
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- E WRK ZN PAV MRK (W)(8")(SLD)

R - REMOVABLE
NR - NON REMOVABLE

NOTES:

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IH 35W
FROM CR 604/ CR 707 TO US 67

TRAFFIC CONTROL PLAN

PHASE 2 STAGE 1
BEGIN TO STA 545+00

SHEET 1 OF 5

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		43

DATE: 5/23/2022 10:41:36 AM
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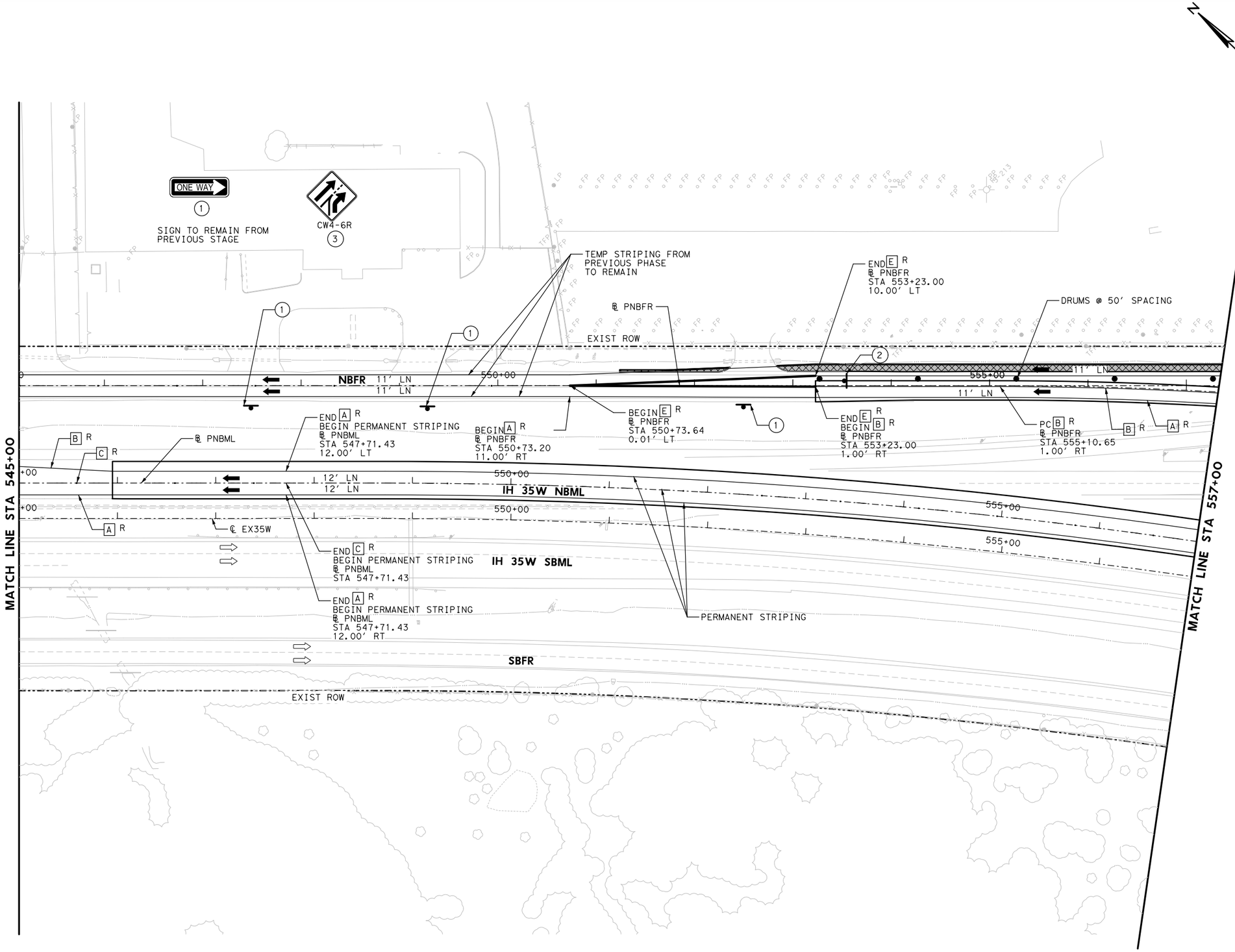

0' 50' 100'
SCALE IN FEET

LEGEND

- PERMANENT CONSTRUCTION IN THIS PHASE
- TEMPORARY PAVEMENT
- TEMPORARY PAVEMENT PREVIOUS PHASE(S)
- PERM PAVEMENT CONSTRUCTED IN PREVIOUS PHASE(S)
- PROPOSED TRAFFIC FLOW
- EXISTING TRAFFIC FLOW
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- B WRK ZN PAV MRK (W)(4")(SLD)
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- E WRK ZN PAV MRK (W)(8")(SLD)

R - REMOVABLE
NR - NON REMOVABLE

NOTES:

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STATE OF TEXAS
IRENE ALANIS
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TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

TRAFFIC CONTROL PLAN

PHASE 2 STAGE 1
STA 545+00 TO STA 557+00

SHEET 2 OF 5

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		44

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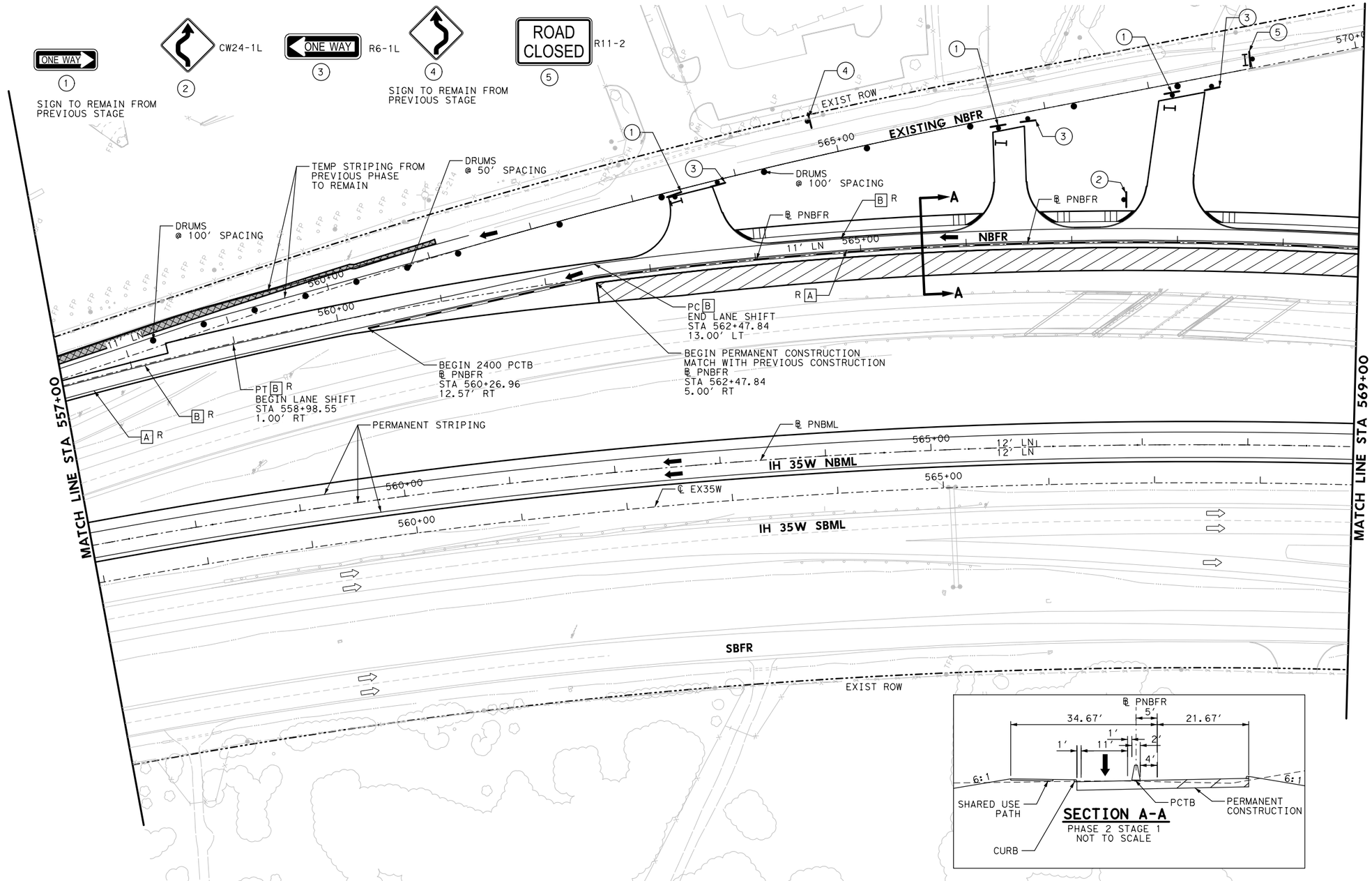

0' 50' 100'
SCALE IN FEET

LEGEND

- PERMANENT CONSTRUCTION IN THIS PHASE
- TEMPORARY PAVEMENT
- TEMPORARY PAVEMENT PREVIOUS PHASE(S)
- PERM PAVEMENT CONSTRUCTED IN PREVIOUS PHASE(S)
- PROPOSED TRAFFIC FLOW
- EXISTING TRAFFIC FLOW
- CHANNELIZING DRUMS
- TYPE III BARRICADE
- PORTABLE CONCRETE TRAFFIC BARRIER (PCTB)
- CRASH ATTENUATOR
- TEMPORARY SPECIAL SHORING
- PORTABLE CHANGEABLE MESSAGE SIGN
- TRAILER MOUNTED FLASHING WITH ARROW BOARD
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- B WRK ZN PAV MRK (W)(4")(SLD)
- C WRK ZN PAV MRK (W)(4")(BRK)
- D WRK ZN PAV MRK (W)(24")(SLD)
- E WRK ZN PAV MRK (W)(8")(SLD)

R - REMOVABLE
NR - NON REMOVABLE

NOTES:

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TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

TRAFFIC CONTROL PLAN

PHASE 2 STAGE 1
STA 557+00 TO STA 569+00
SHEET 3 OF 5

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		45

DATE: 5/23/2022 10:41:49 AM
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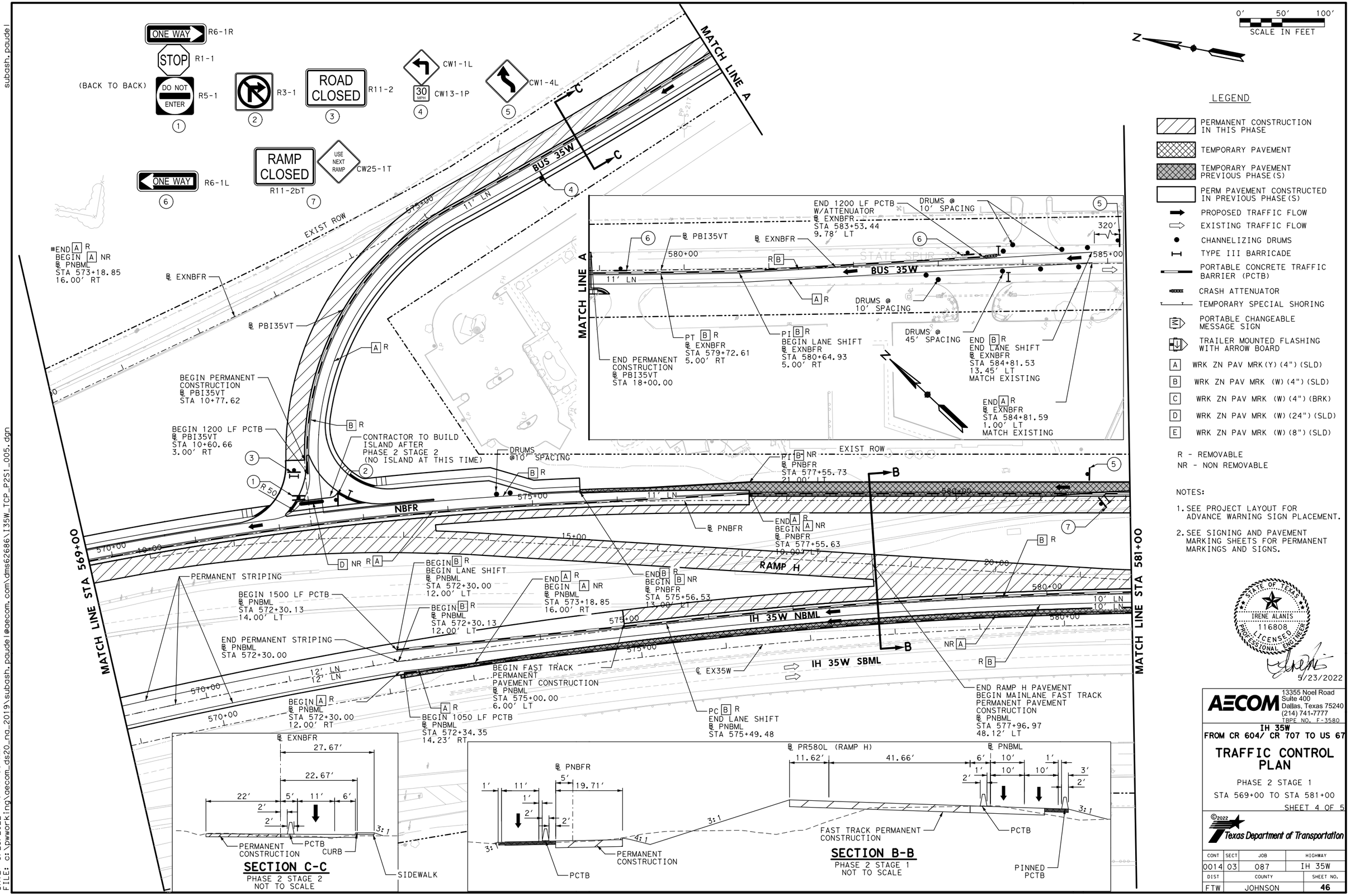
ONE WAY R6-1R
STOP R1-1
(BACK TO BACK)
DO NOT ENTER R5-1
1
R3-1
2
ROAD CLOSED R11-2
3
CW1-1L
30 MPH CW13-1P
4
CW1-4L
5
ONE WAY R6-1L
6
RAMP CLOSED R11-2bT
USE NEXT RAMP CW25-1T
7
MATCH LINE A
BUS 35W
EXIST ROW
11' LN
575+00
#END A R
BEGIN A NR
℄ PNBML
STA 573+18.85
16.00' RT
℄ EXNBFR
℄ PBI35VT
A R
BEGIN PERMANENT CONSTRUCTION
℄ PBI35VT
STA 10+77.62
B R
BEGIN 1200 LF PCTB
℄ PBI35VT
STA 10+60.66
3.00' RT
CONTRACTOR TO BUILD ISLAND AFTER PHASE 2 STAGE 2 (NO ISLAND AT THIS TIME)
DRUMS @10' SPACING
R 50
NBFR
570+00
10+00
D NR R A
PERMANENT STRIPING
BEGIN 1500 LF PCTB
℄ PNBML
STA 572+30.13
14.00' LT
END PERMANENT STRIPING
℄ PNBML
STA 572+30.00
MATCH LINE STA 569+00
12' LN
BEGIN B R
BEGIN LANE SHIFT
℄ PNBML
STA 572+30.00
12.00' LT
BEGIN A R
℄ PNBML
STA 572+30.13
12.00' LT
END A R
BEGIN A NR
℄ PNBML
STA 573+18.85
16.00' RT
END B R
BEGIN B NR
℄ PNBFR
STA 575+56.53
13.00' LT
BEGIN A R
℄ PNBML
STA 572+30.00
12.00' RT
A R
BEGIN 1050 LF PCTB
℄ PNBML
STA 572+34.35
14.23' RT
BEGIN FAST TRACK PERMANENT PAVEMENT CONSTRUCTION
℄ PNBML
STA 575+00.00
6.00' LT
℄ EX35W
IH 35W NBML
IH 35W SBML
PC B R
END LANE SHIFT
℄ PNBML
STA 575+49.48
END RAMP H PAVEMENT
BEGIN MAINLANE FAST TRACK PERMANENT PAVEMENT CONSTRUCTION
℄ PNBML
STA 577+96.97
48.12' LT
MATCH LINE STA 581+00
END 1200 LF PCTB W/ATTENUATOR
℄ EXNBFR
STA 583+53.44
9.78' LT
DRUMS @ 10' SPACING
320'
580+00
℄ PBI35VT
℄ EXNBFR
RB
STATE SPUR 366
585+00
END PERMANENT CONSTRUCTION
℄ PBI35VT
STA 18+00.00
PT B R
℄ EXNBFR
STA 579+72.61
5.00' RT
PI B R
BEGIN LANE SHIFT
℄ EXNBFR
STA 580+64.93
5.00' RT
DRUMS @ 45' SPACING
END B R
END LANE SHIFT
℄ EXNBFR
STA 584+81.53
13.45' LT
MATCH EXISTING
END A R
℄ EXNBFR
STA 584+81.59
1.00' LT
MATCH EXISTING
EXIST ROW
PI B NR
℄ PNBFR
STA 577+55.73
21.00' LT
℄ PNBFR
END A R
BEGIN A NR
℄ PNBFR
STA 577+55.63
19.00' LT
RAMP H
B R
NR A
R B
℄ EXNBFR
27.67'
22.67'
22'
5'
11'
6'
2'
2'
3:1
PERMANENT CONSTRUCTION
PCTB
CURB
SIDEWALK
SECTION C-C
PHASE 2 STAGE 2
NOT TO SCALE
℄ PNBFR
5'
19.71'
1'
11'
1'
2'
2'
3:1
4:1
3:1
PERMANENT CONSTRUCTION
PCTB
℄ PR580L (RAMP H)
℄ PNBML
11.62'
41.66'
6'
10'
1'
1'
10'
10'
2'
3'
2'
3:1
FAST TRACK PERMANENT CONSTRUCTION
PCTB
PINNED PCTB
SECTION B-B
PHASE 2 STAGE 1
NOT TO SCALE
0'
50'
100'
SCALE IN FEET
N
LEGEND
PERMANENT CONSTRUCTION IN THIS PHASE
TEMPORARY PAVEMENT
TEMPORARY PAVEMENT PREVIOUS PHASE(S)
PERM PAVEMENT CONSTRUCTED IN PREVIOUS PHASE(S)
PROPOSED TRAFFIC FLOW
EXISTING TRAFFIC FLOW
CHANNELIZING DRUMS
TYPE III BARRICADE
PORTABLE CONCRETE TRAFFIC BARRIER (PCTB)
CRASH ATTENUATOR
TEMPORARY SPECIAL SHORING
PORTABLE CHANGEABLE MESSAGE SIGN
TRAILER MOUNTED FLASHING WITH ARROW BOARD
A WRK ZN PAV MRK (Y)(4")(SLD)
B WRK ZN PAV MRK (W)(4")(SLD)
C WRK ZN PAV MRK (W)(4")(BRK)
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E WRK ZN PAV MRK (W)(8")(SLD)
R - REMOVABLE
NR - NON REMOVABLE
NOTES:
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IH 35W
FROM CR 604/ CR 707 TO US 67
TRAFFIC CONTROL PLAN
PHASE 2 STAGE 1
STA 569+00 TO STA 581+00
SHEET 4 OF 5
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CONT 0014
SECT 03
JOB 087
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DIST FTW
COUNTY JOHNSON
SHEET NO. 46
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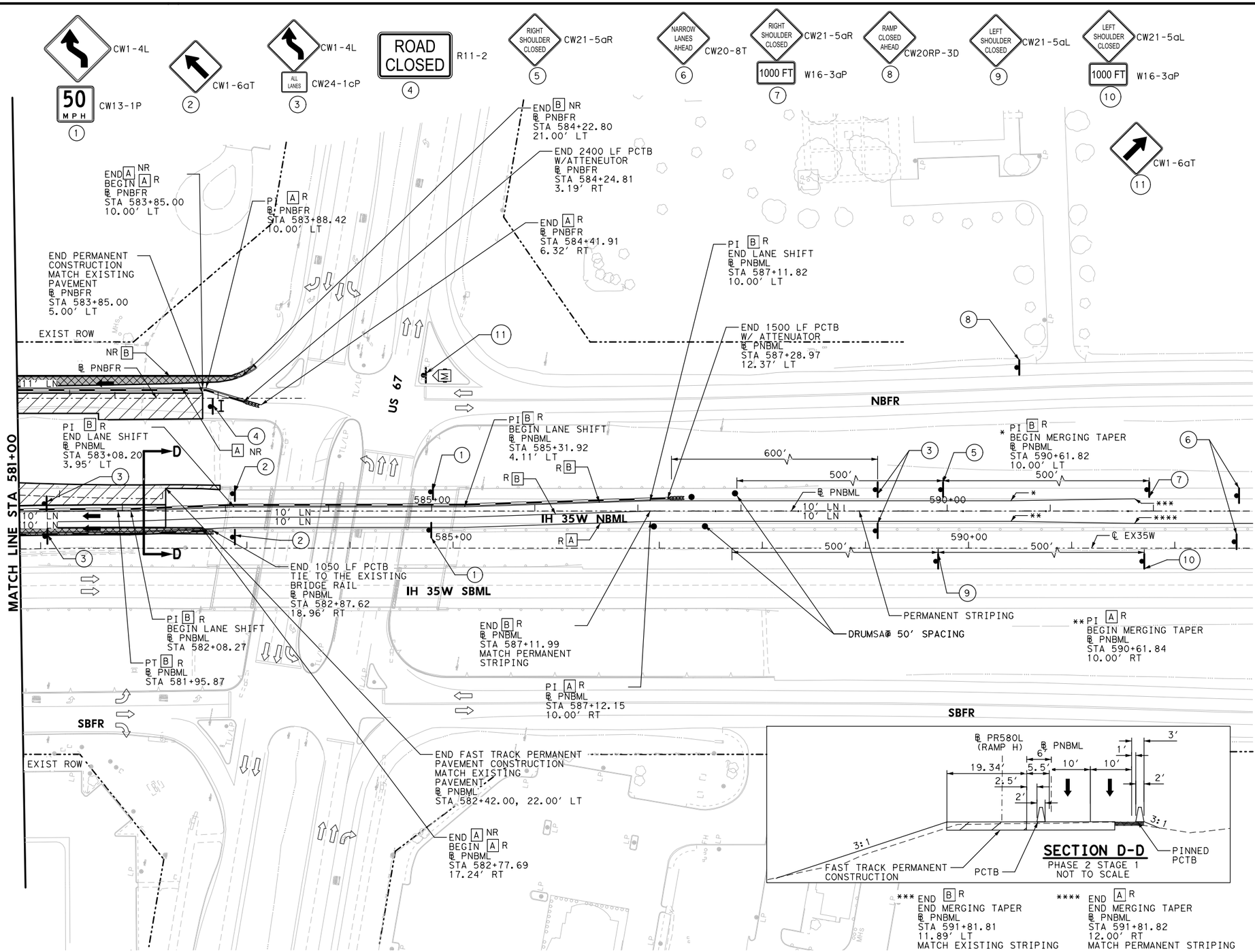

0' 50' 100'
SCALE IN FEET

N

LEGEND

- PERMANENT CONSTRUCTION IN THIS PHASE
- TEMPORARY PAVEMENT
- TEMPORARY PAVEMENT PREVIOUS PHASE(S)
- PERM PAVEMENT CONSTRUCTED IN PREVIOUS PHASE(S)
- PROPOSED TRAFFIC FLOW
- EXISTING TRAFFIC FLOW
- CHANNELIZING DRUMS
- TYPE III BARRICADE
- PORTABLE CONCRETE TRAFFIC BARRIER (PCTB)
- CRASH ATTENUATOR
- TEMPORARY SPECIAL SHORING
- PORTABLE CHANGEABLE MESSAGE SIGN
- TRAILER MOUNTED FLASHING WITH ARROW BOARD
- A WRK ZN PAV MRK(Y)(4")(SLD)
- B WRK ZN PAV MRK (W)(4")(SLD)
- C WRK ZN PAV MRK (W)(4")(BRK)
- D WRK ZN PAV MRK (W)(24")(SLD)
- E WRK ZN PAV MRK (W)(8")(SLD)

R - REMOVABLE
NR - NON REMOVABLE

NOTES:

1. SEE PROJECT LAYOUT FOR ADVANCE WARNING SIGN PLACEMENT.
2. SEE SIGNING AND PAVEMENT MARKING SHEETS FOR PERMANENT MARKINGS AND SIGNS.

STATE OF TEXAS
IRENE ALANIS
116808
LICENSED
PROFESSIONAL ENGINEER
5/23/2022

AECOM
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(214) 741-7777
TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

TRAFFIC CONTROL PLAN

PHASE 2 STAGE 1
STA 581+00 TO END PROJECT
SHEET 5 OF 5

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		47

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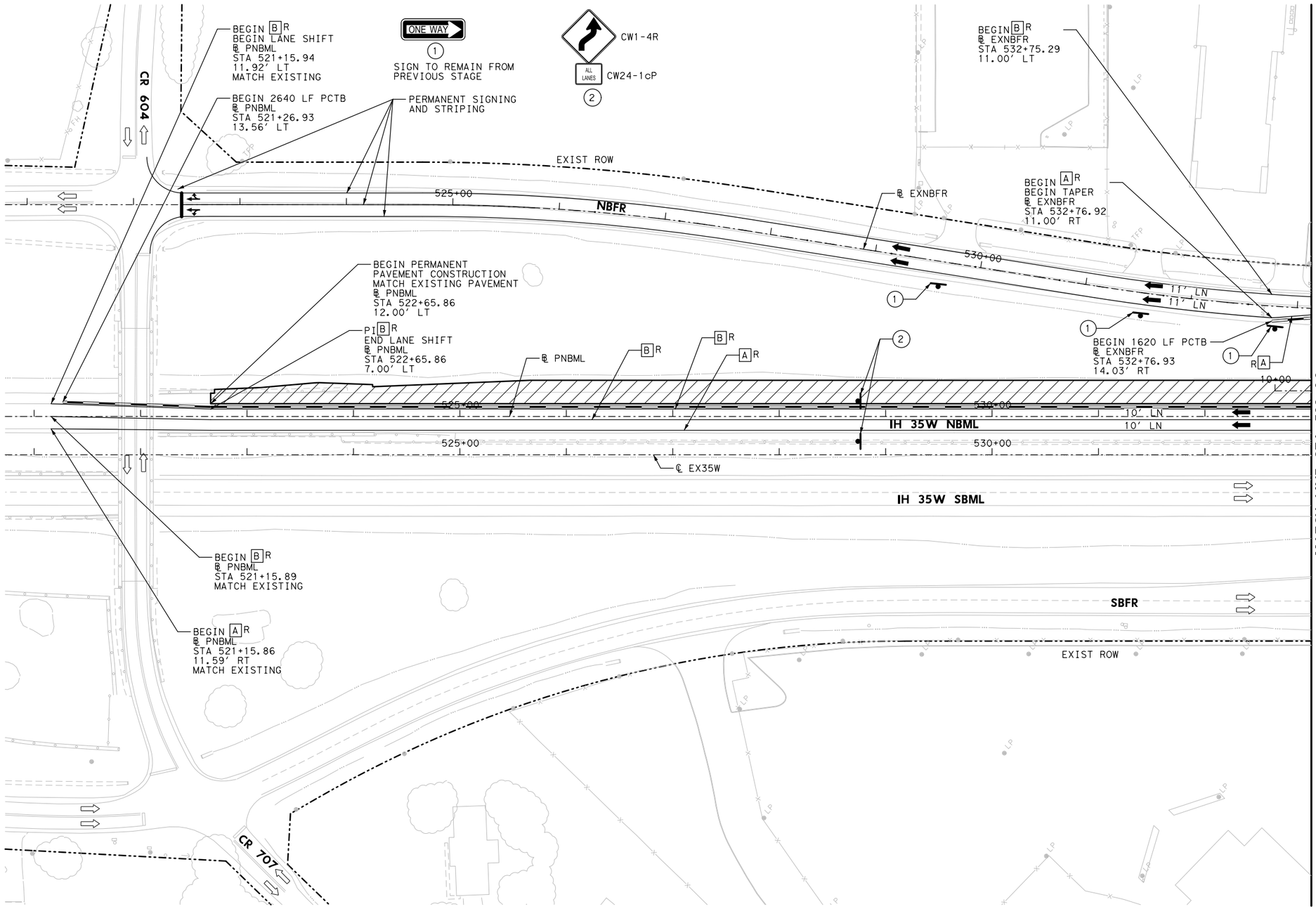

0' 50' 100'
SCALE IN FEET

LEGEND

- PERMANENT CONSTRUCTION IN THIS PHASE
- TEMPORARY PAVEMENT
- TEMPORARY PAVEMENT PREVIOUS PHASE(S)
- PERM PAVEMENT CONSTRUCTED IN PREVIOUS PHASE(S)
- PROPOSED TRAFFIC FLOW
- EXISTING TRAFFIC FLOW
- CHANNELIZING DRUMS
- TYPE III BARRICADE
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- CRASH ATTENUATOR
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- TRAILER MOUNTED FLASHING WITH ARROW BOARD
- A WRK ZN PAV MRK (Y) (4") (SLD)
- B WRK ZN PAV MRK (W) (4") (SLD)
- C WRK ZN PAV MRK (W) (4") (BRK)
- D WRK ZN PAV MRK (W) (24") (SLD)
- E WRK ZN PAV MRK (W) (8") (SLD)

R - REMOVABLE
NR - NON REMOVABLE

NOTES:

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IH 35W
FROM CR 604/ CR 707 TO US 67

TRAFFIC CONTROL PLAN

PHASE 2 STAGE 2
BEGIN PROJECT TO STA 533+00
SHEET 1 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		48

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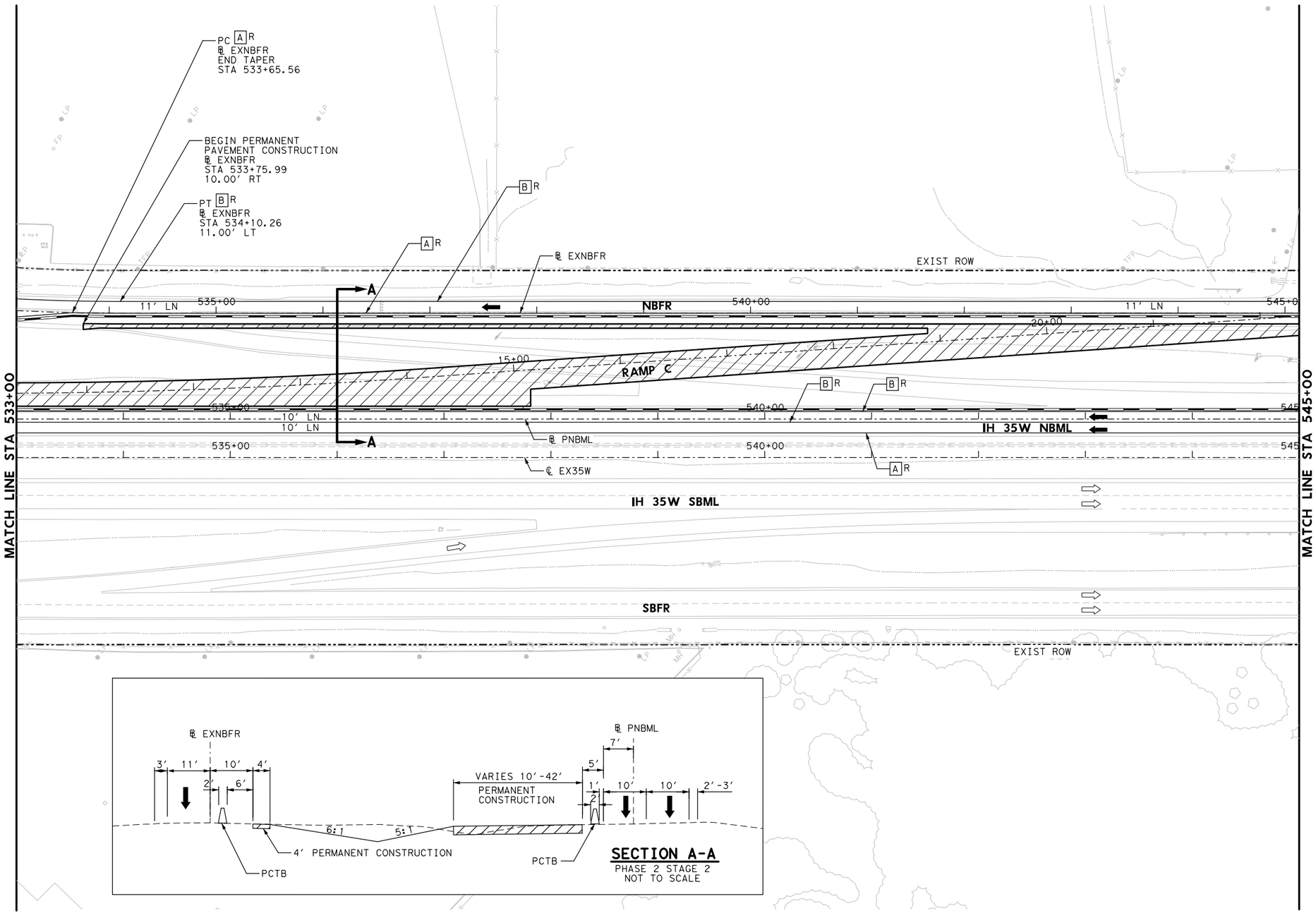

0' 50' 100'
SCALE IN FEET

LEGEND

- PERMANENT CONSTRUCTION IN THIS PHASE
- TEMPORARY PAVEMENT
- TEMPORARY PAVEMENT PREVIOUS PHASE(S)
- PERM PAVEMENT CONSTRUCTED IN PREVIOUS PHASE(S)
- PROPOSED TRAFFIC FLOW
- EXISTING TRAFFIC FLOW
- CHANNELIZING DRUMS
- TYPE III BARRICADE
- PORTABLE CONCRETE TRAFFIC BARRIER (PCTB)
- CRASH ATTENUATOR
- TEMPORARY SPECIAL SHORING
- PORTABLE CHANGEABLE MESSAGE SIGN
- TRAILER MOUNTED FLASHING WITH ARROW BOARD
- A WRK ZN PAV MRK (Y) (4") (SLD)
- B WRK ZN PAV MRK (W) (4") (SLD)
- C WRK ZN PAV MRK (W) (4") (BRK)
- D WRK ZN PAV MRK (W) (24") (SLD)
- E WRK ZN PAV MRK (W) (8") (SLD)

R - REMOVABLE
NR - NON REMOVABLE

NOTES:

1. SEE PROJECT LAYOUT FOR ADVANCE WARNING SIGN PLACEMENT.
2. SEE SIGNING AND PAVEMENT MARKING SHEETS FOR PERMANENT MARKINGS AND SIGNS.

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IH 35W
FROM CR 604/ CR 707 TO US 67

TRAFFIC CONTROL PLAN

PHASE 2 STAGE 2

STA 533+00 TO STA 545+00

SHEET 2 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		49

DATE: 5/23/2022 10:42:14 AM
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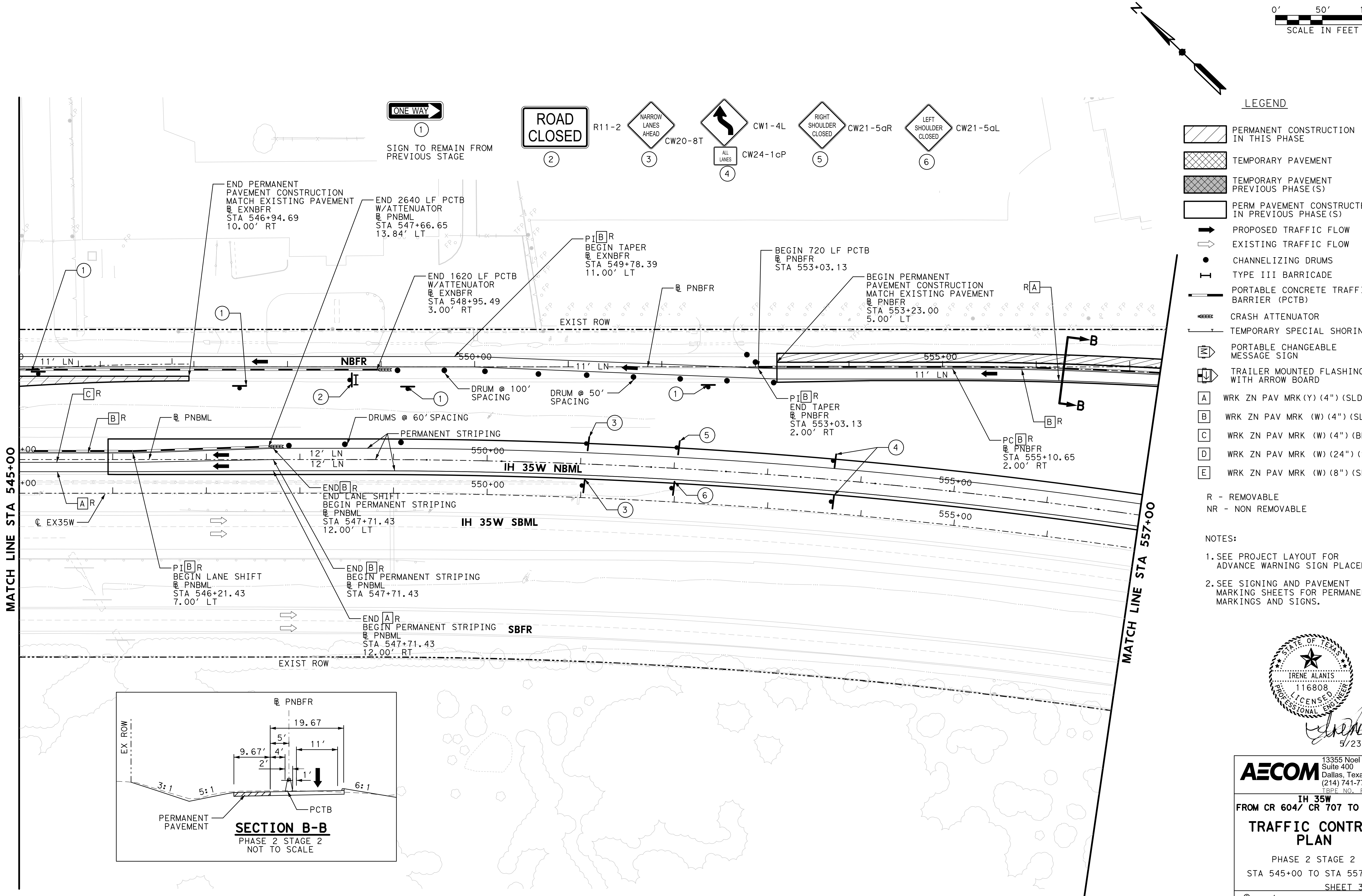

LEGEND

- PERMANENT CONSTRUCTION IN THIS PHASE
- TEMPORARY PAVEMENT
- TEMPORARY PAVEMENT PREVIOUS PHASE(S)
- PERM PAVEMENT CONSTRUCTED IN PREVIOUS PHASE(S)
- PROPOSED TRAFFIC FLOW
- EXISTING TRAFFIC FLOW
- CHANNELIZING DRUMS
- TYPE III BARRICADE
- PORTABLE CONCRETE TRAFFIC BARRIER (PCTB)
- CRASH ATTENUATOR
- TEMPORARY SPECIAL SHORING
- PORTABLE CHANGEABLE MESSAGE SIGN
- TRAILER MOUNTED FLASHING WITH ARROW BOARD

A	WRK ZN PAV MRK (Y) (4") (SLD)
B	WRK ZN PAV MRK (W) (4") (SLD)
C	WRK ZN PAV MRK (W) (4") (BRK)
D	WRK ZN PAV MRK (W) (24") (SLD)
E	WRK ZN PAV MRK (W) (8") (SLD)

R - REMOVABLE
NR - NON REMOVABLE

NOTES:

1. SEE PROJECT LAYOUT FOR ADVANCE WARNING SIGN PLACEMENT.
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TRAFFIC CONTROL PLAN

PHASE 2 STAGE 2

STA 545+00 TO STA 557+00

SHEET 3 OF 6

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST		COUNTY	SHEET NO.
FTW		JOHNSON	50

subash.paudel
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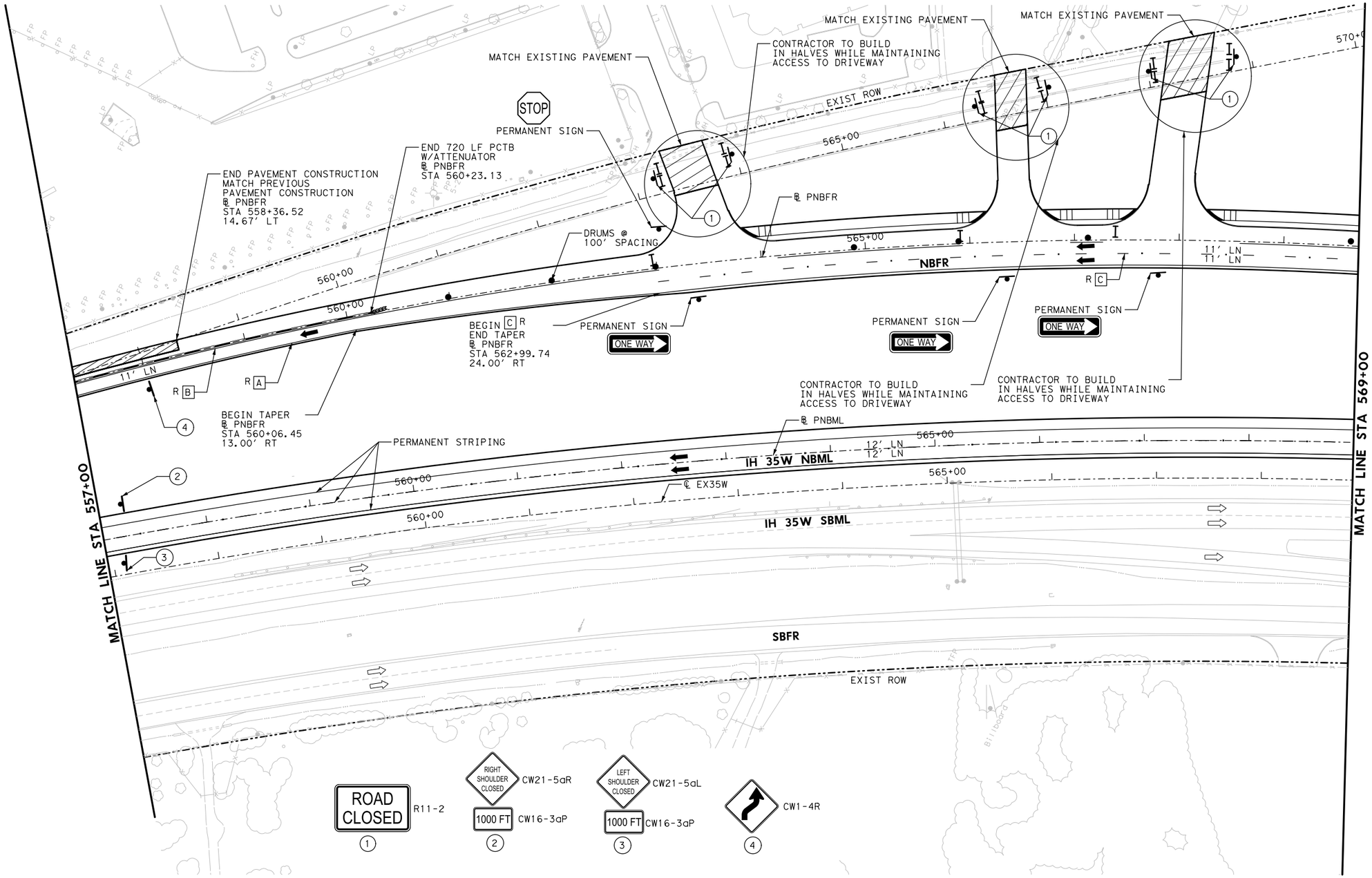

LEGEND

- PERMANENT CONSTRUCTION IN THIS PHASE
- TEMPORARY PAVEMENT
- TEMPORARY PAVEMENT PREVIOUS PHASE(S)
- PERM PAVEMENT CONSTRUCTED IN PREVIOUS PHASE(S)
- PROPOSED TRAFFIC FLOW
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- PORTABLE CONCRETE TRAFFIC BARRIER (PCTB)
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- TEMPORARY SPECIAL SHORING
- PORTABLE CHANGEABLE MESSAGE SIGN
- TRAILER MOUNTED FLASHING WITH ARROW BOARD
- A WRK ZN PAV MRK(Y)(4")(SLD)
- B WRK ZN PAV MRK (W)(4")(SLD)
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- D WRK ZN PAV MRK (W)(24")(SLD)
- E WRK ZN PAV MRK (W)(8")(SLD)

R - REMOVABLE
NR - NON REMOVABLE

NOTES:

1. SEE PROJECT LAYOUT FOR ADVANCE WARNING SIGN PLACEMENT.
2. SEE SIGNING AND PAVEMENT MARKING SHEETS FOR PERMANENT MARKINGS AND SIGNS.

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IH 35W
FROM CR 604/ CR 707 TO US 67

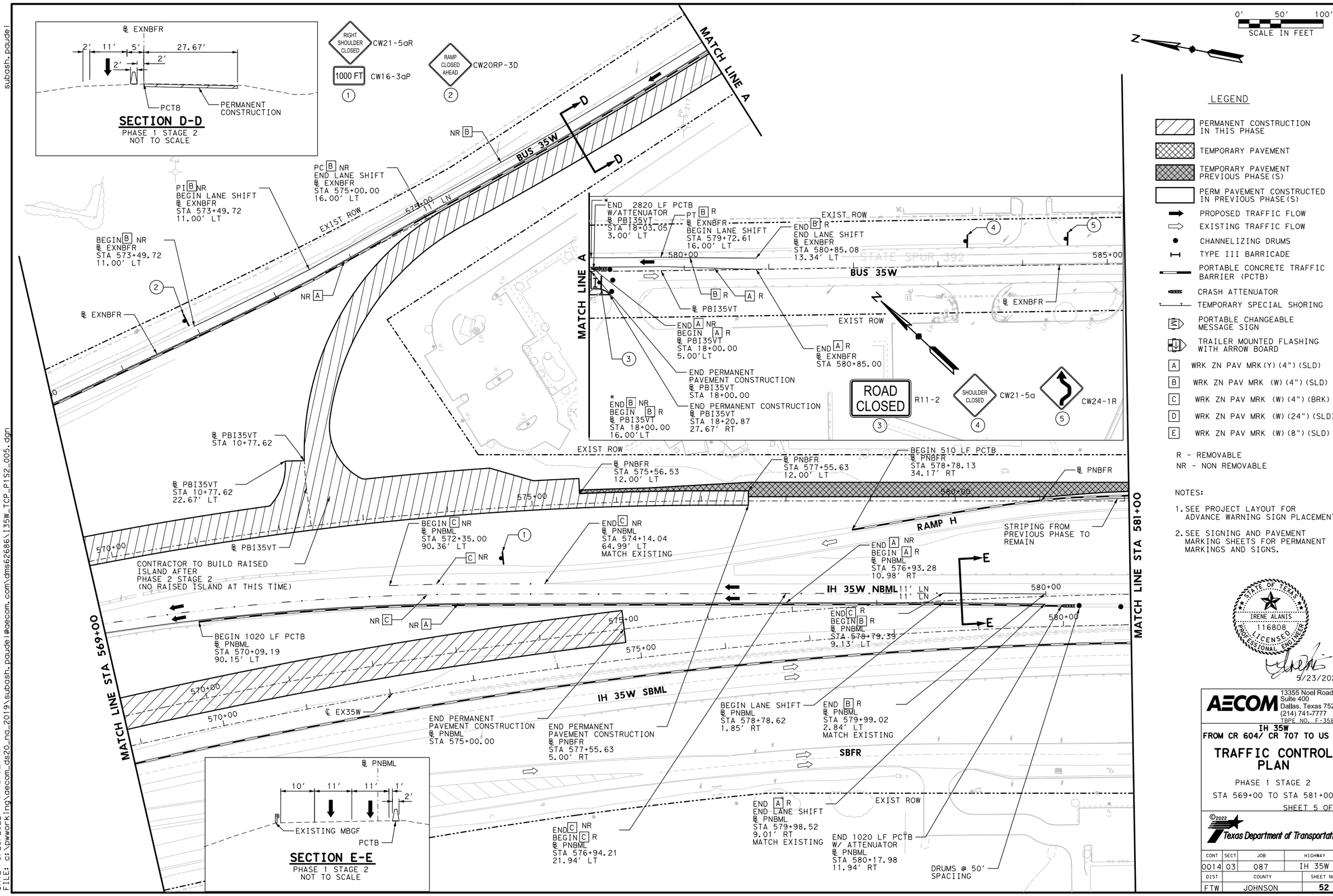
TRAFFIC CONTROL PLAN

PHASE 2 STAGE 2
STA 557+00 TO STA 569+00
SHEET 4 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		51

SECTION D-D
PHASE 1 STAGE 2
NOT TO SCALE



SECTION E-E
PHASE 1 STAGE 2
NOT TO SCALE

0′ 50′ 100′
SCALE IN FEET

N

LEGEND

- PERMANENT CONSTRUCTION IN THIS PHASE
- TEMPORARY PAVEMENT
- TEMPORARY PAVEMENT PREVIOUS PHASE(S)
- PERM PAVEMENT CONSTRUCTED IN PREVIOUS PHASE(S)
- PROPOSED TRAFFIC FLOW
- EXISTING TRAFFIC FLOW
- CHANNELIZING DRUMS
- TYPE III BARRICADE
- PORTABLE CONCRETE TRAFFIC BARRIER (PCTB)
- CRASH ATTENUATOR
- TEMPORARY SPECIAL SHORING
- PORTABLE CHANGEABLE MESSAGE SIGN
- TRAILER MOUNTED FLASHING WITH ARROW BOARD
- A WRK ZN PAV MRK (Y) (4") (SLD)
- B WRK ZN PAV MRK (W) (4") (SLD)
- C WRK ZN PAV MRK (W) (4") (BRK)
- D WRK ZN PAV MRK (W) (24") (SLD)
- E WRK ZN PAV MRK (W) (8") (SLD)

R - REMOVABLE
NR - NON REMOVABLE

NOTES:

1. SEE PROJECT LAYOUT FOR ADVANCE WARNING SIGN PLACEMENT.
2. SEE SIGNING AND PAVEMENT MARKING SHEETS FOR PERMANENT MARKINGS AND SIGNS.

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IH 35W
FROM CR 604/ CR 707 TO US 67

TRAFFIC CONTROL PLAN

PHASE 1 STAGE 2
STA 569+00 TO STA 581+00
SHEET 5 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		52

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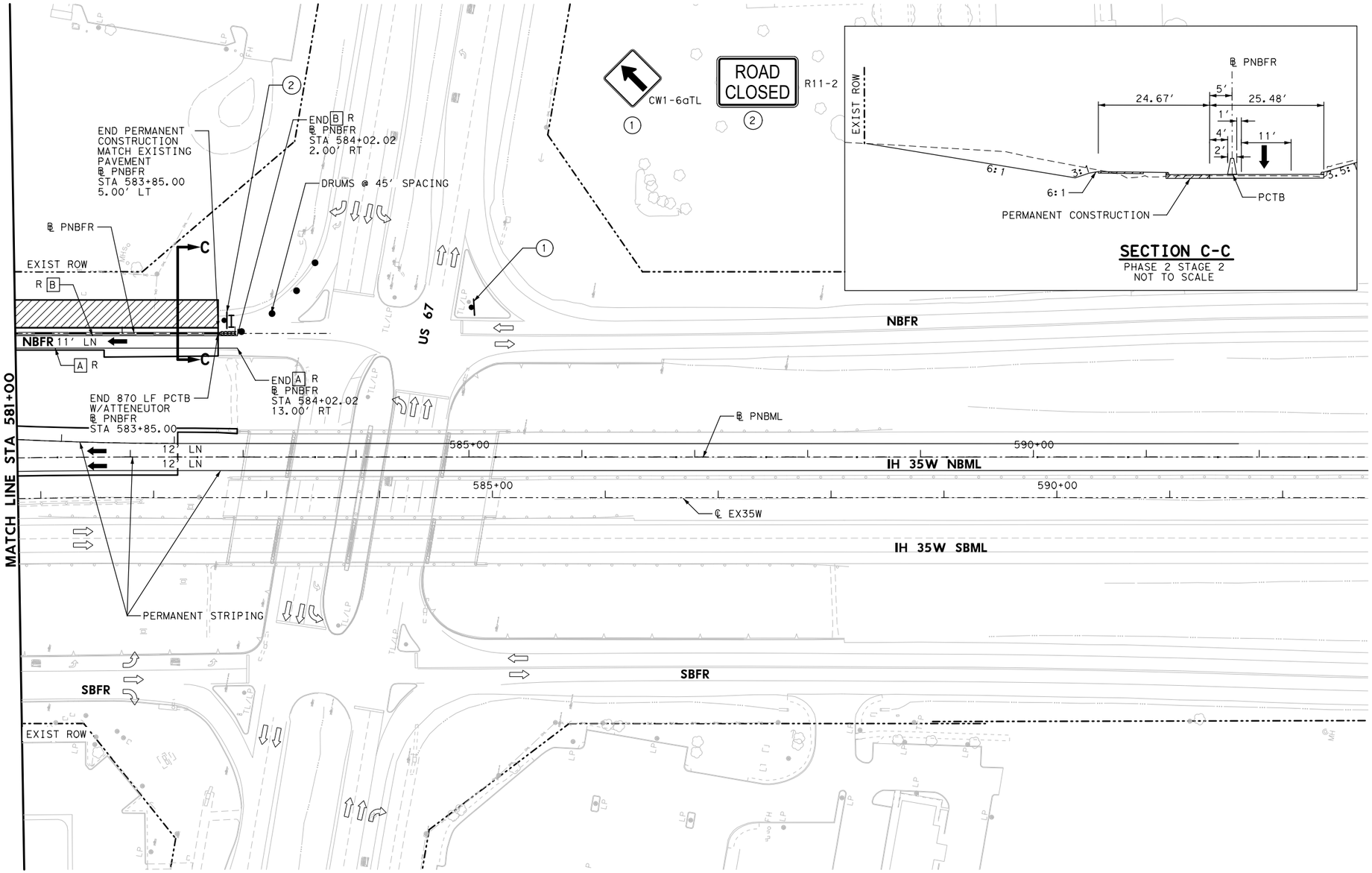

SECTION C-C
PHASE 2 STAGE 2
NOT TO SCALE

0' 50' 100'
SCALE IN FEET

N

LEGEND

- PERMANENT CONSTRUCTION IN THIS PHASE
- TEMPORARY PAVEMENT
- TEMPORARY PAVEMENT PREVIOUS PHASE(S)
- PERM PAVEMENT CONSTRUCTED IN PREVIOUS PHASE(S)
- PROPOSED TRAFFIC FLOW
- EXISTING TRAFFIC FLOW
- CHANNELIZING DRUMS
- TYPE III BARRICADE
- PORTABLE CONCRETE TRAFFIC BARRIER (PCTB)
- CRASH ATTENUATOR
- TEMPORARY SPECIAL SHORING
- PORTABLE CHANGEABLE MESSAGE SIGN
- TRAILER MOUNTED FLASHING WITH ARROW BOARD
- [A] WRK ZN PAV MRK (Y) (4") (SLD)
- [B] WRK ZN PAV MRK (W) (4") (SLD)
- [C] WRK ZN PAV MRK (W) (4") (BRK)
- [D] WRK ZN PAV MRK (W) (24") (SLD)
- [E] WRK ZN PAV MRK (W) (8") (SLD)

R - REMOVABLE
NR - NON REMOVABLE

NOTES:

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STATE OF TEXAS
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Dallas, Texas 75240
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TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

TRAFFIC CONTROL PLAN

PHASE 2 STAGE 2
STA 581+00 TO END PROJECT

SHEET 6 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		53

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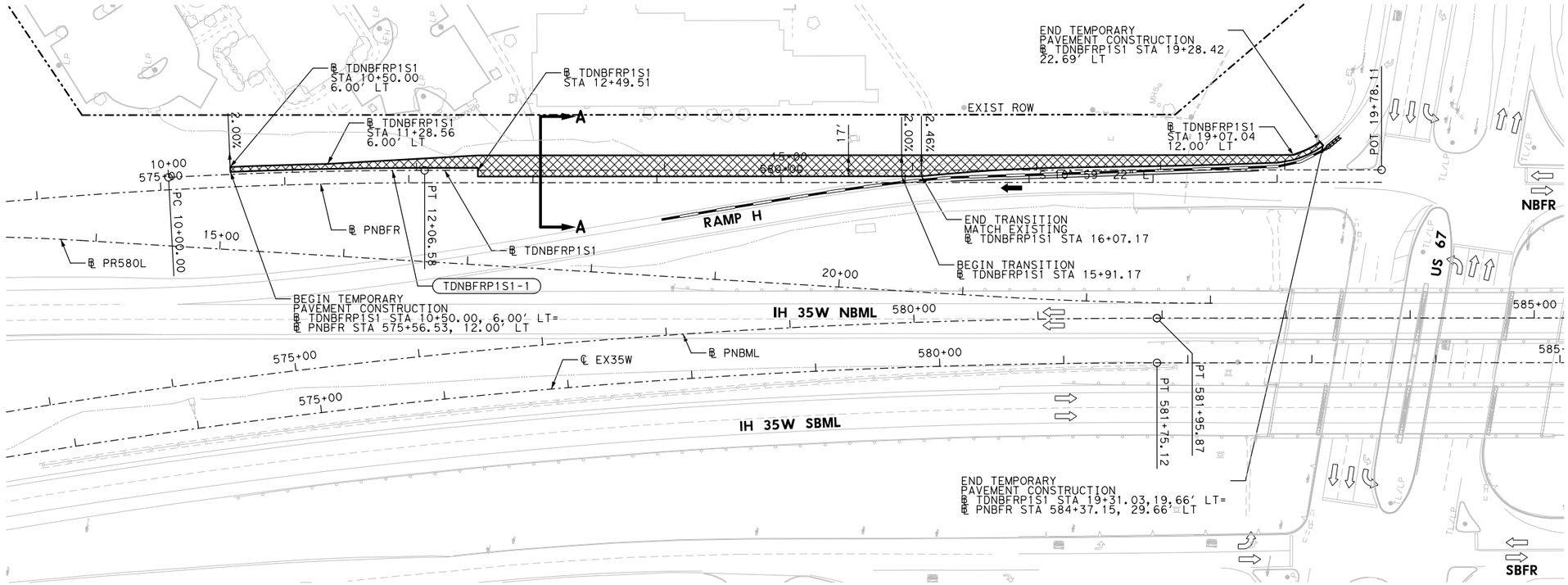

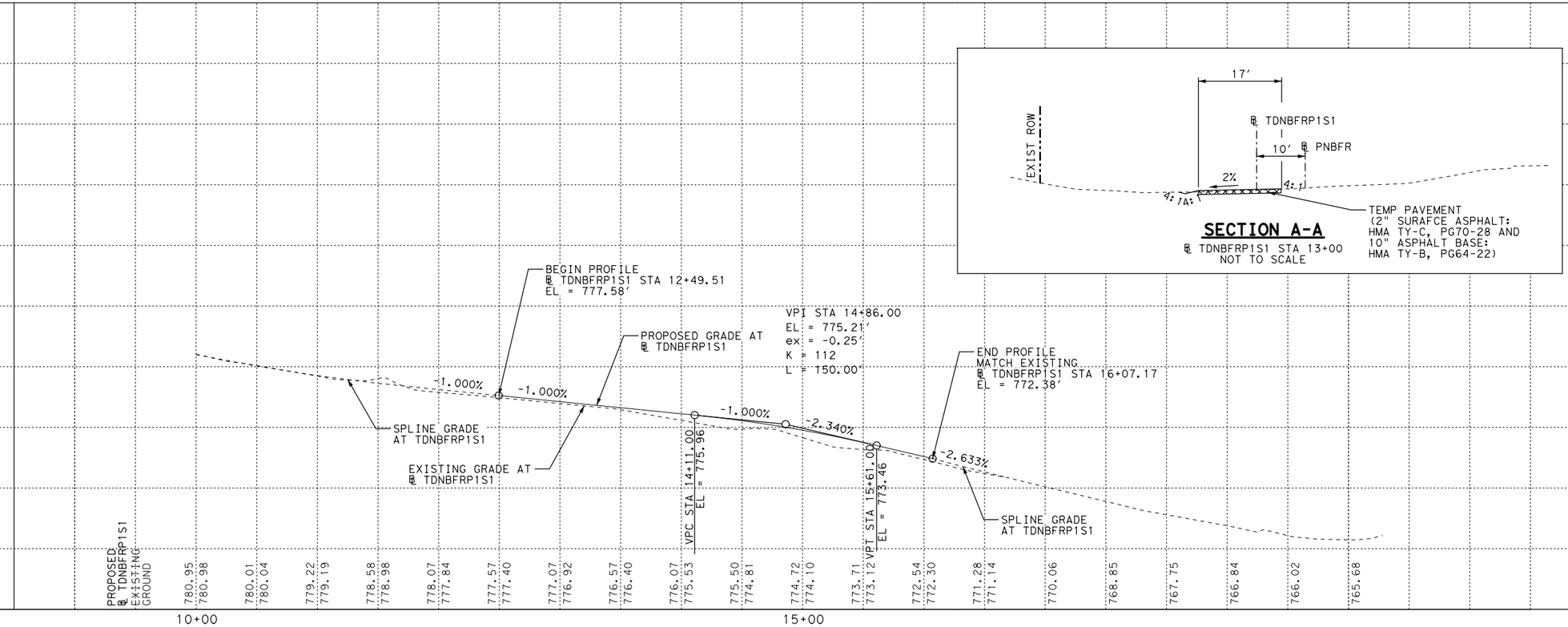

SECTION A-A
℄ TDNBFRP1S1 STA 13+00
NOT TO SCALE

STATE OF TEXAS
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5/23/2022

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TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

DETOUR PLAN & PROFILE

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		54

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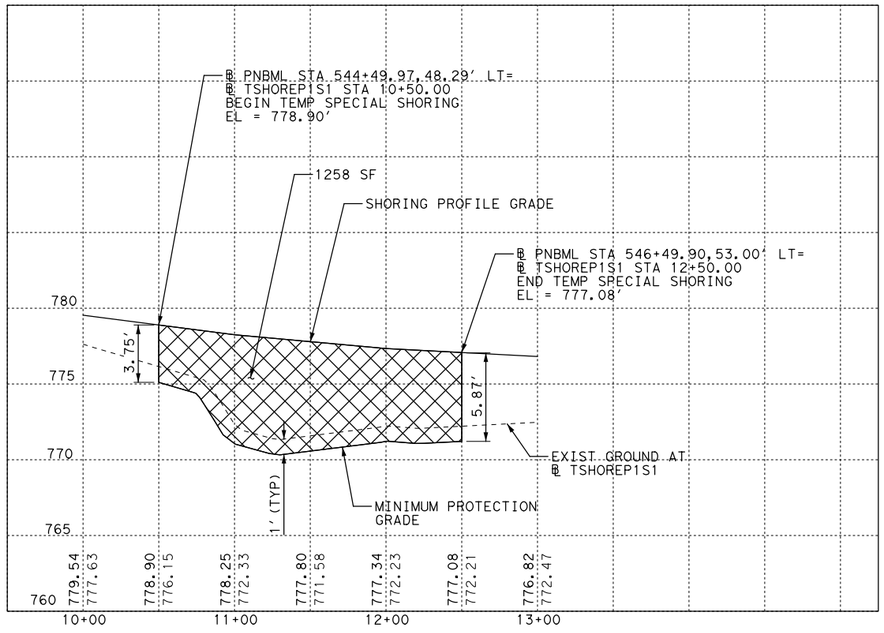
SCALE IN FEET



SHORING DETAIL

STATE OF TEXAS
IRENE ALANIS
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5/23/2022

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13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

TEMPORARY SPECIAL SHORING LAYOUT

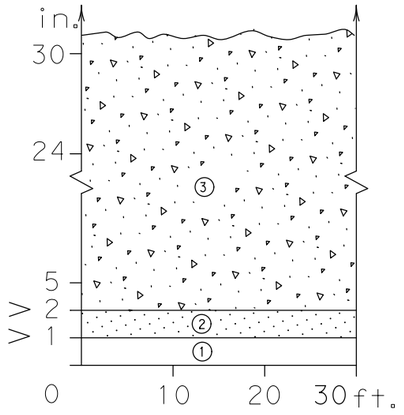
SHEET 1 OF 1

Texas Department of Transportation

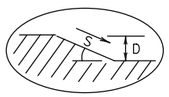
CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		55

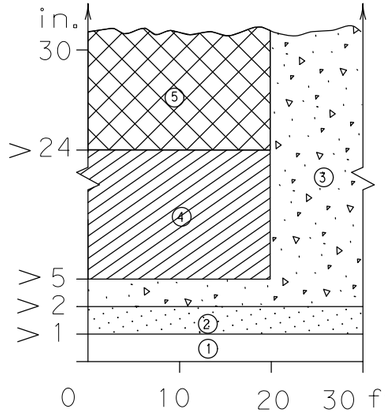
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

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

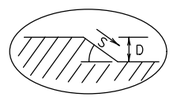


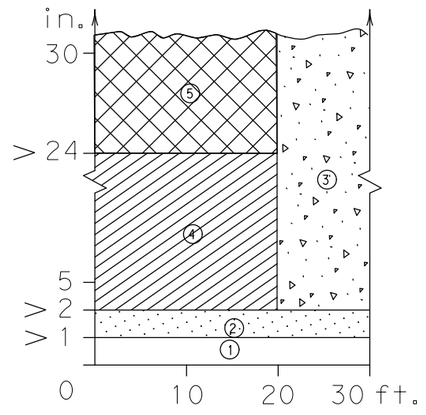
Edge Condition I
S = (3:1) (or flatter)



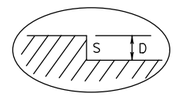


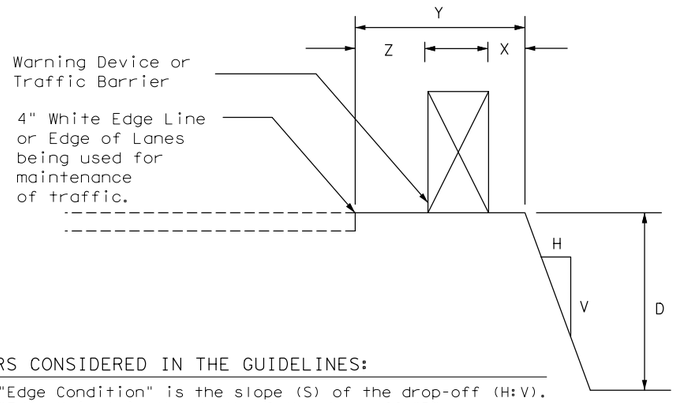
Edge Condition II
S = ((2.99):1) to (1:1)





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:

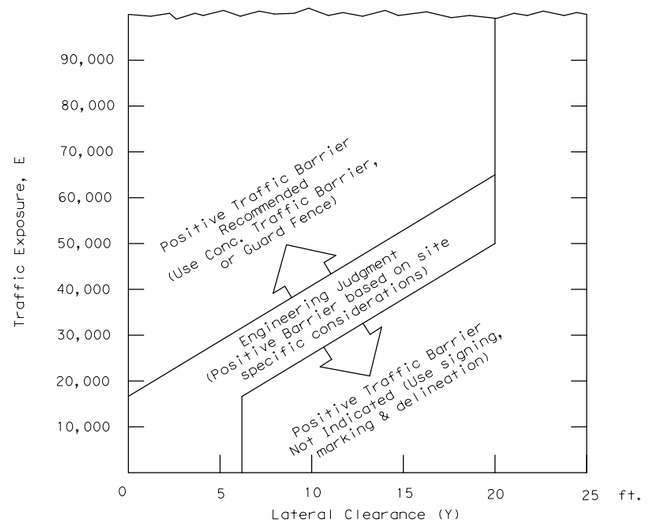
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

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
IRENE ALANIS
116808
LICENSED
PROFESSIONAL ENGINEER

Date 5/23/2022

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
REVISIONS	0014	03	087	IH 35W
03-01 08-01 9-21	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		56

DATE: 5/23/2022 10:42:55 AM
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LOC NO.	TCP PHASE	PLAN SHEET NUMBER	LOCATION	STA	TEST LEVEL	DIRECTION OF TRAFFIC (UNI/BI)	FOUNDATION PAD		BACKUP SUPPORT			AVAILABLE SITE LENGTH	CRASH CUSHION									
															MOVE / RESET		L	L	R	R	S	S
							PROPOSED MATERIAL	PROPOSED THICKNESS	DESCRIPTION	WIDTH	HEIGHT		INSTALL	REMOVE	MOVE/ RESET	FROM LOC. #	N	W	N	W	N	W
1	1-1	1	IH 35W NBML	℄ PNBML STA 540+01.36 24.77' LT	2 & 3	UNI	NA	NA	PCTB	24"	42"		1								X	
1A	1-1	2	EXIST NBFR	℄ EXNBFR STA 551+23.96 10.50' LT	2 & 3	BI	NA	NA	PCTB	24"	42"		1								X	
2A	1-1	2	EXIST NBFR	℄ EXNBFR STA 552+13.96 10.50' LT	2 & 3	BI	NA	NA	PCTB	24"	42"		1								X	
2B	1-1	2	EXIST NBFR	℄ EXNBFR STA 553+08.88 10.50' LT	2 & 3	BI	NA	NA	PCTB	24"	42"		1								X	
2	1-1	3	EXIST IH 35W ENTRANCE RAMP	℄ PNBML STA 558+03.41 30.74' RT	2 & 3	UNI	NA	NA	PCTB	24"	42"		1								X	
3	1-1	3	EXIST NBFR	℄ EXNBFR STA 562+53.27 13.33' LT	2 & 3	BI	NA	NA	PCTB	24"	42"		1								X	
4	1-1	5	EXIST RAMP H	℄ PNBFR STA 584+38.70 26.55' LT	2 & 3	UNI	NA	NA	PCTB	24"	42"		1	1							X	
5	1-2	2	IH 35W SBML	℄ PNBML STA 541+77.68 57.53' RT	2 & 3	UNI	NA	NA	PCTB	24"	42"				1	1					X	
5A	1-2	3	IH 35W NBML	℄ PNBML STA 554+13.54 58.75' LT	2 & 3	UNI	NA	NA	PCTB	24"	42"				1	1A					X	
6	1-2	4	IH 35W NBML	℄ PNBML STA 564+00.75 109.71'LT	2 & 3	UNI	NA	NA	PCTB	24"	42"				1	2					X	
7	1-2	5	BUS 35W	℄ PBI35VT STA 18+03.05 3.00' LT	2 & 3	UNI	NA	NA	PCTB	24"	42"				1	2A					X	
8	1-2	5	IH 35W NBML	℄ PNBML STA 580+17.98 11.94' RT	2 & 3	UNI	NA	NA	PCTB	24"	42"				1	2B					X	
9	1-2	6	EXIST RAMP H	℄ PNBFR STA 583+85.10 12.27 LT	2 & 3	UNI	NA	NA	PCTB	24"	42"			1	1	3					X	
9A	1-3	4	IH 35W SBML	℄ PNBML STA 568+37.29 57.58' RT	2 & 3	UNI	NA	NA	PCTB	24"	42"			1	1	5					X	
10	1-3	6	IH 35W NBML	℄ PNBML STA 589+35.17 0.85' RT	2 & 3	UNI	NA	NA	PCTB	24"	42"			1	1	8					X	
10	2-1	4	BUS 35W	℄ EXNBFR STA 583+53.44 9.78' LT	2 & 3	UNI	NA	NA	PCTB	24"	42"				1	5A					X	
11	2-1	5	EXIST RAMP H	℄ PNBFR STA 584+24.81 3.19' RT	2 & 3	UNI	NA	NA	PCTB	24"	42"				1	6					X	
12	2-1	5	IH 35W NBML	℄ PNBML STA 587+28.97 12.37' LT	2 & 3	UNI	NA	NA	PCTB	24"	42"				1	7					X	
13	2-2	3	IH 35W NBML	℄ PNBML STA 547+66.65 13.84' LT	2 & 3	UNI	NA	NA	PCTB	24"	42"			1	1	11					X	
14	2-2	3	EXIST NBFR	℄ EXNBFR STA 548+95.49 3.00 RT	2 & 3	UNI	NA	NA	PCTB	24"	42"			1	1	12					X	
15	2-2	4	PROP NBFR	℄ PNBFR STA 560+23.13	2 & 3	UNI	NA	NA	PCTB	24"	42"			1	1	13					X	
16	2-2	6	PROP NBFR	℄ PNBFR STA 583+85.00	2 & 3	UNI	NA	NA	PCTB	24"	42"		1	1							X	
												TOTALS	8	8	14							

LEGEND:
L=LOW MAINTENANCE
R=REUSABLE
S=SACRIFICIAL
N=NARROW
W=WIDE

FOR DEFINITIONS SEE THE "CRASH CUSHION CATEGORIZATION CHART.PDF" AT THE DESIGN DIVISION (ROADWAY STANDARDS) WEBSITE. USE QUICK LINKS TO ACCESS ATTENUATORS / CRASH CUSHIONS SECTION.
http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/rdwylse.htm

STATE OF TEXAS
IRENE ALANIS
116808
LICENSED
PROFESSIONAL ENGINEER
5/23/2022

CRASH CUSHION SUMMARY SHEET

SHEET 1 OF 1

FILE: ccss.dgn	DN: TxDOT	CK:	CK:
© TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	03	087	IH 35W
	DIST	COUNTY	
	FTW	JOHNSON	
	FEDERAL AID PROJECT		SHEET NO.
			57

DATE: 5/23/2022 10:43:09 AM
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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	0014	03	087	IH 35W
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		58

DATE: 5/23/2022 10:43:10 AM
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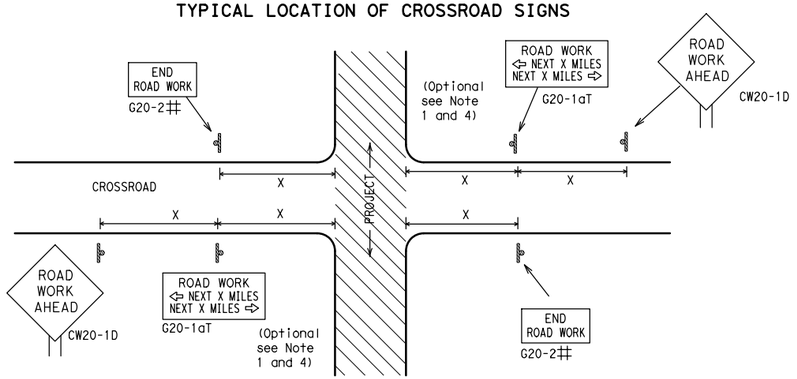
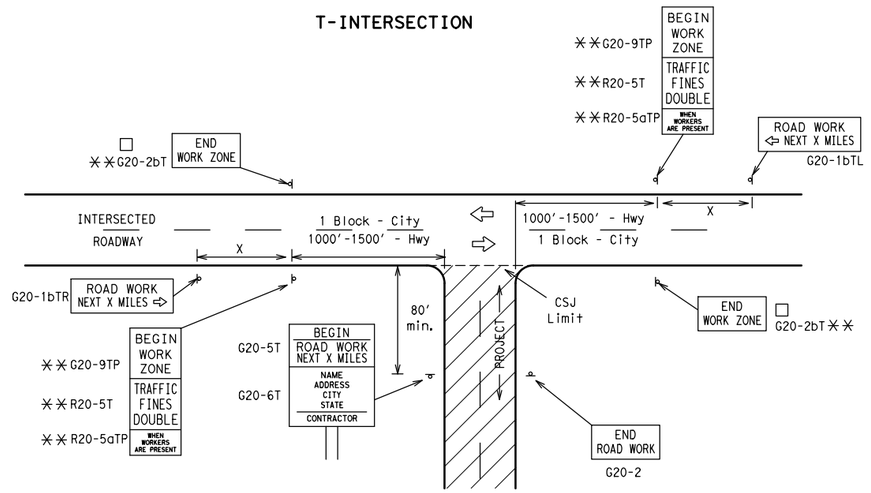
TYPICAL LOCATION OF CROSSROAD SIGNS



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]

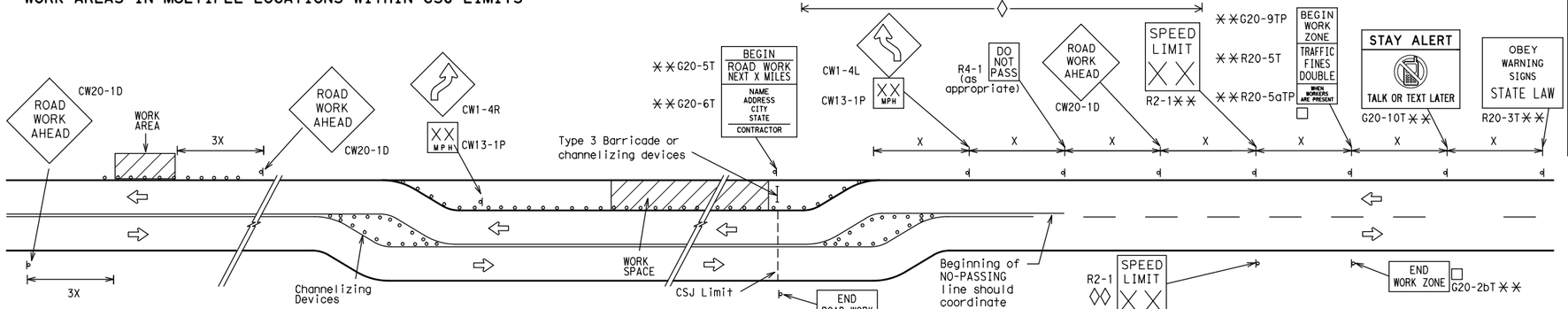
✳ For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

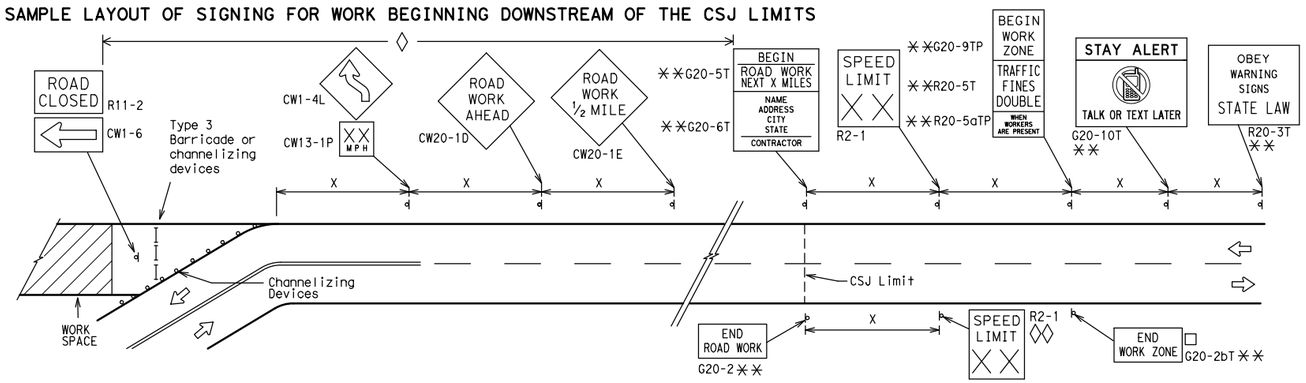
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may 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 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.

SHEET 2 OF 12

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
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	03	087	IH 35W
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	FTW	JOHNSON		59

DATE: 5/23/2022 10:43:11 AM
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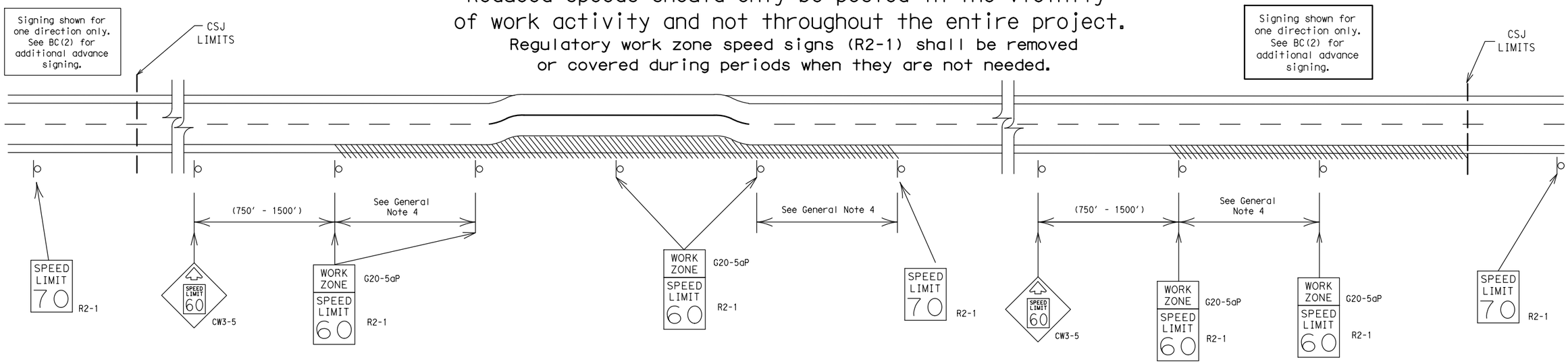
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13 5-21	0014	03	087	IH 35W
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		60

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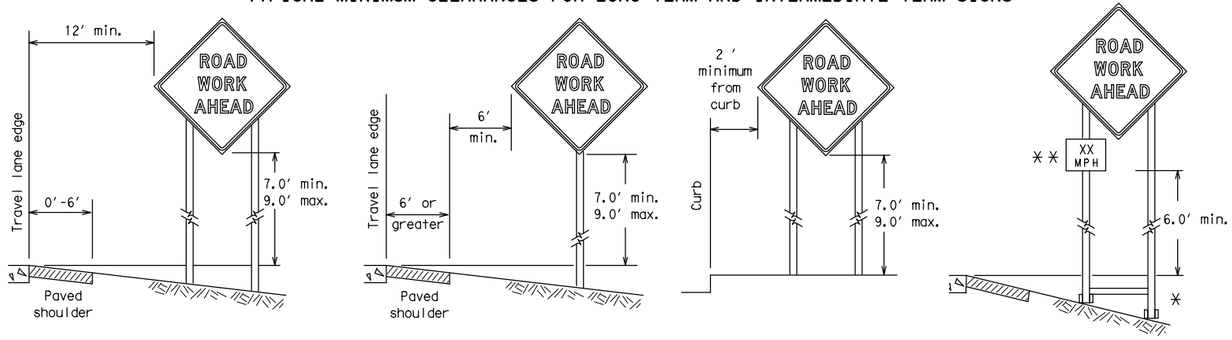
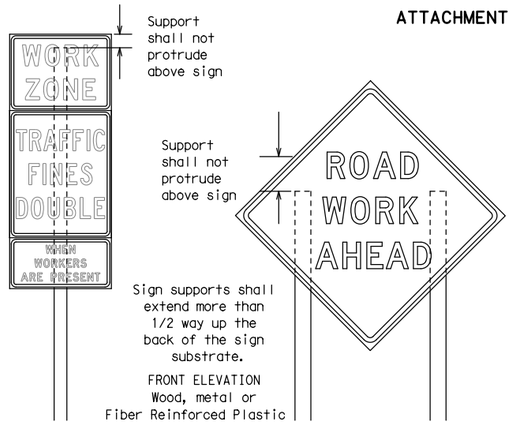
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

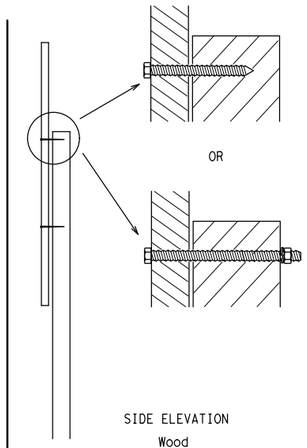


⁎ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

⁎⁎ 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





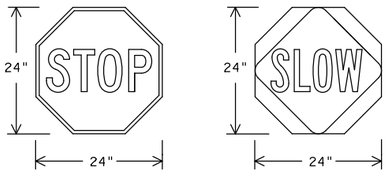
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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.



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.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	FTW	JOHNSON		61

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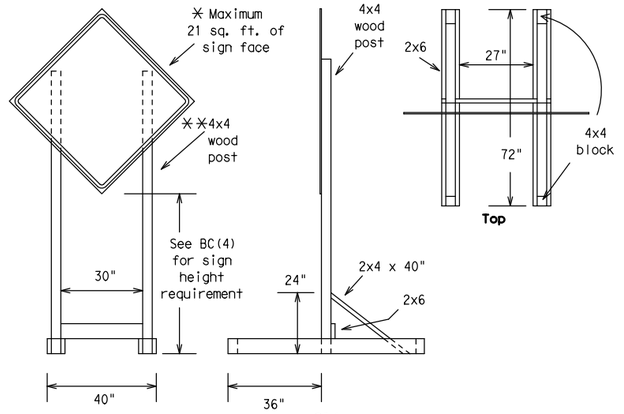
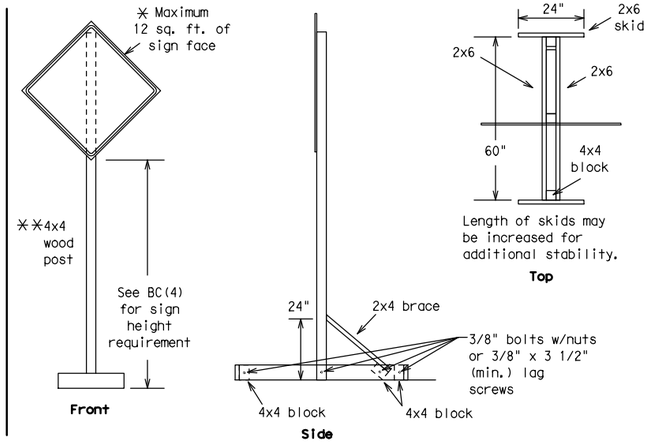
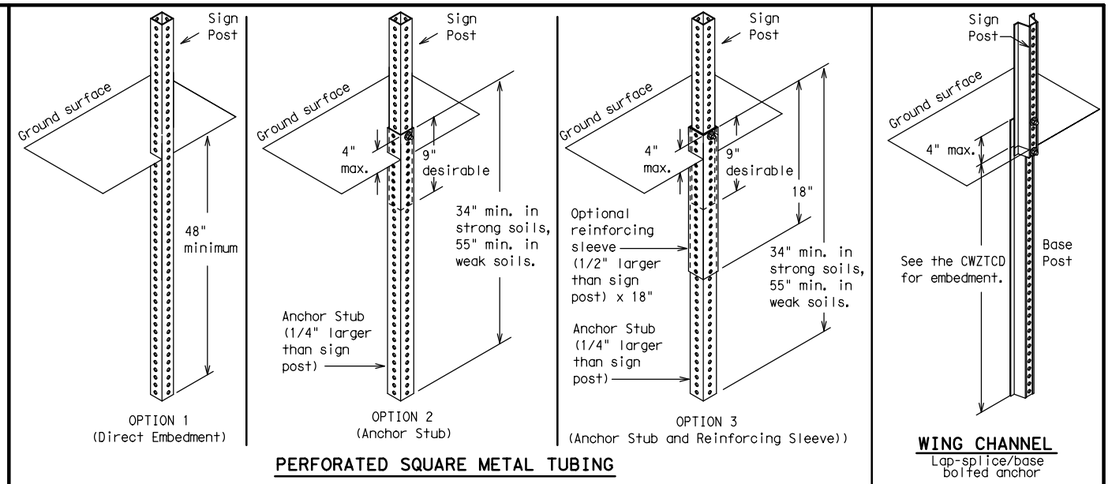




SKID MOUNTED WOOD SIGN SUPPORTS

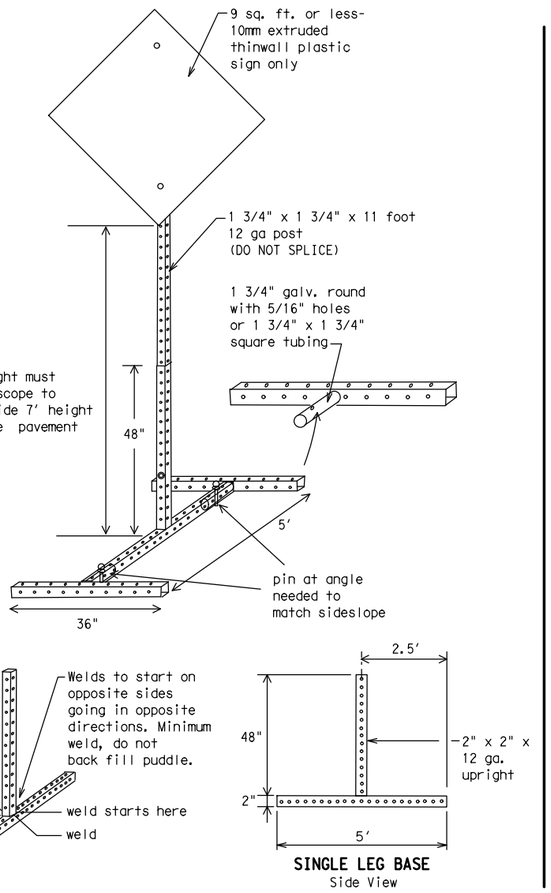
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

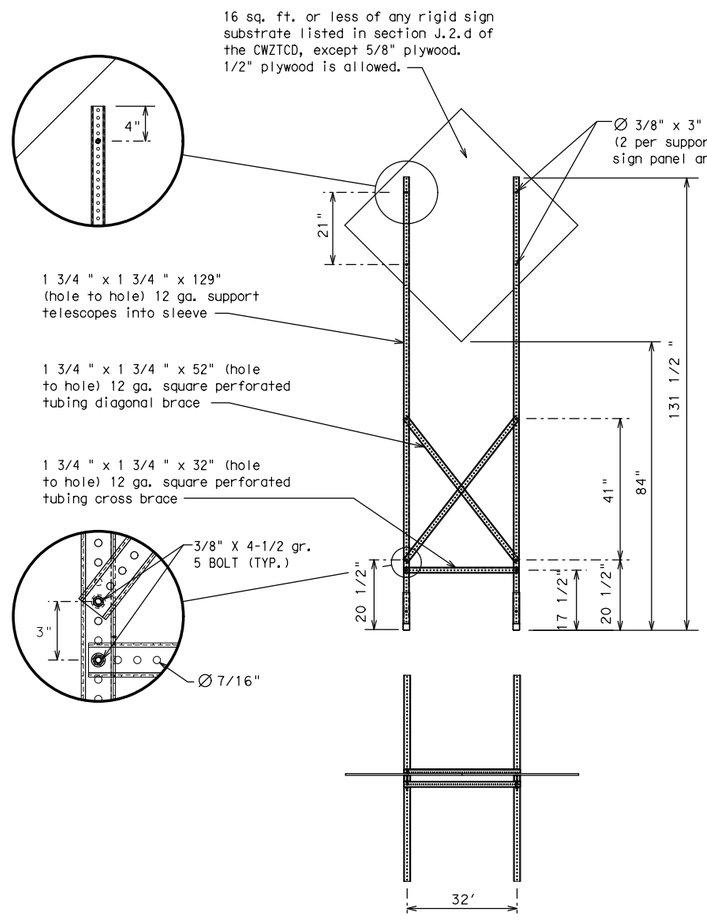


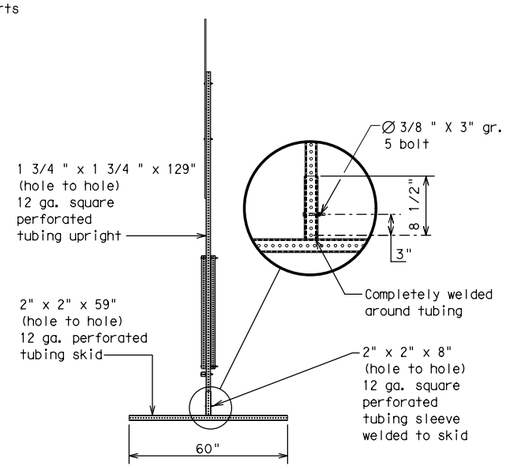
PERFORATED SQUARE METAL TUBING

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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	FTW	JOHNSON		62

DATE: 5/23/2022 10:43:15 AM
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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 *

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

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9-07 8-14		DIST	COUNTY		SHEET NO.
7-13 5-21		FTW	JOHNSON		63

100

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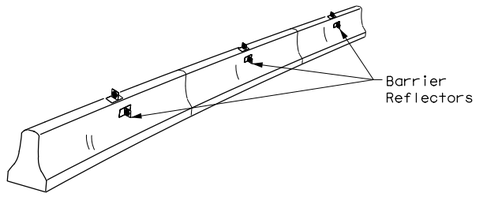
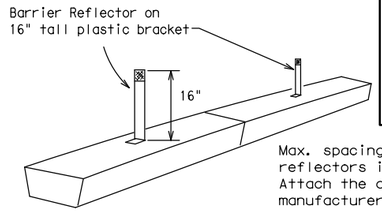
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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

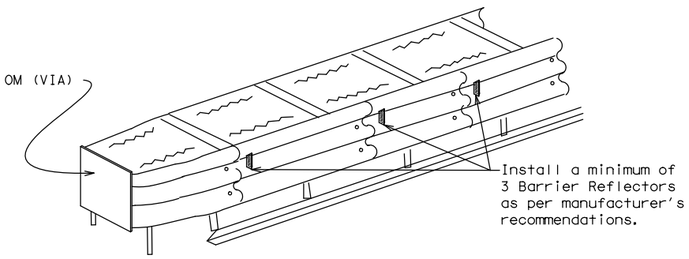


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB)

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.

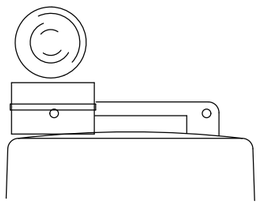


DELINEATION OF END TREATMENTS

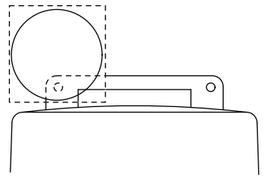
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

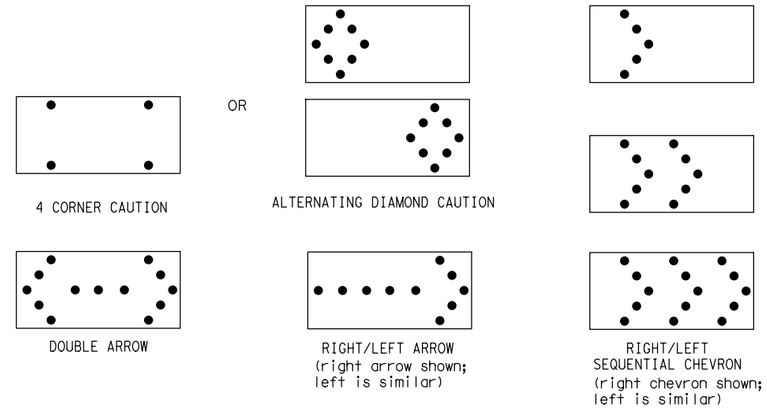
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing 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.

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	0014	03	087	IH 35W
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	FTW	JOHNSON		64

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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:

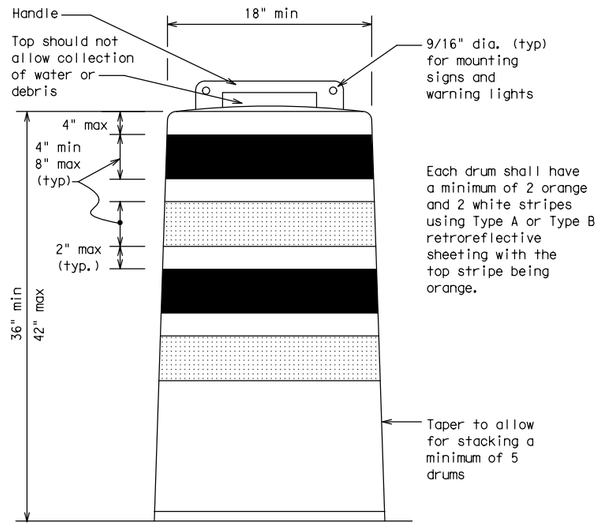
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents 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.

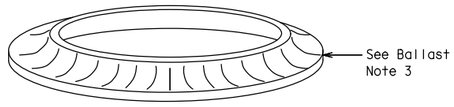
RETROREFLECTIVE SHEETING

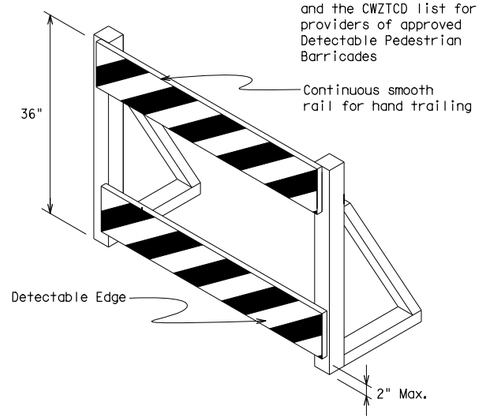
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall 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.

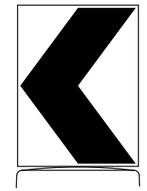




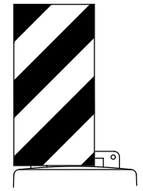


DETECTABLE PEDESTRIAN BARRICADES

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	0014	03	087	IH 35W
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	FTW	JOHNSON		65
7-13				

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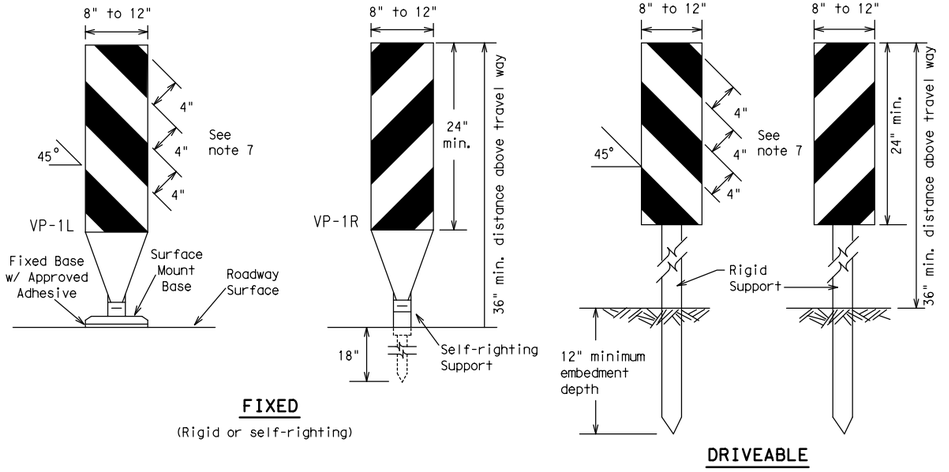
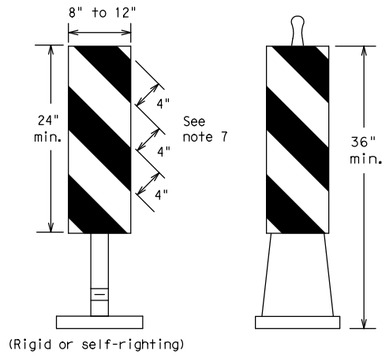


FIXED
(Rigid or self-righting)

DRIVEABLE

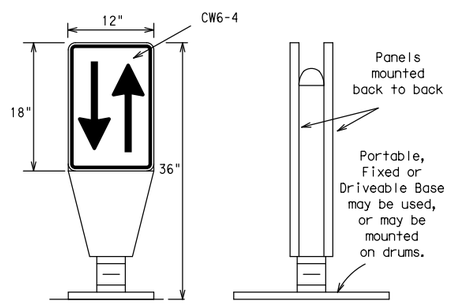


(Rigid or self-righting)

PORTABLE

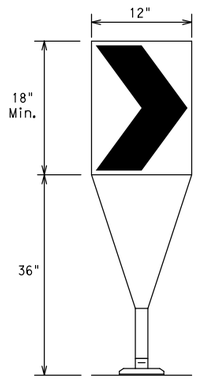
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is 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)



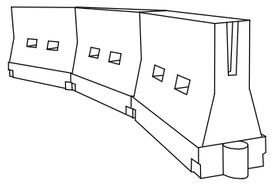
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

SHEET 9 OF 12

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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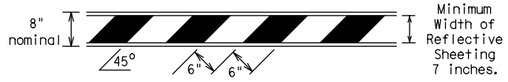
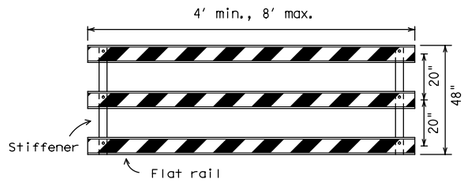
TYPE 3 BARRICADES

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.



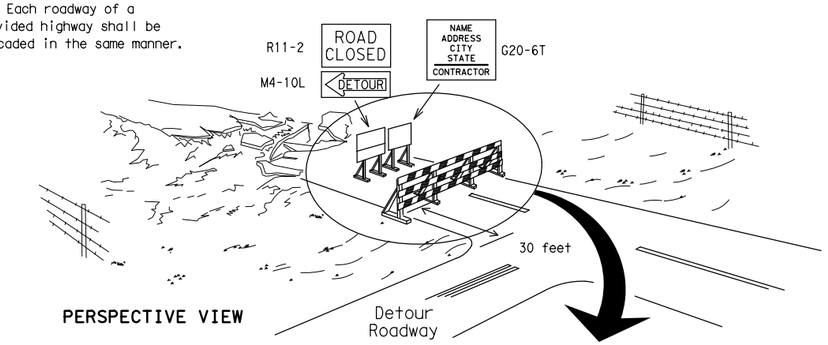
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

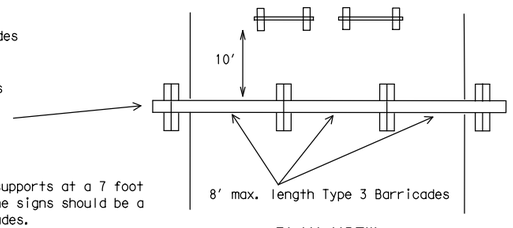
Each roadway of a divided highway shall be barricaded in the same manner.



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.

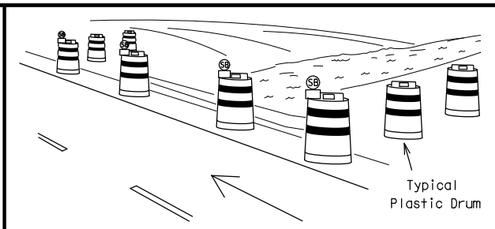
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

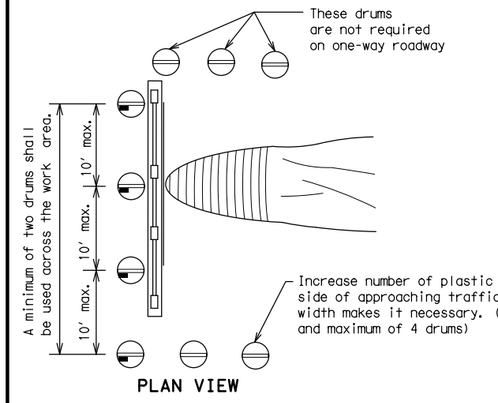
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

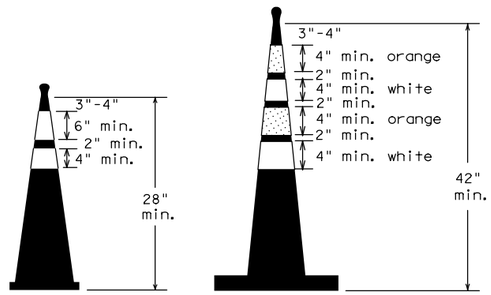
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder 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.



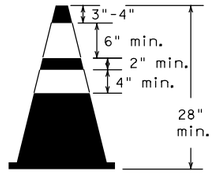
PLAN VIEW

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

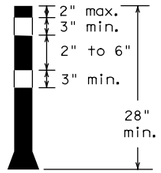
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

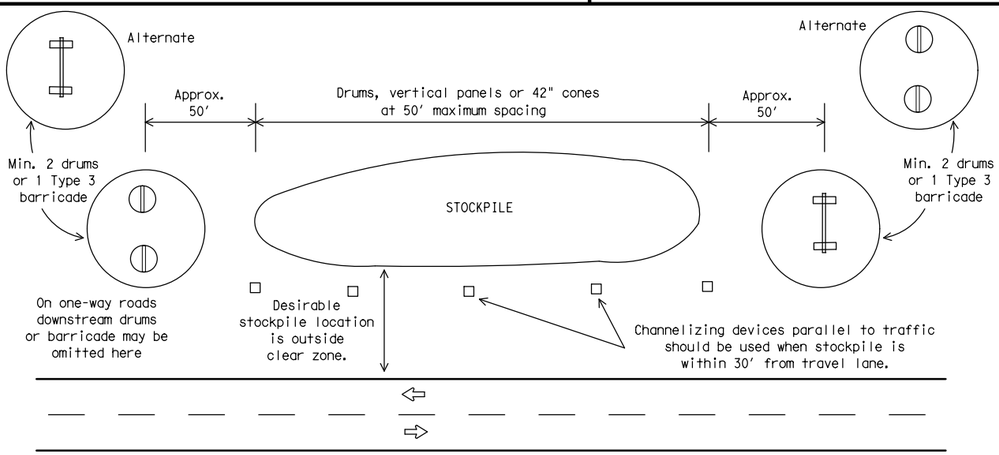


Tubular Marker

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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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.

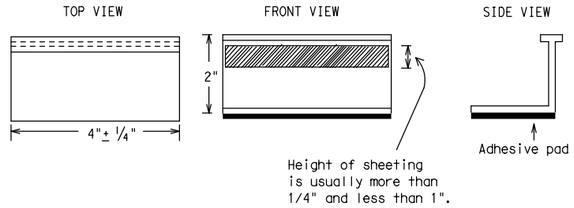
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

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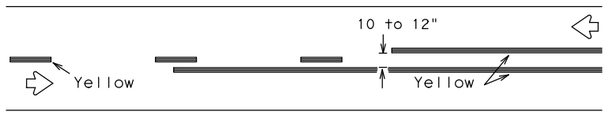
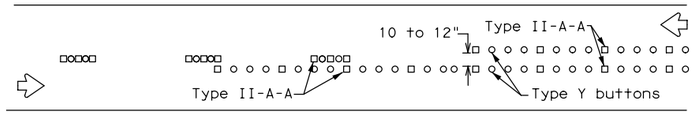
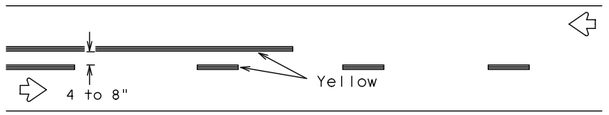
PAVEMENT MARKING PATTERNS



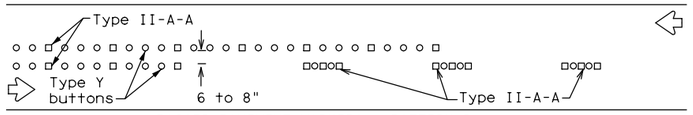
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



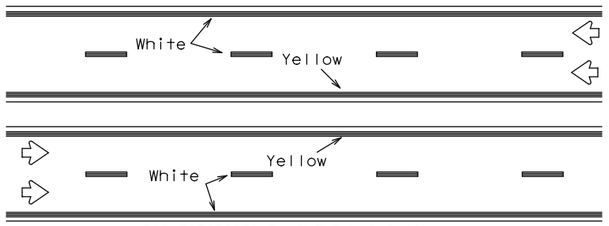
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



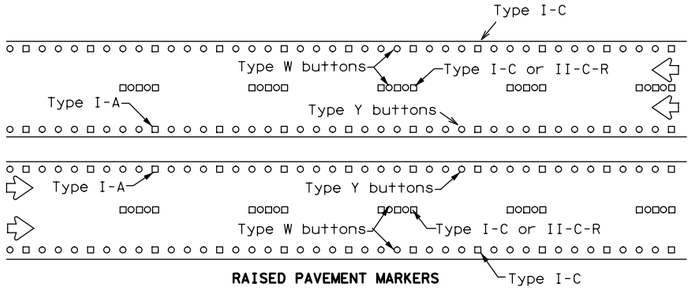
RAISED PAVEMENT MARKERS - PATTERN B

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



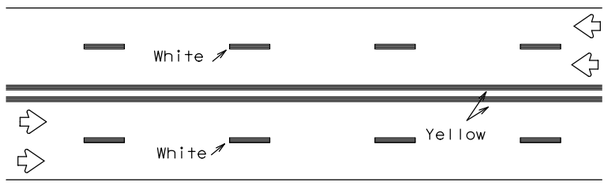
REFLECTORIZED PAVEMENT MARKINGS



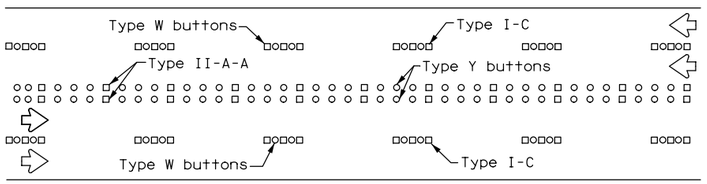
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



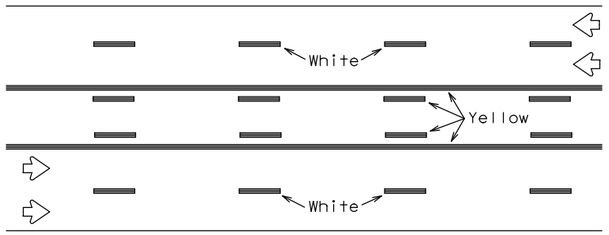
REFLECTORIZED PAVEMENT MARKINGS



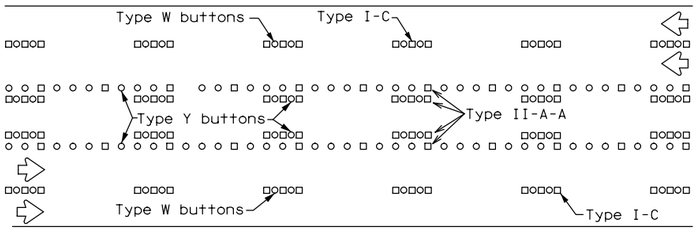
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

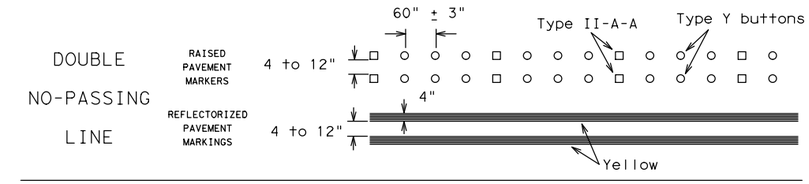
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

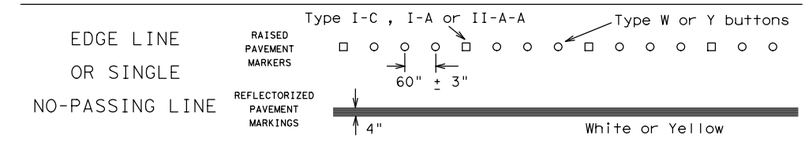
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

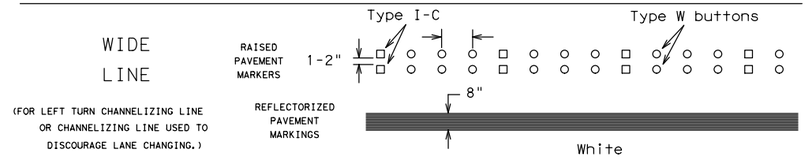


EDGE LINE OR SINGLE NO-PASSING LINE



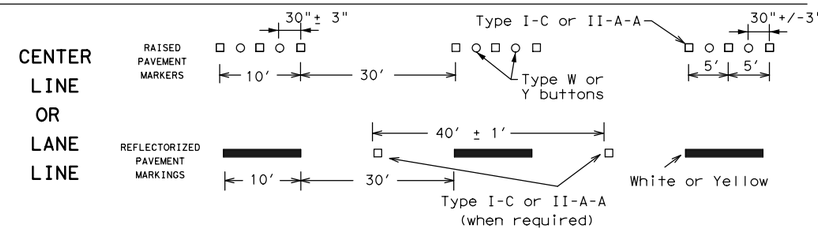
WIDE LINE

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

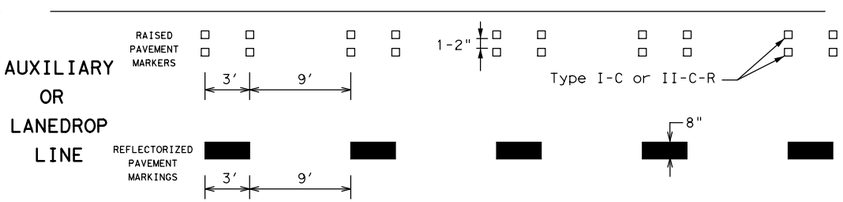


BROKEN LINES

CENTER LINE OR LANE LINE

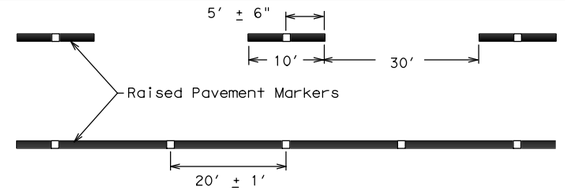


AUXILIARY OR LANEDROP LINE



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."

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

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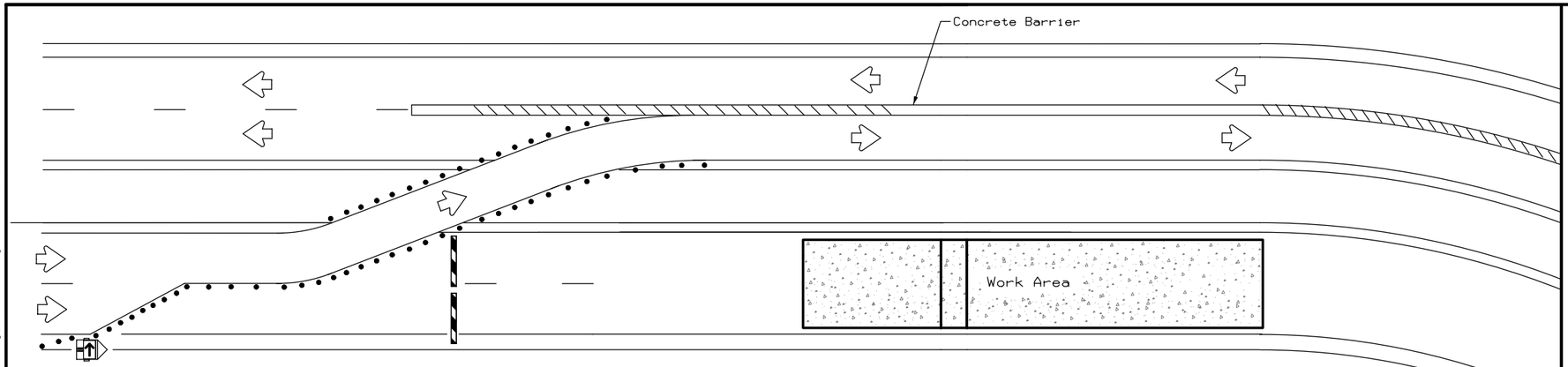


NOTES:

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.

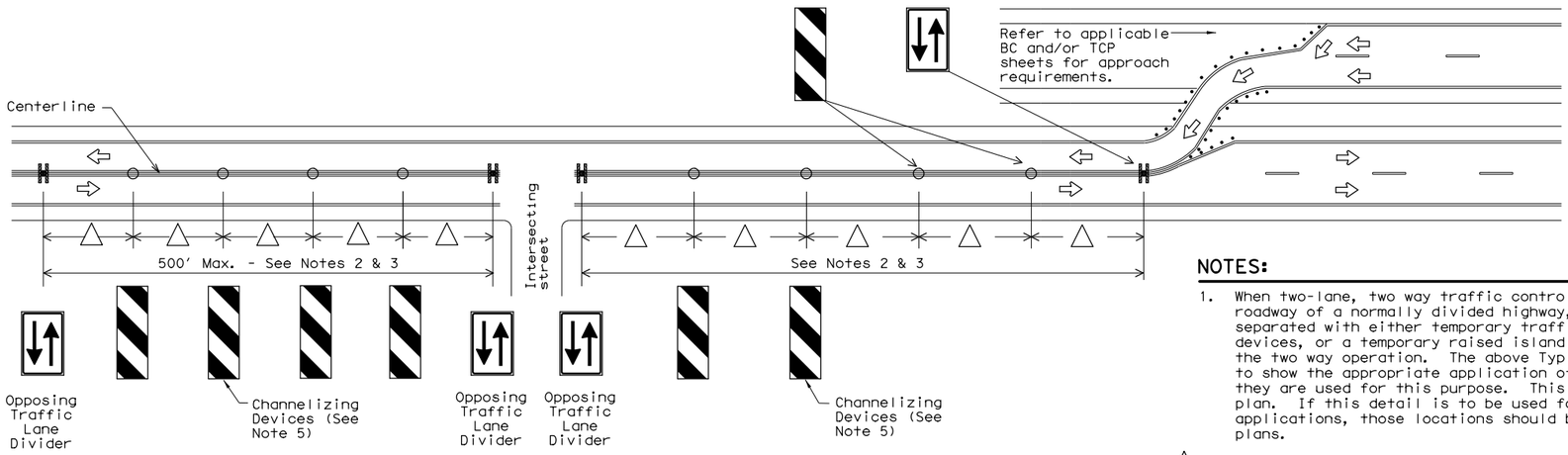
BARRIER DELINEATION WITH MODULAR GLARE SCREENS

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

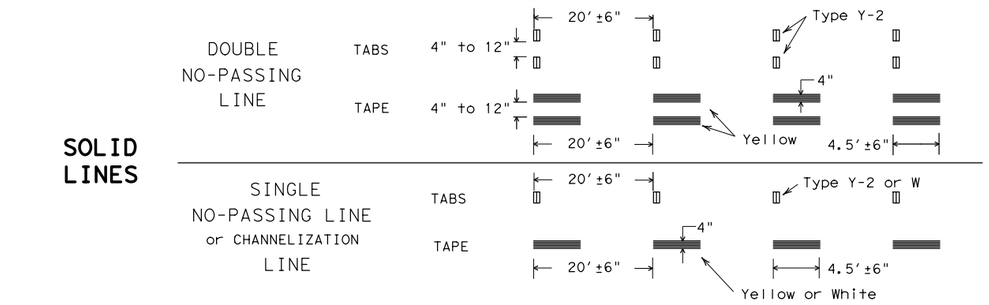
TRAFFIC CONTROL PLAN TYPICAL DETAILS

WZ(TD)-17

FILE: wztd-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-98 2-17 3-03 7-13	0014	03	087	IH 35W
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		70

110

WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



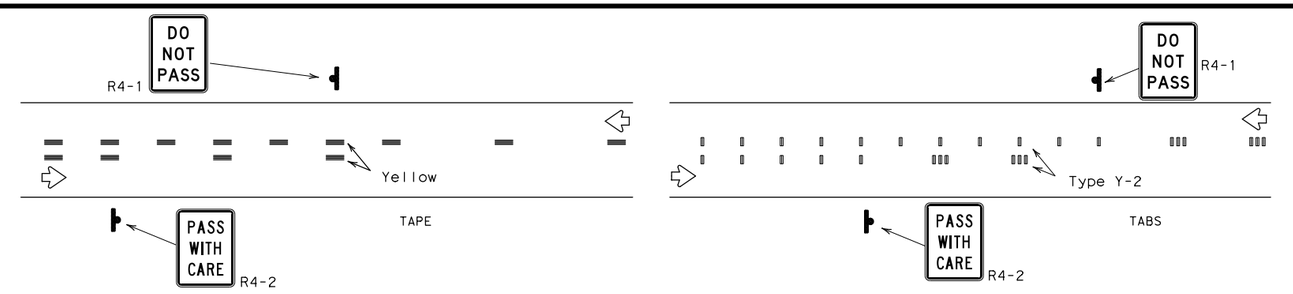
NOTES:

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.

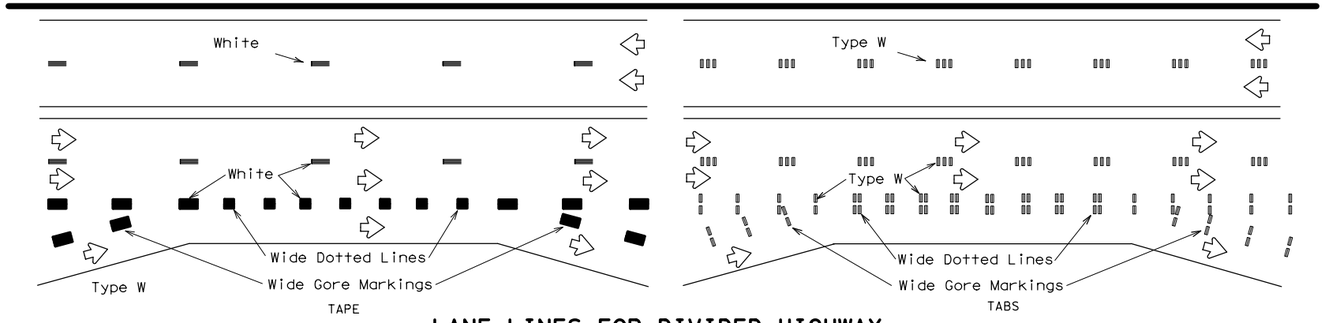
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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.

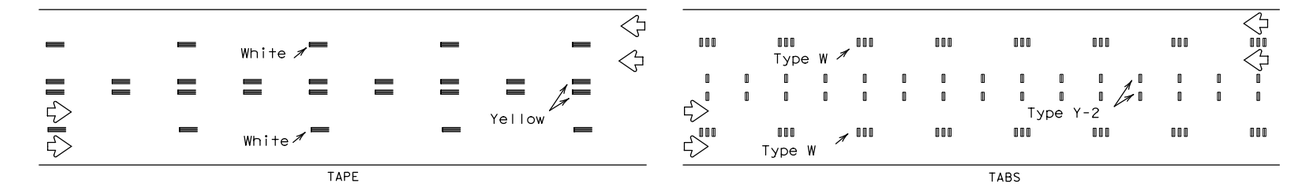
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



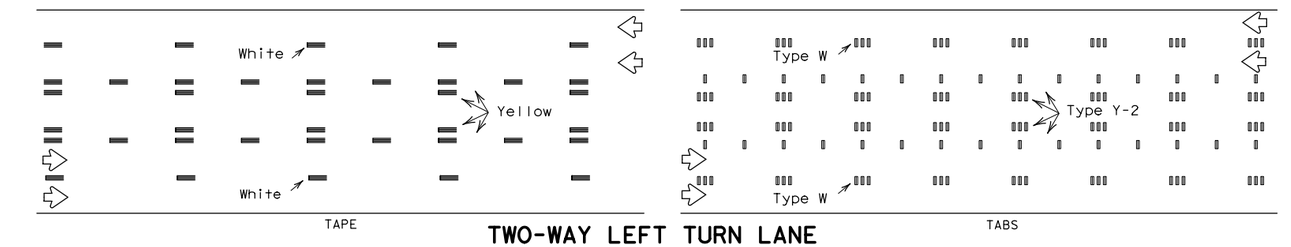
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



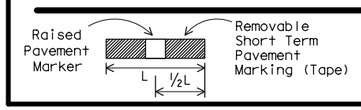
LANE LINES FOR DIVIDED HIGHWAY



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 Operations Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-13

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© TxDOT	April 1992	CONT	SECT	JOB	HIGHWAY
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1-97		DIST	COUNTY		SHEET NO.
3-03		FTW	JOHNSON		71
7-13					

111

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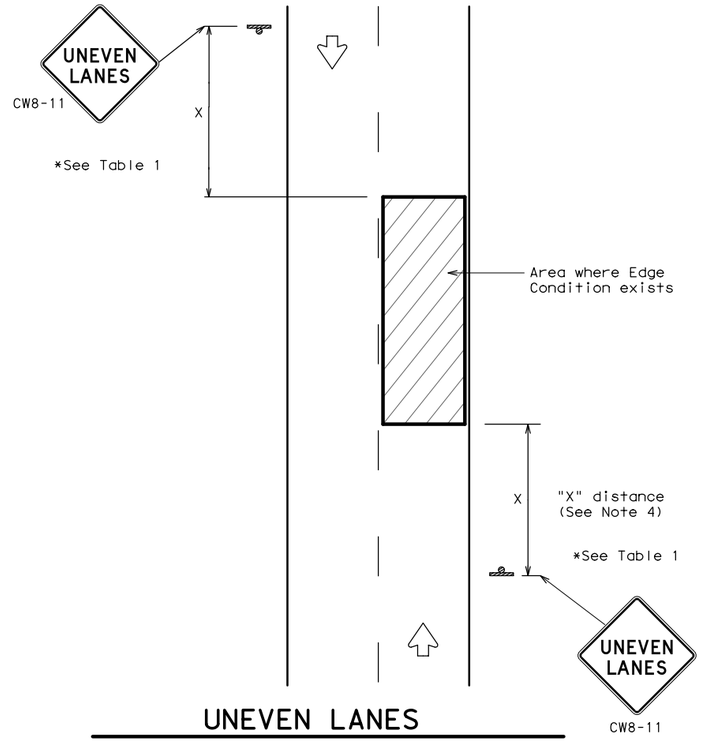
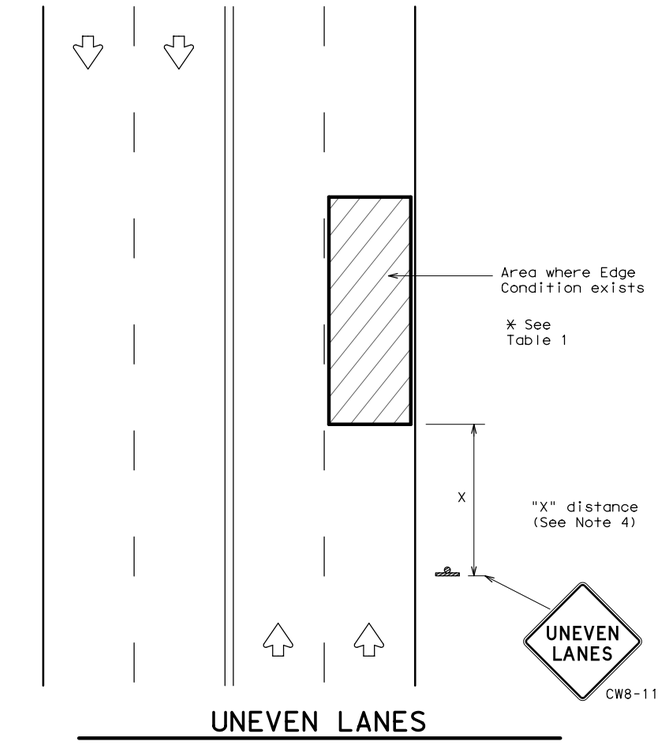
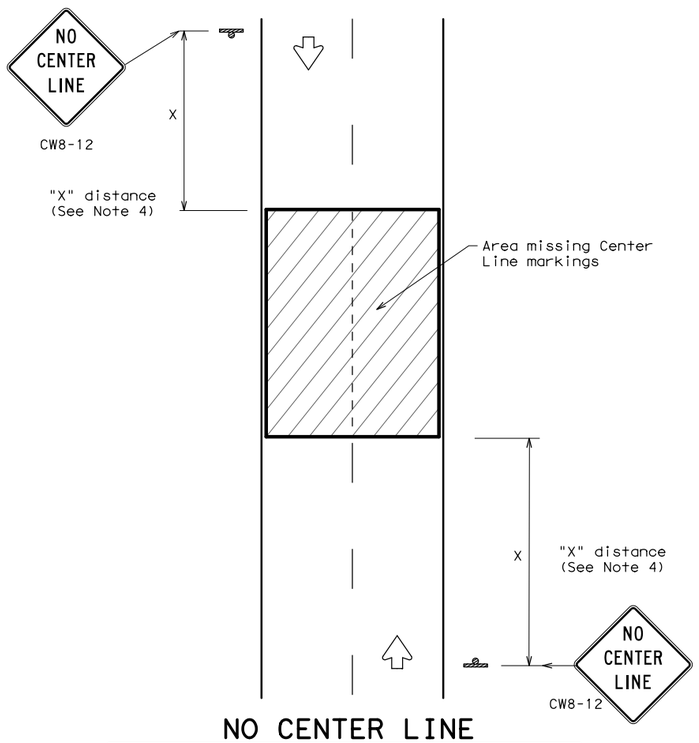


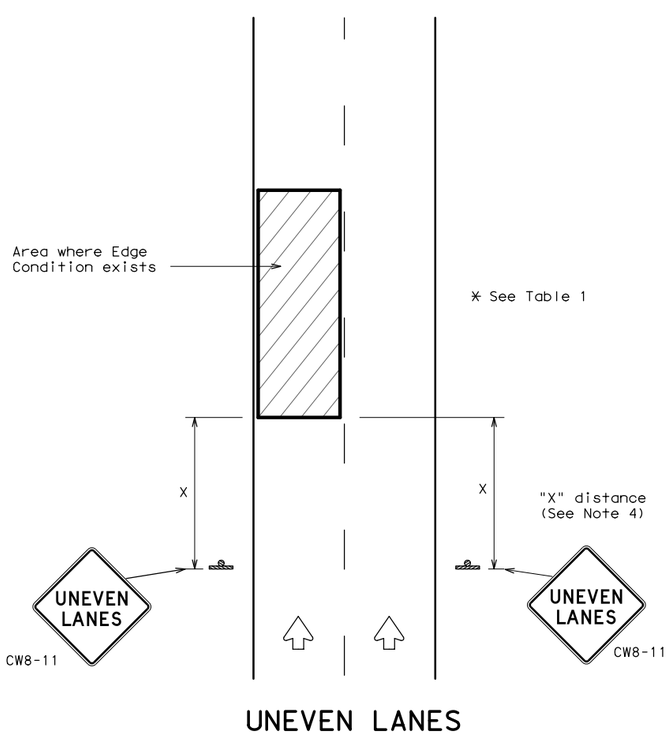
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

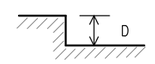
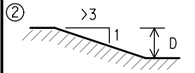
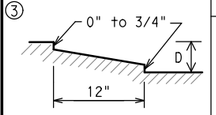
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

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	0014	03	087	IH 35W
8-95 2-98 7-13	DIST	COUNTY		SHEET NO.
1-97 3-03	FTW	JOHNSON		72

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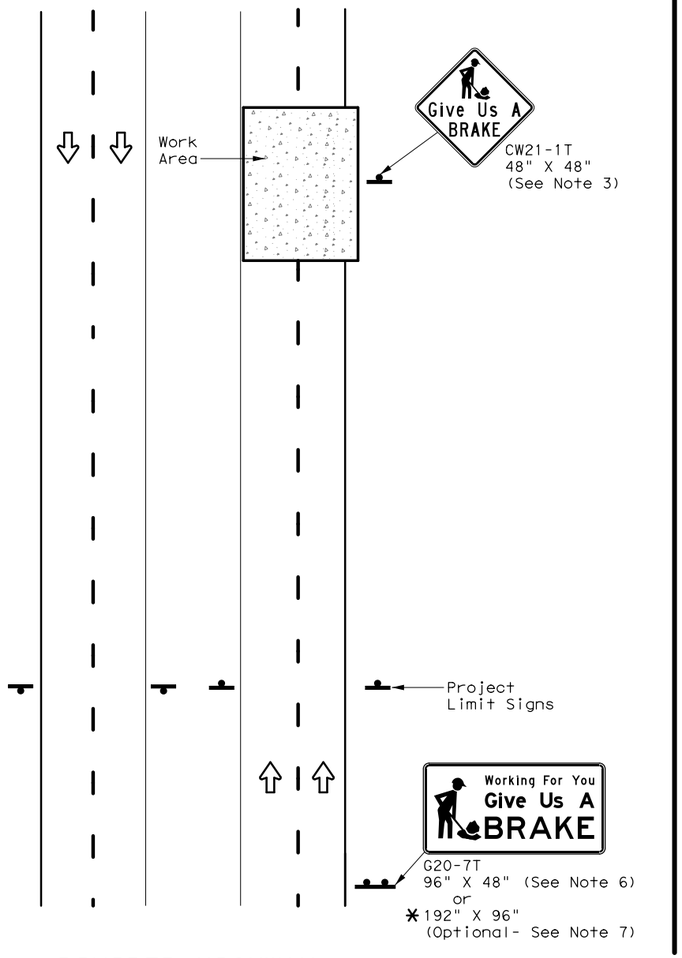
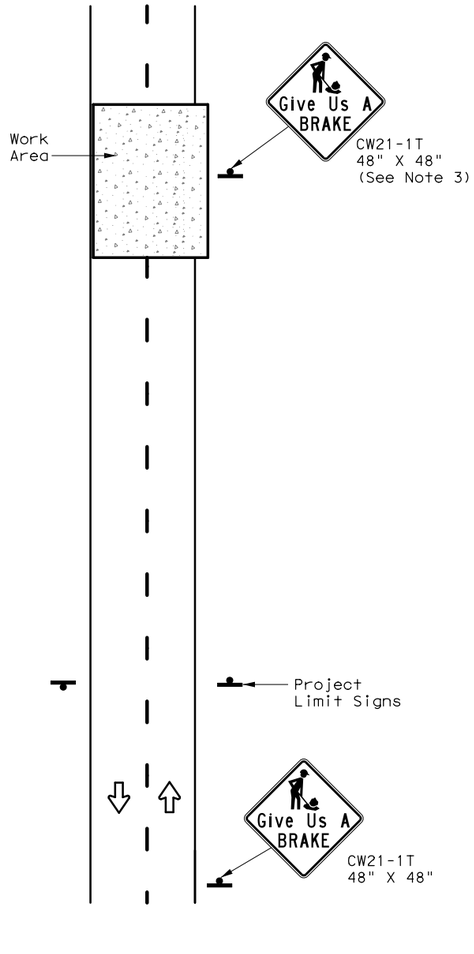


DIVIDED HIGHWAY



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
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6-96 5-98 7-13	DIST	COUNTY		SHEET NO.
8-96 3-03	FTW	JOHNSON		73

116

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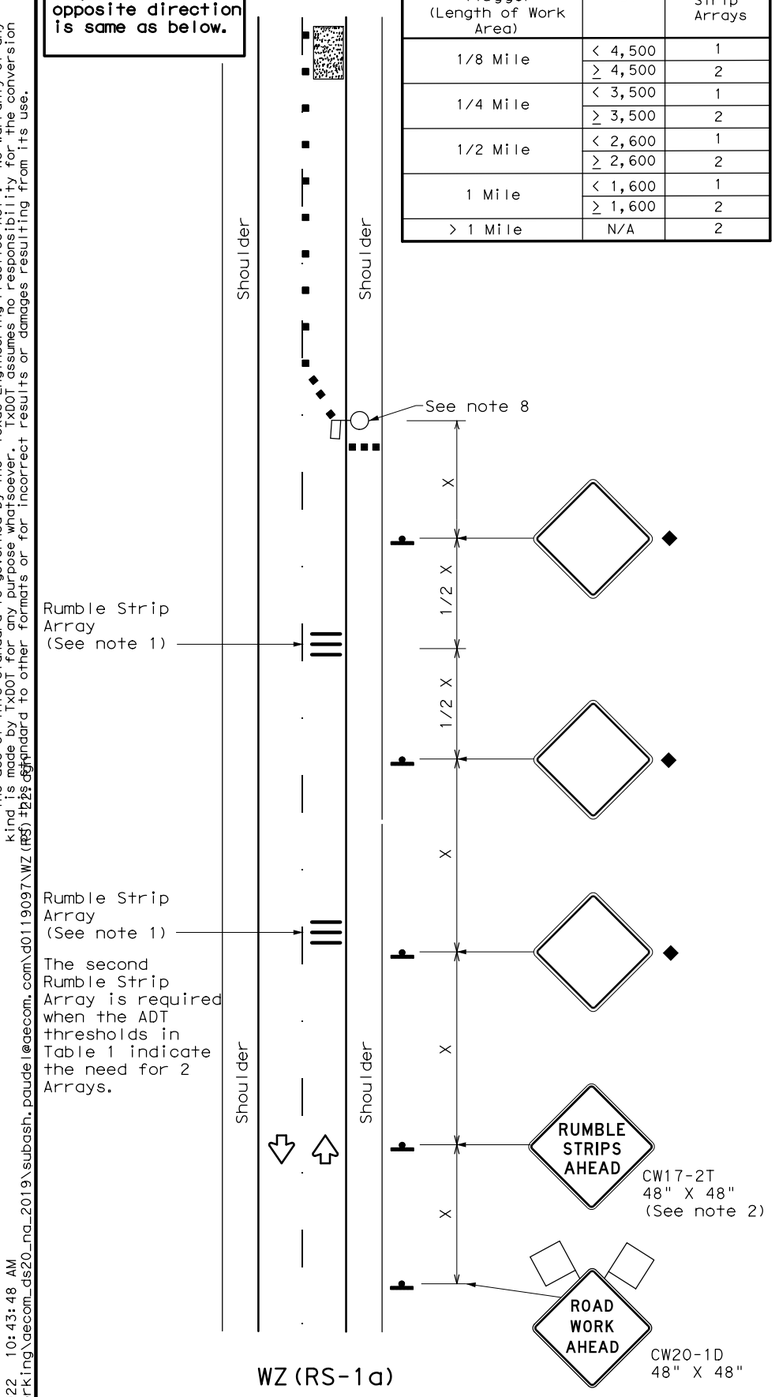
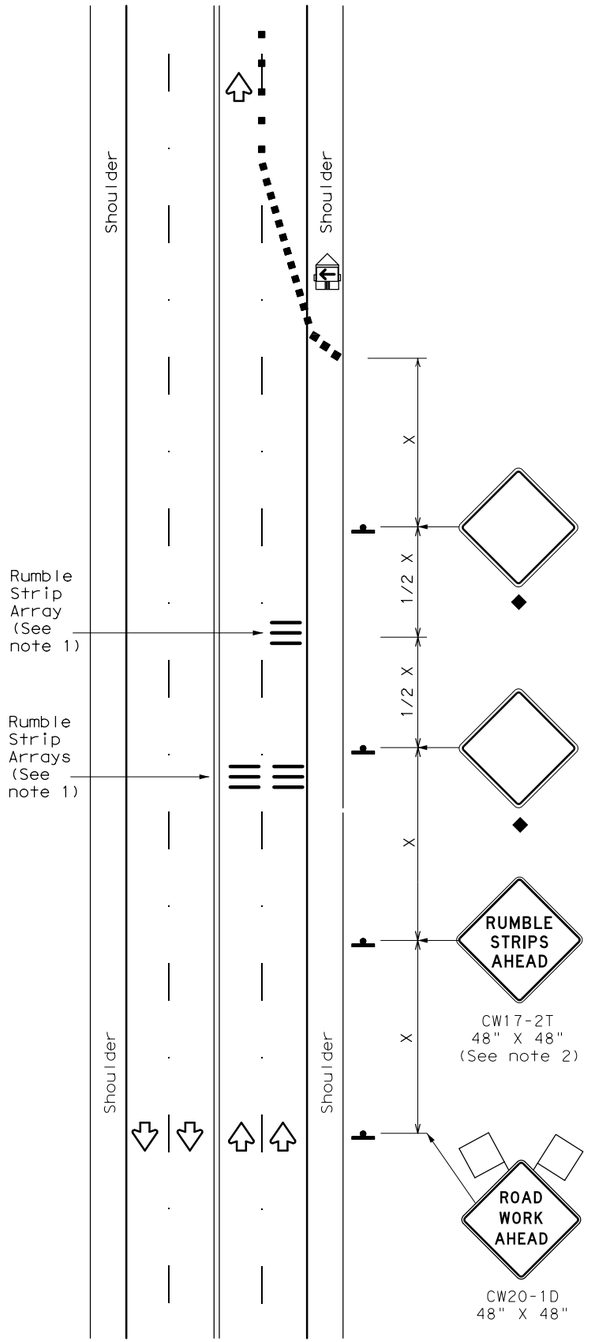
Warning sign and rumble strip sequence in opposite direction is same as below.



WZ(RS-1a)

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION

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-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

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© TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		74

117

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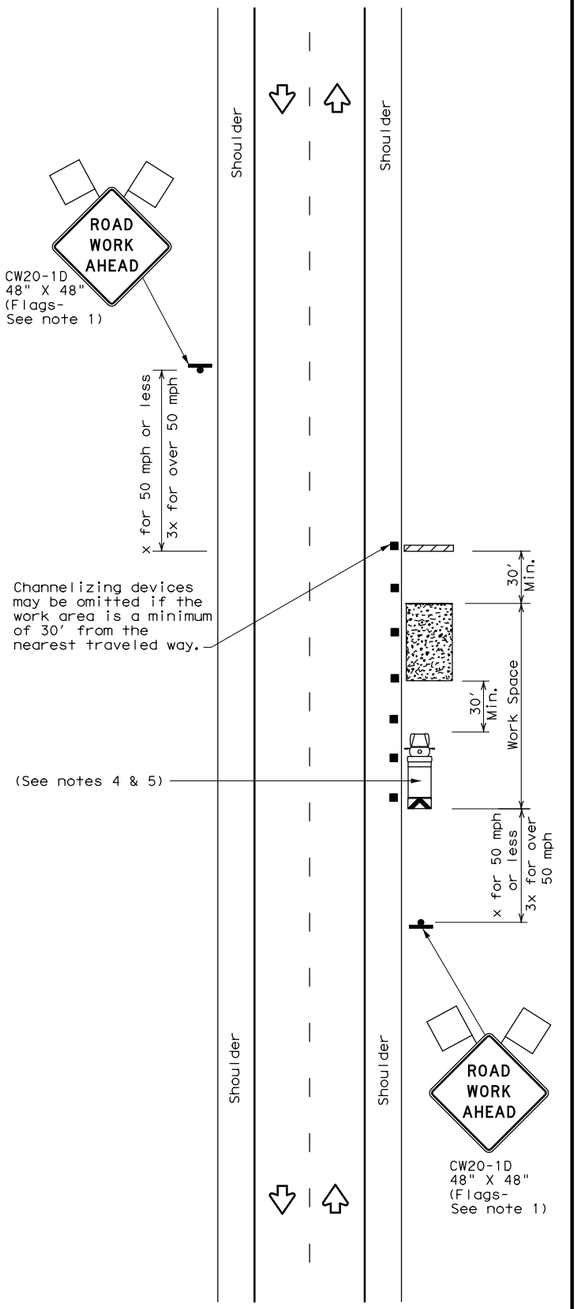
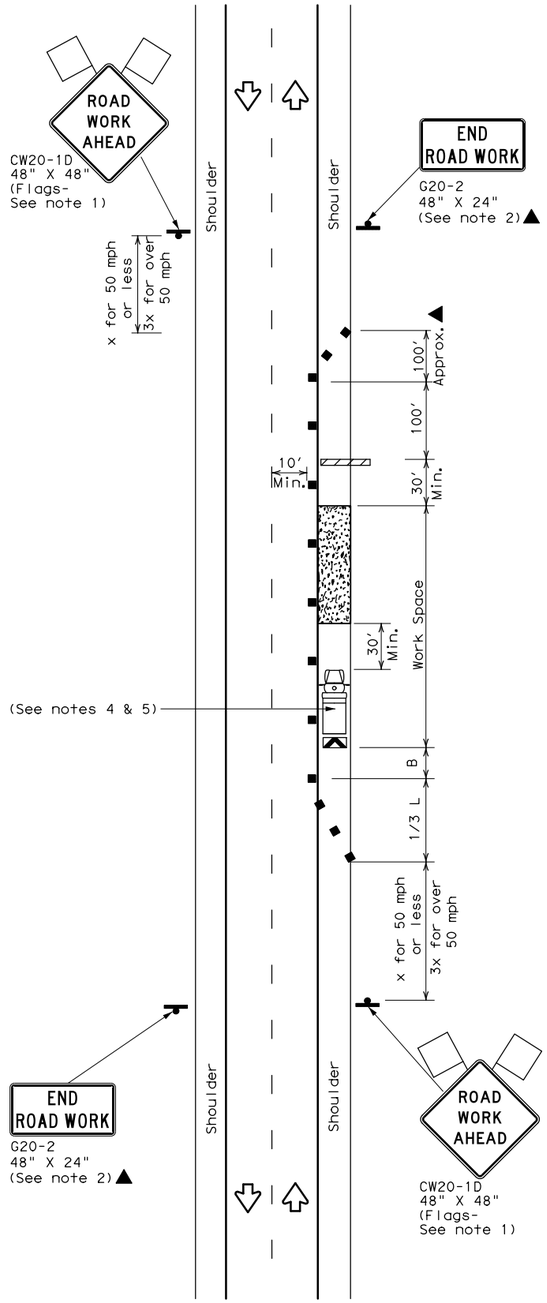


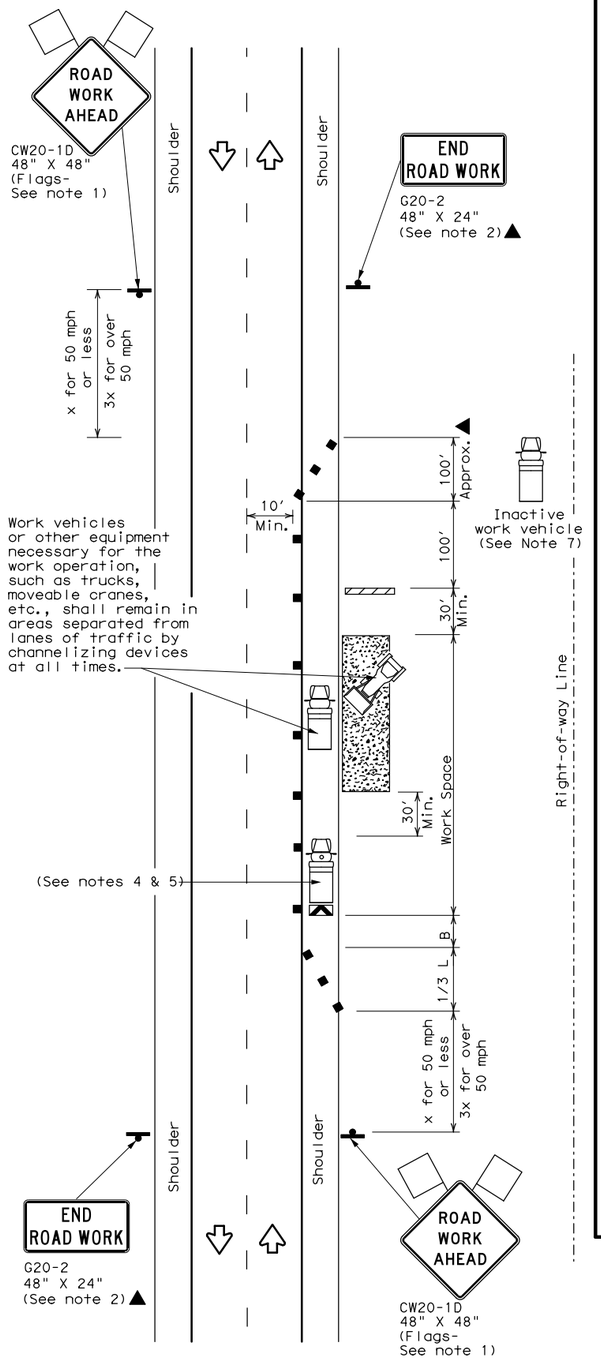
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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)

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 in the plans, or for routine maintenance work, when approved by the Engineer.
3. Stockpiled material should be placed a minimum of 30 feet from nearest traveled way.
4. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. 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.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.
6. See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
7. Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
8. CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

Texas Department of Transportation

Traffic Operations Division Standard

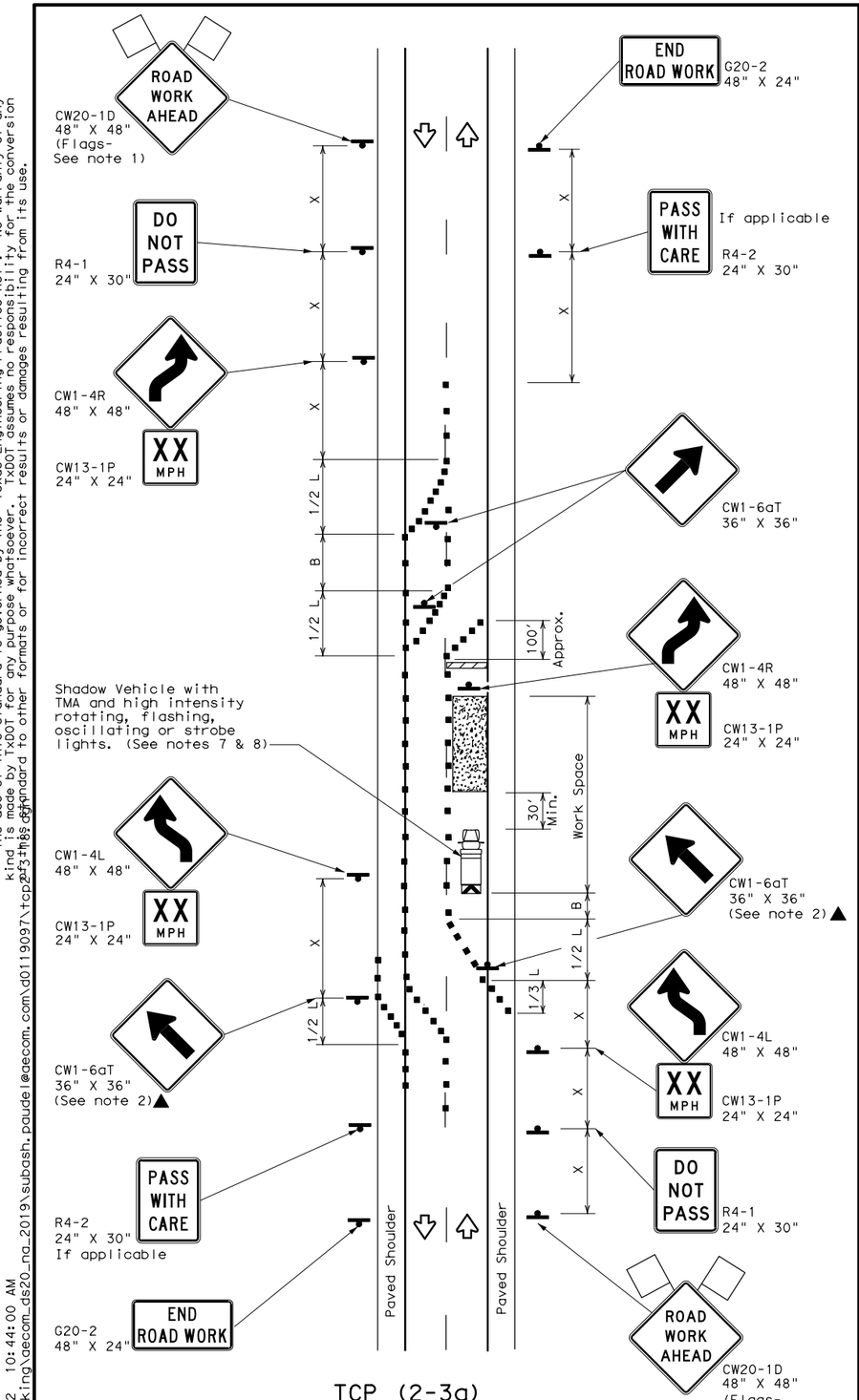
TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-18

FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	03	087	IH 35W
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	FTW	JOHNSON		75
1-97 2-18				

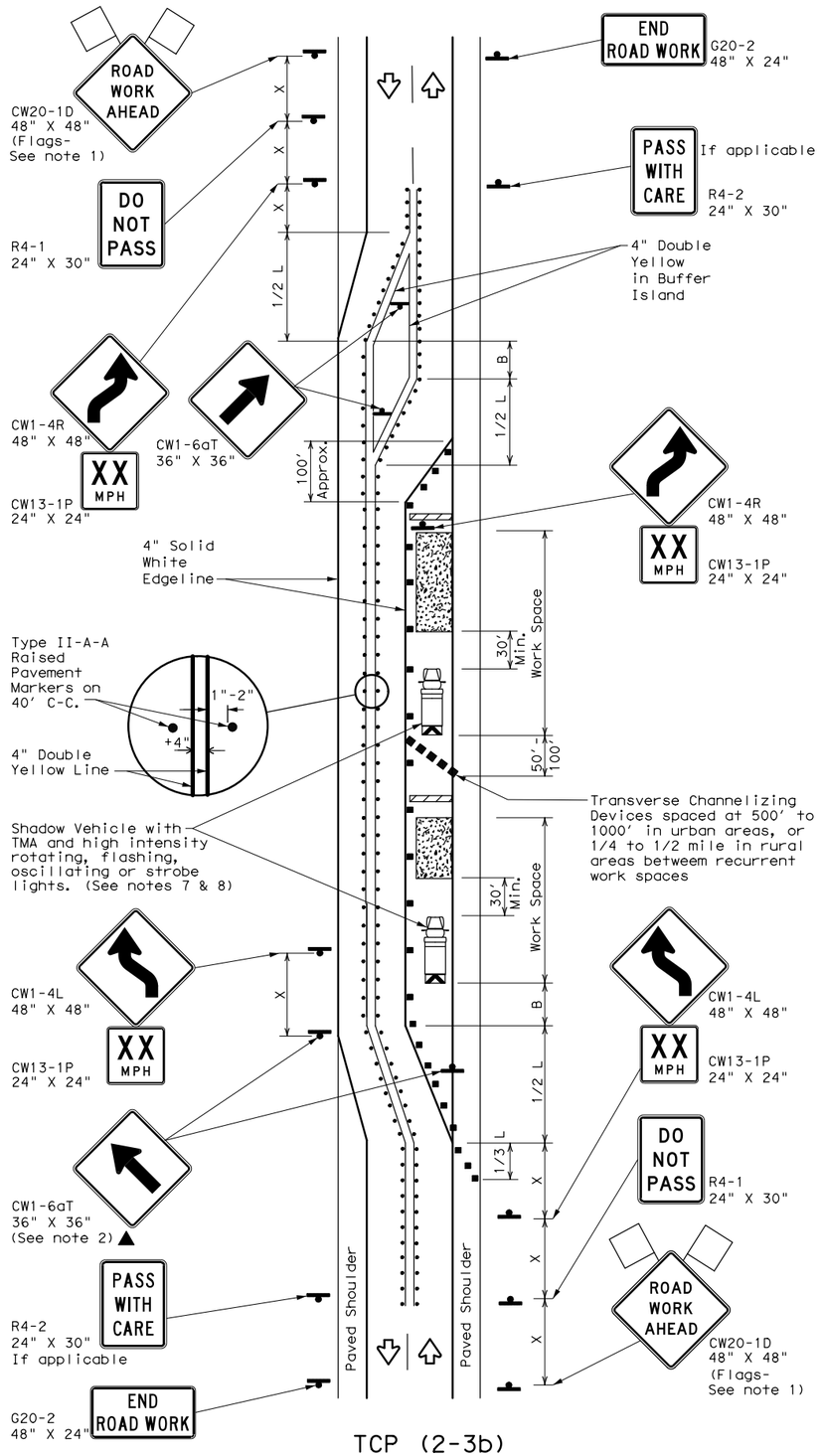
161

DATE: 5/23/2022 10:44:00 AM
FILE: c:\pwworking\aecom_ds20_na_2019\subash.paudel@aecom.com\d0119097\tcp2-3-18.dgn



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 Operations Division Standard

TRAFFIC CONTROL PLAN TRAFFIC SHIFTS ON TWO-LANE ROADS

TCP(2-3)-18

FILE: tcp(2-3)-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	03	087	IH 35W
8-95 3-03	DIST	COUNTY		SHEET NO.
1-97 2-12	FTW	JOHNSON		76
4-98 2-18				

DATE: 5/23/2022 10:44:05 AM
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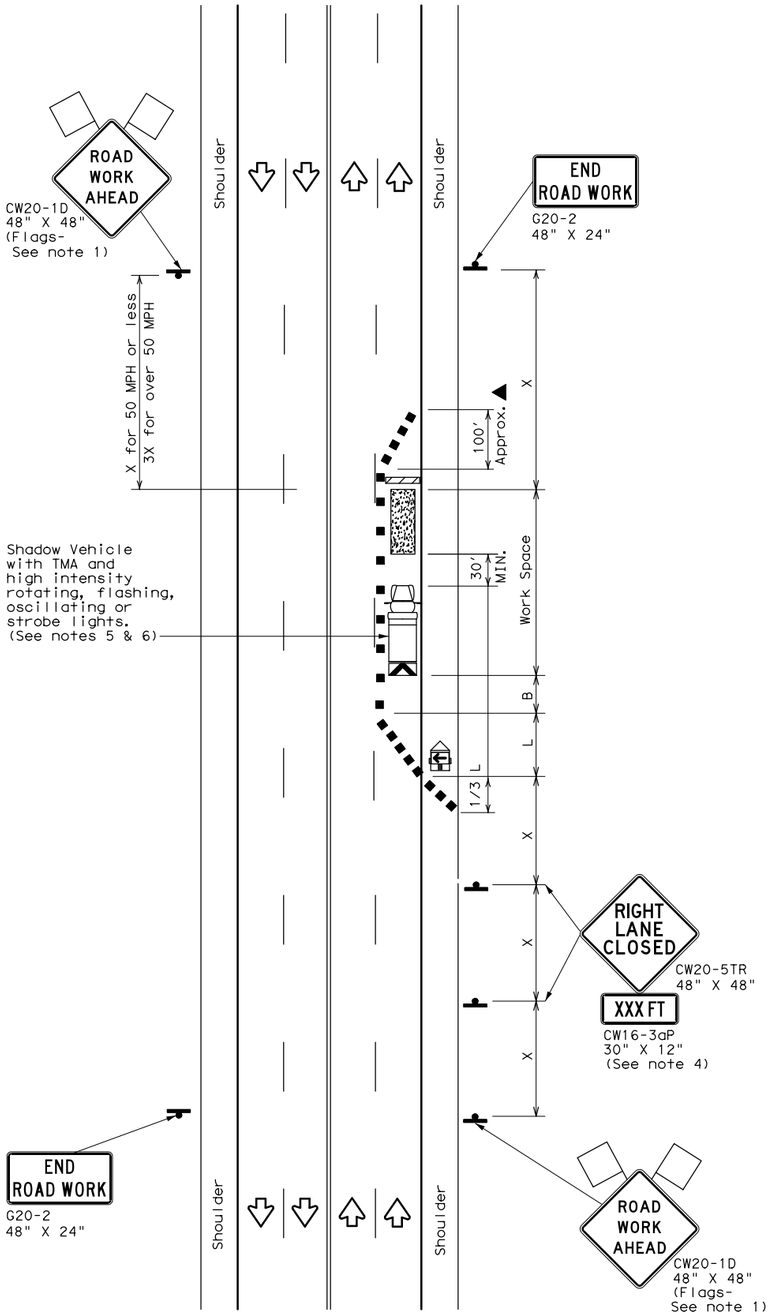
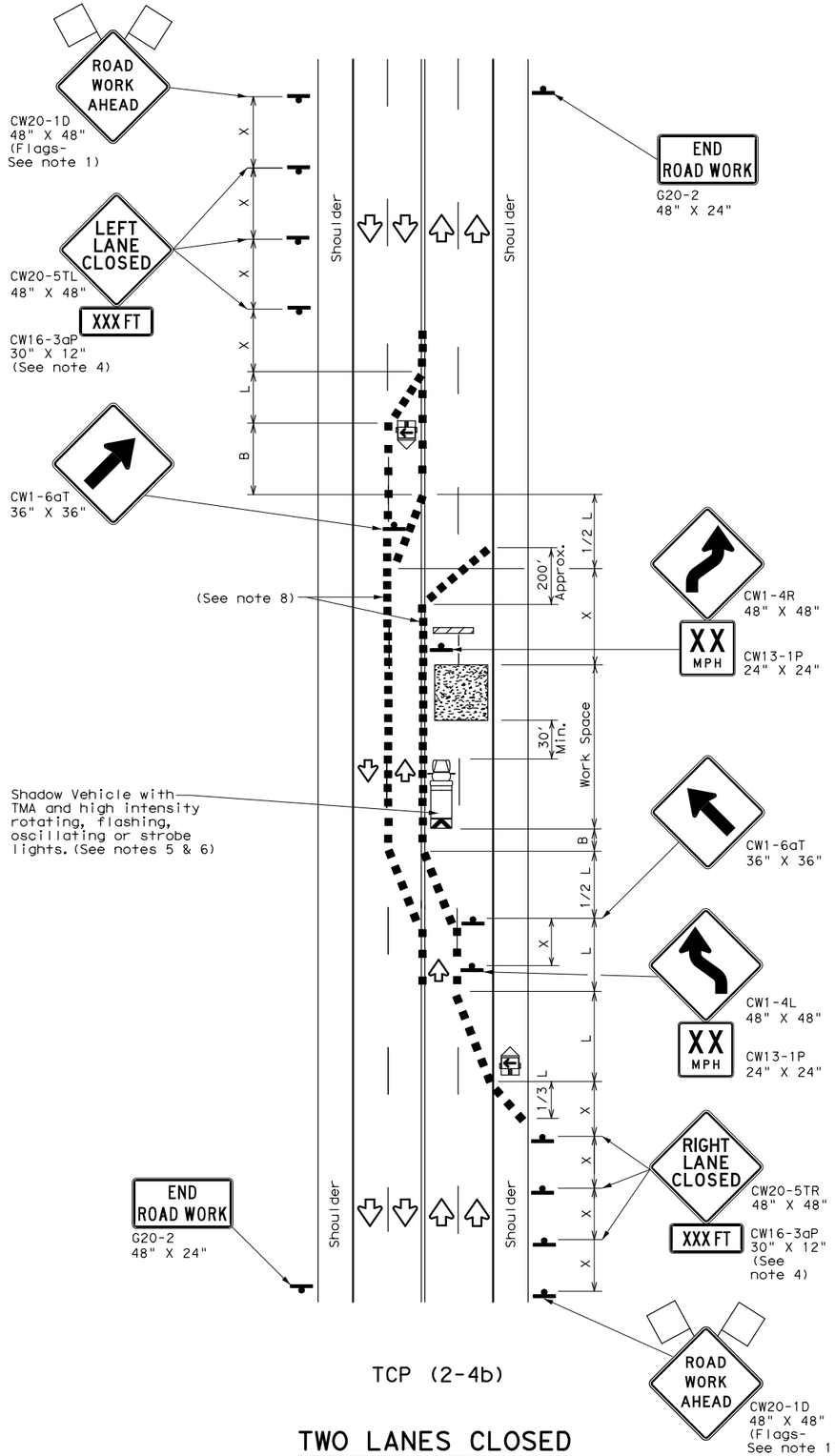


TCP (2-4a)

ONE LANE CLOSED



TCP (2-4b)

TWO LANES CLOSED

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 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
		✓	✓	

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 downstream taper is optional. When used, it should be 100 feet minimum length per lane.
4. For short term applications, when post mounted signs are not used, the distance legend may be shown on the sign face rather than on a CW16-3aP supplemental plaque.
5. 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.
6. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-4a)

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

TCP (2-4b)

8. 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 devices spacing is intended for the area of conflicting markings, not the entire work zone.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(2-4)-18

FILE: tcp2-4-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0014	03	087	IH 35W
1-97 2-12	DIST	COUNTY		SHEET NO.
4-98 2-18	FTW	JOHNSON		77

DATE: 5/23/2022 10:44:11 AM
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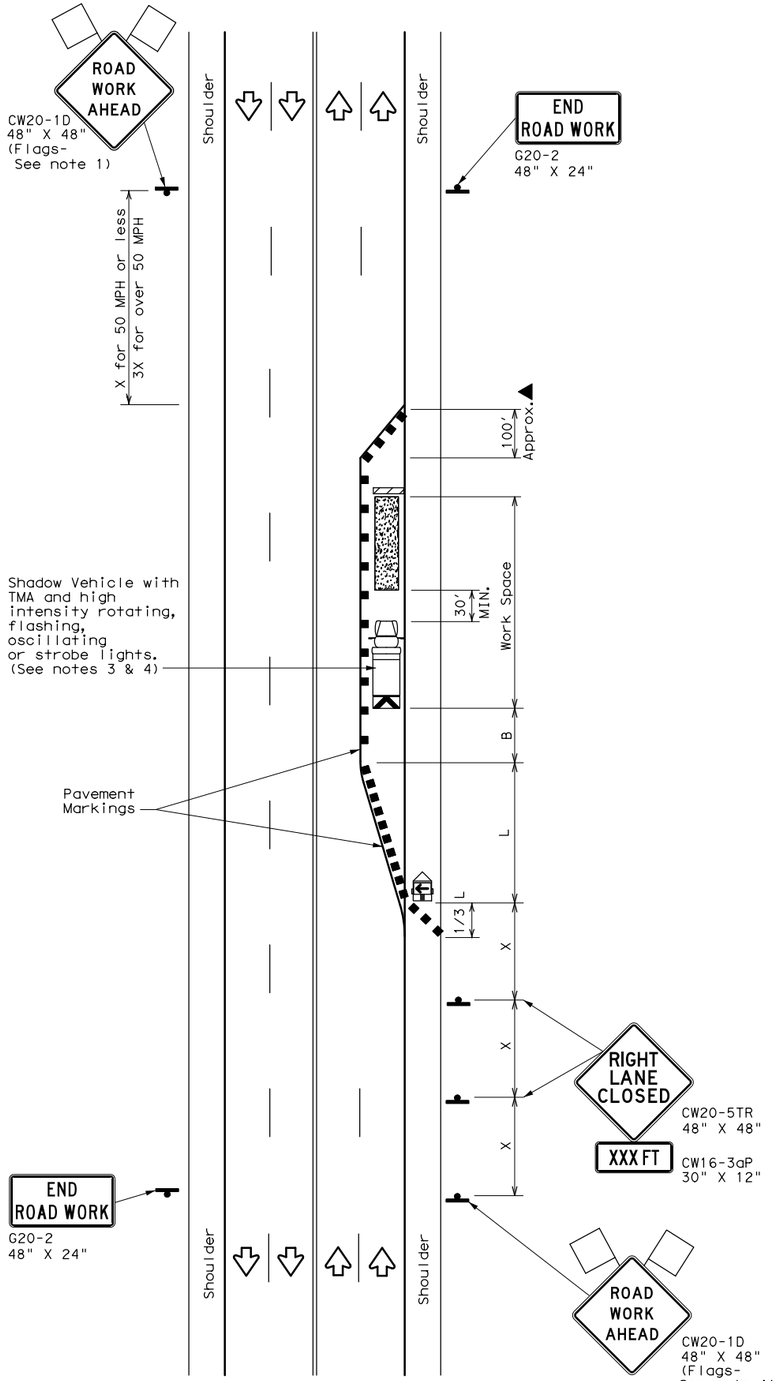
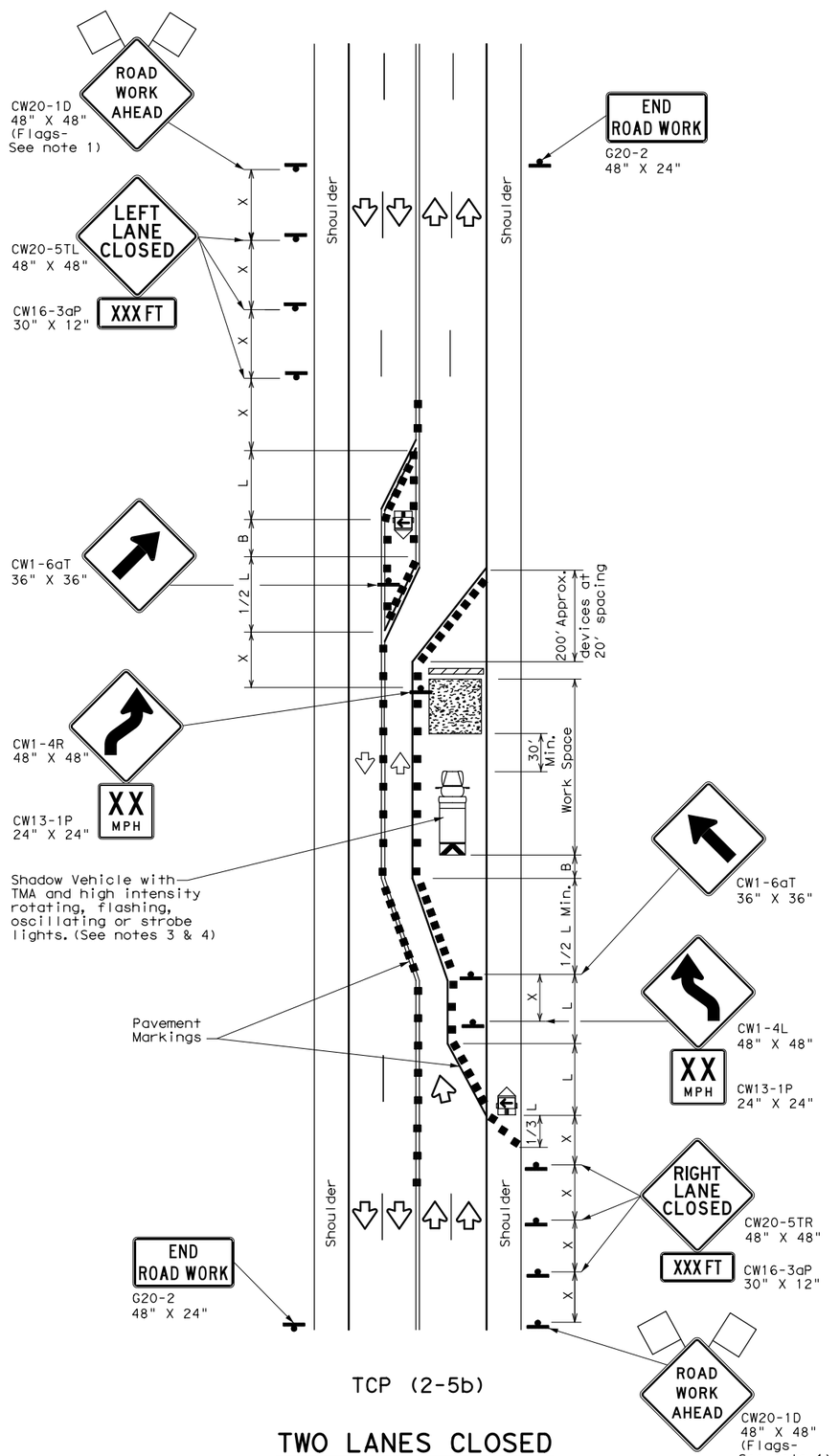


TCP (2-5a)

ONE LANE CLOSED



TCP (2-5b)

TWO LANES CLOSED

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 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
			✓	✓

GENERAL NOTES

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

TCP (2-5a)

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

TCP (2-5b)

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LONG TERM LANE CLOSURES MULTILANE CONVENTIONAL RDS.

TCP(2-5)-18

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©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 2-12	0014	03	087	IH 35W
1-97 3-03	DIST	COUNTY		SHEET NO.
4-98 2-18	FTW	JOHNSON		78

DATE: 5/23/2022, 10:44:18 AM
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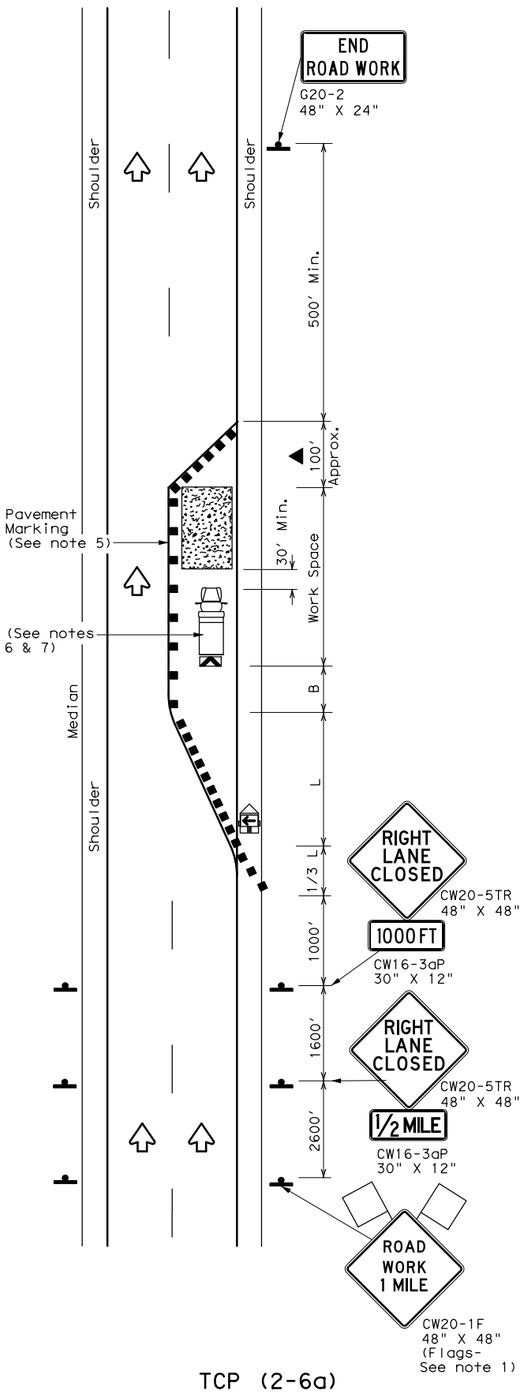
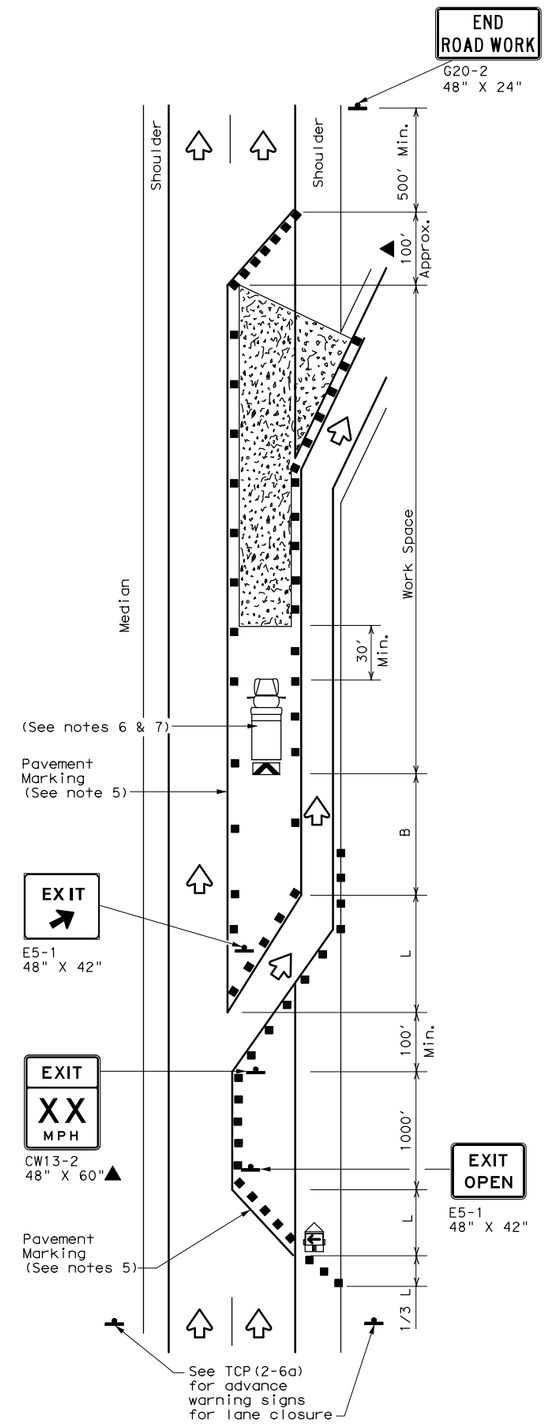


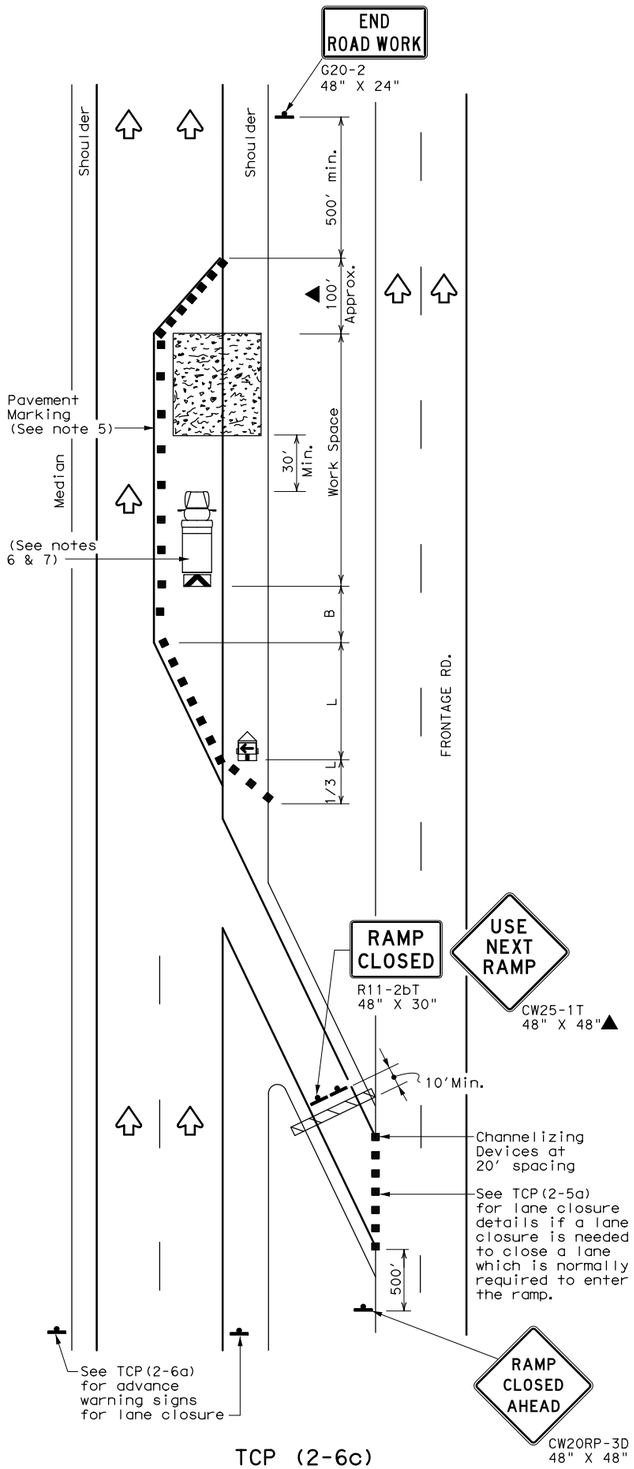
TCP (2-6a)

ONE LANE CLOSURE



TCP (2-6b)

LANE CLOSURE NEAR EXIT RAMPS



TCP (2-6c)

LANE CLOSURE NEAR ENTRANCE RAMPS

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)

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. Channelizing devices used to close lanes may be supplemented with the Chevron Alignment Sign placed on every other channelizing device. Chevrons may be attached to plastic drums as per BC Standards.
4. Channelizing devices used along the work space or along tangent sections may be supplemented with vertical panels (VP) placed on everyother channelizing device. If night time conditions make it difficult to see at least two VPs, the VPs may be placed on each channelizing device.
5. The placement of pavement markings may be omitted on Intermediate-term stationary work zones with the approval of the Engineer.
6. Shadow Vehicle with TMA and high intensity rotating, flashing,oscillating or strobe lights. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. 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 in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON DIVIDED HIGHWAYS

TCP(2-6)-18

FILE: tcp2-6-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	03	087	IH 35W
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	FTW	JOHNSON		79
1-97 2-18				

DATE: 5/23/2022 10:44:23 AM
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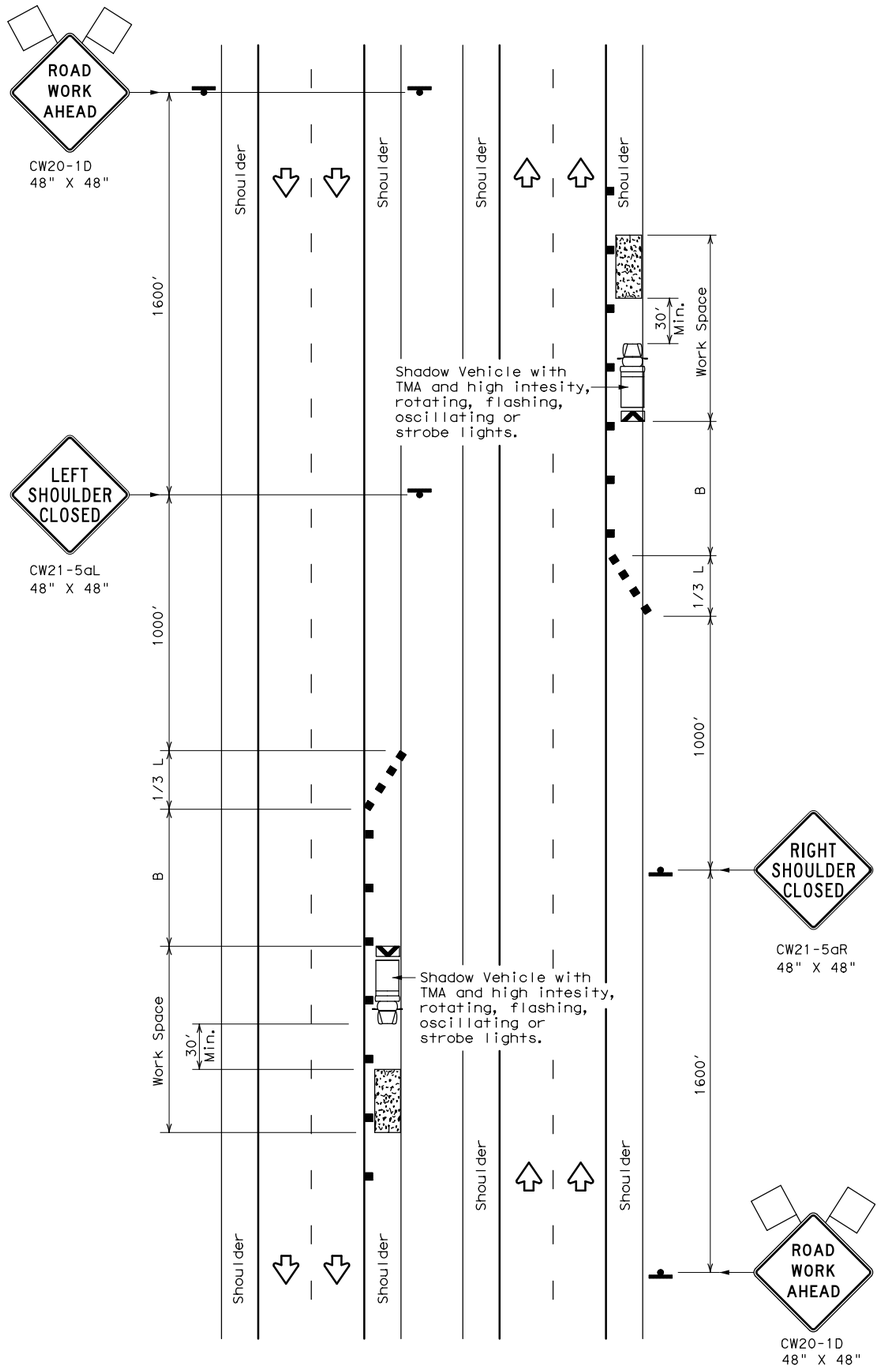
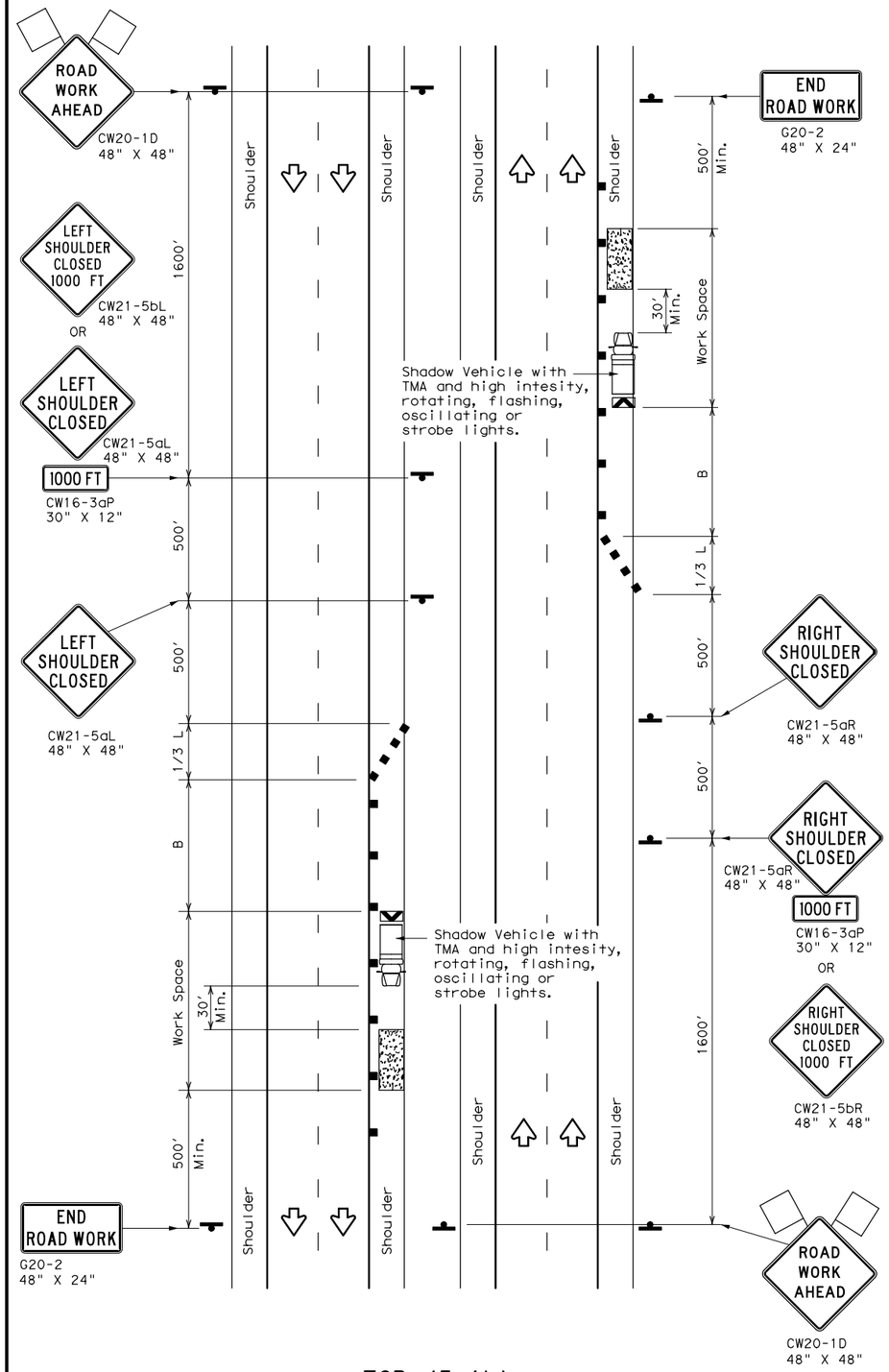


TCP (5-1a)

WORK AREA ON SHOULDER



TCP (5-1b)

WORK AREA ON SHOULDER

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	Suggested Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	90'
35		205'	225'	245'	35'	70'	120'
40		265'	295'	320'	40'	80'	155'
45	L=WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

* 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(5-1a)	TCP(5-1b)	TCP(5-1b)	

GENERAL NOTES

1. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30' to 100' in advance of the area of crew exposure without adversely effecting the performance or quality of the work. Type 3 barricades or drums may be substituted when workers on foot are no longer present when approved by the Engineer.
2. 28" tall or taller one-piece cones will be allowed only for Short Duration or Short Term stationary operations when workers are present to maintain the devices upright and in proper location. Intermediate Term stationary work areas should use Drums, Vertical Panels or 42" tall two-piece cones.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN SHOULDER WORK FOR FREEWAYS / EXPRESSWAYS

TCP(5-1)-18

FILE: tcp5-1-18.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	03	087	IH 35W
2-18	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		80

DATE: 5/23/2022 10:44:28 AM
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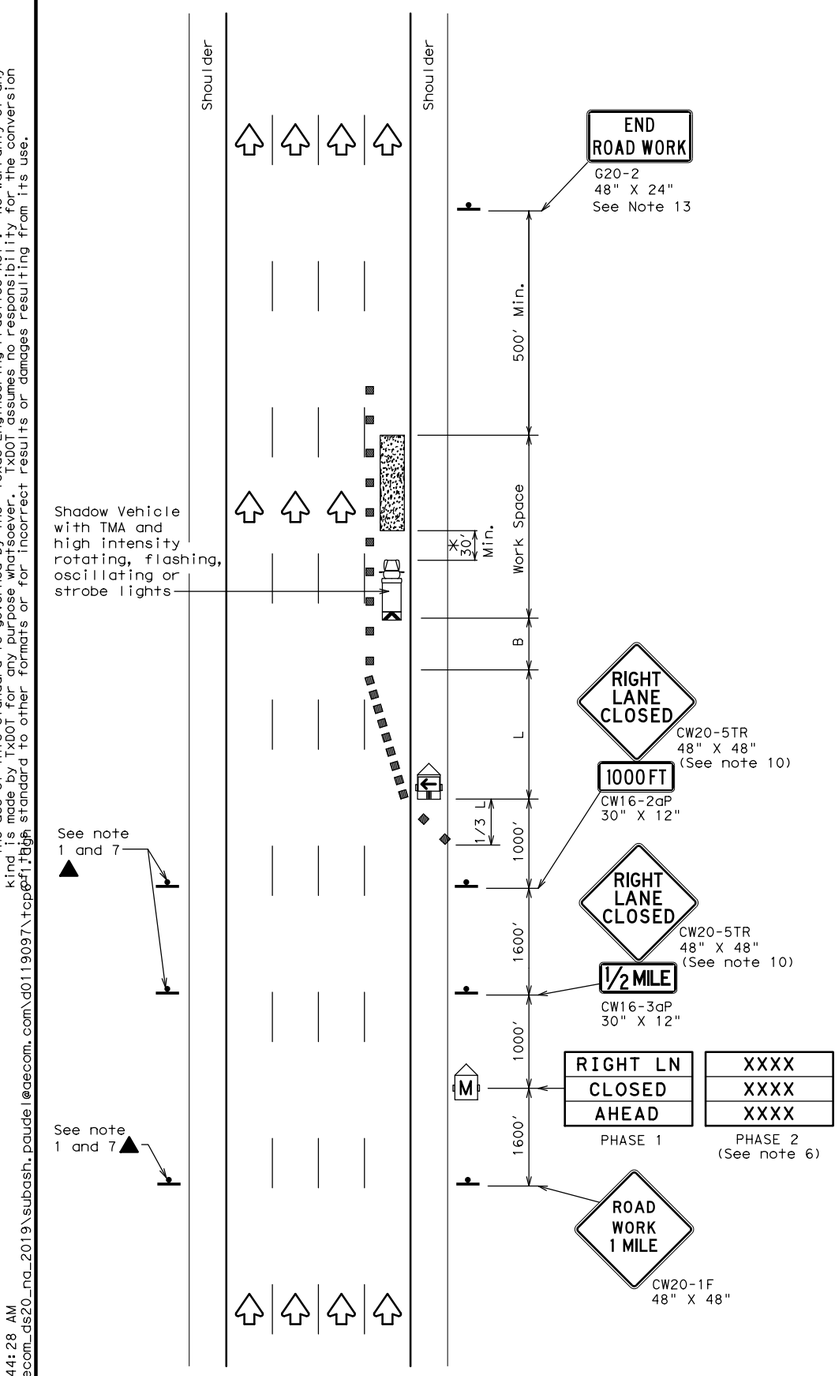
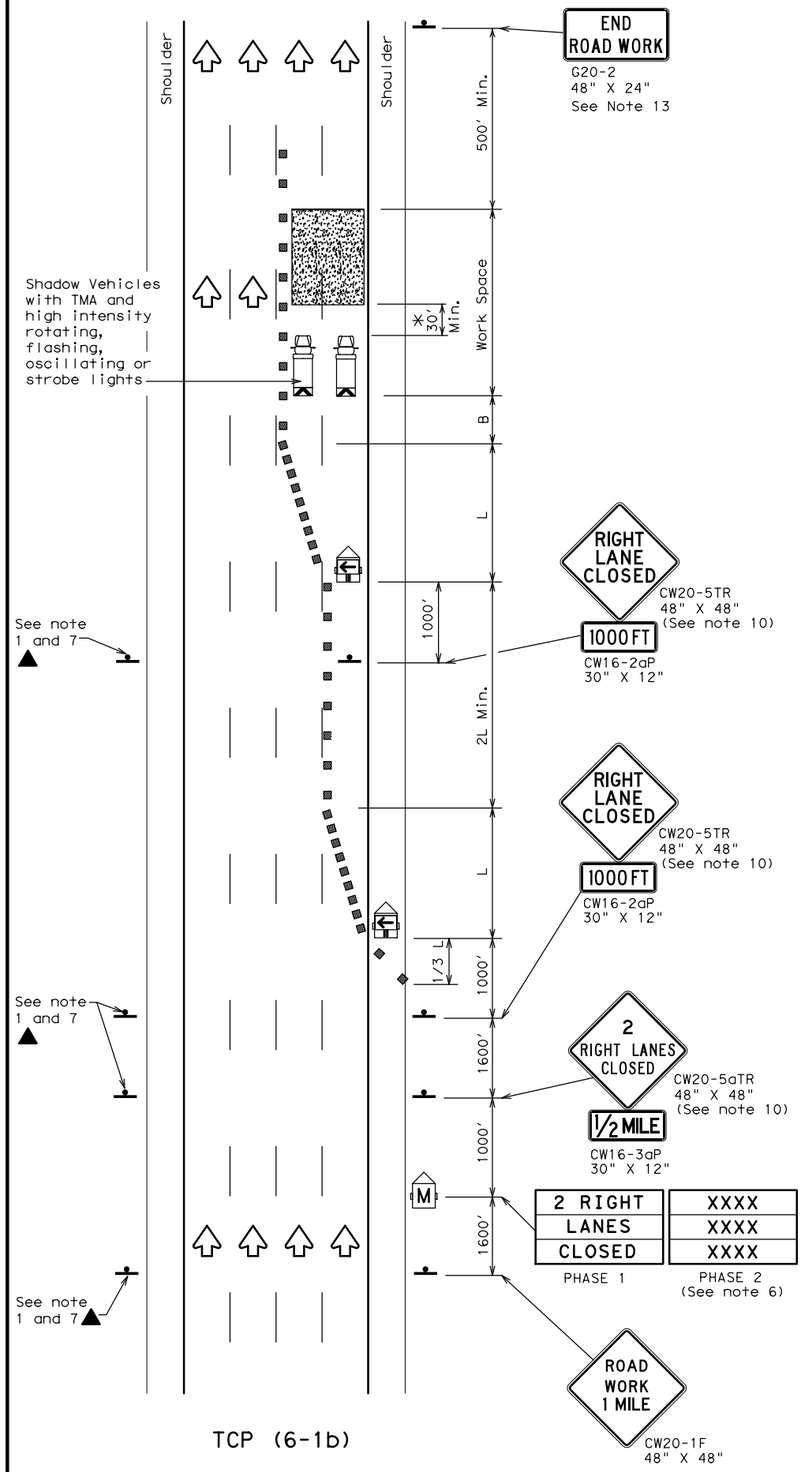


TCP (6-1a)

TYPICAL FREEWAY ONE LANE CLOSURE



TCP (6-1b)

TYPICAL FREEWAY TWO LANE CLOSURE

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 "L" ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Suggested Longitudinal Buffer Space "B"
45	L=WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

** 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. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
2. Drums or 42"cones are the typical channelizing devices. For Intermediate Term Stationary work, drums shall be used on tapers with drums or 42" cones used on tangent sections. Other channelizing devices may be used as directed by the Engineer.
3. All construction signs and barricades placed during any phase of work shall remain in place until removal is approved by the Engineer.
4. The Engineer may direct the Contractor to furnish additional signs and barricades as required to maintain traffic flow, detours and motorist safety during construction.
5. Static message boards or changeable message signs stating the date and duration of ramp or freeway lane closures shall be placed a minimum of seven (7) calendar days in advance of the actual closure.
6. Phase 2 of the PCMS message should include appropriate information formatted as shown on BC(6), such as "MERGE LEFT," recommended advisory speed, delay information, or other specific warnings.
7. Duplicate construction warning signs should be erected on the medians side of freeways where median width will permit and traffic volume justifies the signing.
8. The number of closed lanes may be increased provided the spacing of traffic control devices, taper lengths and tangent lengths meet the requirements of the TMUTCD.
9. Warning signs for intermediate term stationary work should be mounted at 7' to the bottom of the sign.
10. Warning signs shown shall be appropriately altered for left lane closures. When signs are mounted at 1' height for short term stationary or short duration work, sign versions shown in the SHSD for Texas with distances on the sign face rather than mounted on a plaque below the sign may be used.
11. When possible, PCMS units should be located in advance of the last available exit ramp prior to the lane closure to allow motorists an alternate route. They may also be relocated to improve advance warning in case of unanticipated queuing or congestion.
12. For Intermediate Term Stationary work at night, floodlights should be used to illuminate the work area and equipment crossings. Floodlights shall not produce a disabling glare condition for road users or workers.
13. The END ROAD WORK (G20-2) sign may be omitted when it conflicts with G20-2 signs already in place on the project.

* A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

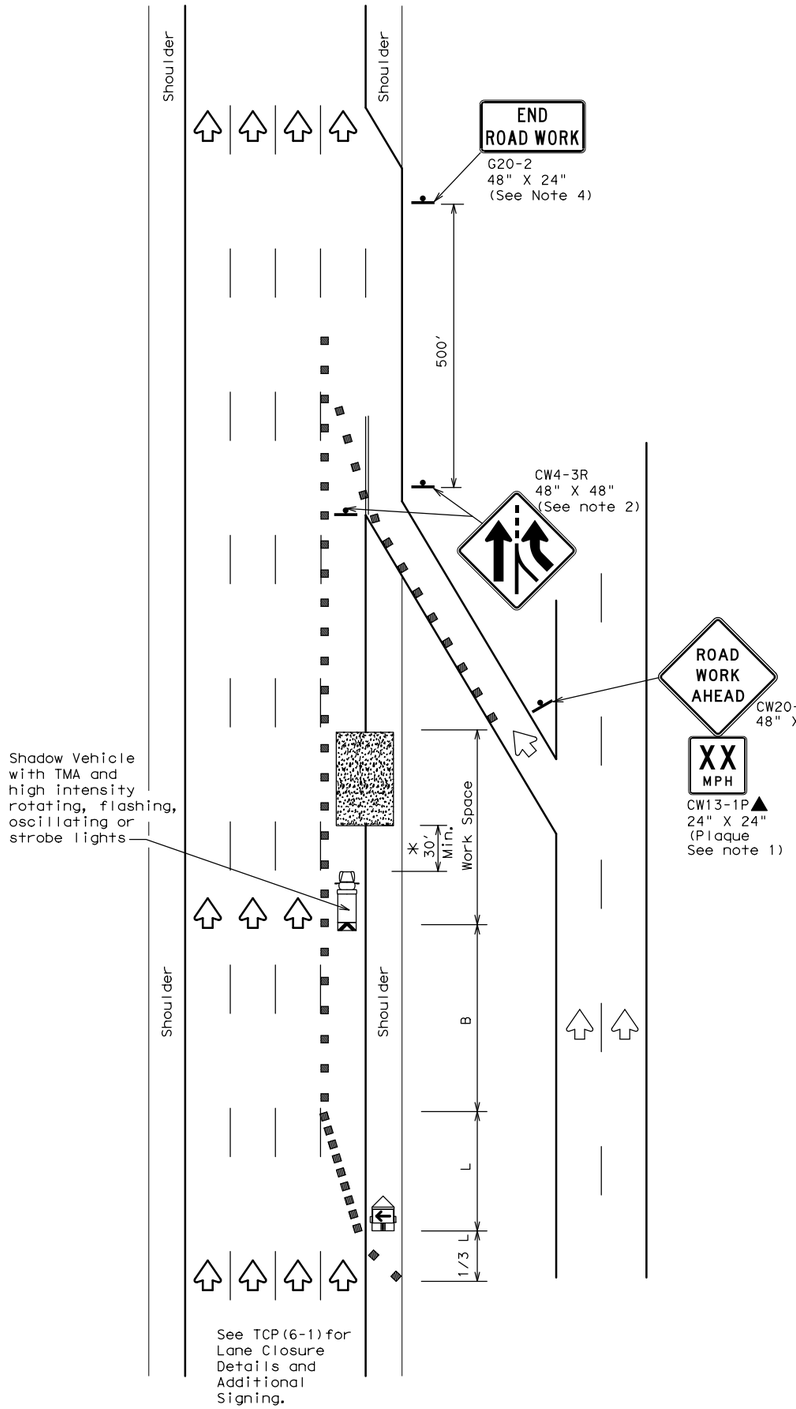
Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN FREEWAY LANE CLOSURES

TCP(6-1)-12

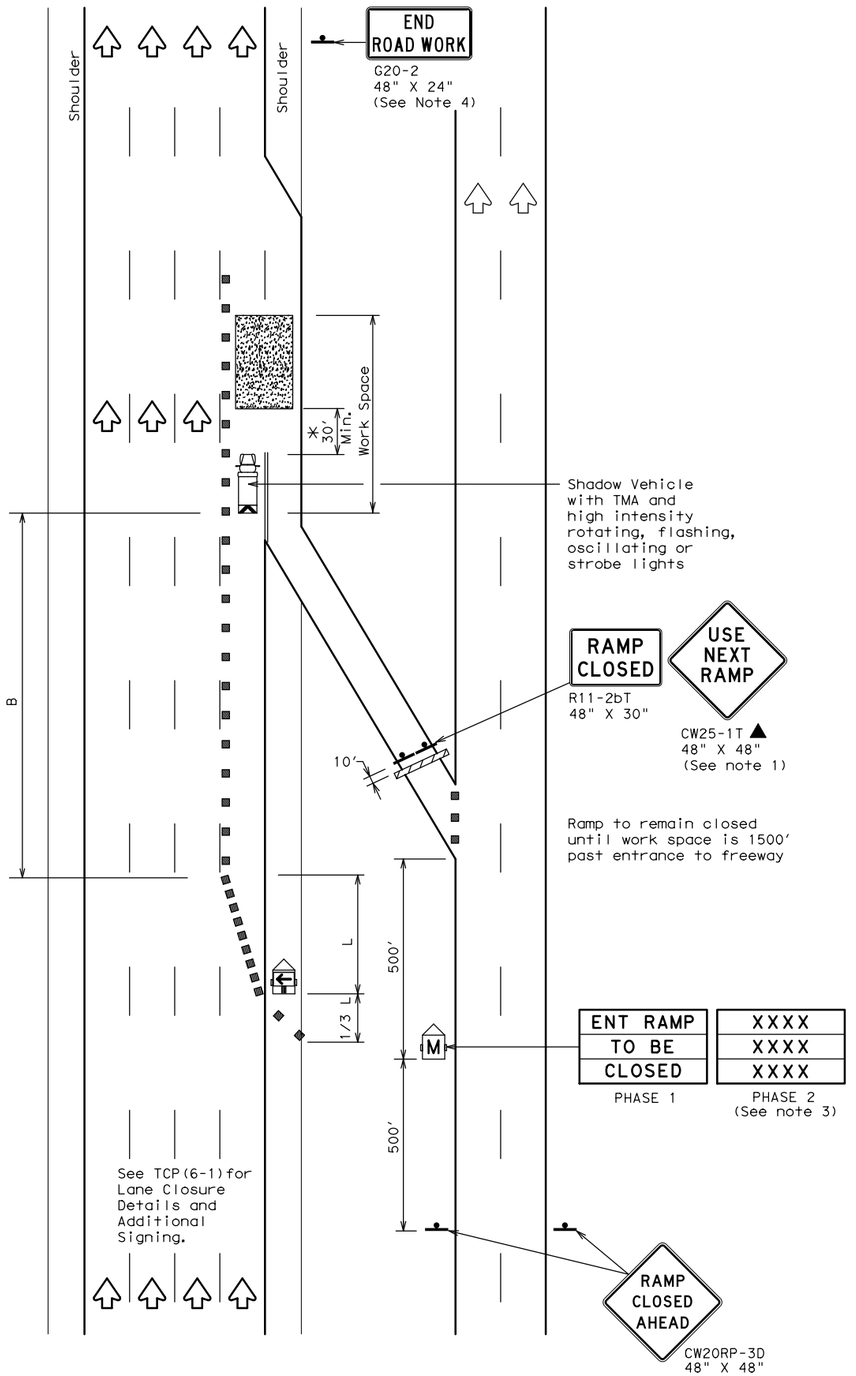
FILE: tcp6-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-12	0014	03	087	IH 35W
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		81

201



TCP (6-2a)

ENTRANCE RAMP OPEN
WORK WITHIN 500' OF RAMP



TCP (6-2b)

ENTRANCE RAMP CLOSED

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

Posted Speed	Formula	Minimum Desirable Taper Lengths "L" ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Suggested Longitudinal Buffer Space "B"
45	L=WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

** 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. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
2. ADDED LANE Symbol (CW4-3) sign may be omitted when sign between ramp and mainlane can be seen from both roadways.
3. See "Advance Notice List" on BC(6) for recommended date and time formatting options for PCMS Phase 2 message.
4. The END ROAD WORK (G20-2) sign may be omitted when it conflicts with G20-2 signs already in place on the project.

* A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA NEAR RAMP

TCP(6-2)-12

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©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	03	087	IH 35W
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	FTW	JOHNSON		82

202

DATE: 5/23/2022 10:44:34 AM
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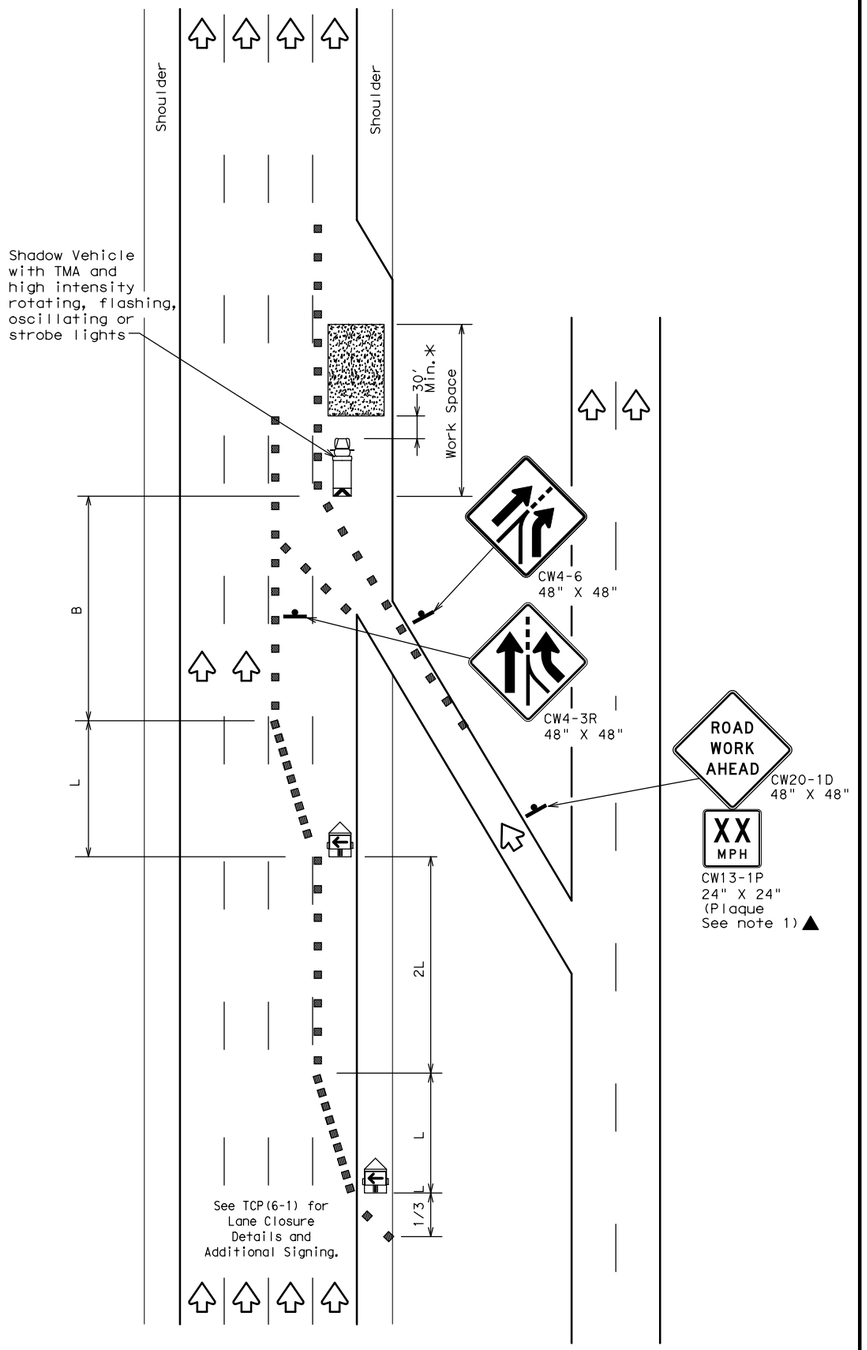
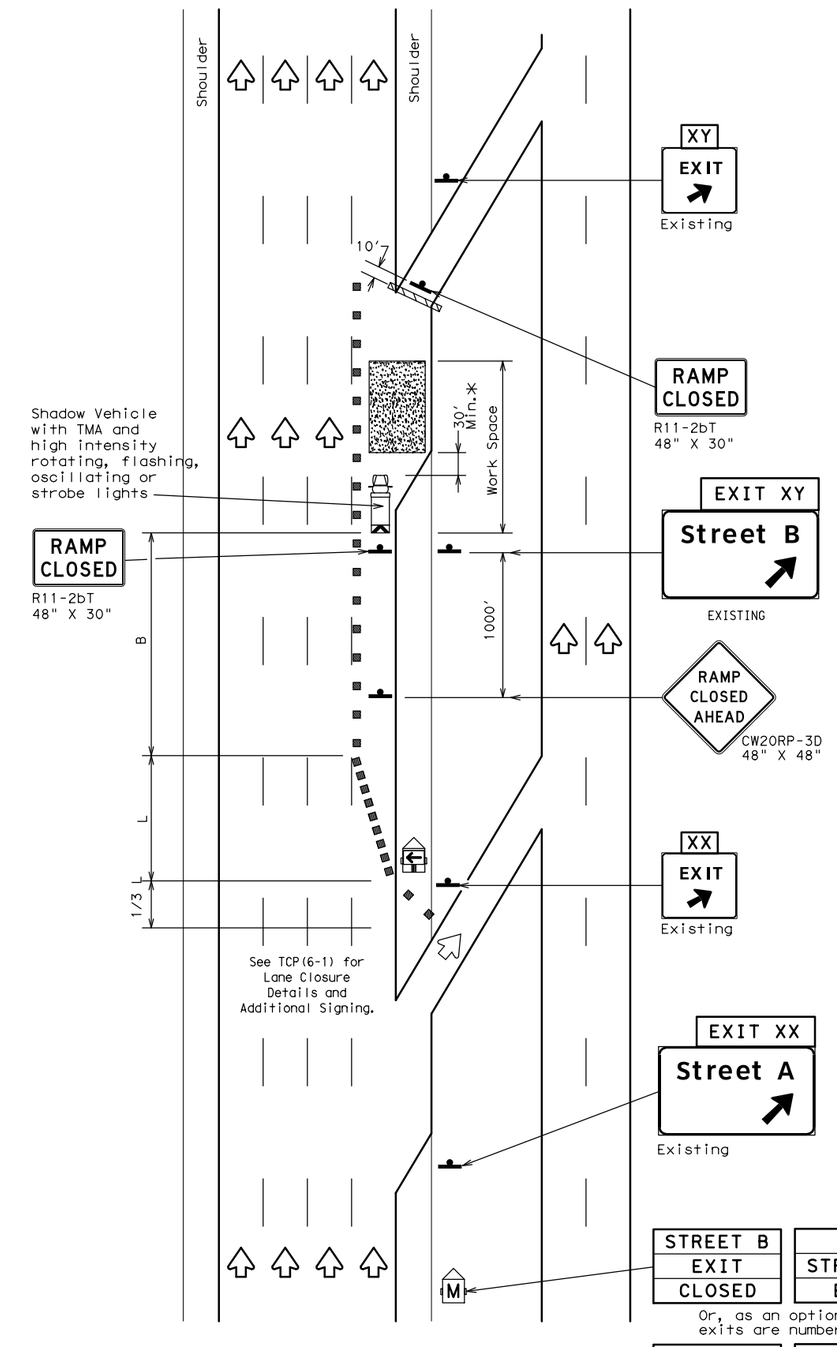


TCP (6-3a)

ENTRANCE RAMP OPEN



STREET B	USE
EXIT	STREET A
CLOSED	EXIT

Or, as an option when exits are numbered

EXIT XY	USE
CLOSED	EXIT XX

Place 1 mile (approx.) in advance of Street A exit.

TCP (6-3b)

EXIT RAMP CLOSED
TRAFFIC EXITS PRIOR TO CLOSED RAMP

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 "L" ✳✳			Suggested Maximum Spacing of Channelizing Devices		Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	
45	L=WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

✳✳ 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. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.

✳A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA BEYOND RAMP

TCP(6-3)-12

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©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	03	087	IH 35W
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	FTW	JOHNSON		83

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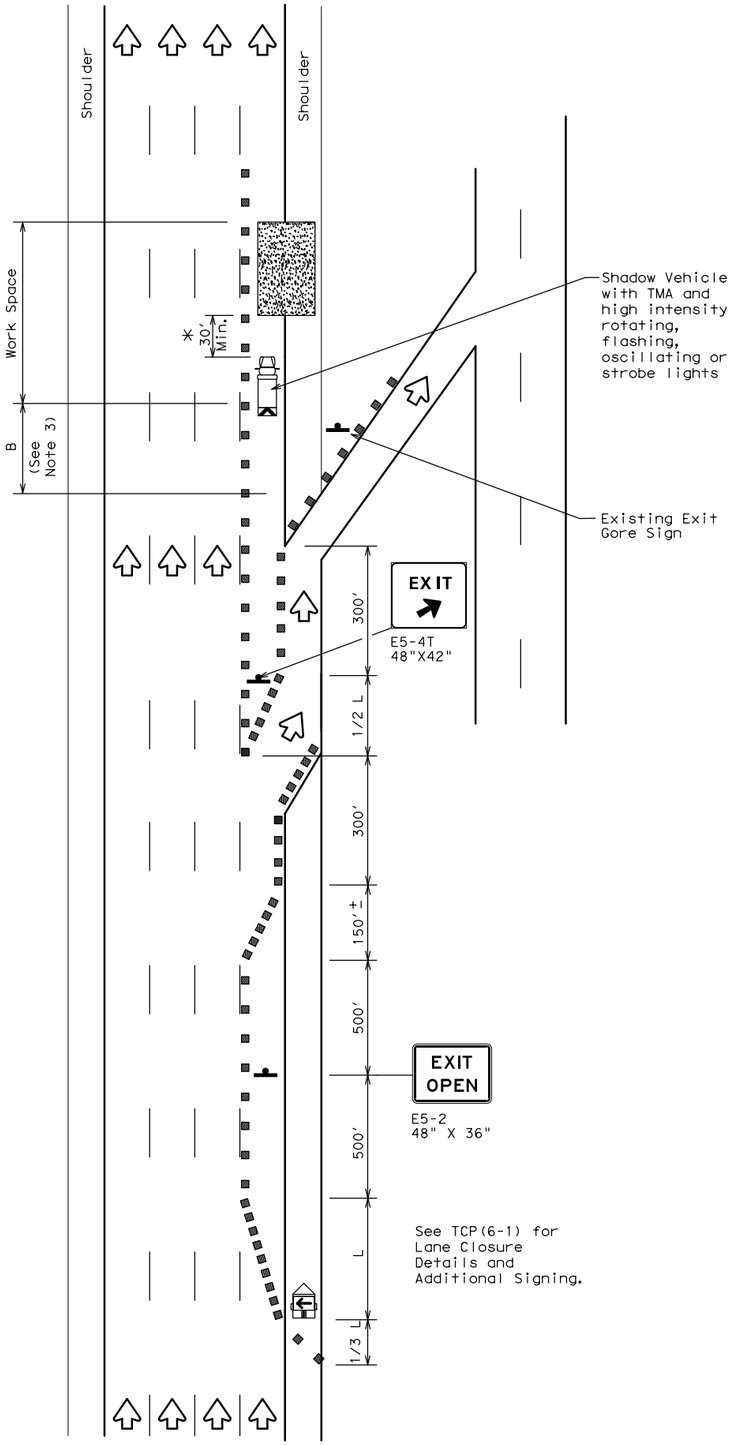
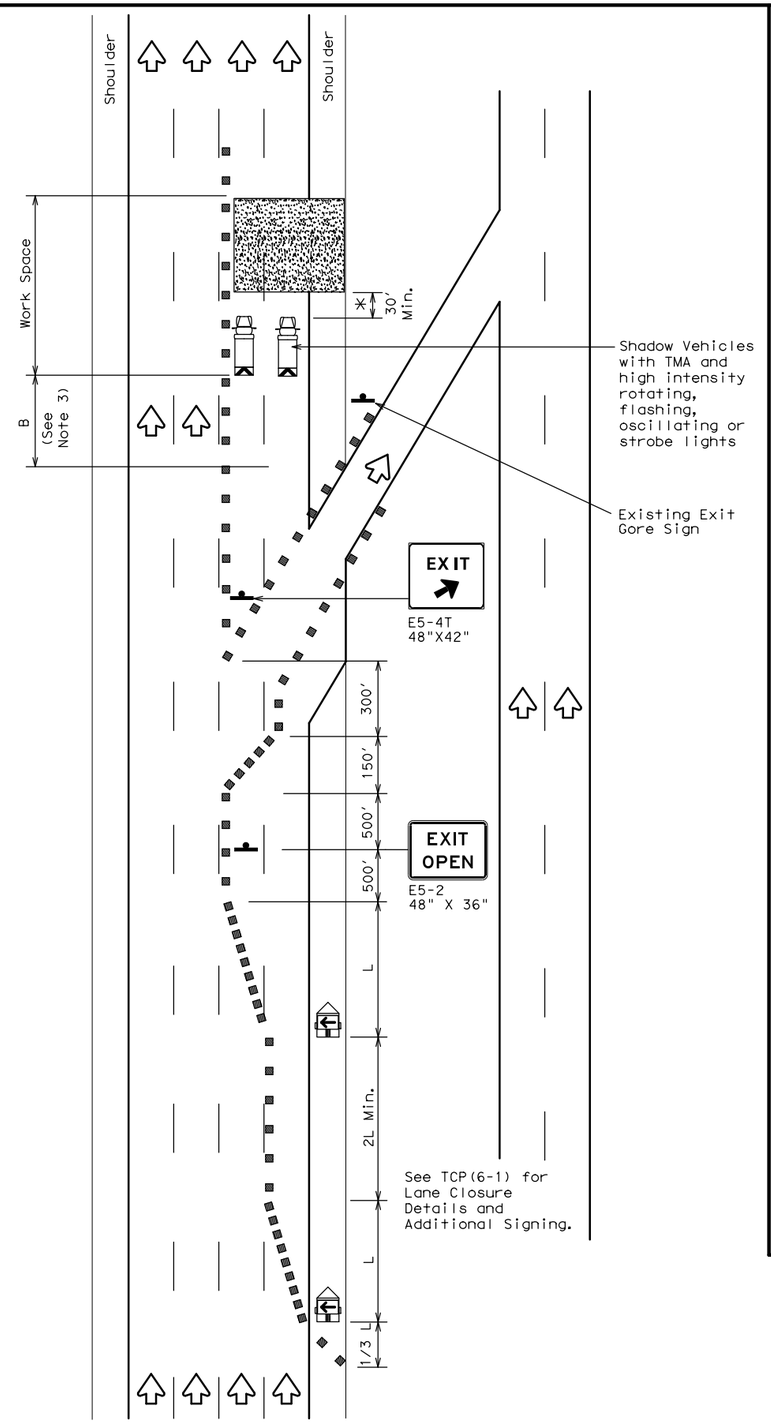


TCP (6-5a)

EXIT RAMP OPEN



TCP (6-5b)

EXIT RAMP OPEN
TWO LANE CLOSURE WITHIN 1500' PAST EXIT RAMP

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 "L" ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Suggested Longitudinal Buffer Space "B"
45	L=WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

** 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. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
2. See BC standards for sign details.
3. If adequate longitudinal buffer length "B" does not exist between the work space and the exit ramp, consideration should be given to closing the ramp.

* A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA BEYOND EXIT RAMP

TCP(6-5)-12

FILE: tcp6-5.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT Feburary 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	03	087	IH 35W
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	FTW	JOHNSON		84

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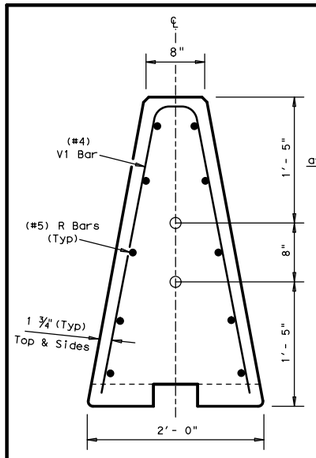
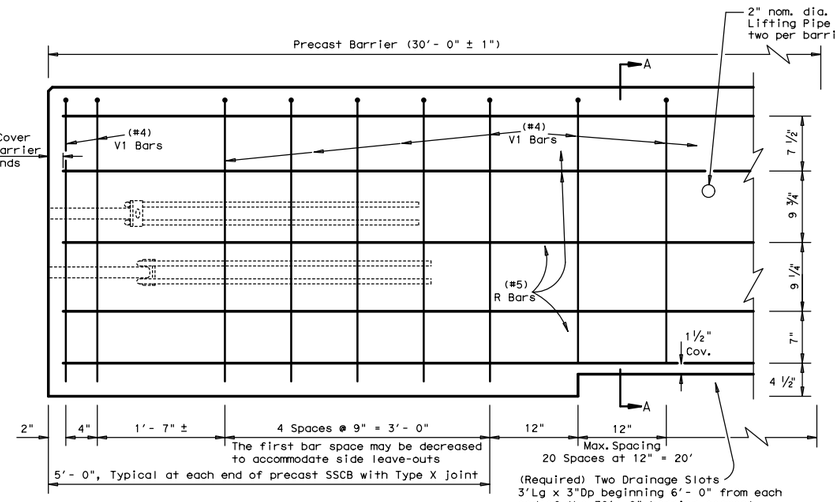


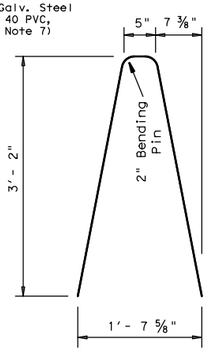
End View Precast Barrier

Pipe locations for Joint Type X connection



Reinforcement for Precast (SSCB) Single Slope Concrete Barrier (Type 1)

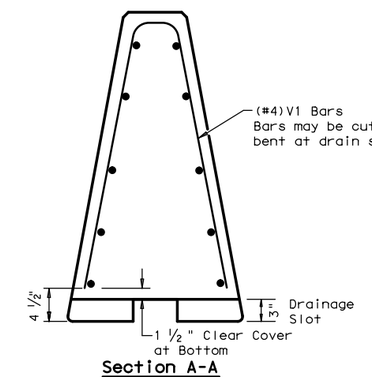
Showing reinforcement for Joint Connection (Type X)



V1 Bar

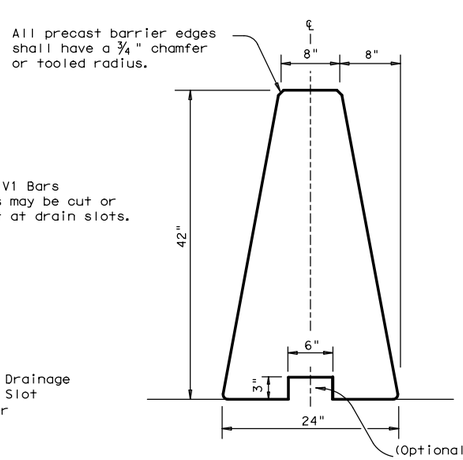
#4 Rebar

Note:
V1 Bars above the drainage slots may bent to accomadate 1 ½" clear cover as directed by the Engineer.



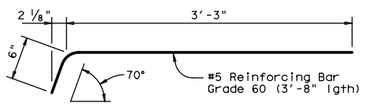
Section A-A

Steel Placement at (Required) Drainage Slots



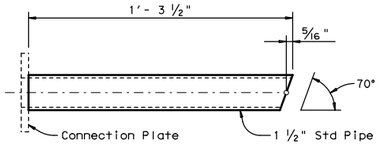
Single Slope Concrete Traffic Barrier

Precast SSCB barrier may be connected to cast-in-place SSBC. The joint connection "Types" may be used in the cast-in-place barrier, to match the precast barrier connection.



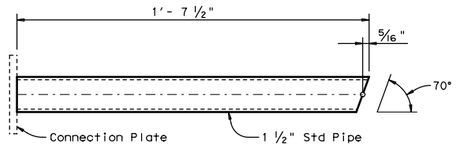
DEFORMED BAR ANCHOR DETAILS

Two (2) Bars required per assembly.
Eight (8) required per Joint.



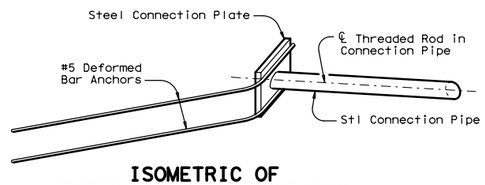
UPPER CONNECTION PIPE DETAILS

One (1) Steel Pipe required per Upper Assembly.
Two (2) required per Joint.



LOWER CONNECTION PIPE DETAILS

One (1) Steel Pipe required per Lower Assembly.
Two (2) required per Joint.

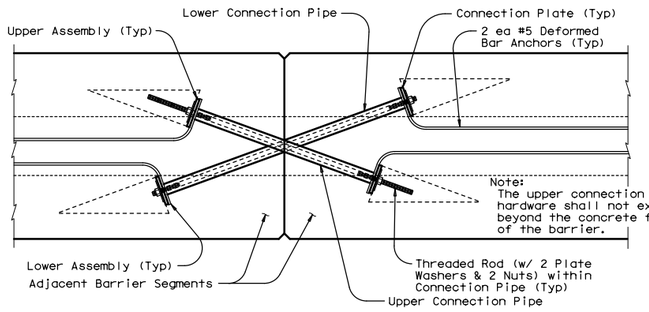


ISOMETRIC OF TYPICAL WELDED ASSEMBLY

Four (4) [2 Upper & 2 Lower] Assemblies required per Joint.

General Notes

1. Concrete shall be Class H with a minimum compressive strength of 3,600 psi.
2. Where used, rebar reinforcement shall be Grade 60 and conform to ASTM A615.
3. Precast barrier length shall be 30 ft. unless otherwise specified on the plans.
4. All precast barrier edges shall have a ¾" chamfer or a tooled radius.
5. All concrete, reinforcement, joint connection systems, grout etc. as shown, are considered as part of the barrier payment.
6. Conduit trough when required shall be shown elsewhere on the plans, or as directed by the Engineer.
7. Regardless of the method of handling, barrier lifting points shall be approx. 7.5 feet from the ends of the barrier. Lifting devices and attachments to barrier sections shall be approved by the Engineer.
8. Surface finishing and grouting (where required) shall be two parts sand one part cement with enough water to make the mixture plastic. Grouting shall be done in a manner that will assure a smooth surface. Surface finishing shall be considered subsidiary to the various bid items.
9. All steel assemblies shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."



TYPE X JOINT INSTALLATION DETAIL

Barrier reinforcing and Type X Joint Leave-Out dimensions not shown for clarity.

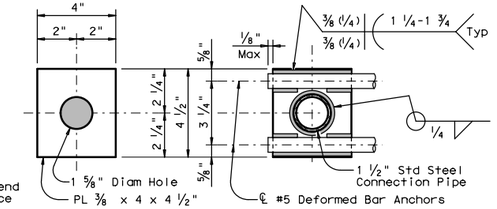
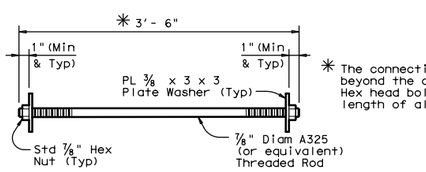


PLATE DIMENSIONS — WELDING DETAILS

CONNECTION PLATE DETAILS

One (1) Plate required per assembly.
Four (4) required per Joint. All steel fittings for joint Type X shall be galvanized after fabrication in accordance with Item 445.

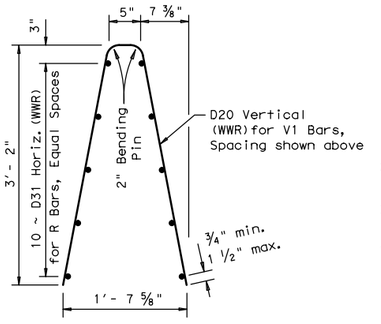


✳ The connection hardware shall not extend beyond the concrete face of the barrier. Hex head bolts may be provided. The proper length of all hardware should be verified.

CONNECTION BOLT OR THREADED ROD DETAIL

Two (2) Threaded Rods (Or Equivalent Hex Hd. Bolts) (w/ Two (2) PL ⅜ x 3 x 3 Plate Washers & Two (2) Std Hex Nuts) required per Joint.

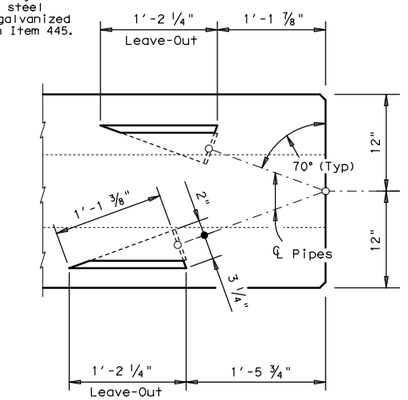
Weight of one precast 30 ft. (SSCB) segment = Approx. 10.5 Tons or 717 lbs per ft.



Welded Wire Reinforcement (WWR) Option for Bars R and V1

(WWR) General Notes

1. Deformed Welded Wire Reinforcement (WWR) shall conform to ASTM A497.
2. Welded wire cage may be cut or bent to accommodate the Type X joint connection and drainage slots, as directed by the Engineer.
3. All reinforcement shall comply with Item 440, "Reinforcing Steel."
4. Combinations of reinforcing steel and WWR will be permitted, as directed by the Engineer. The dimension from the end of the barrier section to the first wire shall not exceed 3".



BARRIER PLAN AT JOINT

SHEET 1 OF 2

Texas Department of Transportation | Design Division Standard

SINGLE SLOPE CONCRETE BARRIER

PRECAST BARRIER (TYPE 1)

SSCB(2)-10

FILE: sscb210.dgn	DN: TxDOT	CK: AM	DW: BD	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		85

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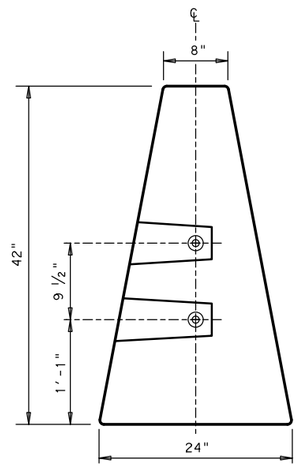
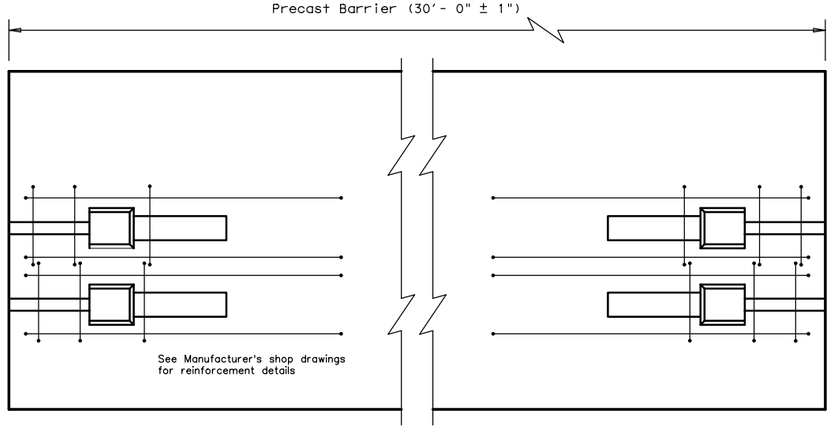
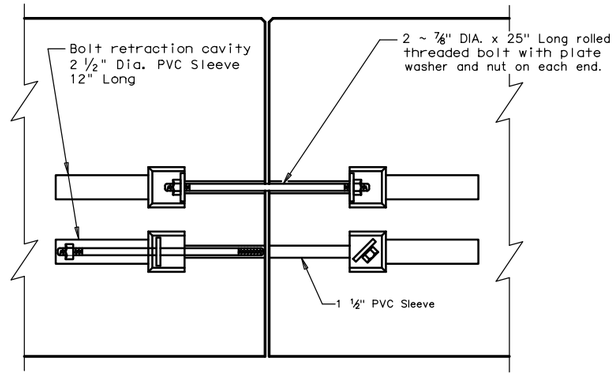


END VIEW
"QUICK-BOLT" POCKET LOCATIONS

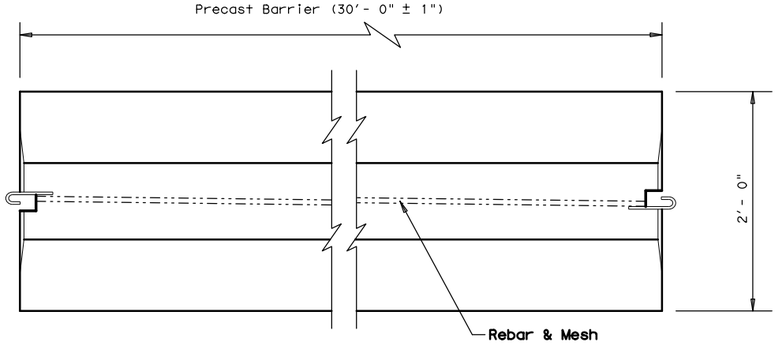


ELEVATION VIEW
"QUICK-BOLT" (SSCB)
See Manufacturer's shop drawing for additional details

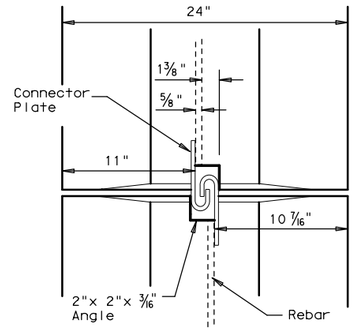


ELEVATION VIEW SHOWING JOINT CONNECTION
"QUICK-BOLT"

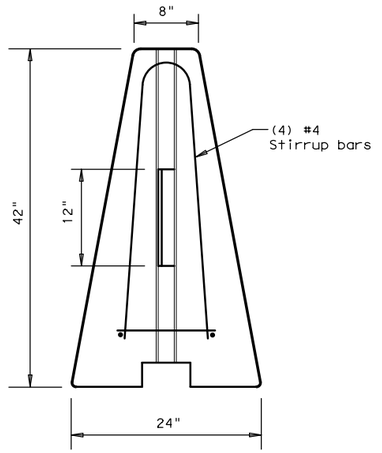
Joint Connection (Type Q)



TOP VIEW
PRECAST (SSCB) WITH J-J HOOKS
See Manufacturer's shop drawing for additional details



VIEW FROM ABOVE
J-J HOOK CONNECTION



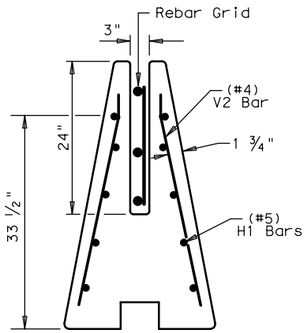
END VIEW

Proprietary Joint Connections (SSCB)

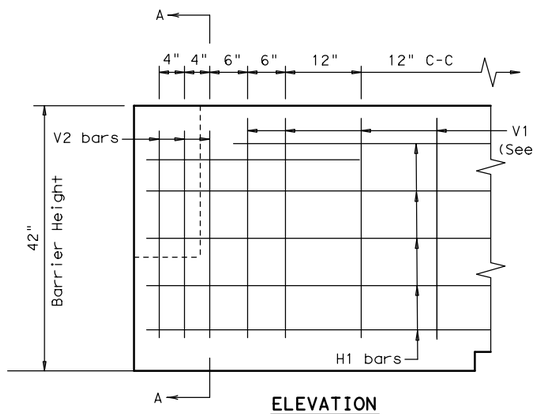
Two proprietary joint connections are acceptable as alternates to the (Type X) connection shown, here on. These joint connections types are:

J-J Hooks by Easi-Set Industries, (800)547-4045
Quick-Bolt by Bexar Concrete, (210)497-3773

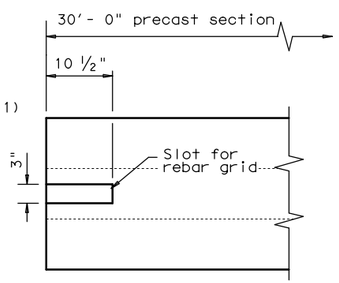
If one of these connection systems are exclusively specified in the plans, prior approval for sole source use must be obtained. Details of the connection components and barrier reinforcement for these systems, will be shown on the manufacturer's shop drawing(s) furnished to the Engineer.



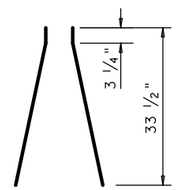
SECTION A-A
Showing (Type R) Rebar Grid



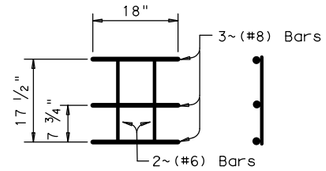
ELEVATION
V1 Bars (See Sheet 1)



TOP VIEW
JOINT CONNECTION
Typical at both ends of barrier segment



(#4) V2 BARS
6 ~ two piece bars per barrier segment



WELDED REBAR GRID

Joint Connection (Type R)

SHEET 2 OF 2

Texas Department of Transportation — Design Division Standard

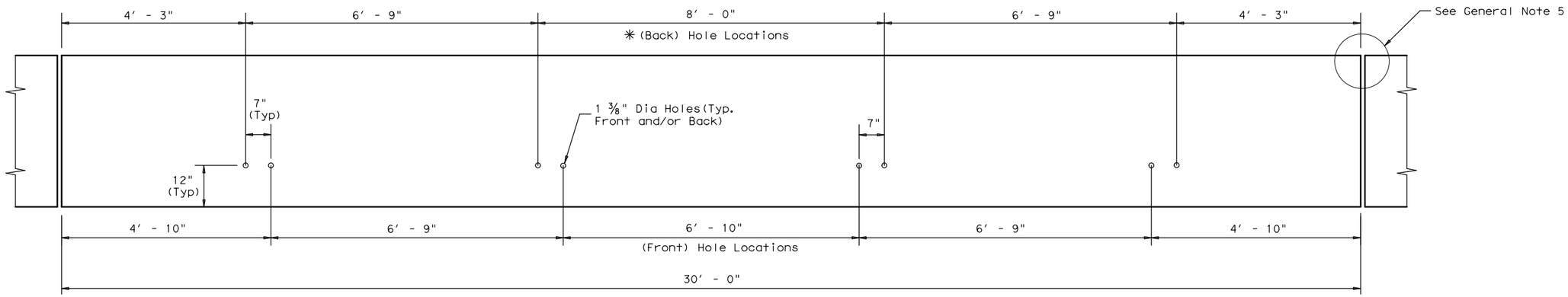
SINGLE SLOPE CONCRETE BARRIER

PRECAST BARRIER
(TYPE 1)

SSCB(2)-10

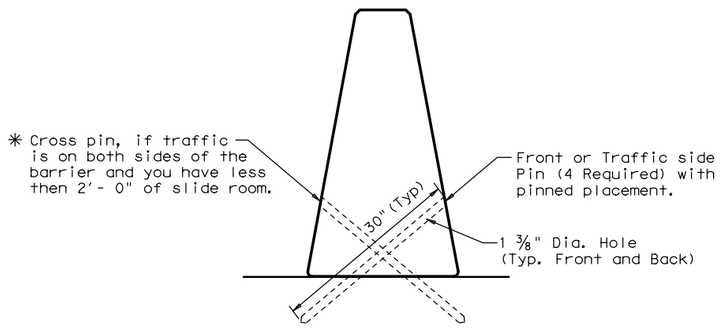
FILE: sscb210.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	03	087	IH 35W
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		86

DATE: 5/23/2022
FILE: c:\pwworking\aecom_ds20_na_2019\subash.paude1@aecom.com\d0119097\sscb510.dgn



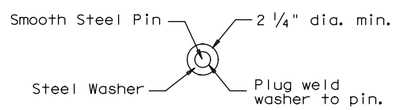
DETAIL 1

Precast SSCB(42")
Showing hole locations

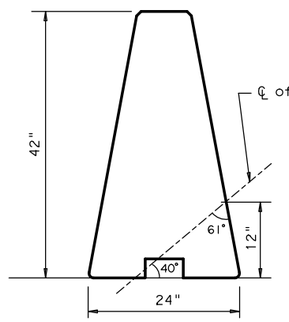


DETAIL 2

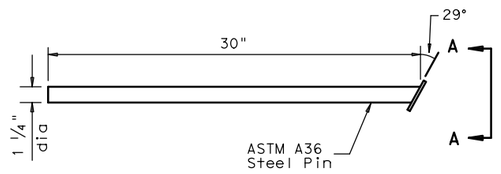
Placement on (ACP)
Asphalt Conc. Pavement
or Treated Base Material
(30" Pin required)



VIEW A-A

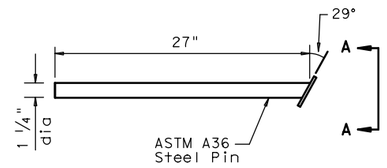


HOLE LOCATION DETAIL



(30") PIN DETAIL

See Detail 2



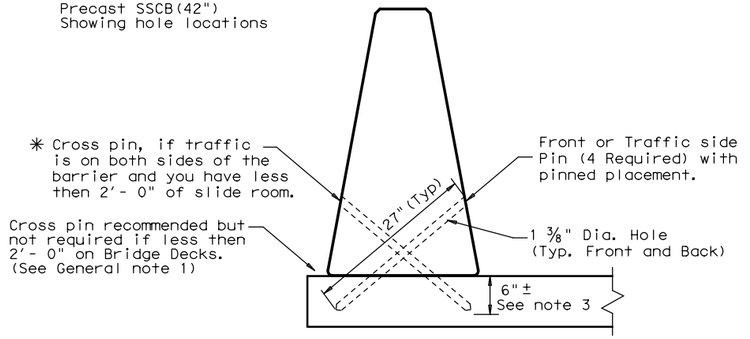
(27") PIN DETAIL

See Detail 3

Note:
Steel washer welded to pin at 29° angle so that the washer is flush with barrier surface. (See View A-A)

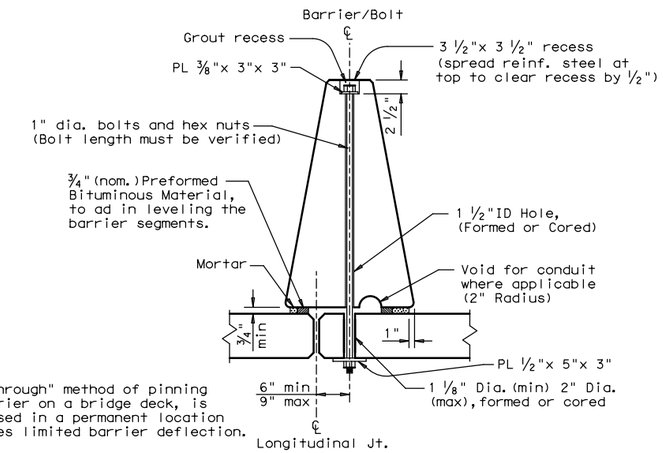
DETAIL 3

Bridge Deck or CRCP
(27" Pin required).



CORE DRILLING EXISTING BARRIER

Core drilling existing concrete barrier is permitted. Holes shall be drilled with coring or masonry drilling type equipment. Percussion (star) drilling shall not be used. A special drill bit (to cut through existing reinforcing) will likely be required. Spalls in the concrete exceeding ½" shall be patched.



Note:
The "Bolt Through" method of pinning precast barrier on a bridge deck, is primarily used in a permanent location that requires limited barrier deflection.

PRECAST SSCB (BOLT THROUGH) PLACEMENT OVER LONGITUDINAL EXPANSION JOINT

For bolt through locations, use the (Front) hole locations shown on Detail 1.

GENERAL NOTES

1. These details provide a method of laterally restraining precast concrete barrier to limit deflections under normally expected passenger vehicle impacts. These details are intended for use in work zones, primarily on bridge decks, or pavement where temporary barrier must be placed less then 2 ft. from the longitudinal edge of the deck or dropoff and parallel to the direction of travel. Other applications of these details are acceptable as directed by the Engineer.
2. Each precast concrete barrier section shall have a minimum of four or total of eight 1 ⅜in. ID holes formed or cored through the barrier. The center lines of the holes are shown in the hole location detail. If rebar is encountered, the entry point may be shifted 2" plus or minus longitudinally along the barrier. The eight holes are spaced along the length of the barrier as shown in Detail 1.
3. The drilling of the travel surface is accomplished by placing the pre-drilled barrier section on the travel surface in the desired position. Then the hole is drilled with the bit passing though the hole in the barrier. The bit is to be inserted into the hole in the barrier so that the travel surface is drilled to a point which is slightly more than the pin length.
4. Note that steel washers have been welded to the top of the steel pins to aid in the removal of the pins, when the barrier is removed.
5. See SSCB(2) standard sheet for reinforcement requirements and joint connection types.
6. The forming or coring of holes in the barrier, drilling of holes in bridge deck or pavement, fabrication and materials for the 1 ¼in. pins, installation of pins, and any repair to the barrier shall be considered as subsidiary to the barrier bid items.
7. The barrier and travel surface will be repaired as directed by the Engineer in accordance with Item 429, "Concrete Structure Repair."
8. All steel pins shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."
9. Weight of barrier is approx. 700 lbs per foot.

Texas Department of Transportation

Design Division Standard

SINGLE SLOPE CONCRETE BARRIER

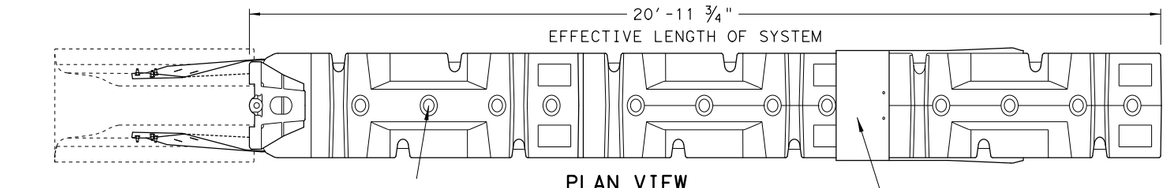
PRECAST BARRIER
(TYPE 1)
PINNED PLACEMENT

SSCB(5)-10

FILE: sscb510.dgn	DN: TxDOT	CK: AM	DW: BD	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	03	087	IH 35W
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		87

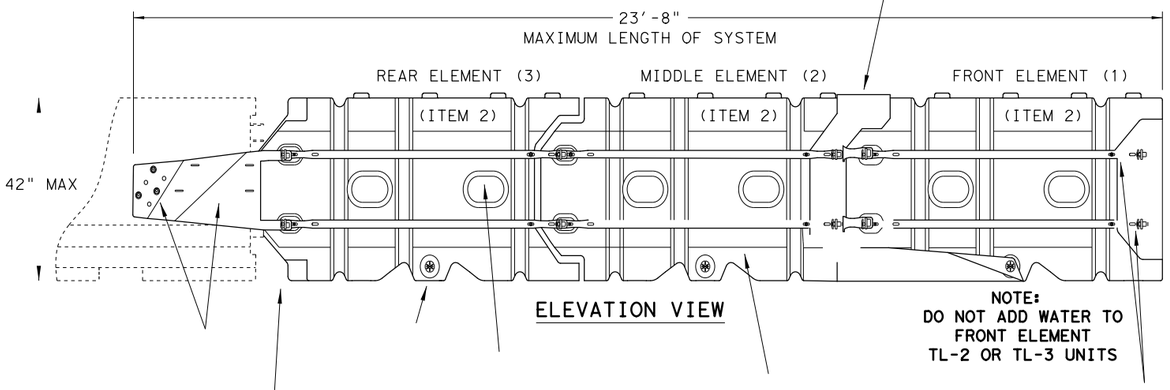
DATE: 5/23/2022
FILE: c:\pwworking\aecom_ds20_na_2019\subash.paudel@aecom.com\d0119097\absorbm19.dgn

SYSTEM SHOWN - ABSORB-M TL-3



PLAN VIEW

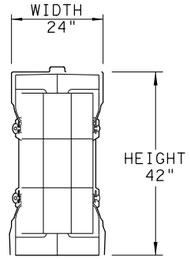
TRAFFIC FLOW



ELEVATION VIEW

NOTE:
DO NOT ADD WATER TO
FRONT ELEMENT
TL-2 OR TL-3 UNITS

TRAFFIC FLOW



SECTION A-A

TEST LEVEL	NUMBER OF ELEMENTS	EFFECTIVE LENGTH	MAXIMUM LENGTH
TL-2	2	14'- 7 3/4"	17'- 4"
TL-3	3	20'- 11 3/4"	23'- 8"

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING THE INSTALLATION AND TECHNICAL GUIDANCE, CONTACT: LINDSAY TRANSPORTATION SOLUTIONS (LTS) - BARRIER SYSTEMS, INC. AT (707) 374-6800. 180 RIVER ROAD, RIO VISTA, CA 94571
2. THE ABSORB-M SYSTEM IS ONLY APPROVED FOR USE IN (TEMPORARY WORK ZONE) LOCATIONS.
3. THE ABSORB-M IS A WATER FILLED NON-REDIRECTIVE, GATING CRASH CUSHION THAT DOES NOT NEED TO BE ATTACHED TO A FOUNDATION AND CAN BE INSTALLED ON TOP OF CONCRETE, ASPHALT, OR ANY SURFACE CAPABLE OF BEARING THE WEIGHT OF THE SYSTEM.
4. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%.
5. THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
6. THE ABSORB-M SHOULD BE LOCATED APPROXIMATELY PARALLEL WITH THE BARRIER.
7. THE USE OF THE ABSORB-M IS RESTRICTED TO A BARRIER HEIGHT OF UP TO 42 INCHES.
8. DO NOT ADD WATER TO FRONT ELEMENT (TL-2 OR TL-3 UNIT).

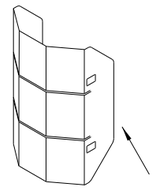
BILL OF MATERIALS (BOM) ABSORB-M TL-3 & TL-2 SYSTEMS			QTY	QTY
ITEM #	PART NUMBER	PART DESCRIPTION	TL-2 SYSTEM	TL-3 SYSTEM
1	BSI-1809036-00	TRANSITION-(GALV)	1	1
* 2	BSI-1808002-00	PRE-ASSEMBLED ABSORBING (ELEMENTS)	2	3
* 3	BSI-4004598	FILL CAPS	8	12
* 4	BSI-4004599	DRAIN PLUGS	2	3
* 5	BSI-1809053-00	TENSION STRAP-(GALV)	8	12
* 6	BSI-2001998	C-SCR FH 3/8-16 X 1 1/2 GR5 PLT	8	12
* 7	BSI-2001999	C-SCR FH 3/8-16 X 1 GR5 PLT	8	12
8	BSI-1809035-00	MIDNOSE-(GALV)	1	1
9	BSI-1808014-00	NOSE PLATE	1	1
10	BSI-1809037-00	TRANSITION STRAP (LEFT-HAND)-(GALV)	1	1
11	BSI-1809038-00	TRANSITION STRAP (RIGHT-HAND)-(GALV)	1	1
12	BSI-1808005-00	PIN ASSEMBLY	8	10
13	BSI-2002001	ANC MECH 5/8-11X5 (GALV)	6	6
14	ABSORB-M	INSTALLATION AND INSTRUCTIONS MANUAL	1	1

*COMPONENTS PRE-ASSEMBLED WITH ELEMENT ASSEMBLY

DELINEATION DECAL PLACEMENT GUIDE

TRAFFIC FLOW LEFT-SIDE BARRIER | TRAFFIC FLOW BOTH-SIDE BARRIER | TRAFFIC FLOW RIGHT-SIDE BARRIER

**APPLY DECAL



NOSE PLATE

** NOTE: (PROVIDED BY OTHERS)
ENGINEER OR CONTRACTOR SHALL COORDINATE WITH THE MANUFACTURER FOR THE CORRECT DECAL PER TRAFFIC FLOW, LEFT, RIGHT OR BOTH-SIDES.

NOTE:
APPLY A HIGH REFLECTIVE DECAL TO THE NOSE PLATE. DELINEATION DECAL ORIENTATION IS SHOWN ON THE CONSTRUCTION PLAN SET AND SHALL BE IN ACCORDANCE WITH THE TEXAS MUTCD FOR (TRAFFIC CONTROL DEVICES). DECALs ARE AVAILABLE FOR TRAFFIC FLOW ON THE LEFT-SIDE, BOTH -SIDES AND RIGHT-SIDE.

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE ABSORB-M, IT IS NOT INTENDED TO REPLACE THE INSTALLATION INSTRUCTIONS MANUAL.

SACRIFICIAL

Texas Department of Transportation — Design Division Standard

LINDSAY TRANSPORTATION SOLUTIONS
CRASH CUSHION
(MASH TL-3 & TL-2)
TEMPORARY - WORK ZONE
ABSORB(M)-19

FILE: absorbm19	DN: TxDOT	CK: KM	DW: VP	CK:
© TxDOT: JULY 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	03	087	IH 35W
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		88

DATE: 6/16/2022
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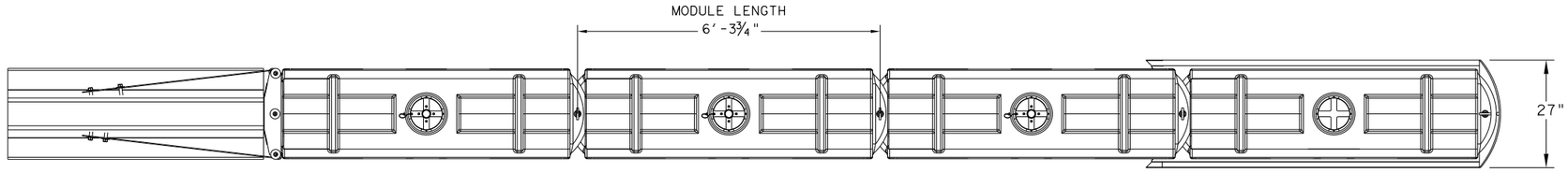
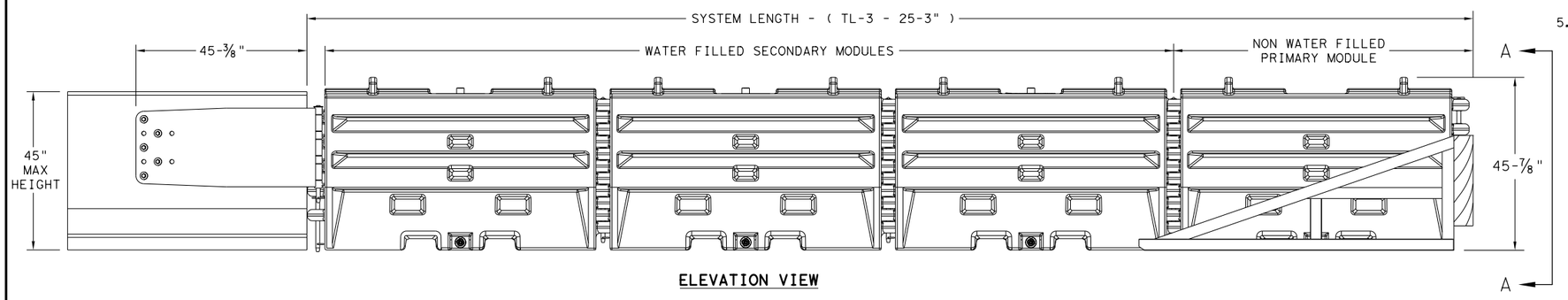
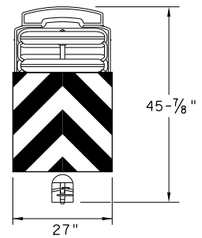


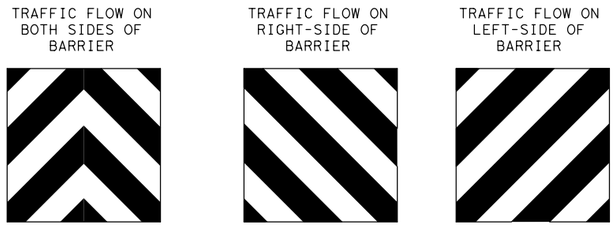
PLAN VIEW



ELEVATION VIEW



SECTION A-A



NOSE SHEETING PANEL DELINEATION

NOTE:
SEE INSTALLATION MANUAL FOR CUSTOMIZED DELINEATION NOSE SHEETING FOR DECAL PLACEMENT.

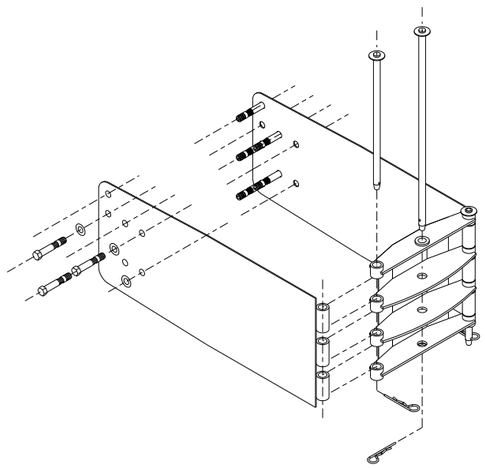
TEST LEVEL	NUMBER OF SECONDARY MODULES	SYSTEM LENGTH
TL-3	3	25′ 3"

GENERAL NOTES

1. REFER TO THE INSTALLATION MANUAL FOR SPECIFIC SYSTEM ASSEMBLY AND MODULE ORIENTATION. FOR ADDITIONAL INFORMATION, CONTACT TRAFFIX, INC. AT (949) 361-5663.
2. THE SLED SYSTEM IS A MASH APPROVED TEST LEVEL 3 (TL-3) CRASH CUSHION APPROVED FOR USE IN TEMPORARY WORK ZONES. THE SLED SYSTEM IS A NON-REDIRECTIVE, GATING CRASH CUSHION THAT DOES NOT NEED TO BE ATTACHED TO THE GROUND AND CAN BE INSTALLED ON CONCRETE, ASPHALT, GRAVEL OR COMPACTED SOIL.
3. MAXIMUM PERMISSIBLE CROSS SLOPE IS 8° (DEGREES) (14%).
4. THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
5. THE SLED SYSTEM CAN BE ATTACHED TO:

- CONCRETE BARRIER, TEMPORARY OR PERMANENT, 45" MAXIMUM HEIGHT
- STEEL BARRIER
- PLASTIC BARRIER
- CONCRETE BRIDGE ABUTMENTS
- W-BEAM GUARD RAIL
- THRIE BEAM GUARD RAIL

BILL OF MATERIAL		
PART NUMBER	DESCRIPTION	QTY: TL-3
45131	TRANSITION FRAME, GALVANIZED	1
45150	TRANSITION PANEL, GALVANIZED	2
45147-CP	TRANSITION SHORT DROP PIN W/ KEEPER PIN, GALVANIZED	2
45148-CP	TRANSITION LONG DROP PIN W/ KEEPER PIN, GALVANIZED	1
45050	ANCHOR BOLTS	9
12060	WASHER, 3/4" ID X 2" OD	9
45044-Y	SLED YELLOW WATER FILLED MODULE	3
45044-YH	SLED YELLOW "NO FILL" MODULE	1
45044-S	CIS (CONTAINMENT IMPACT SLED), GALVANIZED	1
45043-CP	T-PIN W/ KEEPER PIN	4
18009-B-I	FILL CAP W/ "DRIVE BY" FLOAT INDICATOR	3
45033-RC-B	DRAIN PLUG	3
45032-DPT	DRAIN PLUG REMOVAL TOOL	1



SLED TRANSITION COMPONENTS FOR ATTACHMENT TO CMB

NOTE:
SEE MANUFACTURER'S INSTALLATION MANUAL FOR FURTHER DETAILS.

TRANSITION OPTIONS
SLED TRANSITION TO CONCRETE TRAFFIC BARRIER (TEMPORARY OR PERMANENT)
SLED TRANSITION TO STEEL TRAFFIC BARRIER (CONTACT MFGR FOR PROPER TRANSITION)
SLED TRANSITION TO PLASTIC TRAFFIC BARRIER (CONTACT MFGR FOR PROPER TRANSITION)
SLED TRANSITION TO W-BEAM OR THRIE BEAM GUARD RAIL (CONTACT MFGR FOR PROPER TRANSITION)
SLED TRANSITION TO CONCRETE BRIDGE ABUTMENT

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE SLED, IT IS NOT INTENDED TO REPLACE THE INSTALLATION INSTRUCTIONS MANUAL.

SACRIFICIAL

Texas Department of Transportation

Design Division Standard

SLED
CRASH CUSHION
TL-3 MASH COMPLIANT
(TEMPORARY, WORK ZONE)
SLED-19

FILE: sled19.dgn	DN: TxDOT	CK: KM	DW: VP	CK:
© TxDOT: DECEMBER 2019	CONT	SECT	JOB	HIGHWAY
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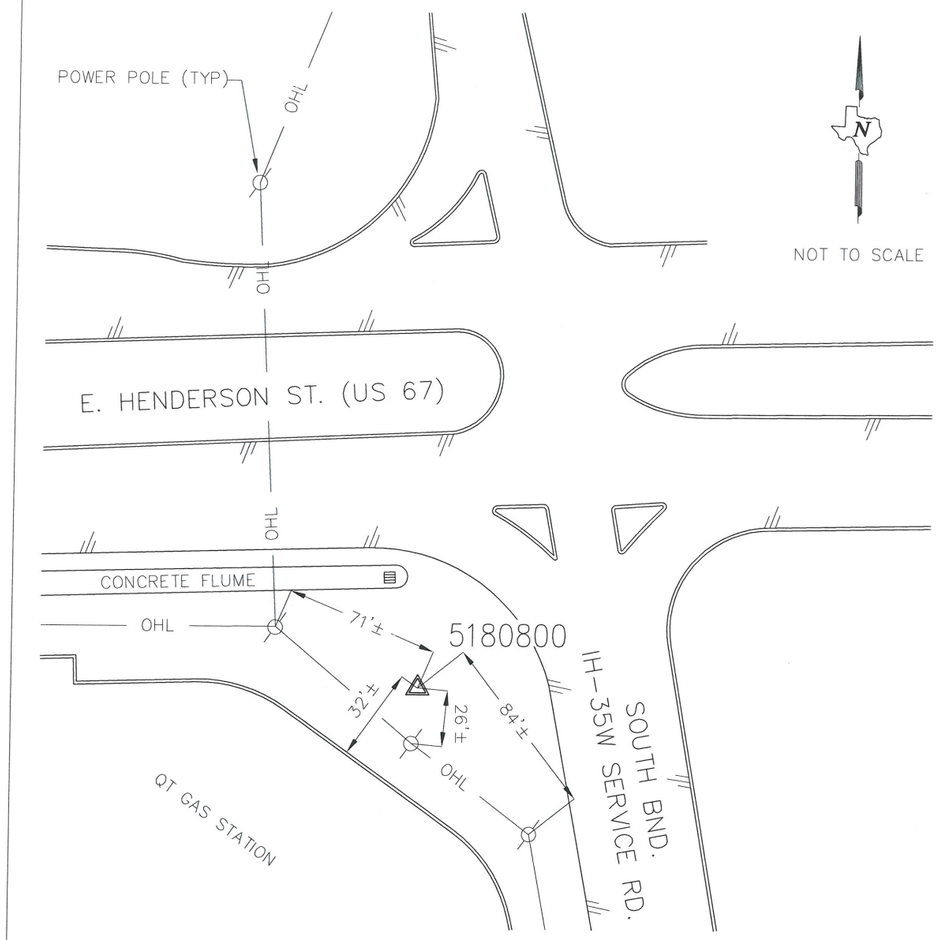
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		88A

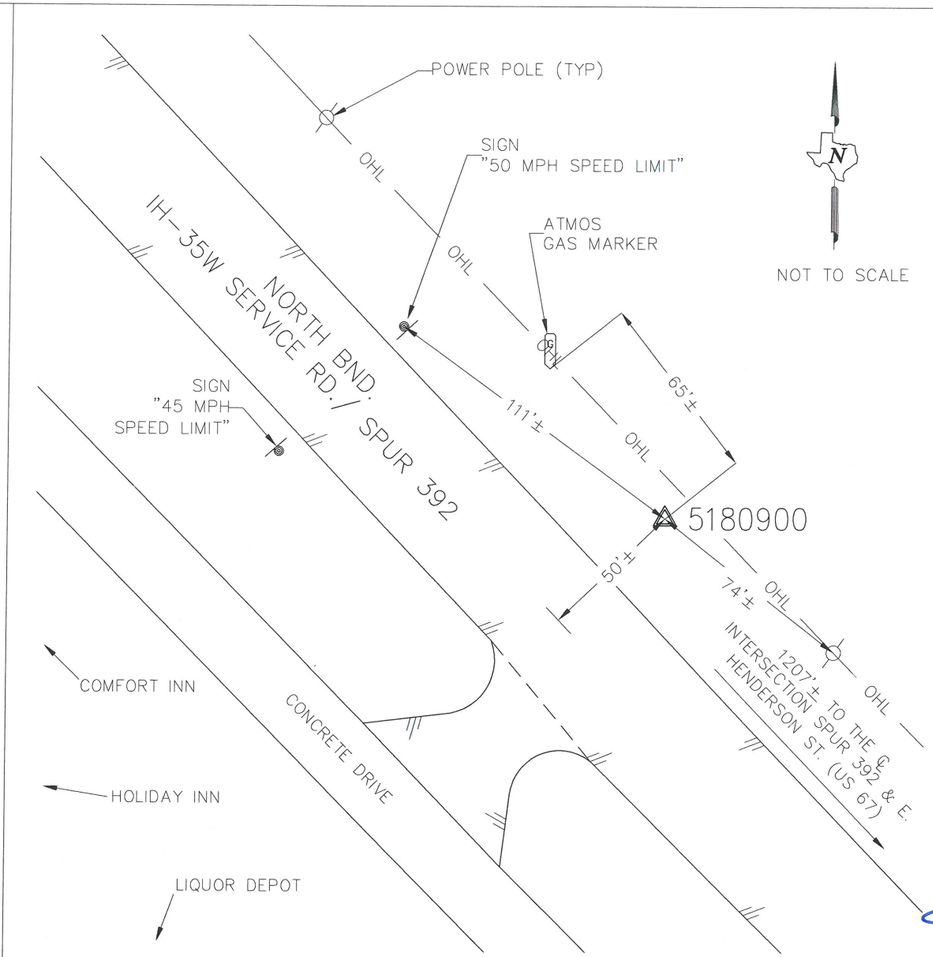


CONTROL POINT No. 5180800

APPROXIMATE LOCATION:

A 3 1/4" TxDOT ALUMINUM DISC SET IN CONCRETE STAMPED "TEXAS DEPARTMENT OF TRANSPORTATION GPS MONUMENT" AT THE SOUTHWEST CORNER OF THE INTERSECTION OF E. HENDERSON ST. (US 67) & THE SOUTH BOUND IH-35W SERVICE ROAD, 84'± NORTHWEST OF POWER POLE NEAR THE SERVICE ROAD, 26'± NORTH OF A POWER POLE NEAR THE QT GAS STATION PARKING LOT, 71'± SOUTHEAST OF A POWER POLE NEAR HENDERSON ST, 32'± NORTHEAST FROM THE BACK OF CURB OF THE QT GAS STATION.

US SURVEY FEET
NAVD 88 ELEVATION = 766.01'
DATE SET: JUNE 11, 2014
MONUMENT: 3 1/4" TxDOT ALUMINUM DISC
JOHNSON COUNTY SCALE FACTOR: 1.00012
SURFACE ENGLISH CO-ORDS
NORTHING: 6,837,376.930
EASTING: 2,361,279.023
STATE PLANE ENGLISH CO-ORDS
NORTHING: 6,836,556.543
EASTING: 2,360,995.704
ELEVATIONS ARE NAVD 88 BASED UPON
TxDOT VRS RTK NETWORK



CONTROL POINT No. 5180900

APPROXIMATE LOCATION:

A 3 1/4" TxDOT ALUMINUM DISC SET IN CONCRETE STAMPED "TEXAS DEPARTMENT OF TRANSPORTATION GPS MONUMENT", 1207'± NORTHWEST OF THE ℄ INTERSECTION OF E. HENDERSON ST. (US 67) & SPUR 392, 50'± NORTHEAST OF THE CENTERLINE OF SPUR 392, 74'± NORTHWEST OF A POWER POLE, 111'± SOUTHEAST OF A "50 MPH SPEED LIMIT" SIGN, 65'± SOUTHEAST OF A ATMOS GAS MARKER.

US SURVEY FEET
NAVD 88 ELEVATION = 775.81'
DATE SET: JUNE 11, 2014
MONUMENT: 3 1/4" TxDOT ALUMINUM DISC
JOHNSON COUNTY SCALE FACTOR: 1.00012
SURFACE ENGLISH CO-ORDS
NORTHING: 6,838,448.621
EASTING: 2,362,056.902
STATE PLANE ENGLISH CO-ORDS
NORTHING: 6,837,628.106
EASTING: 2,361,773.489
ELEVATIONS ARE NAVD 88 BASED UPON
TxDOT VRS RTK NETWORK

I HEREBY CERTIFY THAT THE HORIZONTAL AND VERTICAL DATA SHOWN HEREON WAS DETERMINED BY A FIELD SURVEY ON JUNE 11, 2014 UTILIZING THE TxDOT VIRTUAL REFERENCE SYSTEM RTK NETWORK AND IS CORRECTLY SHOWN HEREON.

STATE OF TEXAS
REGISTERED
SCOTT M. POSEY
5350
PROFESSIONAL
LAND SURVEYOR

Scott M. Posey
Registered Professional Land Surveyor
No. 5350

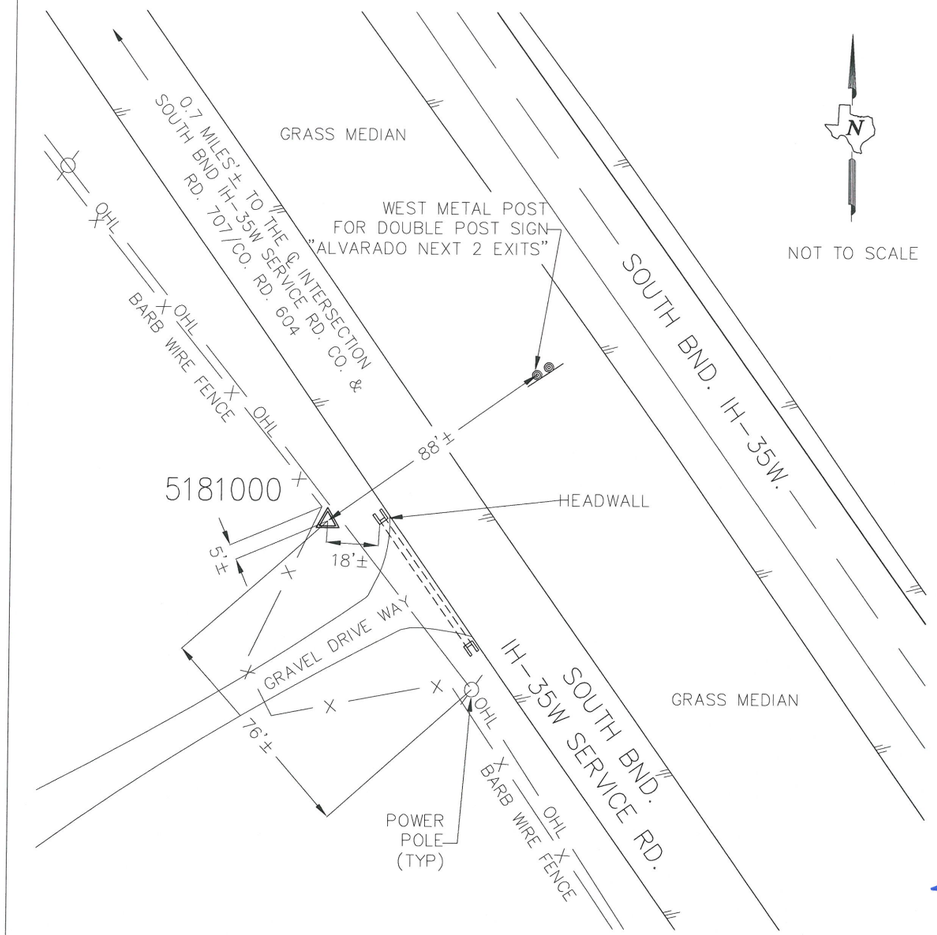
LAMB-STAR ENGINEERING, L.P.
5700 W. PLANO PARKWAY,
SUITE 1000
PLANO, TX. 75093
TBPLS # 10048300

URS 3010 LBJ FREEWAY, SUITE 1300
DALLAS, TEXAS 75234
972.406.6950 TBPE REG #3162

IH-35W ALVARADO

SURVEY CONTROL DATA

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
	(SEE TITLE SHEET)		IH-35W
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	JOHNSON	89
CONTROL	SECTION	JOB	
0014	03	087	



CONTROL POINT No. 5181000

APPROXIMATE LOCATION:

A 3 1/4" TxDOT ALUMINUM DISC SET IN CONCRETE STAMPED "TEXAS DEPARTMENT OF TRANSPORTATION GPS MONUMENT", 0.7± MILES SOUTHEAST OF THE ℄ INTERSECTION OF THE SOUTH BOUND IH-35W SERVICE RD. & COUNTY RD. 707/COUNTY RD. 604, 76'± NORTHWEST OF A POWER POLE, 18'± WEST OF A HEADWALL, 5'± SOUTHEAST OF A METAL POST (FENCE ANGLE CORNER), 88'± SOUTHWEST OF THE WEST METAL POST OF A DOUBLE POST SIGN "ALVARADO NEXT 2 EXITS".

US SURVEY FEET
NAVD 88 ELEVATION = 779.14'
DATE SET: JUNE 11, 2014
MONUMENT: 3 1/4" TxDOT ALUMINUM DISC
JOHNSON COUNTY SCALE FACTOR: 1.00012
SURFACE ENGLISH CO-ORDS
NORTHING: 6,839,856.097
EASTING: 2,360,352.413
STATE PLANE ENGLISH CO-ORDS
NORTHING: 6,839,035.413
EASTING: 2,360,069.205
ELEVATIONS ARE NAVD 88 BASED UPON
TxDOT VRS RTK NETWORK

I HEREBY CERTIFY THAT THE HORIZONTAL AND VERTICAL DATA SHOWN HEREON WAS DETERMINED BY A FIELD SURVEY ON JUNE 11, 2014 UTILIZING THE TxDOT VIRTUAL REFERENCE SYSTEM RTK NETWORK AND IS CORRECTLY SHOWN HEREON.

STATE OF TEXAS
REGISTERED
SCOTT M. POSEY
5350
PROFESSIONAL
LAND SURVEYOR

Scott M. Posey
Registered Professional Land Surveyor
No. 5350

LAMB-STAR ENGINEERING, L.P.
5700 W. PLANO PARKWAY,
SUITE 1000
PLANO, TX. 75093
TBPLS # 10048300

URS 3010 LBJ FREEWAY, SUITE 1300
DALLAS, TEXAS 75234
972.406.6950 TBPE REG #3162

IH-35W ALVARADO

SURVEY CONTROL DATA

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
	(SEE TITLE SHEET)		IH-35W
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	JOHNSON	90
CONTROL	SECTION	JOB	
0014	03	087	

PROPOSED IH 35W NORTHBOUND MAINLANES (PNBML)

Beginning chain PNBML description

Point NBCL45 N 6,842,917.4773 E 2,357,771.9217 Sta 517+00.00

Course from NBCL45 to PC PNBML-1 S 44° 01′ 12.80" E Dist 3,172.0500

Curve PNBML-1

Curve Data						
P.I. Station	565+81.57	N	6,839,407.1653	E	2,361,164.1856	
Delta =	33° 01′ 50.46"	(RT)				
Degree =	0° 59′ 37.52"					
Tangent =	1,709.5219					
Length =	3,323.8232					
Radius =	5,765.5800					
External =	248.1026					
Long Chord =	3,277.9866					
Mid. Ord. =	237.8668					
P.C. Station	548+72.05	N	6,840,636.4733	E	2,359,976.2179	
P.T. Station	581+95.87	N	6,837,728.9926	E	2,361,490.0713	
C.C.		N	6,836,629.9014	E	2,355,830.2205	

Back = S 44° 01′ 12.80" E
Ahead = S 10° 59′ 22.34" E
Chord Bear = S 27° 30′ 17.57" E

Course from PT PNBML-1 to NBCL46 S 10° 59′ 22.34" E Dist 1,997.4333

Point NBCL46 N 6,835,768.1882 E 2,361,870.8416 Sta 601+93.31

Ending chain PNBML description

PROPOSED NORTHBOUND FRONTAGE ROAD (PNBFR)

Beginning chain PNBFR description

Point PNBFR550 N 6,840,622.7966 E 2,360,127.1078 Sta 550+00.00

Course from PNBFR550 to PC PNBFR-1 S 44° 01′ 12.80" E Dist 510.6498

Curve PNBFR-1

Curve Data						
P.I. Station	566+43.21	N	6,839,441.7699	E	2,361,268.9976	
Delta =	33° 01′ 50.46"	(RT)				
Degree =	1° 30′ 00.00"					
Tangent =	1,132.5648					
Length =	2,202.0455					
Radius =	3,819.7186					
External =	164.3689					
Long Chord =	2,171.6786					
Mid. Ord. =	157.5876					
P.C. Station	555+10.65	N	6,840,255.5911	E	2,360,481.9645	
P.T. Station	577+12.70	N	6,838,329.3742	E	2,361,484.8982	
C.C.		N	6,837,601.2221	E	2,357,735.2255	

Back = S 44° 01′ 12.80" E
Ahead = S 10° 59′ 22.34" E
Chord Bear = S 27° 30′ 17.57" E

Course from PT PNBFR-1 to PNBFR551 S 10° 59′ 22.34" E Dist 771.5338

Point PNBFR551 N 6,837,571.9888 E 2,361,631.9755 Sta 584+84.23

Ending chain PNBFR description

PROPOSED RAMP C (PR533L)

Beginning chain PR533L description

Curve PR533L-1

Curve Data						
P.I. Station	12+00.08	N	6,841,664.2776	E	2,359,016.3529	
Delta =	4° 00′ 00.00"	(LT)				
Degree =	1° 00′ 00.00"					
Tangent =	200.0813					
Length =	400.0000					
Radius =	5,729.5780					
External =	3.4924					
Long Chord =	399.9188					
Mid. Ord. =	3.4903					
P.C. Station	10+00.00	N	6,841,808.1550	E	2,358,877.3140	
P.T. Station	14+00.00	N	6,841,530.4496	E	2,359,165.0895	
C.C.		N	6,845,789.7086	E	2,362,997.4225	

Back = S 44° 01′ 12.80" E
Ahead = S 48° 01′ 12.80" E
Chord Bear = S 46° 01′ 12.80" E

Course from PT PR533L-1 to PC PR533L-2 S 48° 01′ 12.80" E Dist 818.0539

Curve PR533L-2

Curve Data						
P.I. Station	23+18.09	N	6,840,916.3653	E	2,359,847.5834	
Delta =	4° 00′ 00.00"	(RT)				
Degree =	2° 00′ 00.00"					
Tangent =	100.0406					
Length =	200.0000					
Radius =	2,864.7890					
External =	1.7462					
Long Chord =	199.9594					
Mid. Ord. =	1.7452					
P.C. Station	22+18.05	N	6,840,983.2793	E	2,359,773.2151	
P.T. Station	24+18.05	N	6,840,844.4266	E	2,359,917.1029	
C.C.		N	6,838,853.6498	E	2,357,857.0486	

Back = S 48° 01′ 12.80" E
Ahead = S 44° 01′ 12.80" E
Chord Bear = S 46° 01′ 12.80" E

Ending chain PR533L description

PROPOSED RAMP H (PR580L)

Beginning chain PR580L description

Curve PR580L-1

Curve Data						
P.I. Station	11+94.80	N	6,838,785.8418	E	2,361,361.3224	
Delta =	13° 34′ 19.67"	(RT)				
Degree =	3° 30′ 00.00"					
Tangent =	194.7993					
Length =	387.7751					
Radius =	1,637.0223					
External =	11.5494					
Long Chord =	386.8692					
Mid. Ord. =	11.4685					
P.C. Station	10+00.00	N	6,838,967.6795	E	2,361,291.4525	
P.T. Station	13+87.78	N	6,838,592.6855	E	2,361,386.5696	
C.C.		N	6,838,380.5177	E	2,359,763.3546	

Back = S 21° 01′ 08.23" E
Ahead = S 7° 26′ 48.56" E
Chord Bear = S 14° 13′ 58.39" E

Course from PT PR580L-1 to PC PR580L-2 S 7° 26′ 48.56" E Dist 737.4216

Curve PR580L-2

Curve Data						
P.I. Station	22+13.79	N	6,837,773.6347	E	2,361,493.6264	
Delta =	3° 32′ 33.78"	(LT)				
Degree =	2° 00′ 00.00"					
Tangent =	88.5962					
Length =	177.1358					
Radius =	2,864.7890					
External =	1.3696					
Long Chord =	177.1076					
Mid. Ord. =	1.3690					
P.C. Station	21+25.20	N	6,837,861.4836	E	2,361,482.1438	
P.T. Station	23+02.33	N	6,837,686.6633	E	2,361,510.5155	
C.C.		N	6,838,232.7773	E	2,364,322.7700	

Back = S 7° 26′ 48.56" E
Ahead = S 10° 59′ 22.34" E
Chord Bear = S 9° 13′ 05.45" E

Ending chain PR580L description

PROPOSED BUS 35W (PBI35VT)

Beginning chain PBI35VT description

Point BUS35 N 6,838,788.7835 E 2,361,365.6453 Sta 10+00.00

Course from BUS35 to PC PBI35VT-1 N 71° 53′ 10.86" E Dist 45.2100

Curve PBI35VT-1

Curve Data						
P.I. Station	12+71.57	N	6,838,873.2153	E	2,361,623.7565	
Delta =	68° 24′ 45.05"	(RT)				
Degree =	17° 12′ 21.38"					
Tangent =	226.3597					
Length =	397.6099					
Radius =	333.0000					
External =	69.6509					
Long Chord =	374.4077					
Mid. Ord. =	57.6026					
P.C. Station	10+45.21	N	6,838,802.8394	E	2,361,408.6148	
P.T. Station	14+42.82	N	6,838,699.0571	E	2,361,768.3513	
C.C.		N	6,838,486.3424	E	2,361,512.1455	

Back = N 71° 53′ 10.86" E
Ahead = S 39° 42′ 04.09" E
Chord Bear = S 73° 54′ 26.62" E

Curve PBI35VT-2

Curve Data						
P.I. Station	16+62.86	N	6,838,529.7629	E	2,361,908.9077	
Delta =	4° 23′ 54.94"	(LT)				
Degree =	1° 00′ 00.00"					
Tangent =	220.0379					
Length =	439.8596					
Radius =	5,729.5800					
External =	4.2236					
Long Chord =	439.7515					
Mid. Ord. =	4.2205					
P.C. Station	14+42.82	N	6,838,699.0571	E	2,361,768.3513	
P.T. Station	18+82.68	N	6,838,371.7472	E	2,362,062.0342	
C.C.		N	6,842,359.0159	E	2,366,176.6150	

Back = S 39° 42′ 04.09" E
Ahead = S 44° 05′ 59.03" E
Chord Bear = S 41° 54′ 01.56" E

Course from PT PBI35VT-2 to BUS36 S 44° 05′ 59.03" E Dist 195.5005

Point BUS36 N 6,838,231.3525 E 2,362,198.0848 Sta 20+78.18

Ending chain PBI35VT description

STATE OF TEXAS
MARIA XIMENA MEDERO
107551
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PROFESSIONAL ENGINEER
5/23/2022

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13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

HORIZONTAL ALIGNMENT DATA

PROPOSED

SHEET 1 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		91

EXISTING IH 35W CENTERLINE (EX35W)

Beginning chain EX35W description

Point CL45 N 6,842,892.4604 E 2,357,746.0343 Sta 517+00.00

Course from CL45 to PC EX35W-1 S 44° 01′ 12.80" E Dist 3,172.0500

Curve EX35W-1

Curve Data					
P.I. Station	565+70.90	N	6,839,389.8242	E	2,361,130.8805
Delta =	33° 01′ 50.46"	(RT)			
Degree =	1° 00′ 00.00"				
Tangent =	1,698.8478				
Length =	3,303.0694				
Radius =	5,729.5800				
External =	246.5534				
Long Chord =	3,257.5190				
Mid. Ord. =	236.3815				
P.C. Station	548+72.05	N	6,840,611.4565	E	2,359,950.3305
P.T. Station	581+75.12	N	6,837,722.1299	E	2,361,454.7315
C.C.		N	6,836,629.9014	E	2,355,830.2205

Back = S 44° 01′ 12.80" E
Ahead = S 10° 59′ 22.34" E
Chord Bear = S 27° 30′ 17.57" E

Course from PT EX35W-1 to CL46 S 10° 59′ 22.34" E Dist 1,997.4333

Point CL46 N 6,835,761.3255 E 2,361,835.5017 Sta 601+72.55

Ending chain EX35W description

EXISTING NORTHBOUND FRONTAGE ROAD (EXNBFR)

Beginning chain EXNBFR description

Point 110 N 6,842,844.8019 E 2,358,118.8906 Sta 520+00.00

Course from 110 to PC EXNBFR-1 S 44° 01′ 12.80" E Dist 471.6300

Curve EXNBFR-1

Curve Data					
P.I. Station	526+21.94	N	6,842,397.5687	E	2,358,551.0838
Delta =	8° 59′ 59.99"	(RT)			
Degree =	3° 00′ 00.00"				
Tangent =	150.3092				
Length =	300.0000				
Radius =	1,909.8600				
External =	5.9057				
Long Chord =	299.6917				
Mid. Ord. =	5.8875				
P.C. Station	524+71.63	N	6,842,505.6553	E	2,358,446.6321
P.T. Station	527+71.63	N	6,842,274.4731	E	2,358,637.3410
C.C.		N	6,841,178.4703	E	2,357,073.2621

Back = S 44° 01′ 12.80" E
Ahead = S 35° 01′ 12.81" E
Chord Bear = S 39° 31′ 12.80" E

Course from PT EXNBFR-1 to PC EXNBFR-2 S 35° 01′ 12.81" E Dist 338.6300

Curve EXNBFR-2

Curve Data					
P.I. Station	532+60.57	N	6,841,874.0566	E	2,358,917.9264
Delta =	8° 59′ 59.99"	(LT)			
Degree =	3° 00′ 00.00"				
Tangent =	150.3092				
Length =	300.0000				
Radius =	1,909.8600				
External =	5.9057				
Long Chord =	299.6917				
Mid. Ord. =	5.8875				
P.C. Station	531+10.26	N	6,841,997.1522	E	2,358,831.6691
P.T. Station	534+10.26	N	6,841,765.9701	E	2,359,022.3781
C.C.		N	6,843,093.1551	E	2,360,395.7481

Back = S 35° 01′ 12.81" E
Ahead = S 44° 01′ 12.80" E
Chord Bear = S 39° 31′ 12.80" E

Course from PT EXNBFR-2 to PC EXNBFR-3 S 44° 01′ 12.80" E Dist 2,492.9642

Curve EXNBFR-3

Curve Data					
P.I. Station	562+87.15	N	6,839,697.2115	E	2,361,021.5664
Delta =	7° 40′ 01.64"	(RT)			
Degree =	1° 00′ 00.00"				
Tangent =	383.9293				
Length =	766.7125				
Radius =	5,729.5800				
External =	12.8488				
Long Chord =	766.1406				
Mid. Ord. =	12.8201				
P.C. Station	559+03.22	N	6,839,973.2930	E	2,360,754.7693
P.T. Station	566+69.94	N	6,839,388.0028	E	2,361,249.1443
C.C.		N	6,835,991.7380	E	2,356,634.6593

Back = S 44° 01′ 12.80" E
Ahead = S 36° 21′ 11.16" E
Chord Bear = S 40° 11′ 11.98" E

Course from PT EXNBFR-3 to PC EXNBFR-4 S 36° 21′ 11.16" E Dist 528.0142

Curve EXNBFR-4

Curve Data					
P.I. Station	575+85.87	N	6,838,650.3261	E	2,361,792.0750
Delta =	7° 44′ 47.87"	(LT)			
Degree =	1° 00′ 00.00"				
Tangent =	387.9228				
Length =	774.6634				
Radius =	5,729.5800				
External =	13.1172				
Long Chord =	774.0735				
Mid. Ord. =	13.0872				
P.C. Station	571+97.95	N	6,838,962.7511	E	2,361,562.1299
P.T. Station	579+72.61	N	6,838,371.7472	E	2,362,062.0342
C.C.		N	6,842,359.0159	E	2,366,176.6150

Back = S 36° 21′ 11.16" E
Ahead = S 44° 05′ 59.03" E
Chord Bear = S 40° 13′ 35.09" E

Course from PT EXNBFR-4 to 111 S 44° 05′ 59.03" E Dist 1,238.2696

Point 111 N 6,837,482.5092 E 2,362,923.7576 Sta 592+10.88

Ending chain EXNBFR description

STATE OF TEXAS
MARIA XIMENA MEDERO
107551
LICENSED
PROFESSIONAL ENGINEER
5/23/2022

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13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

HORIZONTAL ALIGNMENT DATA

EXISTING

SHEET 2 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		92

DATE: 5/23/2022 10:45:24 AM
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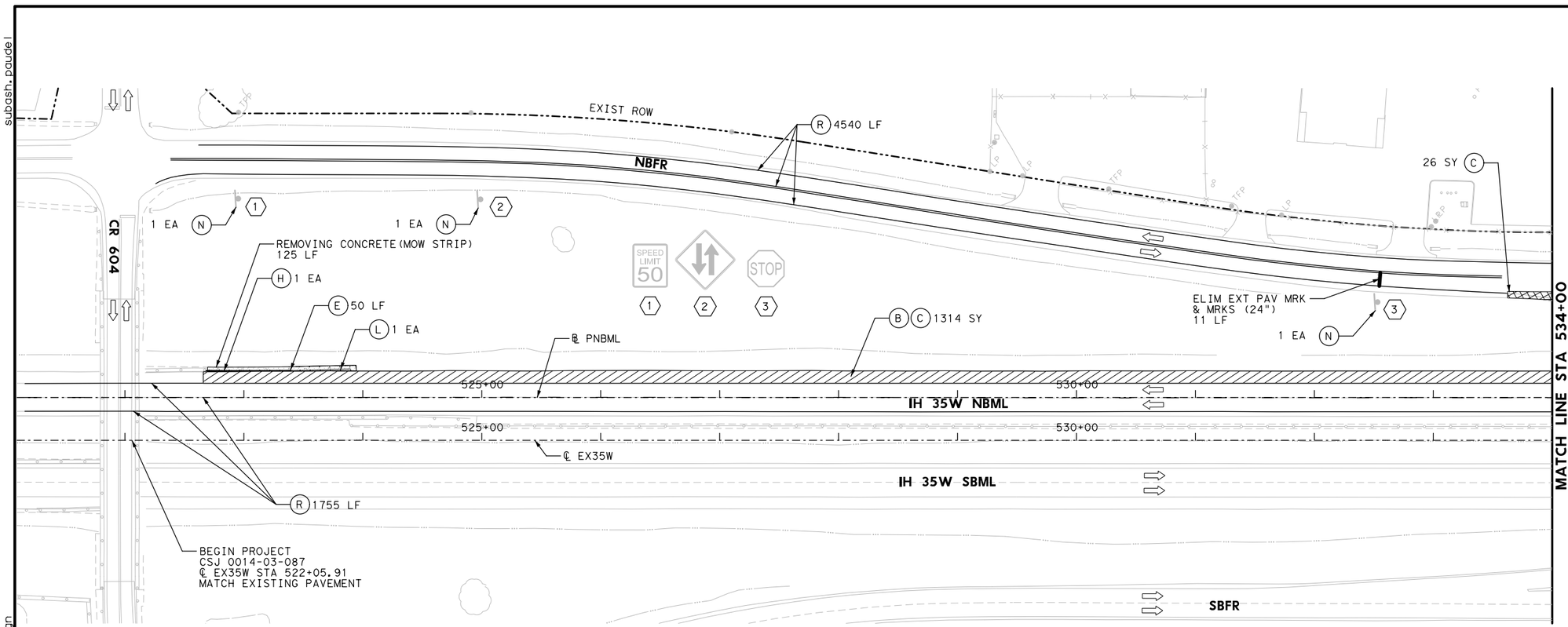

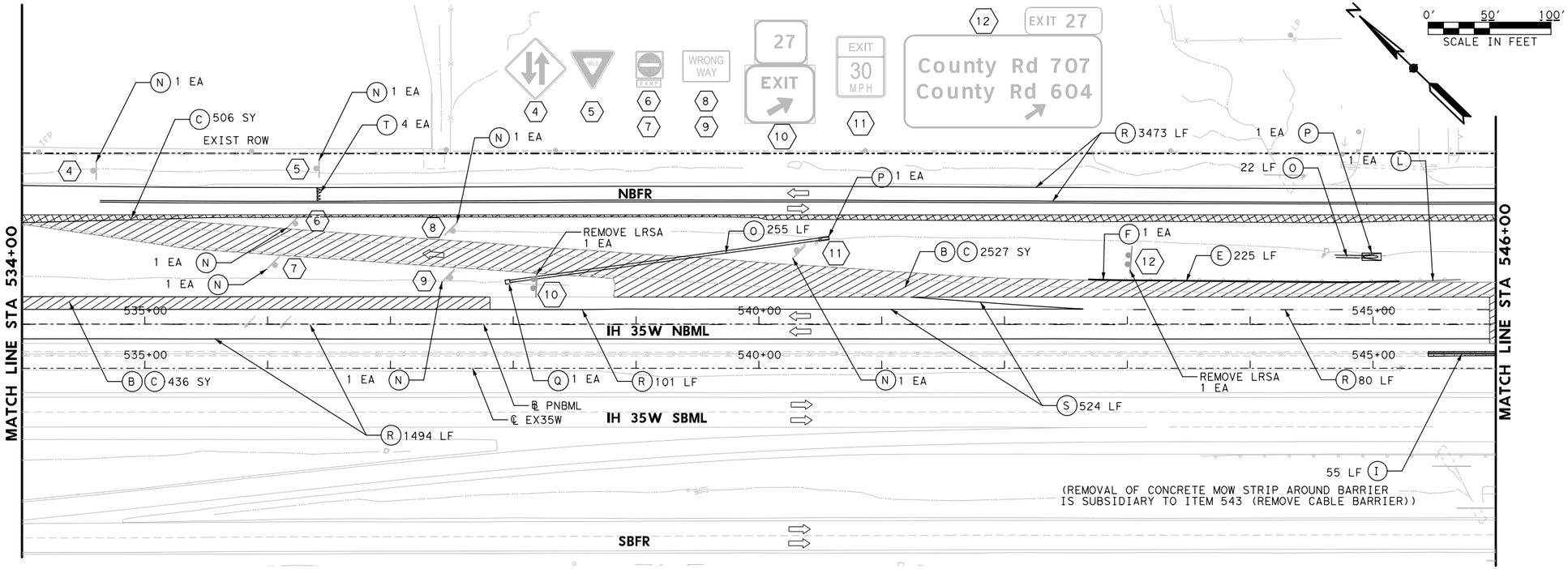

LEGEND

- REMOVE CONC PAV AND REMOVE STAB BASE & ASPH PAV
- REMOVE STAB BASE & ASPH PAV
- (A) REMOVE CONC (CTB)
- (B) REMOVING CONC (PAV)
- (C) REMOVING STAB BASE & ASPH PAV (7"-12")
- (D) REMOVE CONC (CURB AND GUTTER)
- (E) REMOVE METAL BEAM GUARD FENCE
- (F) REMOVE TERMINAL ANCHOR SECTION
- (G) REMOVE DOWNSTREAM ANCHOR TERMINAL
- (H) RM MTL BM GD FENCE TRANS (THRIE-BEAM)
- (I) REMOVE CABLE BARRIER
- (J) REMOVE CABLE BARRIER TERMINAL SECTION
- (K) REMOVE CRASH ATTEN (REMOVE)
- (L) GUARDRAIL END TREATMENT (REMOVE)
- (M) REMOVING CONC (DRIVEWAYS)
- (N) REMOVE SM RD SN SUP&AM
- (O) REMOV STR (PIPE)
- (P) REMOV STR (SET)
- (Q) REMOV STR (INLET)
- (R) ELIM EXT PAV MRK & MARKS (4")
- (S) ELIM EXT PAV MRK & MARKS (8")
- (T) ELIM EXT PAV MRK & MRKS (36") (YLD TRI)
- (#) SIGN IDENTIFICATION

NOTES:

1. CONTRACTOR TO REMOVE CONCRETE PAVEMENT AND STAB BASE & ASPH PAVEMENT ON EXISTING MAINLANE AND RAMPS AS SHOWN.
2. REMOVAL OF DELINEATORS OBJECT MARKERS SUBSIDIARY TO OTHER ITEMS.

STATE OF TEXAS
MARIA XIMENA MEDERO
107551
LICENSED
PROFESSIONAL ENGINEER
5/23/2022

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13355 Noel Road
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Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

REMOVAL PLAN

BEGIN TO STA 546+00

SHEET 1 OF 4

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	I 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		93

DATE: 5/23/2022 10:45:32 AM
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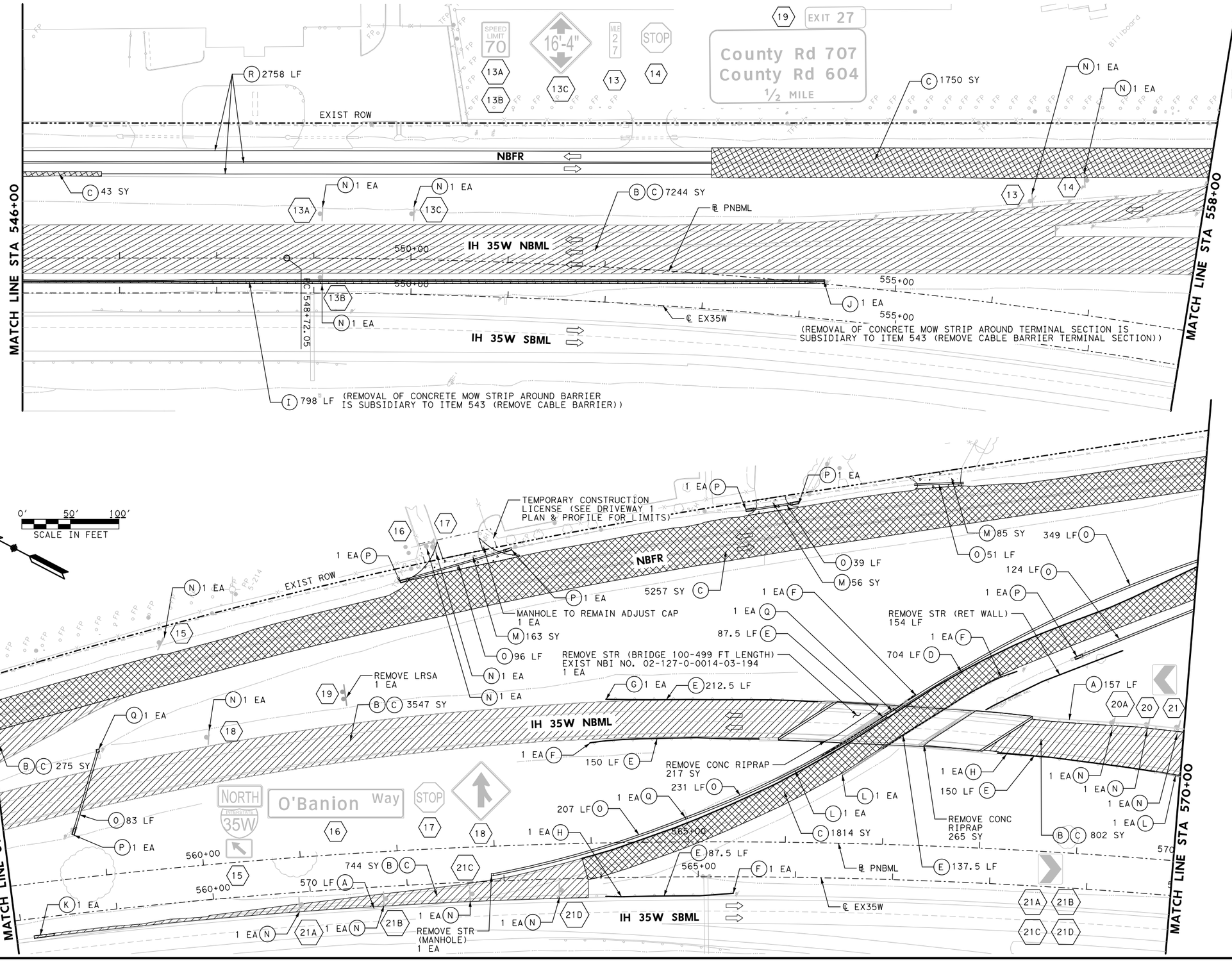

LEGEND

- REMOVE CONC PAV AND REMOVE STAB BASE & ASPH PAV
- REMOVE STAB BASE & ASPH PAV
- (A) REMOVE CONC (CTB)
- (B) REMOVING CONC (PAV)
- (C) REMOVING STAB BASE & ASPH PAV (7"-12")
- (D) REMOVE CONC (CURB AND GUTTER)
- (E) REMOVE METAL BEAM GUARD FENCE
- (F) REMOVE TERMINAL ANCHOR SECTION
- (G) REMOVE DOWNSTREAM ANCHOR TERMINAL
- (H) RM MTL BM GD FENCE TRANS (THRIE-BEAM)
- (I) REMOVE CABLE BARRIER
- (J) REMOVE CABLE BARRIER TERMINAL SECTION
- (K) REMOVE CRASH ATTEN (REMOVE)
- (L) GUARDRAIL END TREATMENT (REMOVE)
- (M) REMOVING CONC (DRIVEWAYS)
- (N) REMOVE SM RD SN SUP&AM
- (O) REMOV STR (PIPE)
- (P) REMOV STR (SET)
- (Q) REMOV STR (INLET)
- (R) ELIM EXT PAV MRK & MARKS(4")
- (S) ELIM EXT PAV MRK & MARKS(8")
- (T) ELIM EXT PAV MRK & MRKS (36") (YLD TRI)
- (#) SIGN IDENTIFICATION

NOTES:

1. CONTRACTOR TO REMOVE CONCRETE PAVEMENT AND STAB BASE & ASPH PAVEMENT ON EXISTING MAINLANE AND RAMPS AS SHOWN.
2. REMOVAL OF DELINEATORS OBJECT MARKERS SUBSIDIARY TO OTHER ITEMS.

STATE OF TEXAS
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5/23/2022

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13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

REMOVAL PLAN

STA 546+00 TO STA 570+00

SHEET 2 OF 4

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	I 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		94

DATE: 5/23/2022 10:45:38 AM
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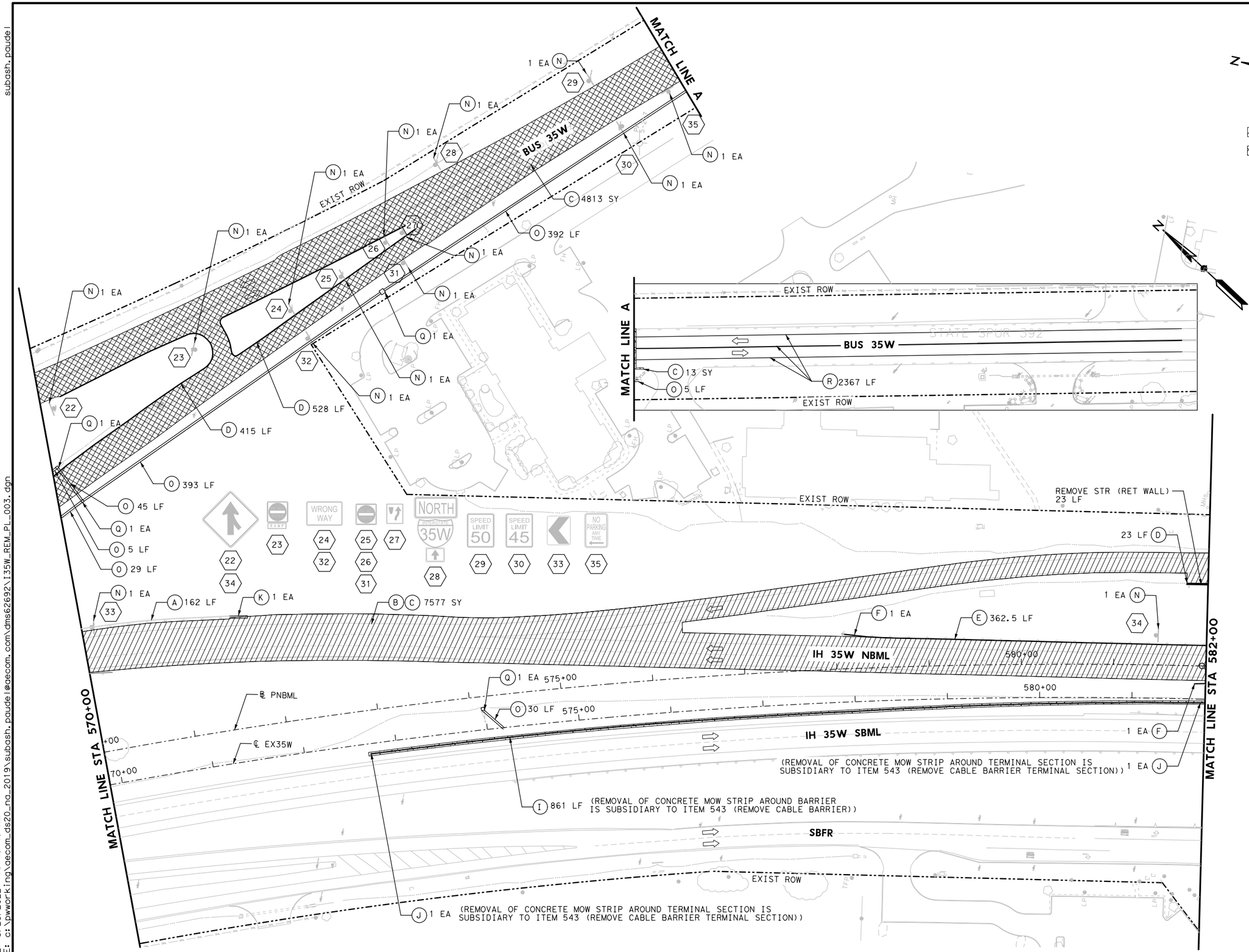

LEGEND

- REMOVE CONC PAV AND REMOVE STAB BASE & ASPH PAV
- REMOVE STAB BASE & ASPH PAV
- (A) REMOVE CONC (CTB)
- (B) REMOVING CONC (PAV)
- (C) REMOVING STAB BASE & ASPH PAV (7"-12")
- (D) REMOVE CONC (CURB AND GUTTER)
- (E) REMOVE METAL BEAM GUARD FENCE
- (F) REMOVE TERMINAL ANCHOR SECTION
- (G) REMOVE DOWNSTREAM ANCHOR TERMINAL
- (H) RM MTL BM GD FENCE TRANS (THRIE-BEAM)
- (I) REMOVE CABLE BARRIER
- (J) REMOVE CABLE BARRIER TERMINAL SECTION
- (K) REMOVE CRASH ATTEN (REMOVE)
- (L) GUARDRAIL END TREATMENT (REMOVE)
- (M) REMOVING CONC (DRIVEWAYS)
- (N) REMOVE SM RD SN SUP&AM
- (O) REMOV STR (PIPE)
- (P) REMOV STR (SET)
- (Q) REMOV STR (INLET)
- (R) ELIM EXT PAV MRK & MARKS(4")
- (S) ELIM EXT PAV MRK & MARKS(8")
- (T) ELIM EXT PAV MRK & MRKS (36") (YLD TRI)
- (#) SIGN IDENTIFICATION

NOTES:

1. CONTRACTOR TO REMOVE CONCRETE PAVEMENT AND STAB BASE & ASPH PAVEMENT ON EXISTING MAINLANE AND RAMPS AS SHOWN.
2. REMOVAL OF DELINEATORS OBJECT MARKERS SUBSIDIARY TO OTHER ITEMS.

STATE OF TEXAS
MARIA XIMENA MEDERO
107551
LICENSED
PROFESSIONAL ENGINEER

5/23/2022

AECOM
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

REMOVAL PLAN

STA 570+00 TO 582+00

SHEET 3 OF 4

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	I 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		95

DATE: 5/23/2022 10:45:45 AM
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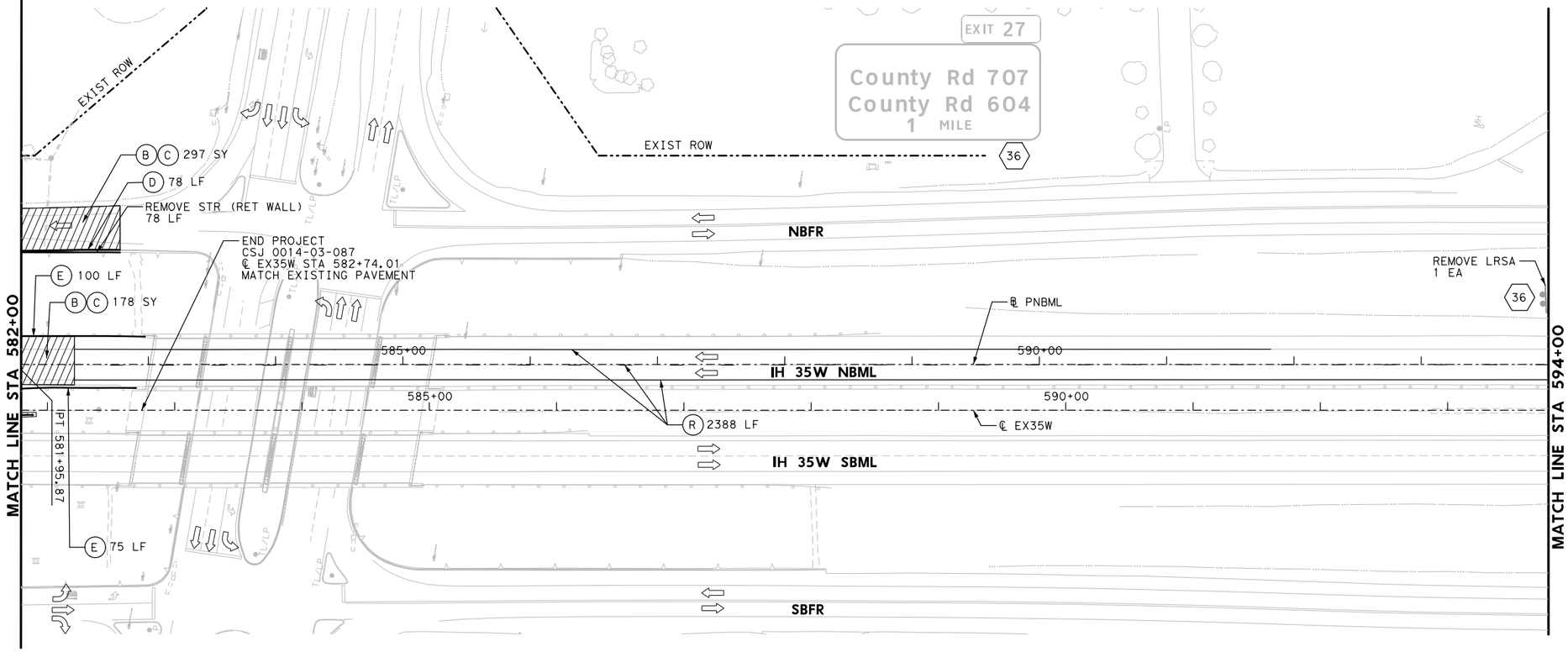

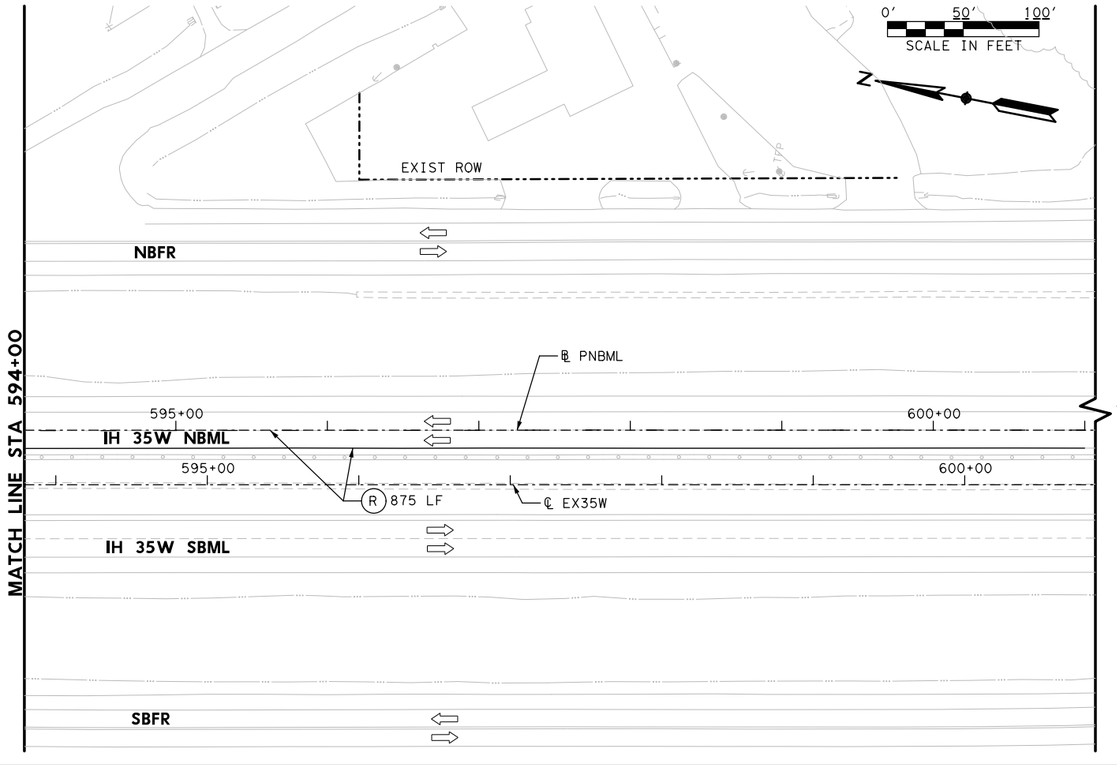

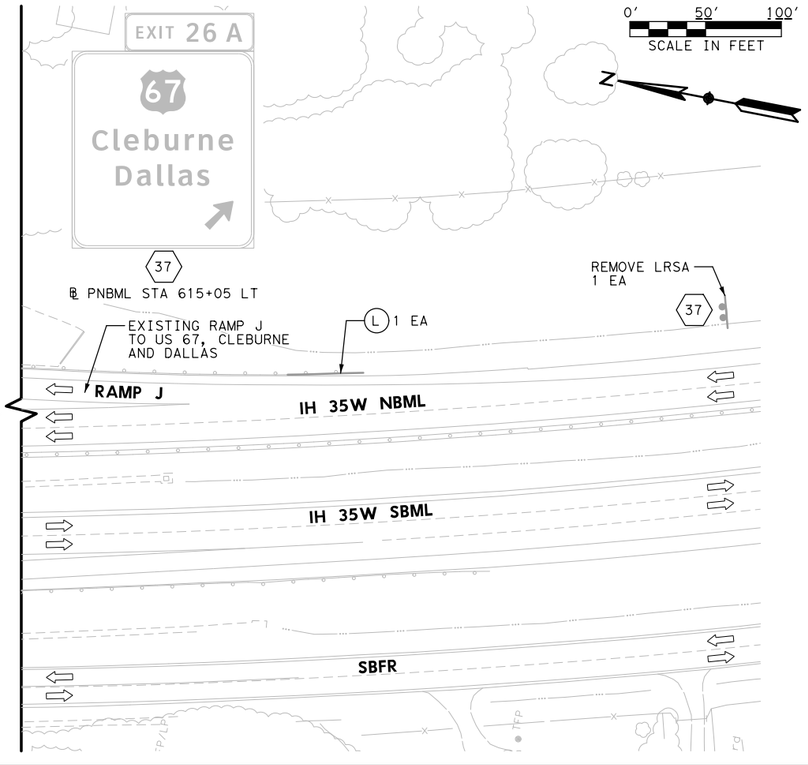

0′ 50′ 100′
SCALE IN FEET

LEGEND

- REMOVE CONC PAV AND REMOVE STAB BASE & ASPH PAV
- REMOVE STAB BASE & ASPH PAV
- (A) REMOVE CONC (CTB)
- (B) REMOVING CONC (PAV)
- (C) REMOVING STAB BASE & ASPH PAV (7"-12")
- (D) REMOVE CONC (CURB AND GUTTER)
- (E) REMOVE METAL BEAM GUARD FENCE
- (F) REMOVE TERMINAL ANCHOR SECTION
- (G) REMOVE DOWNSTREAM ANCHOR TERMINAL
- (H) RM MTL BM GD FENCE TRANS (THRIE-BEAM)
- (I) REMOVE CABLE BARRIER
- (J) REMOVE CABLE BARRIER TERMINAL SECTION
- (K) REMOVE CRASH ATTEN (REMOVE)
- (L) GUARDRAIL END TREATMENT (REMOVE)
- (M) REMOVING CONC (DRIVEWAYS)
- (N) REMOVE SM RD SN SUP&AM
- (O) REMOV STR (PIPE)
- (P) REMOV STR (SET)
- (Q) REMOV STR (INLET)
- (R) ELIM EXT PAV MRK & MARKS(4")
- (S) ELIM EXT PAV MRK & MARKS(8")
- (T) ELIM EXT PAV MRK & MRKS (36") (YLD TRI)
- (#) SIGN IDENTIFICATION

NOTES:

1. CONTRACTOR TO REMOVE CONCRETE PAVEMENT AND STAB BASE & ASPH PAVEMENT ON EXISTING MAINLANE AND RAMPS AS SHOWN.
2. REMOVAL OF DELINEATORS OBJECT MARKERS SUBSIDIARY TO OTHER ITEMS.

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5/23/2022

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TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

REMOVAL PLAN

STA 582+00 TO END

SHEET 4 OF 4

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	I 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		96

DATE: 5/23/2022 10:45:51 AM
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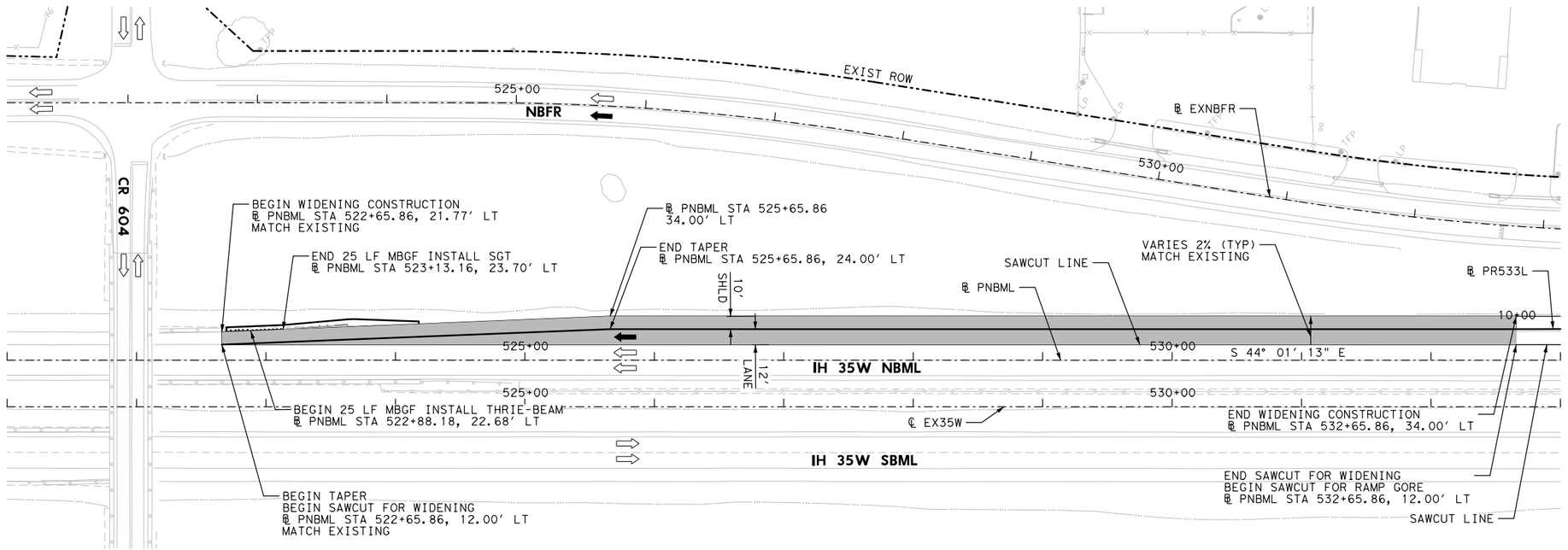
I35W_REM_PL_004.dgn



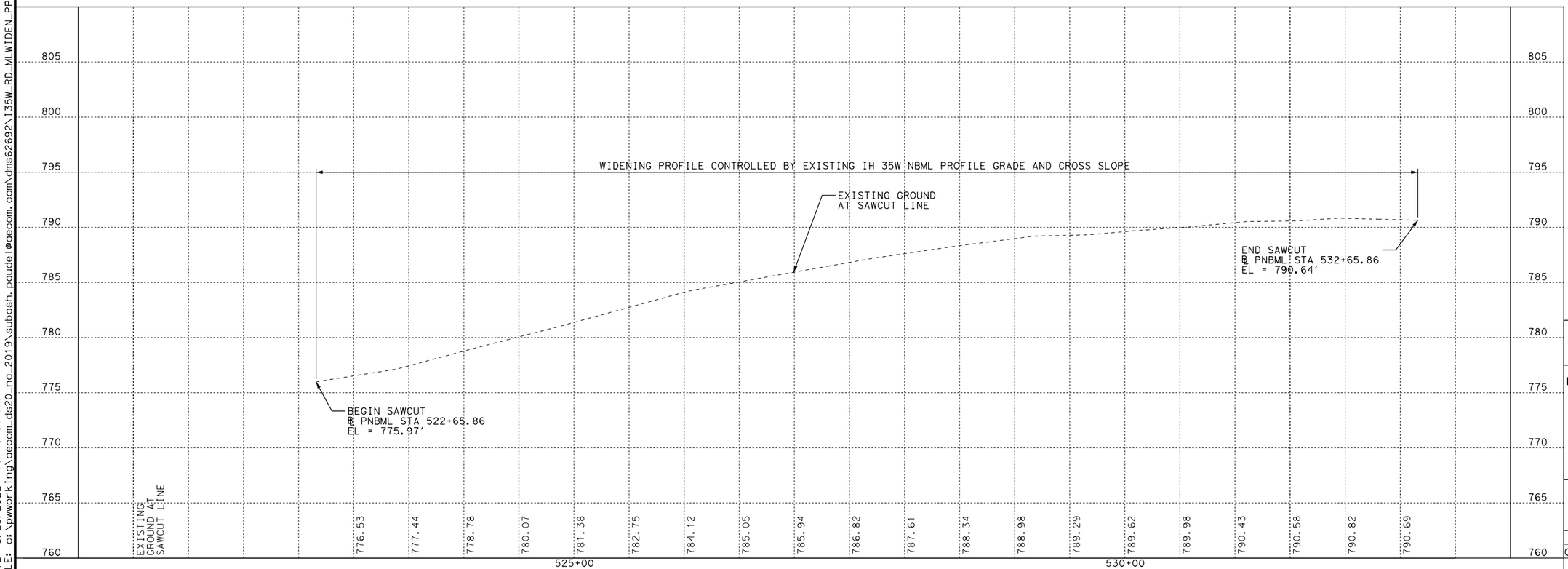
HORZ 0' 50' 100'
VERT 0' 5' 10'
SCALE IN FEET

LEGEND

- PROPOSED LANES
- EXISTING LANES
- HORIZ-1 CURVE NUMBER
- CONTROL OF ACCESS
- WIDENING
- ASPHALT TRANSITION
- CABLE BARRIER WITH MOW STRIP

NOTES:

1. EXISTING UTILITIES BASED ON THE BEST AVAILABLE INFORMATION. CONTRACTOR TO FIELD VERIFY UTILITY LOCATION PRIOR TO CONSTRUCTION. CALL 811 BEFORE YOU DIG.



STATE OF TEXAS
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5/23/2022

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IH 35W
FROM CR 604/ CR 707 TO US 67

NBML WIDENING PLAN & PROFILE

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		97

DATE: 5/23/2022 10:45:57 AM
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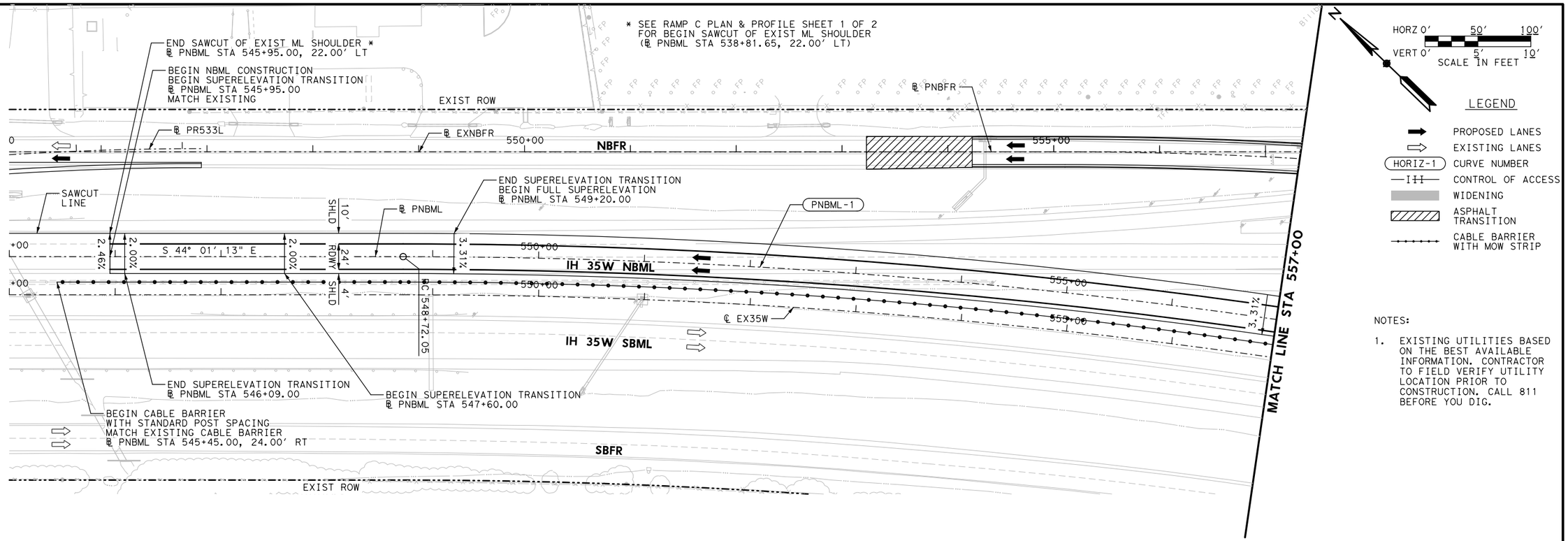

NOTES:

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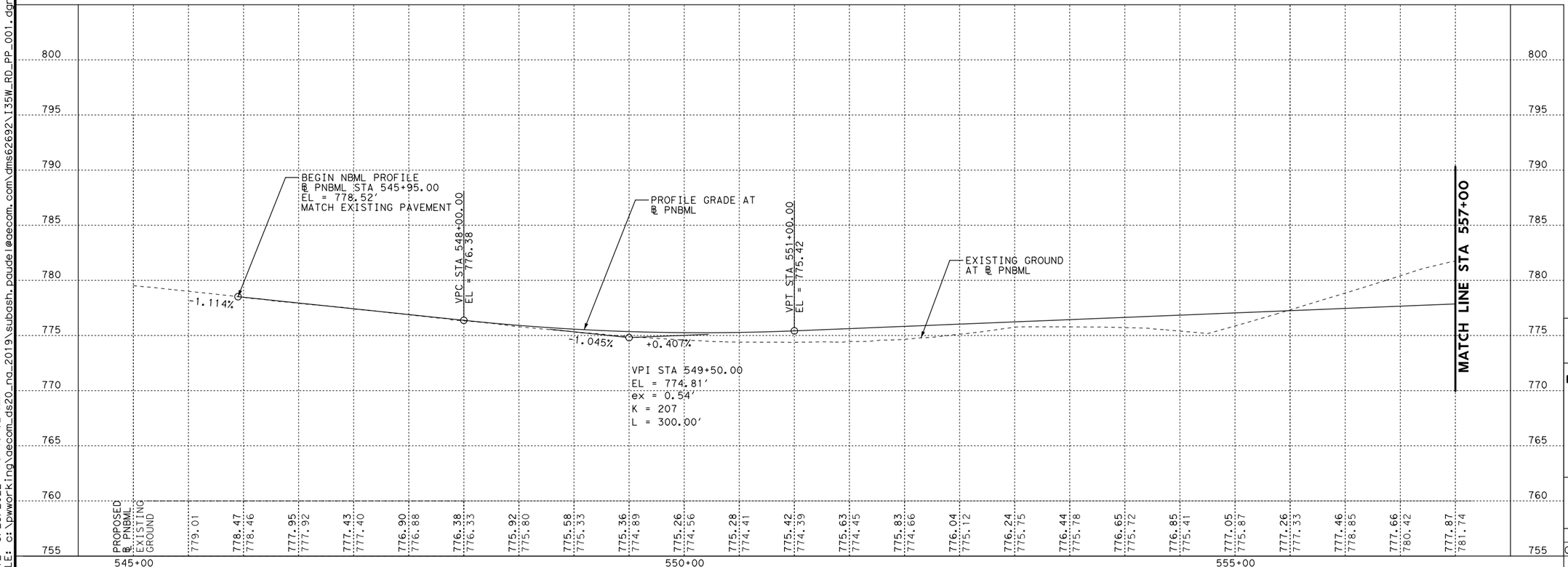

STATE OF TEXAS
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5/23/2022

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13355 Noel Road
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TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

IH 35W NBML PLAN & PROFILE

BEGIN TO STA 557+00

SHEET 1 OF 4

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		98

DATE: 5/23/2022 10:46:02 AM
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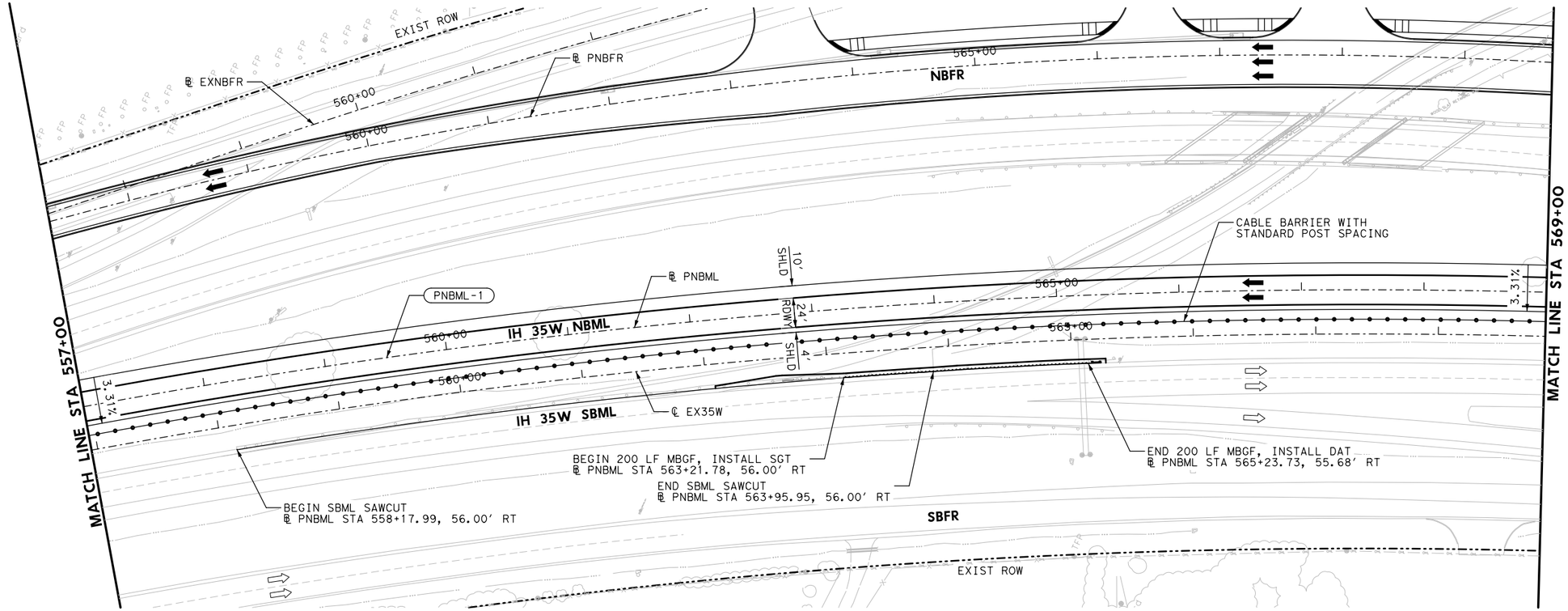
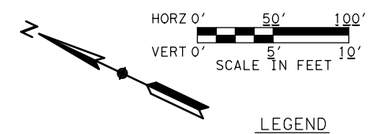


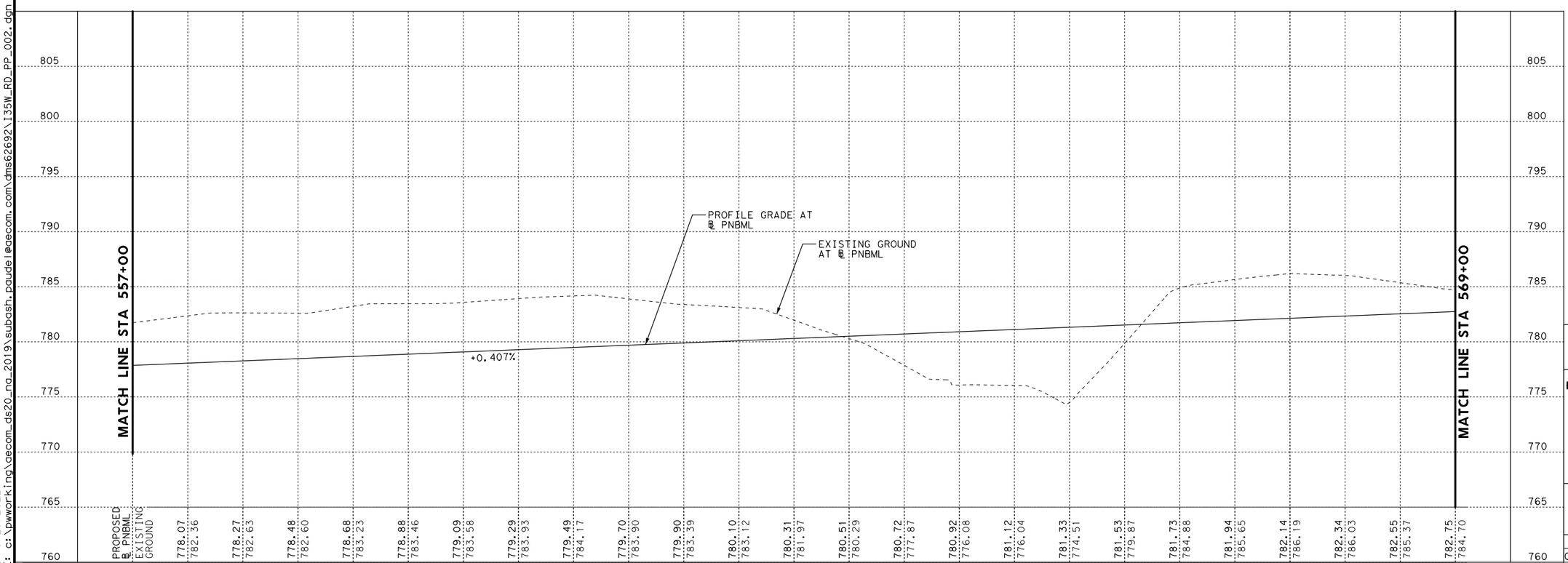


LEGEND

- PROPOSED LANES
- EXISTING LANES
- HORIZ-1 CURVE NUMBER
- CONTROL OF ACCESS
- WIDENING
- ASPHALT TRANSITION
- CABLE BARRIER WITH MOW STRIP

NOTES:

1. EXISTING UTILITIES BASED ON THE BEST AVAILABLE INFORMATION. CONTRACTOR TO FIELD VERIFY UTILITY LOCATION PRIOR TO CONSTRUCTION. CALL 811 BEFORE YOU DIG.



STATE OF TEXAS
MARIA XIMENA MEDERO
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5/23/2022

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IH 35W
FROM CR 604/ CR 707 TO US 67

IH 35W NBML PLAN & PROFILE

STA 557+00 TO STA 569+00

SHEET 2 OF 4

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		99

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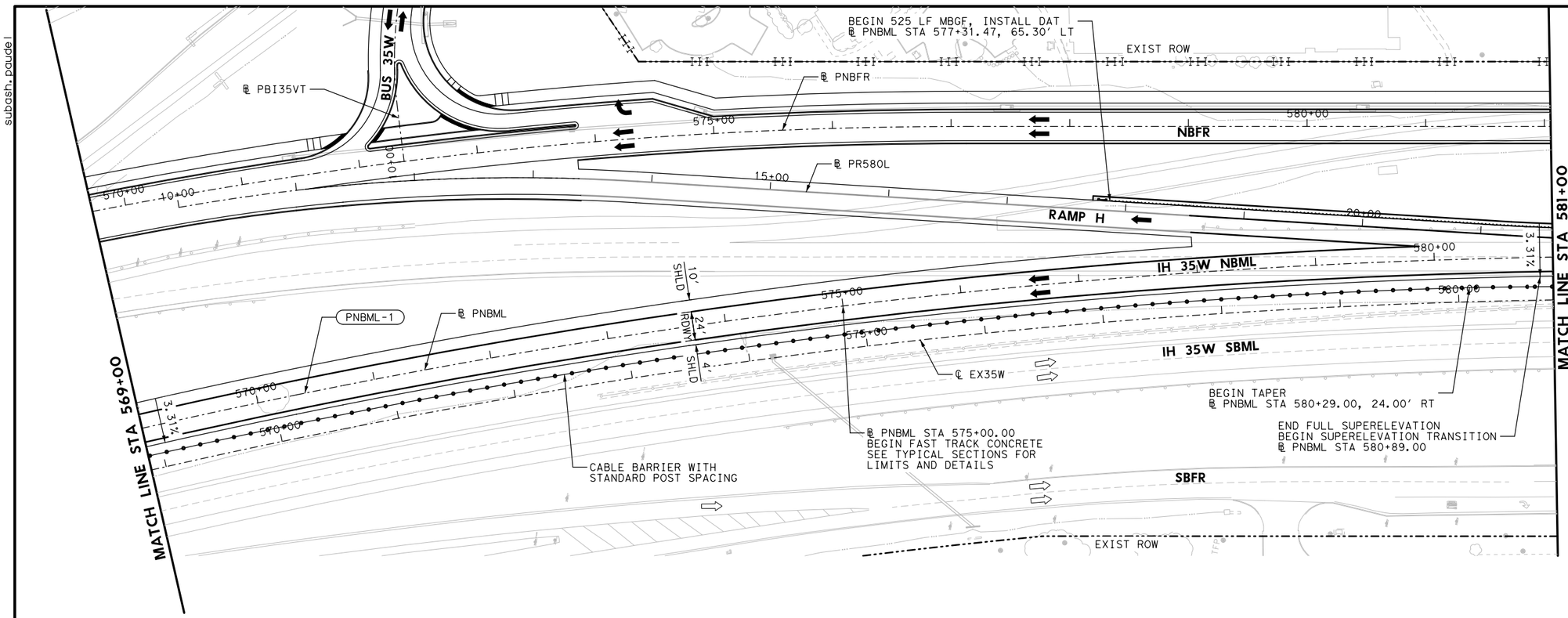
dgn



HORZ 0' 50' 100'
VERT 0' 5' 10'
SCALE IN FEET

N

LEGEND

- PROPOSED LANES
- EXISTING LANES
- HORIZ-1 CURVE NUMBER
- CONTROL OF ACCESS
- WIDENING
- ASPHALT TRANSITION
- CABLE BARRIER WITH MOW STRIP

NOTES:

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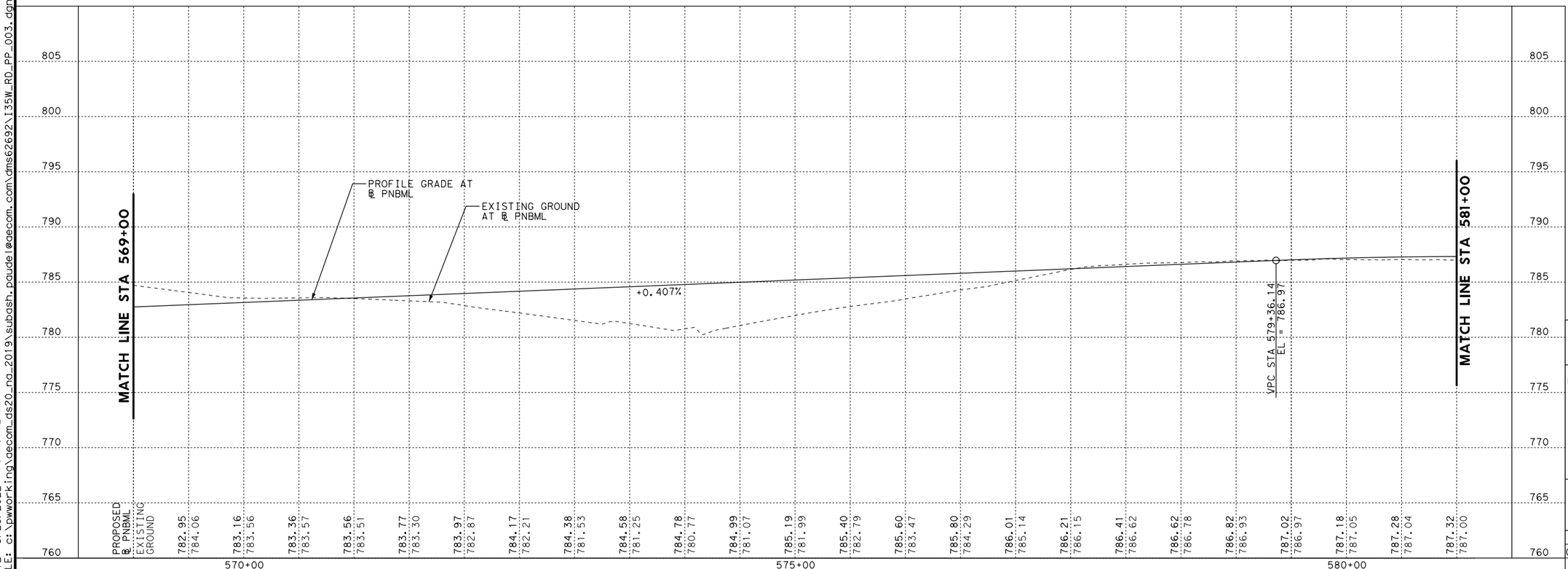

STATE OF TEXAS
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5/23/2022

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13355 Noel Road
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IH 35W
FROM CR 604/ CR 707 TO US 67

IH 35W NBML PLAN & PROFILE

STA 569+00 TO STA 581+00

SHEET 3 OF 4

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		100

DATE: 5/23/2022 10:46:12 AM
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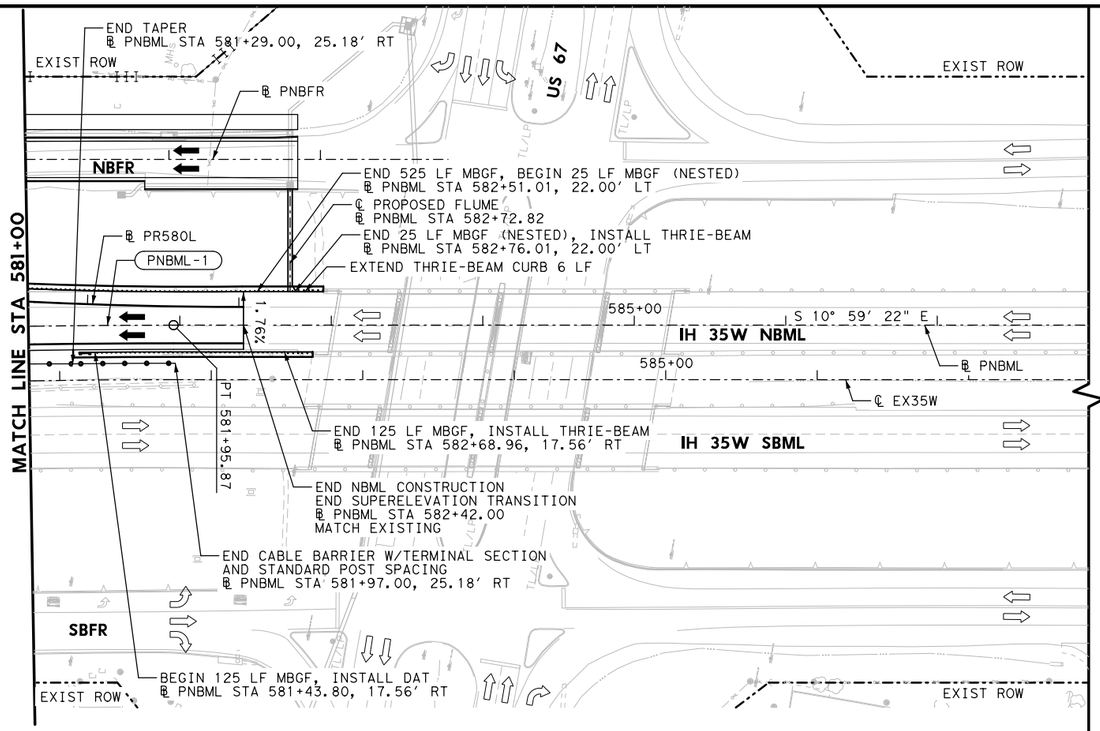

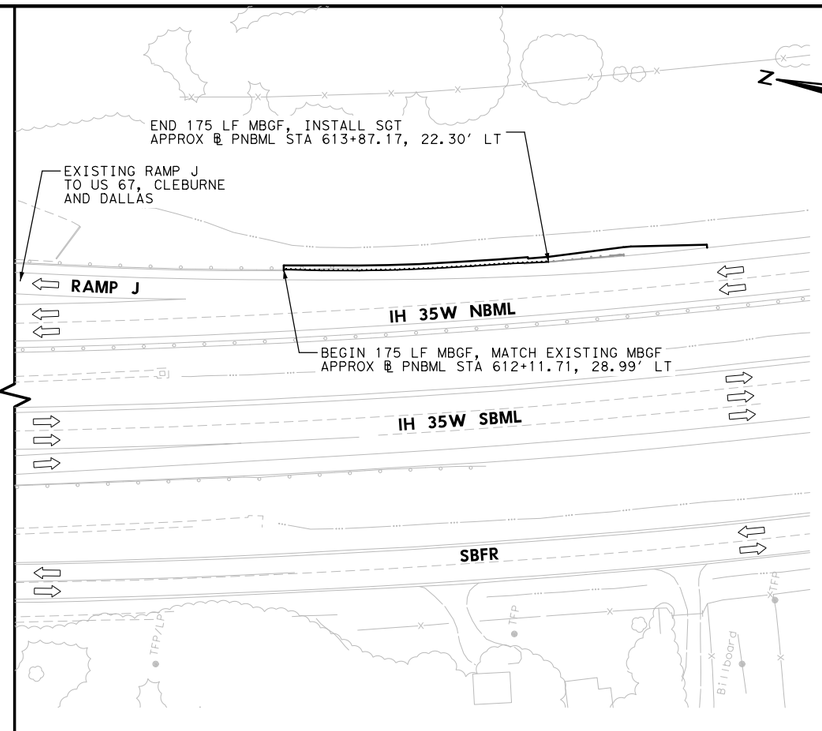

HORZ 0' 50' 100'
VERT 0' 5' 10'
SCALE IN FEET

N

LEGEND

- PROPOSED LANES
- EXISTING LANES
- HORIZ-1 CURVE NUMBER
- CONTROL OF ACCESS
- WIDENING
- ASPHALT TRANSITION
- CABLE BARRIER WITH MOW STRIP

NOTES:

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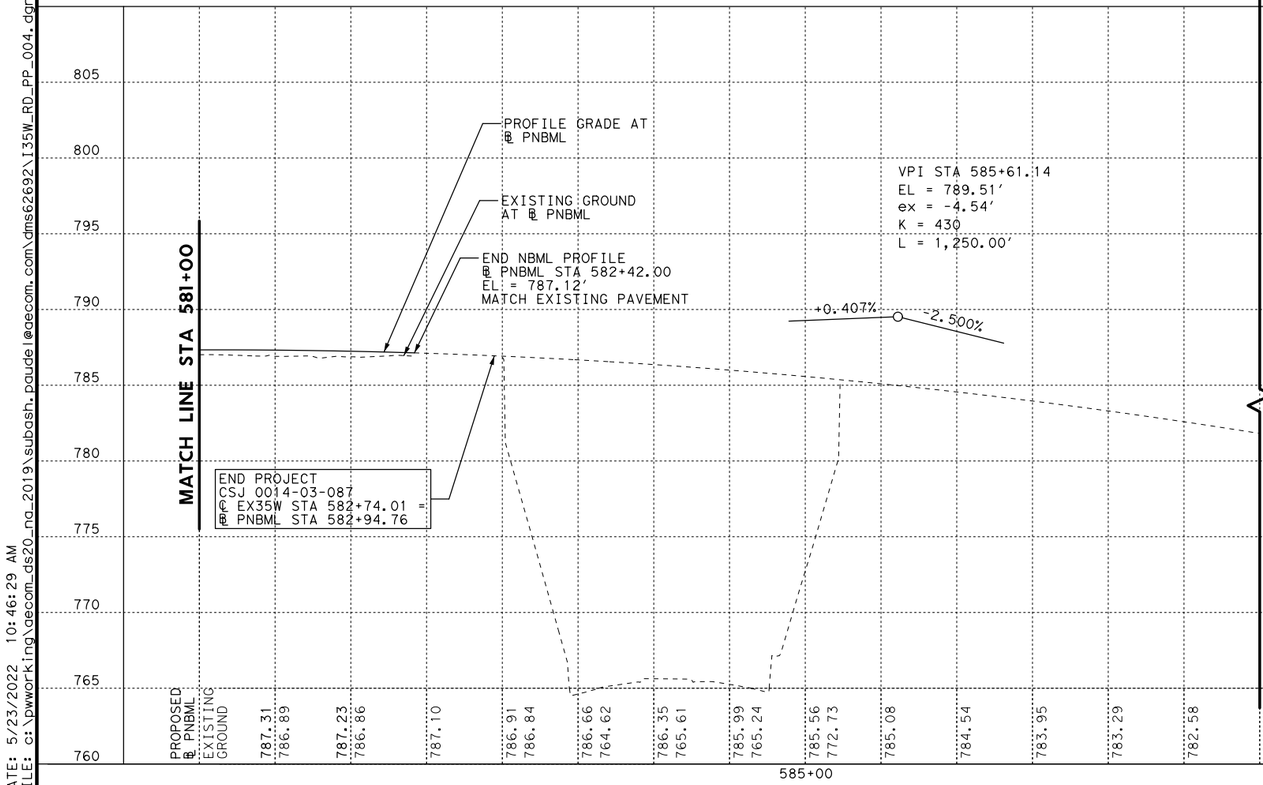

STATE OF TEXAS
MARIA XIMENA MEDERO
107551
LICENSED
PROFESSIONAL ENGINEER
5/23/2022

AECOM
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

IH 35W NBML PLAN & PROFILE

STA 581+00 TO END PROJECT

SHEET 4 OF 4

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		101

DATE: 5/23/2022 10:46:29 AM
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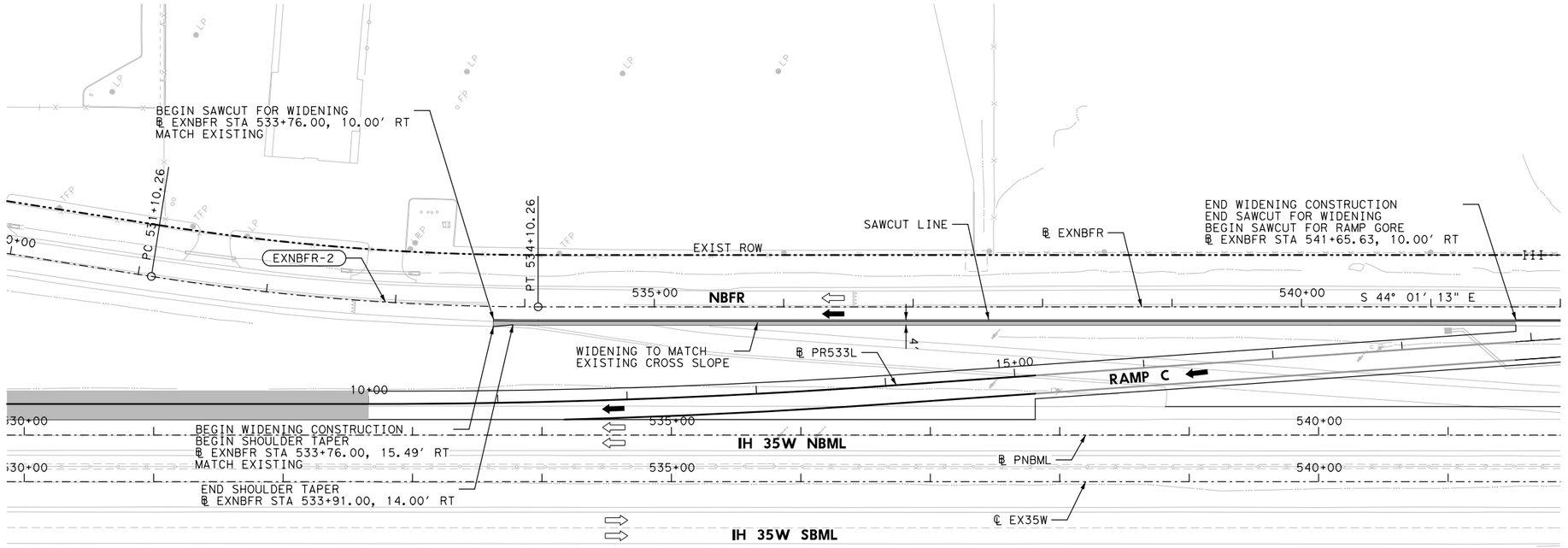

HORZ 0' 50' 100'
VERT 0' 5' 10'
SCALE IN FEET

LEGEND

- PROPOSED LANES
- EXISTING LANES
- HORIZ-1 CURVE NUMBER
- CONTROL OF ACCESS
- WIDENING
- ASPHALT TRANSITION
- CABLE BARRIER WITH MOW STRIP

NOTES:

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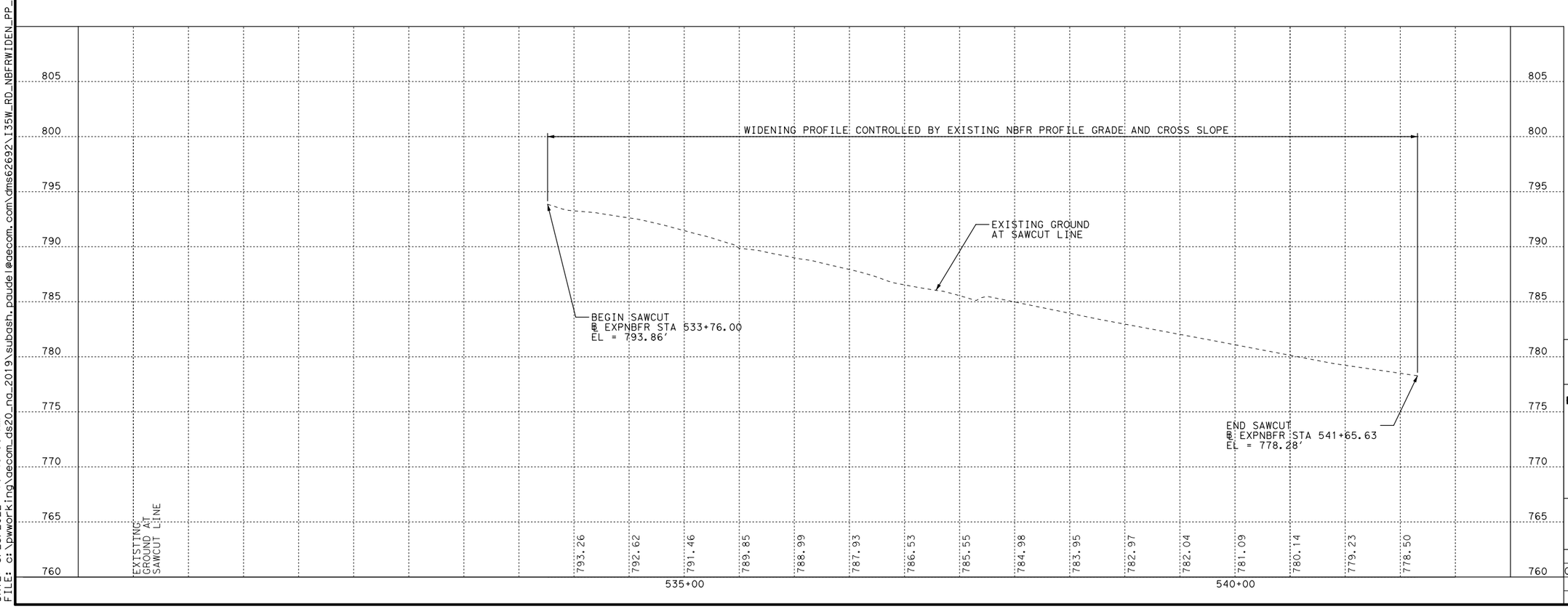

STATE OF TEXAS
MARIA XIMENA MEDERO
107551
LICENSED
PROFESSIONAL ENGINEER
5/23/2022

AECOM
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

NBFR WIDENING PLAN & PROFILE

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		102

DATE: 5/23/2022 10:46:36 AM
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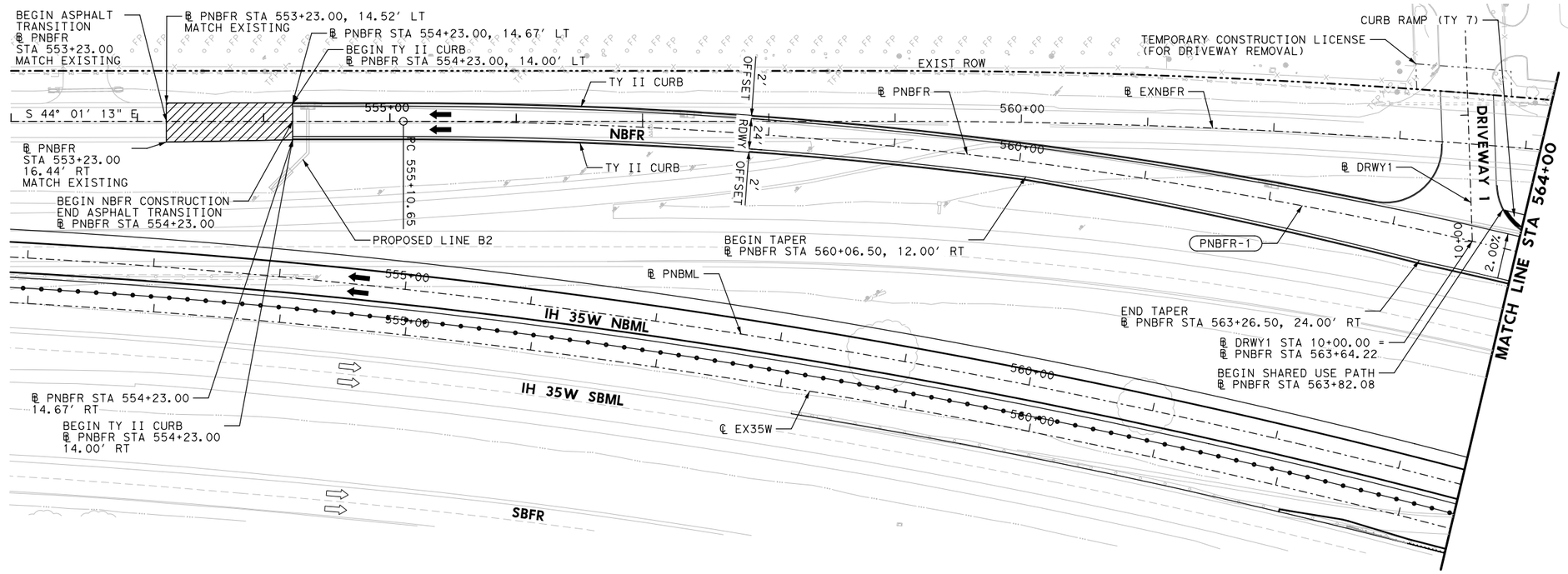

NOTES:

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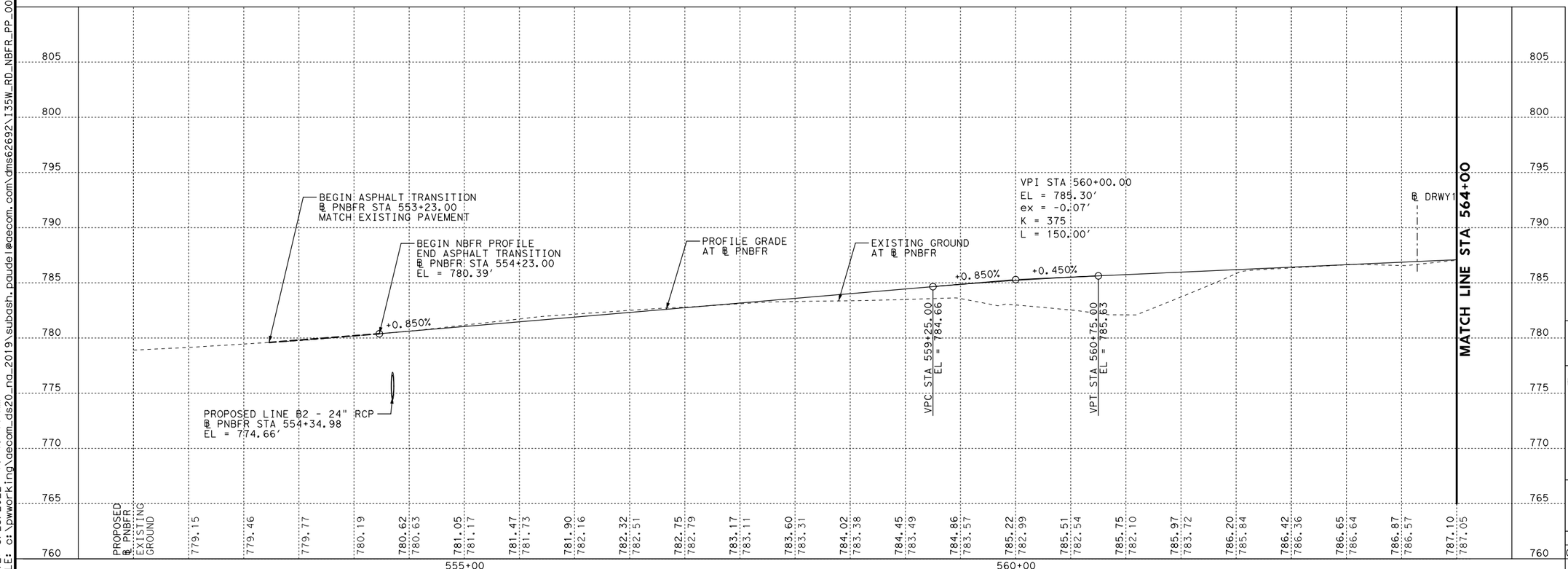

STATE OF TEXAS
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PROFESSIONAL ENGINEER

5/23/2022

AECOM
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

NBFR PLAN & PROFILE

BEGIN TO STA 564+00

SHEET 1 OF 3

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		103

DATE: 5/23/2022 10:46:44 AM
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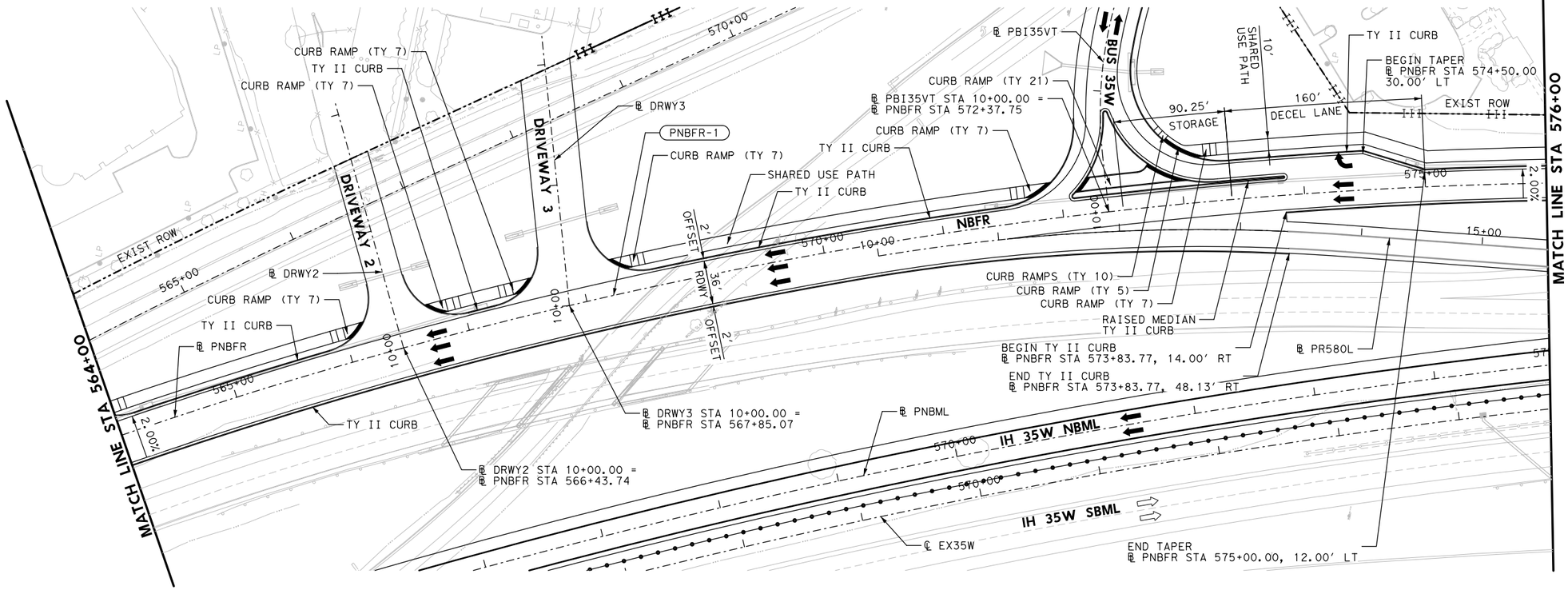

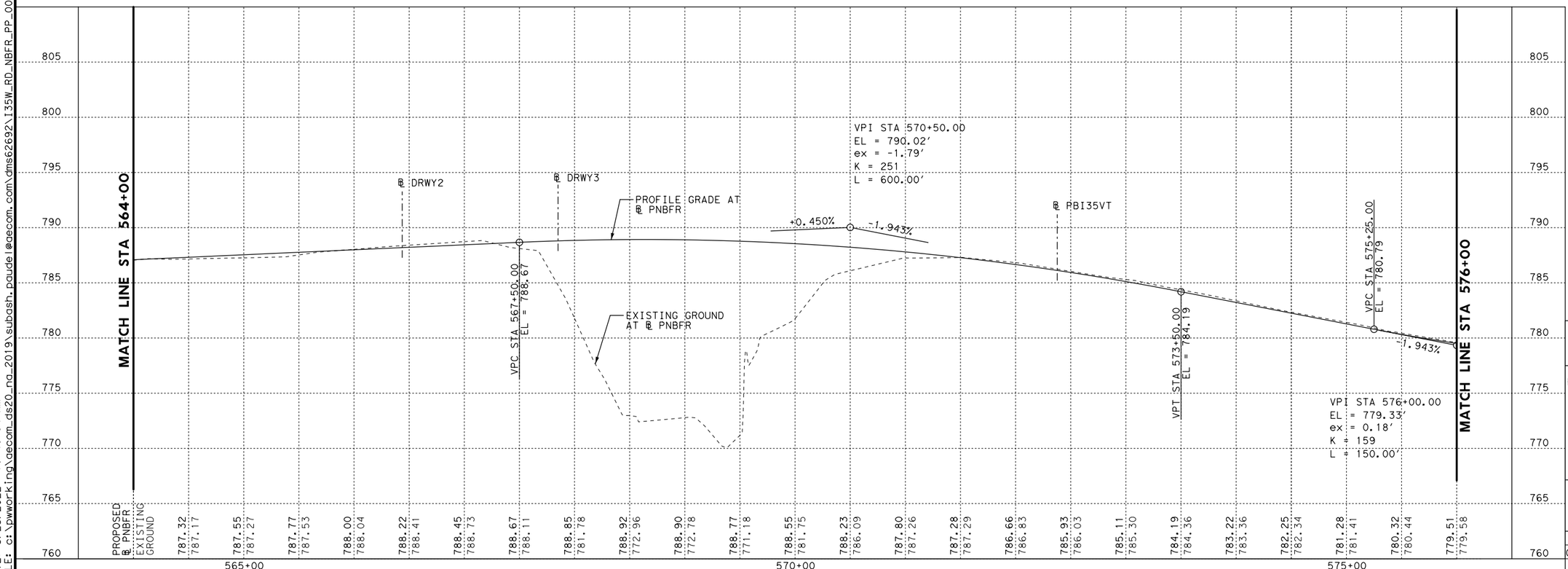

HORZ 0' 50' 100'
VERT 0' 5' 10'
SCALE IN FEET

N

LEGEND

- PROPOSED LANES
- EXISTING LANES
- HORIZ-1 CURVE NUMBER
- CONTROL OF ACCESS
- WIDENING
- ASPHALT TRANSITION
- CABLE BARRIER WITH MOW STRIP

NOTES:

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STATE OF TEXAS
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5/23/2022

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TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

NBFR
PLAN & PROFILE

STA 564+00 TO STA 576+00

SHEET 2 OF 3

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		104

DATE: 5/23/2022 10:46:54 AM
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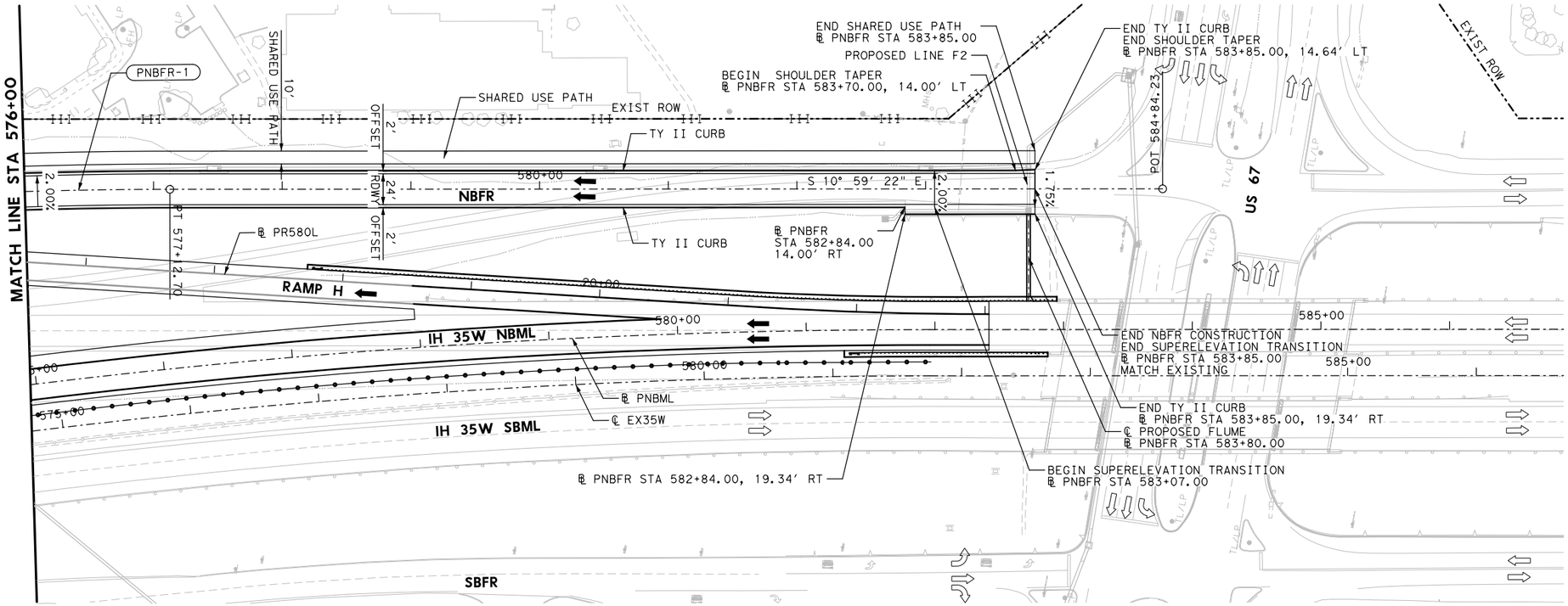

NOTES:

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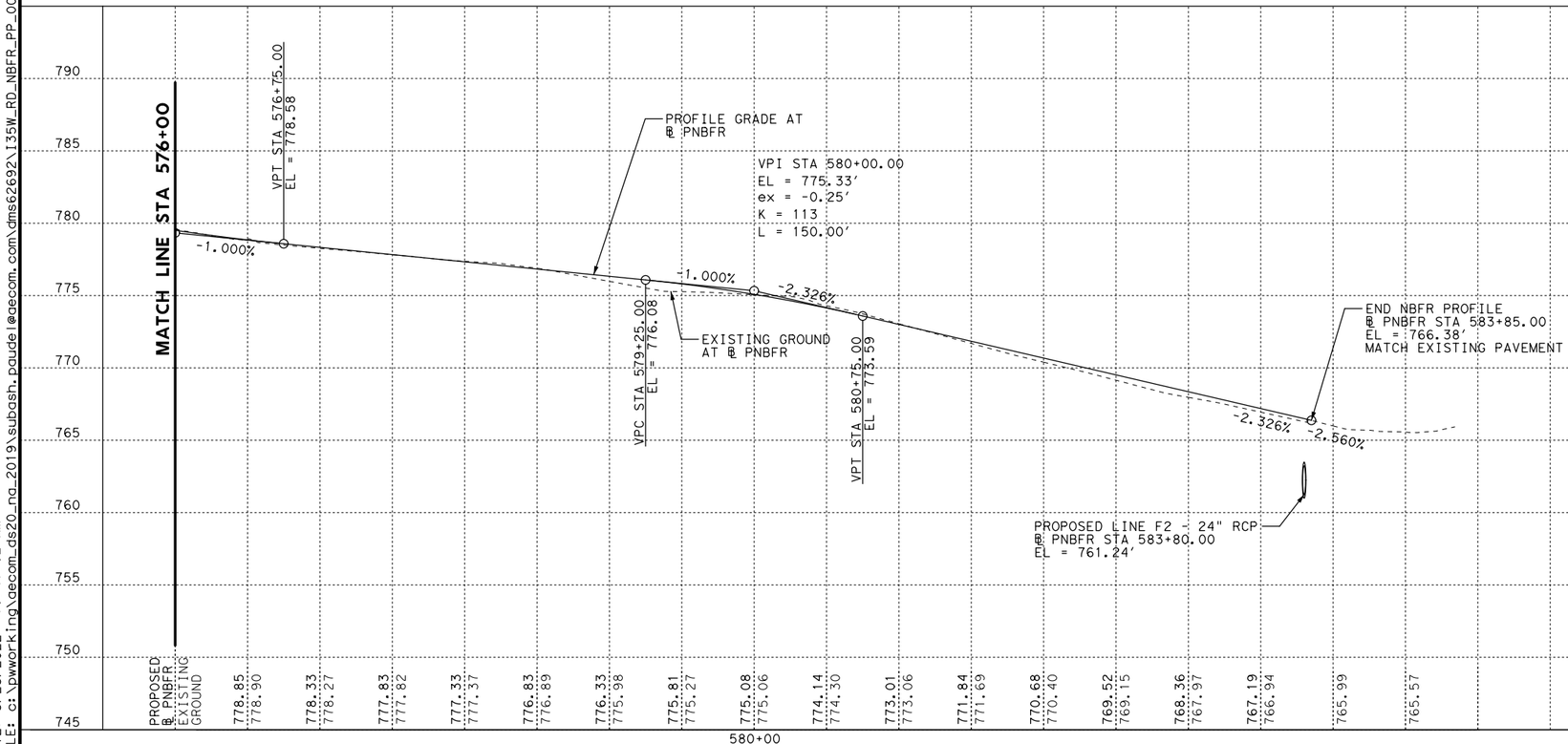

STATE OF TEXAS
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5/23/2022

AECOM
13355 Noel Road
Suite 400
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TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

NBFR PLAN & PROFILE

STA 576+00 TO END

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		105

DATE: 5/23/2022 10:47:02 AM
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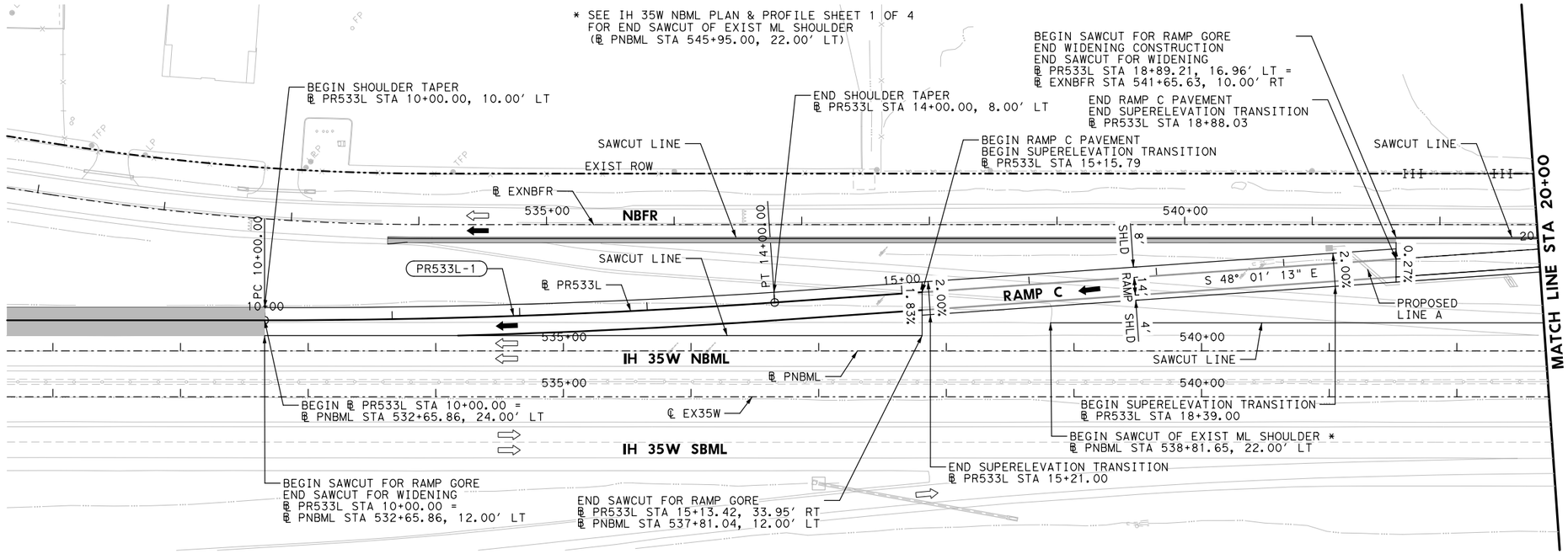
subash.paudel



NOTES:

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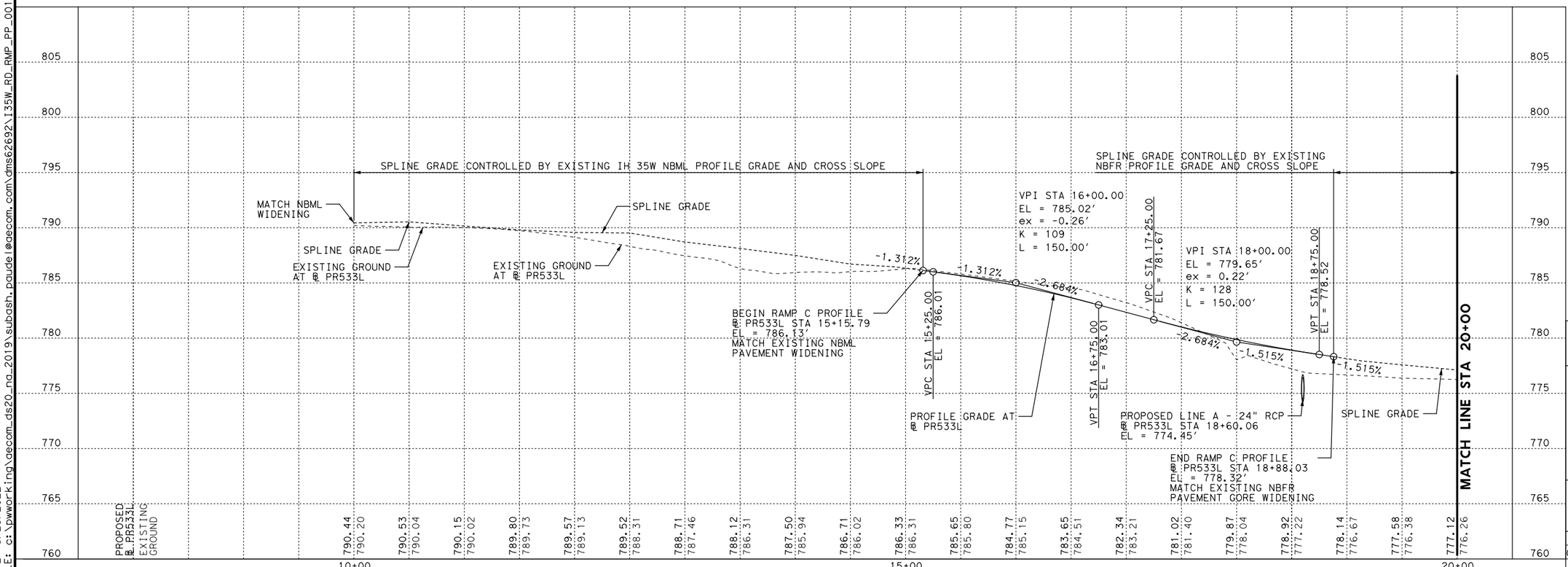

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IH 35W
FROM CR 604/ CR 707 TO US 67

RAMP C PLAN & PROFILE

BEGIN TO STA 20+00

SHEET 1 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		106

DATE: 5/23/2022 10:47:11 AM
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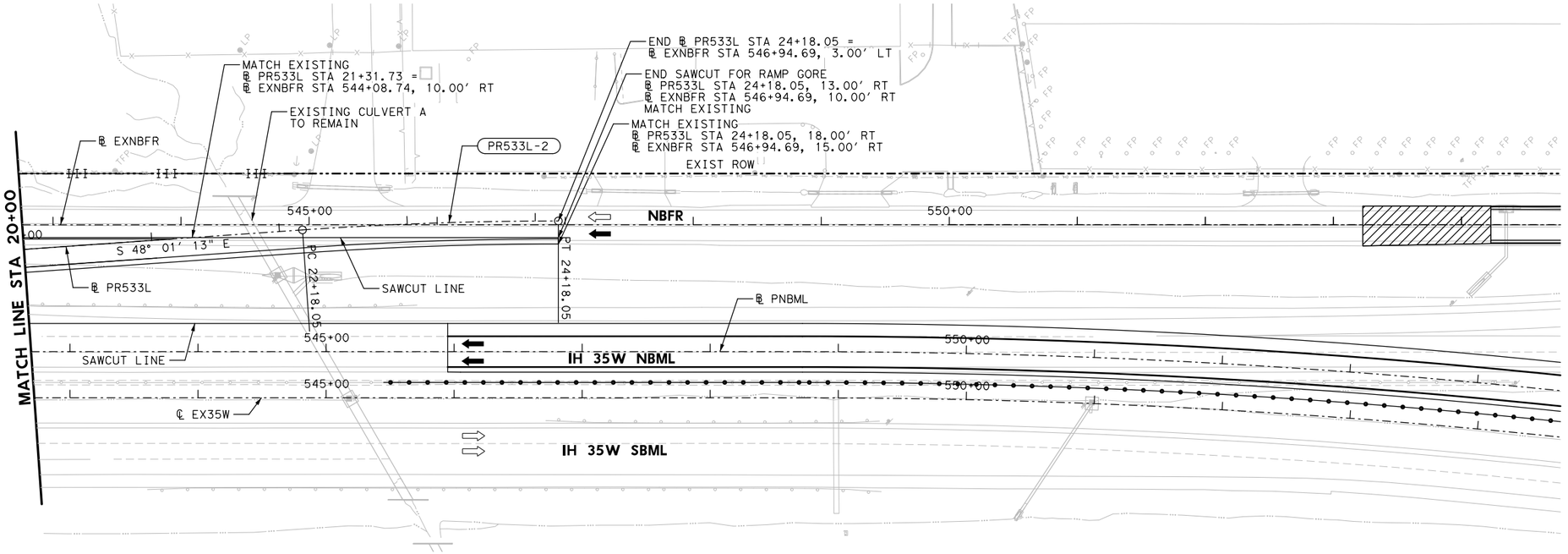
subash.paudel



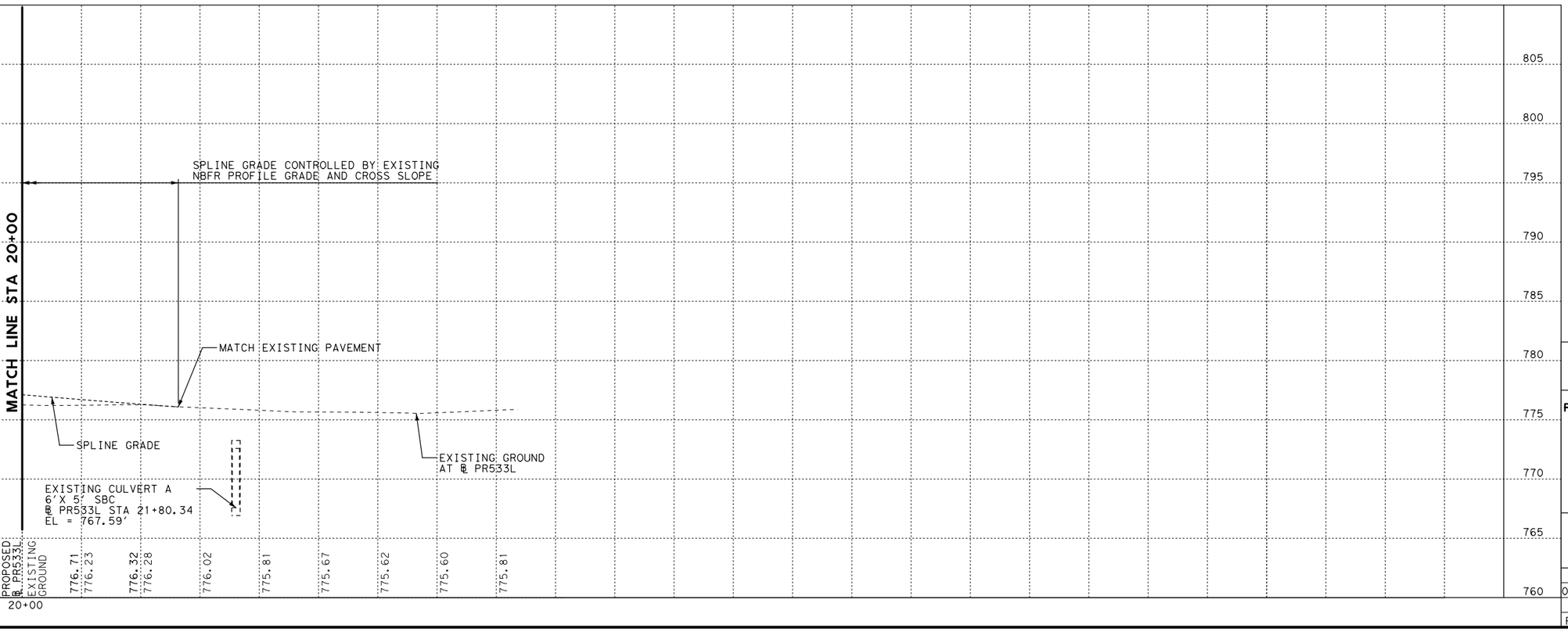
HORZ 0' 50' 100'
VERT 0' 5' 10'
SCALE IN FEET

LEGEND

- PROPOSED LANES
- EXISTING LANES
- HORIZ-1 CURVE NUMBER
- CONTROL OF ACCESS
- WIDENING
- ASPHALT TRANSITION
- CABLE BARRIER WITH MOW STRIP

NOTES:

1. EXISTING UTILITIES BASED ON THE BEST AVAILABLE INFORMATION. CONTRACTOR TO FIELD VERIFY UTILITY LOCATION PRIOR TO CONSTRUCTION. CALL 811 BEFORE YOU DIG.



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RAMP C
PLAN & PROFILE

STA 20+00 TO END

SHEET 2 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		107

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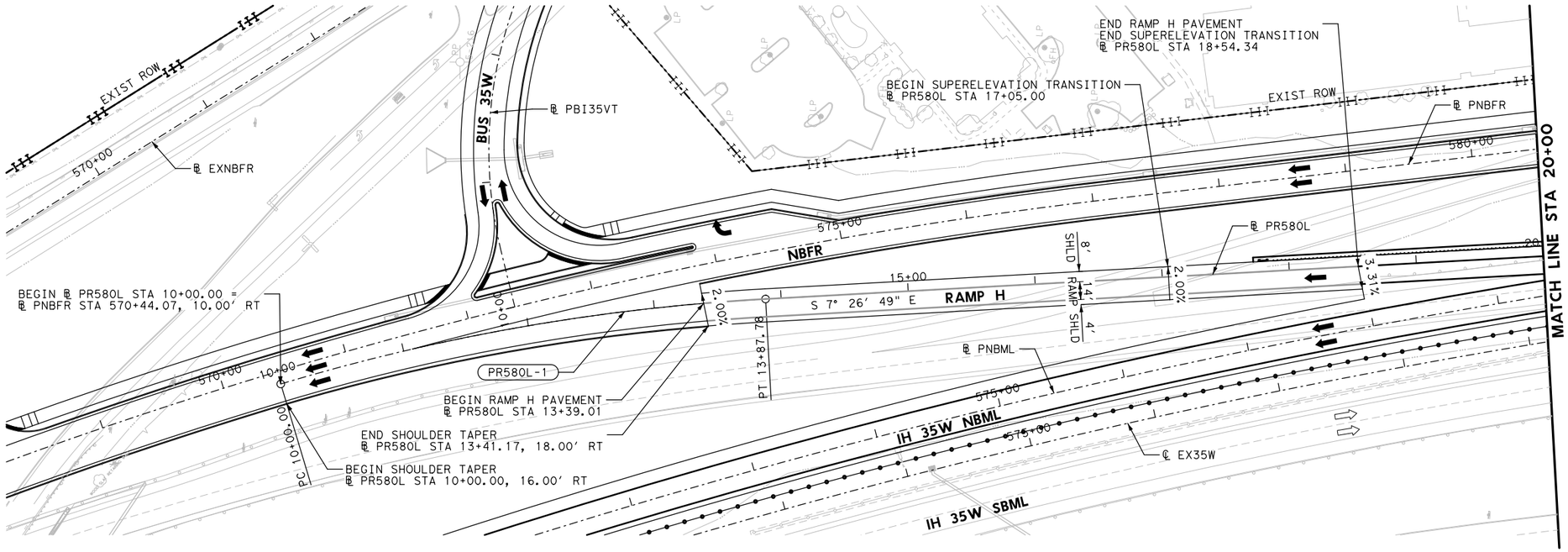

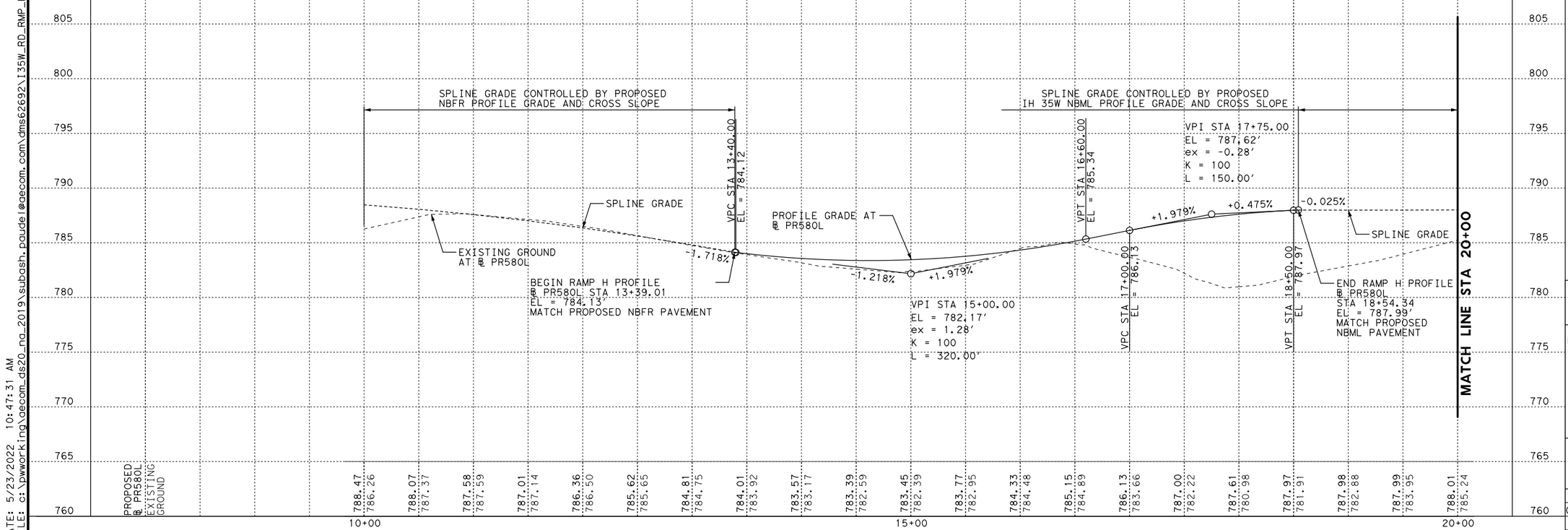

HORZ 0' 50' 100'
VERT 0' 5' 10'
SCALE IN FEET

N

LEGEND

- PROPOSED LANES
- EXISTING LANES
- HORIZ-1 CURVE NUMBER
- CONTROL OF ACCESS
- WIDENING
- ASPHALT TRANSITION
- CABLE BARRIER WITH MOW STRIP

NOTES:

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2. SEE IH 35W NBML PLAN & PROFILE SHEETS FOR MBGF LIMITS.

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IH 35W
FROM CR 604/ CR 707 TO US 67

RAMP H
PLAN & PROFILE

BEGIN TO STA 20+00

SHEET 1 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		108

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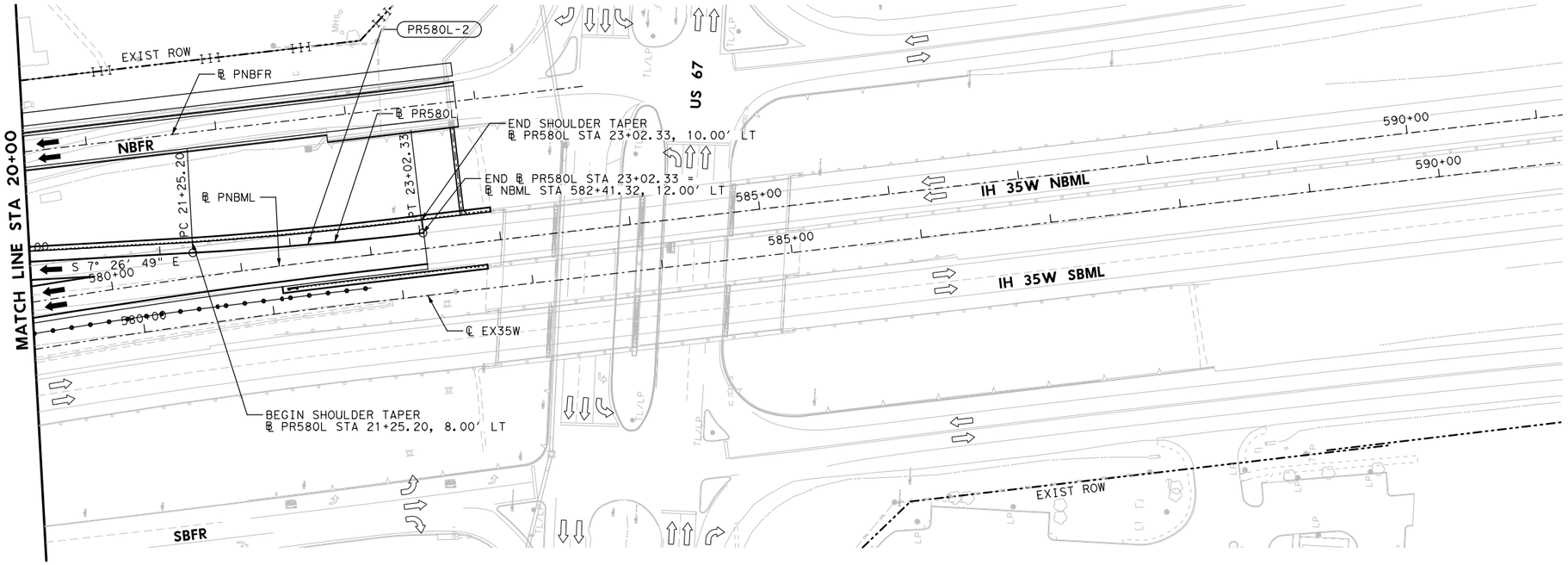
subash.paude



HORZ 0' 50' 100'
VERT 0' 5' 10'
SCALE IN FEET

N

LEGEND

- PROPOSED LANES
- EXISTING LANES
- HORIZ-1 — CURVE NUMBER
- CONTROL OF ACCESS
- WIDENING
- ASPHALT TRANSITION
- CABLE BARRIER WITH MOW STRIP

NOTES:

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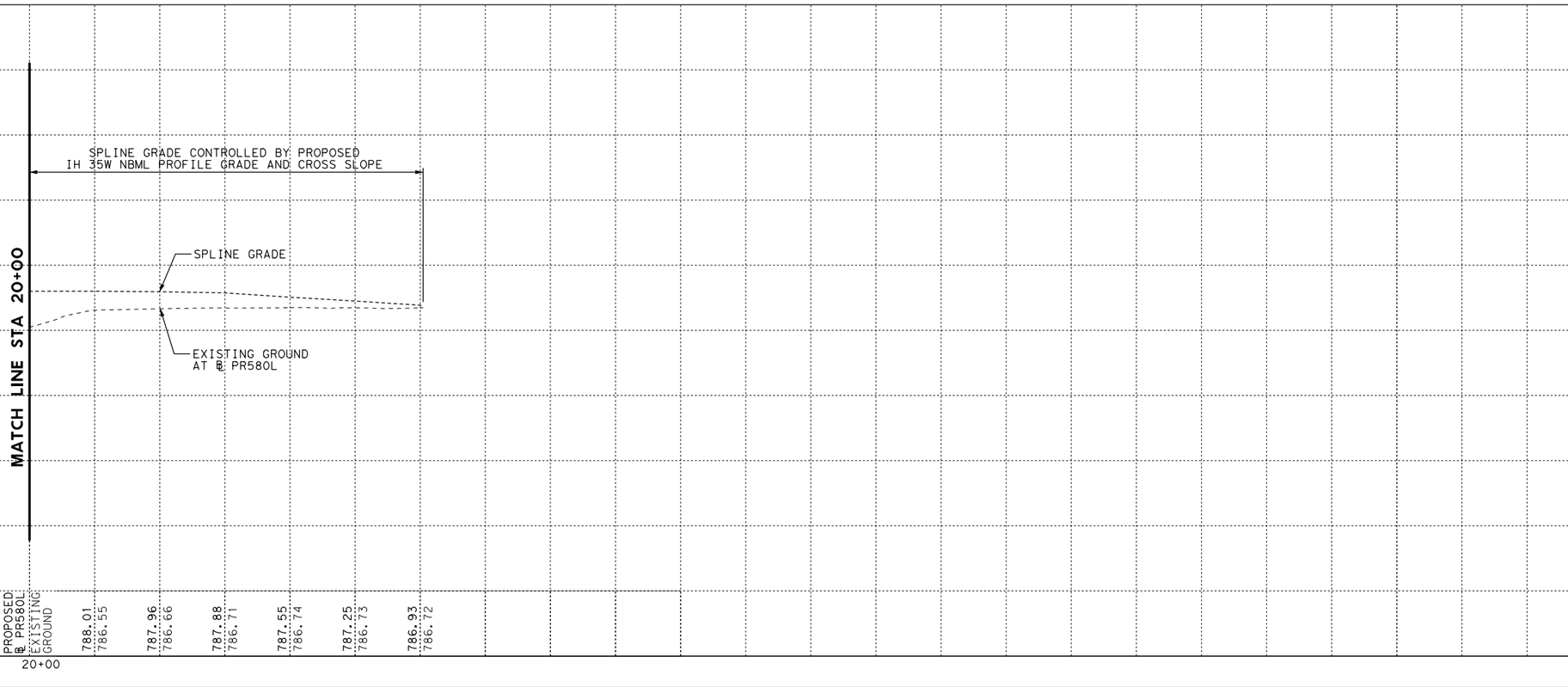
2. SEE IH 35W NBML PLAN & PROFILE SHEETS FOR MBGF LIMITS.



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IH 35W
FROM CR 604/ CR 707 TO US 67

RAMP H
PLAN & PROFILE

STA 20+00 TO END

SHEET 2 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		109

DATE: 5/23/2022 10:47:38 AM
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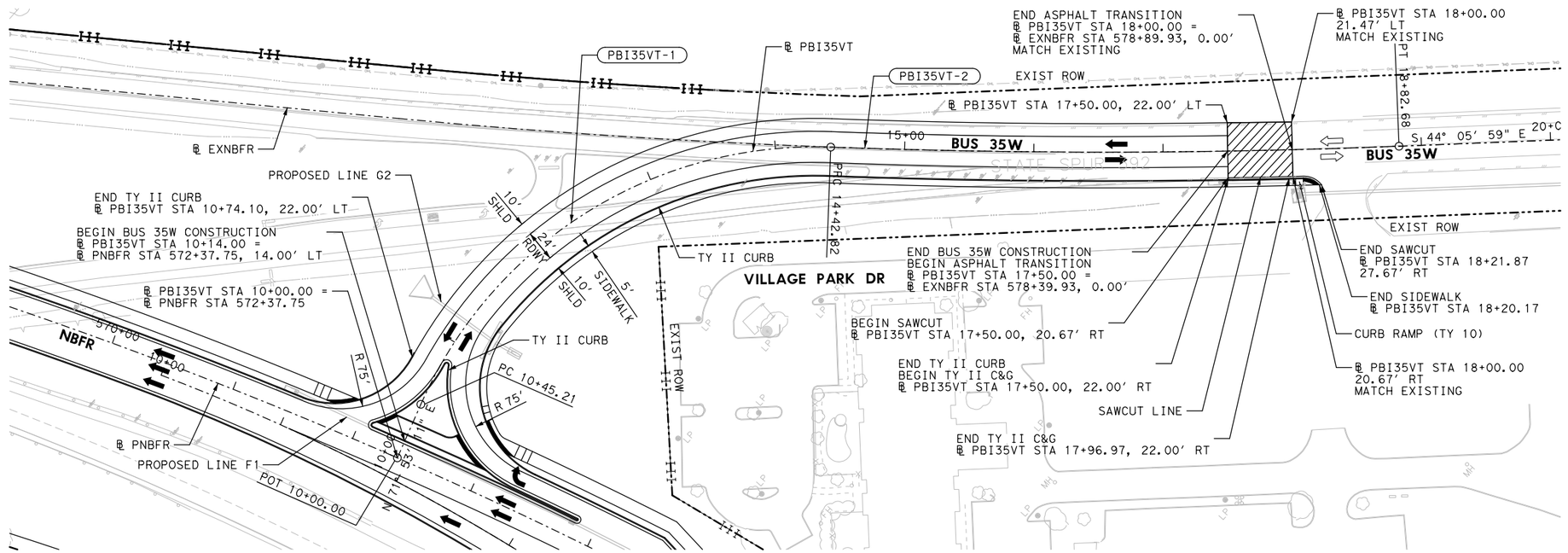

HORZ 0' 50' 100'
VERT 0' 5' 10'
SCALE IN FEET

LEGEND

- PROPOSED LANES
- EXISTING LANES
- HORIZ-1 — CURVE NUMBER
- CONTROL OF ACCESS
- WIDENING
- ASPHALT TRANSITION
- CABLE BARRIER WITH MOW STRIP

NOTES:

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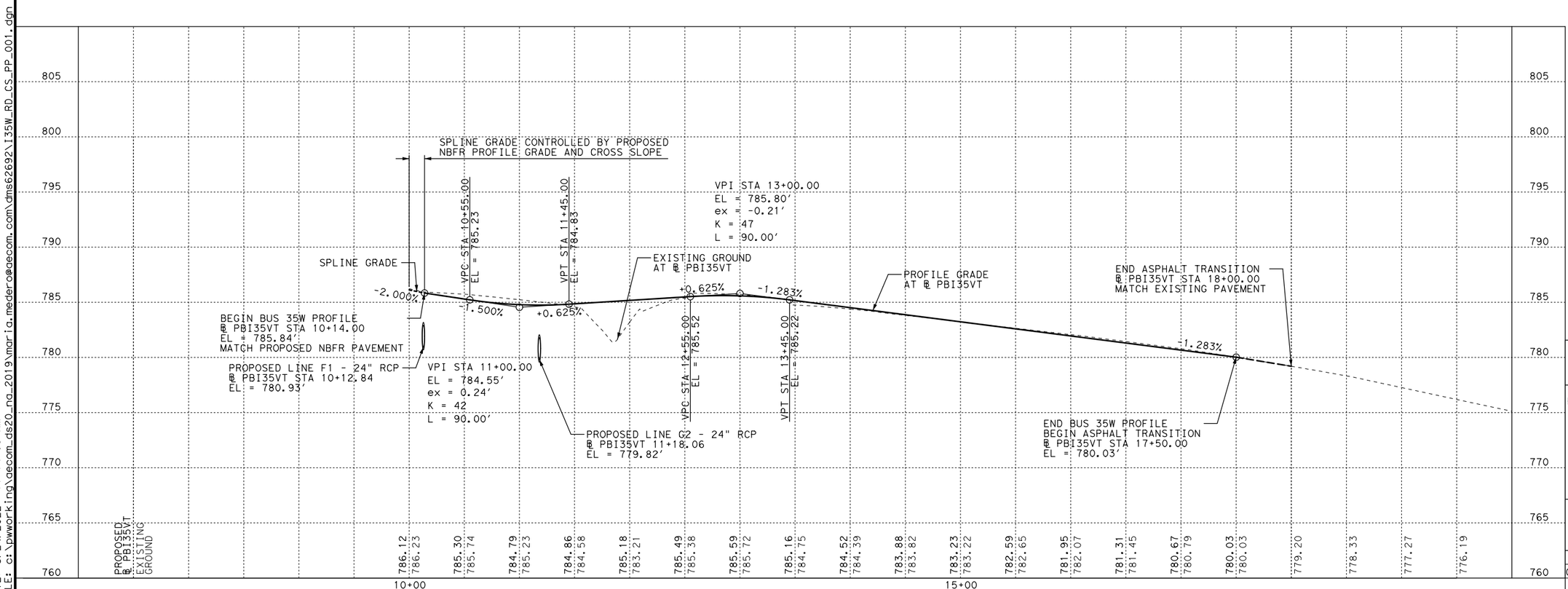

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5/24/2022

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IH 35W
FROM CR 604/ CR 707 TO US 67

BUS 35W PLAN & PROFILE

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		110

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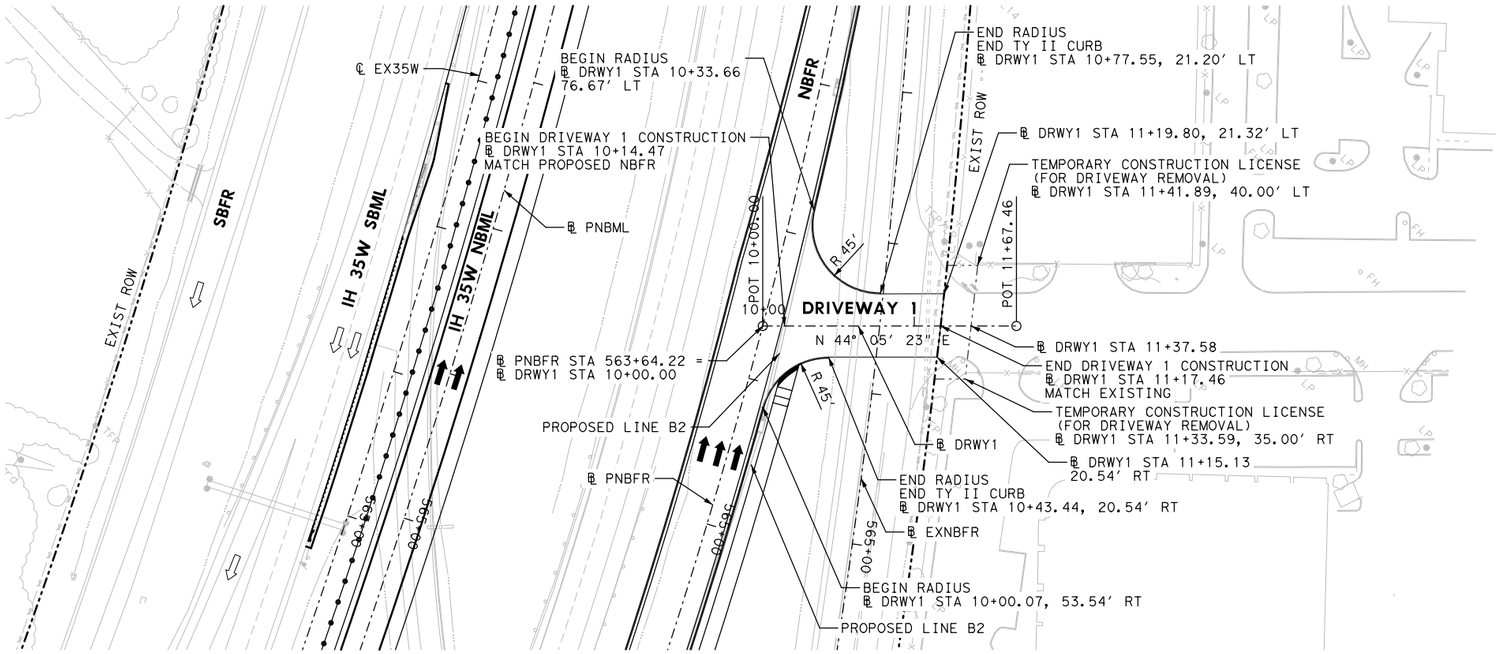
maria.medero



HORZ 0' 50' 100'
VERT 0' 5' 10'
SCALE IN FEET

LEGEND

- PROPOSED LANES
- EXISTING LANES
- HORIZ-1 CURVE NUMBER
- CONTROL OF ACCESS
- WIDENING
- ASPHALT TRANSITION
- CABLE BARRIER WITH MOW STRIP

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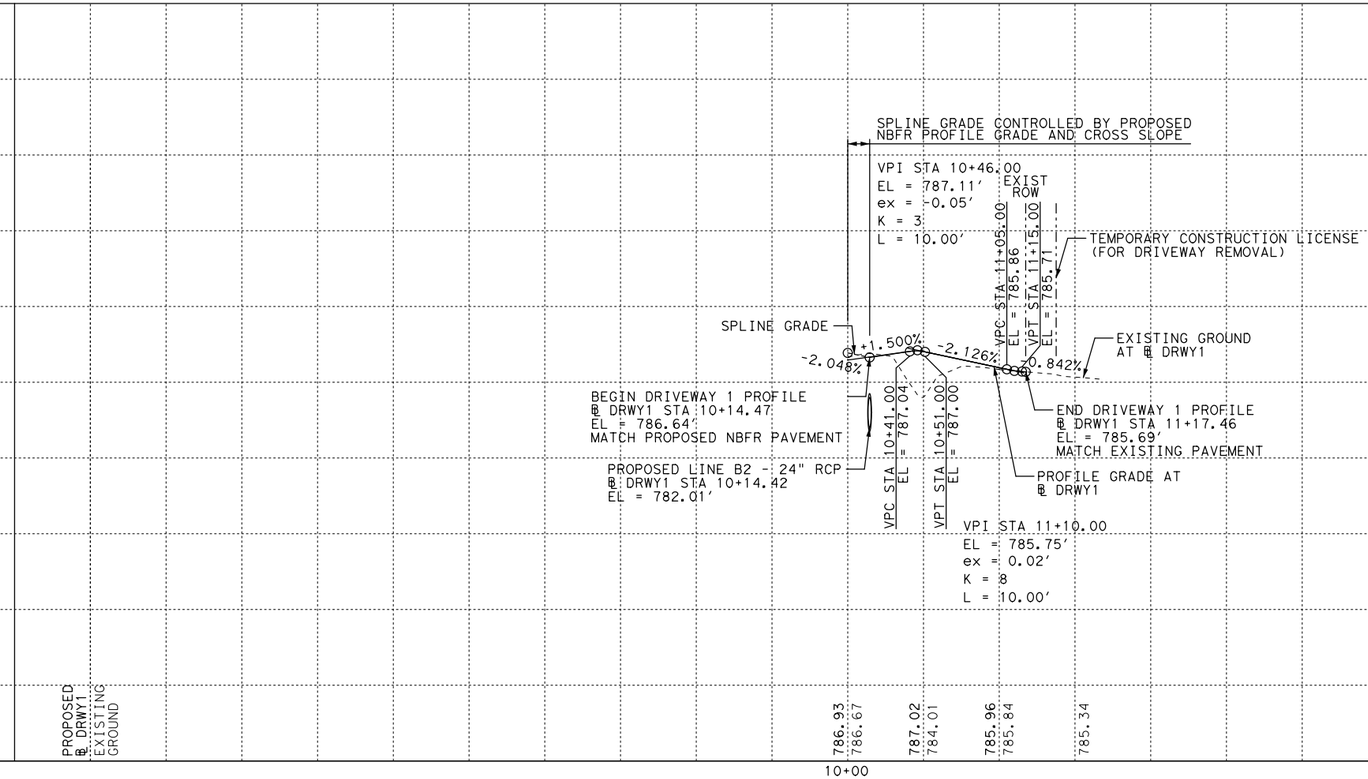

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5/23/2022

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IH 35W
FROM CR 604/ CR 707 TO US 67

DRIVEWAY PLAN & PROFILE

DRIVEWAY 1

SHEET 1 OF 3

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		111

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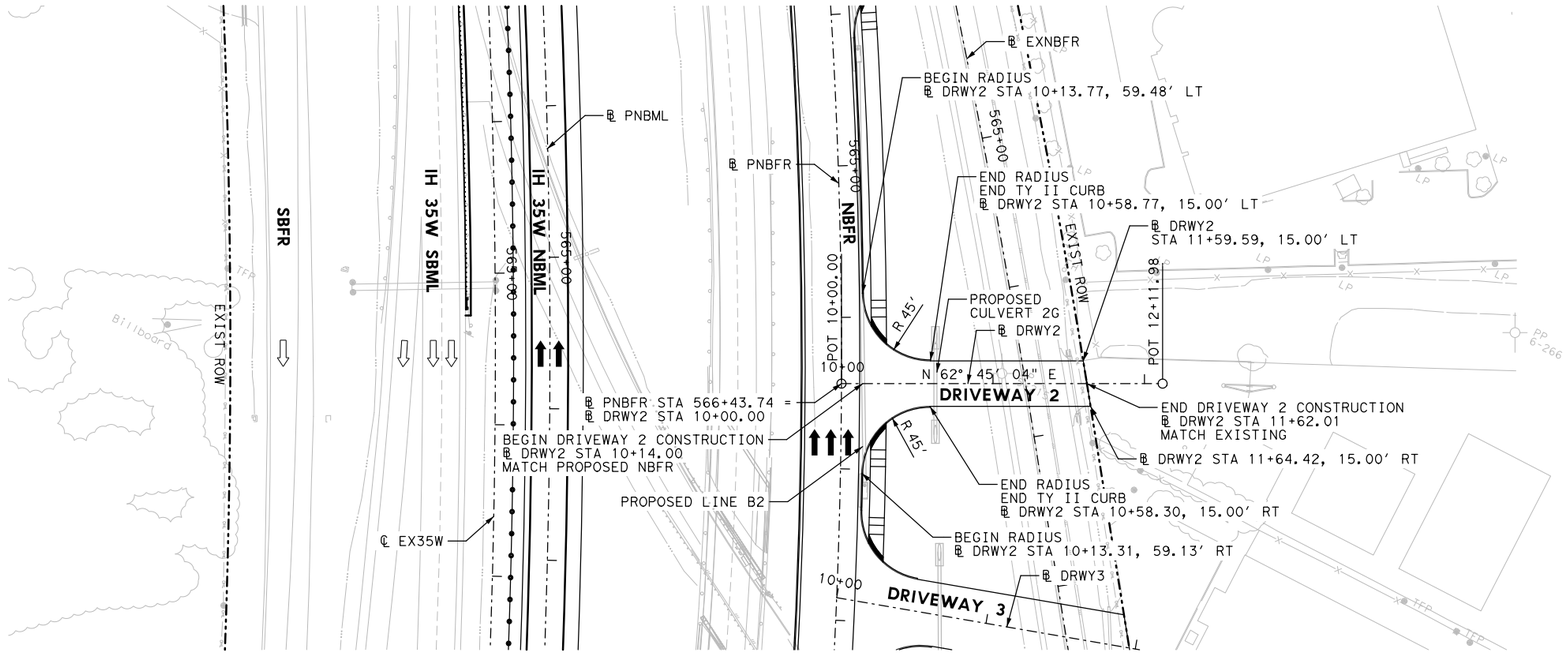

HORZ 0' 50' 100'
VERT 0' 5' 10'
SCALE IN FEET

LEGEND

- PROPOSED LANES
- EXISTING LANES
- HORIZ-1 — CURVE NUMBER
- CONTROL OF ACCESS
- WIDENING
- ASPHALT TRANSITION
- CABLE BARRIER WITH MOW STRIP

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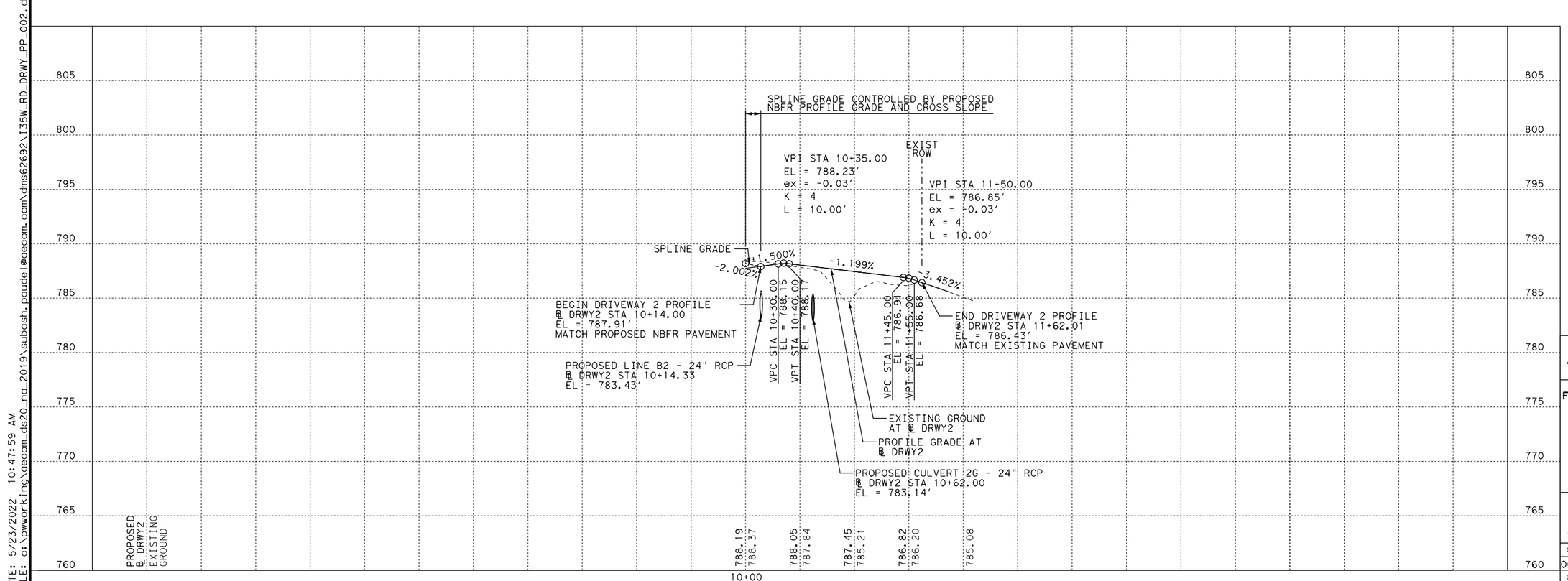

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FROM CR 604/ CR 707 TO US 67

DRIVEWAY PLAN & PROFILE

DRIVEWAY 2

SHEET 2 OF 3

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		112

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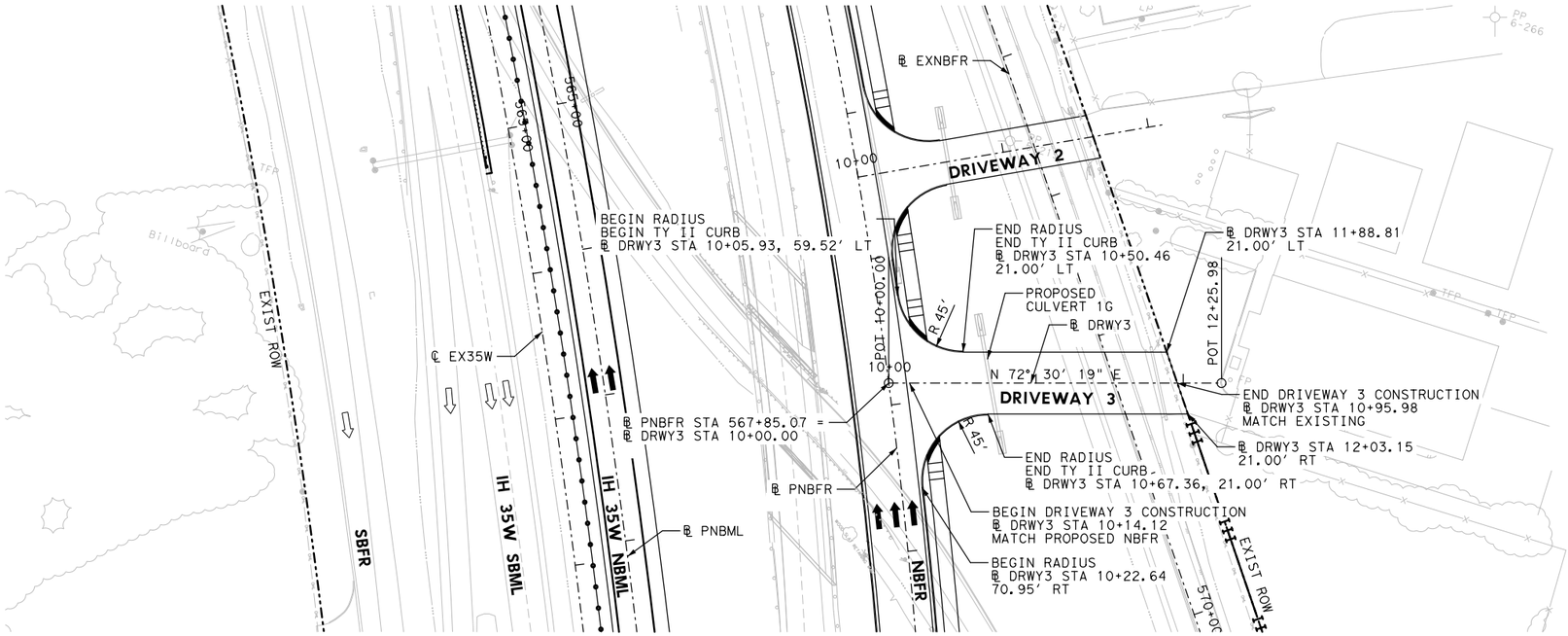

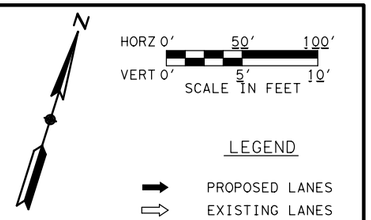

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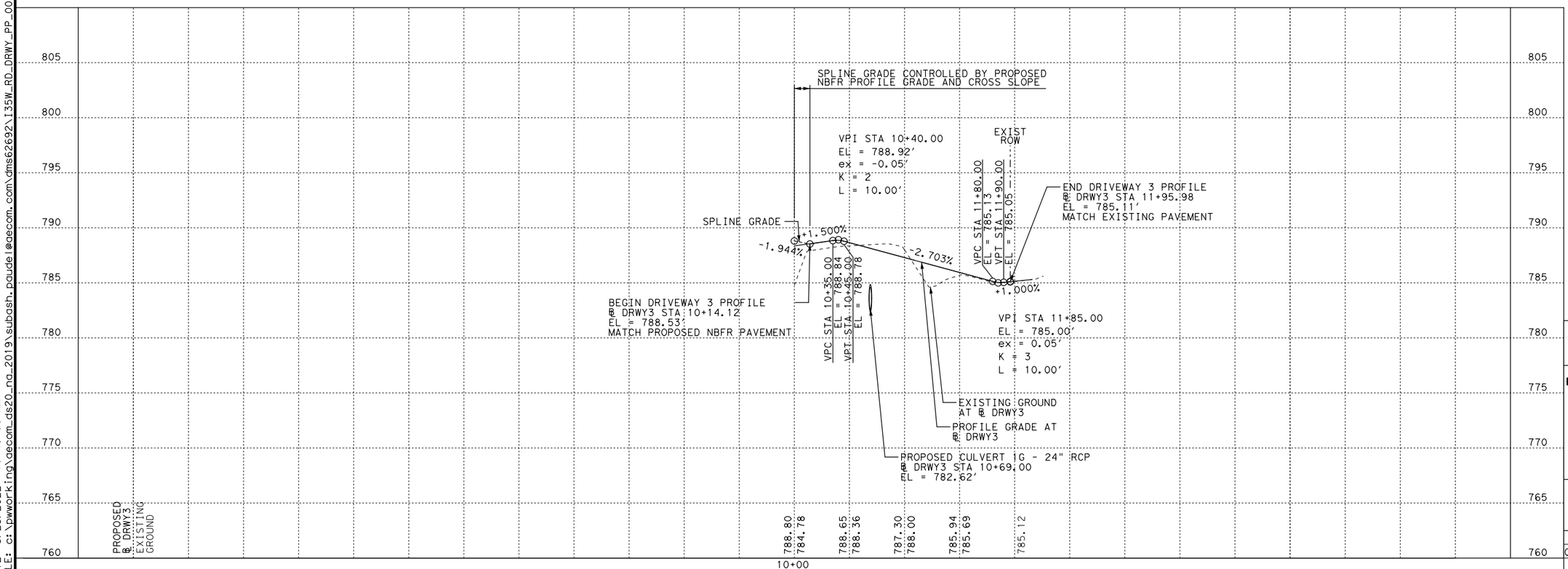

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TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

DRIVEWAY PLAN & PROFILE

DRIVEWAY 3

SHEET 3 OF 3

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		113

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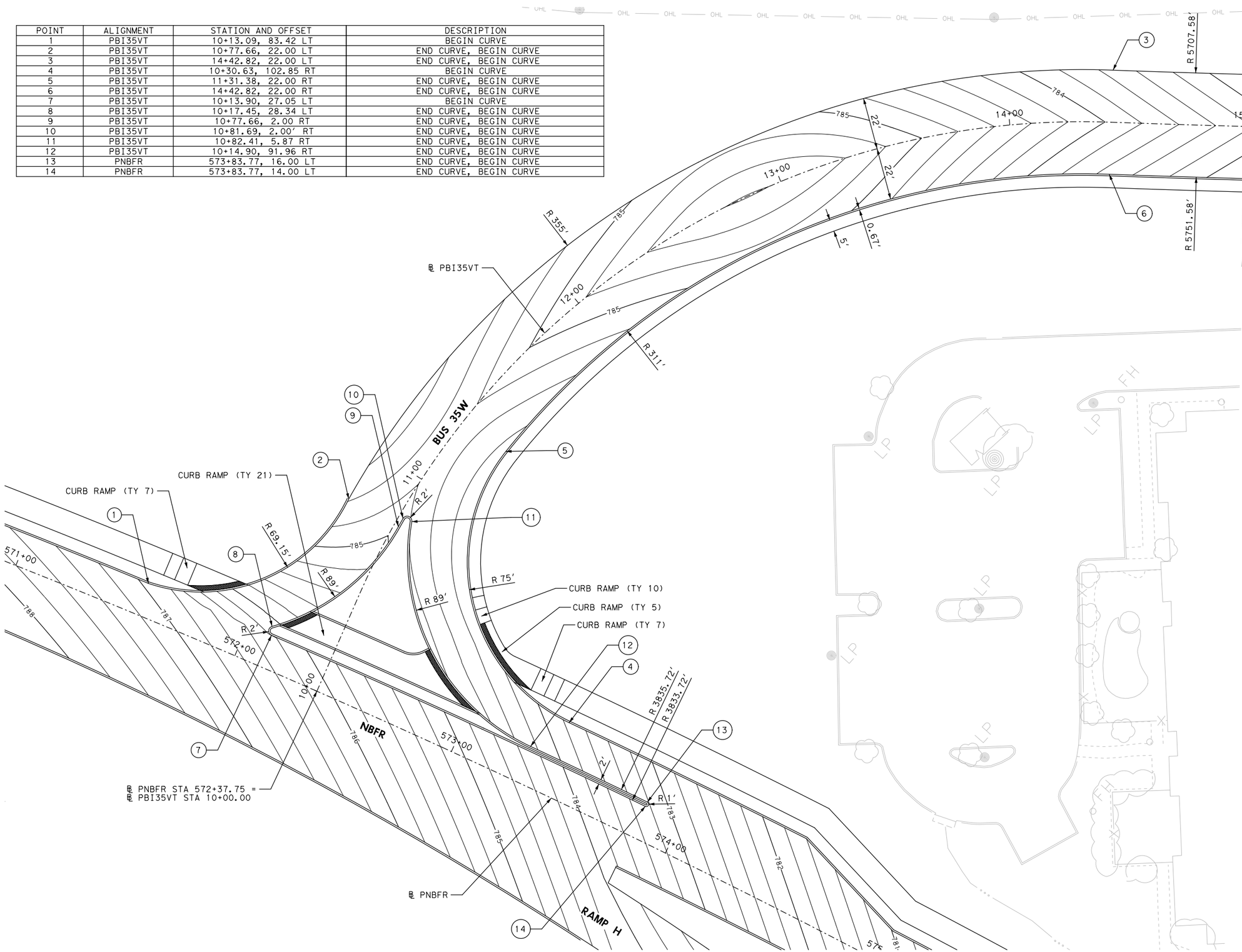
subash.paude1

POINT	ALIGNMENT	STATION AND OFFSET	DESCRIPTION
1	PBI35VT	10+13.09, 83.42 LT	BEGIN CURVE
2	PBI35VT	10+77.66, 22.00 LT	END CURVE, BEGIN CURVE
3	PBI35VT	14+42.82, 22.00 LT	END CURVE, BEGIN CURVE
4	PBI35VT	10+30.63, 102.85 RT	BEGIN CURVE
5	PBI35VT	11+31.38, 22.00 RT	END CURVE, BEGIN CURVE
6	PBI35VT	14+42.82, 22.00 RT	END CURVE, BEGIN CURVE
7	PBI35VT	10+13.90, 27.05 LT	BEGIN CURVE
8	PBI35VT	10+17.45, 28.34 LT	END CURVE, BEGIN CURVE
9	PBI35VT	10+77.66, 2.00 RT	END CURVE, BEGIN CURVE
10	PBI35VT	10+81.69, 2.00' RT	END CURVE, BEGIN CURVE
11	PBI35VT	10+82.41, 5.87 RT	END CURVE, BEGIN CURVE
12	PBI35VT	10+14.90, 91.96 RT	END CURVE, BEGIN CURVE
13	PNBFR	573+83.77, 16.00 LT	END CURVE, BEGIN CURVE
14	PNBFR	573+83.77, 14.00 LT	END CURVE, BEGIN CURVE



NOTES:

1. ALL STATIONS/OFFSETS ARE FROM ℄ PBI35VT UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS ARE FROM FACE OF CURB WHERE CURB IS PRESENT.

STATE OF TEXAS
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IH 35W
FROM CR 604/ CR 707 TO US 67

BUS 35W INTERSECTION LAYOUT

SHEET 1 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		114

DATE: 5/23/2022 10:48:14 AM
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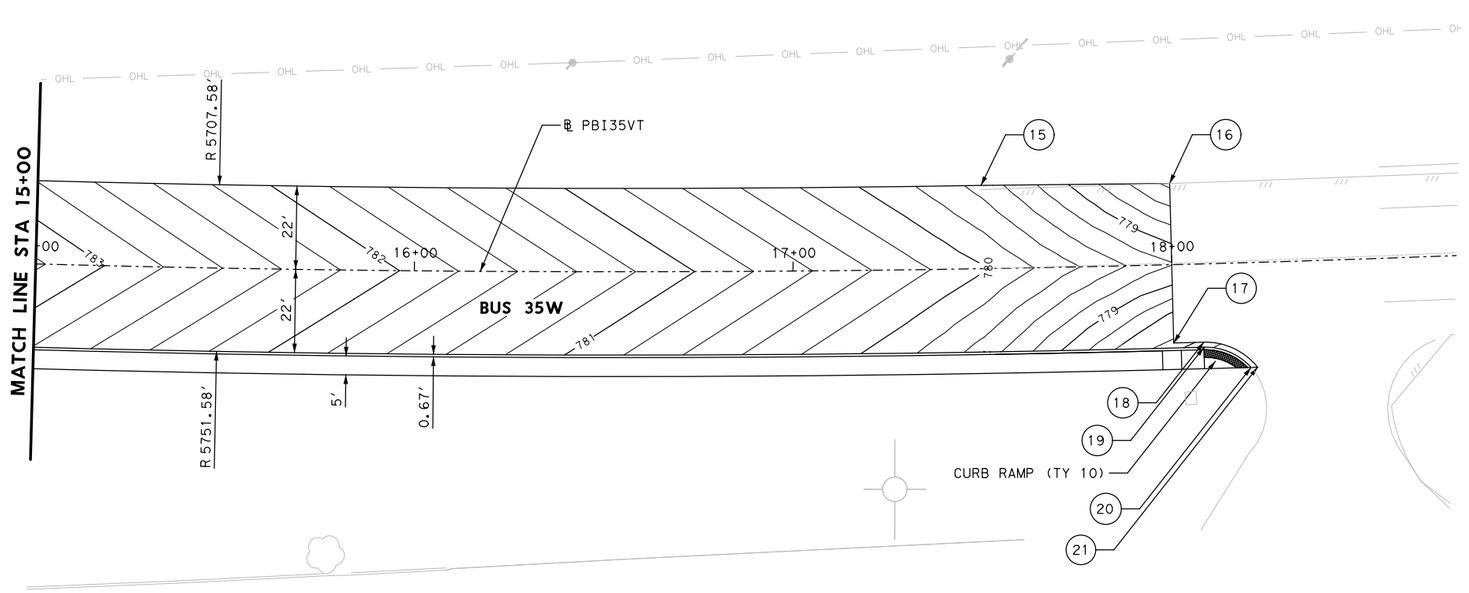

0' 20' 40'
SCALE IN FEET

POINT	ALIGNMENT	STATION AND OFFSET	DESCRIPTION
15	PBI35VT	17+50.00, 22.00 LT	END CURVE
16	PBI35VT	18+00.00, 21.47 LT	MATCH EXISTING
17	PBI35VT	18+00.00, 20.67 RT	MATCH EXISTING, BEGIN CURVE
18	PBI35VT	18+07.92, 20.67 RT	END CURVE, BEGIN CURVE, MATCH EXISTING
19	PBI35VT	18+07.92, 22.00 RT	END CURVE, BEGIN CURVE
20	PBI35VT	18+20.17, 27.67 RT	END CURVE, MATCH EXISTING
21	PBI35VT	18+21.87, 27.67 RT	END CURVE, MATCH EXISTING

NOTES:

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2. ALL DIMENSIONS ARE FROM FACE OF CURB WHERE CURB IS PRESENT.

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IH 35W
FROM CR 604/ CR 707 TO US 67

BUS 35W INTERSECTION LAYOUT

SHEET 2 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		115

DATE: 5/23/2022 10:48:21 AM
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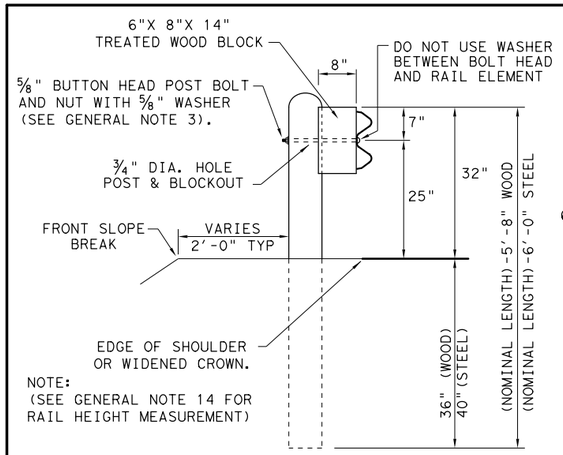
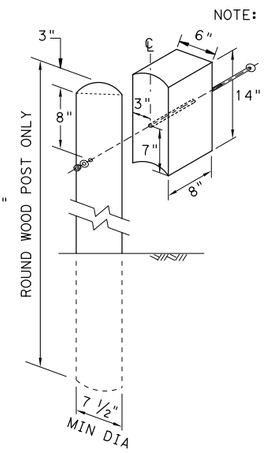
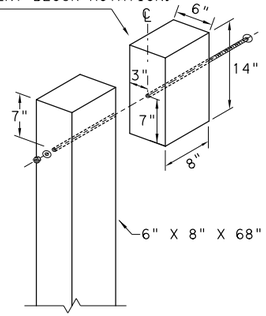


TYPICAL POST PLACEMENT

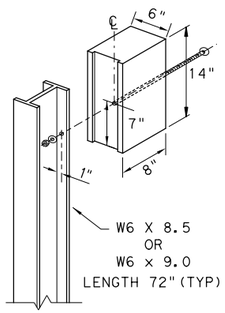


WOOD BLOCK TO ROUND WOOD POST

NOTE: TOENAIL WITH ONE 16D GALV. NAIL TO PREVENT BLOCK ROTATION.

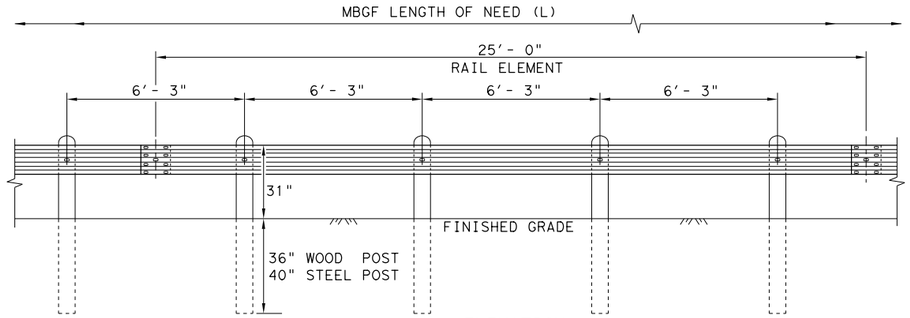


WOOD BLOCK TO RECTANGULAR WOOD POST



ROUTED WOOD BLOCK TO I-BEAM STEEL POST

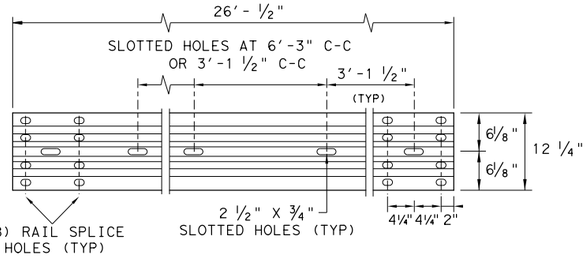
NOTE: ✳✳ "WOOD" INDICATES DIMENSIONS FOR BOTH ROUND AND RECTANGULAR WOOD POST SYSTEMS.



DIRECTION OF TRAFFIC

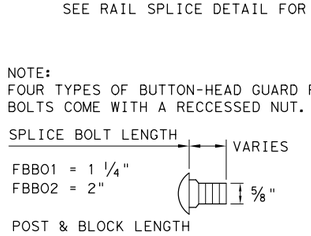
ELEVATION
MID-SPAN RAIL SPLICE

SHOWING A 25'- 0" SECTION OF W-BEAM RAIL. (SEE GENERAL NOTE 2)



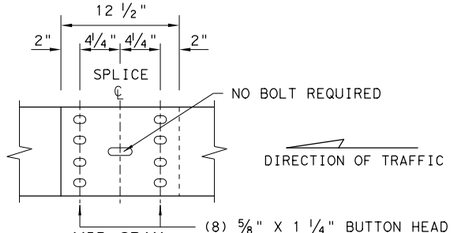
ELEVATION 25'- 0"(NOM.) W-BEAM SECTION

NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES.
SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.



BUTTON HEAD BOLT

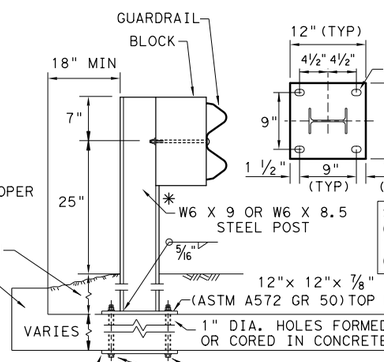
NOTE: SEE GENERAL NOTE 3 FOR SPLICE & POST BOLT DETAILS.



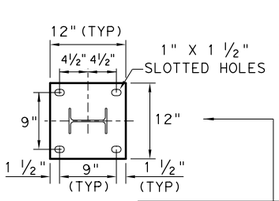
DIRECTION OF TRAFFIC

MID-SPAN RAIL SPLICE DETAIL

NOTE: GF(31), MID-SPAN RAIL SPLICES ARE REQUIRED WITH 6'-3" POST SPACINGS.



LOW FILL CULVERT POST



STEEL POST CONNECTION TO CULVERT SLAB (USE WHEN THERE IS LESS THAN 36" COVER OVER CULVERT SLAB).

NOTE: TWO INSTALLATION OPTIONS.

1. BOLT-THROUGH OPTION: REQUIRES A 6" MIN. SLAB THICKNESS. ⅞" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS.
   NOTE: BOLT LENGTH = SLAB PLUS 2 ¼" MIN.

2. EPOXY ANCHOR OPTION: THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 9" MIN. THICK. THREADED ANCHOR RODS MUST BE ⅞" DIA. ASTM A449 OR A193 GRADE B7 WITH HEAVY HEX NUT, AND ONE HARDENED WASHER EACH. EMBED ANCHOR RODS 6" WITH HILTI HIT RE 500 EPOXY ADHESIVE. OTHER TYPE III CLASS C EPOXY ADHESIVES MEETING THE REQUIREMENTS OF DMS-6100, "EPOXIES AND ADHESIVES", MAY BE USED IF IT CAN BE DEMONSTRATED THAT THEY MEET OR EXCEED THE STRENGTH OF HILTI HIT RE 500 WITH THE SAME EMBEDMENT DEPTH AND THREADED ROD DIA. FOLLOW THE MANUFACTURER'S REQUIREMENTS FOR INSTALLING EPOXIED THREADED RODS. EXTEND RODS ¼" MIN. BEYOND NUT.

NOTE: CULVERTS OF 25 FT. OR LESS, SEE GF(31)LS STANDARD FOR "LONG SPAN" OPTION.

NOTE: TRANSISTIONS TO BRIDGE RAILS OR TRAFFIC BARRIERS.
SEE GF(31)TL3 TR STANDARD FOR HIGH-SPEED TL-3 TRANSITIONS.
SEE GF(31)TL2 TR STANDARD FOR LOW-SPEED TL-2 TRANSITIONS.

GENERAL NOTES

1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540,"METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'- 0", OR 12'- 6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'-1 ½" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE DOWNSTREAM ANCHOR TERMINAL (DAT) AND THE TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445,"GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
5. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
6. THE LATERAL APPROACH TO THE GUARD FENCE, SHALL HAVE A MAXIMUM SLOPE OF 1V:10H.
7. IF SHOWN ELSEWHERE IN THE PLANS OR AS DIRECTED BY THE ENGINEER, THE GUARD FENCE MAY BE FLARED AT A RATE OF 25:1 OR FLATTER.
8. UNLESS OTHERWISE SHOWN IN THE PLANS, GUARD FENCE PLACED IN THE VICINITY OF CURBS SHALL BE POSITIONED SO THAT THE FACE OF CURB IS LOCATED DIRECTLY BELOW OR BEHIND THE FACE OF THE RAIL. RAIL PLACED OVER CURBS SHALL BE INSTALLED SO THAT THE POST BOLT IS LOCATED APPROXIMATELY 25 INCHES ABOVE THE GUTTER PAN OR EDGE OF SHOULDER.
9. APPLICATIONS IN SOLID ROCK ARE ONLY ALLOWED WITH STEEL POSTS. IF SOLID ROCK IS ENCOUNTERED WITHIN 0 TO 18" OF THE FINISHED GRADE, DRILL A 24" DIA. HOLE, 24" INTO THE ROCK. IF SOLID ROCK IS ENCOUNTERED BELOW 18", DRILL A 12" DIA. HOLE, 12" INTO THE ROCK OR TO THE STANDARD EMBEDMENT DEPTH, WHICHEVER MAYBE LESS. ANY EXCESS POST LENGTH, AFTER MEETING THESE DEPTHS, MAY BE FIELD CUT TO ENSURE PROPER GUARDRAIL MOUNTING HEIGHT. BACKFILL WITH COARSE AGGREGATE MATERIAL.
10. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
11. SPECIAL FABRICATION WILL BE REQUIRED AT INSTALLATION LOCATIONS HAVING A CURVATURE OF LESS THAN 150 FT. RADIUS.
12. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210,"COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. THE CONSTRUCTION DIVISION, TXDOT MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210 ONLY PRODUCERS ON THE MPL MAY FURNISH COMPOSITE MATERIAL BLOCKS.
13. FOR THE LOW FILL CULVERT OPTION, POSTS LOCATED PARTIALLY OR WHOLLY BETWEEN PRECAST BOX CULVERT UNITS, THE USE OF A CAST-IN-PLACE CONCRETE CLOSURE BETWEEN BOXES IS REQUIRED. THE LENGTH OF THE CAST-IN-PLACE CONCRETE CLOSURE SHALL ACCOMMODATE THE PLACEMENT OF THE LOW FILL CULVERT OPTION. SEE CONCRETE CLOSURE DETAILS ON BRIDGE STANDARD SCP-MD.
14. GUARDRAIL HEIGHT MEASUREMENT: WHEN THE GUARDRAIL IS LOCATED ABOVE PAVEMENT, MEASURE THE HEIGHT FROM THE PAVEMENT TO THE TOP OF THE W-BEAM RAIL. WHEN THE GUARDRAIL IS LOCATED UP TO 2 FT. OFF OF THE EDGE OF PAVEMENT OR FOR A PAVEMENT OVERLAY, USE A 10-FOOT STRAIGHTEDGE TO EXTEND THE PAVEMENT/SHOULDER SLOPE TO THE BACK OF RAIL, MEASURE FROM THE BOTTOM OF STRAIGHTEDGE TO THE TOP OF RAIL. FOR GUARDRAIL LOCATED DOWN A 10:1 SLOPE, MEASURE FROM THE NOMINAL TERRAIN.

Texas Department of Transportation — Design Division Standard

METAL BEAM GUARD FENCE
TL-3 MASH COMPLIANT
GF(31)-19

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	03	087	IH 35W
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		116

DATE: 5/23/2022
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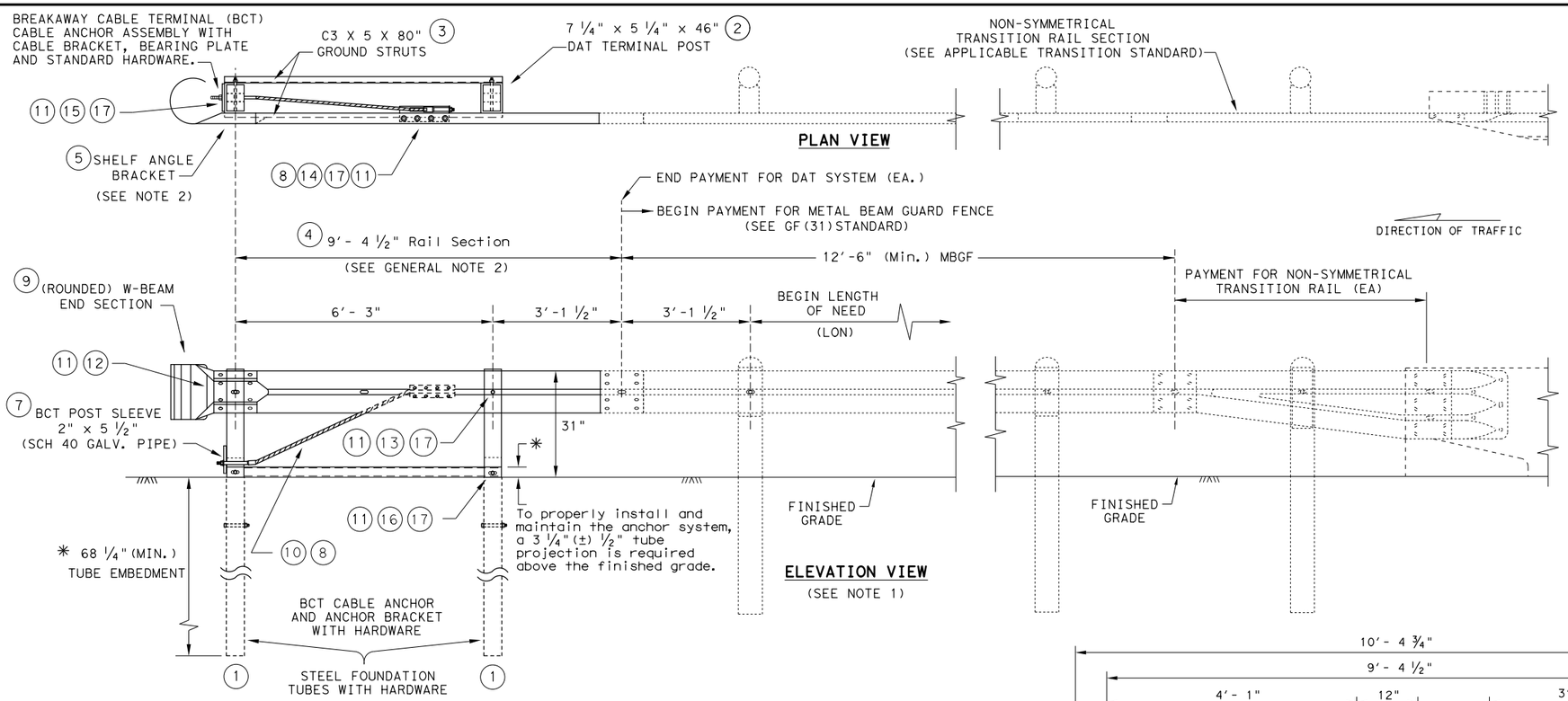


DOWNSTREAM ANCHOR TERMINAL (DAT)

NOTE: ONLY FOR DOWNSTREAM USE, WHEN LOCATED OUTSIDE THE HORIZONTAL CLEARANCE AREA OF OPPOSING TRAFFIC.

GENERAL NOTES

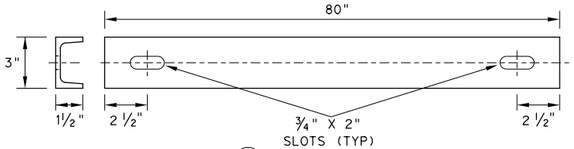
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN 3 3/4" ABOVE THE FINISHED GRADE.
4. ALL HARDWARE FOR DAT SHALL BE ASTM A307 UNLESS OTHERWISE SHOWN.
5. REFER TO GF(31) SHEET FOR TERMINAL CONNECTION DETAILS.

MOW STRIP INSTALLATION

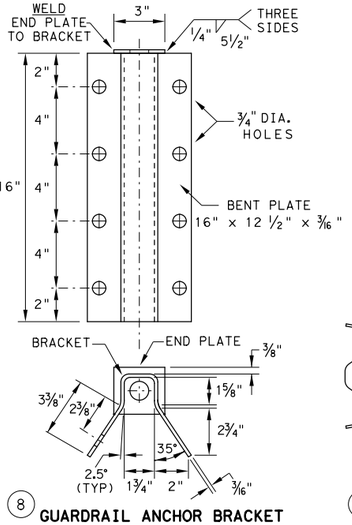
IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

#	(DAT) PARTS LIST	QTY
(1)	STEEL FOUNDATION TUBE	2
(2)	DAT TERMINAL POST	2
(3)	CHANNEL STRUT	2
(4)	TERMINAL RAIL ELEMENT	1
(5)	SHELF ANGLE BRACKET	1
(6)	BCT BEARING PLATE	1
(7)	BCT POST SLEEVE	1
(8)	GUARDRAIL ANCHOR BRACKET	1
(9)	(ROUNDED) W-BEAM END SECTION	1
(10)	BCT CABLE ANCHOR	1
(11)	RECESSED NUT, GUARDRAIL	20
(12)	1 1/4" BUTTON HEAD BOLT	4
(13)	10" BUTTON HEAD BOLT	2
(14)	5/8" X 2" HEX HEAD BOLT	8
(15)	5/8" X 8" HEX HEAD BOLT	4
(16)	5/8" X 10" HEX HEAD BOLT	2
(17)	5/8" FLAT WASHER	18

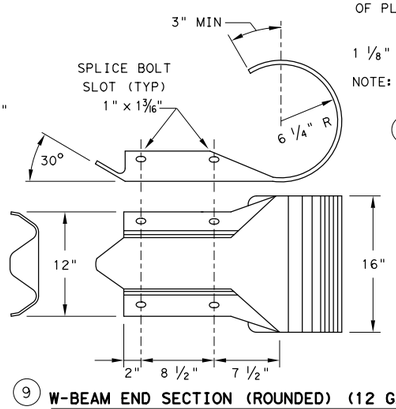
(4) TERMINAL RAIL ELEMENT FOR DAT



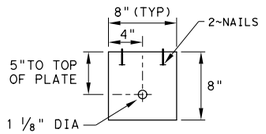
(3) CHANNEL STRUT
C3 X 5 X 80", GRADE A36



(8) GUARDRAIL ANCHOR BRACKET

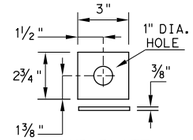


(9) W-BEAM END SECTION (ROUNDED) (12 GA.)

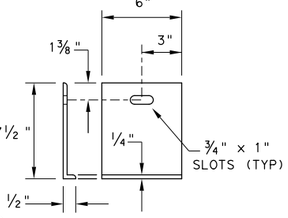


NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

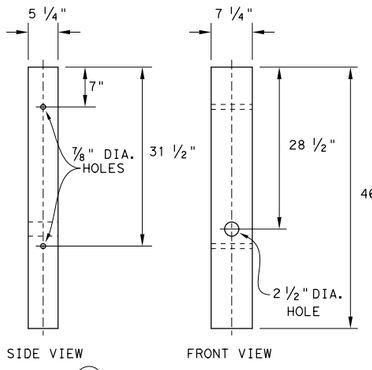
(6) BEARING PLATE
8"x 8"x 5/8" R



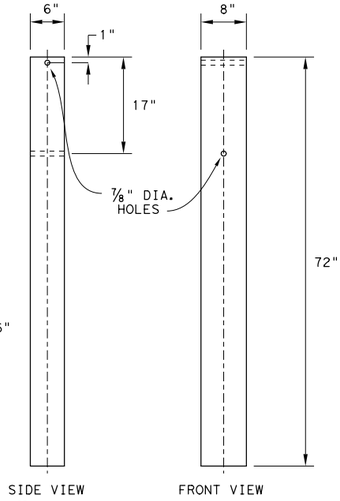
END PLATE



(5) SHELF ANGLE BRACKET



(2) TERMINAL POST
7 1/4"x 5 1/4"x 46" WOOD POST



(1) STEEL FOUNDATION TUBE
6"x 8"x 1/8" x 72" STEEL TUBE

Texas Department of Transportation — Design Division Standard

METAL BEAM GUARD FENCE
(DOWNSTREAM ANCHOR TERMINAL)
TL-3 MASH COMPLIANT
GF(31)DAT-19

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©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		117

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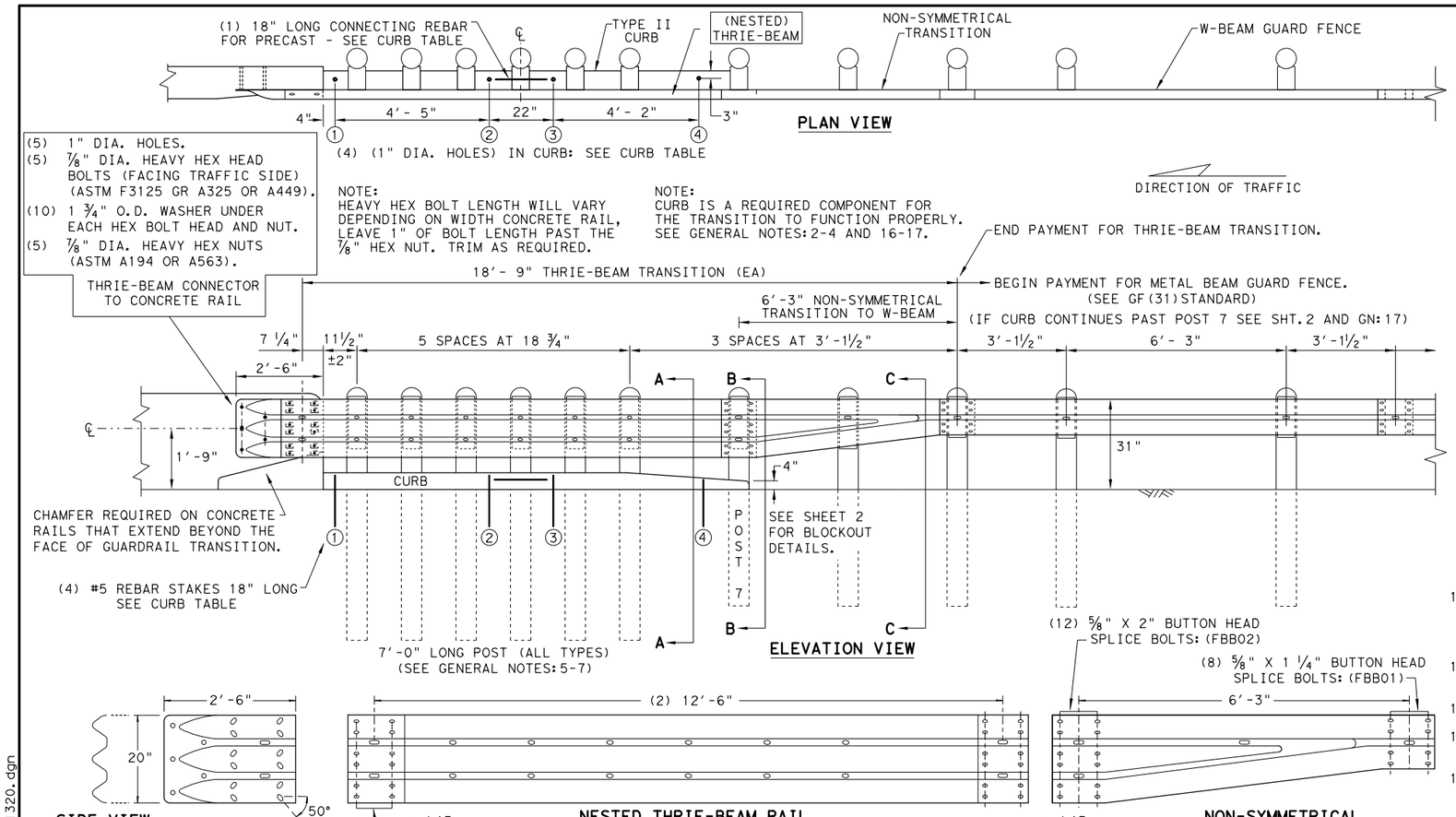


GENERAL NOTES

1. CONTACT THE DESIGN DIVISION FOR DRAINAGE CUT OUT OPTIONS NEEDED WITHIN THE CURB SECTION OF THE THRIE-BEAM TRANSITION. (512) 416-2678
2. CONCRETE CURB MAY BE CAST-IN-PLACE OR PRECAST AS SHOWN ON THIS SHEET. WHEN USED IN CONJUNCTION WITH THE THRIE-BEAM TRANSITIONS, CURB SHALL BE TYPE II (5- 3/4" HEIGHT); SEE CURRENT CCCG STANDARD SHEET FOR FURTHER DETAILS. IF OTHER CURB HEIGHTS ARE SHOWN IN THE PLANS IN CONJUNCTION WITH THE TRANSITION, THE CURB HEIGHT MAY BE FROM 4" TO 8" WITH A RELATIVELY VERTICAL FACE. CONCRETE CURB SHALL BE CONTINUOUS TO THE SEVENTH POST UNLESS OTHERWISE SHOWN IN THE PLANS. SEE GENERAL NOTE: 17 FOR CIRCUMSTANCES WHERE CURB CONTINUES PAST POST 7.
3. CONCRETE CURB TYPE II SUBSIDIARY TO "METAL BEAM GUARD FENCE TRANSITION". IF NO ADDITIONAL CURB IS INDICATED BEYOND THE TRANSITION, THEN ANY CURB HEIGHT GREATER THAN 4" WILL BE TAPERED DOWN BEGINNING AT THE LAST 7 FT. POST TO A MAXIMUM HEIGHT OF 4" AT POST 7. IF SHOWN ELSEWHERE IN THE PLANS, ADDITIONAL CURB UNDERNEATH GUARDRAIL WILL BE PAID FOR BY THE LINEAR FOOT.
4. UNLESS OTHERWISE SHOWN IN THE PLANS, TRANSITIONS SHALL BE PLACED WITH THE BLOCKOUT FACE IN FRONT OF OR DIRECTLY ABOVE THE CURB FACE. SEE SECTION A-A.
5. FOR ROUND WOOD POST SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 1/2" DIA. MINIMUM THROUGHOUT THE THRIE-BEAM TRANSITION.
6. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. REFER TO GF(31) STANDARD SHEET.
7. THE POST LENGTH SHALL BE MARKED ON ALL 7'- 0" LONG POSTS BY THE MANUFACTURER. THE MARK SHALL BE LOCATED WITHIN THE TOP 1 FT. REGION OF THE POST, AT LEAST 5/8" IN HEIGHT, AND VISIBLE AFTER INSTALLATION. WOODEN POSTS SHALL BE MARKED WITH A BRAND, AND STEEL POSTS WITH A STENCIL BEFORE GALVANIZING.
8. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
9. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE THRIE-BEAM TERMINAL CONNECTOR AND THE THRIE-BEAM TRANSITION TO W-BEAM SHALL BE OF THE SAME MATERIAL, BUT SHALL NOT BE LESS THAN 10 GAUGE. CONTRACTOR SHALL VERIFY THAT THE LOCATIONS OF BOLT HOLES MATCH THOSE IN THE THRIE-BEAM TERMINAL CONNECTOR PRIOR TO ORDERING MATERIALS.
10. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 5/8" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
11. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
12. CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
13. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
14. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. TXDOT'S MATERIALS AND TESTS DIVISION MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL CAN FURNISH COMPOSITE MATERIAL BLOCKS.
15. REFER TO GF(31) STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
16. THE INSTALLATION OF THE TYPE II CURB IS CRITICAL FOR THE PERFORMANCE OF THE THRIE-BEAM TRANSITION SYSTEM. THE CURB PREVENTS (VEHICLE WHEEL SNAGGING) AT THE CONCRETE RAIL AND IS REQUIRED TO MEET MASH CRASH TEST CRITERIA.
17. IF CURB EXTENDS BEYOND POST 7, 25' OF NESTED W-BEAM GUARDRAIL SHALL BE INSTALLED BEYOND THE PAY LIMITS OF THRIE-BEAM TRANSITION SECTION, (SEE SHT.2). PAYMENT FOR THIS 25' SECTION WILL BE BY LINEAR FOOT, PAY ITEM "0540 6XXX MTL W-BEAM GD FEN (NESTED)(TIM POST)" OR "540 6XXX MTL W-BEAM GD FEN (NESTED)(STEEL POST)" AS APPLICABLE FOR POST TYPE. SEE SHT.2 FOR ADDITIONAL INFORMATION.

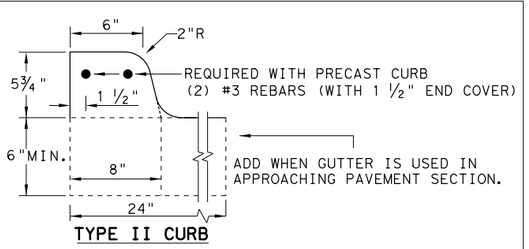
THRIE-BEAM TERMINAL - CURB TABLE

PRECAST CURB FULL LENGTH EQUALS 12'- 2"
THE PRECAST CURB MAY BE FORMED INTO TWO SECTIONS.

CURB (1) LENGTH 5'- 8"
CURB (2) LENGTH 6'- 6"
TAPER CURB (2) TO A HEIGHT OF 4" AT POST 7

CONNECTING PRECAST CURB SECTIONS (1) & (2):
FORM OR CORE 1" DIA. HOLE 9" LONG INTO EACH CURB END.
USE (1) #5 GR.60 REBAR 18" LONG TO CONNECT BOTH CURBS.

SECURING PRECAST OR CAST-IN-PLACE TO FINISHED GRADE *:
FORM OR CORE (4) 1" DIA. HOLES, SEE PLAN AND ELEVATION VIEWS FOR HOLE LOCATIONS. DRIVE (4) #5 GR.60 REBAR STAKES 18" LONG INTO THE GROUND AND 1/2" BELOW TOP OF CURB.
FILL HOLES WITH APPROVED GROUT MIXTURE.



TYPE II CURB

NOTE: OPTIONS FOR TYPE II CURB:
1. PRECAST
2. CAST-IN-PLACE

* NOTES: NOT NEEDED FOR CAST-IN-PLACE.
SEE TYPE II CURB DETAIL FOR REBAR AND COVER REQUIREMENTS.
PERCUSSION DRILLING IS NOT PERMITTED WITH:
TYPE II CURB, BRIDGE RAIL OR CONCRETE TRAFFIC RAIL.

TYPE II CURB DETAILS

HIGH-SPEED TRANSITION

SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT

GF(31)TR TL3-20

FILE: gf31trt1320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
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	FTW	JOHNSON		118

DATE: 5/23/2022
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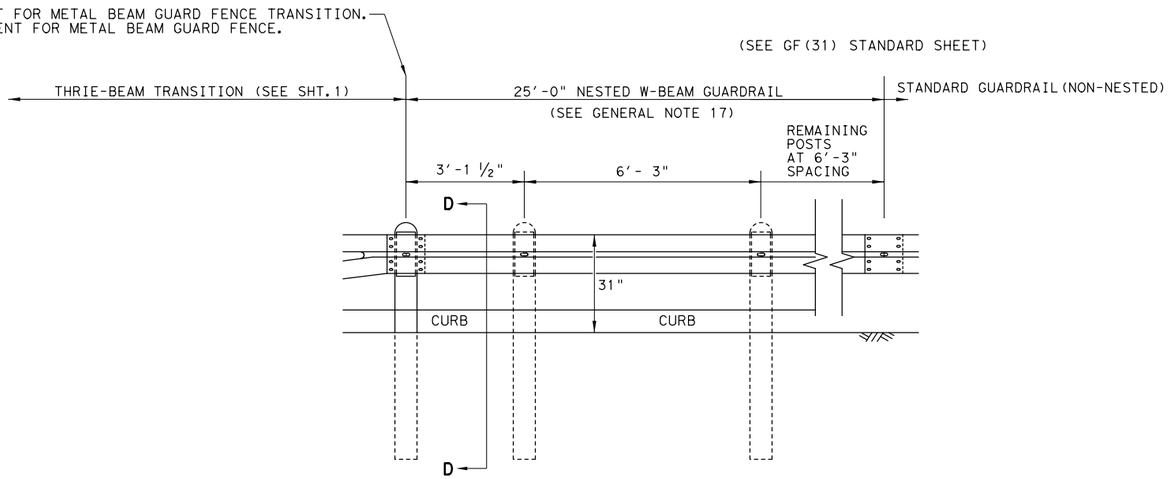
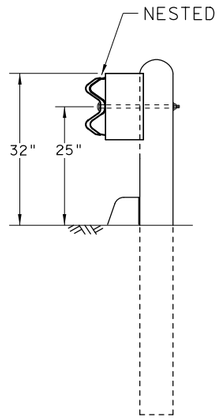
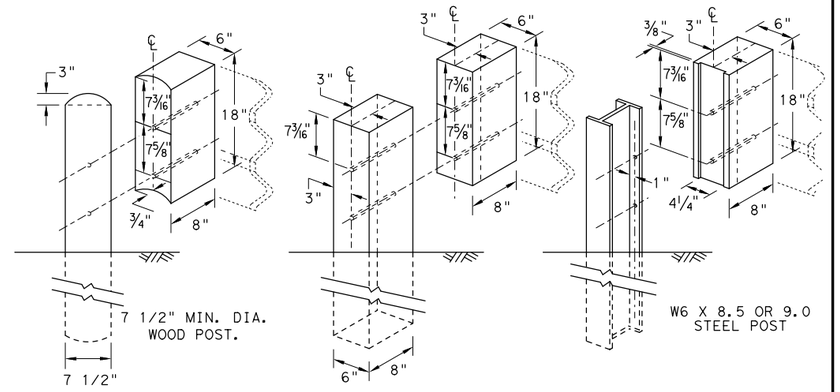
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

Texas Department of Transportation | Design Division Standard

METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT

GF(31)TR TL3-20

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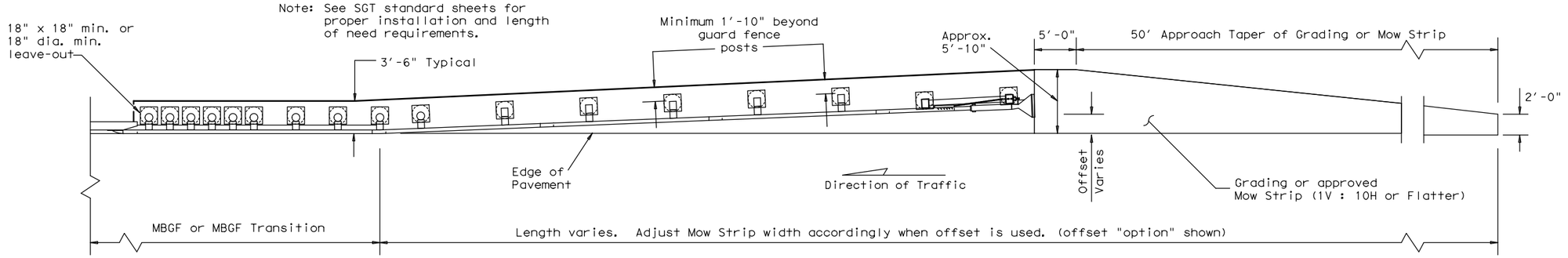
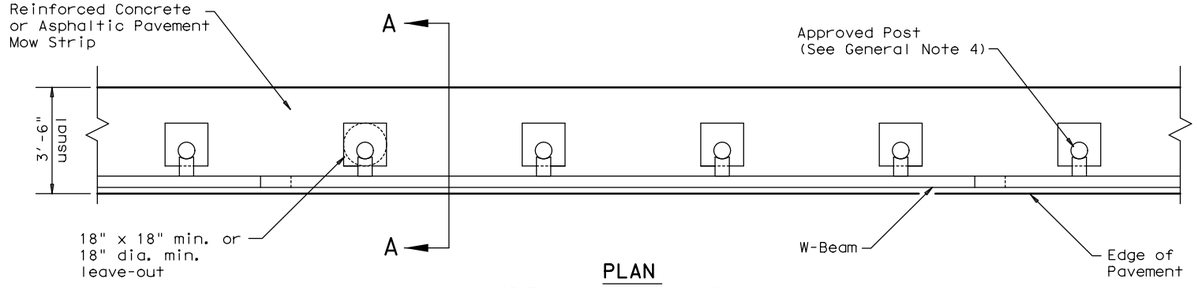
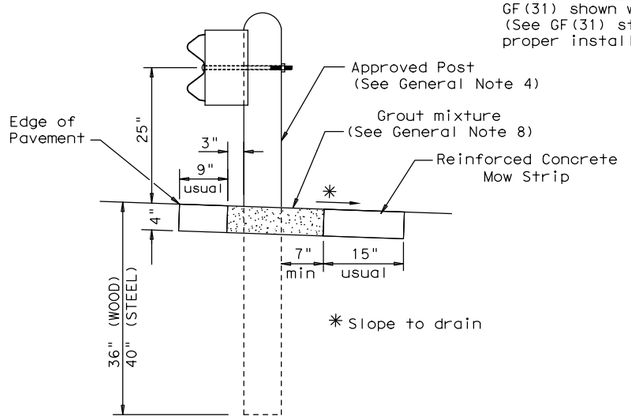


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



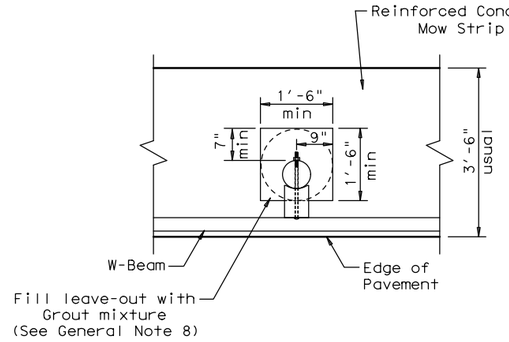
PLAN

GF(31) shown with Mow Strip
(See GF(31) standard sheet for proper installation)



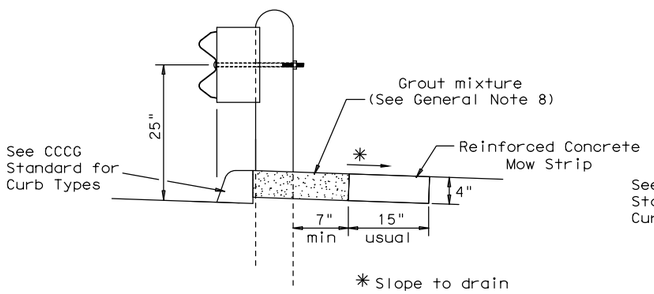
SECTION A-A

Typical



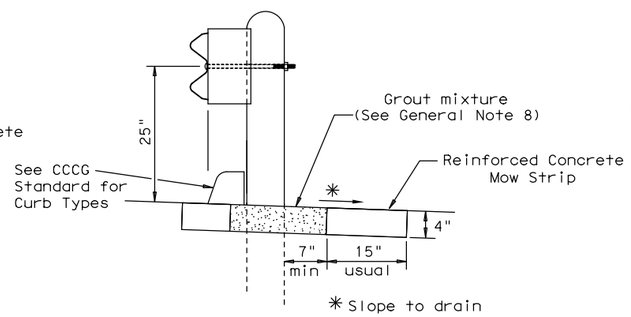
MOW STRIP DETAIL

Reinforced Concrete Mow Strip
with 18" x 18" Square or
18" Dia. minimum leave-out.



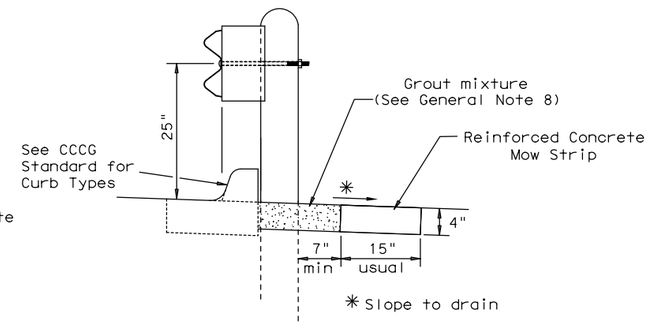
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Note: Site Condition(s)

Site conditions may exist where grading is required for the proper installation of metal guard fence and end treatments.

Approach grading or mow strip may be decreased or eliminated, as directed by the Engineer.

GENERAL NOTES

1. This mow strip design is for use with metal beam guard fence, guard fence transitions, and guard fence end treatments. See applicable GF(31) MBGF or GF(31) Transition Standard sheet for additional information.
2. Mow strips shall be reinforced concrete with (wire mesh or synthetic fiber), as shown on the plans and will be paid for under the pertinent bid item. Reinforced concrete shall be placed in accordance with Item 432, "Riprap." The use of the synthetic fiber in lieu of steel reinforcing is acceptable, provided the fiber producer is on the Department Material Producer List (MPL), maintained by TxDOT, Construction Division.
3. The leave-out behind the post shall be a minimum of 7".
4. Only steel (W6 x 8.5 or W6 x 9.0), or 7 ½" Dia. round wood posts are acceptable for use in the mow strip. See GF(31) Standard for additional details.
5. Other curb placement options may be used. Curbs are not considered part of the mow strip and will be paid for under other pertinent bid item.
6. Thickness of the mow strip will be 4".
7. The limits of payment for reinforced concrete will include leave-outs for the posts.
8. The leave-outs shall be filled with a Grout mixture consisting of: 2719 pounds sand, 188 pounds Type 1 or II cement, and 550 pounds of water per cubic yard, with a 28-day compressive strength of approximately 230 psi or less. Provide grout with a consistency that will flow into and completely fill all voids. Due to auger size, larger leave-out dimensions are acceptable from both an impact performance and maintenance repair standpoint (Suggested Maximum leave-out of 20"). Payment for furnishing and placing the grout mixture will be subsidiary to the pay item of riprap mow strip.

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE (MOW STRIP) TL-3 MASH COMPLIANT

GF(31)MS-19

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		120

DATE: 5/23/2022 10:48:58 AM
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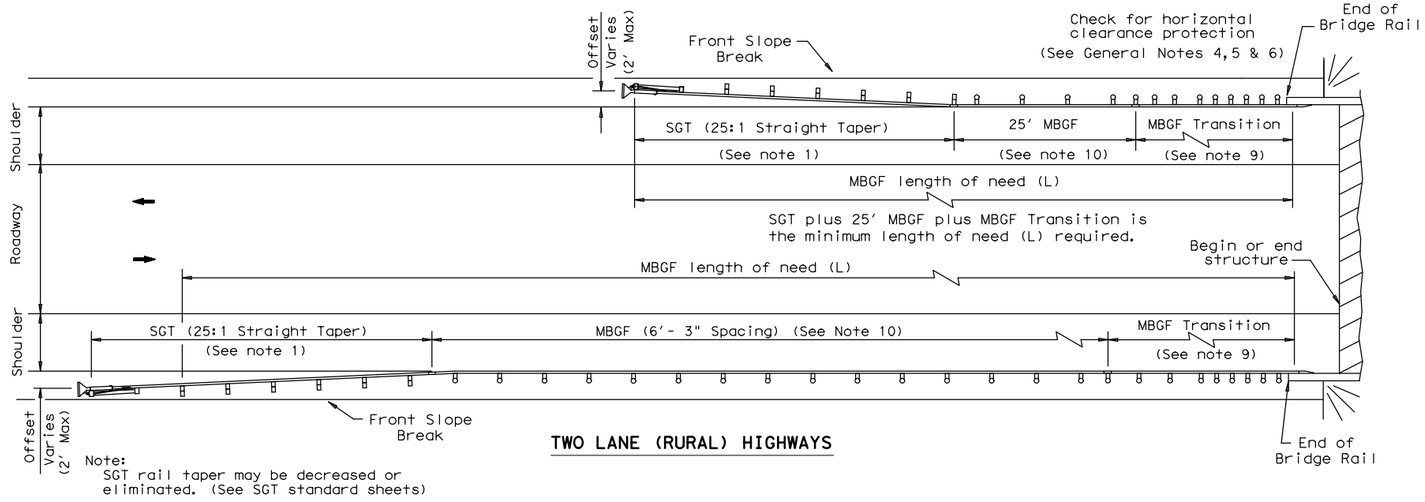
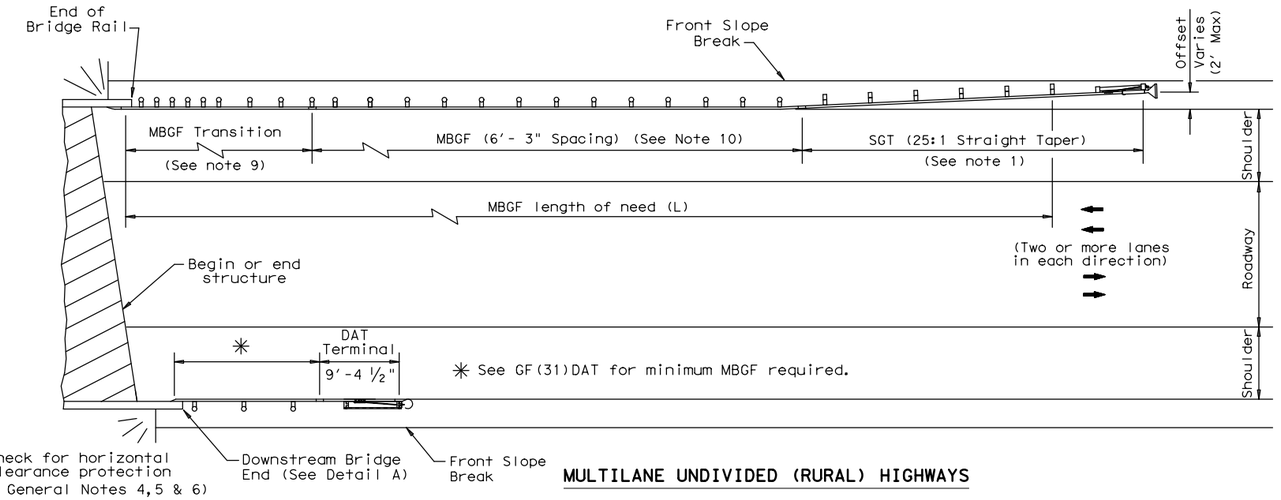
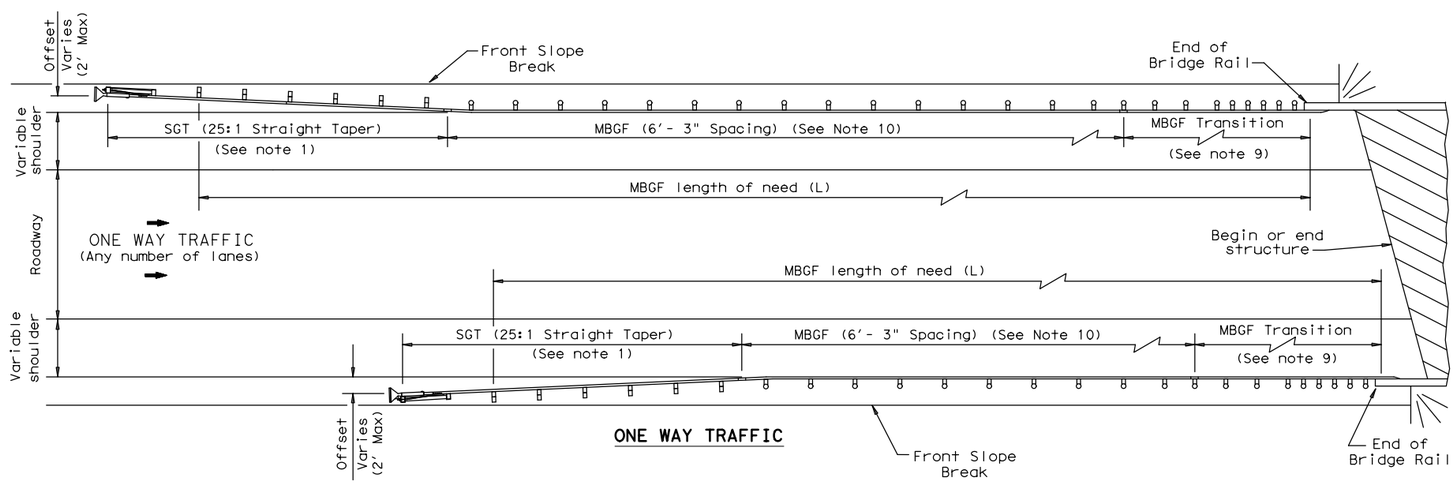


TWO LANE (RURAL) HIGHWAYS

Note:
SGT rail taper may be decreased or eliminated. (See SGT standard sheets)



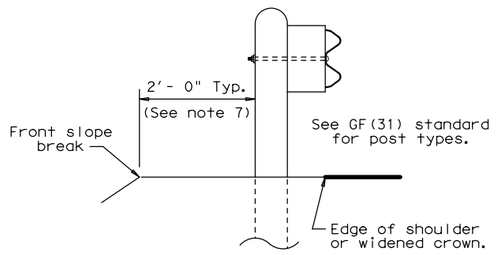
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



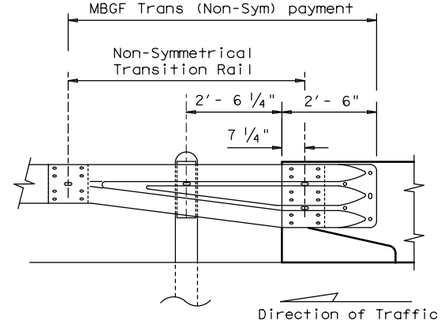
ONE WAY TRAFFIC

GENERAL NOTES

1. For more detail: See GF(31), SGT( )31, GF(31)TR, and GF(31)TL2 standard sheets.
2. Quantities of metal beam guard fence (MBGF) at individual bridge ends are as shown in the plans.
3. Use average daily traffic (ADT) for the current year to determine MBGF length of need in accordance with the Roadway Design Manual unless otherwise specified. Where significant traffic volume growth is anticipated on low volume (0-750 ADT) highways, use length determinations for the higher volume category.
4. MBGF may not be required to shield departure end of bridge unless other obstacles within the horizontal clearance limits or opposing traffic indicate a MBGF consideration.
5. Downstream anchor terminals (DAT) are only for downstream end anchorage use, outside the horizontal clearance area of opposing traffic.
6. Direct connection of MBGF to concrete rails are only for downstream rail connections outside the horizontal clearance area of opposing traffic. (This requires a minimum of three standard line posts plus the DAT terminal, See Detail A)
7. The crown shall be widened to accommodate MBGF. Typically the "front slope" break should be 2'- 0" from the back of the MBGF post. This applies to new construction on new alignment or where existing roadway cross section is to be widened to increase roadway width. This does not apply to rehabilitation work where existing roadway crown width is to be retained (See Typical Cross Section at MBGF).
8. For restrictive bridge widths: The MBGF should be properly transitioned from the existing bridge rail to the adjoining MBGF (See MBGF Transition Standards). Metal beam guard fence at these bridge location(s) shall be flared at the rate of 25:1 or flatter, and be of the length necessary to locate the terminal end at the 2 ft."maximum" offset from the shoulder edge in the approach direction.
9. Transition length and post spacing will vary depending on the transition type. Transition type will be shown elsewhere in the plans.
10. A minimum 25' length of MBGF will be required.



TYPICAL CROSS SECTION AT MBGF



Note:
All rail elements shall be lapped in the direction of adjacent traffic.

DETAIL A

Showing Downstream Rail Attachment

Texas Department of Transportation

Design Division Standard

BRIDGE END DETAILS

(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

BED-14

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
© TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED APRIL 2014 SEE (MEMO 0414)	0014	03	087	IH 35W
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		121

DATE: 5/23/2022
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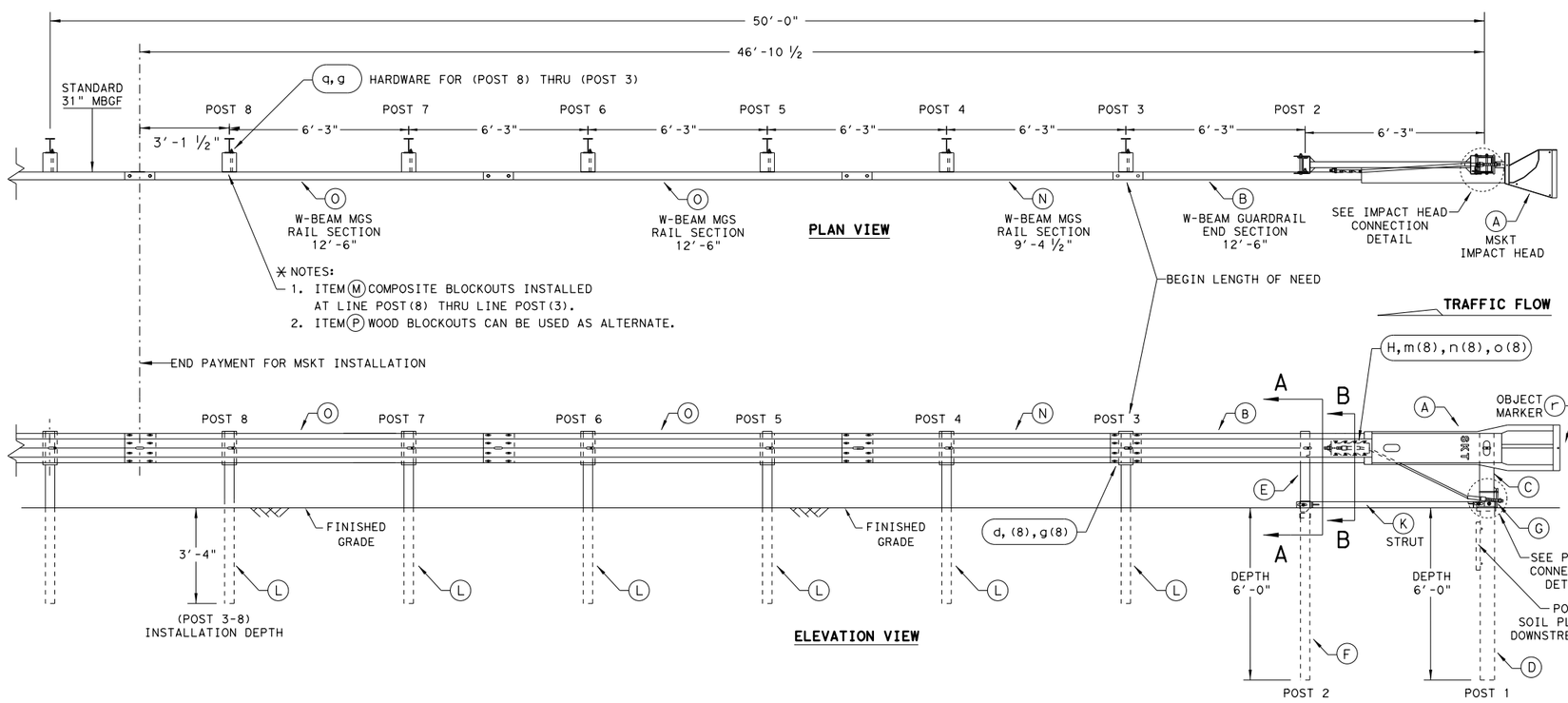


NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.

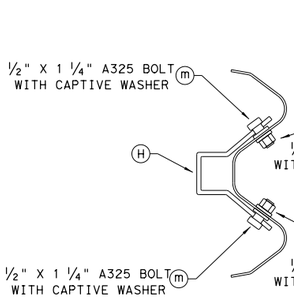
GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: ROAD SYSTEMS, INC. (432)263-2435. 3616 OLD HOWARD COUNTY AIRPORT, BIG SPRING, TX 79720
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE; MSKT END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL (PUBLICATION~062717).
3. APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
4. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
5. HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. SYSTEM SHOWN USING STEEL WIDE FLANGE POSTS WITH COMPOSITE BLOCKOUTS.
7. A COMPOSITE MATERIAL BLOCKOUTS THAT MEETS THE REQUIREMENTS OF DMS-7210, MAY BE SUBSTITUTED FOR BLOCKOUTS OF SIMILAR DIMENSIONS. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
8. IF SOLID ROCK IS ENCOUNTERED IN THE AREA OF (POST 1) AND / OR (POST 2) CONTACT THE MANUFACTURER, & REFER TO THE LATEST ROADWAY MBGF STANDARD FOR INSTALLATION GUIDANCE.
9. POSTS SHALL NOT BE SET IN CONCRETE.
10. SYSTEM MUST BE ATTACHED TO STANDARD 31" MBGF.
11. UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE MSKT SYSTEM BE CURVED.
12. A FLARE RATE OF UP TO 25:1 MAY BE USED TO PREVENT THE TERMINAL HEAD FROM ENCROACHING ON THE SHOULDER. THE FLARE MAY BE DECREASED OR ELIMINATED FOR SPECIFIC INSTALLATIONS, IF DIRECTED BY THE ENGINEER.
13. THE SYSTEM IS SHOWN WITH TWO 12'-6" MBGF PANELS, ONE 25'-0" MBGF PANEL IS ALSO ALLOWED IN THEIR PLACE.
14. A DRIVING CAP WITH A TIMBER OR PLASTIC INSERT SHALL BE USED WHEN DRIVING POSTS 3-8 TO PREVENT DAMAGE TO THE GALVANIZING ON TOP OF THE POST. SPECIAL DRIVING CAP TO BE USED ON LOWER POSTS 1 & 2 TO PREVENT DAMAGE TO THE WELDED PLATES.

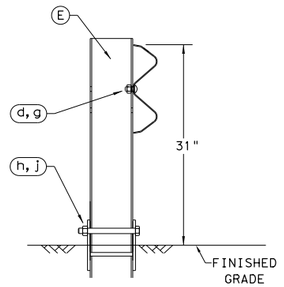
ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	SF1303
C	1	POST 1 - TOP (6" X 6" X 1/8" TUBE)	MTPHP1A
D	1	POST 1 - BOTTOM (6' W6X15)	MTPHP1B
E	1	POST 2 - ASSEMBLY TOP	UHP2A
F	1	POST 2 - ASSEMBLY BOTTOM (6' W6X9)	HP2B
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770
K	1	GROUND STRUT	MS785
L	6	W6x9 OR W6x8.5 STEEL POST	P621
M	6	COMPOSITE BLOCKOUTS	CBSP-14
N	1	W-BEAM MGS RAIL SECTION (9'-4 1/2")	G12025
O	2	W-BEAM MGS RAIL SECTION (12'-6")	G1203A
P	6	WOOD BLOCKOUT 6" X 8" X 14"	P675
Q	1	W-BEAM MGS RAIL SECTION (25'-0")	G1209
		SMALL HARDWARE	
a	2	5/8" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	5/8" WASHER	W0516
c	2	5/8" HEX NUT	N0516
d	25	5/8" Dia. x 1 1/4" SPLICE BOLT (POST 2)	B580122
e	2	5/8" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	5/8" WASHER	W050
g	33	5/8" Dia. H.G.R NUT	N050
h	1	3/4" Dia. x 8 1/2" HEX BOLT (GRD A449)	B340854A
j	1	3/4" Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	1/2" x 1 1/4" A325 BOLT WITH CAPTIVE WASHER	SB12A
n	8	1/2" STRUCTURAL NUTS	N012A
o	8	1 1/16" O.D. x 9/16" I.D. STRUCTURAL WASHERS	W012A
p	1	BEARING PLATE RETAINER TIE	CT-100ST
q	6	5/8" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151

SEE NOTES: ✳

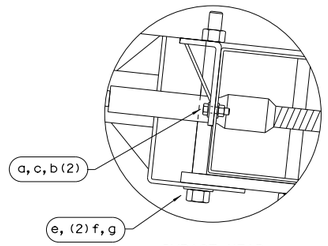
ALTERNATIVE ITEMS NOT SHOWN. ✳✳
✳ ITEM(P) 8" WOOD-BLOCKOUT
✳✳ ITEM(Q) 25'GUARD FENCE PANEL



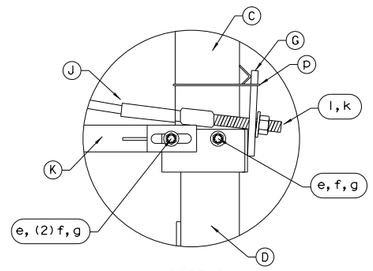
SECTION B-B
ANCHOR BRACKET



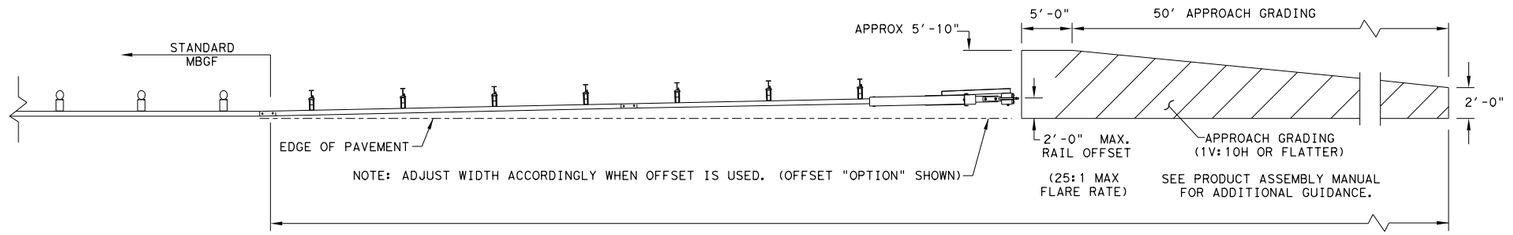
POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL



APPROACH GRADING AT GUARDRAIL END TREATMENTS

TRAFFIC FLOW

NOTE: TXDOT GENERIC APPROACH GRADING LAYOUT USED FOR ALL TANGENT TYPE END TREATMENTS.

NOTE: THIS STANDARD IS A BASIC REPRESENTATION OF THE MSKT END TERMINAL, IT IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

Texas Department of Transportation

Design Division Standard

SINGLE GUARDRAIL TERMINAL
MSKT-MASH-TL-3
SGT(12S)31-18

FILE: sgt12s3118.dgn	DN:TxDOT	CK:KM	DW:VP		CK:CL
© TxDOT: APRIL 2018	CONT	SECT	JOB		HIGHWAY
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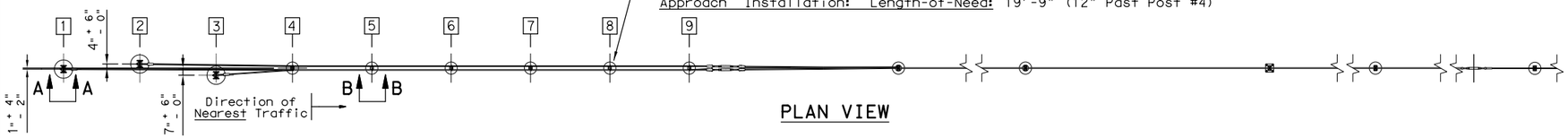
	DIST	COUNTY			SHEET NO.
	FTW	JOHNSON			122

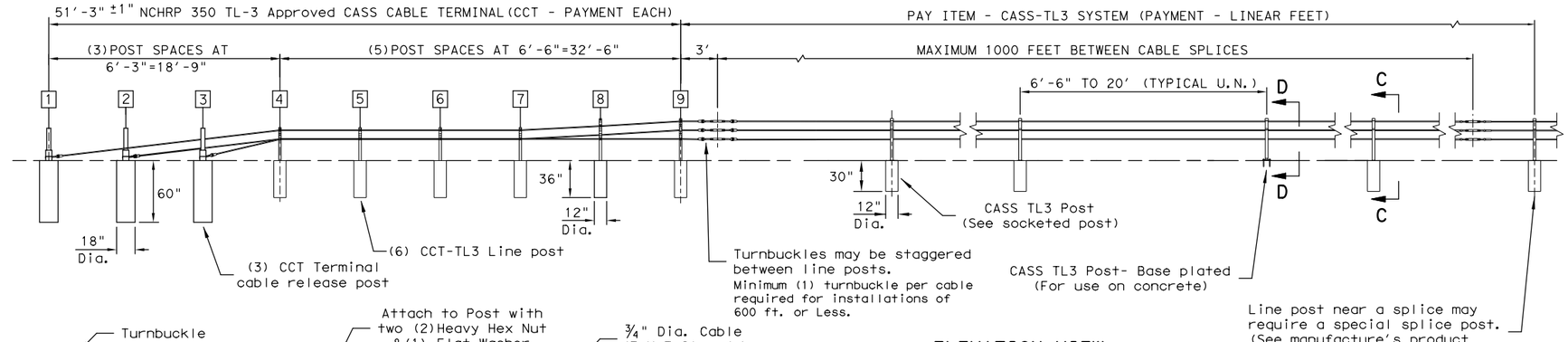
DATE: 5/23/2022 10:49:11 AM
FILE: c:\pwworking\aecom_ds20_na_2019\subash.paudel@aecom.com\d0119094\cass-tl3\314.dgn

Preferred Installation: Locate post #2 away from nearest traffic.
System has been succesfully tested with opposite installation.

Length-of-Need Cass Cable Terminal (CCT):
Departure Installation: Length-of-Need: 44'-9" (At Post #8)
Approach Installation: Length-of-Need: 19'-9" (12" Past Post #4)

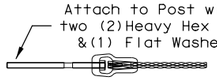


PLAN VIEW

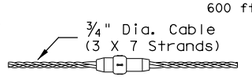


ELEVATION VIEW
(TYPICAL LAY-OUT)

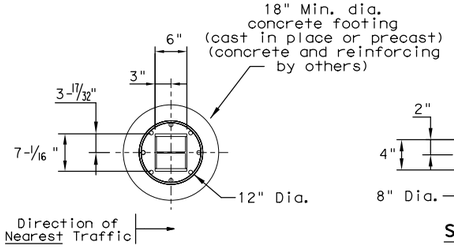
CABLE SPLICE WITH TURNBUCKLE
(OPEN BODY STYLE)



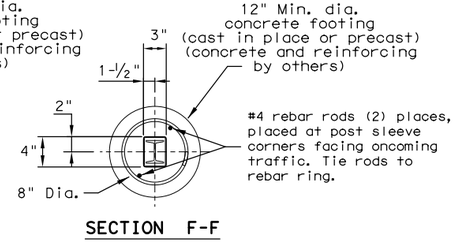
CABLE STUD ASSEMBLY



TORPEDO CABLE SPLICE



SECTION E-E



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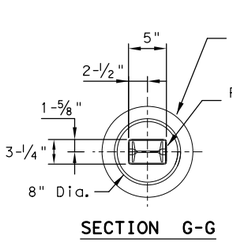

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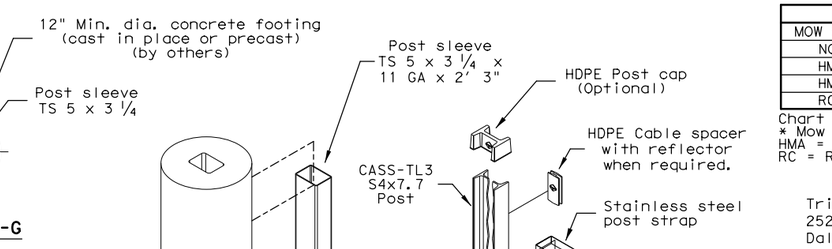
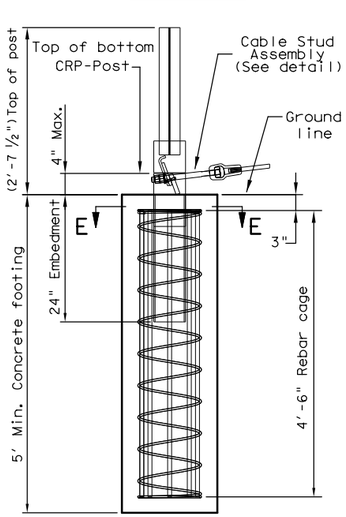
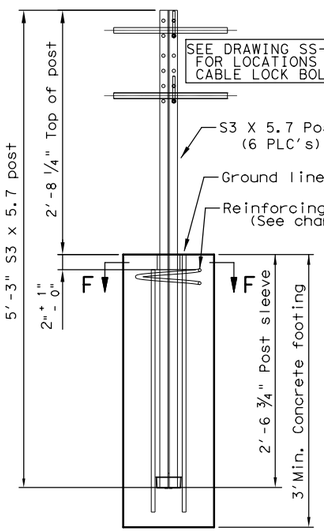


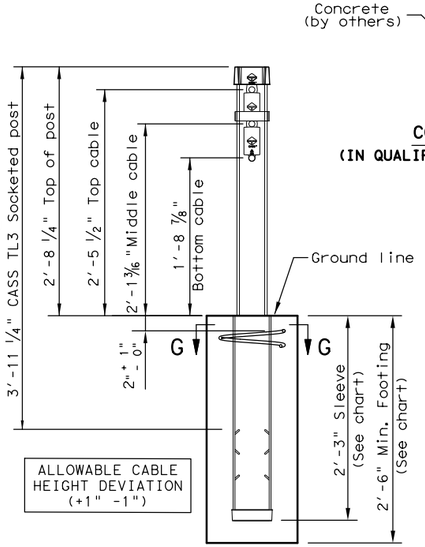
CONCRETE FOOTING
(IN QUALIFYING MOW STRIP SEE CHART)



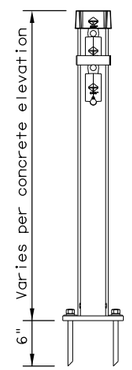
VIEW A-A
(CABLE RELEASE POST 1-3)



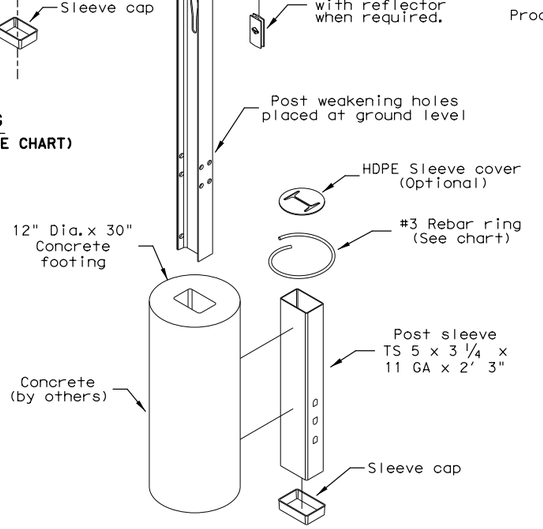
VIEW B-B
(TERMINAL LINE POST 4-7)



SECTION C-C
(SOCKETED POST)



SECTION D-D
(BASE PLATED POST)



STANDARD POST & CONCRETE FOOTING
(SOCKETED POST)

GENERAL NOTES

1. This drawing is a general overview of CASS TL-3 Barrier System. See SS-730 (latest version) for specific details of CASS cable terminal (CCT) and cable safety system (CASS) requirements, proper installation, options and specification.
2. CASS is designed for bi-directional traffic flows and can be installed on either side of the median. Contact Trinity (800-527-6050) or consult the design, installation, or repair manual(s) for additional information.
3. All concrete for CASS footings shall be TxDOT class A. If class A or stronger concrete is utilized for the mowstrip, please see chart below for allowable footing depth and sleeve deviations.
4. All posts shall be socketed unless otherwise specified. All cables shall be pre-stretched unless otherwise specified.
5. For payment see Special Specification "Cable Barrier System".
6. CASS TL-3 shall be installed on shoulders or medians with slopes of 6:1 or flatter without obstructions, depressions, etc. That may significantly affect the stability of an errant vehicle. Grading of site and/or appropriate fill materials may be required. The designer/installer shall "Flatten" or "Round" various topographical inconsistencies that could interfere with the ability of the installer to consistently maintain the design height (in relation to the terrain) of the cables. Please consult manual(s) and / or TxDOT Memo(s) for installations in "Ditch Sections".
7. CASS TL-3 post spacing may be modified to avoid obstacles that conflict with the installation of CASS TL-3 line posts or to reduce deflection on radiuses. No post space can exceed the maximum post TxDOT space limit of 20'. Reducing or increasing post spacing affects deflection. CASS TL-3 may be laterally transferred at a rate not to exceed 30:1.
8. Post foundations may be drilled through existing pavement. Please see line post foundation chart for minimum footing requirements in various applications.
9. For aesthetic purposes Trinity recommends all sleeves, driven posts, and lower cable release posts to be installed reasonably plumb (approximately ⅛" per foot).
10. CASS TL-3 shall be installed in well-drained, compacted, NCHRP Report 350 Standard soil. If soil does not meet this classification, if solid rock/concrete is encountered below grade or if soil is susceptable to severe freeze/thaw cycles, please contact Trinity about alternate footing design(s). Trinity suggests the use of "Mow strips" for erosion prevention and ease of maintenance / installation.
11. See the Texas MUTCD for proper "Barrier" Delineation.

MOW STRIP DETAIL*			CONCRETE FOOTING CHART		
MOW STRIP	DEPTH	WIDTH	FOOTING	TUBE SLEEVE	REBAR RING
NONE			30" Min.	27" Min.	YES
HMA	6" Min.	3' Min.	27" Min.	15" Min.	NO
HMA	8" Min.	3' Min.	24" Min.	15" Min.	NO
RC	3" Min.	3' Min.	24" Min.	15" Min.	NO

Chart does not apply to Terminal Posts 1 thru 9.
* Mow strip or pavement.
HMA = Hot Mix Asphalt (Not Recycled Asphalt Pavement).
RC = Reinforced Concrete (TxDOT Class A Minimum).

CABLE TENSION CHART	
FAHRENHEIT	PRE-STRETCHED
DEGREES	LB / FORCE
-10	7300
0	7000
10	6600
20	6300
30	6000
40	5600
50	5300
60	5000
70	4600
80	4300
90	4000
100	3600
110	3300
120	3000
130	2700
140	2500
150	2300

Allowable deviation from chart in tangent sections: +800, -200 pounds/force. Cable tension readings are typically higher in curved cable sections.

Trinity Highway Products, LLC.
2525 Stemmons Freeway
Dallas, TX 75207
Phone: (800) 644-7976

Product.INFO@TRIN.NET

Texas Department of Transportation

Design Division Standard

TRINITY CABLE SAFETY SYSTEM (TL-3)

CASS(TL3)-14

FILE: cass-tl314.dgn	DN: TxDOT	CK: RM	DW: VP	CK:
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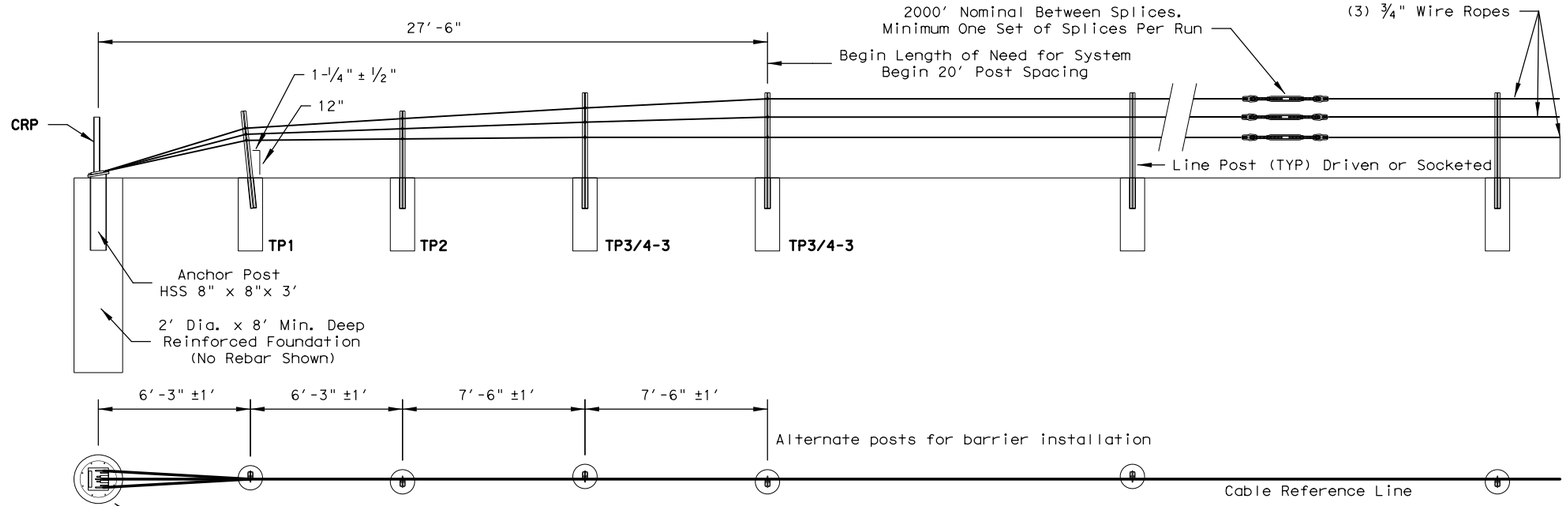
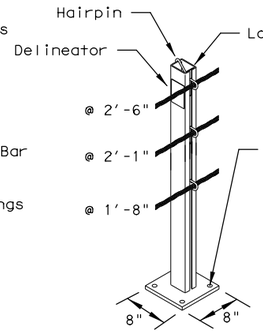
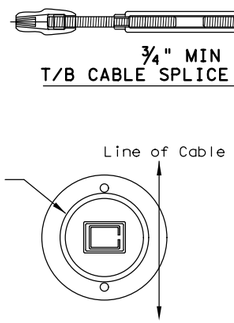
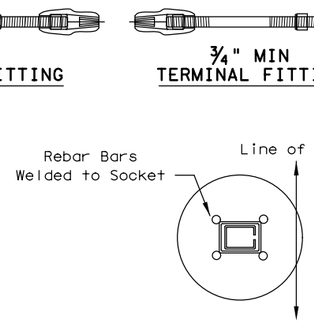




LINE POST
(BASE-PLATED OPTION)
Low-Fill Box Culvert Less than 15" Fill



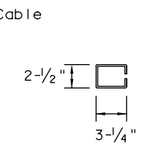
SECTION A



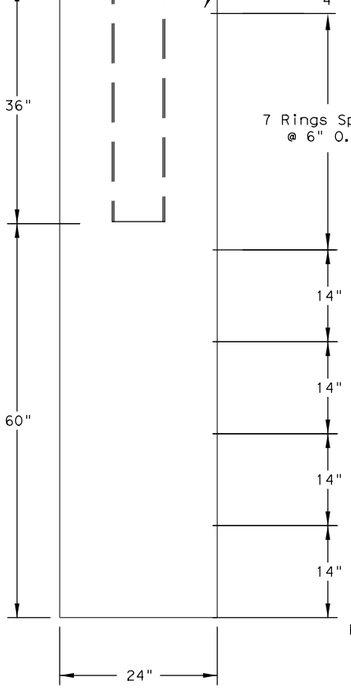
SECTION B

¾" MIN
T/B CABLE SPLICE FITTING

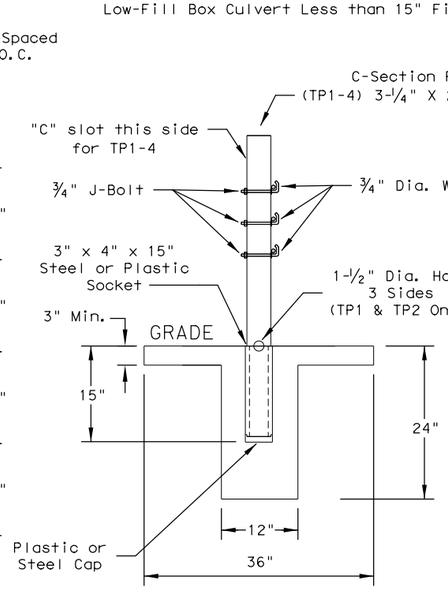
¾" MIN
TERMINAL FITTING



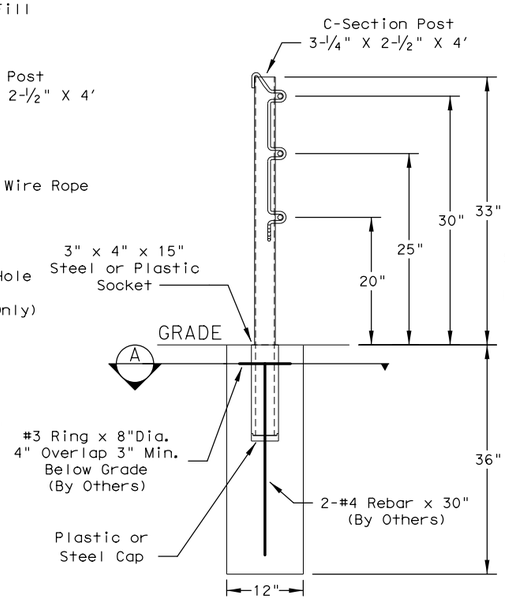
C-SECTION POST



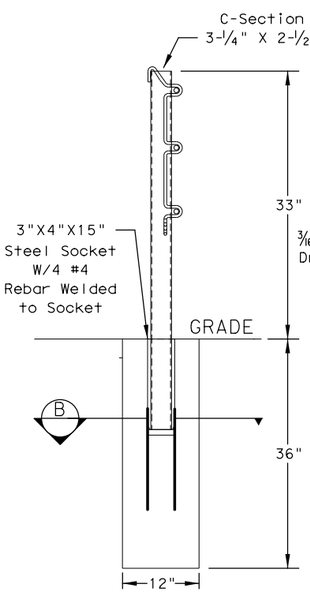
CABLE RELEASE AND ANCHOR POST



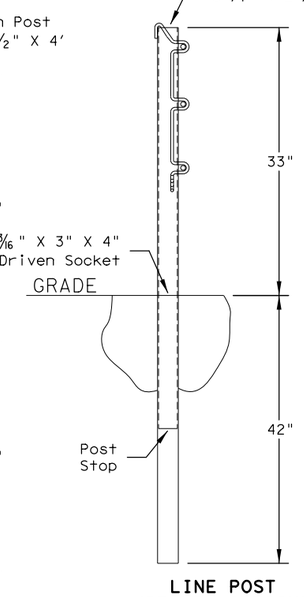
TERMINAL POST
(SHOWN WITH CONCRETE MOWSTRIP)
(Shown with Tube Plate Option)
(See Note 9)



LINE POST SOCKETED
(Shown with Rebar Ring/Bars Socket Option)
(See Note 9)



LINE POST SOCKETED
(Shown with Welded Rebar Socket Option)
(See Note 9)



LINE POST
(DRIVEN OPTION)
(Shown with Driven
Socket Option)
(See Note 9)

GENERAL NOTES

1. For additional information contact Gibraltar, Inc. at 1-800-495-8957, 830-798-5444, or see the manufacturer's product manual.
2. All concrete shall be CLASS A.
3. The Cable Barrier System shall be installed on shoulders or on medians with slopes of 6:1 or flatter.
4. The Cable Barrier System is accepted by the FHWA Test Level - 3.
5. See the Texas MUTCD for proper "Barrier" delineation.
6. Rock Clause: Where solid rock is encountered:
   A. For socketed post, continue digging 12" diameter, 15" deep into rock or the required plan depth, whichever comes first.
   B. For driven post, core drill a 4" diameter hole 18" deep into rock or the required plan depth, whichever comes first.
   C. For Anchor post, continue digging 24" diameter, 30" deep into rock or the required plan depth, whichever comes first.
7. Tolerances:
   * LP = 3" out of plumb, at top
   * Cable height = 1"
   * Anchor Post = 5" off of Cable Reference Line
8. The Gibraltar cable barrier system shall be installed in NCHRP Report 350 standard compacted soil. Soil must be well drained.
9. All non-welded rebar by others.
10. Minimum recommended line post foundation.
    A. Without mowstrip, 36" Deep x 12" diameter foundations with #3 rebar ring x 8" diameter with two #4 rebar vertical bars 30" long
    B. With 4" minimum depth hot mix asphalt, 30" deep x 12" diameter foundations with #3 rebar ring x 8" diameter with two #4 rebar vertical bars 30" long.
    C. With 3" minimum depth concrete mowstrip, 24" deep x 12" diameter foundations. (No rebar required)
    D. Direct drive post 42" deep.

CABLE TENSION CHART*	
-10 °F	8000
0 °F	7600
10 °F	7200
20 °F	6800
30 °F	6400
40 °F	6000
50 °F	5600
60 °F	5200
70 °F	4800
80 °F	4400
90 °F	4000
100 °F	3600
110 °F	3200

DEFLECTION	
Deflection	Post Spacing
8'-0"	20 FT
7'-0"	12 FT
6'-8"	10 FT

* Allowable Deviation from Chart +/- 10%

Texas Department of Transportation — Design Division Standard

GIBRALTAR
CABLE BARRIER SYSTEM
(TL-3)

GBRLTR(TL3)-14

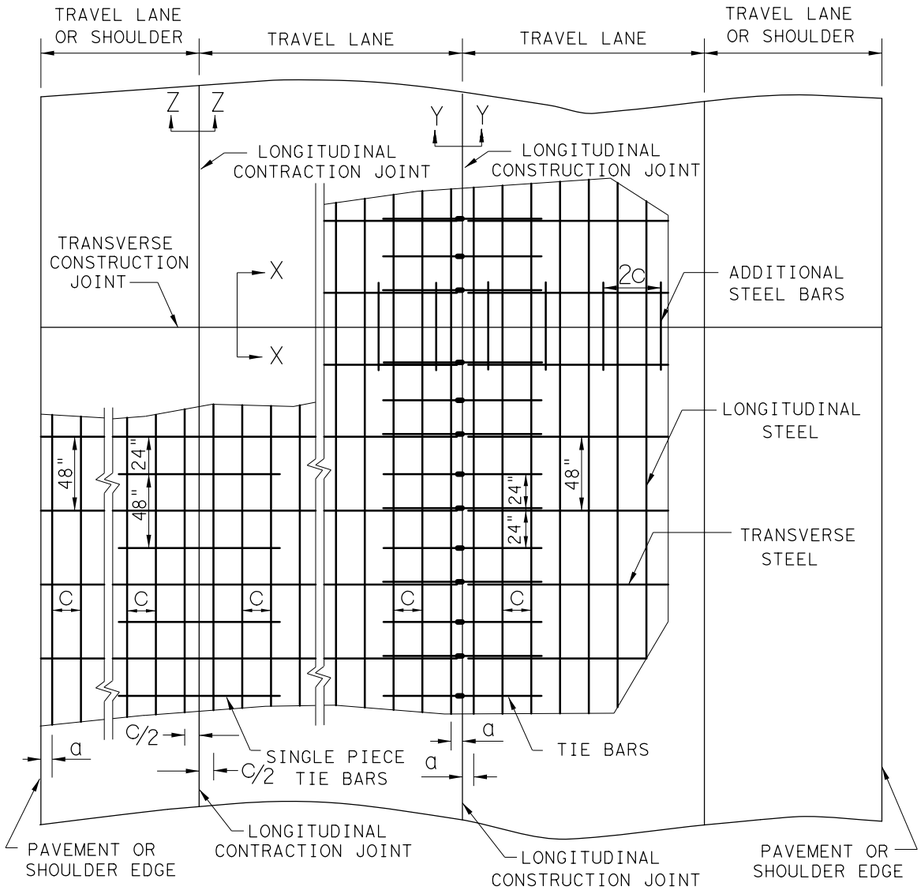
FILE: gbrltrtl314.dgn	DN: TxDOT	CK: RM	DW: VP	CK:
© TxDOT: March 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	03	087	IH 35W
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		124

DATE: 5/23/2022 10:49:24 AM
FILE: c:\pwworking\aecom_ds20_na_2019\subash.paudel@aecom.com\d0119094\crcp120.dgn

GENERAL NOTES

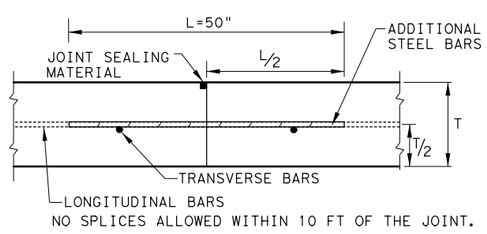
TABLE NO. 1 LONGITUDINAL STEEL					
SLAB THICKNESS AND BAR SIZE		REGULAR STEEL BARS	FIRST SPACING AT EDGE OR JOINT	ADDITIONAL STEEL BARS AT TRANSVERSE CONSTRUCTION JOINT (SECTION X-X)	
T (IN.)	BAR SIZE	SPACING C (IN.)	SPACING a (IN.)	SPACING 2 X C (IN.)	LENGTH L (IN.)
7.0	#5	6.5	3 TO 4	13	50
7.5	#5	6.0	3 TO 4	12	50
8.0	#6	9.0	3 TO 4	18	50
8.5	#6	8.5	3 TO 4	17	50
9.0	#6	8.0	3 TO 4	16	50
9.5	#6	7.5	3 TO 4	15	50
10.0	#6	7.0	3 TO 4	14	50
10.5	#6	6.75	3 TO 4	13.5	50
11.0	#6	6.5	3 TO 4	13	50
11.5	#6	6.25	3 TO 4	12.5	50
12.0	#6	6.0	3 TO 4	12	50
12.5	#6	5.75	3 TO 4	11.5	50
13.0	#6	5.5	3 TO 4	11	50

TABLE NO. 2 TRANSVERSE STEEL AND TIE BARS						
SLAB THICKNESS (IN.)	TRANSVERSE STEEL		TIE BARS AT LONGITUDINAL CONTRACTION JOINT (SECTION Z-Z)		TIE BARS AT LONGITUDINAL CONSTRUCTION JOINT (SECTION Y-Y)	
	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
7.0 - 7.5	#5	48	#5	48	#5	24
8.0 - 13.0	#5	48	#6	48	#6	24



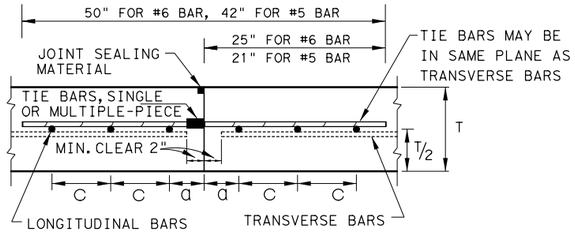
TYPICAL PAVEMENT LAYOUT

PLAN VIEW (NOT TO SCALE)



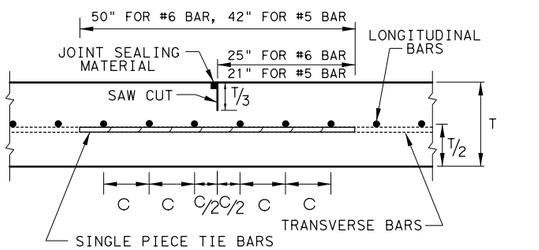
TRANSVERSE CONSTRUCTION JOINT

SECTION X - X



LONGITUDINAL CONSTRUCTION JOINT

SECTION Y - Y



LONGITUDINAL CONTRACTION JOINT

SECTION Z - Z

SHEET 1 OF 2

Texas Department of Transportation

Design Division Standard

CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

ONE LAYER STEEL BAR PLACEMENT T - 7 to 13 INCHES

CRCP(1)-20

FILE: crcp120.dgn	DN: TxDOT	CK: KM	DW: AN	CK: VP
© TxDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 10/10/2011 ADD GN #12 04/09/2013 REMOVE 6" AND 6.5" ADD CTE REQUIREMENTS 05/05/2017 CoTE AS RATED 4.3	0014	03	087	IH 35W
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		125

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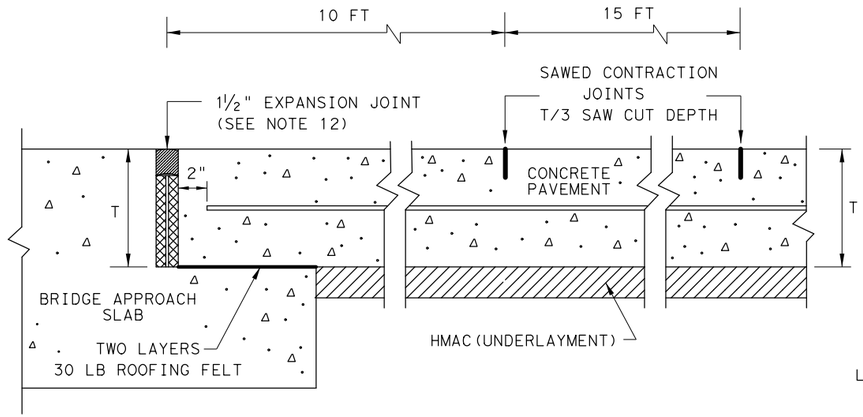
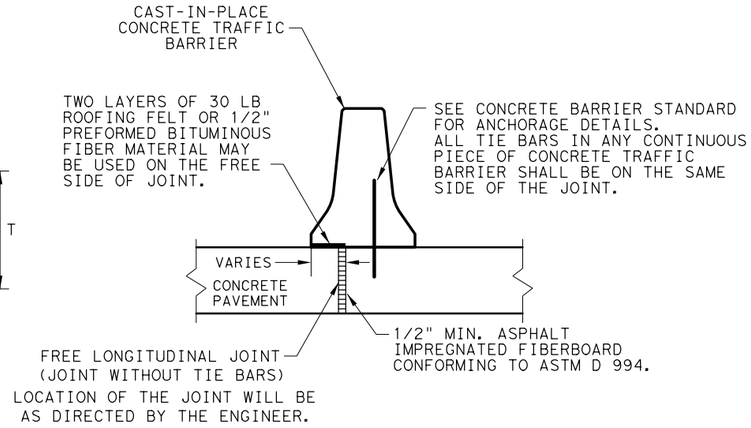


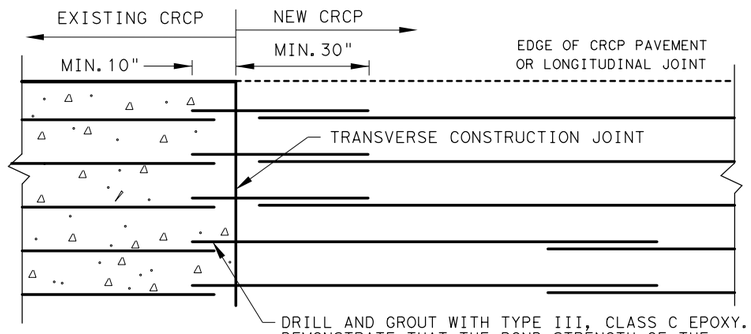
TRANSVERSE EXPANSION JOINT DETAIL
AT BRIDGE APPROACH



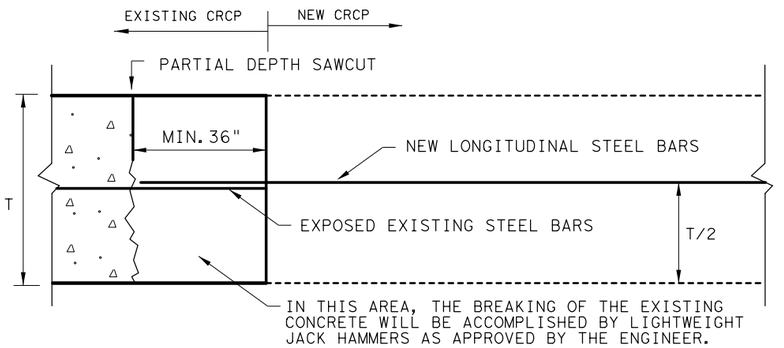
FREE LONGITUDINAL JOINT DETAIL

STAGGER THE LAP LOCATIONS SO THAT NO MORE THAN 1/3 OF THE LONGITUDINAL STEEL IS SPLICED IN ANY GIVEN 12-FT. WIDTH AND 2-FT. LENGTH OF THE PAVEMENT. ANY OTHER LAP CONFIGURATION MEETING THIS REQUIREMENT WILL BE ALLOWED.

EXAMPLES OF LAP CONFIGURATION
PLAN VIEW (NOT TO SCALE)

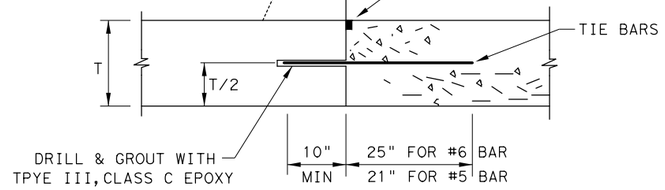


OPTION A: DRILL AND EPOXY
PLAN VIEW (NOT TO SCALE)



OPTION B: BREAKBACK AND LAP

TRANSVERSE TIE JOINT DETAIL
EXISTING CRCP TO NEW CRCP



1. BEFORE WIDENING WORK, DEMONSTRATE THAT THE BOND STRENGTH OF THE EPOXY-GROUTED TIE BARS MEETS THE REQUIRMENTS OF PULL-OUT TEST SPECIFIED IN ITEM 361.
2. SPACE TIE BARS AT 24" SPACING. USE #6 TIE BARS FOR 8" AND THICKER SLABS, USE #5 TIE BARS FOR LESS THAN 8" THICK SLABS.

LONGITUDINAL WIDENING JOINT DETAIL

Texas Department of Transportation — Design Division Standard

CONTINUOUSLY REINFORCED CONCRETE PAVEMENT
ONE LAYER STEEL BAR PLACEMENT
T - 7 to 13 INCHES
CRCP(1)-20

FILE: crcp120.dgn	DN: TxDOT	CK: KM	DW: AN	CK: VP
© TxDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 03/16/2020 REMOVED TABLE 1A	0014	03	087	IH 35W
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		126

DATE: 5/23/2022
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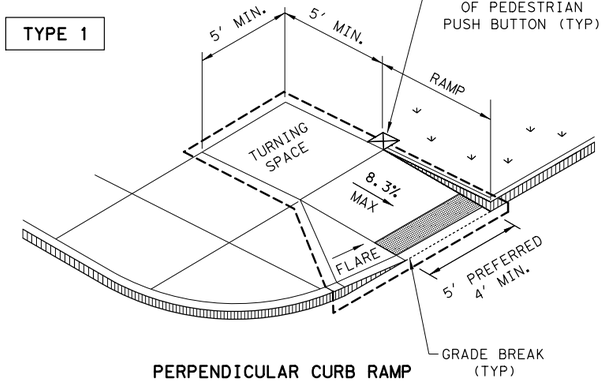
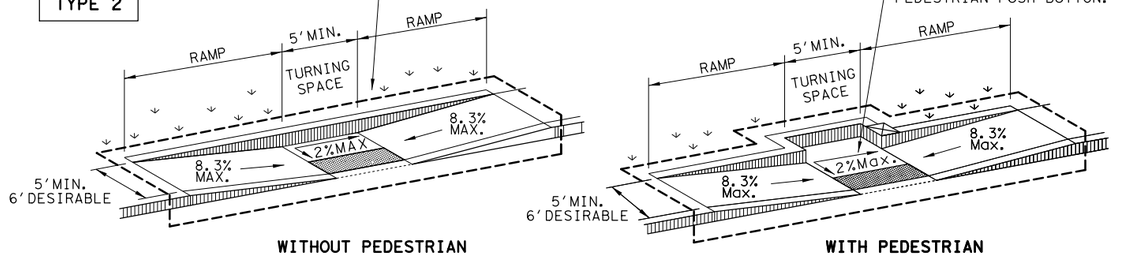
TYPE 1



PERPENDICULAR CURB RAMP

TYPE 2

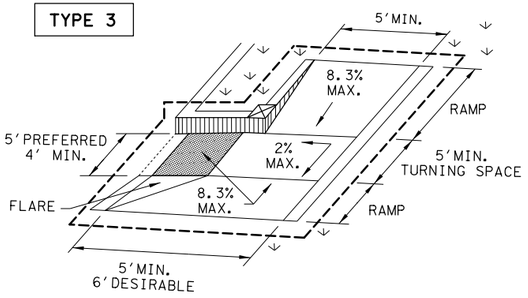


WITHOUT PEDESTRIAN PUSH BUTTON

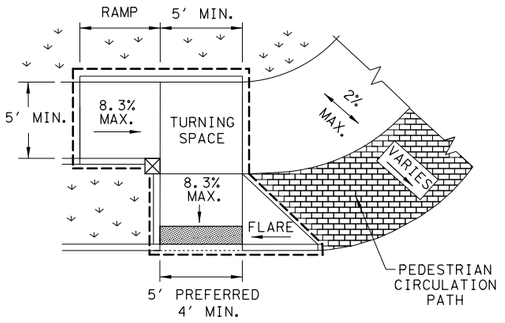
WITH PEDESTRIAN PUSH BUTTON

PARALLEL CURB RAMP

TYPE 3

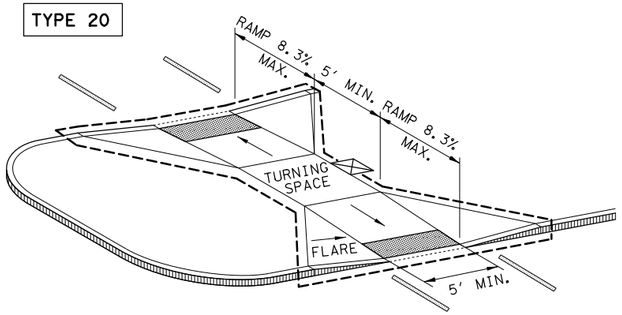


TYPE 6



COMBINATION CURB RAMPS

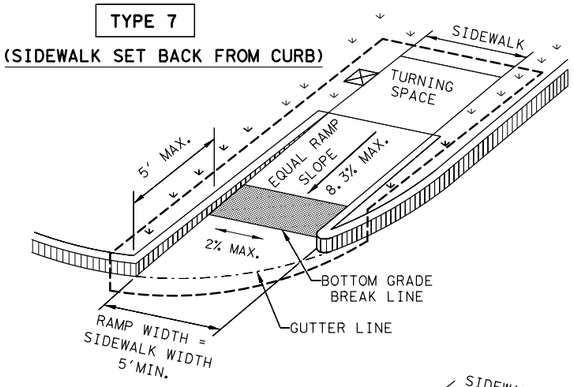
TYPE 20



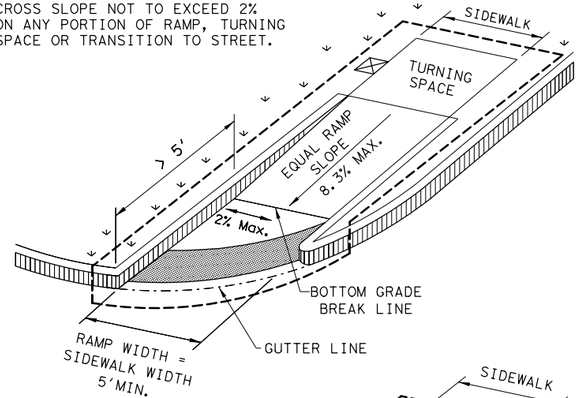
CURB RAMPS AT MEDIAN ISLANDS

TYPE 7

(SIDEWALK SET BACK FROM CURB)

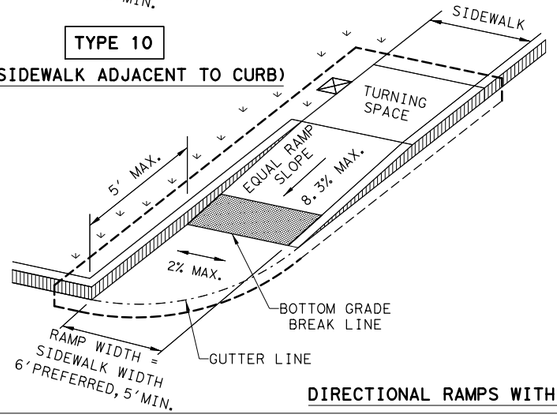


CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.



TYPE 10

(SIDEWALK ADJACENT TO CURB)



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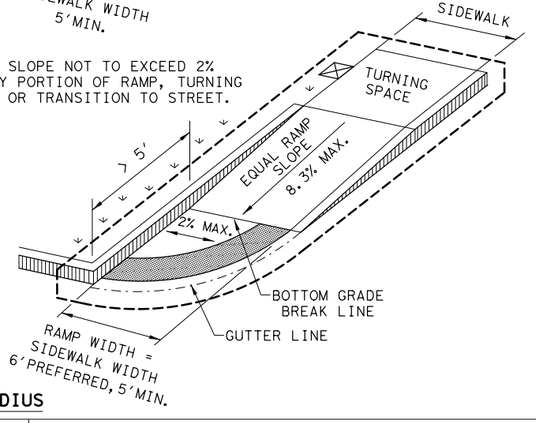
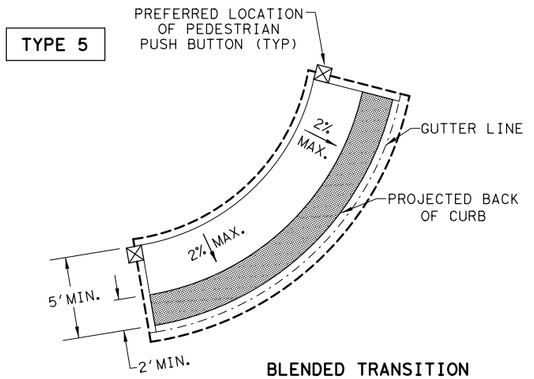


DIRECTIONAL RAMPS WITHIN RADIUS

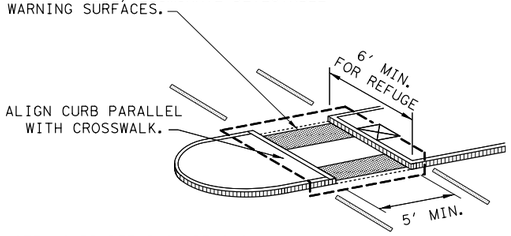
TYPE 5



BLENDED TRANSITION
(FLUSH LANDING)

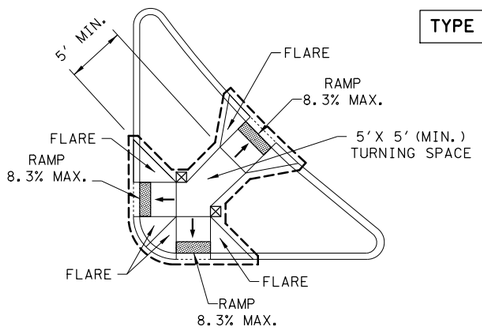
TYPE 21

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.



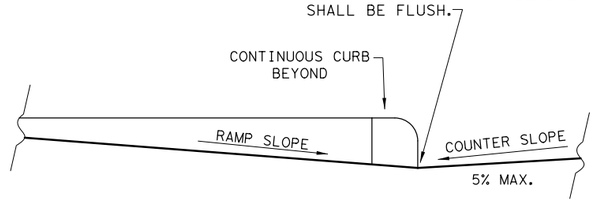
NOTE: CURB DETAILS ARE SHOWN ELSEWHERE IN THE PLANS.

TYPE 22



COMBINATION ISLAND RAMPS

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

SHEET 1 OF 4

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	0014	03	087	IH 35W
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		127

DATE: 5/23/2022
FILE: c:\pwworking\aecom_ds20_na_2019\subash.paude@aecom.com\d0119094\ped18.dgn

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

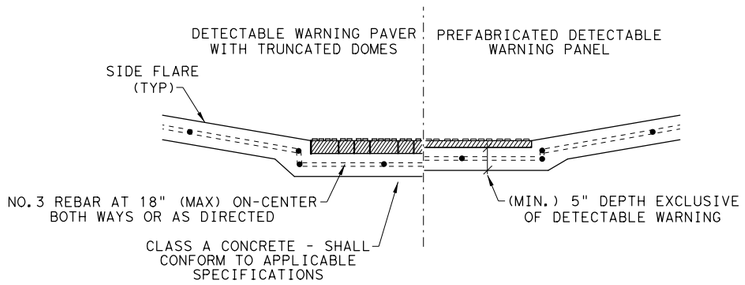
19. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with PROWAG. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material 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.

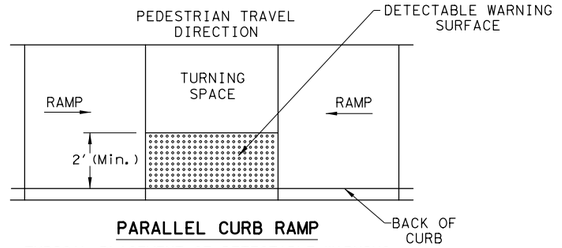
SIDEWALKS

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.

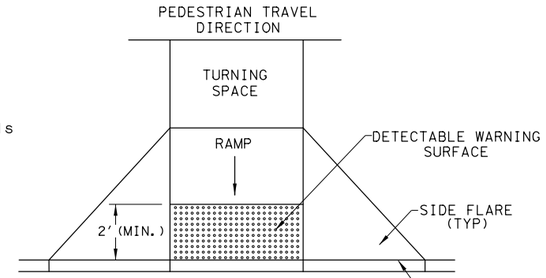


SECTION VIEW DETAIL
CURB RAMP AT DETECTIBLE WARNINGS

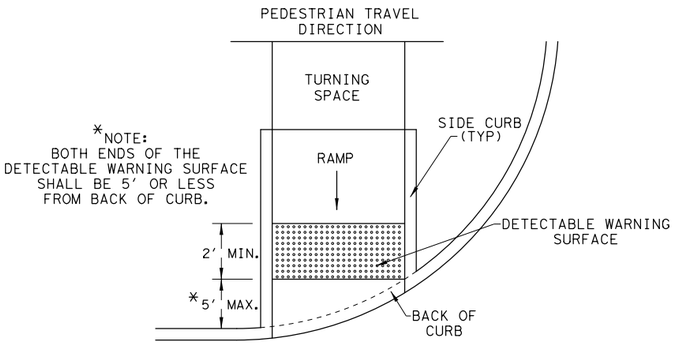
DETECTABLE WARNING SURFACE DETAILS



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

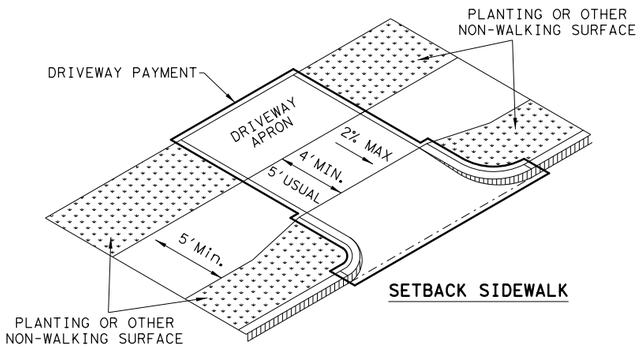
PEDESTRIAN FACILITIES CURB RAMPS

PED-18

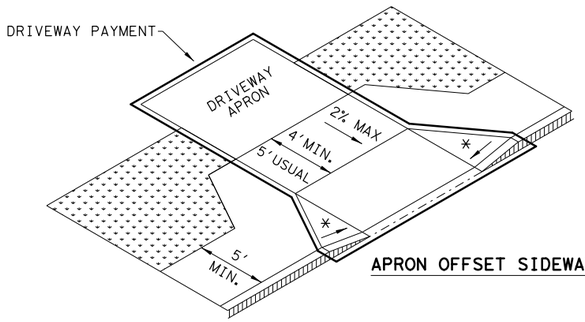
FILE: ped18	DN: TxDOT		DW: VP	CK: KM	CK: PK & JG	
© TxDOT: MARCH, 2002	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0014	03	087		IH 35W	
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY			SHEET NO.	
	FTW	JOHNSON			128	

DATE: 5/23/2022
FILE: c:\pwworking\aecom_ds20_na_2019\subash.paude@aecom.com\d0119094\ped18.dgn

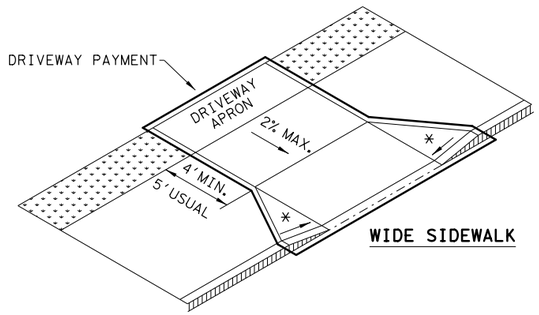
SIDEWALK TREATMENT AT DRIVEWAYS



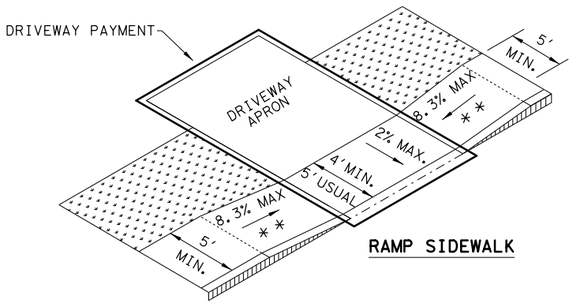
SETBACK SIDEWALK



APRON OFFSET SIDEWALK



WIDE SIDEWALK

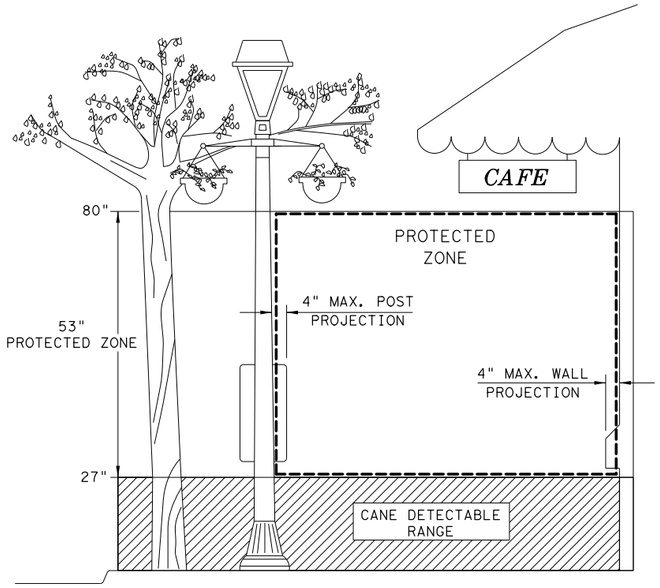


RAMP SIDEWALK

NOTES:

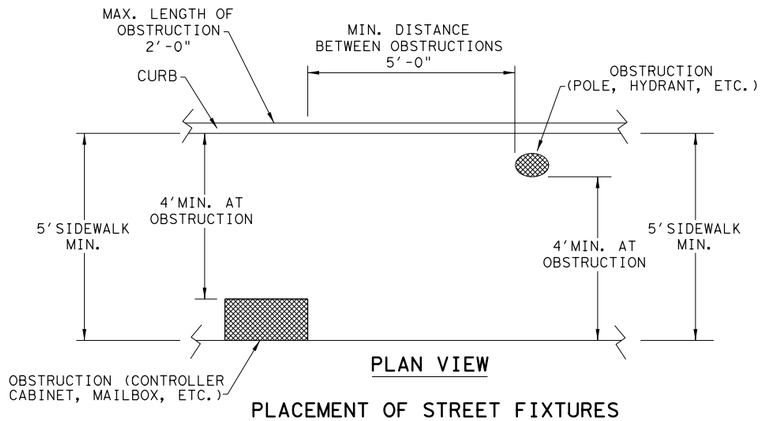
* WHERE DRIVEWAYS CROSS THE PEDESTRIAN ROUTE, SIDES SHALL BE FLARED AT 10% MAX SLOPE.

* * 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

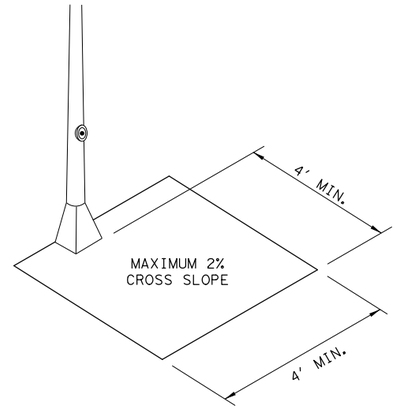
NOTE: IN PEDESTRIAN CIRCULATION AREA, MAXIMUM 4" PROJECTION FOR POST OR WALL MOUNTED OBJECTS BETWEEN 27" AND 80" ABOVE THE SURFACE.



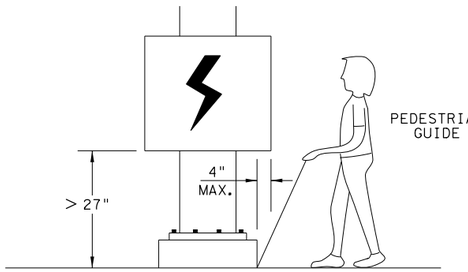
PLAN VIEW

PLACEMENT OF STREET FIXTURES

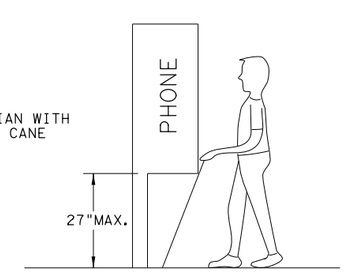
NOTE: ITEMS NOT INTENDED FOR PUBLIC USE. MINIMUM 4' X 4' CLEAR GROUND SPACE REQUIRED AT PUBLIC USE FIXTURES.



CLEAR SPACE ADJACENT TO PEDESTRIAN PUSH BUTTON



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

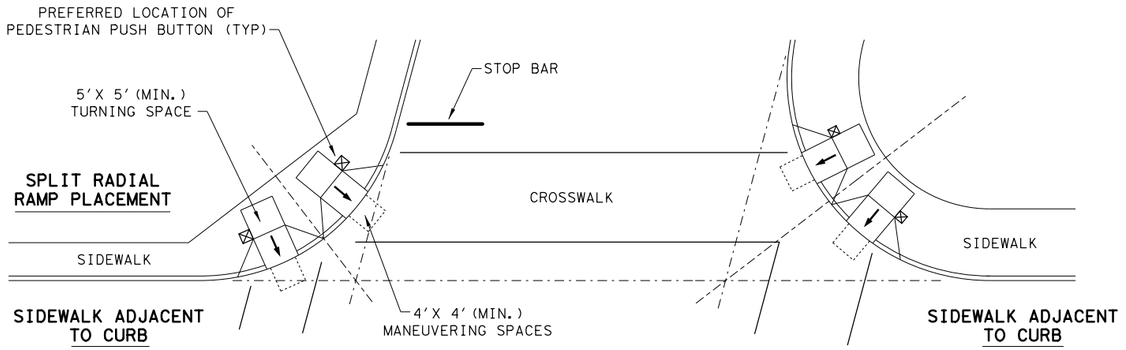
PED-18

FILE: ped18	DN: TxDOT		DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB		HIGHWAY
REVISIONS	0014	03	087		IH 35W
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY			SHEET NO.
	FTW	JOHNSON			129

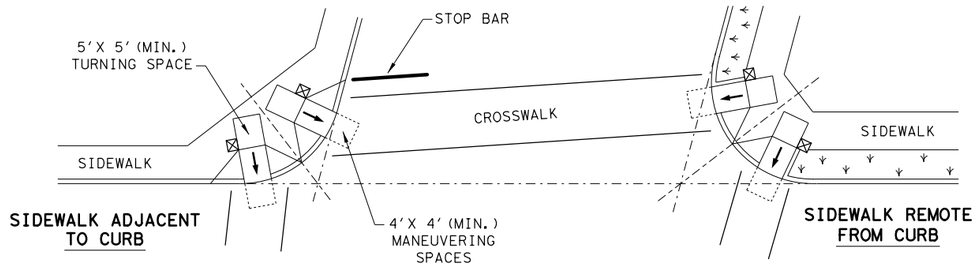
DATE: 5/23/2022
FILE: c:\pwworking\aecom_ds20_na_2019\subash.paudel@aecom.com\d0119094\ped18.dgn

TYPICAL CROSSING LAYOUTS

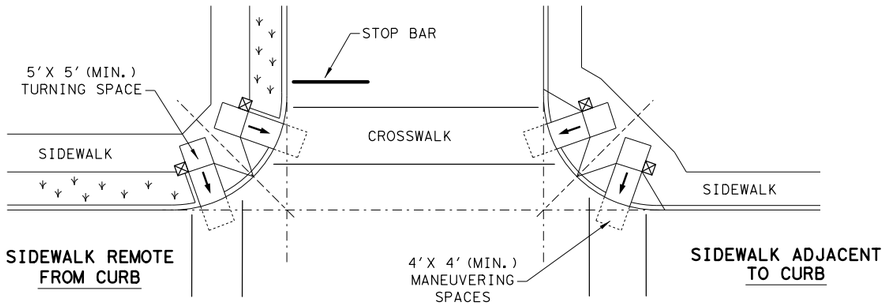
SEE SHEET 1 OF 4 FOR DETAILS AND DIMENSIONS



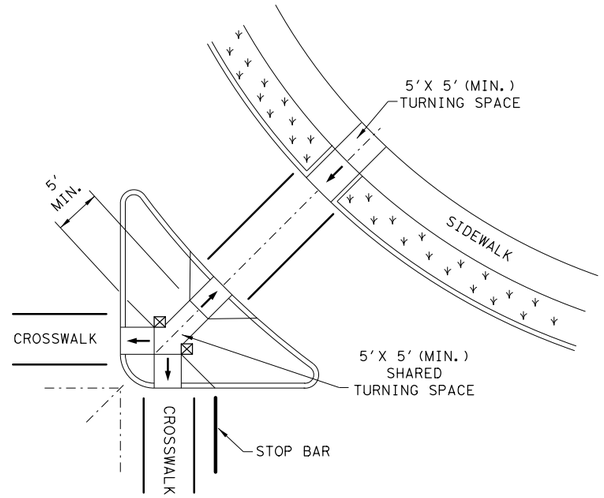
SKEWED INTERSECTION WITH "LARGE" RADIUS



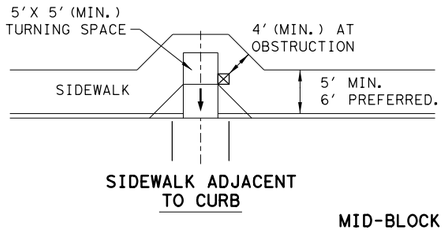
SKEWED INTERSECTION WITH "SMALL" RADIUS



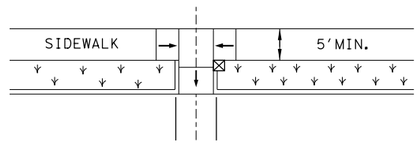
NORMAL INTERSECTION WITH "SMALL" RADIUS



AT INTERSECTION
W/FREE RIGHT TURN & ISLAND



SIDEWALK ADJACENT TO CURB



SIDEWALK REMOTE FROM CURB

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	0014	03	087		IH 35W
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY			SHEET NO.
	FTW	JOHNSON			130

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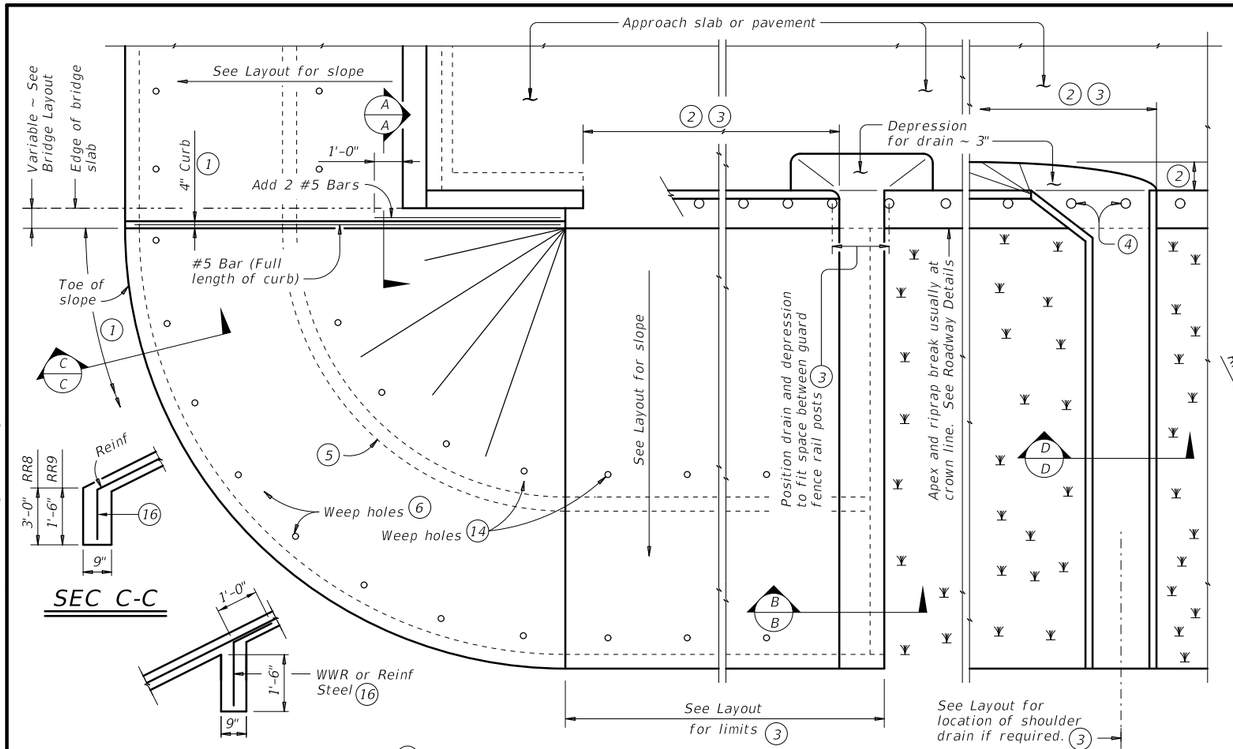
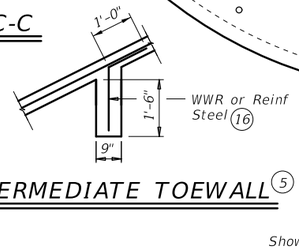
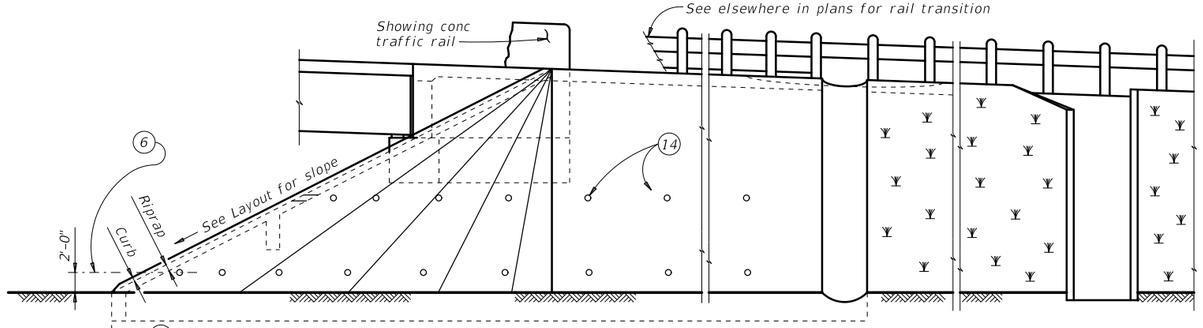


PLAN

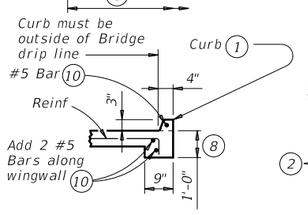
SEC C-C



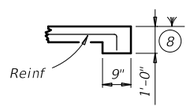
INTERMEDIATE TOEWALL



ELEVATION

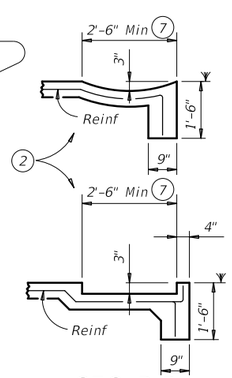


SEC A-A



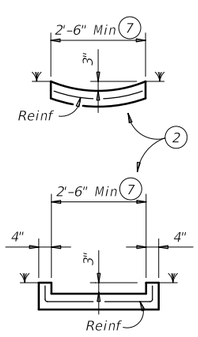
SEC B-B

(No drain)



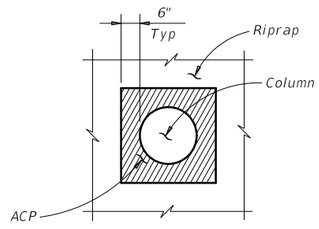
SEC B-B

(Shoulder drain integral with riprap)



SEC D-D

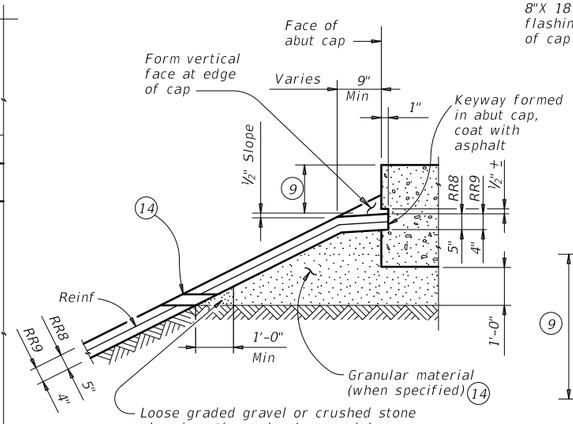
(Shoulder drain)



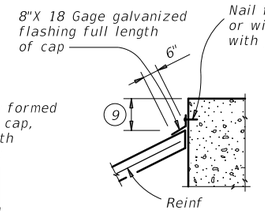
Riprap blockout to be filled with ACP. (Subsidiary to riprap)

RIPRAP DETAIL AT COLUMNS

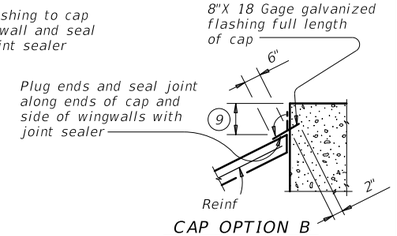
(As directed by the Engineer)



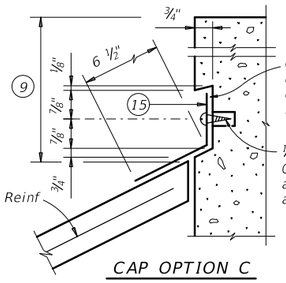
SHOWING KEYWAY OPTION



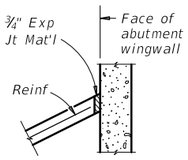
CAP OPTION A



CAP OPTION B

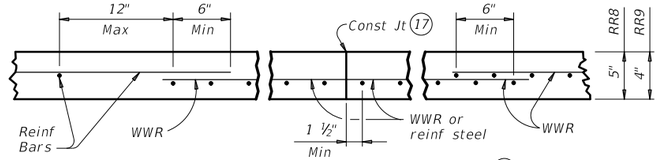


CAP OPTION C



SECT THRU RIPRAP AT WINGWALL (12)

SECTIONS THRU RIPRAP AT CAP (11)



REINFORCEMENT DETAILS (13)

See General Notes for optional synthetic fiber reinforcement.

1. When riprap is shown extended around header on layout, extend slab and toewall as shown and eliminate 4" curb.
2. Limits and configuration of drains and depressions are as shown elsewhere in plans or as directed by the Engineer.
3. Location of shoulder drain must consider limitations imposed by rail transition. Do not locate shoulder drains at expansion joints between approach slab and concrete pavement.
4. See details elsewhere in plans for installation of guard fence posts through concrete riprap.
5. Provide intermediate toewall only when designated elsewhere in the plans or included in the specifications.
6. Provide lower level of 2" Dia weep holes at 10' c-c backed by 1 CF packet of gravel and galvanized hardware cloth at all locations unless directed by the Engineer to eliminate.
7. Use wider or other drain configurations if shown elsewhere in plans or if directed by the Engineer.
8. Wall extension may be reduced or modified if approved by the Engineer. Increase wall extension to 1'-6" whenever the optional intermediate toewall is called for in the plans.
9. Top of cap to top of riprap dimension varies as directed by the Engineer. Should be 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.
10. #5 bars shown are required even when synthetic fiber reinforcing option is selected.
11. Provide sealing option for joint between the face of cap and riprap as designated by the Engineer or as shown elsewhere on plans.
12. Flashing (shown in Cap Option A) may be used at wingwall in addition to Exp Jt Mat'l if shown on plans or directed by the Engineer.
13. Provide #3 reinforcing bars at 18" Spa c-c. Provide Welded Wire Reinforcement (WWR) as 6x6-D2.9xD2.9 or D3xD3. Combinations of WWR and reinforcing bars may be used if both are permitted. Use lap splices of a minimum 6 inches, measured from the transverse wire of WWR, and the ends of reinforcing bars.
14. If granular material is specified, provide upper level of 2" Dia weep holes at 10' c-c backed by galvanized hardware cloth.
15. 8" x 18 Gage Galv Sheet Metal
16. Provide WWR or #3 bars, with 1'-0" extension into slope.
17. WWR or reinforcing steel is continuous through riprap construction joints. Provide WWR or reinforcing steel that extends 1'-1" minimum into adjacent riprap on each side of construction joint even if synthetic reinforcing fiber is utilized.

FOR CONTRACTOR'S INFORMATION ONLY:
5" of RR8 = 0.015 CY/SF
4" of RR9 = 0.012 CY/SF
#3 Reinf at 18" c-c = 0.501 Lbs/SF
6x6-D3xD3 = 0.408 Lbs/SF

GENERAL NOTES:

Provide Class "B" concrete (f'c = 2,000 psi) unless noted elsewhere in plans.

Provide Grade 60 reinforcing steel.

Provide deformed welded wire reinforcement (WWR) meeting ASTM A1064, unless otherwise shown.

Provide reinforcing bars, deformed WWR, or any suitable combination of both types for riprap reinforcing, unless specified elsewhere in the plans.

Optionally synthetic fibers may be used if approved by the Engineer. Provide synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) in lieu of steel reinforcing in riprap concrete.

Install construction joints or grooved joints extending the full slant slope height at intervals of approximately 20 feet unless otherwise directed by the Engineer.

Hardware cloth, loose grade stone behind weep holes, flashing, or other sealing material are subsidiary to the bid item "Riprap".

See Layout for limits of riprap.

RR8 is to be used on stream crossings.

RR9 is to be used on other embankments.

Texas Department of Transportation

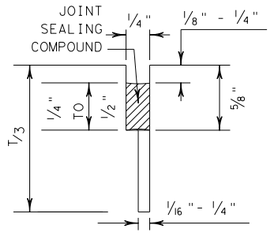
Bridge Division Standard

CONCRETE RIPRAP AND SHOULDER DRAINS
EMBANKMENTS AT BRIDGE ENDS (TYPES RR8 & RR9)

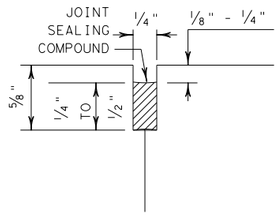
CRR

FILE: crrstde1-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	03	087	IH 35W
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		131

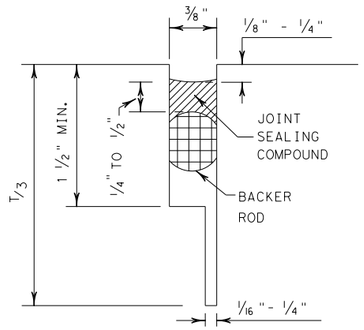
METHOD B: JOINT SEALING COMPOUND



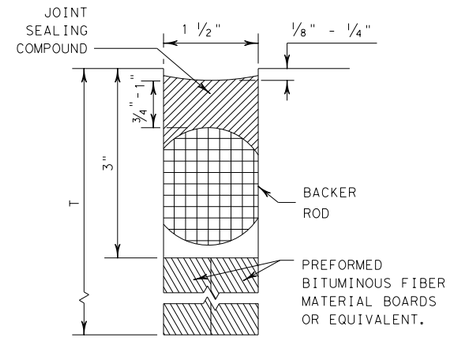
LONGITUDINAL SAWED
CONTRACTION JOINT



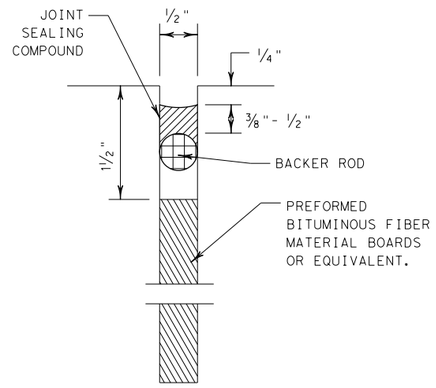
LONGITUDINAL OR TRANSVERSE
CONSTRUCTION JOINT



TRANSVERSE SAWED
CONTRACTION JOINT



TRANSVERSE FORMED
EXPANSION JOINT



FORMED
ISOLATION/EXPANSION JOINT

GENERAL NOTES

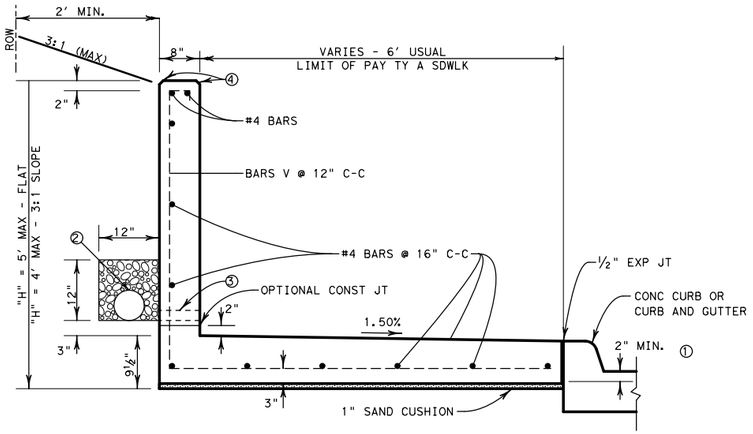
1. PREFORMED COMPRESSION SEALS (METHOD A) WILL NOT BE PERMITTED.
2. DIMENSION "T" IS THICKNESS OF CONCRETE PAVEMENT.
3. THE LOCATION OF JOINTS SHALL BE AS SHOWN ELSEWHERE IN THE PLANS.
4. THE JOINT RESERVOIR FOR SEALANT FOR THE LONGITUDINAL AND TRANSVERSE CONSTRUCTION JOINTS AND SAWED JOINTS SHALL BE SAWED UNLESS OTHERWISE SHOWN ON THE PLANS.
5. REFER TO DMS-6310 "JOINT SEALANTS AND FILLERS" FOR SEALANT CLASSIFICATIONS.
6. FOR SAWED LONGITUDINAL JOINTS, LONGITUDINAL OR TRANSVERSE CONSTRUCTION JOINTS, USE JOINT SEALANT CLASS 5 OR 8 UNLESS OTHERWISE SHOWN ON THE PLANS OR APPROVED.
7. FOR TRANSVERSE SAWED CONTRACTION JOINTS, TRANSVERSE FORMED EXPANSION JOINTS, AND ISOLATION/EXPANSION JOINTS, USE JOINT SEALANT CLASS 5 OR 8 AT NEW JOINTS. USE JOINT SEALANT CLASS 4,5,7,OR 8 FOR MAINTAINING EXISTING JOINTS.
8. THE JOINTS SHALL BE CLEANED IN ACCORDANCE WITH THE ITEM 438 "CLEANING AND SEALING JOINTS" OR ITEM 713 "CLEANING AND SEALING JOINTS AND CRACKS (CONCRETE PAVEMENT)".
9. ISOLATION/EXPANSION JOINTS ACCOMMODATE HORIZONTAL AND VERTICAL MOVEMENTS THAT OCCUR BETWEEN A PAVEMENT AND A STRUCTURE. ISOLATION/EXPANSION JOINTS MAY BE USED FOR BRIDGE ABUTMENTS, INTERSECTIONS, CURB AND GUTTER, OLD AND NEW PAVEMENTS, OR AROUND DRAINAGE INLETS, MANHOLES, FOOTINGS AND LIGHTING STRUCTURES.

Texas Department of Transportation

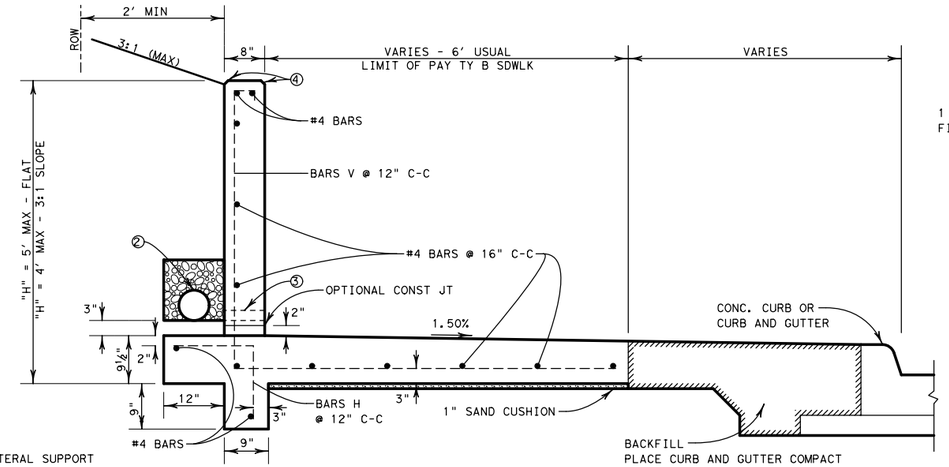
Fort Worth District Standard

CONCRETE PAVING DETAILS
JOINT SEALS
JS (FTW)

ORIGINAL DRAWING: 05/2019	js-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
DATE	REVISIONS	6	SEE TITLE SHEET	132
05/2019	REPLACES JS-03(FW)	STATE	STATE DIST.NO.	COUNTY
		TEXAS	FTW	JOHNSON
		CONT.	SECT.	JOB / HIGHWAY NO.
		0014	03	087 / IH 35W

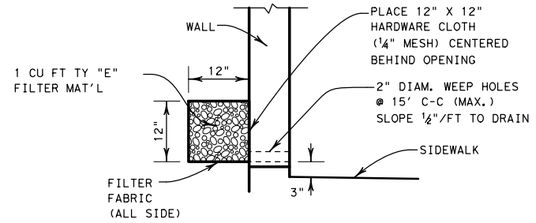


TYPE A SIDEWALK-ADJACENT TO CURB



① 2" MINIMUM REQUIRED FOR LATERAL SUPPORT
② INSTALL 6" PIPE UNDERDRAIN (TY. 5, 6, 7, OR 8) ENTIRE LENGTH OF WALL. USE TY. "E" FILTER MATERIAL. SLOPE TO DRAIN AND CONNECT TO STORM DRAIN.
③ IF, IN THE OPINION OF THE ENGINEER, USE OF UNDERDRAIN IS IMPRACTICAL, INSTALL WEEP HOLES AS SHOWN.
④ ¾" CHAMFER

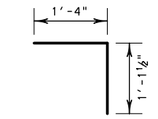
TYPE B SIDEWALK-REMOTE FROM CURB



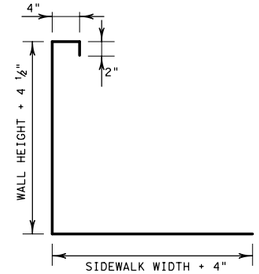
WEEP HOLE DETAIL

SPECIAL CONCRETE SIDEWALK w/ INTEGRATED RETAINING WALL

N. T. S.

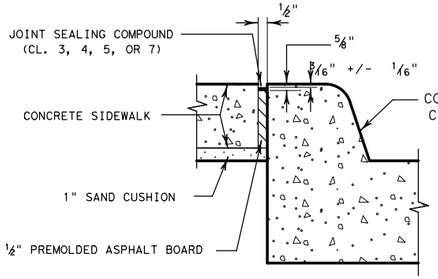


#4 BARS H @ 12" C-C



#4 BARS V @ 12" C-C

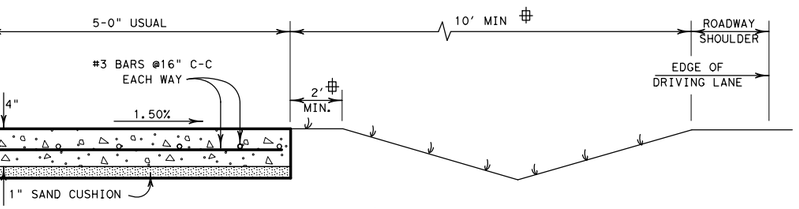
REINFORCING STEEL DETAILS



1#2" EXPANSION JOINT
(SIDEWALK ADJACENT TO CURB)

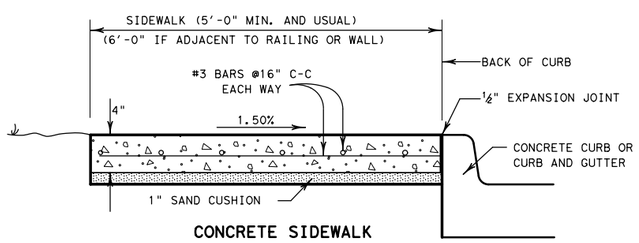
GENERAL NOTES:

1. ALL CONCRETE SHALL BE CLASS "C".
2. ALL REINFORCING STEEL SHALL BE GRADE 60, # 4 BARS UNLESS OTHERWISE INDICATED.
3. SEE PLAN SHEETS FOR LOCATIONS OF SIDEWALKS AND RETAINING WALLS.
4. LONGITUDINAL SLOPE OF SIDEWALKS SHALL NOT EXCEED 5% EXCEPT IN CASES WHERE THE ADJACENT ROADWAY SLOPE EXCEEDS 5%. IF ROADWAY SLOPE EXCEEDS 5%, LONGITUDINAL SLOPE OF SIDEWALK MAY MATCH THAT OF ROADWAY.
5. IF SIDEWALK WIDTH IS LESS THAN 5', PROVIDE 5' X 5' PASSING AREAS AT INTERVALS NOT TO EXCEED 200' SPACING.
6. RETAINING WALL WILL BE SUBSIDIARY TO THE ITEM, "CONC SIDEWALKS (SPECIAL) (TYPE A)" OR "CONC SIDEWALKS (SPECIAL)(TYPE B)", WITH LIMITS OF PAY AS SHOWN.
7. SURFACE TREATMENT OF RETAINING WALL FACE DETAILED ELSEWHERE IN THE PLANS.
8. SEE PED STANDARDS FOR TREATMENT AT INTERSECTIONS AND CROSSWALKS.

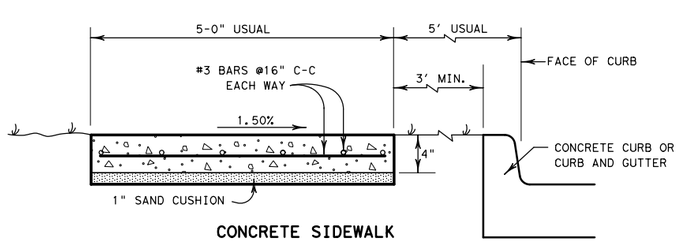


CONCRETE SIDEWALK
(ROADWAY W/O CURB)

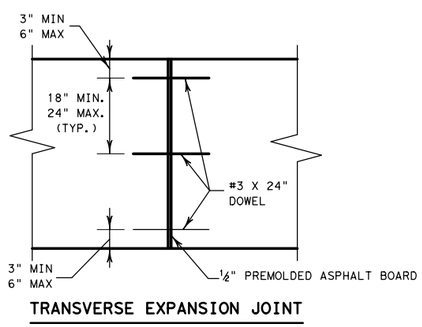
SIDEWALK TO BE 10' MIN. FROM EDGE OF SHOULDER OR 2' MIN. FROM TOP OF DITCH BACK SLOPE, WHICHEVER IS GREATER (10' MIN. FROM EDGE OF SHOULDER IF NO DITCH.)



CONCRETE SIDEWALK
(ADJACENT TO CURB)



CONCRETE SIDEWALK
(REMOTE FROM CURB)



TRANSVERSE EXPANSION JOINT

CONCRETE SIDEWALK DETAILS

N. T. S.

Texas Department of Transportation

Fort Worth District Standard

CONCRETE SIDEWALK DETAILS
CSWD (FTW)

ORIGINAL DRAWING: 05/2019	cswd-ftw.dgn	PROJECT NO.			SHEET NO.
DATE	REVISIONS	SEE TITLE SHEET			133
05/2019	NEW STANDARD	STATE	STATE DIST. NO.	COUNTY	
		TEXAS	FTW	JOHNSON	
		CONT.	SECT.	JOB	HIGHWAY NO.
		0014	03	087	IH 35W

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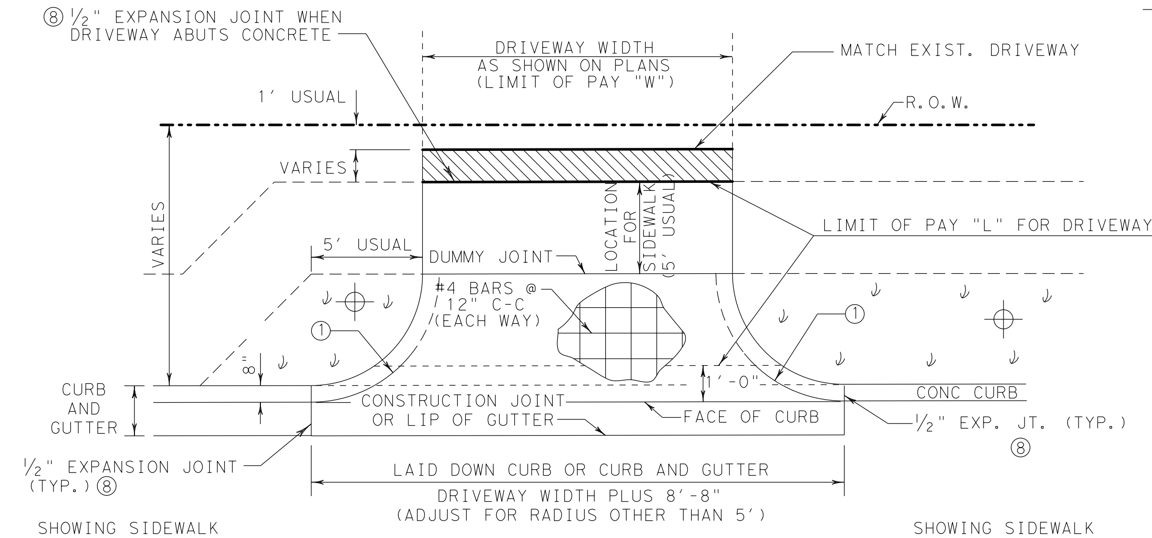
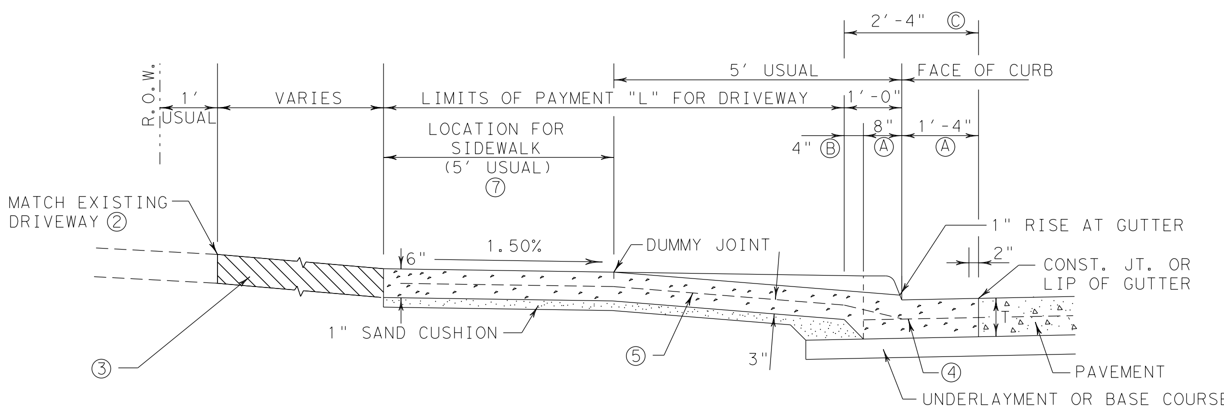
CONCRETE RESIDENTIAL DRIVEWAY



PLAN VIEW



SECTION VIEW

Ⓒ DO NOT PAVE AREA BETWEEN SIDEWALK AND DRIVEWAY CURB. SEED, SOD, OR LANDSCAPE AS DIRECTED.

↓ - SEEDING OR OTHER SURFACE NOT SUITABLE AS PEDESTRIAN WALKWAY.

PAY AREA FOR DRIVEWAY SHALL BE THE PRODUCT OF "L" x "W"

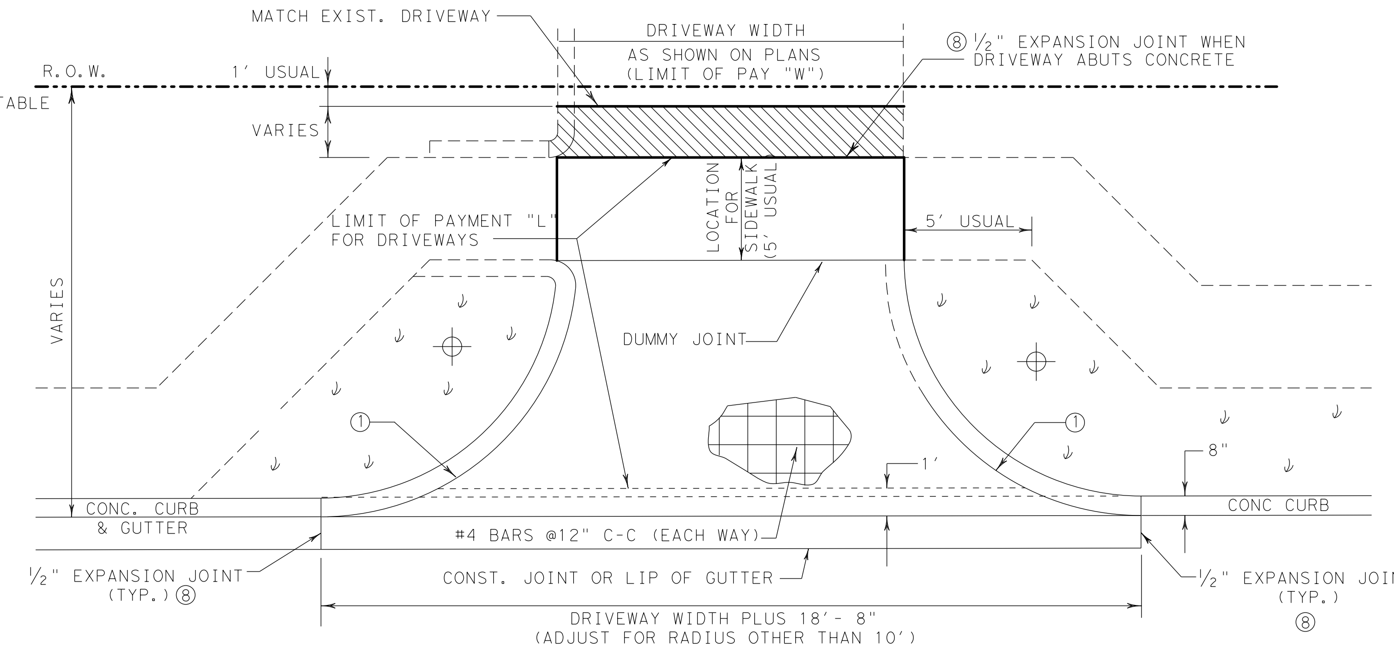
S.Y. NON-PAY CONCRETE IN DRIVEWAY RADIUS	
2-90° RADII (FT)	NON-PAY CONC. (S.Y.)
5	0.42
10	3.04
15	10.73
20	15.36
25	29.81
30	37.19

① RADII AS SHOWN ON PLANS

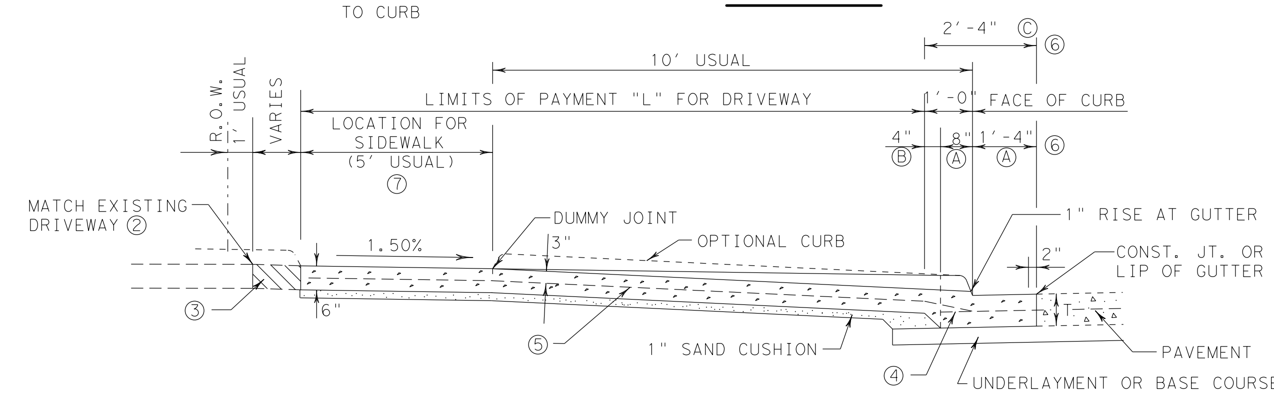
SEE ROADWAY DESIGN MANUAL, APPENDIX C FOR RECOMMENDED RADII.

② FULL DEPTH SAW CUT IF CONCRETE

CONCRETE COMMERCIAL DRIVEWAY



PLAN VIEW



SECTION VIEW

③ REPLACE EXISTING DRIVEWAY WITH EQUAL OR BETTER MATERIAL:

IF CONCRETE, PAY FOR AS CONCRETE DRIVEWAY.

IF HOT MIX OR OTHER MATERIAL, PAY FOR IN ACCORDANCE WITH APPROPRIATE BID ITEMS.

④ 36" - #4 TIE BAR, 12" EMBEDMENT INTO PAVEMENT (CAST-IN-PLACE OR DRILLED AND GROUTED). SPACING TO MATCH TRANSVERSE STEEL IN CONCRETE PAVEMENT.

MULTIPLE-PIECE TIE BARS OR 24" EXTENSION OF TRANSVERSE PAVING STEEL MAY BE USED IN LIEU OF TIE BARS.

LONGITUDINAL STEEL IN GUTTER PORTION TO MATCH CONCRETE PAVEMENT OR CONCRETE CURB AND GUTTER DETAILS.

⑤ #4 BARS @ 12" C-C EACH WAY (EXTEND TO FACE OF CURB) BEND AS REQ'D TO TIE TO PAVING STEEL OR TIE BARS.

⑥ IF ADJACENT TO CONCRETE PAVEMENT:
Ⓐ PAID FOR AS CONCRETE PAVEMENT,
Ⓑ PAID FOR AS CONCRETE CURB.

IF ADJACENT TO HOT MIX OR FLEXIBLE PAVEMENT:
Ⓒ PAID FOR AS CONCRETE CURB AND GUTTER.

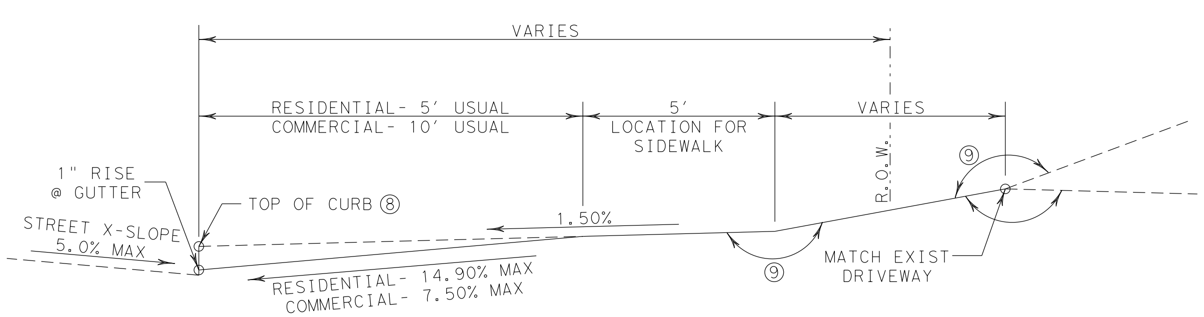
T = THICKNESS OF CONCRETE PAVEMENT OR CONCRETE CURB AND GUTTER

⑦ LOCATION FOR SIDEWALK TO BE PROVIDED ON ALL DRIVEWAYS

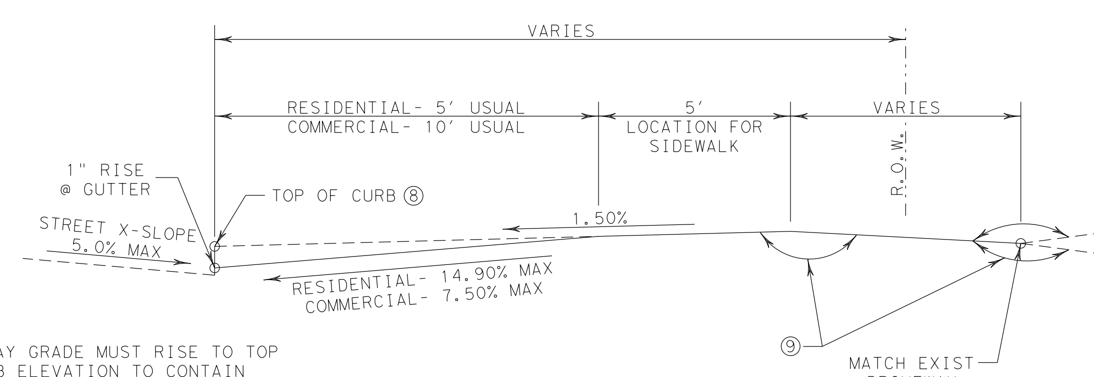
FOR SIDEWALK DETAILS, SEE STANDARD CSWD(FTW)

⑧ SEE STANDARD JS (FTW) FOR JOINT DETAILS.

ALLOWABLE DRIVEWAY GRADES



SAG CONDITION



CREST CONDITION

⑧ DRIVEWAY GRADE MUST RISE TO TOP OF CURB ELEVATION TO CONTAIN DRAINAGE IN STREET GUTTER.

⑨ 8% MAX CHANGE IN GRADE

Texas Department of Transportation — Fort Worth District Standard

CONCRETE DRIVEWAY DETAILS CDD (FTW)

ORIGINAL DRAWING: 05/2019	cdd-ftw.dgn	PROJECT NO.	SHEET NO.
DATE	REVISIONS	SEE TITLE SHEET	134
05/2019	NEW STANDARD		

STATE	STATE DIST. NO.	COUNTY	
TEXAS	FTW	JOHNSON	
CONT.	SECT.	JOB	HIGHWAY NO.
0014	03	087	IH 35W

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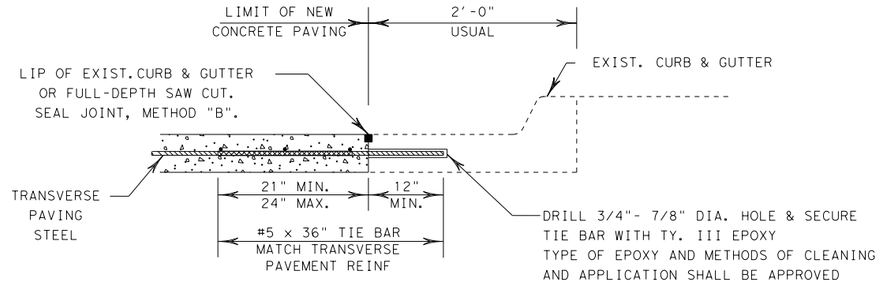
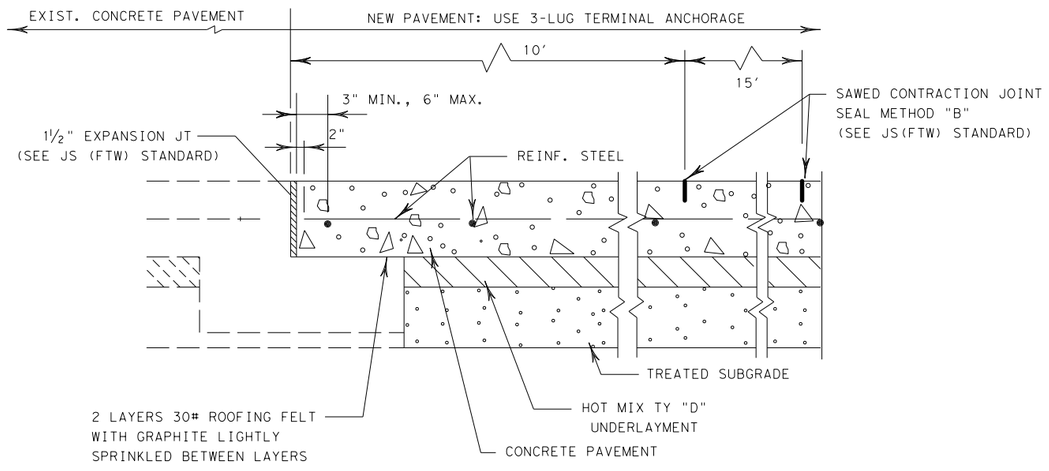


TIE TO EXIST. CONC. CURB & GUTTER

N.T.S.

NOTE:
SAWING OF PAVEMENT AND REMOVAL OF EXISTING CONC. WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE SUBSIDIARY TO THE VARIOUS BID ITEMS.



TIE TO EXIST. CONCRETE PAVEMENT

(TRANSVERSE JOINTS W/EXISTING "SLEEPER" SLAB)
N.T.S.

GENERAL NOTES

TIE BARS SHALL BE SECURED INTO THE EXISTING CONCRETE THE MINIMUM LENGTHS SHOWN, USING TY III EPOXY, CLASS "E" OR "F" AND MUST MEET THE REQUIREMENTS OF THE PULL-OUT TEST SPECIFIED IN ITEM 361.

ALL HOLES FOR TIE BARS OR CONCRETE ANCHORS SHALL BE DRILLED WITH A CORE OR ROTARY DRILL. THE USE OF HAMMER DRILLS WILL NOT BE PERMITTED.

SEE CRCP STANDARD FOR ADDITIONAL DETAILS.

SEE JS (FTW) STANDARD FOR JOINT DETAILS.

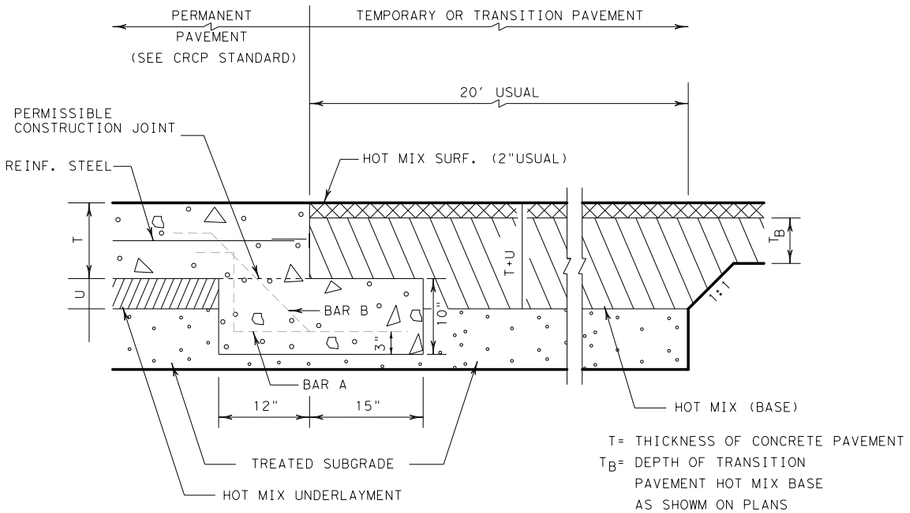
Texas Department of Transportation

Fort Worth District Standard

CONCRETE PAVEMENT TIES TO EXISTING PAVEMENT

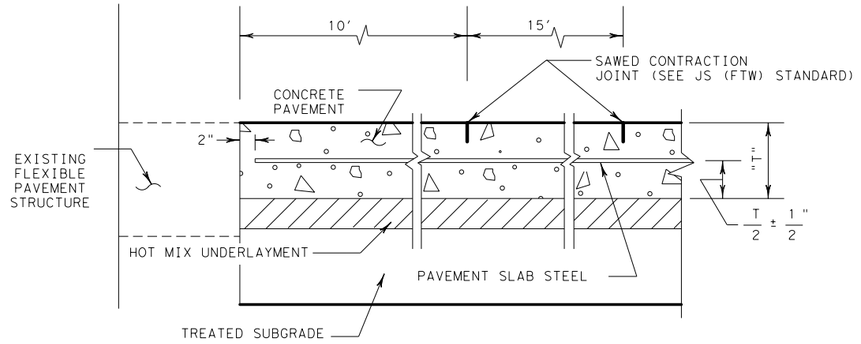
CP-TEP (FTW)

ORIGINAL DRAWING: 05/2019	cptep-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
DATE	REVISIONS	6	SEE TITLE SHEET		135
05/2019	REPLACES CP-TEP-03(FW)	STATE	STATE DIST.NO.	COUNTY	
		TEXAS	FTW	JOHNSON	
		CONT.	SECT.	JOB	HIGHWAY NO.
		0014	03	087	IH 35W

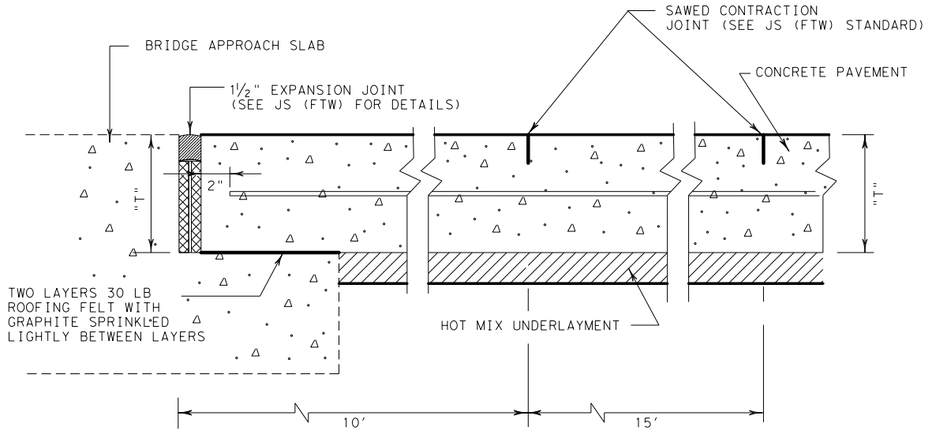


T= THICKNESS OF CONCRETE PAVEMENT
T_B= DEPTH OF TRANSITION PAVEMENT HOT MIX BASE AS SHOWM ON PLANS
U= THICKNESS OF HOT MIX UNDERLAYMENT

CONCRETE PAVEMENT TERMINUS
AT HOT MIX TRANSITION OR TEMPORARY PAVEMENT
N.T.S.

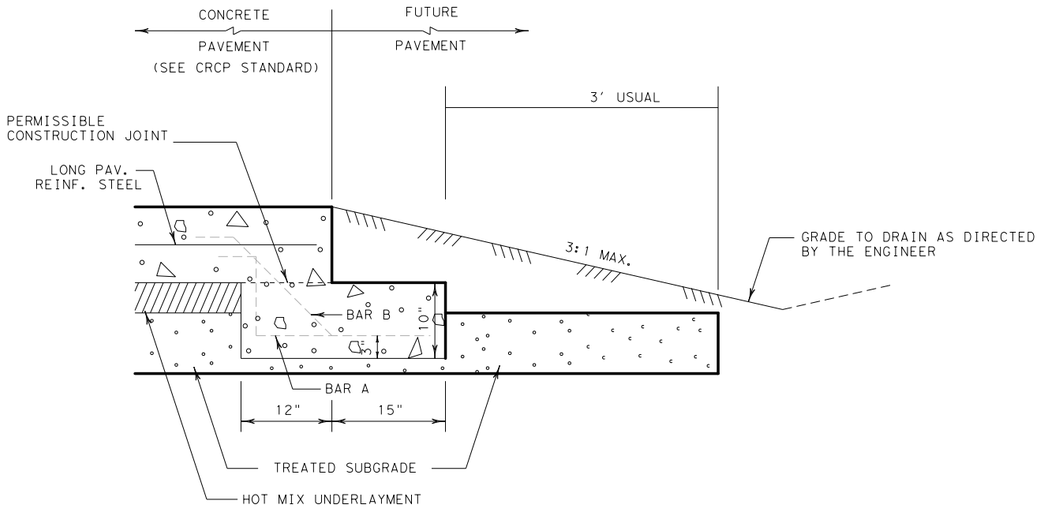


CONCRETE PAVEMENT TERMINUS
AT FLEXIBLE PAVEMENT
N.T.S.

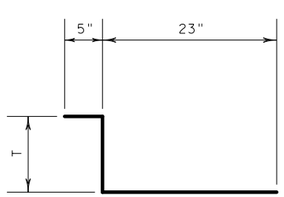


CONCRETE PAVEMENT TERMINUS
AT BRIDGE APPROACH SLAB
N.T.S.

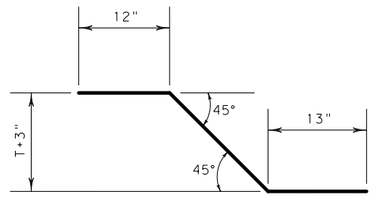
"T" = THICKNESS OF CONCRETE PAVEMENT AND BRIDGE APPROACH SLAB (8" MIN.). THICKNESS TO BE SHOWN ELSEWHERE IN THE PLANS. IF NORMAL PAVEMENT THICKNESS IS LESS THAN 8", 10' ADJACENT TO BRIDGE APPROACH SLAB TO BE 8" THICK, TAPERING TO NORMAL PAVEMENT THICKNESS OVER NEXT 15'. NO ADJUSTMENT IN PAY WILL BE MADE DUE TO INCREASED DEPTH OF CONCRETE PAVEMENT.



CONCRETE PAVEMENT TERMINUS
W/O HOT MIX TRANSITION OR TEMPORARY PAVEMENT
N.T.S.



BAR "A" (#5)
@12" C-C



BAR "B" (#5)
@12" C-C

Texas Department of Transportation

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CONCRETE PAVEMENT TERMINUS DETAILS
CPTD (FTW)

ORIGINAL DRAWING: 05/2019	cptd-ftw.dgn	FED.RO. DIV.NO.	PROJECT NO.	SHEET NO.
DATE	REVISIONS	6	SEE TITLE SHEET	136
05/2019	REPLACES CP-TD-03(FW)	STATE	STATE DIST.NO.	COUNTY
		TEXAS	FTW	JOHNSON
		CONT.	SECT.	JOB / HIGHWAY NO.
		0014	03	087 / IH 35W

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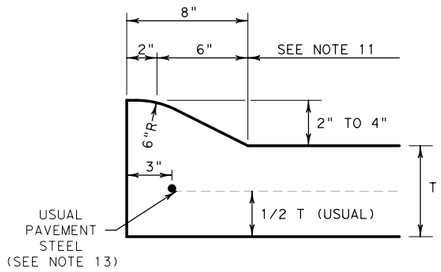
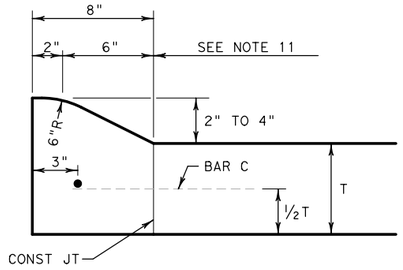
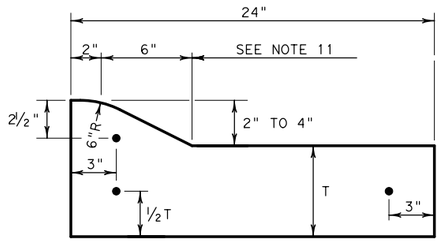


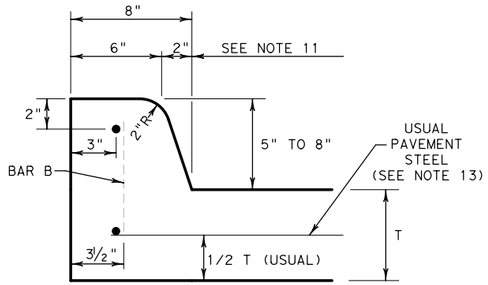
TYPE I CURB (MONOLITHIC)
2" - 4" HEIGHT



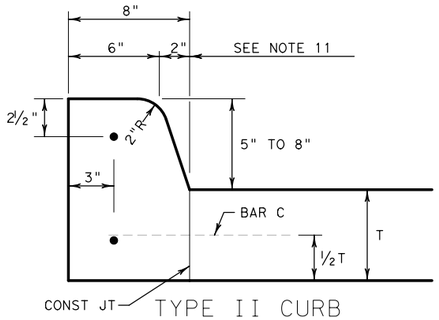
TYPE I CURB
2" - 4" HEIGHT



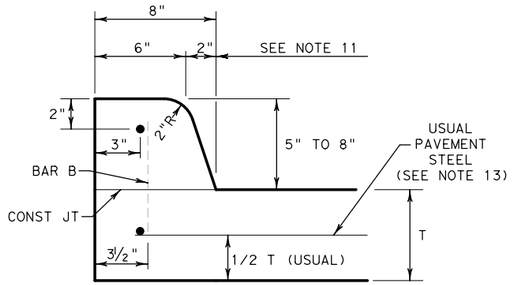
TYPE I CURB AND GUTTER
2" - 4" HEIGHT



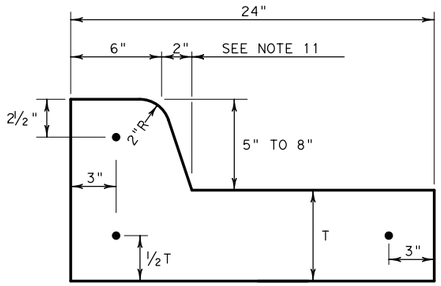
TYPE II CURB (MONOLITHIC)
5" - 8" HEIGHT



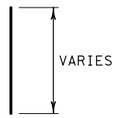
TYPE II CURB
5" - 8" HEIGHT
DOWELED VERTICAL JOINT



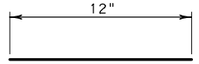
TYPE II CURB
5" - 8" HEIGHT
DOWELED HORIZONTAL JOINT



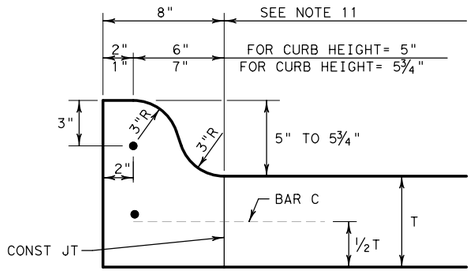
TYPE II CURB AND GUTTER
5" - 8" HEIGHT



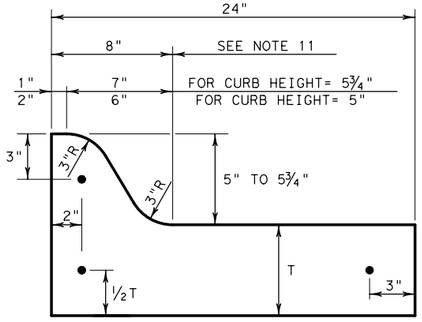
BAR B
L = (T/2) + (H- 1½")
WHERE "H" = CURB HEIGHT
FOR NEW PAVEMENT, EMBED T/2 INTO FRESH CONCRETE.
FOR EXISTING PAVEMENT, DRILL 3/8" DIAM HOLE T/2 + 1/4" INTO PAVEMENT.
SECURE WITH TY III EPOXY, CLASS "E" OR "F".



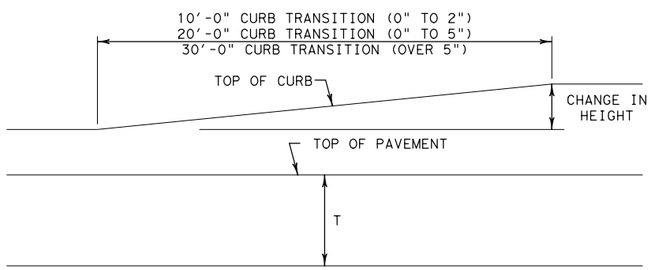
BAR C
EMBED 6" INTO EXISTING CONCRETE PAVEMENT.
DRILL 3/8" X 6 1/4" HOLE
SECURE WITH TY III EPOXY, CLASS "E" OR "F".



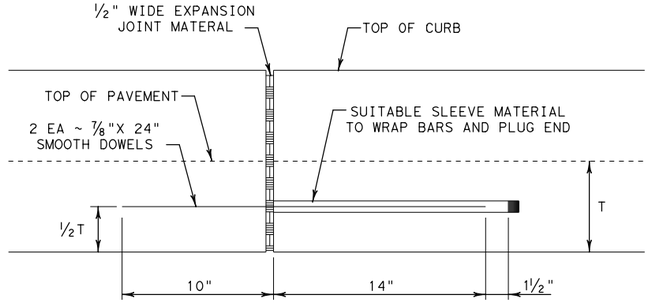
TYPE IIA CURB
5" - 5 3/4" HEIGHT



TYPE IIA CURB AND GUTTER
5" - 5 3/4" HEIGHT



CURB TRANSITION
NOTE: TO BE PAID FOR AS HIGHEST CURB



EXPANSION JOINT DETAIL

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. CURB HEIGHT SHALL BE AS SHOWN ON TYPICAL SECTIONS OR PLAN-PROFILE SHEETS.
5. ROUND EXPOSED SHARP EDGES WITH A ROUNDING TOOL, TO A MINIMUM RADIUS OF ¼".
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, ½" 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.

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		137
05/2019	REPLACES CC-CG(FW)	STATE	STATE DIST.NO.	COUNTY	
		TEXAS	FTW	JOHNSON	
		CONT.	SECT.	JOB	HIGHWAY NO.
		0014	03	087	IH 35W

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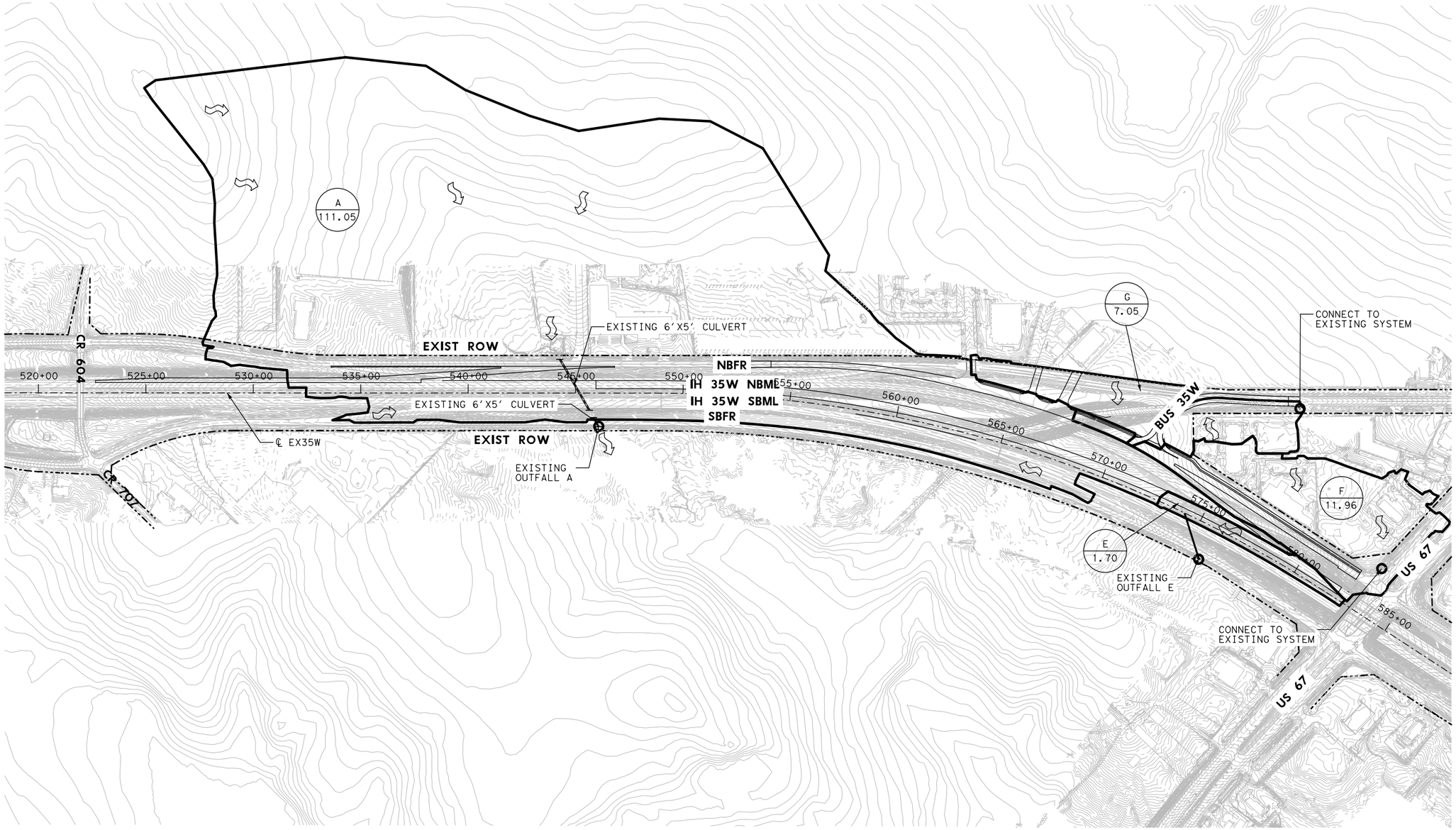

N

0′ 250′ 500′
SCALE IN FEET

LEGEND

- DRAINAGE FLOW ARROW
- DRAINAGE AREA BOUNDARY
- X / XXX.X — DRAINAGE AREA IDENTIFICATION; DRAINAGE AREA (ACRES)

STATE OF TEXAS
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116808
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5/24/2022

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(214) 741-7777
TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

OVERALL DRAINAGE AREA MAP

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		138

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0′ 50′ 100′
SCALE IN FEET

LEGEND

- DRAINAGE FLOW ARROW
- DRAINAGE AREA BOUNDARY
- X / XX.XX — DRAINAGE AREA IDENTIFICATION / DRAINAGE AREA (ACRES)
- HP — HIGH POINT
- LP — LOW POINT
- PROP DITCH FLOW
- EXIST DITCH FLOW
- TRAFFIC FLOW ARROW

NOTES:

1. ALL STATIONS AND OFFSETS ARE BASED ON THE ℄ PNBML UNLESS OTHERWISE NOTED.

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IH 35W
FROM CR 604/ CR 707 TO US 67

IH 35W DRAINAGE AREA MAP

BEGIN PROJECT TO STA 533+00

SHEET 1 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		139

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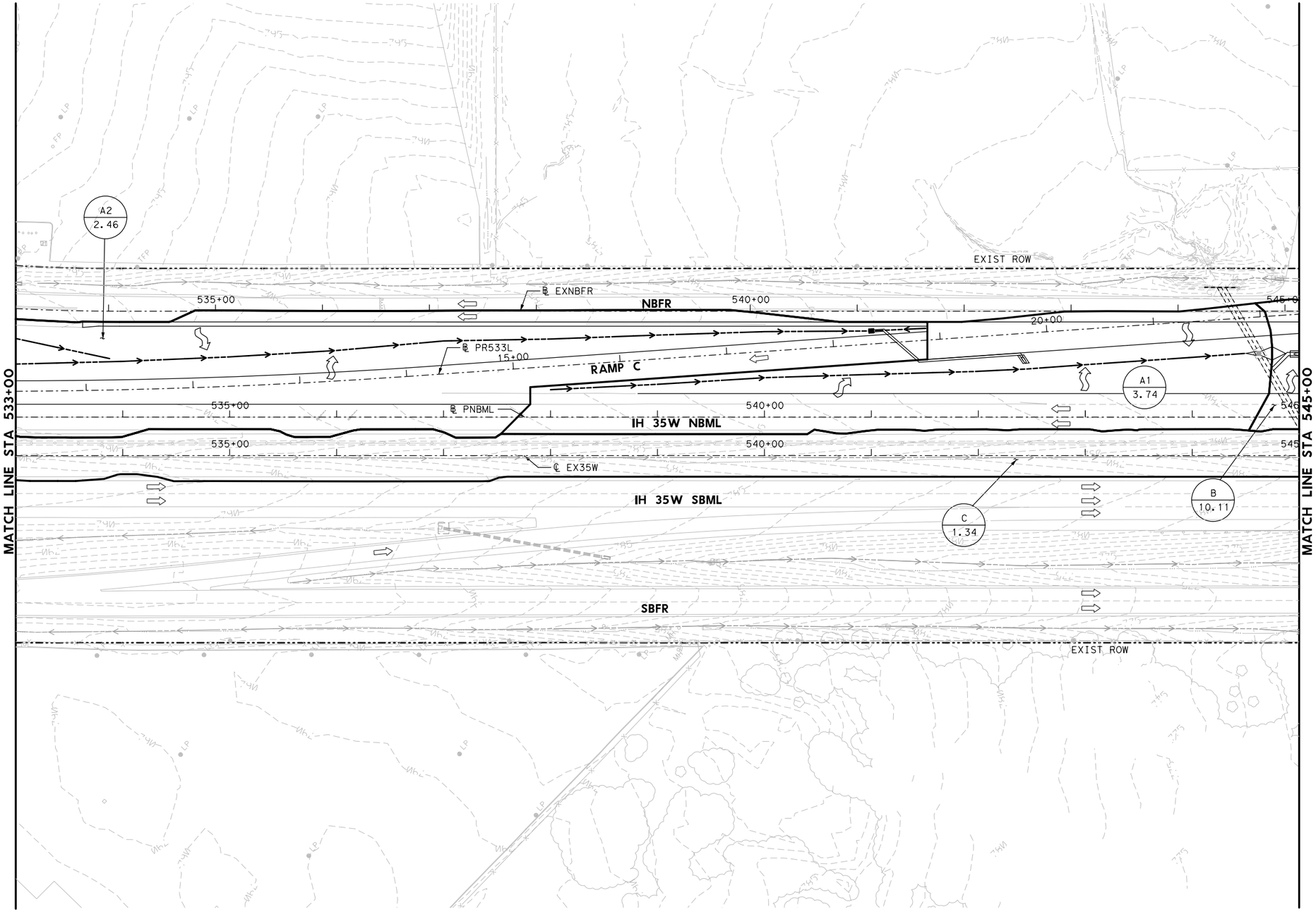

0′ 50′ 100′
SCALE IN FEET

LEGEND

- DRAINAGE FLOW ARROW
- DRAINAGE AREA BOUNDARY
- X / XX.XX — DRAINAGE AREA IDENTIFICATION; DRAINAGE AREA (ACRES)
- HP — HIGH POINT
- LP — LOW POINT
- PROP DITCH FLOW
- EXIST DITCH FLOW
- TRAFFIC FLOW ARROW

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IH 35W
FROM CR 604/ CR 707 TO US 67

IH 35W DRAINAGE AREA MAP

STA 533+00 TO STA 545+00

SHEET 2 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		140

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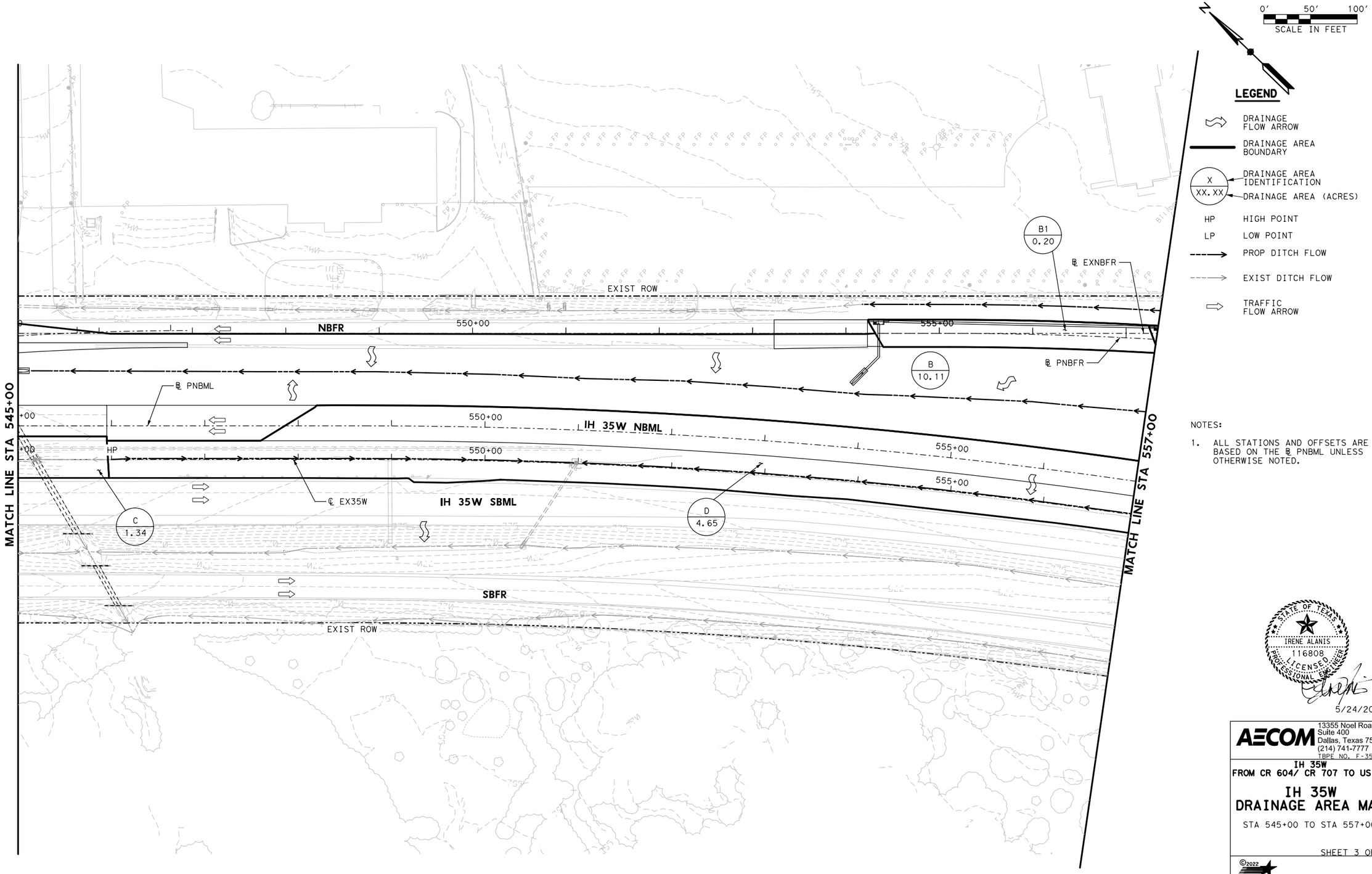

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IH 35W
FROM CR 604/ CR 707 TO US 67

IH 35W DRAINAGE AREA MAP

STA 545+00 TO STA 557+00

SHEET 3 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		141

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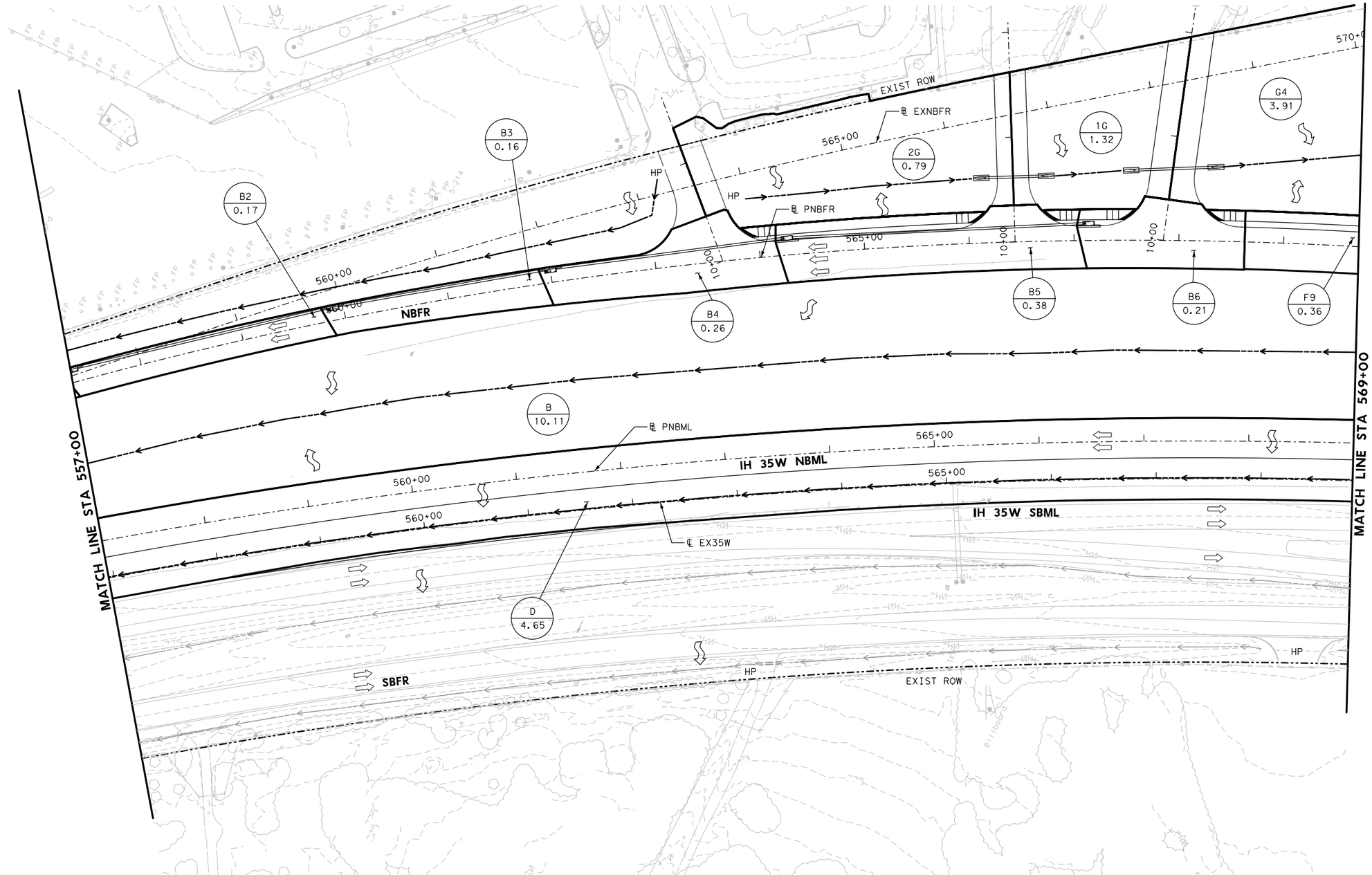

0′ 50′ 100′
SCALE IN FEET

LEGEND

- DRAINAGE FLOW ARROW
- DRAINAGE AREA BOUNDARY
- X / XX.XX — DRAINAGE AREA IDENTIFICATION / DRAINAGE AREA (ACRES)
- HP — HIGH POINT
- LP — LOW POINT
- PROP DITCH FLOW
- EXIST DITCH FLOW
- TRAFFIC FLOW ARROW

NOTES:

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IH 35W
FROM CR 604/ CR 707 TO US 67

IH 35W DRAINAGE AREA MAP

STA 557+00 TO STA 569+00

SHEET 4 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		142

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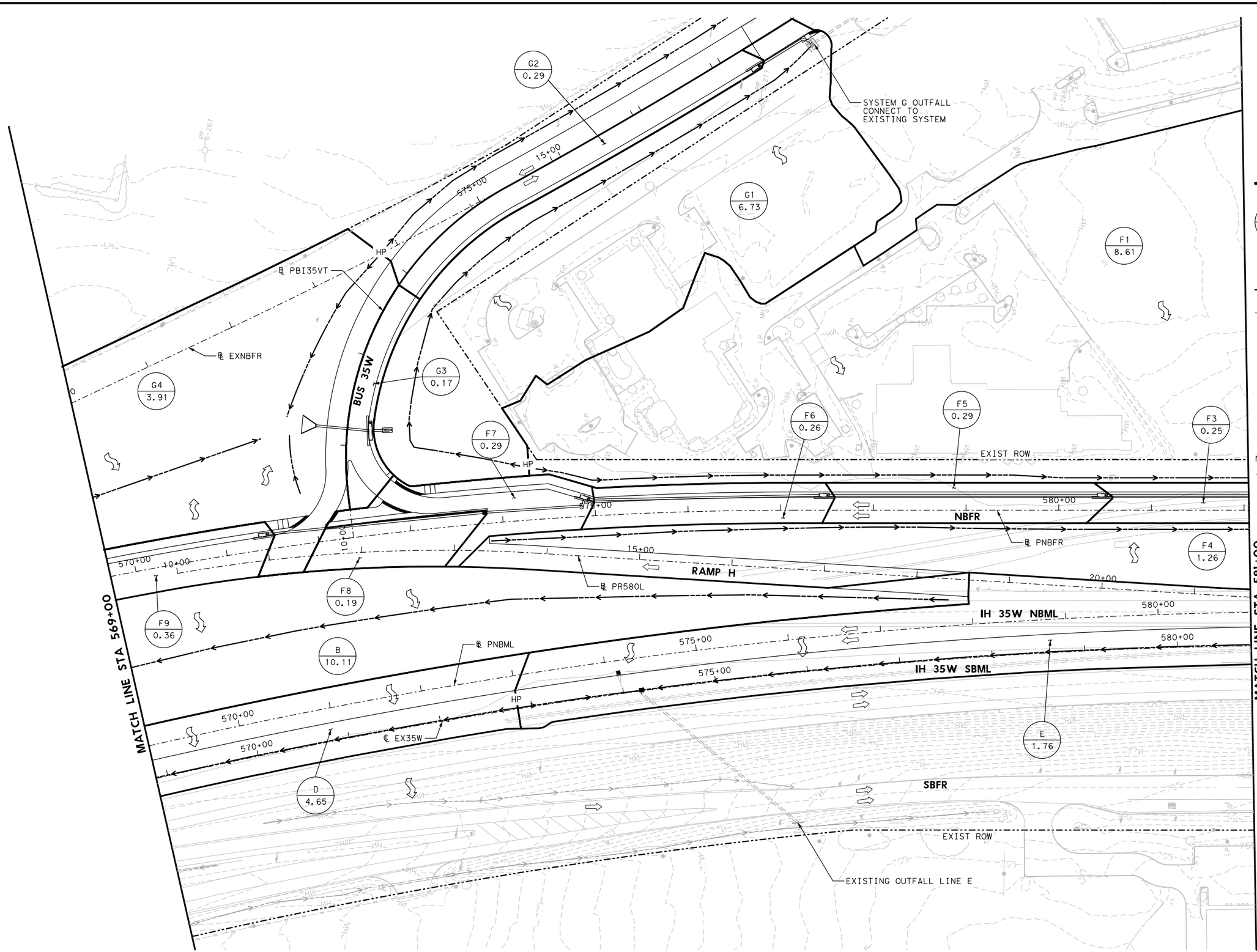

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SCALE IN FEET

N

LEGEND

- DRAINAGE FLOW ARROW
- DRAINAGE AREA BOUNDARY
- X / XX.XX — DRAINAGE AREA IDENTIFICATION / DRAINAGE AREA (ACRES)
- HP — HIGH POINT
- LP — LOW POINT
- PROP DITCH FLOW
- EXIST DITCH FLOW
- TRAFFIC FLOW ARROW

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IH 35W
FROM CR 604/ CR 707 TO US 67

IH 35W DRAINAGE AREA MAP

STA 569+00 TO STA 581+00

SHEET 5 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		143

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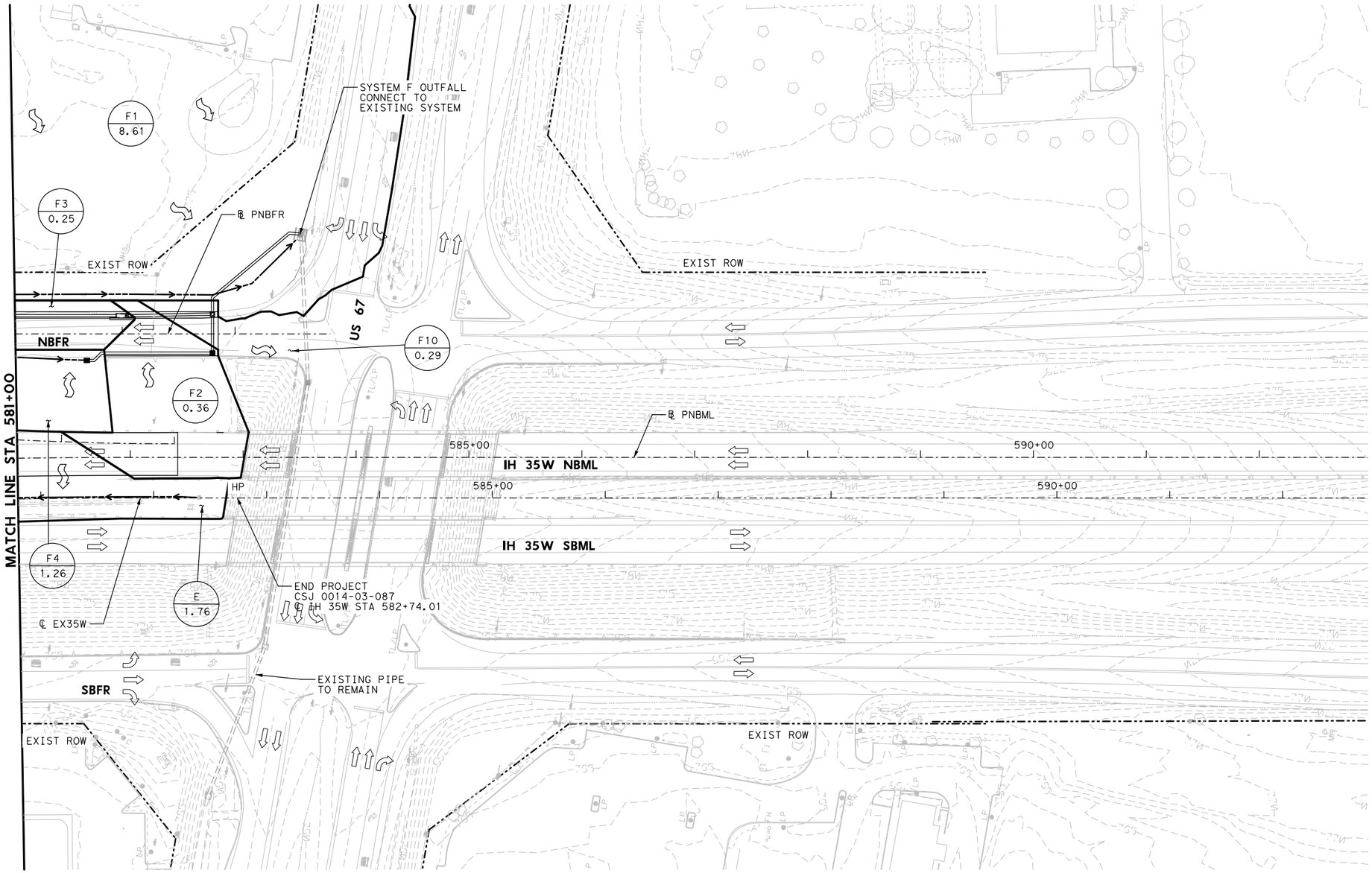

0′ 50′ 100′
SCALE IN FEET

N

LEGEND

- DRAINAGE FLOW ARROW
- DRAINAGE AREA BOUNDARY
- X / XX.XX — DRAINAGE AREA IDENTIFICATION / DRAINAGE AREA (ACRES)
- HP — HIGH POINT
- LP — LOW POINT
- PROP DITCH FLOW
- EXIST DITCH FLOW
- TRAFFIC FLOW ARROW

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TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

IH 35W DRAINAGE AREA MAP

STA 581+00 TO END PROJECT

SHEET 6 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
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DIST	COUNTY		SHEET NO.
FTW	JOHNSON		144

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subash.paude

RUNOFF COMPUTATIONS

CULVERT NAME	AREA (AC)	C*	Tc (MIN)	I - RAINFALL INTENSITY (IN/HR)			Q - PEAK FLOW (CFS)		
				4%	2%	1%	4%	2%	1%
A @ ML	100.71	0.51	28.26	4.88	5.50	6.14	253	285	318
A @ SBFR	111.05	0.52	28.72	4.82	5.43	6.06	278	313	349

CULVERT COMPUTATIONS

CULVERT NAME	ALIGNMENT	STA	STRUCTURE					SLOPE	DESIGN					1% AEP CHECK			
			SPAN (FT)	RISE (FT)	SHAPE	# BARRELL	LENGTH	(%)	AEP	Q (CFS)	H* (FT)	T* (FT)	V (FT/S)	Q (CFS)	H* (FT)	T* (FT)	V (FT/S)
A @ ML	CL EX35W	545+18.08	6.00	5.00	BOX	1	274	0.30	2%	285	775.20	769.47	11.52	318	775.99	769.61	11.90
A @ SBFR	CL EX35W	545+18.08	6.00	5.00	BOX	1	49	0.36	4%	278	773.33	770.35	10.20	349	773.81	770.92	9.89
1G	BL DRWY3	10+69.00			24" RCP	1	73	0.36	10%	3.15	783.74	783	3.82	4.76	783.99	783.11	4.33
2G	BL DRWY2	10+62.00			24" RCP	1	54	0.36	10%	1.73	783.95	783.43	3.24	2.61	784.13	783.52	3.64

NOTES:

1. COMPUTATIONS FOLLOW TxDOT 2019 HYDRAULIC DESIGN MANUAL

   RATIONAL METHOD
   Q=C*I*A
   I INTENSITY WAS COMPUTED USING THE PRECIPITATION FREQUENCY VALUES PROVIDED ON NOAA'S DATA SERVER.

Table 1 - Summary of Culvert Flows at Crossing: CULVERT A @ SBFR

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	FR Discharge (cfs)	Roadway Discharge (cfs)	Iterations
773.33	25 YR	277.80	277.80	0.00	1
773.67	50 YR	313.00	291.30	21.49	8
773.81	100 YR	349.30	296.56	52.38	5
773.50	Overtopping	284.59	284.59	0.00	Overtopping

Table 2 - Culvert Summary Table: CULVERT A @ SBFR

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
25 YR	277.80	277.80	773.33	7.337	6.973	7-M1t	4.241	4.053	4.541	4.541	10.196	5.803
50 YR	313.00	291.30	773.67	7.684	7.186	7-M1t	4.403	4.183	4.830	4.830	10.053	5.984
100 YR	349.30	296.56	773.81	7.823	7.411	4-FFf	5.000	4.233	5.000	5.108	9.885	6.155

****

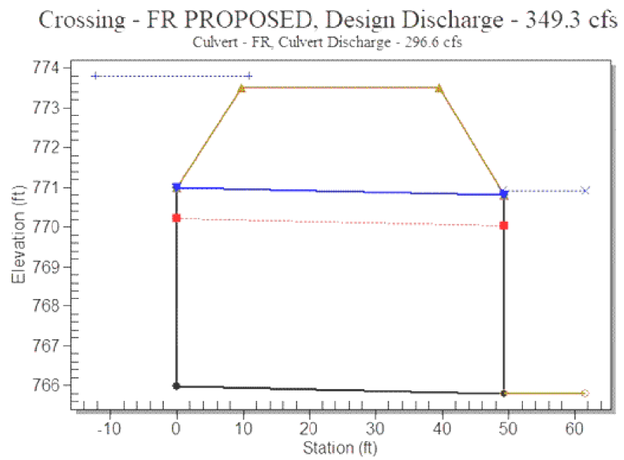
Straight Culvert

Inlet Elevation (invert): 765.99 ft, Outlet Elevation (invert): 765.81 ft

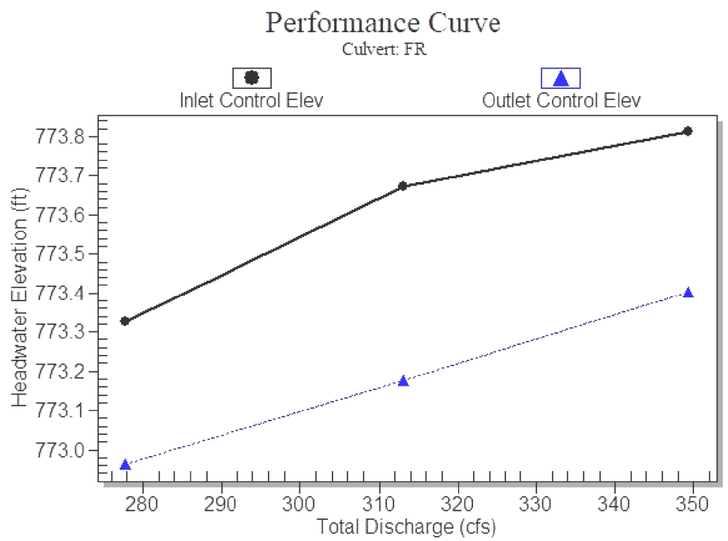
Culvert Length: 49.33 ft, Culvert Slope: 0.0036

****

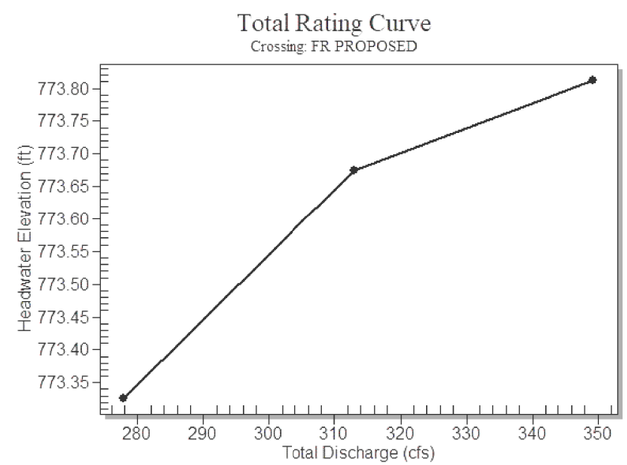
Water Surface Profile Plot for Culvert: CULVERT A @ SBFR



Culvert Performance Curve Plot: CULVERT A @ SBFR



Rating Curve Plot for Crossing: CULVERT A @ SBFR



STATE OF TEXAS
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5/24/2022

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IH 35W
FROM CR 604/ CR 707 TO US 67

HYDRAULIC COMPUTATIONS

CULVERT HYDROLOGY AND HYDRAULICS

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		145

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Table 3 - Downstream Channel Rating Curve (Crossing: CULVERT A @ SBFR)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
277.80	770.35	4.54	5.80	3.12	0.57
313.00	770.64	4.83	5.98	3.32	0.58
349.30	770.92	5.11	6.16	3.51	0.58

Tailwater Channel Data - CULVERT A @ SBFR

Tailwater Channel Option: Trapezoidal Channel
Bottom Width: 6.00 ft
Side Slope (H:V): 1.00 (_:1)
Channel Slope: 0.0110
Channel Manning's n: 0.0500
Channel Invert Elevation: 765.81 ft

Roadway Data for Crossing: CULVERT A @ SBFR

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 100.00 ft
Crest Elevation: 773.50 ft
Roadway Surface: Paved
Roadway Top Width: 30.00 ft

Site Data - CULVERT A @ SBFR

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 765.99 ft
Outlet Station: 49.33 ft
Outlet Elevation: 765.81 ft
Number of Barrels: 1

Culvert Data Summary - CULVERT A @ SBFR

Barrel Shape: Concrete Box
Barrel Span: 6.00 ft
Barrel Rise: 5.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge (90°) Headwall
Inlet Depression: NONE

NOTES:

1. COMPUTATIONS FOLLOW TxDOT 2019 HYDRAULIC DESIGN MANUAL

   RATIONAL METHOD
   Q=C*I*A
   I INTENSITY WAS COMPUTED USING THE PRECIPITATION FREQUENCY VALUES PROVIDED ON NOAA'S DATA SERVER.

Table 1 - Summary of Culvert Flows at Crossing: CULVERT A @ ML

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	ML Discharge (cfs)	Roadway Discharge (cfs)	Iterations
774.42	25 YR	252.60	252.60	0.00	1
775.20	50 YR	284.70	284.70	0.00	1
775.99	100 YR	317.80	314.03	3.41	14
775.96	Overtopping	312.87	312.87	0.00	Overtopping

Table 2 - Culvert Summary Table: CULVERT A @ ML

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
25 YR	252.60	252.60	774.42	6.727	6.538	7-M2c	4.275	3.804	3.804	2.440	11.067	8.558
50 YR	284.70	284.70	775.20	7.514	7.078	7-M2c	5.000	4.120	4.120	2.586	11.518	8.834
100 YR	317.80	314.03	775.99	8.303	7.554	7-M2c	5.000	4.398	4.398	2.727	11.900	9.094

****

Straight Culvert

Inlet Elevation (invert): 767.69 ft, Outlet Elevation (invert): 766.88 ft

Culvert Length: 273.98 ft, Culvert Slope: 0.0030

****

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IH 35W
FROM CR 604/ CR 707 TO US 67

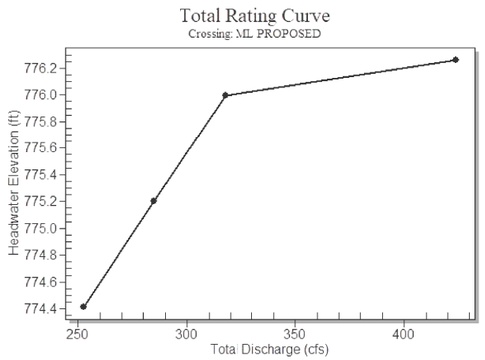
HYDRAULIC COMPUTATIONS

CULVERT HYDROLOGY AND HYDRAULICS

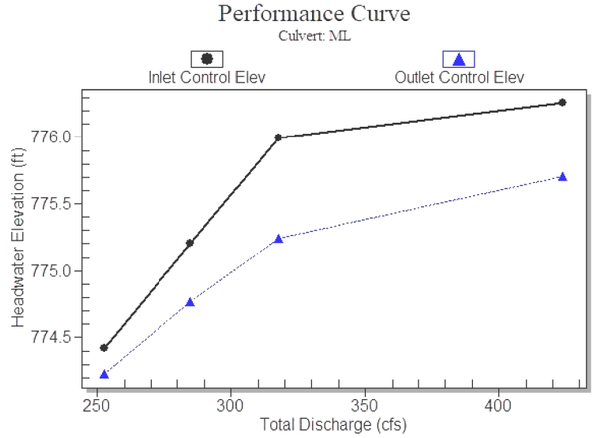
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		146

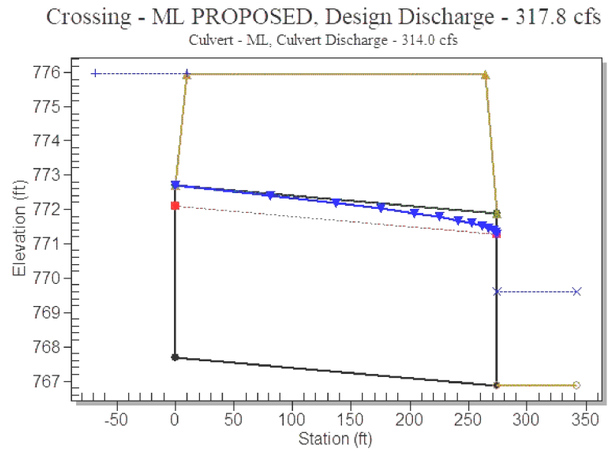
Rating Curve Plot for Crossing: CULVERT A @ ML



Culvert Performance Curve Plot: CULVERT A @ ML



Water Surface Profile Plot for Culvert: CULVERT A @ ML



NOTES:

1. COMPUTATIONS FOLLOW TxDOT 2019 HYDRAULIC DESIGN MANUAL

   RATIONAL METHOD
   Q=C*I*A
   I INTENSITY WAS COMPUTED USING THE PRECIPITATION FREQUENCY VALUES PROVIDED ON NOAA'S DATA SERVER.

Table 3 - Downstream Channel Rating Curve (Crossing: CULVERT A @ CULVERT A @ ML)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
252.60	769.32	2.44	8.56	3.47	1.18
284.70	769.47	2.59	8.83	3.68	1.19
317.80	769.61	2.73	9.09	3.88	1.20

Tailwater Channel Data - CULVERT A @ CULVERT A @ ML

Tailwater Channel Option: Trapezoidal Channel
Bottom Width: 6.00 ft
Side Slope (H:V): 2.50 (_:1)
Channel Slope: 0.0228
Channel Manning's n: 0.0350
Channel Invert Elevation: 766.88 ft

Roadway Data for Crossing: CULVERT A @ CULVERT A @ ML

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 200.00 ft
Crest Elevation: 775.96 ft
Roadway Surface: Paved
Roadway Top Width: 254.00 ft

Site Data - CULVERT A @ ML

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 767.69 ft
Outlet Station: 273.98 ft
Outlet Elevation: 766.88 ft
Number of Barrels: 1

Culvert Data Summary - CULVERT A @ ML

Barrel Shape: Concrete Box
Barrel Span: 6.00 ft
Barrel Rise: 5.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge (90º) Headwall
Inlet Depression: NO

STATE OF TEXAS
IRENE ALANIS
116808
LICENSED
PROFESSIONAL ENGINEER
5/24/2022

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TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

HYDRAULIC COMPUTATIONS

CULVERT HYDROLOGY AND HYDRAULICS

SHEET 3 OF 3

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		147

Drainage Area (10 Year)															
Area - ID	Area - Composite C Value	Area - Composite Area (acres)	Area - Subarea 1 Area (acres)	Area - Subarea 1 C Value	Area - Subarea 1 Description	Area - Subarea 2 Area(acres)	Area - Subarea 2 C Value	Area - Subarea 2 Description	Area - Subarea 3 Area(acres)	Area - Subarea 3 C Value	Area - Subarea 3 Description	Area - Time of Concentration	Area - Tc Used (min.)	Area - Intensity (in./hr.)	Area - Discharge (cfs)
B1	0.95	0.2	0.2	0.95	Pavement	0	0		0	0		10	10	7.26	1.39
B2	0.95	0.17	0.17	0.95	Pavement	0	0		0	0		10	10	7.26	1.18
B3	0.95	0.16	0.16	0.95	Pavement	0	0		0	0		10	10	7.26	1.08
B4	0.95	0.26	0.26	0.95	Pavement	0	0.5	Grass	0	0		10	10	7.26	1.82
B5	0.92	0.38	0.35	0.95	Pavement	0.02	0.5	Grass	0	0		10	10	7.26	2.53
B6	0.94	0.21	0.21	0.95	Pavement	0.01	0.5	Grass	0	0		10	10	7.26	1.46
F1	0.69	8.61	0.55	0.95	Pavement	1.19	0.5	Grass	6.86	0.7	Business	10	10	7.26	43.05
F2	0.75	0.36	0.2	0.95	Pavement	0.16	0.5	Grass	0	0		10	10	7.26	1.95
F3	0.9	0.25	0.22	0.95	Pavement	0.03	0.5	Grass	0	0		10	10	7.26	1.66
F5	0.9	0.29	0.26	0.95	Pavement	0.03	0.5	Grass	0	0		10	10	7.26	1.92
F6	0.9	0.26	0.23	0.95	Pavement	0.03	0.5	Grass	0	0		10	10	7.26	1.69
F7	0.92	0.29	0.26	0.95	Pavement	0.02	0.5	Grass	0	0		10	10	7.26	1.9
F8	0.95	0.19	0.19	0.95	Pavement	0	0		0	0		10	10	7.26	1.33
F9	0.91	0.36	0.33	0.95	Pavement	0.03	0.5	Grass	0	0		10	10	7.26	2.39
F10	0.84	0.29	0.22	0.95	Pavement	0.07	0.5	Grass	0	0		10	10	7.26	1.76
1G	0.57	1.32	0.21	0.95	Pavement	1.11	0.5	Grass	0	0		10	10	7.26	5.47
2G	0.55	0.79	0.09	0.95	Pavement	0.7	0.5	Grass	0	0		10	10	7.26	1.85
G1	0.6	6.73	0.72	0.95	Pavement	4.31	0.5	Grass	1.71	0.7	Business	10	10	7.26	29.28
G2	0.95	0.29	0.29	0.95	Pavement	0	0		0	0		10	10	7.26	1.99

Drainage Area (25 Year)															
Area - ID	Area - Composite C Value	Area - Composite Area (acres)	Area - Subarea 1 Area (acres)	Area - Subarea 1 C Value	Area - Subarea 1 Description	Area - Subarea 2 Area(acres)	Area - Subarea 2 C Value	Area - Subarea 2 Description	Area - Subarea 3 Area(acres)	Area - Subarea 3 C Value	Area - Subarea 3 Description	Area - Time of Concentration	Area - Tc Used (min.)	Area - Intensity (in./hr.)	Area - Discharge (cfs)
G4	0.56	3.91	0.51	0.95	Pavement	3.41	0.5	Grass	0	0		10	10	8.45	18.46

Drainage Area (50 Year)															
Area - ID	Area - Composite C Value	Area - Composite Area (acres)	Area - Subarea 1 Area (acres)	Area - Subarea 1 C Value	Area - Subarea 1 Description	Area - Subarea 2 Area(acres)	Area - Subarea 2 C Value	Area - Subarea 2 Description	Area - Subarea 3 Area(acres)	Area - Subarea 3 C Value	Area - Subarea 3 Description	Area - Time of Concentration	Area - Tc Used (min.)	Area - Intensity (in./hr.)	Area - Discharge (cfs)
A1	0.75	3.74	2.11	0.95	Pavement	1.63	0.5	Grass	0	0		10	10	9.66	27.21
A2	0.74	2.46	1.31	0.95	Pavement	1.15	0.5	Grass	0	0		10	10	9.66	17.55
B	0.61	10.11	2.36	0.95	Pavement	7.75	0.5	Grass	0	0		10	10	9.66	59.11
C	0.57	1.34	0.22	0.95	Pavement	1.11	0.5	Grass	0	0		10	10	9.66	7.41
D	0.72	4.65	2.26	0.95	Pavement	2.39	0.5	Grass	0	0		10	10	9.66	32.28
E	0.73	1.76	0.89	0.95	Pavement	0.87	0.5	Grass	0	0		10	10	9.66	12.38
F4	0.61	1.26	0.3	0.95	Pavement	0.96	0.5	Grass	0	0		10	10	9.66	7.50
G3	0.95	0.17	0.17	0.95	Pavement	0	0		0	0		10	10	9.66	1.57

NOTES:

1. COMPUTATIONS FOLLOW TxDOT 2019 HYDRAULIC DESIGN MANUAL.

   RATIONAL METHOD
   Q=C*I*A

2. INTENSITY VALUES WERE CALCULATED USING e, b, d VALUES OBTAINED FROM THE EBDLKUP-2015v2 SPREADSHEET.

STATE OF TEXAS
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TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

HYDRAULIC COMPUTATIONS

SYSTEM
LINE A,B,C,D,E,F,G

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		148

DATE: 5/24/2022 11:29:28 AM
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subash.paudel

Inlet Configuration(10 Year)

Inlet - ID	Node - Reference Chain	Node - Station	Node - Offset	Node - Library Item Name	Inlet - Profile Type	Inlet - Type	Inlet - Curb Length (ft.)	Inlet - Curb Depression (ft.)	Inlet - Curb Height (ft.)	Inlet - Curb Depression Width (ft.)	Inlet - Grate Type	Inlet - Grate Length (ft.)	Inlet - Grate Width(ft.)	Inlet - Grate Area (sf)	Inlet - Grate Clog Area	Inlet - Grate Perime	Inlet - Grate Clog Per
B1	PNBFR	554+35.00	-14	I-CU(10')(6" curb)	On Grade	Curb	10	0.333	0.49	1.333	n/a	n/a	n/a	n/a	n/a	n/a	n/a
B2	PNBFR	557+35.00	-14	I-CU(10')(6" curb)	On Grade	Curb	10	0.333	0.49	1.333	n/a	n/a	n/a	n/a	n/a	n/a	n/a
B3	PNBFR	559+90.00	-14	I-CU(10')(6" curb)	On Grade	Curb	10	0.333	0.49	1.333	n/a	n/a	n/a	n/a	n/a	n/a	n/a
B4	PNBFR	562+00.00	-14	I-CU(10')(6" curb)	On Grade	Curb	10	0.333	0.49	1.333	n/a	n/a	n/a	n/a	n/a	n/a	n/a
B5	PNBFR	564+27.00	-14	I-CO(10'x3')(6" curb)	On Grade	Curb	10	0.333	0.49	1.333	n/a	n/a	n/a	n/a	n/a	n/a	n/a
B6	PNBFR	567+14.00	-14	I-CO(10'x3')(6" curb)	On Grade	Curb	10	0.333	0.49	1.333	n/a	n/a	n/a	n/a	n/a	n/a	n/a
* F1	PNBFR	584+58.00	-88	I-AD(FTW)	Sag	Grate	n/a	n/a	n/a	n/a	Parallel 1 7/8 - 4	3.00	3.50	12.74	0.5	25.69	0.5
F2	PNBFR	583+80.00	17	I-FG(FTW)	On Grade	Grate	n/a	n/a	n/a	n/a	Parallel 1 7/8 - 4	3.542	3.375	6.903	0.5	8.67	0.5
F3	PNBFR	583+00.00	-14	I-CO(10'x3')(6" curb)	On Grade	Curb	10	0.333	0.49	1.333	n/a	n/a	n/a	n/a	n/a	n/a	n/a
F5	PNBFR	580+47.00	-14	I-CO(10'x3')(6" curb)	On Grade	Curb	10	0.333	0.49	1.333	n/a	n/a	n/a	n/a	n/a	n/a	n/a
F6	PNBFR	577+47.00	-14	I-CO(10'x3')(6" curb)	On Grade	Curb	10	0.333	0.49	1.333	n/a	n/a	n/a	n/a	n/a	n/a	n/a
F7	PNBFR	574+89.00	-18	I-CO(10'x3')(6" curb)	On Grade	Curb	10	0.333	0.49	1.333	n/a	n/a	n/a	n/a	n/a	n/a	n/a
F8	PNBFR	573+81.00	-12	I-FG(FTW)	On Grade	Grate	n/a	n/a	n/a	n/a	Parallel 1 7/8 - 4	3.542	3.375	6.903	0.5	8.67	0.5
F9	PNBFR	571+42.00	-14	I-CO(10'x3')(6" curb)	On Grade	Curb	10	0.333	0.49	1.333	n/a	n/a	n/a	n/a	n/a	n/a	n/a
F10	PNBFR	584+65.00	43.3	I-FG(FTW)	On Grade	Grate	n/a	n/a	n/a	n/a	Parallel 1 7/8 - 4	3.542	3.375	6.903	0.5	8.67	0.5
* G1	PBI35VT	18+04.16	35.3	I-AD(FTW)	Sag	Grate	n/a	n/a	n/a	n/a	Parallel 1 7/8 - 4	3.00	3.50	12.74	0.5	25.69	0.5
G2	PBI35VT	17+40.00	22	I-CO(10'x3')(6" curb)	On Grade	Curb	10	0.333	0.49	1.333	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Inlet Configuration(50 Year)

Inlet - ID	Node - Reference Chain	Node - Station	Node - Offset	Node - Library Item Name	Inlet - Profile Type	Inlet - Type	Inlet - Curb Length (ft.)	Inlet - Curb Depression (ft.)	Inlet - Curb Height (ft.)	Inlet - Curb Depression Width (ft.)	Inlet - Grate Type	Inlet - Grate Length (ft.)	Inlet - Grate Width(ft.)	Inlet - Grate Area (sf)	Inlet - Grate Clog Area	Inlet - Grate Perime	Inlet - Grate Clog Per
* A1	PNBML	544+62.50	-59.8	I-AD(FTW)	Sag	Grate	n/a	n/a	n/a	n/a	Parallel 1 7/8 - 4	3.00	3.50	12.74	0.5	25.69	0.5
A2	PNBML	541+00.00	-80.5	I-AD(FTW)	Sag	Grate	n/a	n/a	n/a	n/a	Parallel 1 7/8 - 4	3.00	3.50	12.74	0.5	25.69	0.5
* C	PNBML	545+18.00	36.5	I-AD(FTW)	Sag	Grate	n/a	n/a	n/a	n/a	Parallel 1 7/8 - 4	3.00	3.50	12.74	0.5	25.69	0.5
* D	PNBML	550+99.10	35	I-AD(FTW)	Sag	Grate	n/a	n/a	n/a	n/a	Parallel 1 7/8 - 4	3.00	3.50	12.74	0.5	25.69	0.5
E	EX35W	574+20.00	-1	I-AD(FTW)	Sag	Grate	n/a	n/a	n/a	n/a	Parallel 1 7/8 - 4	3.00	3.50	12.74	0.5	25.69	0.5
F4	PNBML	581+62.00	-86	I-AD(FTW)	Sag	Grate	n/a	n/a	n/a	n/a	Parallel 1 7/8 - 4	3.00	3.50	12.740	0.5	25.69	0.5
G3	PBI35VT	11+18.00	22.8	I-CO(20'x3')(6" curb)	Sag	Curb	20	0.333	0.49	1.333	n/a	n/a	n/a	n/a	n/a	n/a	n/a

* Existing inlet to remain

Sag Inlet - Hydraulic Computations (50 Year)

Inlet - ID	Node - Library Item Name	Inlet - Type	Inlet - By Pass Flow Into (cfs)	Inlet - Discharge (cfs)	Discharge (Left) (cfs)	Discharge (Right) (cfs)	Inlet - Capacity (cfs)	Longitudinal Slope (Left) (%)	Longitudinal Slope (Right) (%)	Inlet - Composite Spread Slope (ft./ft.)	Inlet - Spread N	Inlet - Ponded Width Left (ft.)	Inlet - Ponded Width Right (ft.)	Inlet - Ponded Width Total (ft.)	Inlet - Max Ponded Width (ft.)	Inlet - Computed Ponded Depth (ft.)	Inlet - Max Ponded Depth (ft.)
* A1	I-AD(FTW)	Grate	0	27.21	25.85	1.36	34.24	0.12	8.33	0.33	0.035	8.38	1.26	2.33	10	0.78	1.0
A2	I-AD(FTW)	Grate	0	17.55	17.20	0.35	23.72	1.60	0.12	0.17	0.015	4.99	1.89	3.50	8	0.58	0.7
* C	I-AD(FTW)	Grate	0	7.41	7.04	0.37	34.24	1.89	0.50	0.29	0.035	3.39	1.44	1.15	10	0.33	1.0
* D	I-AD(FTW)	Grate	0	32.29	6.46	25.83	34.24	0.45	0.45	0.25	0.035	4.66	7.83	3.56	10	0.89	1.0
E	I-AD(FTW)	Grate	0	12.38	2.48	9.91	34.24	1.00	0.51	0.20	0.015	2.35	4.47	2.30	10	0.46	1.0
* F1	I-AD(FTW)	Grate	0	** 43.05	25.83	17.22	48.42	3.50	2.40	0.14	0.035	8.21	7.74	11.74	20	1.58	2.0
F4	I-AD(FTW)	Grate	0	7.50	7.13	0.38	34.24	2.30	8.30	0.25	0.015	3.56	0.93	1.32	10	0.33	1.0
* G1	I-AD(FTW)	Grate	0.008	** 29.29	28.70	0.59	41.93	2.50	10.90	0.19	0.035	7.14	1.26	4.42	7.5	0.82	1.5
G3	I-CO(20'x3')(6" curb)	Curb	0	1.57	0.86	0.71	4.61	0.31	0.75	0.02	0.014	8.09	6.37	4.88	10	0.10	0.2

* Existing inlet to remain
** Existing inlets F1 and G1 were analyzed with 10 Year discharge.

On-Grade Inlet - Hydraulic Computations (10 Year)

Inlet - ID	Node - Library Item Name	Inlet - Type	Inlet - By Pass Flow Into (cfs)	Inlet - Discharge (cfs)	Inlet - Capacity (cfs)	Inlet - By Pass Flow(cfs)	Inlet - By Pass Node ID	Inlet - Longitudinal Slope (%)	Inlet - Composite Spread Slope (ft./ft.)	Inlet - Spread N	Inlet - Computed Ponded Width (ft.)	Inlet - Max Ponded Width (ft.)	Inlet - Computed Ponded Depth (ft.)	Inlet - Max Ponded Depth (ft.)
B1	I-CU(10')(6" curb)	Curb	0	1.39	1.39	0		0.85	0.02	0.014	8.01	14	0.16	0.28
B2	I-CU(10')(6" curb)	Curb	0	1.18	1.18	0		0.85	0.02	0.014	7.54	14	0.15	0.28
B3	I-CU(10')(6" curb)	Curb	0	1.08	1.08	0		0.677	0.02	0.014	7.61	14	0.15	0.28
B4	I-CU(10')(6" curb)	Curb	0	1.82	1.82	0		0.45	0.02	0.014	9.98	14	0.20	0.28
B5	I-CO(10'x3')(6" curb)	Curb	0	2.53	2.53	0		0.45	0.02	0.014	11.30	14	0.23	0.28
B6	I-CO(10'x3')(6" curb)	Curb	0	1.46	1.46	0		0.45	0.02	0.014	9.19	14	0.18	0.28
F2	I-FG(FTW)	Grate	0.019	1.97	1.51	0.463	F10	2.326	0.015	0.014	9.06	14	0.14	0.28
F3	I-CO(10'x3')(6" curb)	Curb	0.045	1.70	1.68	0.019	F2	2.326	0.02	0.014	7.16	14	0.14	0.28
F5	I-CO(10'x3')(6" curb)	Curb	0	1.92	1.88	0.045	F3	2.078	0.02	0.014	7.65	14	0.15	0.28
F6	I-CO(10'x3')(6" curb)	Curb	0.065	1.76	1.76	0	F5	1.000	0.02	0.014	8.49	14	0.17	0.28
F7	I-CO(10'x3')(6" curb)	Curb	0.156	2.06	2.00	0.065	F6	1.943	0.02	0.014	7.96	14	0.16	0.28
F8	I-FG(FTW)	Grate	0	1.34	1.18	0.156	F7	1.943	0.02	0.014	6.76	14	0.14	0.28
F9	I-CO(10'x3')(6" curb)	Curb	0	2.39	2.34	0.047	Line G2	1.113	0.02	0.014	9.33	14	0.19	0.28
F10	I-FG(FTW)	Grate	0.463	2.23	1.76	0.465	Existing DS Inlet	0.880	0.02	0.014	9.50	15	0.19	0.30
G2	I-CO(10'x3')(6 curb)	Curb	0	1.99	1.99	0.008	G1	1.283	0.02	0.014	8.49	10	0.17	0.20

NOTES:

1. COMPUTATIONS FOLLOW TxDOT 2019 HYDRAULIC DESIGN MANUAL.

   RATIONAL METHOD
   Q=C*I*A

2. INTENSITY VALUES WERE CALCULATED USING e, b, d VALUES OBTAINED FROM THE EBDLKUP-2015v2 SPREADSHEET.

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TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

HYDRAULIC COMPUTATIONS

SYSTEM
LINE A,B,C,D,E,F,G

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		149

DATE: 5/24/2022 11:29:36 AM
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subash.paudel

Conduit - Configuration (10 Year)

Line - ID	Link - ID	Link - Type	Link - Upstream Node	Link - Downstream Node	FN Node - Cumulative Area (acre)	FN Node - Cumulative C Value	FN Node - Cumulative Intensity (in./hr.)	FN Node - Tc Used (min.)	Link - Actual Length (ft.)	Link - Shape	Link - Number of Barrels	Link - Rise (ft.)	Link - Span (ft.)	Link - Manning's N Value	Link - Slope (%)	Link - Invert Upstream (ft.)	Link - Invert Downstream (ft.)
LINE B2	B2-1	Pipe	B1	B2-OUT	1.384	0.94	6.187	14.322	59.193	Circular	1	2	n/a	0.012	0.561	774.712	774.38
	B2-2	Pipe	B2	B1	1.183	0.938	6.354	13.545	290.702	Circular	1	2	n/a	0.012	0.88	777.271	774.712
	B2-3	Pipe	B3	B2	1.012	0.936	6.511	12.853	245.817	Circular	1	2	n/a	0.012	0.856	779.374	777.271
	B2-4	Pipe	B4	B3	0.856	0.934	6.66	12.233	200.681	Circular	1	2	n/a	0.012	0.768	780.915	779.374
	B2-5	Pipe	B5	B4	0.592	0.928	6.853	11.471	217.867	Circular	1	2	n/a	0.012	0.699	782.438	780.915
	B2-6	Pipe	B6	B5	0.214	0.937	7.265	10	278.167	Circular	1	2	n/a	0.012	0.465	783.732	782.438
LINE F1	F-1	Pipe	MH-F1	F1	3.261	0.78	6.542	12.72	110.393	Circular	1	2	n/a	0.012	0.77	760.73	759.88
	F-2	Pipe	F3	MH-F1	1.648	0.91	6.573	12.592	73.526	Circular	1	2	n/a	0.012	2.571	762.62	760.73
	F-3	Pipe	F5	F3	1.394	0.912	6.672	12.182	243.014	Circular	1	2	n/a	0.012	2.8	769.425	762.62
	F-4	Pipe	F6	F5	1.1	0.916	6.846	11.497	290.014	Circular	1	2	n/a	0.012	1.261	773.083	769.425
	F-5	Pipe	F7	F6	0.841	0.921	7.009	10.891	248.732	Circular	1	2	n/a	0.012	1.427	776.633	773.083
	F-6	Pipe	F8	F7	0.555	0.923	7.075	10.655	112.19	Circular	1	2	n/a	0.012	2.867	778.349	775.133
	F-7	Pipe	F9	F8	0.361	0.908	7.265	10	233.401	Circular	1	2	n/a	0.012	1.817	782.591	778.349
LINE F2	F2-1	Pipe	F2	MH-F1	1.613	0.647	7.194	10.238	31.501	Circular	1	2	n/a	0.012	3.206	761.74	760.73
	F2-2	Pipe	F4	F2	1.256	0.618	7.265	10	111.005	Circular	1	2	n/a	0.012	1.91	763.86	761.74
LINE G1	LINE G1	Pipe	G2	G1	0.289	0.95	7.265	10	65.089	Circular	1	2	n/a	0.012	5.156	773.186	769.83

Conduit - Configuration (25 Year)

Line - ID	Link - ID	Link - Type	Link - Upstream Node	Link - Downstream Node	FN Node - Cumulative Area	FN Node - Cumulative C Value	FN Node - Cumulative Intensity	FN Node - Tc Used	Link - Actual Length	Link - Shape	Link - Number of Barrels	Link - Rise	Link - Span	Link - Manning's N Value	Link - Slope	Link - Invert Upstream	Link - Invert Downstream
LINE G2	LINE G2	Pipe	G4	G3	3.914	0.558	8.45	10	57.924	Circular	1	2	n/a	0.012	0.52	780	779.69
	LINE G2-1	Pipe	G3	G3-OUT	4.085	0.575	8.361	10.264	15.958	Circular	1	2	n/a	0.012	1.179	779.69	779.59

Conduit - Configuration (50 Year)

Line - ID	Link - ID	Link - Type	Link - Upstream Node	Link - Downstream Node	FN Node - Cumulative Area	FN Node - Cumulative C Value	FN Node - Cumulative Intensity	FN Node - Tc Used	Link - Actual Length	Link - Shape	Link - Number of Barrels	Link - Rise	Link - Span	Link - Manning's N Value	Link - Slope	Link - Invert Upstream	Link - Invert Downstream
LINE A	LINE A	Pipe	A2	A-OUT	2.457	0.74	9.659	10	151.765	Circular	1	2	n/a	0.012	0.443	774.573	773.9
LINE B1	LINE B1	Pipe	B	B1-OUT	10.112	0.605	9.659	10	26.048	Circular	1	3	n/a	0.012	1.106	768.71	768.422
LINE E	LINE E-1	Pipe	E-BEND	E-OUT	1.759	0.729	9.659	10	217.961	Circular	1	2	n/a	0.012	4.184	773.12	764
	LINE E-2	Pipe	E	E-BEND	1.759	0.729	9.659	10	4.104	Circular	1	2	n/a	0.012	1.949	773.2	773.12

NOTES:

1. COMPUTATIONS FOLLOW TxDOT 2019 HYDRAULIC DESIGN MANUAL.

   RATIONAL METHOD
   Q=C*I*A

2. INTENSITY VALUES WERE CALCULATED USING e, b, d VALUES OBTAINED FROM THE EBDLKUP-2015v2 SPREADSHEET.

Conduit - Hydraulic Computations (10 Year)

Line - ID	Link - ID	Link - Type	Link - Upstream Node	Link - Downstream Node	Link - Actual Length (ft.)	Link - Discharge (cfs)	Link - Capacity (cfs)	Link - Uniform Depth (ft.)	Link - Critical Depth (ft.)	Link - Actual Depth Downstream (ft.)	Link - Uniform Velocity (fps)	Link - Actual Velocity Downstream (fps)	Link - Friction Slope (ft./ft.)	FN Node - Junction Loss(ft.)	FN Node - Elevation (ft.)	Link - HGL Upstream (ft.)	TN Node - Elevation (ft.)	Link - HGL Downstream (ft.)
LINE B2	B2-1	Pipe	B1	B2-OUT	59.193	8.049	19.744	0.924	1.01	2	5.672	2.562	0.006	0.164	780.212	776.633	777.22	776.38
	B2-2	Pipe	B2	B1	290.702	7.054	24.735	0.759	0.943	0.761	6.451	6.431	0.009	0.038	782.77	778.34	780.212	775.473
	B2-3	Pipe	B3	B2	245.817	6.171	24.384	0.711	0.879	0.712	6.161	6.155	0.009	0.036	784.87	780.374	782.77	777.983
	B2-4	Pipe	B4	B3	200.681	5.322	23.102	0.678	0.814	0.679	5.67	5.665	0.008	0.05	785.91	781.855	784.87	780.053
	B2-5	Pipe	B5	B4	217.867	3.763	22.042	0.579	0.68	0.579	4.984	4.984	0.007	0.06	786.94	783.248	785.91	781.494
	B2-6	Pipe	B6	B5	278.167	1.458	17.981	0.4	0.416	0.4	3.264	3.264	0.005	0.109	788.232	784.304	786.94	782.838
LINE F1	F-1	Pipe	MH-F1	F1	110.393	16.644	23.133	1.32	1.471	1.471	7.566	6.72	0.008	0.659	767.226	763.057	763.6	761.351
	F-2	Pipe	F3	MH-F1	73.526	9.856	42.267	0.683	1.123	0.704	10.403	9.978	0.026	0.043	768.12	763.953	767.226	761.434
	F-3	Pipe	F5	F3	243.014	8.484	44.116	0.617	1.038	0.618	10.298	10.268	0.028	0.024	773.92	770.766	768.12	763.238
	F-4	Pipe	F6	F5	290.014	6.896	29.608	0.682	0.932	0.683	7.291	7.283	0.013	0.043	777.58	774.184	773.92	770.108
	F-5	Pipe	F7	F6	248.732	5.427	31.495	0.583	0.822	0.583	7.125	7.124	0.014	0.29	781.13	777.887	777.58	773.666
	F-6	Pipe	F8	F7	112.19	3.623	44.635	0.4	0.667	0.401	8.109	8.083	0.029	0.039	783.349	779.141	781.13	775.534
	F-7	Pipe	F9	F8	233.401	2.385	35.541	0.364	0.537	0.364	6.107	6.097	0.018	0.11	787.091	783.357	783.349	778.713
LINE F2	F2-1	Pipe	F2	MH-F1	31.501	7.514	47.205	0.56	0.974	0.614	10.433	9.174	0.032	0.435	766.24	763.245	767.226	761.344
	F2-2	Pipe	F4	F2	111.005	5.638	36.433	0.552	0.839	0.555	7.992	7.938	0.019	0.266	768.36	765.06	766.24	762.295
LINE G1	LINE G1	Pipe	G2	G1	65.089	1.994	59.862	0.259	0.49	0.26	8.357	8.322	0.052	0.04	779.69	774.063	775.83	770.09

Conduit - Hydraulic Computations (25 Year)

Line - ID	Link - ID	Link - Type	Link - Upstream Node	Link - Downstream Node	Link - Actual Length	Link - Discharge	Link - Capacity	Link - Uniform Depth	Link - Critical Depth	Link - Actual Depth Downstream	Link - Uniform Velocity	Link - Actual Velocity Downstream	Link - Friction Slope	FN Node - Junction Loss	FN Node - Elevation	Link - HGL Upstream	TN Node - Elevation	Link - HGL Downstream
LINE G2	LINE G2	Pipe	G4	G3	57.924	18.463	19.286	1.7	1.547	2	6.48	5.88	0.00534	0.537	783	782.29	784.29	781.9
	LINE G2-1	Pipe	G3	G3-OUT	14	19.34	21.883	1.584	1.593	2	7.357	6.25	0.00685	0.042	784.29	781.9	782.43	781.71

Conduit - Hydraulic Computations (50 Year)

Line - ID	Link - ID	Link - Type	Link - Upstream Node	Link - Downstream Node	Link - Actual Length	Link - Discharge	Link - Capacity	Link - Uniform Depth	Link - Critical Depth	Link - Actual Depth Downstream	Link - Uniform Velocity	Link - Actual Velocity Downstream	Link - Friction Slope	FN Node - Junction Loss	FN Node - Elevation	Link - HGL Upstream	TN Node - Elevation	Link - HGL Downstream
LINE A	LINE A	Pipe	A2	A-OUT	151.765	17.552	17.556	1.877	1.51	1.51	5.732	6.898	0.004	0.485	778.24	777.56	778.121	775.41
LINE B1	LINE B1	Pipe	B1-IN	B1-OUT	26.048	59.109	81.73	1.991	2.486	3	11.868	8.362	0.011	1.087	772.54	772.06	776.348	771.422
LINE E	LINE E-1	Pipe	E-BEND	E-OUT	217.961	12.394	53.926	0.677	1.266	0.679	13.227	13.196	0.042	0.211	780.84	774.6	767.138	764.679
	LINE E-2	Pipe	E	E-BEND	4.104	12.394	36.806	0.832	1.266	1.1	10.019	7.004	0.019	0.374	780.84	774.84	780.84	774.22

Notes:
1. Starting Water Surface Elevation at node OUT is assumed to be equal to the soffit elevation of the pipe.
2. Lines F1, F2, & G1 downstream connection is to an existing ditch area inlet.
3. Existing Line E's Actual Velocity Downstream is > than 12 fps. This line was kept at its existing location to maintain drainage patterns and to minimize any disturbance to the IH 35W Southbound Mainlanes.

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5/24/2022

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TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

HYDRAULIC COMPUTATIONS

SYSTEM
LINE A,B,D,E,F,G

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		150

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Conduit - Hydraulic Computations (100 Year)

Line - ID	Link - ID	Link - Type	Link - Upstream Node	Link - Downstream Node	Link - Actual Length	Link - Discharge	Link - Capacity	Link - Uniform Depth	Link - Critical Depth	Link - Actual Depth Downstream	Link - Uniform Velocity	Link - Actual Velocity Downstream	Link - Friction Slope	FN Node - Junction Loss	FN Node - Elevation	Link - HGL Upstream	TN Node - Elevation	Link - HGL Downstream
LINE A	LINE A	Pipe	A2	A-OUT	142.838	19.951	17.556	2	1.604	1.604	6.515	7.386	0.006	0.627	778.24	777.508	778.121	775.504
LINE B1	LINE B1	Pipe	B	B1-OUT	24.712	67.187	83.91	2.145	2.619	3	12.423	9.505	0.012	1.456	771.865	774.28	776.348	771.422
LINE B2	B2-1	Pipe	B1	B2-OUT	73.601	12.444	19.744	1.203	1.268	2	6.306	3.961	0.006	0.369	780.712	776.911	774	776.38
	B2-2	Pipe	B2	B1	290.702	10.868	24.735	0.968	1.182	0.968	7.212	7.212	0.009	0.055	783.271	778.596	780.712	775.68
	B2-3	Pipe	B3	B2	245.817	9.477	24.384	0.902	1.1	0.902	6.891	6.89	0.009	0.051	785.374	780.611	783.271	778.173
	B2-4	Pipe	B4	B3	200.681	8.148	23.102	0.854	1.017	0.855	6.363	6.36	0.008	0.069	786.415	782.078	785.374	780.229
	B2-5	Pipe	B5	B4	217.867	5.738	22.042	0.726	0.846	0.726	5.572	5.572	0.007	0.083	787.438	783.437	786.415	781.641
	B2-6	Pipe	B6	B5	278.167	2.204	17.981	0.491	0.515	0.491	3.678	3.678	0.005	0.145	788.732	784.438	787.438	782.929
LINE E	LINE E-1	Pipe	E-BEND	E-OUT	217.961	14.087	53.926	0.725	1.352	0.727	13.703	13.652	0.042	0.234	780.84	774.706	767.138	764.727
	LINE E-2	Pipe	E	E-BEND	4.104	14.087	36.806	0.895	1.352	1.182	10.353	7.288	0.019	0.415	780.84	774.967	780.84	774.302
LINE F1	F-1	Pipe	MH-F1	F1	105.139	25.541	23.704	2	1.775	1.775	8.341	8.665	0.009	3.051	767.226	765.923	763.6	761.655
	F-2	Pipe	F3	MH-F1	73.526	15.115	42.267	0.86	1.402	2	11.704	4.811	0.026	0.023	768.62	766.25	767.226	765.923
	F-3	Pipe	F5	F3	243.014	12.983	44.116	0.774	1.296	0.774	11.57	11.555	0.028	0.038	774.425	771.039	768.62	763.394
	F-4	Pipe	F6	F5	290.014	10.514	29.608	0.858	1.162	0.858	8.164	8.164	0.013	0.063	778.083	774.433	774.425	770.283
	F-5	Pipe	F7	F6	258.939	8.251	30.868	0.733	1.023	0.734	7.904	7.892	0.014	0.082	781.633	777.798	778.083	773.817
	F-6	Pipe	F8	F7	108.586	5.498	45.369	0.488	0.828	0.49	9.273	9.214	0.03	0.058	783.349	779.299	781.633	775.623
	F-7	Pipe	F9	F8	233.401	3.605	35.541	0.446	0.665	0.447	6.911	6.886	0.018	0.156	787.591	783.529	783.349	778.796
LINE F2	F2-1	Pipe	F2	MH-F1	31.501	11.375	47.205	0.695	1.21	2	11.725	3.621	0.032	0.258	766.24	766.255	767.226	765.923
	F2-2	Pipe	F4	F2	111.513	8.521	36.35	0.684	1.041	2	8.977	2.712	0.019	0.114	768.36	766.505	766.24	766.255
LINE G1	LINE G1	Pipe	G2	G1	65.735	3.014	59.567	0.317	0.606	0.319	9.418	9.317	0.051	0.152	780.186	774.029	775.83	770.149
LINE G2	LINE G2	Pipe	G4	G3	98.8	23.997	19.004	2	1.735	2	7.837	7.638	0.008	0.907	779.577	783.23	784.79	781.312
	LINE G2-1	Pipe	G3	G3-OUT	26.2	25.569	28.629	1.569	1.776	2	9.668	8.139	0.012	0.037	784.79	781.312	781.855	781.102

NOTES:

1. COMPUTATIONS FOLLOW TxDOT 2019 HYDRAULIC DESIGN MANUAL.

   RATIONAL METHOD
   Q=C*I*A

2. INTENSITY VALUES WERE CALCULATED USING e, b, d VALUES OBTAINED FROM THE EBDLKUP-2015v2 SPREADSHEET.

STATE OF TEXAS
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5/24/2022

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TBPE NO. F-3580

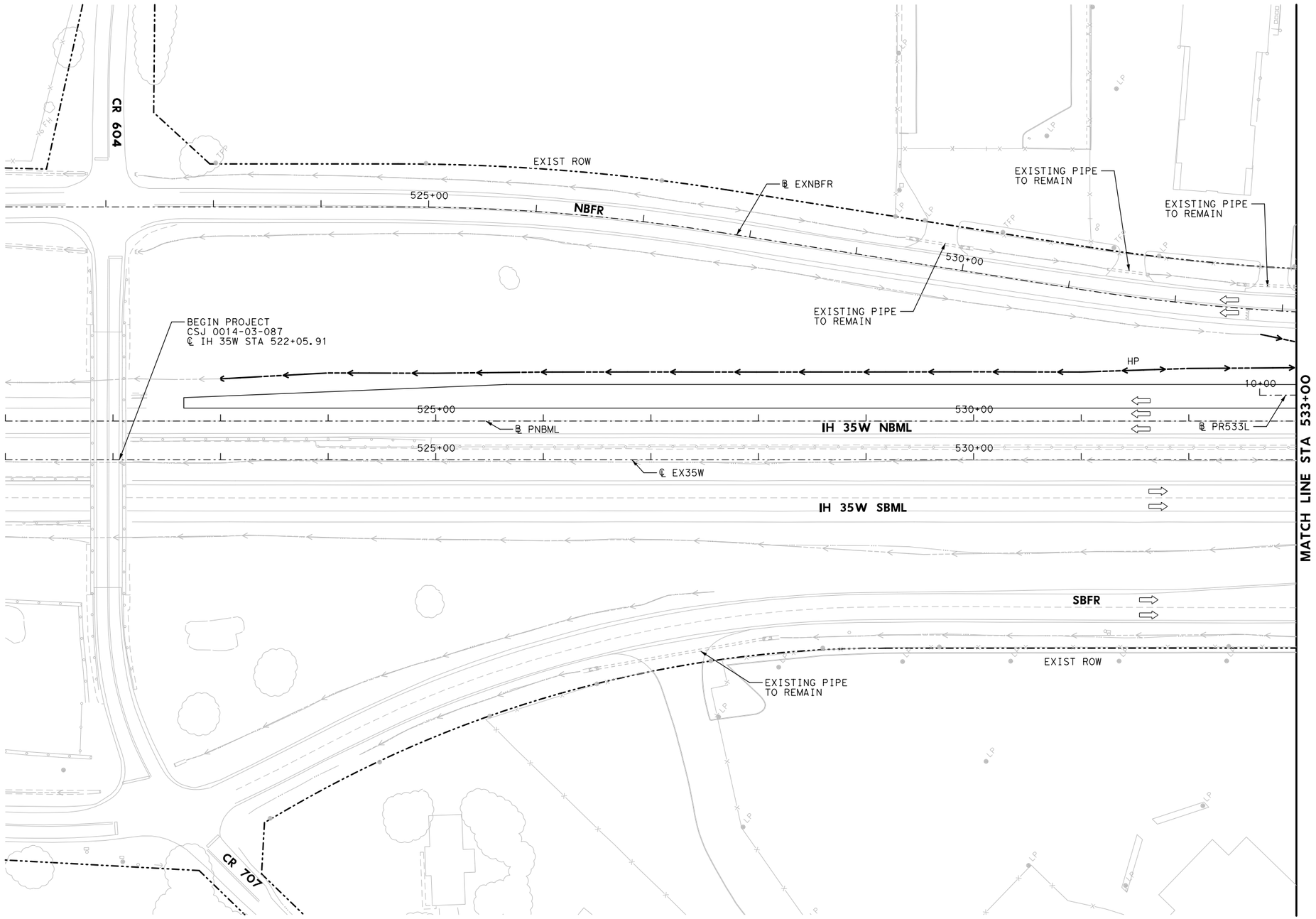
IH 35W
FROM CR 604/ CR 707 TO US 67

HYDRAULIC COMPUTATIONS

SYSTEM
LINE A,B,D,E,F,G

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		151



0′ 50′ 100′
SCALE IN FEET

LEGEND

I-CO	CURB INLET OUTSIDE PAVEMENT
I-CU	CURB INLET UNDER PAVEMENT
I-FG	GRATED INLET FOR PAVED SURFACES
I-AD	AREA-DITCH INLET
	DRAINAGE FLOW ARROW
XX	INLET IDENTIFICATION
MH-XX	MANHOLE
XX OUTFALL	OUTFALL NAME
	PROP DITCH FLOW
	EXIST DITCH FLOW
	TRAFFIC FLOW ARROW

NOTES:

1. ALL STATIONS AND OFFSETS ARE BASED ON THE ℄ PNBML UNLESS OTHERWISE NOTED.
2. UNLESS OTHERWISE SPECIFIED DITCH FLOWLINES ARE DICTATED BY ROADWAY CROSS SECTIONS.
3. CONTRACTOR TO VERIFY UTILITIES LOCATION AND ELEVATION.

STATE OF TEXAS
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IH 35W
FROM CR 604/ CR 707 TO US 67

IH 35W DRAINAGE PLAN

BEGIN PROJECT TO STA 533+00

SHEET 1 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		152

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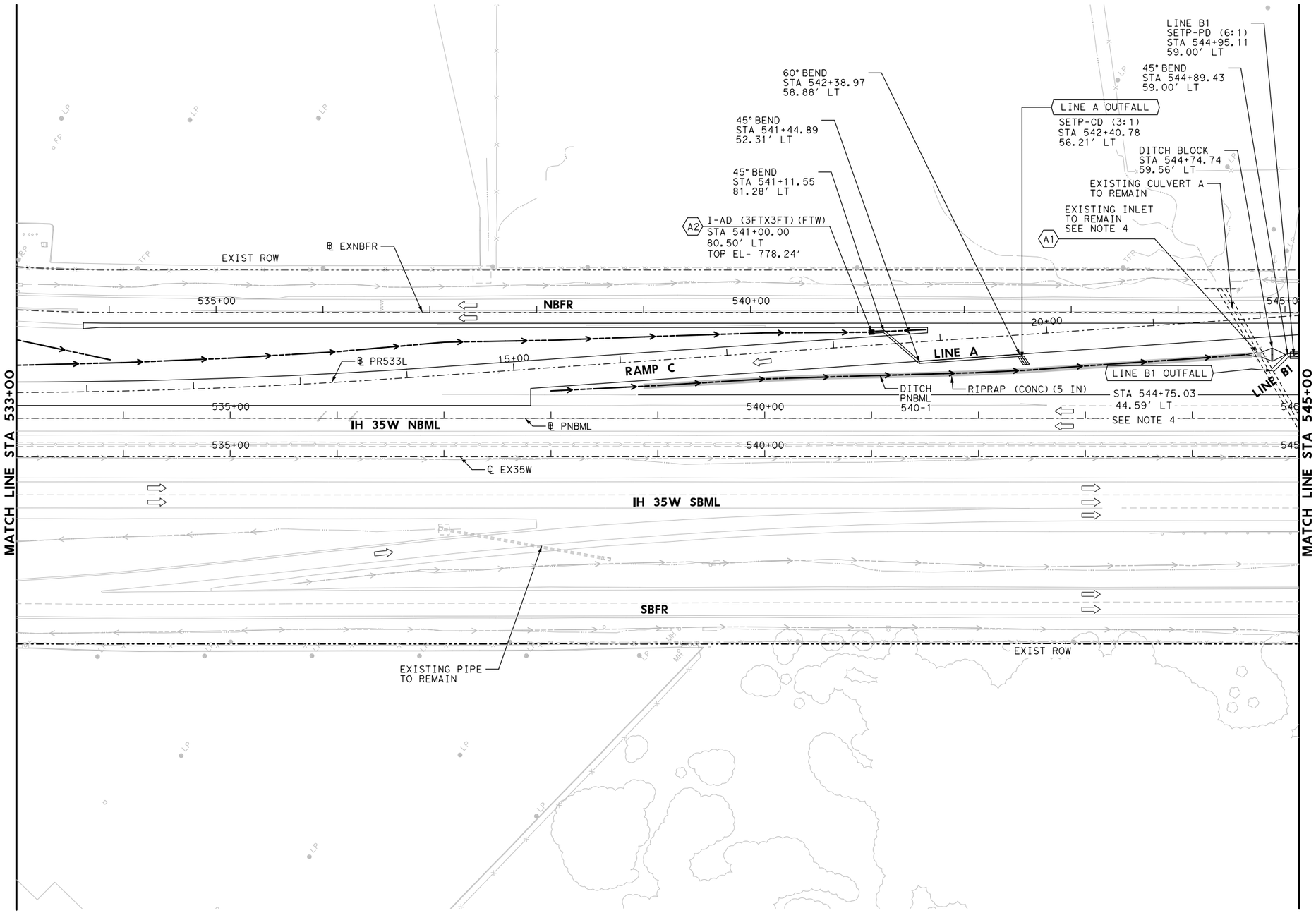

0' 50' 100'
SCALE IN FEET

LEGEND

I-CO	CURB INLET OUTSIDE PAVEMENT
I-CU	CURB INLET UNDER PAVEMENT
I-FG	GRATED INLET FOR PAVED SURFACES
I-AD	AREA-DITCH INLET
	DRAINAGE FLOW ARROW
XX	INLET IDENTIFICATION
MH-XX	MANHOLE
XX OUTFALL	OUTFALL NAME
	PROP DITCH FLOW
	EXIST DITCH FLOW
	TRAFFIC FLOW ARROW

NOTES:

1. ALL STATIONS AND OFFSETS ARE BASED ON THE ℄ PNBML UNLESS OTHERWISE NOTED.
2. UNLESS OTHERWISE SPECIFIED DITCH FLOWLINES ARE DICTATED BY ROADWAY CROSS SECTIONS.
3. CONTRACTOR TO VERIFY UTILITIES LOCATION AND ELEVATION.
4. CONTRACTOR TO VERIFY LOCATION AND ELEVATION OF EXISTING INLETS.

STATE OF TEXAS
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TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

IH 35W DRAINAGE PLAN

STA 533+00 TO STA 545+00

SHEET 2 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		153

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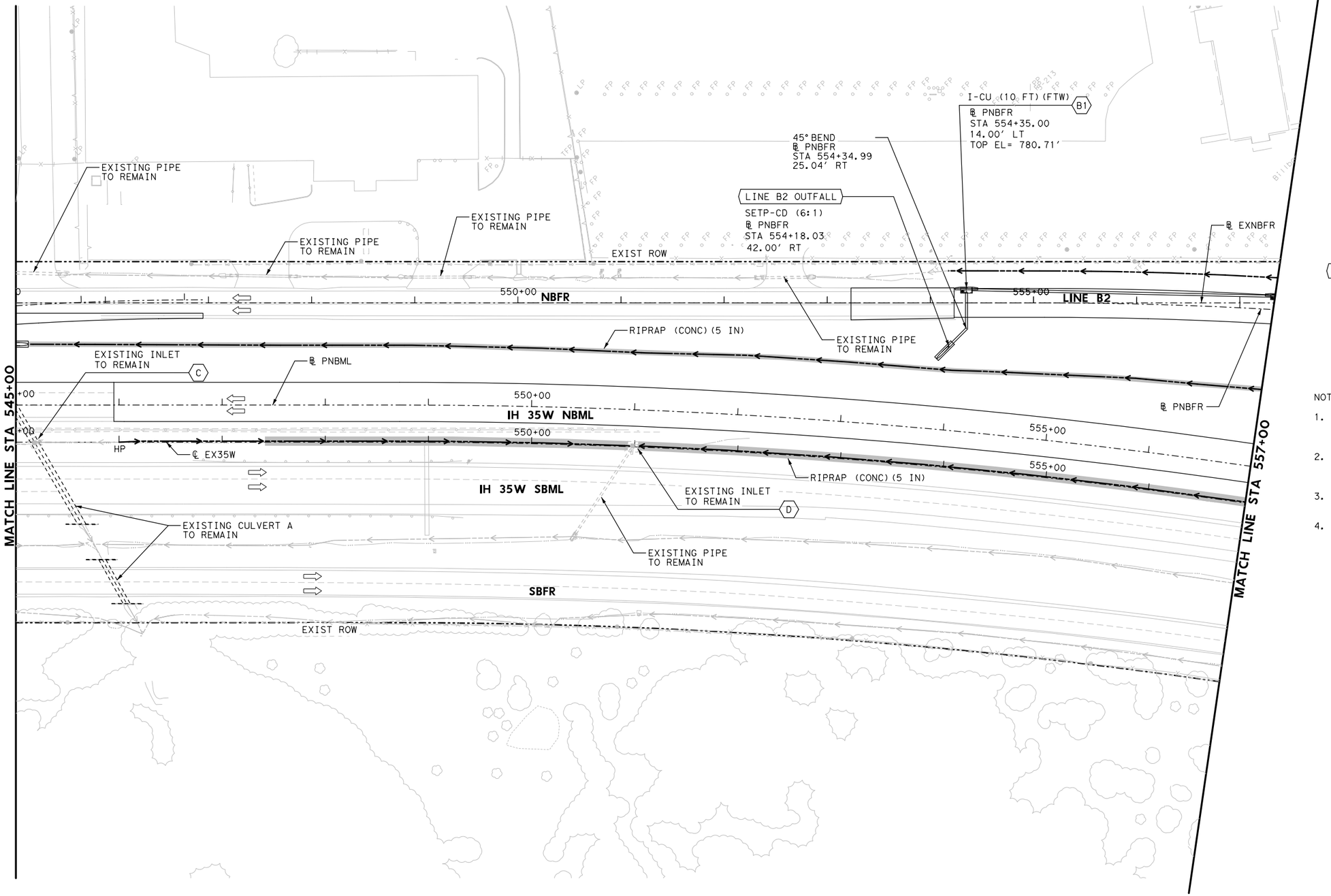

0' 50' 100'
SCALE IN FEET

LEGEND

I-CO	CURB INLET OUTSIDE PAVEMENT
I-CU	CURB INLET UNDER PAVEMENT
I-FG	GRATED INLET FOR PAVED SURFACES
I-AD	AREA-DITCH INLET
	DRAINAGE FLOW ARROW
XX	INLET IDENTIFICATION
MH-XX	MANHOLE
XX OUTFALL	OUTFALL NAME
	PROP DITCH FLOW
	EXIST DITCH FLOW
	TRAFFIC FLOW ARROW

NOTES:

1. ALL STATIONS AND OFFSETS ARE BASED ON THE ℄ PNBML UNLESS OTHERWISE NOTED.
2. UNLESS OTHERWISE SPECIFIED DITCH FLOWLINES ARE DICTATED BY ROADWAY CROSS SECTIONS.
3. CONTRACTOR TO VERIFY UTILITIES LOCATION AND ELEVATION.
4. CONTRACTOR TO VERIFY LOCATION AND ELEVATION OF EXISTING INLETS.

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IH 35W
FROM CR 604/ CR 707 TO US 67

IH 35W DRAINAGE PLAN

STA 545+00 TO STA 557+00

SHEET 3 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		154

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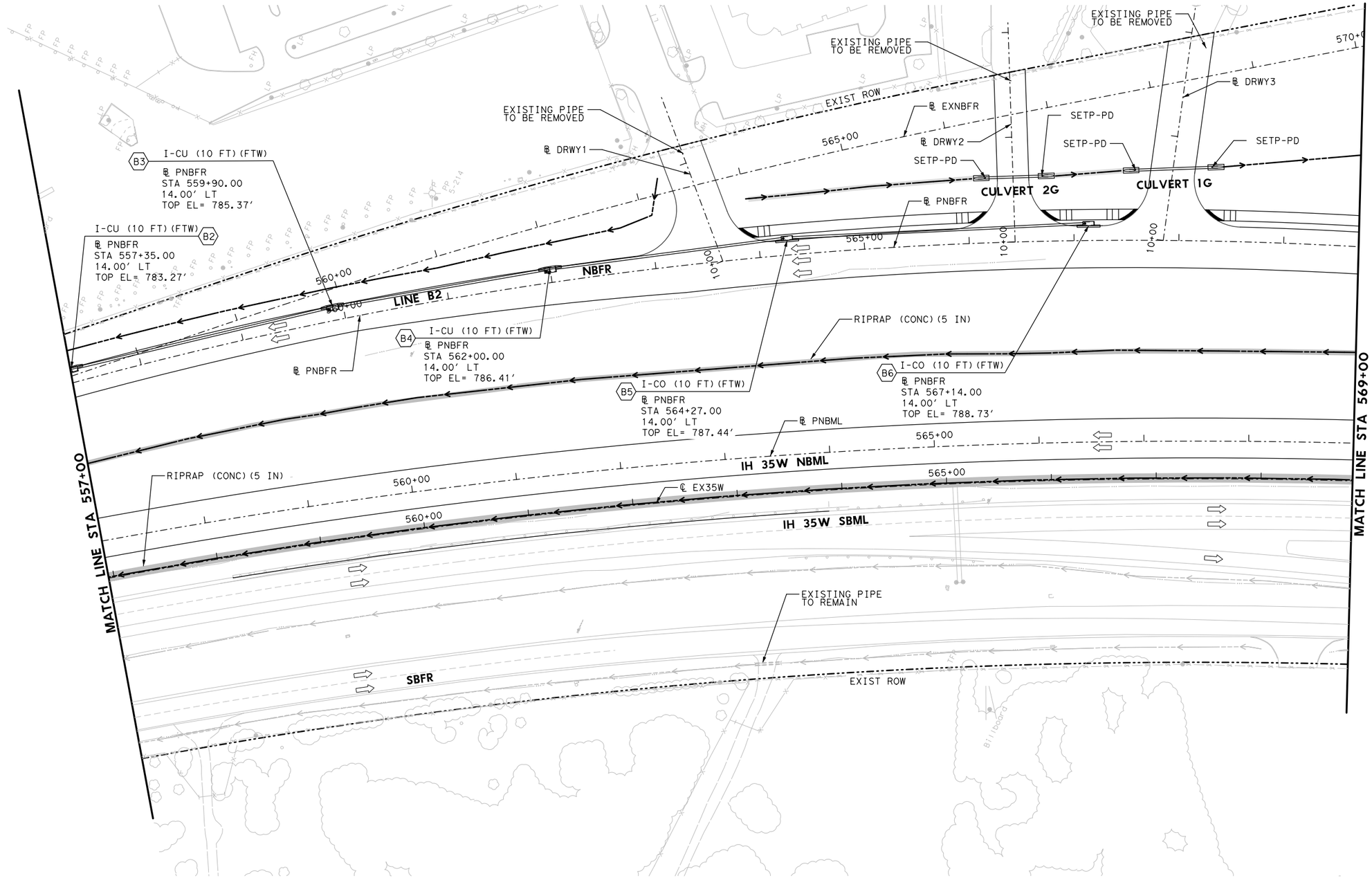

0′ 50′ 100′
SCALE IN FEET

LEGEND

I-CO	CURB INLET OUTSIDE PAVEMENT
I-CU	CURB INLET UNDER PAVEMENT
I-FG	GRATED INLET FOR PAVED SURFACES
I-AD	AREA-DITCH INLET
	DRAINAGE FLOW ARROW
XX	INLET IDENTIFICATION
MH-XX	MANHOLE
XX OUTFALL	OUTFALL NAME
	PROP DITCH FLOW
	EXIST DITCH FLOW
	TRAFFIC FLOW ARROW

NOTES:

1. ALL STATIONS AND OFFSETS ARE BASED ON THE ℄ PNBML UNLESS OTHERWISE NOTED.
2. UNLESS OTHERWISE SPECIFIED DITCH FLOWLINES ARE DICTATED BY ROADWAY CROSS SECTIONS.
3. CONTRACTOR TO VERIFY UTILITIES LOCATION AND ELEVATION.

STATE OF TEXAS
IRENE ALANIS
116808
LICENSED
PROFESSIONAL ENGINEER

5/24/2022

AECOM
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

IH 35W DRAINAGE PLAN

STA 557+00 TO STA 569+00

SHEET 4 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		155

DATE: 5/24/2022 11:30:25 AM
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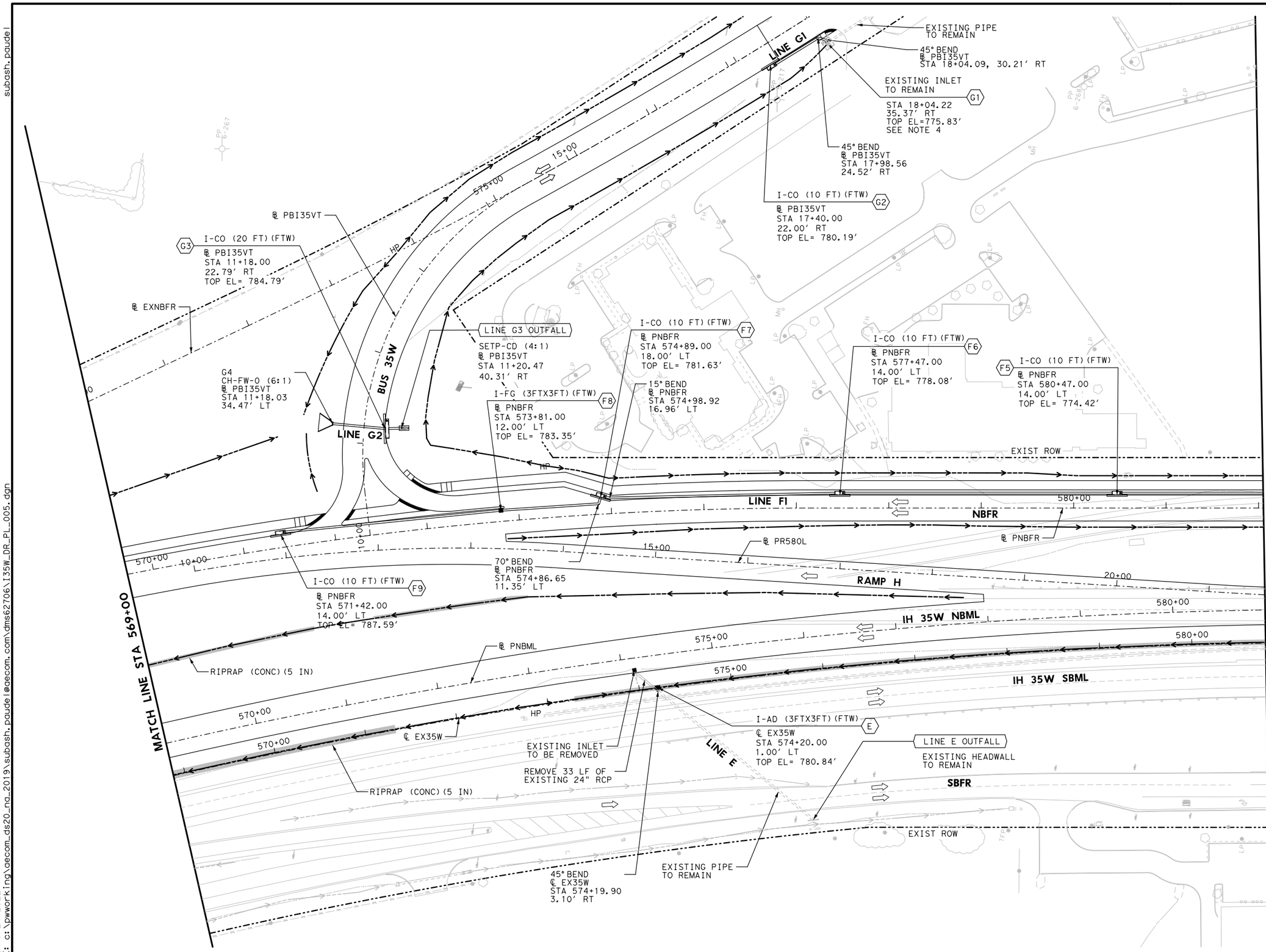

0' 50' 100'
SCALE IN FEET

N

LEGEND

I-CO	CURB INLET OUTSIDE PAVEMENT
I-CU	CURB INLET UNDER PAVEMENT
I-FG	GRATED INLET FOR PAVED SURFACES
I-AD	AREA-DITCH INLET
	DRAINAGE FLOW ARROW
XX	INLET IDENTIFICATION
MH-XX	MANHOLE
XX OUTFALL	OUTFALL NAME
	PROP DITCH FLOW
	EXIST DITCH FLOW
	TRAFFIC FLOW ARROW

NOTES:

1. ALL STATIONS AND OFFSETS ARE BASED ON THE ℄ PNBML UNLESS OTHERWISE NOTED.
2. UNLESS OTHERWISE SPECIFIED DITCH FLOWLINES ARE DICTATED BY ROADWAY CROSS SECTIONS.
3. CONTRACTOR TO VERIFY UTILITIES LOCATION AND ELEVATION.
4. CONTRACTOR TO VERIFY LOCATION AND ELEVATION OF EXISTING INLETS.

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IRENE ALANIS
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IH 35W
FROM CR 604/ CR 707 TO US 67

IH 35W DRAINAGE PLAN

STA 569+00 TO STA 581+00

SHEET 5 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		156

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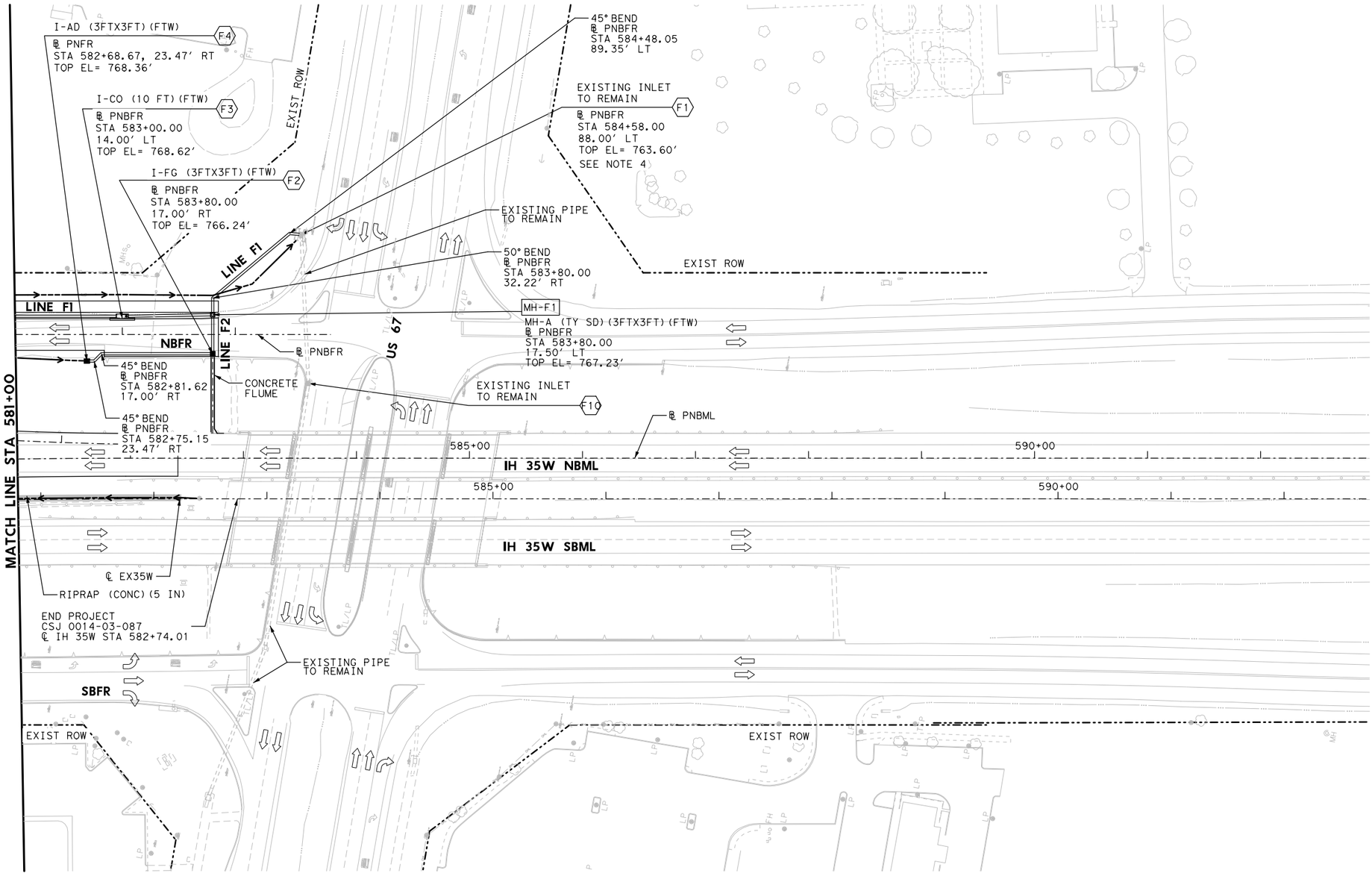

0' 50' 100'
SCALE IN FEET

N

LEGEND

I-CO	CURB INLET OUTSIDE PAVEMENT
I-CU	CURB INLET UNDER PAVEMENT
I-FG	GRATED INLET FOR PAVED SURFACES
I-AD	AREA-DITCH INLET
	DRAINAGE FLOW ARROW
XX	INLET IDENTIFICATION
MH-XX	MANHOLE
XX OUTFALL	OUTFALL NAME
	PROP DITCH FLOW
	EXIST DITCH FLOW
	TRAFFIC FLOW ARROW

NOTES:

1. ALL STATIONS AND OFFSETS ARE BASED ON THE ℄ PNBML UNLESS OTHERWISE NOTED.
2. UNLESS OTHERWISE SPECIFIED DITCH FLOWLINES ARE DICTATED BY ROADWAY CROSS SECTIONS.
3. CONTRACTOR TO VERIFY UTILITIES LOCATION AND ELEVATION.
4. CONTRACTOR TO VERIFY LOCATION AND ELEVATION OF EXISTING INLETS.

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IH 35W
FROM CR 604/ CR 707 TO US 67

IH 35W DRAINAGE PLAN

STA 581+00 TO END PROJECT

SHEET 6 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		157

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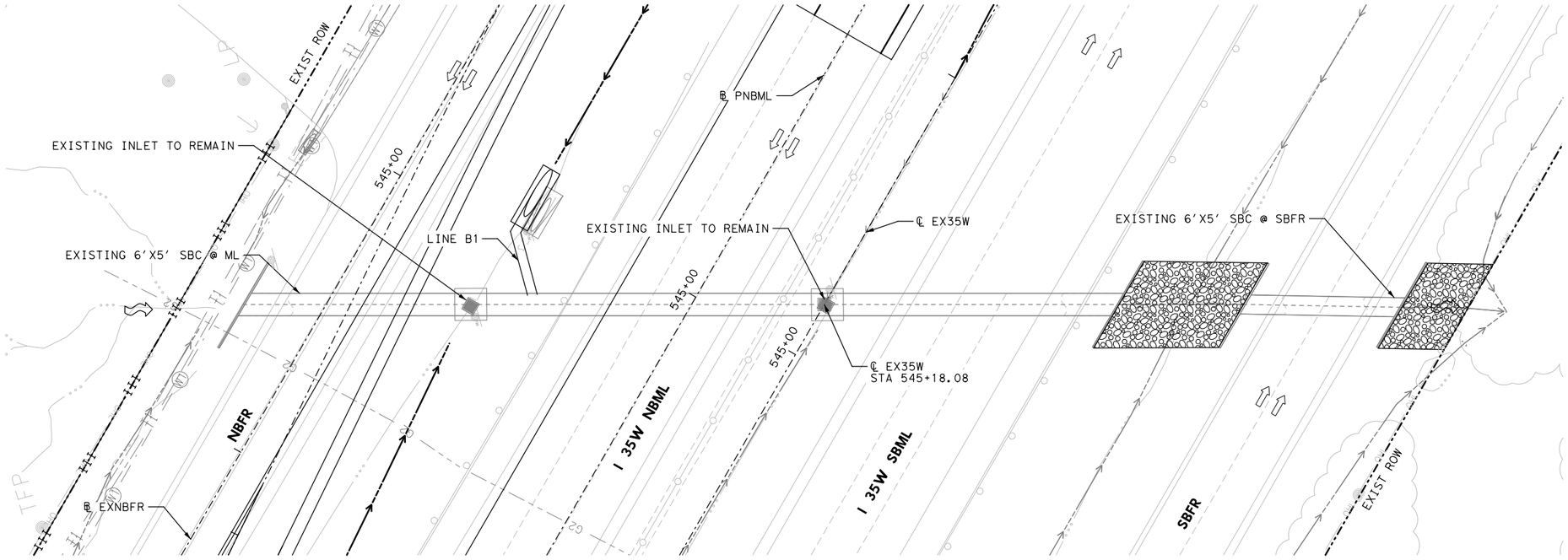


HORZ 0' 20' 40'
VERT 0' 10' 20'
SCALE IN FEET

LEGEND

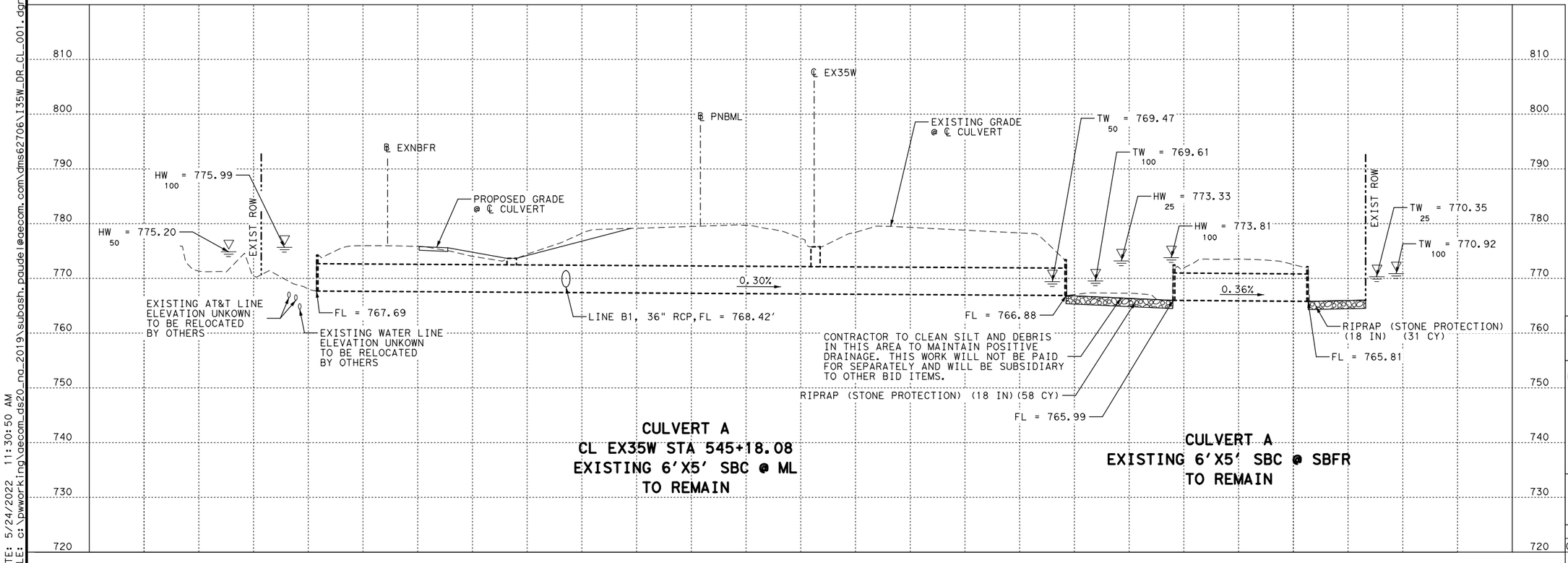
- DRAINAGE FLOW ARROW
- PROP DITCH FLOW
- EXIST DITCH FLOW
- TRAFFIC FLOW ARROW
- RIPRAP STONE PROTECTION (18 IN)

CULVERT A @ ML COMPUTATIONS

Q_{50} = 285 CFS	Q_{100} = 318 CFS
HW_{50} = 775.20'	HW_{100} = 775.99'
TW_{50} = 769.47'	TW_{100} = 769.61'
V_{50} = 11.52 FT/S	V_{100} = 11.90 FT/S

CULVERT A @ SBFR COMPUTATIONS

Q_{25} = 278 CFS	Q_{100} = 349 CFS
HW_{25} = 773.33'	HW_{100} = 773.81'
TW_{25} = 770.35'	TW_{100} = 770.92'
V_{25} = 10.20 FT/S	V_{100} = 9.89 FT/S



CULVERT A
CL EX35W STA 545+18.08
EXISTING 6'X5' SBC @ ML
TO REMAIN

CULVERT A
EXISTING 6'X5' SBC @ SBFR
TO REMAIN

STATE OF TEXAS
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5/24/2022

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IH 35W
FROM CR 604/ CR 707 TO US 67

IH 35W CULVERT A LAYOUT

EX35W STA 545+18.08

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		158

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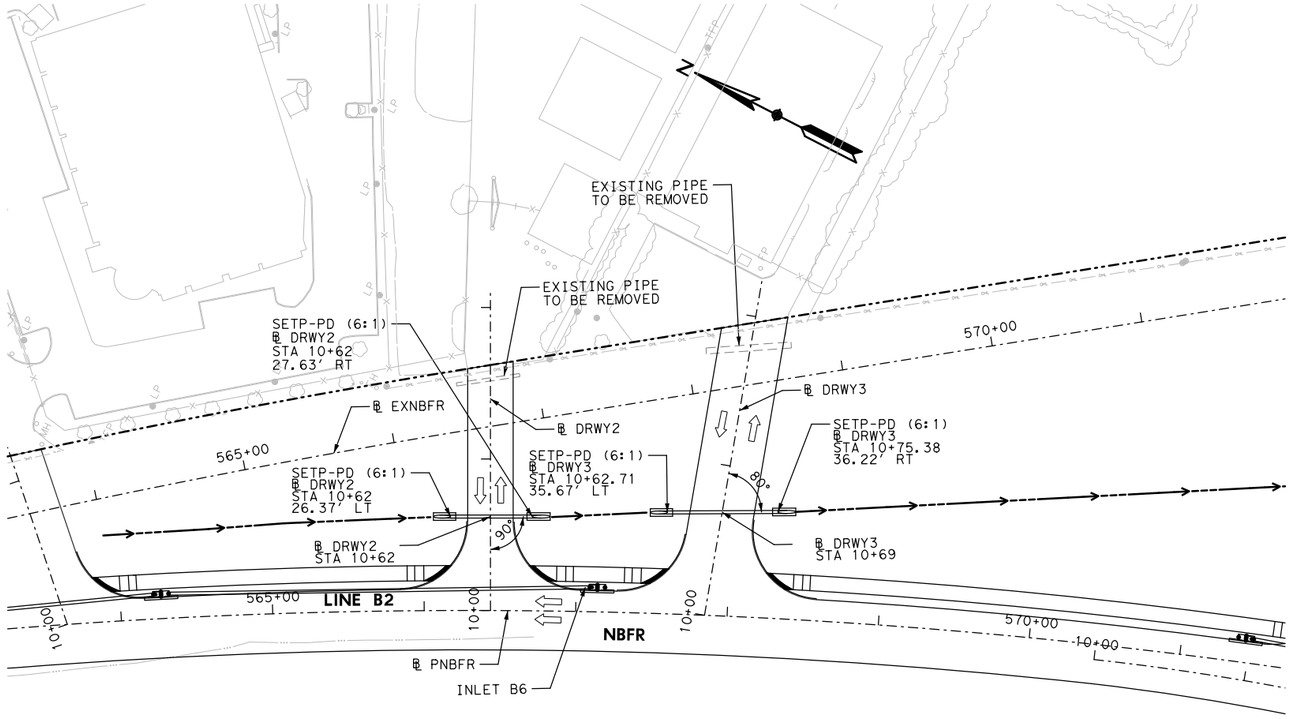


HORZ 0' 50' 100'
VERT 0' 5' 10'
SCALE IN FEET

LEGEND

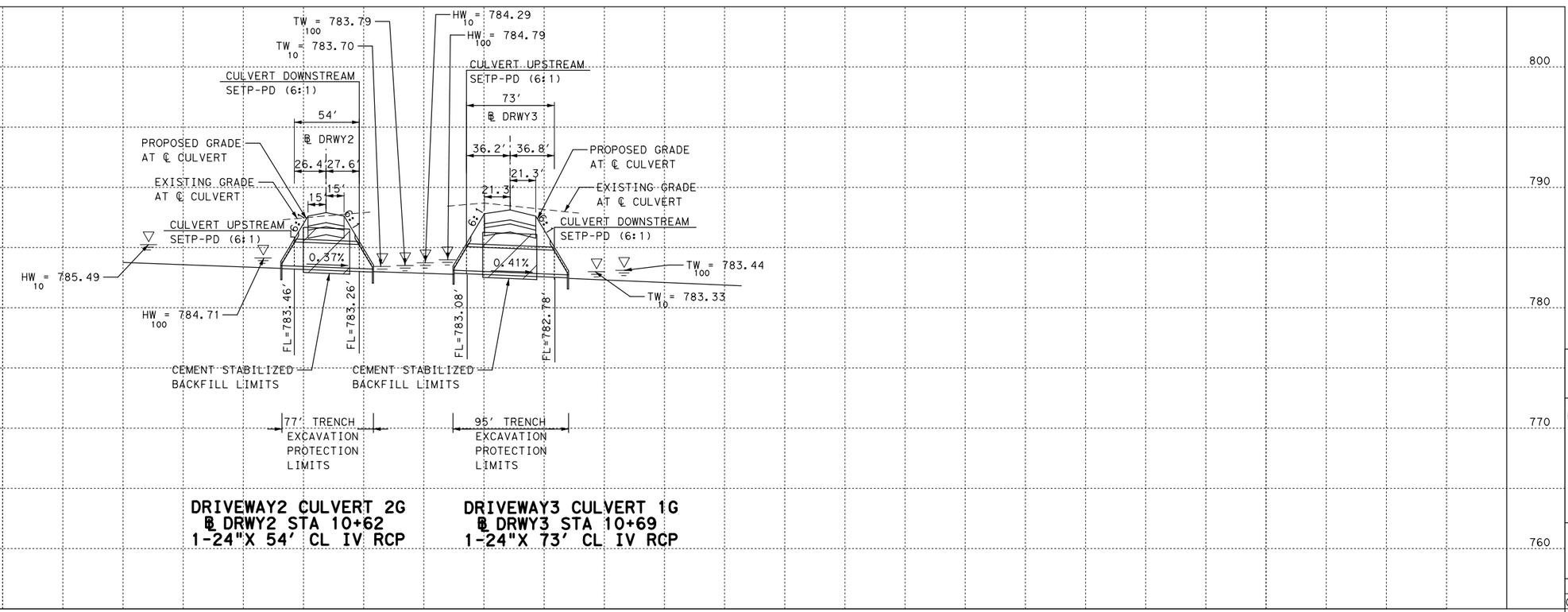
- DRAINAGE FLOW ARROW
- PROP DITCH FLOW
- EXIST DITCH FLOW
- TRAFFIC FLOW ARROW

CULVERT 1G COMPUTATIONS

Q_{10} = 5.47 CFS	Q_{100} = 8.27 CFS
HW_{10} = 784.29'	HW_{100} = 784.79'
TW_{10} = 783.33'	TW_{100} = 783.44'
V_{10} = 4.58 FT/S	V_{100} = 5.11 FT/S

CULVERT 2G COMPUTATIONS

Q_{10} = 3.16 CFS	Q_{100} = 4.77 CFS
HW_{10} = 785.49'	HW_{100} = 784.71'
TW_{10} = 783.70'	TW_{100} = 783.79'
V_{10} = 3.82 FT/S	V_{100} = 4.33 FT/S



DRIVEWAY2 CULVERT 2G
℄ DRWY2 STA 10+62
1-24"X 54' CL IV RCP

DRIVEWAY3 CULVERT 1G
℄ DRWY3 STA 10+69
1-24"X 73' CL IV RCP

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IH 35W
FROM CR 604/ CR 707 TO US 67

DRIVEWAY CULVERTS

1G & 2G

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		159

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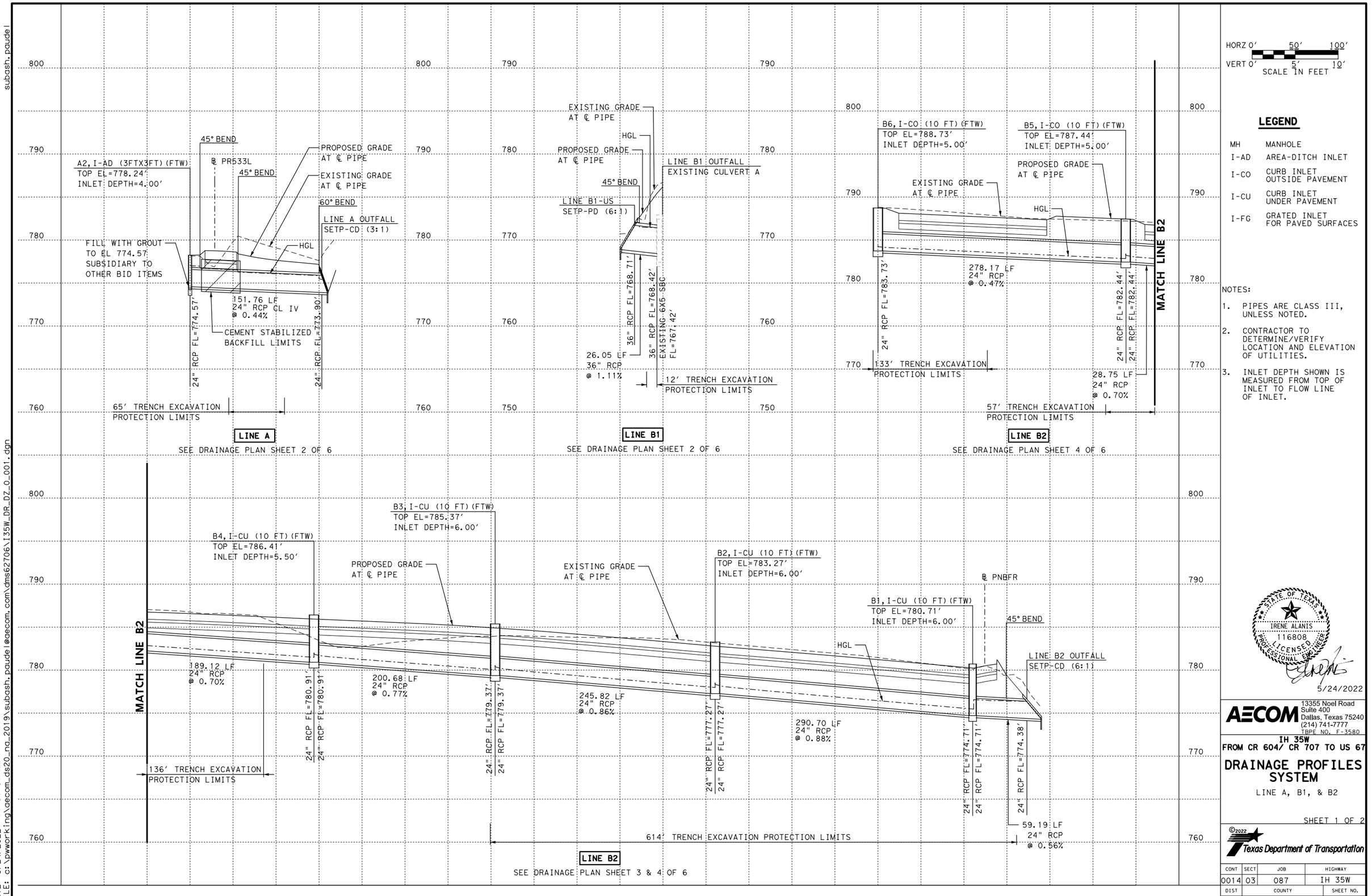

HORZ 0' 50' 100'
VERT 0' 5' 10'
SCALE IN FEET

LEGEND

MH	MANHOLE
I-AD	AREA-DITCH INLET
I-CO	CURB INLET OUTSIDE PAVEMENT
I-CU	CURB INLET UNDER PAVEMENT
I-FG	GRATED INLET FOR PAVED SURFACES

NOTES:

1. PIPES ARE CLASS III, UNLESS NOTED.
2. CONTRACTOR TO DETERMINE/VERIFY LOCATION AND ELEVATION OF UTILITIES.
3. INLET DEPTH SHOWN IS MEASURED FROM TOP OF INLET TO FLOW LINE OF INLET.

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IH 35W
FROM CR 604/ CR 707 TO US 67

DRAINAGE PROFILES SYSTEM

LINE A, B1, & B2

SHEET 1 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		160

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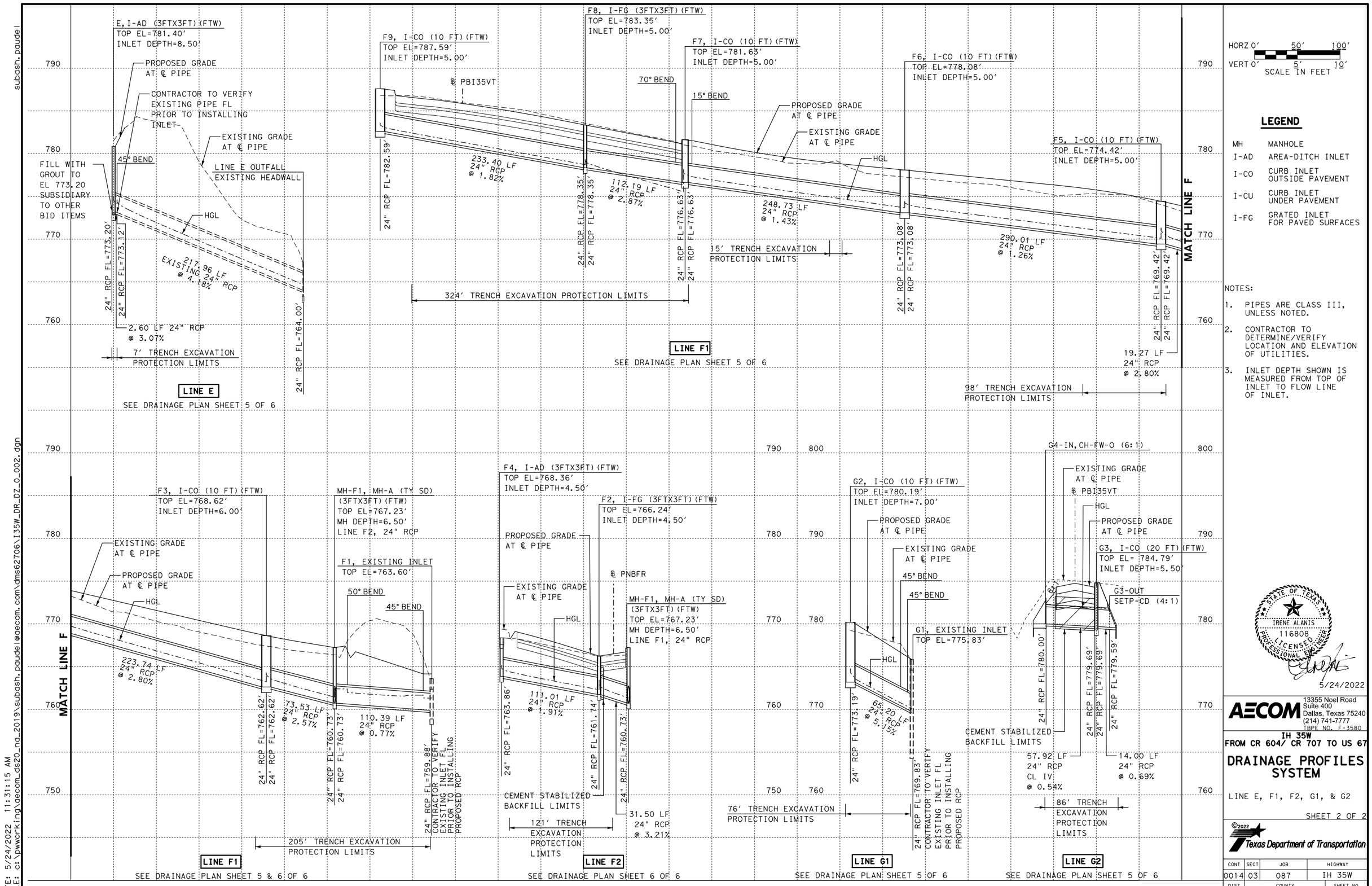

HORZ 0' 50' 100'
VERT 0' 5' 10'
SCALE IN FEET

LEGEND

MH	MANHOLE
I-AD	AREA-DITCH INLET
I-CO	CURB INLET OUTSIDE PAVEMENT
I-CU	CURB INLET UNDER PAVEMENT
I-FG	GRATED INLET FOR PAVED SURFACES

NOTES:

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3. INLET DEPTH SHOWN IS MEASURED FROM TOP OF INLET TO FLOW LINE OF INLET.

STATE OF TEXAS
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5/24/2022

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IH 35W
FROM CR 604/ CR 707 TO US 67

DRAINAGE PROFILES SYSTEM

LINE E, F1, F2, G1, & G2

SHEET 2 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		161

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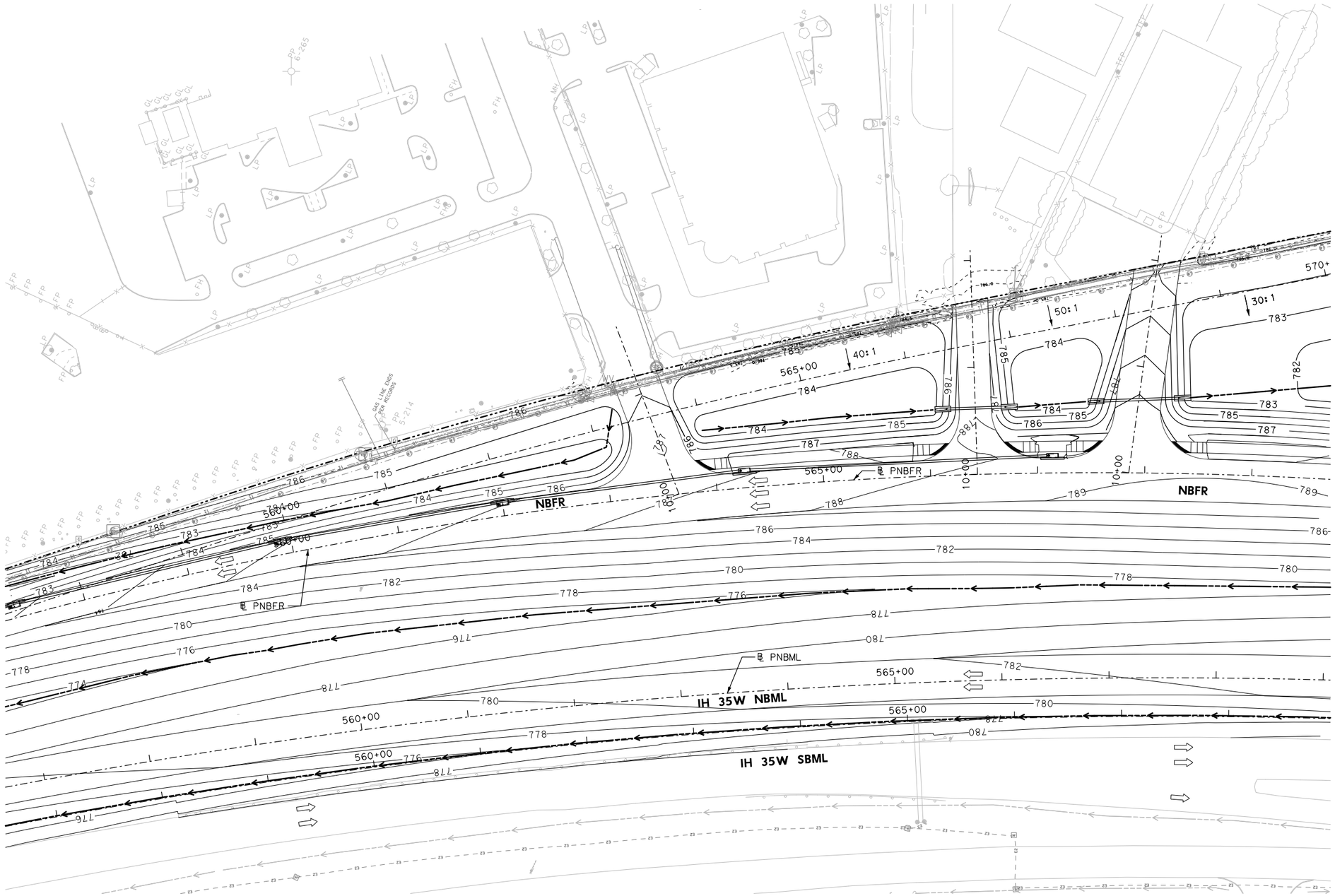

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IH 35W
FROM CR 604/ CR 707 TO US 67

IH 35W GRADING LAYOUT

SHEET 1 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		162

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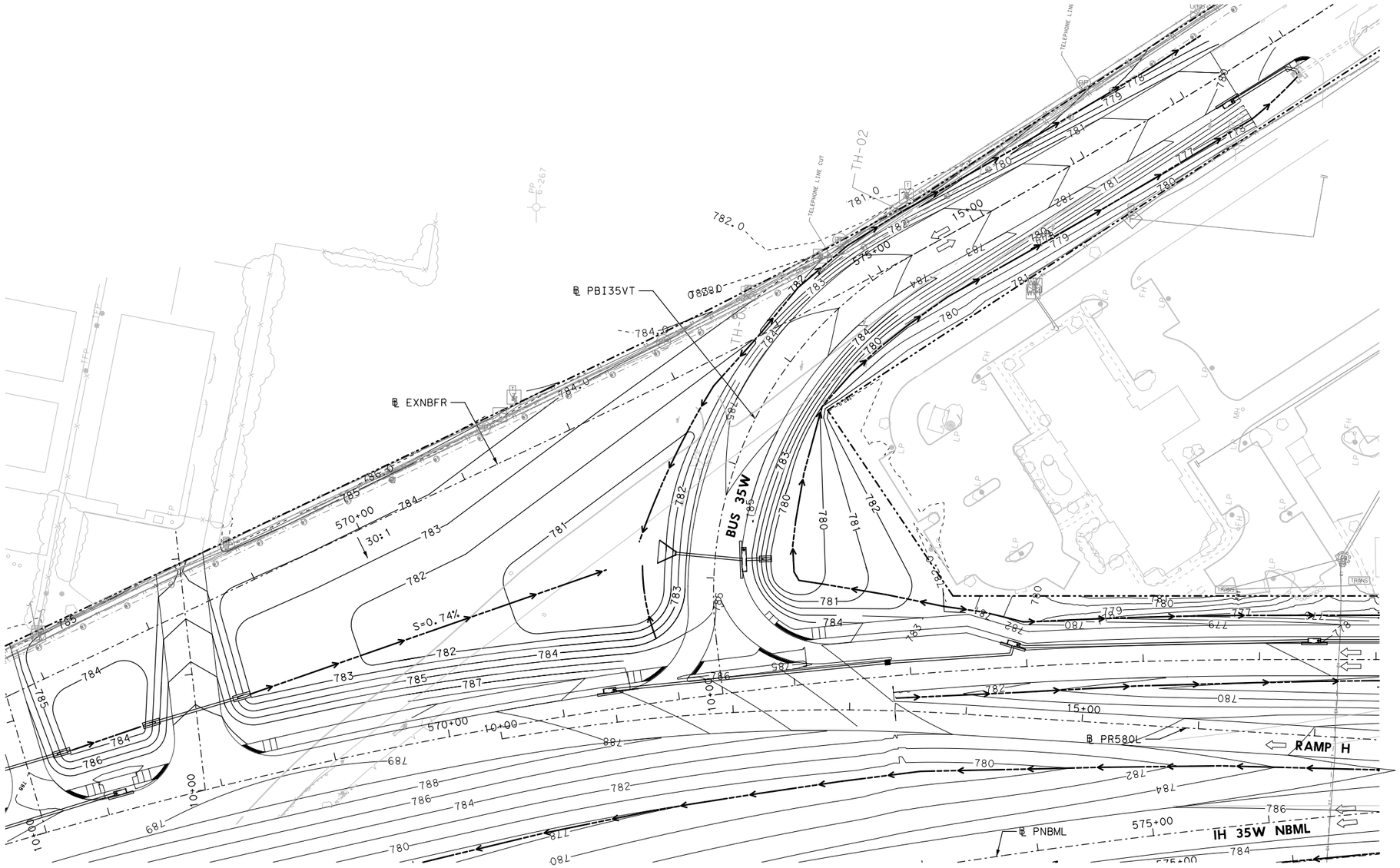

N

0′ 50′ 100′
SCALE IN FEET

LEGEND

PROP DITCH FLOW

EXIST DITCH FLOW

TRAFFIC FLOW ARROW

NOTES:

1. ALL STATIONS AND OFFSETS ARE BASED ON THE ℄ PNBML UNLESS OTHERWISE NOTED.
2. UNLESS OTHERWISE SPECIFIED DITCH FLOWLINES ARE DICTATED BY ROADWAY CROSS SECTIONS.
3. CONTRACTOR TO VERIFY UTILITIES LOCATION AND ELEVATION.

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IH 35W
FROM CR 604/ CR 707 TO US 67

IH 35W GRADING LAYOUT

SHEET 2 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		163

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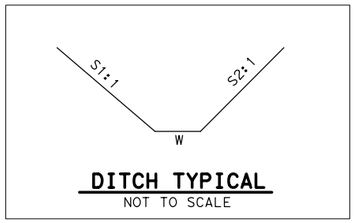
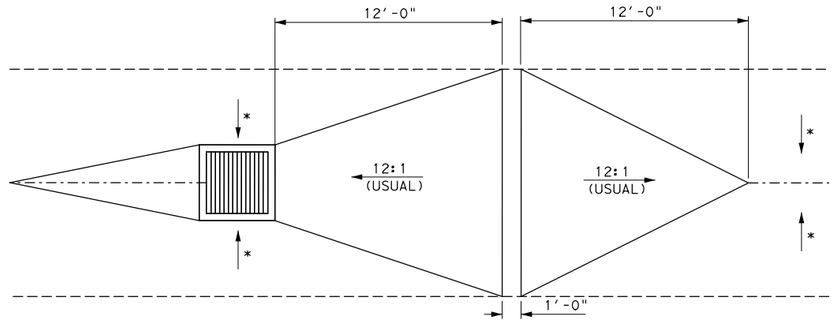
DITCH PNBML 540-1						
STATION PNBML	OFFSET (FT)		FL EL (FT)	S1	W (FT)	S2
541+00.00	43.51	LT	777.84	4	0	4
542+00.00	48.69	LT	774.88	3	0	3
542+50.00	50.42	LT	773.79	3	0	3
543+00.00	51.82	LT	773.76	4	0.75	4
544+00.00	55.86	LT	773.73	6	4	5

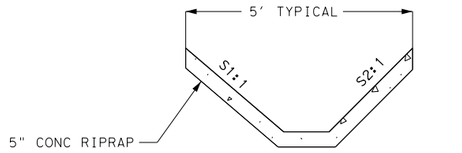


DITCH TYPICAL
NOT TO SCALE

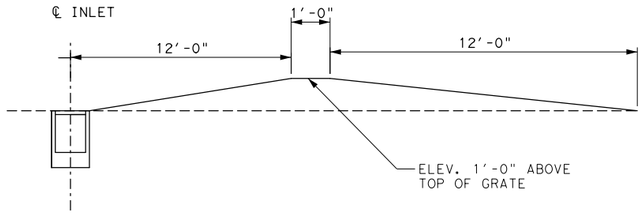


* SIDE SLOPE & DITCH
BLOCK HEIGHT VARIES

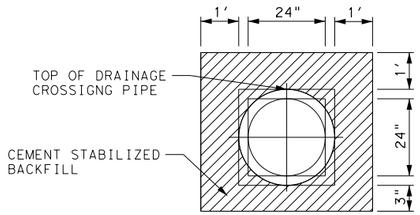
DITCH BLOCK PLAN DETAIL
NOT TO SCALE



RIPRAP DITCH TYPICAL
NOT TO SCALE



DITCH BLOCK ELEVATION DETAIL
NOT TO SCALE



CEMENT STABILIZED BACKFILL DETAIL
NOT TO SCALE

5/24/2022

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IH 35W
FROM CR 604/ CR 707 TO US 67

MISCELLANEOUS DRAINAGE DETAILS

SPECIAL DITCH TABLES

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		164

DATE: 5/24/2022 11:31:47 AM
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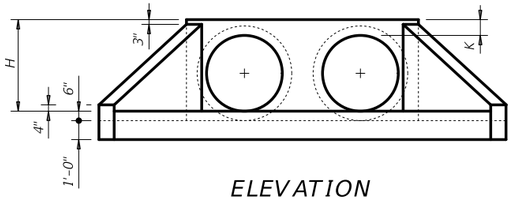
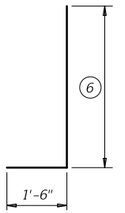
TABLE OF VARIABLE DIMENSIONS AND QUANTITIES FOR ONE HEADWALL (5)

Slope	Dia of Pipe (D)	Values for One Pipe						Values to be Added for Each Addt'l Pipe		
		W	X	Y	L	Reinf (Lbs)	Conc (CY) (1)	X and W	Reinf (Lbs)	Conc (CY) (1)
2:1	12"	4' – 7 ½"	2' – 6"	2' – 10"	3' – 3 ¼"	88	0.6	1' – 9"	20	0.2
	15"	5' – 5 ¾"	2' – 9 ½"	3' – 4"	3' – 10 ¼"	103	0.7	2' – 2"	24	0.3
	18"	6' – 4 ¼"	3' – 1"	3' – 10"	4' – 5"	124	0.9	2' – 8"	32	0.3
	21"	7' – 2 ¾"	3' – 4 ½"	4' – 4"	5' – 0"	143	1.1	3' – 1"	43	0.4
	24"	8' – 2 ½"	3' – 9 ½"	4' – 10"	5' – 7"	164	1.3	3' – 7"	50	0.5
	27"	9' – 1"	4' – 1"	5' – 4"	6' – 2"	179	1.5	3' – 11"	56	0.6
	30"	9' – 11 ½"	4' – 4 ½"	5' – 10"	6' – 8 ¾"	203	1.7	4' – 4"	65	0.8
	33"	10' – 10"	4' – 8"	6' – 4"	7' – 3 ¾"	224	2.0	4' – 8"	71	0.9
	36"	11' – 8 ¼"	4' – 11 ½"	6' – 10"	7' – 10 ¾"	249	2.2	5' – 1"	81	1.0
	42"	13' – 5 ¼"	5' – 6 ½"	7' – 10"	9' – 0 ½"	298	2.8	5' – 10"	97	1.3
	48"	15' – 9"	6' – 1 ½"	9' – 4"	10' – 9 ¼"	360	3.8	6' – 7"	117	1.7
	54"	17' – 5 ¾"	6' – 8 ½"	10' – 4"	11' – 11 ¼"	427	4.5	7' – 6"	151	2.1
	60"	19' – 2 ¾"	7' – 3 ½"	11' – 4"	13' – 1"	481	5.3	8' – 3"	174	2.5
	66"	20' – 11 ½"	7' – 10 ½"	12' – 4"	14' – 3"	544	6.2	8' – 9"	194	2.9
	72"	22' – 8 ½"	8' – 5 ½"	13' – 4"	15' – 4 ¾"	601	7.1	9' – 4"	213	3.3
3:1	12"	6' – 3"	2' – 6"	4' – 3"	4' – 11"	118	0.8	1' – 9"	22	0.2
	15"	7' – 5"	2' – 9 ½"	5' – 0"	5' – 9 ¼"	137	1.1	2' – 2"	28	0.3
	18"	8' – 6 ¾"	3' – 1"	5' – 9"	6' – 7 ¾"	170	1.3	2' – 8"	37	0.5
	21"	9' – 8 ¾"	3' – 4 ½"	6' – 6"	7' – 6"	195	1.6	3' – 1"	48	0.6
	24"	11' – 0"	3' – 9 ½"	7' – 3"	8' – 4 ½"	227	2.0	3' – 7"	58	0.7
	27"	12' – 2"	4' – 1"	8' – 0"	9' – 2 ¾"	251	2.3	3' – 11"	67	0.8
	30"	13' – 4"	4' – 4 ½"	8' – 9"	10' – 1 ¼"	293	2.7	4' – 4"	77	1.0
	33"	14' – 5 ¾"	4' – 8"	9' – 6"	10' – 11 ¾"	318	3.1	4' – 8"	84	1.2
	36"	15' – 7 ¾"	4' – 11 ½"	10' – 3"	11' – 10"	351	3.5	5' – 1"	96	1.4
	42"	17' – 11 ½"	5' – 6 ½"	11' – 9"	13' – 6 ¾"	432	4.5	5' – 10"	119	1.7
	48"	21' – 1 ¾"	6' – 1 ½"	14' – 0"	16' – 2"	537	6.1	6' – 7"	146	2.3
	54"	23' – 5 ½"	6' – 8 ½"	15' – 6"	17' – 10 ¾"	630	7.3	7' – 6"	186	2.9
	60"	25' – 9 ¼"	7' – 3 ½"	17' – 0"	19' – 7 ½"	719	8.7	8' – 3"	219	3.4
	66"	28' – 1"	7' – 10 ½"	18' – 6"	21' – 4 ¼"	811	10.1	8' – 9"	242	3.9
	72"	30' – 4 ¾"	8' – 5 ½"	20' – 0"	23' – 1 ¼"	924	11.7	9' – 4"	272	4.4
4:1	12"	7' – 10 ¾"	2' – 6"	5' – 8"	6' – 6 ½"	148	1.1	1' – 9"	24	0.3
	15"	9' – 4"	2' – 9 ½"	6' – 8"	7' – 8 ½"	181	1.5	2' – 2"	32	0.4
	18"	10' – 9 ½"	3' – 1"	7' – 8"	8' – 10 ¼"	221	1.9	2' – 8"	42	0.5
	21"	12' – 2 ¾"	3' – 4 ½"	8' – 8"	10' – 0"	260	2.3	3' – 1"	57	0.7
	24"	13' – 9 ½"	3' – 9 ½"	9' – 8"	11' – 2"	301	2.8	3' – 7"	67	0.9
	27"	15' – 3"	4' – 1"	10' – 8"	12' – 3 ¾"	334	3.3	3' – 11"	77	1.0
	30"	16' – 8 ¼"	4' – 4 ½"	11' – 8"	13' – 5 ¾"	385	3.8	4' – 4"	89	1.3
	33"	18' – 1 ¾"	4' – 8"	12' – 8"	14' – 7 ½"	425	4.5	4' – 8"	101	1.4
	36"	19' – 7"	4' – 11 ½"	13' – 8"	15' – 9 ¼"	472	5.1	5' – 1"	115	1.7
	42"	22' – 5 ¾"	5' – 6 ½"	15' – 8"	18' – 1"	583	6.5	5' – 10"	141	2.1
	48"	26' – 6 ¼"	6' – 1 ½"	18' – 8"	21' – 6 ¾"	730	8.9	6' – 7"	175	2.8
	54"	29' – 5"	6' – 8 ½"	20' – 8"	23' – 10 ¼"	875	10.7	7' – 6"	226	3.6
	60"	32' – 3 ¾"	7' – 3 ½"	22' – 8"	26' – 2"	996	12.7	8' – 3"	264	4.3
	66"	35' – 2 ½"	7' – 10 ½"	24' – 8"	28' – 5 ¾"	1,140	14.9	8' – 9"	300	4.9
	72"	38' – 1 ¼"	8' – 5 ½"	26' – 8"	30' – 9 ½"	1,297	17.3	9' – 4"	334	5.6
6:1	12"	11' – 2"	2' – 6"	8' – 6"	9' – 9 ¾"	224	1.9	1' – 9"	28	0.4
	15"	13' – 2 ¼"	2' – 9 ½"	10' – 0"	11' – 6 ½"	268	2.5	2' – 2"	37	0.5
	18"	15' – 2 ½"	3' – 1"	11' – 6"	13' – 3 ¼"	330	3.2	2' – 8"	50	0.7
	21"	17' – 2 ¾"	3' – 4 ½"	13' – 0"	15' – 0 ¼"	387	3.9	3' – 1"	69	0.9
	24"	19' – 4 ½"	3' – 9 ½"	14' – 6"	16' – 9"	453	4.8	3' – 7"	80	1.2
	27"	21' – 4 ¾"	4' – 1"	16' – 0"	18' – 5 ¾"	512	5.7	3' – 11"	96	1.4
	30"	23' – 5 ¼"	4' – 4 ½"	17' – 6"	20' – 2 ½"	593	6.7	4' – 4"	110	1.7
	33"	25' – 5 ½"	4' – 8"	19' – 0"	21' – 11 ¼"	675	7.8	4' – 8"	127	2.0
	36"	27' – 5 ¾"	4' – 11 ½"	20' – 6"	23' – 8"	735	9.0	5' – 1"	144	2.3
	42"	31' – 6 ¼"	5' – 6 ½"	23' – 6"	27' – 1 ½"	922	11.5	5' – 10"	179	3.0
	48"	37' – 3 ½"	6' – 1 ½"	28' – 0"	32' – 4"	1,191	15.9	6' – 7"	231	4.0
	54"	41' – 4 ¼"	6' – 8 ½"	31' – 0"	35' – 9 ½"	1,424	19.2	7' – 6"	300	5.0
	60"	45' – 4 ¾"	7' – 3 ½"	34' – 0"	39' – 3"	1,631	22.9	8' – 3"	353	6.0

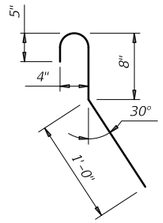


ELEVATION

(Showing dimensions.)



BARS V



BARS CL

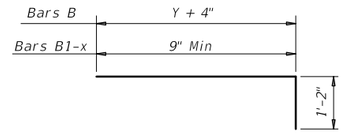
(Length = 2'-5")

TABLE OF (5) REINFORCING STEEL

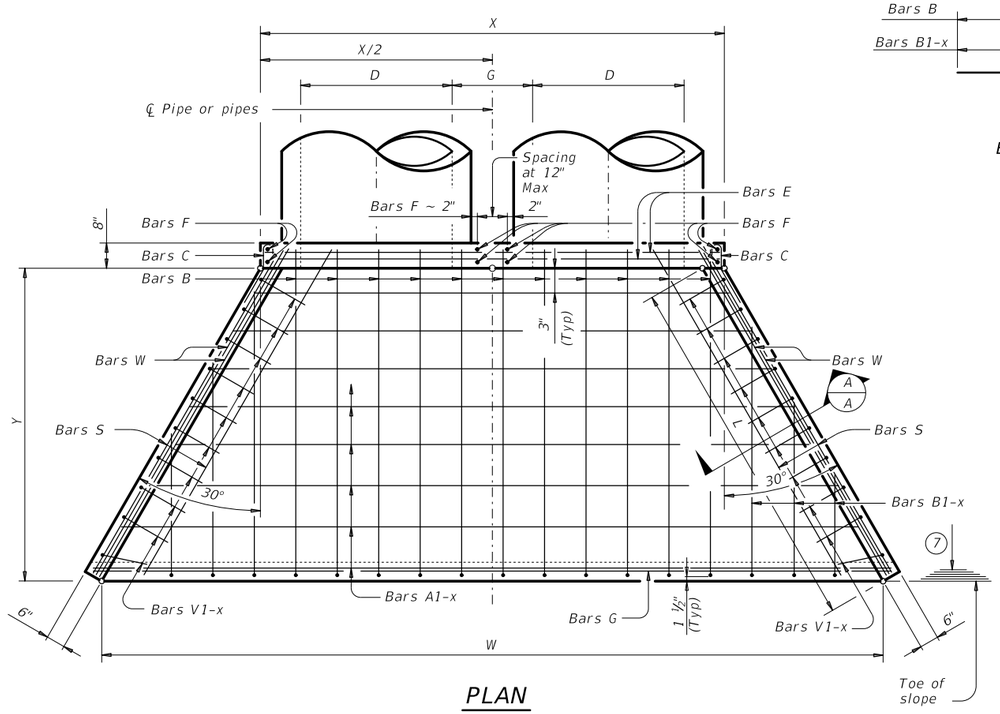
Bar	Size	Spa	No.
A	#4	1' – 0"	~
B	#3	1' – 6"	~
C	#4	1' – 0"	~
D	#3	1' – 0"	~
E	#5	~	4
F	#5	~	~
G	#3	~	2
S	#4	~	6
V	#4	1' – 0"	~
W	#5	~	4

TABLE OF CONSTANT DIMENSIONS

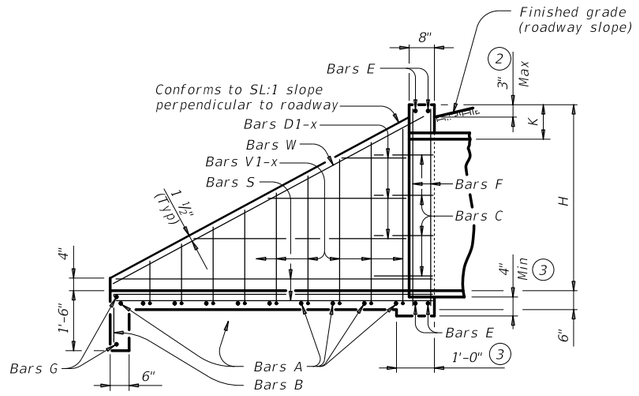
Dia of Pipe (D)	G	K (4)	H
12"	0' – 9"	1' – 0"	2' – 0"
15"	0' – 11"	1' – 0"	2' – 3"
18"	1' – 2"	1' – 0"	2' – 6"
21"	1' – 4"	1' – 0"	2' – 9"
24"	1' – 7"	1' – 0"	3' – 0"
27"	1' – 8"	1' – 0"	3' – 3"
30"	1' – 10"	1' – 0"	3' – 6"
33"	1' – 11"	1' – 0"	3' – 9"
36"	2' – 1"	1' – 0"	4' – 0"
42"	2' – 4"	1' – 0"	4' – 6"
48"	2' – 7"	1' – 3"	5' – 3"
54"	3' – 0"	1' – 3"	5' – 9"
60"	3' – 3"	1' – 3"	6' – 3"
66"	3' – 3"	1' – 3"	6' – 9"
72"	3' – 4"	1' – 3"	7' – 3"



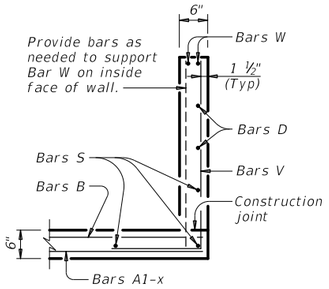
BARS B and B1-x



PLAN



TYPICAL WING ELEVATION



SECTION A-A

(1) Quantities shown are for concrete pipe and will increase slightly for metal pipe installations.

(2) For vehicle safety, construct curbs no more than 3" above finished grade. Reduce curb heights, if necessary, to meet these requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

(3) Provide a 1'-0" footing as shown where required to maintain 4" minimum cover for pipes.

(4) Dimensions shown are usual and maximum.

(5) Quantities shown are for one structure end only (one headwall).

(6) Min Length = $6" + 3" \times \left(\frac{12 \times H - 7}{12 \times L}\right)$

Max Length = $12 \times H - 3" \times \left(\frac{12 \times H - 7}{12 \times L}\right) - 1"$

(7) Lengths of wings based on SL:1 slope along this line.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide Class C concrete (f'c = 3,600 psi).

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Do not mount bridge rails of any type directly to these culvert headwalls.

This standard may not be used for wall heights, H, exceeding the values shown.

Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing dimensions are out-to-out of bars.

Texas Department of Transportation

Bridge Division Standard

CONCRETE HEADWALLS WITH FLARED WINGS FOR 0° SKEW PIPE CULVERTS

CH-FW-0

FILE: chfw00se-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		165

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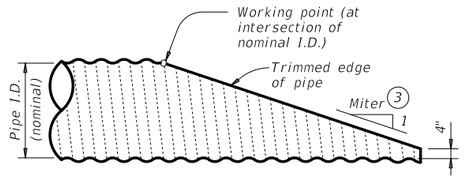
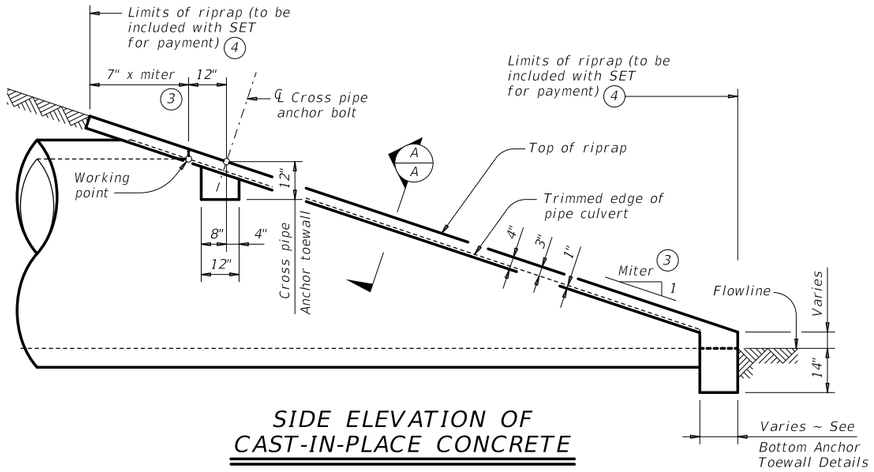


NOTE: All pipe runners, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

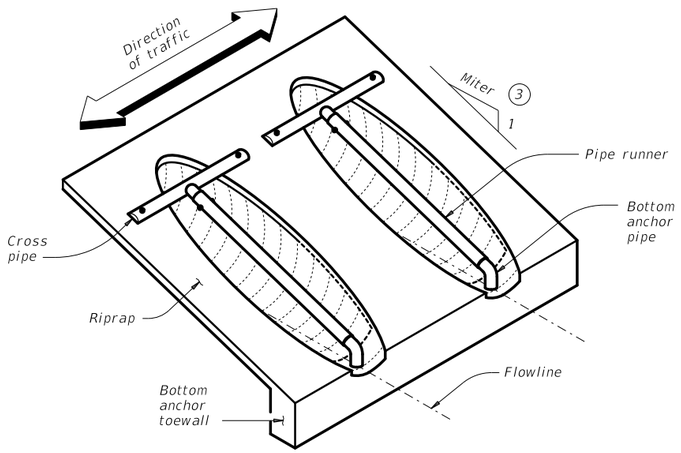
SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

(Showing corrugated metal pipe (CMP) culvert.
Details of reinforced concrete pipe (RCP) culvert are similar.)



SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(Showing reinforced concrete pipe (RCP) culvert.
Details of corrugated metal pipe (CMP) culvert
are similar. Pipe runners not shown for clarity)



ISOMETRIC VIEW OF TYPICAL INSTALLATION

(Showing installation with no skew.)

CROSS PIPE LENGTHS AND PIPE RUNNER LENGTHS (1)(2)

Nominal Culvert I.D.	Pipe Culvert Spa ~ G	Cross Pipe Length	Pipe Runner Length											
			3:1 Side Slope				4:1 Side Slope				6:1 Side Slope			
			0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew
24"	1' – 7"	3' – 5"	N/A	N/A	N/A	5' – 10"	N/A	N/A	N/A	8' – 1"	N/A	N/A	N/A	12' – 9"
27"	1' – 8"	3' – 8"	N/A	N/A	5' – 5"	6' – 11"	N/A	N/A	7' – 7"	9' – 7"	N/A	N/A	11' – 11"	14' – 11"
30"	1' – 10"	3' – 11"	N/A	N/A	6' – 4"	8' – 0"	N/A	N/A	8' – 9"	11' – 0"	N/A	N/A	13' – 8"	17' – 0"
33"	1' – 11"	4' – 2"	6' – 2"	6' – 5"	7' – 3"	9' – 1"	8' – 6"	8' – 10"	10' – 0"	12' – 5"	13' – 3"	13' – 9"	15' – 5"	19' – 2"
36"	2' – 1"	4' – 5"	6' – 11"	7' – 3"	8' – 2"	10' – 2"	9' – 6"	9' – 11"	11' – 2"	13' – 10"	14' – 9"	15' – 3"	17' – 2"	21' – 3"
42"	2' – 4"	4' – 11"	8' – 6"	8' – 10"	9' – 11"	12' – 4"	11' – 7"	12' – 0"	13' – 6"	16' – 8"	17' – 9"	18' – 5"	20' – 8"	25' – 7"
48"	2' – 7"	5' – 5"	10' – 1"	10' – 5"	11' – 9"	N/A	13' – 7"	14' – 2"	15' – 10"	N/A	20' – 9"	21' – 6"	24' – 2"	N/A
54"	3' – 0"	5' – 11"	11' – 8"	12' – 1"	N/A	N/A	15' – 8"	16' – 3"	N/A	N/A	23' – 10"	24' – 8"	N/A	N/A
60"	3' – 3"	6' – 5"	13' – 3"	N/A	N/A	N/A	17' – 9"	N/A	N/A	N/A	26' – 10"	N/A	N/A	N/A

TYPICAL PIPE CULVERT MITERS (3)

Side Slope	0° Skew	15° Skew	30° Skew	45° Skew
3:1	3:1	3.106:1	3.464:1	4.243:1
4:1	4:1	4.141:1	4.619:1	5.657:1
6:1	6:1	6.212:1	6.928:1	8.485:1

CONDITIONS WHERE PIPE RUNNERS ARE NOT REQUIRED (2)

Nominal Culvert I.D.	Single Pipe Culvert	Multiple Pipe Culverts
12" thru 21"	Skews thru 45°	Skews thru 45°
24"	Skews thru 45°	Skews thru 30°
27"	Skews thru 30°	Skews thru 15°
30"	Skews thru 15°	Skews thru 15°
33"	Skews thru 15°	Always required
36"	Normal (no skew)	Always required
42" thru 60"	Always required	Always required

STANDARD PIPE SIZES AND MAX PIPE RUNNER LENGTHS (1)

Pipe Size	Pipe O.D.	Pipe I.D.	Max Pipe Runner Length
2" STD	2.375"	2.067"	N/A
3" STD	3.500"	3.068"	10' – 0"
4" STD	4.500"	4.026"	19' – 8"
5" STD	5.563"	5.047"	34' – 2"

ESTIMATED CONCRETE RIPRAP QUANTITIES (CY) (5)

Nominal Culvert I.D.	3:1 Side Slope				4:1 Side Slope				6:1 Side Slope			
	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew
12"	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.6	0.7	0.7	0.7	0.8
15"	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.9
18"	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.8	0.8	0.8	0.9	1.0
21"	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.9	0.9	0.9	1.0	1.2
24"	0.6	0.7	0.7	0.8	0.8	0.8	0.8	1.0	1.0	1.0	1.1	1.3
27"	0.7	0.7	0.8	0.9	0.8	0.9	0.9	1.1	1.1	1.1	1.2	1.4
30"	0.8	0.8	0.8	0.9	0.9	0.9	1.0	1.2	1.2	1.2	1.3	1.6
33"	0.8	0.8	0.9	1.0	1.0	1.0	1.1	1.3	1.3	1.4	1.5	1.7
36"	0.9	0.9	0.9	1.1	1.1	1.1	1.2	1.4	1.4	1.5	1.6	1.8
42"	1.0	1.0	1.1	1.3	1.2	1.3	1.3	1.6	1.6	1.7	1.8	2.1
48"	1.1	1.1	1.2	N/A	1.4	1.4	1.5	N/A	1.9	1.9	2.1	N/A
54"	1.3	1.3	N/A	N/A	1.6	1.6	N/A	N/A	2.1	2.1	N/A	N/A
60"	1.4	N/A	N/A	N/A	1.7	N/A	N/A	N/A	2.3	N/A	N/A	N/A

(1) Provide pipe runner of the size shown in the tables. Provide cross pipe of the same size as the pipe runner. Provide cross pipe stub out and bottom anchor pipe of the next smaller size pipe as shown in the Standard Pipe Sizes and Max Pipe Runner Lengths table.

(2) This standard allows for the placement of only one pipe runner across each culvert pipe opening. In order to limit the clear opening to be traversed by an errant vehicle, the following conditions must be met:

For 60" culvert pipes, the skew must not exceed 0°.
For 54" culvert pipes, the skew must not exceed 15°.
For 48" culvert pipes, the skew must not exceed 30°.
For all culvert pipe sizes 42" and less, the skew must not exceed 45°.

If the above conditions cannot be met, the designer should consider using a safety end treatment with flared wings. For further information, refer to the TxDOT Roadway Design Manual.

(3) Miter = slope of mitered end of pipe culvert.

(4) Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap".

(5) Quantities shown are for one end of one reinforced concrete pipe (RCP) culvert. For multiple pipe culverts or for corrugated metal pipe (CMP) culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only.

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

FOR 12" DIA TO 60" DIA
PIPE CULVERTS
TYPE II ~ CROSS DRAINAGE

SETP-CD

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	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		166

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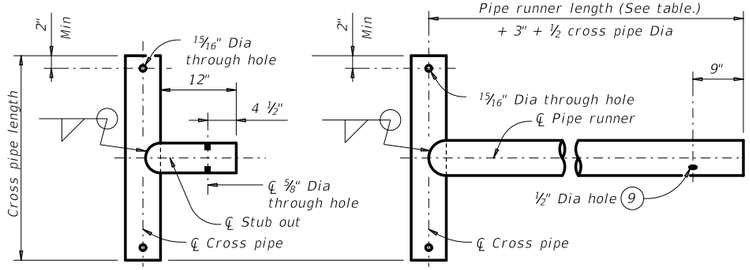
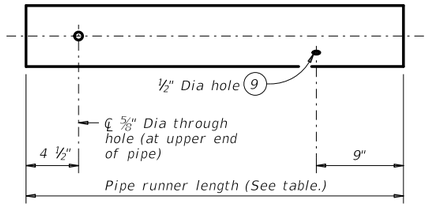


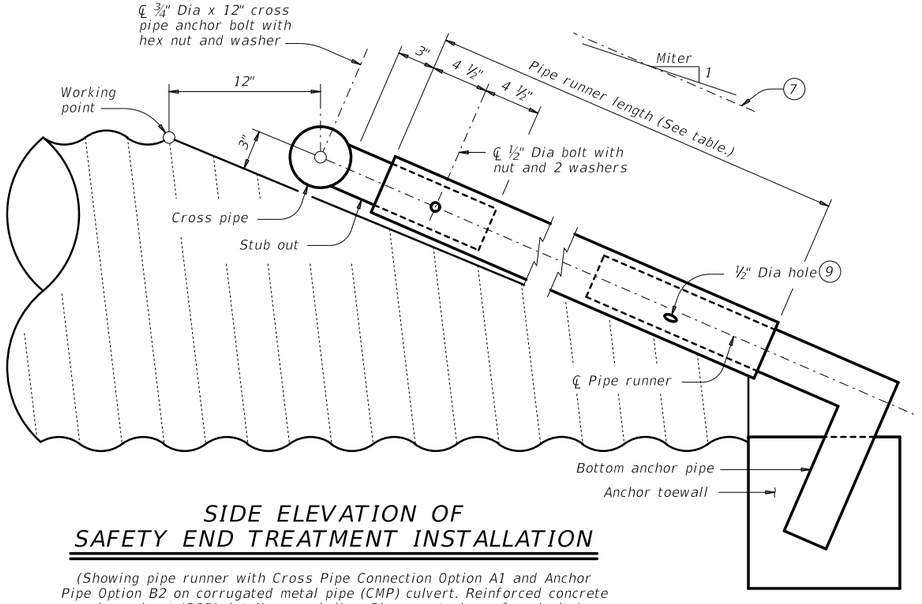
OPTION A1 OPTION A2

CROSS PIPE AND CONNECTIONS DETAILS



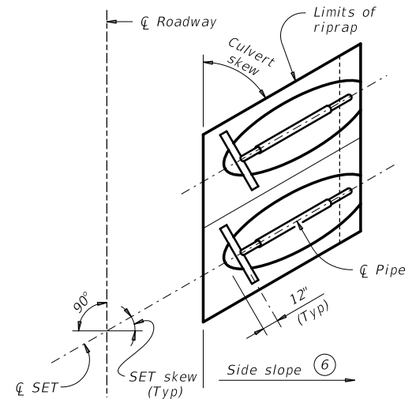
NOTE: The separate pipe runner shown is required when Cross Pipe Connection Option A1 is used.

PIPE RUNNER DETAILS

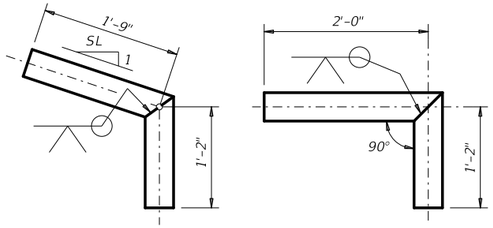


SIDE ELEVATION OF SAFETY END TREATMENT INSTALLATION

(Showing pipe runner with Cross Pipe Connection Option A1 and Anchor Pipe Option B2 on corrugated metal pipe (CMP) culvert. Reinforced concrete pipe culvert (RCP) details are similar. Riprap not shown for clarity)

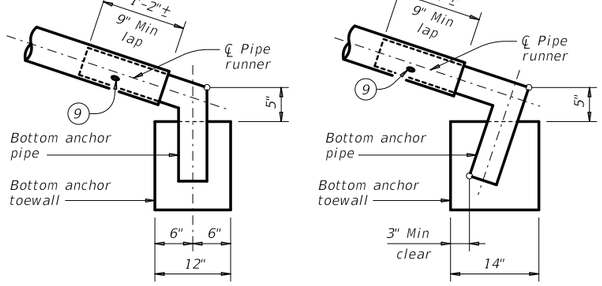


PLAN OF SKEWED INSTALLATION



OPTION B1 OPTION B2

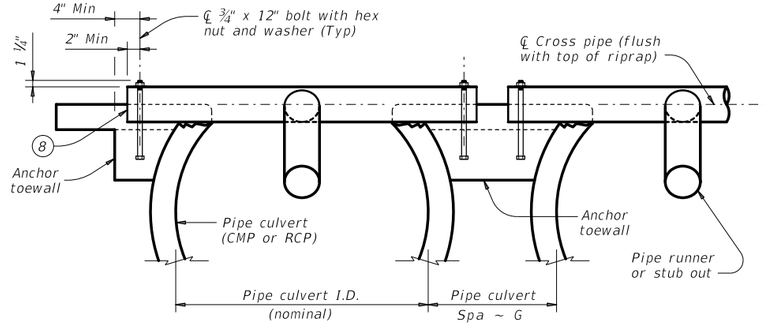
BOTTOM ANCHOR PIPE DETAILS (10)



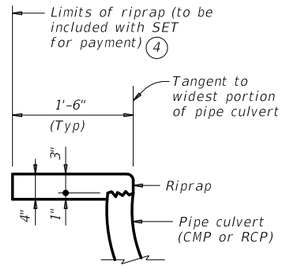
OPTION B1 OPTION B2

BOTTOM ANCHOR TOEWALL DETAILS

(Culvert and riprap not shown for clarity.)



SHOWING CROSS PIPE AND ANCHOR TOEWALL



SHOWING TYPICAL PIPE CULVERT AND RIPRAP

SECTION A-A

(4) Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap".

(6) Recommended values of side slope are 3:1, 4:1, and 6:1. All quantities, calculations, and dimensions shown herein are based on these recommended values. Slope of 3:1 or flatter is required for vehicle safety.

(7) Note that actual slope of pipe runner may vary slightly from side slope of riprap and trimmed culvert pipe edge.

(8) Ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access.

(9) After installation, inspect the 1/2" hole to ensure that the lap of the pipe runner with the bottom anchor pipe is adequate.

(10) At fabricator's option, a heat bend to a smooth 5" radius or a manufactured elbow (of the same material as the runner) may be substituted for the mitered and welded joint in the bottom anchor pipe.

MATERIAL NOTES:

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Provide pipe runners, cross pipes, and anchor pipes conforming to the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.

Provide ASTM A307 bolts and nuts.

Galvanize all steel components, except concrete reinforcing, after fabrication.

Repair galvanizing damaged during transport or construction in accordance with the specifications.

GENERAL NOTES:

Pipe runners are designed for a traversing load of 1,800 pounds at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.

Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the pipe runners.

Payment for riprap and toewall is included in the price bid for each safety end treatment.

Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap".

SHEET 2 OF 2

Texas Department of Transportation | Bridge Division Standard

SAFETY END TREATMENT

FOR 12" DIA TO 60" DIA
PIPE CULVERTS
TYPE II ~ CROSS DRAINAGE

SETP-CD

FILE: setpcdse-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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	FTW	JOHNSON		167

DATE: 5/23/2022, 10:53:17 AM
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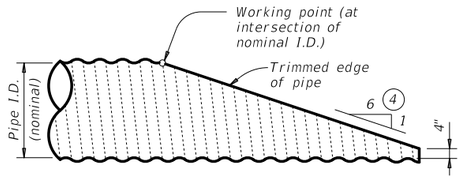
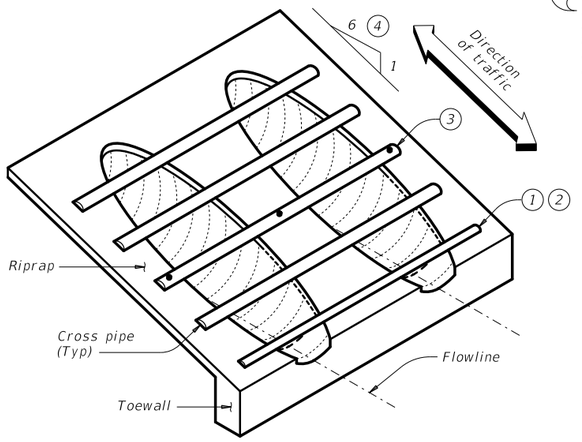


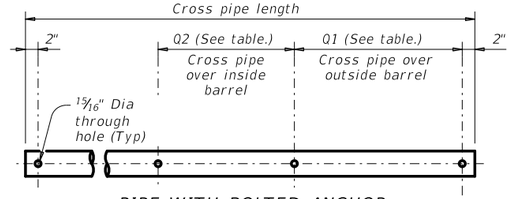
NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

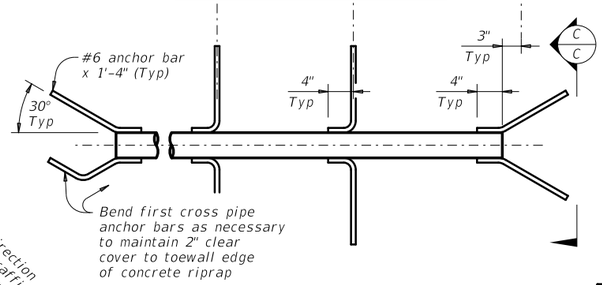
(Showing corrugated metal pipe (CMP) culvert Details at reinforced concrete pipe (RCP) culvert are similar.)



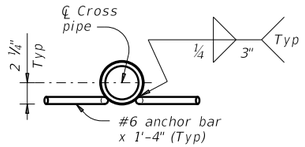
ISOMETRIC VIEW OF TYPICAL INSTALLATION



PIPE WITH BOLTED ANCHOR

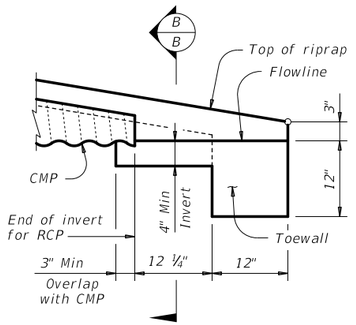


PIPE WITH ANCHOR BARS



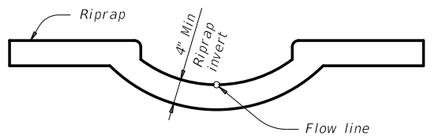
SECTION C-C

CROSS PIPE DETAILS



DETAIL "A"

(Showing invert with corrugated metal pipe (CMP) culvert. Reinforced concrete pipe (RCP) culvert details are similar. Cross pipes not shown for clarity.)



SECTION B-B

(Cross pipes not shown for clarity.)

CROSS PIPE LENGTHS, REQUIRED PIPE SIZES, AND RIPRAP QUANTITIES (2)

Nominal Culvert I.D.	Conc Riprap (CY) (6)	Pipe Culvert Spa ~ G	Single Barrel ~ Q1	Multi-Barrel ~ Q1	Q2	Conditions for Use of Cross Pipes	Cross Pipe Sizes
12"	0.6	0' - 9"	N/A	2' - 1"	1' - 9"	3 or more pipe culverts	3" Std (3.500" O.D.)
15"	0.7	0' - 11"	N/A	2' - 5"	2' - 2"		
18"	0.8	1' - 2"	N/A	2' - 10"	2' - 8"		
21"	0.9	1' - 4"	N/A	3' - 2"	3' - 1"		
24"	0.9	1' - 7"	N/A	3' - 6"	3' - 7"		
27"	1.0	1' - 8"	N/A	3' - 10"	3' - 11"	3 or more pipe culverts	3 1/2" Std (4.000" O.D.)
30"	1.1	1' - 10"	N/A	4' - 2"	4' - 4"	2 or more pipe culverts	
33"	1.2	1' - 11"	4' - 2"	4' - 5"	4' - 8"	All pipe culverts	
36"	1.3	2' - 1"	4' - 5"	4' - 9"	5' - 1"	All pipe culverts	4" Std (4.500" O.D.)
42"	1.5	2' - 4"	4' - 11"	5' - 5"	5' - 10"		
48"	1.7	2' - 7"	5' - 5"	6' - 0"	6' - 7"	All pipe culverts	5" Std (5.563" O.D.)
54"	2.0	3' - 0"	5' - 11"	6' - 9"	7' - 6"		
60"	2.2	3' - 3"	6' - 5"	7' - 4"	8' - 3"		
66"	2.4	3' - 3"	6' - 11"	7' - 10"	8' - 9"		
72"	2.7	3' - 4"	7' - 5"	8' - 5"	9' - 4"		

(1) The proper installation of the first cross pipe is critical for vehicle safety. Place the top of the first cross pipe no more than 6" above the flow line.

(2) Provide cross pipes, except the first bottom pipe, of the size shown in the table. Provide a 3 1#2" standard pipe (4" O.D.) for the first bottom pipe.

(3) Install the third cross pipe from the bottom of the culvert using a bolted connection. Ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access. At the Contractor's option, install all other cross pipes using the bolted connection details.

(4) Match cross slope as shown elsewhere in the plans. Cross slope of 6:1 or flatter is required for vehicle safety.

(5) Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap".

(6) Quantities shown are for one end of one reinforced concrete pipe (RCP) culvert. For multiple pipe culverts or for corrugated metal pipe (CMP) culverts, quantities will need to be adjusted. Riprap quantities are for contractor's information only.

MATERIAL NOTES:

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Provide cross pipes that meet the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 (Gr B), or API 5LX52.

Provide ASTM A307 bolts and nuts.

Galvanize all steel components, except concrete reinforcing, after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

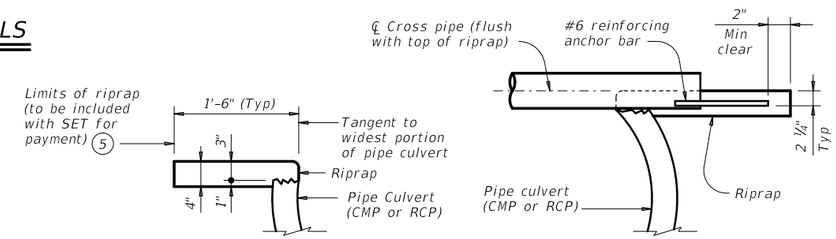
GENERAL NOTES:

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.

Safety end treatments (SET) 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.

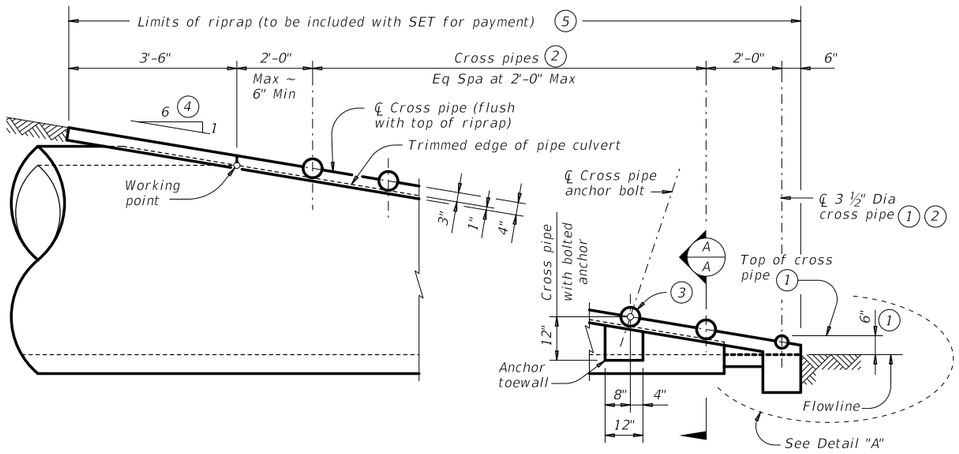
Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap".

Payment for riprap and toewall is included in the Price Bid for each Safety End Treatment.



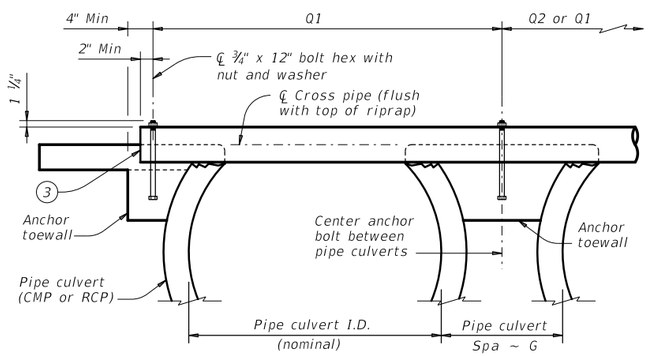
SHOWING TYPICAL PIPE CULVERT AND RIPRAP

SHOWING CROSS PIPE WITH ANCHOR BAR



SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(Showing reinforced concrete pipe (RCP) culvert. Details at corrugated metal pipe (CMP) culvert are similar.)



SHOWING CROSS PIPE WITH BOLTED ANCHOR

SECTION A-A

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

FOR 12" DIA TO 72" DIA
PIPE CULVERTS
TYPE II ~ PARALLEL DRAINAGE

SETP-PD

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	FTW	JOHNSON		168

DATE: 5/23/2022 10:53:23 AM
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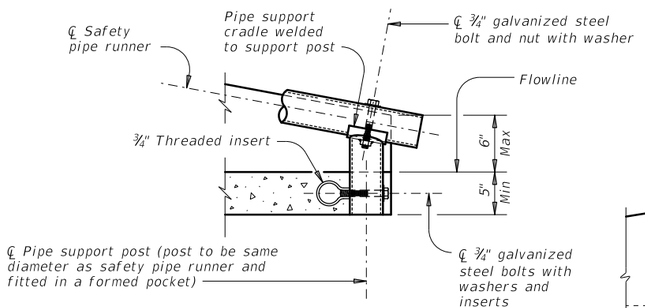
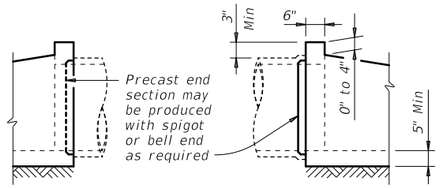
REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (8)	"D" (1)	Slope	Min Length of Unit	Single Pipe		Multiple Pipes	
						Skew	Pipe Runners Required	Skew	Pipe Runners Required
12"	2"	1.15"	17.00"	3:1	2' – 11"	≤ 45°	No	≤ 45°	No
				4:1	3' – 6"				
				6:1	4' – 9"				
15"	2 ¼"	1.30"	20.50"	3:1	3' – 8"	≤ 45°	No	≤ 45°	No
				4:1	4' – 7"				
				6:1	6' – 5"				
18"	2 ½"	1.60"	24.00"	3:1	4' – 6"	≤ 45°	No	≤ 45°	No
				4:1	5' – 8"				
				6:1	8' – 0"				
24"	3"	1.95"	31.00"	3:1	6' – 2"	≤ 45°	No	= 30°	No
				4:1	7' – 10"			> 30°	Yes
				6:1	11' – 3"				
30"	3 ½"	2.65"	38.50"	3:1	7' – 10"	= 15°	No	= 15°	No
				4:1	10' – 1"	> 15°	Yes	> 15°	Yes
				6:1	14' – 8"				
36"	4"	2.75"	45.50"	3:1	9' – 5"	= 0°	No	≥ 0°	Yes
				4:1	12' – 3"	> 0°	Yes		
				6:1	17' – 11"				
42"	4 ½"	2.7"	52.50"	3:1	11' – 1"	≥ 0°	Yes	≥ 0°	Yes
				4:1	14' – 5"				
				6:1	21' – 2"				



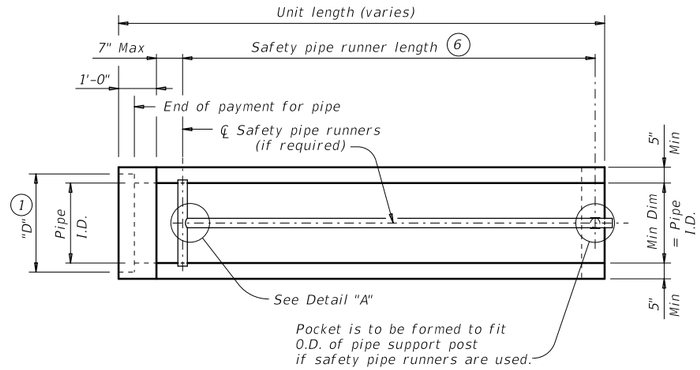
END DETAIL FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)



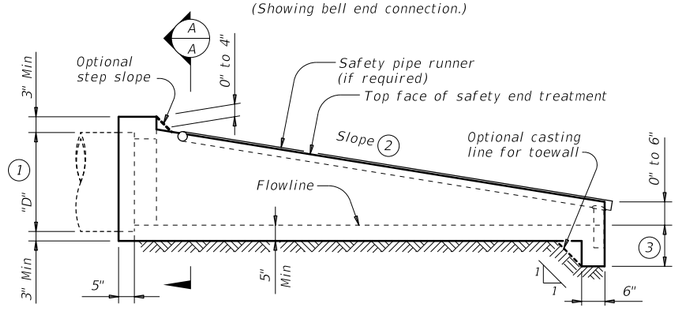
OPTIONAL JOINT FOR RCP

(Showing joint between RCP and precast safety end treatment)



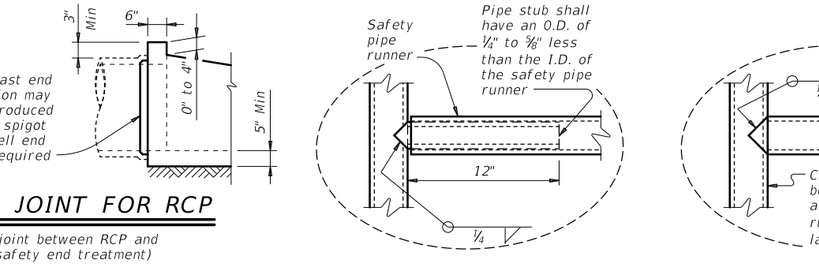
PLAN

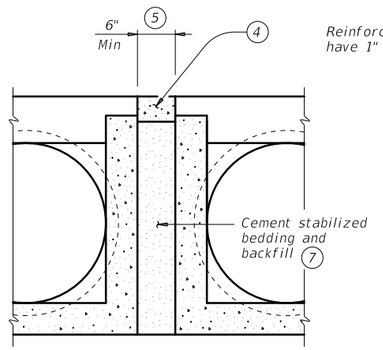
(Showing bell end connection.)



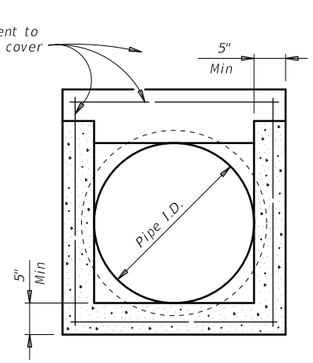
LONGITUDINAL ELEVATION

(Showing bell end connection.)

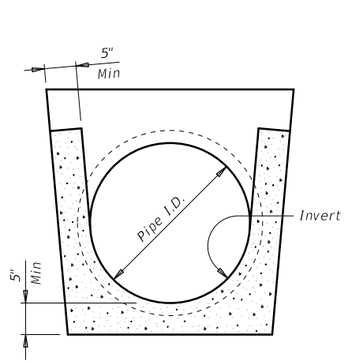




MULTIPLE PIPE INSTALLATION

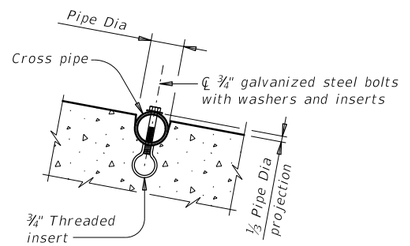


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)

SAFETY PIPE RUNNER DIMENSIONS

Max Safety Pipe Runner Length	Required Pipe Runner Size		
	Pipe Size	Pipe O.D.	Pipe I.D.
11' – 2"	3" STD	3.500"	3.068"
15' – 6"	3 ½" STD	4.000"	3.548"
20' – 10"	4" STD	4.500"	4.026"
35' – 4"	5" STD	5.563"	5.047"

(1) Dimension "D" is based on reinforced concrete pipe (RCP) meeting the requirements of ASTM C-76, Class III, (RCP Wall "B" thickness). Adjust "D" for any other wall thickness used. For thermoplastic pipe (TP) take into account the annular space requirements for grouted connections.

(2) Slope as shown elsewhere in plans. Slope of 3:1 or flatter is required for vehicle safety.

(3) Toewall to be used only when dimension is shown elsewhere in the plans.

(4) Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap is considered subsidiary to the Item 467, "Safety End Treatment".

(5) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

(6) Measured along slope.

(7) Provide cement stabilized bedding and backfill in accordance with the Item 400, "Excavation and Backfill for Structures". Bedding and backfill is considered subsidiary to the Item 467, "Safety End Treatment". When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.

(8) Thermoplastic pipe wall thickness may vary. Adjust accordingly. Thermoplastic pipe requires the safety end treatments to have a bell end for grouted connections.

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe (RCP), and thermoplastic pipe (TP) may be used for TYPE II end treatment as specified in Item "Safety End Treatment".

When precast safety end treatment is used as a Contractor's alternate to mitered RCP, riprap will not be required unless noted otherwise on the plans.

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Manufacture this product in accordance with Item 467, "Safety End Treatment" except as noted below :

A. Provide minimum reinforcing of #4 at 6" (Grade 40) or #4 at 9" (Grade 60) each way or 6"x6" – D12 x D12 or 5"x5" – D10 x D10 welded wire reinforcement (WWR).
B. For precast (steel formed) sections, provide Class "C" concrete (f'c = 3,600 psi).

At the option and expense of the Contractor, the next larger size of safety end treatment may be furnished as long as the "D" dimension cast is that of the required size of pipe.

Pipe runners are designed for a traversing load of 1,800 Lbs at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.

Provide safety pipe runners, cross pipes, pipe support posts, and pipe stubs meeting the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

Galvanize all steel components except reinforcing steel after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

Connect RCP using the Optional Joint for RCP detail shown or in accordance with Item 464 "Reinforced Concrete Pipe". Connect TP by grouting. See Pipe and Box Grouted Connections (PBGC) standard for grouted connections with TP and precast safety end treatment.

Texas Department of Transportation

Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ CROSS DRAINAGE

PSET-SC

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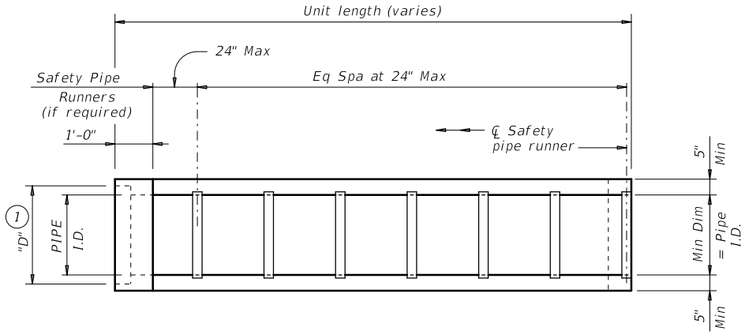
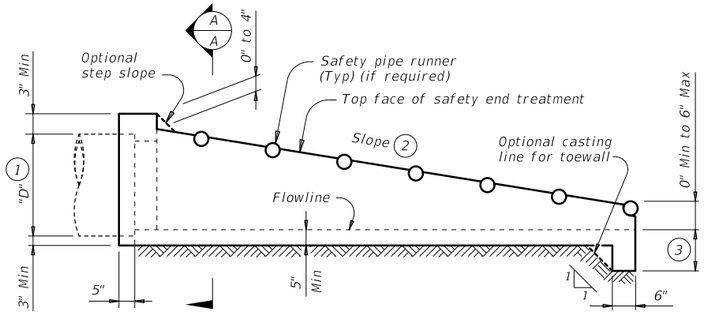


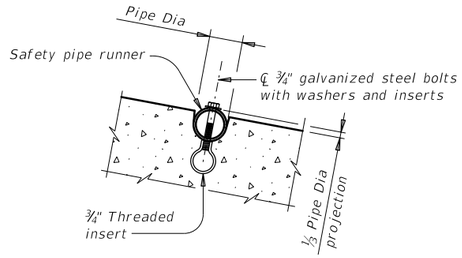
PLAN

(Showing bell end connection.)



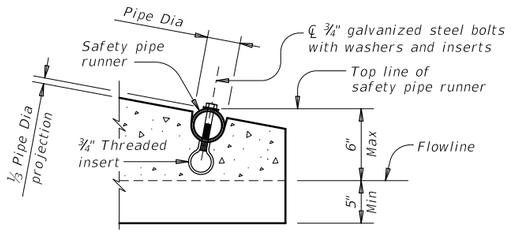
LONGITUDINAL ELEVATION

(Showing bell end connection.)

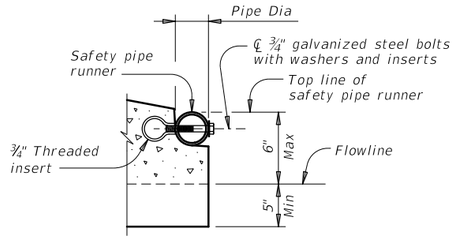


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



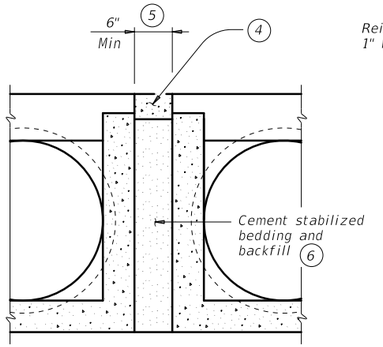
OPTION A



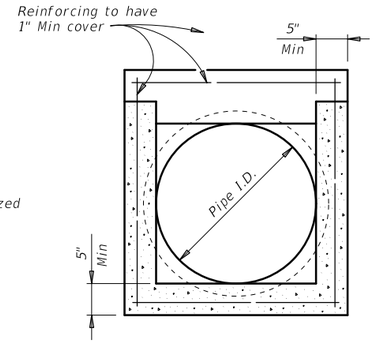
OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

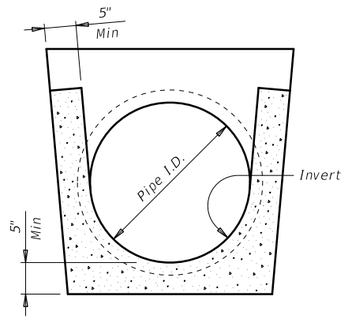
(If required)



MULTIPLE PIPE INSTALLATION

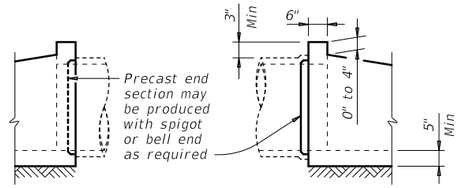


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



OPTIONAL JOINT FOR RCP

(Showing joint between RCP and precast safety end treatment.)

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (7)	"D" (1)	Slope	Min Length	Pipe Runners Required		Required Pipe Runner Size		
						Single Pipe	Multiple Pipe	Nominal Dia.	O.D.	I.D.
12"	2"	1.15"	17.00"	6:1	4' – 9"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
15"	2 ¼"	1.30"	20.50"	6:1	6' – 5"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
18"	2 ½"	1.60"	24.00"	6:1	8' – 0"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
24"	3"	1.95"	31.00"	6:1	11' – 3"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
30"	3 ½"	2.65"	38.50"	6:1	14' – 8"	No	Yes	4" STD	4.500"	4.026"
36"	4"	2.75"	45.50"	6:1	17' – 11"	Yes	Yes	4" STD	4.500"	4.026"
42"	4 ½"	2.7"	52.50"	6:1	21' – 2"	Yes	Yes	4" STD	4.500"	4.026"

(1) Dimension "D" is based on reinforced concrete pipe (RCP) meeting the requirements of ASTM C-76, Class III, (RCP Wall "B" thickness). Adjust "D" for any other wall thickness used. For thermoplastic pipe (TP) take into account the annular space requirements for grouted connections.

(2) Slope as shown elsewhere in the plans. Slope of 6:1 or flatter is required for vehicle safety.

(3) Toewall to be used only when dimension is shown elsewhere in the plans.

(4) Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap is considered subsidiary to the Item 467, "Safety End Treatment".

(5) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

(6) Provide cement stabilized bedding and backfill in accordance with the Item 400, "Excavation and Backfill for Structures". Bedding and backfill is considered subsidiary to the Item 467, "Safety End Treatment". When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.

(7) Thermoplastic pipe wall thickness may vary. Adjust accordingly. Thermoplastic pipe requires the safety end treatments to have a bell end for grouted connections.

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe (RCP), and thermoplastic pipe (TP) may be used for TYPE II end treatment as specified in Item "Safety End Treatment".

When precast safety end treatment is used as a Contractor's alternate to mitered RCP, riprap will not be required unless noted otherwise on the plans.

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Manufacture this product in accordance with Item 467, "Safety End Treatment" except as noted below :

A. Provide minimum reinforcing of #4 at 6" (Grade 40) or #4 at 9" (Grade 60) each way or 6"x6" – D12 x D12 or 5"x5" – D10 x D10 welded wire reinforcement (WWR).

B. For precast (steel formed) sections, provide Class "C" concrete (f'c = 3,600 psi).

At the option and expense of the Contractor the next larger size of safety end treatment may be furnished; as long as the "D" dimension cast is that of the required size of pipe.

Pipe runners are designed for a traversing load of 10,000 Lbs at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

Provide pipe runners meeting the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

Galvanize all steel components except reinforcing steel after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

Connect RCP using the Optional Joint for RCP detail shown or in accordance with Item 464, "Reinforced Concrete Pipe". Connect TP by grouting. See Pipe and Box Grouted Connections (PBGC) standard for grouted connections with TP and precast safety end treatment.

Texas Department of Transportation

Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ PARALLEL DRAINAGE

PSET-SP

FILE: psetspss-21.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-21: Added 42" TP	0014	03	087	IH 35W
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		170

DATE: 5/23/2022 10:53:32 AM
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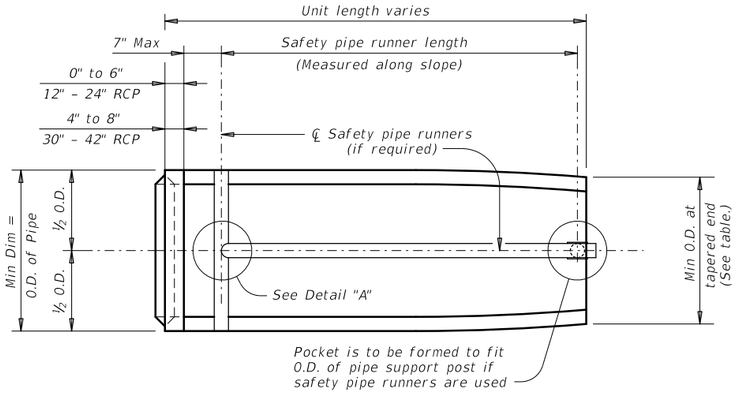
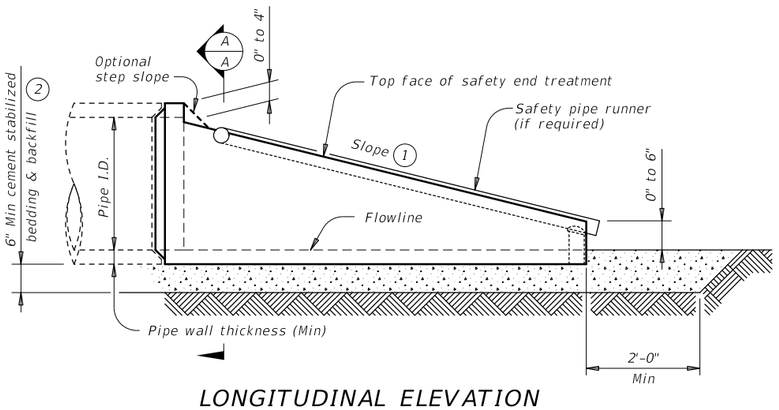


PLAN VIEW

(Showing spigot end connection.)



LONGITUDINAL ELEVATION

(Showing spigot end connection.)

MAX SAFETY PIPE RUNNER LENGTHS AND REQUIRED SAFETY PIPE RUNNER SIZES

Max Safety Pipe Runner Length	Required Pipe Runner Size		
	Pipe Size	Pipe O.D.	Pipe I.D.
11' – 2"	3" STD	3.500"	3.068"
15' – 6"	3 ½" STD	4.000"	3.548"
20' – 10"	4" STD	4.500"	4.026"
35' – 4"	5" STD	5.563"	5.047"

(1) Slope as shown elsewhere in the plans. Slope of 3:1 or flatter is required for vehicle safety.

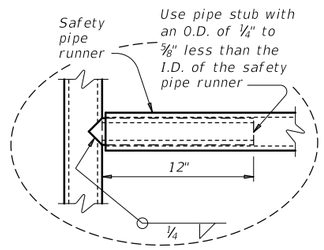
(2) Provide cement stabilized bedding and backfill in accordance with the Item, "Excavation and Backfill for Structures". Bedding and backfill is considered subsidiary to the Item "Safety End Treatment". When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.

(3) Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap be considered subsidiary to the Item "Safety End Treatment".

(4) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

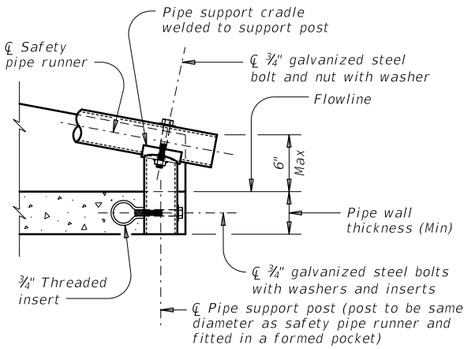
REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	Min Wall Thickness	Min O.D.	Min O.D. at Tapered End	Min Reinf Requirements (sq. in. / ft. of pipe)	Slope	Minimum Length of Unit	Single Pipe		Multiple Pipe	
							Skew	Pipe Runners Required	Skew	Pipe Runners Required
12"	2"	16"	16"	0.07 Circ.	3:1	2' – 0"	≤ 45°	No	≤ 45°	No
					4:1	2' – 8"				
					6:1	4' – 0"				
15"	2 ¼"	19 ½"	19"	0.07 Circ.	3:1	2' – 10"	≤ 45°	No	≤ 45°	No
					4:1	3' – 9"				
					6:1	5' – 8"				
18"	2 ½"	23"	21 ½"	0.07 Circ.	3:1	3' – 8"	≤ 45°	No	≤ 45°	No
					4:1	4' – 10"				
					6:1	7' – 3"				
24"	3"	30"	27"	0.07 Circ.	3:1	5' – 3"	≤ 45°	No	≤ 30°	No
					4:1	7' – 0"			> 30°	Yes
					6:1	10' – 6"				
30"	3 ½"	37"	31"	0.18 Circ.	3:1	6' – 3"	≤ 15°	No	≤ 15°	No
					4:1	8' – 2"	> 15°	Yes	> 15°	Yes
					6:1	12' – 1"				
36"	4"	44"	36"	0.19 Ellip.	3:1	7' – 10"	= 0°	No	≥ 0°	Yes
					4:1	10' – 4"	> 0°	Yes		
					6:1	15' – 4"				
42"	4 ½"	51"	41 ½"	0.23 Ellip.	3:1	9' – 6"	≥ 0°	Yes	≥ 0°	Yes
					4:1	12' – 6"				
					6:1	18' – 7"				



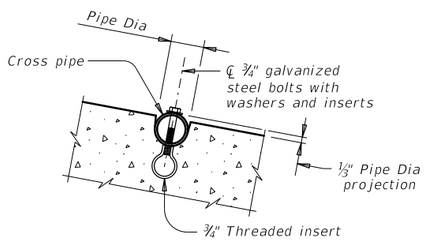
OPTION A OPTION B

DETAIL A



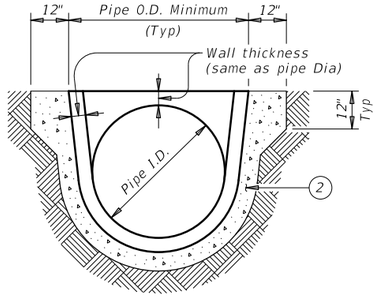
END DETAIL FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)

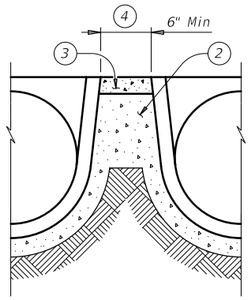


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



SECTION A-A



MULTIPLE PIPE INSTALLATION

MATERIAL NOTES:

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Provide safety pipe runners, cross pipes, pipe support posts, and pipe stubs meeting the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.

Galvanize all steel components except reinforcing steel after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe (CRP) may be used for TYPE II end treatment as specified in Item 467, "Safety End Treatment".

When precast safety end treatment is used as a Contractor's alternate to mitered RCP, riprap will not be required unless noted otherwise on the plans.

Manufacture precast concrete end sections in accordance with Item 464, "Reinforced Concrete Pipe" and in accordance with ASTM Specification C-76, Class III, Wall B for circular pipe.

Provide precast concrete end sections with a spigot or bell end for compatibility to upstream or downstream end conditions with sufficient annular space to allow for grout, mortar, cold applied asphalt joint compound or pre-formed plastic gasket material.

Methods of lifting shall be provided by the manufacturer for ease of loading, unloading, and installation.

Pipe runners are designed for a traversing load of 1,800 Lbs at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.

Texas Department of Transportation

Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ CROSS DRAINAGE

PSET-RC

FILE: psetrcss-20.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		171

DATE: 5/23/2022 10:53:37 AM
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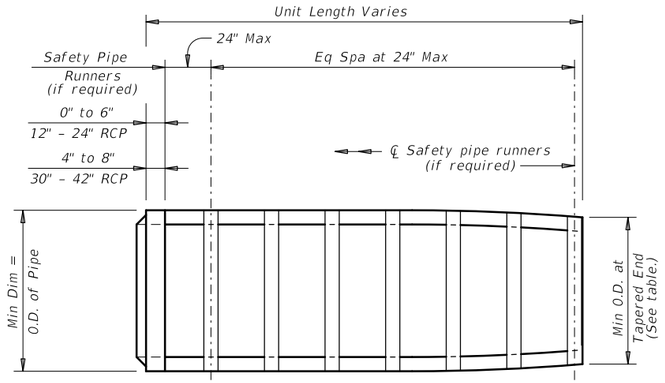
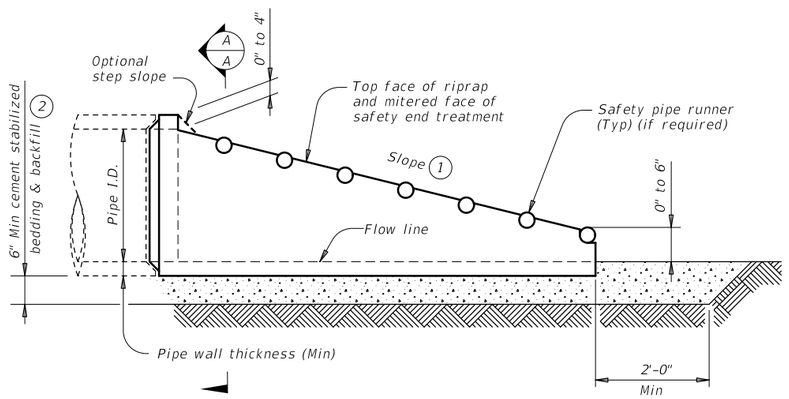


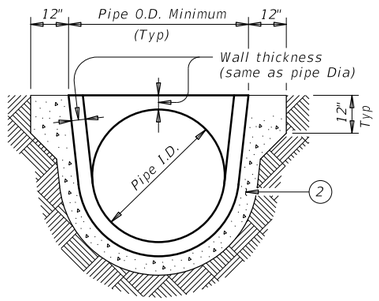
PLAN VIEW – 12" THRU 24"

(Showing spigot end connection.)

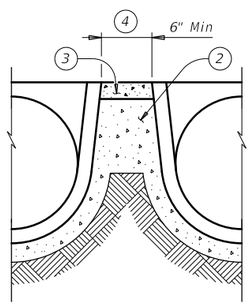


LONGITUDINAL ELEVATION - 12" THRU 24"

(Showing spigot end connection.)



SECTION A-A



MULTIPLE PIPE INSTALLATION

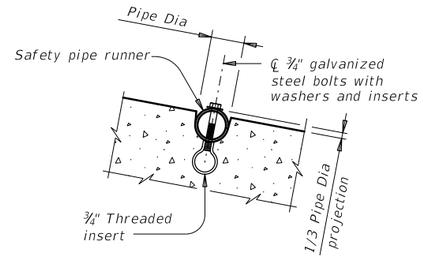
(1) Slope as shown elsewhere in the plans. Slope of 6:1 or flatter is required for vehicle safety.

Provide cement stabilized bedding and backfill in accordance with the Item, "Excavation and Backfill for Structures". Bedding and backfill is considered subsidiary to the Item 467, "Safety End Treatment". When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.

(3) Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap is considered subsidiary to the Item 467, "Safety End Treatment".

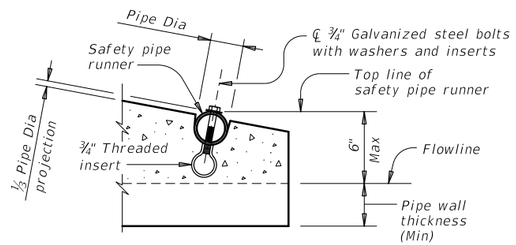
(4) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

(5) Safety pipe runners are required for multiple pipe culverts with more than two pipes.

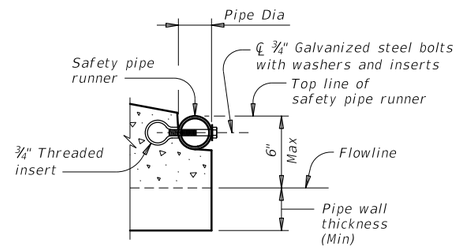


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



OPTION A



OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	Min Wall Thickness	Min O.D.	Min O.D. at Tapered End	Min Reinf Requirements (sq. in. per ft. of Pipe)	Max Slope	Min Length of Unit	Pipe Runner Requirements		Required Pipe Runner Sizes		
							Single Pipe	Multiple Pipe	Nominal Dia	O.D.	I.D.
12"	2"	16"	16"	0.07 Circ.	6:1	4'–0"	No	(5)	3" STD	3.500"	3.068"
15"	2 ¼"	19 ½"	19"	0.07 Circ.	6:1	5'–8"	No	(5)	3" STD	3.500"	3.068"
18"	2 ½"	23"	21 ½"	0.07 Circ.	6:1	7'–3"	No	(5)	3" STD	3.500"	3.068"
24"	3"	30"	27"	0.07 Circ.	6:1	10'–6"	No	(5)	3" STD	3.500"	3.068"
30"	3 ½"	37"	31"	0.18 Circ.	6:1	12'–1"	No	Yes	4" STD	4.500"	4.026"
36"	4"	44"	36"	0.19 Ellip.	6:1	15'–4"	Yes	Yes	4" STD	4.500"	4.026"
42"	4 ½"	51"	41 ½"	0.23 Ellip.	6:1	18'–7"	Yes	Yes	4" STD	4.500"	4.026"

MATERIAL NOTES:

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Provide pipe runners meeting the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.

Galvanize steel components except reinforcing steel after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe (RCP) may be used for TYPE II end treatment as specified in Item 467, "Safety End Treatment".

When precast safety end treatment is used as a Contractor's alternate to mitered RCP, riprap will not be required unless noted otherwise on the plans.

Manufacture precast concrete end sections in accordance with Item 464, "Reinforced Concrete Pipe" and in accordance with ASTM Specification C-76, Class III, Wall B for circular pipe.

Provide precast concrete end sections with a spigot or bell end for compatibility to upstream or downstream end conditions with sufficient annular space to allow for grout, mortar, cold applied asphalt joint compound or pre-formed plastic gasket material.

Methods of lifting shall be provided by the manufacturer for ease of loading, unloading and installation.

Pipe runners are designed for a traversing load of 10,000 Lbs at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

Texas Department of Transportation

Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ PARALLEL DRAINAGE

PSET-RP

FILE: psetrpss-20.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		172

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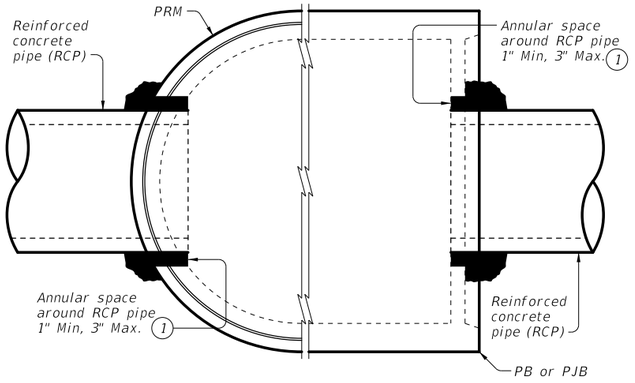
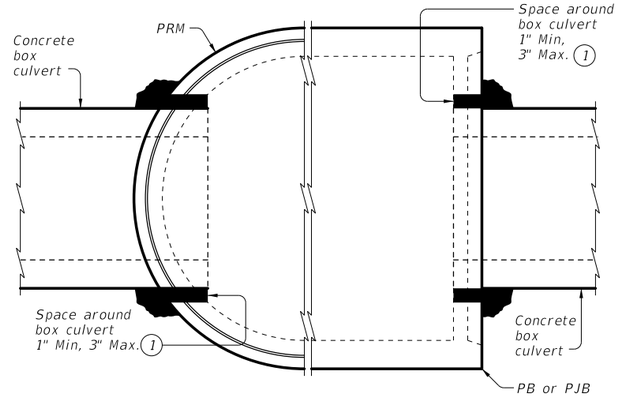


PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE

PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

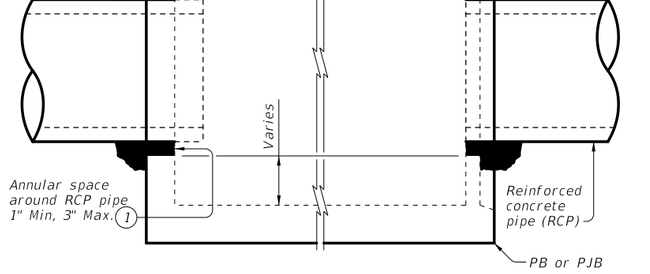
TYPICAL HALF PLAN



PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE

PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

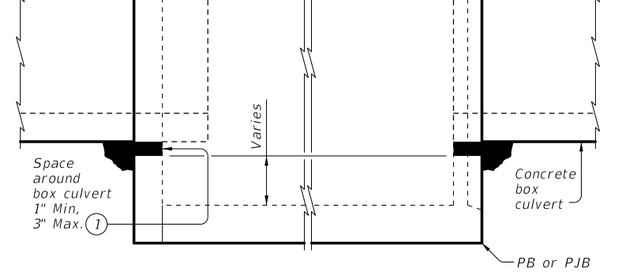
TYPICAL HALF PLAN



PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE

PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

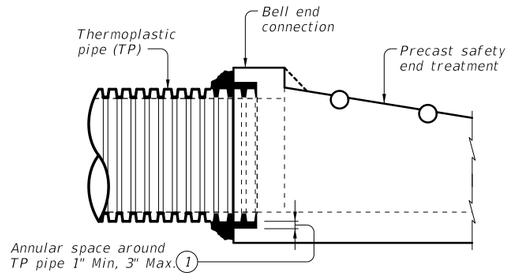
TYPICAL HALF ELEVATION



PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE

PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

TYPICAL HALF ELEVATION



TYPICAL PARTIAL ELEVATION OF PRECAST SAFETY END TREATMENTS

Showing square PSET for parallel drainage, cross drainage shown similar.

(1) Completely fill the void between the precast structure and the connecting pipe or box with cementitious grouts and mortars in accordance with DMS-4675 "Cementitious Grouts and Mortars for Miscellaneous Application".

CONSTRUCTION NOTES:

Do not grout rubber gasket joints without Manufacturer's recommendations.

Do not use bricks, masonry blocks, native stone, or similar materials in conjunction with grouted connections when filling void spaces around pipes or box culverts.

MATERIAL NOTES:

Provide grouted connections in accordance with DMS-4675 "Cementitious Grouts and Mortars for Miscellaneous Application".

GENERAL NOTES:

See applicable standards for notes and details not shown:
- Precast Base (PB)
- Precast Junction Box (PJB)
- Precast Round Manhole (PRM)
- Precast Safety End Treatments C/D Square (PSET-SC)
- Precast Safety End Treatments P/D Square (PSET-SP)

Provide Concrete Box Culverts in accordance with Item 462 "Concrete Box Culverts and Drains".

Provide Reinforced Concrete Pipe (RCP) in accordance with Item 464 "Reinforced Concrete Pipe".

Provide Thermoplastic Pipe (TP) in accordance with Special Specification Thermoplastic Pipe.

Payment for grouted connections is considered subsidiary to other bid Items.

Texas Department of Transportation

Bridge Division Standard

PIPE AND BOX GROUTED CONNECTIONS FOR PRECAST STRUCTURES

PBGC

FILE: pbgcstd1-20.dgn	DN: TxDOT	CK: TAR	DW: JTR	CK: TAR
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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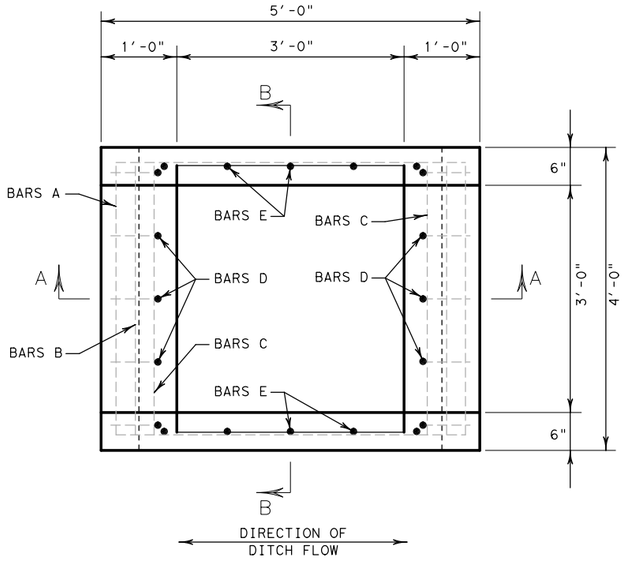
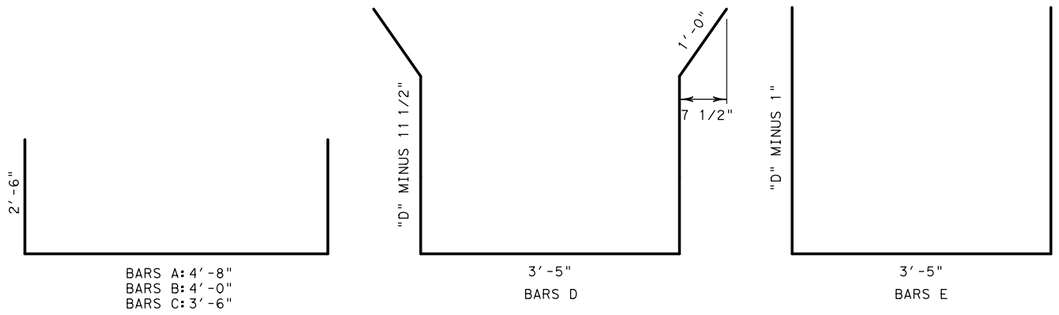
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		173



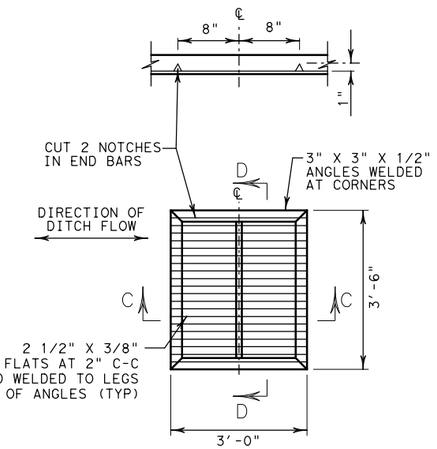
PLAN VIEW
N.T.S.



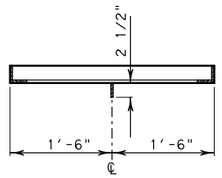
BILL OF REINFORCING STEEL FOR "D" = 4.00'					
BAR	SIZE	SPACING	REINFORCING STEEL		
		(in)	No	Length	Wt
A	#4	N/A	2	9.667	13
B	#4	N/A	2	9.000	12
C	#4	10"	8	8.500	45
D	#4	10"	5	11.583	39
E	#4	10"	5	11.250	38

SUMMARY OF QUANTITIES	
TOTAL STEEL - LBS	147
CLASS "C" CONCRETE - CY	1.52

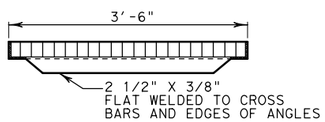
ADDITIONAL QUANTITIES	
STEEL (LBS. P.L.F.)	28
CONCRETE (CY P.L.F.)	0.26



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.

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.

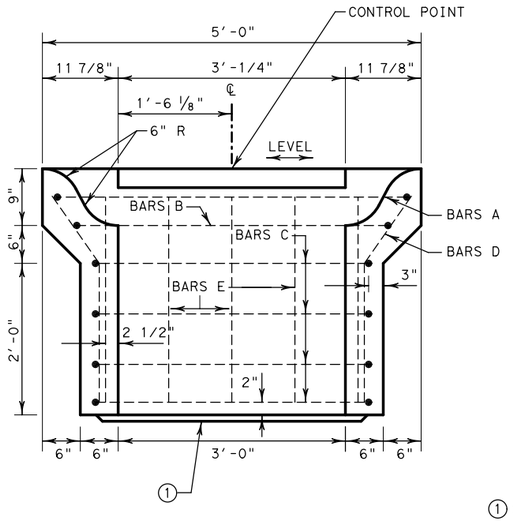
SHEET 1 OF 2 SHEETS

Texas Department of Transportation

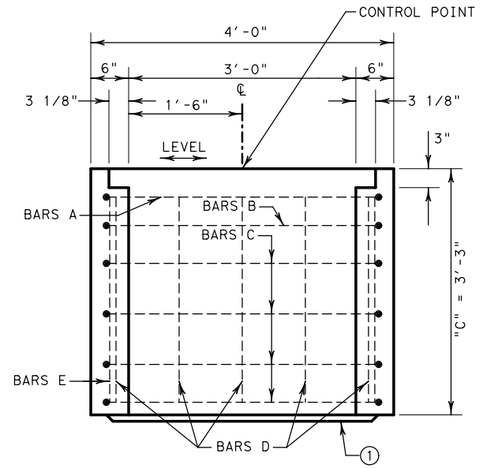
Fort Worth District Standard

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		174
05/2019	REPLACES DI-1-02(FW)	STATE	STATE DIST.NO.	COUNTY	
		TEXAS	FTW	JOHNSON	
		CONT.	SECT.	JOB	HIGHWAY NO.
		0014	03	087	IH 35W



SECTION A-A



SECTION B-B

① SEE NOTE 10

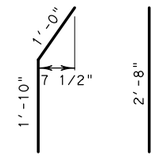
PRECAST INLET TOP

FOR USE WITH PRECAST RISER
SEE MI-B&R
N.T.S.

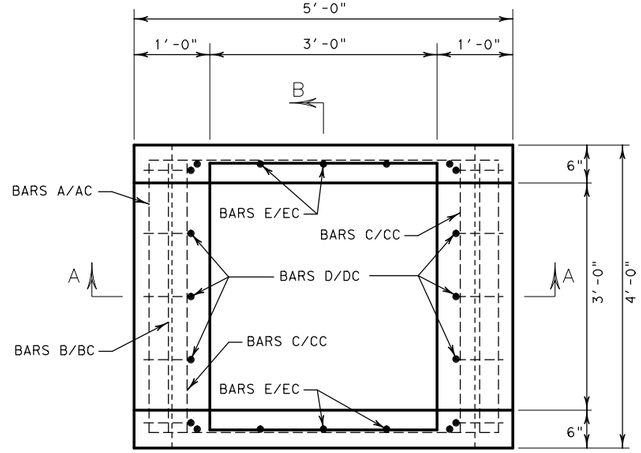
BILL OF REINFORCING STEEL FOR "C" = 3'-3"					
BAR	SIZE	SPACING (in)	REINFORCING STEEL No	Length	Wt
A	#4	N/A	2	9.667	13
B	#4	N/A	2	9.000	12
C	#4	10"	6	8.500	34
D	#4	10"	10	2.833	19
E	#4	10"	10	2.667	18

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

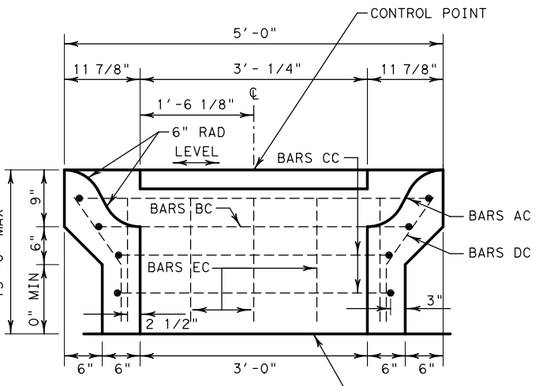


PLAN VIEW
N.T.S.

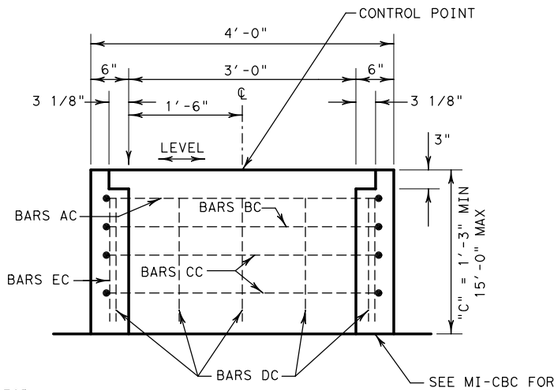
BILL OF REINFORCING STEEL FOR "C" = 1'-3"					
BAR	SIZE	SPACING (in)	REINFORCING STEEL No	Length	Wt
AC	#4	N/A	2	9.667	13
BC	#4	N/A	2	9.000	12
CC	#4	10"	2	8.500	11
DC	#4	10"	10	1.000	7
EC	#4	10"	10	0.833	6

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



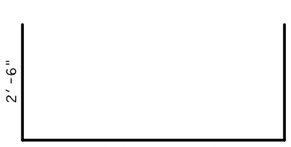
SECTION A-A



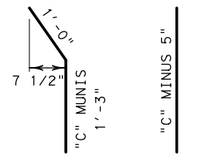
SECTION B-B

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.



BARS AC 4'-8"
BARS BC 4'-0"
BARS CC 3'-6"



BARS DC BARS EC

GENERAL NOTES

SEE SHEET 1 OF 2 FOR GENERAL NOTES.

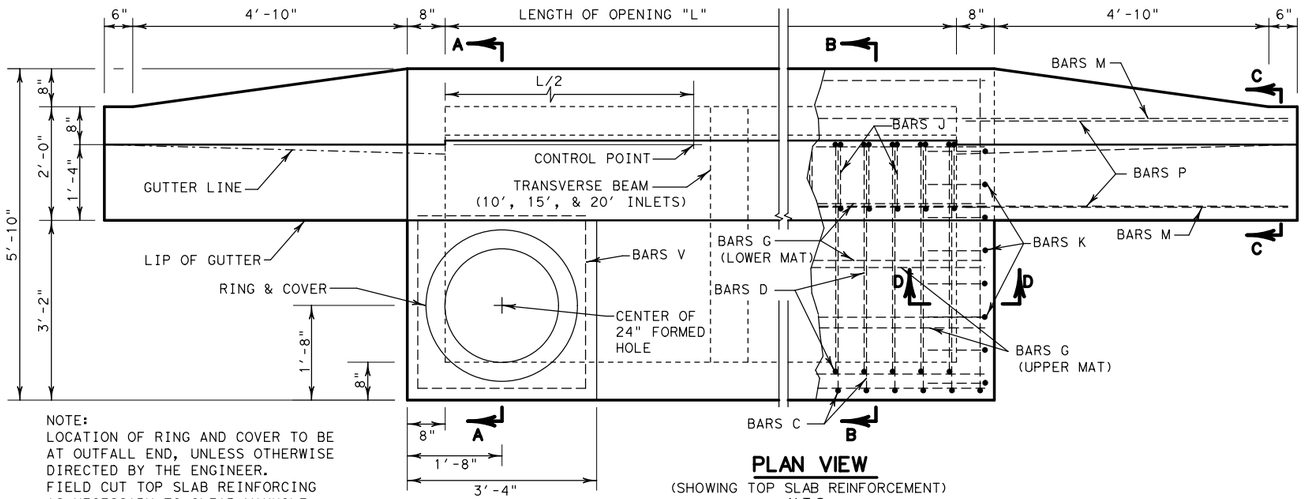
SHEET 2 OF 2 SHEETS

Texas Department of Transportation

Fort Worth District Standard

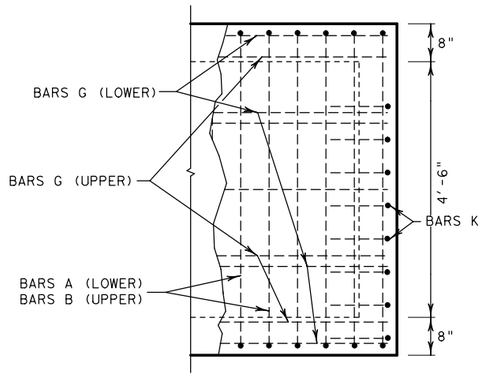
AREA-DITCH INLET TYPE AD
I-AD (FTW)

ORIGINAL DRAWING: 05/2019	iad-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
DATE	REVISIONS	6	SEE TITLE SHEET	175
05/2019	REPLACES DI-1-02(FW)	STATE	STATE DIST.NO.	COUNTY
		TEXAS	FTW	JOHNSON
		CONT.	SECT.	JOB / HIGHWAY NO.
		0014	03	087 / IH 35W

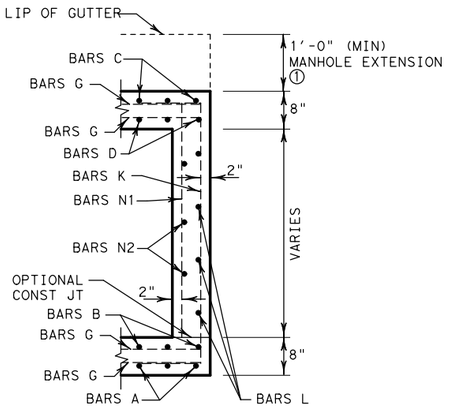


NOTE:
LOCATION OF RING AND COVER TO BE AT OUTFALL END, UNLESS OTHERWISE DIRECTED BY THE ENGINEER. FIELD CUT TOP SLAB REINFORCING AS NECESSARY TO CLEAR MANHOLE.

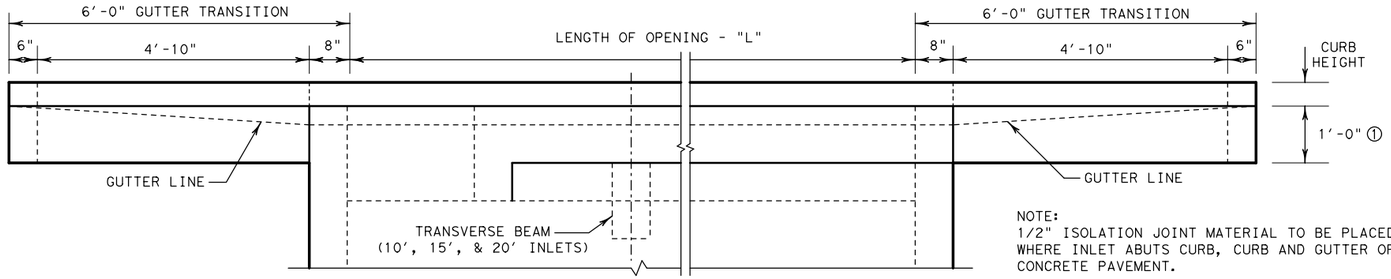
PLAN VIEW
(SHOWING TOP SLAB REINFORCEMENT)
N.T.S.



PARTIAL PLAN VIEW
(SHOWING BOTTOM SLAB REINFORCEMENT)
N.T.S.

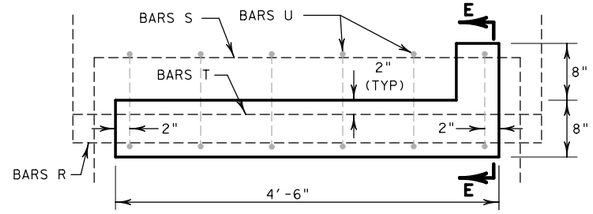


SECTION "D-D"
N.T.S.

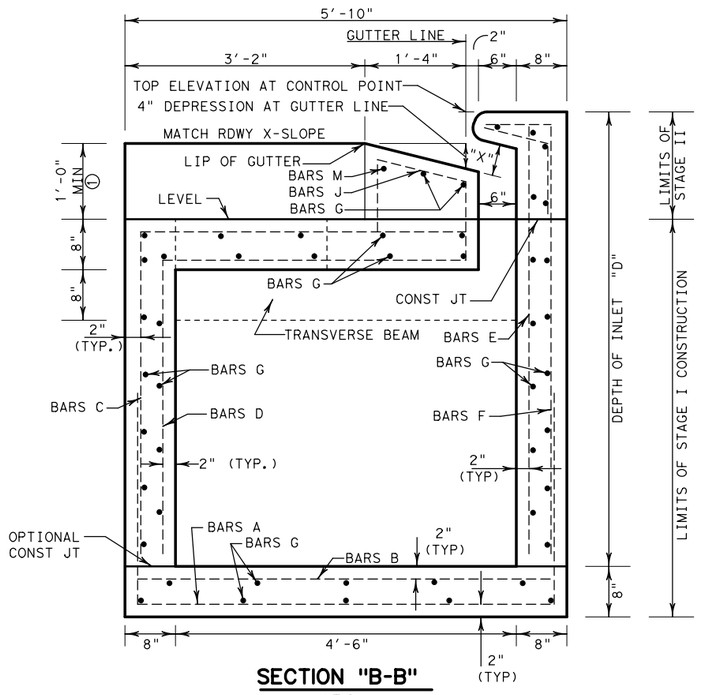


NOTE:
1/2" ISOLATION JOINT MATERIAL TO BE PLACED WHERE INLET ABUTS CURB, CURB AND GUTTER OR CONCRETE PAVEMENT.

FRONT ELEVATION VIEW
N.T.S.



TRANSVERSE BEAM DETAIL
BEAMS AT 5' C-C (10', 15', & 20' INLETS)
N.T.S.

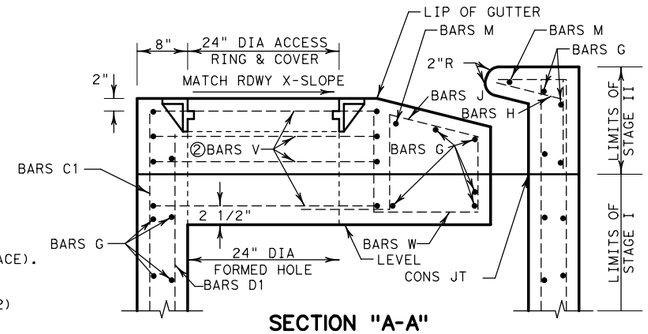


SECTION "B-B"
N.T.S.

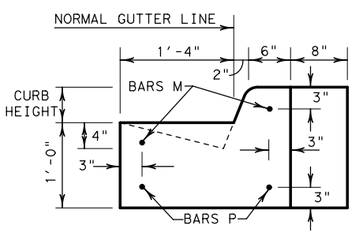
THROAT DIMENSION	
CURB HEIGHT (IN)	"X"
5	5"
6	5 7/8"
7	6 1/4"
8	6 1/2"

① MATCH DEPTH OF PAVEMENT STRUCTURE (BASE AND SURFACE). ADJUST BAR LENGTHS AS DIRECTED BY THE ENGINEER. (SEE DETAIL, SHEET 2 OF 2)

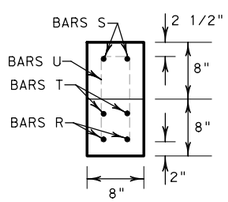
② STAGE II BARS V @ 3 EQUAL SPACES



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	176
05/2019	NEW STANDARD	STATE	STATE DIST.NO.	COUNTY
04/2020	ADD MAX CONDUIT SIZE TABLE	TEXAS	FTW	JOHNSON
11/2020	REVISE JOINT NOMENCLATURE	CONT.	SECT.	JOB / HIGHWAY NO.
		0014	03	087 IH 35W

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

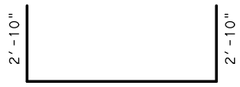
BILL OF REINFORCING STEEL FOR "D" = 6' (CONTINUED)

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

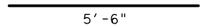
SUMMARY OF QUANTITIES

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

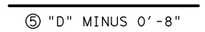
* BASED ON 6" CURB HEIGHT. ADJUST FOR OTHER CURB HEIGHTS.



#5 BARS A

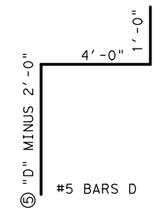


#5 BARS B

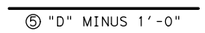


#5 BARS C1

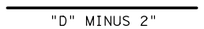
#5 BARS C



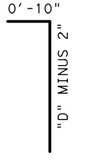
#5 BARS D



#5 BARS D1



#5 BARS E



#5 BARS F

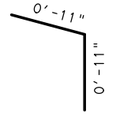
"L" + 1'-0"

#5 BARS G

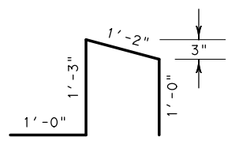
BAR G SPACING:

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

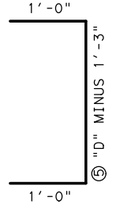
⑤ BASED ON 6" CURB HEIGHT. ADJUST FOR OTHER CURB HEIGHTS.



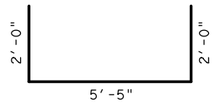
#4 BARS H



#4 BARS J



#4 BARS K



#5 BARS L

"L" + 11'-8"

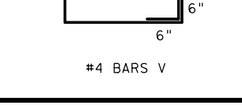
#4 BARS M
PLACE AS SHOWN

⑤ "D" MINUS 1'-8" (N1)

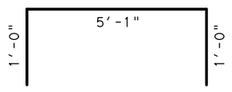
5'-6" (N2)

#4 BARS N

5'-8"
#4 BARS P
PLACE AS SHOWN

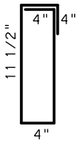


#6 BARS R
PLACE AS SHOWN

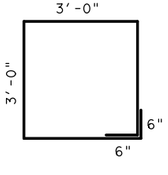


#6 BARS S
PLACE AS SHOWN

#6 BARS T
PLACE AS SHOWN



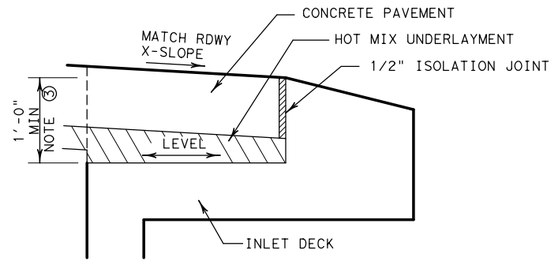
#4 BARS U



#4 BARS V

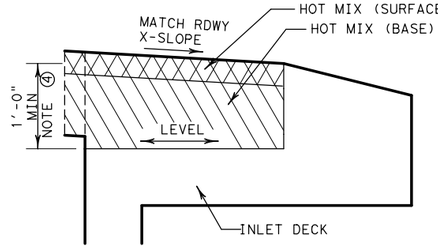
#4 BARS W

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

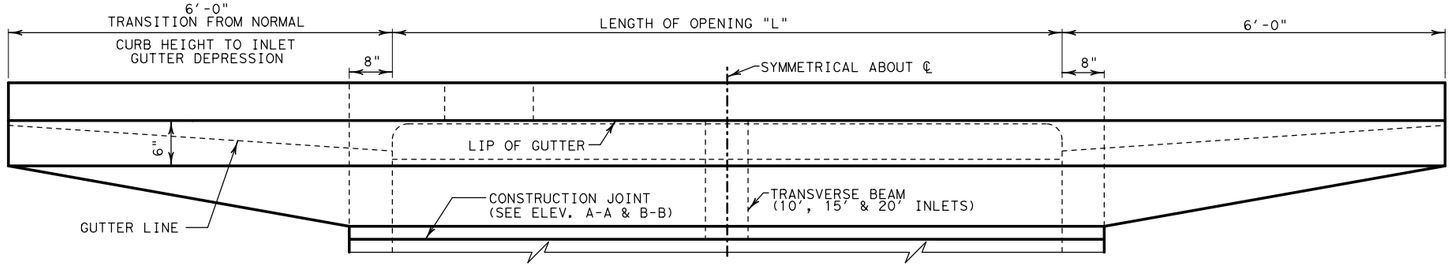
1. DESIGNED FOR AASHTO LRFD HL-93 LOADING.
2. ALL CONCRETE FOR CAST-IN-PLACE STRUCTURES SHALL BE CLASS "C"; ALL CONCRETE FOR PRECAST STRUCTURES SHALL BE CLASS "H" (MINIMUM 5000 PSI DESIGN STRENGTH).
3. ALL REINFORCING STEEL SHALL BE GRADE 60.
4. STAGE I MAY BE EITHER CAST-IN-PLACE OR PRECAST. FABRICATE 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

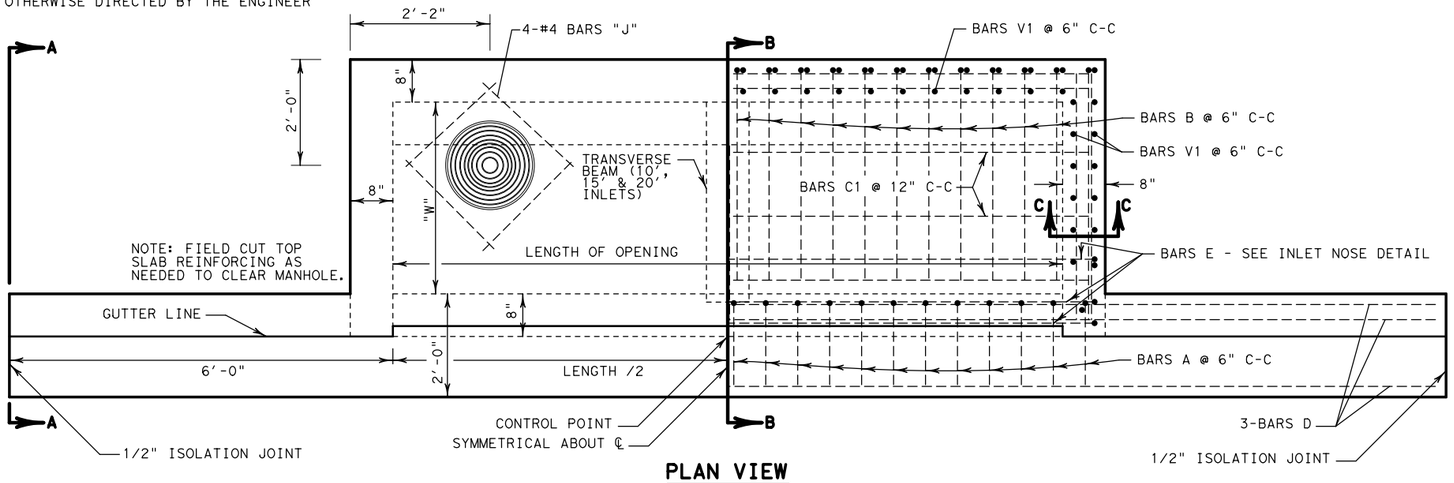
CURB INLET UNDER PAVEMENT FOR USE WITH TYPE II CURB I-CU (FTW)

ORIGINAL DRAWING: 05/2019	icu-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
DATE	REVISIONS	6	SEE TITLE SHEET		177
05/2019	REPLACES C1-2-08(FW)	STATE	STATE DIST.NO.	COUNTY	
04/2020	ADD MAX CONDUIT SIZE TABLE	TEXAS	FTW	JOHNSON	
11/2020	REVISE JOINT NOMENCLATURE	CONT.	SECT.	JOB	HIGHWAY NO.
		0014	03	087	IH 35W

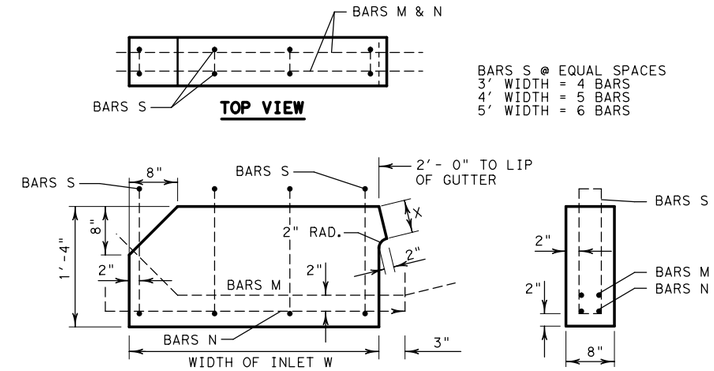


FRONT ELEVATION VIEW
N.T.S.

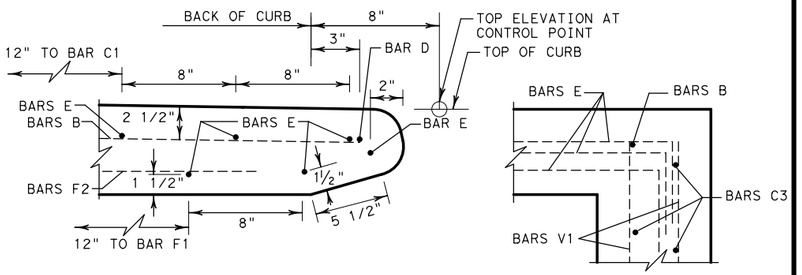
NOTE: LOCATION OF RING AND COVER TO BE AT OUTFALL END, UNLESS OTHERWISE DIRECTED BY THE ENGINEER



PLAN VIEW
(ONLY TOP LAYER OF SLAB REINFORCING SHOWN, FOR CLARITY)
N.T.S.

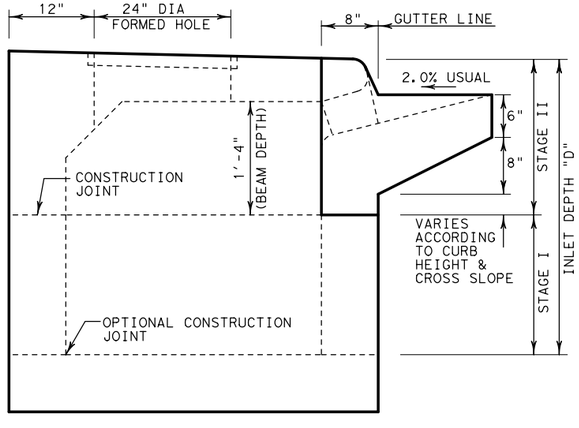


TRANSVERSE BEAM DETAIL
BEAMS AT 5' C - C (10', 15' & 20' INLETS)
N.T.S.

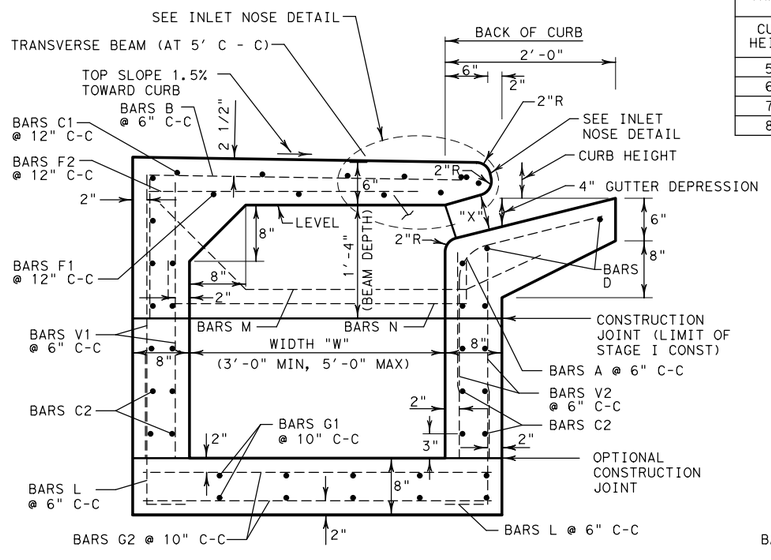


INLET NOSE DETAIL
N.T.S.

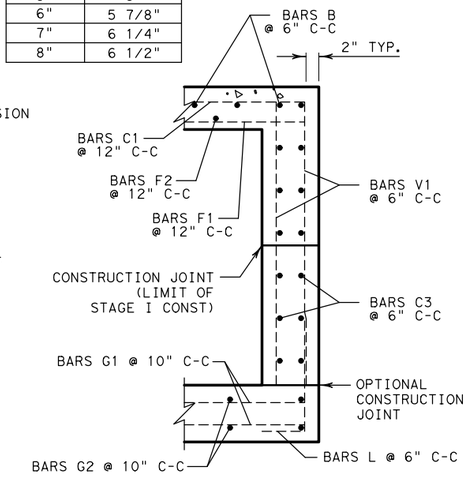
THROAT DIMENSION	
CURB HEIGHT	"X"
5"	5"
6"	5 7/8"
7"	6 1/4"
8"	6 1/2"



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.

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	178
05/2019	NEW STANDARD	STATE	STATE DIST.NO.	COUNTY
04/2020	ADD MAX CONDUIT SIZE TABLE	TEXAS	FTW	JOHNSON
11/2020	REVISED JOINT NOMENCLATURE	CONT.	SECT.	JOB / HIGHWAY NO.
		0014	03	087 IH 35W

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

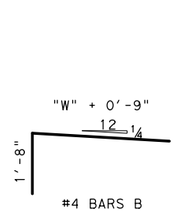
Total Reinf Weight	Steel Qty Adjust. P.L.F.	Class "C" Concrete	Concrete Qty Adjust. P.L.F.
[Lb]	[Lb]	[CY]	[CY]
1,040	171.1	3.8	0.46
1,163	187.7	4.3	0.51
1,286	204.4	4.8	0.56
1,659	254.5	5.9	0.71
1,829	271.2	6.6	0.76
2,000	287.9	7.3	0.81
2,278	337.9	7.9	0.95
2,496	354.6	8.9	1.00
2,714	371.3	9.8	1.05
2,896	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

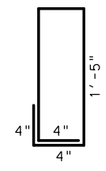
NOTE:
AT CONTRACTOR'S OPTION, BARS L MAY BE FABRICATED TO BE CONTINUOUS WITH BARS V1 AND/OR V2.

AT CONTRACTOR'S OPTION, BARS A MAY BE FABRICATED TO BE CONTINUOUS WITH BARS V2.



#4 BARS B

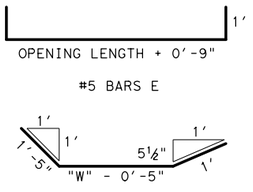
#5 BARS V1



#4 BARS S

#5 BARS V2

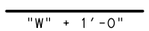
#5 BARS L



#5 BARS E

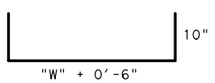
#4 BARS M

#4 BARS J



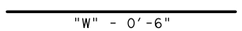
#5 BARS C3 & G2

#5 BARS C1, C2 & G1
#4 BARS F1

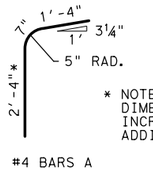


#5 BARS N

#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

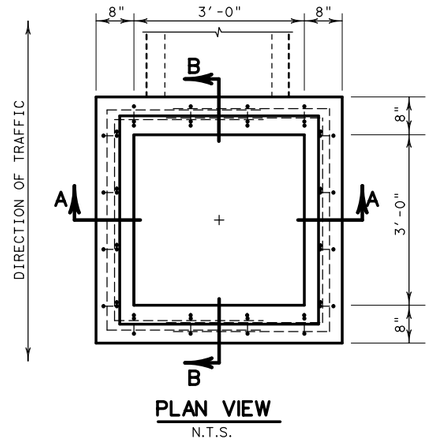
1. DESIGNED ACCORDING TO AASHTO LRFD SPECIFICATIONS FOR PEDESTRIAN LOADING AND HL-93 LOADING UNDER "EXTREME EVENT II" LOAD COMBINATION.
2. ALL CONCRETE FOR CAST-IN-PLACE STRUCTURES SHALL BE CLASS "C"; ALL CONCRETE FOR PRECAST STRUCTURES SHALL BE CLASS "H"(MINIMUM 5000 PSI DESIGN STRENGTH).
3. ALL REINFORCING 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	179
05/2019	NEW STANDARD	STATE	STATE DIST.NO.	COUNTY
04/2020	ADD MAX CONDUIT SIZE TABLE	TEXAS	FTW	JOHNSON
11/2020	REVISED JOINT NOMENCLATURE	CONT.	SECT.	JOB / HIGHWAY NO.
01/2021	REVISE MAX CONDUIT SIZE TABLE	0014	03	087 / IH 35W

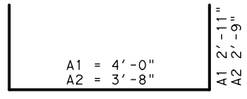


PLAN VIEW
N.T.S.

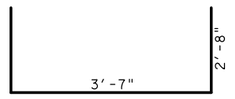
BILL OF REINFORCING STEEL - FREE-STANDING INLET												
DEPTH "D"	BARS A1			BARS A2			BARS B			BARS C		
	#5			#5		12" Spa	#5		12" Spa	#5		12" Spa
(ft)	No	Length	Wt	No	Length	Wt	No	Length	Wt	No	Length	Wt
4.0	2	9.833	21	8	9.167	76	8	8.917	74	16	3.833	64

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

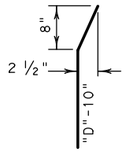
MAXIMUM DEPTH "D" = 30.00'



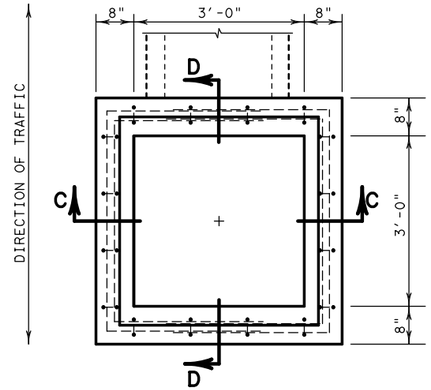
BARS A1 & A2



BARS B



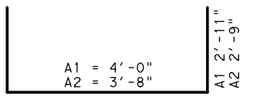
BARS C



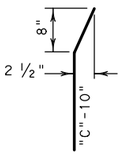
PLAN VIEW
N.T.S.

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

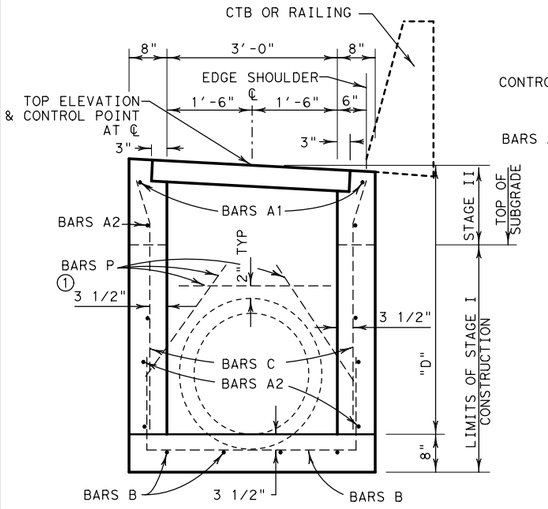
SUMMARY OF QUANTITIES - INLET (RISER ONLY)			
TOTAL REINFORCING STEEL	ADDITIONAL REINFORCING STEEL	CLASS "C" CONCRETE	ADDITIONAL CONCRETE
Weight	P.L.F.		P.L.F.
(Lb)	(Lb)	(CY)	(CY)
69	35.8	0.4	0.18



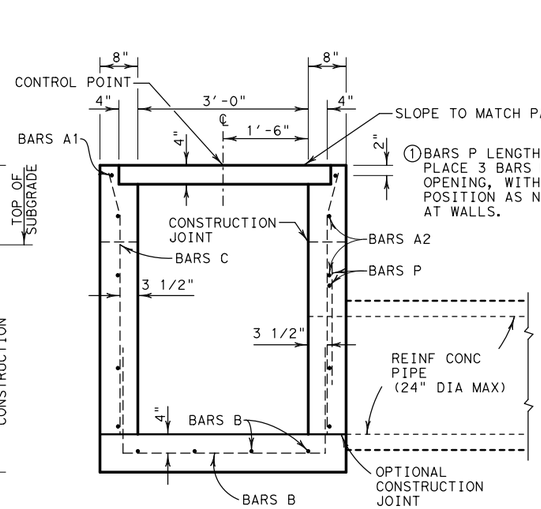
BARS A



BARS C



SECTION A-A



SECTION B-B

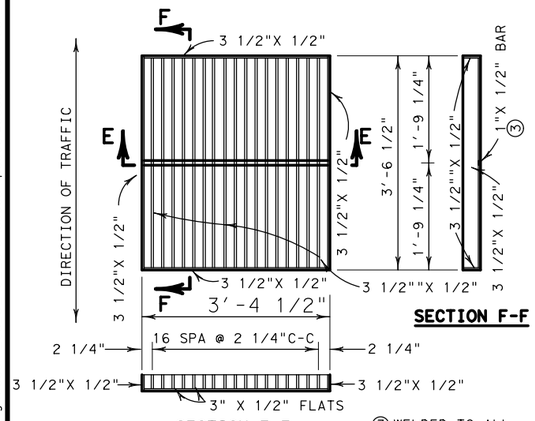
① BARS P LENGTH = PIPE O.D. + 0'-9"
PLACE 3 BARS P AS SHOWN AT EACH PIPE OPENING, WITH 2"CLEAR COVER OVER PIPE. POSITION AS NEEDED TO PROVIDE 2" CLEAR AT WALLS.

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

TYPE FG INLET (FREE-STANDING)

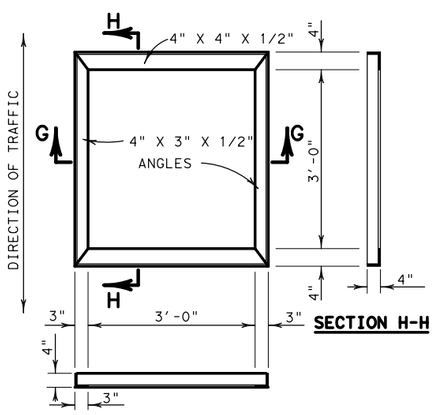
MAXIMUM PIPE SIZE - 24" DIAMETER
N.T.S.



SECTION E-E

GRATE DETAIL
N.T.S.

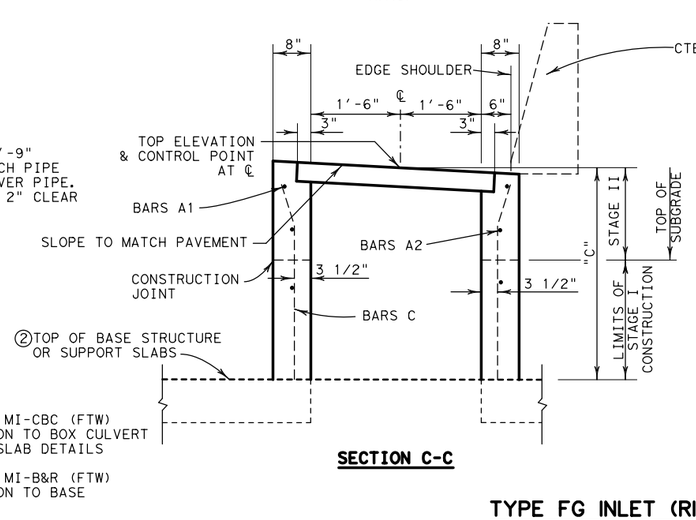
③ WELDED TO ALL TRANSVERSE FLATS



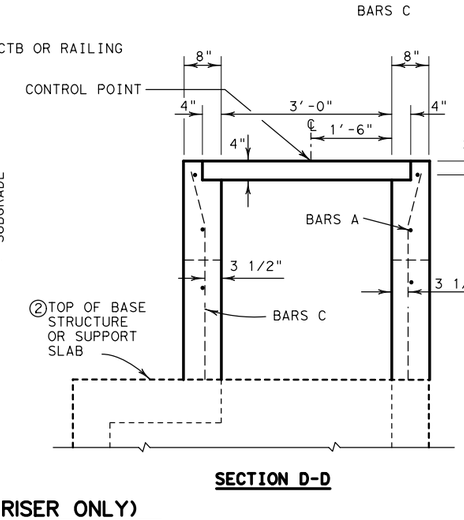
SECTION H-H

SECTION G-G

FRAME DETAIL
N.T.S.



SECTION C-C



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

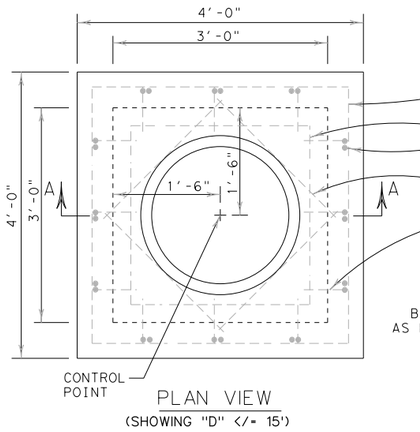
Fort Worth District Standard

GRATED INLET FOR PAVED SURFACES TYPE FG

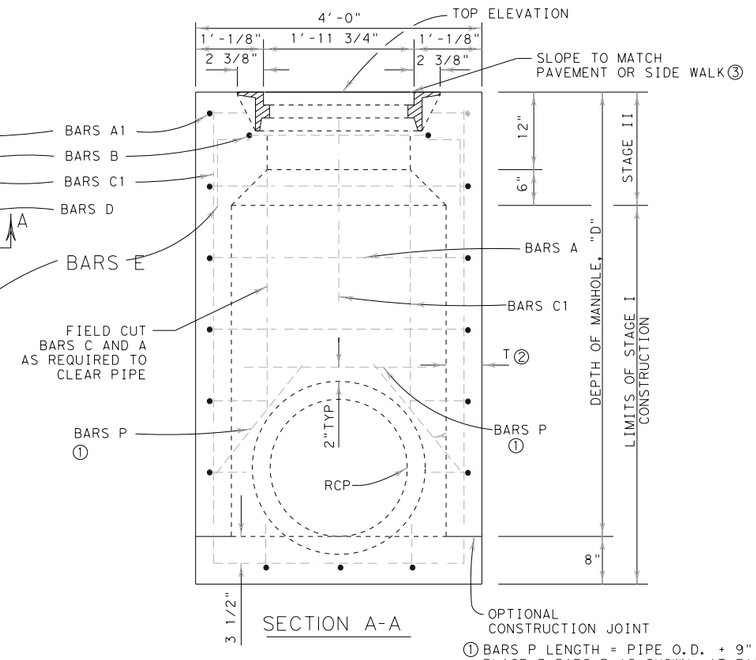
I-FG (FTW)

ORIGINAL DRAWING: 05/2019	ifg-ftw.dgn	PROJECT NO.			SHEET NO.
DATE	REVISIONS	SEE TITLE SHEET			180
05/2019	REPLACES GI-1-02(FW)	STATE	STATE DIST.NO.	COUNTY	
09/2020	REVISED TITLE BLOCK TO INDICATE APPLICATION	TEXAS	FTW	JOHNSON	
11/2020	REVISE JOINT NOMENCLATURE	CONT.	SECT.	JOB	HIGHWAY NO.
		0014	03	087	IH 35W

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.



PLAN VIEW
(SHOWING "D" </= 15')



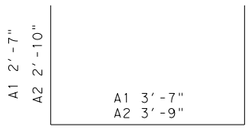
SECTION A-A

① BARS P LENGTH = PIPE O.D. + 9"
PLACE 3 BARS P AS SHOWN, AT EACH PIPE OPENING, WITH 2" CLEAR COVER OVER PIPES.
POSITION AS NEEDED TO PROVIDE 2" CLEAR COVER AT WALLS.

② SEE TYPICAL SECTION

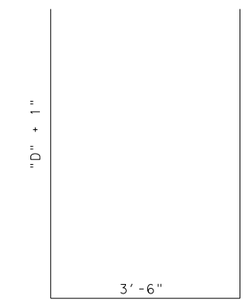
③ LEVEL IF NOT LOCATED IN PAVEMENT OR SIDEWALK

TABLE OF QUANTITIES - FREE-STANDING MANHOLE														
Bar	Size	Spacing	D=4'-0"			D=10'-0"			D=20'-0"			D=30'-0"		
		(in)	No	Length	Wt	No	Length	Wt	No	Length	Wt	No	Length	Wt
A1	#4	10"	8	8.750	47	22	8.750	129	36	8.750	210	36	8.750	210
A2	#5	12"	0	0.000	0	0	0.000	0	10	9.416	98	30	9.416	295
B	#4	-	2	6.500	9	2	6.500	9	2	6.500	9	2	6.500	9
C1	#4	12"	6	11.667	47	6	23.667	95	0	0.000	0	0	0.000	0
C2	#5	12"	0	0.000	0	0	0.000	0	12	22.916	287	12	32.916	412
D	#4	-	4	2.500	7	4	2.500	7	4	2.500	7	4	2.500	7
E	#4	-	12	1.583	13	12	1.583	13	12	1.583	13	12	1.583	13
Total Steel - Lbs					122			251			624			945
Class "C" Concrete - CY					1.70			3.26			6.43			10.05
			D=3' TO D=15' Lbs Steel = 102 + 21.38 Ld/Lf CY Conc. = 1.44 + 0.259 CY/Lf						D=15' TO D=30' Lbs Steel = 362 + 32.16 Ld/Lf CY Conc. = 4.55 + 0.362 CY/Lf					

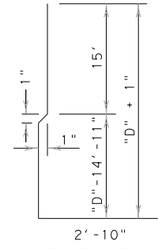


BARS A1 & A2

BARS B



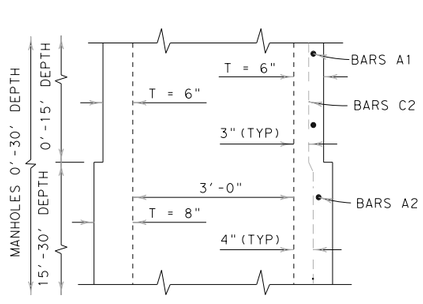
BARS C1
(FOR D </= 15')



BARS C2
(FOR D> 15')

BARS E

BARS D



TYPICAL SECTION
SHOWING TRANSITION SECTION FROM WALL THICKNESS OF 6" TO 8"

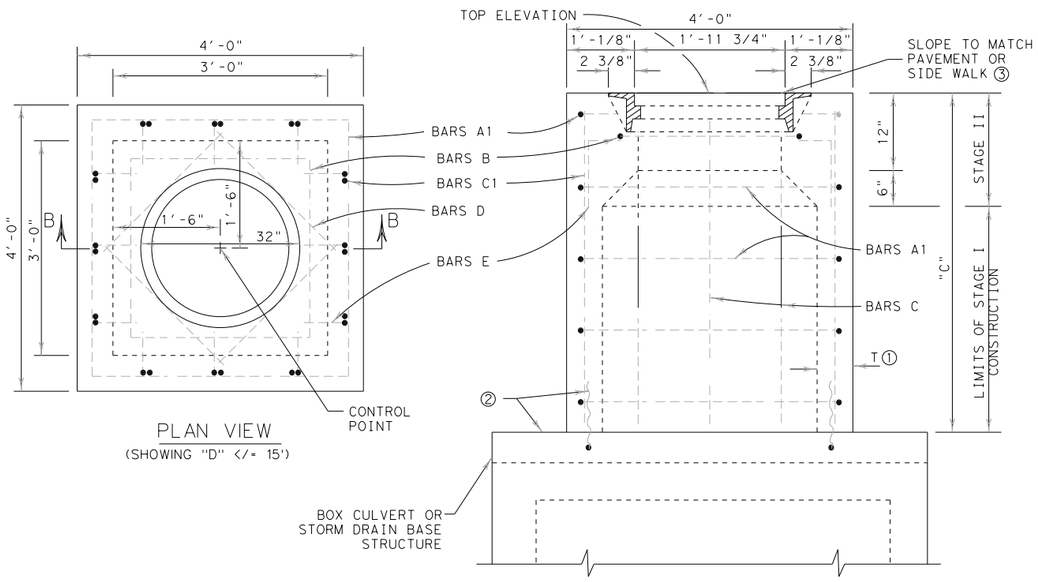
STORM DRAIN MANHOLE (FREE-STANDING)
MAXIMUM PIPE SIZE - 24" DIAMETER
N.T.S.

Texas Department of Transportation | Fort Worth District Standard

STORM DRAIN MANHOLE DETAILS

MH-SD (FTW)

ORIGINAL DRAWING: 05/2019	mhsd-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
DATE	REVISIONS	6	SEE TITLE SHEET	181
05/2019	REPLACES MH-1-02 (FW)	STATE	STATE DIST.NO.	COUNTY
		TEXAS	FTW	JOHNSON
		CONT.	SECT.	JOB / HIGHWAY NO.
		0014	03	087 / IH 35W

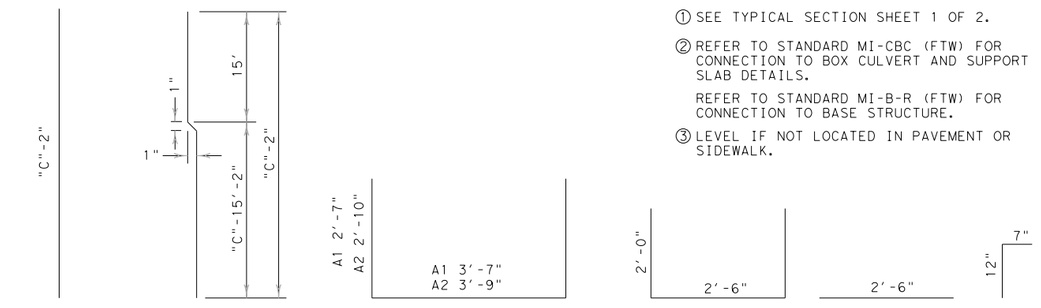


SECTION B-B

TABLE OF QUANTITIES - MANHOLE (RISER ONLY)													
Bar	Size	Spacing	C-1'-6"			C-10'-0"			C-20'-0"			C-30'-0"		
		(in)	No	Length	Wt	No	Length	Wt	No	Length	Wt	No	Length	Wt
A1	#4	10"	4	8.750	23	24	8.750	140	36	8.750	210	36	8.750	210
A2	#5	12"	0	0.000	0	0	0.000	0	10	9.416	98	30	9.416	295
B	#4	-	2	6.500	9	2	6.500	9	2	6.500	9	2	6.500	9
C1	#4	12"	0	0.000	0	6	9.833	39	0	0.000	0	0	0.000	0
C2	#5	12"	0	0.000	0	0	0.000	0	12	19.833	248	12	29.833	373
D	#4	-	4	2.500	7	4	2.500	7	4	2.500	7	4	2.500	7
E	#4	-	12	1.583	13	12	1.583	13	12	1.583	13	12	1.583	13
Total Steel - Lbs					51			208			585			906
Class "C" Concrete - CY					0.66			2.86			5.97			9.59
			C=1'-6" TO C=15'						C=15' TO C=30'					
			Lbs Steel = 51 + 14.03 Lb/Lf						Lbs Steel = 238 + 32.16 Lb/Lf					
			CY Conc. = 0.66 + 0.259 CY/Lf						CY Conc. = 4.16 + 0.362 CY/Lf					

GENERAL NOTES:

1. DESIGNED FOR AASHTO LRFD HL 93 LOADING.
2. STAGE I MAY BE EITHER CAST-IN-PLACE OR PRECAST. IF PRECAST, A MINIMUM 2' DEPTH AT TOP OF STAGE I TO BE FABRICATED USING REBAR AS SHOWN, WITH BARS C1 AND/OR C2 TO BE INCLUDED WITH STAGE I. SPLICING OF BARS WILL NOT BE PERMITTED.
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" EXPANSION JOINT AROUND THE TOP OF THE MANHOLE 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 CAST IRON RING AND COVER CONFORMING TO ITEM 471. SEE MISCELLANEOUS DRAINAGE DETAILS FOR RING AND COVER DETAILS.
9. FOR CAST-IN-PLACE STRUCTURES, A CONSTRUCTION JOINT MAY BE PLACED AT EACH 5' (MIN) INCREMENT OF DEPTH.
10. FOR PIPE OR BOX CONNECTIONS TO PRECAST STRUCTURES, SEE STANDARD PBGC.
11. DEPTHS OTHER THAN THOSE SHOWN MAY BE USED WHENEVER NECESSARY, UP TO A MAXIMUM DEPTH ("C" OR "D") OF 30'. QUANTITIES FOR OTHER DEPTHS MAY BE DETERMINED BY INTERPOLATION.
12. DO NOT COMMENCE WITH STAGE II CONSTRUCTION UNTIL PERMISSION IS GRANTED BY THE ENGINEER.
13. INSTALL A TEMPORARY WOOD COVER AFTER STAGE I IS COMPLETED, TO REMAIN IN PLACE UNTIL STAGE II CONSTRUCTION BEGINS.
14. THE LOCATION OF MANHOLE AS SHOWN IN THE PLAN REFERS TO THE CONTROL POINT SHOWN HEREON. FOR MANHOLES LOCATED ON BASE STRUCTURE, STRUCTURES MAY BE POSITIONED AS NECESSARY TO ALIGN WITH STORM DRAINS, ROADWAY CURBS AND OTHER FEATURES, AS DIRECTED. FOR MANHOLES LOCATED ON BOX CULVERT LESS THAN 4' SPAN, USE WITH BASE STRUCTURE.



BARS C1 ("C"</=15') | BARS C2 ("C">15') | BARS A1 & A2 | BARS B | BARS D | BARS E

① SEE TYPICAL SECTION SHEET 1 OF 2.

② REFER TO STANDARD MI-CBC (FTW) FOR CONNECTION TO BOX CULVERT AND SUPPORT SLAB DETAILS.

REFER TO STANDARD MI-B-R (FTW) FOR CONNECTION TO BASE STRUCTURE.

③ LEVEL IF NOT LOCATED IN PAVEMENT OR SIDEWALK.

STORM DRAIN MANHOLE (RISER ONLY)

LOCATED ON BASE STRUCTURE OR BOX CULVERT
DO NOT USE WITH BOX CULVERT SPAN LESS THAN 4'
SEE MI-CBC FOR CULVERT SPAN >/= 4'
SEE MI-B&R FOR CULVERT SPAN < 4'
N.T.S.

Texas Department of Transportation | Fort Worth District Standard

STORM DRAIN MANHOLE DETAILS

MH-SD (FTW)

ORIGINAL DRAWING: 05/2019	mhsd-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
DATE	REVISIONS	6	SEE TITLE SHEET	182
05/2019	REPLACES MH-1-02 (FW)	STATE	STATE DIST.NO.	COUNTY
		TEXAS	FTW	JOHNSON
		CONT.	SECT.	JOB / HIGHWAY NO.
		0014	03	087 / IH 35W

http://www.dot.state.tx.us/ftw/specinfo/standard.htm
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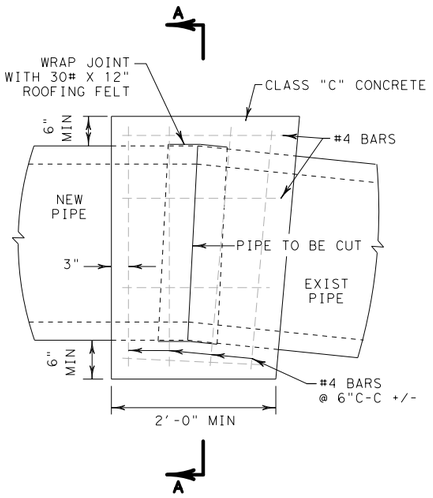
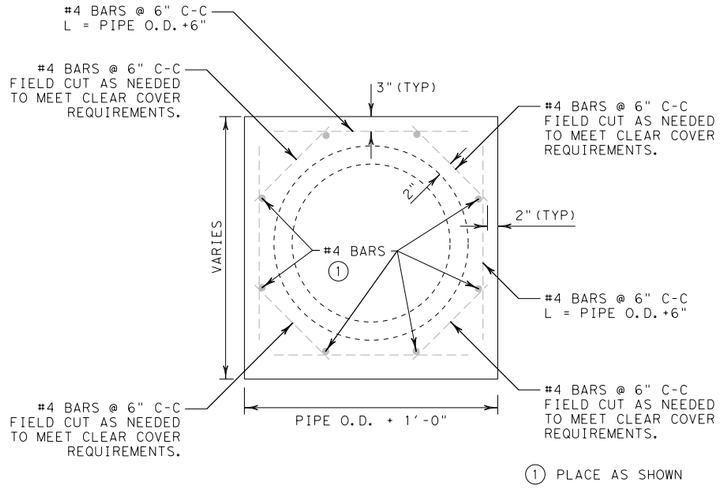


PLAN/ELEVATION



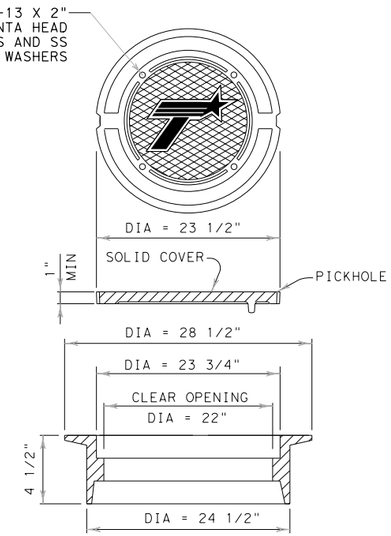
SECTION A-A

PIPE COLLAR DETAIL

FOR HORIZONTAL OR VERTICAL PLACEMENT
N.T.S.

PIPE COLLAR GENERAL NOTES

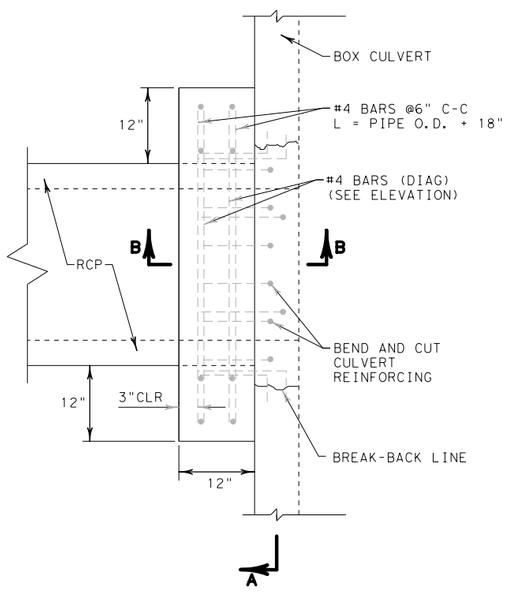
1. THE CONTRACTOR SHALL TAKE STEPS TO ENSURE A SMOOTH JOINT ALONG THE INSIDE WALL OF PIPE.
2. ANY SPILLAGE OF CONCRETE THROUGH THE JOINT SHALL BE REMOVED AND THE INSIDE PIPE SURFACES SMOOTHED AS DIRECTED BY THE ENGINEER.
3. PIPE COLLARS WILL NOT BE PAID FOR DIRECTLY, BUT SHALL BE CONSIDERED SUBSIDIARY TO ITEM 464.



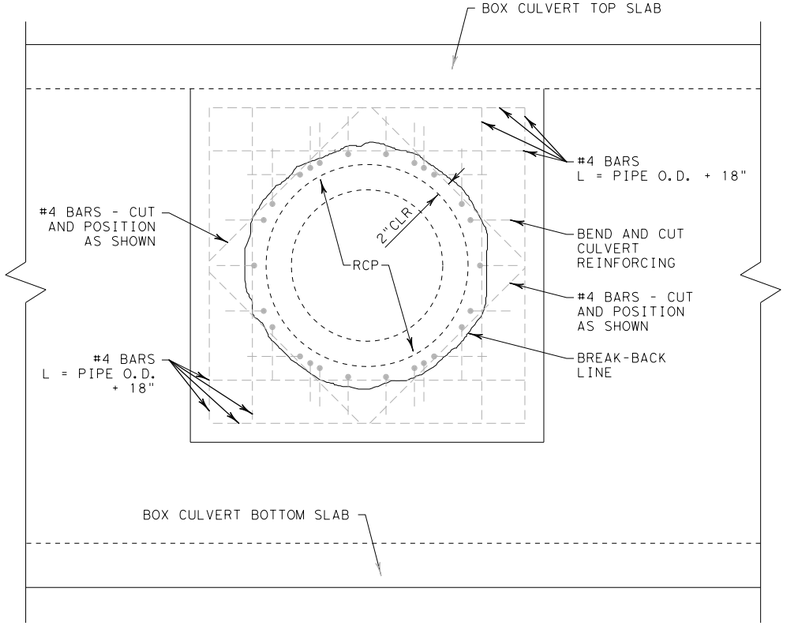
RING AND COVER DETAILS

MANHOLES AND CURB INLETS
N.T.S.

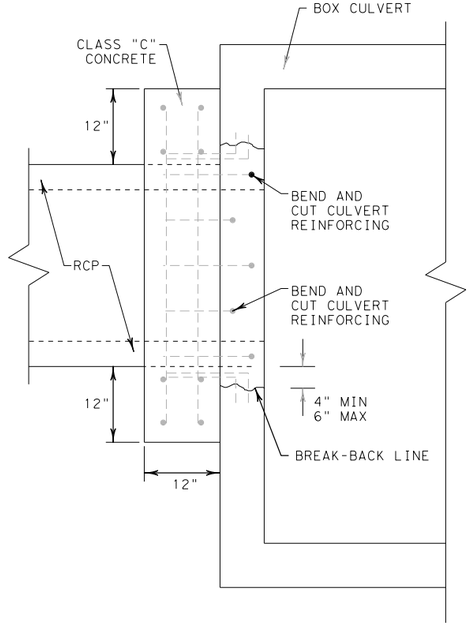
RING AND COVER SHALL CONFORM TO THE REQUIREMENTS OF ITEM 471 AND SHALL BE INCLUDED IN THE CURRENT TXDOT "APPROVED CAST IRON PRODUCTS SHEETS"



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

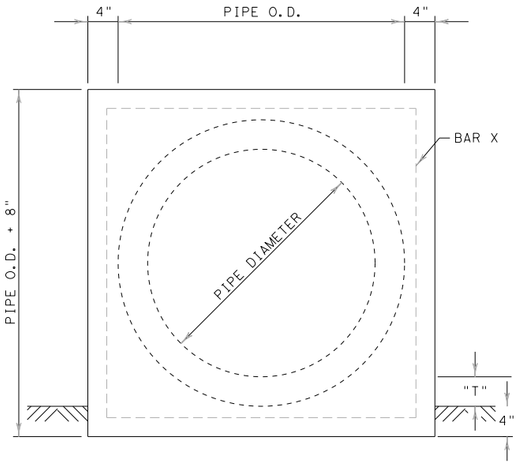
1. SAW CUT A MAXIMUM 1/2" DEPTH AT BREAK-BACK LINE. USE REMOVAL METHODS THAT WILL NOT DAMAGE REMAINING CONCRETE OR CULVERT REINFORCING.
2. EXPOSE AND CLEAN BOX CULVERT REINFORCING. BEND BARS INTO PROPOSED CONNECTION AND TIE TO CONNECTION REINFORCING.
3. ROUGHEN AND CLEAN EXISTING CONCRETE SURFACES THAT 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

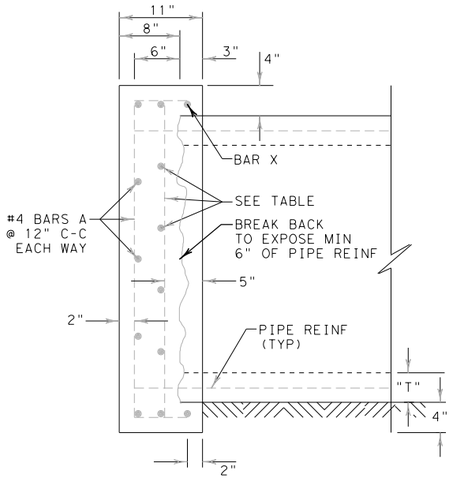
Fort Worth District Standard

MISCELLANEOUS DRAINAGE DETAILS
MDD(FTW)

ORIGINAL DRAWING: 05/2019	mdd-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
DATE	REVISIONS	6	SEE TITLE SHEET		183
05/2019	NEW STANDARD	STATE	STATE DIST.NO.	COUNTY	
		TEXAS	FTW	JOHNSON	
		CONT.	SECT.	JOB	HIGHWAY NO.
		0014	03	087	IH 35W

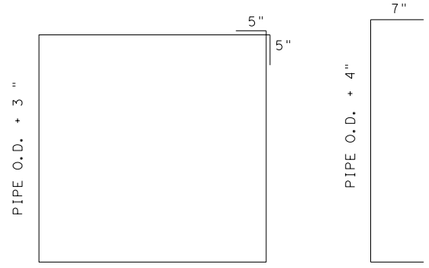


FRONT ELEVATION



SIDE ELEVATION

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



#4 BAR X

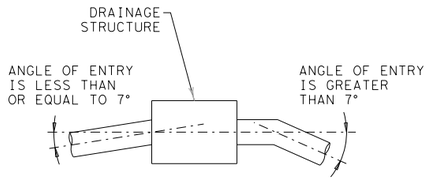
#4 BAR A

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.

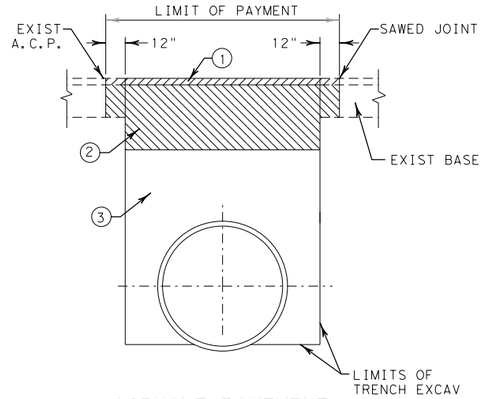


CONNECT PIPES WITHIN 7° OF NORMAL TO INLET OR MANHOLE. IF NECESSARY, USE PIPE ELBOW OR CURVED APPROACH ALIGNMENT TO STAY WITHIN THIS LIMIT.

PIPE CONNECTION

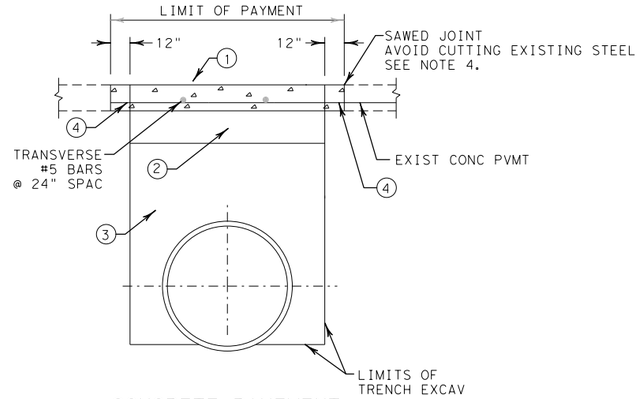
N.T.S.

(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.



ASPHALT PAVEMENT

(1) CLASS "A", "P", OR "HES" CONCRETE PAVEMENT. MATCH EXISTING PAVEMENT DEPTH. USE CLASS "HES" IF OPENING TO TRAFFIC LESS THAN 72 HOURS AFTER PLACEMENT.
(2) 4" COLD MIX ASPHALT BASE. PLACE BASE MATERIAL IN ACCORDANCE WITH ITEM 361.2.2.2.
(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.
(4) AT CONTRACTOR'S OPTION, USE FULL-DEPTH SAW CUT AND TIE TO EXISTING PAVEMENT IN ACCORDANCE WITH ITEM 361.4.2. FOR PARTIAL DEPTH SAW CUT, EXPOSE MINIMUM 8" OF LONGITUDINAL REINFORCING AND CONSTRUCT 8" WELDED LAP (MATCH LONGITUDINAL PAVEMENT REINFORCEMENT).



CONCRETE PAVEMENT

CUTTING AND RESTORING PAVEMENT DETAILS

N.T.S.

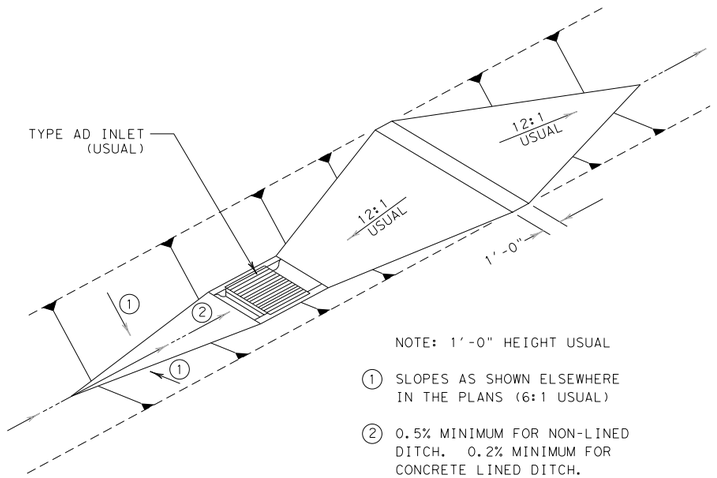
CUTTING AND RESTORING PAVEMENT GENERAL NOTES

1. HOT MIX OR CONCRETE PAVEMENT WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE SUBSIDIARY TO CUTTING AND RESTORING PAVEMENT.
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.

Texas Department of Transportation | Fort Worth District Standard

MISCELLANEOUS DRAINAGE DETAILS
MDD(FTW)

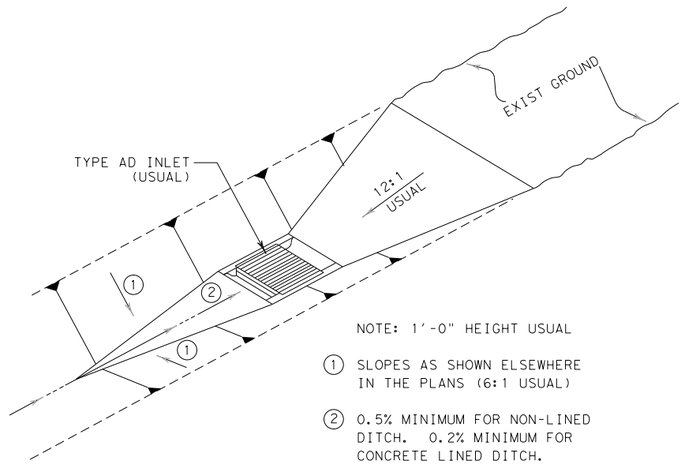
ORIGINAL DRAWING: 05/2019	mdd-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
DATE	REVISIONS	6	SEE TITLE SHEET		184
05/2019	NEW STANDARD	STATE	STATE DIST.NO.	COUNTY	
07/2020	REVISE CUT & RESTORE PAVEMENTS FOR CSB & FLOWABLE FILL; ALLOW OCTAGONAL PIPE PLUG; EDIT GENERAL NOTES	TEXAS	FTW	JOHNSON	
		CONT.	SECT.	JOB	HIGHWAY NO.
		0014	03	087	IH 35W



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.

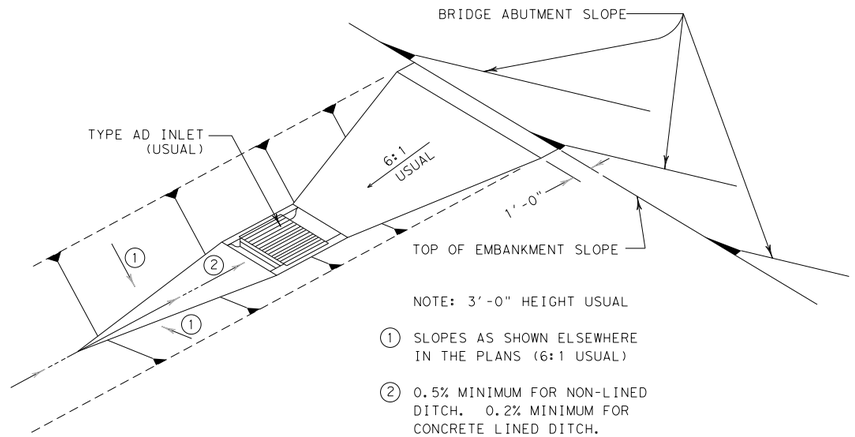
CONTINUOUS DITCH



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.

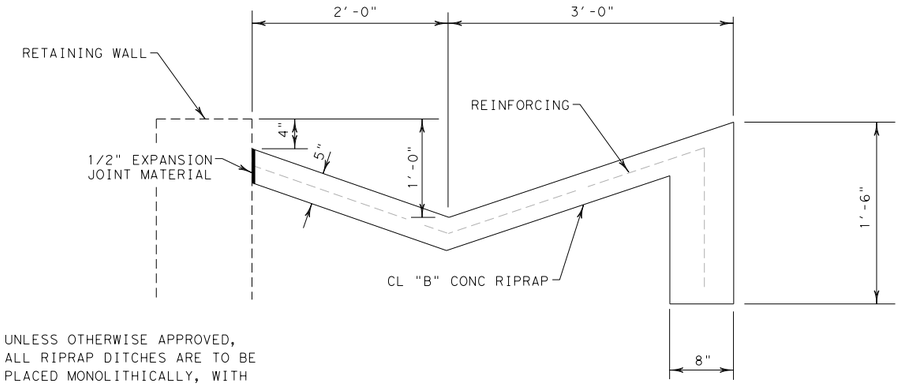
DITCH TERMINATION AT BRIDGE END

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

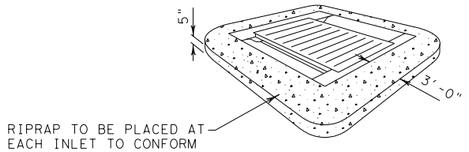
N.T.S.



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)

ORIGINAL DRAWING: 05/2019	mdd-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
DATE	REVISIONS	6	SEE TITLE SHEET		185
05/2019	NEW STANDARD	STATE	STATE DIST.NO.	COUNTY	
11/2020	ADD NOTE FOR MONOLITHIC PLACEMENT OF RIPRAP DITCHES	TEXAS	FTW	JOHNSON	
		CONT.	SECT.	JOB	HIGHWAY NO.
		0014	03	087	IH 35W

Brendon.Gomez

UTILITY QUALITY LEVELS

(OBTAINED FROM ASCE PUBLICATION CI/ASCE STANDARD 38-02)

1. UTILITY QUALITY LEVEL D (QL D): INFORMATION DERIVED FROM EXISTING RECORDS OR ORAL RECOLLECTIONS.

2. UTILITY QUALITY LEVEL C (QL C): INFORMATION OBTAINED BY SURVEYING AND PLOTTING VISIBLE ABOVE-GROUND UTILITY FEATURES AND BY USING PROFESSIONAL JUDGEMENT IN CORRELATING THIS INFORMATION TO QUALITY LEVEL D INFORMATION.

3. UTILITY QUALITY LEVEL B (QL B): 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.

4. UTILITY QUALITY LEVEL A (QL A): PRECISE HORIZONTAL AND VERTICAL LOCATION OF UTILITIES OBTAINED BY THE ACTUAL EXPOSURE (OR VERIFICATION OF PREVIOUSLY EXPOSED AND SURVEYED UTILITIES) AND SUBSEQUENT MEASUREMENT OF SUBSURFACE UTILITIES, USUALLY AT A SPECIFIC POINT. MINIMALLY INTRUSIVE EXCAVATION EQUIPMENT IS TYPICALLY USED TO MINIMIZE THE POTENTIAL FOR UTILITY DAMAGE. A PRECISE HORIZONTAL AND VERTICAL LOCATION, AS WELL AS OTHER UTILITY ATTRIBUTES, IS SHOWN ON PLAN DOCUMENTS. ACCURACY IS TYPICALLY SET TO 15-MM VERTICAL AND TO APPLICABLE HORIZONTAL SURVEY AND MAPPING ACCURACY AS DEFINED OR EXPECTED BY THE PROJECT OWNER.

GENERAL NOTES

1. THE UTILITIES DEPICTED WERE INVESTIGATED BY LAMB-STAR ENGINEERING, ALL OTHER PLAN INFORMATION, NOTABLY THE BACKGROUND INFORMATION, WAS PROVIDED BY OTHERS AND LAMB-STAR ENGINEERING DISCLAIMS RESPONSIBILITY FOR ITS ACCURACY.

2. EXISTING SUBSURFACE UTILITY INVESTIGATIONS WERE COMPLETED ON 04/21/2021.LIMITS OF LAMB-STAR SUE INVESTIGATION ARE FROM STA 522+00 TO STA 585+00 ALONG CENTERLINE IH 35W. LAMB-STAR ENGINEERING EXPRESSLY DISCLAIMS ANY AND ALL RESPONSIBILITY FOR SUE DATA PROVIDED BY OTHERS AND NEW UTILITY INSTALLATIONS OR MODIFICATIONS, AND ADJUSTMENTS TO EXISTING UTILITIES AFTER THE COMPLETION DATE.

3. UTILITY LOCATIONS ON THESE DRAWINGS ARE INTENDED FOR DESIGN PURPOSES AND NOT CONSTRUCTION. THEY REFLECT SUBSURFACE UTILITIES AT THE TIME SURVEYED. CALL TEXAS 811 FOR UTILITY LOCATIONS 48-HOURS PRIOR TO ANY WORK.

4. UTILITIES ON THESE DRAWINGS HAVE BEEN IDENTIFIED TO ASCE STANDARD 38-02. QUALITY LEVEL D INFORMATION IS SHOWN AS NOTED IN THE LEGEND.

5. UTILITIES ON THESE DRAWINGS HAVE BEEN IDENTIFIED TO ASCE STANDARD 38-02. QUALITY LEVEL C INFORMATION IS SHOWN AS NOTED IN THE LEGEND.

6. UTILITY LINES WERE DESIGNATED WHERE POSSIBLE. HOWEVER, SOME SERVICE LINES ARE CONSTRUCTED OF NON-CONDUCTIVE MATERIAL AND UTILITY COMPANY DRAWINGS DO NOT SHOW SERVICE LINE LOCATIONS. THEREFORE, NOT ALL SERVICE LINES MAY BE SHOWN.

Utility Type	Utility Owner	Utility Contact		
		Name	Phone Number	Email
Communications	AT&T	Peter Russell	972-649-8749	pr7004@att.com
Gas	Atmos Energy	Jay Mathis	214-263-4523	Jay.Mathis@atmosenergy.com
Water/Wastewater	City of Alvarado	Dana Duncan	817-790-3351	Duncand@cityofalvarado.org
Water/Wastewater	Johnson County Special Utility District	Danny Armstrong	817-240-5870	Darmstrong@jcsud.com
Gas	Eagle Ridge Operating	James Proctor	817-487-6873	jproctor@eagleridgeenergy.com
Electric	Oncor	Larry K. Baldwin	817-215-6184	larry.baldwin@oncor.com
Electric	United Coop Services	Wes Burton	817-447-9292	wes@ucs.net
Communications	Zayo	Lucas Flores	817-585-4466	lucas.flores@zayo.com

LEGEND OF UTILITY TYPES

GENERAL
- UTILITY CONTINUES
- UTILITY TERMINATES
- QL-B SIGNAL LOST

COMMUNICATIONS
- FIBER - AT&T (QL-B) — FO1
- OH FIBER - AT&T (QL-C) — OFO1
- FIBER - AT&T (QL-D) — FO1(D)
- FIBER - ZAYO (QL-B) — FO2
- FIBER - ZAYO (QL-D) — FO2(D)
- TELEPHONE - AT&T (QL-B) — T1
- OH TELEPHONE - AT&T (QL-C) — OT1
- TELEPHONE - AT&T (QL-D) — T1(D)

ELECTRIC
- ELECTRIC - ONCOR (QL-B) — E1
- OH ELECTRIC - ONCOR (QL-C) — OE1
- ELECTRIC - ONCOR (QL-D) — E1(D)
- ELECTRIC - UNITED SERVICES (QL-B) — E2
- OH ELECTRIC - UNITED SERVICES (QL-C) — OE2
- ELECTRIC - UNITED SERVICES (QL-D) — E2(D)
- ELECTRIC - TXDOT (QL-B) — E3

GAS
- GAS - ATMOS (QL-B) — G1
- GAS - ATMOS (QL-D) — G1(D)
- ABANDONED GAS - EAGLE RIDGE (QL-B) — G2
- ABANDONED GAS - EAGLE RIDGE (QL-D) — G2(D)

WATER
- WATER - CITY OF ALVARADO (QL-D) — W1(D)
- WATER - JOHNSON COUNTY SUD (QL-B) — W2
- WATER - JOHNSON COUNTY SUD (QL-D) — W2(D)

WASTEWATER
- WASTEWATER - CITY OF ALVARADO (QL-B) — WW1

ELECTRIC
- GUY WIRE
- ELECTRIC CABINET — E
- LIGHT POLE SMALL/BOLLARD LIGHT — LP
- POWER POLE (WOOD) — PP
- SWITCH GEAR — SW
- TRAFFIC SIGNAL BOX — TB
- TRANSFORMER — TRANS

FIBER
- HAND HOLE — F
- UNDERGROUND FIBER MARKER — F
- VAULT — F

GAS
- UNDERGROUND GAS MARKER — G
- REGULATOR STATION — GRS
- TEST STATION — GTS

TELEPHONE
- TELEPHONE PEDESTAL — T
- UNDERGROUND TELEPHONE MARKER — T

WATER
- FIRE HYDRANT
- WATER METER — WM
- WATER VALVE — WV

WASTEWATER
- MANHOLE WASTE WATER — WW

STATE OF TEXAS
JILL M. VAN HOEWYK
110940
LICENSED
PROFESSIONAL ENGINEER

5/20/2022

LAMB-STAR ENGINEERING, L.L.C.
5700 W. PLANO PARKWAY, SUITE 1000
PLANO, TEXAS 75093 (214) 440-3600
TEXAS REGISTERED ENGINEERING FIRM F-9073

IH 35W
FROM CR 604/ CR 707 TO US 67

UTILITY NOTES

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		186

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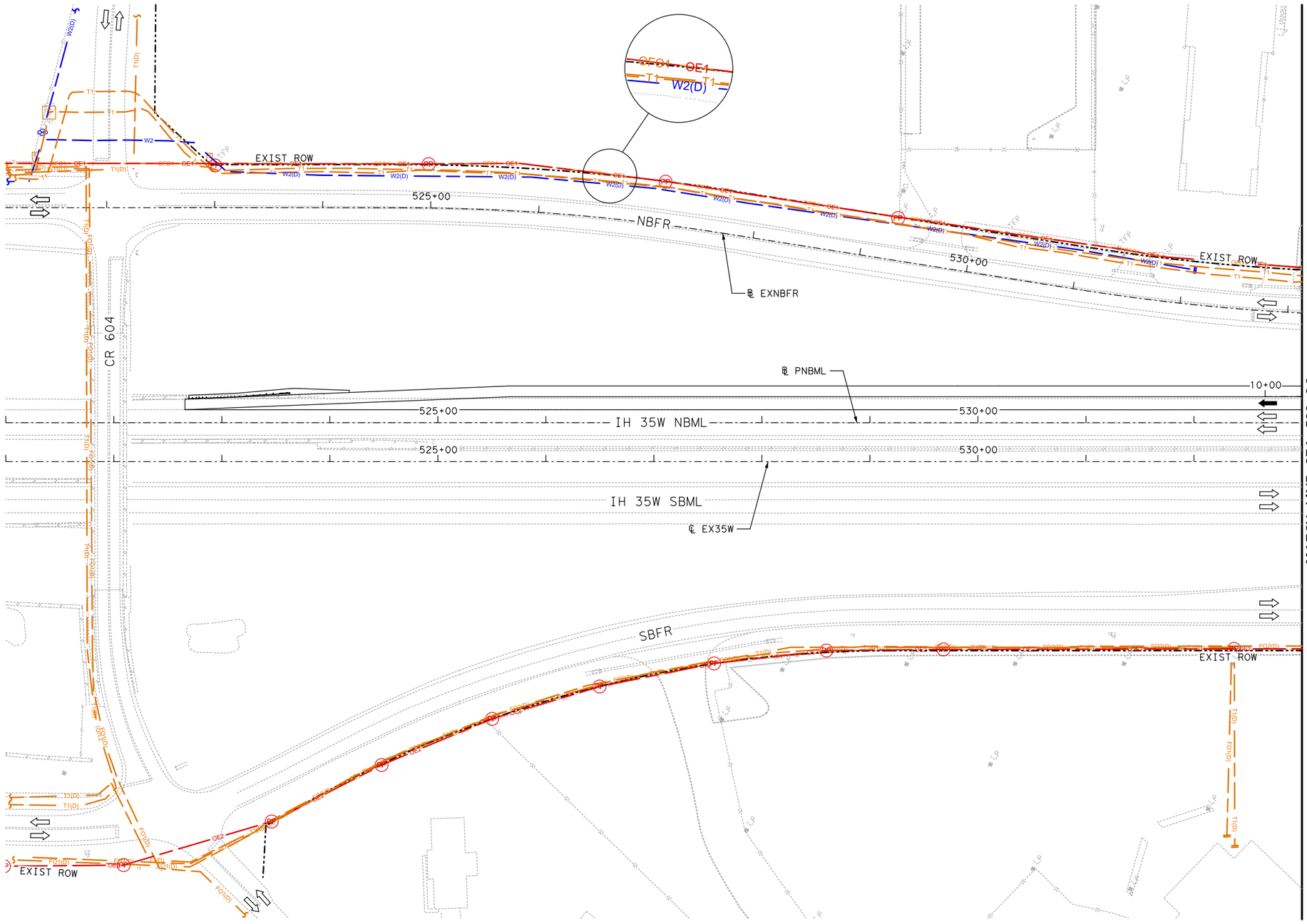

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SCALE IN FEET

LEGEND OF UTILITY TYPES

GENERAL
- UTILITY CONTINUES
- UTILITY TERMINATES
- QL-B SIGNAL LOST

COMMUNICATIONS
- FIBER - AT&T (QL-B) — FO1
- OH FIBER - AT&T (QL-C) — OFO1
- FIBER - AT&T (QL-D) — FO1(D)
- FIBER - ZAYO (QL-B) — FO2
- FIBER - ZAYO (QL-D) — FO2(D)
- TELEPHONE - AT&T (QL-B) — T1
- OH TELEPHONE - AT&T (QL-C) — OT1
- TELEPHONE - AT&T (QL-D) — T1(D)

ELECTRIC
- ELECTRIC - ONCOR (QL-B) — E1
- OH ELECTRIC - ONCOR (QL-C) — OE1
- ELECTRIC - ONCOR (QL-D) — E1(D)
- ELECTRIC - UNITED SERVICES (QL-B) — E2
- OH ELECTRIC - UNITED SERVICES (QL-C) — OE2
- ELECTRIC - UNITED SERVICES (QL-D) — E2(D)
- ELECTRIC - TXDOT (QL-B) — E3

GAS
- GAS - ATMOS (QL-B) — G1
- GAS - ATMOS (QL-D) — G1(D)
- ABANDONED GAS - EAGLE RIDGE (QL-B) — G2
- ABANDONED GAS - EAGLE RIDGE (QL-D) — G2(D)

WATER
- WATER - CITY OF ALVARADO (QL-D) — W1(D)
- WATER - JOHNSON COUNTY SUD (QL-B) — W2
- WATER - JOHNSON COUNTY SUD (QL-D) — W2(D)

WASTEWATER
- WASTEWATER - CITY OF ALVARADO (QL-B) — WW1

NOTES:

QUANTITIES:

LEVEL "B"	2,627
LEVEL "C"	3,648
LEVEL "D"	5,664
TOTAL=	11,939

STATE OF TEXAS
JILL M. VAN HOEWYK
110940
REGISTERED PROFESSIONAL ENGINEER

5/20/2022

LAMB-STAR ENGINEERING, L.L.C.
5700 W. PLANO PARKWAY, SUITE 1000
PLANO, TEXAS 75093 (214) 440-3600
TEXAS REGISTERED ENGINEERING FIRM F-9073

IH 35W
FROM CR 604/ CR 707 TO US 67

IH 35W UTILITY PLAN

BEGIN PROJECT TO STA 533+00

SHEET 1 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		187

Brendan.Gomez

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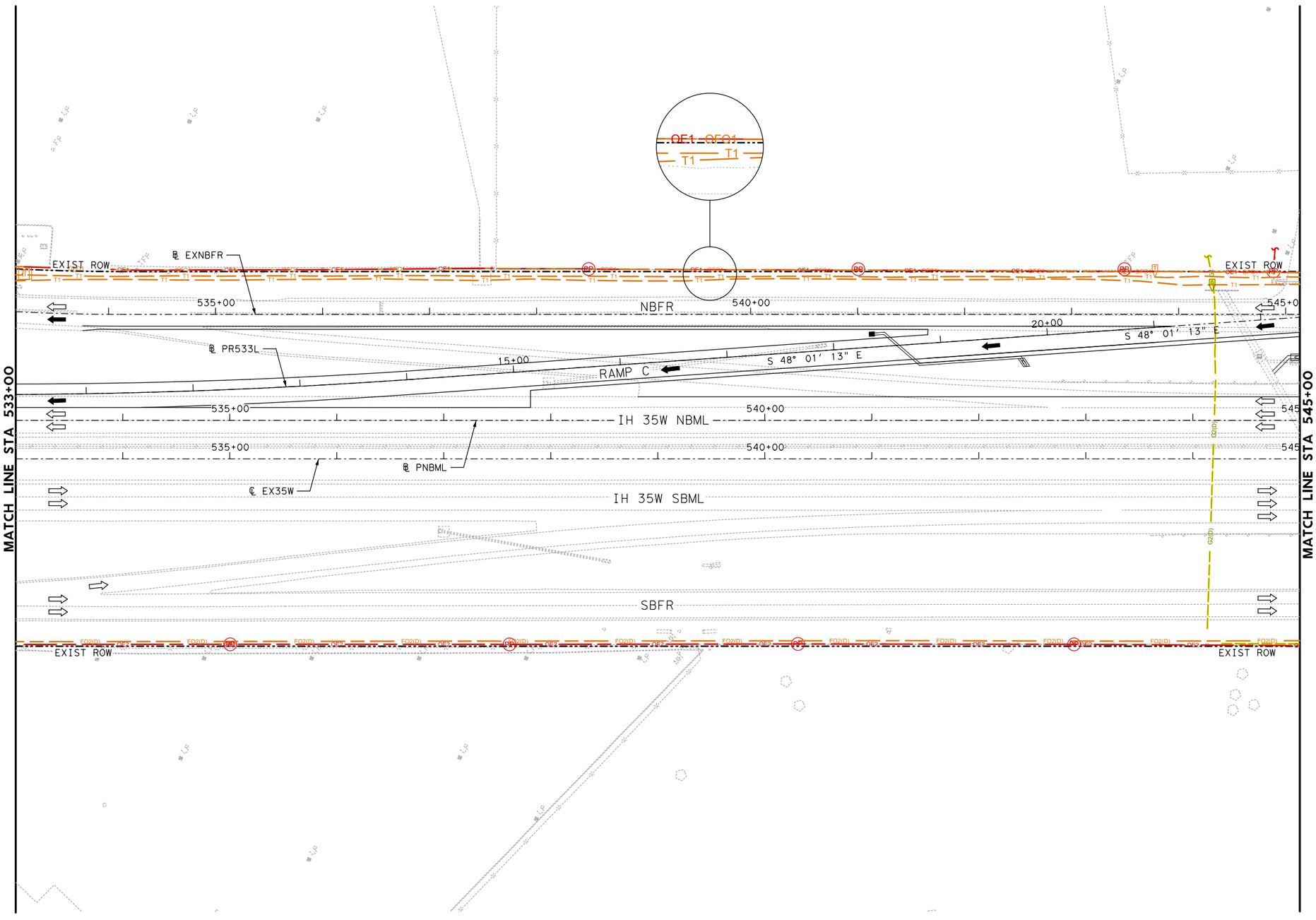

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SCALE IN FEET

LEGEND OF UTILITY TYPES

GENERAL
- UTILITY CONTINUES
- UTILITY TERMINATES
- QL-B SIGNAL LOST

COMMUNICATIONS
- FIBER - AT&T (QL-B) — FO1
- OH FIBER - AT&T (QL-C) — OFO1
- FIBER - AT&T (QL-D) — FO1(D)
- FIBER - ZAYO (QL-B) — FO2
- FIBER - ZAYO (QL-D) — FO2(D)
- TELEPHONE - AT&T (QL-B) — T1
- OH TELEPHONE - AT&T (QL-C) — OT1
- TELEPHONE - AT&T (QL-D) — T1(D)

ELECTRIC
- ELECTRIC - ONCOR (QL-B) — E1
- OH ELECTRIC - ONCOR (QL-C) — OE1
- ELECTRIC - ONCOR (QL-D) — E1(D)
- ELECTRIC - UNITED SERVICES (QL-B) — E2
- OH ELECTRIC - UNITED SERVICES (QL-C) — OE2
- ELECTRIC - UNITED SERVICES (QL-D) — E2(D)
- ELECTRIC - TXDOT (QL-B) — E3

GAS
- GAS - ATMOS (QL-B) — G1
- GAS - ATMOS (QL-D) — G1(D)
- ABANDONED GAS - EAGLE RIDGE (QL-B) — G2
- ABANDONED GAS - EAGLE RIDGE (QL-D) — G2(D)

WATER
- WATER - CITY OF ALVARADO (QL-D) — W1(D)
- WATER - JOHNSON COUNTY SUD (QL-B) — W2
- WATER - JOHNSON COUNTY SUD (QL-D) — W2(D)

WASTEWATER
- WASTEWATER - CITY OF ALVARADO (QL-B) — WW1

NOTES:

QUANTITIES:

LEVEL "B"	2,526
LEVEL "C"	3,619
LEVEL "D"	333
TOTAL=	6,478

STATE OF TEXAS
JILL M. VAN HOEWYK
110940
LICENSED
PROFESSIONAL ENGINEER

5/20/2022

LAMB-STAR ENGINEERING, L.L.C.
5700 W. PLANO PARKWAY, SUITE 1000
PLANO, TEXAS 75093 (214) 440-3600
TEXAS REGISTERED ENGINEERING FIRM F-9073

IH 35W
FROM CR 604/ CR 707 TO US 67

IH 35W UTILITY PLAN

STA 533+00 TO STA 545+00

SHEET 2 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		188

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Brendon.Gomez

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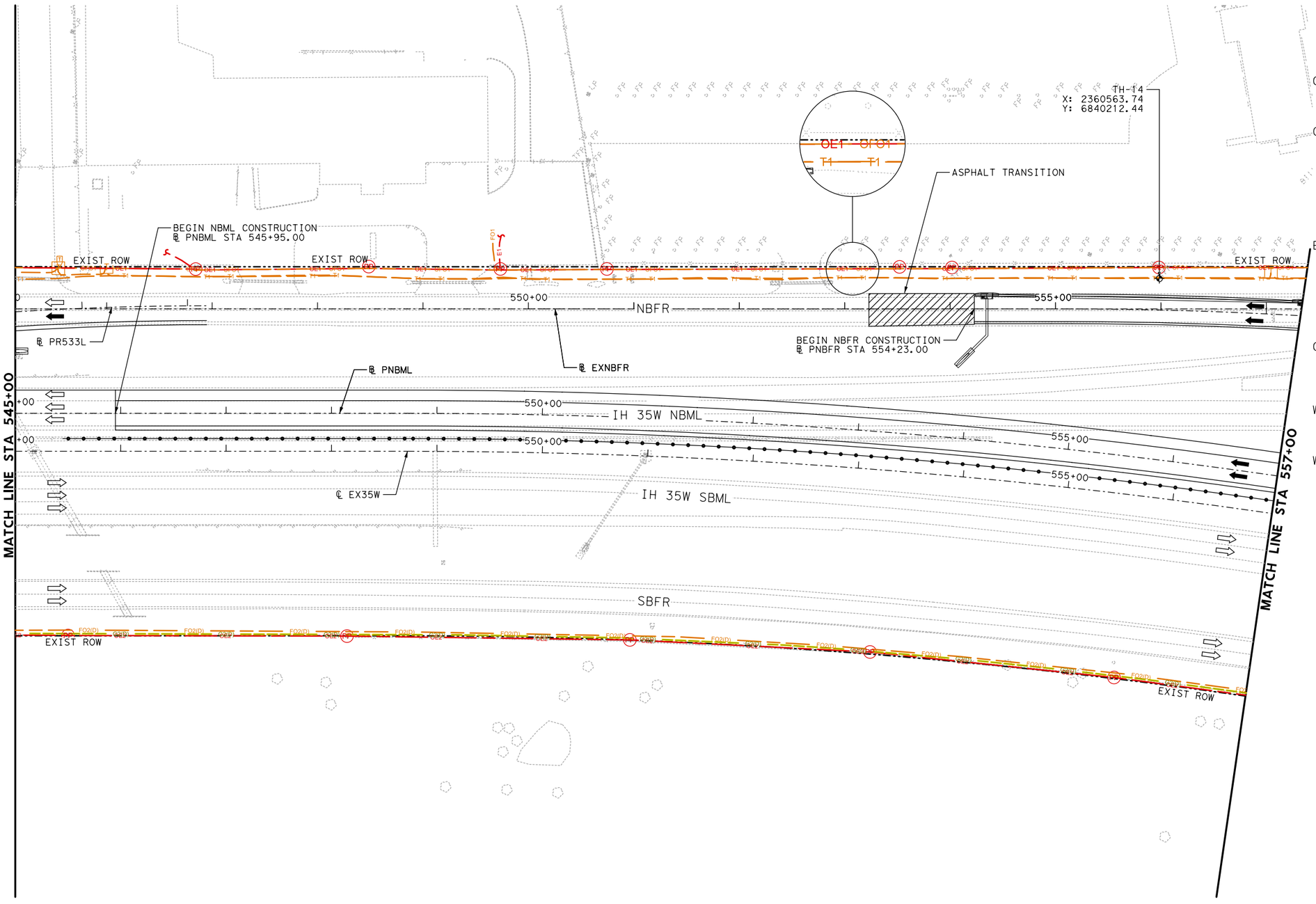

LEGEND OF UTILITY TYPES

GENERAL
- UTILITY CONTINUES
- UTILITY TERMINATES
- QL-B SIGNAL LOST

COMMUNICATIONS
- FIBER - AT&T (QL-B) — FO1
- OH FIBER - AT&T (QL-C) — OFO1
- FIBER - AT&T (QL-D) — FO1(D)
- FIBER - ZAYO (QL-B) — FO2
- FIBER - ZAYO (QL-D) — FO2(D)
- TELEPHONE - AT&T (QL-B) — T1
- OH TELEPHONE - AT&T (QL-C) — OT1
- TELEPHONE - AT&T (QL-D) — T1(D)

ELECTRIC
- ELECTRIC - ONCOR (QL-B) — E1
- OH ELECTRIC - ONCOR (QL-C) — OE1
- ELECTRIC - ONCOR (QL-D) — E1(D)
- ELECTRIC - UNITED SERVICES (QL-B) — E2
- OH ELECTRIC - UNITED SERVICES (QL-C) — OE2
- ELECTRIC - UNITED SERVICES (QL-D) — E2(D)
- ELECTRIC - TXDOT (QL-B) — E3

GAS
- GAS - ATMOS (QL-B) — G1
- GAS - ATMOS (QL-D) — G1(D)
- ABANDONED GAS - EAGLE RIDGE (QL-B) — G2
- ABANDONED GAS - EAGLE RIDGE (QL-D) — G2(D)

WATER
- WATER - CITY OF ALVARADO (QL-D) — W1(D)
- WATER - JOHNSON COUNTY SUD (QL-B) — W2
- WATER - JOHNSON COUNTY SUD (QL-D) — W2(D)

WASTEWATER
- WASTEWATER - CITY OF ALVARADO (QL-B) — WW1

NOTES:

QUANTITIES:

LEVEL "B"	2,579
LEVEL "C"	3,623
LEVEL "D"	1,170
TOTAL=	7,372

STATE OF TEXAS
JILL M. VAN HOEWYK
110940
PROF. LICENSED ENGINEER
5/20/2022

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PLANO, TEXAS 75093 (214) 440-3600
TEXAS REGISTERED ENGINEERING FIRM F-9073

IH 35W
FROM CR 604/ CR 707 TO US 67

IH 35W UTILITY PLAN

STA 545+00 TO STA 557+00

SHEET 3 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		189

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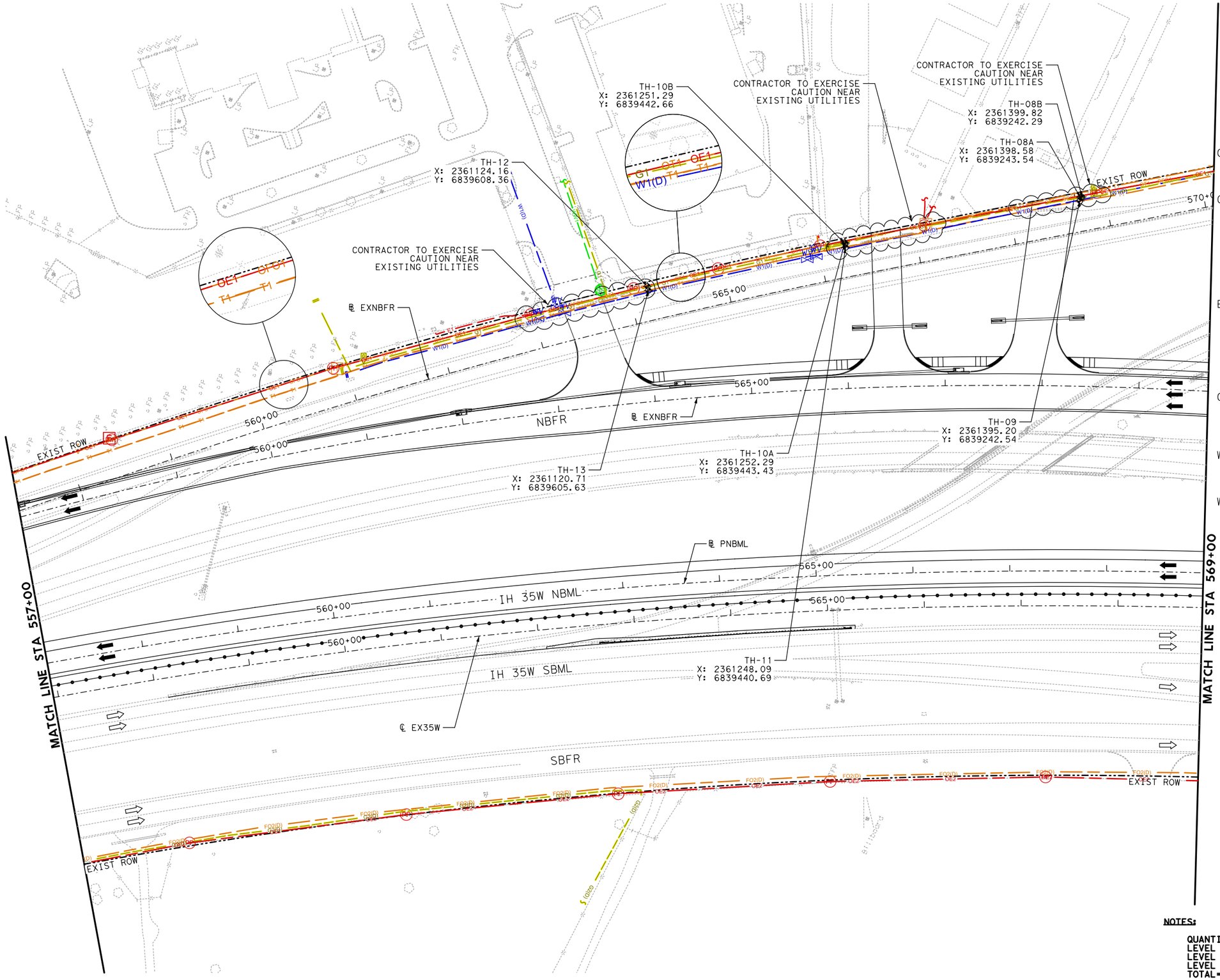
Brendon.Gomez



LEGEND OF UTILITY TYPES

GENERAL
- UTILITY CONTINUES
- UTILITY TERMINATES
- QL-B SIGNAL LOST

COMMUNICATIONS
- FIBER - AT&T (QL-B) — FO1
- OH FIBER - AT&T (QL-C) — OFO1
- FIBER - AT&T (QL-D) — FO1(D)
- FIBER - ZAYO (QL-B) — FO2
- FIBER - ZAYO (QL-D) — FO2(D)
- TELEPHONE - AT&T (QL-B) — T1
- OH TELEPHONE - AT&T (QL-C) — OT1
- TELEPHONE - AT&T (QL-D) — T1(D)

ELECTRIC
- ELECTRIC - ONCOR (QL-B) — E1
- OH ELECTRIC - ONCOR (QL-C) — OE1
- ELECTRIC - ONCOR (QL-D) — E1(D)
- ELECTRIC - UNITED SERVICES (QL-B) — E2
- OH ELECTRIC - UNITED SERVICES (QL-C) — OE2
- ELECTRIC - UNITED SERVICES (QL-D) — E2(D)
- ELECTRIC - TXDOT (QL-B) — E3

GAS
- GAS - ATMOS (QL-B) — G1
- GAS - ATMOS (QL-D) — G1(D)
- ABANDONED GAS - EAGLE RIDGE (QL-B) — G2
- ABANDONED GAS - EAGLE RIDGE (QL-D) — G2(D)

WATER
- WATER - CITY OF ALVARADO (QL-D) — W1(D)
- WATER - JOHNSON COUNTY SUD (QL-B) — W2
- WATER - JOHNSON COUNTY SUD (QL-D) — W2(D)

WASTEWATER
- WASTEWATER - CITY OF ALVARADO (QL-B) — WW1

NOTES:

QUANTITIES:

LEVEL "B"	3,300
LEVEL "C"	4,688
LEVEL "D"	2,578
TOTAL=	10,566

JILL M. VAN HOEWYK
110940
PROFESSIONAL LICENSED ENGINEER
STATE OF TEXAS

5/20/2022

LAMB-STAR ENGINEERING, L.L.C.
5700 W. PLANO PARKWAY, SUITE 1000
PLANO, TEXAS 75093 (214) 440-3600
TEXAS REGISTERED ENGINEERING FIRM F-9073

IH 35W
FROM CR 604/ CR 707 TO US 67

IH 35W UTILITY PLAN

STA 557+00 TO STA 569+00

SHEET 4 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		190

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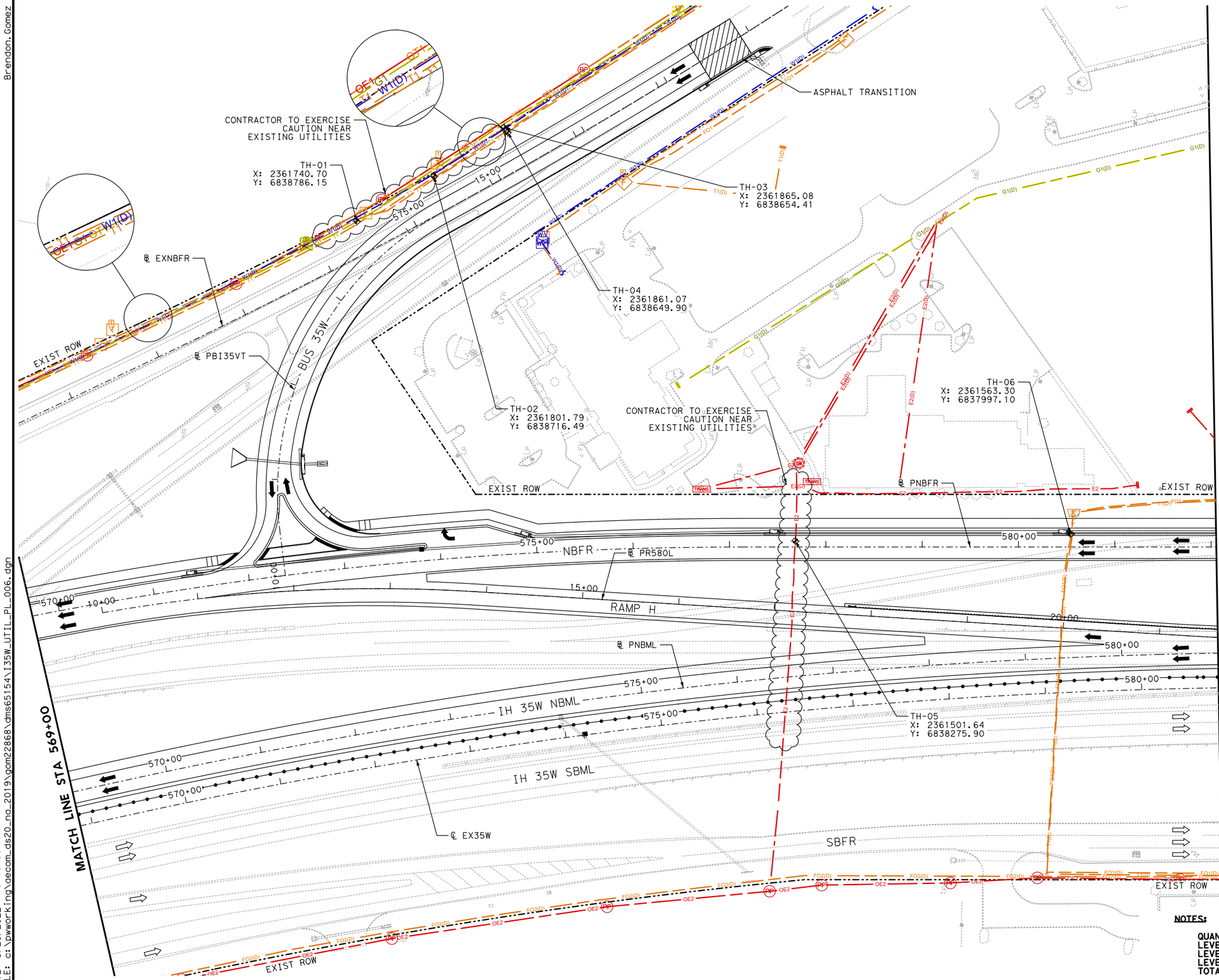
Brendon.Gomez



0′ 50′ 100′
SCALE IN FEET

N

LEGEND OF UTILITY TYPES

GENERAL
- UTILITY CONTINUES
- UTILITY TERMINATES
- QL-B SIGNAL LOST

COMMUNICATIONS
- FIBER - AT&T (QL-B) — FO1
- OH FIBER - AT&T (QL-C) — OFO1
- FIBER - AT&T (QL-D) — FO1(D)
- FIBER - ZAYO (QL-B) — FO2
- FIBER - ZAYO (QL-D) — FO2(D)
- TELEPHONE - AT&T (QL-B) — T1
- OH TELEPHONE - AT&T (QL-C) — OT1
- TELEPHONE - AT&T (QL-D) — T1(D)

ELECTRIC
- ELECTRIC - ONCOR (QL-B) — E1
- OH ELECTRIC - ONCOR (QL-C) — OE1
- ELECTRIC - ONCOR (QL-D) — E1(D)
- ELECTRIC - UNITED SERVICES (QL-B) — E2
- OH ELECTRIC - UNITED SERVICES (QL-C) — OE2
- ELECTRIC - UNITED SERVICES (QL-D) — E2(D)
- ELECTRIC - TXDOT (QL-B) — E3

GAS
- GAS - ATMOS (QL-B) — G1
- GAS - ATMOS (QL-D) — G1(D)
- ABANDONED GAS - EAGLE RIDGE (QL-B) — G2
- ABANDONED GAS - EAGLE RIDGE (QL-D) — G2(D)

WATER
- WATER - CITY OF ALVARADO (QL-D) — W1(D)
- WATER - JOHNSON COUNTY SUD (QL-B) — W2
- WATER - JOHNSON COUNTY SUD (QL-D) — W2(D)

WASTEWATER
- WASTEWATER - CITY OF ALVARADO (QL-B) — WW1

STATE OF TEXAS
JILL M. VAN HOEWYK
110940
REGISTERED PROFESSIONAL ENGINEER

5/20/2022

LAMB-STAR ENGINEERING, L.L.C.
5700 W. PLANO PARKWAY, SUITE 1000
PLANO, TEXAS 75093 (214) 440-3600
TEXAS REGISTERED ENGINEERING FIRM F-9073

IH 35W
FROM CR 604/ CR 707 TO US 67

IH 35W UTILITY PLAN

STA 569+00 TO STA 581+00

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		191

NOTES:

QUANTITIES:

LEVEL "B"	4,153
LEVEL "C"	3,548
LEVEL "D"	4,357
TOTAL=	12,058

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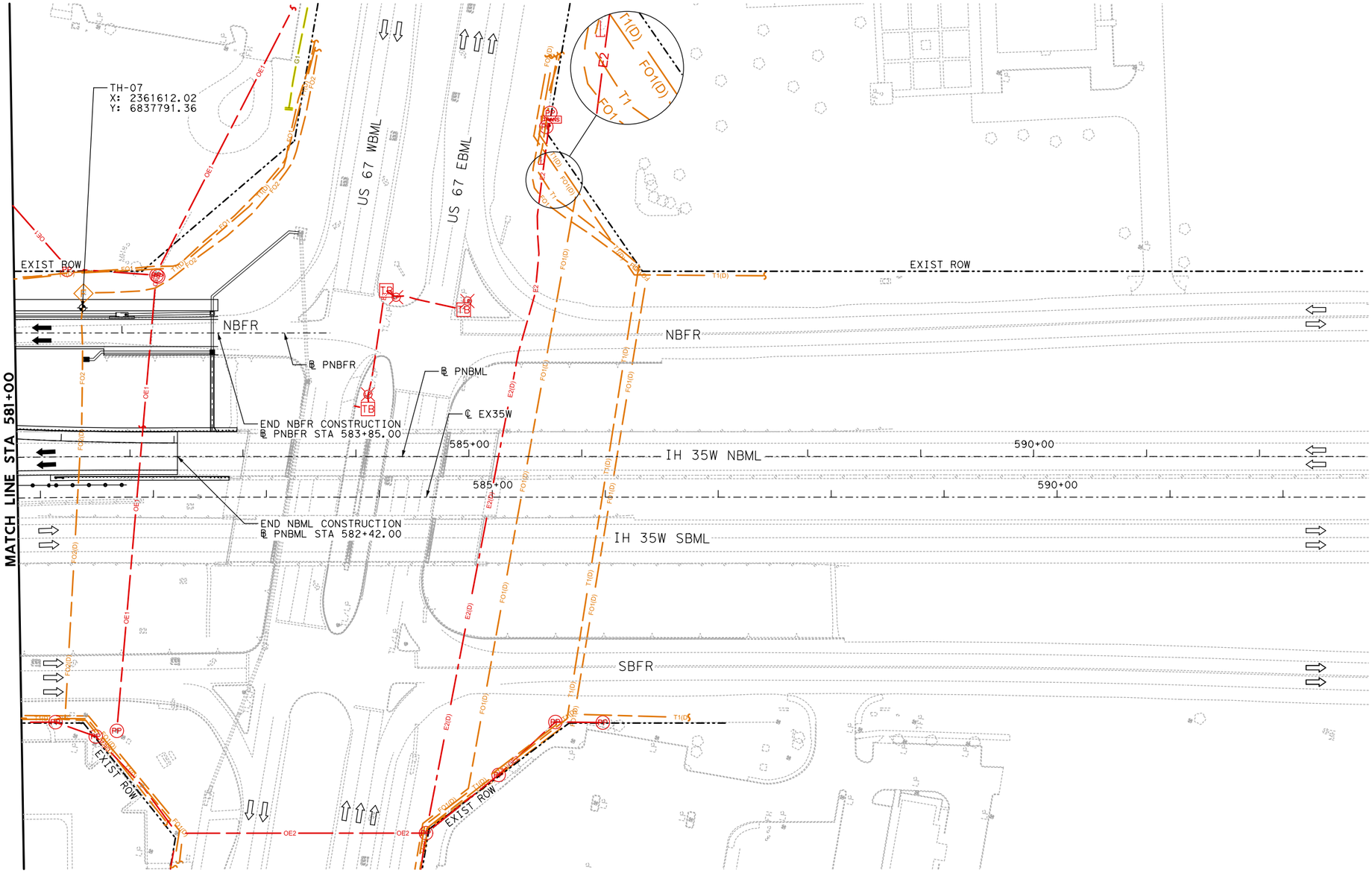

LEGEND OF UTILITY TYPES

GENERAL
- UTILITY CONTINUES
- UTILITY TERMINATES
- QL-B SIGNAL LOST

COMMUNICATIONS
- FIBER - AT&T (QL-B) — FO1
- OH FIBER - AT&T (QL-C) — OFO1
- FIBER - AT&T (QL-D) — FO1(D)
- FIBER - ZAYO (QL-B) — FO2
- FIBER - ZAYO (QL-D) — FO2(D)
- TELEPHONE - AT&T (QL-B) — T1
- OH TELEPHONE - AT&T (QL-C) — OT1
- TELEPHONE - AT&T (QL-D) — T1(D)

ELECTRIC
- ELECTRIC - ONCOR (QL-B) — E1
- OH ELECTRIC - ONCOR (QL-C) — OE1
- ELECTRIC - ONCOR (QL-D) — E1(D)
- ELECTRIC - UNITED SERVICES (QL-B) — E2
- OH ELECTRIC - UNITED SERVICES (QL-C) — OE2
- ELECTRIC - UNITED SERVICES (QL-D) — E2(D)
- ELECTRIC - TXDOT (QL-B) — E3

GAS
- GAS - ATMOS (QL-B) — G1
- GAS - ATMOS (QL-D) — G1(D)
- ABANDONED GAS - EAGLE RIDGE (QL-B) — G2
- ABANDONED GAS - EAGLE RIDGE (QL-D) — G2(D)

WATER
- WATER - CITY OF ALVARADO (QL-D) — W1(D)
- WATER - JOHNSON COUNTY SUD (QL-B) — W2
- WATER - JOHNSON COUNTY SUD (QL-D) — W2(D)

WASTEWATER
- WASTEWATER - CITY OF ALVARADO (QL-B) — WW1

NOTES:

QUANTITIES:

LEVEL "B"	1,740
LEVEL "C"	1,462
LEVEL "D"	5,118
TOTAL=	8,320

STATE OF TEXAS
JILL M. VAN HOEWYK
110940
PROFESSIONAL LICENSED ENGINEER

5/20/2022

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PLANO, TEXAS 75093 (214) 440-3600
TEXAS REGISTERED ENGINEERING FIRM F-9073

IH 35W
FROM CR 604/ CR 707 TO US 67

IH 35W UTILITY PLAN

STA 581+00 TO END PROJECT

SHEET 6 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		192

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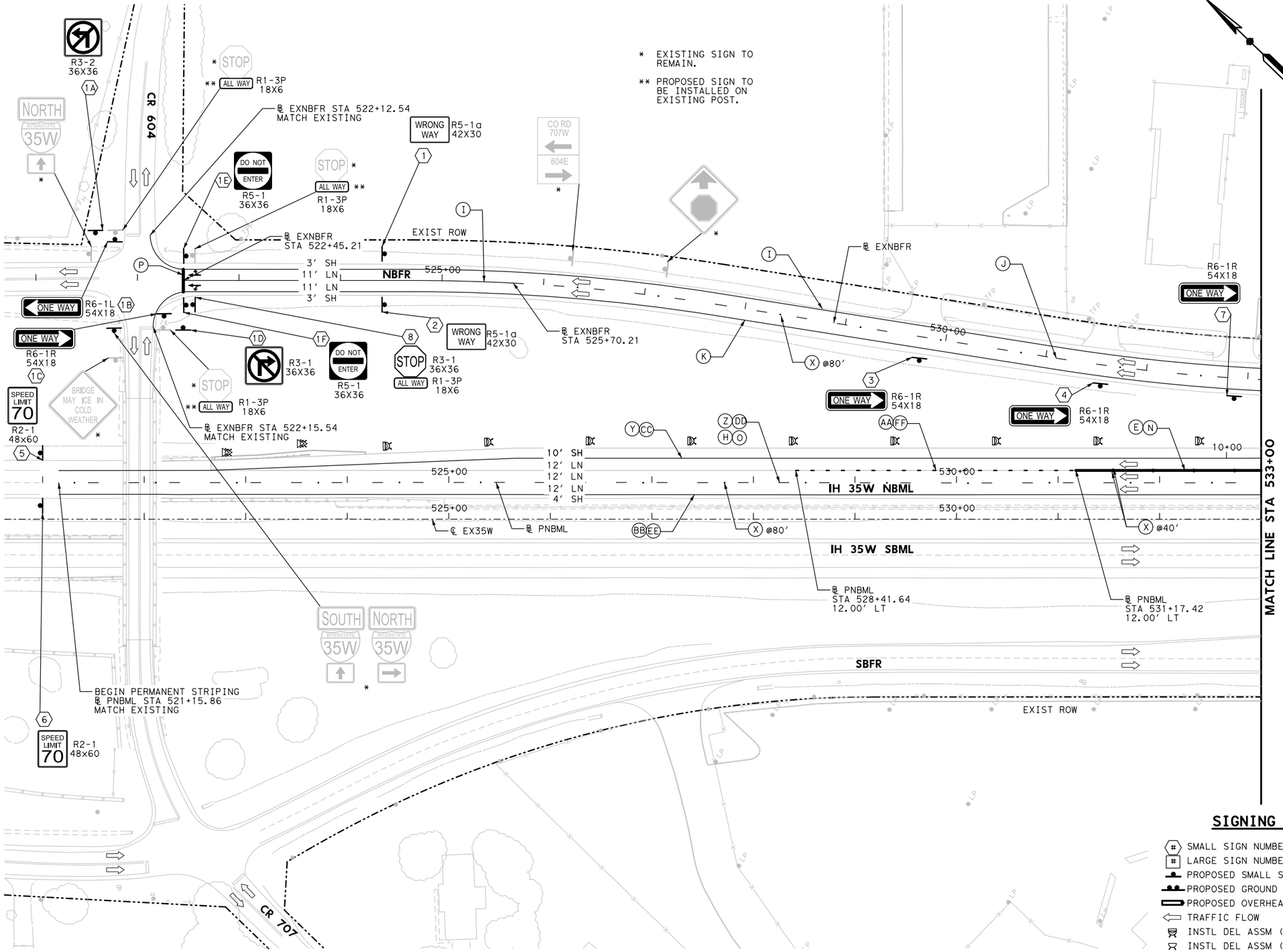

0′ 50′ 100′
SCALE IN FEET

LEGEND

- (A) REFL PAV MRK W/RET REQ TY I (W)4"(SLD)
- (B) REFL PAV MRK W/RET REQ TY I (W)4"(BRK)
- (C) REFL PAV MRK TY I (W)4"(DOT)
- (D) REFL PAV MRK TY I (W)8"(SLD)
- (E) REFL PAV MRK TY I (W)12"(SLD)
- (F) REFL PAV MRK TY I (W)24"(SLD)
- (G) REFL PAV MRK W/RET REQ TY I (Y)4"(SLD)
- (H) RE PV MRK TY I(BLACK)6"(SHADOW)
- (I) REF PAV MRK TY II (W)4"(SLD)
- (J) REF PAV MRK TY II (W)4"(BRK)
- (K) REF PAV MRK TY II (Y)4"(SLD)
- (L) REF PAV MRK TY II (W)8"(SLD)
- (M) REF PAV MRK TY II (W)4"(DOT)
- (N) REF PAV MRK TY II (W)12"(SLD)
- (O) REFL PAV MRK TY II (BLACK)6"(SHADOW)
- (P) REF PAV MRK TY II (W)24"(SLD)
- (Q) REF PAV MRK TY I (W)18"(YLD TRI)
- (R) REF PAV MRK TY II (W)18"(YLD TRI)
- (S) REFL PAV MRKR TY I-C
- (T) REFL PAV MRKR TY II-A-A
- (X) REFL PAV MRKR TY II-C-R
- (Y) REFL PAV MRK W/RET REQ TY I (W)6"(SLD)
- (Z) REFL PAV MRK W/RET REQ TY I (W)6"(BRK)
- (AA) REFL PAV MRK TY I (W)6"(DOT)
- (BB) REFL PAV MRK W/RET REQ TY I (Y)6"(SLD)
- (CC) REF PAV MRK TY II (W)6"(SLD)
- (DD) REF PAV MRK TY II (W)6"(BRK)
- (EE) REF PAV MRK TY II (Y)6"(SLD)
- (FF) REF PAV MRK TY II (W)6"(DOT)
- REF PAV MRK TY I&II (W)(ARROW)
- REF PAV MRK TY II (W)(DBL ARW)
- REF PAV MRK TY I&II (W)(WORD)

NOTE: ALL TY I MRK ARE 100 MIL.

NOTE:

1. NBML, NBFR, EXNBFR, PBI35VT AND RAMPS BASELINE NOT SHOWN FOR MARKING CLARITY.

SIGNING LEGEND

- SMALL SIGN NUMBER
- LARGE SIGN NUMBER
- PROPOSED SMALL SIGN
- PROPOSED GROUND MOUNTED LARGE SIGN
- PROPOSED OVERHEAD CANTILEVER SIGN
- TRAFFIC FLOW
- INSTL DEL ASSM (D-DW)SZ1(WFLX)GND
- INSTL DEL ASSM (D-SW)SZ1(WFLX)GND
- INSTL DEL ASSM (D-SW)SZ1(WFLX)GND(BI)
- INSTL DEL ASSM (D-SY)SZ1(BRF)GF1
- INSTL DEL ASSM (D-SW)SZ1(BRF)GF1
- INSTL DEL ASSM (D-DW)SZ1(BRF)GF2
- RUMBLE STRIPS (SHOULDER)
- INSTL OM ASSM (OM-2Z) (WFLX)GND

STATE OF TEXAS
MARIA XIMENA MEDERO
107551
LICENSED PROFESSIONAL ENGINEER
5/23/2022

AECOM
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

SIGNING AND PAVEMENT MARKING PLAN

BEGIN TO STA 533+00

SHEET 1 OF 8

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		193

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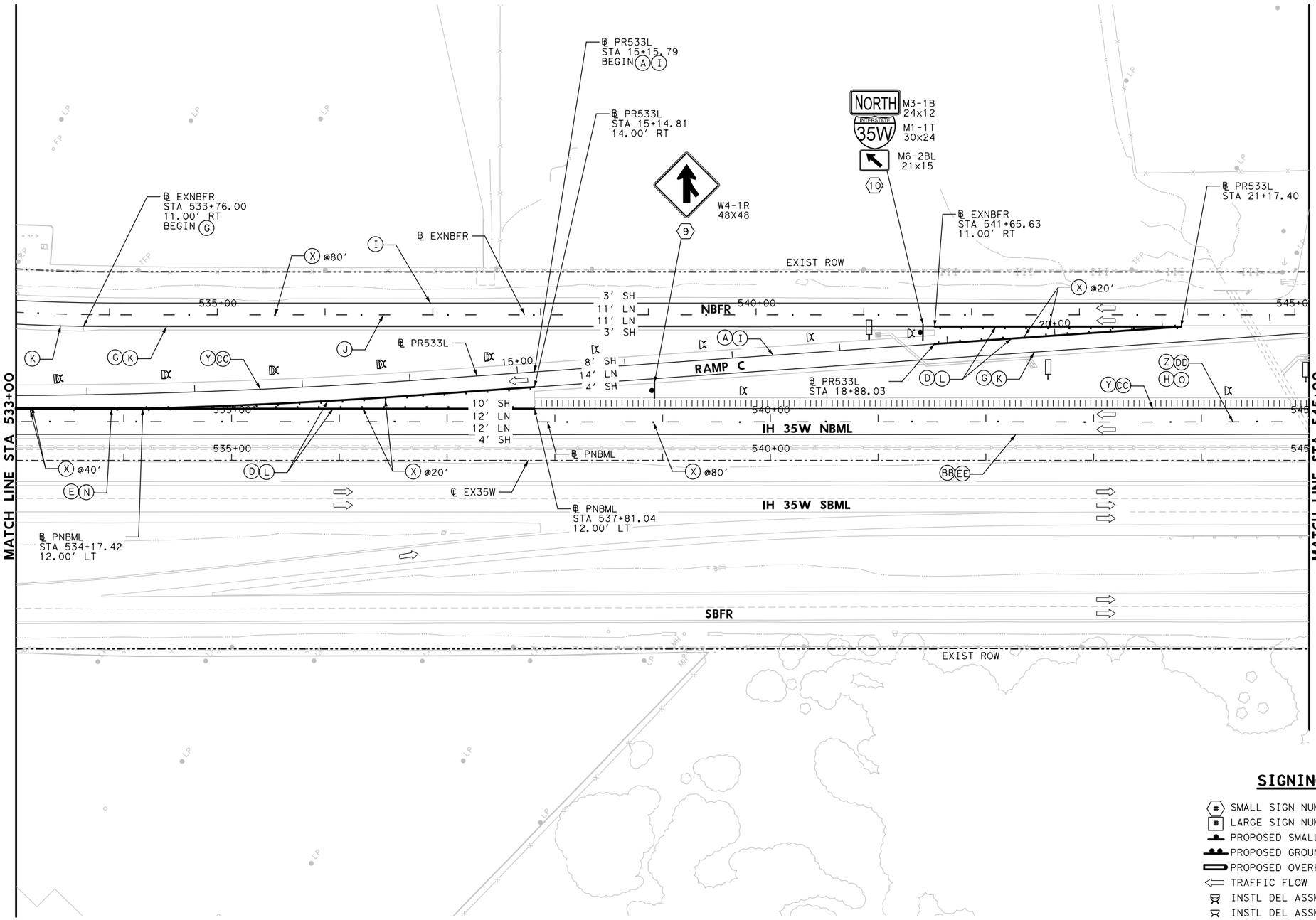

0' 50' 100'
SCALE IN FEET

LEGEND

- (A) REFL PAV MRK W/RET REQ TY I (W)4"(SLD)
- (B) REFL PAV MRK W/RET REQ TY I (W)4"(BRK)
- (C) REFL PAV MRK TY I (W)4"(DOT)
- (D) REFL PAV MRK TY I (W)8"(SLD)
- (E) REFL PAV MRK TY I (W)12"(SLD)
- (F) REFL PAV MRK TY I (W)24"(SLD)
- (G) REFL PAV MRK W/RET REQ TY I (Y)4"(SLD)
- (H) RE PV MRK TY I(BLACK)6"(SHADOW)
- (I) REF PAV MRK TY II (W)4"(SLD)
- (J) REF PAV MRK TY II (W)4"(BRK)
- (K) REF PAV MRK TY II (Y)4"(SLD)
- (L) REF PAV MRK TY II (W)8"(SLD)
- (M) REF PAV MRK TY II (W)4"(DOT)
- (N) REF PAV MRK TY II (W)12"(SLD)
- (O) REFL PAV MRK TY II (BLACK)6"(SHADOW)
- (P) REF PAV MRK TY II (W)24"(SLD)
- (Q) REF PAV MRK TY I (W)18"(YLD TRI)
- (R) REF PAV MRK TY II (W)18"(YLD TRI)
- (S) REFL PAV MRKR TY I-C
- (T) REFL PAV MRKR TY II-A-A
- (X) REFL PAV MRKR TY II-C-R
- (Y) REFL PAV MRK W/RET REQ TY I (W)6"(SLD)
- (Z) REFL PAV MRK W/RET REQ TY I (W)6"(BRK)
- (AA) REFL PAV MRK TY I (W)6"(DOT)
- (BB) REFL PAV MRK W/RET REQ TY I (Y)6"(SLD)
- (CC) REF PAV MRK TY II (W)6"(SLD)
- (DD) REF PAV MRK TY II (W)6"(BRK)
- (EE) REF PAV MRK TY II (Y)6"(SLD)
- (FF) REF PAV MRK TY II (W)6"(DOT)
- REF PAV MRK TY I&II (W)(ARROW)
- REF PAV MRK TY II (W)(DBL ARW)
- REF PAV MRK TY I&II (W)(WORD)

NOTE: ALL TY I MRK ARE 100 MIL.

NOTE:

1. NBML, NBFR, EXNBFR, PBI35VT AND RAMPS BASELINE NOT SHOWN FOR MARKING CLARITY.

SIGNING LEGEND

- SMALL SIGN NUMBER
- LARGE SIGN NUMBER
- PROPOSED SMALL SIGN
- PROPOSED GROUND MOUNTED LARGE SIGN
- PROPOSED OVERHEAD CANTILEVER SIGN
- TRAFFIC FLOW
- INSTL DEL ASSM (D-DW)SZ1(WFLX)GND
- INSTL DEL ASSM (D-SW)SZ1(WFLX)GND
- INSTL DEL ASSM (D-SW)SZ1(WFLX)GND(BI)
- INSTL DEL ASSM (D-SY)SZ1(BRF)GF1
- INSTL DEL ASSM (D-SW)SZ1(BRF)GF1
- INSTL DEL ASSM (D-DW)SZ1(BRF)GF2
- RUMBLE STRIPS (SHOULDER)
- INSTL OM ASSM (OM-2Z) (WFLX)GND

STATE OF TEXAS
MARIA XIMENA MEDERO
107551
LICENSED
PROFESSIONAL ENGINEER

5/23/2022

AECOM
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

SIGNING AND PAVEMENT MARKING PLAN

STA 533+00 TO STA 545+00

SHEET 2 OF 8

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		194

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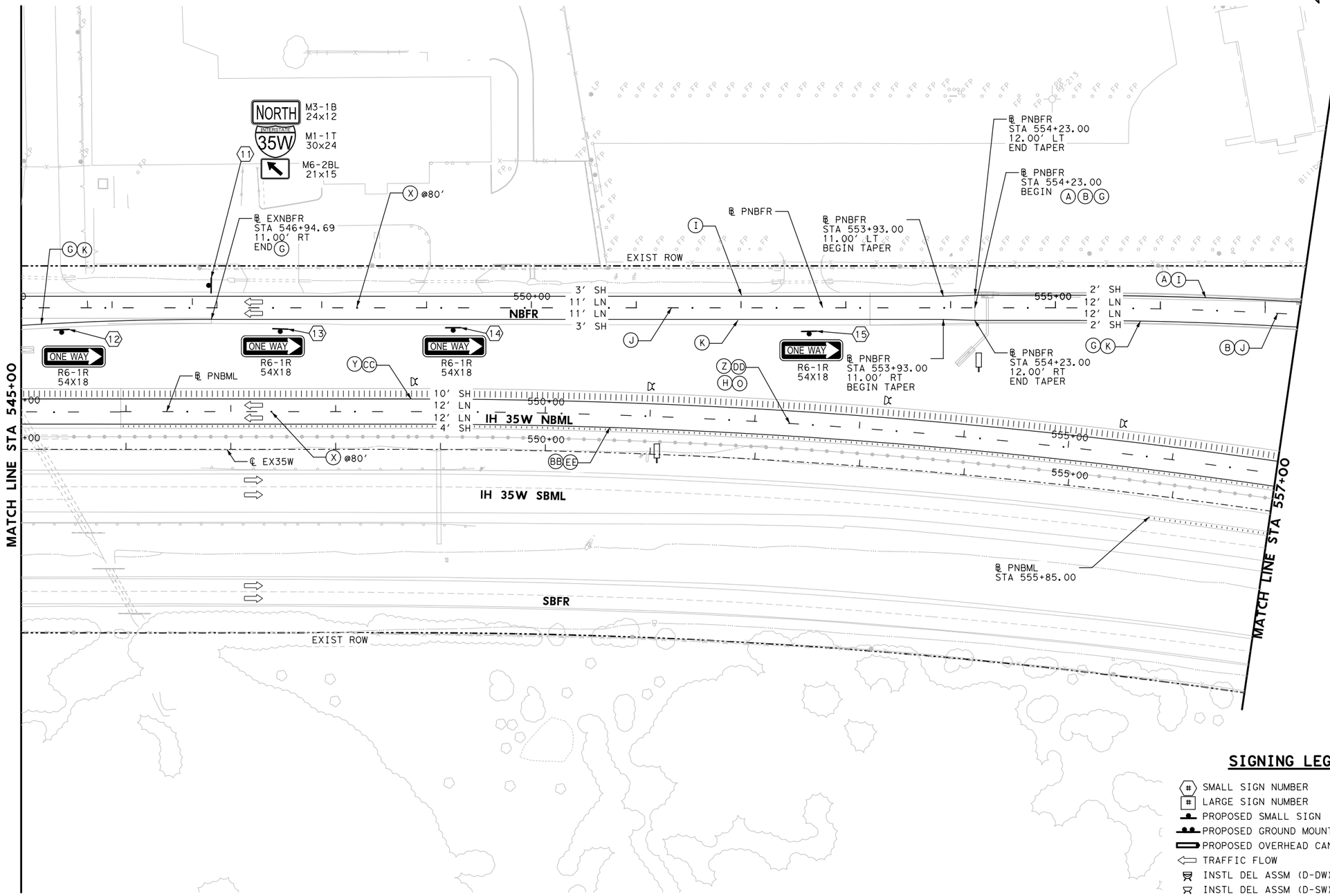

0' 50' 100'
SCALE IN FEET

LEGEND

- (A) REFL PAV MRK W/RET REQ TY I (W)4"(SLD)
- (B) REFL PAV MRK W/RET REQ TY I (W)4"(BRK)
- (C) REFL PAV MRK TY I (W)4"(DOT)
- (D) REFL PAV MRK TY I (W)8"(SLD)
- (E) REFL PAV MRK TY I (W)12"(SLD)
- (F) REFL PAV MRK TY I (W)24"(SLD)
- (G) REFL PAV MRK W/RET REQ TY I (Y)4"(SLD)
- (H) RE PV MRK TY I(BLACK)6"(SHADOW)
- (I) REF PAV MRK TY II (W)4"(SLD)
- (J) REF PAV MRK TY II (W)4"(BRK)
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- (N) REF PAV MRK TY II (W)12"(SLD)
- (O) REFL PAV MRK TY II (BLACK)6"(SHADOW)
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- (Q) REF PAV MRK TY I (W)18"(YLD TRI)
- (R) REF PAV MRK TY II (W)18"(YLD TRI)
- (S) REFL PAV MRKR TY I-C
- (T) REFL PAV MRKR TY II-A-A
- (X) REFL PAV MRKR TY II-C-R
- (Y) REFL PAV MRK W/RET REQ TY I (W)6"(SLD)
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- REF PAV MRK TY II (W)(DBL ARW)
- REF PAV MRK TY I&II (W)(WORD)

NOTE: ALL TY I MRK ARE 100 MIL.

NOTE:

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SIGNING LEGEND

- SMALL SIGN NUMBER
- LARGE SIGN NUMBER
- PROPOSED SMALL SIGN
- PROPOSED GROUND MOUNTED LARGE SIGN
- PROPOSED OVERHEAD CANTILEVER SIGN
- TRAFFIC FLOW
- INSTL DEL ASSM (D-DW)SZ1(WFLX)GND
- INSTL DEL ASSM (D-SW)SZ1(WFLX)GND
- INSTL DEL ASSM (D-SW)SZ1(WFLX)GND(BI)
- INSTL DEL ASSM (D-SY)SZ1(BRF)GF1
- INSTL DEL ASSM (D-SW)SZ1(BRF)GF1
- INSTL DEL ASSM (D-DW)SZ1(BRF)GF2
- RUMBLE STRIPS (SHOULDER)
- INSTL OM ASSM (OM-2Z) (WFLX)GND

STATE OF TEXAS
MARIA XIMENA MEDERO
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PROFESSIONAL ENGINEER
5/23/2022

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TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

SIGNING AND PAVEMENT MARKING PLAN

STA 545+00 TO STA 557+00

SHEET 3 OF 8

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		195

DATE: 5/23/2022 10:55:38 AM
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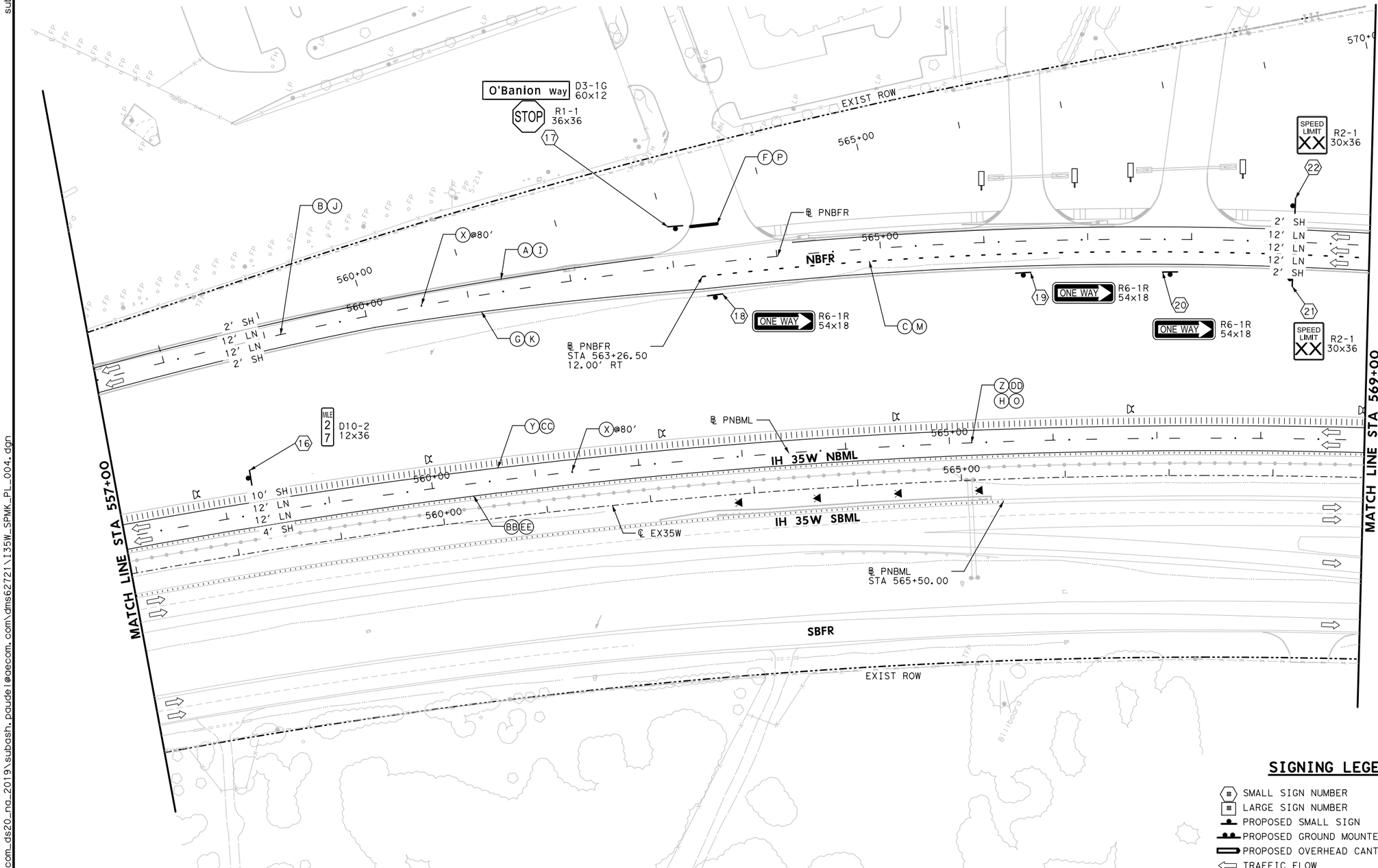

0' 50' 100'
SCALE IN FEET

LEGEND

- (A) REFL PAV MRK W/RET REQ TY I (W)4"(SLD)
- (B) REFL PAV MRK W/RET REQ TY I (W)4"(BRK)
- (C) REFL PAV MRK TY I (W)4"(DOT)
- (D) REFL PAV MRK TY I (W)8"(SLD)
- (E) REFL PAV MRK TY I (W)12"(SLD)
- (F) REFL PAV MRK TY I (W)24"(SLD)
- (G) REFL PAV MRK W/RET REQ TY I (Y)4"(SLD)
- (H) RE PV MRK TY I(BLACK)6"(SHADOW)
- (I) REF PAV MRK TY II (W)4"(SLD)
- (J) REF PAV MRK TY II (W)4"(BRK)
- (K) REF PAV MRK TY II (Y)4"(SLD)
- (L) REF PAV MRK TY II (W)8"(SLD)
- (M) REF PAV MRK TY II (W)4"(DOT)
- (N) REF PAV MRK TY II (W)12"(SLD)
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- (Q) REF PAV MRK TY I (W)18"(YLD TRI)
- (R) REF PAV MRK TY II (W)18"(YLD TRI)
- (S) REFL PAV MRKR TY I-C
- (T) REFL PAV MRKR TY II-A-A
- (X) REFL PAV MRKR TY II-C-R
- (Y) REFL PAV MRK W/RET REQ TY I (W)6"(SLD)
- (Z) REFL PAV MRK W/RET REQ TY I (W)6"(BRK)
- (AA) REFL PAV MRK TY I (W)6"(DOT)
- (BB) REFL PAV MRK W/RET REQ TY I (Y)6"(SLD)
- (CC) REF PAV MRK TY II (W)6"(SLD)
- (DD) REF PAV MRK TY II (W)6"(BRK)
- (EE) REF PAV MRK TY II (Y)6"(SLD)
- (FF) REF PAV MRK TY II (W)6"(DOT)
- REF PAV MRK TY I&II (W)(ARROW)
- REF PAV MRK TY II (W)(DBL ARW)
- (W) REF PAV MRK TY I&II (W)(WORD)

NOTE: ALL TY I MRK ARE 100 MIL.

NOTE:

1. NBML, NBFR, EXNBFR, PBI35VT AND RAMPS BASELINE NOT SHOWN FOR MARKING CLARITY.

SIGNING LEGEND

- SMALL SIGN NUMBER
- LARGE SIGN NUMBER
- PROPOSED SMALL SIGN
- PROPOSED GROUND MOUNTED LARGE SIGN
- PROPOSED OVERHEAD CANTILEVER SIGN
- TRAFFIC FLOW
- INSTL DEL ASSM (D-DW)SZ1(WFLX)GND
- INSTL DEL ASSM (D-SW)SZ1(WFLX)GND
- INSTL DEL ASSM (D-SW)SZ1(WFLX)GND(BI)
- INSTL DEL ASSM (D-SY)SZ1(BRF)GF1
- INSTL DEL ASSM (D-SW)SZ1(BRF)GF1
- INSTL DEL ASSM (D-DW)SZ1(BRF)GF2
- RUMBLE STRIPS (SHOULDER)
- INSTL OM ASSM (OM-2Z) (WFLX)GND

STATE OF TEXAS
MARIA XIMENA MEDERO
107551
LICENSED PROFESSIONAL ENGINEER
5/23/2022

AECOM
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

SIGNING AND PAVEMENT MARKING PLAN

STA 557+00 TO STA 569+00

SHEET 4 OF 8

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		196

DATE: 5/23/2022 10:55:43 AM
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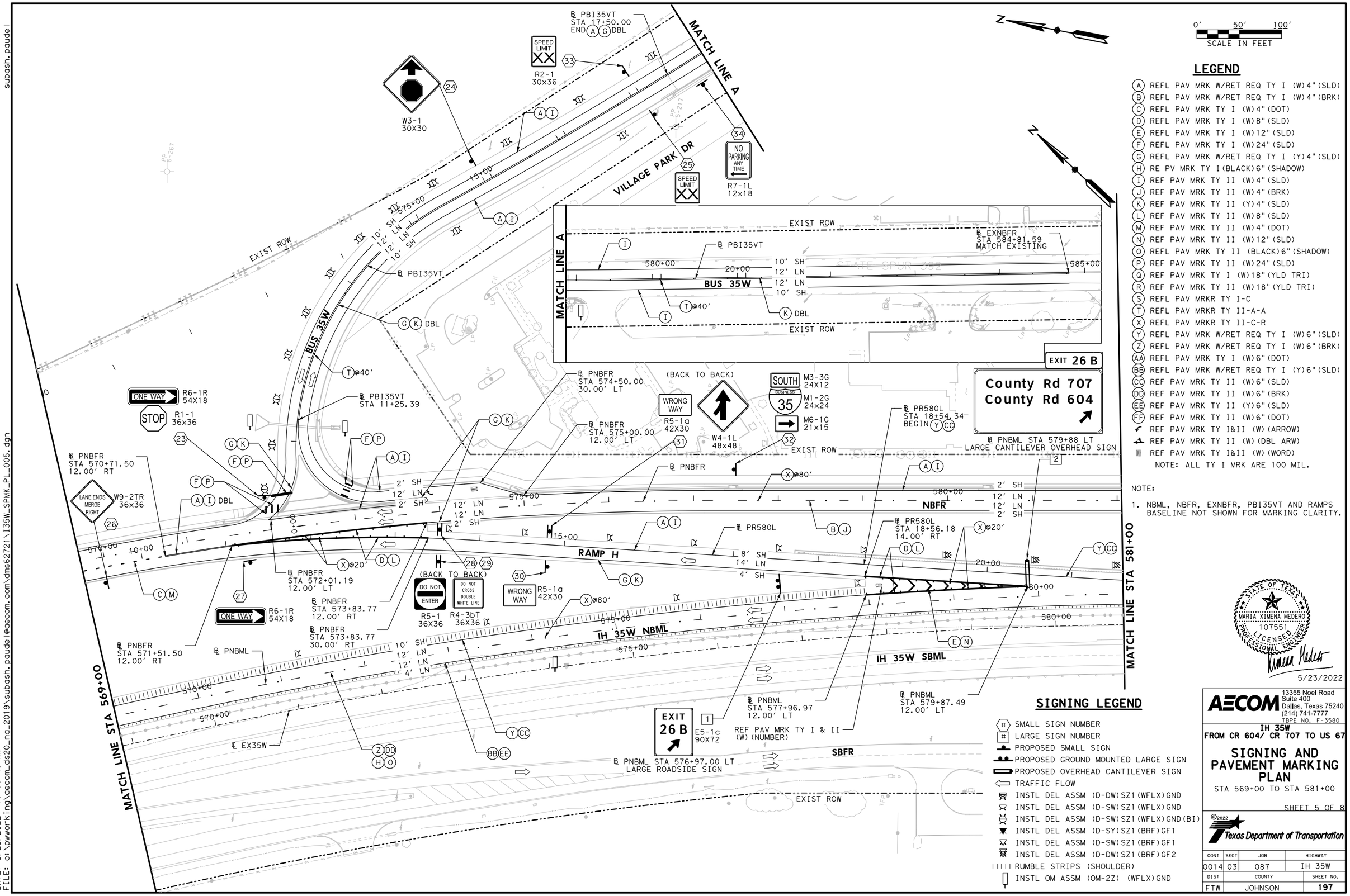

LEGEND

- (A) REFL PAV MRK W/RET REQ TY I (W)4"(SLD)
- (B) REFL PAV MRK W/RET REQ TY I (W)4"(BRK)
- (C) REFL PAV MRK TY I (W)4"(DOT)
- (D) REFL PAV MRK TY I (W)8"(SLD)
- (E) REFL PAV MRK TY I (W)12"(SLD)
- (F) REFL PAV MRK TY I (W)24"(SLD)
- (G) REFL PAV MRK W/RET REQ TY I (Y)4"(SLD)
- (H) RE PV MRK TY I(BLACK)6"(SHADOW)
- (I) REF PAV MRK TY II (W)4"(SLD)
- (J) REF PAV MRK TY II (W)4"(BRK)
- (K) REF PAV MRK TY II (Y)4"(SLD)
- (L) REF PAV MRK TY II (W)8"(SLD)
- (M) REF PAV MRK TY II (W)4"(DOT)
- (N) REF PAV MRK TY II (W)12"(SLD)
- (O) REFL PAV MRK TY II (BLACK)6"(SHADOW)
- (P) REF PAV MRK TY II (W)24"(SLD)
- (Q) REF PAV MRK TY I (W)18"(YLD TRI)
- (R) REF PAV MRK TY II (W)18"(YLD TRI)
- (S) REFL PAV MRKR TY I-C
- (T) REFL PAV MRKR TY II-A-A
- (X) REFL PAV MRKR TY II-C-R
- (Y) REFL PAV MRK W/RET REQ TY I (W)6"(SLD)
- (Z) REFL PAV MRK W/RET REQ TY I (W)6"(BRK)
- (AA) REFL PAV MRK TY I (W)6"(DOT)
- (BB) REFL PAV MRK W/RET REQ TY I (Y)6"(SLD)
- (CC) REF PAV MRK TY II (W)6"(SLD)
- (DD) REF PAV MRK TY II (W)6"(BRK)
- (EE) REF PAV MRK TY II (Y)6"(SLD)
- (FF) REF PAV MRK TY II (W)6"(DOT)
- REF PAV MRK TY I&II (W)(ARROW)
- REF PAV MRK TY II (W)(DBL ARW)
- REF PAV MRK TY I&II (W)(WORD)

NOTE: ALL TY I MRK ARE 100 MIL.

NOTE:

1. NBML, NBFR, EXNBFR, PBI35VT AND RAMPS BASELINE NOT SHOWN FOR MARKING CLARITY.

SIGNING LEGEND

- (#) SMALL SIGN NUMBER
- [#] LARGE SIGN NUMBER
- PROPOSED SMALL SIGN
- PROPOSED GROUND MOUNTED LARGE SIGN
- PROPOSED OVERHEAD CANTILEVER SIGN
- TRAFFIC FLOW
- INSTL DEL ASSM (D-DW)SZ1(WFLX)GND
- INSTL DEL ASSM (D-SW)SZ1(WFLX)GND
- INSTL DEL ASSM (D-SW)SZ1(WFLX)GND(BI)
- INSTL DEL ASSM (D-SY)SZ1(BRF)GF1
- INSTL DEL ASSM (D-SW)SZ1(BRF)GF1
- INSTL DEL ASSM (D-DW)SZ1(BRF)GF2
- RUMBLE STRIPS (SHOULDER)
- INSTL OM ASSM (OM-2Z) (WFLX)GND

STATE OF TEXAS
MARIA XIMENA MEDERO
107551
LICENSED
PROFESSIONAL ENGINEER
5/23/2022

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(214) 741-7777
TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

SIGNING AND PAVEMENT MARKING PLAN

STA 569+00 TO STA 581+00

SHEET 5 OF 8

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		197

DATE: 5/23/2022 10:55:48 AM
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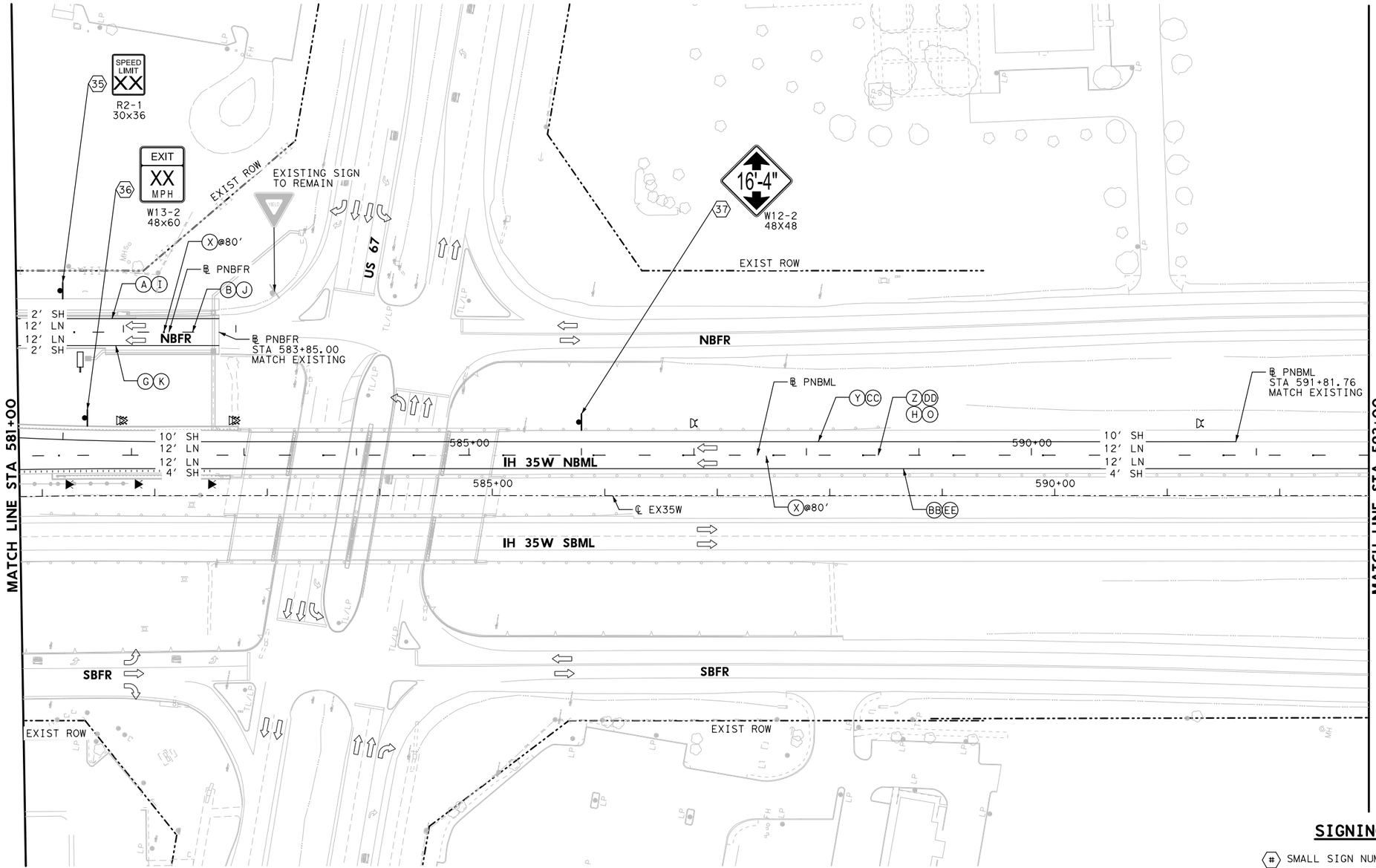

N

0' 50' 100'
SCALE IN FEET

LEGEND

- (A) REFL PAV MRK W/RET REQ TY I (W)4"(SLD)
- (B) REFL PAV MRK W/RET REQ TY I (W)4"(BRK)
- (C) REFL PAV MRK TY I (W)4"(DOT)
- (D) REFL PAV MRK TY I (W)8"(SLD)
- (E) REFL PAV MRK TY I (W)12"(SLD)
- (F) REFL PAV MRK TY I (W)24"(SLD)
- (G) REFL PAV MRK W/RET REQ TY I (Y)4"(SLD)
- (H) RE PV MRK TY I(BLACK)6"(SHADOW)
- (I) REF PAV MRK TY II (W)4"(SLD)
- (J) REF PAV MRK TY II (W)4"(BRK)
- (K) REF PAV MRK TY II (Y)4"(SLD)
- (L) REF PAV MRK TY II (W)8"(SLD)
- (M) REF PAV MRK TY II (W)4"(DOT)
- (N) REF PAV MRK TY II (W)12"(SLD)
- (O) REFL PAV MRK TY II (BLACK)6"(SHADOW)
- (P) REF PAV MRK TY II (W)24"(SLD)
- (Q) REF PAV MRK TY I (W)18"(YLD TRI)
- (R) REF PAV MRK TY II (W)18"(YLD TRI)
- (S) REFL PAV MRKR TY I-C
- (T) REFL PAV MRKR TY II-A-A
- (X) REFL PAV MRKR TY II-C-R
- (Y) REFL PAV MRK W/RET REQ TY I (W)6"(SLD)
- (Z) REFL PAV MRK W/RET REQ TY I (W)6"(BRK)
- (AA) REFL PAV MRK TY I (W)6"(DOT)
- (BB) REFL PAV MRK W/RET REQ TY I (Y)6"(SLD)
- (CC) REF PAV MRK TY II (W)6"(SLD)
- (DD) REF PAV MRK TY II (W)6"(BRK)
- (EE) REF PAV MRK TY II (Y)6"(SLD)
- (FF) REF PAV MRK TY II (W)6"(DOT)
- REF PAV MRK TY I&II (W)(ARROW)
- REF PAV MRK TY II (W)(DBL ARW)
- REF PAV MRK TY I&II (W)(WORD)

NOTE: ALL TY I MRK ARE 100 MIL.

NOTE:

1. NBML, NBFR, EXNBFR, PBI35VT AND RAMPS BASELINE NOT SHOWN FOR MARKING CLARITY.

SIGNING LEGEND

- SMALL SIGN NUMBER
- LARGE SIGN NUMBER
- PROPOSED SMALL SIGN
- PROPOSED GROUND MOUNTED LARGE SIGN
- PROPOSED OVERHEAD CANTILEVER SIGN
- TRAFFIC FLOW
- INSTL DEL ASSM (D-DW)SZ1(WFLX)GND
- INSTL DEL ASSM (D-SW)SZ1(WFLX)GND
- INSTL DEL ASSM (D-SW)SZ1(WFLX)GND(BI)
- INSTL DEL ASSM (D-SY)SZ1(BRF)GF1
- INSTL DEL ASSM (D-SW)SZ1(BRF)GF1
- INSTL DEL ASSM (D-DW)SZ1(BRF)GF2
- RUMBLE STRIPS (SHOULDER)
- INSTL OM ASSM (OM-2Z) (WFLX)GND

STATE OF TEXAS
MARIA XIMENA MEDERO
107551
LICENSED
PROFESSIONAL ENGINEER

5/23/2022

AECOM
13355 Noel Road
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Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

SIGNING AND PAVEMENT MARKING PLAN

STA 581+00 TO 593+00

SHEET 6 OF 8

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		198

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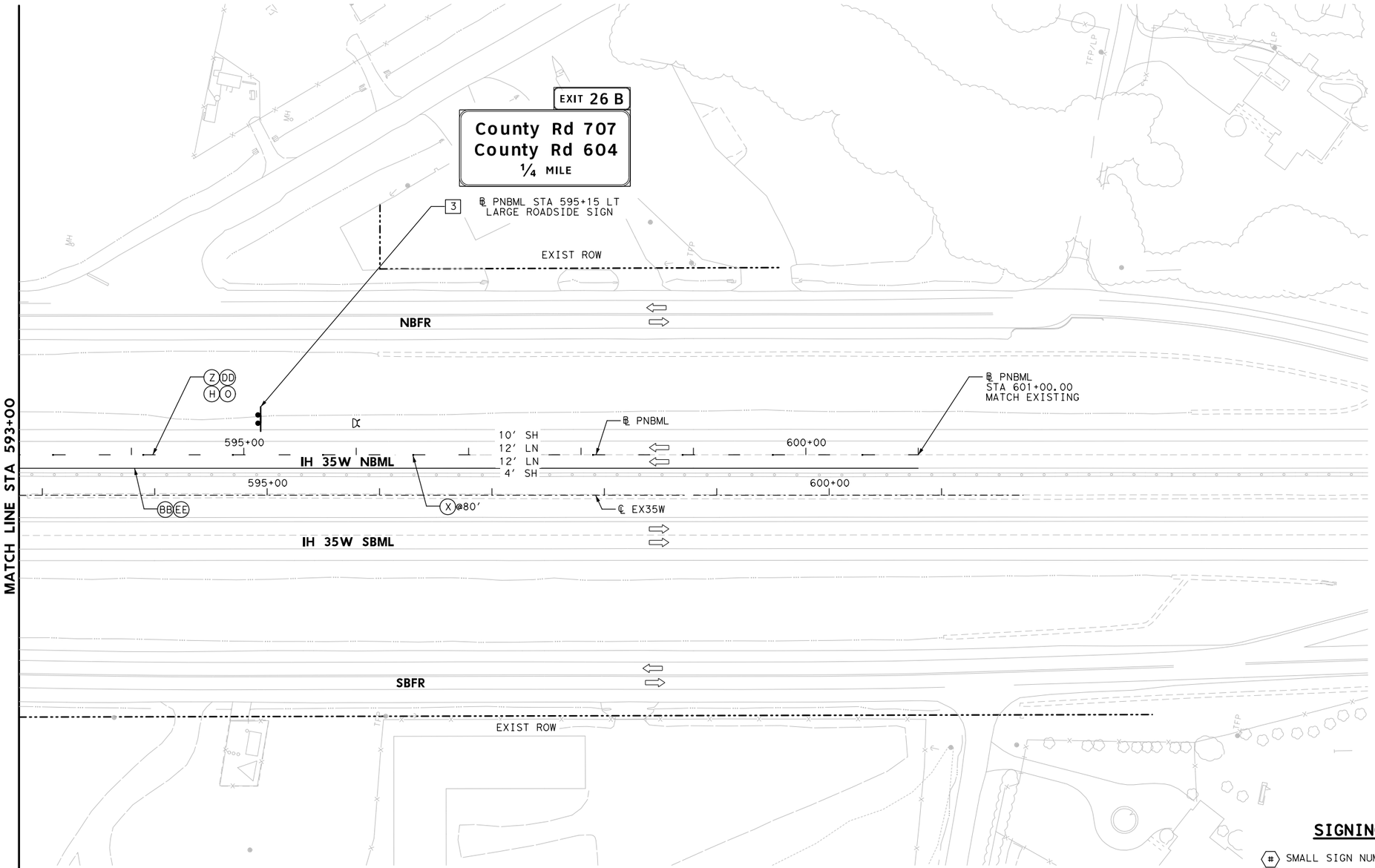

0' 50' 100'
SCALE IN FEET

LEGEND

- (A) REFL PAV MRK W/RET REQ TY I (W)4"(SLD)
- (B) REFL PAV MRK W/RET REQ TY I (W)4"(BRK)
- (C) REFL PAV MRK TY I (W)4"(DOT)
- (D) REFL PAV MRK TY I (W)8"(SLD)
- (E) REFL PAV MRK TY I (W)12"(SLD)
- (F) REFL PAV MRK TY I (W)24"(SLD)
- (G) REFL PAV MRK W/RET REQ TY I (Y)4"(SLD)
- (H) RE PV MRK TY I(BLACK)6"(SHADOW)
- (I) REF PAV MRK TY II (W)4"(SLD)
- (J) REF PAV MRK TY II (W)4"(BRK)
- (K) REF PAV MRK TY II (Y)4"(SLD)
- (L) REF PAV MRK TY II (W)8"(SLD)
- (M) REF PAV MRK TY II (W)4"(DOT)
- (N) REF PAV MRK TY II (W)12"(SLD)
- (O) REFL PAV MRK TY II (BLACK)6"(SHADOW)
- (P) REF PAV MRK TY II (W)24"(SLD)
- (Q) REF PAV MRK TY I (W)18"(YLD TRI)
- (R) REF PAV MRK TY II (W)18"(YLD TRI)
- (S) REFL PAV MRKR TY I-C
- (T) REFL PAV MRKR TY II-A-A
- (X) REFL PAV MRKR TY II-C-R
- (Y) REFL PAV MRK W/RET REQ TY I (W)6"(SLD)
- (Z) REFL PAV MRK W/RET REQ TY I (W)6"(BRK)
- (AA) REFL PAV MRK TY I (W)6"(DOT)
- (BB) REFL PAV MRK W/RET REQ TY I (Y)6"(SLD)
- (CC) REF PAV MRK TY II (W)6"(SLD)
- (DD) REF PAV MRK TY II (W)6"(BRK)
- (EE) REF PAV MRK TY II (Y)6"(SLD)
- (FF) REF PAV MRK TY II (W)6"(DOT)
- REF PAV MRK TY I&II (W)(ARROW)
- REF PAV MRK TY II (W)(DBL ARW)
- REF PAV MRK TY I&II (W)(WORD)

NOTE: ALL TY I MRK ARE 100 MIL.

NOTE:

1. NBML, NBFR, EXNBFR, PBI35VT AND RAMPS BASELINE NOT SHOWN FOR MARKING CLARITY.

SIGNING LEGEND

- (#) SMALL SIGN NUMBER
- [#] LARGE SIGN NUMBER
- PROPOSED SMALL SIGN
- PROPOSED GROUND MOUNTED LARGE SIGN
- PROPOSED OVERHEAD CANTILEVER SIGN
- TRAFFIC FLOW
- INSTL DEL ASSM (D-DW)SZ1(WFLX)GND
- INSTL DEL ASSM (D-SW)SZ1(WFLX)GND
- INSTL DEL ASSM (D-SW)SZ1(WFLX)GND(BI)
- INSTL DEL ASSM (D-SY)SZ1(BRF)GF1
- INSTL DEL ASSM (D-SW)SZ1(BRF)GF1
- INSTL DEL ASSM (D-DW)SZ1(BRF)GF2
- RUMBLE STRIPS (SHOULDER)
- INSTL OM ASSM (OM-2Z) (WFLX)GND

STATE OF TEXAS
MARIA XIMENA MEDERO
107551
LICENSED PROFESSIONAL ENGINEER
5/23/2022

AECOM
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

SIGNING AND PAVEMENT MARKING PLAN

STA 593+00 TO END

SHEET 7 OF 8

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		199

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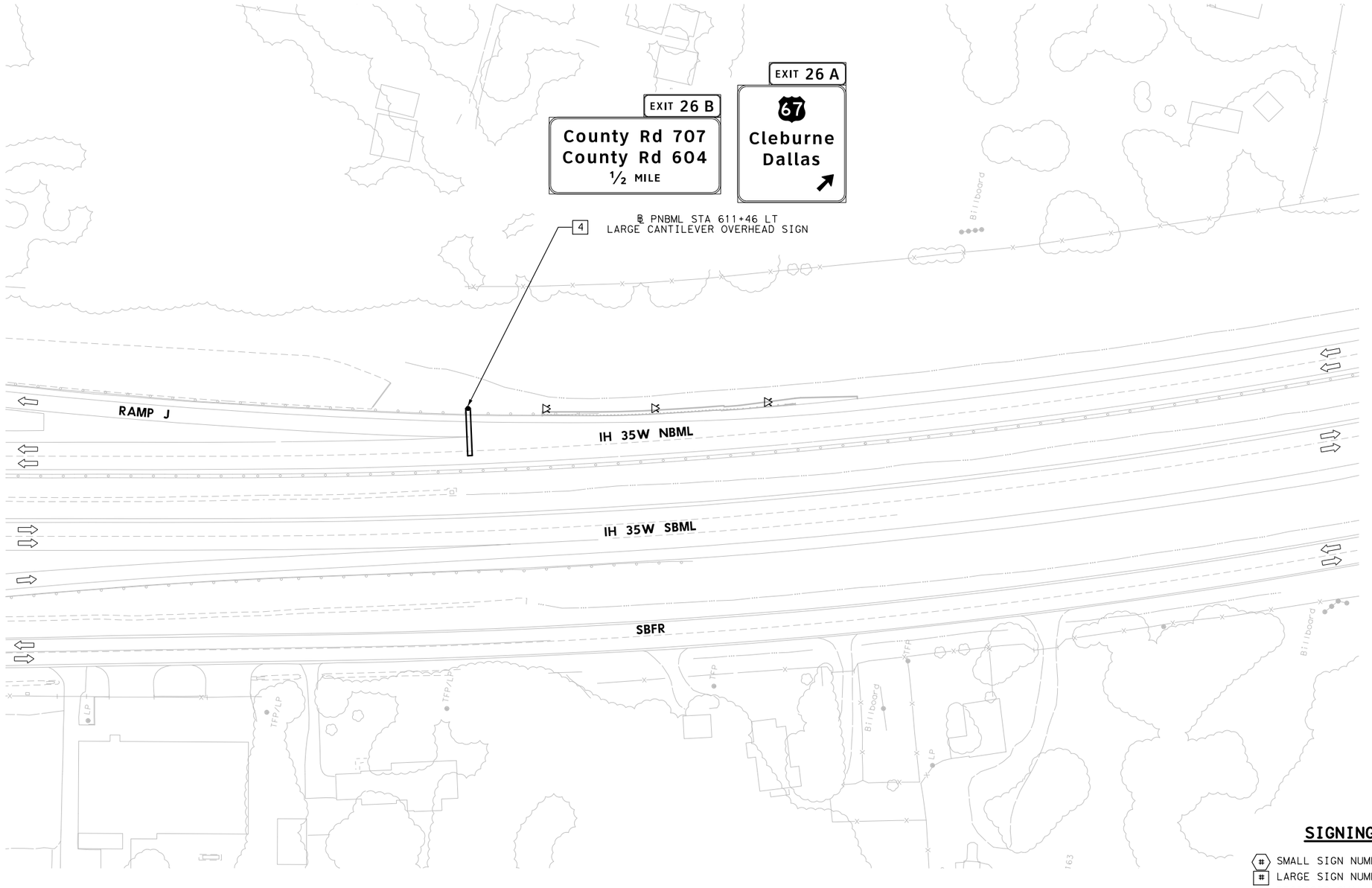

N

0′ 50′ 100′
SCALE IN FEET

LEGEND

- (A) REFL PAV MRK W/RET REQ TY I (W)4"(SLD)
- (B) REFL PAV MRK W/RET REQ TY I (W)4"(BRK)
- (C) REFL PAV MRK TY I (W)4"(DOT)
- (D) REFL PAV MRK TY I (W)8"(SLD)
- (E) REFL PAV MRK TY I (W)12"(SLD)
- (F) REFL PAV MRK TY I (W)24"(SLD)
- (G) REFL PAV MRK W/RET REQ TY I (Y)4"(SLD)
- (H) RE PV MRK TY I(BLACK)6"(SHADOW)
- (I) REF PAV MRK TY II (W)4"(SLD)
- (J) REF PAV MRK TY II (W)4"(BRK)
- (K) REF PAV MRK TY II (Y)4"(SLD)
- (L) REF PAV MRK TY II (W)8"(SLD)
- (M) REF PAV MRK TY II (W)4"(DOT)
- (N) REF PAV MRK TY II (W)12"(SLD)
- (O) REFL PAV MRK TY II (BLACK)6"(SHADOW)
- (P) REF PAV MRK TY II (W)24"(SLD)
- (Q) REF PAV MRK TY I (W)18"(YLD TRI)
- (R) REF PAV MRK TY II (W)18"(YLD TRI)
- (S) REFL PAV MRKR TY I-C
- (T) REFL PAV MRKR TY II-A-A
- (X) REFL PAV MRKR TY II-C-R
- (Y) REFL PAV MRK W/RET REQ TY I (W)6"(SLD)
- (Z) REFL PAV MRK W/RET REQ TY I (W)6"(BRK)
- (AA) REFL PAV MRK TY I (W)6"(DOT)
- (BB) REFL PAV MRK W/RET REQ TY I (Y)6"(SLD)
- (CC) REF PAV MRK TY II (W)6"(SLD)
- (DD) REF PAV MRK TY II (W)6"(BRK)
- (EE) REF PAV MRK TY II (Y)6"(SLD)
- (FF) REF PAV MRK TY II (W)6"(DOT)
- REF PAV MRK TY I&II (W)(ARROW)
- REF PAV MRK TY II (W)(DBL ARW)
- REF PAV MRK TY I&II (W)(WORD)

NOTE: ALL TY I MRK ARE 100 MIL.

NOTE:

1. NBML, NBFR, EXNBFR, PBI35VT AND RAMPS BASELINE NOT SHOWN FOR MARKING CLARITY.

SIGNING LEGEND

- SMALL SIGN NUMBER
- LARGE SIGN NUMBER
- PROPOSED SMALL SIGN
- PROPOSED GROUND MOUNTED LARGE SIGN
- PROPOSED OVERHEAD CANTILEVER SIGN
- TRAFFIC FLOW
- INSTL DEL ASSM (D-DW)SZ1(WFLX)GND
- INSTL DEL ASSM (D-SW)SZ1(WFLX)GND
- INSTL DEL ASSM (D-SW)SZ1(WFLX)GND(BI)
- INSTL DEL ASSM (D-SY)SZ1(BRF)GF1
- INSTL DEL ASSM (D-SW)SZ1(BRF)GF1
- INSTL DEL ASSM (D-DW)SZ1(BRF)GF2
- RUMBLE STRIPS (SHOULDER)
- INSTL OM ASSM (OM-2Z) (WFLX)GND

STATE OF TEXAS
MARIA XIMENA MEDERO
107551
LICENSED
PROFESSIONAL ENGINEER

5/23/2022

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(214) 741-7777
TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

SIGNING AND PAVEMENT MARKING PLAN

RAMP J

SHEET 8 OF 8

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		200

DATE: 5/23/2022 10:56:02 AM
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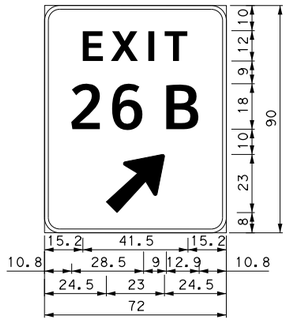
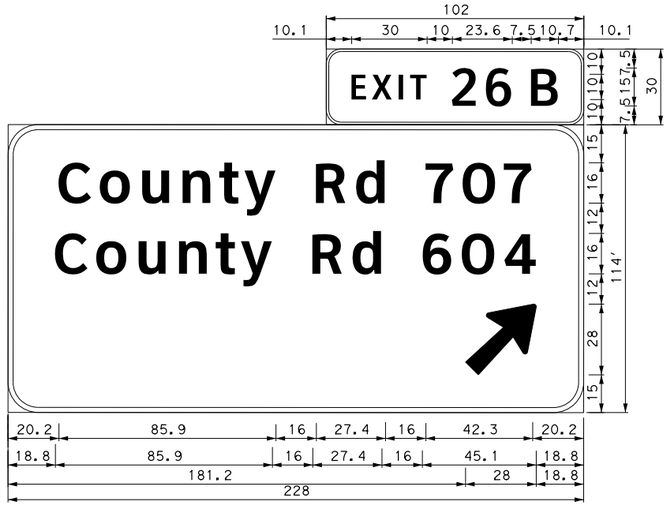
subash.paudel



E5-1c;
6.0" Radius, 1.5" Border, White on Green;
"EXIT", ClearviewHwy-6-W; "26", ClearviewHwy-4-W;
"B", ClearviewHwy-4-W; Arrow A-2 - 29.3" 45°;

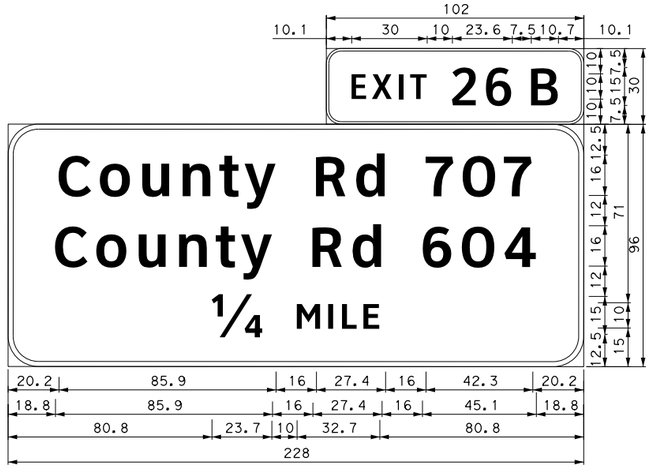
SHEET 5 OF 8 - SIGN [1]



6.0" Radius, 1.0" Border, White on Green;
"EXIT", ClearviewHwy-4-W; "26", ClearviewHwy-4-W; "B", ClearviewHwy-4-W;

12.0" Radius, 2.0" Border, White on Green;
"County", ClearviewHwy-5-W-R; "Rd", ClearviewHwy-5-W-R; "707",
ClearviewHwy-5-W-R; "County", ClearviewHwy-5-W-R; "Rd",
ClearviewHwy-5-W-R; "604", ClearviewHwy-5-W-R; Arrow A-3 - 35.6" 45°;

SHEET 5 OF 8 - SIGN [2]



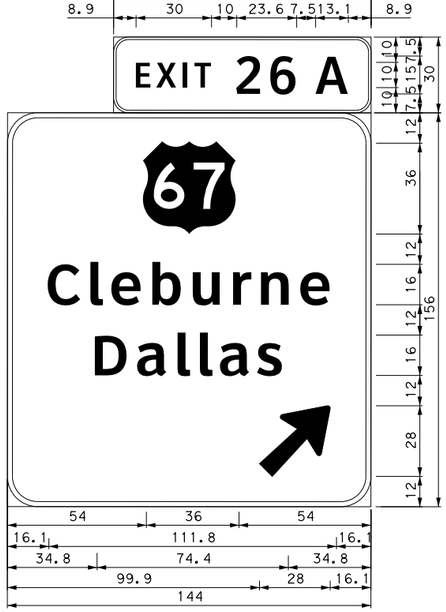
6.0" Radius, 1.0" Border, White on Green;
"EXIT", ClearviewHwy-4-W; "26", ClearviewHwy-4-W; "B", ClearviewHwy-4-W;

12.0" Radius, 2.0" Border, White on Green;
"County", ClearviewHwy-5-W-R; "Rd", ClearviewHwy-5-W-R; "707",
ClearviewHwy-5-W-R; "County", ClearviewHwy-5-W-R; "Rd",
ClearviewHwy-5-W-R; "604", ClearviewHwy-5-W-R; "¼",
ClearviewHwy-5-W-R; "MILE", ClearviewHwy-5-W-R;

SHEET 7 OF 8 - SIGN [3]

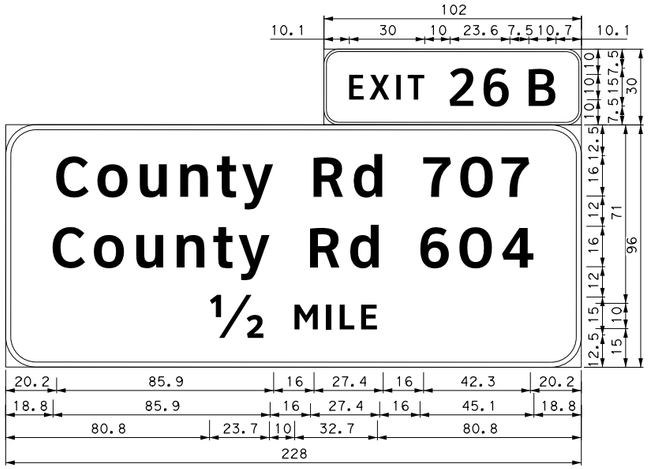
NOTES:

1. REFER TO SIGNING AND PAVEMENT MARKING PLAN FOR SIGN LOCATION.
2. ALL DIMENSIONS ARE IN INCHES.



6.0" Radius, 1.0" Border, White on, Green;
"EXIT", ClearviewHwy-4-W; "26", ClearviewHwy-4-W; "A", ClearviewHwy-4-W;
12.0" Radius, 2.0" Border, White on, Green;
US 67 M1-4; "Cleburne", ClearviewHwy-5-W-R; "Dallas", ClearviewHwy-5-W-R;
Arrow A-3 - 35.6" 45°

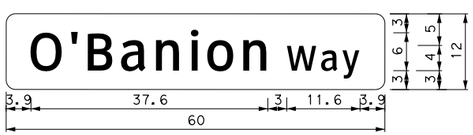
SHEET 8 OF 8 - SIGN [4]



6.0" Radius, 1.0" Border, White on Green;
"EXIT", ClearviewHwy-4-W; "26", ClearviewHwy-4-W; "B", ClearviewHwy-4-W;

12.0" Radius, 2.0" Border, White on Green;
"County", ClearviewHwy-5-W-R; "Rd", ClearviewHwy-5-W-R; "707",
ClearviewHwy-5-W-R; "County", ClearviewHwy-5-W-R; "Rd",
ClearviewHwy-5-W-R; "604", ClearviewHwy-5-W-R; "½",
ClearviewHwy-5-W-R; "MILE", ClearviewHwy-5-W-R;

SHEET 8 OF 8 - SIGN [4]



D3-1G;
1.5" Radius, No border, White on, Green;
"O'Banion" ClearviewHwy-3-W;
"Way" ClearviewHwy-3-W;

SHEET 4 OF 8 - SIGN (17)

NOT TO SCALE

STATE OF TEXAS
MARIA XIMENA MEDERO
107551
LICENSED
PROFESSIONAL ENGINEER
5/23/2022

AECOM
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

SIGN DETAILS

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		201

DATE: 5/23/2022 10:56:11 AM
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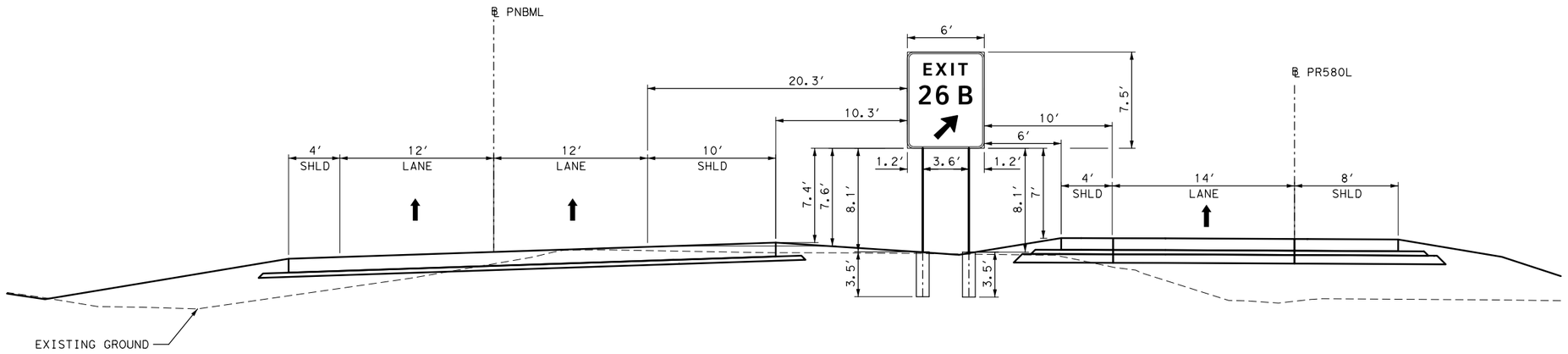

DESIGN DATA

TOTAL SIGN AREA	45.00	SF
PENETROMETER VALUE	10	
TYPE OF MOUNT	321	
POST TYPE	S4X7.7	
POST 1 LENGTH	15.6	FT
POST 2 LENGTH	15.6	FT
TOTAL WEIGHT OF STEEL	310.7	LB
DRILLED SHAFT DIAMETER	12	IN
DRILLED SHAFT DEPTH(EA)	3.5	FT

IH 35W NBML
STA 576+97

NOT TO SCALE

STATE OF TEXAS
MARIA XIMENA MEDERO
107551
LICENSED
PROFESSIONAL ENGINEER

5/23/2022

AECOM
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

LARGE SIGN ELEVATIONS

SHEET 5-SIGN 1

SHEET 1 OF 4

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		202

DATE: 5/23/2022 10:56:15 AM
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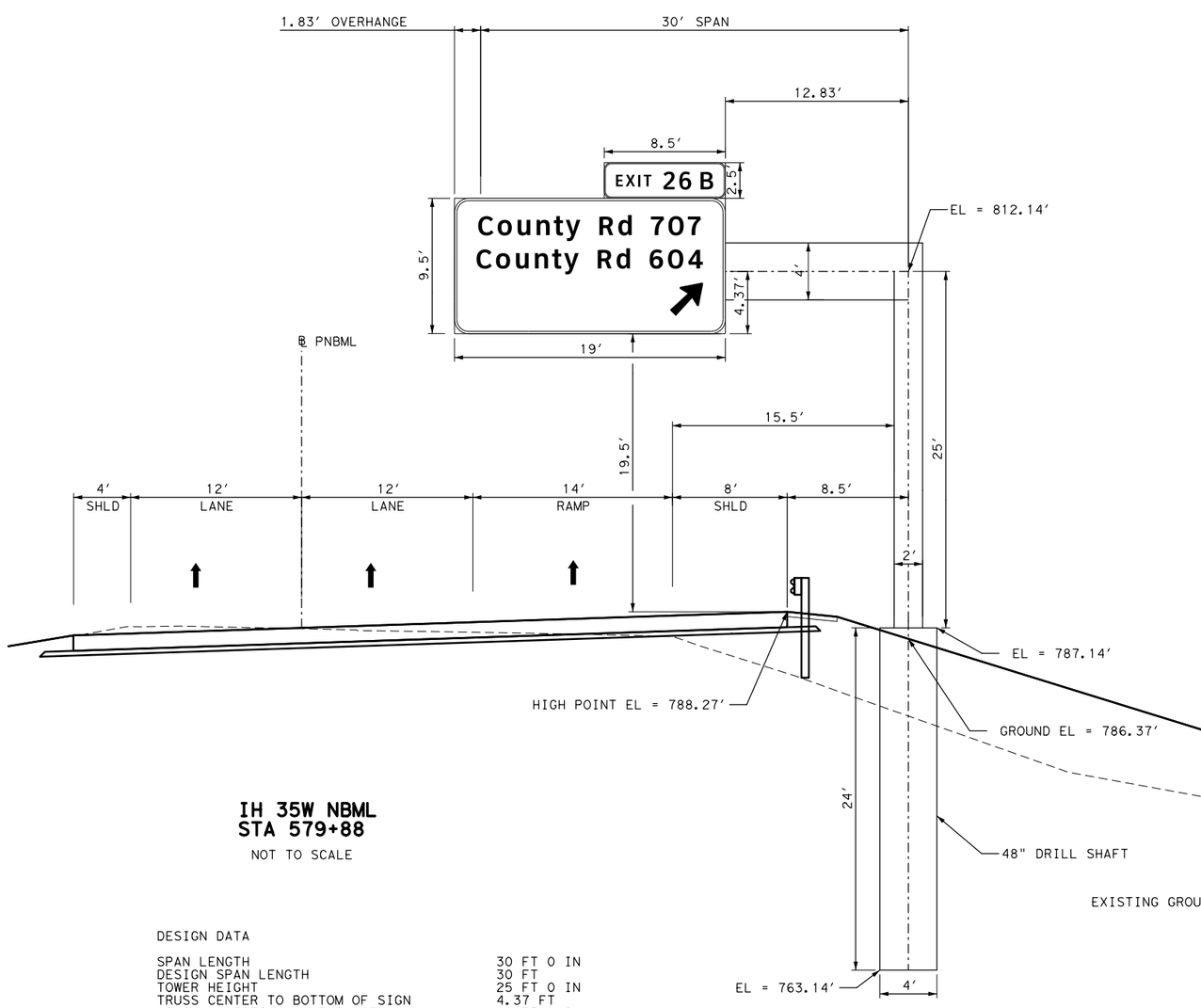
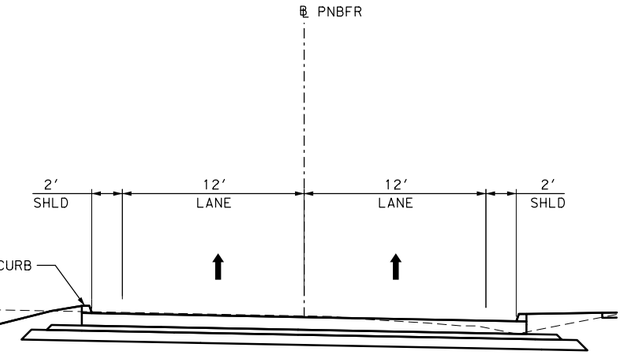
subash.paudel





IH 35W NBML
STA 579+88

NOT TO SCALE

DESIGN DATA

SPAN LENGTH	30 FT 0 IN	
DESIGN SPAN LENGTH	30 FT	
TOWER HEIGHT	25 FT 0 IN	
TRUSS CENTER TO BOTTOM OF SIGN	4.37 FT	
MINIMUM VERTICAL CLEARANCE	19 FT 6 IN	
SIGN AREA	201.75	SF
PENETROMETER VALUE	10	
MOMENT	283.74	K-FT
TORSION	155.44	K-FT
SHEAR	11.28	K
TRUSS CENTERLINE ELEVATION	812.14′	
HIGH POINT ELEVATION	788.27′	

SUMMARY OF DRILLED SHAFT

SIZE	48 IN
LENGTH	24 FT
GROUND ELEVATION	786.37′
BOTTOM OF DRILLED SHAFT ELEVATION	763.14′

STATE OF TEXAS
MARIA XIMENA MEDERO
107551
LICENSED
PROFESSIONAL ENGINEER
5/23/2022

AECOM
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

LARGE SIGN ELEVATIONS

SHEET 5-SIGN 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		203

DATE: 5/23/2022 10:56:19 AM
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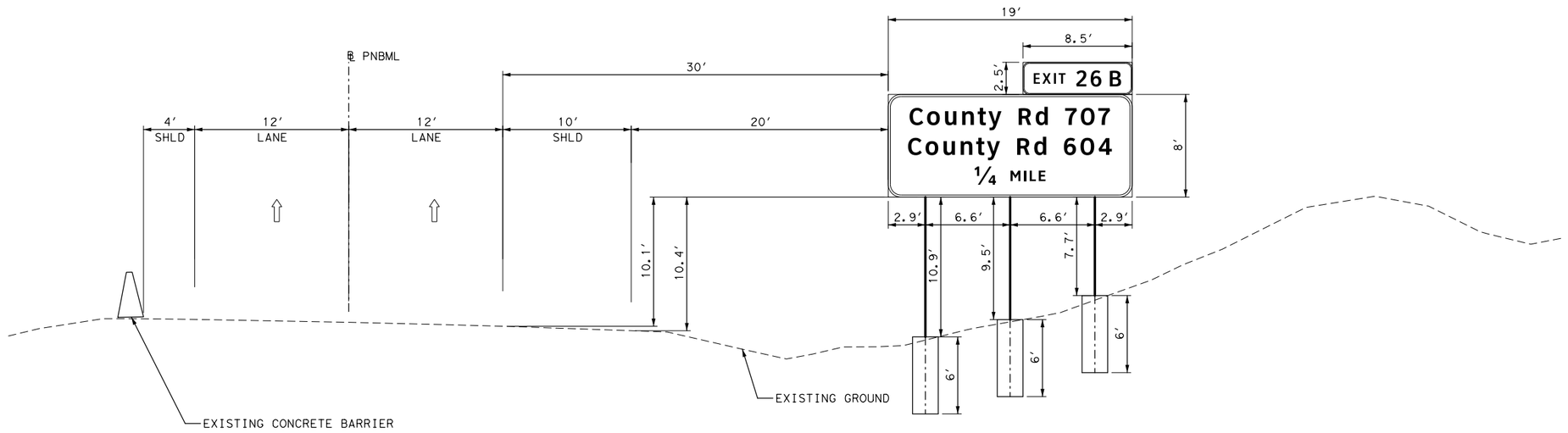
subash.paudel



IH 35W NBML
STA 595+15

NOT TO SCALE

NO PROPOSED ROADWAY WORK IN THIS LOCATION

DESIGN DATA

TOTAL SIGN AREA	173.25	SF
PENETROMETER VALUE	10	
TYPE OF MOUNT	331	
POST TYPE	W6X9	
POST 1 LENGTH	18.9	FT
POST 2 LENGTH	17.5	FT
POST 3 LENGTH	15.7	FT
TOTAL WEIGHT OF STEEL	568.5	LB
DRILLED SHAFT DIAMETER	24	IN
DRILLED SHAFT DEPTH(EA)	6	FT

STATE OF TEXAS
MARIA XIMENA MEDERO
107551
LICENSED
PROFESSIONAL ENGINEER

5/23/2022

AECOM
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

LARGE SIGN ELEVATIONS

SHEET 7-SIGN 3

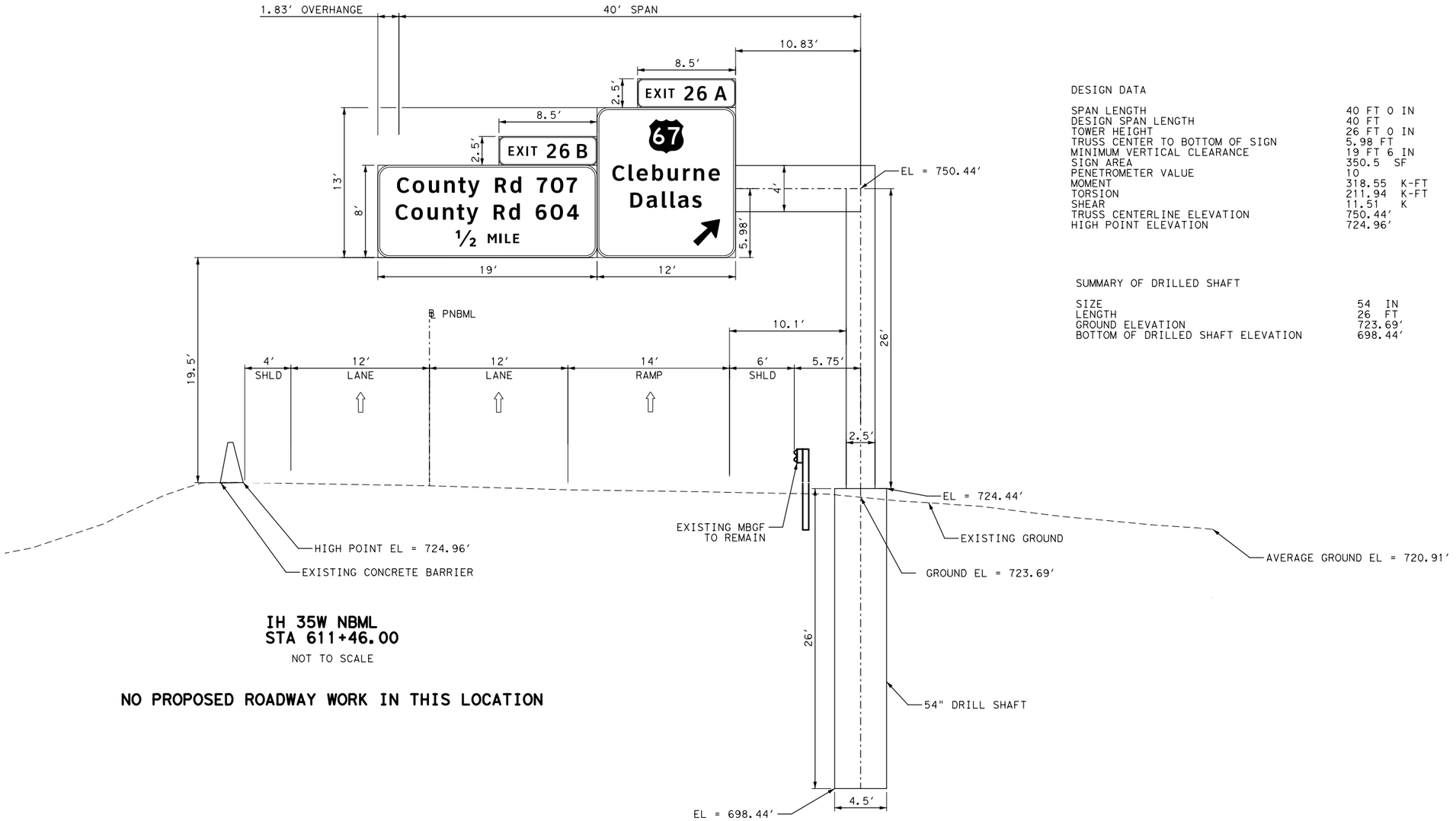
SHEET 3 OF 4

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		204

DATE: 5/23/2022 10:56:23 AM
FILE: c:\pwworking\aecom_ds20_na_2019\subash.paude1@aecom.com\dms62721\I35W_SPMK_LSE_003.dgn

subash.paude1



IH 35W NBML
STA 611+46.00

NOT TO SCALE

NO PROPOSED ROADWAY WORK IN THIS LOCATION

DESIGN DATA

SPAN LENGTH	40 FT 0 IN
DESIGN SPAN LENGTH	40 FT
TOWER HEIGHT	26 FT 0 IN
TRUSS CENTER TO BOTTOM OF SIGN	5.98 FT
MINIMUM VERTICAL CLEARANCE	19 FT 6 IN
SIGN AREA	350.5 SF
PENETROMETER VALUE	10
MOMENT	318.55 K-FT
TORSION	211.94 K-FT
SHEAR	11.51 K
TRUSS CENTERLINE ELEVATION	750.44′
HIGH POINT ELEVATION	724.96′

SUMMARY OF DRILLED SHAFT

SIZE	54 IN
LENGTH	26 FT
GROUND ELEVATION	723.69′
BOTTOM OF DRILLED SHAFT ELEVATION	698.44′

STATE OF TEXAS
MARIA XIMENA MEDERO
107551
LICENSED
PROFESSIONAL ENGINEER

5/24/2022

AECOM
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

LARGE SIGN ELEVATIONS

SHEET 8-SIGN 4

SHEET 4 OF 4

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		205

DATE: 5/24/2022 3:34:50 PM
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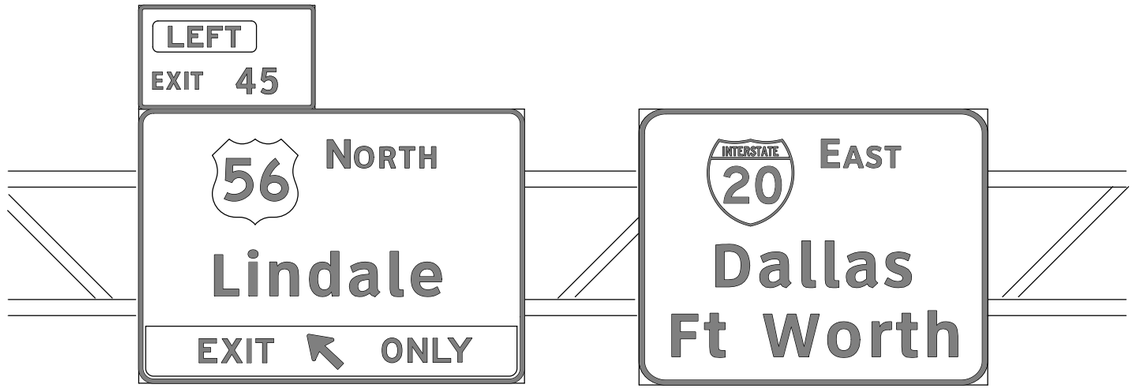
subash.paudel

DATE: 5/23/2022 10:56:31 AM
FILE: c:\pwworking\aecom_ds20_na_2019\subash.paudel@aecom.com\d0119096\tsr1-13.dgn

REQUIREMENTS FOR OVERHEAD AND LARGE GROUND-MOUNTED SIGNS

TYPICAL EXAMPLES



GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign summary sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Black legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod, or F).
   White legend shall use the Clearview Alphabet.
   The following Clearview fonts shall be used to replace the existing white FHWA lettering, 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. 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 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 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 need not be trimmed or rounded if fabricated from an extruded material.
7. Sign substrate for ground-mounted signs shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative. Sign substrate for overhead signs shall be any material that meets DMS-7110. Exit Number Panels attached above the parent sign shall be made with the same substrate and sheeting as the parent sign.
8. Mounting details of attachments to parent sign face are shown on Standard Plan Sheet TSR(5). Mounting details of exit number panels above parent sign are shown in the "SMD series" Standard Plan Sheets.
9. Background sheeting shall be applied to the substrate per sheeting manufacturer's recommendations. Sheeting will not be allowed to bridge the horizontal gap between panels.
10. Cut all legend, symbols, borders, and direct applied sign attachments at panel joints.

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/

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE B OR C SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM

Texas Department of Transportation

Traffic Operations Division Standard

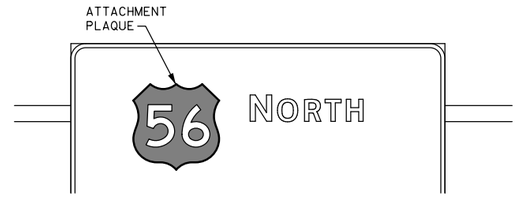
TYPICAL SIGN REQUIREMENTS

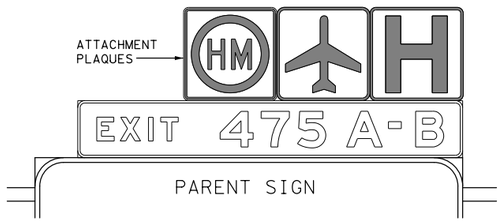
TSR(1)-13

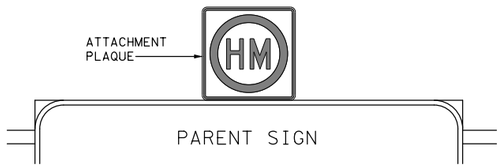
FILE: tsr1-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	03	087	IH 35W
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	FTW	JOHNSON		206

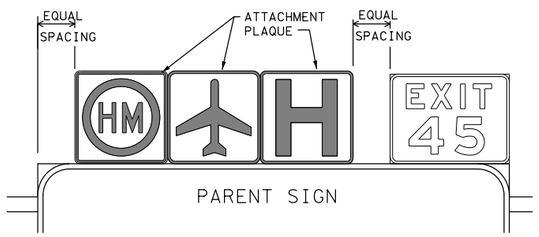
DATE: 5/23/2022 10:56:35 AM
FILE: c:\pwworking\aecom_ds20_na_2019\subash.paudel@aecom.com\d0119096\tsr2-13.dgn

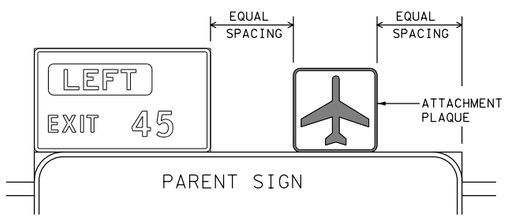
REQUIREMENTS FOR ATTACHMENTS TO OVERHEAD AND LARGE GROUND MOUNTED SIGNS











TYPICAL EXAMPLES

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

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B OR C SHEETING

GENERAL NOTES

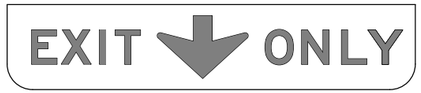
1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Route Marker legends (ie. IH, US, SH and FM shields) shall use the Federal 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 and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to white background sheeting, or combination thereof.
7. Route markers and other attachments within the parent sign face shall be direct applied unless otherwise specified in the plans. Attachments not direct applied shall use 0.063 inch thick one piece sheet aluminum signs (Type A).
8. General Service Plaques shall be 0.080 inch thick and Routing Plaques shall be 0.100 inch thick.
9. The priority for Routing Plaques shall be (left to right) Hazardous Material, Airport then Hospital. See examples for mounting location.
10. Mounting details of attachments to parent signs face are shown on Standard Plan Sheet TSR(5). Mounting details of sign plaque attachments above and below parent sign are shown in the "SMD series" Standard Plan Sheets.
11. Plaques shall be horizontally centered at the top of the parent sign. If an exit number panel exists, the plaque shall be centered between the edge of the parent sign and the edge of the exit number panel. The plaque may be placed above the exit number panel when there is insufficient space.

TYPICAL EXAMPLES

REQUIREMENTS FOR EXIT ONLY AND LEFT EXIT PANELS

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

SHEETING REQUIREMENTS FOR OVERHEAD EXIT PANELS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLUORESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND	BLACK	ACRYLIC NON-REFLECTIVE FILM



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). Individual panel sizes shown in the plans may be adjusted to fit actual parent sign sizes if necessary.
2. Exit Panel legend shall use the Federal Highway Administration (FHWA)Standard Highway Alphabets E Series.
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 shall be applied by screening process or cut-out acrylic non-reflective black film to yellow background sheeting, or combination thereof.
5. Exit Only and Left Exit panels within the parent sign face shall be direct applied unless otherwise specified in the plans. Panels not direct applied shall use 0.063 inch thick one piece sheet aluminum signs (Type A).
6. Mounting details of Exit Only and Left Exit panel attachments to parent signs face are shown on Standard Plan Sheet TSR(5).

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(2)-13

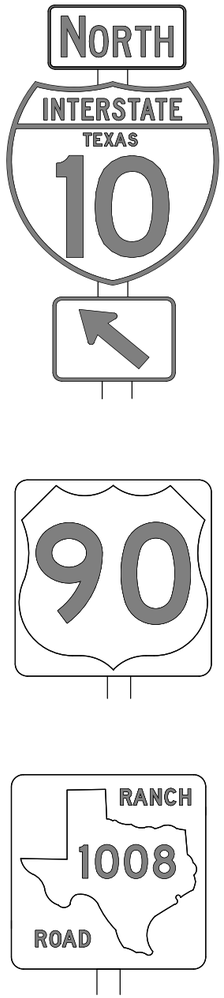
FILE: tsr2-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	03	087	IH 35W
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	FTW	JOHNSON		207

2

DATE: 5/23/2022 10:56:39 AM
FILE: c:\pwworking\aecom_ds20_na_2019\subash.paudel@aecom.com\d0119096\tsr3-13.dgn

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

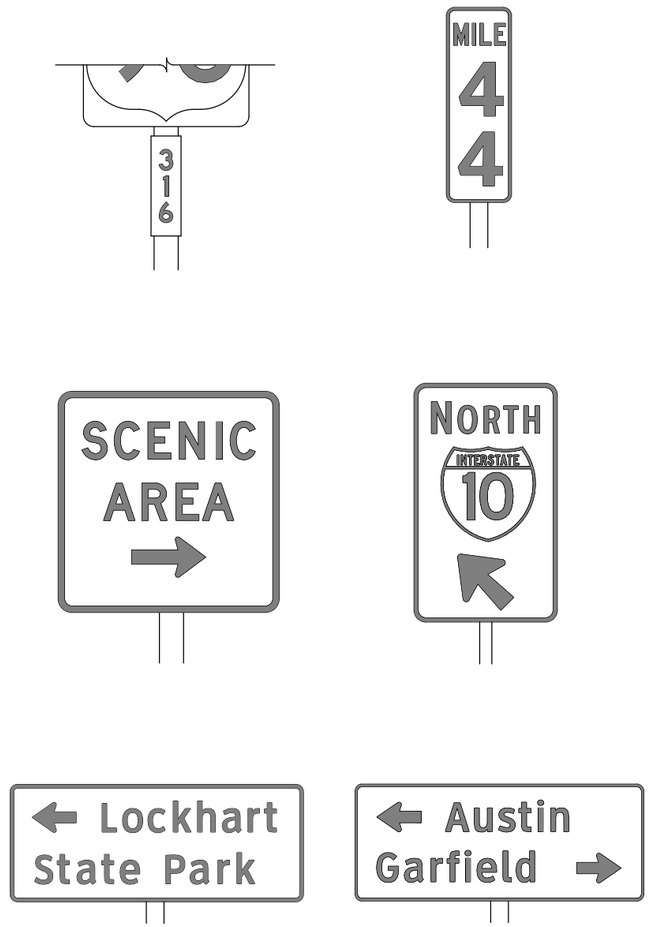
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



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

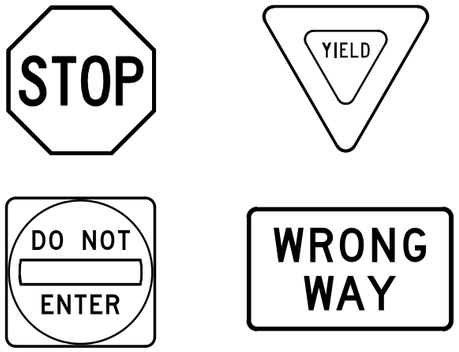
TSR(3)-13

FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	03	087	IH 35W
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	FTW	JOHNSON		208

DATE: 5/23/2022 10:56:43 AM
FILE: c:\pwworking\aecom_ds20_na_2019\subash.paudel@aecom.com\d0119096\tsr4-13.dgn

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

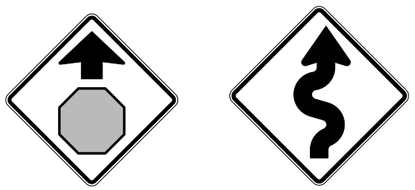
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(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

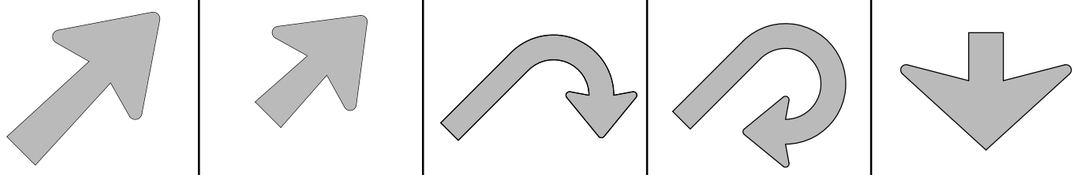
TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-03 7-13 9-08	0014	03	087	IH 35W
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		209

DATE: 5/23/2022 10:56:47 AM
FILE: c:\pwworking\aecom_ds20_na_2019\subash.paudel@aecom.com\d0119096\tsr5-13.dgn

ARROW DETAILS

for Large Ground-Mounted and Overhead Guide Signs



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

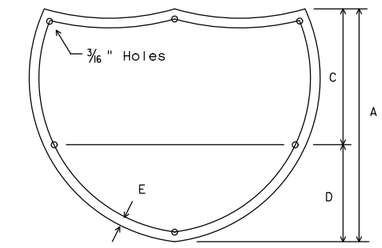
NOTE

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.

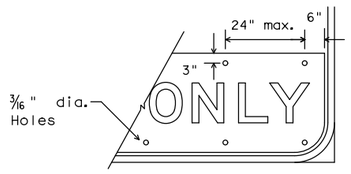
http://www.txdot.gov/

SIGN BLANK PUNCHING DETAILS FOR ATTACHMENTS WHEN SPECIFIED TO BE TYPE A ALUMINUM SIGNS (FOR MOUNTING TO GUIDE SIGN FACE)

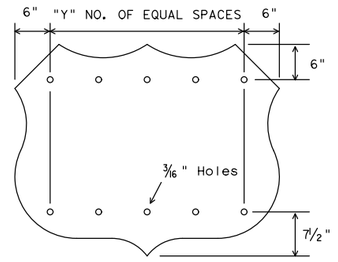


INTERSTATE ROUTE MARKERS

A	C	D	E
36	21	15	1 1/2
48	28	20	1 3/4

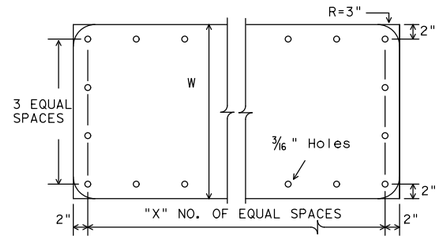


EXIT ONLY PANEL



U.S. ROUTE MARKERS

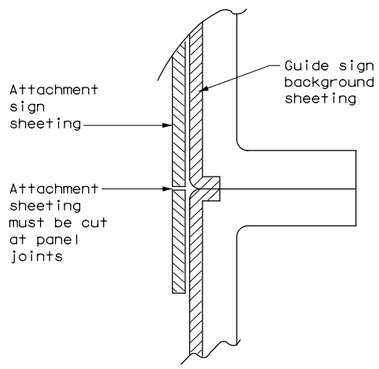
Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



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

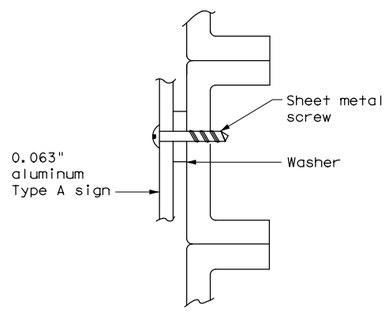
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



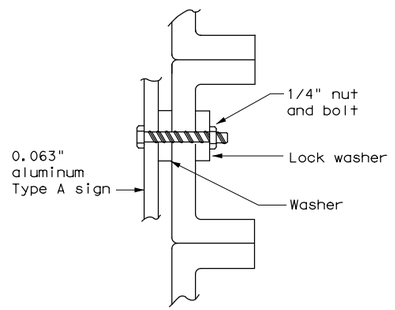
DIRECT APPLIED ATTACHMENT

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".



SCREW ATTACHMENT



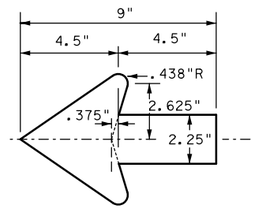
NUT/BOLT ATTACHMENT

NOTE:

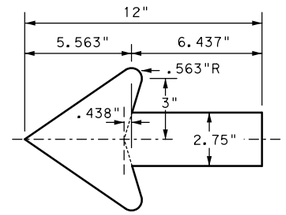
Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

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

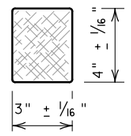
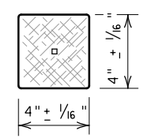
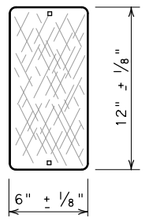
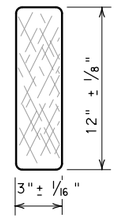
TYPICAL SIGN REQUIREMENTS

TSR(5)-13

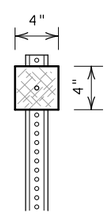
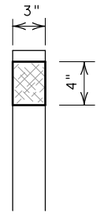
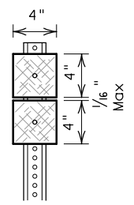
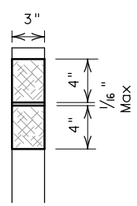
FILE: tsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	03	087	IH 35W
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	FTW	JOHNSON		210

DATE: 5/23/2022 10:56:51 AM
FILE: c:\pwworking\aecom_ds20_na_2019\subash.paudel@aecom.com\d0119096\dom-2010.dgn

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			

DELINEATORS

	SINGLE		DOUBLE	
DEVICE	 1-Size 2 reflector unit	 1-Size 1 reflector unit	 2-Size 2 reflector units	 2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
S = Single
D = Double

COLOR OF REFLECTORS
W = White
Y = Yellow
R = Red

REFLECTOR UNIT SIZE
1 or 2

TYPE OF POST OR DELINEATOR
WC = Wing Channel Post
YFLX = Yellow Flexible Post
WFLX = White Flexible Post
BRF = Barrier Reflector

TYPE OF MOUNT
GND = Embedded (drivable or set in concrete)
CTB = Concrete Barrier Mount
GF1 or GF2 = Guard Fence Attachment
SRF = Surface Mount

DIRECTION
If Required
BI = Bi-Directional
BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
1, 2, 3, or 4

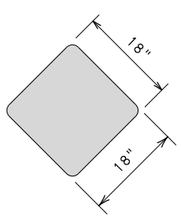
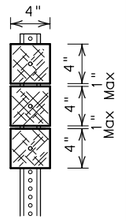
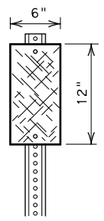
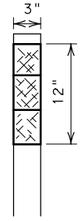
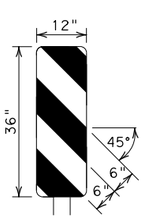
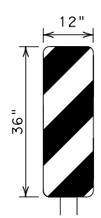
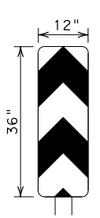
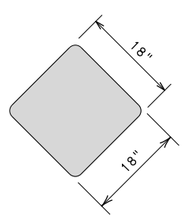
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

TYPE OF POST
WC = Wing Channel Post
WFLX = White Flexible Post
TWT = Thin Walled Tubing

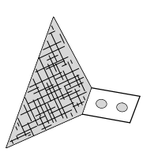
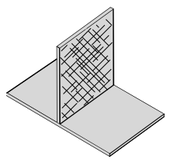
TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

OBJECT MARKERS

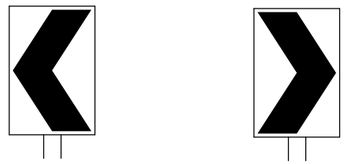
	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE		 3-Size 2 reflector units	 1-Size 3 reflector unit	 3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE			
	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.		
SHEETING	Yellow, White, Red		
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.		

CHEVRONS

DEVICE



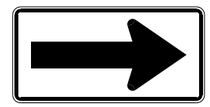
W1-8

SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	

NOTE
1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies).
2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).

ONE DIRECTION LARGE ARROW

DEVICE



W1-6

SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

DEPARTMENTAL MATERIAL SPECIFICATIONS

FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	03	087	IH 35W
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	FTW	JOHNSON		211

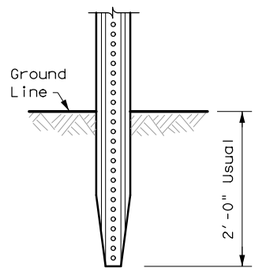
20A

DATE: 5/23/2022 10:56:55 AM
FILE: c:\pwworking\aecom_ds20_na_2019\subash.paudel@aecom.com\d0119096\dom2-20.dgn

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

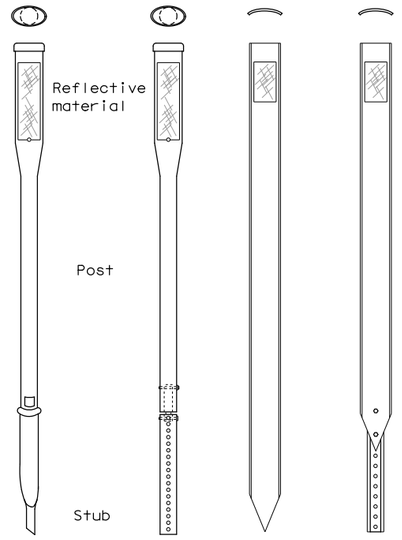


NOTES

1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

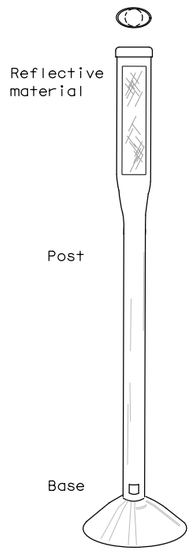
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



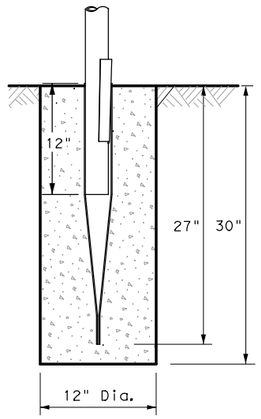
SURFACE MOUNT

NOTES

1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

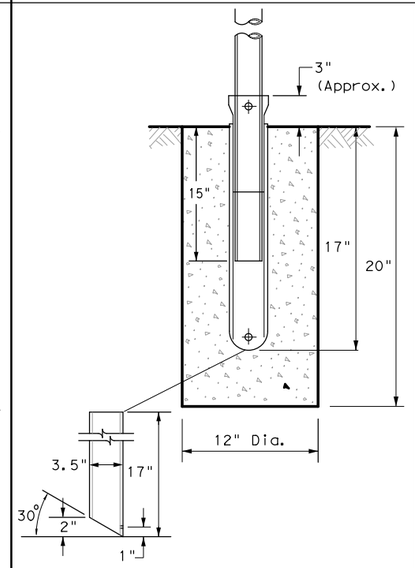
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

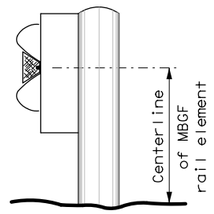
NOTE

1. Install per manufacturer's recommendations.

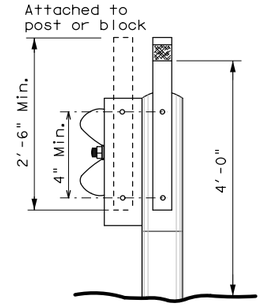
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

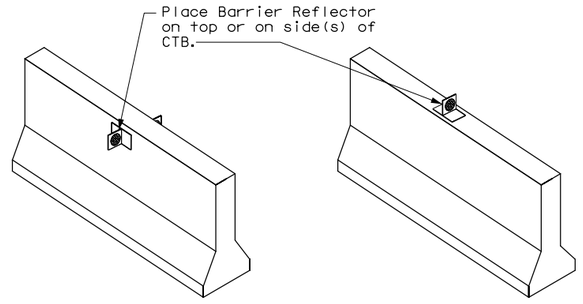
GF1



GF2



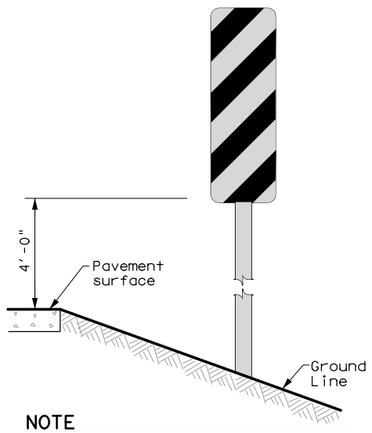
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

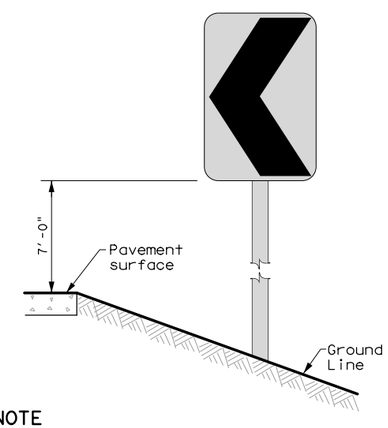
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

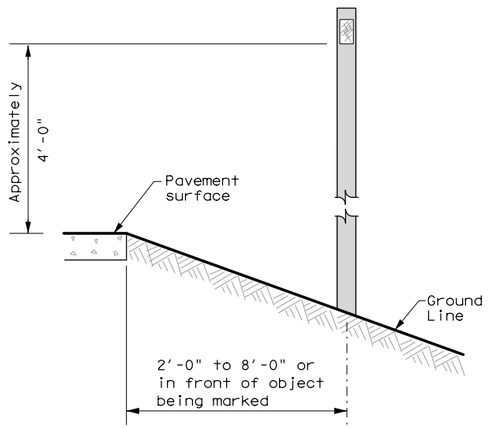
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	03	087	IH 35W
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	FTW	JOHNSON		212

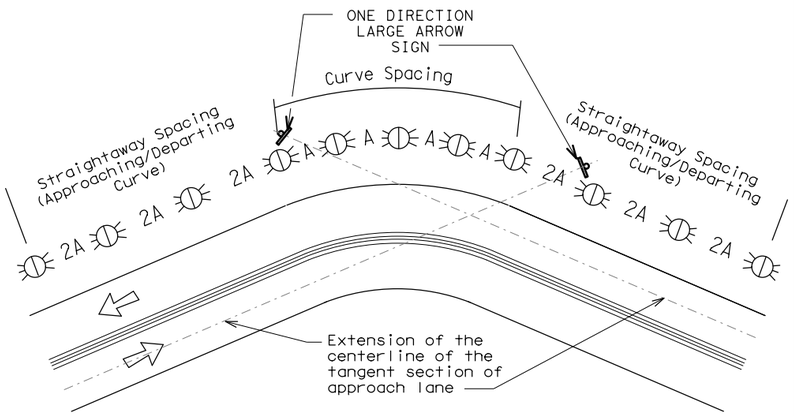
20B

DATE: 5/23/2022 10:57:00 AM
FILE: c:\pwworking\aecom_ds20_na_2019\subash.paudel@aecom.com\d0119096\dom3-2019.dgn

MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

Amount by which Advisory Speed is less than Posted Speed	Curve Advisory Speed	
	Turn (30 MPH or less)	Curve (35 MPH or more)
5 MPH & 10 MPH	• RPMs	• RPMs
15 MPH & 20 MPH	• RPMs and One Direction Large Arrow sign	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons.
25 MPH & more	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons	• RPMs and Chevrons

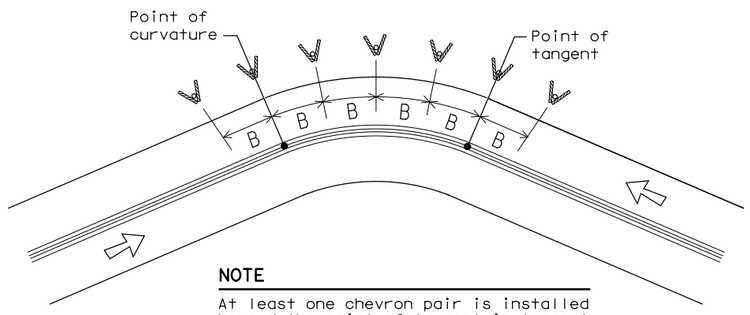
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

ONE DIRECTION LARGE ARROW (W1-6) sign should be located at approximately and perpendicular to the extension of the centerline of the tangent section of approach lane.

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

At least one chevron pair is installed beyond the point of tangent in tangent section.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

Degree of Curve	FEET			
	Radius of Curve	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
		A	2A	B
1	5730	225	450	——
2	2865	160	320	——
3	1910	130	260	200
4	1433	110	220	160
5	1146	100	200	160
6	955	90	180	160
7	819	85	170	160
8	716	75	150	160
9	637	75	150	120
10	573	70	140	120
11	521	65	130	120
12	478	60	120	120
13	441	60	120	120
14	409	55	110	80
15	382	55	110	80
16	358	55	110	80
19	302	50	100	80
23	249	40	80	80
29	198	35	70	40
38	151	30	60	40
57	101	20	40	40

Curve delineator approach and departure spacing should include 3 delineators spaced at 2A. This spacing should be used during design preparation or when the degree of curve is known.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

If the degree of curve is not known, delineator spacing may be determined based on the Advisory Speed of the curve. Use the delineator curve spacing for each Advisory Speed (MPH).

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

CONDITION	REQUIRED TREATMENT	MINIMUM SPACING
Frwy./Exp. Tangent	RPMs	See PM-series and FPM-series standard sheets
Frwy./Exp. Curve	Single delineators on right side	See delineator spacing table
Frwy/Exp.Ramp	Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 3 on D&OM(4))	100 feet on ramp tangents Use delineator spacing table for ramp curves ("straightway spacing" does not apply to ramp curves)
Acceleration/Deceleration Lane	Double delineators (see Detail 3 on D&OM(4))	100 feet (See Detail 3 on D & OM (4))
Truck Escape Ramp	Single red delineators on both sides	50 feet
Bridge Rail (steel or concrete)and Metal Beam Guard Fence	Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction	Equal spacing (100'max) but not less than 3 delineators
Concrete Traffic Barrier (CTB) or Steel Traffic Barrier	Barrier reflectors matching the color of the edge line	Equal spacing 100' max
Cable Barrier	Reflectors matching the color of the edge line	Every 5th cable barrier post (up to 100'max)
Guard Rail Terminus/Impact Head	Divided highway - Object marker on approach end Undivided 2-lane highways - Object marker on approach and departure end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5) and D & OM (6)
Bridges with no Approach Rail	Type 3 Object Marker (OM-3) at end of rail and 3 single delineators approaching rail	See D & OM(5)
Reduced Width Approaches to Bridge Rail	Type 2 and Type 3 Object Markers (OM-3) and 3 single delineators approaching bridge	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5)
Culverts without MBGF	Type 2 Object Markers	See Detail 2 on D & OM(4)
Crossovers	Double yellow delineators and RPMs	See Detail 1 on D & OM (4)
Pavement Narrowing (lane merge) on Freeways/Expressway	Single delineators adjacent to affected lane for full length of transition	100 feet

NOTES

1. Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
2. Barrier reflectors may be used to replace required delineators.
3. Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND	
	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	03	087	IH 35W
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	FTW	JOHNSON		213

20C

DATE: 5/23/2022 10:57:04 AM
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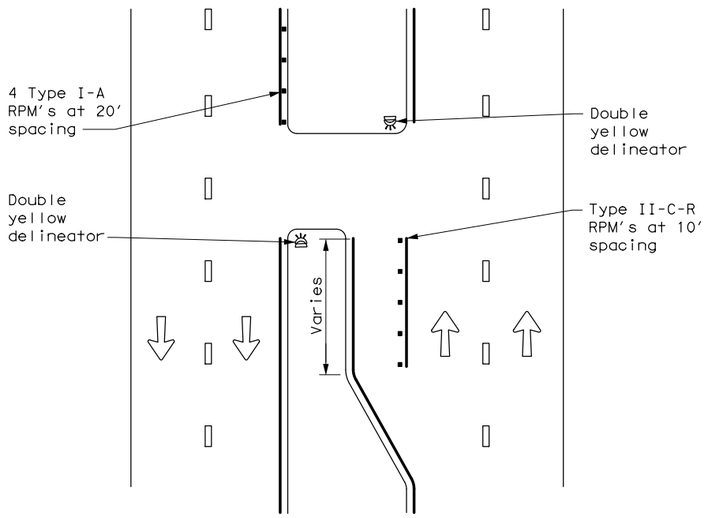
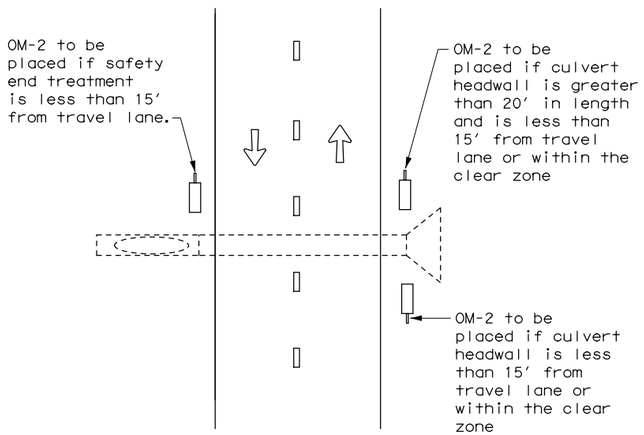
CROSSOVERS



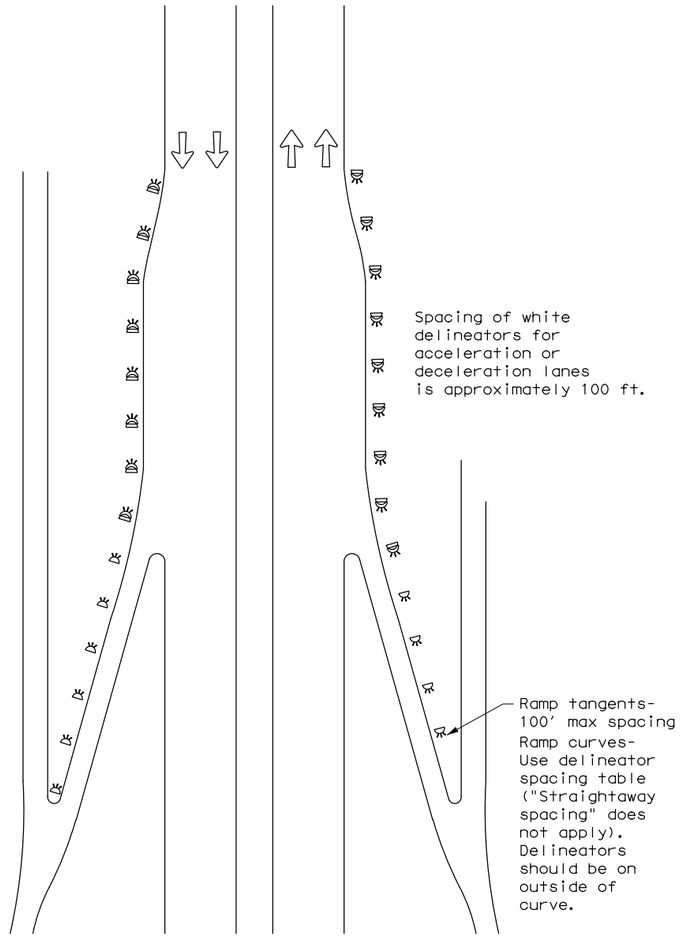
DETAIL 1

FOR CULVERTS WITHOUT MBGF



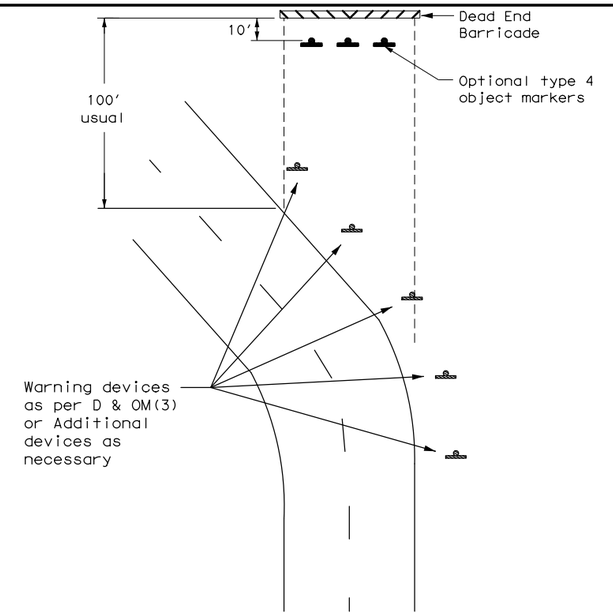
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



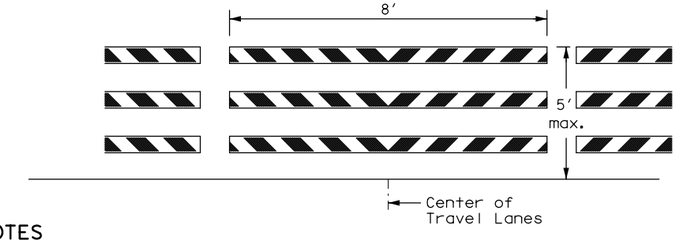
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

DETAIL 5

LEGEND	
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator

Texas Department of Transportation

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DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4)-20

FILE: dom4-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	03	087	IH 35W
3-15	DIST	COUNTY		SHEET NO.
7-20	FTW	JOHNSON		214

20D

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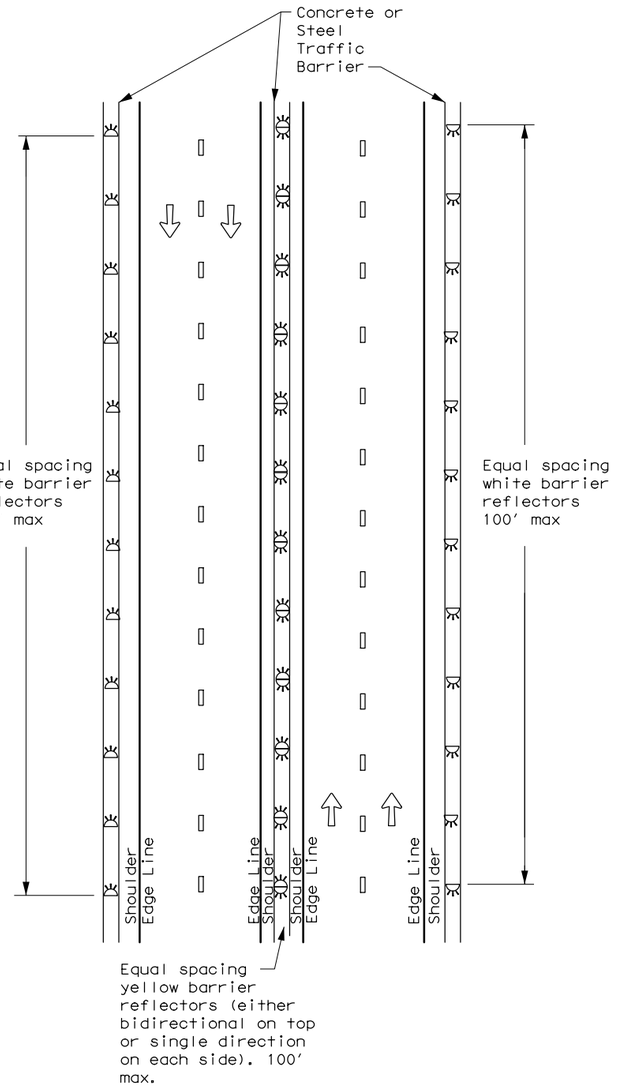
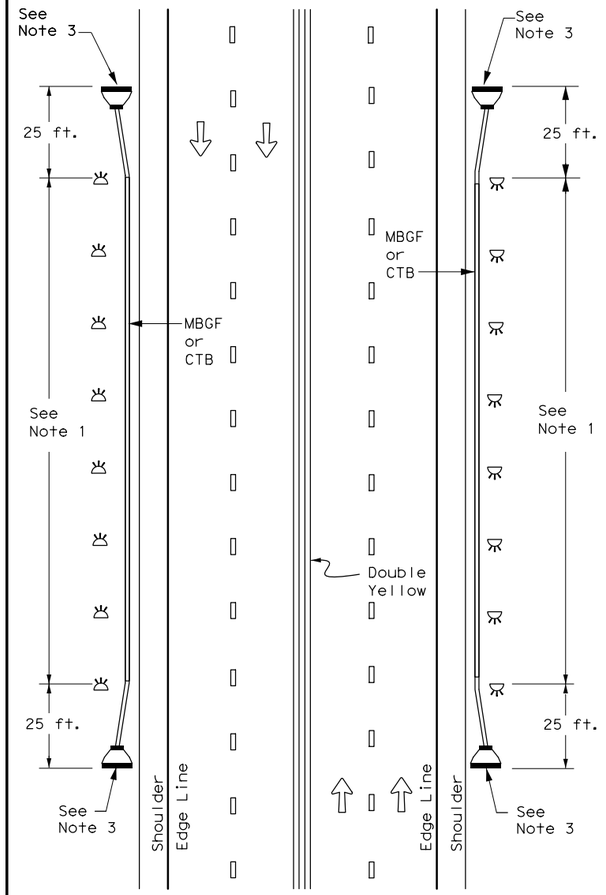
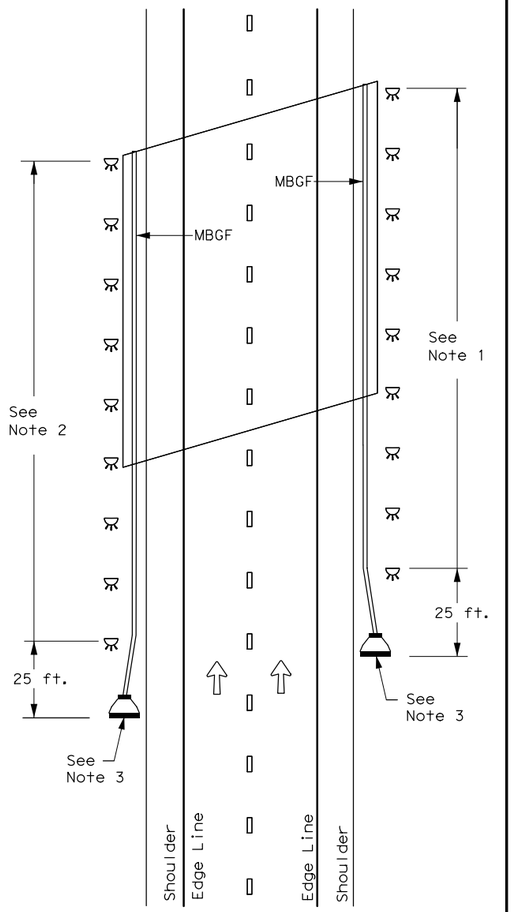
CONTINUOUS CONCRETE OR STEEL BARRIER



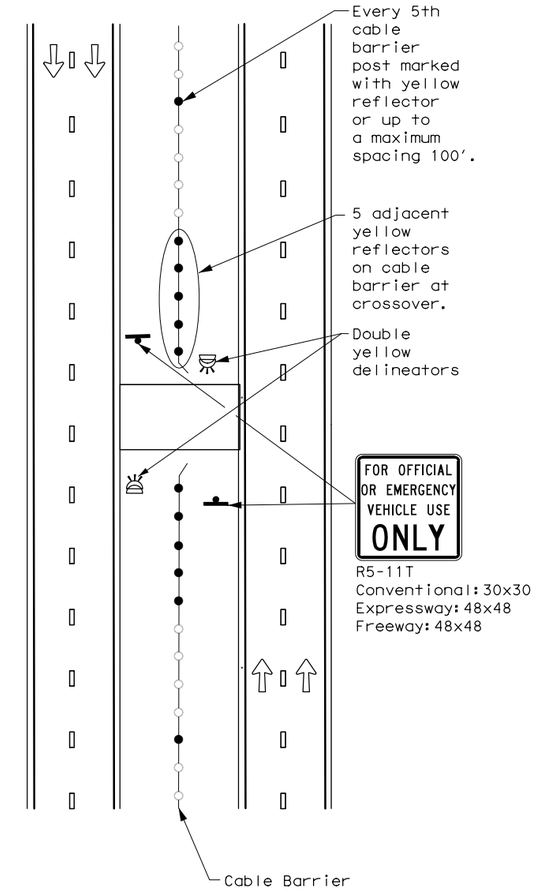
MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



DIVIDED ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



EMERGENCY CROSSOVER



NOTES

1. Equal spacing (100′ max), but not less than 3 single directional white barrier reflectors or delineators. On Continuos Barrier, equal spacing (100′ max.)
2. Equal spacing (100′ max), but not less than 3 single directional yellow barrier reflectors or delineators.
3. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3)in front of the terminal end.

LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(6)-20

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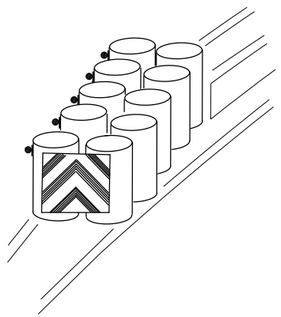
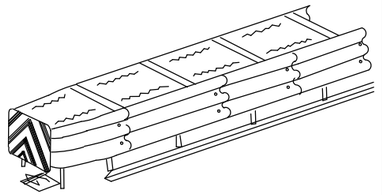
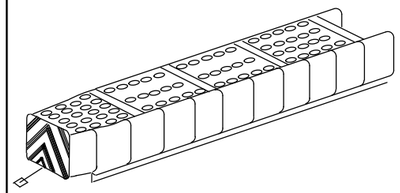
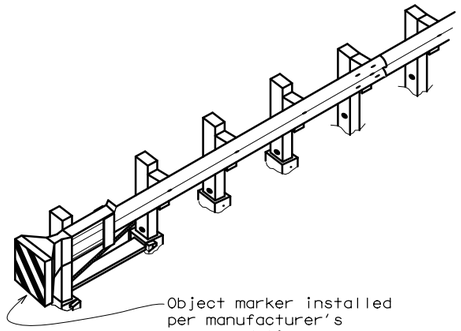
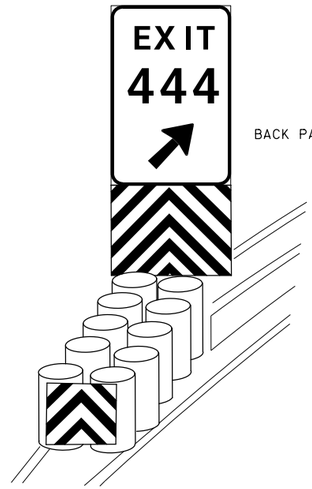
	FTW	JOHNSON		215



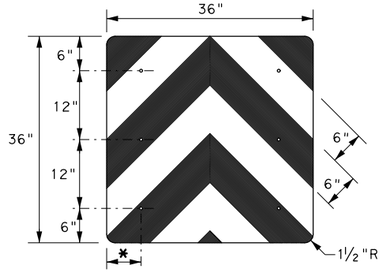


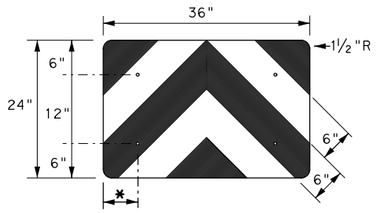




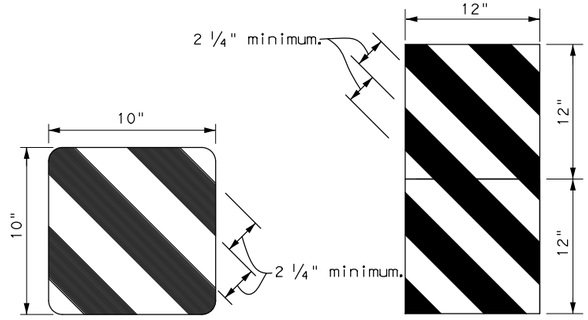


BACK PANEL (OPTIONAL)

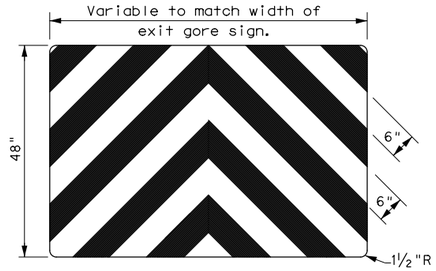


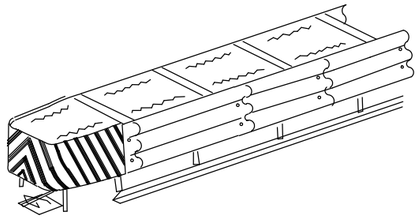


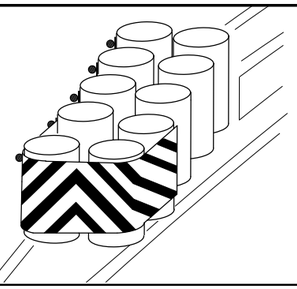
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

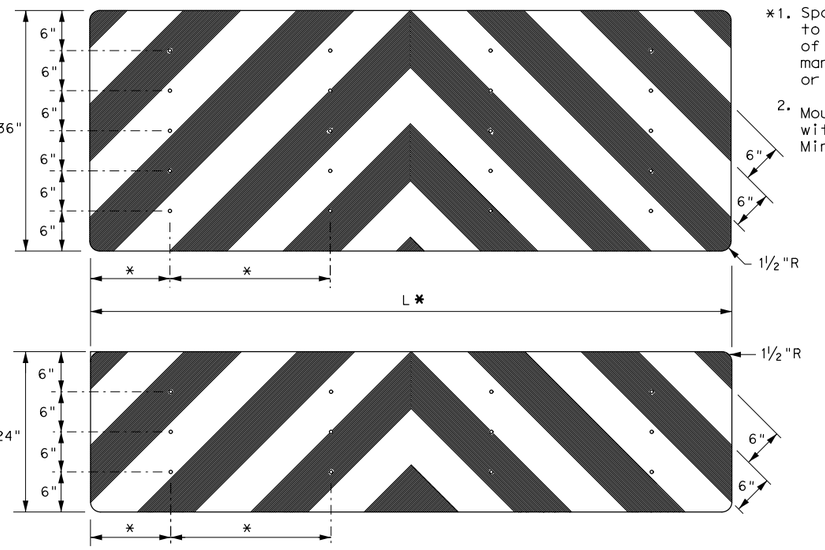


OBJECT MARKERS SMALLER THAN 3 FT^2









NOTES

*1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturers recommendation, or as directed by the Engineer.

2. Mounting should be flush with top of attenuator. Minimum size 96" x 24".

NOTES

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.

2. Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.

3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 ¼".

4. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.

5. Object Marker at nose of attenuator is subsidiary to the attenuator.

6. See D & OM (1-4) for required barrier reflectors.

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DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-20

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©TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
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4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	FTW	JOHNSON		216
4-98 7-20				
20G				

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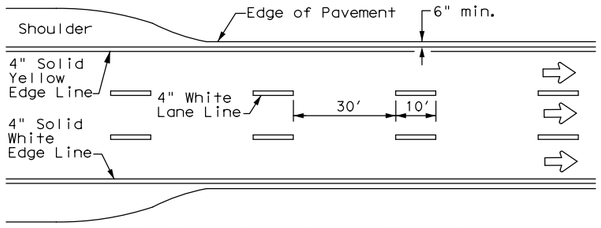
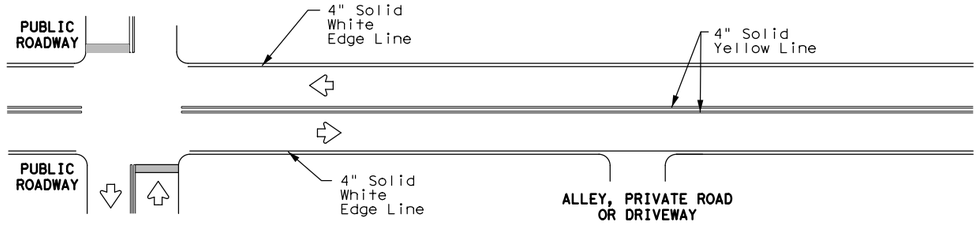
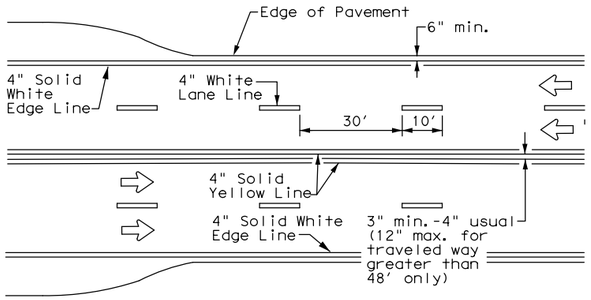


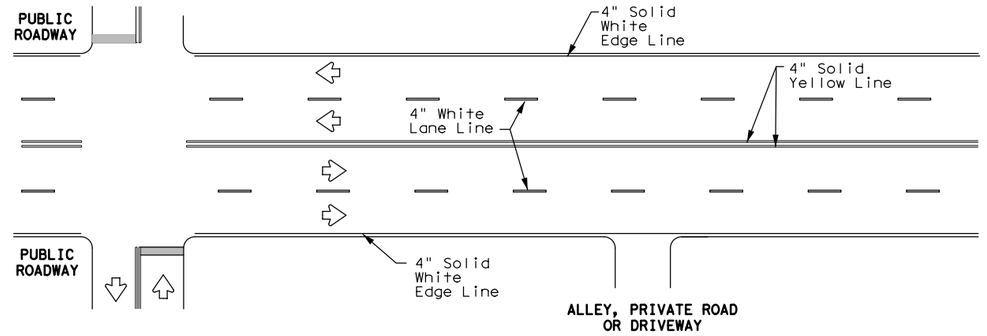
EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



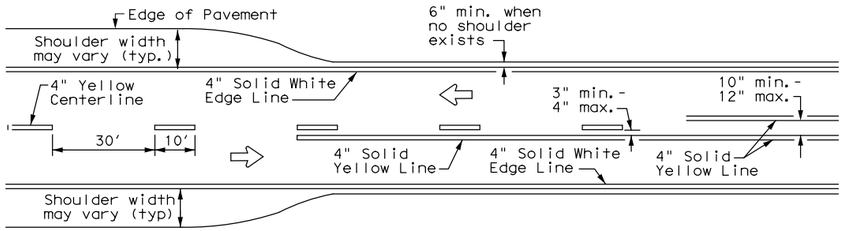
TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



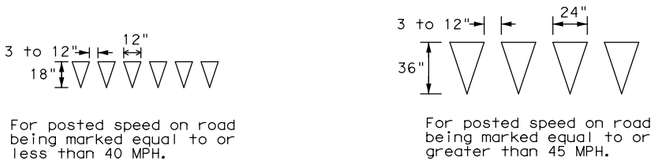
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



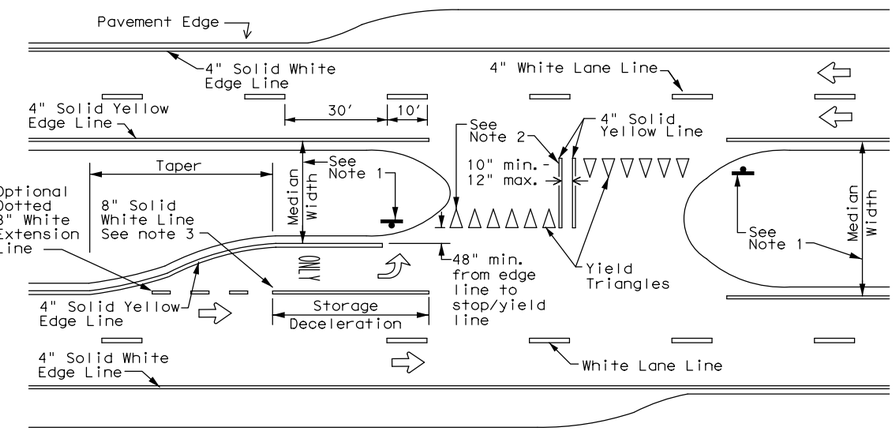
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



YIELD LINES



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 are optional as determined by the Engineer.

2. Install median striping (double yellow centerlines and stop bars/yield triangles) when a 50' or greater median centerline can be placed. Stop bars shall only be used with stop signs. Yield traingles 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.

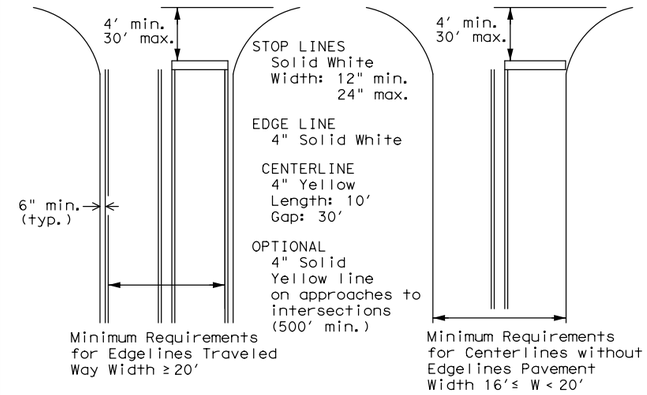
GENERAL NOTES

1. Edgeline striping shall be as shown in the plans or as directed by the Engineer. The edgeline should not be placed less less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edgelines 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 inside of edgeline to the inside of edgeline 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.



GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Highways

Texas Department of Transportation

Traffic Safety Division Standard

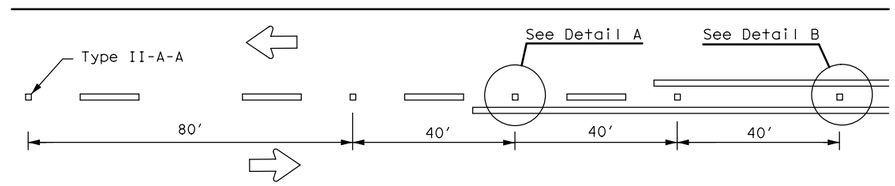
TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-20

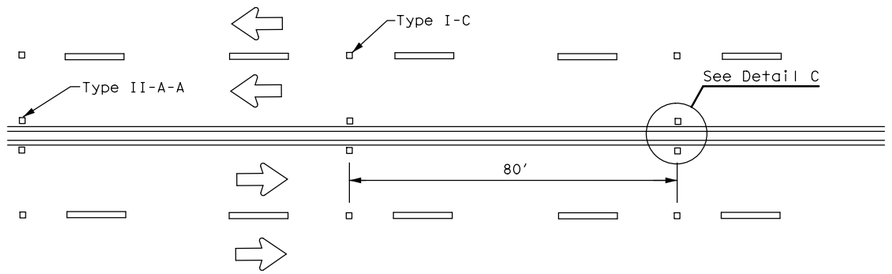
FILE: pm1-20.dgn	DN:	CK:	DW:	CK:
© TxDOT November 1978	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0014	03	087	IH 35W
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	FTW	JOHNSON		217

22B

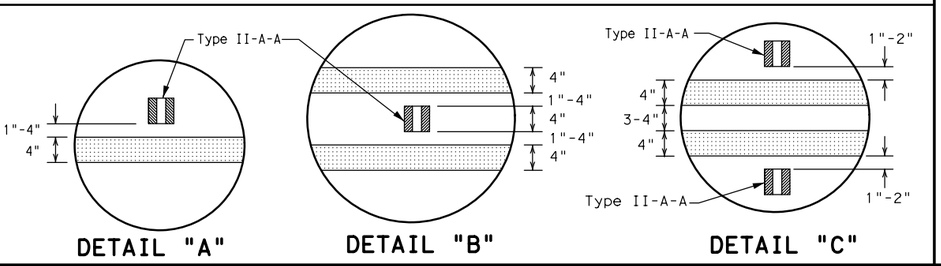
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



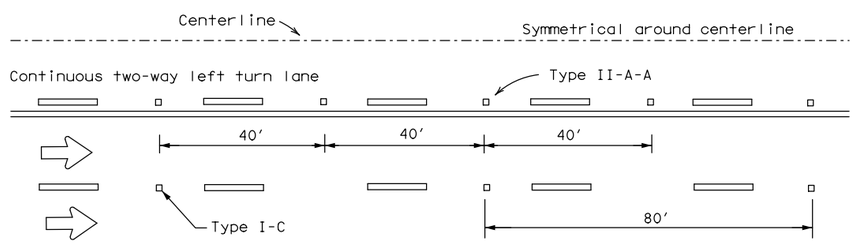
CENTERLINE FOR ALL TWO LANE ROADWAYS



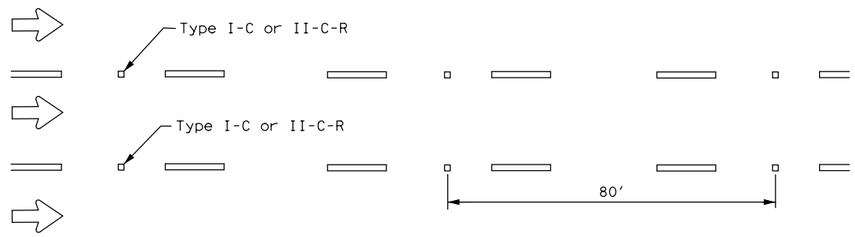
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS



DETAIL "A" **DETAIL "B"** **DETAIL "C"**

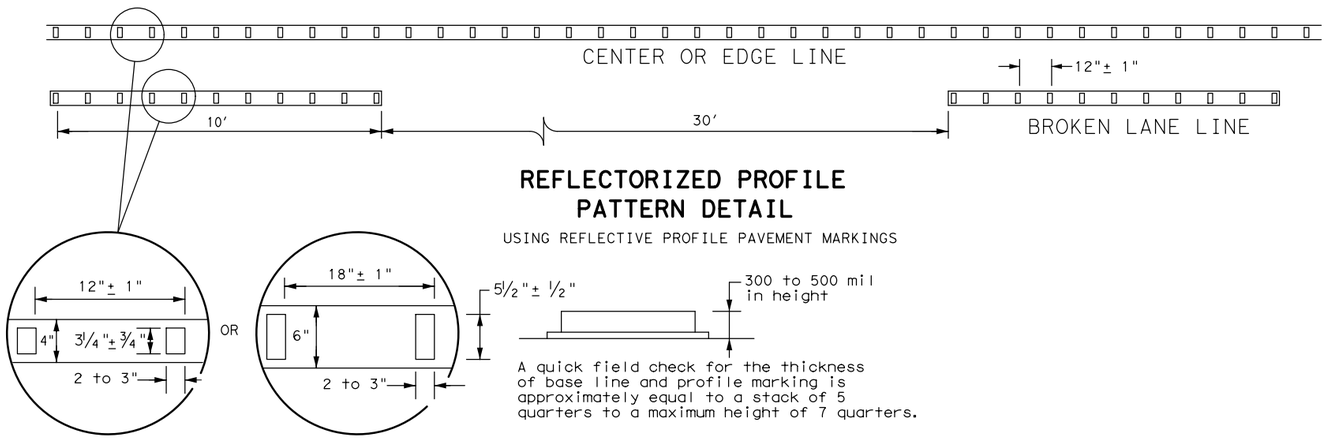


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



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.



REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

4" EDGE LINE, CENTER LINE OR LANE LINE

OPTIONAL 6" EDGE LINE, CENTER LINE OR LANE LINE

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.

NOTE

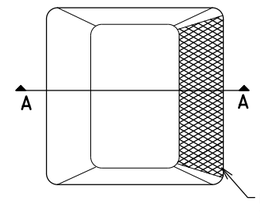
Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

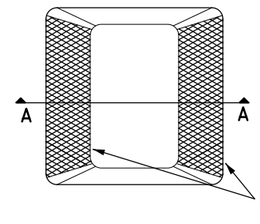
1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

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

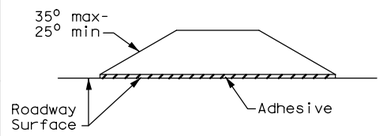
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



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 RELECTORIZED PROFILE MARKINGS PM(2)-20

FILE: pm2-20.dgn	DN:	CK:	DW:	CK:
© TxDOT April 1977	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-92 2-10 5-00 2-12 8-00 6-20	0014	03	087	IH 35W
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		218

22B

DATE: 5/23/2022 10:57:21 AM
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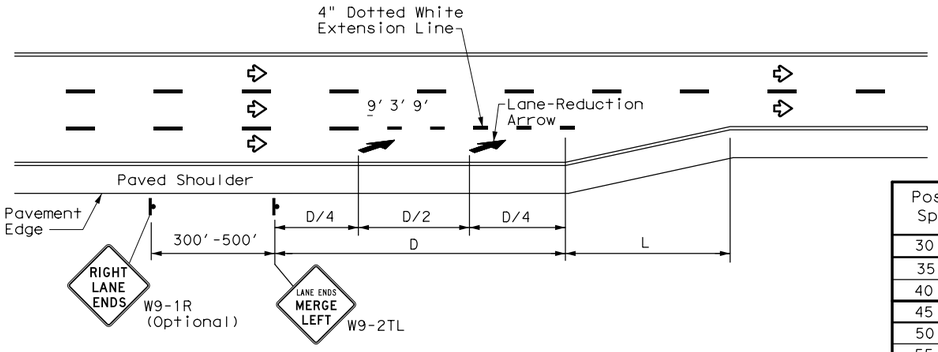
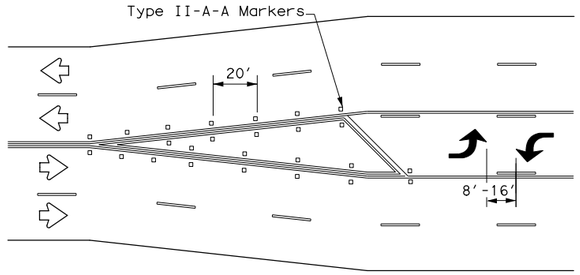


LANE REDUCTION

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	

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 W9-1R "RIGHT LANE ENDS" 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.



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.

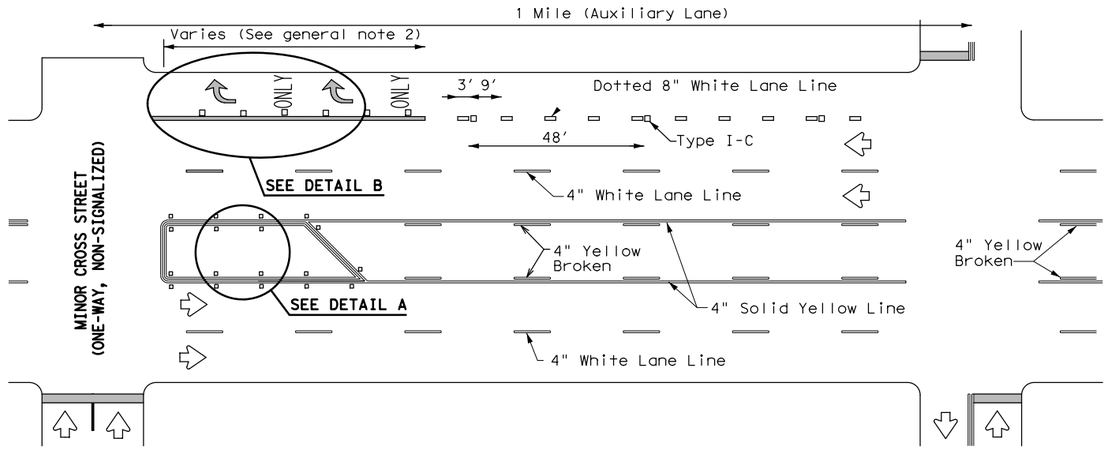
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

GENERAL NOTES

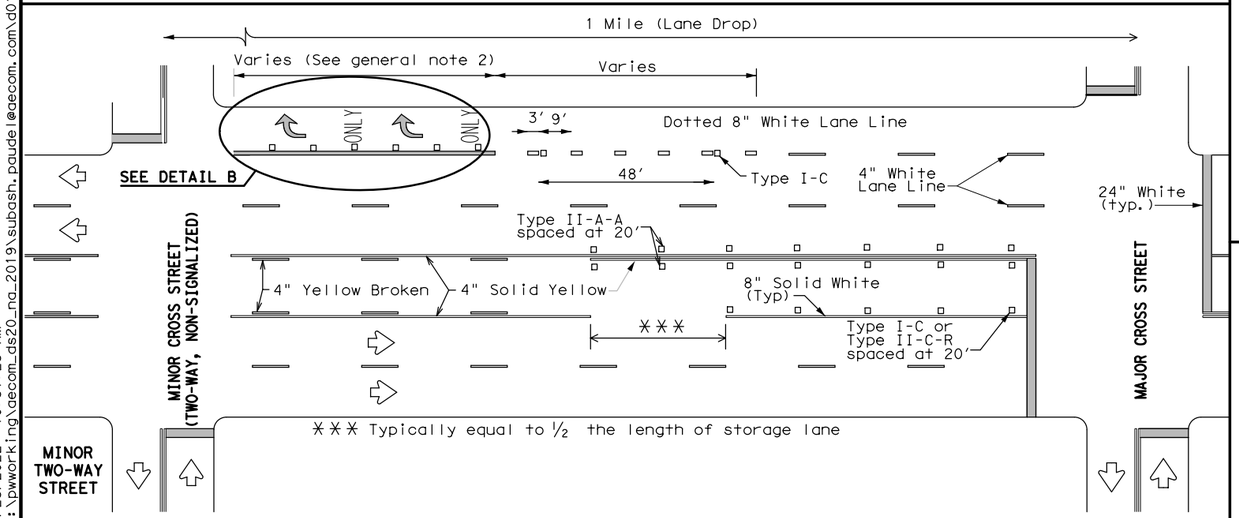
1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn 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.

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

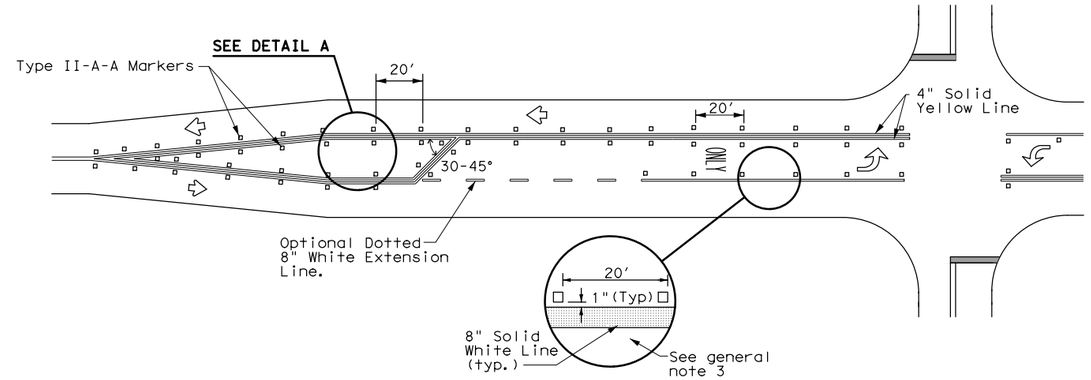
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



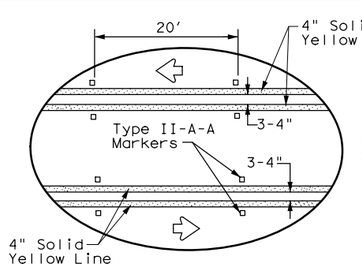
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



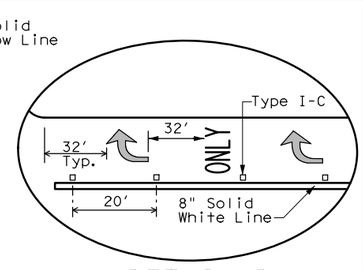
TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP



TYPICAL TWO-LANE HIGHWAY INTERSECTION WITH LEFT TURN BAYS



DETAIL A



DETAIL B

Texas Department of Transportation

Traffic Safety Division Standard

TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS PM(3)-20

FILE: pm3-20.dgn	DN:	CK:	DW:	CK:
©TxDOT April 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	03	087	IH 35W
5-00 2-10	DIST	COUNTY		SHEET NO.
8-00 2-12	FTW	JOHNSON		219
3-03 6-20				

22D

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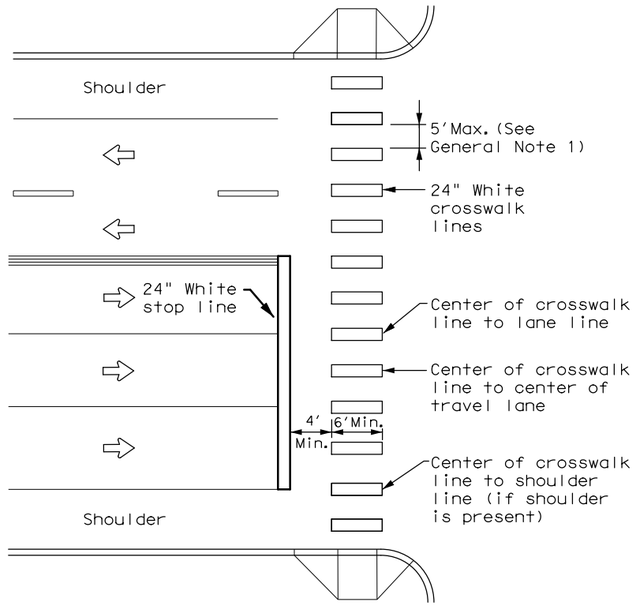


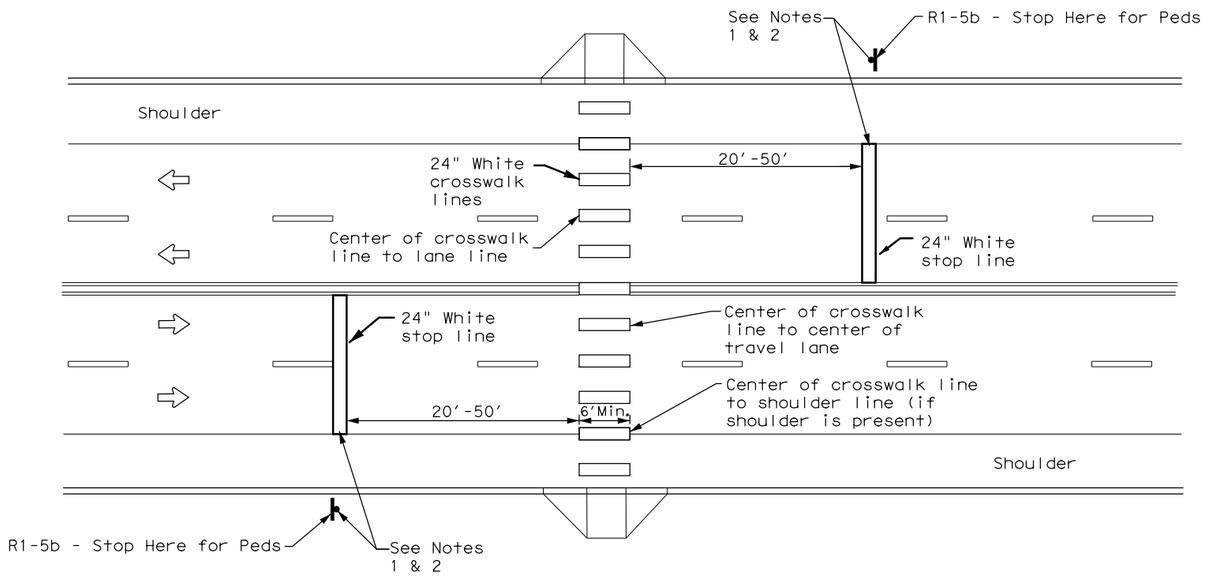
HIGH-VISIBILITY LONGITUDINAL CROSSWALK AT CONTROLLED APPROACH

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 MID BLOCK HIGH-VISIBILITY LONGITUDINAL CROSSWALK

NOTES:

1. Use stop bars with "Stop Here for Pedestrians" signs at unsignalized mid block cross walks.
2. Use stop bars with "Stop Here on Red" 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)-22

FILE: pm4-22.dgn	DN:	CK:	DW:	CK:
© TxDOT June 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 3-22	0014	03	087	IH 35W
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		220

22D

DATE: 5/23/2022 10:57:33 AM
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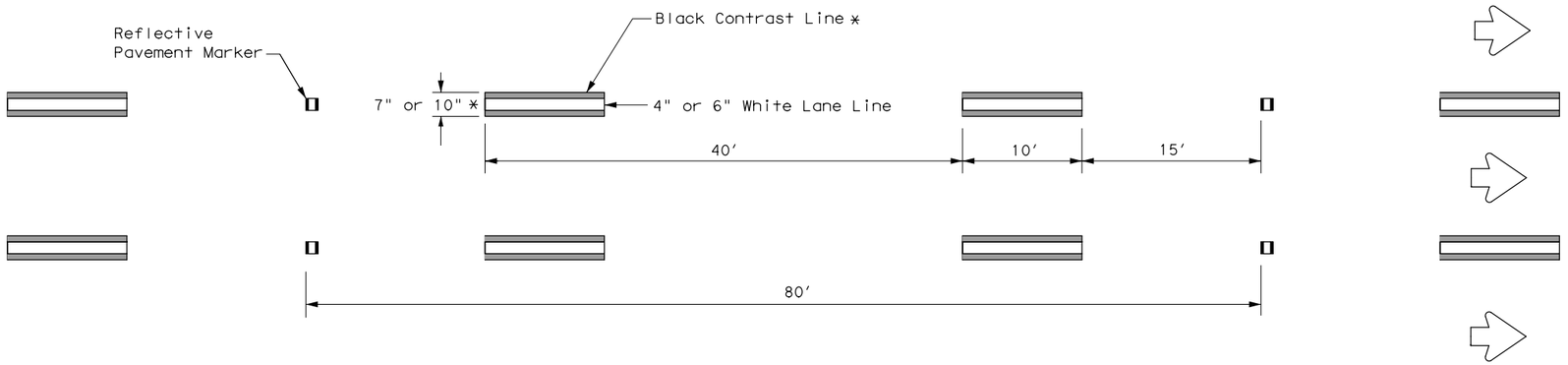
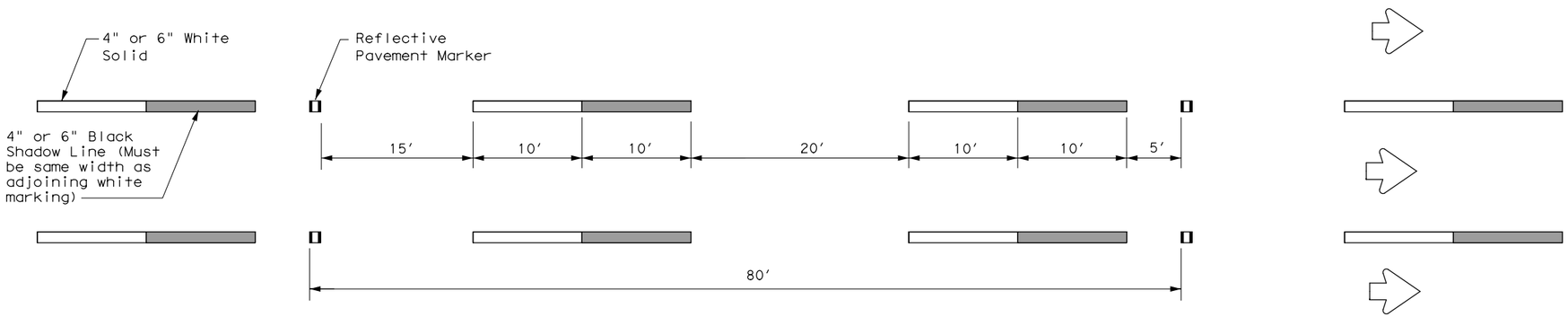


CONTRAST LANE LINE DESIGN

* See contrast line dimensions table for width of black line.

CONTRAST LINE DIMENSIONS		
White	Black (per side)	Total Width
4"	1.5"	7"
6"	2"	10"



SHADOW LANE LINE DESIGN

GENERAL NOTES

1. Contrast and Shadow markings may only be used on concrete pavements.
2. Contrast and Shadow markings shall not be used on edge lines.
3. Contrast lane lines shall be permanent prefabricated pavement markings meeting DMS 8240.
4. Shadow lane line designs shall be a liquid markings system approved by TxDOT.
5. All raised reflective pavement markers placed in broken lines shall be placed in line with and midway between the white stripes.
6. See PM(2) for raised reflective pavement markings installation details.

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.

Texas Department of Transportation

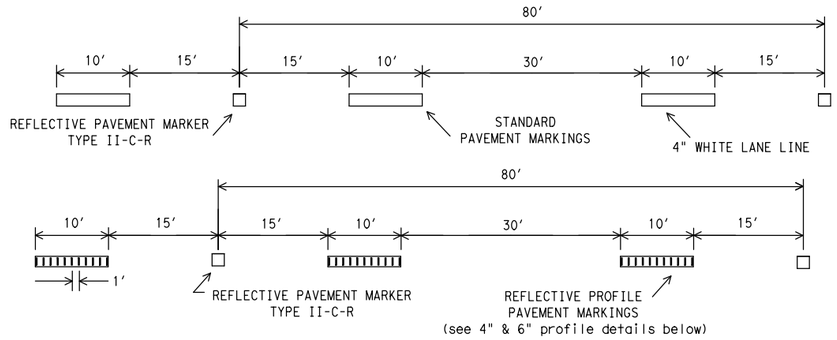
Traffic Operations Division Standard

CONTRAST AND SHADOW PAVEMENT MARKINGS

CPM(1)-14

FILE: CPM(1)14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	03	087	IH 35W
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		221

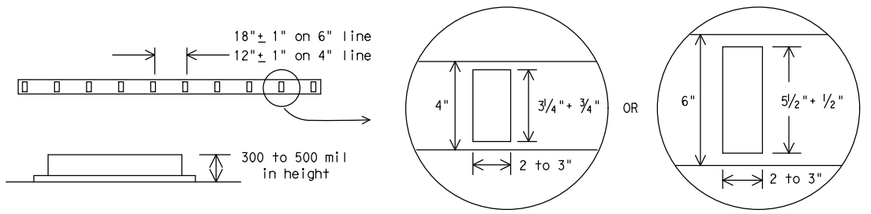
22N



PAVEMENT MARKERS (REFL) TYPE II-C-R SHALL BE SPACED ON 80' CENTERS WITH THE CLEAR FACE TOWARD NORMAL TRAFFIC AND THE RED FACE TOWARD WRONG WAY TRAFFIC.

TRAFFIC LANE LINES PAVEMENT MARKING DETAILS

EDGELINES SHOULD TYPICALLY BE 4" WIDE AND THE MATERIALS SHALL BE AS SPECIFIED IN THE PLANS.
IF RAISED PROFILE PAVEMENT MARKINGS ARE USED SEE DETAILS BELOW.

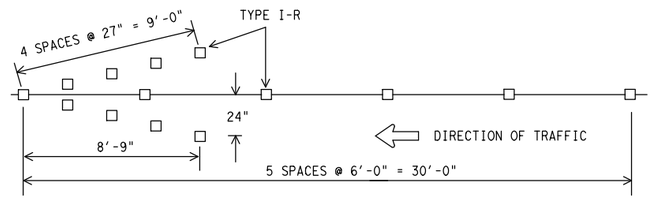


REFLECTIVE PROFILE PAVEMENT MARKINGS

STANDARD 4" PROFILE DETAIL

OPTIONAL 6" PROFILE DETAIL

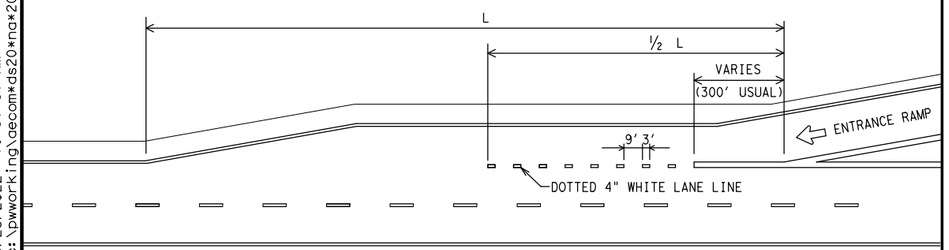
EDGELINE PAVEMENT MARKINGS



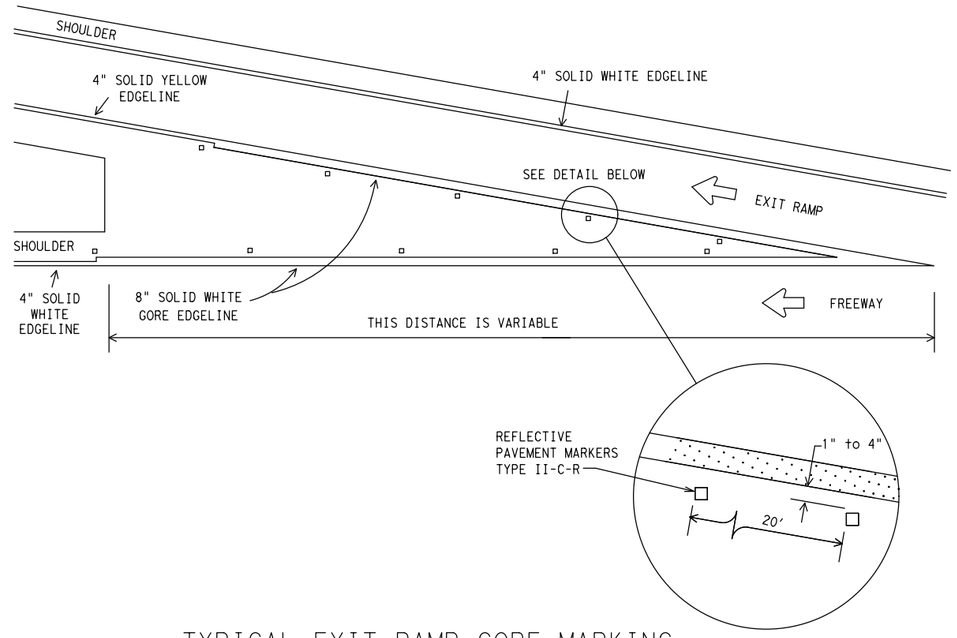
ALL RAISED MARKERS IN THE WRONG WAY ARROW SHALL BE TYPE I-R REFLECTORIZED PAVEMENT MARKERS WITH THE REFLECTORIZED SURFACE FACING THE WRONG WAY TRAFFIC. TYPE II-C-R SHALL NOT BE USED.

REFLECTORIZED WRONG WAY ARROWS, NOT TO EXCEED TWO, MAY BE PLACED ON EXIT RAMPS.
LOCATION OF THE ARROWS SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER.

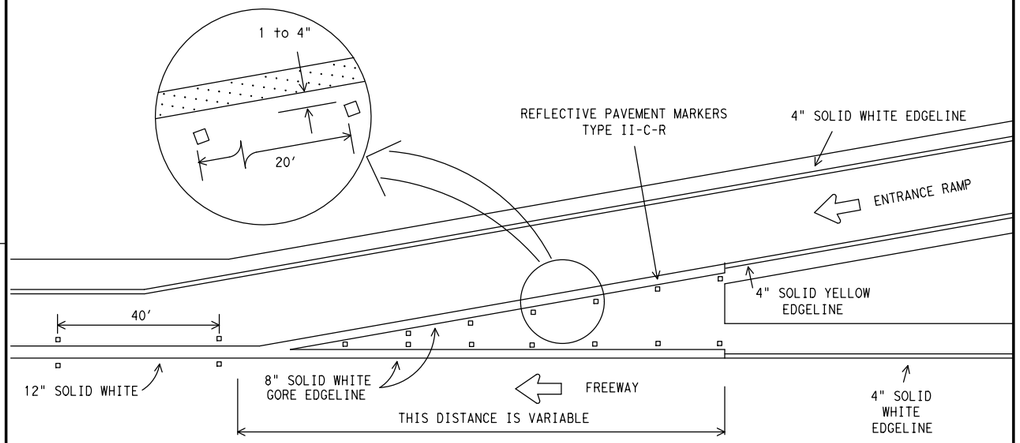
WRONG WAY ARROW DETAIL



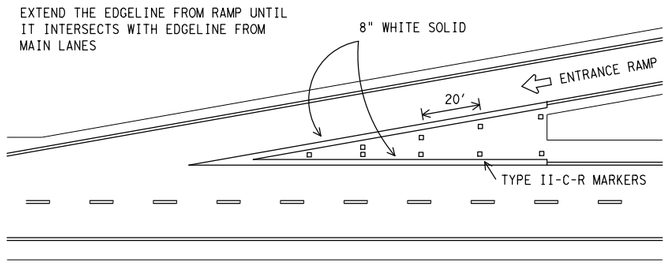
PARALLEL ACCELERATION LANE



TYPICAL EXIT RAMP GORE MARKING



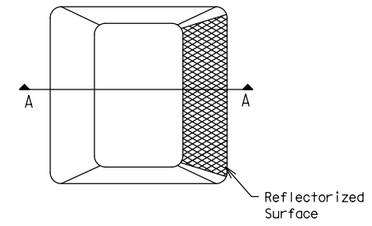
TYPICAL ENTRANCE RAMP GORE MARKING



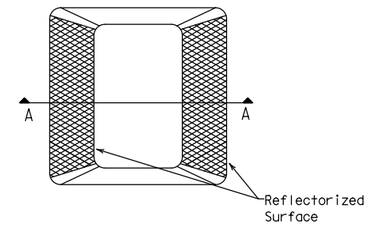
TAPERED ACCELERATION LANE

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)



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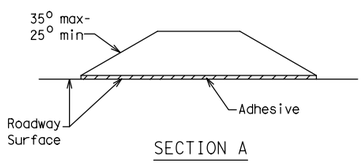

SECTION A

RAISED PAVEMENT MARKERS

Texas Department of Transportation
Traffic Operations Division

TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS WITH RAISED PAVEMENT MARKERS

FPM(1)-12

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS
4-92 2-10
5-00 2-12
8-00
2-08

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		222

23A

DATE: 5/23/2022 10:57:37 AM
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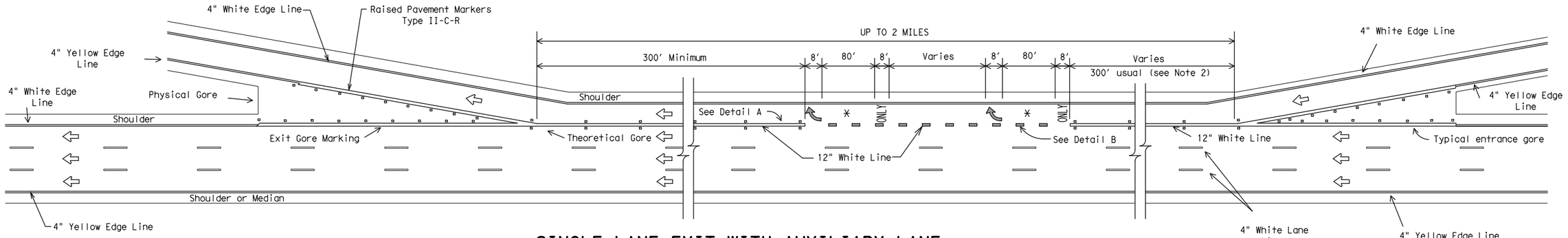
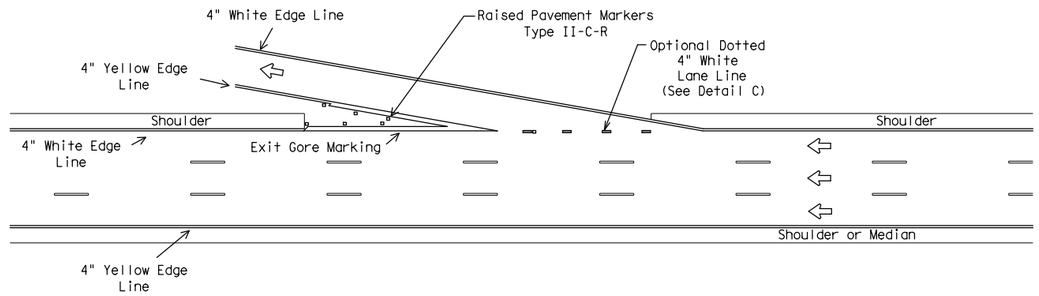
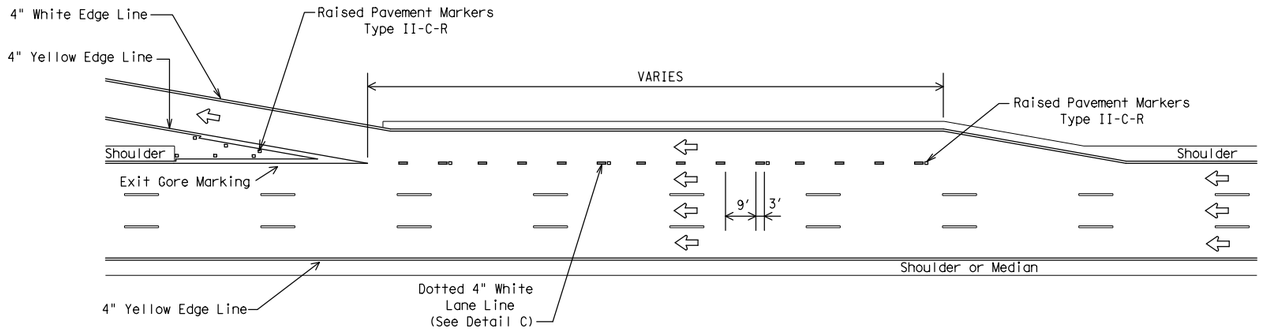


SINGLE LANE EXIT WITH AUXILIARY LANE

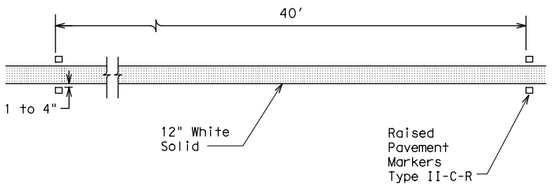
(See Note 2)



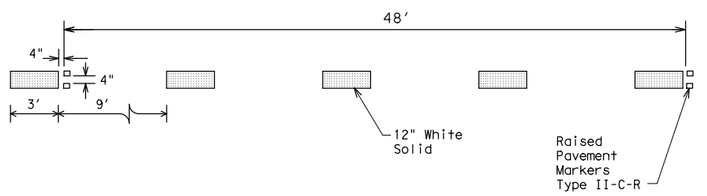
TAPERED DECELERATION LANE



PARALLEL DECELERATION LANE

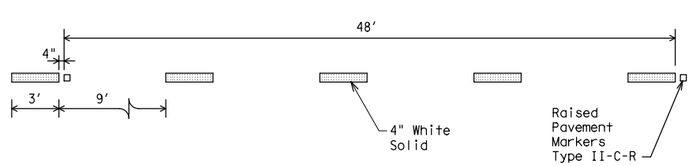


DETAIL A



DETAIL B

Wide (12") Dotted Lane Line (See Note 3)



DETAIL C

Normal (4") Dotted Lane Line (See Note 4)

GENERAL NOTES

1. Pavement markings shall be white except as otherwise noted.
2. Length of 12" white line may vary depending on location.
3. Wide (12") Dotted Lane Line (See Detail B) is used to separate a through lane from a lane drop at normal exit ramp and from an auxiliary lane between an entrance and exit ramp.
4. Normal (4") Dotted Lane Line (See Detail C) is used at parallel acceleration and deceleration lanes.

LEGEND	
⇦	Denotes direction of traffic.
⬏	Pavement marking arrows (white)
✳	Arrow markings are optional, however "ONLY" is required if arrow is used

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.

Texas Department of Transportation
Traffic Operations Division

TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS ENTRANCE AND EXIT RAMPS

FPM(2)-12

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

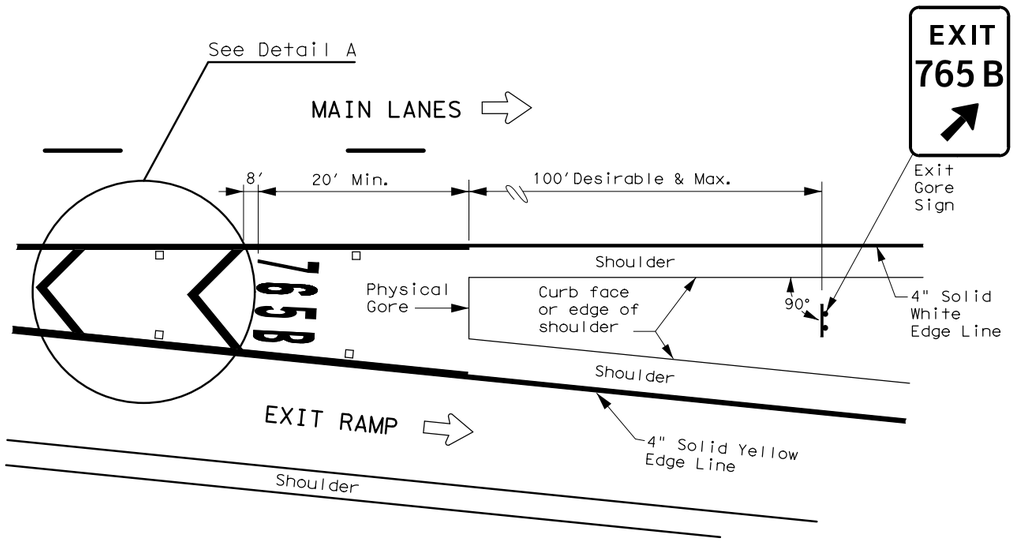
REVISIONS		CONT	SECT	JOB	HIGHWAY
4-92	2-10	0014	03	087	IH 35W
8-95	2-12	DIST	COUNTY		SHEET NO.
5-00		FTW	JOHNSON		223
8-00					

23B

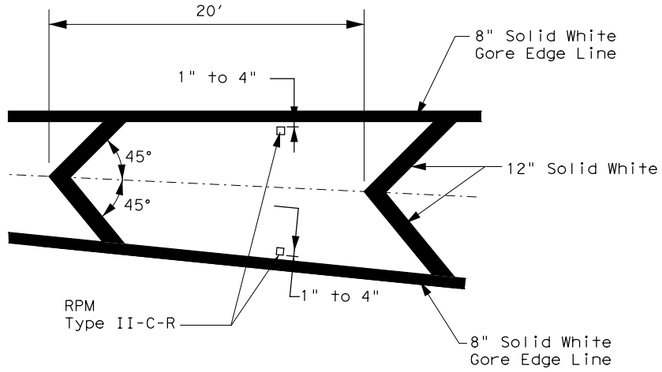
DATE: 5/23/2022 10:57:41 AM
FILE: c:\pwworking\aecom*ds20*na*2019\subash.paudel@aecom.com\d0119096\fpm2-12.dgn

EXIT NUMBER PAVEMENT MARKING NOTES

1. Minimum 8 foot white markings should be used, unless otherwise noted.
2. Spacing between letters and numbers should be approximately 4 inches.
3. Pavement markings are to be located as specified elsewhere in the plans.
4. All pavement marking materials shall meet the required Departmental Material Specifications or as specified in these plans.
5. Numbers and Letters details can be found in the Standard Highway Design for Texas (SHSD) Chapter 12 at http://www.txdot.gov



MARKINGS WITH EXIT NUMBER



NOTES

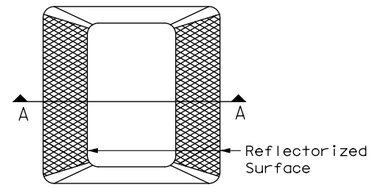
1. Raised pavement markers shall be centered between chevron or gore lines.
2. For more information, see Reflectorized Raised Pavement Marker Detail.

DETAIL A

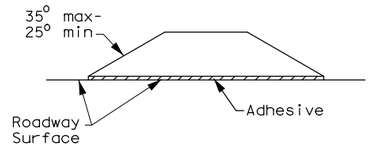
MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.

LEGEND	
⇦	Traffic flow
▫	Reflectorized Raised Markers (RPM) Type II-C-R

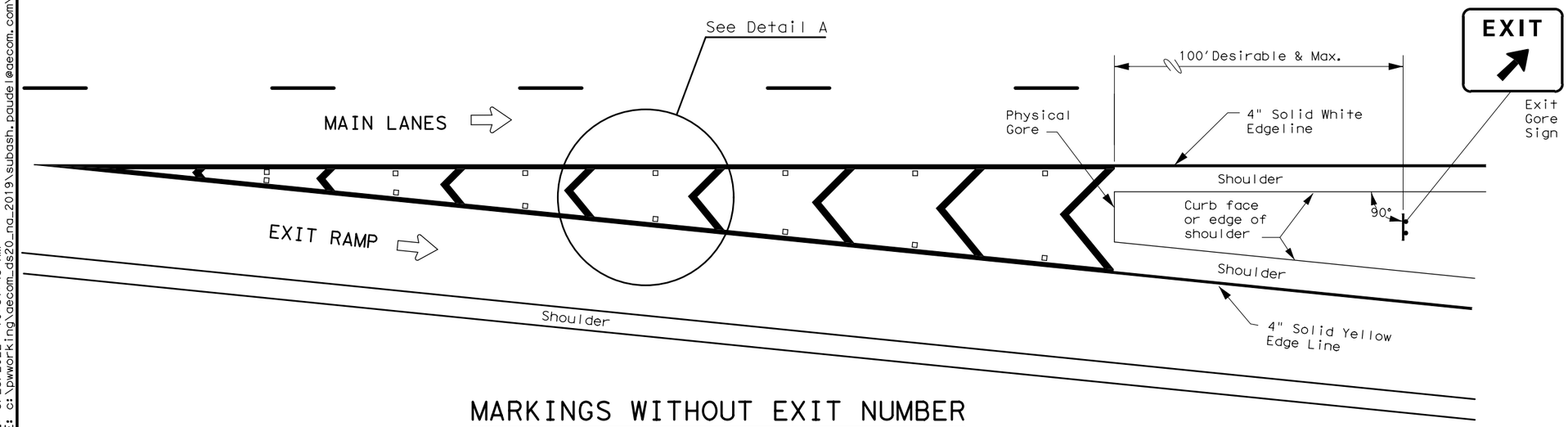


Type II (Top View)



SECTION A

REFLECTORIZED RAISED PAVEMENT MARKER (RPM)



MARKINGS WITHOUT EXIT NUMBER

Texas Department of Transportation

Traffic Safety Division Standard

EXIT GORE PAVEMENT MARKINGS

FPM(5)-19

FILE: fpm(5)-19.dgn	DN:	CK:	DW:	CK:
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	03	087	IH 35W
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		224

23F

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)

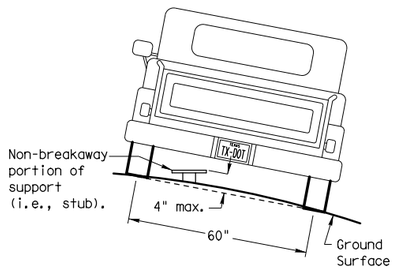
Anchor Type

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-1))

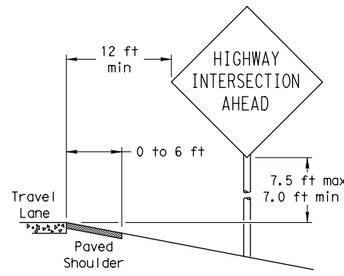
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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).

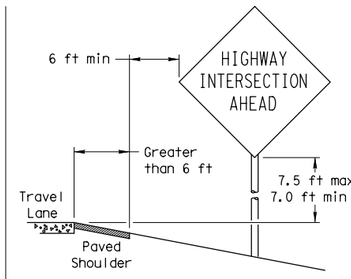
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

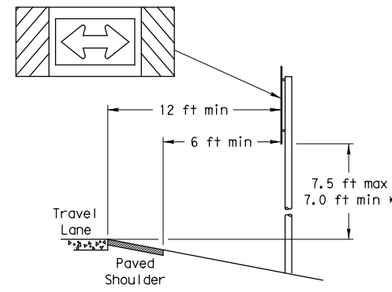
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



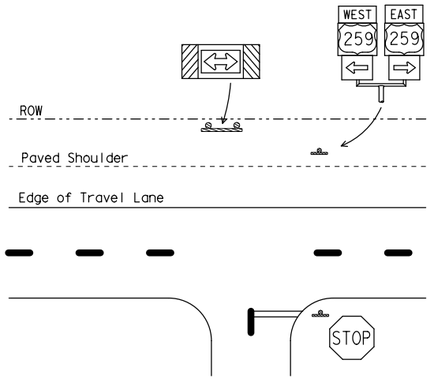
GREATER THAN 6 FT. WIDE

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.

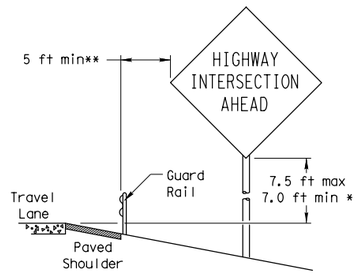
T-INTERSECTION



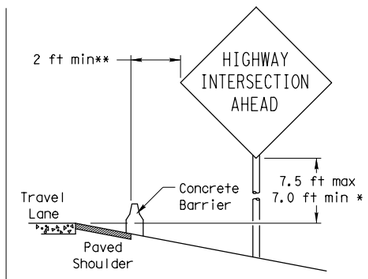
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



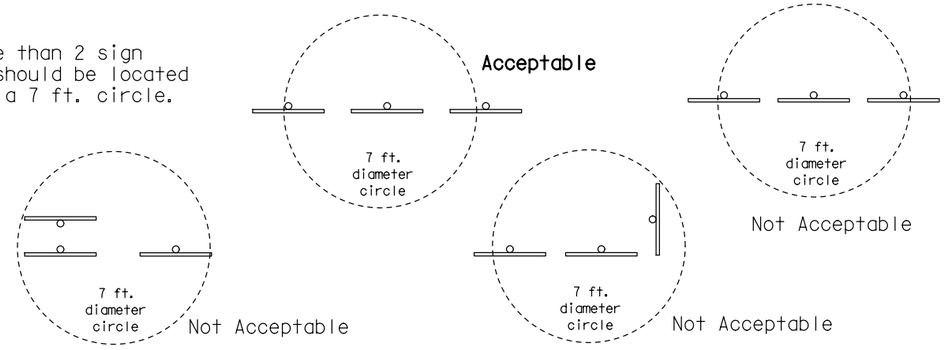
BEHIND GUARDRAIL



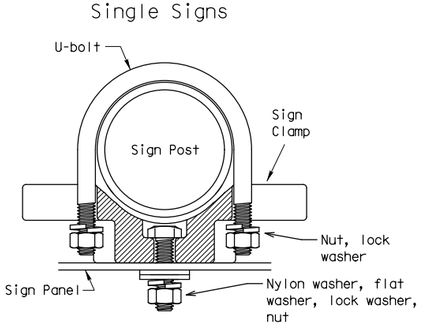
BEHIND CONCRETE BARRIER

**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

No more than 2 sign posts should be located within a 7 ft. circle.



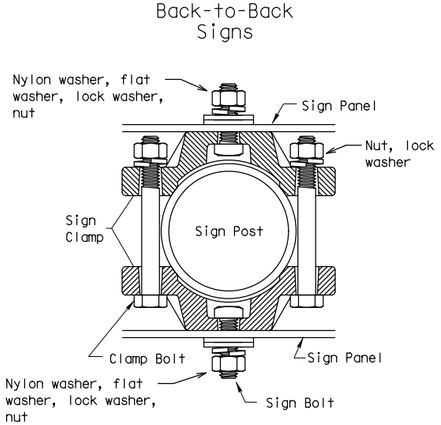
TYPICAL SIGN ATTACHMENT DETAIL



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.

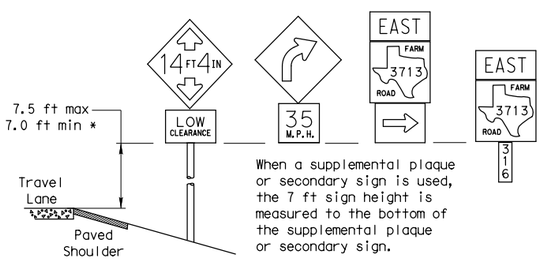
When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

Sign clamps may be either the specific size clamp or the universal clamp.



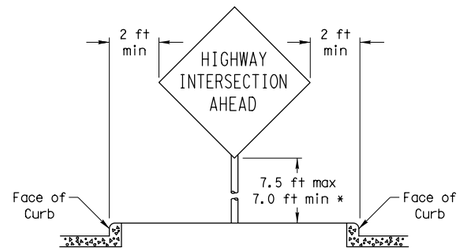
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



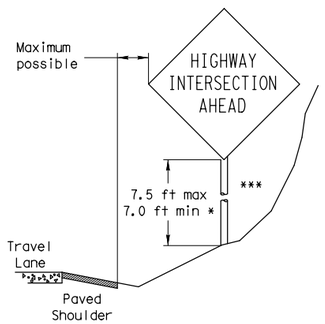
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

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.

* 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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

9-08 REVISIONS

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W

DIST	COUNTY	SHEET NO.
FTW	JOHNSON	225

26A

DATE: 5/23/2022 10:57:49 AM
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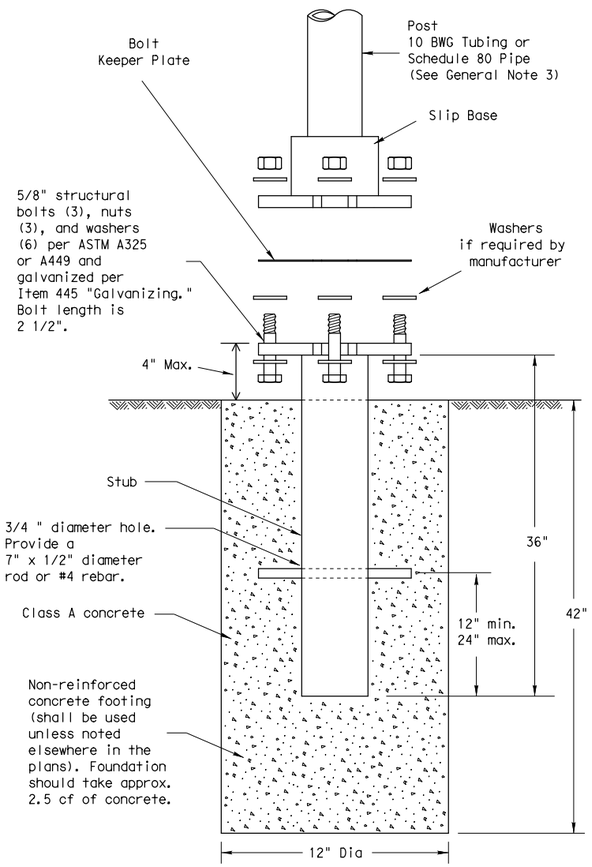
DATE: 5/23/2022 10:57:53 AM
FILE: c:\pwworking\decomwds20\mai2019\subash.paudel@aecom.com\d0119096\Copy of*smds1.dgn

TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS

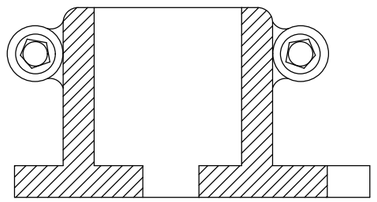


SM RD SGN ASSM TY XXXXX(X)SA(X-XXXX)

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.

1



SLIPBASE SECTION

BOLT CLAMP TYPE

(SEE APPLICABLE FABRICATION DRAWINGS FOR FURTHER DETAIL)

http://ftp.dot.state.tx.us/pub/txdot-info/cmd/cserve/standard/traffic/slipdetail.pdf

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

1

3A. Slipbases ustilizing the "Set Screw type Section" will not be allowed. Use Slipbases matching the "Bolt Clamp type Section." The acceptable section has been added to this Standard for Contractor's information only.

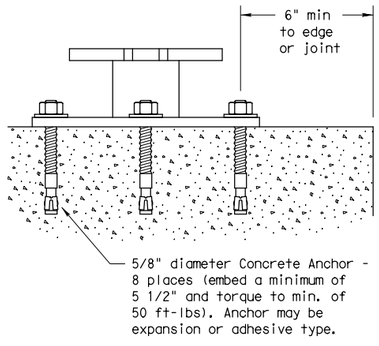
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

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.

STATE OF TEXAS
MARIA XIMENA MEDERO
107551
LICENSED
PROFESSIONAL ENGINEER

5/23/2022

1 SIGNING ENGINEER RESPONSIBLE FOR MODIFICATIONS AS NOTED. ALL OTHER DETAILS IN THE UNMODIFIED CONDITION ARE SHOWN IDENTICAL TO THE UNMODIFIED STANDARD.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

1 (MOD) SMD(SLIP-1)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS 9-08

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W

DIST	COUNTY	SHEET NO.
FTW	JOHNSON	226

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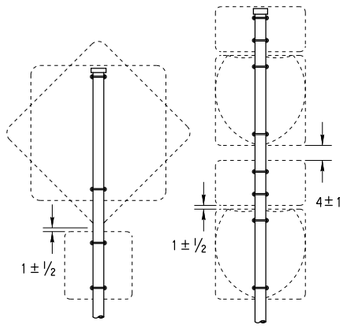
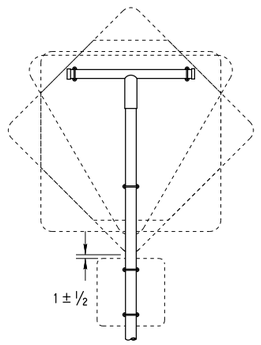


SM RD SGN ASSM TY XXXXX(1)XX(P)



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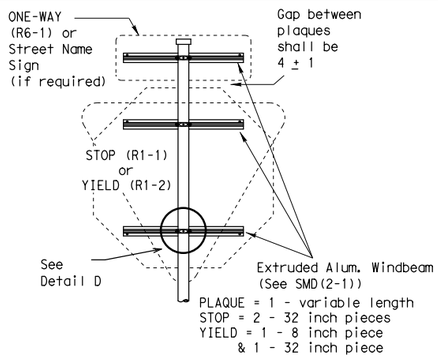

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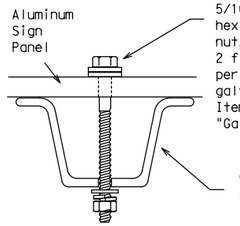
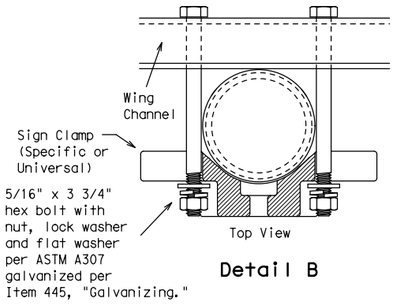


Detail A



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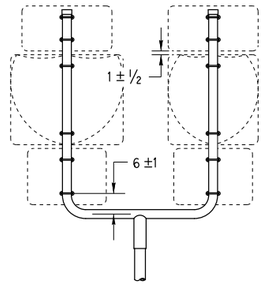

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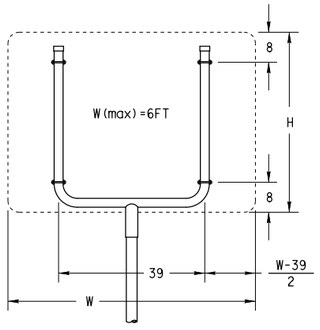

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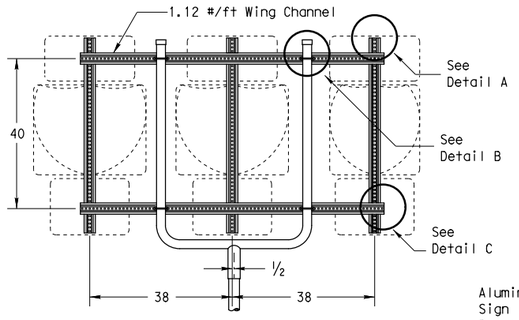


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

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."

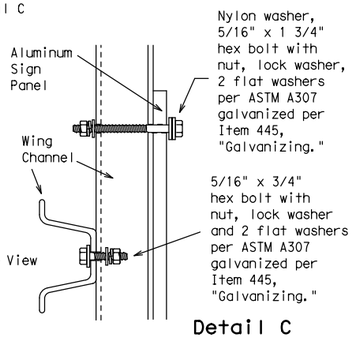
1 1/2"

Extender

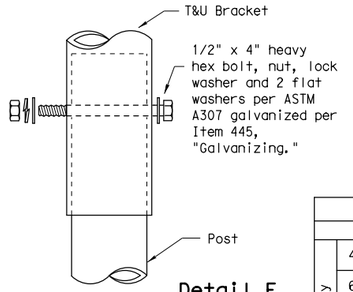
U-Bracket

Detail F

Splices shall only be allowed behind the sign substrate.



Detail C



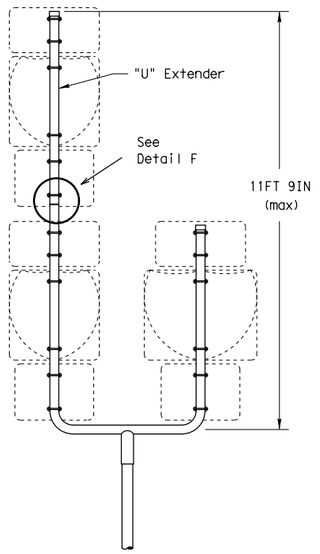
Detail E

GENERAL NOTES:

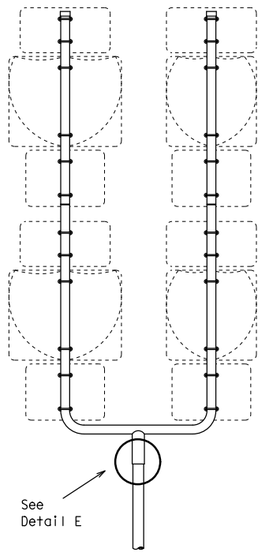
1.

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

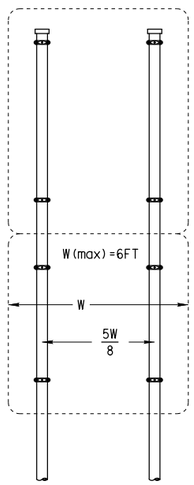
2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material 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 S80(1)XX(U-1EXT)

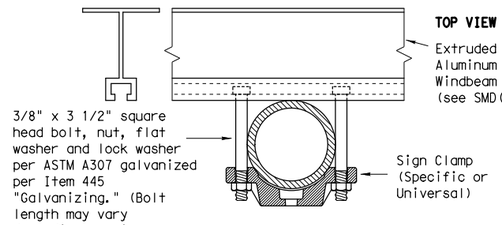


SM RD SGN ASSM TY S80(1)XX(U-2EXT)

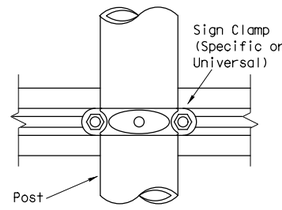


SM RD SGN ASSYM TY XXXXX(2)XX(P)

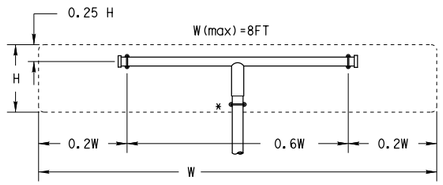
SIDE VIEW



Detail D



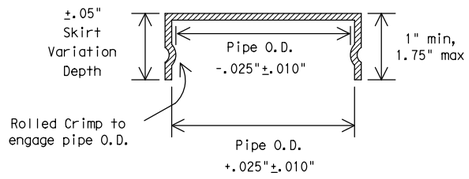
REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	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

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W

DIST	COUNTY	SHEET NO.
FTW	JOHNSON	227

9-08 REVISIONS

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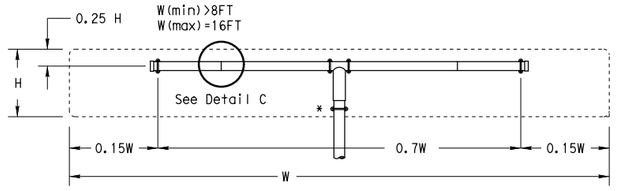
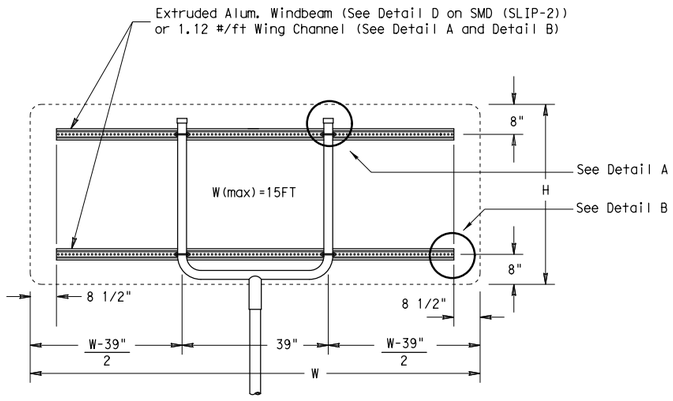
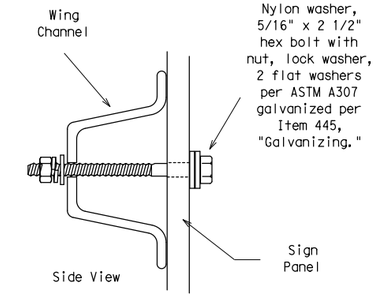


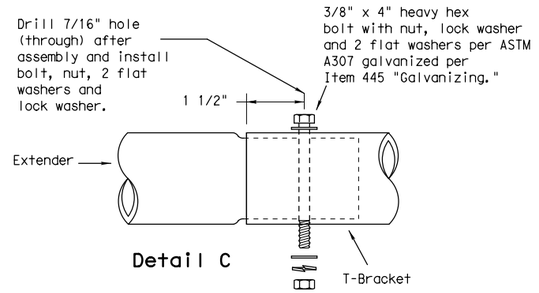
SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



Detail B



Detail C

Splices shall only be allowed behind the sign substrate.

GENERAL NOTES:

1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
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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.
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8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
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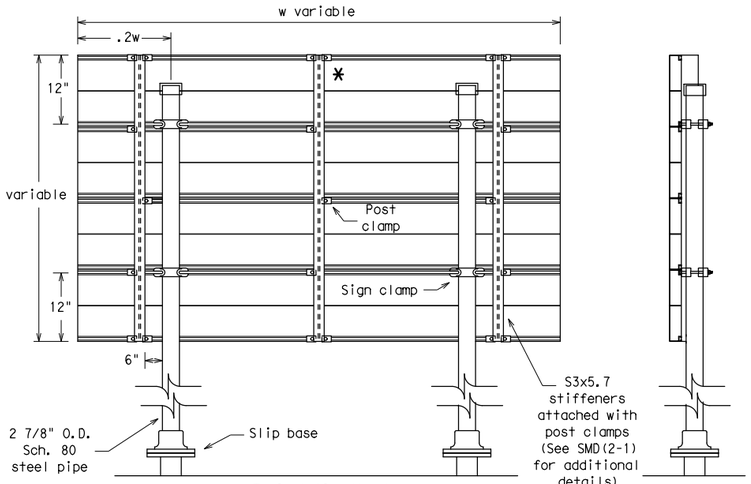
11. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.

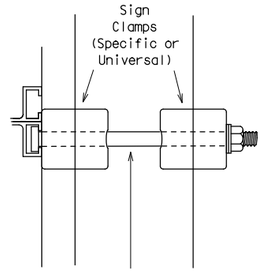


Typical Sign Mount

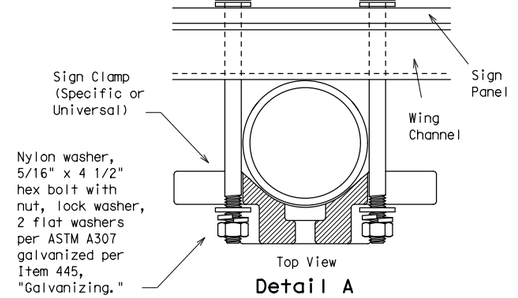
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

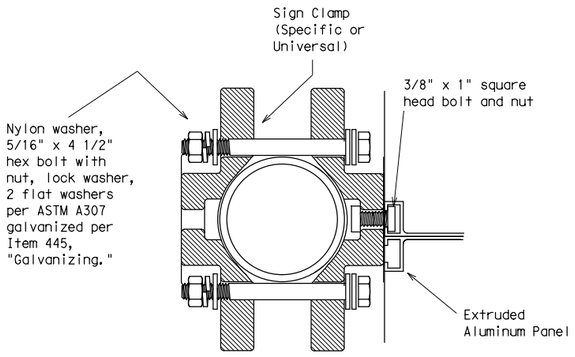
See Detail E
for clamp installation



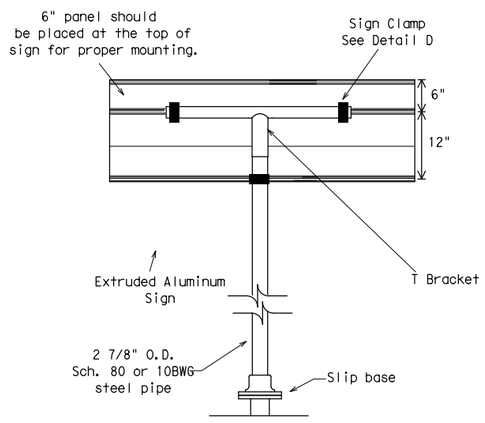
Detail E



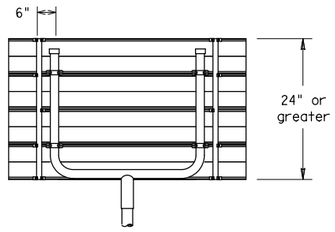
Detail A



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)
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	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
	0014	03	087	IH 35W
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		228

DATE: 5/23/2022 10:58:06 AM
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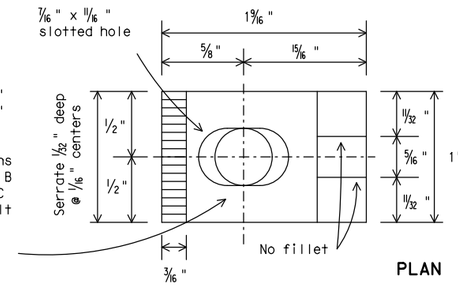
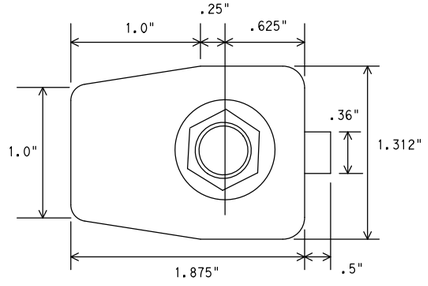
NOTE: centerline of hole for 3/8" diameter squarehead bolt x 2 1/4" long with a flat washer and self-locking nut, or lock washer and hex. nut. Bolt head dimensions shall be in accordance with ANSI B 18.2.1 as referred to in the AISC Manual of steel construction. Bolt assembly shall be galvanized.



PLAN



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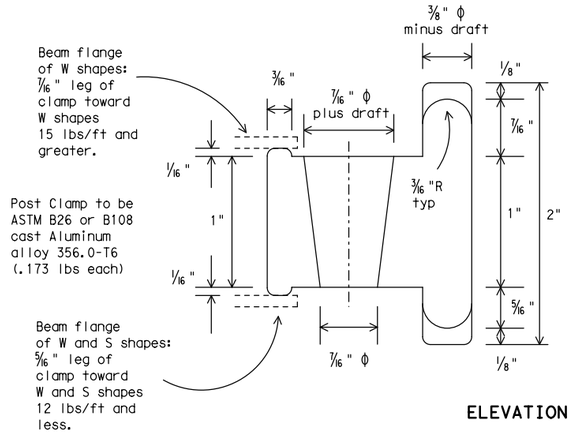
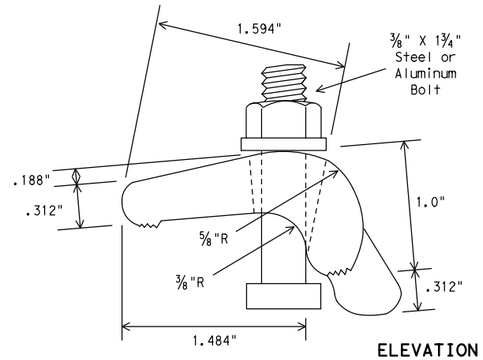


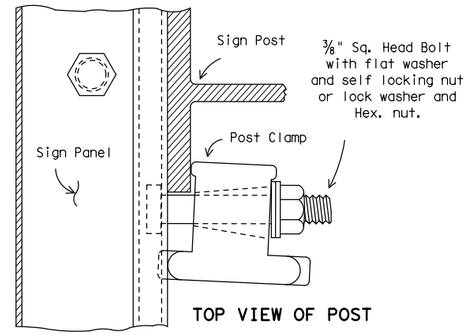
ELEVATION

POST CLAMP DETAIL

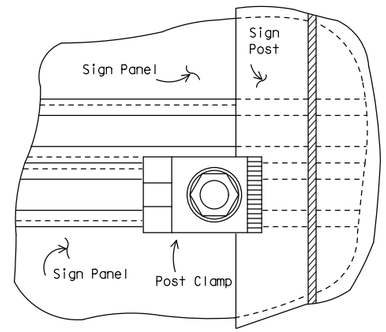


ELEVATION

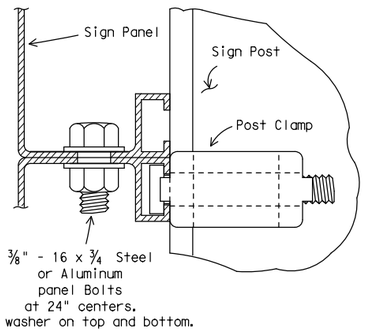
ALTERNATE POST CLAMP DETAIL



TOP VIEW OF POST



TOP VIEW OF CLAMP



SIDE VIEW OF PANELS

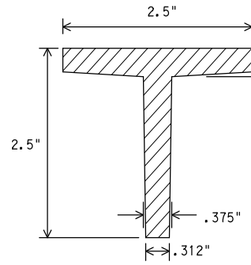
CONNECTION DETAILS

DEPARTMENTAL MATERIAL SPECIFICATIONS

SIGN HARDWARE DMS-7120

GENERAL NOTES:

1. Design conforms with AASHTO Specifications for the design and construction of structural supports for highway signs.
2. Materials and fabrication shall conform to the requirements of the Department material specifications.
3. Structural steel shall be "low-alloy steel" for non-bridge structures per Item 442, "Metal For Structures."
4. For fiberglass substrate connection details, see manufacturer's recommendations.

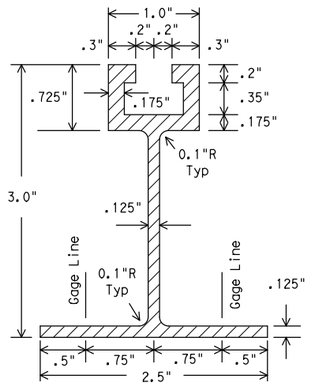


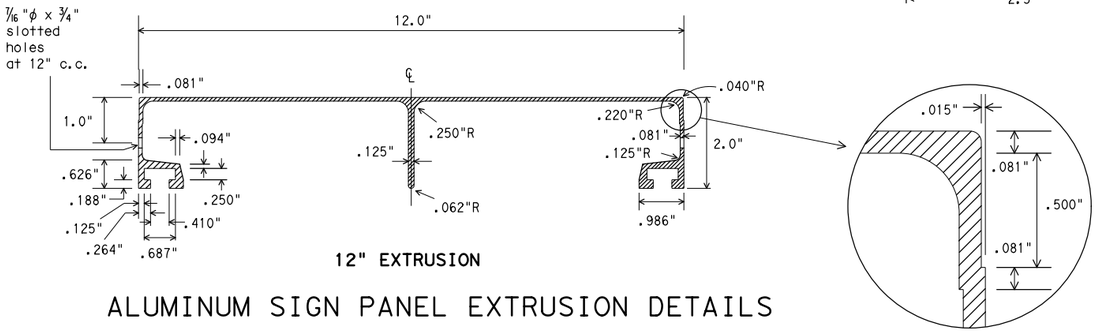
1.912 lbs/ft

ALUMINUM T SECTION OR APPROVED ALTERNATIVE

WINDBEAM CROSS SECTION

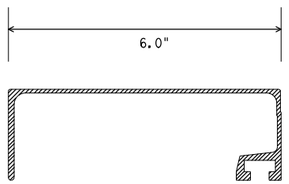
Windbeam to be extruded aluminum (1.175 lbs/ft) or approved alternative



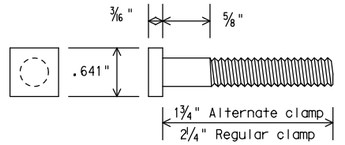


12" EXTRUSION

ALUMINUM SIGN PANEL EXTRUSION DETAILS



6" EXTRUSION



POST CLAMP BOLT DETAIL

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS- EXTRUDED ALUMINUM SIGN PANELS & HARDWARE

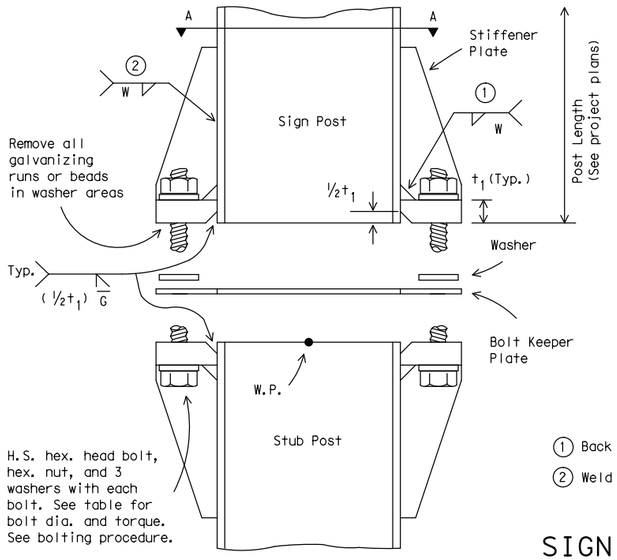
SMD(2-1)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

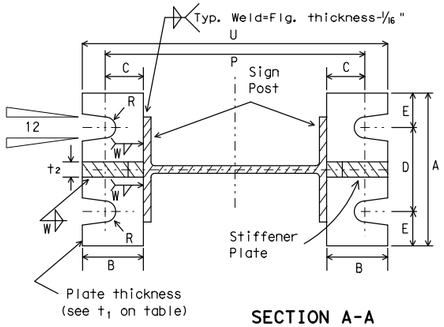
REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	0014	03	087	IH 35W

DIST	COUNTY	SHEET NO.
FTW	JOHNSON	229

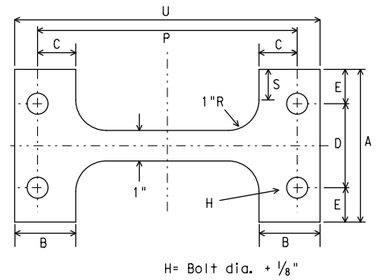
DATE: 5/23/2022 10:58:10 AM
FILE: c:\pwworking\aecom*ds20*na*2019\subash.paudel@aecom.com\d0119096\sma22-08.dgn



ELEVATION

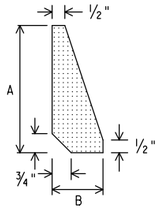


SECTION A-A



H= Bolt dia. + ⅛"

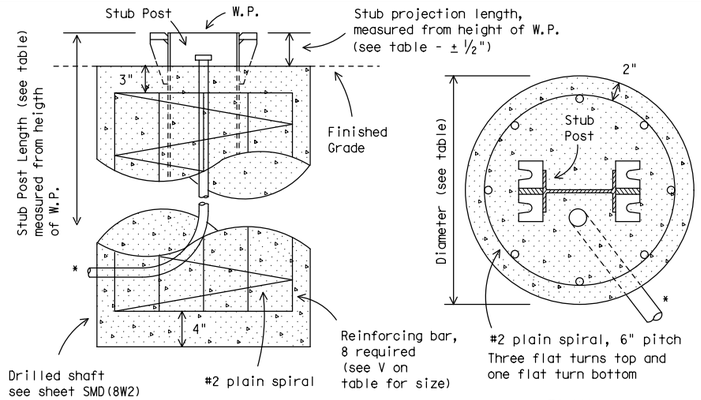
BOLT KEEPER PLATE
30 Ga galv. sheet steel



STIFFENER PLATE DETAIL

Steel Plate (thickness = t_2)

(See table for dimensions)



ELEVATION **PLAN**

FOUNDATION DETAIL

*Note: For signs with electrical apparatus, see ED(10) for conduit required in founation.

1. Back up weld to be made before installing stiffener plate
2. Weld W may be continued across clips to seal joint

SIGN POST AND STUB POST

(For W Shapes)

BOLTING PROCEDURE FOR ASSEMBLY OF BASE CONNECTION:

1. Assemble sign post, BOLT KEEPER PLATE and stub post with bolts and three flat washers per bolt as shown.
2. Shim as required to plumb post.
3. Tighten all bolts the maximum possible with a 12 to 15 inch wrench to clean bolt threads and to bed washers and shims.
4. Loosen each bolt in sequence and retighten bolts in a systematic order to the prescribed torque. Do not overtighten.
5. To prevent nut loosening, burr threads of bolt at junction with nut using a center punch.

Dimensions / Post Size	Base Connection Data Table: Bolt Size & Torque	A	B	C	D	E	t_1	t_2	W	R
W6x9	⅝"ϕ x 2¾" 440-450 inch pounds 36-38 foot pounds	5"	2"	1¼"	2¾"	1⅛"	¾"	½"	¼"	11/32"
W6x12										
W6x15										
W8x18										
W8x21	¾"ϕ x 3½" 740-750 inch pounds 62-63 foot pounds	6"	2¼"	1⅜"	3½"	1¼"	1"	¾"	5/16"	13/32"
W10x22										
W10x26										
W12x26										
S3x5.7	½"ϕ x 2½" 440-450 inch pounds 36-38 foot pounds	See Detail Below								
S4x7.7										

Perforated Fuse Plate Data Table												Bolt Keeper Data			Foundation Data			
F	G	J	K	M	d_1	d_2	t_3	Bolt Dia.	Wt. (ea.) (lbs.)	Bolt length	P	S	U	Stub length	Stub projection	Dr. Shaft diameter	Bar V Size
4¼"	2"	4"	2¼"	1"	9/16"	¾"	¼"	½"	1.01	1½"	8⅜"	1"	9⅞"	2'-0"	3"	24"	#5
											8½"		10"				#5
5"	2½"	6"	3½"	1½"	11/16"	1¼"	⅜"	⅝"	2.51	2¼"	8½"		10"	2'-6"	3"		#6
5"	2½"	5¼"	2¾"	1¼"	11/16"	1 1/16"	⅜"	⅝"	2.26	2¼"	10⅝"		12⅛"	2'-6"	3"		#7
5½"	2½"	5¼"	2¾"	1¼"	13/16"	1"	½"	¾"	3.35	2¼"	11"	1½"	12¾"	3'-0"	2½"		#8
6"	3"	5¾"	2¾"	1⅜"	13/16"	1⅛"	½"	¾"	4.03	2¼"	12⅞"		14⅝"	3'-0"	2½"		#9
											13⅜"		14⅞"	3'-0"	2½"		#10
6"	3"	6½"	3½"	1⅝"	13/16"	1 5/16"	½"	¾"	4.47	2¼"	15"		16¾"	3'-0"	2½"		#11
3¾"	1½"	2⅝"	1½"	⅝"	9/16"	⅜"	¼"	½"	0.60	1½"	See Detail Below			3'-3½"	3½"	12"	Non-reinforced ③

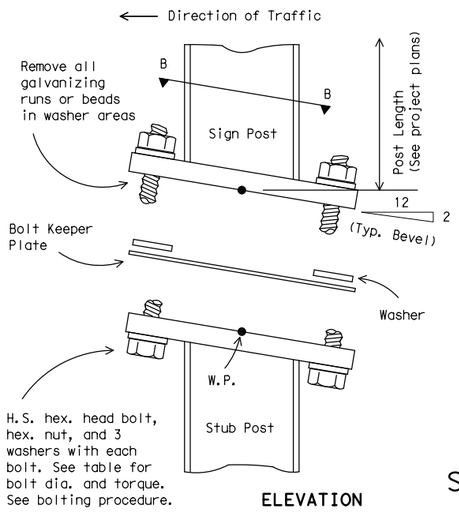
③ Foundation design shall be Type G Mount, see SMD (TY G).

SHIM DETAIL

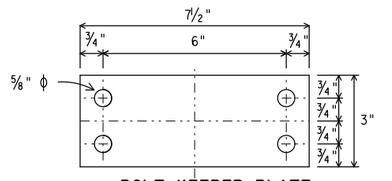
Furnish two .012"+ thick and two .032"+ thick shims per post. Shims shall be fabricated from brass shim stock or strip conforming to ASTM B36.

PERFORATED FUSE PLATE DETAIL

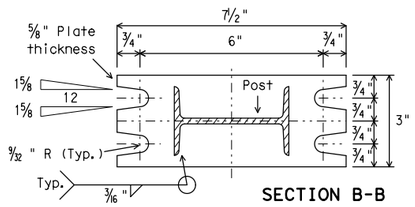
Use H.S. hex head bolts, hex head nut and bevel or flat washer (where req'd) under nut. All holes shall be drilled, sub-punched and reamed. All plate cuts shall preferably be saw cuts. However, flame cutting will be permitted provided all edges are ground. Metal projecting beyond the plane of the plate face will not be permitted. Steel fuse plates shall conform to the requirements of ASTM A36. ASTM A572 Grade 50 or ASTM A588 may be substituted for A36 at the option of the fabricator. Mill test reports shall be submitted for Fuse Plates. Steel used shall have an ultimate tensile strength not to exceed 80 KSI. For alternative Fuse Plate contact Traffic Operations Division.



ELEVATION



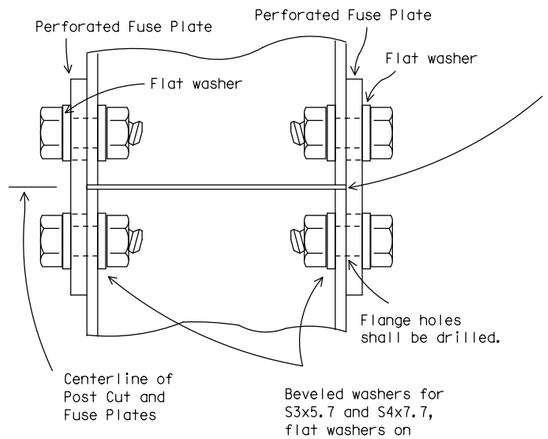
BOLT KEEPER PLATE
30 Ga galv. sheet steel



SECTION B-B

SIGN POST AND STUB POST

(For S4x7.7 and S3x5.7)



Parts shall be saw cut either before galvanizing and the galvanized cut cleaned of zinc build-up, or saw cut after galvanizing and the cut surface repaired per Item 445, "Galvanizing."

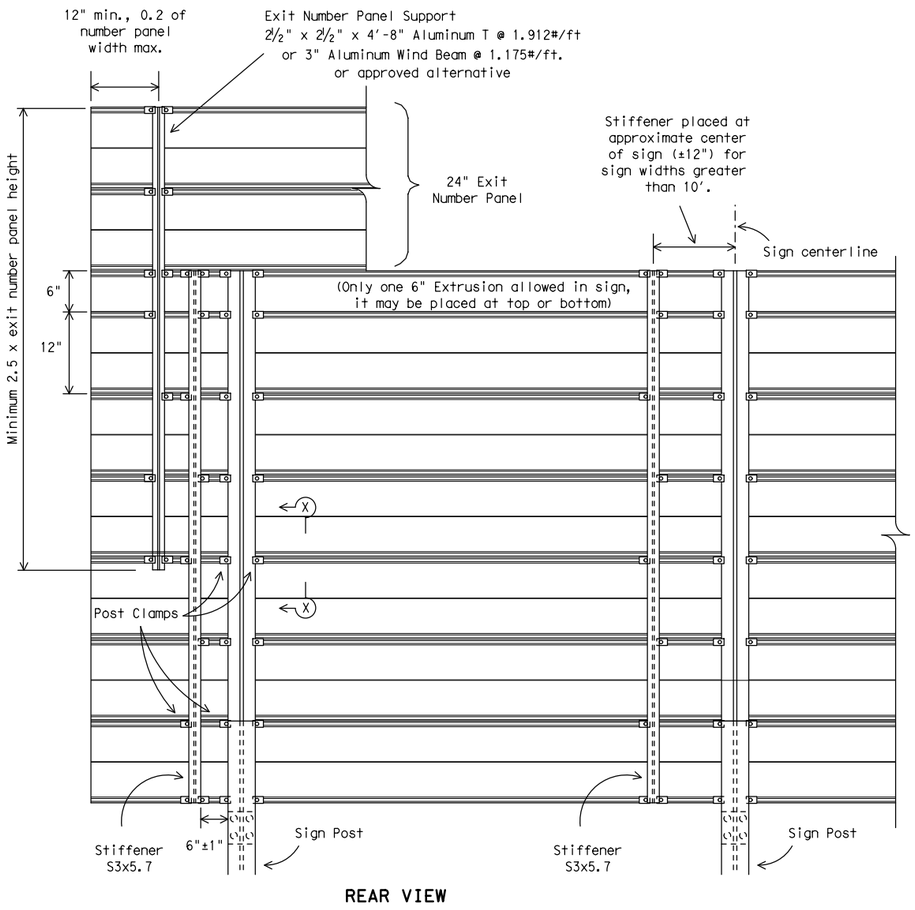
DETAIL "A"

Texas Department of Transportation
Traffic Operations Division

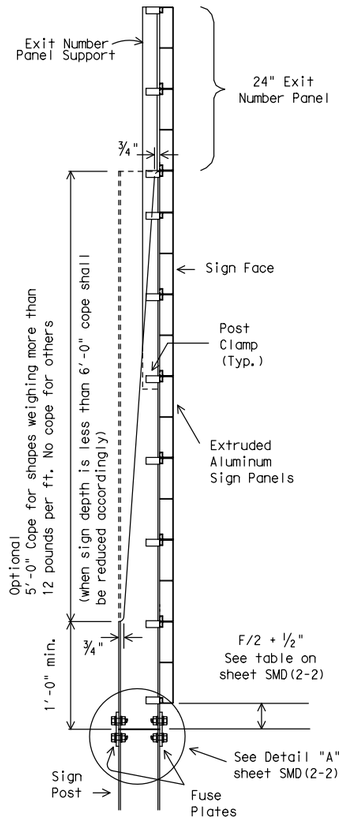
SIGN MOUNTING DETAILS- LARGE ROADSIDE SIGNS FOUNDATION & STUB

SMD(2-2)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
4-98	CONT	SECT	JOB	HIGHWAY
9-08	0014	03	087	IH 35W
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		230

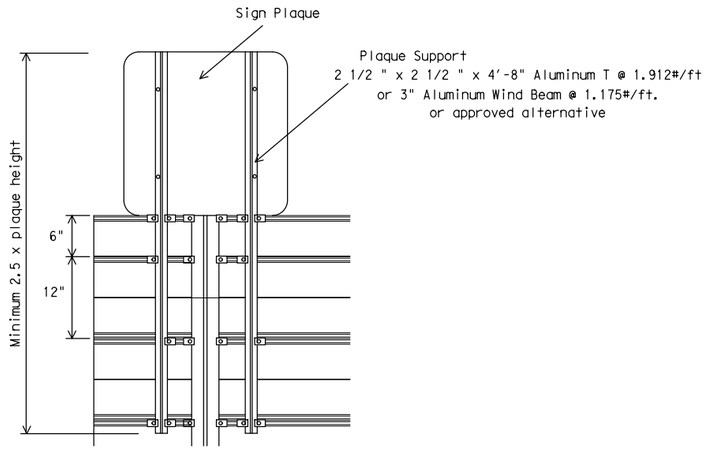


REAR VIEW



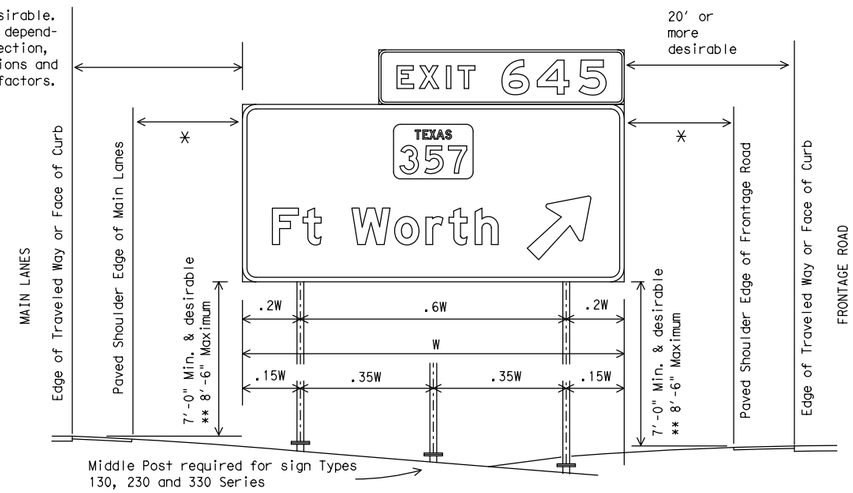
SIDE VIEW

ALUMINUM PARENT SIGN & EXIT NUMBER PANEL MOUNTING DETAILS



SIGN PLAQUE MOUNTING DETAIL TO ALUMINUM PARENT SIGN

30' or more desirable. May be reduced depending on cross section, viewing conditions and other related factors.



TYPICAL SIGN INSTALLATION AND LOCATION

LATERAL CLEARANCE NOTES:

Lateral clearances of signs mounted on median side of main lanes are the same as shown above where space will permit.

Where a sign is to be located behind guardrail, an allowable minimum clearance of five feet may be used, measured from the face of the guardrail to the near edge of sign.

✳ - 6' minimum and desirable may be used only in areas of limited lateral clearance and when approved by the Engineer.

POST SPACING NOTES:

Post spacing on a two post sign may vary a maximum of plus or minus 10% of total sign width to fit field conditions.

Post spacing on a three post sign may vary a maximum of plus or minus 5% of total sign width to fit field conditions.

SIGN HEIGHT NOTES:

** The 8' 6" maximum may be exceeded when placing signs on extreme slopes. In these conditions, a 7' minimum from natural ground to bottom of sign must be maintained.

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN HARDWARE	DMS-7120

GENERAL NOTES:

1. Exit number panel shall be mounted to the right hand side of the parent sign for right exits and to the left hand side for left exits. The number panel shall be mounted with two uprights so its right edge is even with the right edge of the parent sign or vice-versa for left hand exits.
2. Exit number panel support shall be symmetrical about number panel centerline.
3. Exit number panel support shall be ASTM A36 structural steel galvanized after fabrication, or ASTM B221 aluminum alloy 6061-T6 or approved alternative.
4. All bolts, nuts and washers shall be galvanized per ASTM Designation: B695 Class 50, or A153 Class C or D.
5. Posts, parent sign panels, and exit number panels shall comply with notes on sheets SMD(2-1) and SMD(2-2).
6. Signs (such as exit number panels) attached above a parent sign shall be made of the same type material as the parent sign. General Service and Routing signs may be fabricated from flat sheet aluminum.
7. Exit number panel support and other connection hardware required to fasten exit number panel to parent sign shall be subsidiary to "Aluminum Signs" or "Fiberglass Signs."
8. For fiberglass sign installation details, see manufacturer's recommendations.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS-LARGE ROADSIDE SIGNS

SMD(2-3)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W

DIST	COUNTY	SHEET NO.
FTW	JOHNSON	231

DATE: 5/23/2022 10:58:14 AM
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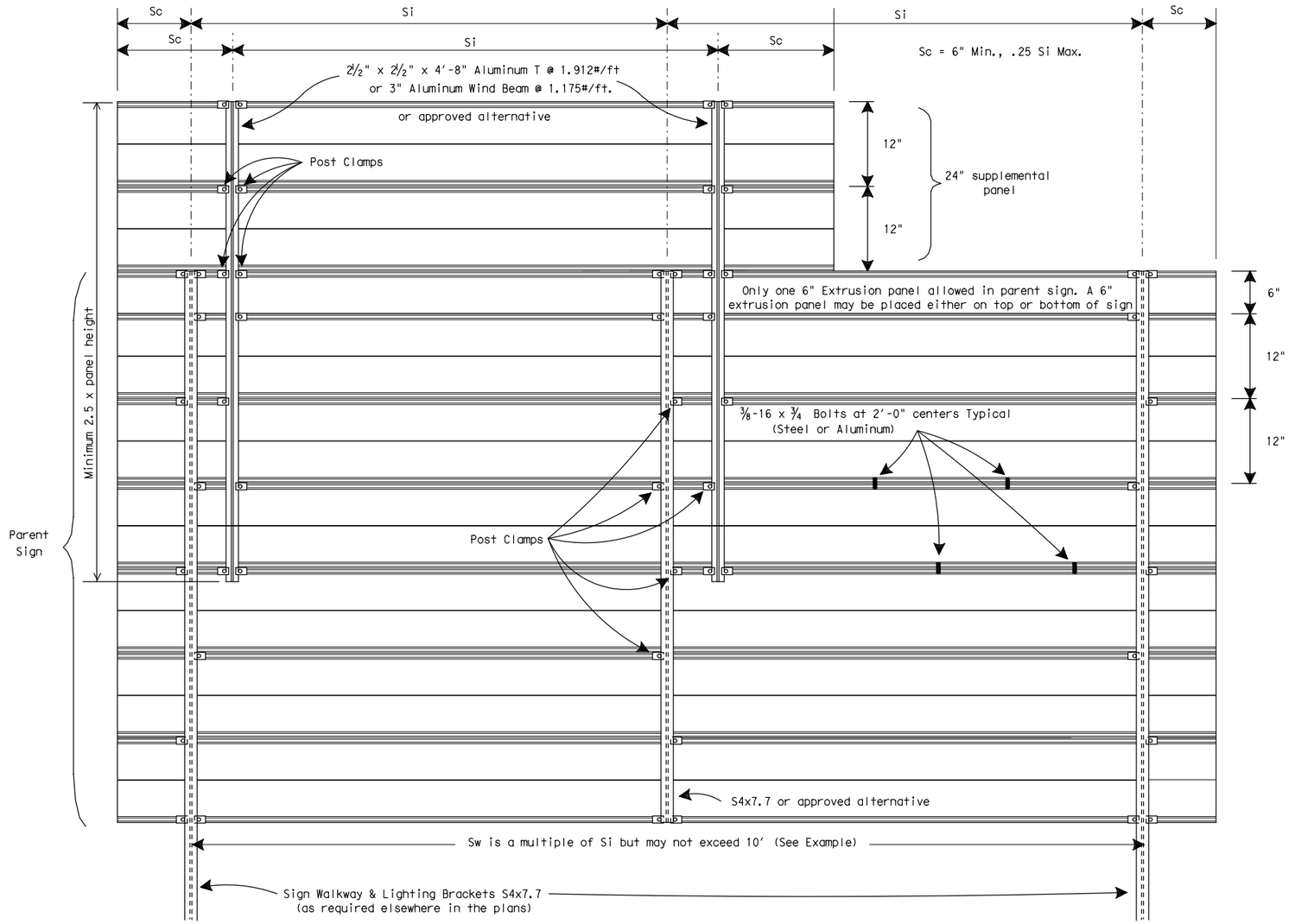
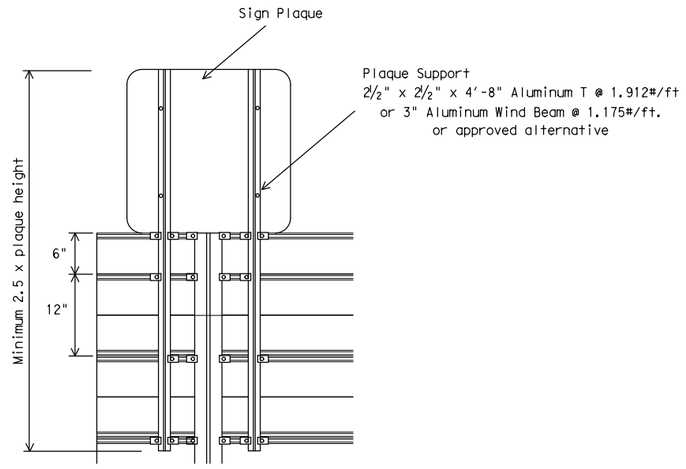


REAR VIEW

EXAMPLES (FOR DETERMINING Si and Sw)

NO.	ZONE	"d"	EXIT PANEL	WALKWAY	Si	Sw	COMMENT
1	1	15.0	YES	YES	4.5	9.0	Sw=2x(Si)
2	2	14.0	YES	NO	7.5	7.5	Sw = Si
3	1	15.0	NO	NO	8.5	8.5	Sw = Si
4	3	14.0	NO	YES	10.0	10.0	Sw = Si

Values shown for Si are maximum values. Si may be varied for different sign lengths and Truss mounting conditions. Sw should not exceed two times Si(Max.) or 10 feet.



SIGN PLAQUE MOUNTING DETAIL

MAXIMUM SIGN SUPPORT SPACING "Si" (FEET)

"d" Deepest Sign in Group (Ft.)	EXTRUDED ALUMINUM SIGN PANELS															
	WITH EXIT NUMBER PANELS								WITHOUT EXIT NUMBER PANELS							
	WITH WALKWAYS				WITHOUT WALKWAYS				WITH WALKWAYS				WITHOUT WALKWAYS			
	WIND ZONE				WIND ZONE				WIND ZONE				WIND ZONE			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
15	4.5	7	8	10	5	7	8	10	7	8	9	10	8.5	10	10	10
14	6	7.5	9.5	10	6	7.5	9.5	10	8	9	10	10	10	10	10	10
13	7.5	9	10	10	7.5	9	10	10	9	10	10	10	10	10	10	10
12	8.5	10	10	10	8.5	10	10	10	10	10	10	10	10	10	10	10
11 or less	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10

For fiberglass sign installations, see manufacturer's recommendations.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS-OVERHEAD SIGNS EXTRUDED ALUMINUM

SMD(2-4)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

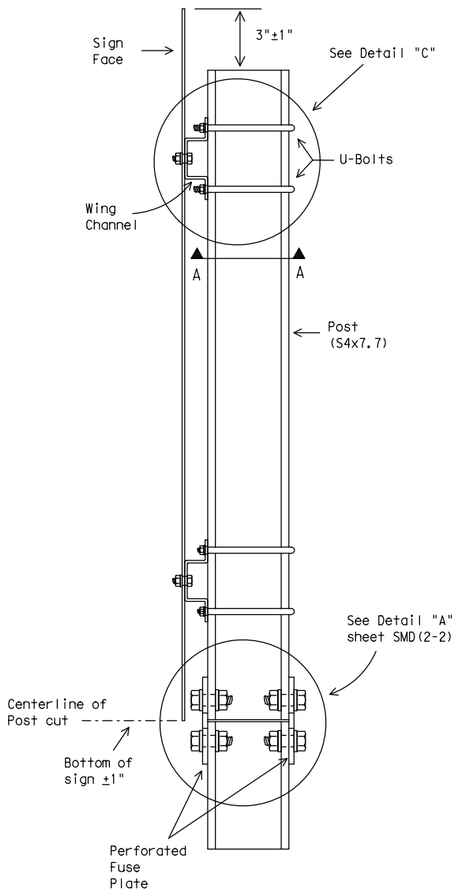
REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	0014	03	087	IH 35W
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		232

27D

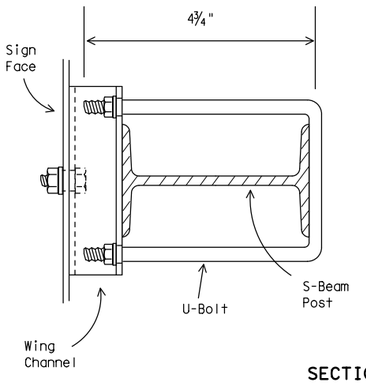
DATE: 5/23/2022 10:58:18 AM
FILE: c:\pwworking\aecom*ds20*nc*2019\subash.paudel@aecom.com\d0119096\smd24-08.dgn

DATE: 5/23/2022 10:58:22 AM
FILE: c:\pwworking\aecom\d820\ng\2019\subash.paudel@aecom.com\d0119096\smdtyg08.dgn

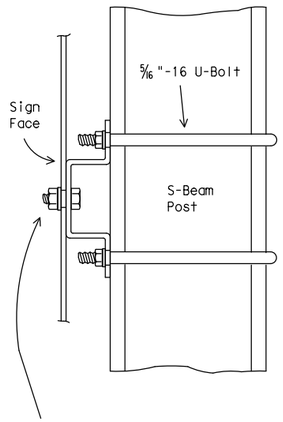
WING CHANNEL CLAMP DETAIL FOR TYPE G MOUNT



SIDE VIEW

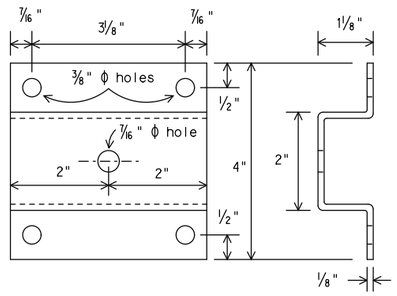


SECTION A-A



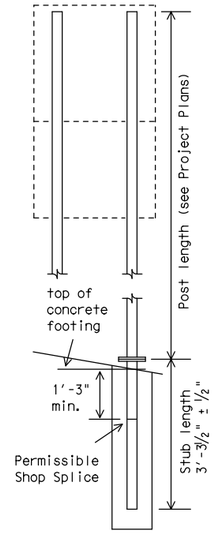
Galvanized steel or aluminum self-locking hex. head nut. 3/8 " - 16 x 3/4 " hex. head bolt for sheet metal. 3/8 " - 16 x 1 1/4 " hex. head bolt for plywood. 3/8 " galvanized medium washer.

DETAIL "C"



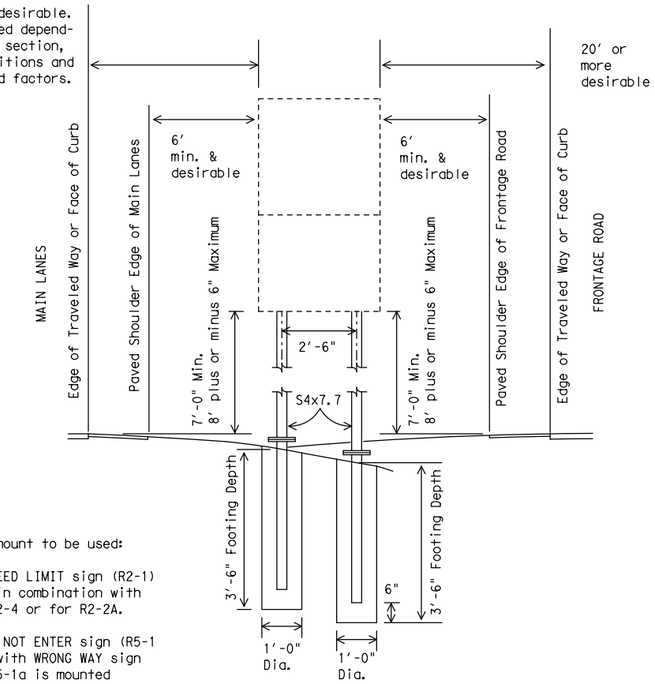
WING CHANNEL

Wing channel, 4" width x 1⅛" depth x ⅛" thickness, shall be aluminum (ASTM B221 6061-T6 or B308 6061-T6), galvanized steel (ASTM A36) or stainless steel (ASTM A167 type 304, No. 2B finish).



The weight of one S4x7.7 post is equal to 112.2 lbs. plus 7.7 lbs./ft x (post length in feet minus 10 ft). The weight of 112.2 lbs. includes 10 feet of post length, post foundation stub, related connection plates, friction fuse plate, and all high strength bolts, nuts and washers.

30' or more desirable. May be reduced depending on cross section, viewing conditions and other related factors.



This type mount to be used:

(1) For SPEED LIMIT sign (R2-1) when used in combination with R2-2 and R2-4 or for R2-2A.

(2) For DO NOT ENTER sign (R5-1 when used with WRONG WAY sign (R5-1a). R5-1a is mounted above R5-1.

DEPARTMENTAL MATERIAL SPECIFICATIONS
SIGN HARDWARE DMS-7120

GENERAL NOTES:

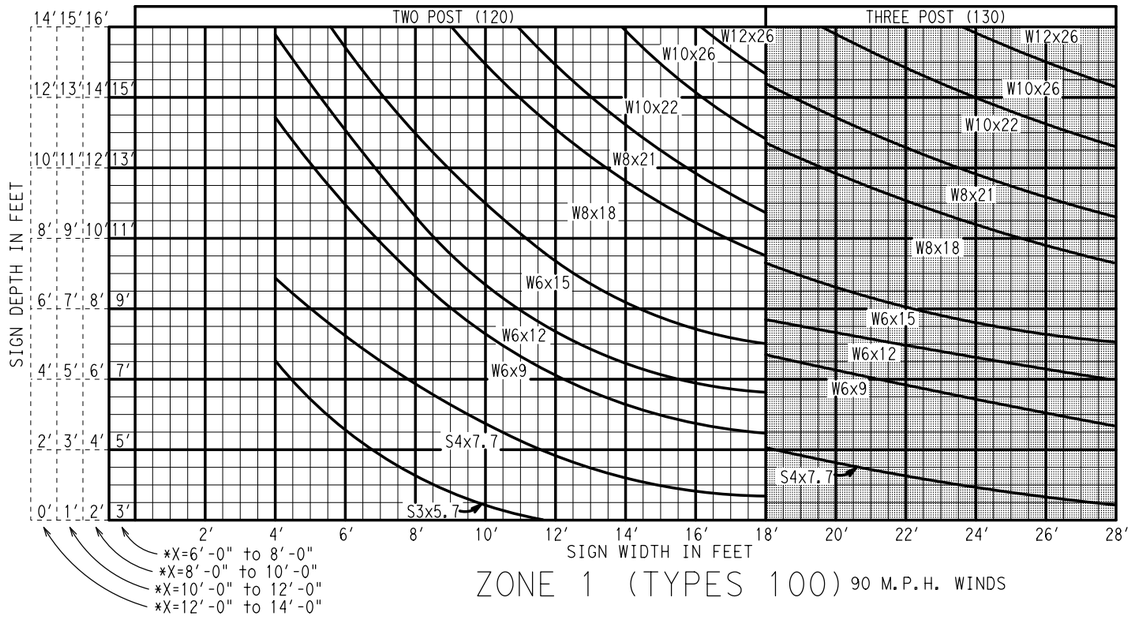
1. Design conforms with AASHTO Specifications for the design and construction of structural supports for highway signs.
2. Materials and fabrication shall conform to the requirements of the Department material specifications.
3. Structural steel shall be "Low-Alloy Steel" for non-bridge structures per Item 442, "Metal For Structures."
4. Parts shall be saw cut either before galvanizing and the galvanized cut cleaned of zinc build-up, or saw cut after galvanizing and the cut surface repaired per Item 445, "Galvanizing." (Cut surface will not be treated until plate is installed and all bolts fully tightened.)

Texas Department of Transportation
Traffic Operations Division

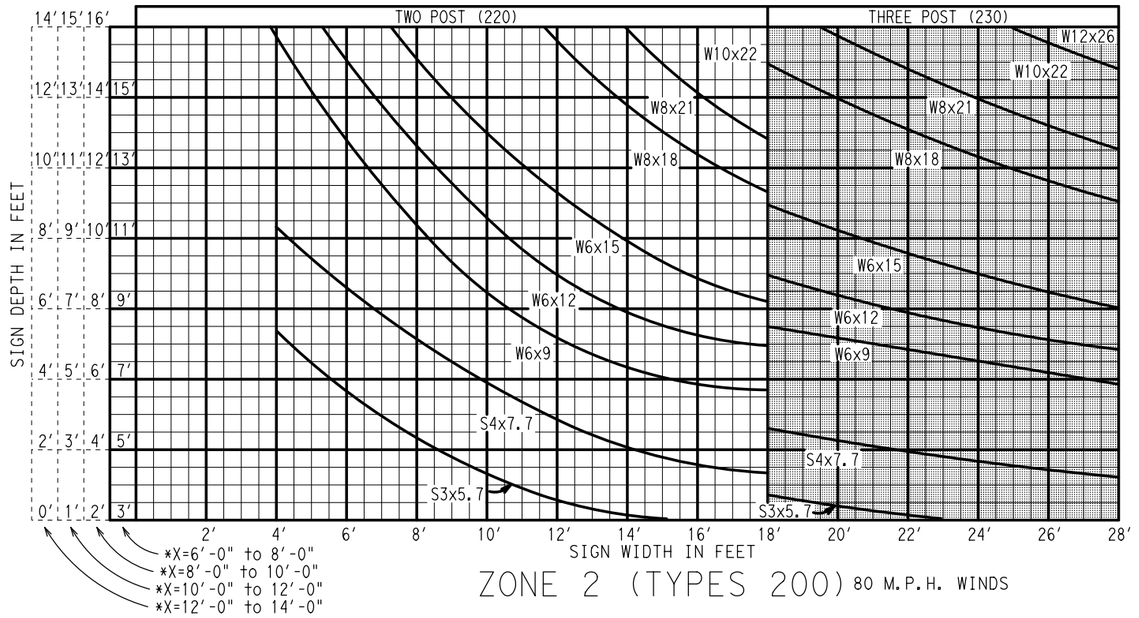
SIGN MOUNTING DETAILS, TYPE G SUPPORT

SMD(TY G)-08

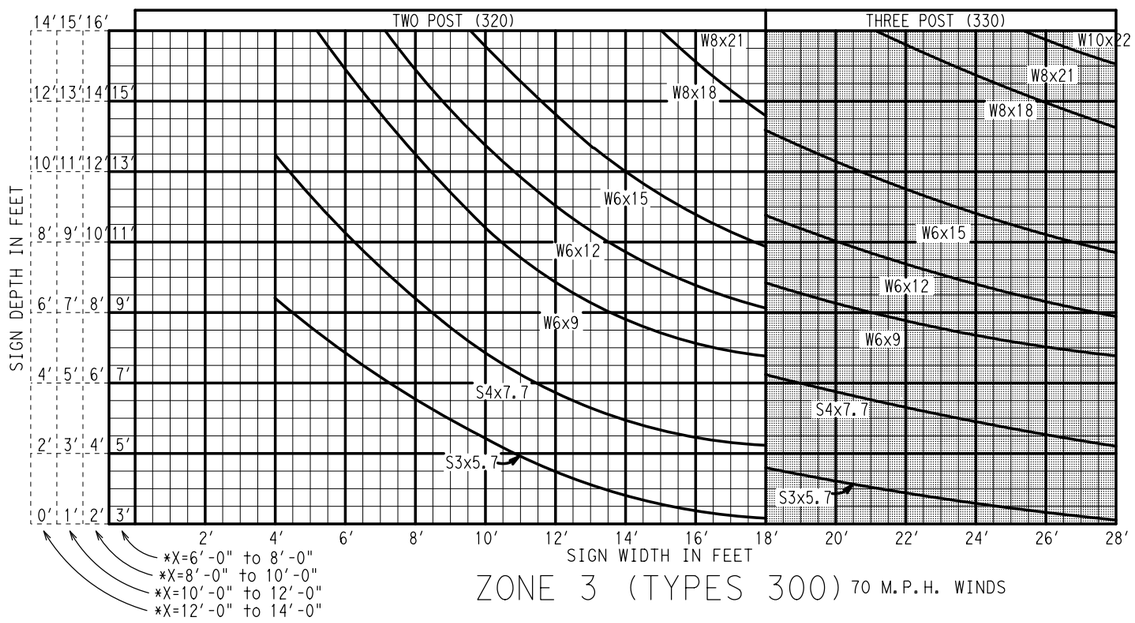
REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
1-97	CONT	SECT	JOB	HIGHWAY
9-08	0014	03	087	IH 35W
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		233



ZONE 1 (TYPES 100) 90 M.P.H. WINDS



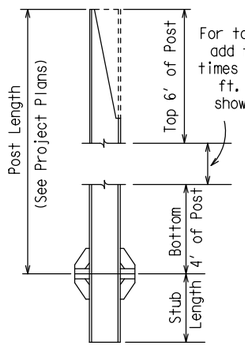
ZONE 2 (TYPES 200) 80 M.P.H. WINDS



ZONE 3 (TYPES 300) 70 M.P.H. WINDS

* NOTE: "X" EQUALS THE AVERAGE HEIGHT FROM THE GROUND LINE TO THE BOTTOM EDGE OF THE SIGN.

SHADED AREA DENOTES 3 POST SUPPORTS



POST WEIGHT DATA

POST SIZE	WEIGHT OF ONE POST (#)	WEIGHT OF TWO POSTS (#)	WEIGHT OF THREE POSTS (#)
W6x9*	123.2	246.4	369.6
W6x12*	160.3	320.6	480.9
W6x15*	167.8	335.6	503.4
W8x18*	201.8	403.6	605.4
W8x21*	254.7	509.4	764.1
W10x22*	266.0	532.0	798.0
W10x26*	308.0	616.0	924.0
W12x26*	308.6	617.2	925.8
S3x5.7*	85.9	171.8	257.7
S4x7.7*	112.2	224.4	336.6

*LAST FIGURES=POST WT. PER FT.

Weight Data is the weight of items shown for one, two or three posts - (includes top 6' of post, bottom 4' of post, post foundation stub, related base connection plates and stiffeners, friction fuse plate and all high strength bolts, nuts and washers).

SIGN TYPE

SIGN TYPE 1 3 0

- 1 — Wind Design Zone
- 3 — Series No.
- 0 — No. of Posts

Series No.: 0 Aluminum/Fiberglass; 1 Aluminum; 2 Fiberglass

Note: Footings for S3x5.7 and S4x7.7 post sizes shall be non-reinforced with Class A concrete, while footing for all other post sizes shall be reinforced with Class C concrete.

Texas Department of Transportation
Traffic Operations Division

LARGE ROADSIDE SIGN SUPPORTS POST SELECTION WORKSHEET

SMD(8W1)-08

REVISIONS
1-82
5-01
9-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W

DIST	COUNTY	SHEET NO.
FTW	JOHNSON	234

DATE: 5/23/2022, 10:58:27 AM
FILE: c:\pwworking\aecom*ds20*na*2019\subash.paude1@aecom.com\d0119096\smd8-08.dgn

DISCLAIMER:
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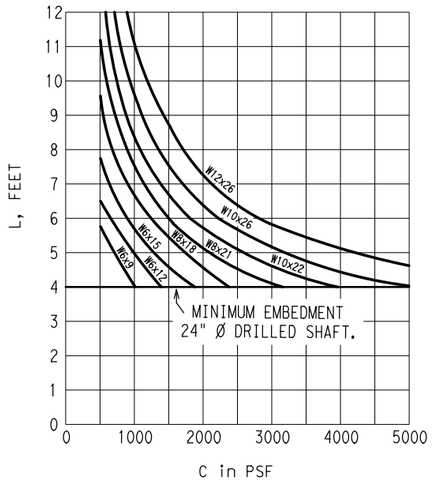
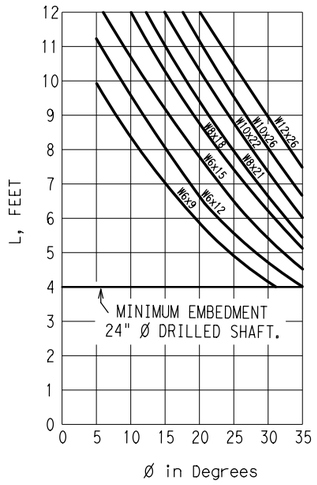
DATE: 5/23/2022 10:58:29 AM
FILE: c:\pwworking\aecom\ds820\nga2019\subash.paudel@aecom.com\d0119096\smd8-08.dgn

I



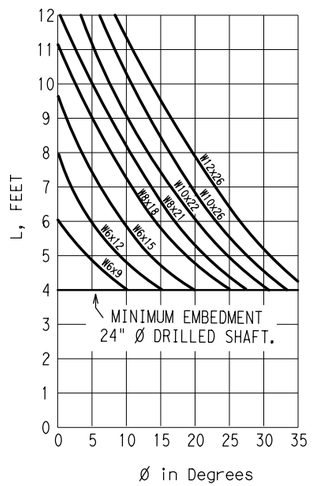
Ø = 0 Degrees

II



C = 0 PSF

III



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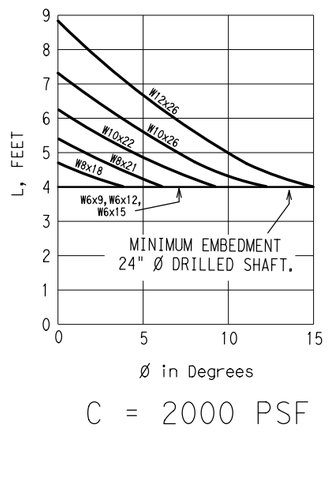

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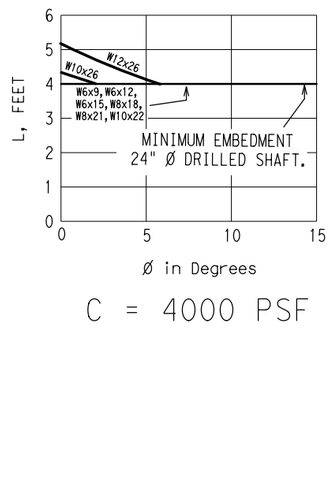
V



C = 4000 PSF

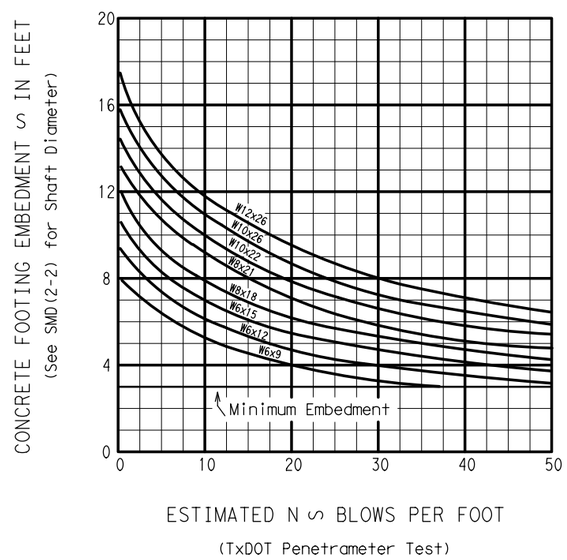
DRILLED CONCRETE FOOTING DEPTH CHART
(COHFRIC DESIGN)

NOTE: THESE CHARTS MAY BE USED AS AN ALTERNATE TO THE CHART BELOW, PROVIDED THAT SOIL COHESION AND INTERNAL FRICTION (COHFRIC) DATA ARE AVAILABLE.

LEGEND:

L = Required embedment of concrete drilled shaft, in feet
C = Cohesive shear strength of soil, in psf
Ø = Angle of internal friction of soil, in degrees

For values of C and Ø which are intermediate to those on the charts, embedments may be determined by straight - line interpolation.



DRILLED CONCRETE FOOTING DEPTH CHART
(TxDOT PENETROMETER DESIGN)

NOTE: ESTIMATED N SHOULD BE BASED AT APPROXIMATELY THE UPPER ONE-THIRD POINT OF THE DRILLED CONCRETE FOOTING BELOW THE GROUND LINE

Note:
1. Curves shown on this sheet are applicable for reinforced concrete footings only.

Texas Department of Transportation
Traffic Operations Division

LARGE ROADSIDE SIGN SUPPORTS FOUNDATION WORKSHEET

SMD(8W2)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS
5-74
4-78
9-08

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W

DIST	COUNTY	SHEET NO.
FTW	JOHNSON	235

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DATE: 5/23/2022 10:58:33 AM
FILE: c:\pw\working\aecom_as20_na_2019\subash.paudel@aecom.com\d0119096\windice.dgn

NOTE: Structures north of ice line to be designed for ice.

ZONE 2
(90 MPH WIND)

ZONE 3
(80 MPH WIND)

ZONE 4
(70 MPH WIND)

ICE LINE

ZONE 4
(70 MPH WIND)

ICE LINE

ZONE 3
(80 MPH WIND)

ZONE 1
(100 MPH WIND)

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)

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.

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

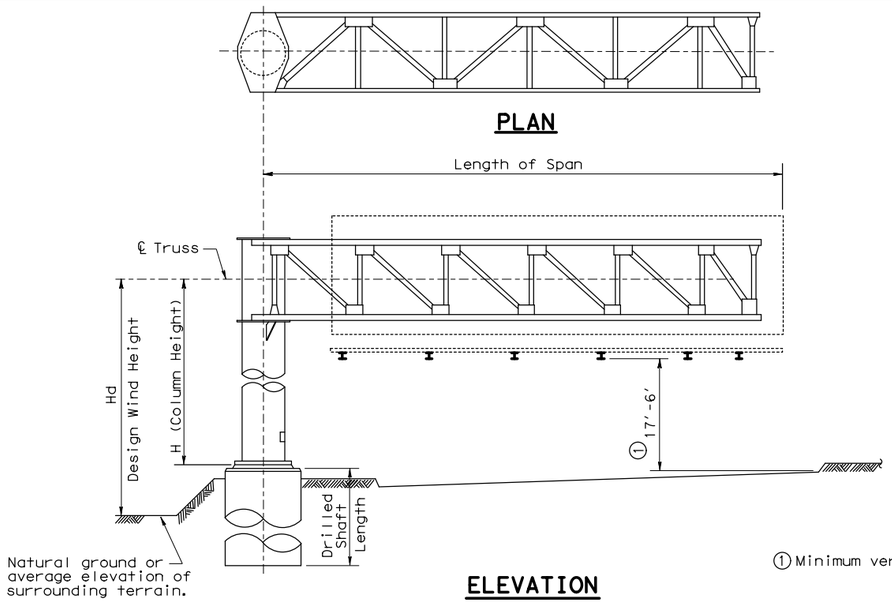
Traffic Operations Division Standard

WIND VELOCITY AND ICE ZONES

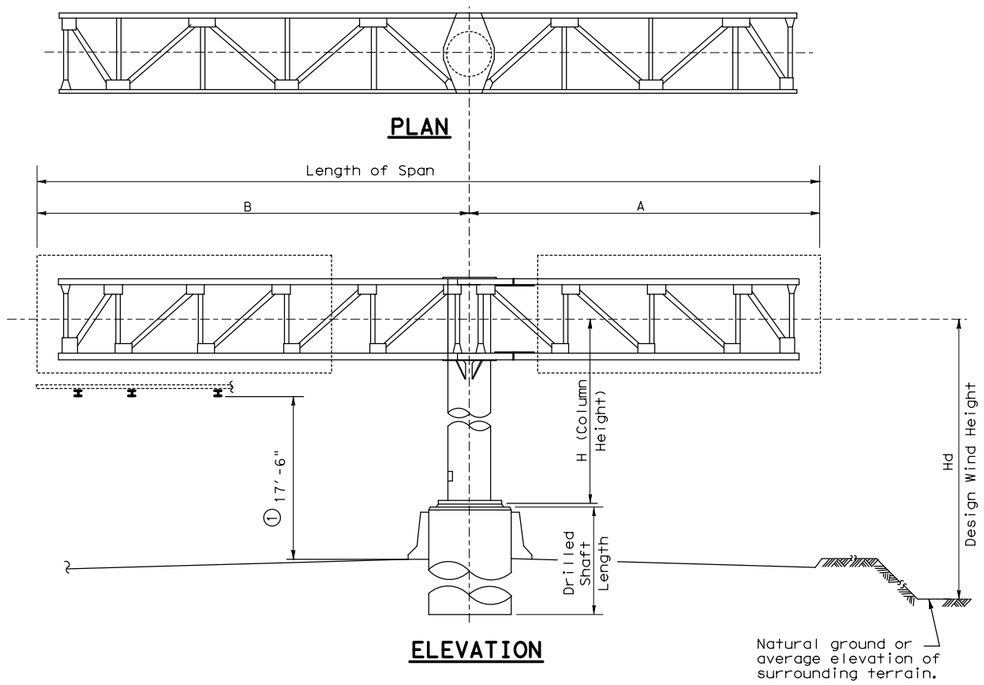
WV & IZ-14

FILE: windice.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1996	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	03	087	IH 35W
8-14-Added list of applicable standards, restricting use to structures designed for Fastest Mile wind speeds.	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		236

DATE: 5/23/2022 10:58:37 AM
FILE: c:\pwworking\aecom#ds20#nar2019\subash.paudel@aecom.com\d0119096\stds60.dgn



① Minimum vertical clearance



SELECTION EXAMPLE CANTILEVER SPAN

Given: Cantilever Span = 33′; Column Height, H = 23.3.′; Design Wind Height, Hd = 27′; Avg. Penetrometer Value, N = 15 (clay type soil); Hill County

Step 1: Select applicable COSS standard.
From Wind Velocity and Ice Zone sheet (WV & IZ-96) determine that Hill County is in Zone 4 (70 mph) and is above the ice line. Since Design Wind Height is less than 30′, use standard COSS-Z4 & Z4I. If Design Wind Height is more than 30′, use COSS-Z3 & Z3I. NOTE: In Zone 1 if Design Wind Height is greater than 30′ use HCOSS-Z1.

Step 2: Determine tower details from COSS-Z4 & Z4I. Use column height to nearest tabulated value′ i.e., 23′. Round span length up to the nearest tabulated value, i.e., 35′.
Tower details are:
Tower pipe 24" Dia with min. wall thickness = 0.312"
Base plate 33 ¾" Dia x 1 ¾"
Anchor bolts 8~1 ¾" Dia on 29 ⅜" bolt circle
Horizontal deflection of tower at ℄ truss = 0.889". During installation, double nuts at base plate may be used to plumb tower to compensate for horizontal deflection.
Design Moment = 244 Kip-ft
Design Torsion = 162 Kip-ft

Step 3: Determine truss details from COSS-Z4 & Z4I.
Read from small table at bottom of sheet for span = 35′.
Truss design width, W and depth, D = 4.0′x 4.0′.
Chord L 3 x 3 x 5/16 (HYC) with 6 bolt connection at tower
D.L. Diag. L 2 x 2 x 3/16 (HYC) with 2 bolt connection
W. L. Diag. L 3 x 3 x 3/16 (HYC) with 2 bolt connection
D. L. Vert. L 2 x 2 x 3/16 (HYC) with 2 bolt connection
W. L. Strut. L 2 x 2 x 3/16 (HYC) with 1 bolt connection
Bolts are ⅝" Dia high strength with 5~¾" Dia bolt alternate for chord connection at tower.
D.L. of truss = 50 lb/ft
Truss deflection at free end = 3.2". The fabricator shall compensate for this deflection by offsetting bolt holes between the upper and lower chords at the truss-to-tower connection.

Step 4: Determine foundation details. Use standard COSSF.
From COSSF with 24" Dia pipe and 1 ¾" Dia anchor bolts:
Anchor Bolts 1 ¾" Dia x 3′-10"
Drilled Shaft Dia 42"
Vertical Reinforcing 12 ~ #10 bars
Spiral C = #4 at 6" pitch Grade 60.
Misc. handhole, base plate, anchor bolt, and foundation details are shown on COSSF.

Step 5: Determine drilled shaft length from COSS-FD.
Enter the appropriate graph (for 42" Dia drilled shaft in clay soil) from the bottom with N = 15. Proceed upward interpolating moment curves (solid lines) to locate 244 Kip-ft. Project to the left side of the graph to determine the required embedment length, i.e., 12′.
Repeat the procedure for torsion curves (dashed lines) to locate 162 Kip-ft. The embedment length required to satisfy torsion is 14′. Add 3′-0" to the longer length to obtain a required drilled shaft length of 17′.

SELECTION EXAMPLE DOUBLE CANTILEVER SPAN

Given: Short span, A = 9′; Long Span, B = 25′; Total Cantilever Span = 34′; Column Height, H = 24′; Design Wind Height, Hd = 26′; Avg. Penetrometer Value, N = 20 (clay type soil); Wheeler County.

Step 1: Select applicable COSS standard.
From Wind Velocity and Ice Zone sheet determine that Wheeler County is in Zone 2 (90 mph) and is above the ice line. Since Design Wind Height is less than 30′ use standard COSS-Z2I. If Design Wind Height is more than 30′, use HCOSS-Z1.

Step 2: Determine tower details from COSS-Z2I.
Use column height = 24′. Round total span length up to the next longer tabulated length span, i.e., 35′. If total span length is greater than 40′, a special design would be required.
Tower details are:
Tower pipe 30" Dia with min. wall thickness = 0.310"
Base Plate 40 ½" Dia x 1 ¾"
Anchor bolts 8 ~ 2" Dia on 35 ¾" bolt circle
Horizontal deflection of tower at ℄ truss = 0.574-0.316 = 0.26".
During installation, double nuts at base plate may be used to plumb tower and compensate for horizontal deflection.
Design Moment = 403 Kip-ft (use total span = 35′)
Design Torsion = 136 Kip-ft (use long span = 25′)

Step 3: Determine truss details from COSS-Z2I.
Read from small table at bottom of sheet 2 of 2 for Span A = 9′ (use 10′):
Chord L 3 x 3 x 3/16 (HYC) with 3 bolt connection at splice
D.L. Diag. L 2 x 2 x 3/16 (HYC) with 2 bolt connection
W.L. Diag. L 3 x 3 x 3/16 (HYC) with 2 bolt connection
D.L. Vert. L 2 x 2 x 3/16 (HYC) with 2 bolt connection
W.L. Strut. L 2 x 2 x 3/16 (HYC) with 1 bolt connection
Bolts are ⅝" Dia high strength.
D.L. of truss = 42 lb/ft.
Span B = 25′:
Chord L 3 x 3 x 1/4 (HYC) with 4 bolt connection at tower
D.L. Diag. L 2 x 2 x 3/16 (HYC) with 2 bolt connection
W.L. Diag. L 3 x 3 x 3/16 (HYC) with 2 bolt connection
D.L. Vert. L 2 x 2 x 3/16 (HYC) with 2 bolt connection
W.L. Strut. L 2 x 2 x 3/16 (HYC) with 1 bolt connection
Bolts are ⅝" Dia high strength with 3 ~ ¾" Dia bolt alternate for chord connection at tower.
D.L. of truss = 47 lb/ft.
Truss defl. at free end = 0.2" for Span A, = 1.3" for Span B.
The fabricator shall compensate for deflections by offsetting bolt holes between upper and lower chords at splice and at truss-to-tower connection. Top chord shall be shortened between the tower and the splice to achieve the required offset.

Step 4: Determine foundation details. Use standard COSSF.
From COSSF with 30" Dia pipe and 2" Dia anchor bolts:
Anchor bolts 2" Dia x 4′-3"
Drilled shaft Dia 54"
Vertical Reinforcing 18 ~ #10 bars
Spiral C = #4 at 6" pitch Grade 60
Misc. handhole, base plate, anchor bolt, and foundation details are shown on COSSF.

Step 5: Determine drilled shaft length from COSS-FD.
Enter the appropriate graph (for 54" Dia drilled shaft in clay type soil) from the bottom with N = 20. Proceed upward interpolating moment curves (solid lines) to locate 403 Kip-ft. Project to the left side of graph to determine required embedment length, i.e., 13′.
Repeat the procedure for the torsion curves (dashed lines) to locate 136 Kip-ft. Embedment length required to satisfy torsion is 9′.
Add 3′ to the longer length to obtain required drilled shaft length of 16′.

Texas Department of Transportation
Traffic Operations Division

CANTILEVER OVERHEAD SIGN SUPPORTS SELECTION EXAMPLES

COSS-SE

REVISIONS

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W

DIST	COUNTY	SHEET NO.
FTW	JOHNSON	237

ZONE 3 WITH AND WITHOUT ICE 80 MPH WIND

10' SPAN

TOWER HEIGHT (ft)	TOWER PIPE O.D. (in)	TOWER PIPE WALL THICK (in)	TOWER PIPE DEFL ΔH (in)	ANCHOR BOLTS SIZE DIA (in)	ANCHOR BOLTS NO.	ANCHOR BOLTS BOLT CIR DIA	BASE PLATE SIZE (in)	TRUSS DEFL ΔV (in)	DESIGN LOADS SHEAR V (Kips)	DESIGN LOADS TORSION T (K-ft)	DESIGN LOADS MOMENT M (K-ft)
14'	16	0.250	0.105	1 1/4	6	20 1/2"	24 × 1 1/4	0.2	3.59	16.19	49.87
15'			0.120						3.61		53.42
16'			0.137						3.62		57.00
17'			0.154						3.64		60.59
18'			0.173						3.66		64.21
19'			0.193		6				3.67		67.85
20'			0.214		8				3.69		71.51
21'			0.235						3.71		75.18
22'			0.258					0.2	3.73		78.88
23'			0.282					0.3	3.74		82.59
24'			0.308						3.76		86.33
25'			0.334				24 × 1 1/4		3.78		90.08
26'			0.361				24 × 1 3/8		3.79		93.85
27'			0.389						3.81		97.64
28'			0.419						3.83		101.44
29'			0.449						3.84		105.26
30'			0.481						3.86		109.11
31'			0.513				24 × 1 3/8		3.88		112.96
32'	16	0.250	0.547	1 1/4	8	20 1/2"	24 × 1 1/2	0.3	3.89	16.19	116.84

15' SPAN

TOWER HEIGHT (ft)	TOWER PIPE O.D. (in)	TOWER PIPE WALL THICK (in)	TOWER PIPE DEFL ΔH (in)	ANCHOR BOLTS SIZE DIA (in)	ANCHOR BOLTS NO.	ANCHOR BOLTS BOLT CIR DIA	BASE PLATE SIZE (in)	TRUSS DEFL ΔV (in)	DESIGN LOADS SHEAR V (Kips)	DESIGN LOADS TORSION T (K-ft)	DESIGN LOADS MOMENT M (K-ft)
14'	16	0.250	0.235	1 3/8	8	20 3/4"	24 1/2 × 1 3/8	0.5	5.40	37.56	76.63
15'			0.270					0.6	5.41		81.91
16'			0.308					0.6	5.43		87.23
17'			0.347					0.7	5.45		92.57
18'			0.389				24 1/2 × 1 3/8	0.7	5.46		97.94
19'			0.434				24 1/2 × 1 1/2	0.7	5.48		103.33
20'			0.481					0.8	5.50		108.75
21'		0.250	0.530						5.51		114.19
22'		0.281	0.521	1 3/8		20 3/4"	24 1/2 × 1 1/2		5.53		119.66
23'		0.281	0.569	1 1/2		21"	25 × 1 5/8		5.55		125.14
24'		0.281	0.620						5.56		130.65
25'		0.312	0.610						5.58		136.18
26'		0.312	0.660				25 × 1 5/8		5.60		141.73
27'		0.312	0.711				25 × 1 3/4		5.62		147.30
28'		0.344	0.699						5.63		152.89
29'		0.344	0.750						5.65		158.50
30'		0.344	0.802	1 1/2		21"	25 × 1 3/4		5.67		164.12
31'		0.375	0.791	1 3/4		21 1/2"	26 × 1 7/8		5.68		169.77
32'	16	0.375	0.843	1 3/4	8	21 1/2"	26 × 1 7/8	0.8	5.70	37.56	175.43

20' SPAN

TOWER HEIGHT (ft)	TOWER PIPE O.D. (in)	TOWER PIPE WALL THICK (in)	TOWER PIPE DEFL ΔH (in)	ANCHOR BOLTS SIZE DIA (in)	ANCHOR BOLTS NO.	ANCHOR BOLTS BOLT CIR DIA	BASE PLATE SIZE (in)	TRUSS DEFL ΔV (in)	DESIGN LOADS SHEAR V (Kips)	DESIGN LOADS TORSION T (K-ft)	DESIGN LOADS MOMENT M (K-ft)
14'	20	0.250	0.213	1 1/4	8	24 1/2"	28 × 1 1/4	0.7	7.43	69.08	107.16
15'			0.244	1 1/4		24 1/2"	28 × 1 1/4	0.7	7.43		113.96
16'			0.278	1 3/8		24 3/4"	28 1/2 × 1 3/8	0.8	7.45		121.17
17'			0.314					0.8	7.47		128.42
18'			0.352					0.9	7.49		135.72
19'			0.392	1 3/8		24 3/4"	28 1/2 × 1 3/8	0.9	7.51		143.06
20'			0.435	1 1/2		25"	29 × 1 1/2	1.0	7.53		150.43
21'			0.479					1.0	7.55		157.84
22'			0.526					1.1	7.57		165.28
23'		0.250	0.575				29 × 1 1/2		7.60		172.75
24'		0.281	0.560				29 × 1 5/8		7.62		180.26
25'		0.281	0.607	1 1/2		25"	29 × 1 5/8		7.64		187.79
26'		0.281	0.657	1 3/4		25 3/8"	29 3/4 × 1 5/8		7.66		195.35
27'		0.310	0.640				29 3/4 × 1 3/4		7.68		202.94
28'		0.310	0.688						7.70		210.55
29'		0.310	0.738						7.72		218.20
30'		0.340	0.721				29 3/4 × 1 3/4		7.74		225.86
31'		0.340	0.770				29 3/4 × 1 7/8		7.77		233.56
32'	20	0.340	0.821	1 3/4	8	25 3/8"	29 3/4 × 1 7/8	1.1	7.79	69.08	241.27

25' SPAN

TOWER PIPE O.D. (in)	TOWER PIPE WALL THICK (in)	TOWER PIPE DEFL ΔH (in)	ANCHOR BOLTS SIZE DIA (in)	ANCHOR BOLTS NO.	ANCHOR BOLTS BOLT CIR DIA	BASE PLATE SIZE (in)	TRUSS DEFL ΔV (in)	DESIGN LOADS SHEAR V (Kips)	DESIGN LOADS TORSION T (K-ft)	DESIGN LOADS MOMENT M (K-ft)	TOWER HEIGHT (ft)
20	0.281	0.308	1 1/2	8	25"	29 × 1 1/2	1.3	9.14	107.68	135.49	14'
	0.281	0.354					1.4	9.17		144.13	15'
	0.281	0.403					1.4	9.19		152.86	16'
	0.281	0.455	1 1/2		25"	29 × 1 1/2	1.5	9.21		161.65	17'
	0.312	0.460	1 3/4		25 3/8"	29 3/4 × 1 5/8	1.5	9.23		170.51	18'
	0.312	0.513				29 3/4 × 1 5/8	1.5	9.25		179.43	19'
	0.312	0.568				29 3/4 × 1 3/4	1.6	9.27		188.39	20'
	0.312	0.627					1.6	9.29		197.41	21'
	0.344	0.628					1.6	9.31		206.47	22'
	0.344	0.686				29 3/4 × 1 3/4	1.7	9.34		215.57	23'
	0.344	0.747				29 3/4 × 1 7/8		9.36		224.71	24'
	0.375	0.748				29 3/4 × 1 7/8		9.38		233.89	25'
	0.375	0.809	1 3/4		25 3/8"	29 3/4 × 1 7/8	1.7	9.40		243.10	26'
	0.375	0.872	2		25 3/4"	30 1/2 × 2	1.8	9.42		252.34	27'
	0.406	0.870						9.44		261.62	28'
	0.406	0.933						9.46		270.93	29'
	0.406	0.999				30 1/2 × 2		9.48		280.27	30'
	0.441	0.992				30 1/2 × 2 1/4		9.50		289.64	31'
20	0.441	1.057	2	8	25 3/4"	30 1/2 × 2 1/4	1.8	9.53	107.68	299.04	32'

ZONE 3 WITH AND WITHOUT ICE 80 MPH WIND

30' SPAN

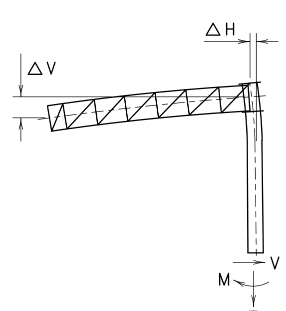
TOWER HEIGHT (ft)	TOWER PIPE O.D. (in)	TOWER PIPE WALL THICK (in)	TOWER PIPE DEFL ΔH (in)	ANCHOR BOLTS SIZE DIA (in)	ANCHOR BOLTS NO.	ANCHOR BOLTS BOLT CIR DIA	BASE PLATE SIZE (in)	TRUSS DEFL ΔV (in)	DESIGN LOADS SHEAR V (Kips)	DESIGN LOADS TORSION T (K-ft)	DESIGN LOADS MOMENT M (K-ft)
14'	24	0.250	0.289	1 1/2	8	29"	33 × 1 1/2	1.6	11.00	155.44	167.11
15'		0.250	0.331	1 1/2		29"	33 × 1 1/2	1.6	11.03		177.27
16'		0.281	0.338	1 3/4		29 3/8"	33 3/4 × 1 1/2	1.6	11.05		187.54
17'			0.381				33 3/4 × 1 1/2	1.7	11.08		197.93
18'			0.428				33 3/4 × 1 1/2	1.8	11.10		208.40
19'		0.281	0.477				33 3/4 × 1 5/8		11.13		218.97
20'		0.312	0.477				33 3/4 × 1 5/8		11.15		229.60
21'			0.526				33 3/4 × 1 5/8	1.8	11.18		240.31
22'			0.577				33 3/4 × 1 3/4	1.9	11.20		251.08
23'			0.631				33 3/4 × 1 3/4	2.0	11.23		261.91
24'		0.312	0.687	1 3/4		29 3/8"	33 3/4 × 1 3/4		11.25		272.80
25'		0.344	0.679	2		29 3/4"	34 1/2 × 1 3/4		11.28		283.74
26'			0.735				34 1/2 × 2	2.0	11.30		294.73
27'			0.792					2.1	11.33		305.77
28'			0.852					2.2	11.36		316.85
29'		0.344	0.914						11.38		327.97
30'		0.375	0.901						11.41		339.13
31'		0.375	0.962					2.2	11.43		350.34
32'	24	0.375	1.023	2	8	29 3/4"	34 1/2 × 2	2.3	11.44	155.44	361.13

35' SPAN

TOWER HEIGHT (ft)	TOWER PIPE O.D. (in)	TOWER PIPE WALL THICK (in)	TOWER PIPE DEFL ΔH (in)	ANCHOR BOLTS SIZE DIA (in)	ANCHOR BOLTS NO.	ANCHOR BOLTS BOLT CIR DIA	BASE PLATE SIZE (in)	TRUSS DEFL ΔV (in)	DESIGN LOADS SHEAR V (Kips)	DESIGN LOADS TORSION T (K-ft)	DESIGN LOADS MOMENT M (K-ft)
14'	30	0.250	0.210	1 3/4	8	35 3/8"	39 3/4 × 1 1/2	1.5	12.87	211.58	202.48
15'			0.241					1.6	12.90		213.97
16'			0.275					1.6	12.93		225.63
17'		0.250	0.310					1.7	12.97		237.46
18'		0.281	0.310					1.7	13.00		249.43
19'			0.346					1.7	13.03		261.52
20'			0.383					1.8	13.06		273.72
21'			0.422					1.8	13.09		286.04
22'			0.463					1.9	13.12		298.44
23'			0.507	1 3/4		35 3/8"	39 3/4 × 1 1/2	2.0	13.16		310.94
24'			0.552	2		35 3/4"	40 1/2 × 1 5/8	2.0	13.19		323.51
25'			0.598				40 1/2 × 1 5/8	2.1	13.22		336.16
26'			0.647				40 1/2 × 1 5/8	2.2	13.25		348.89
27'			0.698				40 1/2 × 1 3/4	2.2	13.28		361.68
28'		0.281	0.751					2.3	13.31		374.53
29'		0.310	0.726					2.2	13.35		387.45
30'			0.777					2.2	13.38		400.42
31'			0.830					2.3	13.41		413.45
32'	30	0.310	0.884	2	8	35 3/4"	40 1/2 × 1 3/4	2.4	13.44	211.58	426.53

40' SPAN

TOWER PIPE O.D. (in)	TOWER PIPE WALL THICK (in)	TOWER PIPE DEFL ΔH (in)	ANCHOR BOLTS SIZE DIA (in)	ANCHOR BOLTS NO.	ANCHOR BOLTS BOLT CIR DIA	BASE PLATE SIZE (in)	TRUSS DEFL ΔV (in)	DESIGN LOADS SHEAR V (Kips)	DESIGN LOADS TORSION T (K-ft)	DESIGN LOADS MOMENT M (K-ft)	TOWER HEIGHT (ft)
30	0.280	0.260	1 3/4	8	35 3/8"	39 7/8 × 1 1/2	2.1	14.65	276.72	242.20	14'
		0.298	1 3/4		35 3/8"	39 7/8 × 1 1/2	2.2	14.68		254.69	15'
		0.339	1 3/4		35 3/8"	39 7/8 × 1 1/2	2.3	14.71		267.44	16'
		0.383	2		35 3/4"	40 1/2 × 1 1/2	2.4	14.75		280.40	17'
		0.429				40 1/2 × 1 5/8	2.5	14.78		293.56	18'
	0.280	0.478					2.6	14.81		306.90	19'
	0.312	0.478					2.6	14.84		320.39	20'
		0.527				40 1/2 × 1 5/8	2.6	14.87		334.02	21'
		0.578				40 1/2 × 1 3/4	2.7	14.90		347.79	22'
		0.632					2.8	14.94		361.67	23'
		0.688					2.9	14.97		375.66	24'
	0.312	0.747				40 1/2 × 1 3/4	3.0	15.00		389.75	25'
	0.340	0.736				40 1/2 × 2	3.0	15.03		403.94	26'
		0.794	2		35 3/4"	40 1/2 × 2	3.0	15.06		418.22	27'
		0.854	2 1/4		36"	41 × 2	3.1	15.09		432.57	28'
		0.916					3.2	15.13		447.01	29'
	0.340	0.980						15.16		461.52	30'
	0.375	0.963						15.19		476.10	31'
30	0.375	1.026	2 1/4	8	36"	41 × 2	3.2	15.22	276.72	490.75	32'



ELEVATION

(SHOWING DESIGN LOADS AND DEAD LOAD DEFLECTIONS)

TRUSS DETAILS

SPAN	10', 15', & 20'	25'	30'	35'	40'
W × D = WIDTH × DEPTH	4.0 × 4.0	4.0 × 4.0	4.0 × 4.0	4.5 × 4.5	4.5 × 4.5
CHORD-①, Unless Otherwise Shown	L 3 × 3 × 3/16 ② [3]	L 3 × 3 × 1/4 ② [4]	L 3 × 3 × 1/4 [6]	L 3 × 3 × 5/16 [7]	L 3 1/2 × 3 1/2 × 5/16 [9]
DEAD LOAD DIAGONAL-②	L 2 × 2 × 3/16 [2]	L 2 × 2 × 3/16 [2]	L 2 × 2 × 3/16 [2]	L 2 × 2 × 3/16 [2]	L 2 × 2 × 3/16 [3]
WIND LOAD DIAGONAL-②	L 2 1/2 × 2 1/2 × 3/16 [2]	L 2 1/2 × 2 1/2 × 3/16 [2]	L 3 × 3 × 1/4 [2]	L 3 × 3 × 1/4 [2]	L 3 × 3 × 1/4 [3]
DEAD LOAD VERTICAL-②	L 2 × 2 × 3/16 [2]	L 2 × 2 × 3/16 [2]	L 2 × 2 × 3/16 [2]	L 2 1/2 × 2 1/2 × 3/16 [2]	L 2 1/2 × 2 1/2 × 3/16 [2]
WIND LOAD STRUT-②	L 2 × 2 × 3/16 [1]	L 2 × 2 × 3/16 [1]	L 2 × 2 × 3/16 [1]	L 2 × 2 × 3/16 [1]	L 2 × 2 × 3/16 [1]
TRUSS DEAD LOAD	38 lb/ft	43 lb/ft	45 lb/ft	53 lb/ft	62 lb/ft
SIZE H.S. BOLTS IN CONNECTION	5/8" DIA	5/8" DIA	5/8" DIA	5/8" DIA	5/8" DIA
NO. & SIZE OF H.S. BOLTS IN CHORD ANGLE TO TOWER CONNECTION PLATE	3 ~ 5/8" DIA ea	4 ~ 5/8" DIA or 3 ~ 3/4" DIA ea	6 ~ 5/8" DIA or 5 ~ 3/4" DIA ea	7 ~ 5/8" DIA or 5 ~ 3/4" DIA ea	9 ~ 5/8" DIA or 7 ~ 3/4" DIA ea

① "Low-Alloy Steel" for non-bridge structures per Item 442, "Metal For Structures".

② "Carbon Steel" for non-bridge structures per Item 442, "Metal For Structures".

GENERAL NOTES :

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

Steel for tower pipe shall conform to ASTM A53 Grade B or to ASTM A501. Tower pipe wall thickness shown is the minimum allowable. Fabricator may use the wall thickness shown or pipe of the same diameter with greater wall thickness.

All connection bolts shall conform to Item 447, "Structural Bolting". All structural steel, connection bolts, nuts and washers shall be galvanized in accordance with the Specifications.

Compensate for truss deflection at free end by offsetting upper and lower bolt holes at truss-to-tower connection.

For truss details see standard drawing COSSD.

For base and foundation details see standard drawing COSSF.

For cantilever truss lengths falling between those shown use sizes called for in the next longer span.

Truss and towers for cantilever sign supports are designed for the equivalent area of a 10'-0" deep sign panel over 100% of the span length. Design includes 3 pounds per foot squared for sign panel and 20 pounds per foot for lights and 50 pounds per foot for walkways all placed as specified for the design sign panel.

Details called for hereon are applicable for Design Wind Heights up to 30' inclusive.

Number of High Strength bolts required in truss connection or splice are indicated in brackets, e.g. [3], after the member size.

Deflections shown include the design loads for Truss, Sign Panel, Lights and Walkways.

Texas Department of Transportation
Traffic Operations Division

CANTILEVER OVERHEAD SIGN SUPPORTS

COSS-Z3 & Z3I-10

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS
4-10

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W

DIST	COUNTY	SHEET NO.
FTW	JOHNSON	238

64

DATE: 5/23/2022 10:58:41 AM
FILE: c:\pwworking\aecom\ds20*na*2019\subash.paudel@aecom.com\d0119096\stds64.dgn

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ZONE 4 WITH AND WITHOUT ICE 70 MPH WIND

10' SPAN

TOWER HEIGHT (ft)	TOWER PIPE O.D. (in)	WALL THICK (in)	DEFL ΔH (in)	ANCHOR BOLTS SIZE DIA (in)	NO.	BOLT CIR DIA	BASE PLATE SIZE (in)	TRUSS DEFL ΔV (in)	SHEAR V (Kips)	TORSION T (K-ft)	MOMENT M (K-ft)
14'	16	0.250	0.104	1 1/4	6	20 1/2"	24 x 1 1/4	0.2	2.75	12.39	38.53
15'			0.119						2.76		41.23
16'			0.136						2.77		43.94
17'			0.153						2.79		46.68
18'			0.172						2.80		49.43
19'			0.191						2.81		52.20
20'			0.212						2.83		54.99
21'			0.234						2.84		57.79
22'			0.257					0.2	2.85		60.61
23'			0.280					0.3	2.87		63.45
24'			0.305						2.88		66.30
25'			0.331	1 1/4		20 1/2"	24 x 1 1/4		2.89		69.16
26'			0.358	1 3/8		20 3/4"	24 1/2 x 1 3/8		2.90		72.04
27'			0.386						2.92		74.93
28'			0.416						2.93		77.84
29'			0.446						2.94		80.76
30'			0.477	1 3/8		20 3/4"	24 1/2 x 1 3/8		2.96		83.69
31'			0.509	1 1/2		21"	25 x 1 1/2		2.97		86.64
32'	16	0.250	0.543	1 1/2	6	21"	25 x 1 1/2	0.3	2.98	12.39	89.61

15' SPAN

TOWER HEIGHT (ft)	TOWER PIPE O.D. (in)	WALL THICK (in)	DEFL ΔH (in)	ANCHOR BOLTS SIZE DIA (in)	NO.	BOLT CIR DIA	BASE PLATE SIZE (in)	TRUSS DEFL ΔV (in)	SHEAR V (Kips)	TORSION T (K-ft)	MOMENT M (K-ft)
14'	16	0.250	0.234	1 3/8	6	20 3/4"	24 1/2 x 1 1/4	0.5	4.13	28.76	59.63
15'			0.268				24 1/2 x 1 1/4	0.6	4.14		63.62
16'			0.305				24 1/2 x 1 3/8	0.6	4.16		67.63
17'			0.345	1 3/8		20 3/4"	24 1/2 x 1 3/8	0.6	4.17		71.67
18'			0.386	1 1/2		21"	25 x 1 3/8	0.7	4.18		75.74
19'			0.431				25 x 1 1/2	0.7	4.20		79.83
20'			0.477					0.7	4.21		83.94
21'			0.526					0.8	4.22		88.08
22'			0.577		6		25 x 1 1/2	0.8	4.23		92.23
23'			0.631		8		25 x 1 5/8	0.9	4.25		96.40
24'			0.687					0.9	4.26		100.60
25'			0.745					0.9	4.27		104.81
26'			0.806					1.0	4.29		109.03
27'			0.869						4.30		113.28
28'		0.250	0.935						4.31		117.54
29'		0.280	0.898						4.33		121.82
30'			0.961						4.34		126.11
31'			1.026					1.0	4.35		130.42
32'	16	0.280	1.094	1 1/2	8	21"	25 x 1 5/8	1.1	4.36	28.76	134.74

20' SPAN

TOWER HEIGHT (ft)	TOWER PIPE O.D. (in)	WALL THICK (in)	DEFL ΔH (in)	ANCHOR BOLTS SIZE DIA (in)	NO.	BOLT CIR DIA	BASE PLATE SIZE (in)	TRUSS DEFL ΔV (in)	SHEAR V (Kips)	TORSION T (K-ft)	MOMENT M (K-ft)
14'	16	0.250	0.419	1 3/4	6	21 1/2"	26 x 1 3/4	1.3	5.59	52.67	83.06
15'		0.250	0.481					1.4	5.61		88.34
16'		0.250	0.547					1.5	5.62		93.66
17'		0.281	0.549					1.4	5.63		99.03
18'			0.615					1.5	5.64		104.44
19'			0.685					1.5	5.66		109.88
20'		0.281	0.759				26 x 1 3/4	1.6	5.67		115.36
21'		0.310	0.759				26 x 2	1.5	5.68		120.86
22'			0.834					1.6	5.70		126.40
23'			0.911		6			1.7	5.71		131.96
24'		0.310	0.992		8				5.77		138.12
25'		0.340	0.990						5.73		143.15
26'		0.340	1.071					1.7	5.75		148.78
27'		0.340	1.155					1.8	5.76		154.43
28'		0.375	1.139					1.7	5.77		160.10
29'		0.375	1.221					1.8	5.79		165.79
30'		0.375	1.307						5.80		171.49
31'		0.410	1.297						5.81		177.22
32'	16	0.410	1.382	1 3/4	8	21 1/2"	26 x 2	1.8	5.83	52.67	182.97

25' SPAN

TOWER HEIGHT (ft)	TOWER PIPE O.D. (in)	WALL THICK (in)	DEFL ΔH (in)	ANCHOR BOLTS SIZE DIA (in)	NO.	BOLT CIR DIA	BASE PLATE SIZE (in)	TRUSS DEFL ΔV (in)	SHEAR V (Kips)	TORSION T (K-ft)	MOMENT M (K-ft)
14'	20	0.250	0.333	1 3/8	8	24 3/4"	28 1/2 x 1 3/8	1.4	7.00	82.44	107.23
15'			0.382					1.5	7.02		113.64
16'			0.435					1.6	7.03		120.14
17'			0.491					1.7	7.05		126.71
18'			0.550	1 3/8		24 3/4"	28 1/2 x 1 3/8	1.7	7.07		133.34
19'			0.613	1 1/2		25"	29 x 1 1/2	1.8	7.08		140.03
20'			0.679					1.9	7.10		146.77
21'		0.250	0.749					2.0	7.12		153.56
22'		0.281	0.735				29 x 1 1/2		7.13		160.39
23'			0.803				29 x 1 5/8		7.15		167.26
24'			0.874	1 1/2		25"			7.16		174.17
25'		0.281	0.949	1 3/4		25 3/8"		2.0	7.18		181.12
26'		0.312	0.920				29 x 1 5/8	2.1	7.20		188.02
27'			0.992				29 3/4 x 1 3/4		7.21		195.03
28'			1.067				29 3/4 x 1 3/4		7.23		202.07
29'		0.312	1.145				29 3/4 x 1 3/4	2.1	7.24		209.14
30'		0.344	1.119				29 3/4 x 2	2.2	7.26		216.23
31'		0.344	1.194				29 3/4 x 2	2.2	7.28		223.35
32'	20	0.344	1.273	1 3/4	8	25 3/8"	29 3/4 x 2	2.2	7.29	82.44	230.50

ZONE 4 WITH AND WITHOUT ICE 70 MPH WIND

30' SPAN

TOWER HEIGHT (ft)	TOWER PIPE O.D. (in)	WALL THICK (in)	DEFL ΔH (in)	ANCHOR BOLTS SIZE DIA (in)	NO.	BOLT CIR DIA	BASE PLATE SIZE (in)	TRUSS DEFL ΔV (in)	SHEAR V (Kips)	TORSION T (K-ft)	MOMENT M (K-ft)
14'	24	0.250	0.285	1 1/2	8	29"	33 x 1 1/2	1.6	8.42	119.01	134.48
15'			0.327					1.6	8.44		141.90
16'			0.372					1.7	8.46		149.44
17'			0.420					1.8	8.48		157.10
18'			0.471					1.9	8.50		164.85
19'			0.524					2.0	8.52		172.68
20'			0.581					2.1	8.54		180.60
21'			0.641	1 1/2		29"	33 x 1 1/2	2.2	8.56		188.59
22'			0.703	1 3/4		29 3/8"	33 3/4 x 1 1/2	2.2	8.58		196.65
23'			0.768				33 3/4 x 1 1/2	2.3	8.60		204.76
24'			0.837				33 3/4 x 1 5/8	2.4	8.62		212.93
25'			0.908				33 3/4 x 1 5/8	2.5	8.64		221.15
26'		0.250	0.982				33 3/4 x 1 5/8	2.6	8.66		229.42
27'		0.281	0.949				33 3/4 x 1 3/4	2.4	8.67		237.74
28'			1.021				33 3/4 x 1 3/4	2.5	8.69		246.10
29'			1.095	1 3/4		29 3/8"	33 3/4 x 1 3/4	2.6	8.71		254.49
30'			1.172	2		29 3/4"	34 1/2 x 1 3/4	2.7	8.73		262.93
31'			1.251	2		29 3/4"	34 1/2 x 1 3/4	2.8	8.75		271.41
32'	24	0.281	1.333	2	8	29 3/4"	34 1/2 x 1 3/4	2.8	8.77	119.01	279.92

35' SPAN

TOWER HEIGHT (ft)	TOWER PIPE O.D. (in)	WALL THICK (in)	DEFL ΔH (in)	ANCHOR BOLTS SIZE DIA (in)	NO.	BOLT CIR DIA	BASE PLATE SIZE (in)	TRUSS DEFL ΔV (in)	SHEAR V (Kips)	TORSION T (K-ft)	MOMENT M (K-ft)
14'	24	0.250	0.406	1 3/4	8	29 3/8"	33 3/4 x 1 1/2	2.6	9.77	161.98	165.20
15'			0.467					2.7	9.79		173.37
16'			0.531					2.8	9.81		181.71
17'		0.250	0.599				33 3/4 x 1 1/2	3.0	9.83		190.21
18'		0.281	0.602				33 3/4 x 1 5/8	2.9	9.85		198.85
19'			0.671					3.0	9.87		207.61
20'			0.743					3.1	9.89		216.48
21'			0.820				33 3/4 x 1 5/8	3.2	9.91		225.46
22'		0.281	0.900				33 3/4 x 1 3/4	3.4	9.93		234.52
23'		0.312	0.889				33 3/4 x 1 3/4	3.2	9.95		243.67
24'			0.968	1 3/4		29 3/8"	33 3/4 x 1 3/4	3.3	9.96		252.90
25'			1.050	2		29 3/4"	34 1/2 x 1 7/8	3.5	9.98		262.20
26'			1.136					3.6	10.00		271.57
27'		0.312	1.225					3.7	10.02		280.99
28'		0.340	1.200				34 1/2 x 1 7/8	3.5	10.04		290.48
29'			1.287				34 1/2 x 2	3.6	10.06		300.02
30'			1.377					3.7	10.08		309.61
31'			1.471					3.8	10.10		319.25
32'	24	0.340	1.567	2	8	29 3/4"	34 1/2 x 2	3.9	10.12	161.98	328.93

40' SPAN

TOWER HEIGHT (ft)	TOWER PIPE O.D. (in)	WALL THICK (in)	DEFL ΔH (in)	ANCHOR BOLTS SIZE DIA (in)	NO.	BOLT CIR DIA	BASE PLATE SIZE (in)	TRUSS DEFL ΔV (in)	SHEAR V (Kips)	TORSION T (K-ft)	MOMENT M (K-ft)
14'	30	0.250	0.280	1 3/4	8	35 3/8"	39 3/4 x 1 1/2	2.4	11.22	211.94	200.44
15'			0.322					2.5	11.24		209.33
16'			0.366					2.6	11.27		218.45
17'			0.413					2.7	11.29		227.79
18'			0.463					2.8	11.32		237.32
19'		0.250	0.516					2.9	11.34		247.01
20'		0.281	0.510					2.8	11.37		256.86
21'			0.562					2.9	11.39		266.86
22'			0.617					3.0	11.41		276.98
23'			0.675				39 3/4 x 1 1/2	3.1	11.44		287.22
24'			0.735	1 3/4		35 3/8"	39 3/4 x 1 5/8	3.2	11.46		297.57
25'			0.797	2		35 3/4"	40 1/2 x 1 5/8	3.3	11.49		308.01
26'			0.862				40 1/2 x 1 5/8	3.4	11.51		318.55
27'			0.930				40 1/2 x 1 5/8	3.5	11.54		329.18
28'			1.000				40 1/2 x 1 3/4	3.6	11.56		339.89
29'			1.073					3.7	11.58		350.68
30'			1.148					3.8	11.61		361.53
31'			1.226					3.9	11.63		372.46
32'	30	0.281	1.306	2	8	35 3/4"	40 1/2 x 1 3/4	4.0	11.68	211.94	384.26

GENERAL NOTES :

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

Steel for tower pipe shall conform to ASTM A53 Grade B or to ASTM A501. Tower pipe wall thickness shown is the minimum allowable. Fabricator may use the wall thickness shown or pipe of the same diameter with greater wall thickness.

All connection bolts shall conform to Item 447, "Structural Bolting". All structural steel, connection bolts, nuts and washers shall be galvanized in accordance with the Specifications.

Compensate for truss deflection at free end by offsetting upper and lower bolt holes at truss-to-tower connection.

For truss details see standard drawing COSSD.

For base and foundation details see standard drawing COSSF.

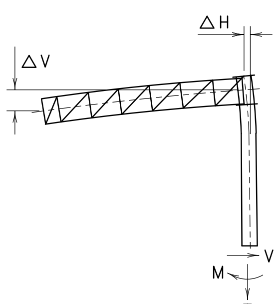
For cantilever truss lengths falling between those shown use sizes called for in the next longer span.

Truss and towers for cantilever sign supports are designed for the equivalent area of a 10'-0" deep sign panel over 100% of the span length. Design includes 3 pounds per foot squared for sign panel and 20 pounds per foot for lights and 50 pounds per foot for walkways all placed as specified for the design sign panel.

Details called for hereon are applicable for Design Wind Heights up to 30' inclusive.

Number of High Strength bolts required in truss connection or splice are indicated in brackets, e.g. [3], after the member size.

Deflections shown include the design loads for Truss, Sign Panel, Lights and Walkways.



ELEVATION

(SHOWING DESIGN LOADS AND DEAD LOAD DEFLECTIONS)

TRUSS DETAILS

SPAN	10', 15', & 20'	25'	30'	35'	40'
W x D = WIDTH x DEPTH	4.0 x 4.0	4.0 x 4.0	4.0 x 4.0	4.0 x 4.0	4.0 x 4.0
CHORD-①, Unless Otherwise Shown	L 3 x 3 x 3/16 ② [4]	L 3 x 3 x 3/16 ② [4]	L 3 x 3 x 1/4 [6]	L 3 x 3 x 5/16 [6]	L 3 x 3 x 3/8 [9]
DEAD LOAD DIAGONAL-②	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 1/2 x 2 1/2 x 3/16 [3]
WIND LOAD DIAGONAL-②	L 2 1/2 x 2 1/2 x 3/16 [2]	L 2 1/2 x 2 1/2 x 3/16 [2]	L 2 1/2 x 2 1/2 x 3/16 [2]	L 3 x 3 x 3/16 [2]	L 3 x 3 x 3/16 [2]
DEAD LOAD VERTICAL-②	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]
WIND LOAD STRUT-②	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]
TRUSS DEAD LOAD	37 lb/ft	38 lb/ft	43 lb/ft	50 lb/ft	56 lb/ft
SIZE H. S. BOLTS IN CONNECTION	5/8" DIA	5/8" DIA	5/8" DIA	5/8" DIA	5/8" DIA
NO. & SIZE OF H. S. BOLTS IN CHORD ANGLE TO TOWER CONNECTION PLATE	4 ~ 5/8" DIA ea	4 ~ 5/8" DIA or 3 ~ 3/4" DIA ea	6 ~ 5/8" DIA or 5 ~ 3/4" DIA ea	6 ~ 5/8" DIA or 5 ~ 3/4" DIA ea	9 ~ 5/8" DIA or 7 ~ 3/4" DIA ea

① "Low-Alloy Steel" for non-bridge structures per Item 442, "Metal For Structures".

② "Carbon Steel" for non-bridge structures per Item 442, "Metal For Structures".

Texas Department of Transportation
Traffic Operations Division

CANTILEVER OVERHEAD SIGN SUPPORTS

COSS-Z4 & Z4I-10

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4-10	0014	03	087	IH 35W
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	FTW		JOHNSON	239

65

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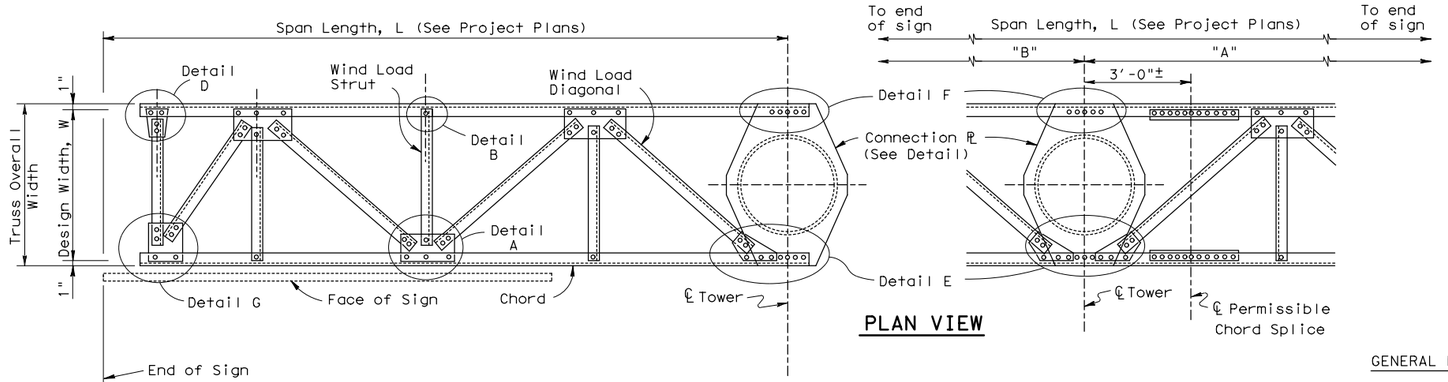
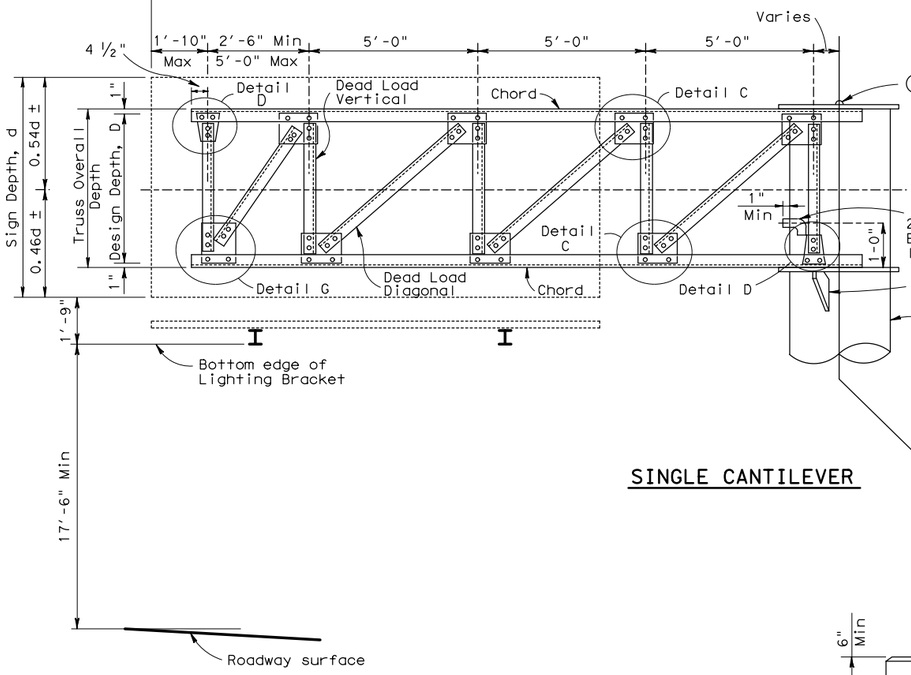


PLAN VIEW

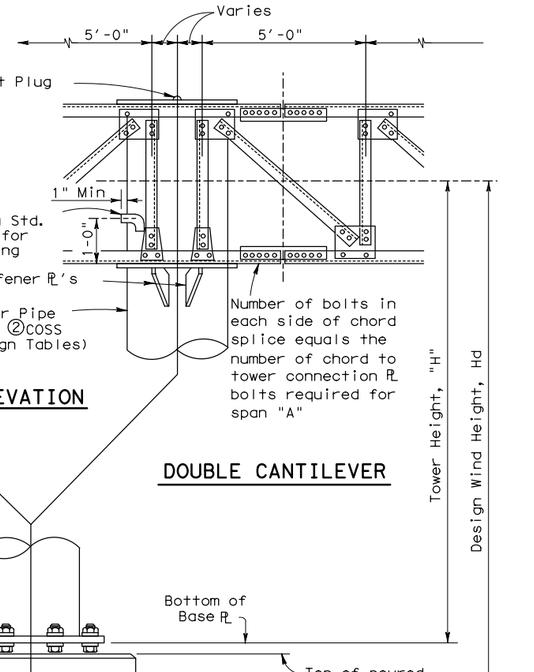
GENERAL NOTES:

Design conforms to 1975 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals and Interim revisions thereto. Connection details are typical only. Actual size of member and number of bolts will vary. The details on this sheet are intended as a guide only. See "Cantilever Overhead Sign Supports" or "High Level Cantilever Overhead Sign Supports" sheets for number of bolts and size of members.

Gusset plates to be same thickness as thickest web member in connection.

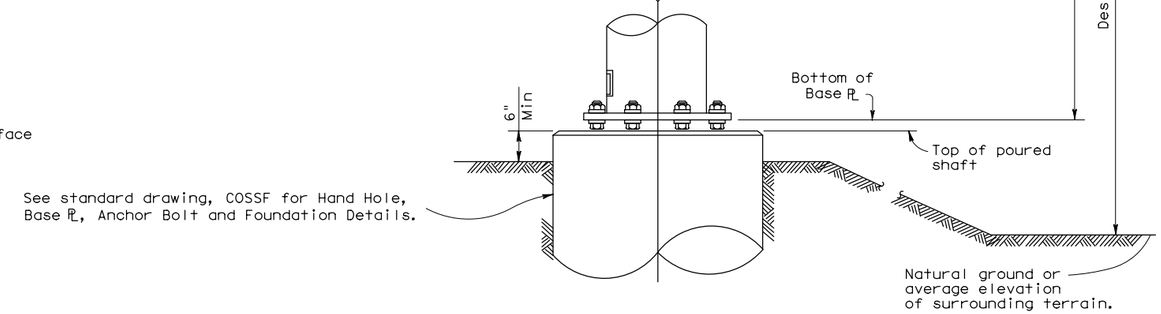


SINGLE CANTILEVER



ELEVATION

DOUBLE CANTILEVER



① Note: Cap shall be solid steel sheet ⅜" nominal thickness. Drill, tap and plug galvanizing vent. Weld plate to pipe with ⅜" weld all around.

② For COSS design tables see standard drawing, "Cantilever Overhead Sign Supports" or "High Level Cantilever Overhead Sign Supports".

SHEET 1 OF 2

Texas Department of Transportation
Traffic Operations Division

CANTILEVER OVERHEAD SIGN SUPPORT DETAILS

COSSD

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	FTW	JOHNSON		240

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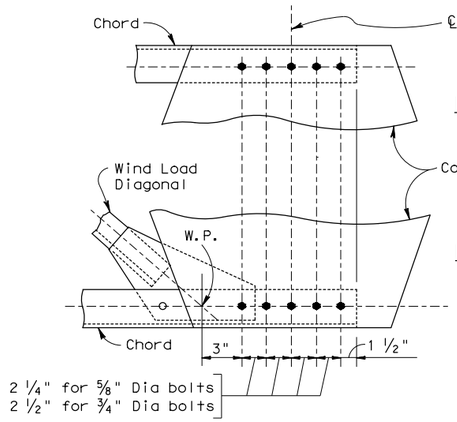
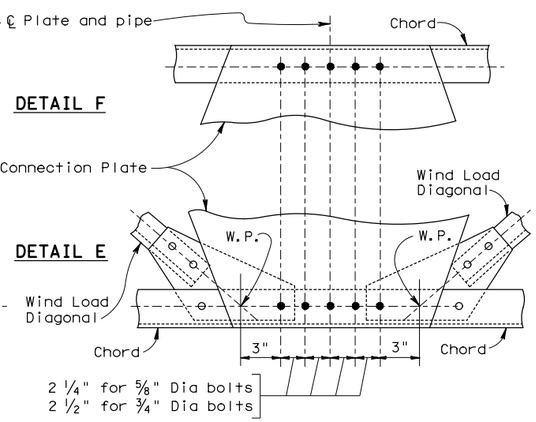


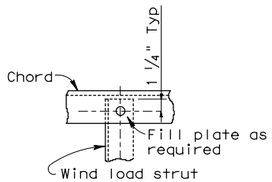
DETAIL F



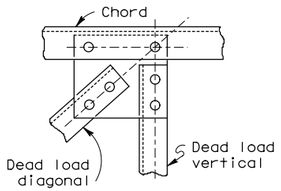
DETAIL E

SINGLE CANTILEVER

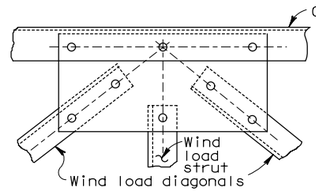
DOUBLE CANTILEVER



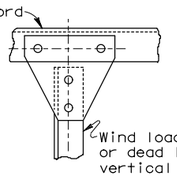
DETAIL B



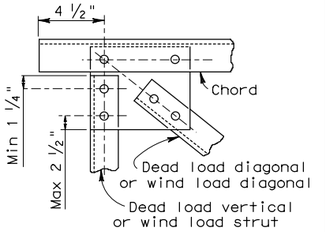
DETAIL C



DETAIL A



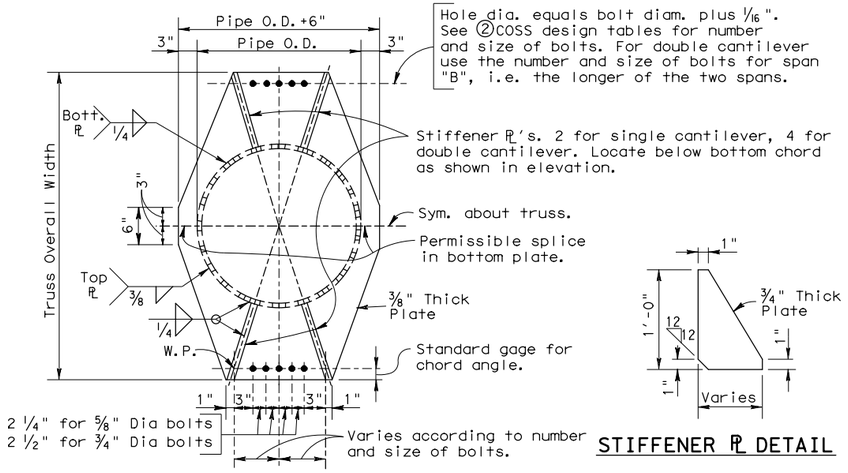
DETAIL D



DETAIL G

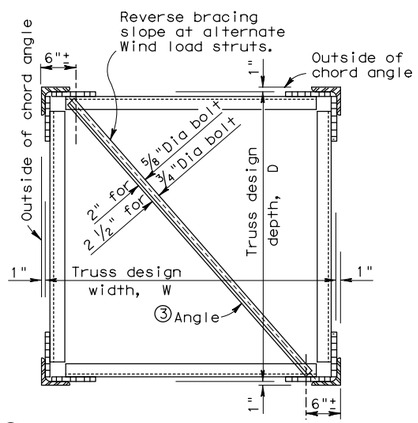
TOTAL NO. OF BOLTS IN DIAG'S. IN JOINT	NUMBER OF BOLTS REQD. IN GUSSET ℞ TO CHORD CONNECTION
0	2
2	2
3	3
4	3
5	4
6	4
8	5
10	6

CONNECTION DETAILS



CONNECTION PLATE DETAIL

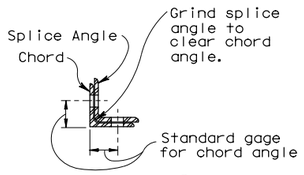
STIFFENER ℞ DETAIL



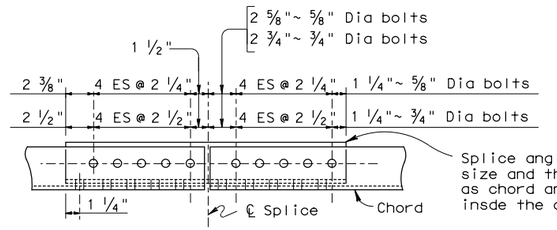
③ 2" x 2" x ⅜" angle for ⅝" Dia bolts [1]
2 ½" x 2" x ⅜" angle for ¾" Dia bolts [1]

TRUSS SECTION

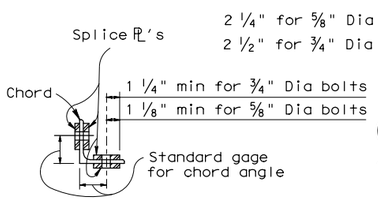
(DIAGONALS NOT SHOWN)



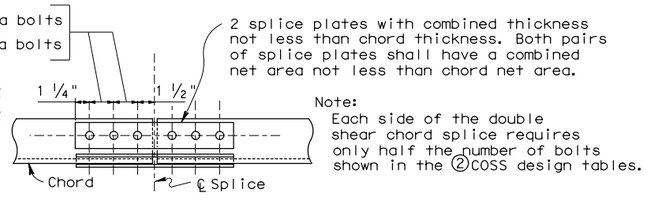
SECTION ON ℄ SPLICE



SINGLE SHEAR CHORD SPLICE

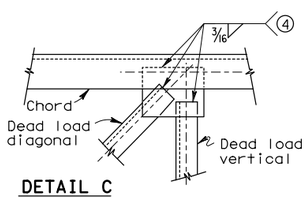


SECTION ON ℄ SPLICE



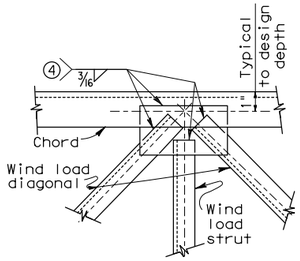
DOUBLE SHEAR CHORD SPLICE

SPLICE DETAILS



DETAIL C

(Gusset plates in other details to be similar)



DETAIL A

ALTERNATE WELDED CONNECTION DETAILS

④ MINIMUM LENGTH OF ⅜" FILLET WELD REQUIRED		
NUMBER OF BOLTS	TO REPLACE ⅝" DIA BOLTS	TO REPLACE ¾" DIA BOLTS
1	2"	3"
2	4"	6"
3	6"	9"
4	8"	11 ½"
5	10"	14 ½"
6	12"	17 ½"
7	14"	20"

SHEET 2 OF 2

Texas Department of Transportation
Traffic Operations Division

CANTILEVER OVERHEAD SIGN SUPPORT DETAILS

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	FTW	JOHNSON		241

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Washers shall conform to ASTM F436.

ANCHOR BOLT DIA.	WASHER DIMENSIONS				HOLE IN BASE PLATE
	OUTSIDE DIAMETER	HOLE DIAMETER	THICKNESS		
d			MIN.	MAX.	
1 ½" or less	2d	d + ⅛"	0.136"	0.177"	d + ¼"
1 ¾"	2d - ⅛"	d + ⅛"	0.178"	0.280"	d + 5/16"
2"	2d - ¼"	d + ⅛"	0.178"	0.280"	d + 5/16"
Over 2"	2d - ½"	d + ⅛"	0.240"	0.340"	d + 5/16"

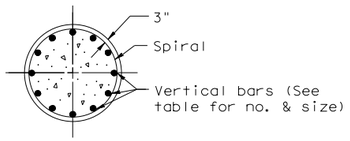
ANCHOR BOLT SIZE				
DIA	BOLT ① LENGTH	THREAD ① LENGTH	PROJECTION LENGTH	GALVAN. ① LENGTH
1 ¼"	2'-11"	5"	5 ¼"	11 ¼"
1 ⅜"	3'-1"	5 ½"	5 ¾"	11 ¾"
1 ½"	3'-4"	6"	6 ¼"	1'-0 ¼"
1 ¾"	3'-10"	7"	7 ¼"	1'-1 ¼"
2"	4'-3"	8"	8 ¼"	1'-2 ¼"
2 ¼"	4'-9"	9"	9 ¼"	1'-3 ¼"
2 ½"	5'-2"	10"	10 ¼"	1'-4 ¼"
2 ¾"	5'-8"	11"	11 ¼"	1'-5 ¼"
3"	6'-1"	1'-0"	1'-0 ¼"	1'-6 ¼"

① Anchor Bolt Fabrication Tolerances:
Bolt Length ~ ±½"
Thread Length ~ ±½"
Galvanized Length ~ -¼"

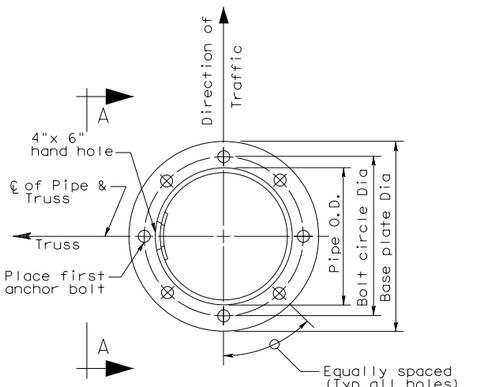
② Thread lenght applies to upper and lower threads

	PIPE OUTSIDE DIAMETER											
	16"			20"			24"			30"		
ANCHOR BOLT SIZE	BOLT CIRCLE DIA	DRILLED SHAFT SIZE	DRILLED SHAFT REINF	BOLT CIRCLE DIA	DRILLED SHAFT SIZE	DRILLED SHAFT REINF	BOLT CIRCLE DIA	DRILLED SHAFT SIZE	DRILLED SHAFT REINF	BOLT CIRCLE DIA	DRILLED SHAFT SIZE	DRILLED SHAFT REINF
1 ¼"Dia x 2'-11"	20 ½"	36" Dia	14-#8 (A)	24 ½"	36" Dia	14-#8 (A)						
1 ⅜"Dia x 3'-1"	20 ¾"	36" Dia	12-#9 (A)	24 ¾"	42" Dia	14-#9 (A)						
1 ½"Dia x 3'-4"	21"	36" Dia	12-#9 (A)	25"	42" Dia	14-#9 (A)	29"	42" Dia	14-#9 (C)			
1 ¾"Dia x 3'-10"	21 ½"	36" Dia	10-#10(A)	25 ⅜"	42" Dia	12-#10(B)	29 ⅜"	48" Dia	16-#10(C)	35 ⅜"	54" Dia	18-#10(C)
2"Dia x 4'-3"	22"	36" Dia	12-#10(A)	25 ¾"	42" Dia	12-#10(B)	29 ¾"	48" Dia	16-#10(C)	35 ¾"	54" Dia	18-#10(C)
2 ¼"Dia x 4'-9"	22 ½"	42" Dia	12-#11(A)	26"	42" Dia	10-#11(B)	30"	48" Dia	14-#11(C)	36"	54" Dia	14-#11(D)
2 ½"Dia x 5'-2"				26 ½"	42" Dia	12-#11(B)	30 ½"	48" Dia	16-#11(C)	36 ½"	54" Dia	16-#11(D)
2 ¾"Dia x 5'-8"							31 ½"	48" Dia	18-#11(D)	37"	54" Dia	20-#11(D)
3"Dia x 6'-1"										37 ½"	54" Dia	24-#11(D)

A = #3 Plain spiral at 6" pitch (Grade 40)
B = #4 Plain spiral at 6" pitch (Grade 40)
C = #4 Plain spiral at 6" pitch (Grade 60)
D = #4 Plain spiral at 3 ½" pitch (Grade 60)

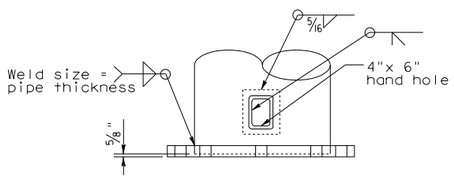


SECTION



PLAN

② See "Cantilever Overhead Sign Support" or "High Lever Cantilever Overhead Sign Support" sheets for number and size.

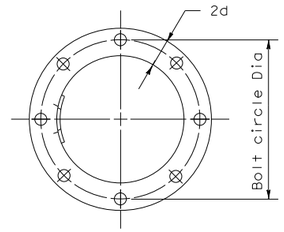


Cut 5" x 7" hole in pipe. Center 4" x 6" hand hole in ⅜" x 8" x 10" back up plate. Provide attachable cover made from section cut from pipe.

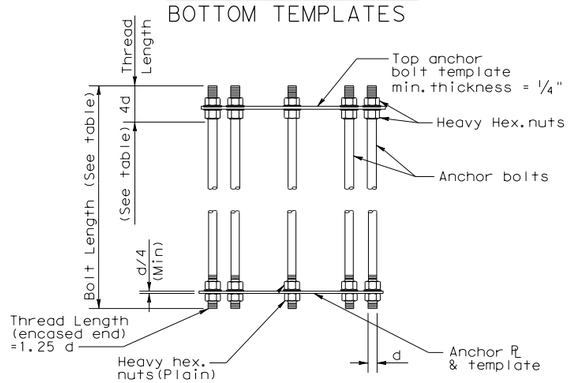
VIEW A-A

③ BASE PLATE & HANDHOLE DETAILS

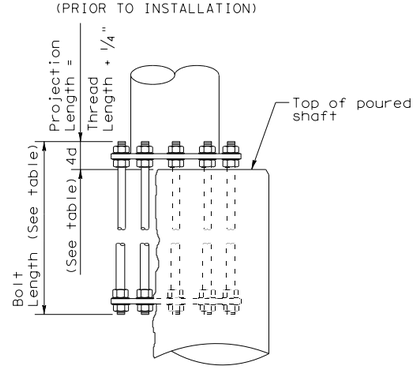
③ See "Cantilever Overhead Sign Support" or "High Level Cantilever Overhead Sign Support" sheets for Diameter and thickness of base plate.



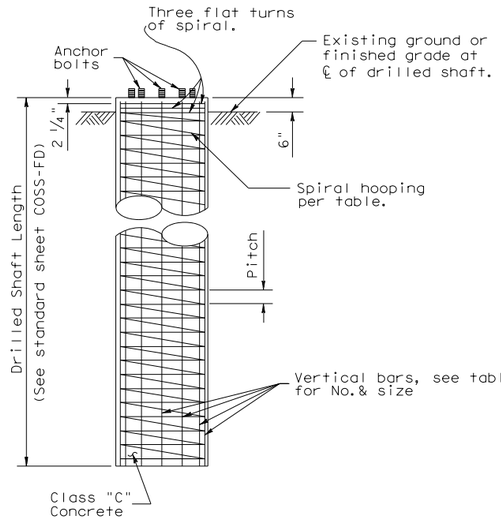
TOP VIEW OF TOP & BOTTOM TEMPLATES



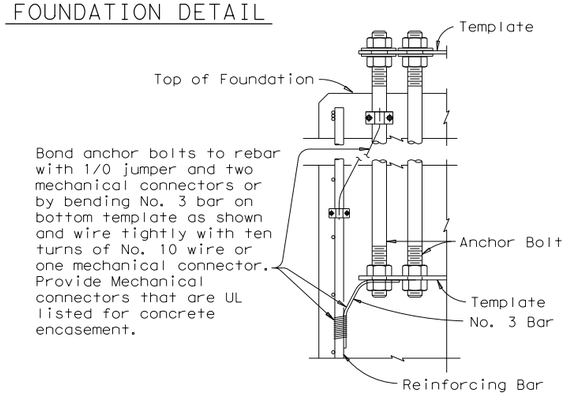
ANCHOR BOLT ASSEMBLY
(PRIOR TO INSTALLATION)



BEARING SEAT ELEVATION



FOUNDATION DETAIL



LIGHTNING PROTECTION SYSTEM

GENERAL NOTES

1. Concrete shall be Class "C".
2. Reinforcing shall conform to Item 440, "Reinforcing Steel".
3. Anchor bolts and nuts for anchor bolts shall be "Alloy Steel" per Item 449, "Anchor Bolts".
4. Anchor bolts shall be rigidly held in position during concrete placement using steel templates at the top and bottom. The top templates shall be removed after the concrete has set.
5. Lubricate and tighten anchor bolts when erecting the structure per Item 449, "Anchor Bolts". After the structure has been aligned in its final position and the anchor bolts have been properly tightened, tack weld anchor bolt nuts to washer, and tack weld washers to base plate. Galvanizing in tack welded areas shall be repaired in accordance with Item 445, "Galvanizing".
6. All vertical reinforcing shall be carried to the bottom of the Drilled Shaft.

Texas Department of Transportation

Traffic Safety Division Standard

CANTILEVER OVERHEAD SIGN SUPPORT FOUNDATION

COSSF-21

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REVISIONS	0014	03	087	IH 35W
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	FTW	JOHNSON		242

DATE: 5/23/2022 10:58:55 AM
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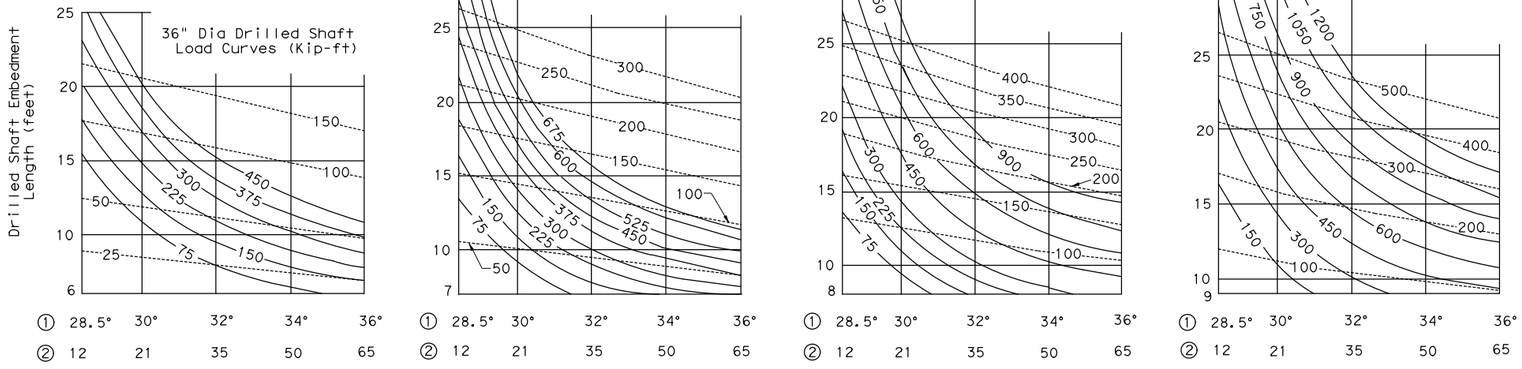


① Ø = Angle of internal friction of soil (degrees)

② N = Texas cone penetrometer value (blows per ft)

④ C(psi) = Cohesive shear strength of soil (psi)

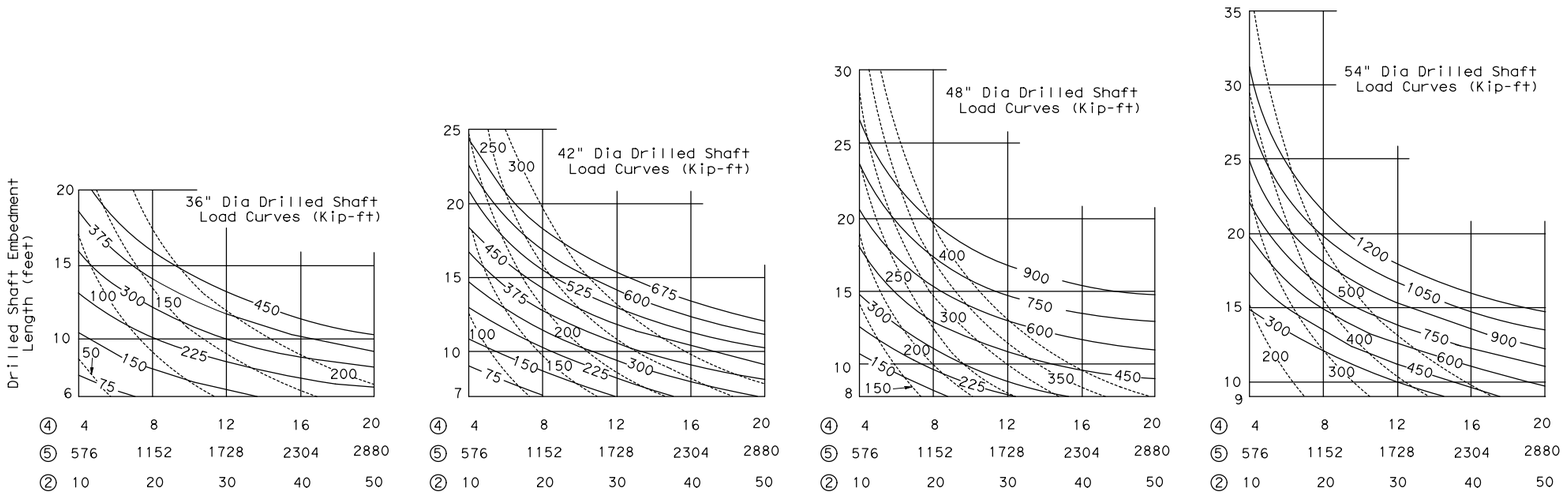
⑤ C(psf) = Cohesive shear strength of soil (psf)

③ **SUBMERGED SAND SOIL (COHESIONLESS)**

Moment ————

Torsion ----------

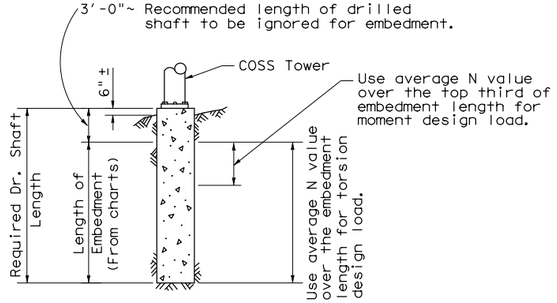
③ Note:
For unsubmerged sands and clayey sands the charts for clay soil will give a conservative foundation design.



CLAY SOIL (COHESIVE)

Moment ————

Torsion ----------



PROCEDURE:

1. Determine design moment and torsion, and the required drilled shaft diameter as outlined in the selection example sheet COSS-SE.
2. Make an initial estimate of the required embedment length.
3. From soil exploration data determine type of soil and average N value or soil property along the upper third of the drilled shaft.
4. Enter chart (for the correct shaft diameter and soil type) from the bottom at the average N value or soil property determined in step 3.
5. Proceed vertically into chart and locate intersection with design moment. Interpolate between moment curves (solid lines) as needed.
6. From intersection point turn 90° to left and read embedment length along vertical scale.
7. If embedment length differs significantly from estimated value return to step 3 with the embedment length determined in step 6.
8. From soil exploration data determine average N value or soil property over the entire length of the embedment.
9. Enter chart (for correct shaft diameter and soil type) from the bottom at the average N value or soil property determined in step 8.
10. Proceed vertically into chart and locate intersection with design torsion. Interpolate between torsion curves (dashed lines) as needed.
11. From intersection point turn 90° to left and read embedment length along vertical scale.
12. Compute the required length of drilled shaft by adding 3'-0" to longer embedment length required for moment or torsion.

GENERAL NOTES:

These charts are for use with Cantilever Overhead Sign Supports with one shaft per tower.
Solid curves are base moment in Kip-ft.
Dash curves are base torsion in Kip-ft.
Minimum embedment of drilled shaft is two diameters.
Add 3'-0" to the required embedment length to determine the required length of drilled shaft.

Texas Department of Transportation
Traffic Operations Division

FOUNDATION EMBEDMENT SELECTION CHARTS

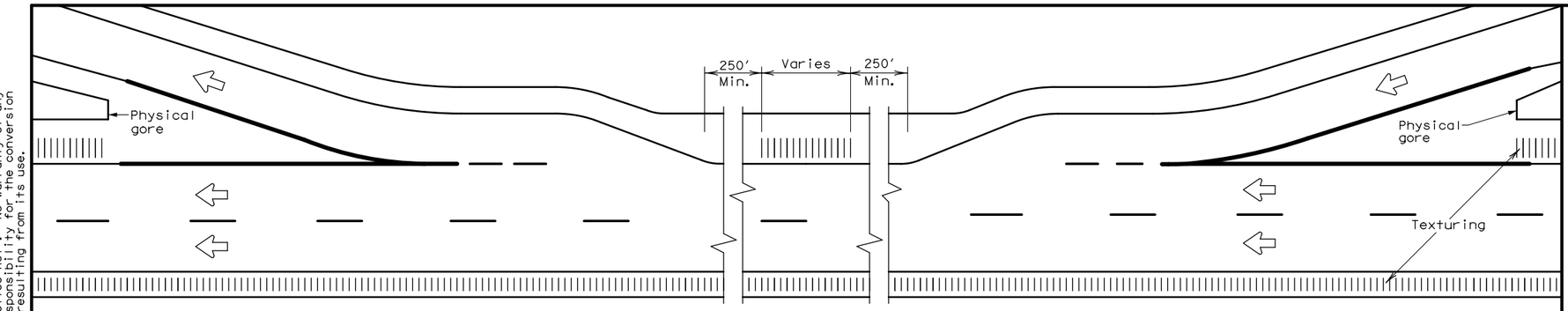
COSS-FD

REVISIONS

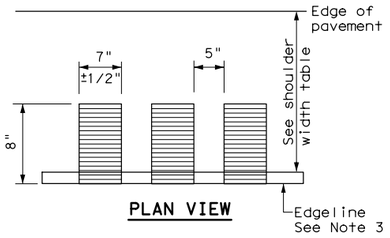
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		243

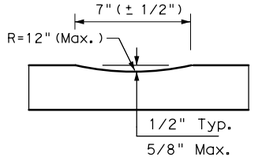
DATE: 5/23/2022 10:59:00 AM
FILE: c:\pwworking\aecom*ds20*na*2019\subash.paudel@aecom.com\d0119096\stds68.dgn



TYPICAL RUMBLE STRIP PLACEMENT AT EXIT AND ENTRANCE RAMPS

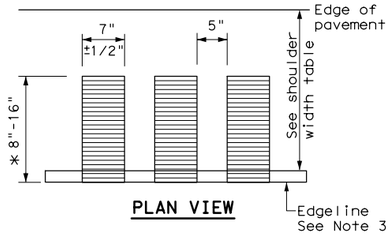


PLAN VIEW



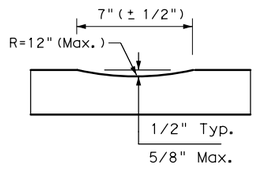
PROFILE VIEW
OPTION 1

CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



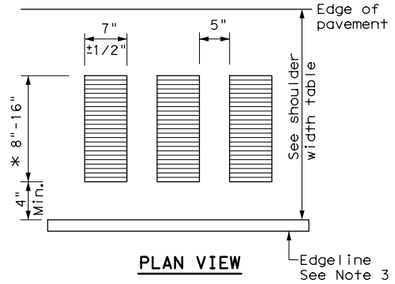
PLAN VIEW

* This distance may vary based on width of shoulder



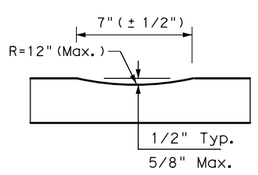
PROFILE VIEW
OPTION 2

CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



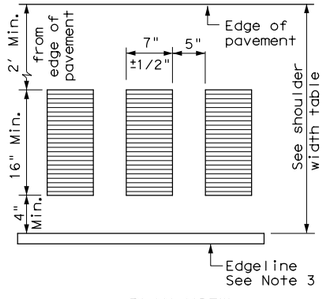
PLAN VIEW

* This distance may vary based on width of shoulder

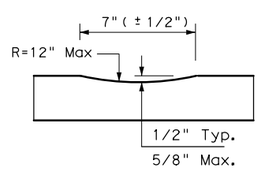


PROFILE VIEW
OPTION 3

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)

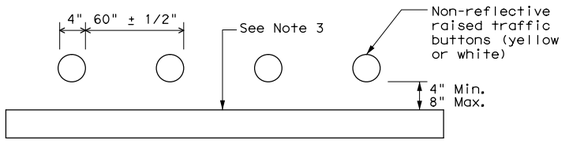


PLAN VIEW



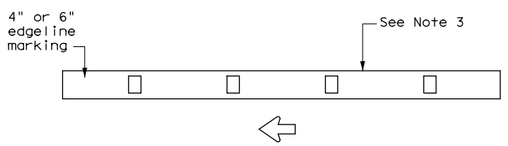
PROFILE VIEW
OPTION 4

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



PLAN VIEW
OPTION 5

RAISED EDGELINE RUMBLE STRIPS



PLAN VIEW
OPTION 6

PROFILE EDGELINE MARKINGS

GENERAL NOTES

1. Rumble strips and profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
2. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
3. Use Standard Sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings, and profile markings.
4. See the table below for determining what options may be used for edgeline rumble strips.

WHEN INSTALLING MILLED DEPRESSION EDGELINE RUMBLE STRIPS:

5. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Operations Division.
6. Pavement markings can be applied over milled shoulder rumble strips to create an edgeline rumble stripe.
7. Breaks in edgeline rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections and driveways with high usage of large trucks when installed on conventional highways.
8. Rumble strips shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
9. Consideration should be given to noise levels when edgeline rumble strips are installed near residential areas, schools, churches, etc. A minimum of 3/8 inches depth of milled rumble strip may be considered in these areas.
10. On roadways with high bicycle activity, consideration should be given before the installation of edgeline rumble strips. Things to consider include size of rumble strips, rumble strip material and location of rumble strips on the shoulder. If the designer determines that gaps are needed in the rumble strips due to bicycle use of the road, then follow the requirement shown in FHWA Technical Advisory T5040.39, or latest version. A detail of the spacing shall be included in the plans.

WHEN INSTALLING RAISED OR PROFILE EDGELINE RUMBLE STRIPS:

11. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per the manufacturer's recommendations.
12. Non-reflective traffic buttons shall be placed adjacent to the pavement marking delineating the edgeline when used as a rumble strip. The color of the button should match the color of the adjacent edgeline marking (white or yellow). The buttons will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
13. Non-reflective traffic buttons shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
14. Breaks in edgeline rumble strips using raised traffic buttons shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossing, intersections and driveways with high usage of large trucks when installed on conventional highways.
15. The minimum distance between the edgeline and the buttons should be used if the shoulder is less than 8 feet in width.
16. Raised profile thermoplastic markings used as edgelines may substitute for buttons.

SHOULDER WIDTH TABLE		
EQUAL TO OR LESS THAN 2 FEET	GREATER THAN 2 FEET LESS THAN 4 FEET	EQUAL TO OR GREATER THAN 4 FEET
Option 1, 5 OR 6	Option 1, 2, 3, 5 or 6	Option 2, 4, 5 OR 6

Texas Department of Transportation

Traffic Operations Division Standard

EDGELINE RUMBLE STRIPS ON FREEWAYS AND DIVIDED HIGHWAYS
RS(1)-13

FILE: rs(1)-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT April 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-10 10-13	0014	03	087	IH 35W
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		244

A. GENERAL SITE DATA

1. PROJECT LIMITS: *Highway: IH 35W*
From: CR 604/ CR 707
To: US 67

LATTITUDE: 32.4° LONGITUDE: -97.2°

2. PROJECT SITE MAPS:

- *Project Location Map: Title Sheet*
- *Drainage Patterns: Drainage Area Maps*
- *Approx. Slopes Anticipated After Major Gradings and Areas of Soil Disturbance: Typical Sections*
- *Major Controls and Locations of Stabilization Practices: SW3P Site Map Sheets*
- *Project Specific Locations:*
  To be specified by Project Field Office and located in the Project SW3P File
- *Surface Waters and Discharge Locations: Drainage and Culvert Layout Sheets*

3. PROJECT DESCRIPTION:
REALIGNMENT OF IH 35W NB MAINLANES, REMOVAL OF SB IH 35W LEFT EXIT RAMP, EXISTING EXIT AND ENTRANCE RAMP RELOCATION, ADDITION OF NB ONE-WAY FTG. ROAD FROM US 67 TO CR 604/707 AND REALIGNMENT OF EXISTING BUS 35W TO T-INTERSECTION TO PROPOSED FTG. ROAD.

4. MAJOR SOIL DISTURBING ACTIVITIES:
Preparing right of way, clearing and grubbing, grading, excavation and embankment for roadway and storm sewers/culverts.

5. EXISTING CONDITION OF SOIL & VEGETATIVE COVER AND % OF EXISTING VEGETATIVE COVER:
Hiden clay, 1 to 3 percent slopes
Ferris-Helden complex, 2 to 5 percent slopes

6. TOTAL PROJECT AREA: *63.33* Acres

7. TOTAL AREA TO BE DISTURBED: *31.26* Acres *(49.4%* OF TOTAL PROJECT AREA)

8. WEIGHTED RUNOFF COEFFICIENT
BEFORE CONSTRUCTION: *0.49*
AFTER CONSTRUCTION: *0.50*

9. NAME OF RECEIVING WATERS:
North Fork Chambers Creek

10. ENDANGERED SPECIES, DESIGNATED CRITICAL HABITAT AND HISTORIC PROPERTY:
See EPIC section IV and V

B. EROSION AND SEDIMENT CONTROLS

1. SOIL STABILIZATION PRACTICES:

(Select T = Temporary or P = Permanent, as applicable)

T	TEMPORARY SEEDING		PRESERVATION OF NATURAL RESOURCES
T	MULCHING (Hay or Straw)		FLEXIBLE CHANNEL LINER
	BUFFER ZONES		RIGID CHANNEL LINER
	PLANTING		SOIL RETENTION BLANKET
P	SEEDING	P	COMPOST MANUFACTURED TOPSOIL
	SODDING		OTHER: (Specify Practice)

2. STRUCTURAL PRACTICES:

(Select T = Temporary or P = Permanent, as applicable)

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

3. STORM WATER MANAGEMENT: *(Example Below - May be used as applicable, revised or expanded)*

1. Storm water drainage will be provided by the ditches, inlets and storm water systems that will carry drainage within the R.O.W. to the low points within the roadway and project site which drain to natural facilities.

2. Other permanent erosion controls include hydraulic design to limit structure outlet velocities and grading design generally consisting of 4:1 or flatter slopes with permanent vegetative cover.

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

(Describe Storm Water Management Activities by Phases)

5. NON-STORM WATER DISCHARGES:
Non-storm water discharges should be filtered, or held in retention basins before being allowed to mix with storm water. These discharges consist of non-polluted ground water, spring water, foundation and/or footing drain water, and water used for dust control, pavement washing and vehicle washwater containing no detergents.

STATE OF TEXAS
MARIA XIMENA MEDERO
107551
PROFESSIONAL ENGINEER

Signature , P.E. 5/23/2022
Date

AECOM
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

Texas Department of Transportation

Fort Worth District Standard

STORM WATER POLLUTION PREVENTION PLAN (SW3P)

SHEET 1 OF 2 SHEETS

ORIGINAL DRAWING: 09/2002	sw3p-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
DATE	REVISIONS	6	SEE TITLE SHEET	245
09/2008	NPDES TO TPDES	STATE	STATE DIST.NO.	COUNTY
01/2012	CLARIFY NOTE C.2.	TEXAS	FTW	JOHNSON
08/2013	ADDED SIGN	CONT.	SECT.	JOB / HIGHWAY NO.
05/2019	2-SHEET FORMAT	0014	03	087 / IH 35W

C. OTHER REQUIREMENTS & PRACTICES

1. MAINTENANCE:

All erosion and sediment controls shall be maintained in good working order. If a repair is necessary, it shall be performed at the earliest date possible but no later than 7 calendar days after the surrounding exposed ground has dried sufficiently to prevent further damage from heavy equipment. Disturbed areas on which construction activities have ceased, temporarily or permanently, shall be stabilized within 14 calendar days unless they are scheduled to and do resume within 21 calendar days. The areas adjacent to creeks and drainageways shall have priority followed by devices protecting storm sewer inlets.

2. INSPECTION:

An inspection shall be performed by a TxDOT inspector every 14 calendar days as well as within 24 hours after any rainfall of one-half inch or more is recorded on a non-freezing rain gauge to be located at the project site, or every 7 calendar days. An inspection and Maintenance Report shall be filed for each inspection. Based on the inspection results, the controls shall be revised in accordance with the inspection report.

3. WASTE MATERIALS:

Except as noted below, all waste materials shall be collected in a metal dumpster having a secure cover. The dumpster shall meet all state and local solid waste management regulations. All trash and debris from construction shall be deposited in the dumpster. The dumpster shall be emptied, as necessary or as required by local regulation, and hauled to a local approved land fill site. The burying of construction waste on the project site shall not be permitted.

Concrete washout areas shall be required and shall consist of a pit, lined with an impervious material, of sufficient size to contain, until evaporation, all water used and washout material produced during concrete washout operations. The concrete washout locations shall be as directed by the engineer.

Lime slaking tanks shall be surrounded by an earthen berm, capable of containing any overflow.

4. HAZARDOUS WASTE (INCLUDING SPILL REPORTING):

As a minimum, any products in the following categories are considered to be hazardous: paints, acids, solvents, asphalt products, chemical additives for soil stabilization, and concrete curing compounds or additives. In the event of a spill which may be hazardous, the spill coordinator shall be contacted immediately.

5. SANITARY WASTE:

All sanitary waste shall be collected from the portable units, as necessary or as required by local regulation, by a licensed sanitary waste management contractor.

6. OFFSITE VEHICLE TRACKING:

The Contractor shall be required, on a regular basis or as may be directed by the Engineer, to dampen haul roads for dust control, stabilize construction entrances and to remove excess dirt from the roadway.

7. MANAGEMENT PRACTICES: *(Example Below - May be used as applicable, revised or expanded)*

1. Disposal areas, stockpiles and haul roads shall be constructed in a manner that will minimize and control the amount of sediment that may enter receiving waters. Disposal areas shall not be located in any wetland, waterbody or streambed.

2. Construction staging areas and vehicle maintenance areas shall be constructed by the Contractor in a manner to minimize the runoff of pollutants.

3. All temporary fills placed in waterways shall be built of erosion resistant material. (NWP 14)

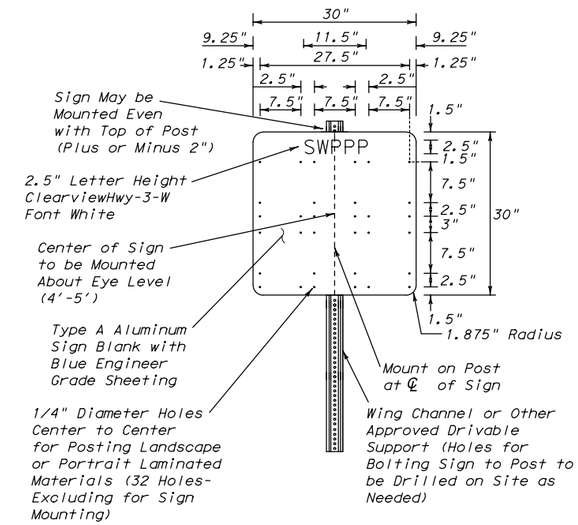
4. All waterways shall be cleared as soon as practicable of temporary embankment, temporary bridges, matting, falsework, piling, debris or other obstructions placed during construction operations that are not a part of the finished work.

8. OTHER:

1. Listing of construction materials stored on site to be provided by Project Field Office.

2. The Project SW3P File located at the project field office shall contain the N.O.I., CGP Coverage Notice, TCEQ TPDES Form, Signature Authorization, Certification/Qualification Statements, Inspection Reports, Required Maps, and a copy of the TPDES General Permit No. TXR150000.

STORM WATER POLLUTION PREVENTION PLAN PERMIT POSTING



No Permanent Installation Allowed.
Sign to be Removed After Project Completion.

STATE OF TEXAS
MARIA XIMENA MEDERO
107551
LICENSED PROFESSIONAL ENGINEER

Signature , P.E. 5/23/2022 Date

AECOM
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

Texas Department of Transportation

Fort Worth District Standard

STORM WATER POLLUTION PREVENTION PLAN (SW3P)

SHEET 2 OF 2 SHEETS

ORIGINAL DRAWING: 09/2002	sw3p-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
DATE	REVISIONS	6	SEE TITLE SHEET		246
09/2008	NPDES TO TPDES	STATE	STATE DIST.NO.	COUNTY	
01/2012	CLARIFY NOTE C.2.	TEXAS	FTW	JOHNSON	
08/2013	ADDED SIGN	CONT.	SECT.	JOB	HIGHWAY NO.
05/2019	2-SHEET FORMAT	0014	03	087	IH 35W

DATE: 5/23/2022
FILE: c:\pwworking\aecom_ds20_na_2019\subash.paude1@aecom.com\dms62727\epic.dgn

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

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

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

1. City of Alvarado, MS4 Operator

2.

☐ No Action Required ☒ Required Action

Action No.

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

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

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

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

☒ No Permit Required

☐ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)

☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)

☐ Individual 404 Permit Required

☐ Other Nationwide Permit Required: NWP# _____

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

1. Receiving Waters: North Fork Chambers Creek
2. Contractor to follow terms and conditions of the NWP#14 during construction.
3.
4.

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	☒ Silt Fence	☐ Vegetative Filter Strips
☐ Blankets/Matting	☒ Rock Berm	☐ Retention/Irrigation Systems
☐ Mulch	☐ Triangular Filter Dike	☐ Extended Detention Basin
☐ Sodding	☐ Sand Bag Berm	☐ Constructed Wetlands
☐ Interceptor Swale	☐ Straw Bale Dike	☐ Wet Basin
☐ Diversion Dike	☐ Brush Berms	☐ Erosion Control Compost
☐ Erosion Control Compost	☐ Erosion Control Compost	☐ Mulch Filter Berm and Socks
☐ Mulch Filter Berm and Socks	☐ Mulch Filter Berm and Socks	☐ Compost Filter Berm and Socks
☒ Compost Filter Berm and Socks	☒ Compost Filter Berm and Socks	☒ Vegetation Lined Ditches
	☐ Stone Outlet Sediment Traps	☐ Sand Filter Systems
	☐ 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.

☒ 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.

☐ No Action Required ☒ Required Action

Action No.

1.
2. (SEE SHEET 2 OF 3)
3.
4.

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

☐ No Action Required ☒ Required Action

Action No.

1.
2. (SEE SHEET 2 AND 3 OF 3)
3.
4.

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

LIST OF ABBREVIATIONS

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

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

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

Contact the Engineer if any of the following are detected:
* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

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

☒ Yes ☐ No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

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

☐ Yes ☒ No

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

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

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

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

☐ No Action Required ☒ Required Action

Action No.

1. Lead Paint
2.
3.

VII. OTHER ENVIRONMENTAL ISSUES

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

☒ No Action Required ☐ Required Action

Action No.

1.
2.
3.

Texas Department of Transportation — Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR	
	CONT	SECT	JOB	HIGHWAY	
REVISIONS 12-12-2011 (DS) 05-07-14 ADDED NOTE SECTION IV. 01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	0014	03	087	IH 35W	
	DIST	COUNTY		SHEET NO.	
	FTW	JOHNSON		247	

IV. VEGETATION RESOURCES

Action No.

1. For vegetation disturbance, the following BMPs would be implemented:
   a. Minimize the amount of vegetation cleared. Removal of native vegetation, particularly mature native trees and shrubs should be avoided. Impacted vegetation should be replaced with in-kind on-site replacement/restoration of native vegetation.
   b. To minimize adverse effects, activities should be planned to preserve mature trees, particularly acorn, nut or berry producing varieties. These types of vegetation have high value to wildlife as food and cover.
   c. It is strongly recommended that trees greater than 12 inches in diameter at breast height (DBH) that are removed be replaced. TPWD's experience indicates that for ecologically effective replacement, a ratio of three trees for every one (3:1) lost should be provided to either on-site or off-site. Trees less than 12 inches DBH should be replaced at a 1:1 ratio.
   d. Replacement trees should be of equal or better wildlife quality than those removed and be regionally adapted native species.
   e. When trees are planted, a maintenance plan that ensures at least an 85 percent survival rate after three years should be developed for the replacement trees.
   f. The use of any non-native vegetation in landscaping and revegetation is discouraged. Locally adapted native species should be used.
   g. The use of seed mix that contains seeds from only regional ecotype native species is recommended.

2. For invasive Species, the following BMPs would be implemented:
   a. For all work in water bodies designated as 'infested' or 'positive'for invasive zebra (Dreissena polymorpha) or quagga mussels (Dreissena bugensis) on http://texasinvasives.org/zebramussels/ as well as waters downstream of these lakes, all machinery, equipment, vessels, or vehicles coming in contact with such waters should be cleaned prior to leaving the site to remove any mud, plants, organisms, or debris, water drained (if applicable), and dried completely before use in another water body to prevent the potential spread of invasive mussels.
   b. Care should be taken to prevent the spread of aquatic and terrestrial invasive plants during construction activities. Educate contractors on how to identify common invasive plants and the importance of proper equipment cleaning, transport, and disposal of invasive plants in a manner and location that prevents spread when invasive plants are removed during construction.
   c. Care should be taken to avoid the spread of aquatic invasive plants such as giant Salvinia (Salvinia molesta), common salvinia (Salvinia minima), hydrilla (Hydrilla verticillata), water hyacinth (Eichhornia spp.), Eurasian watermilfoil (Myriophyllum spicatum), water lettuce (Pistia stratiotes), and alligatorweed (Alternanthera philoxeroides) from infested water bodies into areas not currently infested. All machinery, equipment, vessels, boat trailers, or vehicles coming in contact with waters containing aquatic invasive plant species should be cleaned prior to leaving the site to remove all aquatic plant material and dried completely before use on another water body to prevent the potential spread of invasive plants. Removed plants should be transported for disposal in a secure manner to prevent dispersal.
   d. Colonization by invasive plants should be actively prevented on disturbed sites in terrestrial habitats. Vegetation management should include removing or chemically treating invasive species as soon as practical while allowing the existing native plants to revegetate the disturbed areas; repeated removal or treatment efforts may be needed. Only native or non-invasive plants should be planted. Care should be taken to avoid mowing invasive giant reed (Arundo donax), which spreads by fragmentation, and to clean equipment if inadvertently mowed to prevent spread. If using hay bales for sediment control, use locally grown weed-free hay to prevent the spread of invasive species. Leave the hay bales in place and allow them to break down, as this acts as mulch assisting in revegetation.
   e. Aquatic invasive species (e.g., tilapias (Oreochromis spp., Tilapia zillii), suckermouth armored catfish (Hypostomus plecostomus, Pterigoplichthys spp.), Asian clams (Corbicula fluminea), zebra mussels (Dreissena polymorpha)) or those not native to the subwatershed should not be relocated but rather should be dispatched. Invasive mussels attached to native mussels should be removed and destroyed or disposed prior to relocation of the native mussels. Prohibited aquatic invasive species, designated as such in 31 TAC §57.112, should be killed upon possession.

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

Action No.

1. The contractor will be advised of potential occurrence in the project area and to avoid harming the following species:
   a. Amphibians - Woodhouse's toad
   b. Insects - American bumblebee
   c. Mammals - eastern spotted skunk
   d. Bats - cave myotis bat and eastern red bat
   e. Reptiles - slender glass lizard
   f. Plants - Texas milk vetch and tree dodder
   g. Birds chestnut collared longspur

2. For amphibians and reptiles, the following BMPs would be implemented:
   a. Minimize impacts to wetland temporary and permanent open water features, including depressions, and riverine habitats.
   b. Maintain hydrologic regime and connections between wetlands and other aquatic features.
   c. Use barrier fencing to direct animal movements away from construction activities and areas of potential wildlife-vehicle collisions in construction areas directly adjacent, or that may directly impact, potential habitat for the target species.
   d. Apply hydromulching and/or hydroseeding in areas for soil stabilization and/or revegetation of disturbed areas where feasible. If hydromulching and/or hydroseeding are not feasible due to site conditions, using erosion control blankets or mats that contain no netting, or only contain loosely woven natural fibers netting is preferred. Plastic netting should be avoided to the extent practicable.
   e. For open trenches and excavated pits, install escape ramps at an angle of less than 45 degrees (1:1) in areas left uncovered. Visually inspect excavation areas for trapped wildlife prior to backfilling.
   f. Project specific locations (PSLs) proposed within state owned ROW should be located in uplands away from aquatic features.
   g. When work is directly adjacent to water, minimize impacts to shoreline basking sites (e.g., downed trees, sand bars, exposed bedrock) and overwinter sites (e.g., brush and debris piles, crayfish burrows) where feasible.
   h. Avoid or minimize disturbing or removing downed trees, rotting stumps, and leaf litter. If avoidance or minimization is not practicable, consider removing cover objects prior to the start of the project and replace them at project completion.
   i. Examine heavy equipment stored on site before use, particularly after rain events when reptile and amphibian movements occur more often, to ensure use will not harm individuals that might be seeking temporary refuge.
   j. Due to increased activity (mating) of reptiles and amphibian during the spring, construction activities like clearing or grading should attempt to be scheduled outside of the spring (March-May) season. Also, timing ground disturbing activities before October when reptiles and amphibians become less active and may be using burrows in the project area is also encouraged.
   k. When designing roads with curbs, consider using Type I or Type III curbs to provide a gentle slope to enable turtles and small animals to get out of roadways.
   l. After project is complete, revegetate disturbed areas with an appropriate locally sourced native seed mix. If erosion control blankets or mats will be used, the product should not contain netting, but should only contain loosely woven natural fiber netting in which the mesh design allows the threads to move, therefore allowing expansion of the mesh openings. Plastic netting should be avoided.
   m. Inform contractors that if amphibians or reptiles are found on project site to allow species to safely leave the project site.

3. For the eastern spotted skunk, the following BMPs would be implemented:
   a. Contractors will be advised of potential occurrence in the project area, and to avoid harming mammal species if encountered, and to avoid unnecessary impacts to dens.

4. For bats, the following BMPs would be implemented:
   a. For activities that have the potential to impact structures, cliffs or caves, or trees; a qualified biologist will perform a habitat assessment and occupancy survey of the features(s) with roost potential as early in the planning process as possible or within one year before project letting.
   b. For roosts where occupancy is strongly suspected but unconfirmed during the initial survey, revisit features(s) at most four weeks prior to scheduled disturbance to confirm absence of bats.
   c. If bats are present or recent signs of occupation (i.e., piles of guano, distinct musky odor, or staining and rub marks at potential entry points) are observed, take appropriate measures to ensure that bats are not harmed, such as implementing non-lethal exclusions activities or timing or phasing of construction.
   d. Exclusion devices can be installed by a qualified individual between September 1 and March 31. Exclusion devices should be used for a minimum of seven days when minimum nighttime temperatures are above 50°F AND minimum daytime temperatures are above 70° F. Prior to exclusion, ensure that alternate roosting habitat is available in the immediate area. If no suitable roosting habitat is available, installation of alternate roosts is recommended to replace the loss of an occupied roost. If alternate roost sites are not provided, bats may seek shelter in other inappropriate sites, such as buildings, in the surrounding area.
   e. If feature(s) used by bats are removed as a result of construction, replacement structures should incorporate bat friendly design or artificial roosts should be constructed to replace these features, as practicable.
   f. Conversion of property containing cave or cliff features to transportation purposes should be avoided where feasible.
   g. Large hollow trees, snags (dead standing trees), and trees with shaggy bark should be surveyed for colonies and, if found, should not be disturbed until the bats are no longer occupying these features. Post-occupancy surveys should be conducted by a qualified biologist prior to tree removal from the landscape.

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ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-12-2011 (DS)	0014	03	087	IH 35W
05-07-14 ADDED NOTE SECTION IV.	DIST	COUNTY		SHEET NO.
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	FTW	JOHNSON		248

DATE: 5/23/2022
FILE: c:\pwworking\aecom_ds20_na_2019\subash.paudel@aecom.com\dms62727\epic.dgn

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

h. Retain mature, larger diameter hardwood forest species and native/ornamental palm trees where feasible.
i. In all instances, avoid harm or death to bats. Bats should only be handled as a last resort and after communication with TPWD.
j. Coordinate with TPWD about the latest bat handling restrictions and protocols involving COVID-19 and bat handling. In general, all staff must follow the guidelines listed below:
   i. Do not handle bats if not part of a critical or time-sensitive research project. Contact TPWD to discuss your project needs before beginning work.
   ii. All participants must follow CDC social-distancing guidelines.
   iii. Wear a face mask to minimize the exchange of respiratory droplets such as a surgical mask, dust mask, or cloth mask when within 6 feet of a living bat.
   iv. Use disposable exam gloves or other reusable gloves (e.g., rubber dish-washing gloves) that can be decontaminated to prevent spread of pathogens. Do not touch your face or other potentially contaminated surfaces with your gloves prior to handling bats.
   v. Limit handling to as few handlers as possible.
   vi. Do not blow on bats for any reason.
   vii. Use separate temporary holding containers for each bat such as disposable paper bags.
   viii. Caves housing bats should be avoided unless absolutely necessary.
   ix. Implement additional disinfection, quarantine, and cleaning procedures.
k. Bat surveys of structures should include visual inspections of structural fissures (cracked or spalled concrete, damaged or split beams, split or damaged timber railings), crevices (expansion joins, space between parallel beams, spaces above support piers), and alternative structures (drainage pipes, bolt cavities, open sections between support beams, swallow nests) for the presence of bats.
l. Before excluding bats from any occupied structure, bat species, weather, temperature, season, and geographic location must be incorporated into any exclusion plans to avoid unnecessary harm or death to bats. Winter exclusions must entail a survey to confirm either, 1) bats are absent or 2) present but active (i,e., continuously active - not intermittently active due to arousals from hibernation).
   i. Avoid using materials that degrade quickly, like paper, steel wool or rags, to close to holes.
   ii. Avoid using products or making structural modifications that may block natural ventilation, like hanging plastic sheets over an active roost entrance, thereby altering roots microclimate.
   iii. Avoid using chemical and ultrasonic repellents.
   iv. Avoid use of silicone, polyurethane or similar non-water based caulk products.
   v. Avoid use of expandable foam products at occupied sites.
   vi. Avoid the use of flexible netting attached with duct tape.
m. In order to avoid entombing bats, exclusion activities should be only implemented by a qualified individual. A qualified individual or company should possess a least the following minimum qualifications:
   i. Experience in bat exclusion (the individual, not just the company).
   ii. Proof of rabies pre-exposure vaccinations.
   iii. Demonstrated knowledge of the relevant bat species, including maternity season date range and habitat requirements.
   iv. Demonstrated knowledge of rabies and histoplasmosis in relation to bat roosts.
   v. Contact TPWD for additional resources and information to assist in executing successful bat exclusions that will avoid unnecessary harm or death to bats.

5. For migratory birds, the following BMPs would be implemented:
   a. In addition to complying with the Migratory Bird Treaty Act (MBTA) and Chapter 64 of the Parks and Wildlife Code (PWC) regarding nongame bird protections, perform the following BMP:
      i. Avoid vegetation clearing activities during the general bird nesting season, March through August, to minimize adverse impacts to birds.
      ii. Prior to construction, perform daytime surveys for nests including under bridges and in culverts to determine if they are active before removal. Nests that are active should not be disturbed. If active nests are observed during surveys, TPWD recommends a 150-foot buffer of vegetation remain around the nests until the young have fledged or the nest is abandoned.
      iii. Do not disturb, destroy, or remove active nests, including ground nesting birds, during the nesting season.
      iv. If unoccupied, inactive nests will be removed, ensure that nests are not protected under the Endangered Species Act (ESA), MBTA, or BGEPA.
      v. Prevent the establishment of active nests during the nesting season on TxDOT owned and operated facilities and structures proposed for replacement or repair.
      vi. Do not collect, capture, relocate, or transport birds, eggs, young, or active nests without a permit.
      vii. Minimize extended human presence near nesting birds during construction and maintenance activities. Protect sensitive habitat areas with temporary barriers or fencing to limit human foot-traffic and off-road vehicle use to alert and discourage contractors from causing any unintentional impacts.
      viii. Minimize construction noise above ambient levels during general bird nesting season to minimize adverse impacts on birds.
      ix. Minimize construction lighting during the general bird nesting season by scheduling work activities between dawn and dusk.

6. For Water Quality, the following BMPs would be implemented:
   a. In addition to BMP required for a TCEQ Storm Water Pollution Prevention Plan and/or 401 Water Quality Certification:
      i. Minimize the use of equipment in streams and riparian areas during construction. When possible, equipment access should be from banks, bridge decks, or barges.
      ii. When temporary stream crossings are unavoidable, remove stream crossings once they are no longer needed and stabilize banks and soils around the crossing.
      iii. Wet-Bottomed detention ponds are recommended to benefit wildlife and downstream water quality.
      iv. Consider potential wildlife-vehicle interactions when siting detention ponds.
      v. Rubbish found near bridges on TxDOT ROW should be removed and disposed of properly to minimize the risk of pollution. Rubbish does not include brush piles or snags.

Texas Department of Transportation — Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
© TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	03	087	IH 35W
12-12-2011 (DS)	DIST	COUNTY		SHEET NO.
05-07-14 ADDED NOTE SECTION IV.	FTW	JOHNSON		249
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.				

subash.paudel

NOTES:

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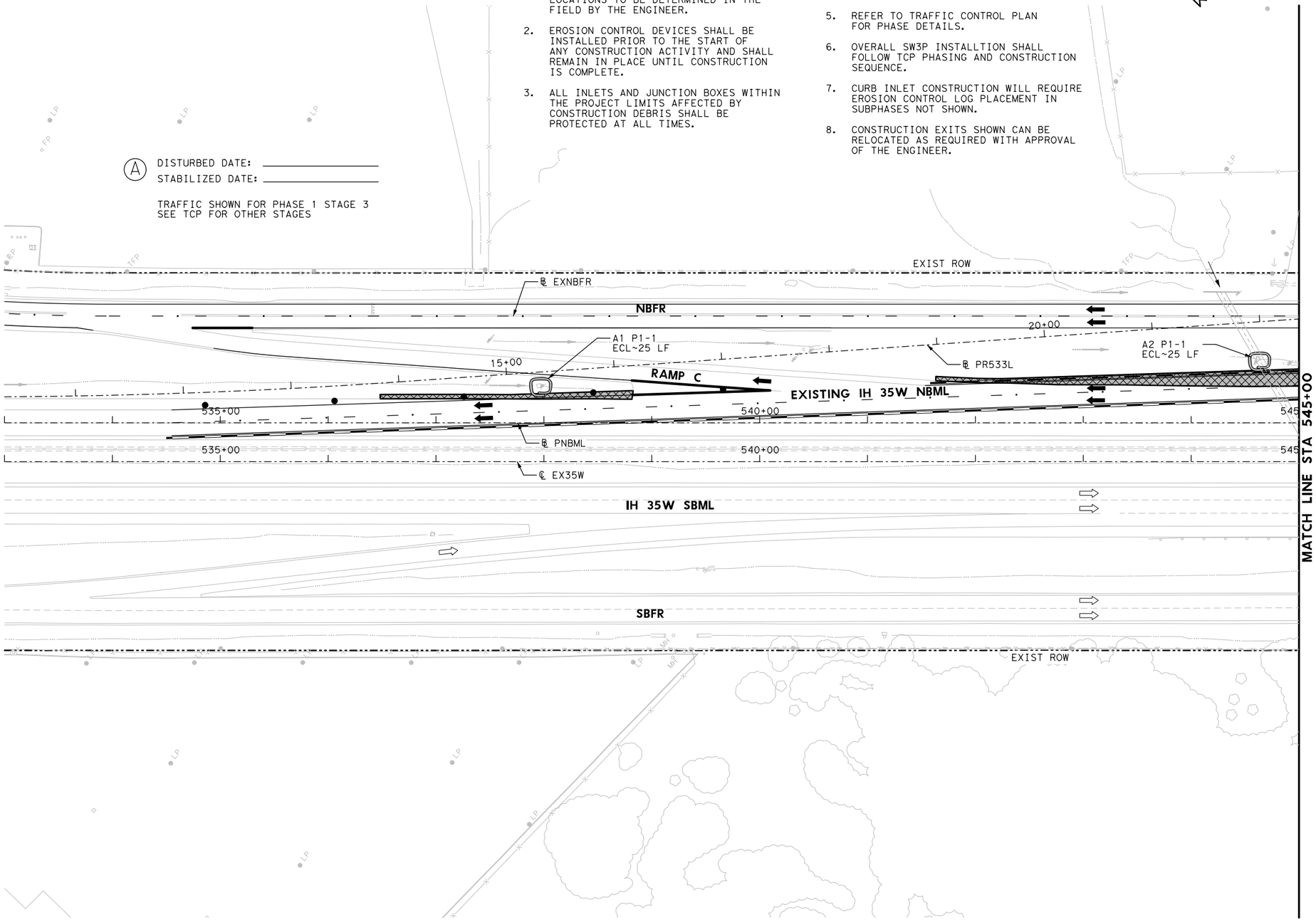
6. OVERALL SW3P INSTALLTION SHALL FOLLOW TCP PHASING AND CONSTRUCTION SEQUENCE.
7. CURB INLET CONSTRUCTION WILL REQUIRE EROSION CONTROL LOG PLACEMENT IN SUBPHASES NOT SHOWN.
8. CONSTRUCTION EXITS SHOWN CAN BE RELOCATED AS REQUIRED WITH APPROVAL OF THE ENGINEER.

(A) DISTURBED DATE: _____
STABILIZED DATE: _____

TRAFFIC SHOWN FOR PHASE 1 STAGE 3
SEE TCP FOR OTHER STAGES



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SCALE IN FEET

LEGEND

- PAVEMENT/SHARED USE PATH CONSTRUCTION
- TEMP ASPH PAVEMENT CONSTRUCTION
- TEMP ASPH PAVEMENT CONSTRUCTED IN PREVIOUS STAGE/STAGES
- PERMANENT PAVEMENT CONSTRUCTED IN PREVIOUS PHASES/STAGES
- EROSION CONTROL LOG AT DROP INLET(18 " DIA)
- EROSION CONTROL LOG DAM (18" DIA)
- RFD2 ROCK FILTER DAMS
- SCF SEDIMENT CONTROL FENCE
- CONSTRUCTION EXIT (TY 2)
- PERMANENT SEEDING
- PREMANENT SEEDING IN PREVIOUS PHASE(S)
- PROPOSED TRAFFIC FLOW
- EXISTING TRAFFIC FLOW
- DRAINAGE DITCH
- EXISTING DRAINAGE DITCH
- FLOW ARROW
- (A) DISTURBED AREA NAME
- * BMP INSTALLED IN PREVIOUS PHASE(S) TO REMAIN

A*-P1-1
- PHASE OF BMP INSTALLATION
- BMP #
- DISTURBED AREA

STATE OF TEXAS
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TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

SW3P PLAN

PHASE 1
STA 533+00 TO STA 545+00

SHEET 1 OF 5

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		250

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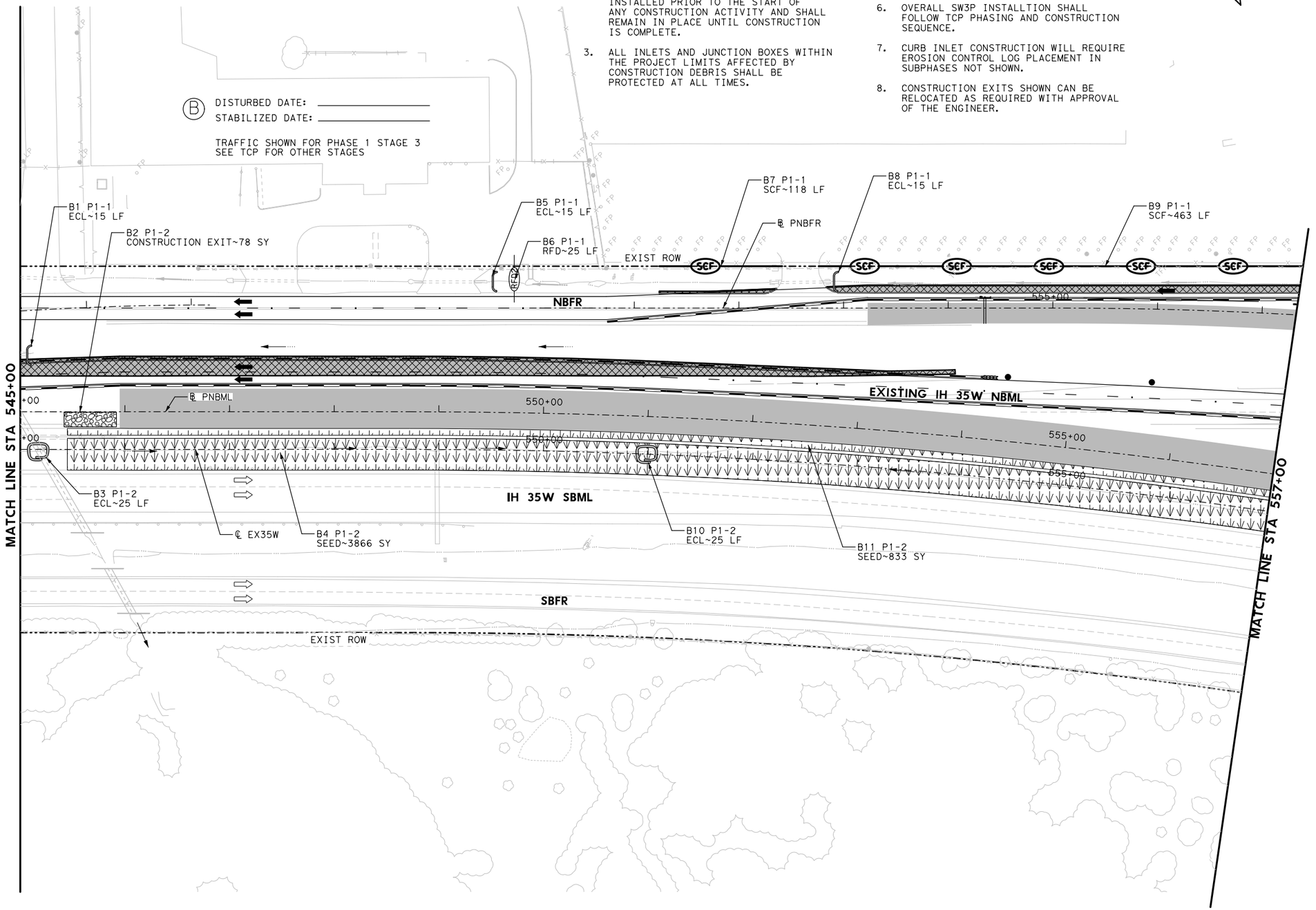

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SCALE IN FEET

LEGEND

- PAVEMENT/SHARED USE PATH CONSTRUCTION
- TEMP ASPH PAVEMENT CONSTRUCTION
- TEMP ASPH PAVEMENT CONSTRUCTED IN PREVIOUS STAGE/STAGES
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- (A) DISTURBED AREA NAME
- * BMP INSTALLED IN PREVIOUS PHASE(S) TO REMAIN

A*-P1-1
- PHASE OF BMP INSTALLATION
- BMP #
- DISTURBED AREA

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IH 35W
FROM CR 604/ CR 707 TO US 67

SW3P PLAN

PHASE 1
STA 545+00 TO STA 557+00
SHEET 2 OF 5

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		251

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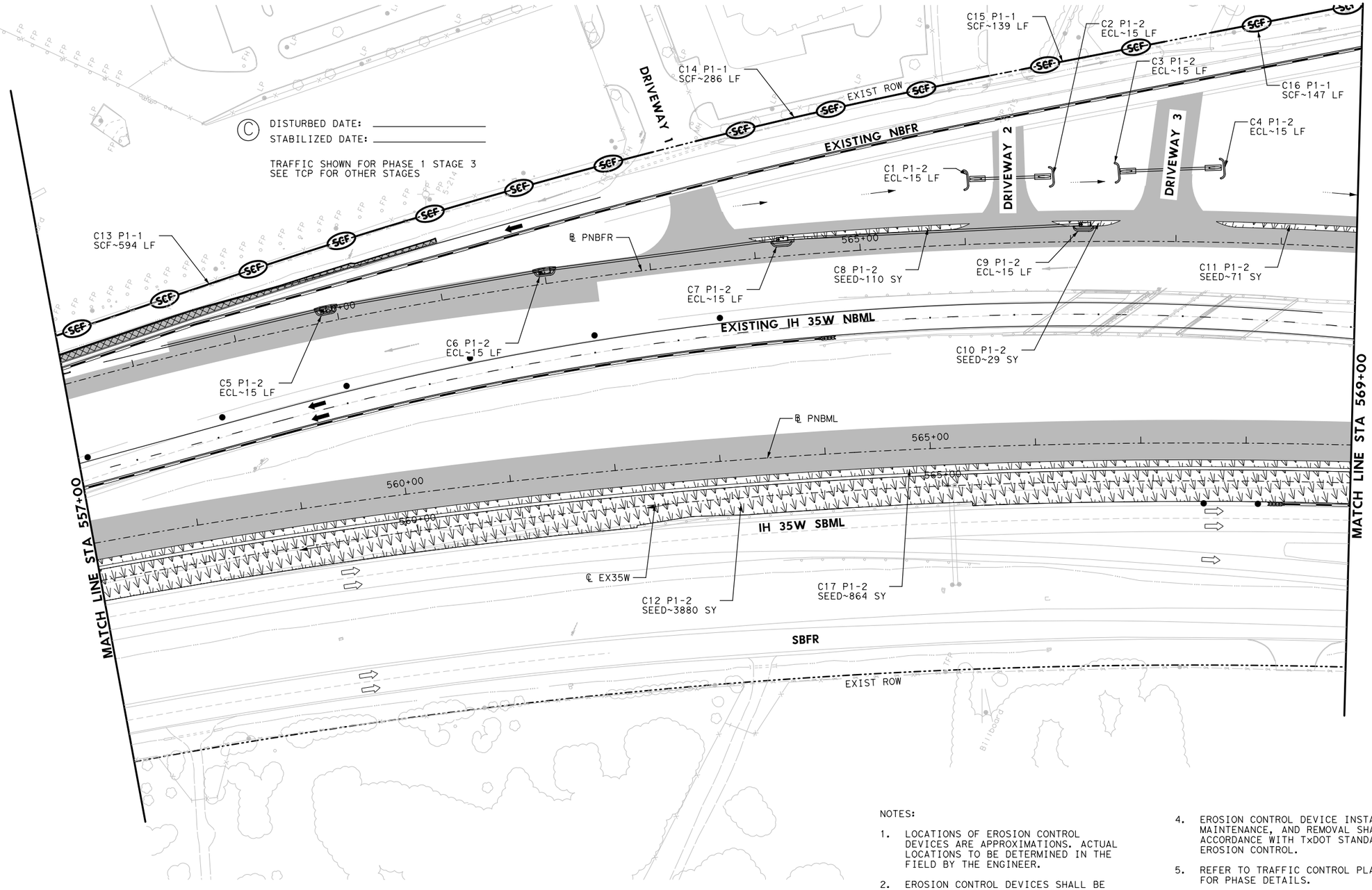

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IH 35W
FROM CR 604/ CR 707 TO US 67

SW3P PLAN

PHASE 1
STA 557+00 TO STA 569+00

SHEET 3 OF 5

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		252

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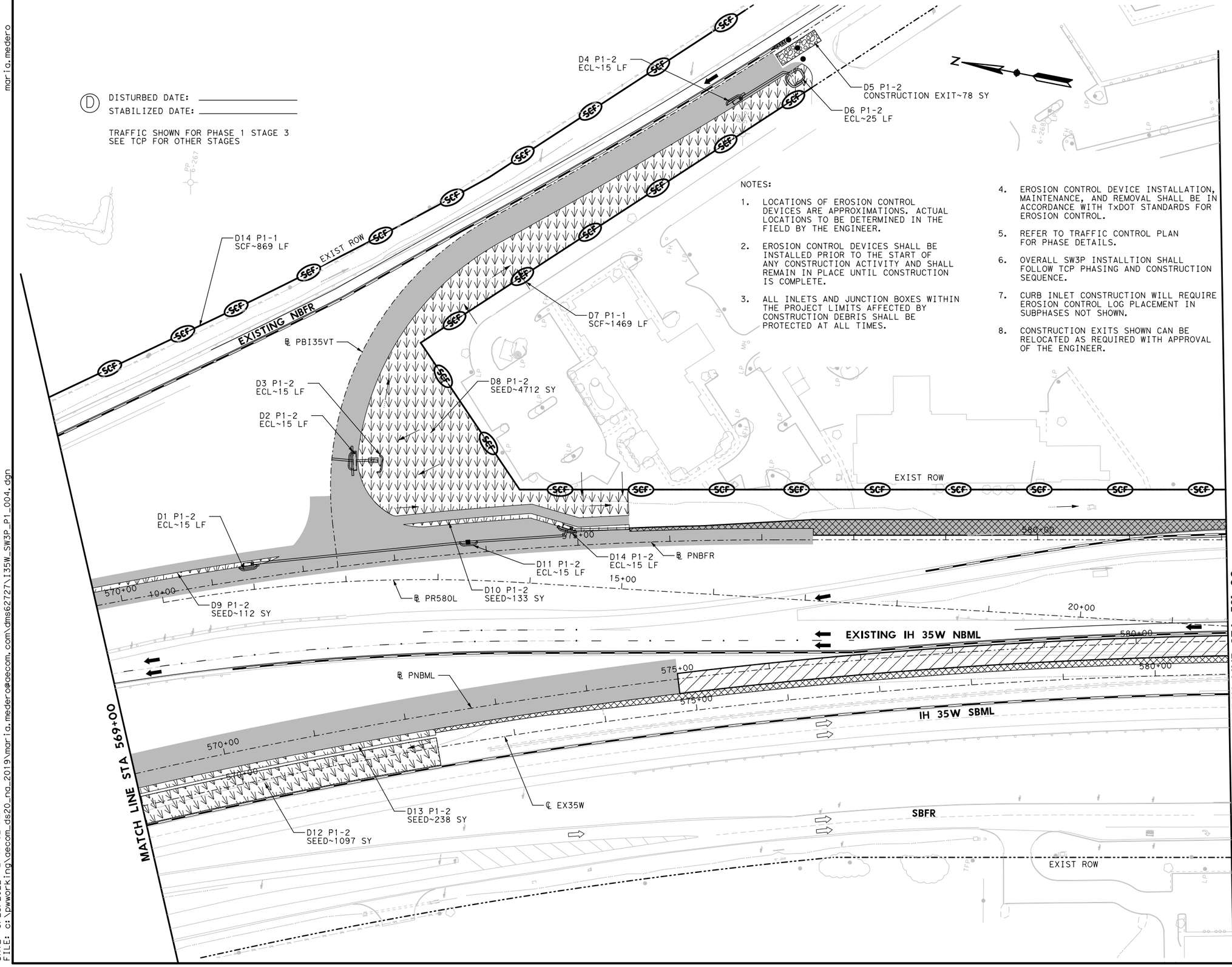

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SW3P PLAN

PHASE 1
STA 569+00 TO STA 581+00
SHEET 4 OF 5

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		253

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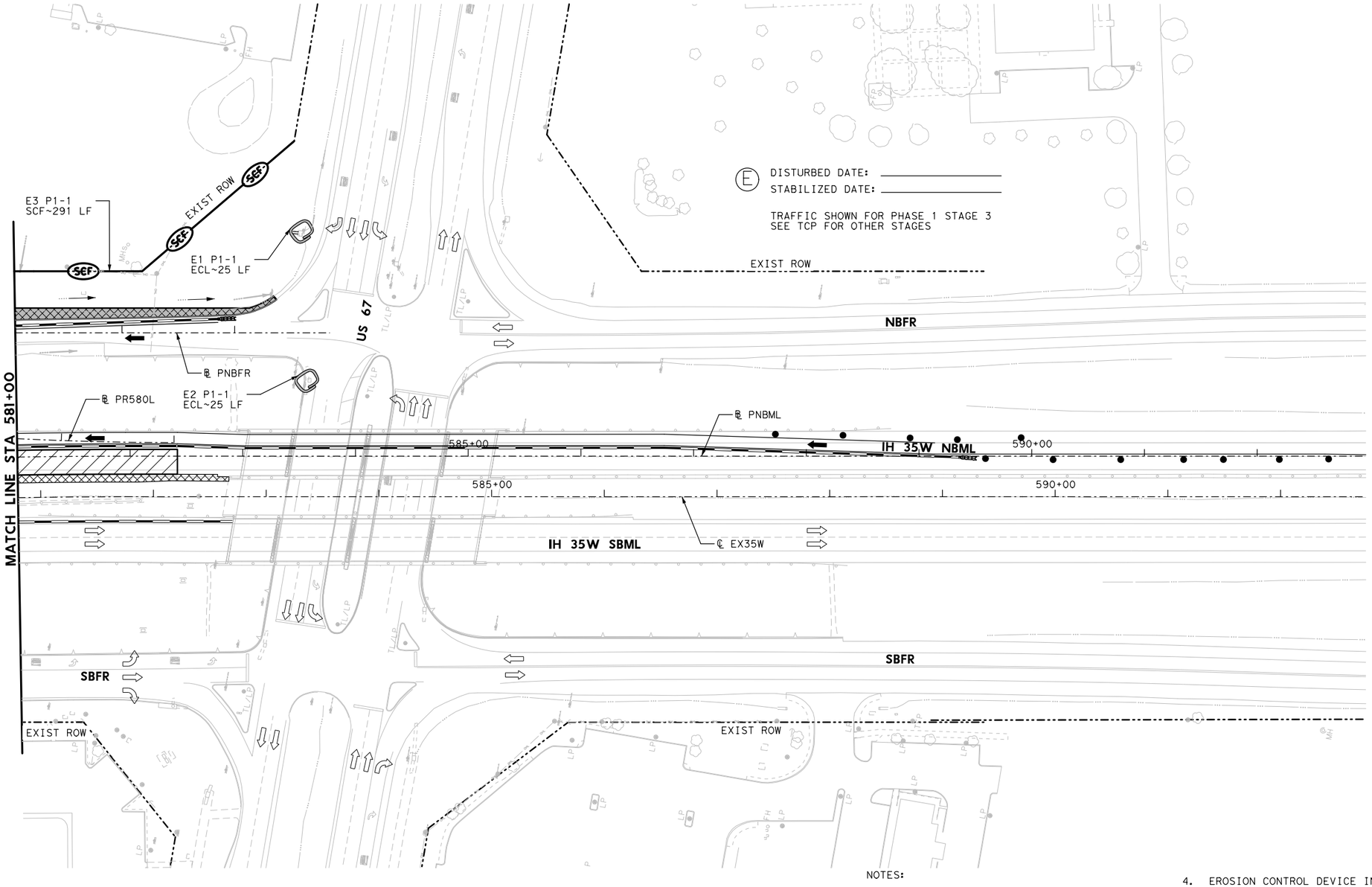

0′ 50′ 100′
SCALE IN FEET

LEGEND

- PAVEMENT/SHARED USE PATH CONSTRUCTION
- TEMP ASPH PAVEMENT CONSTRUCTION
- TEMP ASPH PAVEMENT CONSTRUCTED IN PREVIOUS STAGE/STAGES
- PERMANENT PAVEMENT CONSTRUCTED IN PREVIOUS PHASES/STAGES
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- RFD2 ROCK FILTER DAMS
- SCF SEDIMENT CONTROL FENCE
- CONSTRUCTION EXIT (TY 2)
- PERMANENT SEEDING
- PREMANENT SEEDING IN PREVIOUS PHASE(S)
- PROPOSED TRAFFIC FLOW
- EXISTING TRAFFIC FLOW
- DRAINAGE DITCH
- EXISTING DRAINAGE DITCH
- FLOW ARROW
- (A) DISTURBED AREA NAME
- * BMP INSTALLED IN PREVIOUS PHASE(S) TO REMAIN

A*-P1-1
- PHASE OF BMP INSTALLATION
- BMP #
- DISTURBED AREA

NOTES:

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STATE OF TEXAS
MARIA XIMENA MEDERO
107551
LICENSED PROFESSIONAL ENGINEER
5/23/2022

AECOM
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777
TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

SW3P PLAN

PHASE 1
STA 581+00 TO END

SHEET 5 OF 5

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		254

DATE: 5/23/2022 10:59:40 AM
FILE: c:\pwworking\aecom_ds20_na_2019\subash.paude1@aecom.com\dms62727\135W_SW3P_P1_005.dgn

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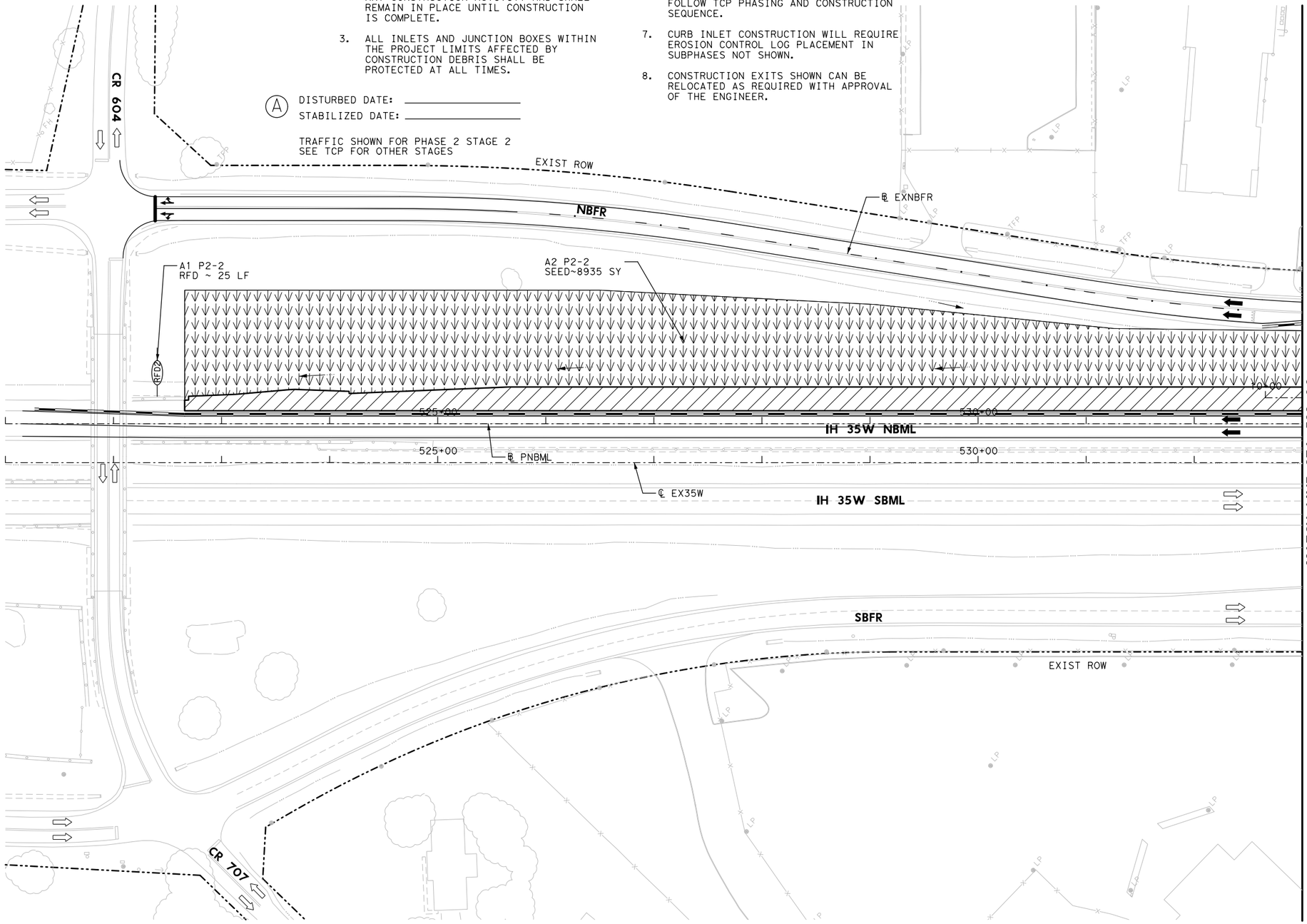
Ⓐ DISTURBED DATE: _____
STABILIZED DATE: _____

TRAFFIC SHOWN FOR PHASE 2 STAGE 2
SEE TCP FOR OTHER STAGES



0′ 50′ 100′
SCALE IN FEET

LEGEND

- PAVEMENT/SHARED USE PATH CONSTRUCTION
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- DRAINAGE DITCH
- EXISTING DRAINAGE DITCH
- FLOW ARROW
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A*-P1-1
- PHASE OF BMP INSTALLATION
- BMP #
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TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

SW3P PLAN

PHASE 2
BEGIN TO STA 533+00

SHEET 1 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		255

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dgn

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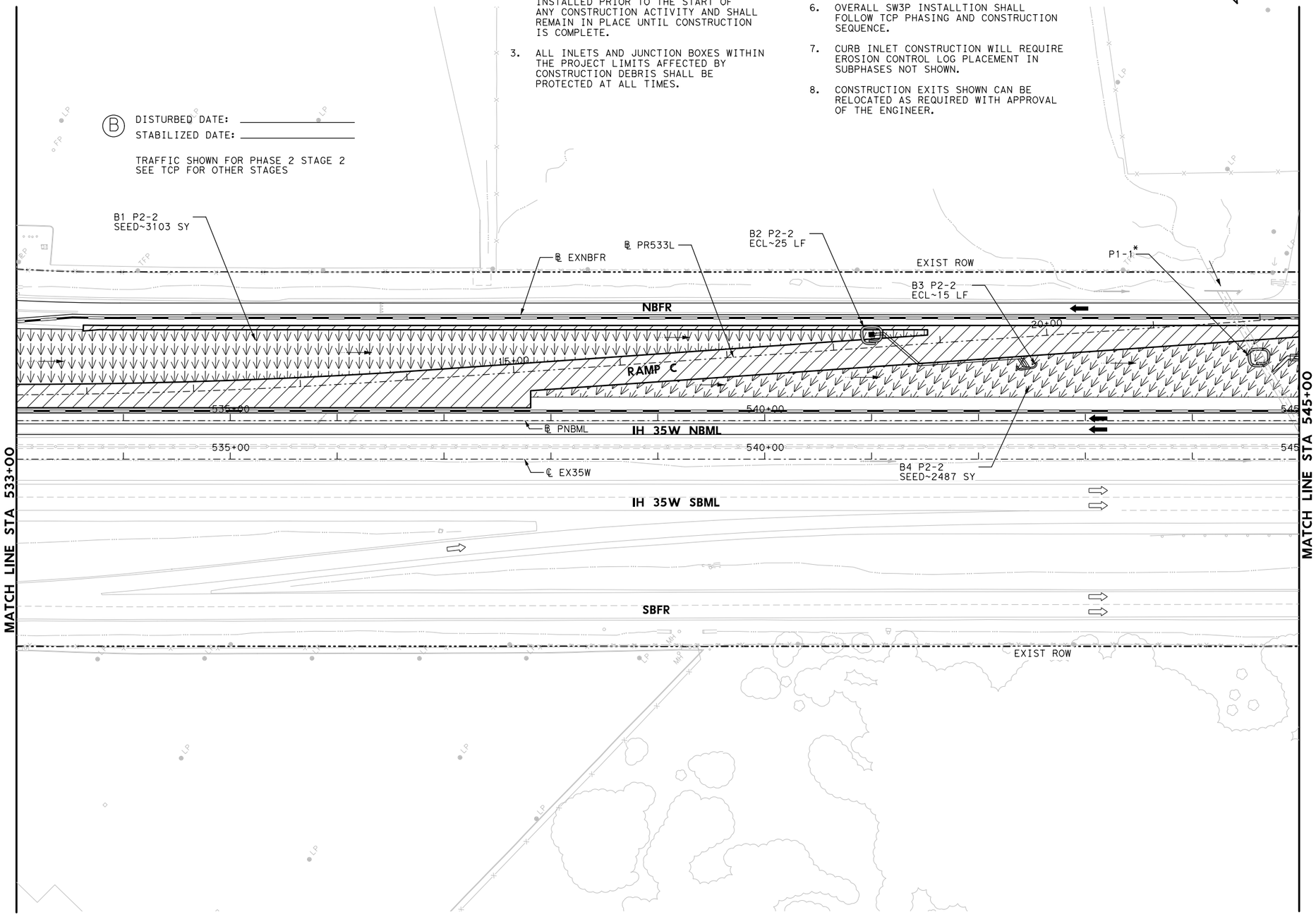
(B) DISTURBED DATE: _____
STABILIZED DATE: _____

TRAFFIC SHOWN FOR PHASE 2 STAGE 2
SEE TCP FOR OTHER STAGES



0′ 50′ 100′
SCALE IN FEET

LEGEND

- PAVEMENT/SHARED USE PATH CONSTRUCTION
- TEMP ASPH PAVEMENT CONSTRUCTION
- TEMP ASPH PAVEMENT CONSTRUCTED IN PREVIOUS STAGE/STAGES
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- DRAINAGE DITCH
- EXISTING DRAINAGE DITCH
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- (A) DISTURBED AREA NAME
- * BMP INSTALLED IN PREVIOUS PHASE(S) TO REMAIN

A*-P1-1
- PHASE OF BMP INSTALLATION
- BMP #
- DISTURBED AREA

STATE OF TEXAS
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5/23/2022

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TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

SW3P PLAN

PHASE 2
STA 533+00 TO STA 545+00

SHEET 2 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		256

DATE: 5/23/2022 10:59:49 AM
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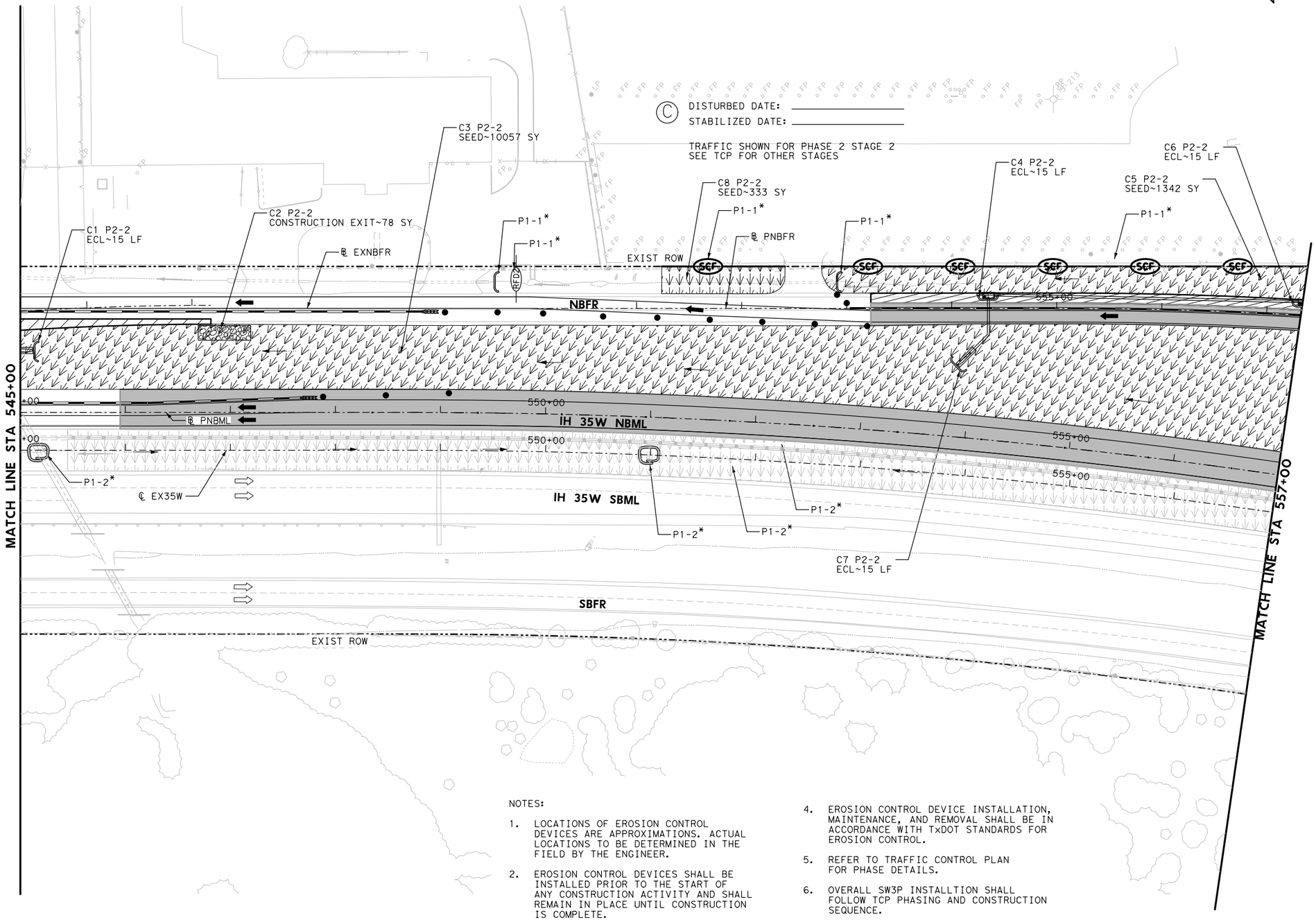
subash.paudel



Ⓒ DISTURBED DATE: _____

STABILIZED DATE: _____

TRAFFIC SHOWN FOR PHASE 2 STAGE 2
SEE TCP FOR OTHER STAGES

0′ 50′ 100′
SCALE IN FEET

LEGEND

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- Ⓐ DISTURBED AREA NAME
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A*-P1-1
- P1-1: BMP #
- A: DISTURBED AREA
- *: PHASE OF BMP INSTALLATION

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5/23/2022

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(214) 741-7777
TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

SW3P PLAN

PHASE 2
STA 545+00 TO STA 557+00
SHEET 3 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		257

DATE: 5/23/2022 10:59:53 AM
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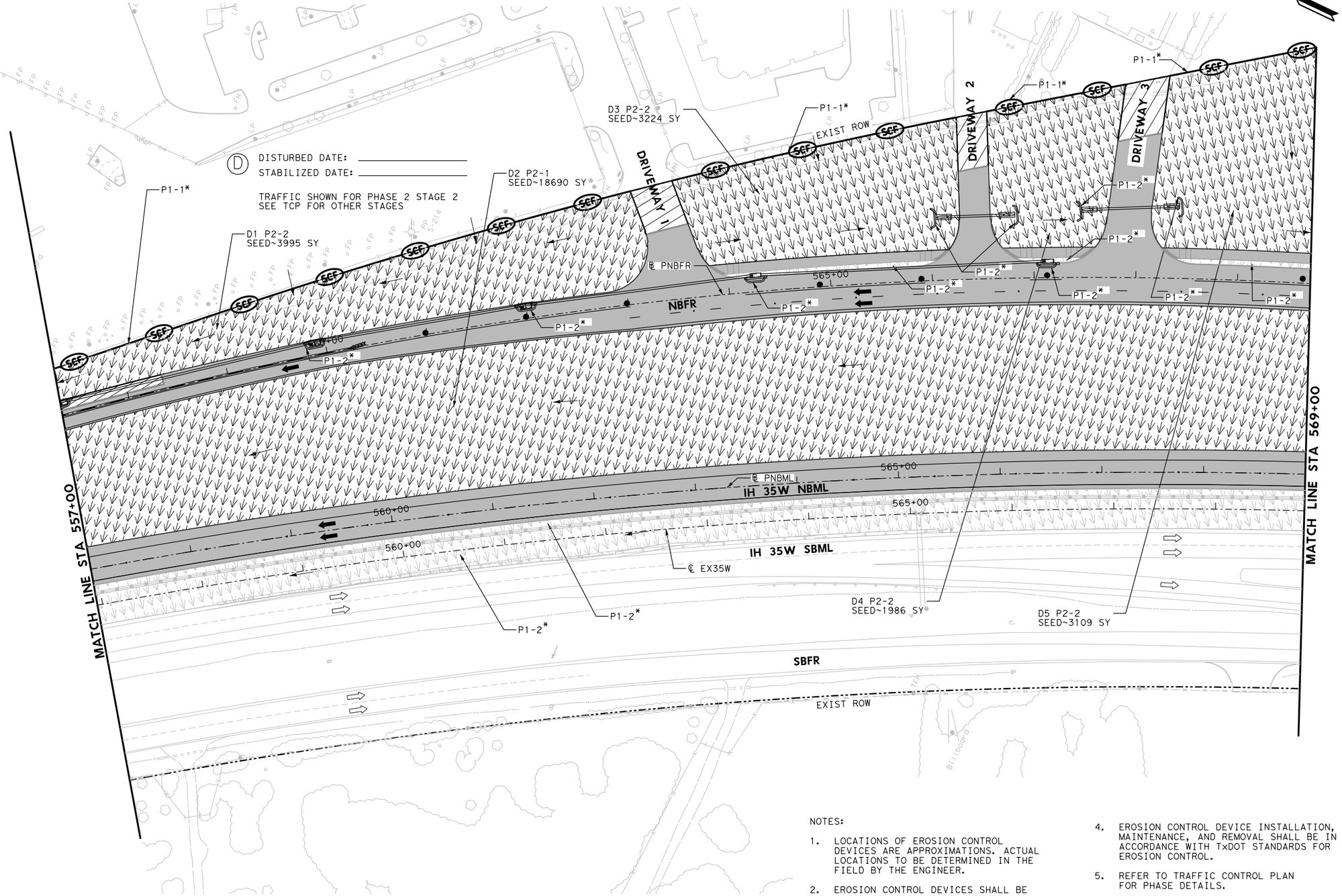
subash.paudel



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0' 50' 100'
SCALE IN FEET

LEGEND

- PAVEMENT/SHARED USE PATH CONSTRUCTION
- TEMP ASPH PAVEMENT CONSTRUCTION
- TEMP ASPH PAVEMENT CONSTRUCTED IN PREVIOUS STAGE/STAGES
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- EROSION CONTROL LOG DAM (18" DIA)
- ROCK FILTER DAMS (RFD2)
- SEDIMENT CONTROL FENCE (SCF)
- CONSTRUCTION EXIT (TY 2)
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- PREMANENT SEEDING IN PREVIOUS PHASE(S)
- PROPOSED TRAFFIC FLOW
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A*-P1-1
- PHASE OF BMP INSTALLATION
- BMP #
- DISTURBED AREA

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TBPE NO. F-3580

IH 35W
FROM CR 604/ CR 707 TO US 67

SW3P PLAN

PHASE 2
STA 557+00 TO STA 569+00
SHEET 4 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		258

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subash.paudel

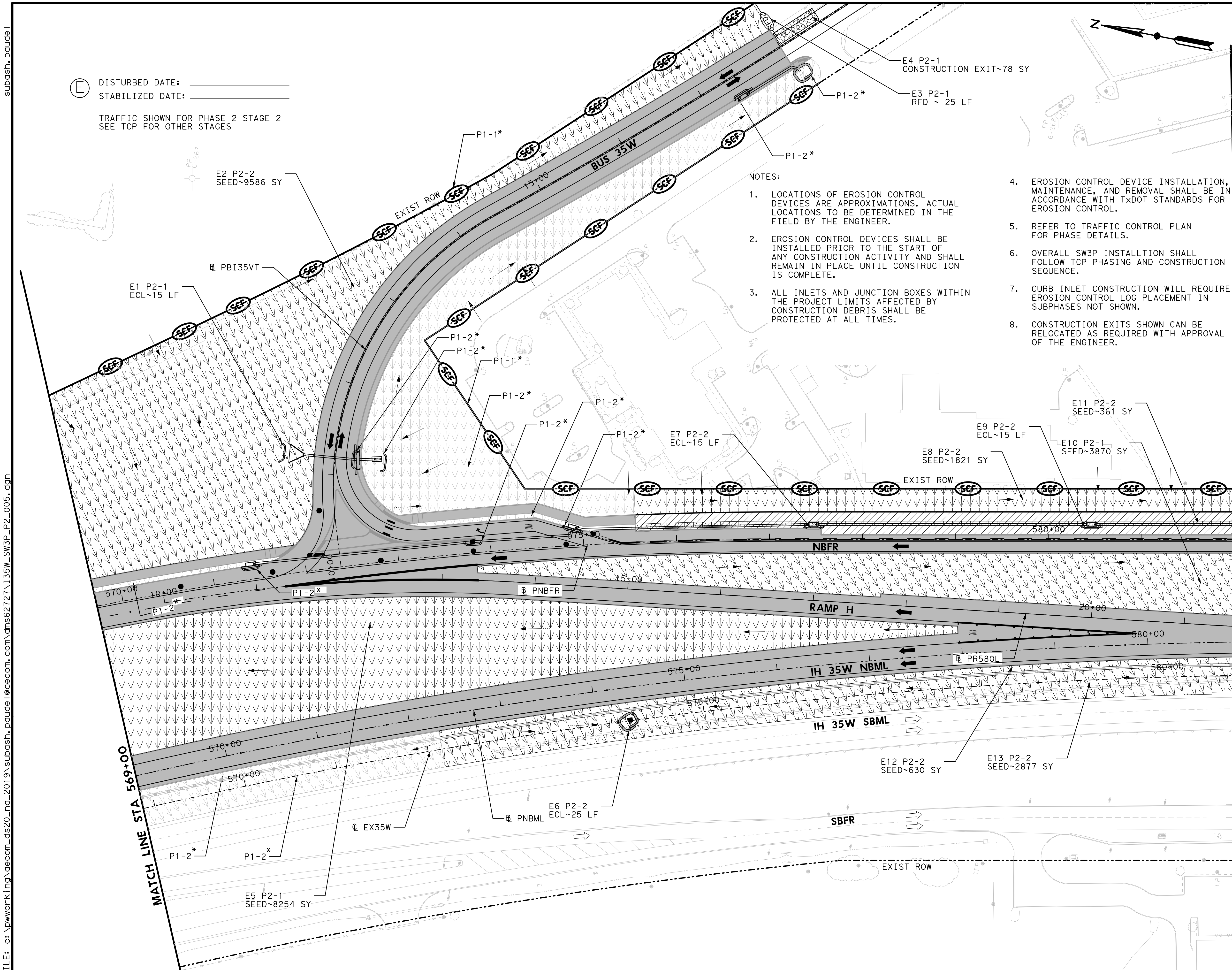
DATE: 5/23/2022 11:00:03 AM
FILE: c:\pwworking\aecom_ds20_na_2019\subash.paudel@aecom.com\dms62727\I35W_SW3P_P2_005.dgn

subash.paudel

Ⓔ DISTURBED DATE: ______________

STABILIZED DATE: ______________

TRAFFIC SHOWN FOR PHASE 2 STAGE 2
SEE TCP FOR OTHER STAGES



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0' 50' 100'
SCALE IN FEET

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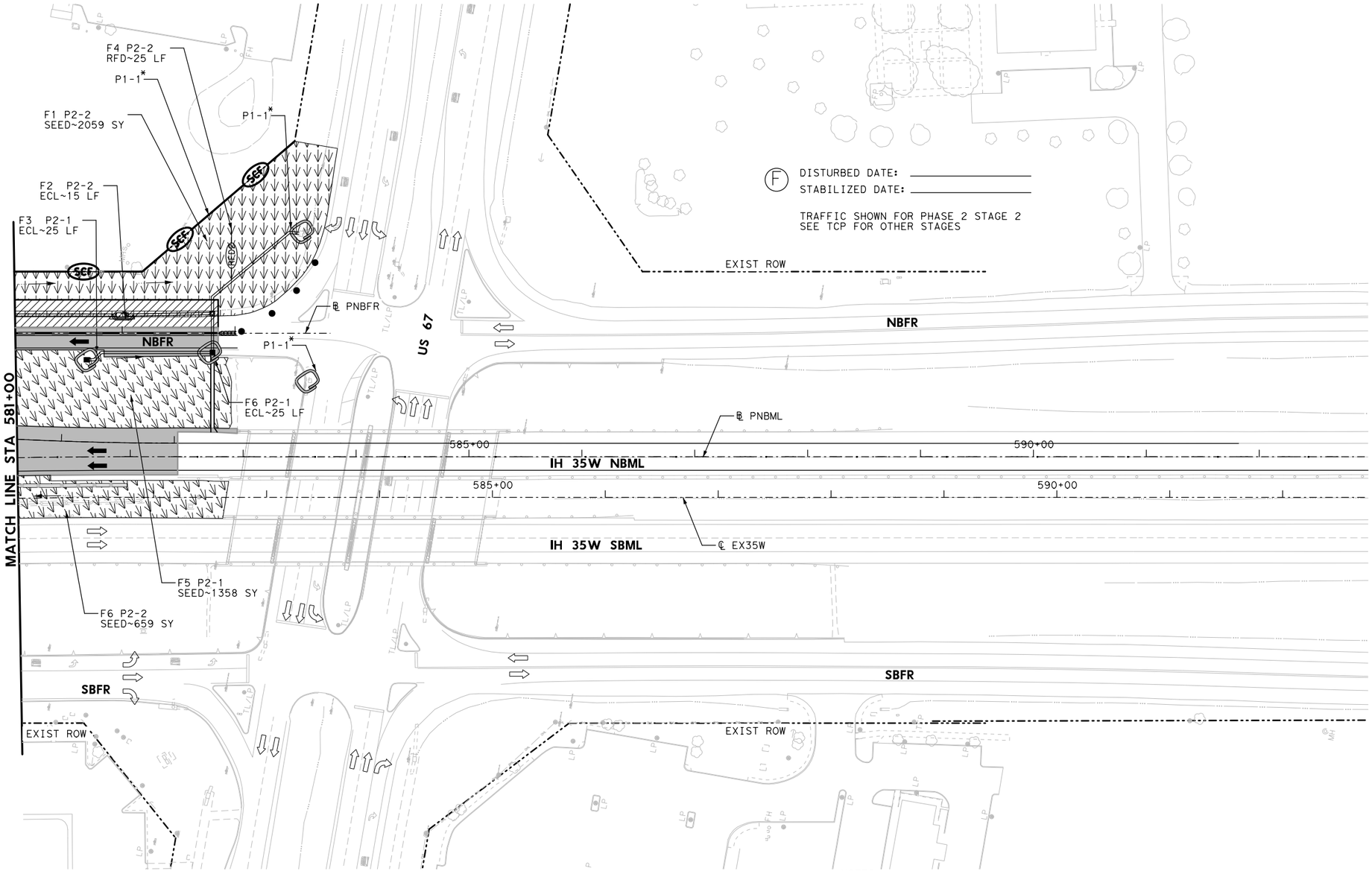
IH 35W
FROM CR 604/ CR 707 TO US 67

SW3P PLAN

PHASE 2
STA 569+00 TO STA 581+00
SHEET 5 OF 6

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		259



N

0′ 50′ 100′
SCALE IN FEET

LEGEND

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IH 35W
FROM CR 604/ CR 707 TO US 67

SW3P PLAN

PHASE 2
STA 581+00 TO END

SHEET 6 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	03	087	IH 35W
DIST	COUNTY		SHEET NO.
FTW	JOHNSON		260

DATE: 5/23/2022 11:00:09 AM
FILE: c:\pwworking\aecom_ds20_na_2019\subash.paude1@aecom.com\dms6272\135W_SW3P_P2_006.dgn
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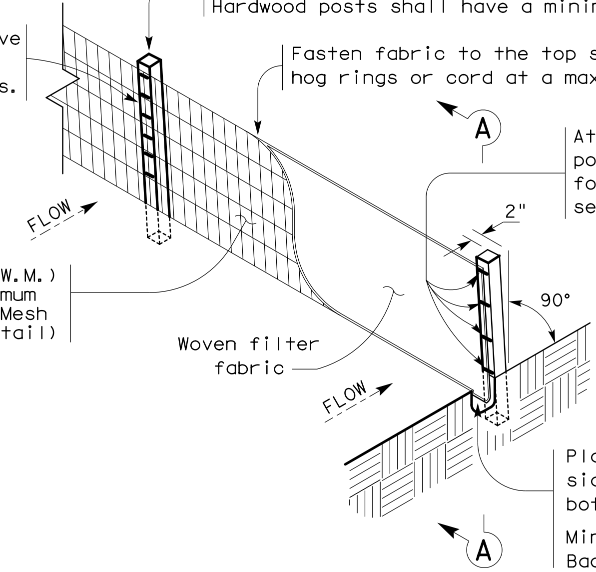
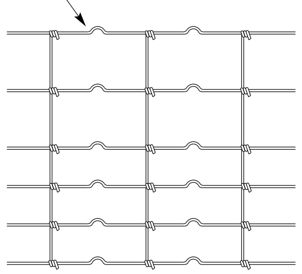
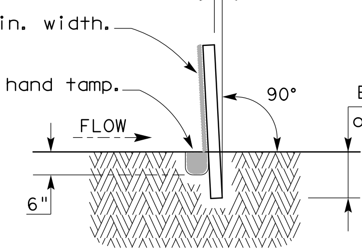


TEMPORARY SEDIMENT CONTROL FENCE

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.

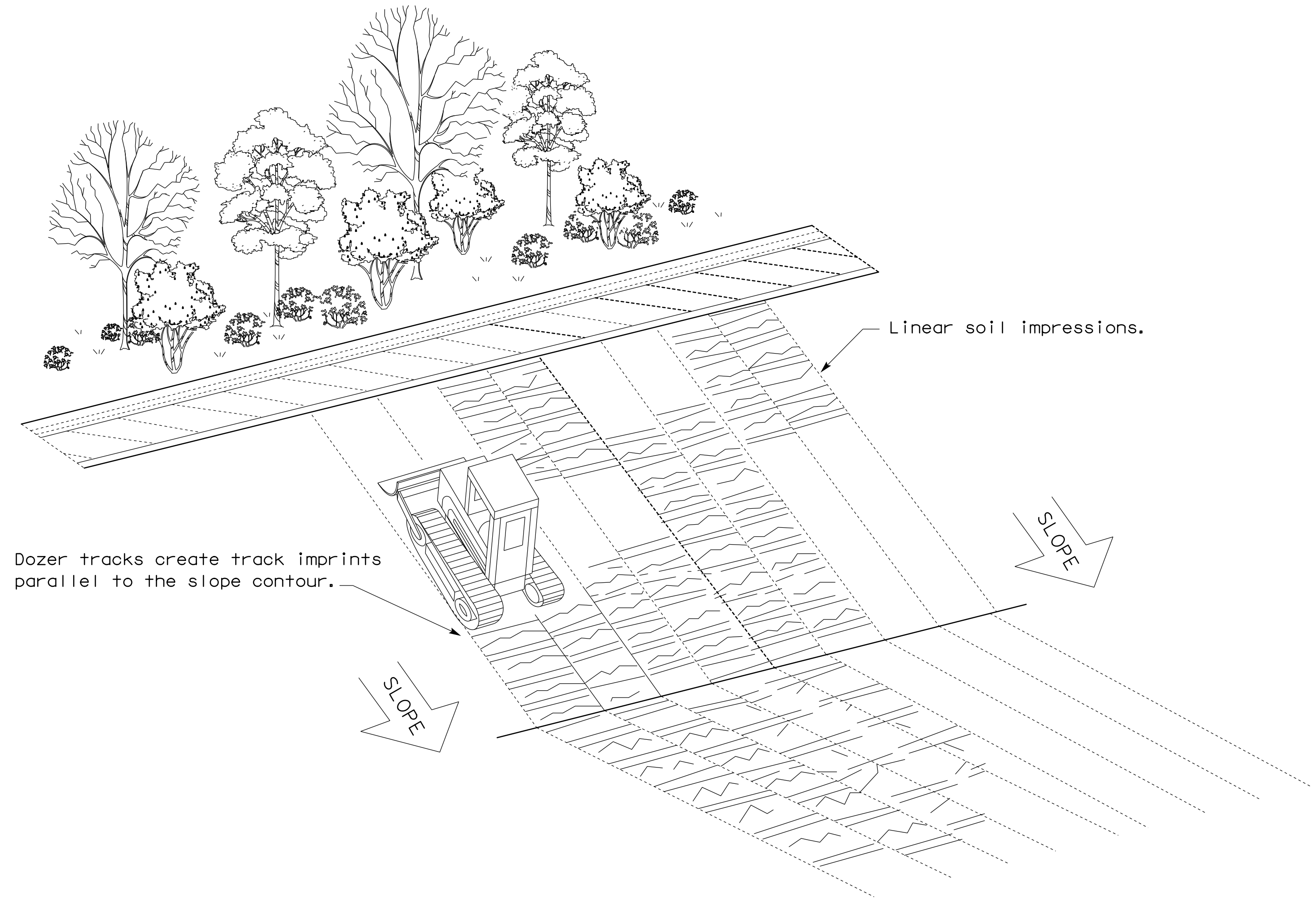
LEGEND

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: 0014	SECT: 03	JOB: 087	HIGHWAY: IH 35W
REVISIONS	DIST: FTW	COUNTY: JOHNSON		SHEET NO.: 261

DATE: 5/23/2022
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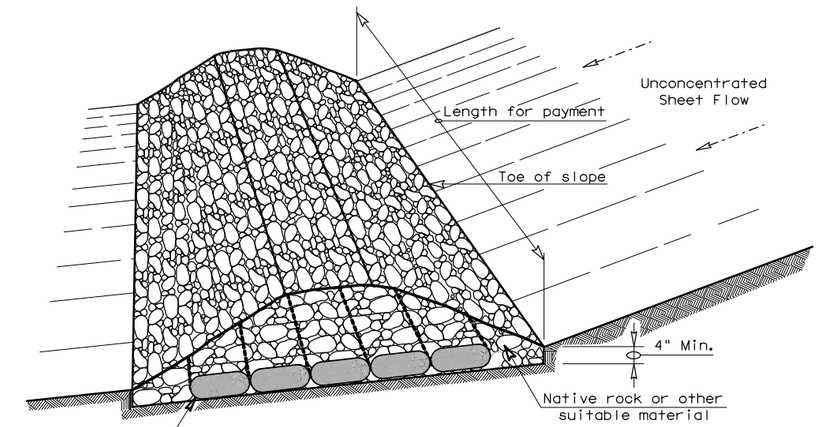
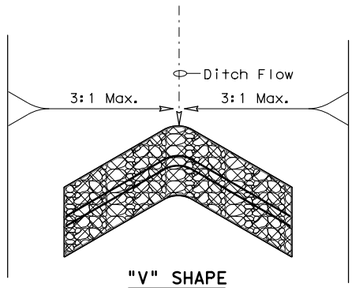
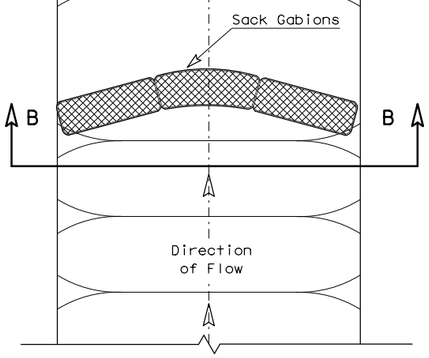


FILTER DAM AT TOE OF SLOPE

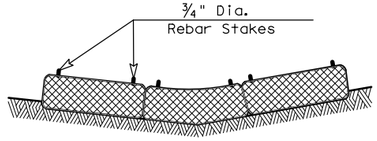
RFD1



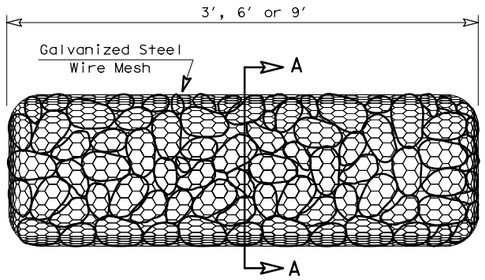
"V" SHAPE
PLAN VIEW



PLAN VIEW

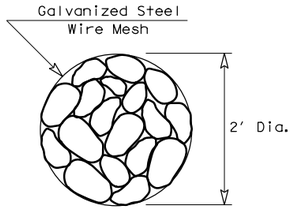


SECTION B-B

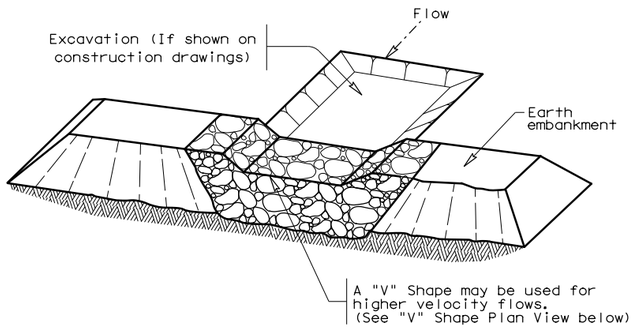


TYPE 4 (SACK GABIONS)

RFD4

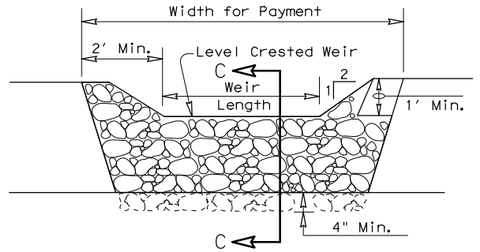


SECTION A-A

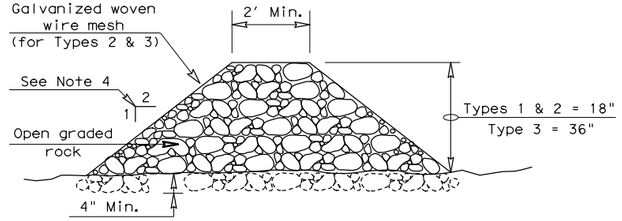


FILTER DAM AT SEDIMENT TRAP

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.

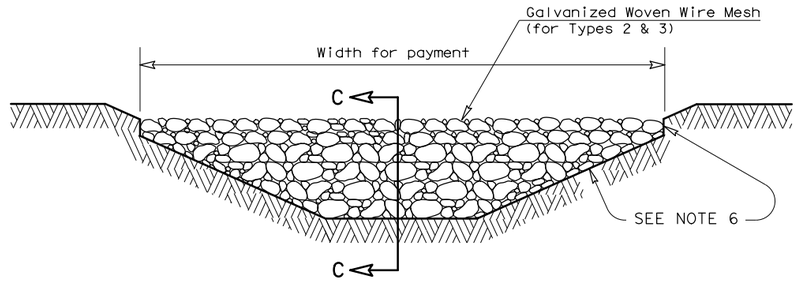
Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity 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 ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
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
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REVISIONS	0014	03	087		IH 35W	
	DIST	COUNTY			SHEET NO.	
	FTW	JOHNSON			262	

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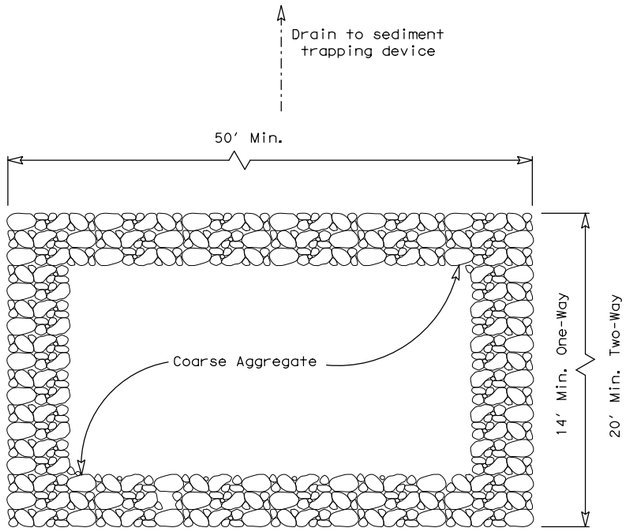
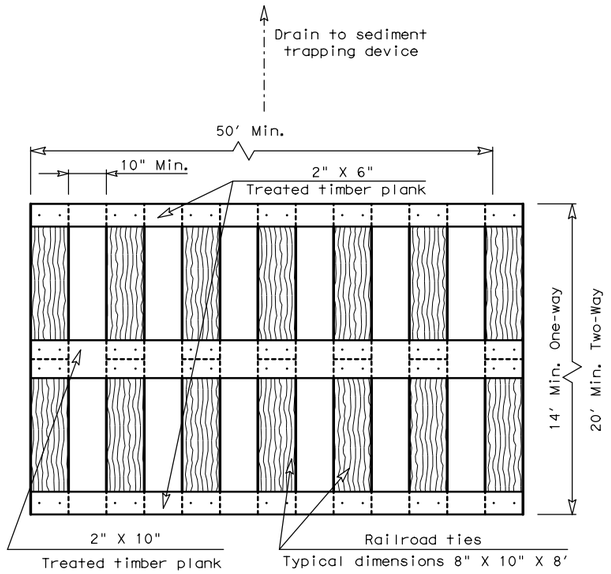
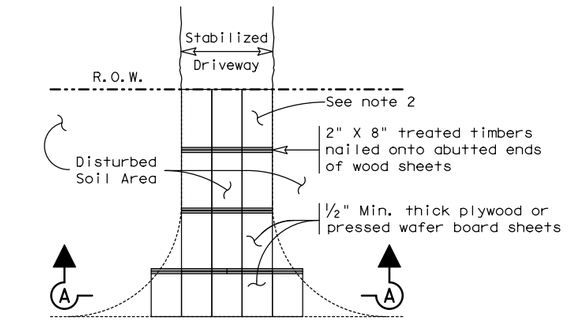


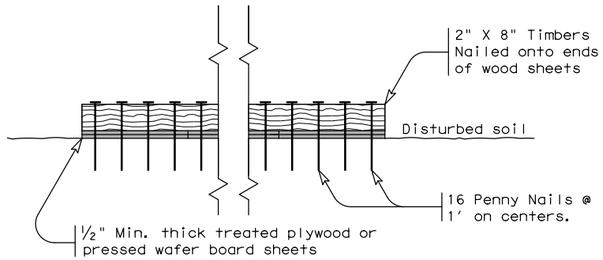
PLAN VIEW



PLAN VIEW



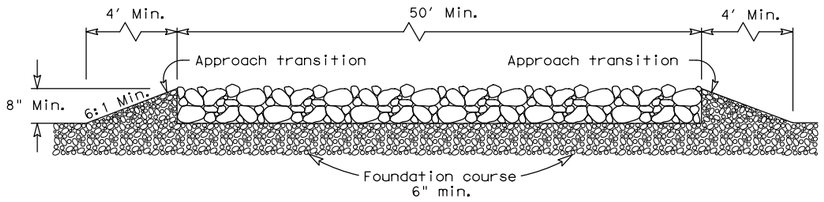
PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

SHORT TERM



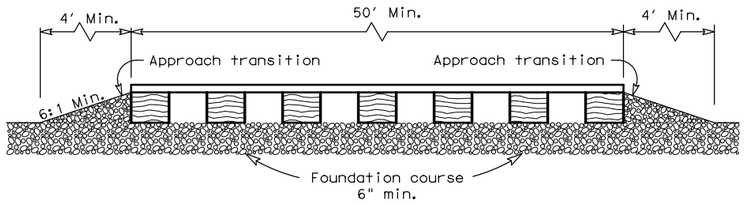
ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)

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.



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

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
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	03	087	IH 35W
	DIST	COUNTY		SHEET NO.
	FTW	JOHNSON		263

DATE: 5/23/2022
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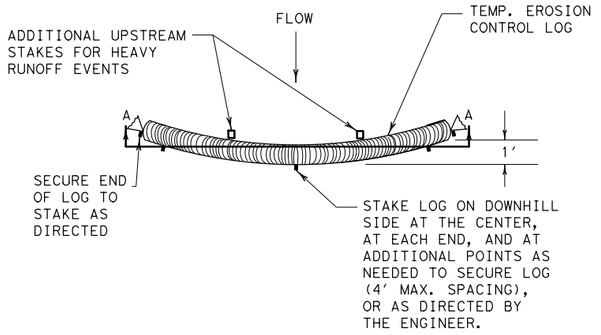
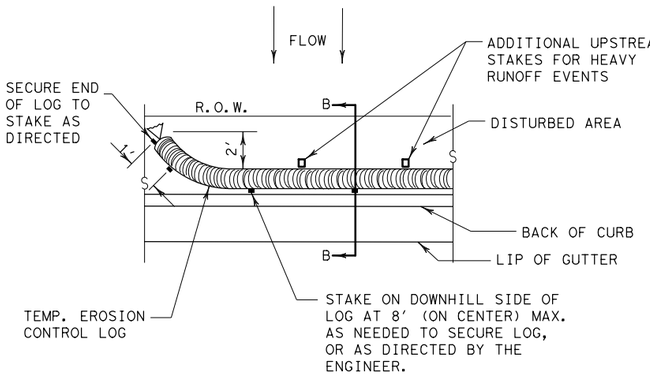
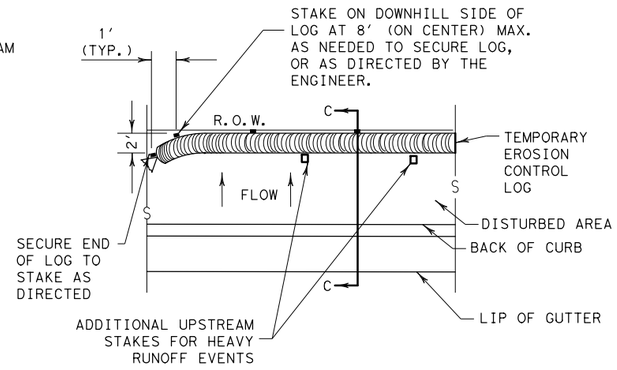


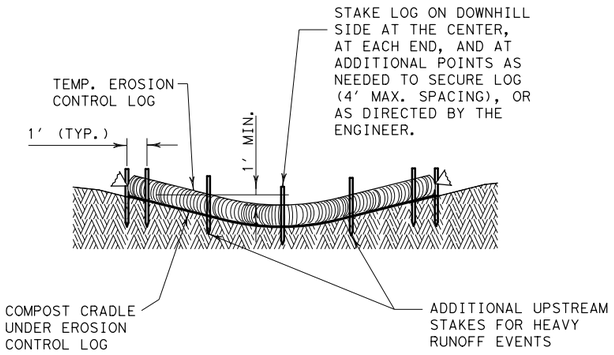
PLAN VIEW



PLAN VIEW



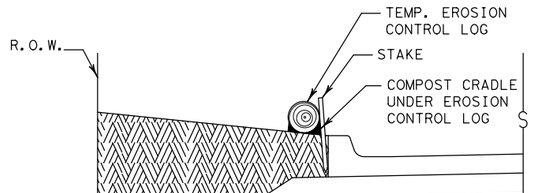
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

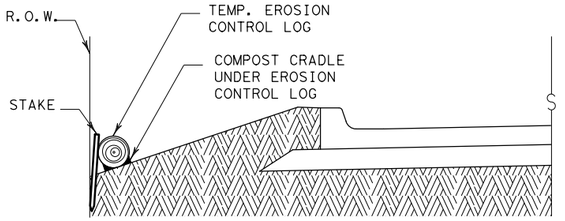
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

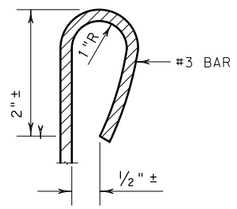
CL-BOC



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.

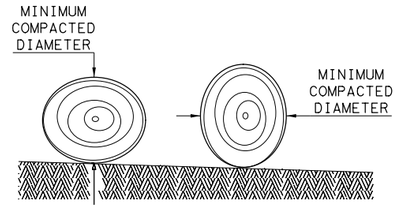
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

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	0014	03	087		IH 35W		
	DIST	COUNTY			SHEET NO.		
	FTW	JOHNSON			264		

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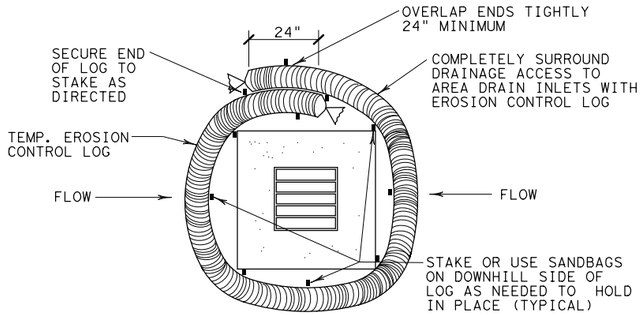
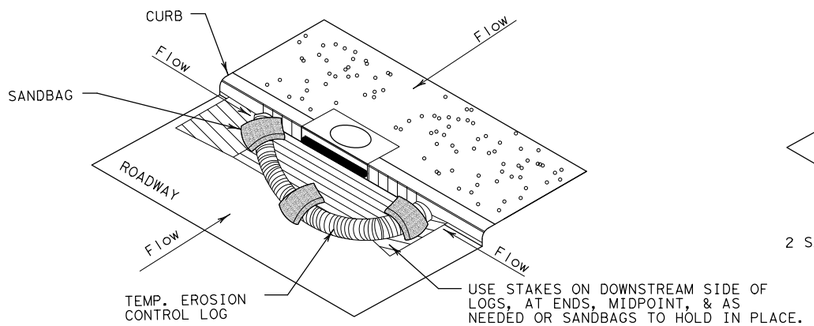


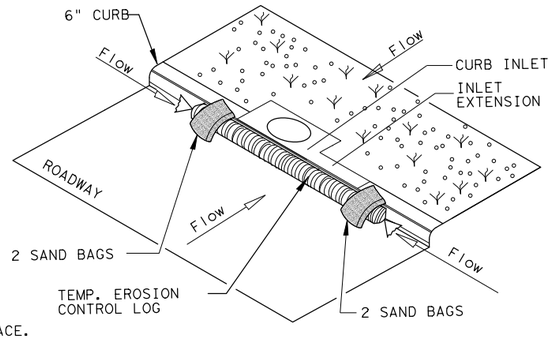
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

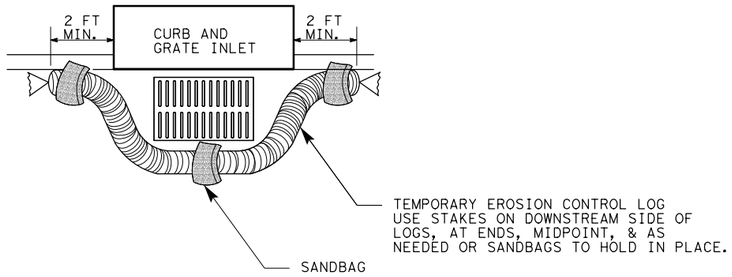
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

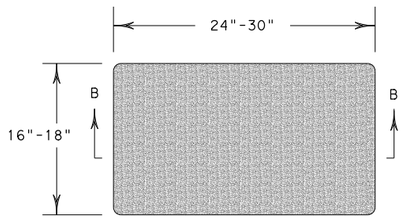
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



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	JOHNSON				265	

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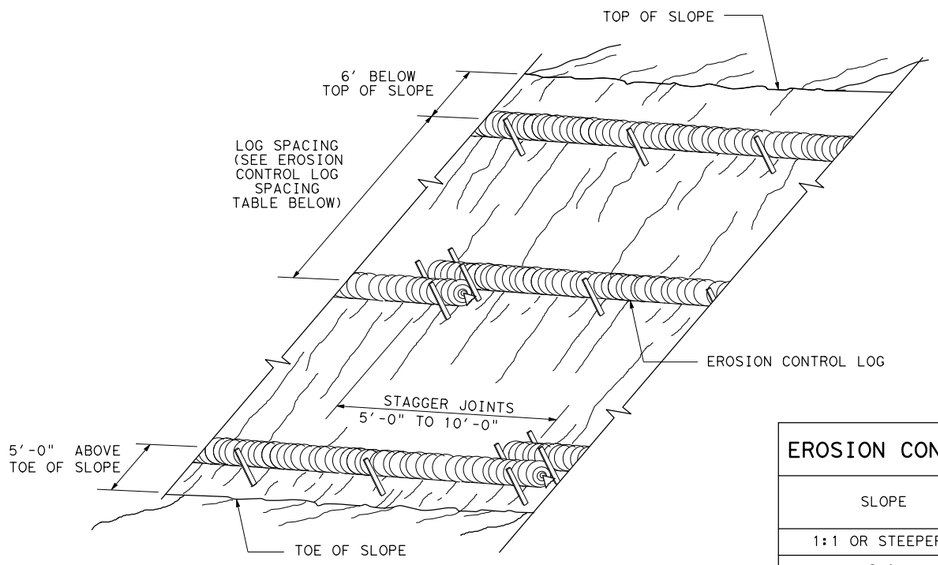
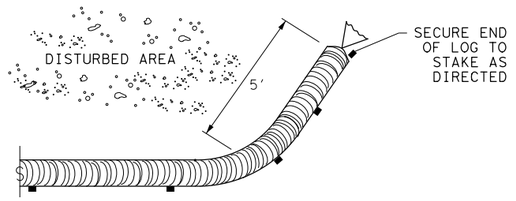


EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

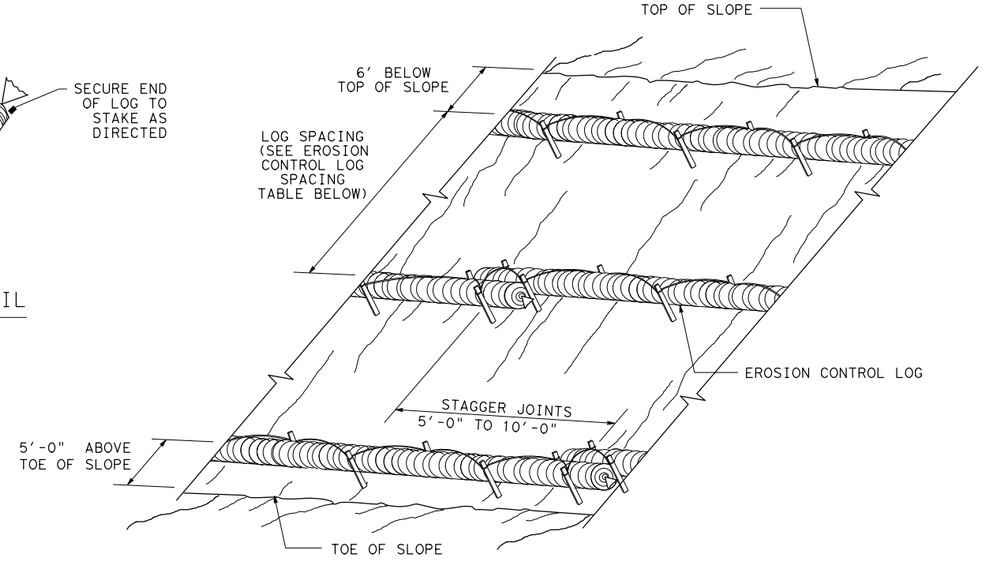
CL-SST



END SECTION RAP DETAIL

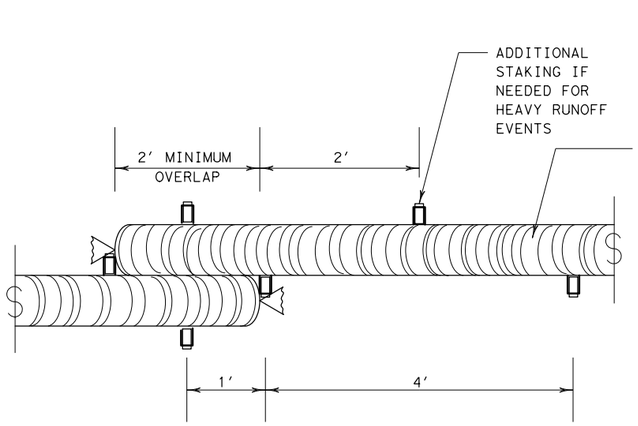
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5′	10′	15′	20′
2:1	10′	20′	30′	40′
3:1	15′	30′	45′	60′
4:1 OR FLATTER	20′	40′	60′	80′

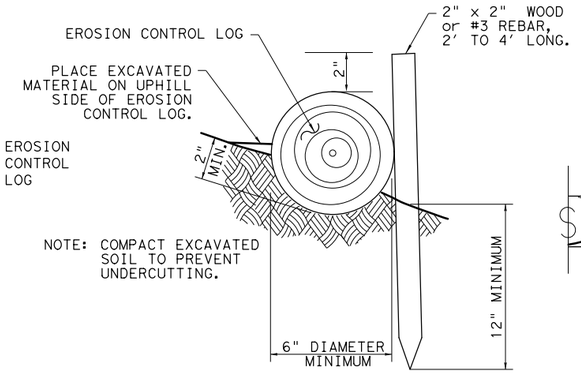
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

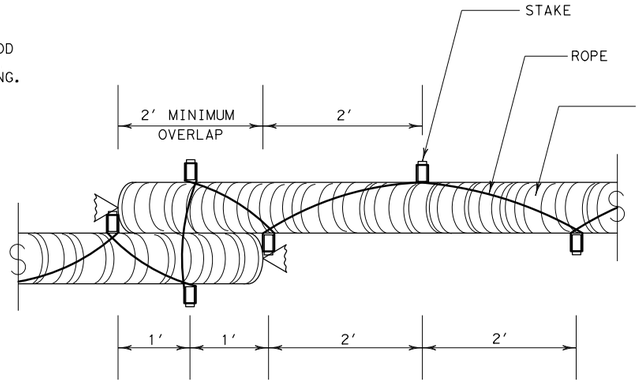


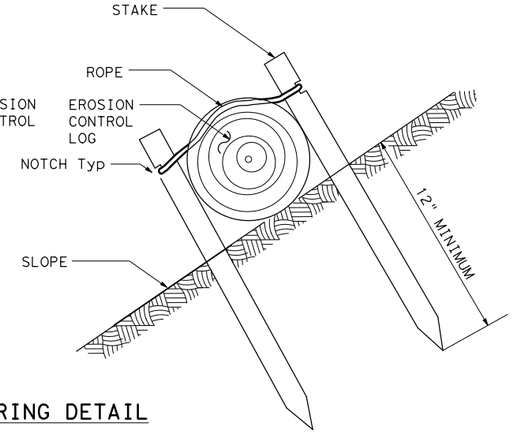


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

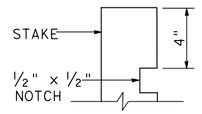
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





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
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REVISIONS	0014	03	087		IH 35W	
	DIST	COUNTY			SHEET NO.	
	FTW	JOHNSON			266	