DESIGN	FED.RD. DIV.NO.	MAINTENANCE PROJECT NO.		HIGHWAY NO.
BD	6	RMC		IH0030
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
BD	TEXAS	DALLAS	DALLAS	1
CHECK	CONTROL	SECTION	JOB	
DM				
CHECK				
DM	6464	74	001	

NOTE:

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014, AND SPECIAL SPECIFICATION ITEMS INCLUDED SHALL GOVERN ON THIS PROJECT.

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
HIGHWAY ROUTINE MAINTENANCE CONTRACT

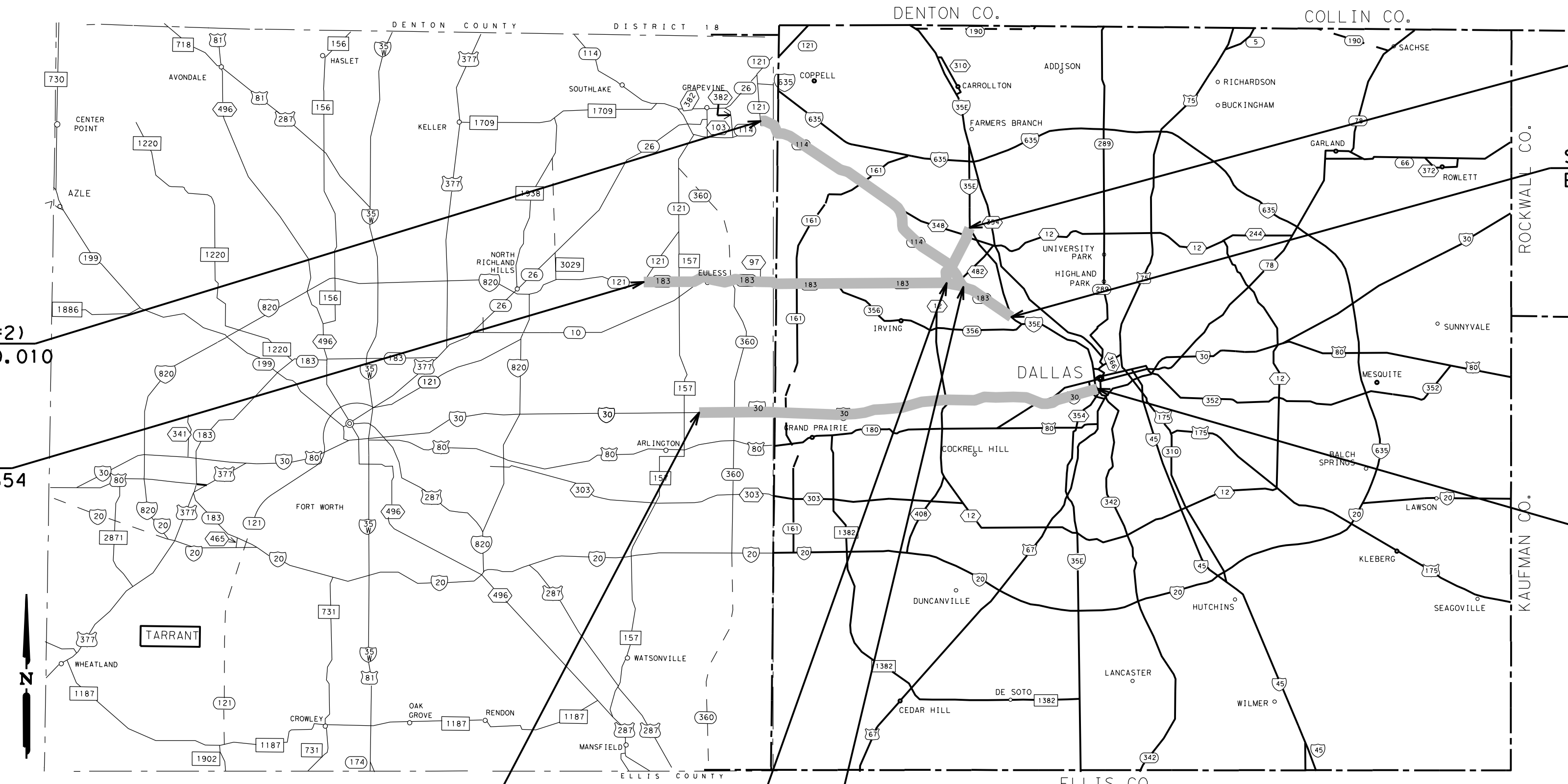
TYPE OF WORK:

PERFORMANCE BASED OPERATIONS AND ROUTINE MAINTENANCE OF MANAGED LANES

PROJECT NO. : RMC-646474001

HIGHWAY: IH0030, SH 114, SH183, SL0012

LIMITS: VARIOUS MANAGED LANES IN DALLAS AND TARRANT COUNTIES



TEXAS DEPARTMENT OF TRANSPORTATION

RECOMMENDED FOR LETTING: 5/3/2024

DocuSigned by: David Morren, P.E. , P.E.
DISTRICT MAINTENANCE ENGINEER

SUBMITTED FOR LETTING: 5/3/2024

DocuSigned by: Darius Haggard , P.E.
TRANSPORTATION MAINTENANCE ENGINEER

APPROVED FOR LETTING: 5/6/2024

DocuSigned by: JEFFREY BUSH , P.E.
DIRECTOR OF OPERATIONS

TIME:$TIME$

DATE:$DATE$

FILE:$FILE$

INDEX OF SHEETS

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

STATE OF TEXAS
DARIUS J. HAGGARD
145313
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Darius Haggard
6A840329DA5948F...
,P.E.
5/3/2024
Signature of Registrant & Date

Texas Department of Transportation

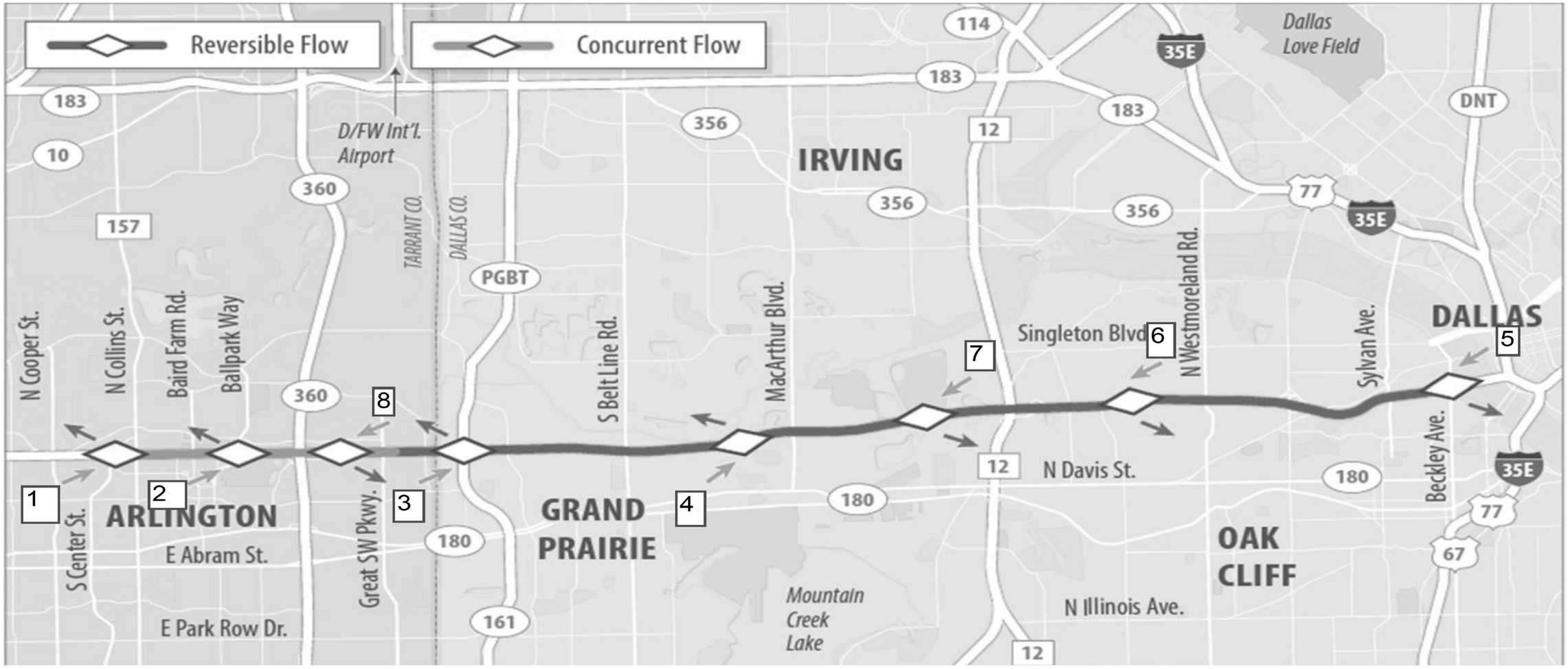
INDEX OF SHEETS

NOT TO SCALE

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		IH0030
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	DALLAS	2
CHECK	CONTROL	SECTION	JOB	
	6464	74	001	

DATE:$DATE$ TIME:$TIME$
FILE:$FILE$

INTERSTATE HIGHWAY 30 TEXpress LANES



Eastbound Entrances	Westbound Entrances
1. Collins St.	5. Beckley Ave.
2. Baird Farm Rd.	6. Cockrell Hill Rd.
3. SH161 (PGBT).	7. MacArthur Blvd.
4. Belt Line Rd.	8. Six Flags Dr.

STATE OF TEXAS
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LICENSED PROFESSIONAL ENGINEER

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Darius Haggard
Signature of Registrant & P.E.

5/3/2024
Date

Texas Department of Transportation
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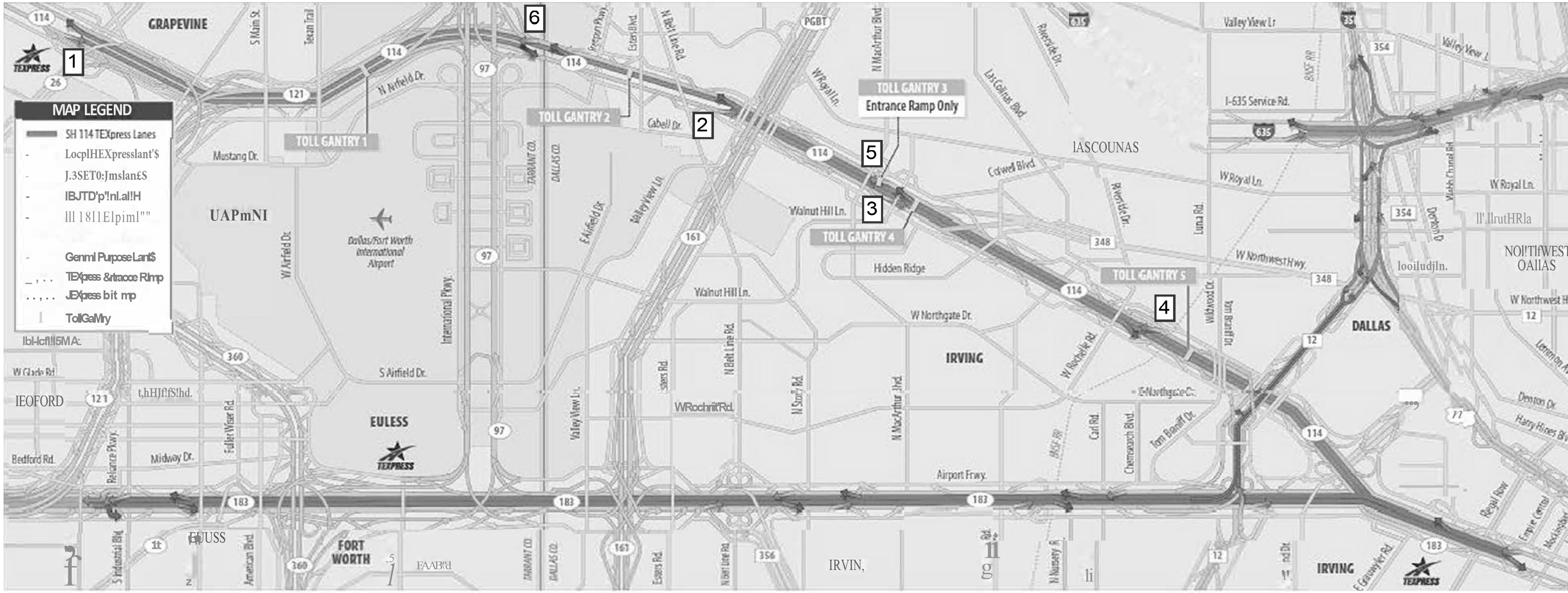
IH0030
LOCATION MAP

SHEET 1 OF 4

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
BD	6	SEE TITLE SHEET		IH0030
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
BD	TEXAS	DAL	DALLAS	
CHECK	CONTROL	SECTION	JOB	3
DM	6464	74	001	
CHECK				
DM				

DATE: $DATE$ TIME: $TIME$
FILE: $FILE$

STATE HIGHWAY 114 TEXpress LANES



Eastbound Entrances
1. SH26
2. SH161 (PBGT).
3. Walnut Hill Ln.

Westbound Entrances
4. Rochelle Rd.
5. MacArthur Blvd.
6. International Pkwy (SH 97)

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6A840320DA5948F...
P.E. 5/3/2024
Signature of Registrant & Date

Texas Department of Transportation

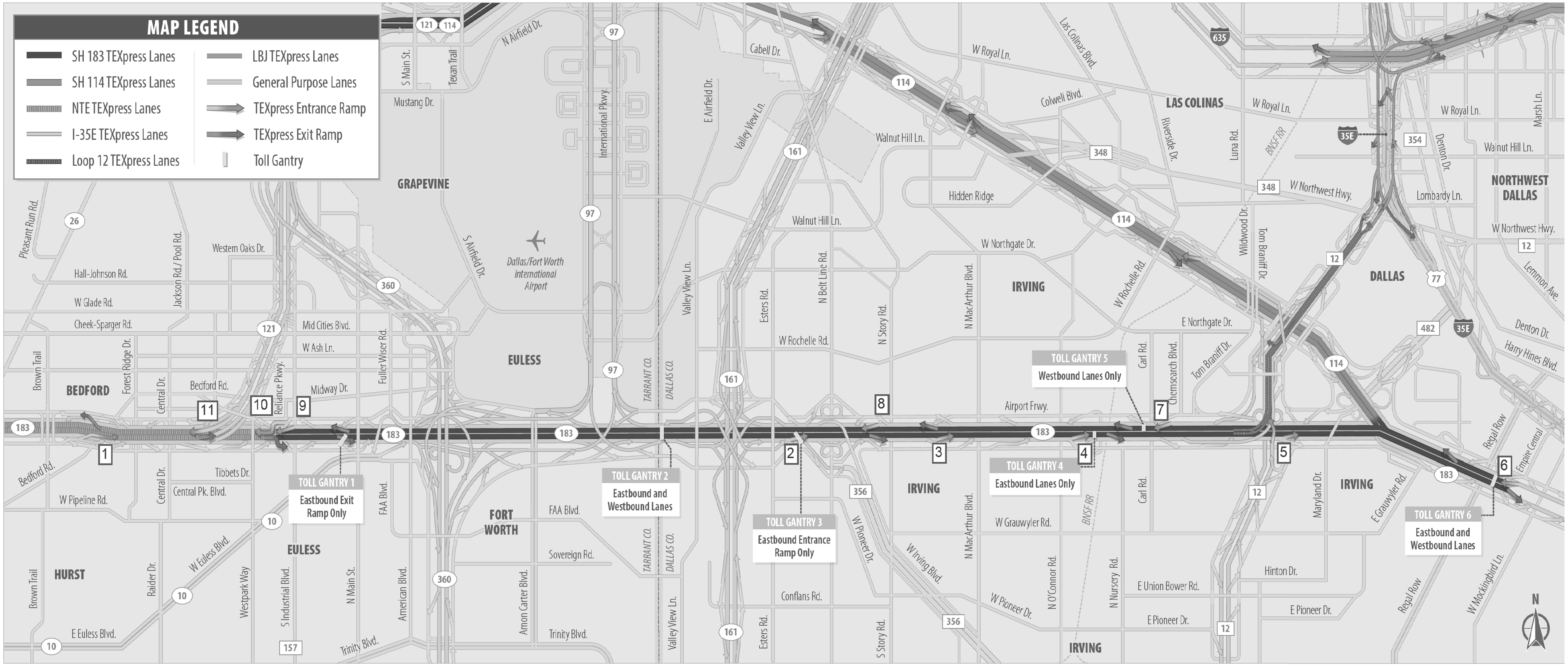
SH 114
LOCATION MAP

SHEET 2 OF 4

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
BD	6	SEE TITLE SHEET		IH0030
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
BD	TEXAS	DAL	DALLAS	4
CHECK	CONTROL	SECTION	JOB	
DM	6464	74	001	
CHECK				
DM				

DATE: $DATE$ FILE: $FILE$ TIME: $TIME$

STATE HIGHWAY 183 TEXpress LANES



Eastbound Entrances

1. Bedford Rd.
2. Belt Line Rd.
3. MacArthur Blvd.
4. O'Connor Rd.
5. Loop 12.

Westbound Entrances

6. Empire Central Dr.
7. Carl Rd.
8. Story Rd.
9. Reliance Pkwy.
10. Airport Freeway
11. SH121 Direct Connector.

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5/3/2024
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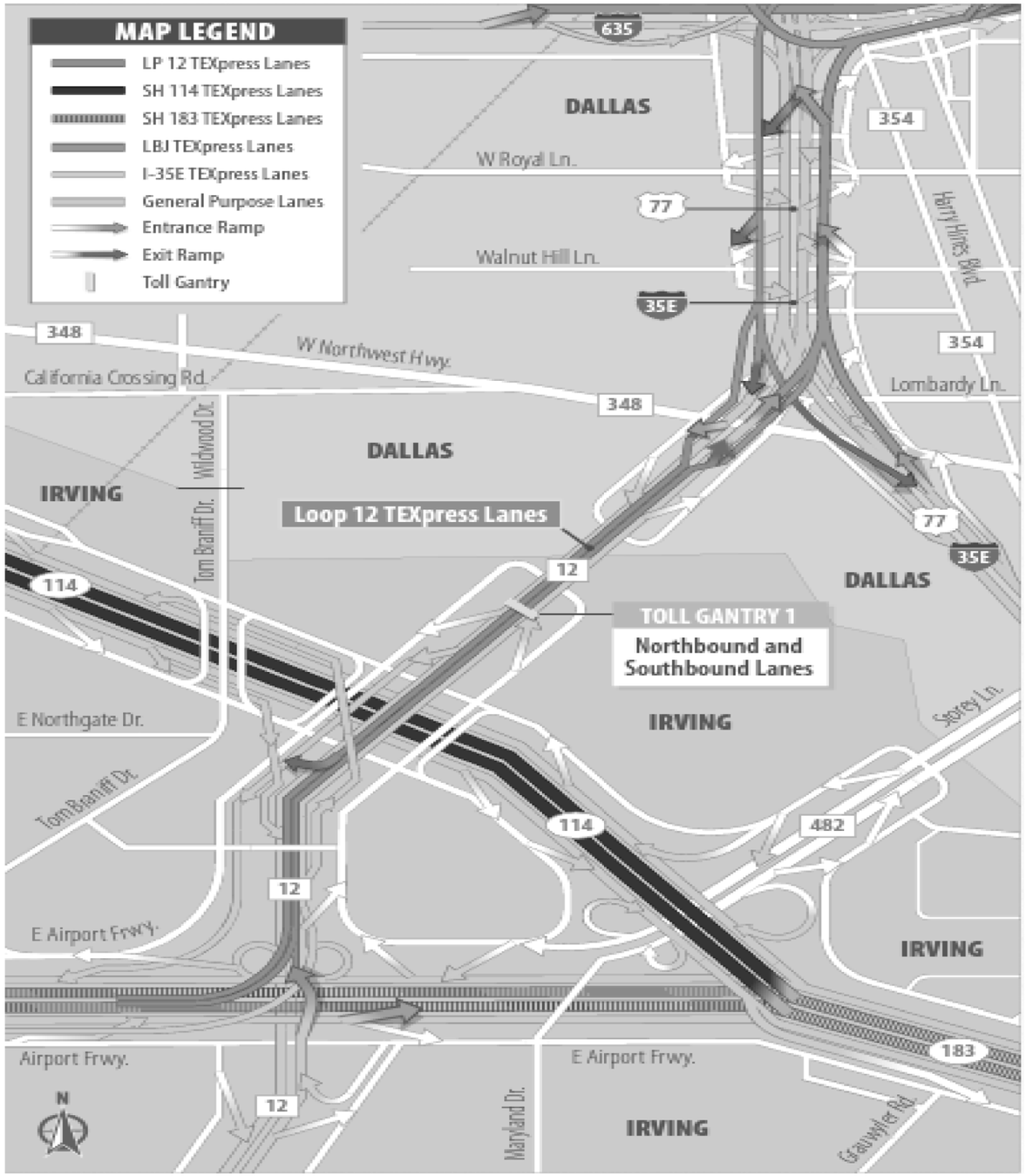
SH 183
LOCATION MAP

SHEET 3 OF 4

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
BD	6	SEE TITLE SHEET		IH0030
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
BD	TEXAS	DAL	DALLAS	5
CHECK	CONTROL	SECTION	JOB	
DM	6464	74	001	
CHECK				
DM				

DATE: $DATE$
TIME: $TIME$
FILE: $FILE$

STATE LOOP 12 TEXpress LANES



SOUTH BOUND ENTRANCES

1 - South of Manana Dr.

2 - South of NW Highway

NORTH BOUND ENTRANCES

3 - North of SH 183

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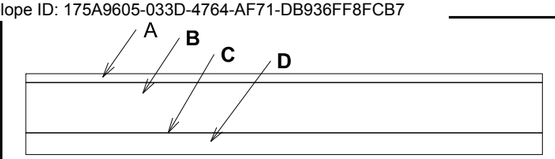
SL 12
LOCATION MAP

SHEET 4 OF 4

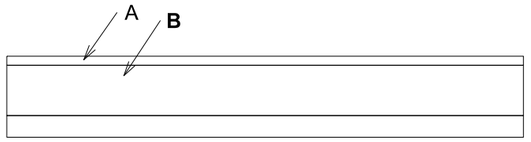
DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
	6	SEE TITLE SHEET		IH0030
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	DALLAS	6
CHECK	CONTROL	SECTION	JOB	
	6464	74	001	

DATE:$DATE$ TIME:$TIME$
FILE:$FILE$



EXISTING MANAGED LANES
ASPHALT PAVEMENT STRUCTURE

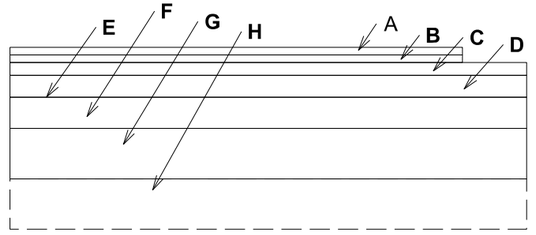
A. 2.5" ACP SURFACE COURSE
B. 14" TY-B HMAC
C. PRIME COAT
D. 8" LIME SUBGRADE



PROPOSED MANAGED LANES
ASPHALT PAVEMENT STRUCTURE

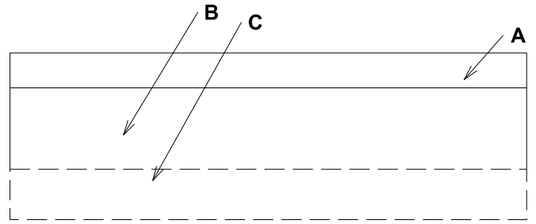
A. 2.5" TY-C HMAC
B. 14" TY-B HMAC

IH-30



SH 114 EXISTING MANAGED LANES
PAVEMENT STRUCTURE

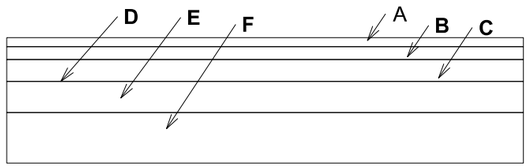
A. 0.75" UTBHMWC (SS 3142, PG 76-22, SAC A
B. 2" HMA TY-C (SS 3268, PG 70-22)
C. 3.25" HMA TY-B (SS 3268, PG 64-22)
D. 4"HMA TY-B(SS3268, PG 64-22)
E. PRIME COAT
F. 8" FLEXIBLE BASE (GRADE 1, TYPE D)
G. 12" TREATED SUBGRADE
H. SELECT FILL OR TREATED SUBGRADE



SH 114 PROPOSED REPAIR FOR
MANAGED LANES PAVEMENT STRUCTURE

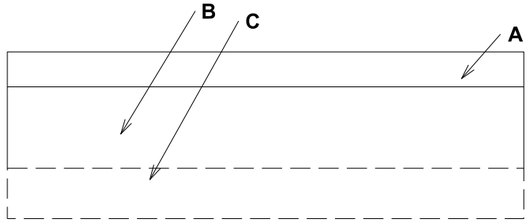
A. 8" HMA TY-C (SS 3142, PG 76-22)
B. 10" HMA TY-B (SS 3268, PG 64-22)
C. SELECT FILL OR TREATED SUBGRADE

SH 114



SH 183 EXISTING MANAGED LANES
PAVEMENT STRUCTURE

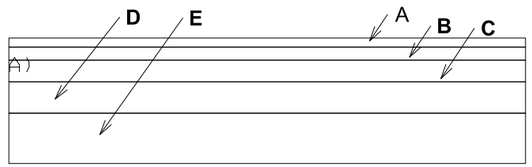
A. 0.75" UTBHMWC (SS 3142, PG 76-22, SAC A)
B. 2" HMA TY-C (SS 3268, PG 70-22)
C. 3.25" HMA TY-B (SS 3268, PG 64-22)
D. PRIME COAT
E. 8" FLEXIBLE BASE (GRADE 1, TYPE D)
F. 17" TREATED SUBGRADE



SH 183 PROPOSED REPAIR
FOR MANAGED LANES PAVEMENT STRUCTURE

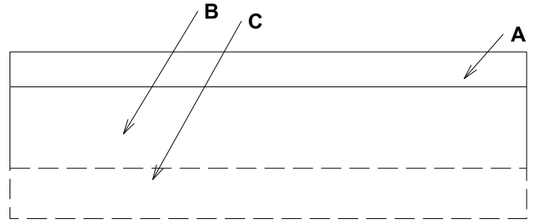
A. 6" HMA TY-C (SS 3142, PG 76-22)
B. 8" HMA TY-B (SS 3268, PG 64-22)
C. TREATED SUBGRADE

SH 183



SL 12 EXISTING MANAGED LANES
PAVEMENT STRUCTURE

A. 0.75" UTBHMWC (SS 3142, PG 76-22, SAC
B. 2" HMA TY-C (SS 3268, PG 70-22)
C. 3.25" HMA TY-B (SS 3268, PG 64-22)
D. 8" FLEXIBLE BASE (GRADE 1, TYPE D)
E. 14" TREATED SUBGRADE



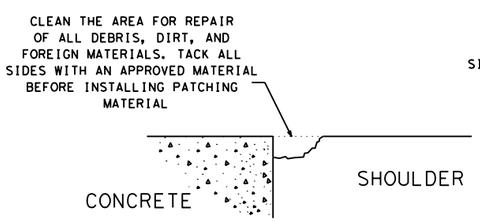
SL 12 PROPOSED REPAIR FOR
MANAGED LANES PAVEMENT STRUCTURE

A. 6" HMA TY-C (SS 3142, PG 76-22)
B. 8" HMA TY-B (SS 3268, PG 64-22)
C. TREATED SUBGRADE

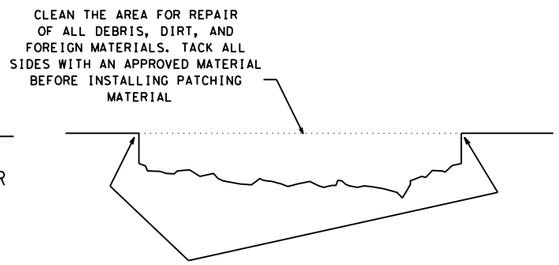
LOOP 12

TYPICAL SPALL AND/OR POTHOLE REPAIR

PAVEMENT EDGE JOINT



POTHOLE OR ASPHALT SPALL REPAIR



STATE OF TEXAS
DARIUS J. HAGGARD
145313
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Darius Haggard
Signature of Registrant

5/3/2024
, P.E.
Date

Texas Department of Transportation

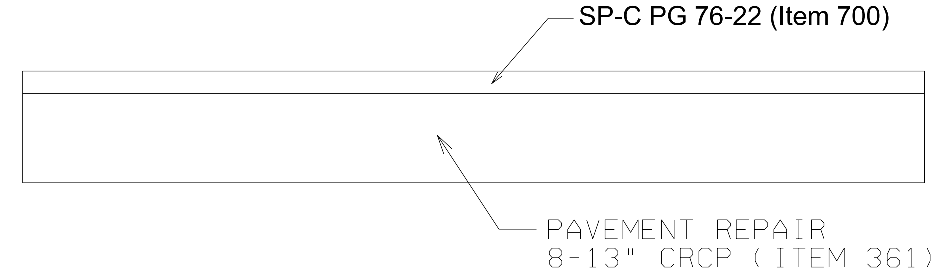
EXISTING & PROPOSED REPAIR TYPICAL SECTIONS

SHEET 1 OF 2

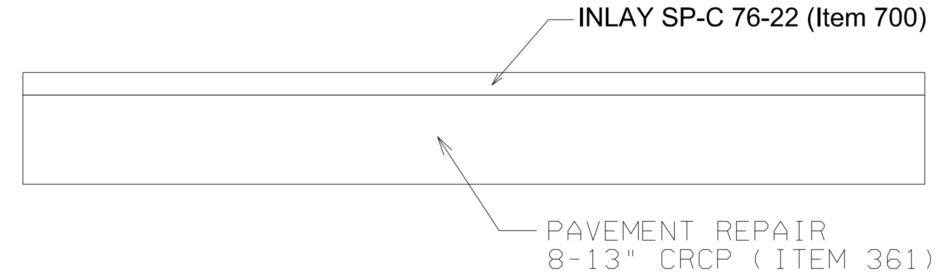
DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
BD	6	SEE TITLE SHEET		IH0030
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
BD	TEXAS	DAL	DALLAS	7
CHECK	CONTROL	SECTION	JOB	
DM	6464	74	001	
CHECK				
DM				

TIME:$TIME$
DATE:$DATE$
FILE:$FILE$

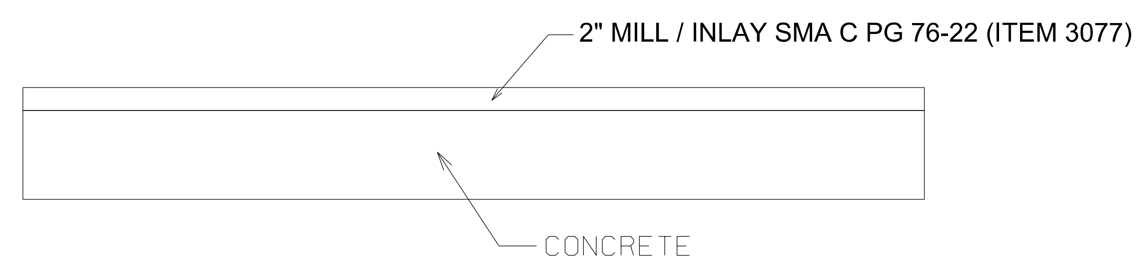
PROPOSED COMPOSITE PAVEMENT REPAIR FULL DEPTH



PROPOSED COMPOSITE PUNCH-OUT REPAIR



PROPOSED MILL/INLAY REPAIR



STATE OF TEXAS
DARIUS J. HAGGARD
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LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Darius Haggard
6A840329DA594BE
, P.E. 5/3/2024
Signature of Registrant & Date

TIME:$TIME$
DATE:$DATE$
FILE:$FILE$

Texas Department of Transportation

PROPOSED TYPICAL SECTIONS

SHEET 1 OF 1

DESIGN BD	FED. RD. DIV. NO. 6	PROJECT NO. SEE TITLE SHEET		HIGHWAY NO. IH0030
GRAPHICS BD	STATE TEXAS	DISTRICT DAL	COUNTY DALLAS	SHEET NO. 8
CHECK DM	CONTROL 6464	SECTION 74	JOB 001	
CHECK DM				

General:

This project consists of performing "Performance Based Operations and Maintenance of Managed Lanes" on the following as indicated in the plans:

1. IH30 and SH 183 Managed Lanes in Northwest Dallas and Tarrant Counties
2. SH114 and SL12 Managed Lanes in Northwest Dallas Maintenance Section

Table 1: Site Location

Site	Roadway	Limits
1	IH 30 (Tom Landry)	From Beckley Ave to Center St.
2	SH 114	From SH 121 to SH 183
3	SH 183	From IH35 E to SH 121
4	SL 12	From SH 183 to IH35 E

Table 2: Basis of Estimate for Permanent Construction

Item	Description	Thickness	Rate		Unit of Measure
3077	SP Mixes	See Plans	110	Lbs./SY/In	TON
3077	Tack Coat (Undiluted Application Rate)		0.06	Gal/SY	GAL
Note: (1) Base material weight based on 1.50 Ton/CY (dry- compacted) (2) Asphalt weight based on 110 Lbs./SY/In					

Provide and maintain a dedicated email address for receipt of work orders and correspondence throughout the term of this contract. Acknowledgement of emailed work order/callouts is required no more than 12 hr. from notification.

Contractor's attention is called to the fact that all adjoining pavement sections will be protected during all phases of construction and any damages incurred due to Contractor's operation will be repaired and replaced at the Contractor's expense.

Each contract awarded by the Department stands on its own as such, is separate from other contracts. A Contractor awarded multiple contracts, must be capable and sufficiently staffed to concurrently process any or all contracts at the same time.

Project Number: RMC-646474001 **Control:** 6464-74-001

County: Dallas **Highway:** IH0030

Table 3: Minimum Production Rates

Full Depth Repair	25	SY
Conc. Str. Repair	50	SF
Overhead/Vertical Conc. Repair	5	SF
Pothole Repair	25	SY
Drain & Downspout Cleaning	20	EA
Storm Sewer Cleaning	500	LF
Mowing	150	AC
Litter Removal	50	AC
Broadcast Herbicide Application	100	AC
Tree Trimming	1	MI/AC
Ditch Cleaning & Reshaping	300	LF
Pavement Edges, Structures & Fixtures	4	MI
Superpave SP-C Asphalt	100	TONS
Remove & Dispose Driftwood & Debris	25	CY

Written notification will be issued to begin each mowing cycle and/or herbicide cycle.

Should herbicide re-treatment be required, time charges will resume until re-treatment is completed.

Written notification will contain the number of acres required for litter removal, mowing and broadcast herbicide treatment, number of centerline miles for pavement edges, structures and fixtures, number of working days to complete the work, and date that time charges will commence.

Department will evaluate each tract before mowing and herbicide treatment. If entire tract does not need to be mowed or treated, acreage will be re-calculated, and limits of mowing or treated area will be shown on work order letter.

Remove and replace guardrail, posts, bolts, nuts, etc., in those areas where entry cannot be made in any other way.

Coordinate work through:

Roger Wahlquist
4777 E. Hwy. 80
Mesquite, Texas 75150
214-319-6569 (Office Number)

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

Darius Haggard, P.E. Darius.Haggard@txdot.gov
Husam Alsaad, P.E. Husam.Alsaad@txdot.gov

Questions may be submitted via the Letting Pre-Bid Q&A web page. This webpage can be accessed from the Notice to Contractors dashboard located at the following Address:

https://tableau.txdot.gov/views/ProjectInformationDashboard/NoticetoContractors

All contractor questions will be reviewed by the Engineer. All questions and any corresponding responses that are generated will be posted through the same Letting Pre-Bid Q&A web page.

The Letting Pre-Bid Q&A web page for each project can be accessed by using the dashboard to navigate to the project you are interested in by scrolling or filtering the dashboard using the controls on the left. Hover over the blue hyperlink for the project you want to view the Q&A for and click on the link in the window that pops up.

Attention is directed to the possible presence of underground utilities owned by the Texas Department of Transportation (irrigation, signal, illumination and surveillance, communication, and control) on the right of way. Call the Department for locates at 214-320-6682, 48 hr. in advance of excavation. Contact the appropriate department of the local city or town a minimum of 48 hr. in advance of excavation.

If overhead or underground power lines need to be de-energized, contact the electrical service provider to perform this work. Cost associated with de-energizing the power lines or other protective measures required are at no expense to the Department.

If working near power lines, comply with the appropriate sections of Texas State Law and Federal Regulations relating to the type of work involved.

Provide a commercial laboratory for testing of all concrete items of work. The commercial laboratory will perform all required sampling and testing of concrete as required by this item and the engineer. Submit all sampling results to the engineer in a timely manner for approval. The commercial laboratory is responsible for all work performed, materials furnished, labor, tools and incidentals required to complete the sampling and testing of concrete.

Item 3 – Award and Execution of Contract:

The contract is Non-Site Specific.

After written notification, work request will be on a callout basis.

Each callout work request will be continuously prosecuted to completion.

Work site is defined as the locations presented on the written callout work request.

Project Number: RMC-646474001 **Control:** 6464-74-001

County: Dallas **Highway:** IH0030

A mobilization callout will be paid for each work site. Only one callout will be paid per request, inclusive of all locations presented on the written callout work request. Multiple locations in a callout work request will generally be limited to one roadway.

For cyclical items including mowing, herbicide, litter, sweeping and debris; multiple roadways will be included in each callout work request. One mobilization callout will be paid for these cyclical items.

There is no minimum callout quantity for safety related items such as guardrail, attenuators, cable barrier, etc. as determined by the engineer. A callout mobilization will be paid for each work site.

For safety related items, schedule and begin physical work on the repair items in the order presented in each written callout work request within 48 hr. or as directed.

All other item of work, begin physical work within 7 days of each written callout work request.

Minimum quantities per written callout notification for specific items of work are as follows:

Table 4: Minimum Quantities Per Call Out

Associated Work Items	Minimum Quantity (Per Call Out)	Units
351 – Flexible Pav Str Repair	500	SY
354 - Plan & Text Asphalt Concrete Pavement.	500	SY
361 - Full-Depth Concrete Repair	200	SY
429 - Concrete Structure Repair	200	SF
512 - Portable CTB Aligning	90	LF
700 - Pothole Repair	25	SY
764 - Drain Inlet and Downspout Cleaning	50	EA
764 - Storm Sewer Cleaning	50	LF
3077 - SP Mixes SP-C PG70-22	500	Tons
7083 - Cleaning Guardrail, Attenuators, & Drainage Flumes	500	LF

Item 7 – Legal Relations and Responsibilities:

Pre-construction safety meeting will be conducted with Contractor's personnel prior to work beginning on a continuously prosecuted contract or before each callout work request.

Attendance of this meeting will not be paid directly but considered subsidiary to the various bid items.

Do not obtain law enforcement personnel without requesting in writing 48 hr. prior to need and the Engineer's written approval. The Department may compensate the Contractor for providing full time, off-duty, uniformed, law enforcement personnel, and patrol car. The law enforcement personnel may be required for assistance with traffic control for lane or ramp closures or other situations that dictate the need for law enforcement officers as directed. Off-duty law enforcement personnel will have transportation jurisdiction and full police powers. Law enforcement personnel will show proof of certification by the Texas Commission on Law Enforcement (TCOLE).

Patrol vehicles must be clearly marked to correspond with the officer's agency and equipped with appropriate lights to identify them as law enforcement. For patrol vehicles not owned by a law enforcement agency, markings will be retroreflective and legible from 100 ft. from both sides and the rear of the vehicle. Lights will be high intensity and visible from all angles.

Holiday restrictions – the Engineer may decide that no lane closures or construction operations will be allowed during the restricted periods listed in the following holiday schedule. TxDOT has the right to lengthen, shorten, or otherwise modify these restricted periods as actual, or expected, traffic conditions may warrant. Working days will not be charged for these restricted periods. No additional compensation will be allowed for these restricted closures (i.e., overhead, delays, stand-by, barricades or any other associated cost impacts).

- New Year's Eve and Day (noon on December 31 thru 10 P.M. January 1)
- Easter Holiday weekend (noon on Friday thru 10 P.M. Sunday)
- Memorial Day weekend (noon on Friday thru 10 P.M. Monday)
- Independence Day (noon on July 3 thru 10 P.M. on July 5)
- Labor Day weekend (noon on Friday thru 10 P.M. Monday)
- Thanksgiving Holiday (noon on Wednesday thru 10 P.M. Sunday)
- Christmas Holiday (noon on December 23 thru 10 P.M. December 26)

Holiday restrictions for Independence Day, Thanksgiving Holiday, and the Christmas Holiday may be extended for the "week of" due to the nature of work being performed and the work location at the discretion of the Engineer for safety of the traveling public.

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

Event Restrictions – No Lane Closures that restricts or interferes with traffic will be allowed for the regional events set forth below. This affects IH35E. TxDOT has the right to lengthen, shorten, or otherwise modify these restrictions as actual traffic conditions may warrant. TxDOT also has the right to modify the list of major events as they are added, renamed, rescheduled, or as warranted.

Project Number: RMC-646474001 **Control:** 6464-74-001

County: Dallas **Highway:** IH0030

- State Fair of Texas (no lane closures after 6 A.M. on Fridays through 9 P.M. on Sundays; no full closures for any direction of any facility from opening day through the closing day)
- The University of Texas vs. University of Oklahoma football game (no lane closures beginning 4 hr. prior to the event and ending 3 hr. following event completion).
- The First Responder Bowl (no lane closures beginning 3 hr. prior to the event and ending 2 hr. following the event completion).
- Dallas Mavericks Home Games (no lane closure beginning 2 hr. prior to the event and ending ½ hr. following event commencement with no full lane closures considered until 2 hr. following event completion).
- Dallas Stars Home Games (no lane closure beginning 2 hr. prior to the event and ending ½ hr. following event commencement with no full lane closures considered until 2 hr. following event completion).
- Texas Rangers Home Games (no lane closure beginning 2 hr. prior to the event and ending ½ hr. following event commencement with no full lane closures considered until 2 hr. following event completion).
- Dallas Cowboys Home Games (no lane closure beginning 2 hr. prior to the event and ending ½ hr. following event commencement with no full lane closures considered until 2 hr. following event completion).
- Major Events at the American Airline Center, Globe Life Park in Arlington, AT&T Stadium with expected attendance exceeding 15,000 (no lane closures beginning 2 hr. prior to event and ending ½ hr. following event commencement with no full closures considered until 2 hr. following event completion).
- Major Downtown Dallas Events (restrictions will be considered on a case-by-case basis). This category could include, but is not limited to, parades for sports championships, major political events, major Art District Events, and large athletic events such as marathons.

Item 8 – Prosecution and Progress:

Contract days will be charged in accordance with Section 8.3.1.5, "Calendar Day". 730 Calendar day's project are set up this project.

Working days will be charged in accordance with Section 8.3.1.4, "Standard Workweek".

Liquidated damages will be charged for each working day exceeding the time allowed in the work order letter.

Nighttime work is allowed in accordance with Article 8.3.

Liquidated damages will be charged for each day for failure to mobilize for the workday.

The Lane Closure Assessment Fee is shown on the following table. The fee applies to the Contractor for closures or obstructions that overlap into restricted hour traffic for each hour or portion thereof, regardless of the duration of the lane closure or obstruction.

Table 5: Lane Closure Assessment Fee Table	
Roadway	**Amount Per Lane Per Hour**
Main Lanes	$4,500
IH 30 Managed Lane or Ramp	$6,250
SH 114 Managed Lane or Ramp	$ 3,000
SH 183 Managed Lane or Ramp	$ 4,500
SL 12 Managed Lane or Ramp	$ 2,500

Item 9 – Measurement and Payment:

Ensure material is readily available to meet the time requirements in the call out work order. Submit invoices for material on hand (MOH) in accordance with this item.

Payment for police officer hours will be paid under "Force Account – Law Enforcement Personnel" and will not exceed the duration of the lane closure. Time will begin when set up operations commence and end when the closure is removed. TxDOT Form 318 will be utilized.

Item 351 – Flexible Pavement Structure Repair:

Provide Superpave mixes in accordance with Item 3077.

Existing asphalt to be removed will be sawed full depth along neat lines where portions are to be left in place temporarily or permanently.

Do not expose any location that cannot receive, at a minimum, a single surface treatment or the final pavement surface in any one day.

Coarse aggregates to be used in the surface course will have a minimum surface aggregate classification of "A".

Cutouts must have Superpave SP-B PG 64-22, Dense Graded Hot Mix Asphalt PG-64-22, Cement Stabilized Base placed by the end of each day with proper slope protection.

Furnish MS-2 or SS-1 Emulsified Asphalt in accordance with Item 300, "Asphalt, Oils and Emulsions," for tack coat.

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Provide surface course Superpave SP-***C*** PG ***70-22***. Asphalt edges will be beveled to eliminate pavement drop offs.

Slope any vertical or near vertical longitudinal face exceeding 1 1/4 in. in height in the pavement surface open to traffic at the end of a work period to a minimum of 1:1. Taper transverse faces in a manner acceptable to the Engineer.

The surface of the pavement after compaction will be smooth and true to the established line, grade, and cross section. When tested with a 10-ft. straight edge placed parallel to the centerline of the roadway or tested by other equivalent means, the maximum deviation will not exceed 1/8 in. within 10 ft., unless otherwise approved by the Engineer.

Occasional repair requests for various areas may arise.

Begin "Finishing" as soon as possible behind surface course operations.

Provide Short Term Work Zone Pavement Markings where striping is eliminated.

Item 354 – Planing and Texturing Pavement:

All reclaimed asphaltic material will become property of the Contractor to be removed and recycled properly.

During the planing operation, maintain the existing centerline stripe for overnight traffic operations unless full width planing is accomplished in one day. Plane all vertical longitudinal faces with a 3:1 slope to meet Edge Condition I as shown on sheet "Treatment for Various Edge Conditions".

Maintain the surface of planed surfaces prior to HMAC operations.

The planing operation will be followed closely by the hot-mix asphalt (HMA) overlay operation. Vacuum loose fines immediately after the milling operation and prior to overlaying with HMA. If inclement weather or other unexpected factors do not allow planed areas to be overlaid as described above, warning signs per Standard Sheet Work Zone for Uneven Lanes will be maintained until the hot-mix asphalt overlay operation is completed.

If unstable material is observed after initial milling, plane additional material to a depth that will support traffic.

Use a minimum 30 ft. ski on the planing machine.

Item 361 – Repair of Concrete Pavement:

Furnish mix designs to the Engineer in a format compatible to the latest version of the Department's Construction Management System (Site Manager).

Mix Design templates may be downloaded at:

http://www.txdot.gov/inside-txdot/forms-publications/consultants-contractors/forms/site-manager.html.

When using the maturity method as specified in Item 360, develop maturity strength relationships for each season and provide strength maturity plots to the engineer for review and acceptance. Maturity meters may not be used if the strength maturity relationship is not approved.

The use of ready-mix concrete will be permitted.

Schedule work so that concrete placement follows full depth saw-cutting by no more than 2 days.

Upon removal of the existing concrete slab, Contractor will excavate base material when necessary and repair base to match the surface elevation of the asphalt base prior to concrete placement. Concrete may not be used to repair existing base or replace asphalt base.

Provide Class HES concrete designed to attain a minimum average flexural strength of 255 psi or a minimum average compressive strength of 1,800 psi within the allowed lane closure time.

For joint pavement, provide dowel support assemblies in concrete pavement constructed of 0.306 in. diameter wire in the main vertical members. Rigidly support the dowels in parallel positions and weld them on one end to the support frame. Provide weld attachments alternately on opposite ends of successive dowels. The support assembly is subject to approval.

Provide grooved joints at 10 ft. intervals and 3/4 in. expansion joint material for doweled curb at the same locations as on the existing pavement.

For full depth repair, the amount of pavement removed will only be that amount which can be replaced during the daily allowable work schedule.

Prior to the installation of tiebars, the hole will be thoroughly cleaned of all loose materials and blown clean with compressed air. An injection nozzle will be used to apply the epoxy the full length of the embedment depth to minimize all voids within the hole.

For joint pavement, provide tiebars in longitudinal joints but do not place them within 15 in. of transverse joints.

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Provide chairs for multiple piece tiebars, threaded connectors or other adequate devices, used in concrete paving, or tie them to the pavement reinforcing steel. Instead of multiple piece tiebars, drill holes into the pavement and grout straight tiebars in place with epoxy. Do not use impact drills for drilling holes for tiebars. A rotary, core type, bit is required to prevent damage to pavement that will remain in place. Do not bend the tiebars or insert them into plastic concrete without the approval of the Engineer.

Tine texturing will be required unless otherwise directed.

Provide standby equipment at all times in order to ensure that possible delays caused by equipment breakdown are kept to a minimum.

Place construction, sawed, and contraction joints in accordance with the pavement detail sheet and as directed.

All permanent pavement markings which are removed during the removal of the existing concrete pavement are to be replaced as directed by the Engineer.

Item 420 – Concrete Structures:

Apply an ordinary surface finish to all concrete surfaces within the same day after form removal.

Item 421 – Hydraulic Cement Concrete:

Furnish mix designs to the Engineer in a format compatible to the latest version of the Department's Construction Management System (Site Manager).

Mix Design templates may be downloaded at:

http://www.txdot.gov/inside-txdot/forms-publications/consultants-contractors/forms/site-manager.html

All test molds will be furnished by the Contractor and will be maintained in proper condition. Provide personnel to transport the test samples to a curing location as directed, remove from the mold to a curing tank. Concrete will not be placed when impending weather conditions arise, and it is determined rainfall may occur. If rainfall should begin after the placement operations begin, the Contractor will provide coverage to protect the work. If texture of the pavement is destroyed or damaged, Contractor will restore the pavement texture by grooving or as directed.

Item 427 – Surface Finishes for Concrete:

Finish Concrete Traffic Railing and patches that meet Surface Area II requirements with an Opaque Sealer. Ensure that surfaces are free of weak surface material, curing compounds and other surface contaminants prior to coating.

Protect adjacent surfaces from concrete splatter or overspray. Clean and repaint surfaces damaged by splatter or overspray without additional compensation.

Use Federal Standard 595B colors to match existing opaque sealer finish.
Do not use membrane curing or barrier type release agents without written approval.
Chemical cleaning is not required.

Item 429 – Concrete Structure Repair:

Restore concrete traffic barrier in proper alignment without deviating from the alignment more than 1 in. per 200 ft. of roadway or more than 2 in. maximum prior to performing work under Item 429 "Concrete Structure Repair". CTB ends will meet flush on all sides when aligning connecting ends. Payment to align will be paid under Item 512 "Port CTB (Aligning)".

Item 500 – Mobilization:

Mobilization for IH 30 Performance Based aspect is lump sum.

Mobilization for all routine maintenance work on SH114, SH183 and SL12 will be callout.

Table 6: Mobilization Callout Group Numbers

MOBILIZATION IDENTIFIER	MOBILIZATION BID ITEM	ASSOCIATED WORK ITEMS
1	500-6003	351, 354, 3077
2	500-6004	361, 429 (Full/Partial Depth Deck Repair), 438
3	500-6005	427, 429(Vertical & Overhead)
4	500-6006	512
5	500-6007	636, 644
6	500-6008	658
7	500-6009	666, 672, 677, 678
8	500-6010	700
9	500-6011	712
10	500-6012	713, 720, 721
11	500-6013	730 (Spot Mowing)
12	500-6014	730, 731

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13	500-6015	734, 735, 738, 740
14	500-6016	764
15	500-6017	770, 774, 7343
16	500-6018	785
17	500-6019	7052
18	500-6020	7083
19	500-6021	734 "Litter Spot"

Item 502 – Barricades, Signs, and Traffic Handling:

Item 502-6025 will only be paid when directed to close entrance and exit ramps on SH 114, SH 183 and SL 12. Measurement will be paid by each ramp closed. Materials and work needed for opening, corrective action, equipment, labor, tools and incidentals will not be measured or paid for directly but will be subsidiary to pertinent Items. See SS 7161 for IH 30 closing and opening operations.

Provide traffic control in compliance with the latest edition of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD), the "Traffic Control Standard Sheets" (TCSS), and as directed.

All work requiring lane closures will be performed Sunday through Thursday between 9:00 P.M. and 5 A.M., unless otherwise approved.

Close no more than one lane at a time, unless otherwise approved. Provide proposed lane closure information to the Engineer by 1 P.M. on the day prior to the proposed closures. Furnish information for Monday closures or closures following a national or state holiday on the last office workday prior to the closures. Do not close lanes if the above reporting requirements have not been met.

Weekend work will be allowed with prior approval. Emergency work will be performed as directed.

Maximum length of lane closure will be 2 miles.

Traffic Control Plans with a lane closure causing backups of 10 minutes or greater in duration will be modified by the Engineer.

Erect barricades and signs in locations not obstructing the traveling public's view of the normal roadway signing or necessary sight distance.

Provide sufficient and qualified staff and equipment to revise the traffic control as directed.

Trailer all slow-moving vehicles (designed to operate 25 mph or less) crossing freeway main lanes.

When moving unlicensed equipment on or across any pavement or public highways, protect the pavement from all damage using an acceptable method.

Equipment and materials will not be left within 30 ft. of the travel lane during non-working hours.

The work performed, materials furnished and all labor, tools, and equipment necessary to complete the work for Non-Site-Specific locations under this Item will not be measured or paid for directly but will be considered subsidiary to the various bid items of this contract.
The "Force Account – Safety Contingency" has been established for this project and is intended to be utilized for work zone enhancements to improve the effectiveness of the Traffic Control Plan that could 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.

Item 512 – Portable Traffic Barrier:

Determine the location of any utilities lying within the median barrier. Repair all damage to utilities caused by Contractor forces at no expense to TxDOT. The Contractor must use a licensed electrician if utilities need to be repaired.

Item 530 – Intersections, Driveways, and Turnouts:

Construct driveway for access to Toll Rate Dynamic Message Sign (TRDMS) control cabinet on IH-30 as directed by the engineer.

Item 585 – Ride Quality for Pavement Surfaces:

Provide a 10-ft. straightedge at all times. Measure and evaluate ride quality of repairs as directed by using Surface Test Type A. Correct surface areas as required.

Item 658 – Delineator and Object Marker Assemblies:

Provide a flat mount delineator for guard fence attachment meeting the following requirements. 33 in. in length and be flattened and sealed on each end enabling mounting height to be consistent without the use of a tape measure. Post will be a minimum of 2-3/8 in. outside diameter composed of recycled tire rubber and post-consumer materials. Post will be permanently sealed at the top

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and be a minimum of 3 in. wide and capable of displaying a 3-in. wide by 12 in. long piece of reflective sheeting.

Provide a flush mount delineator meeting the following requirements. Flexible square to round post (3" outside diameter) that is a simple one-piece, non-metallic molded design that absorbs impacts with immediate rebound response. A 2.5" anchor is required and can be installed at multiple depths by increasing the metal cup by 1.5" increments. A 2" cored hole is required to install into concrete or asphalt epoxy. Space delineators at 20' intervals, or as directed. Delineator color shall match the color of the gore striping.

Provide a surface mount delineator for gore & median pavement attachment meeting the following requirements. The surface mounted post system will be capable of being impacted from any direction, then rapidly recovering installed position after impact. Will be 36 in. in length and capable of enabling mounting height to be consistent without the use of a tape measure. Post will be a minimum of 2-3/8 in. outside diameter composed of recycled tire rubber and post-consumer materials. Post will be permanently sealed at the top and be a minimum of 3 in. wide and capable of displaying two 3-in. wide by 12 in. long piece of reflective sheeting wrapped around the post, allowing for full 360-degree visibility of both reflective sheets. Base will be 7-in wide by 7-in long and attachable to the pavement using either adhesive or anchor bolts (Black adhesive will be used on asphalt pavements and white adhesive will be used on concrete pavements). Base will also be capable of quick releasing the post to allow for rapid maintenance and repairs of the post system.

Provide a cup mount delineator for concrete traffic barrier attachment meeting the following requirements. 8 in. in length and be flattened and sealed on each end enabling mounting height to be consistent without the use of a tape measure. Post will be a minimum of 2-3/8 in. outside diameter composed of recycled tire rubber and post-consumer materials. Post will be permanently sealed at the top and be a minimum of 3 in. wide and capable of displaying a 3-in. wide by 14 in. long piece of reflective sheeting on both sides of post.

Item 666 – Retroreflectorized Pavement Markings:

Pavement marking words and arrows details are contained in the Standard Highway Sign Designs for Texas (SHSD).

Placement of markings in proper alignment will be strictly enforced. Irregular lines placed on both sides of the existing markings will not be accepted.

A gravity flow applicator will be used to funnel the beads onto the stripe. Truck speed will be slow enough to ensure that the beads drop onto the stripe and do not roll in the paint film.

All stripes will be applied in 1 coat.

Layout work will be required where markings have been obliterated, sealed, or overlaid.

All equipment will be capable of maintaining a continuous work schedule to the satisfactory completion of the project. Equipment used for the contract will be equipped with footage counters capable of measuring the linear footage placed. Counters must be calibrated prior to the beginning of striping operations.
Dispose of all empty marking material containers in accordance with all federal, state, and local regulations.

Item 672 – Raised Pavement Markers:

Place all pavement markers in proper alignment with the guides. The maximum deviation rate in alignment is 1 in. per 200 ft. of roadway. The maximum deviation is to not exceed 2 in. or be abrupt.

Removal of old existing adhesive material, bituminous or epoxy is required on concrete surfaces.

Removed Raised Pavement Markers and adhesives are property of the Contractor and will be disposed of at a State approved site off Department property.

Bituminous adhesive will not be allowed on concrete pavement.

Item 700 – Pothole Repair:

Furnish all materials for traditional asphalt mix repair methods in accordance with Item 700. Provide a D mix PG64-22.

Item 712 – Cleaning and Sealing Joints and Cracks (Asphalt Concrete):

Equipment used in cleaning cracks will be capable of delivering a minimum of 125 psi of air pressure with an orifice no more than 0.5 in. in size.

Dispose of solvents or other materials in accordance with federal, state, and local regulations.

Protect raised pavement markers from damage.

Class A Rubber Asphalt Crack Sealer will be utilized.

Lane closures are required.

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Item 713 – Cleaning and Sealing Joints and Cracks (Concrete Pavement):

Protect raised pavement markers from damage.

Dispose of solvents or other materials in accordance with federal, state, and local regulations

Item 730 – Roadside Mowing:

Only motorized hand-trimming equipment will be permitted.

All vegetation including small trees (<3 in.), brush, reeds, cane, etc., (except landscape plantings) in the right of way, to include wet areas, ditches, guardrail, cable barrier, headwalls, culverts, riprap, and structures including retaining walls, sidewalks, islands, traffic barriers, raised medians, curbs, mow strips, areas under bridges, and any other concrete or asphalt structures within the limits as presented in the plans, will be cut by either mowing or hand-trimming to the specified height as directed. Small tree removal is to be performed each mowing cycle and subsidiary to Item 730.

“Spot Mowing” minimum quantity per callout is ½ acres.

Hand trimming will be required around all Department installed fixed objects.

Item 731 – Herbicide Treatment:

Pick up Department furnished materials at the maintenance yard or warehouse listed above.

Use only approved chemicals, chemicals, rates, and application procedures provided in the latest edition of the TxDOT Herbicide Operations Manual. The herbicide solution shall include Drift Control WM or a drift control agent recommended in the manual for all treatments. Drift control will not be paid for directly but will be subsidiary to Item 731 Broadcast Application.

A copy of the latest Herbicide Operations Manual and the Herbicide Records book will be provided by the Department prior to beginning work.

Herbicide Records Book will be completed as directed. A sample for proper record keeping is presented in the Herbicide Records Book.

Furnish water from an approved source, free of industrial wastes and other objectionable matter.

The Engineer or designated licensed TxDOT personnel will determine the level of vegetation management to be used within the right of way on the tracts presented in this contract. The Engineer or designated licensed TxDOT personnel will direct the Contractor of the following:

- Location of application sites
- Timing of herbicide application
- Proper herbicide activity
- Selection of herbicides
- Proper application rates
- Proper application methods

Contractor's licensed personnel will be responsible for the calibration of the Contractor's herbicide equipment including herbicide spray unit, trailer unit, handguns, backpacks, etc. prior to performing work.

The Departments direct supervision affidavit will not relieve the licensed applicator of the responsibilities set forth under Item 731.3.

Trees, brush, grass, reeds, cane, and weeds are considered undesirable vegetation in Pavement Edges, Structures, and Fixtures.

The following tables present the Department furnished material and corresponding rates for:

Table *7*
Broadcast Application Guidelines– Item 731.7.1 and 731.7.2.5

Target/Type of Control Desired	Herbicide	Application Rate	Optimum Treatment Period	Comments
Johnson Grass Control	Roundup PROMAX®+ Outrider®	8 ounces + 1.33 ounces per acre	Early boot to early seedhead is a good time to make application. Apply while actively growing.	Flex-5. For use in Bahiagrass areas. Do not use Outrider® after October 15.
	Outrider®	1.33 ounces per acre + 1 quart Surfactant per 100 gallons of water		Flex-5. In areas where wildflowers are present or if brownout from RoundUP PROMAX® has been a problem. Do not use Outrider® after October 15.
		1 ounce of Outrider per 100 gallons of water + 1 quart of surfactant per 100 gallons of water		Handgun application
	Roundup PROMAX®	2 parts water, 1 part RUPM OR 33% solution		Rotowiper®/Ropewick application

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Johnsongrass Control + Broadleaves (3-Way Mix)	Roundup PROMAX® + Escort® XP + Outrider®	8 ounces + 1 ounce + 1.33 ounces per acre		Overspray Operations/Flex 5 Spray Head Vista XRT® at 10 oz per acre may be substituted for Escort XP® in Bahiagrass ROW. If after July 31, do not apply Escort XP®, or Vista® XRT, as a broadcast application in the ROW. Spot treat problem areas using the Flex-5.
Johnsongrass Control + Broadleaves (4-Way Mix)	Roundup PROMAX® + Escort® XP + Outrider® + Vista XRT®	8 ounces + 1 ounce + 1.33 ounces + 10 ounces per acre		If after July 31, do not apply Escort XP®, or Vista® XRT, as a broadcast application in the ROW. Spot treat problem areas using the Flex-5.
Hard-to-Control Johnsongrass	Target 6.6®	1.5 quarts per acre + 2 quarts of surfactant per 100 gallons of water		Overspray application. Temp needs to be at least 70º. Two applications, 30-60 days apart are needed; as long as Johnsongrass is green and actively growing.
Sunflower	Transline®	10 fluid ounces per acre + 2 quarts per 100 gallons of surfactant	Late Spring/ Early Summer	Overspray operations with Flex-5 boom. Apply before plants mature. Do not use Transline® after July 31 as overspray application on broadleaf plants.
		10 ounces per 100 gallons + 2 quarts per 100 gallons of surfactant		Handgun operations.
Musk Thistle	Transline®	10 fluid ounces per acre + 2 quarts per 100 gallons of surfactant	Early Spring	Overspray operations with Flex-5 boom. Do not use Transline® after July 31 as an overspray application for broadleaves.
		10 fluid ounces/100 gallons + 2 quarts/100 gallons of surfactant		Handgun operations.
Giant Ragweed (Blood weed)	Vista®XRT	10 fluid ounces per acre + 2 quarts surfactant per 100 gallons of water	Late Spring/ Early Summer	Overspray operations with Flex-5 boom. Apply before plants mature. Do not use Vista® XRT in the ROW after July 31st as overspray application.

		10 fluid ounces per 100 gallons + 2 quarts surfactant per 100 gallons of water		Handgun operations.

Table *8*
Pavement Spray – Item 731.7.2 and 731.7.2.1.1

Target/Type of Control Desired	Herbicide	Application Rate	Optimum Treatment Period	Comments
Edge of Pavement, (Bare Ground edge of pavement application, no more than 6 inches from edge of road surface)	Roundup PROMAX® + EsplAnade® 200 SC	3 quarts per acre + 4 ounces per acre	March through October OR when there is green & actively growing vegetation encroaching the pavement.	RoundUp PROMAX (short-term control) is combined with 4 ounces of Esplanade 200 SC (soil-residual control) to control vegetation in the Edge of Pavement.

Table *9*
Structures and Fixture Spray – Items 731.7.2.2, 731.7.2.3, 731.7.2.4 and 731.7.2.5

Target/Type of Control Desired	Herbicide	Application Rate	Optimum Treatment Period	Comments
Guardrail, delineators, mailboxes, signage (removal of tall weeds)	Roundup PROMAX®+ Escort® + Outrider®	8 ounces + 1 ounce + 1.33 ounces per acre	Apply after wildflower seed & before July 31st or as directed by licensed TxDOT personnel.	Complete control (bare ground) beneath guardrails, under delineators and around sign supports is not recommended. Vista® XRT at the rate of 10 ounces per acre can be combined with the three- way or two-way mixtures for the control of
	Roundup PROMAX®+ Outrider®	8 ounces + 1.33 ounces per acre	Can be applied until October 15th or as directed by licensed TxDOT personnel.	

				Giant Ragweed without the need of a surfactant.
Riprap, Paved Medians, Raised Medians, and Retaining Walls (Bare Ground)	Roundup PROMAX®	3 quarts per acre	Year Round	Overspray Operations with Flex-5 spray head
		6 quarts per 100 gallons of water OR 1.5% solution		
	EsplAnade® 200 SC with Roundup PROMAX®	4 ounces per 100 gallons of water + 6 quarts per 100 gallons of water		Handgun Operations. Do not make applications of Esplanade 200 SC if rain is forecasted within 48 hours of the application.

Table *10*
Other Types of Applications – Items 731

Target/Type of Control Desired	Herbicide	Application Rate	Optimum Treatment Period	Comments
Brush* (Mesquite, Huisache, etc.)	Pathfinder II®	2.5 gallons per acre. See page 1 of latest Herbicide Operations Manual to calculate Pathfinder II®area sprayed when less than 2.5 gallons is used.	Year Round (Fall least preferable-As long as ground is NOT frozen)	Cone Jet #5500 X2 nozzle required. Spray lower 12”-15” of stem. Complete coverage required. Do not spray to point of runoff.
Georgia Cane/Arundo Cane/Giant Reed or Cattails	Approved Aquatic Herbicide (54% Glyphosate)	8 quarts per 100 gallons + 2 quarts surfactant per 100 gallons of water	September – October	Handgun operations
Georgia Cane/ Arundo Cane	Imox™ & Approved Aquatic Herbicide (54%Glyphosate	1.5% Imox + 2% Approved Aquatic + 2 quarts surfactant per 100 gallons of water (6 quarts = 1.5% solution in 100 gallons	Make applications when cane is young and growing, usually early May.	Handgun operations. 10 MPH wind restriction. DO NOT apply if winds exceed 10 MPH.

Aquatic Vegetation (standing or running water present)	Approved Aquatic Herbicide (54% Glyphosate)	8 quarts per 100 gallons of water + 2 quarts surfactant per 100 gallons of water	When vegetation is actively growing	Handgun operations. Add surfactant at the rate of 2 quarts per 100 gallons of water.
Aquatic Vegetation (standing or running water present)	Approved Aquatic Herbicide (54% Glyphosate)	3.75 quarts per acre + 2 quarts surfactant per 100 gallons of water	September – October	Overspray operations with Flex-5 boom. Add surfactant at the rate of 2 quarts per 100 gallons of water and appropriate amount of Drift Control.
***Optional Basal Bark and cut stump applications with Pathfinder II® can be used at any time during the year, as long as ground is not frozen.**				

Supply surfactant and blue dye from an approved source for the herbicide operations. Mix the surfactant and blue dye per the manufacture's recommended standards.

Use appropriate Aquatic Herbicide or Basal Bark Treatment according to the Department's latest Herbicide Operations Manual as directed.

DRIFT CONTROL:

Appropriate drift control must be used with all herbicides when using the truck handgun, fixture or Flex-5 booms. Drift control is not required when using backpack sprayers.

The Control WM drift control rate is 2 fluid ounces per 100 Gallons of Water.

The Droplex drift control rate is 10 ounces per acre for non-aquatic applications and 6 ounces per acre for aquatic applications.

These treatments are subsidiary to Pavement Edges, Structures, and Fixtures.

Herbicide treatment for Pavement Edges, Structures, and Fixtures includes entrance/exit ramps, service/access roads where present, all overpasses, underpasses, gores, and jug handles.

Rates for the broadcast application and/or Pavement, Edges, Structures, and Fixtures may change during this contract. All applications will follow the Department's latest Herbicide Operations Manual.

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Item 734 – Litter Removal:

Litter removal must be performed immediately following the completion of mowing each reference.

If the work is not completed within the allotted number of days, liquidated damages will be charged for each working day that the cycle remains uncompleted. Working days will not be carried over to the next or any cycle.

Measure the volume of litter removed from each tract, as directed.

Maintain a record of work performed. A record form will be in a neat, orderly, and presentable manner. The record will contain as a minimum:

A. The start and ending date of each tract.
B. Cycle Number
C. Volume of litter removed.
D. Number of contract personal and equipment.

Records will be submitted as directed.

No minimum quantity per callout for "Litter Removal (Spot)".

Item 735 – Debris Removal:

Perform work as presented in the call-out work order.

Scheduled work that falls on a national holiday will be performed on the following workday. Department will respond to emergency situations.

Begin physical work within 48 hr. of each written notification except for Spot Debris.
Begin removing Spot Debris within 2 hr. of each written notification or as directed.

Maintain a daily record of work performed. Daily record form will be neat, orderly and in presentable manner. Record will contain as a minimum:

A. Roadway
B. Limits
C. Time worked
D. Date Started/Finished
E. Equipment used on roadway
F. Number of employees present
G. Amount of debris collected in cubic feet daily by roadway

H. Provide GPS data as requested.

Record will be submitted at the end of each work day.

The total mile for all debris removal includes all overpasses on each roadway.
Debris removal will be an additional 10 ft. adjacent to the pavement.

Conceal dead animals from view of the traveling public during transport.

Item 738 – Cleaning and Sweeping Highways:

Handwork is required as directed. Begin handwork within 24 hr. of each written notification.

Use regenerative (vacuum) sweepers with gutter brooms on corridors where drainage inlets and grate drains exist.

While sweepers are in operations, travel at a speed as to not allow sweeping materials to scatter and be strewn including dust.

The total mile for all sweeping includes all overpasses on each roadway.

Maintain a daily record of work performed. Daily record form will be neat, orderly and in presentable manner. Record will contain as a minimum:

A. Roadway
B. Limits
C. Date started
D. Date finished
E. Provide GPS data as requested.

Item 740 – Graffiti Removal and Anti-Graffiti Coating:

Remove graffiti from the back of signs on overhead sign structures and ground mounted signs.

No graffiti on the sign face will be removed.

The paint color is to match the existing structures or fixtures as approved by the Engineer.

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County: Dallas **Highway:** IH0030

Item 764 – Pump Stations and Drainage System Cleaning:

Remove and replace grates. Work may include welding, bolting, and unbolting and will not be paid for separately but will be considered subsidiary to Item 764.

Item 770 – Guard Fence Repair:

Use MBGF series standards, BED (28)-19 standard and 28 in. SGT standards or use GF (31) series standards, BED-14 standard, and 31 in. SGT standards as appropriate for each damaged installation.

Removal and replacement of a Terminal Anchor Section will be paid under "Remove and Replace DAT".

Block outs will be composite.

Item 774 – Attenuator Repair:

Begin physical work within 48 hr. of each written notification.
Removal and replacement of a non-MASH compliant crash cushion will be paid under the MASH compliant remove and replace item listed in the plans and as directed.

All replacement attenuators shall be the same TL as the attenuator being replaced.

Furnish Class "A" Concrete in accordance with Item 421.

Item 3077 – Superpave Mixtures:

Design and produce the mixture with a gradation that passes below the reference zone as shown in Table 9 for Item 3077.

Provide surface course Superpave SP-***C*** PG ***76-22***.

Engineer will determine length of overlay in the field. Unless otherwise approved, depth will be 2 in.

Tack coat is required. Dilution of tack is not allowed.

Use aggregate that meets the Surface Aggregate Classification (SAC) requirement of Class A.

Asphalt edges will be beveled to eliminate pavement drop offs.

An approved anti-stripping agent will be required.

All mixing, placing, and compacting will be completed during daylight hours only. Unless otherwise approved, dumping of the asphalt mixture in a windrow and then placing the mixture in the finishing machine will not be permitted.
Storing the completed mix on the ground will not be permitted at the mixing plant or the job site. Any mix that comes in contact with the earth or other objectionable foreign matter will be rejected.

Provide Short Term Work Zone Pavement Markings where striping is eliminated.

Item 3080 – Stone Matrix Asphalt:

Provide SAC-A PG 76-22.

Item 6001 – Portable Changeable Message Sign:

Provide Portable Changeable Message Signs (PCMS) units as approved.

PCMS will be placed as directed.

Item 6185 – Truck Mounted Attenuator (TMA):

The total number of truck mounted attenuators (TMAs) or trailer attenuators (TAs) required when utilizing the traffic control standards are shown in the tables below.

TCP 5 Series	Scenario		Required TMA/TA
(5-1)-18	A	B	1

TCP 6 Series	Scenario		Required TMA/TA	
(6-1)-12	A	B	1	2
(6-2)-12 / (6-3)-12	All		1	
(6-4)-12	A	B	1	2
(6-5)-12	A	B	1	2
(6-8)-14	All		1	

Shadow vehicles equipped for truck mounted attenuators (TMA) for mobile and stationary operations must be available for use at any time as determined by the Engineer.

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The Contractor will be responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMAs/TAs needed for the project for those times per plan requirements. Additional TMAs/TAs used that are not specified in the plans in which the Contractor expects compensation will require prior approval from the Engineer.
When TMAs are paid by the hour or day, "ready for operation" is defined as all equipment, material, personnel, etc. are present on the project ready to begin work.

Item 7052 – Lane Closures

Includes the closing of managed lanes during winter weather events.

Item 7083 – Cleaning Guardrail, Attenuators and Associated Drainage Flumes:

Do not use water or air to blow debris out from under or around the guardrail, attenuators, or flumes.

Remove material beneath guardrail and to a minimum distance of 3 ft. behind the guardrail where possible. If water will not drain, the distance will be increased until water will drain.

Item 7161 – Performance Based Operations and Maintenance of Managed Lanes:

Contractor crew must be always present on the Managed Lanes Corridor except weekday nighttime hours from 9 P.M. to 5 A.M. and weekend hours from Friday 9 P.M. to Monday 5 A.M. Contractor crew must be present on the Managed Lanes corridor during special events and emergency events. During nighttime and weekend hours Contractor must have personnel on call to respond to incidents and emergencies within 60 minutes of being notified by TxDOT. This work will be considered subsidiary to the bid items in this contract.

Toll charges incurred by the Contractor while performing work will be reimbursed. Contractor must follow the procedure in the Maintenance Vendor Transaction Exception Process Standard Operating Procedure (SOP) for toll reimbursement.

Contractor must have additional spare parts on hand to maintain Automated Barricade Gates (ABG) manufactured by Versilis Inc. and the Vehicle Arresting Barriers (VAB) manufactured by Impact Absorption Inc.

Contractor will be allowed to close lanes during nighttime and weekend hours to perform routine maintenance, with prior approval of the Engineer.

TxDOT will not provide any site for Contractor use for parking or material/equipment storage. Parking on private property must have prior written approval from the property owner.

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TxDOT currently has a Contractor operating the IH30 (Tom Landry), etc. Managed Lanes corridor (the operator). If Contractor is not the same as the Operator, Contractor must coordinate with the Operator to take over the operations of the corridor to provide a seamless transition between contracts. This includes getting familiar with operations, training, possession of certain devices necessary to operate equipment at least one month prior to handover. TxDOT will facilitate meetings between Contactor and Operator. Contractor will cooperate and coordinate with future TxDOT Contractors of the corridor for seamless handover of operations at the end of the contract. This work will be considered subsidiary to the bid items in this contract.

Item 7343 – Automated Barrier Gate Repair:

When damages occur due to 3rd party actions, repair/and or replace the ABG using materials as outlined in Special Specification 7161. A partial repair will be paid for damages up to 16 ft. Once repair exceeding 16 ft. on a single ABG, the ABG will be paid for as Complete repair.

Estimate & Quantity Sheet

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						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**6464-74-001**			
		PROJECT ID		**A00207810**			
		COUNTY		**Dallas**			
		HIGHWAY		**IH0030**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	351-6009	FLEXIBLE PAVEMENT STRUCTURE REPAIR(14")	SY	300.000		300.000	
	351-6010	FLEXIBLE PAVEMENT STRUCTURE REPAIR(16")	SY	150.000		150.000	
	351-6013	FLEXIBLE PAVEMENT STRUCTURE REPAIR(4")	SY	500.000		500.000	
	351-6044	FLEXIBLE PAV STR REPAIR 12"-TYPICAL A	SY	150.000		150.000	
	354-6004	PLAN & TEXT ASPH CONC PAV(0" TO 4")	SY	500.000		500.000	
	361-6019	HALF - DEPTH REPAIR CRCP (10")	SY	100.000		100.000	
	361-6021	HALF - DEPTH REPAIR CRCP (12")	SY	200.000		200.000	
	361-6024	HALF - DEPTH REPAIR CRCP (15")	SY	300.000		300.000	
	361-6051	FULL-DPTH REP(BR APPROACH SLAB)(9"-13")	SY	200.000		200.000	
	361-6065	FULL-DEPTH REPAIR CRCP (8"-10")	SY	350.000		350.000	
	361-6086	FULL-DEPTH REPAIR CRCP (11" - 13")	SQ	250.000		250.000	
	361-6087	FULL-DEPTH REPAIR CRCP (14" - 15")	SQ	200.000		200.000	
	427-6002	CONCRETE PAINT FINISH	SF	200.000		200.000	
	427-6003	OPAQUE SEALER FINISH	SF	200.000		200.000	
	429-6004	CONC STR REPAIR(RAPID DECK REP(PRT DPT)	SF	400.000		400.000	
	429-6006	CONC STR REPR(RAPID DECK REP(FULL DPT))	SF	250.000		250.000	
	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	225.000		225.000	
	438-6004	CLEANING AND SEALING EXIST JOINTS(CL7)	LF	500.000		500.000	
	438-6009	CLEANING EXISTING JOINTS	LF	500.000		500.000	
	438-6011	CLEANING AND SEALING JOINTS (FOAM)	LF	2,000.000		2,000.000	
	438-6017	CLEANING AND SEALING EXIST JOINTS (SEJ)	LF	1,000.000		1,000.000	
	500-6003	MOBILIZATION (CALLOUT 1)	EA	30.000		30.000	
	500-6004	MOBILIZATION (CALLOUT 2)	EA	100.000		100.000	
	500-6005	MOBILIZATION (CALLOUT 3)	EA	150.000		150.000	
	500-6006	MOBILIZATION (CALLOUT 4)	EA	24.000		24.000	
	500-6007	MOBILIZATION (CALLOUT 5)	EA	40.000		40.000	
	500-6008	MOBILIZATION (CALLOUT 6)	EA	50.000		50.000	
	500-6009	MOBILIZATION (CALLOUT 7)	EA	10.000		10.000	
	500-6010	MOBILIZATION (CALLOUT 8)	EA	150.000		150.000	
	500-6011	MOBILIZATION (CALLOUT 9)	EA	30.000		30.000	
	500-6012	MOBILIZATION (CALLOUT 10)	EA	50.000		50.000	
	500-6013	MOBILIZATION (CALLOUT 11)	EA	20.000		20.000	
	500-6014	MOBILIZATION (CALLOUT 12)	EA	20.000		20.000	
	500-6015	MOBILIZATION (CALLOUT 13)	EA	208.000		208.000	
	500-6016	MOBILIZATION (CALLOUT 14)	EA	10.000		10.000	
	500-6017	MOBILIZATION (CALLOUT 15)	EA	50.000		50.000	
	500-6018	MOBILIZATION (CALLOUT 16)	EA	24.000		24.000	

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						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**6464-74-001**			
		PROJECT ID		**A00207810**			
		COUNTY		**Dallas**			
		HIGHWAY		**IH0030**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	500-6019	MOBILIZATION (CALLOUT 17)	EA	20.000		20.000	
	500-6020	MOBILIZATION (CALLOUT 18)	EA	20.000		20.000	
	500-6021	MOBILIZATION (CALLOUT 19)	EA	50.000		50.000	
	502-6025	BARR, SIGNS, TRAFFIC HANDLING	EA	120.000		120.000	
	512-6087	PORT CTB (ALIGNING)	LF	4,000.000		4,000.000	
	530-6004	DRIVEWAYS (CONC)	SY	200.000		200.000	
	636-6007	REPLACE EXISTING ALUMINUM SIGNS(TY A)	SF	400.000		400.000	
	636-6009	REPLACE EXISTING ALUMINUM SIGNS(TY O)	SF	1,000.000		1,000.000	
	644-6012	IN SM RD SN SUP&AM TY10BWG(1)SB(T)	EA	20.000		20.000	
	644-6042	IN SM RD SN SUP&AM TYS80(1)SB(T)	EA	8.000		8.000	
	644-6064	IN BRIDGE MNT CLEARANCE SGN ASSM(TY N)	EA	4.000		4.000	
	644-6065	IN BRIDGE MNT CLEARANCE SGN ASSM(TY S)	EA	4.000		4.000	
	644-6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	20.000		20.000	
	644-6070	RELOCATE SM RD SN SUP&AM TY S80	EA	8.000		8.000	
	658-6014	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	EA	200.000		200.000	
	658-6061	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	EA	200.000		200.000	
	658-6092	INSTL DEL ASSM (D-DW)SZ 1(WFLX)GND	EA	2,000.000		2,000.000	
	658-6095	INSTL DEL ASSM (D-DY)SZ 1(YFLX)GND	EA	2,000.000		2,000.000	
	666-6040	REFL PAV MRK TY I (W)12"(SLD)(060MIL)	LF	6,000.000		6,000.000	
	666-6077	REFL PAV MRK TY I (W)(WORD)(090MIL)	EA	40.000		40.000	
	666-6080	REFL PAV MRK TY I(W)(ENTR GORE)(090MIL)	EA	40.000		40.000	
	666-6083	REFL PAV MRK TY I(W)(EXIT GORE)(090MIL)	EA	40.000		40.000	
	666-6139	REFL PAV MRK TY I (Y)12"(SLD)(060MIL)	LF	4,000.000		4,000.000	
	666-6161	RE PV MRK TY I(BLACK)6"(SHADOW)(090MIL)	LF	16,250.000		16,250.000	
	666-6225	PAVEMENT SEALER 6"	LF	90,000.000		90,000.000	
	666-6228	PAVEMENT SEALER 12"	LF	6,000.000		6,000.000	
	666-6239	PAVEMENT SEALER (ENTR GORE)	EA	30.000		30.000	
	666-6240	PAVEMENT SEALER (EXIT GORE)	EA	30.000		30.000	
	666-6284	REF PROF PAV MRK TY I(W)6"(SLD)(060MIL)	LF	80,000.000		80,000.000	
	666-6285	REF PROF PAV MRK TY I(W)6"(SLD)(090MIL)	LF	80,000.000		80,000.000	
	666-6304	RE PM W/RET REQ TY I (W)6"(BRK)(060MIL)	LF	45,000.000		45,000.000	
	666-6305	RE PM W/RET REQ TY I (W)6"(BRK)(090MIL)	LF	25,000.000		25,000.000	
	666-6307	RE PM W/RET REQ TY I (W)6"(SLD)(060MIL)	LF	400,000.000		400,000.000	
	666-6308	RE PM W/RET REQ TY I (W)6"(SLD)(090MIL)	LF	400,000.000		400,000.000	
	666-6319	RE PM W/RET REQ TY I (Y)6"(SLD)(060MIL)	LF	400,000.000		400,000.000	
	666-6320	RE PM W/RET REQ TY I (Y)6"(SLD)(090MIL)	LF	400,000.000		400,000.000	
	666-6348	REFL PAV MRK TY I (W)12"(DOT)(060MIL)	LF	6,000.000		6,000.000	

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						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**6464-74-001**			
		PROJECT ID		**A00207810**			
		COUNTY		**Dallas**			
		HIGHWAY		**IH0030**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	672-6007	REFL PAV MRKR TY I-C	EA	1,000.000		1,000.000	
	672-6008	REFL PAV MRKR TY I-R	EA	200.000		200.000	
	672-6010	REFL PAV MRKR TY II-C-R	EA	400.000		400.000	
	672-6038	REFL PAV MRKR TY II-C-C	EA	1,500.000		1,500.000	
	677-6002	ELIM EXT PAV MRK & MRKS (6")	LF	45,000.000		45,000.000	
	677-6005	ELIM EXT PAV MRK & MRKS (12")	LF	6,000.000		6,000.000	
	677-6013	ELIM EXT PAV MRK & MRKS (ENTR GORE)	EA	30.000		30.000	
	677-6014	ELIM EXT PAV MRK & MRKS (EXIT GORE)	EA	30.000		30.000	
	678-6002	PAV SURF PREP FOR MRK (6")	LF	45,000.000		45,000.000	
	678-6006	PAV SURF PREP FOR MRK (12")	LF	6,000.000		6,000.000	
	678-6017	PAV SURF PREP FOR MRK (ENTR GORE)	EA	30.000		30.000	
	678-6018	PAV SURF PREP FOR MRK (EXIT GORE)	EA	30.000		30.000	
	700-6005	POTHOLE REPAIR (SAW - CUT)	SY	1,000.000		1,000.000	
	712-6009	JT / CRCK SEAL (HOT - POURED RUBBER)	LF	6,500.000		6,500.000	
	713-6005	CRACK CLEANING AND SEALING (JCP)	LF	2,000.000		2,000.000	
	720-6001	SPALLING REPAIR (HYDRAULIC CEMENT)	CF	500.000		500.000	
	721-6002	FIBER REINFORCED POLYMER PATCHING MATLS	LB	2,000.000		2,000.000	
	730-6002	FULL - WIDTH MOWING	AC	240.000		240.000	
	731-6007	PAVEMENT EDGES, STRUCTURES & FIXTURES	MI	160.000		160.000	
	731-6011	BROADCAST APPLICATION	AC	120.000		120.000	
	734-6003	LITTER REMOVAL (SPOT)	AC	40.000		40.000	
	734-6005	LITTER REMOVAL - TRACT (2)	AC	480.000		480.000	
	735-6007	DEBRIS REMOVAL (SPOT DEBRIS)	MI	2,500.000		2,500.000	
	735-6109	DEBRIS-ENTRANCE/EXIT RAMPS - AREA (2)	CYC	104.000		104.000	
	735-6110	DEBRIS-ENTRANCE/EXIT RAMPS - AREA (3)	CYC	104.000		104.000	
	735-6111	DEBRIS-ENTRANCE/EXIT RAMPS - AREA (4)	CYC	104.000		104.000	
	735-6156	DEBRIS REMOVAL (HOV/MNGD LANE) AREA(2)	CYC	200.000		200.000	
	735-6157	DEBRIS REMOVAL (HOV/MNGD LANE) AREA(3)	CYC	200.000		200.000	
	735-6158	DEBRIS REMOVAL (HOV/MNGD LANE) AREA(4)	CYC	200.000		200.000	
	735-6168	DEBRIS REMOVAL BETWEEN BARRIERS	MI	352.000		352.000	
	738-6011	CLEANING / SWEEPING (HANDWORK)	SY	3,000.000		3,000.000	
	738-6075	CLEAN / SWEEP - (ENTR/ EXT RMP)(AREA 2)	MI	54.480		54.480	
	738-6076	CLEAN / SWEEP - (ENTR/ EXT RMP)(AREA 3)	MI	79.440		79.440	
	738-6077	CLEAN / SWEEP - (ENTR/ EXT RMP)(AREA 4)	MI	15.840		15.840	
	738-6317	CLEANING/SWEEPING(HOV LANE)	MI	1,313.280		1,313.280	
	740-6002	GRAFFITI REMOVAL (PAINTING)	SF	500.000		500.000	
	764-6001	DRAIN INLET CLEANING	EA	150.000		150.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 6464-74-001 **DISTRICT** Dallas **COUNTY** Dallas
HIGHWAY IH0030

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**6464-74-001**			
		PROJECT ID		**A00207810**			
		COUNTY		**Dallas**			
		HIGHWAY		**IH0030**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	764-6004	DOWNSPOUT CLEANING	EA	150.000		150.000	
	764-6011	STORM SEWER CLEANING (PIPE)(37"-42"DIA)	LF	300.000		300.000	
	764-6021	SLOTTED DRAIN CLEANING	LF	500.000		500.000	
	770-6001	REPAIR RAIL ELEMENT (W - BEAM)	LF	2,000.000		2,000.000	
	770-6002	REPAIR RAIL ELEMENT (THRIE - BEAM)	LF	700.000		700.000	
	770-6003	REP RAIL ELMNT(THRIE-BM TRANS TO W -BM)	LF	100.000		100.000	
	770-6004	REPAIR RAIL ELEMENT (CURVED RAIL)	LF	10.000		10.000	
	770-6006	RAISE RAIL ELEMENT	LF	10.000		10.000	
	770-6007	RAISE RAIL (TYPE SPECIFIED)	LF	10.000		10.000	
	770-6008	REALIGN EXISTING RAIL	LF	1,000.000		1,000.000	
	770-6009	REPAIR RAIL ELEMENT (T4S)	LF	10.000		10.000	
	770-6012	REM / REPL TIMBER POST W / O CONC FND	EA	160.000		160.000	
	770-6013	REM / REPL STEEL POST W / O CONC FND	EA	160.000		160.000	
	770-6017	REALIGN POSTS	EA	20.000		20.000	
	770-6019	REMOVE & REPLACE BLOCKOUT	EA	160.000		160.000	
	770-6021	REPLACE SINGLE GDRAIL TERMINAL RAIL	LF	100.000		100.000	
	770-6022	REPLACE SINGLE GDRAIL TERMINAL POST	EA	10.000		10.000	
	770-6023	REPAIR OF TERMINAL ANCHORS POSTS	EA	10.000		10.000	
	770-6024	REPLACE TERMINAL ANCHOR POSTS	EA	10.000		10.000	
	770-6027	REMOVE GDRAIL END TRT / REPL WITH SGT	EA	10.000		10.000	
	770-6028	REPL SINGLE GDRAIL TERM IMPACT HEAD	EA	4.000		4.000	
	770-6029	REM & RESET SGT IMPACT HEAD	EA	4.000		4.000	
	770-6030	REPLACE SGT CABLE ASSEMBLY	EA	4.000		4.000	
	770-6031	REPLACE SGT CABLE ANCHOR	EA	4.000		4.000	
	770-6032	REPLACE SGT STRUT	EA	4.000		4.000	
	770-6033	REPLACE SGT OBJECT MARKER	EA	10.000		10.000	
	774-6001	REMOVE AND REPLACE (TRACC)	EA	70.000		70.000	
	774-6002	REMOVE AND REPLACE (WIDE TRACC)	EA	15.000		15.000	
	774-6044	REMOVE AND REPLACE (SMTC) (N)	EA	15.000		15.000	
	774-6045	REPAIR (SMTC) (N)	EA	25.000		25.000	
	774-6046	REMOVE AND REPLACE (SMTC) (W)	EA	25.000		25.000	
	774-6047	REPAIR (SMTC) (W)	EA	25.000		25.000	
	774-6059	REPAIR (TRACC) (BAY)	EA	150.000		150.000	
	774-6060	REPAIR (WIDE TRACC) (BAY)	EA	4.000		4.000	
	774-6068	REPAIR (SMTC) (N)	LF	2,025.000		2,025.000	
	785-6004	BRIDGE JOINT REPAIR (ARMOR)	LF	200.000		200.000	
	785-6005	BRIDGE JOINT REPAIR (SEJ)	LF	300.000		300.000	

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CONTROLLING PROJECT ID 6464-74-001 **DISTRICT** Dallas **COUNTY** Dallas
HIGHWAY IH0030

			CONTROL SECTION JOB		**6464-74-001**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00207810**		
			COUNTY		**Dallas**		
			HIGHWAY		**IH0030**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	3077-6033	SP MIXES SP-C SAC-A PG76-22	TON	250.000		250.000	
	3077-6075	TACK COAT	GAL	40.000		40.000	
	3080-6001	STONE-MTRX-ASPH SMA-C SAC-A PG76-22	TON	250.000		250.000	
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	730.000		730.000	
	6185-6002	TMA (STATIONARY)	DAY	730.000		730.000	
	6185-6005	TMA (MOBILE OPERATION)	DAY	50.000		50.000	
	7052-6046	LANE CLOSURE (SETUP AND REMOV)(TY 5)	EA	10.000		10.000	
	7052-6050	LANE CLOSURE (SETUP AND REMOV)(TY 9)	EA	70.000		70.000	
	7052-6063	LANE CLOSURE (MAINTENANCE) (TY 5)	HR	100.000		100.000	
	7083-6001	CLEANING GUARDRAIL	LF	1,000.000		1,000.000	
	7083-6002	CLEANING ATTENUATOR	LF	300.000		300.000	
	7161-6001	PERF BASED OPER & MAINT MANAGED LANES	MO	24.000		24.000	
	7343-6001	PARTIAL ABG REPAIR	LF	2,000.000		2,000.000	
	7343-6002	COMPLETE ABG REPAIR	EA	50.000		50.000	

TRACT	HIGHWAY	734-6005 LITTER REMOVAL	ACRES	CYCLES	TOTAL ACRES	FREQUENCY
2	SH 114	SH 121 TO SH 183	30	16	480.00	CALL OUT
		TOTAL	30		480.00	

TRACT	HIGHWAY	735-6007, ETC.DEBRIS REMOVAL	CENTER LINE MILES	CYCLES	TOTAL CENTER LINE MILES	FREQUENCY
1*	IH 30	BECKLEY AVENUE TO CENTER STREET	16.5	104	1716	WEEKLY
2	SH 114	SH 121 TO SH 183	20.6	104	2142.4	WEEKLY
3	SH 183	IH 35E TO SH 121	30	104	3120	WEEKLY
4	SL 12	SH 183 TO IH 35E	4.12	104	428.48	WEEKLY
		TOTAL	71.22		7406.88	

*TRACT 1 FOR CONTRACTOR INFORMATION ONLY. PERFORM WORK IN ACCORDANCE WITH 7161-6001

TRACT	HIGHWAY	738-6074, ETC. CLEANING/SWEEPING (ENTRANCE/EXIT RAMP)	CENTER LINE MILES	** CYCLES	TOTAL CENTER LINE MILES	FREQUENCY
1*	IH 30	BECKLEY AVENUE TO CENTER STREET	2.88	24	69.12	MONTHLY
2	SH 114	SH 121 TO SH 183	2.27	24	54.48	MONTHLY
3	SH 183	IH 35E TO SH 121	3.31	24	79.44	MONTHLY
4	SL 12	SH 183 TO IH 35E	0.66	24	15.84	MONTHLY
		TOTAL	9.12		218.88	

*TRACT 1 FOR CONTRACTOR INFORMATION ONLY. PERFORM WORK IN ACCORDANCE WITH 7161-6001
** ALL RAMPS FOR SWEEPING & DEBRIS = 1 CYCLE

TRACT	HIGHWAY	738-6317 , ETC. CLEANING/SWEEPING (HOV LANE)	CENTER LINE MILES	CYCLES	TOTAL CENTER LINE MILES	FREQUENCY
1*	IH 30	BECKLYEY AVENUE TO CENTER STREET	16.5	24	396	MONTHLY
2	SH 114	SH 121 TO SH 183	20.6	24	494.4	MONTHLY
3	SH 183	IH 35E TO SH 121	30	24	720	MONTHLY
4	SL 12	SH 183 TO IH 35E	4.12	24	98.88	MONTHLY
		TOTAL	71.22		1709.28	

*TRACT 1 FOR CONTRACTOR INFORMATION ONLY. PERFORM WORK IN ACCORDANCE WITH 7161-6001

TRACT	HIGHWAY	730-6002 FULL - WIDTH MOWING	ACRES	CYCLES	TOTAL ACRES	FREQUENCY
2	SH 114	SH 121 TO SH 183	25	16	400	CALL OUT
		TOTAL	25		400	

TRACT	HIGHWAY	731-6011 BROADCAST APPLICATION	ACRES	CYCLES	TOTAL ACRES	FREQUENCY
2	SH 114	SH 121 TO SH 183	30	8	240	CALL OUT
		TOTAL	30		240	

DATE:
FILE:

Texas Department of Transportation

ROUTINE MAINTENANCE SCHEDULE

DN:	CK:	DW:	CK:

CONT	SECT	JOB	HIGHWAY
6464	74	001	IH-30

DIST	COUNTY	SHEET NO.
DAL	DALLAS	11

23E

DATE:
FILE:

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

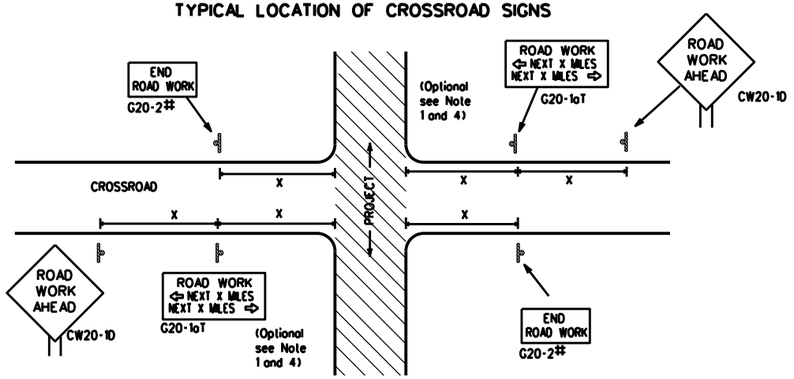
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	DAL	DALLAS		12
5-10 5-21				

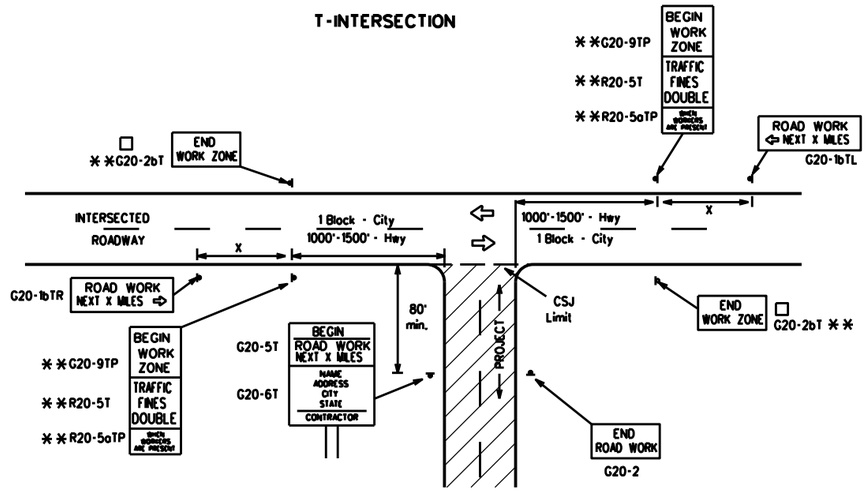
TYPICAL LOCATION OF CROSSROAD SIGNS



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]

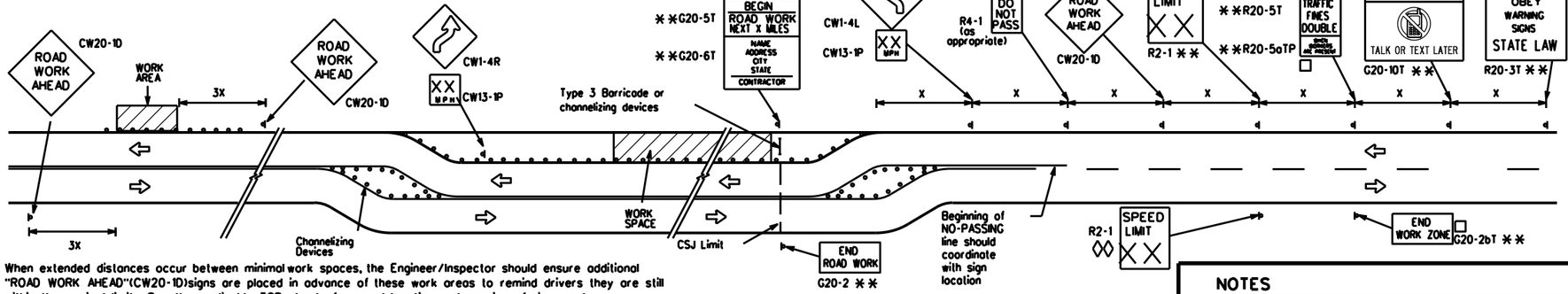
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

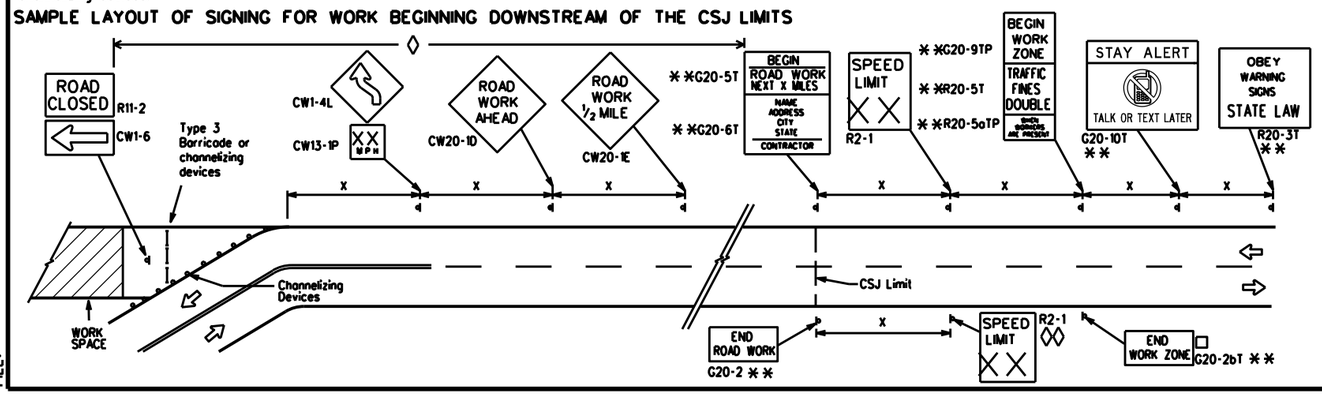
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may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



SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

NOTES

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

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

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	6464	74	001	IH0030
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	DAL	DALLAS		13

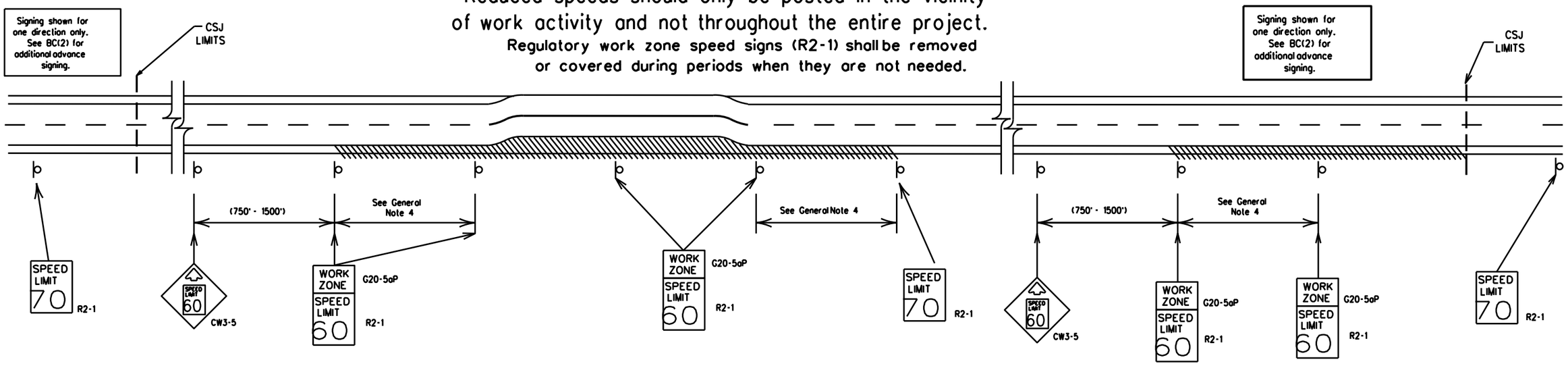
DATE:
FILE:

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
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REVISIONS	6464	74	001	IH0030
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	DAL	DALLAS		14

DATE:
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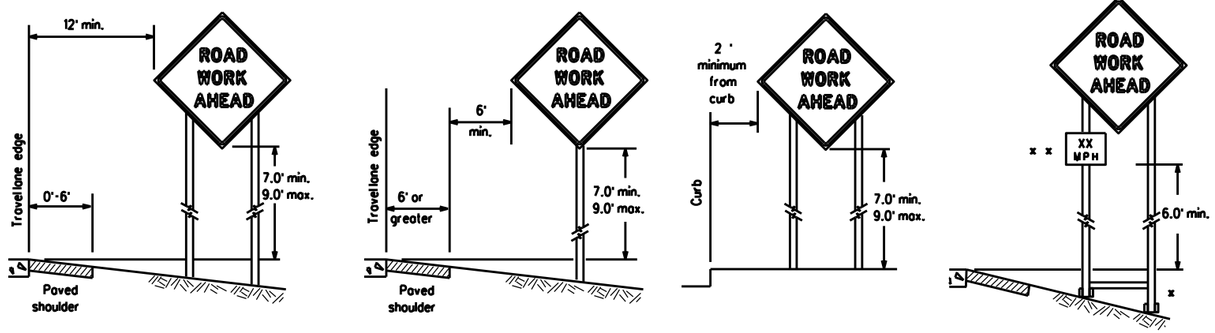
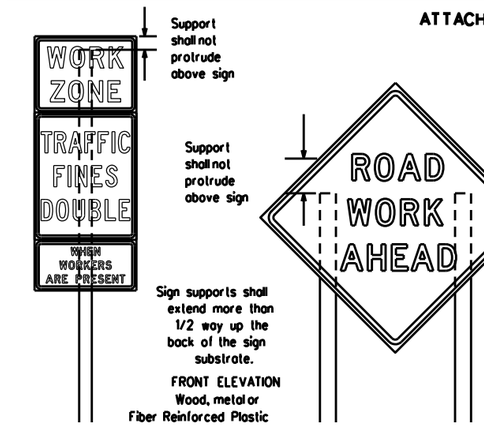
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



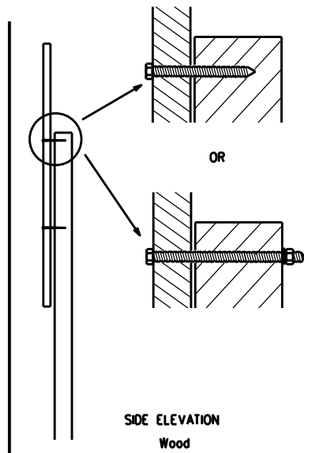
x When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS



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.

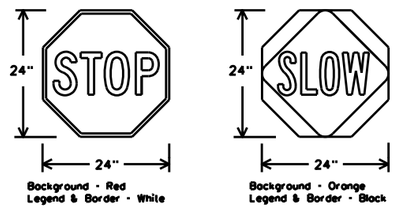


Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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.

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 lightness 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 or Type C_{FL}, shall be used for rigid signs with orange backgrounds.

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

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BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
9-07 8-14	DIST	COUNTY		SHEET NO.
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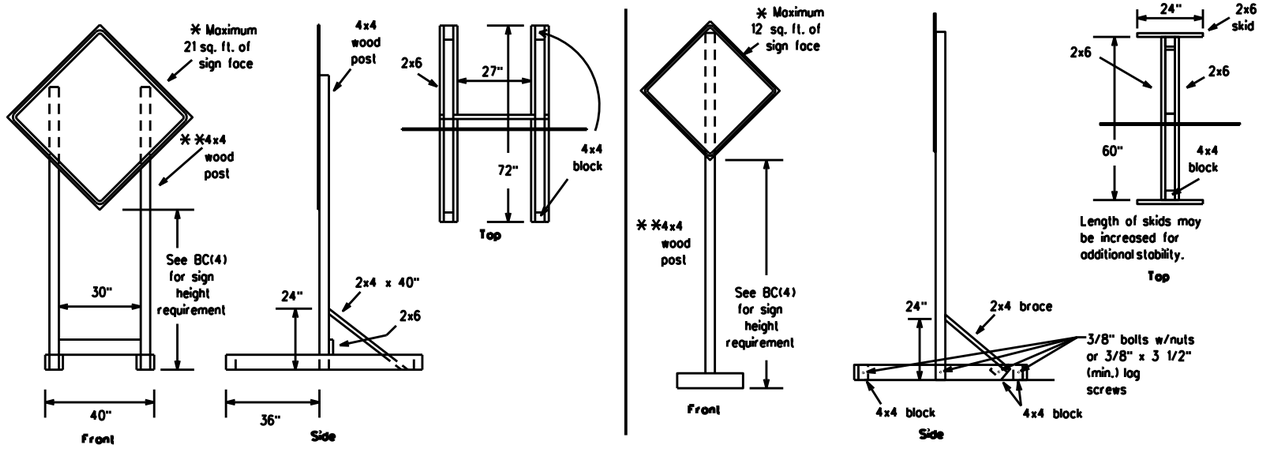
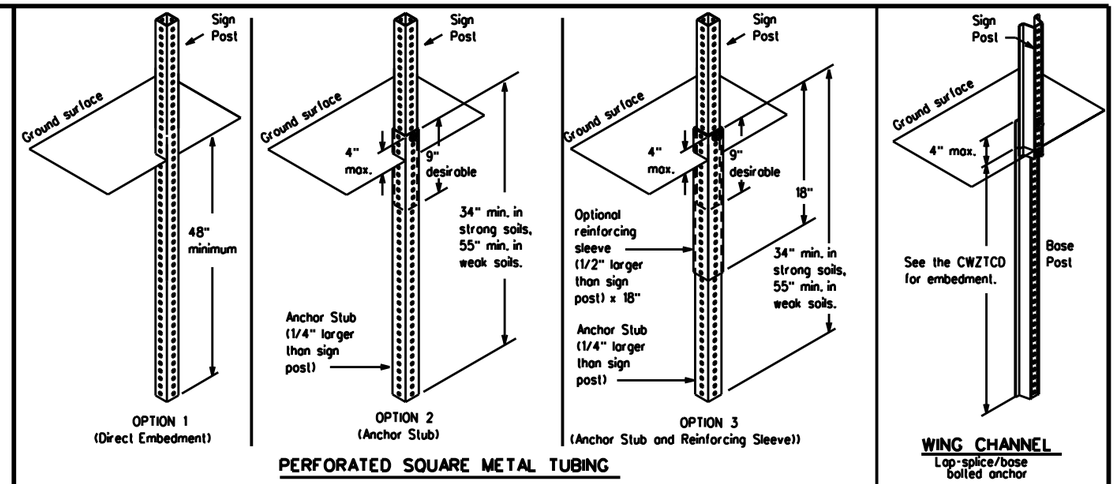


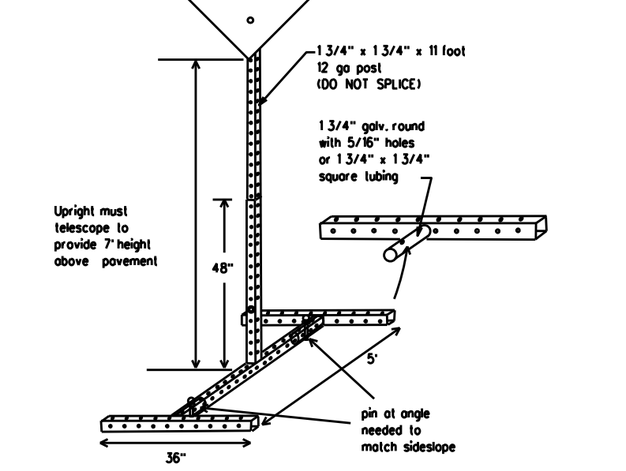
SKID MOUNTED WOOD SIGN SUPPORTS

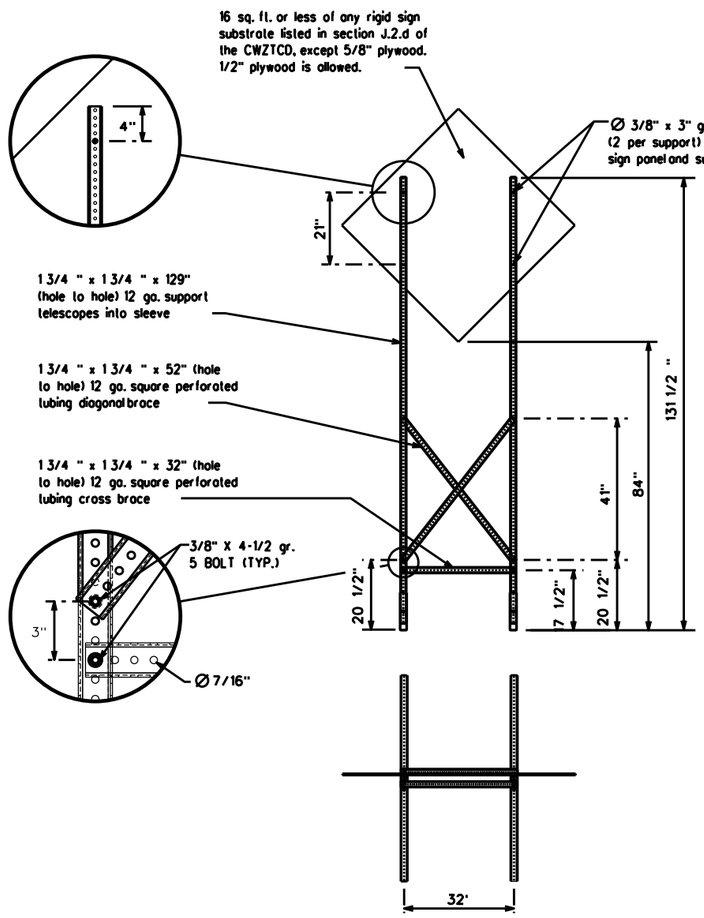
*** LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS**

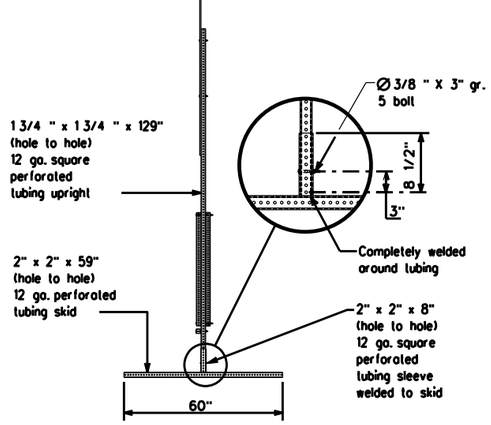


GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

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BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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7-13 5-21	DAL	DALLAS		16

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

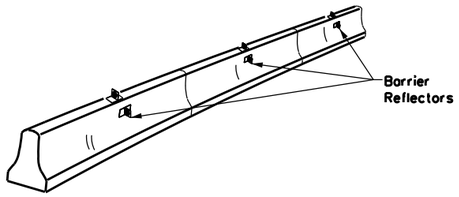
BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	DAL	DALLAS		17

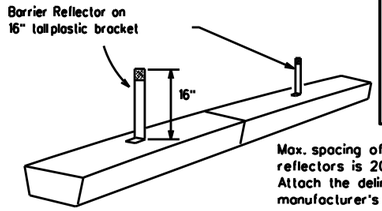
DATE:
FILE:

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.

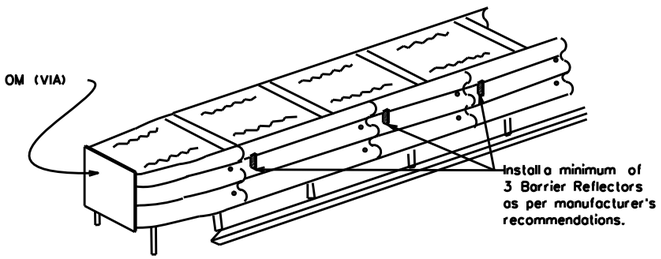


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) 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.

LOW PROFILE CONCRETE BARRIER (LPCB)

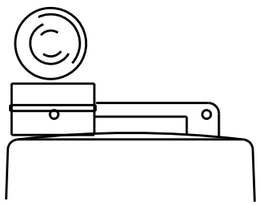


DELINEATION OF END TREATMENTS

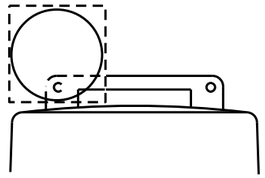
END TREATMENTS FOR CTB'S USED IN WORK ZONES

End treatments used on CTB's in work zones shall meet the appropriate 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 or C 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

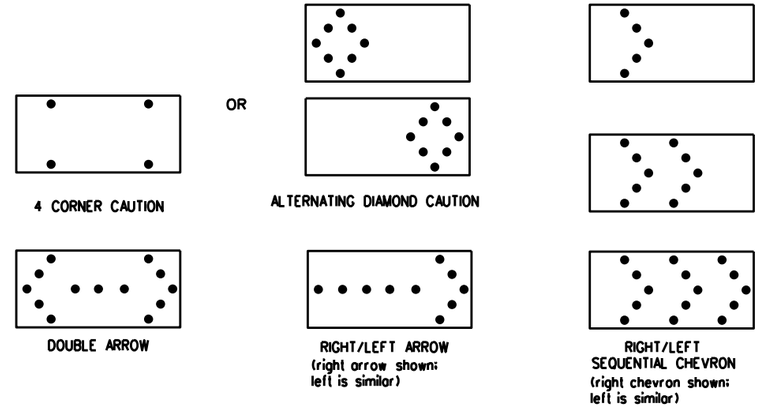
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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



4 CORNER CAUTION

ALTERNATING DIAMOND CAUTION

DOUBLE ARROW

RIGHT/LEFT ARROW
(right arrow shown; left is similar)

RIGHT/LEFT SEQUENTIAL CHEVRON
(right chevron shown; left is similar)

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 on 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	6464	74	001	IH0030
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	DAL	DALLAS		18

DATE:
FILE:

GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

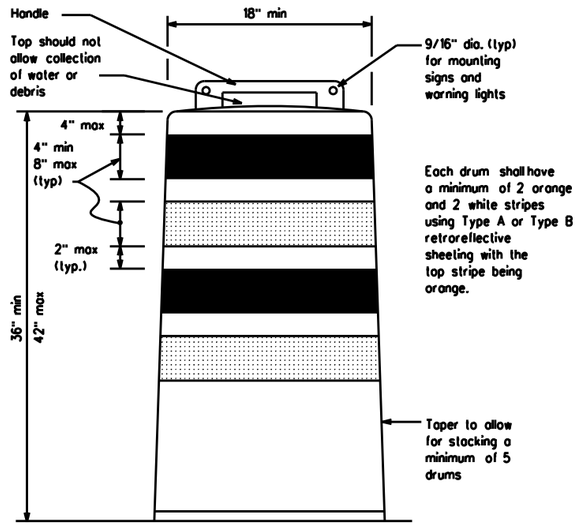
1. Plastic drums shall be a two-piece design: the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

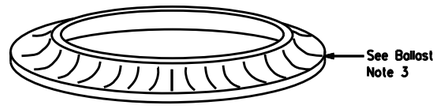
RETROREFLECTIVE SHEETING

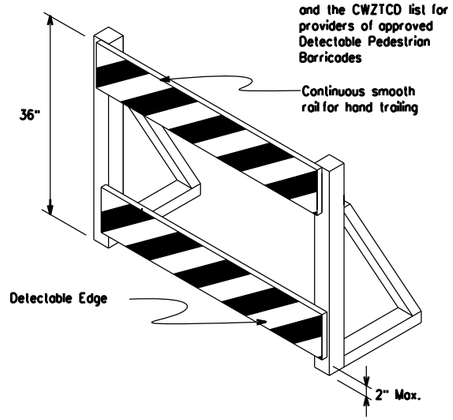
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

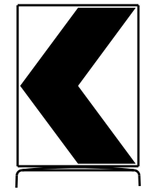




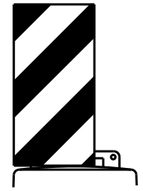


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

1. Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
2. Chevrons and other work zone signs with an orange background shall be manufactured with Type B or Type C Orange_{FL} 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
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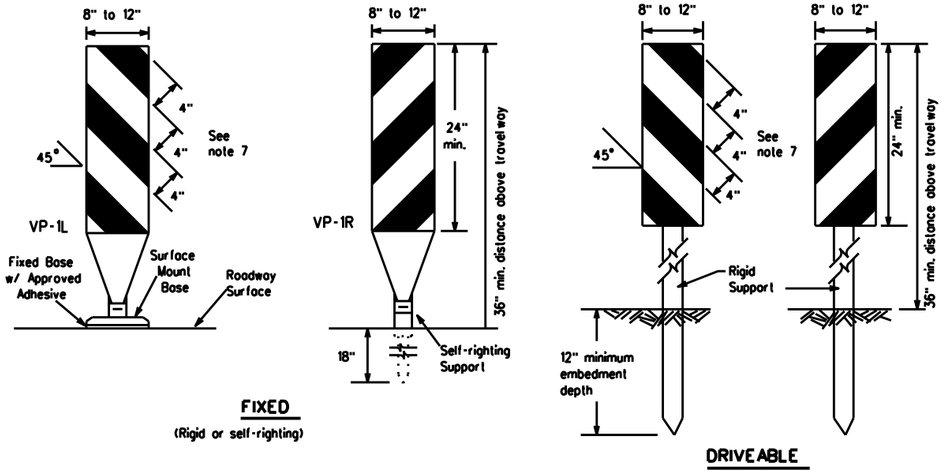
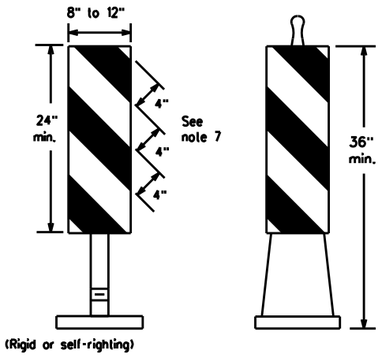
REVISIONS	6464	74	001	IH0030
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	DAL	DALLAS		19
7-13				



FIXED

(Rigid or self-righting)

DRIVEABLE

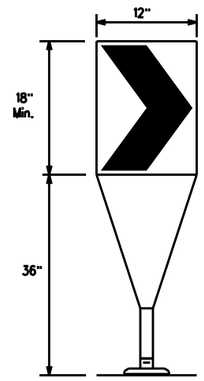


(Rigid or self-righting)

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)



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 or Type C 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.

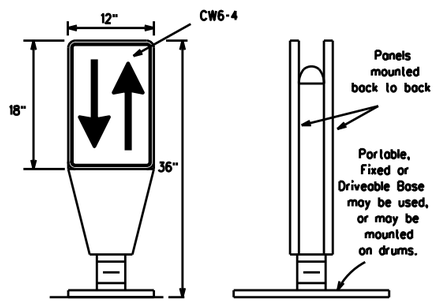
If used to channelize pedestrians, longitudinal channelizing devices or water ballasted systems must have a continuous detectable bottom for users of long canes and the top of the unit shall not be less than 32 inches in height.

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



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 or Type C conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

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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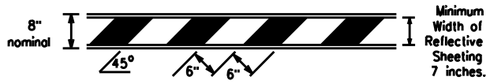
DATE:
FILE:

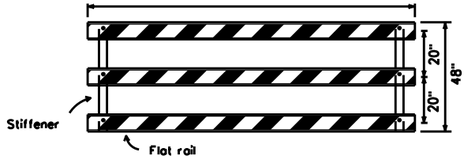
TYPE 3 BARRICADES

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.



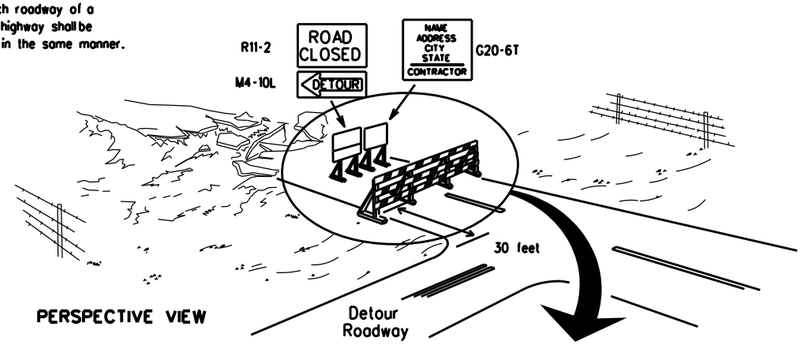
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

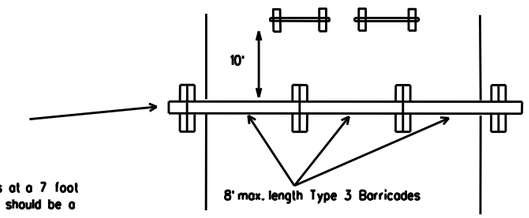
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

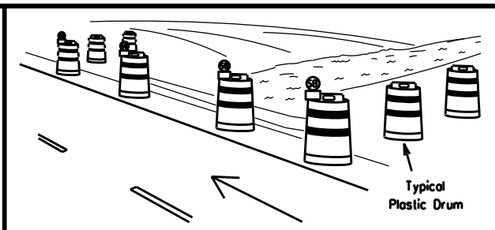
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

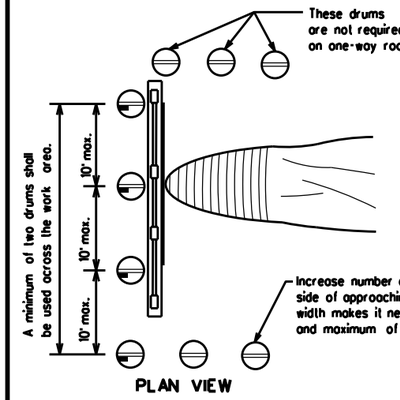
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

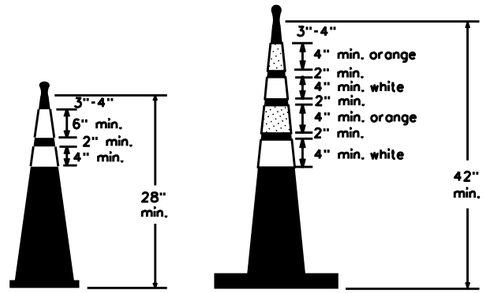
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



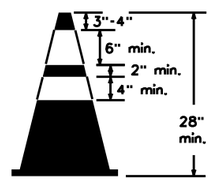
PLAN VIEW

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

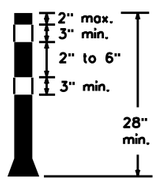
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

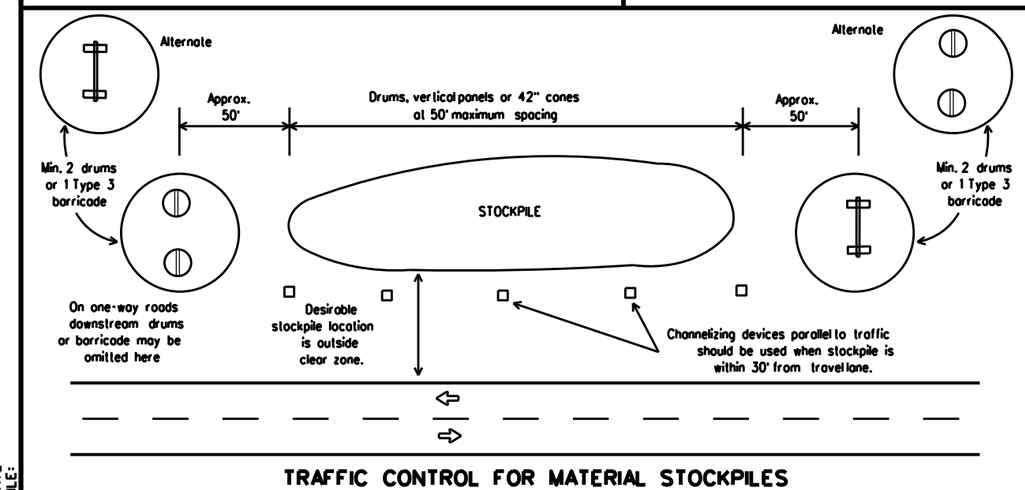


Tubular Marker

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
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	DAL	DALLAS		21

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

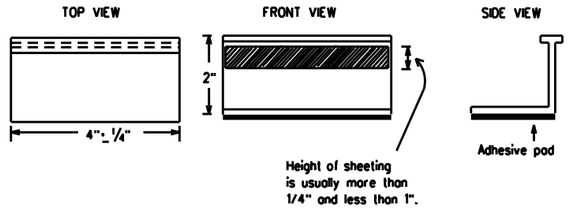
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
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11-02 8-14				

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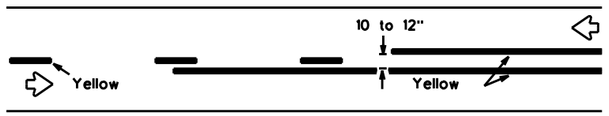
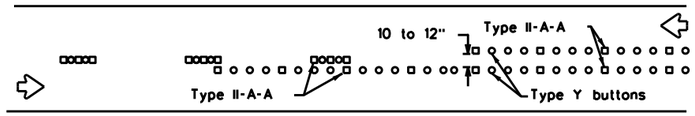
FILE:

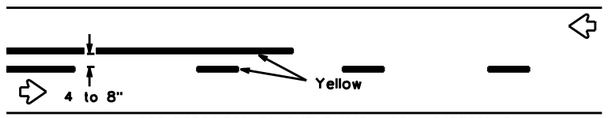
PAVEMENT MARKING PATTERNS



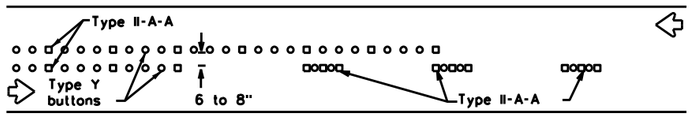
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



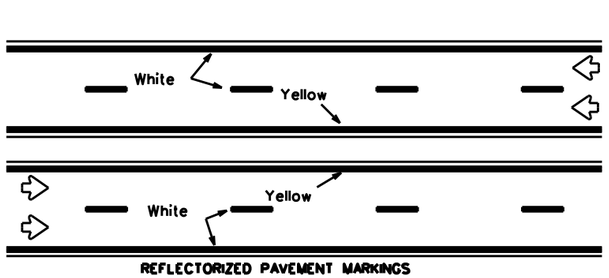
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



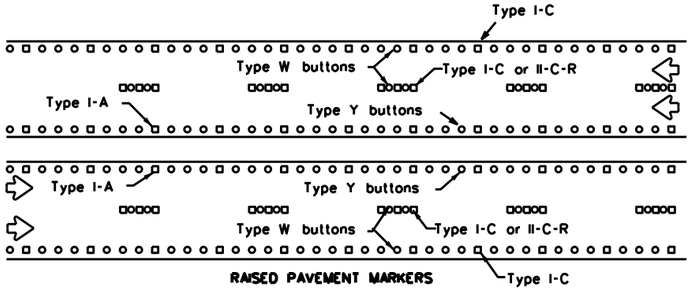
RAISED PAVEMENT MARKERS - PATTERN B

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



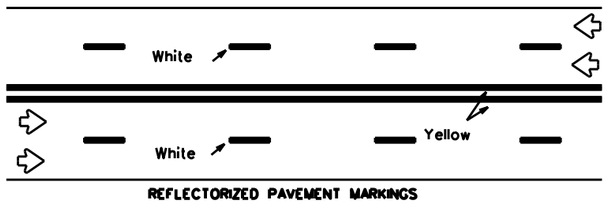
REFLECTORIZED PAVEMENT MARKINGS



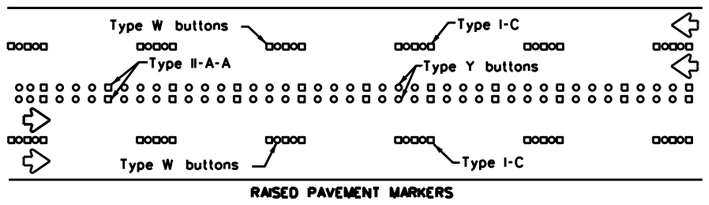
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



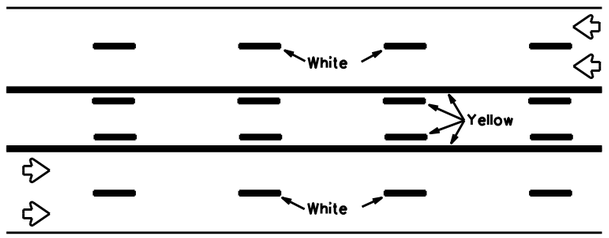
REFLECTORIZED PAVEMENT MARKINGS



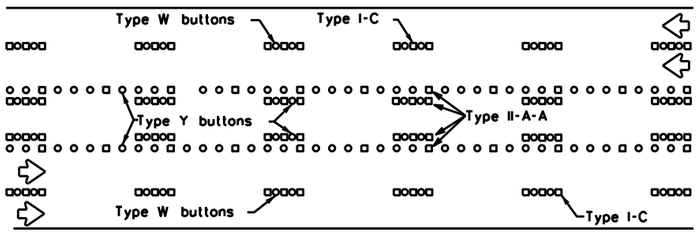
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

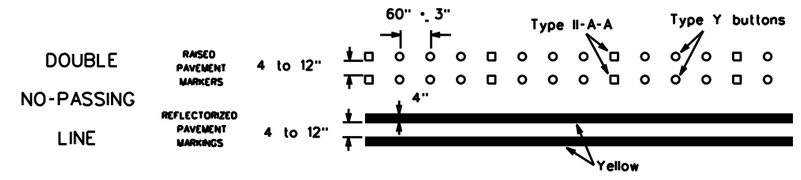
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

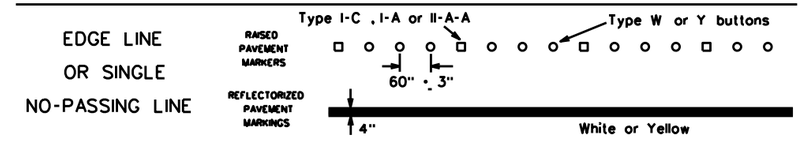
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

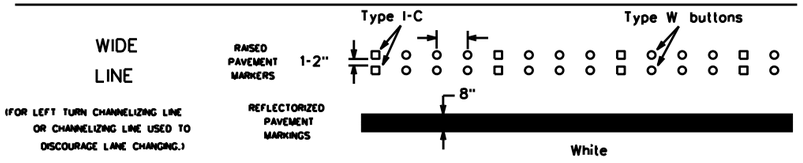


EDGE LINE OR SINGLE NO-PASSING LINE



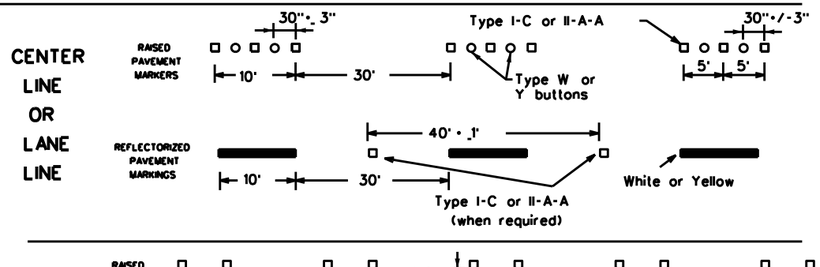
WIDE LINE

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

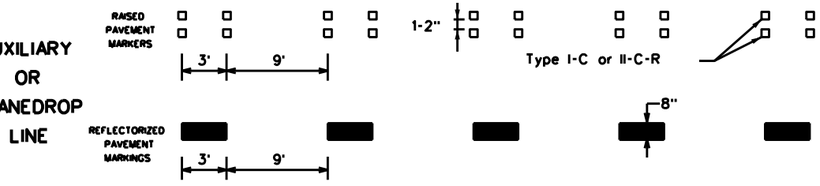


BROKEN LINES

CENTER LINE OR LANE LINE

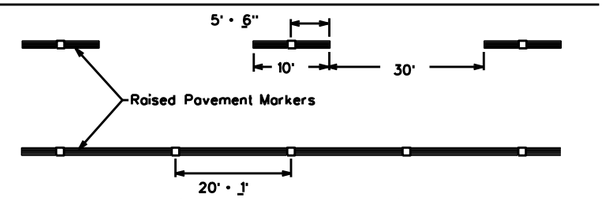


AUXILIARY OR LANEDROP LINE



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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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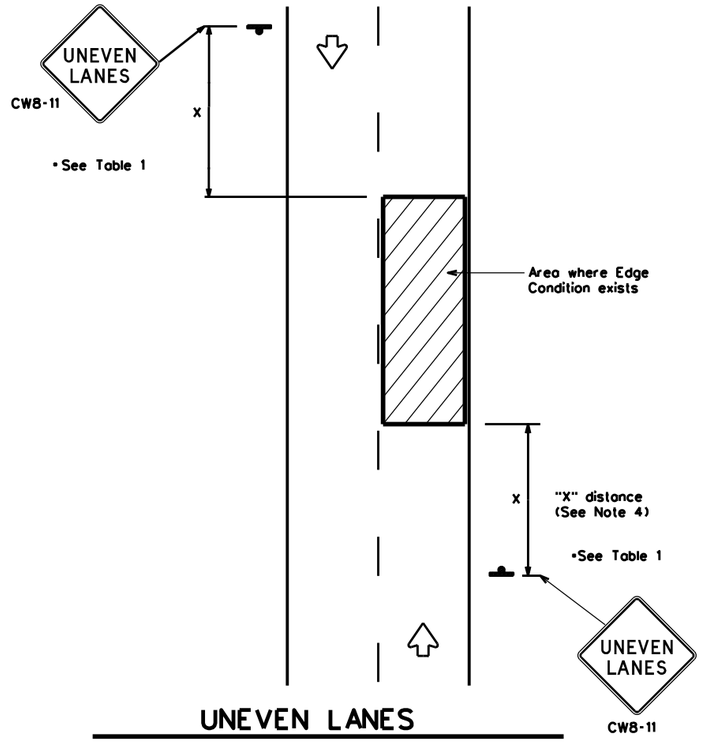
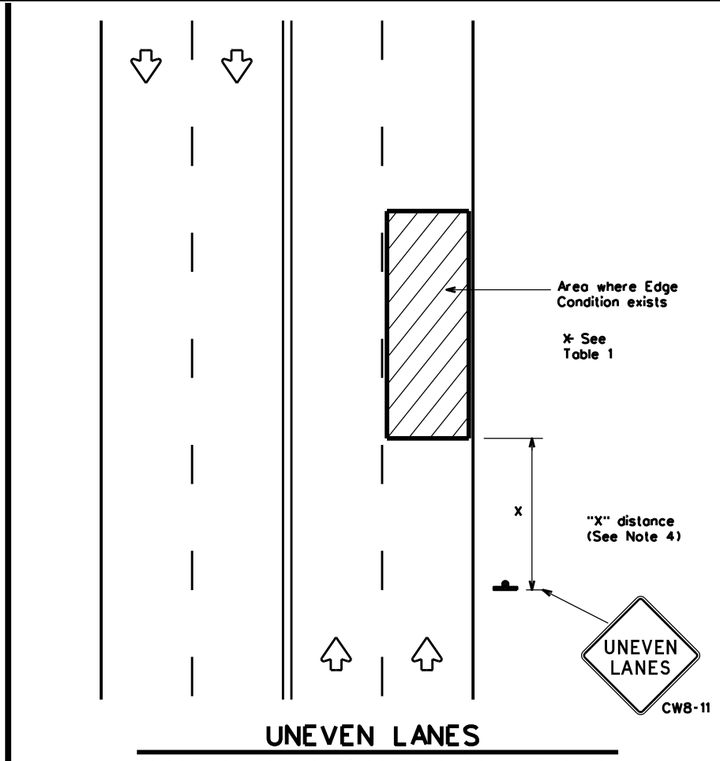
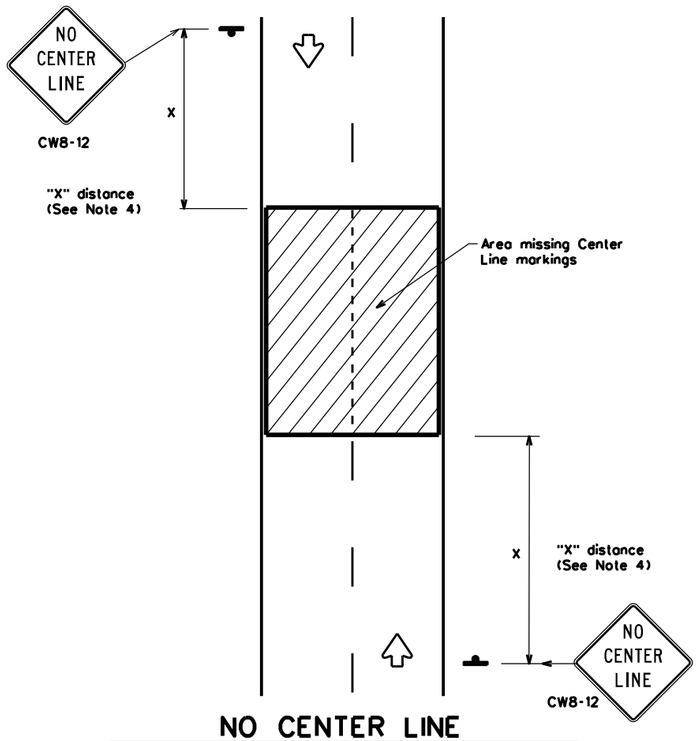
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		23



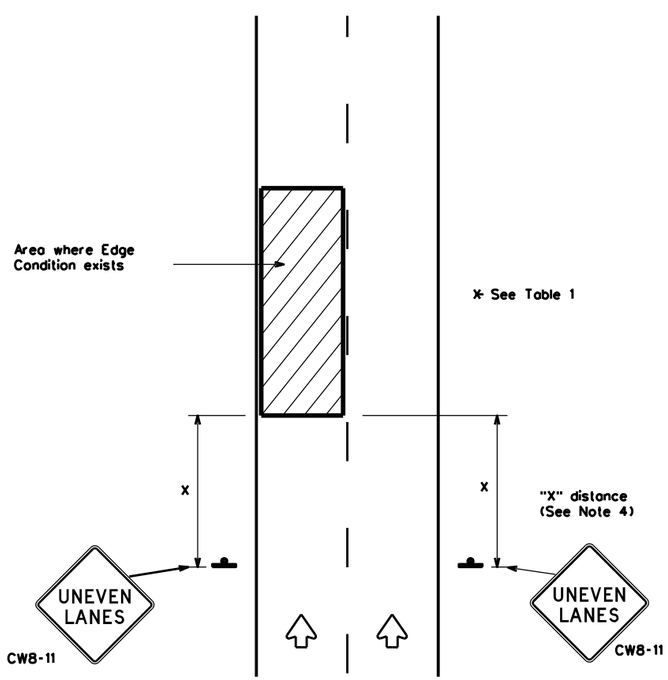
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

DATE:
FILE:

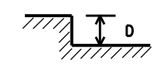
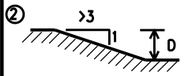
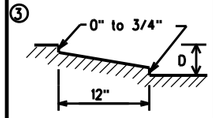
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

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
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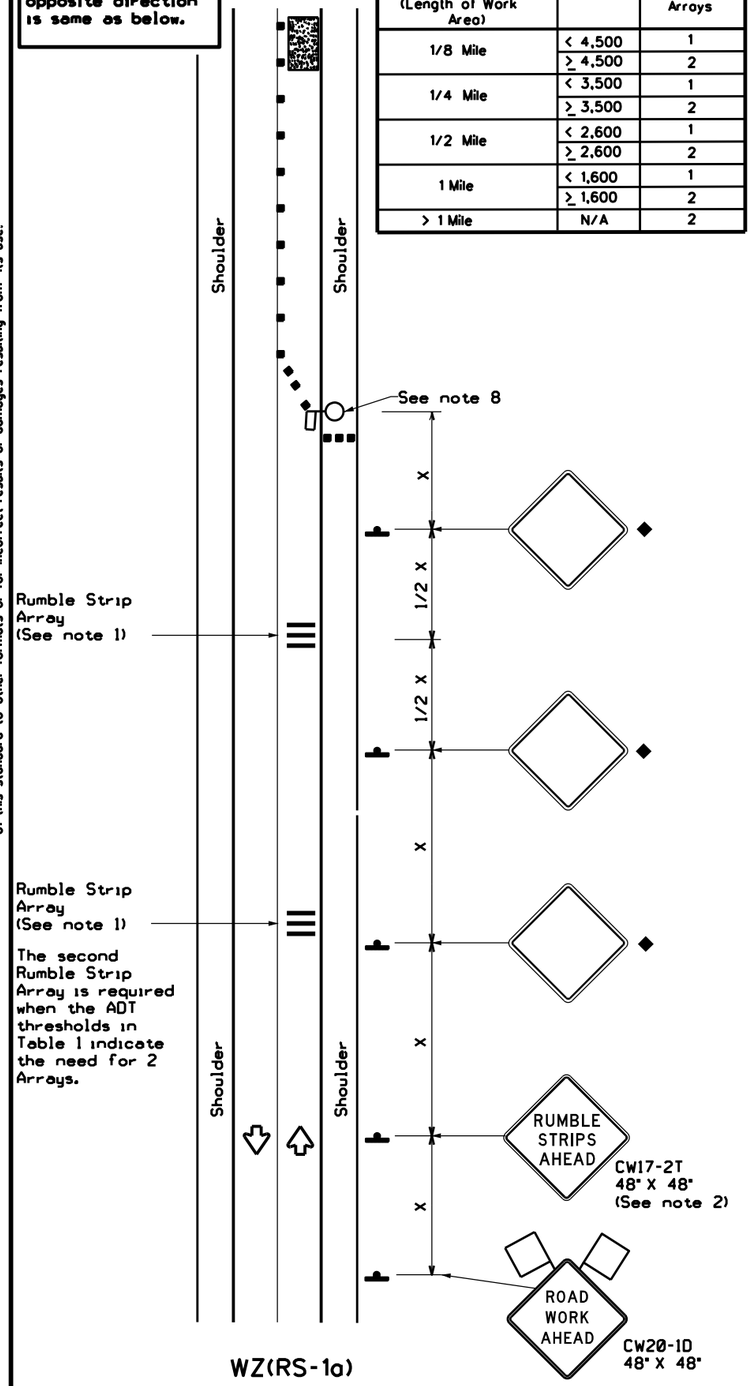
REVISIONS	6464	74	001	IH0030
8-95 2-98 7-13	DIST	COUNTY		SHEET NO.
1-97 3-03	DAL	DALLAS		24

DATE:
FILE:

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

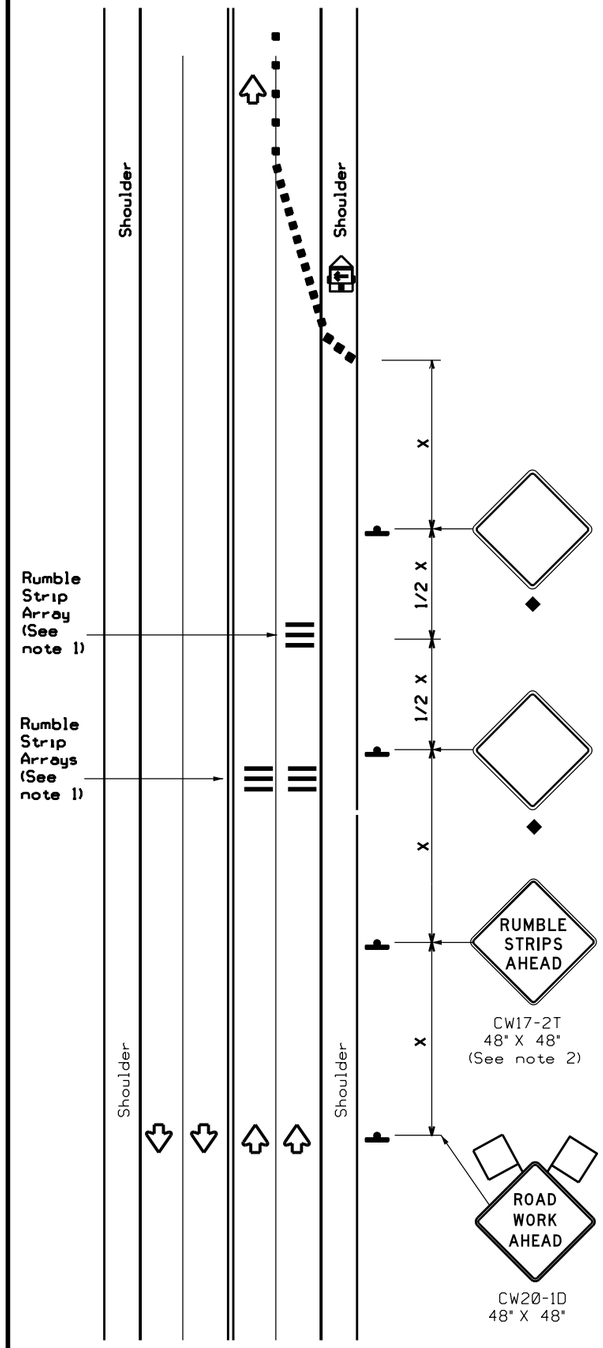


WZ(RS-1a)

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

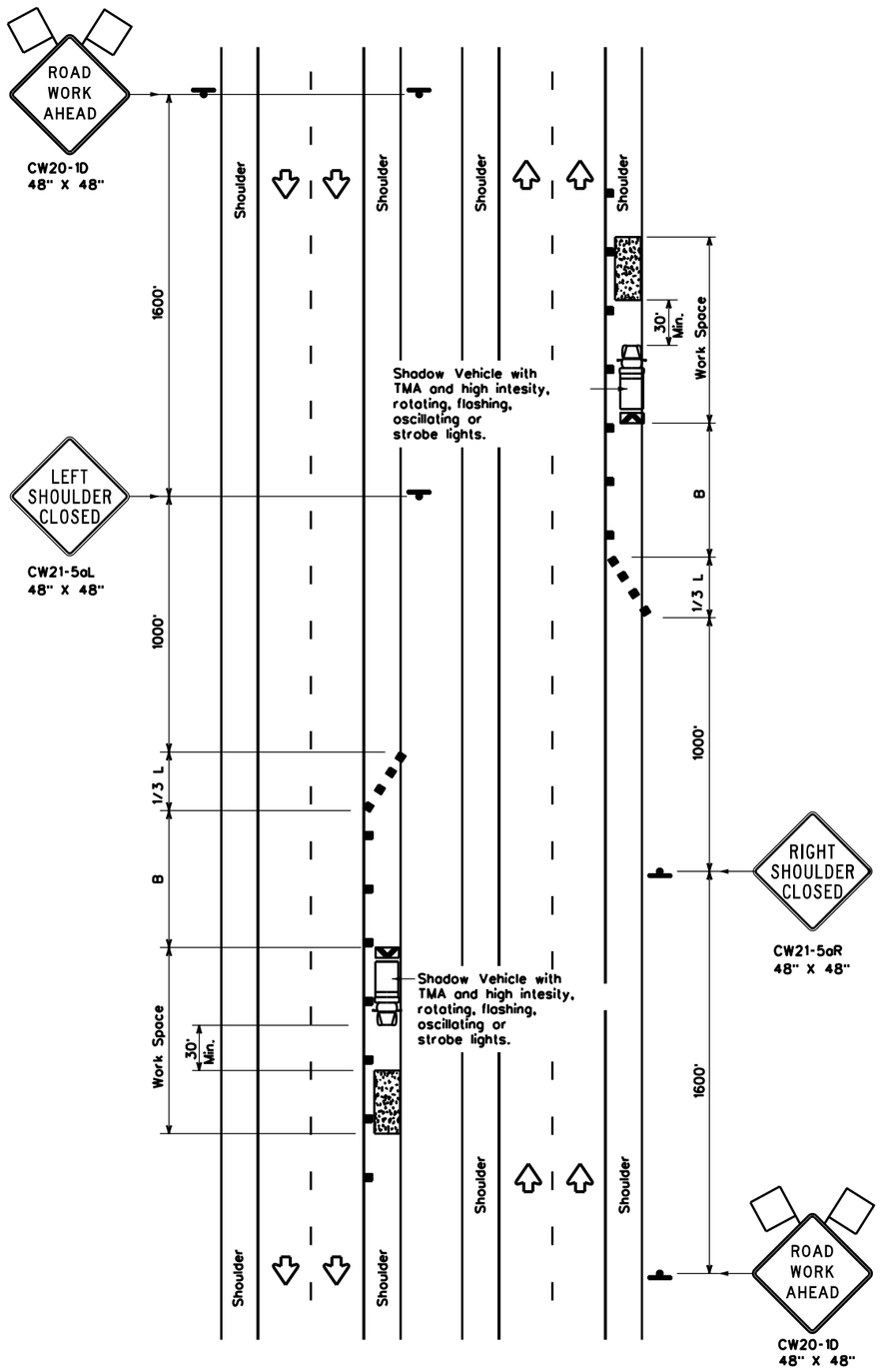
Traffic Safety Division Standard

TEMPORARY RUMBLE STRIPS

WZ(RS)-22

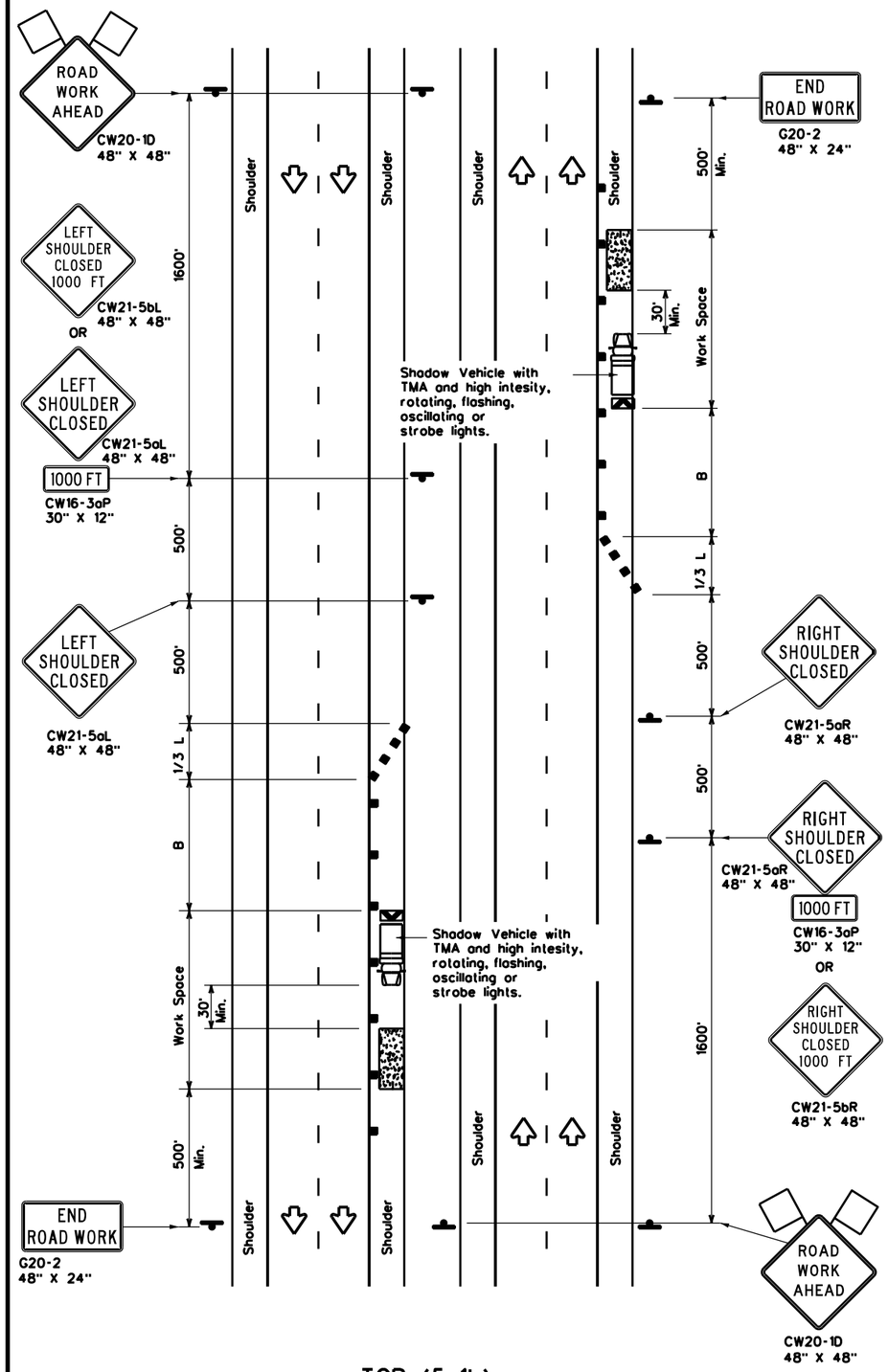
FILE: wzrs22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
2-14 1-22	DIST	COUNTY		SHEET NO.
4-16	DAL	DALLAS		25

DATE:
FILE:



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

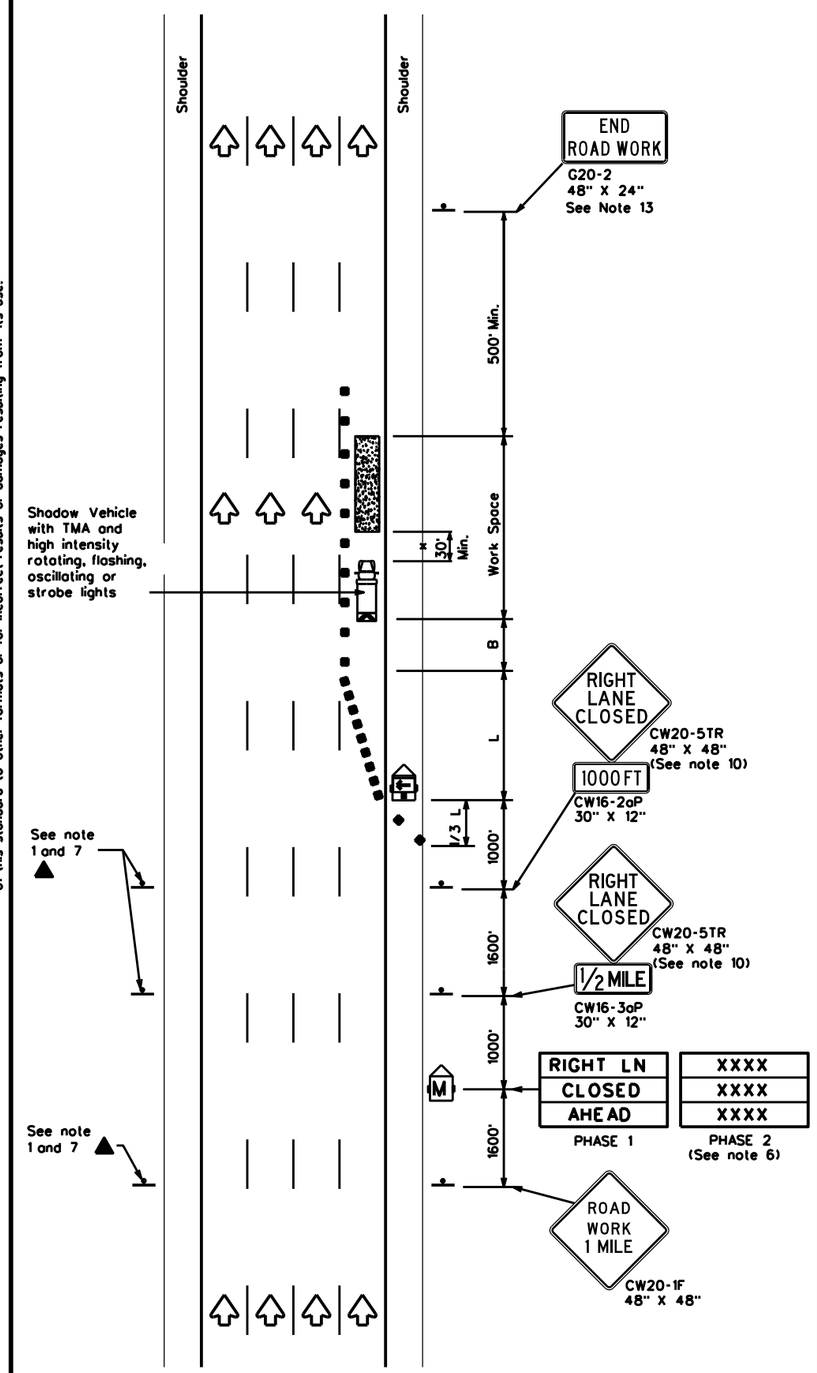
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN SHOULDER WORK FOR FREEWAYS / EXPRESSWAYS

TCP(5-1)-18

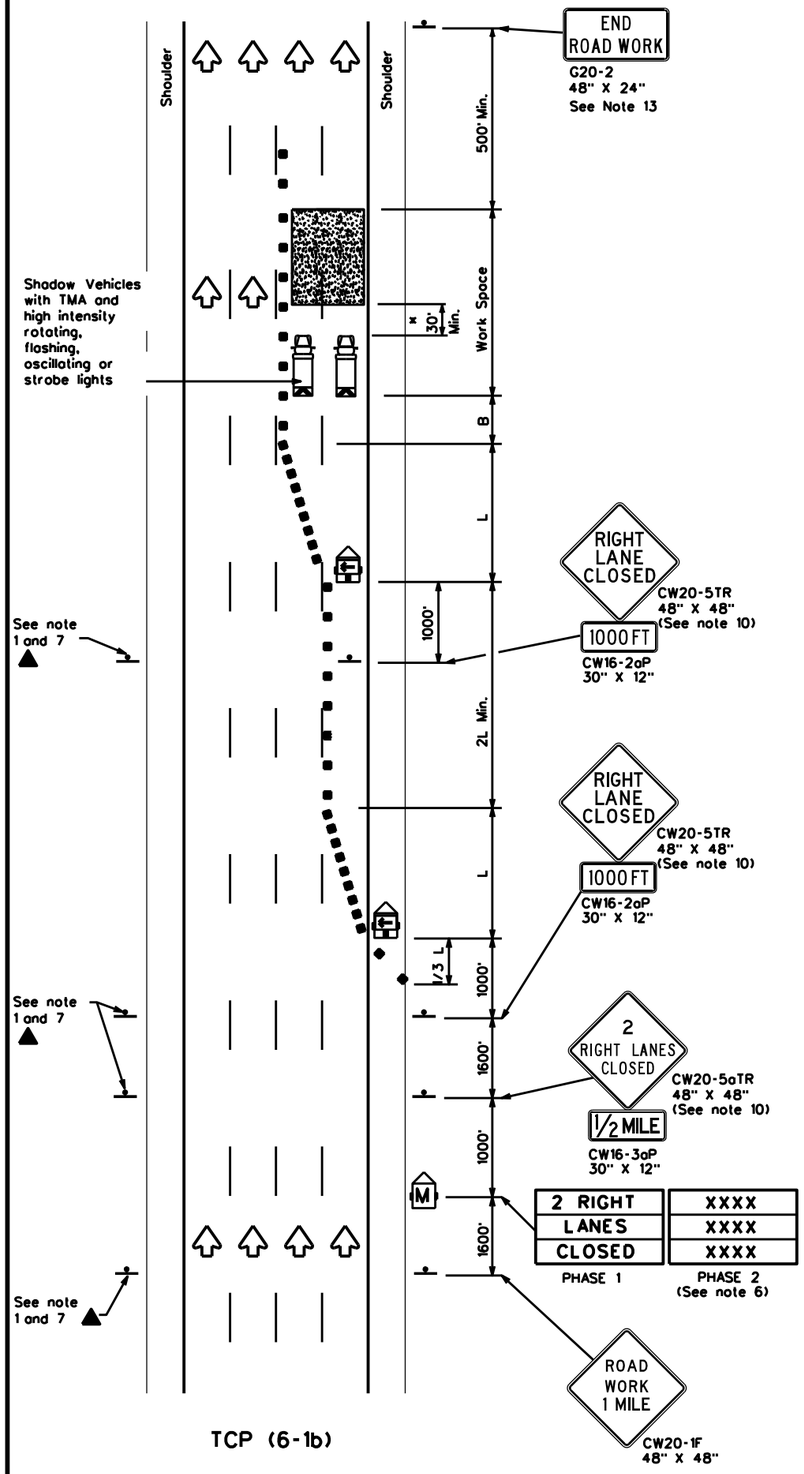
FILE: tcp5-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
2-18	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		26

DATE:
FILE:



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		450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55	L=WS	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 ploque 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.

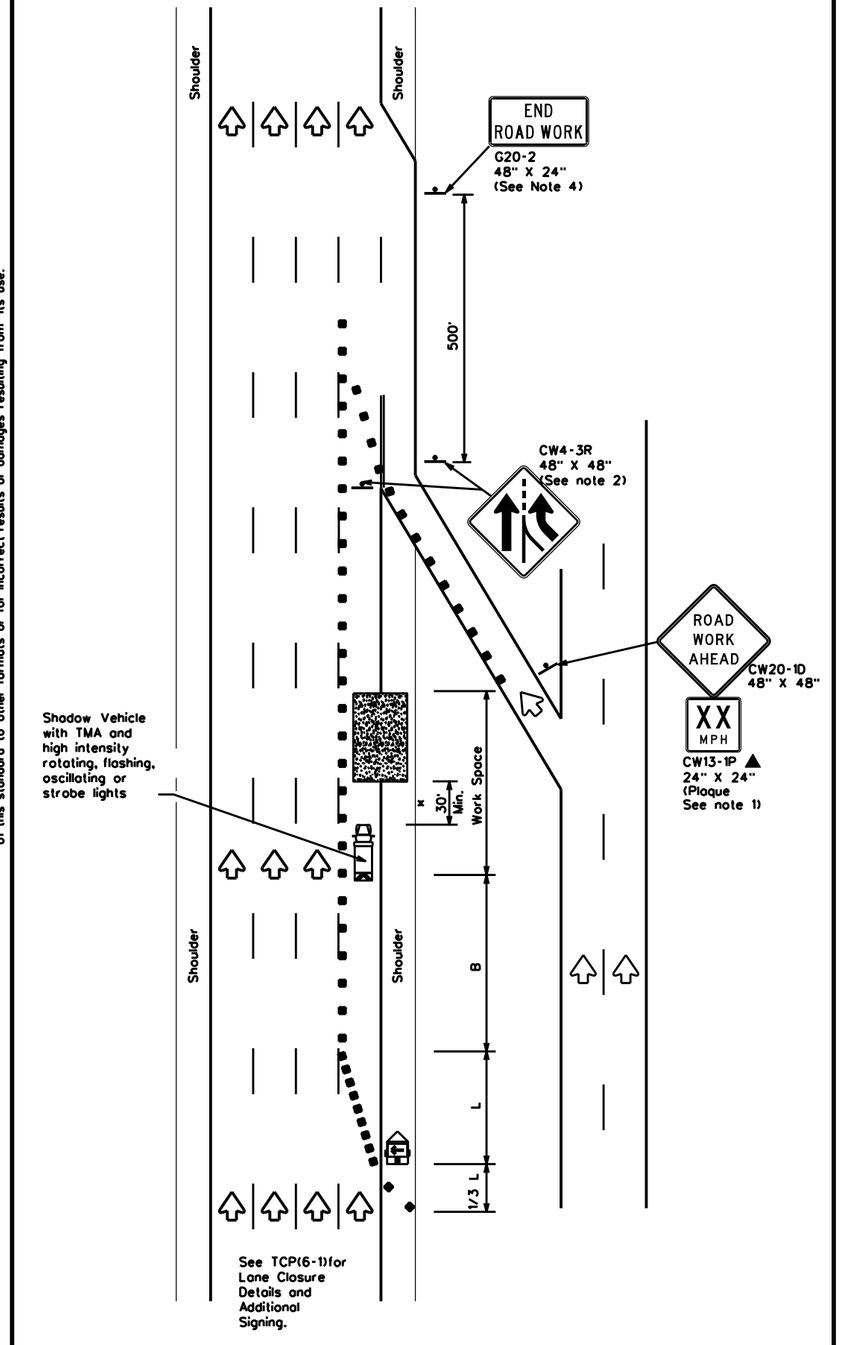
Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN FREEWAY LANE CLOSURES

TCP(6-1)-12

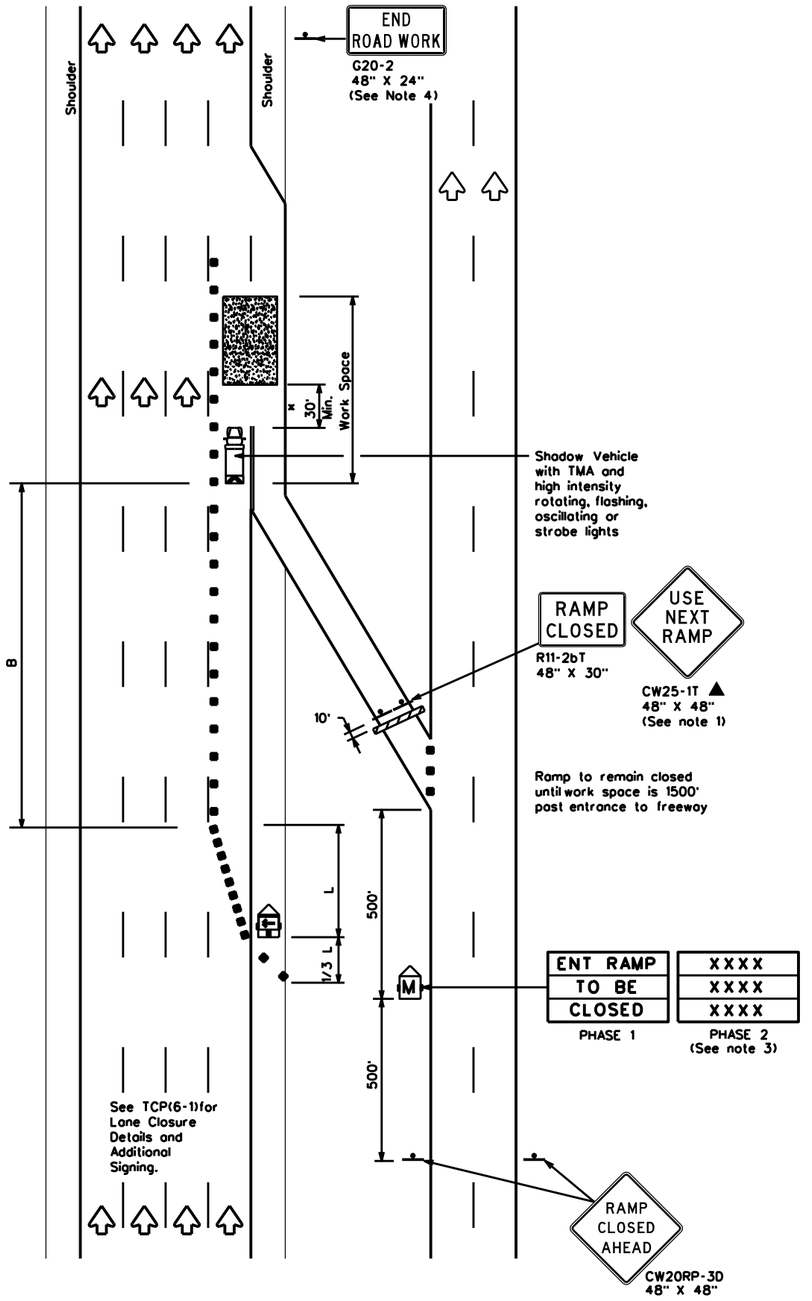
FILE: tcp6-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-12	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		27

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.

x 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

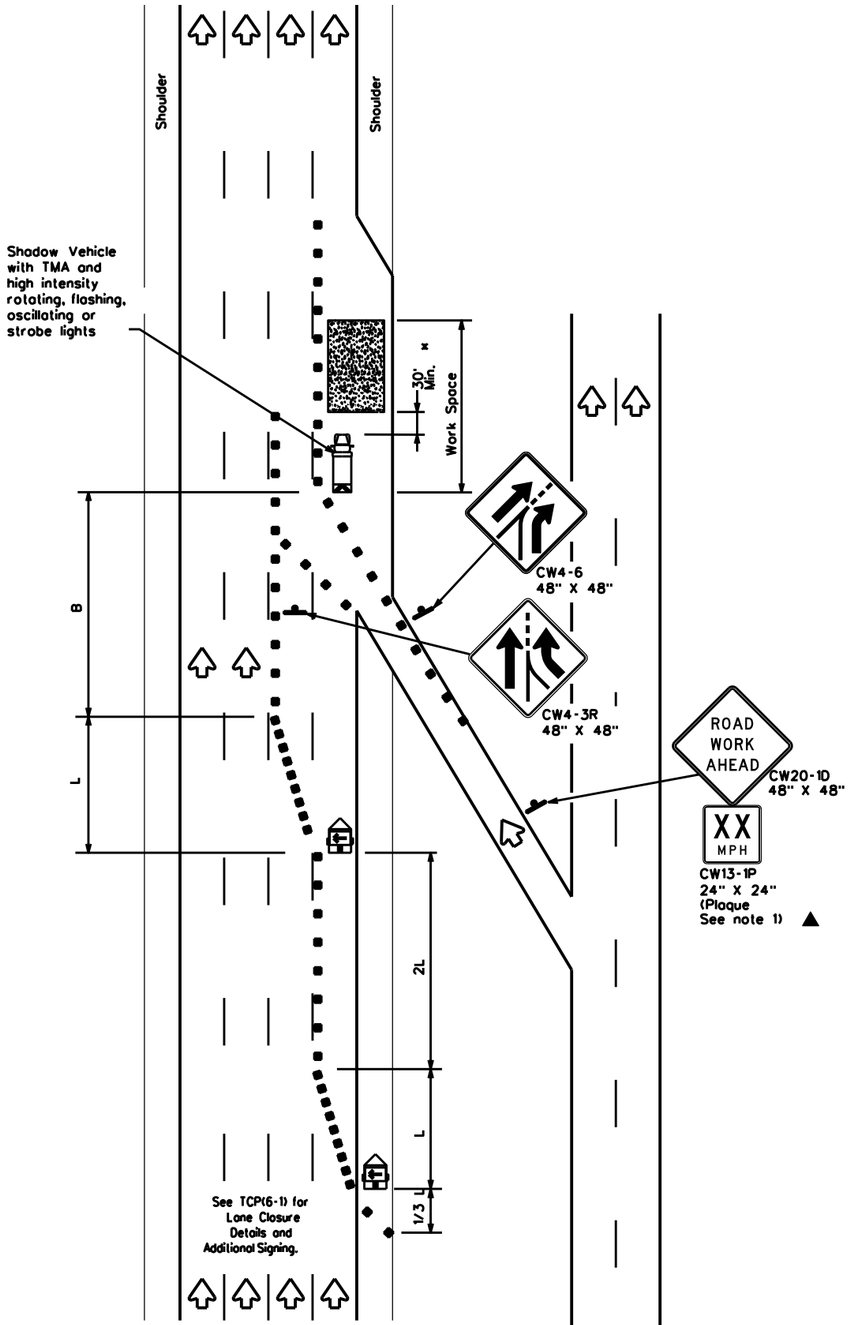
TRAFFIC CONTROL PLAN
WORK AREA NEAR RAMP

TCP(6-2)-12

FILE: tcp6-2.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	DAL	DALLAS		28

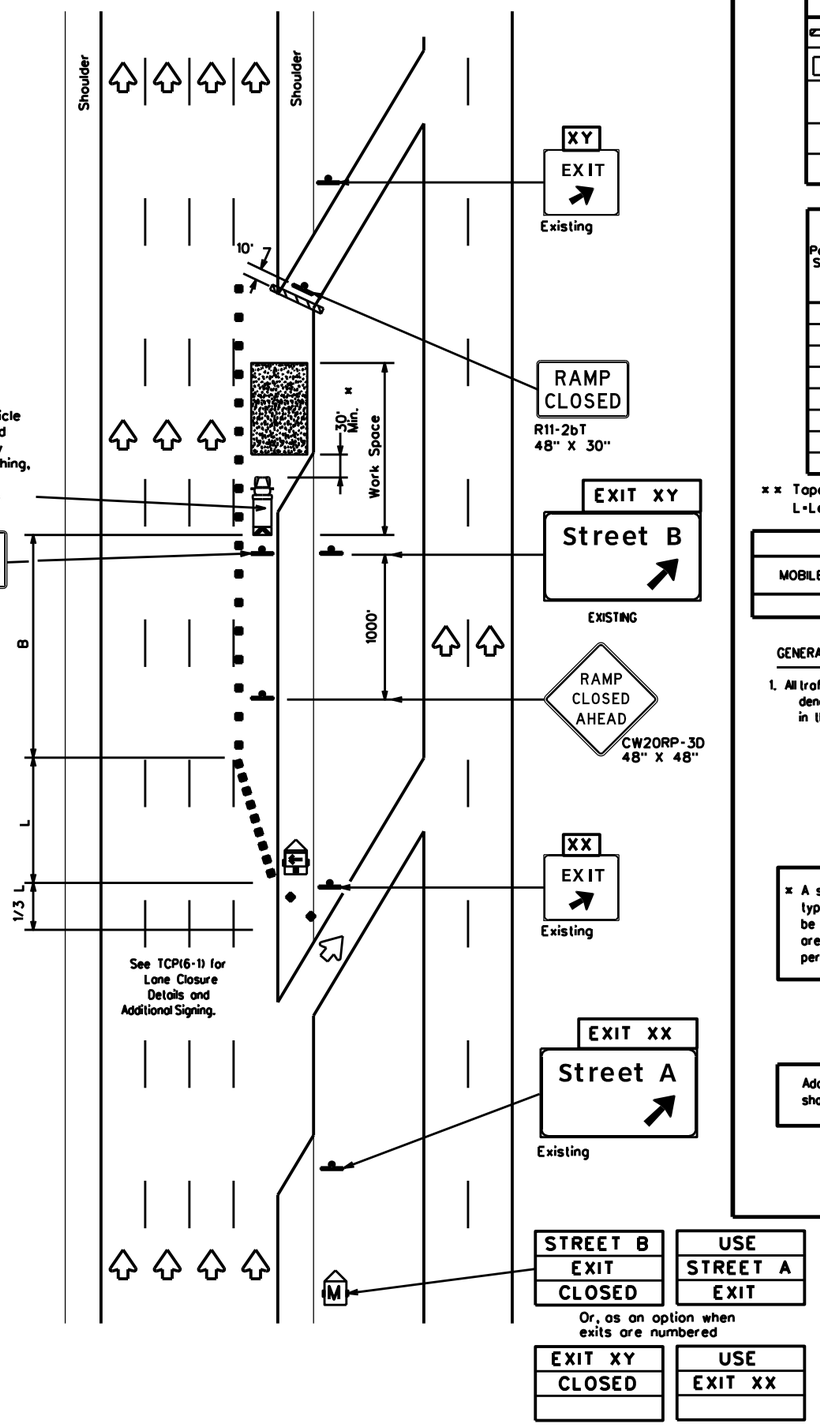
DATE:
FILE:

DATE:
FILE:



TCP (6-3a)

ENTRANCE RAMP OPEN



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" ** 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.

* 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.

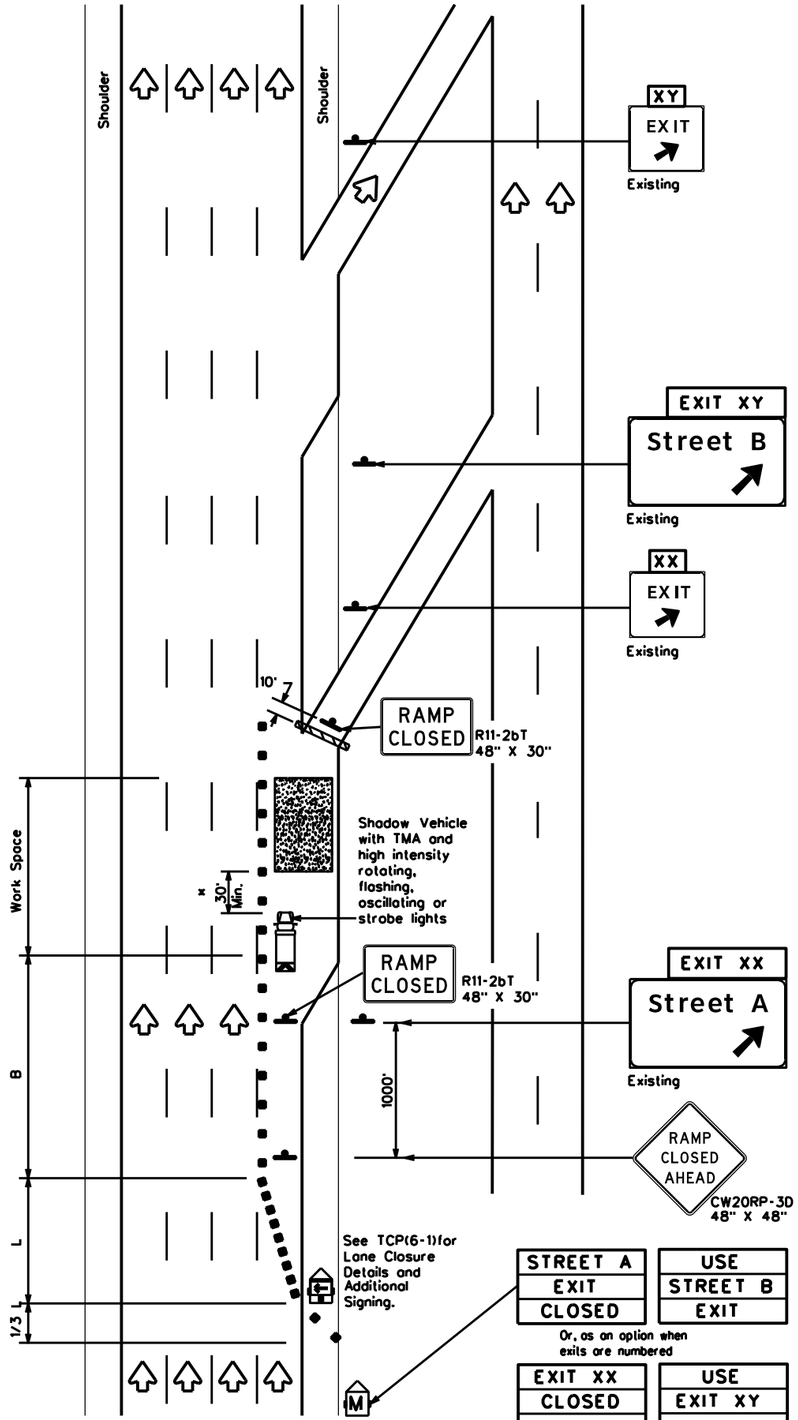
Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA BEYOND RAMP

TCP(6-3)-12

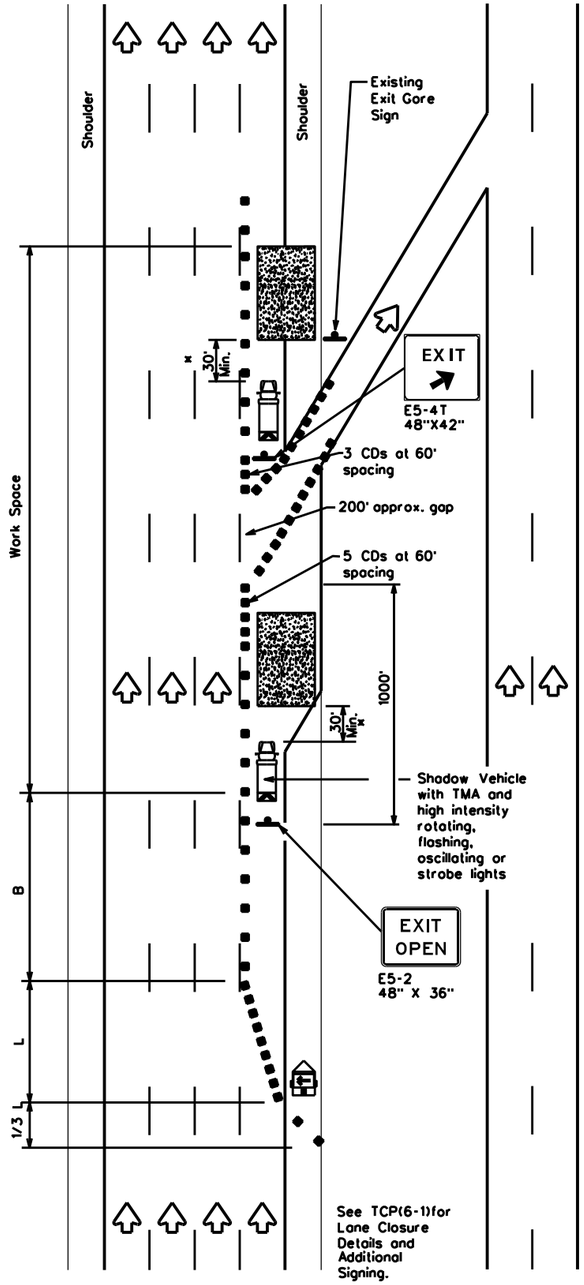
FILE: tcp6-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1994 REVISIONS 1-97 8-98 4-98 8-12	CONT 6464	SECT 74	JOB 001	HIGHWAY IH0030
	DIST DAL	COUNTY DALLAS		SHEET NO. 29



TCP (6-4a)

EXIT RAMP CLOSED

TRAFFIC EXITS PAST CLOSED RAMP



TCP (6-4b)

EXIT RAMP OPEN

LEGEND			
	Type 3 Barricade		Channelizing Devices (CDs)
	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" x x			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'

x x 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.

x 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

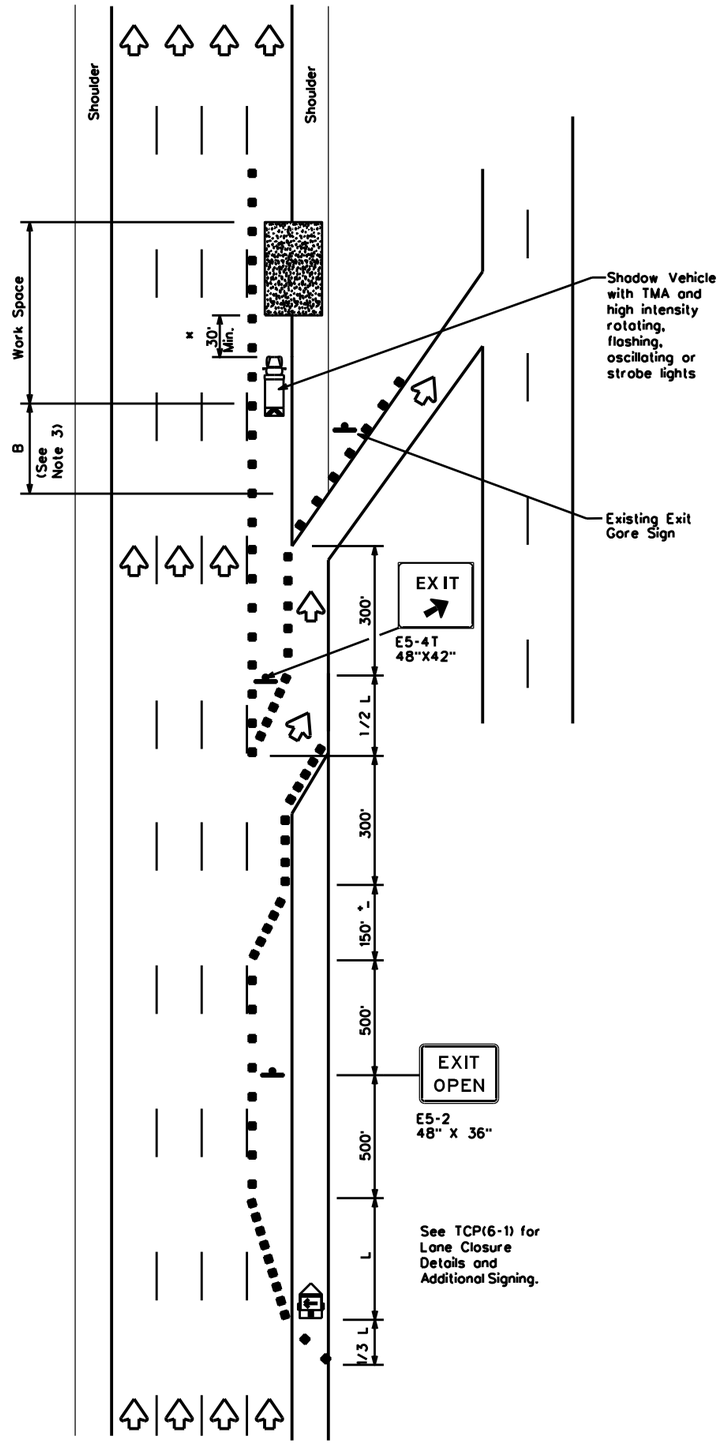
TRAFFIC CONTROL PLAN
WORK AREA AT EXIT RAMP

TCP(6-4)-12

FILE: tcp6-4.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT Feburary 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	DAL	DALLAS		30

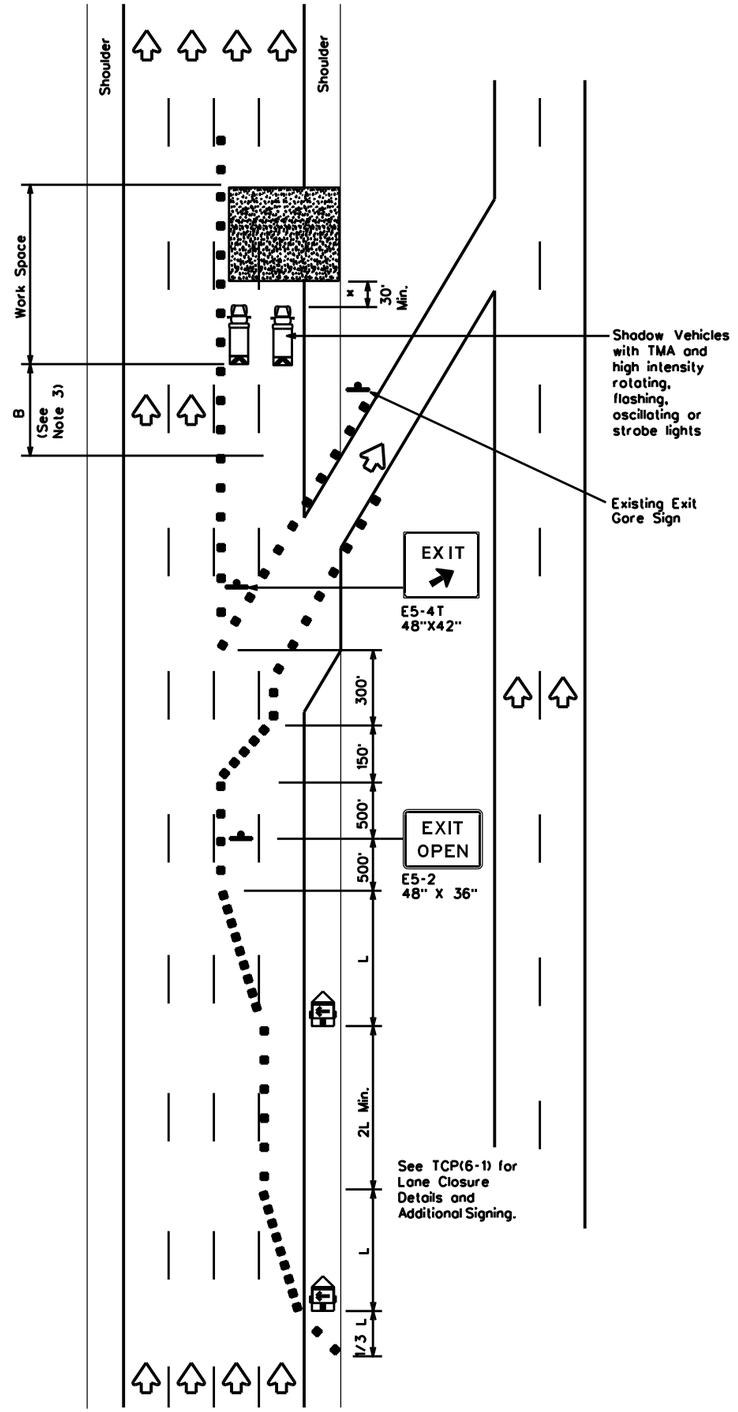
DATE:
FILE:

DATE:
FILE:



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" x x			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'

x x 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.

x 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	6464	74	001	IH0030
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	DAL	DALLAS		31

DATE:
FILE:

LEGEND

	Type 3 Barricade		Channelizing Devices (CDs)
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		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. Place channelizing devices in the gore at 20' spacing.
2. See the Standard Highway Sign Design for Texas (SHSD) for sign details.
3. The PCMS may be omitted when a permanent DMS sign is available in an appropriate location to display a similar message as called for on the PCMS.
4. When it is determined that a through lane should be closed in addition to the exit ramp, refer to TCP(6-4) for traffic control details.
5. Truck mounted attenuator is required.
6. The PCMS may be omitted if replaced with a "RAMP CLOSED" AHEAD (CW20RP-3D) Sign.
7. Roadway ADT should be greater than 10,000.

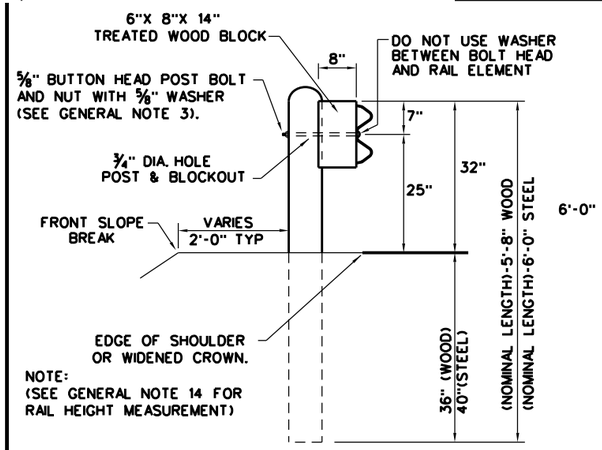
Texas Department of Transportation

Traffic Operations Division Standard

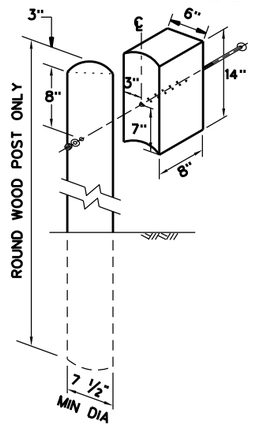
WORK IN EXIT GORE FOR ADT GREATER THAN 10,000

TCP(6-8)-14

FILE: tcp6-8.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		32

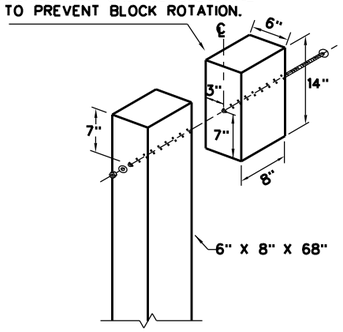


TYPICAL POST PLACEMENT

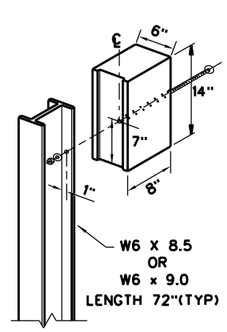


WOOD BLOCK TO ROUND WOOD POST

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

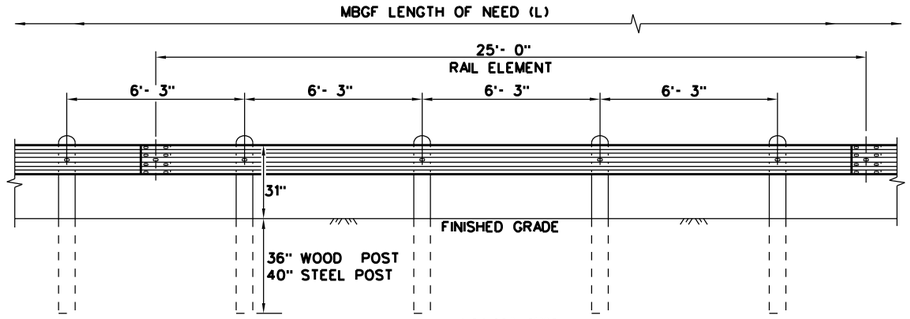


WOOD BLOCK TO RECTANGULAR WOOD POST



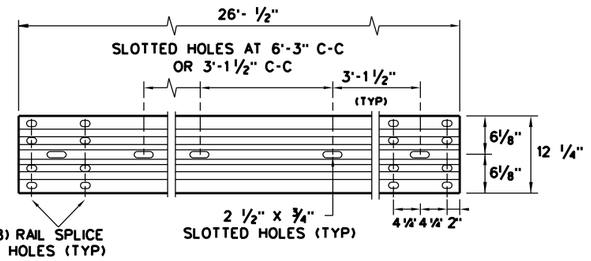
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



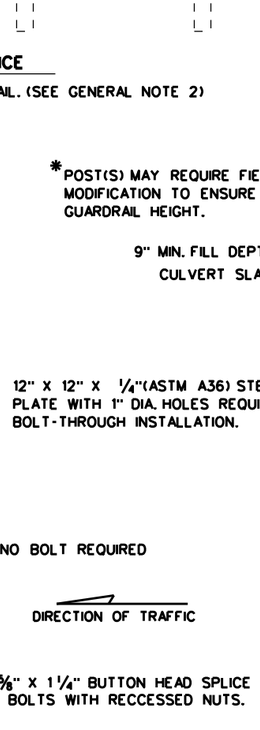
ELEVATION MID-SPAN RAIL SPLICE

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.



*POST(S) MAY REQUIRE FIELD MODIFICATION TO ENSURE PROPER GUARDRAIL HEIGHT.

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

12" X 12" X ¼"(ASTM A36) STEEL BOTTOM PLATE WITH 1" DIA. HOLES REQUIRED WITH BOLT-THROUGH INSTALLATION.

LOW FILL CULVERT POST

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.

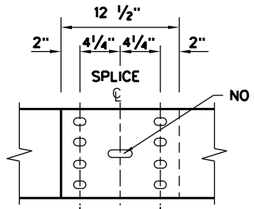
NOTE:
FOUR TYPES OF BUTTON-HEAD GUARD RAIL BOLTS COME WITH A RECCESSED NUT.

SPLICE BOLT LENGTH — VARIES
FBB01 - 1¼"
FBB02 - 2"
⅝"

POST & BLOCK LENGTH
FBB03 - 10"
FBB04 - 18"

BUTTON HEAD BOLT

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



MID-SPAN RAIL SPLICE DETAIL

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

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'-1½" 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
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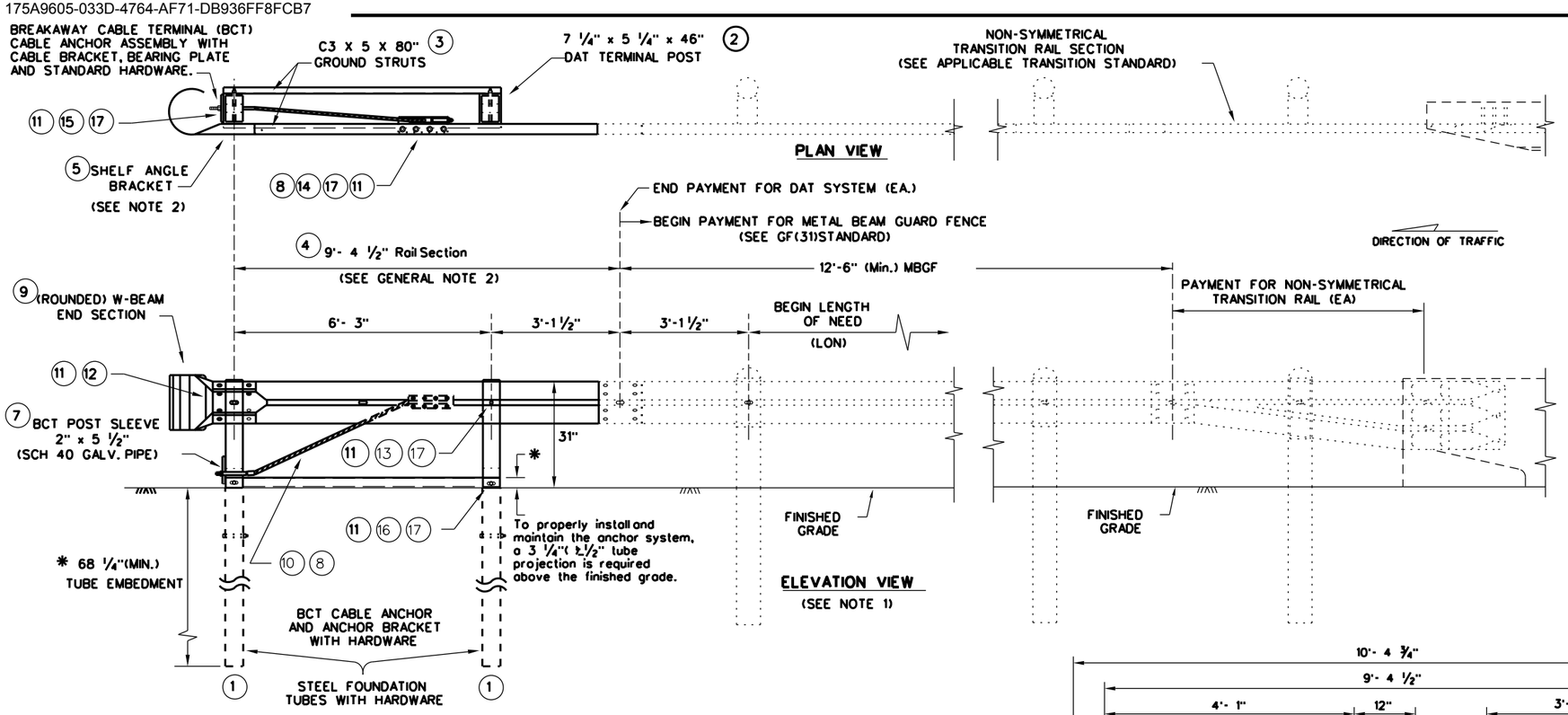


DOWNSTREAM ANCHOR TERMINAL (DAT)

NOTE: ONLY FOR DOWNSTREAM USE, WHEN LOCATED OUTSIDE THE HORIZONTAL CLEARANCE AREA OF OPPOSING TRAFFIC.

GENERAL NOTES

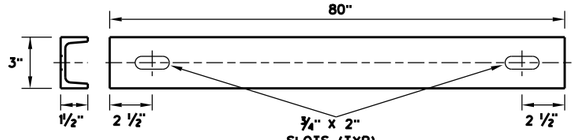
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN 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

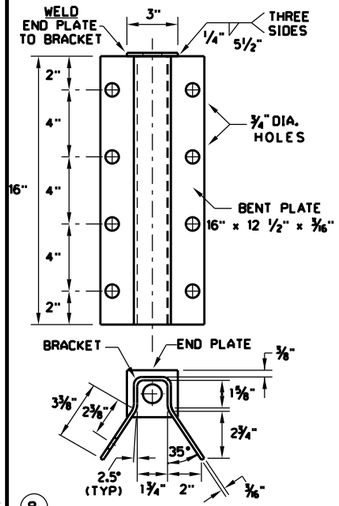
IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

•	(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

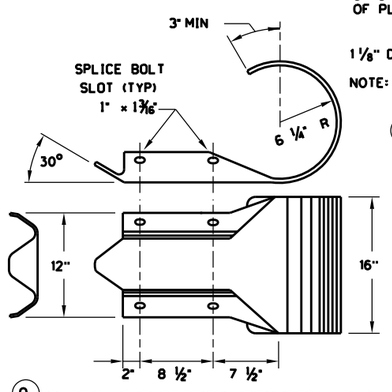
(4) TERMINAL RAIL ELEMENT FOR DAT



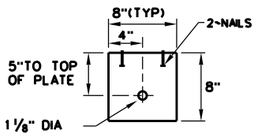
(3) CHANNEL STRUT
C3 X 5 X 80",GRADE A36



(8) GUARDRAIL ANCHOR BRACKET

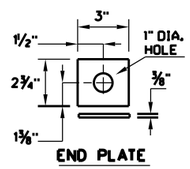


(9) W-BEAM END SECTION (ROUNDED) (12 GA.)

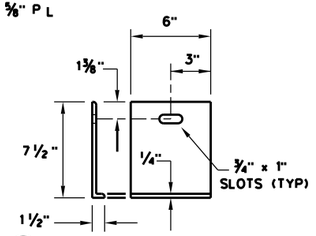


NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

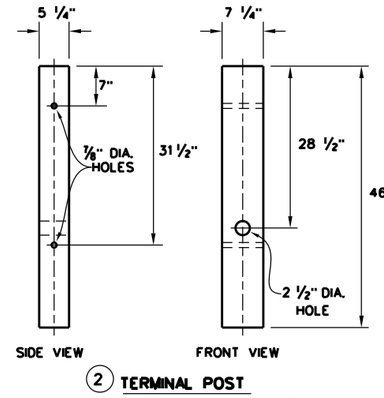
(6) BEARING PLATE
8"x 8"x 5/8" PL



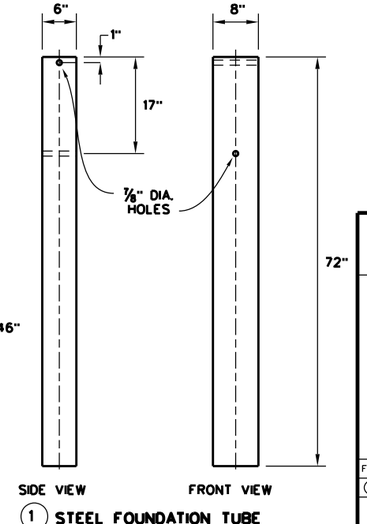
END PLATE



(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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	DAL	DALLAS		34

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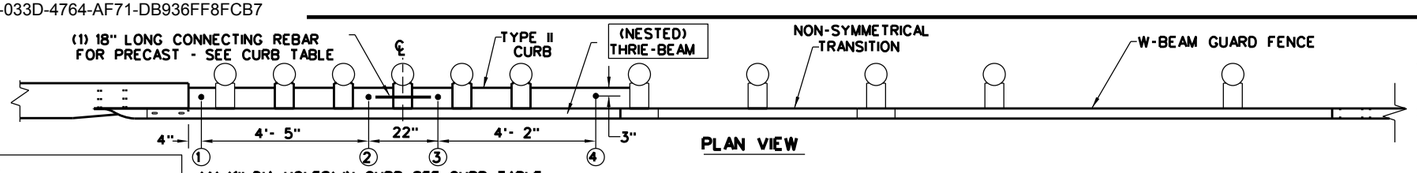


(4) (1" DIA. HOLES) IN CURB: SEE CURB TABLE

(5) 1" DIA. HOLES.
(5) ⅞" DIA. HEAVY HEX HEAD BOLTS (FACING TRAFFIC SIDE) (ASTM F3125 GR A325 OR A449).
(10) 1 ¾" O.D. WASHER UNDER EACH HEX BOLT HEAD AND NUT.
(5) ⅞" DIA. HEAVY HEX NUTS (ASTM A194 OR A563).

NOTE:
HEAVY HEX BOLT LENGTH WILL VARY DEPENDING ON WIDTH CONCRETE RAIL, LEAVE 1" OF BOLT LENGTH PAST THE ⅞" HEX NUT. TRIM AS REQUIRED.

NOTE:
CURB IS A REQUIRED COMPONENT FOR THE TRANSITION TO FUNCTION PROPERLY. SEE GENERAL NOTES:2-4 AND 16-17.

DIRECTION OF TRAFFIC

THRIE-BEAM CONNECTOR TO CONCRETE RAIL

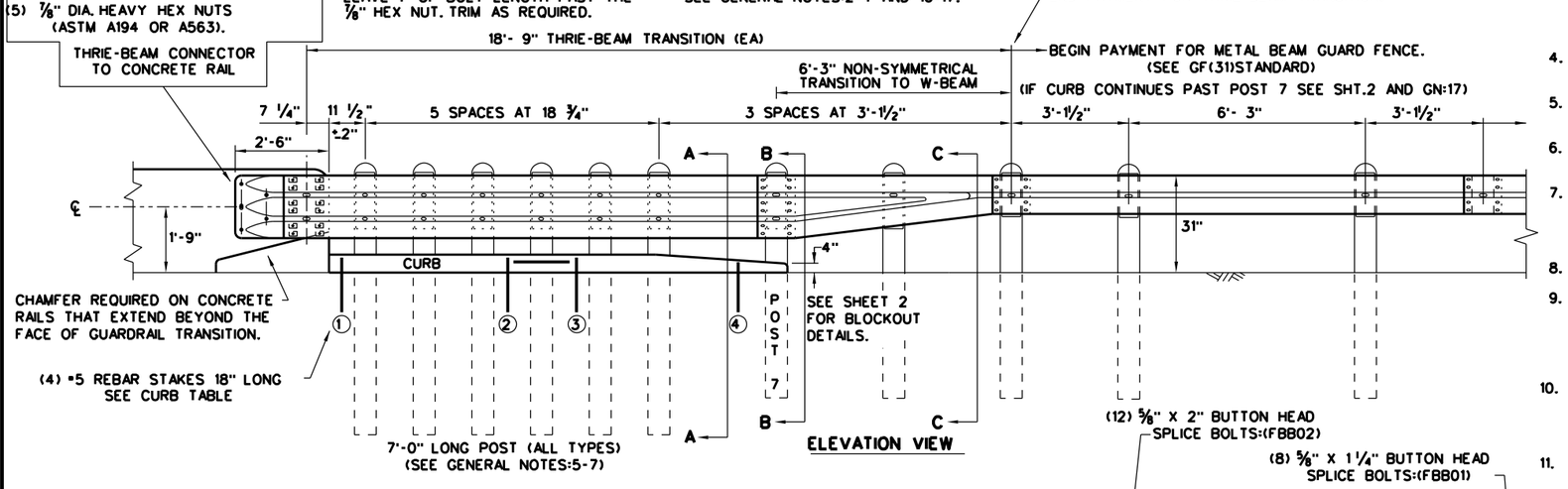
END PAYMENT FOR THRIE-BEAM TRANSITION.

18'- 9" THRIE-BEAM TRANSITION (EA)

BEGIN PAYMENT FOR METAL BEAM GUARD FENCE. (SEE GF(31)STANDARD)

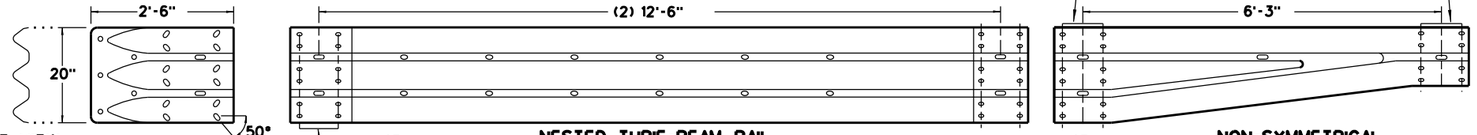
6'-3" NON-SYMMETRICAL TRANSITION TO W-BEAM

(IF CURB CONTINUES PAST POST 7 SEE SHT.2 AND GN:17)



(12) ⅝" X 2" BUTTON HEAD SPLICE BOLTS:(FBB02)

(8) ⅝" X 1¼" BUTTON HEAD SPLICE BOLTS:(FBB01)



SIDE-VIEW

THRIE-BEAM TERMINAL CONNECTOR 10GA.
PART DESIGNATOR RTE01b
NOTE: SEE GENERAL NOTE:9

LAP DIRECTION

NESTED THRIE-BEAM RAIL
PART DESIGNATOR RTM10a

LAP DIRECTION

NON-SYMMETRICAL W-BEAM TO THRIE-BEAM TRANSISTION 10GA.
PART DESIGNATOR RWT02a OR RWT02b

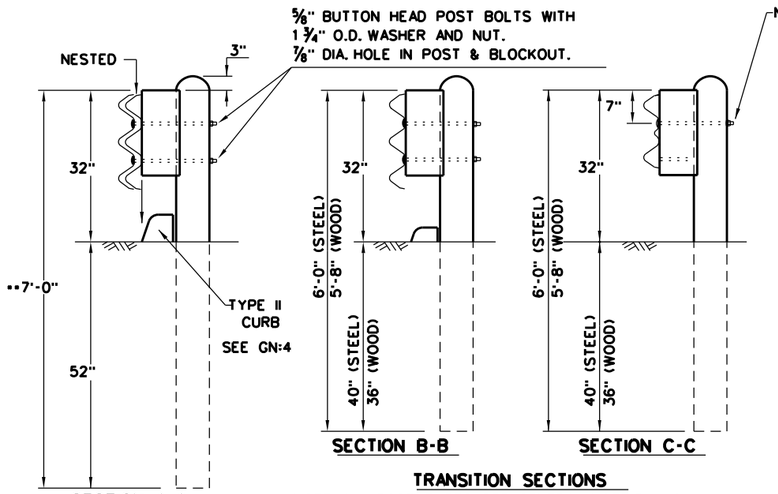
(12) ⅝" X 2" BUTTON HEAD SPLICE BOLTS WITH RECESSED NUTS:(FBB02)
(12) RECTANGULAR GUARDRAIL PLATE WASHERS:(FWR03)

PLATE WASHER INSTRUCTIONS

BRIDGE APPROACH - UPSTREAM: THE NESTED RAIL LAPS OVER THE TERMINAL CONNECTOR. PLATE WASHERS ARE INSTALLED UNDER THE SPLICE NUTS AGAINST INSIDE OF CONNECTOR.
BRIDGE EXIT - DOWNSTREAM: THE TERMINAL CONNECTOR LAPS OVER THE NESTED RAIL. PLATE WASHERS ARE INSTALLED UNDER THE BOLT HEAD AGAINST OUTSIDE OF CONNECTOR.

⅝" BUTTON HEAD POST BOLTS WITH 1 ¾" O.D. WASHER AND NUT.
⅛" DIA. HOLE IN POST & BLOCKOUT.

NOTE: ONLY (1) ⅝" BOLT REQUIRED AT THIS POST LOCATION.



SECTION A-A

SECTION B-B

SECTION C-C

TRANSITION SECTIONS

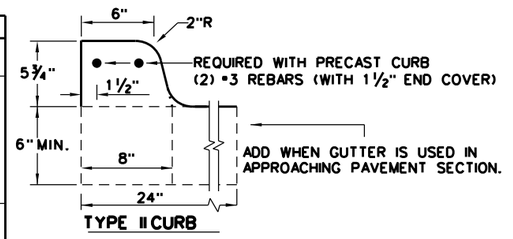
NOTE: ALL POST TYPES, SEE GENERAL NOTE:5 & 6

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

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 ½" BELOW TOP OF CURB. FILL HOLES WITH APPROVED GROUT MIXTURE.

* 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



TYPE II CURB

NOTE: OPTIONS FOR TYPE II CURB:
1. PRECAST
2. CAST-IN-PLACE

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- ¾" 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 ½" 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 ⅝" 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 ⅝" 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.

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: gf31trtl320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		35

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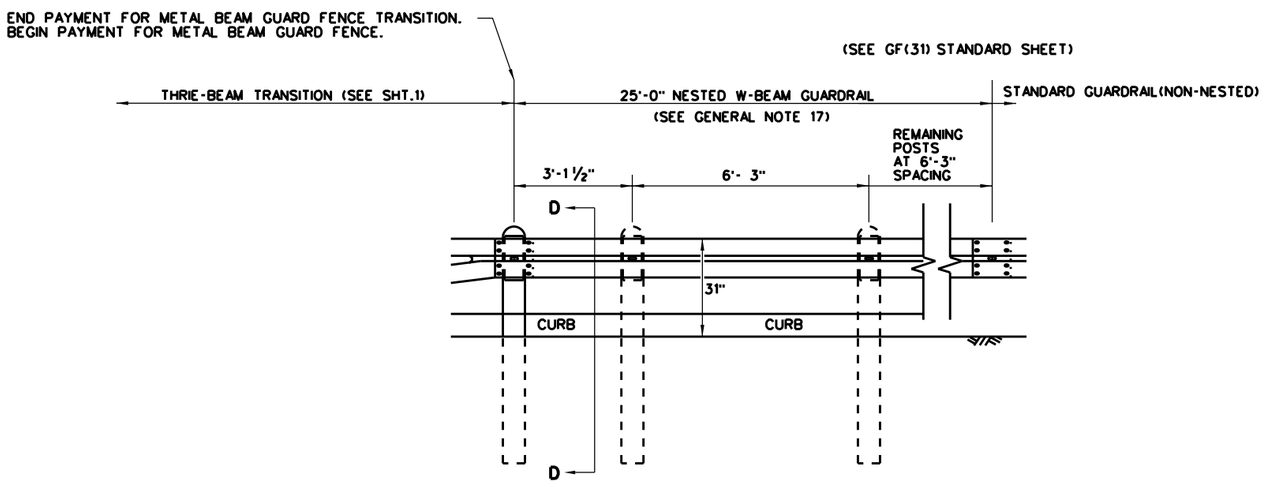
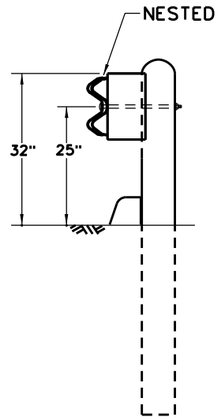
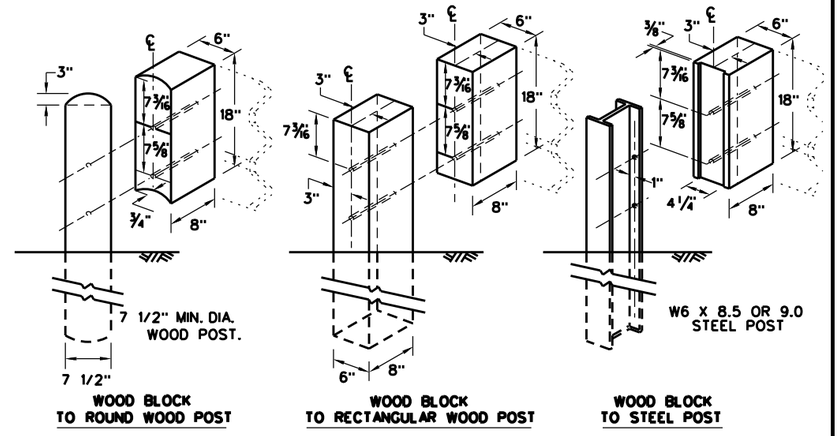
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT

GF(31)TR TL3-20

FILE: gf31trtl320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG		
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB		HIGHWAY	
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	DAL	DALLAS			36	

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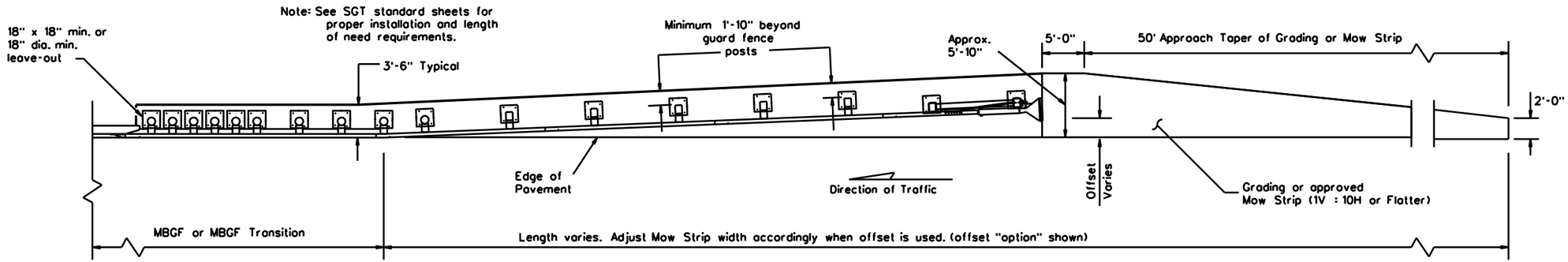
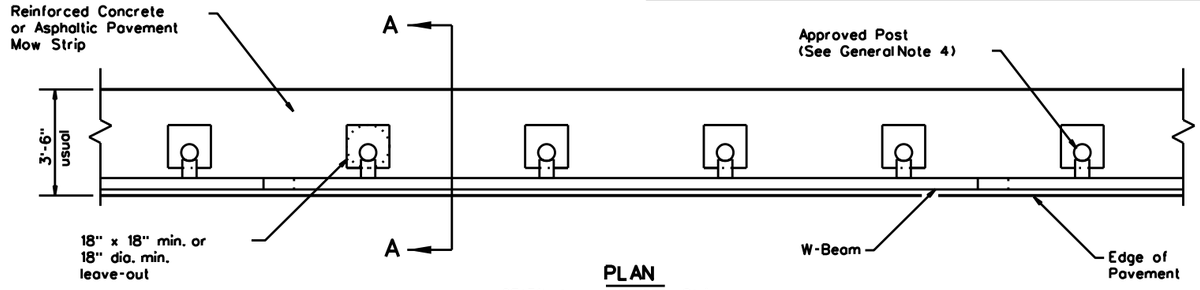
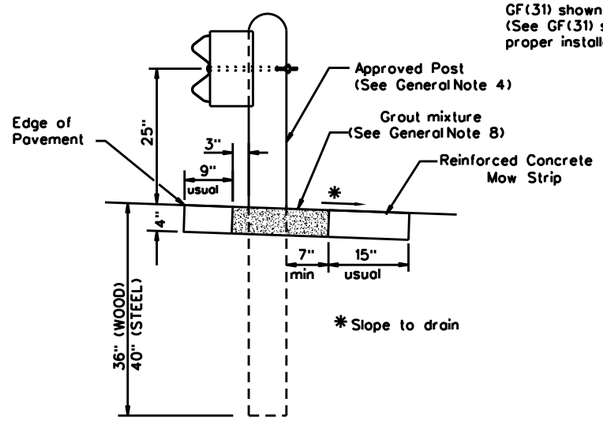


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



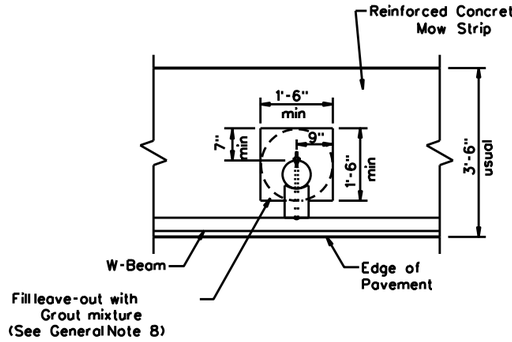
PLAN

GF(31) shown with Mow Strip
(See GF(31) standard sheet for proper installation)



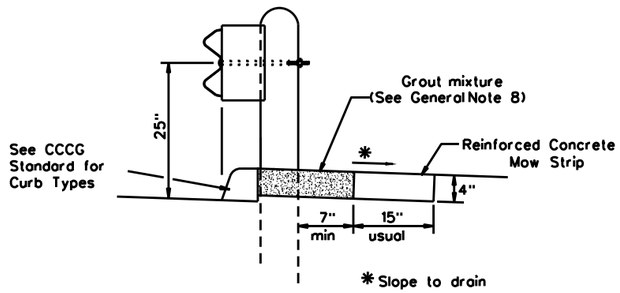
SECTION A-A

Typical



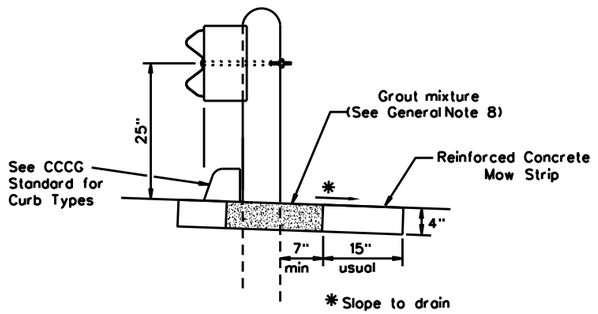
MOW STRIP DETAIL

Reinforced Concrete Mow Strip with 18" x 18" Square or 18" Dia. minimum leave-out.



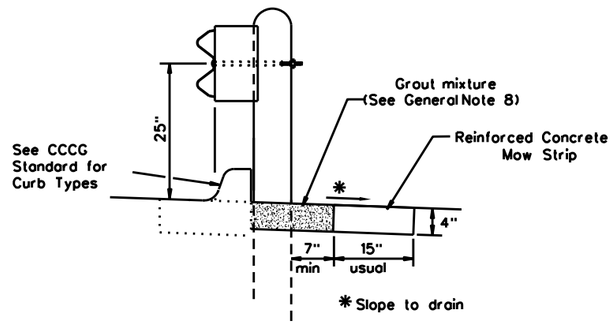
CURB OPTION (1)

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 I 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
REVISIONS	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		37

DATE:
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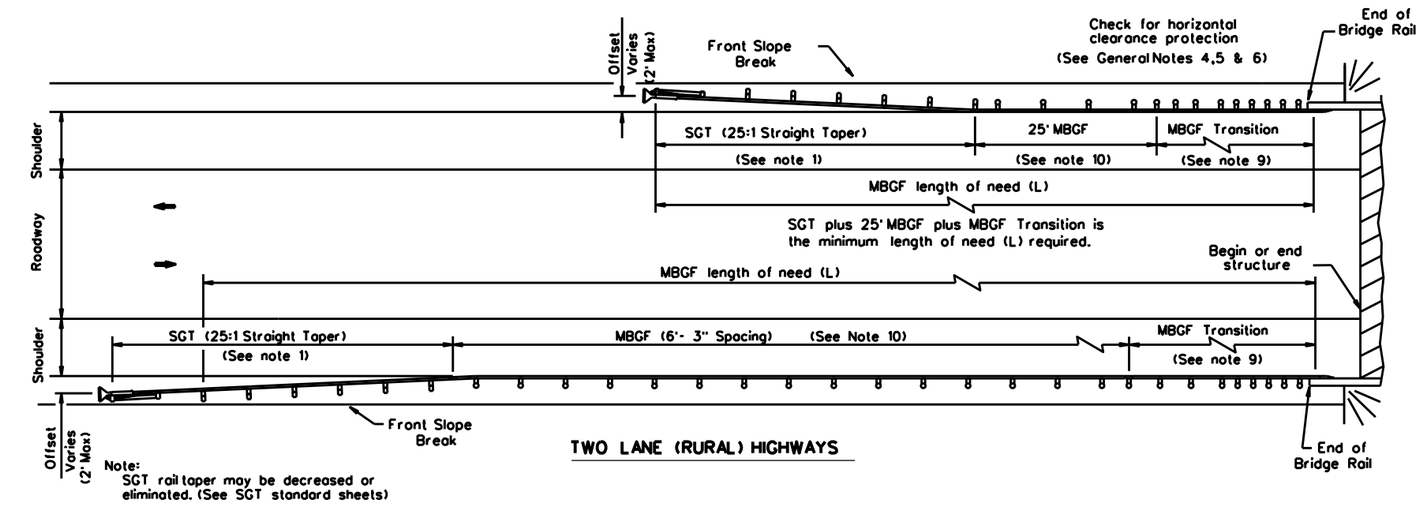
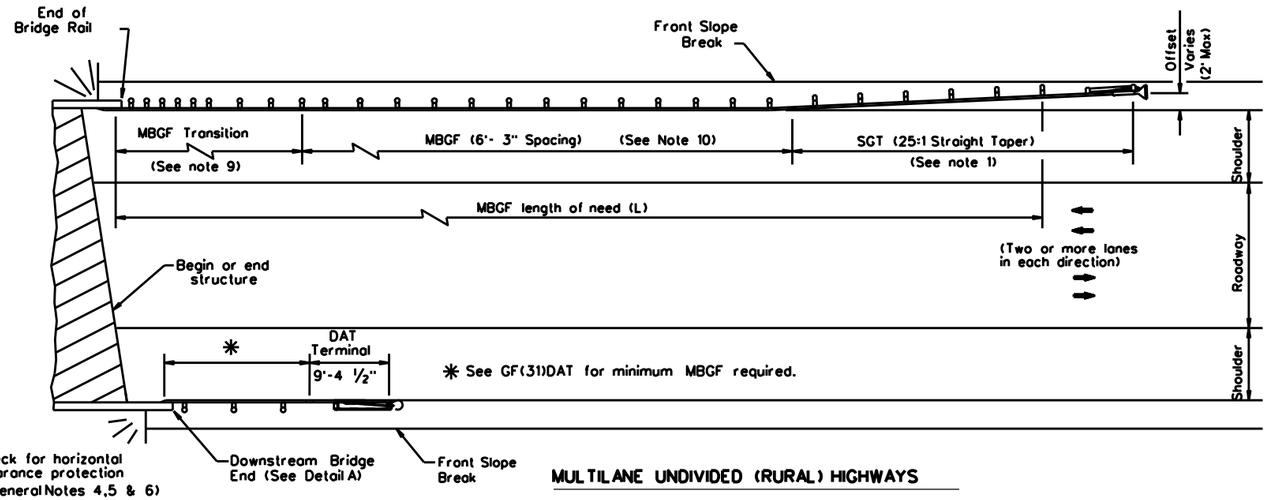
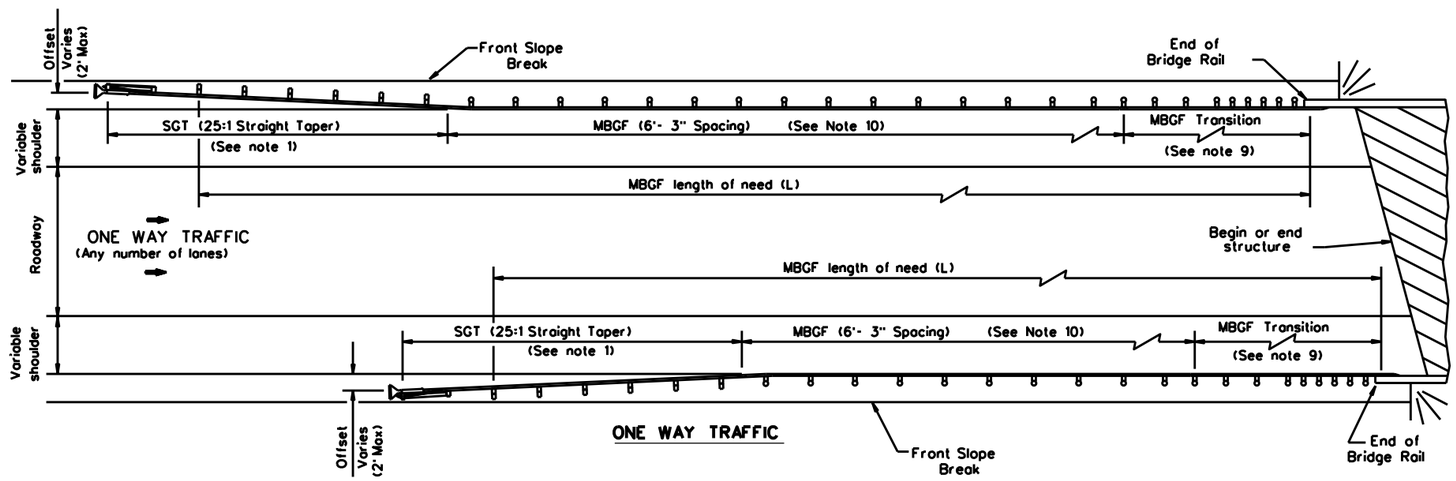


TWO LANE (RURAL) HIGHWAYS

Note:
SGT rail taper may be decreased or eliminated. (See SGT standard sheets)



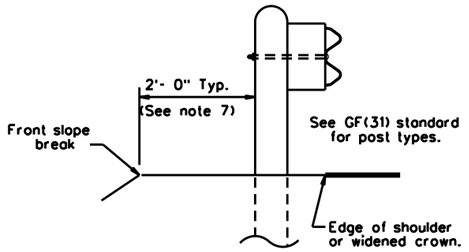
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



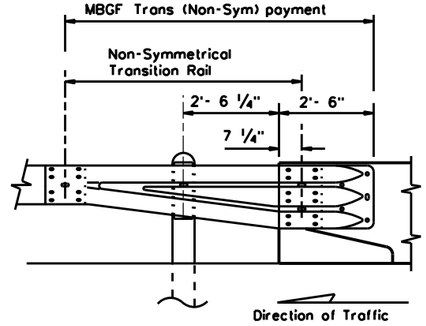
ONE WAY TRAFFIC

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	6464	74	001	IH0030
REVISED APRIL 2014 SEE (MEMO 0414)	DIST	COUNTY		SHEET NO.
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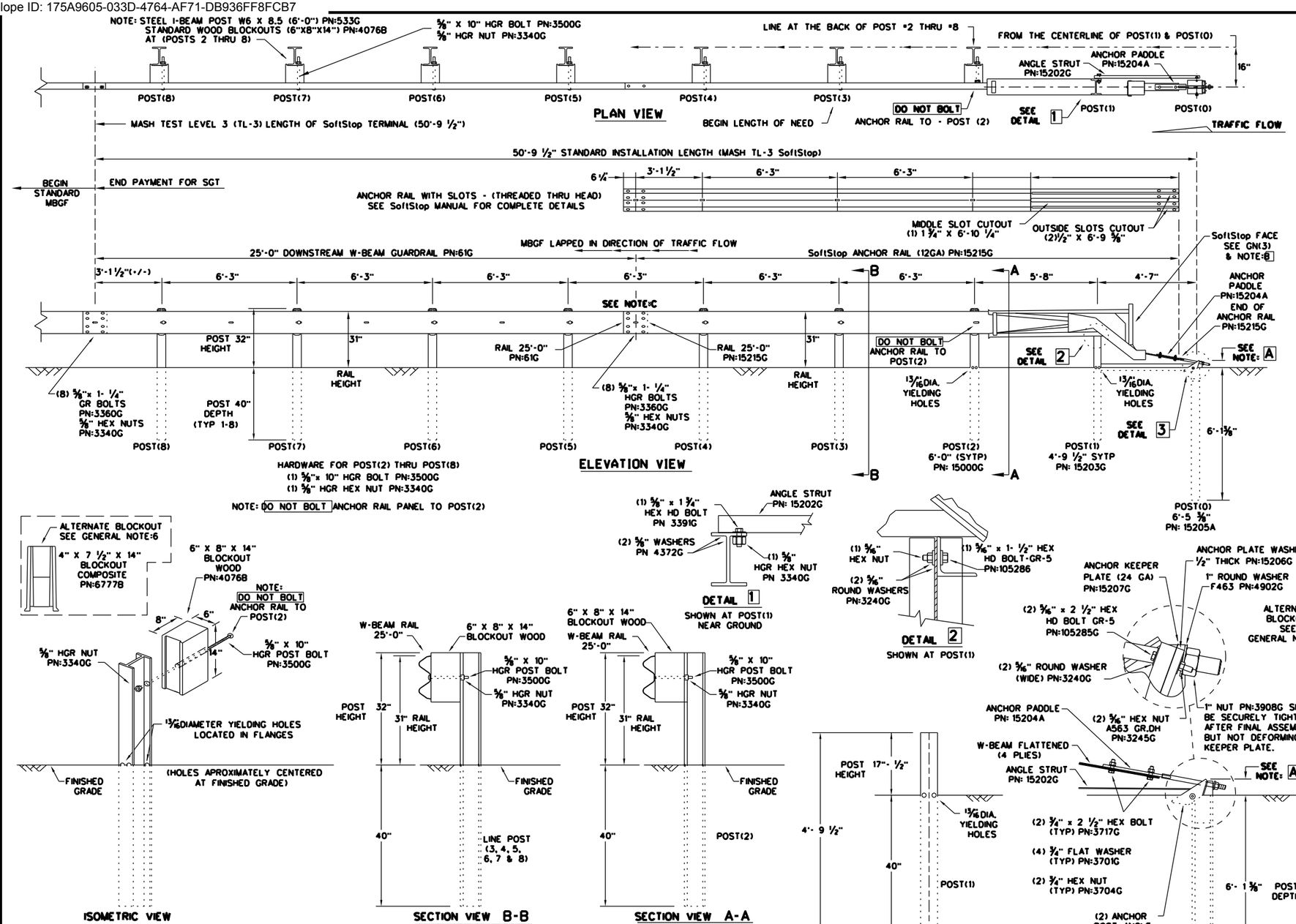

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: TRINITY HIGHWAY AT 1(888)323-6374. 2525 N. STEMMONS FREEWAY, DALLAS, TX 75207
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE: SoftStop END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL. PN:6202378
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. A COMPOSITE MATERIAL BLOCKOUT 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.
7. IF SOLID ROCK IS ENCOUNTERED SEE THE MANUFACTURER'S INSTALLATION MANUAL AND REFER TO THE LATEST ROADWAY MBGF STANDARD FOR INSTALLATION GUIDANCE.
8. POSTS SHALL NOT BE SET IN CONCRETE.
9. IT IS ACCEPTABLE TO INSTALL THE SoftStop IMPACT HEAD PARALLEL TO THE GRADE LINE OR WITH AN UPWARD TILT.
10. DO NOT ATTACH THE SoftStop SYSTEM DIRECTLY TO A RIGID BARRIER.
11. UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE SoftStop 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.

NOTE:A	THE INSTALLATION HEIGHT OF FULLY ASSEMBLED ANCHOR POST WILL VARY FROM 3-¾" MIN. TO 4" MAX. ABOVE FINISHED GRADE.
NOTE:B	PART PN:58528 RIGHT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING) PART PN:58518 LEFT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING)
NOTE:C	W-BEAM SPLICE LOCATED BETWEEN LINE POST(4)AND LINE POST(5) GUARDRAIL PANEL 25'-0" PN:61G ANCHOR RAIL 25'-0" PN:15215G LAP GUARDRAIL IN DIRECTION OF TRAFFIC FLOW.

PART	QTY	MAIN SYSTEM COMPONENTS
6202378	1	PRODUCT DESCRIPTION ASSEMBLY MANUAL (LATEST REV.)
15208A	1	SoftStop HEAD (SEE MANUAL FOR RIGHT-LEFT APPROACH)
15215G	1	SoftStop ANCHOR RAIL (12GA) WITH CUTOUT SLOTS
61G	1	SoftStop DOWNSTREAM W-BEAM RAIL (12GA) (25'- 0")
15205A	1	POST #0 - ANCHOR POST (6'- 5 ⅜")
15203G	1	POST #1 - (SYTP) (4'- 9 ½")
15000G	1	POST #2 - (SYTP) (6'- 0")
533G	6	POST #3 THRU #8 - I-BEAM (W6 x 8.5) (6'- 0")
4076B	7	BLOCKOUT - WOOD (ROUTED) (6" x 8" x 14")
6777B	7	BLOCKOUT - COMPOSITE (4" x 7 ½" x 14")
15204A	1	ANCHOR PADDLE
15207G	1	ANCHOR KEEPER PLATE (24 GA)
15206G	1	ANCHOR PLATE WASHER (½" THICK)
15201G	2	ANCHOR POST ANGLE (10" LONG)
15202G	1	ANGLE STRUT
		HARDWARE
4902G	1	1" ROUND WASHER F436
3908G	1	1" HEAVY HEX NUT A563 GR.DH
3717G	2	¾" x 2 ½" HEX BOLT A325
3701G	4	¾" ROUND WASHER F436
3704G	2	¾" HEAVY HEX NUT A563 GR.DH
3360G	16	⅝" x 1 ¼" W-BEAM RAIL SPLICE BOLTS HGR
3340G	25	⅝" W-BEAM RAIL SPLICE NUTS HGR
3500G	7	⅝" x 10" HGR POST BOLT A307
3391G	1	⅝" x 1 ¾" HEX HD BOLT A325
4489G	1	⅝" x 9" HEX HD BOLT A325
4372G	4	⅝" WASHER F436
105285G	2	⅝" x 2 ½" HEX HD BOLT GR-5
105286G	1	⅝" x 1 ½" HEX HD BOLT GR-5
3240G	6	⅝" ROUND WASHER (WIDE)
3245G	3	⅝" HEX NUT A563 GR.DH
5852B	1	HIGH INTENSITY REFLECTIVE SHEETING - SEE NOTE:B

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE SoftStop END TERMINAL, IT IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

Texas Department of Transportation

Design Division Standard

TRINITY HIGHWAY
SOFTSTOP END TERMINAL
MASH - TL-3
SGT(10S)31-16

FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
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	DAL	DALLAS		39

DATE:
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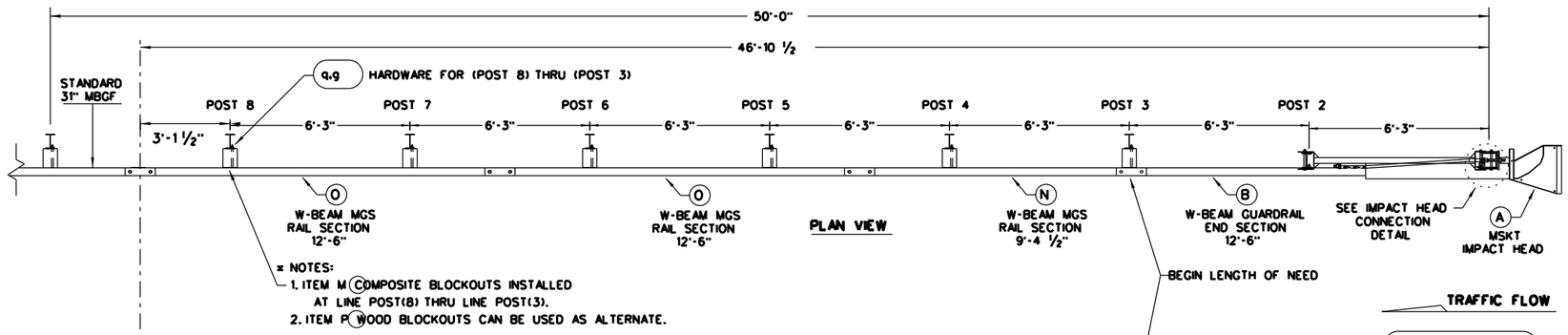


NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.

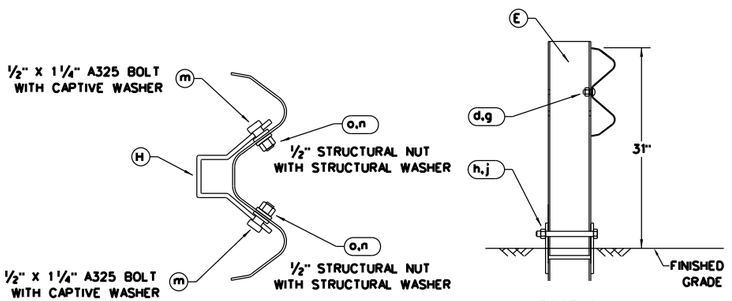
GENERAL NOTES

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 ⅛" 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 ½")	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	⅝" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	⅝" WASHER	W0516
c	2	⅝" HEX NUT	N0516
d	25	⅞" Dia. x 1¼" SPLICE BOLT (POST 2)	B580122
e	2	⅞" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	⅞" WASHER	W050
g	33	⅞" Dia. H.G.R NUT	N050
h	1	¾" Dia. x 8 ½" HEX BOLT (GRD A449)	B340854A
j	1	¾" Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	½" x 1¼" A325 BOLT WITH CAPTIVE WASHER	SB12A
n	8	½" STRUCTURAL NUTS	N012A
o	8	1 ⅛" O.D. x ⅝" I.D. STRUCTURAL WASHERS	W012A
p	1	BEARING PLATE RETAINER TIE	CT-100ST
q	6	⅝" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151

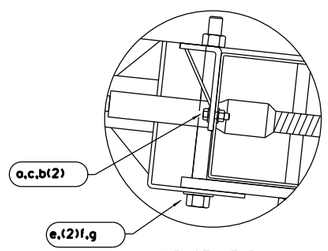
SEE NOTES: *

ALTERNATIVE ITEMS NOT SHOWN. * *
* ITEM(P) 8" WOOD-BLOCKOUT
* * ITEM(Q) 25'GUARD FENCE PANEL

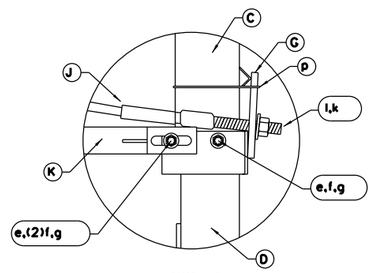


SECTION B-B
ANCHOR BRACKET

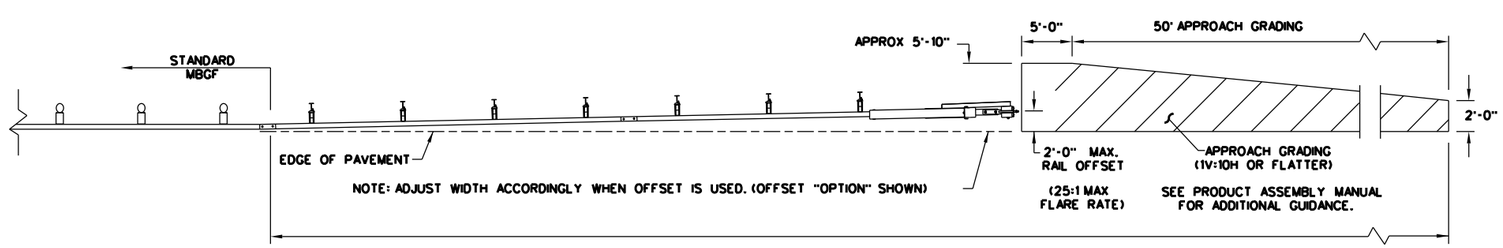
POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL



NOTE: ADJUST WIDTH ACCORDINGLY WHEN OFFSET IS USED. (OFFSET "OPTION" SHOWN)

APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

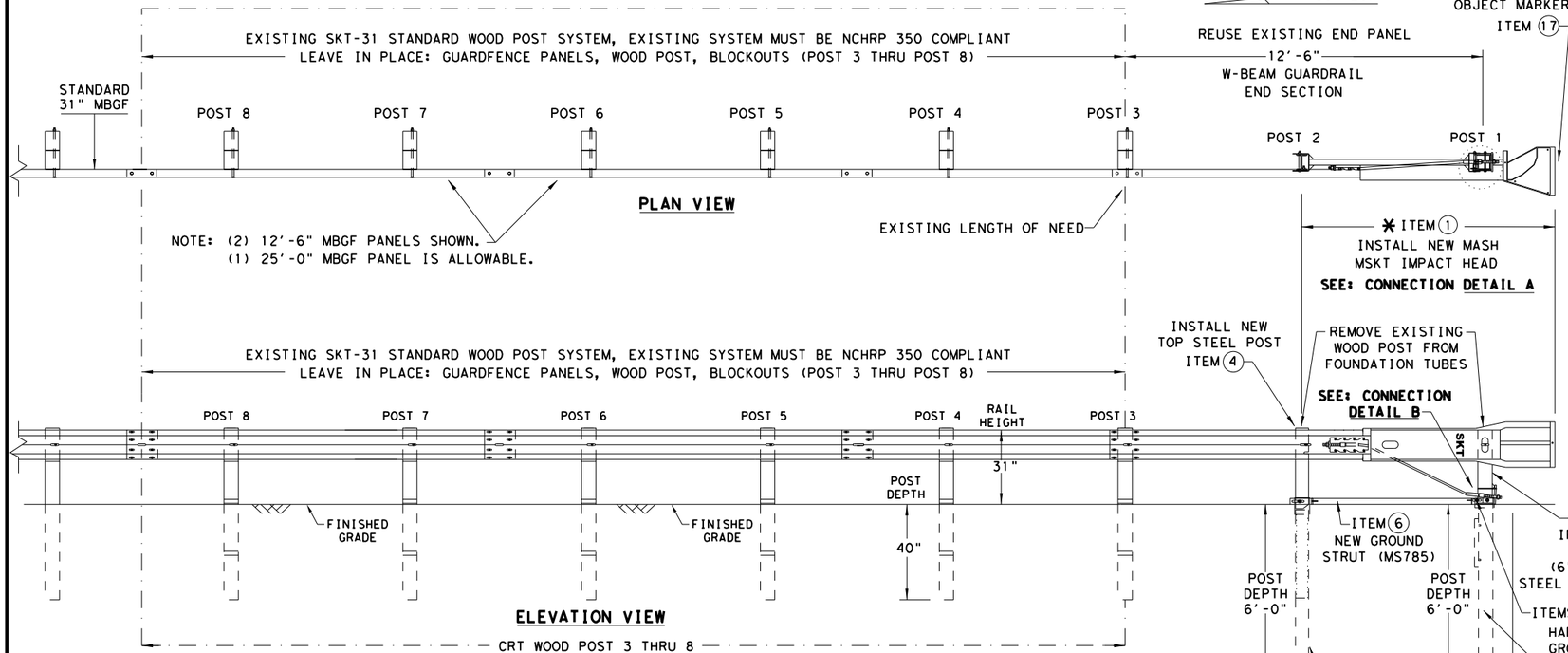
SINGLE GUARDRAIL TERMINAL

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	
REVISIONS	6464	74	001	IH0030	
	DIST	COUNTY		SHEET NO.	
	DAL	DALLAS		40	

DATE:
FILE:



** NOTE: EXTRA SOIL COMPACTION WILL BE NEEDED AROUND NEW (POSTS 1 & 2) DUE TO THE REMOVAL OF THE STEEL FOUNDATION TUBES.

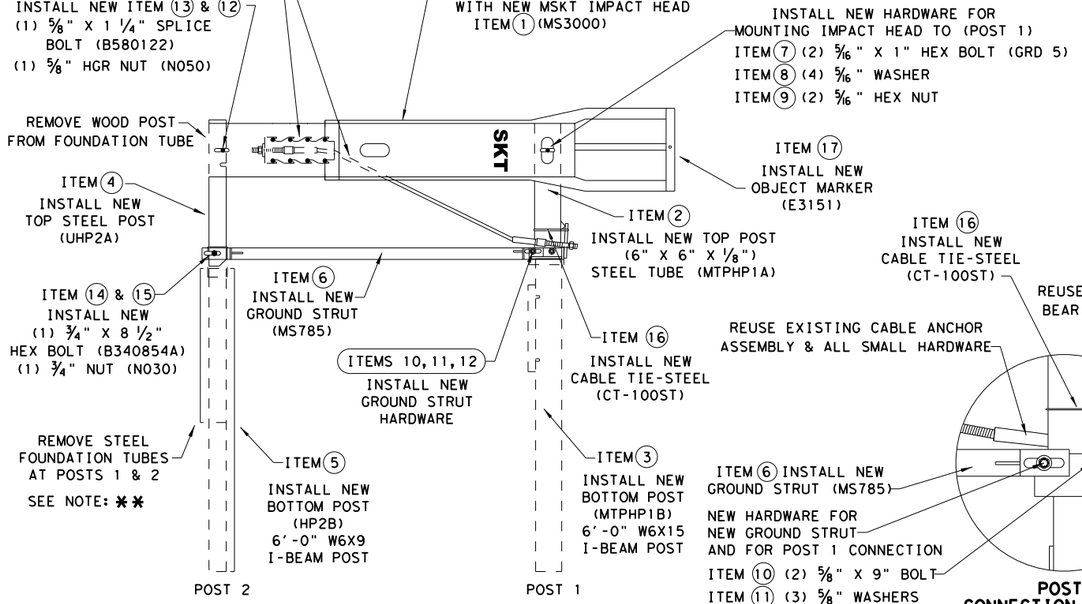
GENERAL NOTES

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; 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. IF SOLID ROCK IS ENCOUNTERED IN THE AREA OF (POST 1) AND / OR (POST 2) CONTACT THE MANUFACTURER, AND REFER TO THE LATEST ROADWAY MBGF STANDARD FOR INSTALLATION GUIDANCE.
7. POSTS SHALL NOT BE SET IN CONCRETE.
8. THE EXISTING SKT 31" STANDARD WOOD POST SYSTEM MUST BE THOROUGHLY INSPECTED, AND DETERMINED TO BE INTACT, AND FREE OF ANY DAMAGE OR DEFECTS BEFORE RETROFITTING. THIS INSPECTION INCLUDES COMPLETING THE MSKT RETROFIT INSPECTION CHECKLIST FOR THE EXISTING SKT 31" WOOD POST NCHRP 350 SYSTEM. ALL EXISTING, AND REUSABLE PARTS MUST BE FREE OF ANY DAMAGE FOR A MASH COMPLIANT RETROFIT.
9. UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE MSKT SYSTEM BE CURVED.
10. 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.
11. SPECIAL DRIVING CAP TO BE USED WHEN DRIVING (LOWER POSTS 1 & 2) TO PREVENT DAMAGE TO THE WELDED PLATES.

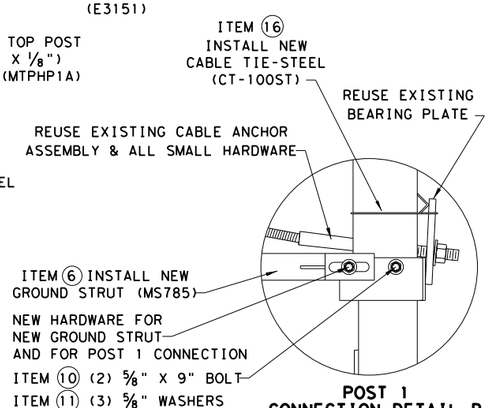
ITEMS	QTY	MAIN SYSTEM COMPONENTS	PART NUMBERS
1	1	MSKT IMPACT HEAD	MS3000
2	1	POST 1 - TOP (6" X 6" X 1/8" TUBE)	MTPHP1A
3	1	POST 1 - BOTTOM (6' W6X15)	MTPHP1B
4	1	POST 2 - ASSEMBLY TOP	UHP2A
5	1	POST 2 - ASSEMBLY BOTTOM (6' W6X9)	HP2B
6	1	GROUND STRUT	MS785
7	2	5/16" X 1" HEX BOLT (GRD 5)	B516014A
8	4	5/16" WASHERS	W0516
9	2	5/16" HEX NUT	N0516
10	2	5/8" X 9" HEX BOLT (GRD A449)	B580904A
11	3	5/8" WASHERS	W050
12	3	5/8" H.G.R NUT	N050
13	1	5/8" X 1 1/4" SPLICE BOLT	B580122
14	1	3/4" X 8 1/2" HEX BOLT (GRD 5)	B340854A
15	1	3/4" HEX NUT	N030
16	1	CABLE TIE-STEEL	CT-100ST
* 17	1	OBJECT MARKER 18" X 18"	E3151

COMPONENTS REQUIRED TO RETROFIT: EXISTING 31" WOOD POST (NCHRP 350 SKT) GUARDRAIL TERMINAL WITH THE NEW 31" (MASH COMPLIANT MSKT IMPACT HEAD).

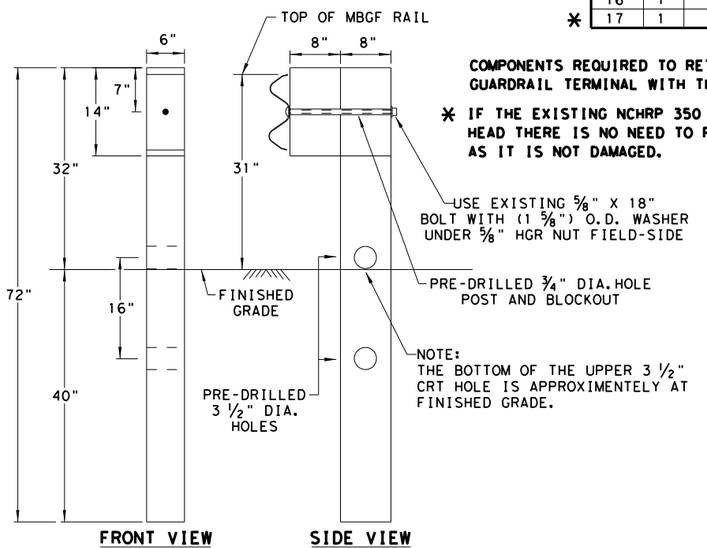
*** IF THE EXISTING NCHRP 350 (31" WOOD POST SKT) ALREADY HAS THE MSKT IMPACT HEAD THERE IS NO NEED TO REPLACE THE IMPACT HEAD OR OBJECT MARKER AS LONG AS IT IS NOT DAMAGED.**



CONNECTION DETAIL A
IMPACT HEAD (POST 1 & POST 2)



POST 1
CONNECTION DETAIL B



FRONT VIEW **SIDE VIEW**
EXISTING WOOD POSTS 3-8
CONTROLLED RELEASE TERMINAL (CRT)

NOTE: THIS STANDARD IS A BASIC REPRESENTATION OF THE EXISTING; SKT END TERMINAL RETROFITED TO THE MSKT MASH COMPLIANT TERMINAL, IT IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

Texas Department of Transportation

Design Division Standard

RETROFIT STANDARD SKT 31" WOOD POST SYSTEM TO MASH MSKT

SGT(14W)31-18

FILE: sgt14w3118.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CL
©TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		41

DATE:
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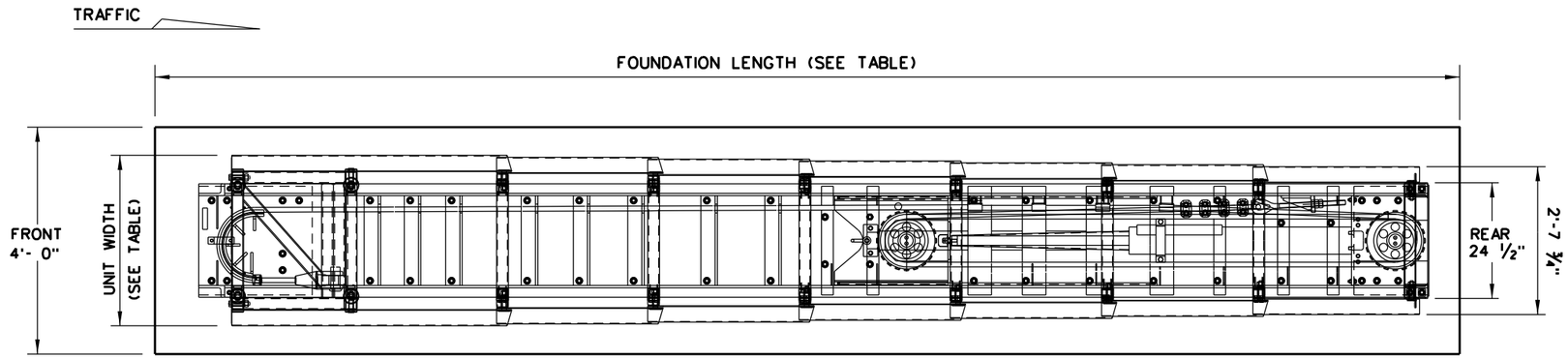
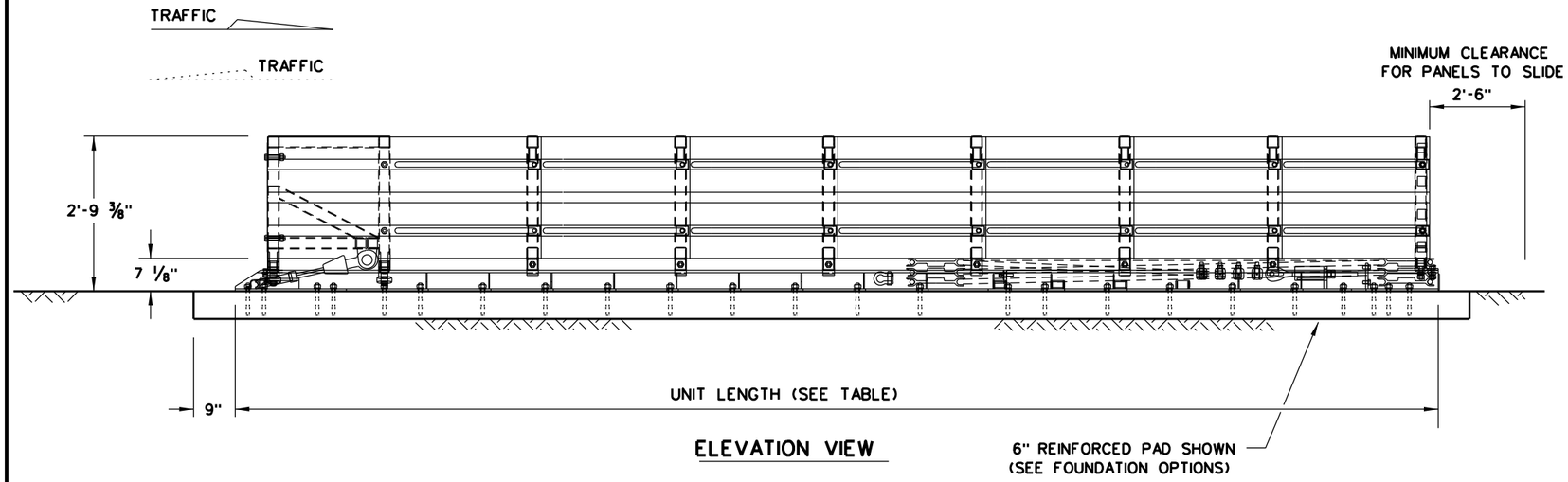


PLAN VIEW



ELEVATION VIEW

MODEL	TEST LEVEL	UNIT LENGTH (approx.)	UNIT WIDTH	FOUNDATION LENGTH	OBSTACLE WIDTH
SCI70GM	TL-2	13'-6"	2'-10 ⅝"	15'- 6 ¼"	24"to 36"
SCI100GM	TL-3	21'-6"	3'-1 ½"	23'- 0"	24"to 36"

SYSTEM AND PAD LENGTHS VARY DEPENDING ON BACKUP TYPE.

FOUNDATION OPTIONS
6" REINFORCED CONCRETE (5 ½" ANCHOR EMBEDMENT)
8" UNREINFORCED CONCRETE (5 ½" ANCHOR EMBEDMENT)
3" MIN. ASPHALT OVER 3" MIN. CONCRETE (16 ½" ANCHOR EMBED.)
6" ASPHALT OVER 6" COMPACT SUBBASE (16 ½" ANCHOR EMBED.)
8" MINIMUM ASPHALT (16 ½" ANCHOR EMBEDMENT)

FOR STEEL PLACEMENT IN CONCRETE FOUNDATIONS, SEE MANUFACTURER'S PRODUCT MANUAL.

TRANSITION OPTIONS
CONCRETE VERTICAL WALL
CONCRETE TRAFFIC BARRIERS
GUARDRAIL (W-BEAM)
GUARDRAIL (THRIE-BEAM)

TRANSITION TYPES ARE SHOWN ELSEWHERE ON THE PLANS (I.E. ATTENUATOR LOCATION DETAILS OR IN THE GENERAL NOTES).

FOR BI-DIRECTIONAL TRANSITION PANEL AND END SHOE DETAILS, SEE MANUFACTURER'S PRODUCT MANUAL.

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: WORK AREA PROTECTION, CORP. AT (800) 327-4417, OR (630) 377-9100.
2. FOR BI-DIRECTIONAL TRAFFIC, APPROPRIATE TRANSITION PANELS WILL BE REQUIRED.
3. ADDITIONAL DETAILS FOR THE TRANSITION OPTION AND FOUNDATION OPTION WILL BE SHOWN ON THE MANUFACTURER'S SHOP DRAWINGS FURNISHED TO THE ENGINEER.
4. CONCRETE SHALL BE CLASS "S" WITH A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI.
5. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%.
6. THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
7. THE SCI100GM & SCI70GM SYSTEMS SHOULD BE APPROXIMATELY PARALLEL WITH THE BARRIER OR CENTERLINE OF MERGING BARRIERS.

NOTE:
FOR ATTACHMENT AND TRANSITIONS TO OTHER SHAPES, BARRIERS, RAILINGS AND BI-DIRECTIONAL TRAFFIC FLOWS ARE AVAILABLE. (SEE MANUFACTURER'S PRODUCT MANUAL)

NOTE:
SIDE PANELS CAN TRAVEL 30" BEYOND THE LAST TERMINAL BRACE AT THE REAR OF THE CUSHION. ALL OBJECTS THAT MAY INTERFERE WITH THIS MOTION CAN AFFECT PERFORMANCE OF AND MAY CAUSE UNDUE DAMAGE TO THE CRASH CUSHION.

Texas Department of Transportation

Design Division Standard

WORK AREA PROTECTION CORP (SMART-NARROW)

SMTC(N)-16

FILE: smtcn16.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP
©TxDOT: February 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
REVISED 06, 2013 (VP) REVISED 03, 2016 (VP)	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		42

LOW MAINTENANCE

DATE:
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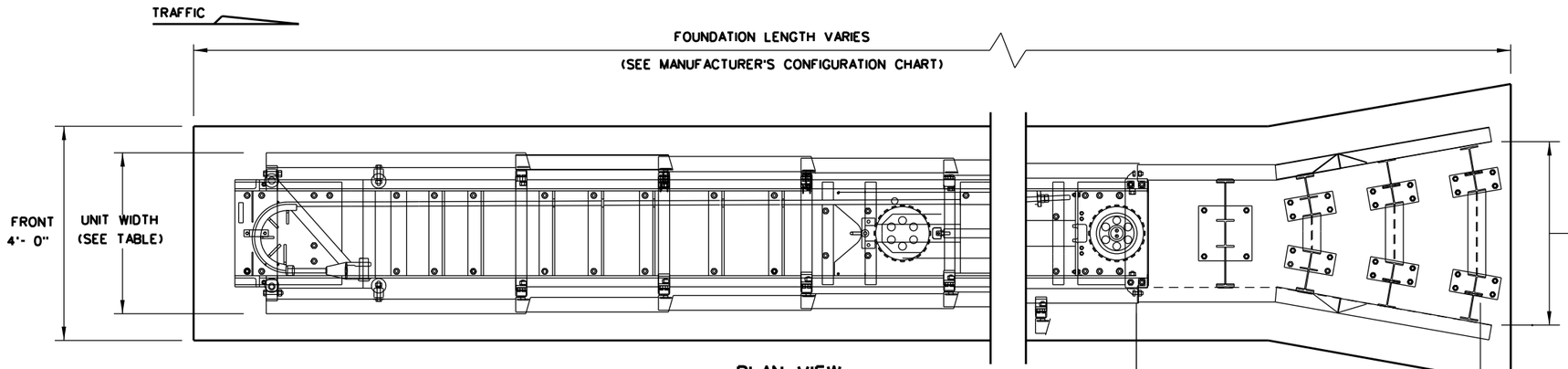
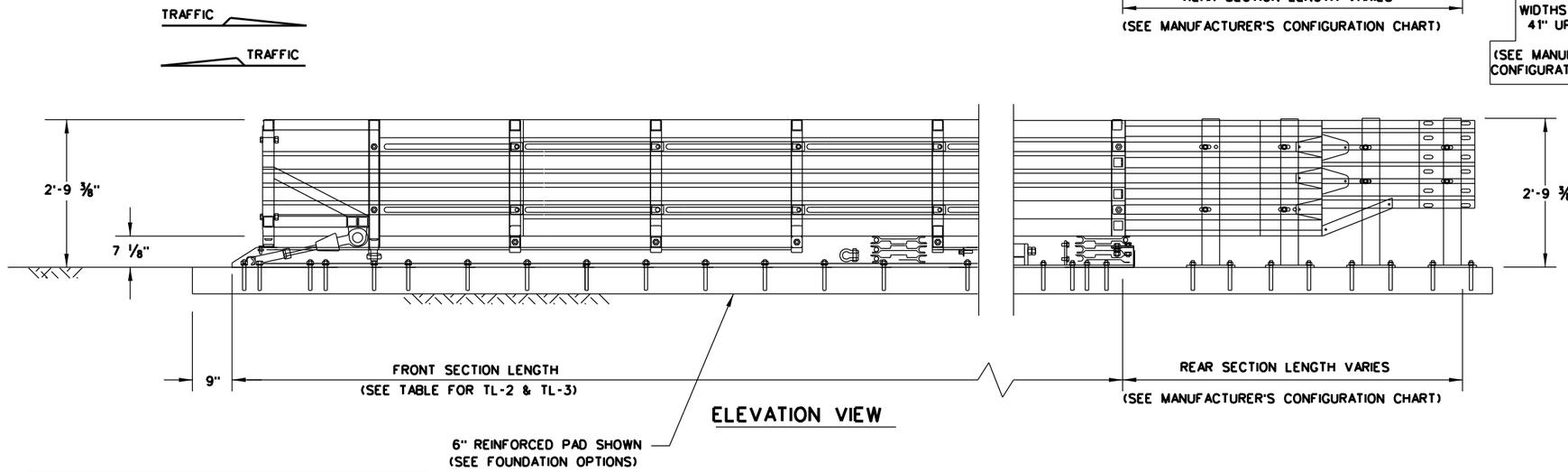


PLAN VIEW



ELEVATION VIEW

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: WORK AREA PROTECTION, CORP. AT (800) 327-4417, OR (630) 377-9100.
2. FOR BI-DIRECTIONAL TRAFFIC, APPROPRIATE TRANSITION PANELS WILL BE REQUIRED.
3. ADDITIONAL DETAILS FOR THE TRANSITION OPTIONS AND FOUNDATION OPTIONS WILL BE SHOWN ON THE MANUFACTURER'S SHOP DRAWINGS FURNISHED TO THE ENGINEER.
4. CONCRETE SHALL BE CLASS "S" WITH A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI.
5. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%.
6. THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
7. THE SCI100GM & SCI70GM SYSTEMS SHOULD BE APPROXIMATELY PARALLEL WITH THE BARRIER OR C |OF MERGING BARRIERS.

NOTE: FOR ATTACHMENT AND TRANSITIONS TO OTHER SHAPES, BARRIERS RAILINGS AND BI-DIRECTIONAL TRAFFIC FLOWS ARE AVAILABLE. (SEE MANUFACTURER'S PRODUCT MANUAL)

NOTE: SIDE PANELS CAN TRAVEL 30" BEYOND THE LAST TERMINAL BRACE AT THE REAR OF THE CUSHION. ALL OBJECTS THAT MAY INTERFERE WITH THIS MOTION CAN AFFECT PERFORMANCE OF AND MAY CAUSE UNDUE DAMAGE TO THE CRASH CUSHION.

WIDE TRANSITION LENGTHS		
GORE WIDTH	TL-2 OVERALL SYSTEM LENGTH	TL-3 OVERALL SYSTEM LENGTH
41"	20'-1"	28'-1"
48"	21'-10"	29'-10"
55"	23'-5"	31'-5"
60"	24'-7"	32'-7"
68"	26'-6"	34'-6"
69"	26'-8"	34'-8"
81"	29'-7"	37'-7"
88"	31'-2"	39'-2"
94"	32'-7"	40'-7"
100"	34'-1"	42'-1"
107"	35'-8"	43'-8"
112"	36'-11"	44'-11"
120"	38'-10"	46'-10"
126"	40'-2"	48'-2"
133"	41'-11"	49'-11"

FOUNDATION OPTIONS
6" Reinforced Concrete (5 1/2" Anchor Embedment)
8" Unreinforced Concrete (5 1/2" Anchor Embedment)
3" Min. Asphalt over 3" Min. Concrete (16 1/2" Anchor Embed.)
6" Asphalt over 6" Compact Subbase (16 1/2" Anchor Embed.)
8" Minimum Asphalt (16 1/2" Anchor Embedment)

FOR STEEL PLACEMENT IN CONCRETE FOUNDATIONS, SEE MANUFACTURER'S PRODUCT MANUAL.

TRANSITION OPTIONS
Concrete Vertical Wall
Concrete Traffic Barriers
Guardrail (W-Beam)
Guardrail (Thrie-Beam)

TRANSITION TYPES ARE SHOWN ELSEWHERE ON THE PLANS (I.E. ATTENUATOR LOCATION DETAILS OR IN THE GENERAL NOTES).

FOR BI-DIRECTIONAL TRANSITION PANEL AND END SHOE DETAILS, SEE MANUFACTURER'S PRODUCT MANUAL.

MODEL (WIDE)	TEST LEVEL	FRONT SECTION LENGTH	UNIT WIDTH	FOUNDATION LENGTH	GORE WIDTH
SCI70GM	TL-2	13'-6"	2'-10 5/8"	OVERALL LENGTH PLUS 1'-6"	41" TO 133"
SCI100GM	TL-3	21'-6"	3'-1 1/2"	OVERALL LENGTH PLUS 1'-6"	41" TO 133"

SYSTEM AND PAD LENGTHS VARY DEPENDING ON BACKUP TYPE.

LOW MAINTENANCE

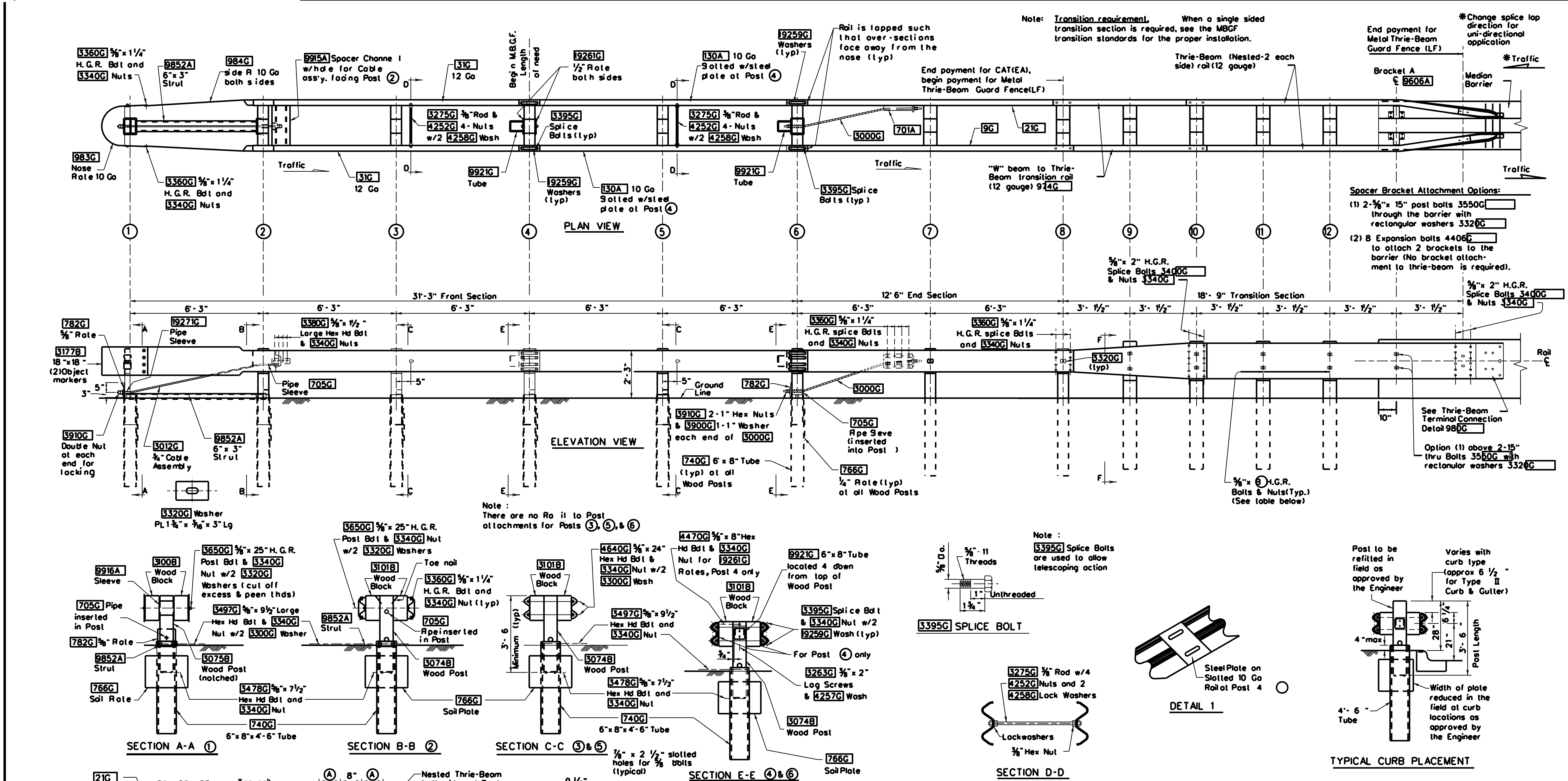
Texas Department of Transportation

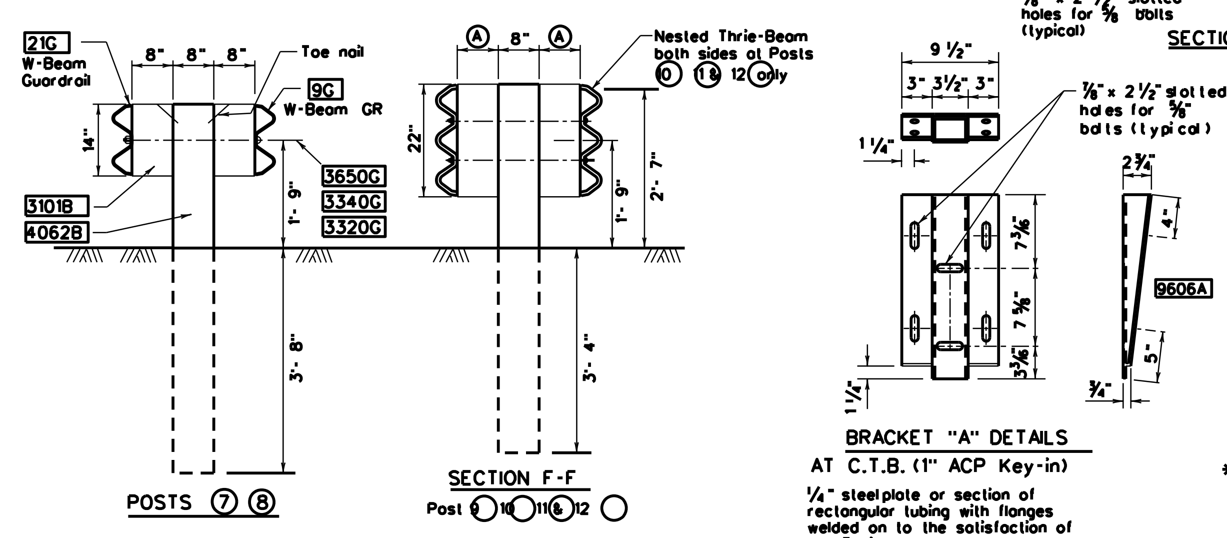
Design Division Standard

WORK AREA PROTECTION CORP (SMART-WIDE)

SMTC(W)-16

FILE: smtcw16.dgn	DN: TxDOT	CK:KM	DW:BD/VP	CK: VP
© TxDOT: FEBRUARY 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
REVISED 06, 2013 VP REVISED 03, 2016 VP REVISED 04, 2018 VP	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		43





Post	(A) Block Width	Product Code	(B) Post Bolt Length	Product Code
9	6 1/2"	3409B	24"	3640G
10	5 1/2"	3408B	22"	3620G
11	4 1/2"	3407B	20"	3600G
12	3 1/2"	3406B	18"	3580G

** Modifications (as approved by the Engineer) in bracket design will be required for other barrier configurations.

SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

TRINITY HIGHWAY ENERGY ABSORPTION CRASH CUSHION (CONCRETE BARRIER)

CATCB(1)-17

FILE: catcb17.dgn	DN: TxDOT	CK: KM	DW: BD	CK: VP
© TxDOT: 1997	CONT	SECT	JOB	HIGHWAY
REVISIONS: REVISED 03,2016 VP; REVISED 03,2017 KM	6464	74	001	IH0030
	DIST		COUNTY	SHEET NO.
	DAL		DALLAS	44

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DATE:
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CATCB FRONT SECTION (POSTS 1 THRU 6)

BILL OF MATERIAL

Mfr Code #	QTY	DESCRIPTION
983G	1	Nose Plate (10 Ga)
984G	2	Side Plate (10 Ga)
31G	2	"W" Beam 12 Ga x 13'-6 1/2 "
130A	2	"W" Beam 10 Ga x 13'-6 1/2 "
9852A	1	Channel Strut x 6'-6 "
740G	6	Steel Foundation Tube
766G	6	Soil Plate 18 x 24 "
3075B	1	Wood Post 5 1/2" x 7 1/2" (Notched) (Post 1)
3074B	5	Wood Post 5 1/2" x 7 1/2"(Post 2-6)
3100B	2	Wood Bock 5 1/2" x 7 1/2"(Post 1)
3101B	10	Wood Bock 5 1/2" x 7 1/2"(Post 2-6)
9916A	1	Sleeve (Post 1)
9915A	1	Spacer Channel (Post 2)
9921G	2	Steel Tube (Posts 4 & 6)
19271G	1	Pipe Sleeve (Post 1)
705G	1	Pipe Sleeve (Post 2)
19261G	2	Post Plate (Post 4)
782G	1	Bearing Plate (Post 1)
3012G	1	Cable Assembly(Posts 1 to 2)
3275G	2	7/8" Restraint Rod(Post 3 & 5)
19259G	32	Plate Washer (Posts 4 & 6)

HARDWARE

3263G	4	7/8" x 2 " Lg Lag Screw
4252G	8	7/8" Hex Nut
4258G	4	7/8" Lock Washer
4257G	4	7/8" Flat Washer
3320G	4	Rectangular Washer
3395G	32	5/8" x 1 3/4 " H.H. Splice Bolt
3650G	2	5/8" x 25 " Lg H.G.R. Bolt
4640G	8	5/8" x 24 " Lg H.H. Bolt
3478G	13	5/8" x 7 1/2" Lg H.H. Bolt
3380G	8	5/8" x 1 1/2 " Lg H.H. Bolt
3360G	16	5/8" x 1 1/4 " Lg H.G.R. Bolt
3340G	85	5/8" H.G.R. Nut
3300G	8	5/8" Flat Washer
3497G	6	5/8" x 9 1/2" Lg H.H. Bolt
3910G	4	1 Hex Nut
3900G	2	1 Flat Washer

CATCB GUARDRAIL TERMINAL END SECTION (POSTS 7 & 8)

BILL OF MATERIAL

Mfr Code #	QTY	DESCRIPTION
4064B	2	Wood Post 5 1/2 "x 7 1/2 "x 6'
3101B	4	Wood Block 5 1/2 "x 7 1/2 "
21G	1	"W" Beam Guard Rail (12 Ga)
9G	1	"W" Beam Guard Rail (12 Ga)
701A	1	Bracket
782G	1	Bearing Plate
705G	1	Pipe Sleve
3000G	1	Cable Assembly
3320G	2	Rectangular Washer

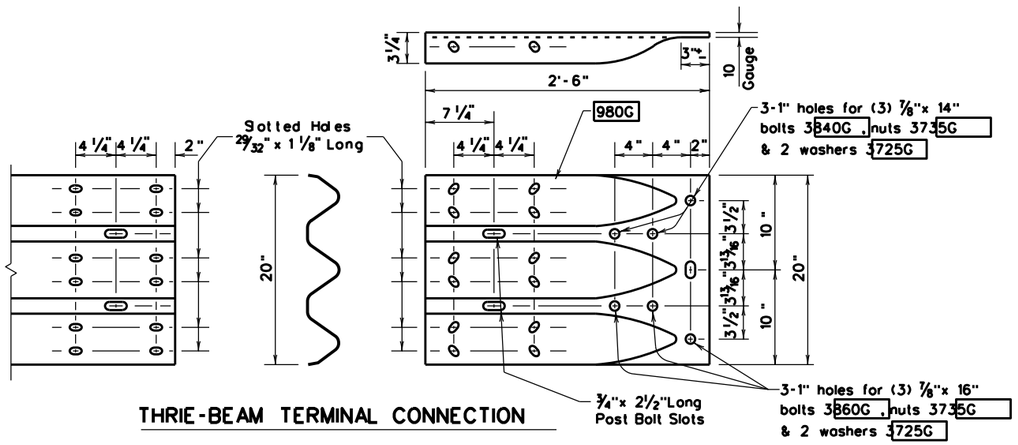
HARDWARE		
3360G	24	5/8" x 1 1/4 "H.G.R. Splice Bolt
3400G	4	5/8" x 25 " H.G.R. Post Bolt
3380G	8	5/8" x 1 1/2 Hex Hd Bolt
3340G	28	5/8" H.G.R. Nut
3300G	8	5/8" Washer
3910G	4	1 Hex Nut
3900G	2	1 Washer

CATCB TRANSITION SECTION (POST 9 THRU END SHOE)

BILL OF MATERIAL

	Mfr Code #	QTY	DESCRIPTION
	211G	4	Thrie beam 12'-6 (12 Ga)
	974G	2	Trans panel 6'-3 (12 "Ga)
	980G	2	Special Thrie beam end shoe
	3078B	3	Wood Post 6 x 8 x 6',(Posts11&12)
	3320G	20	Rectangular Washer
	3340G	62	5/8" H.G.R. Nut
	3400G	52	5/8" x 2 " Splice Bolt
	3406B	2	22 1/2" Block 6 x 3 1/2 (Post 12)
	3407B	2	22 1/2" Block 6 x 4 1/2 (Post 11)
	3408B	2	22 1/2" Block 6 x 5 1/2 (Post 10)
	3409B	2	22 1/2" Block 6 x 6 1/2 (Post 9)
	3412B	1	Wood Post 6 x 8 x 6',(Posts 9)
*	3560G	2	5/8" x 16 " Bolt
*	4406G	8	5/8" x 3 3/4" Expansion Bolts w/Nuts
	3580G	2	5/8" x 18 "Post Bolt (Post 12)
	3600G	2	5/8" x 20 "Post Bolt (Post 11)
	3620G	2	5/8" x 22 "Post Bolt (Post 10)
	3640G	2	5/8" x 24 "Post Bolt (Post 9)
	3725G	12	7/8" Washer (End Shoe Bolts)
	3735G	6	7/8" Hex Nuts (End Shoe Bolts)
	3840G	3	7/8" x 14 " Hex Bolt (End Shoe)
	3860G	3	7/8" x 16 "Hex Bolt (End Shoe)
	9606A	2	Spacer Bracket
			Delineation
	3177B	2	Object Marker 18 x 18 " (Cut to fit)
			Optional Hardware for Single Slope Barrier-42 "
	3640G	2	5/8" x 24 " Bolt
	4896G	6	7/8" x 24 " Hex Bolt (End Shoe)

* Expansion or through bolts may be used with optional bracket installation.



THRIE-BEAM TERMINAL CONNECTION

GENERAL NOTES

1. For specific information regarding installation and technical guidance of the system, contact: Trinity Highway at 1(888)323-6374. 70 W. Madison St. Suite 2350. Chicago, IL 60602
2. Crown will be widened to accommodate the CAT system. The crown should extend at least 3 feet beyond the inside face of rail. The ground line at posts should be an extension of the roadway surface crown.
3. All bolts,nuts,washers,cable assemblies,cable anchors,post tubes,backup plates,and soil plates shall be galvanized.
4. The exposed end segment of an End Section should be evaluated as a potential obstacle in the determination of the need of MBGF for the opposing direction of traffic.
5. For placement at curb sections the height from gutter pan to post bolt will be 21 and the front section shall be flared (See Detail 2).
6. The wood blockouts shall be toe nailed to the rectangular wood posts to prevent them from turning when the wood shrinks.
7. Either 6"- 8" or 5 1/2"x 7 1/2" wood blocks may be used at posts 1 thru 8 as supplied by the manufacturer.
8. If a "single sided" transition section is required for the attachment to a rigid concrete rail, see the MBGF transition standards for the proper installation.
9. Object markers shall be installed on the front of the terminal as detailed on the D&OM(VIA).

SACRIFICIAL

SHEET 2 OF 2

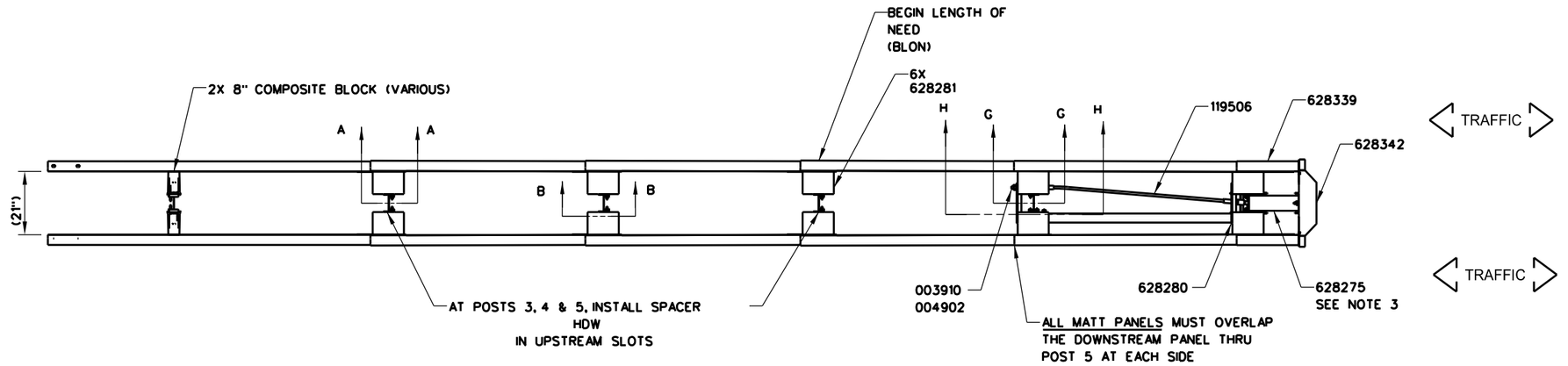
Texas Department of Transportation

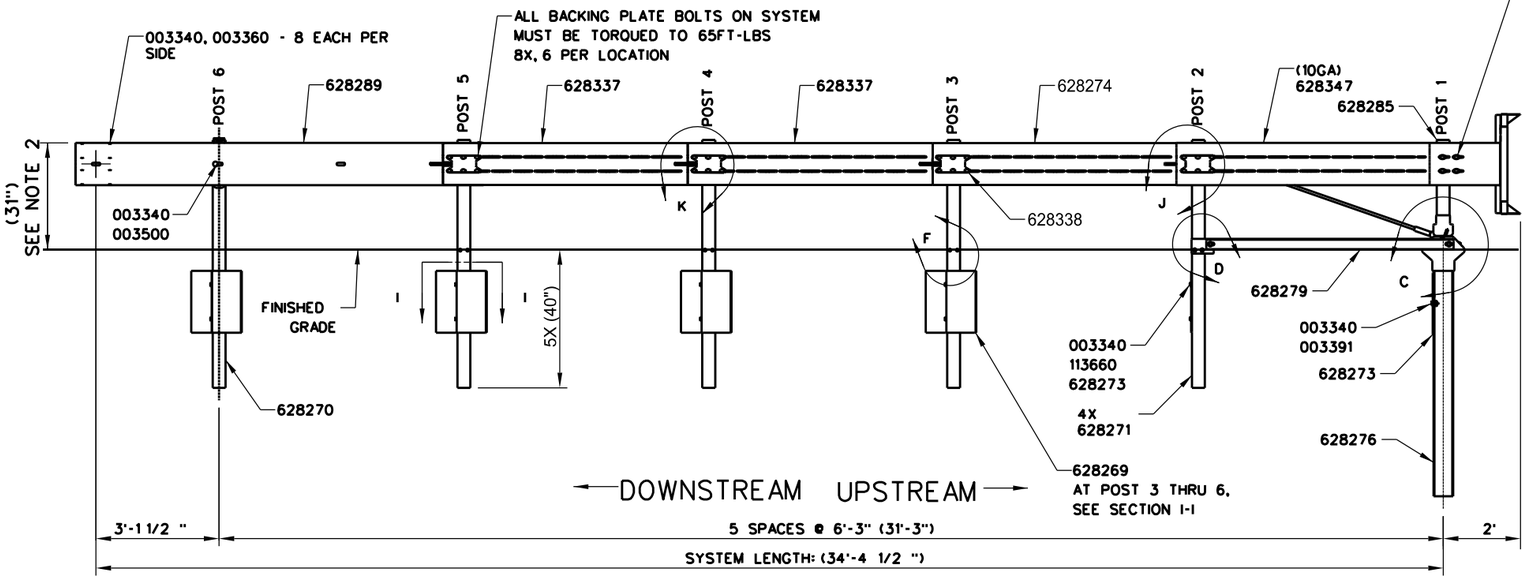
Design Division Standard

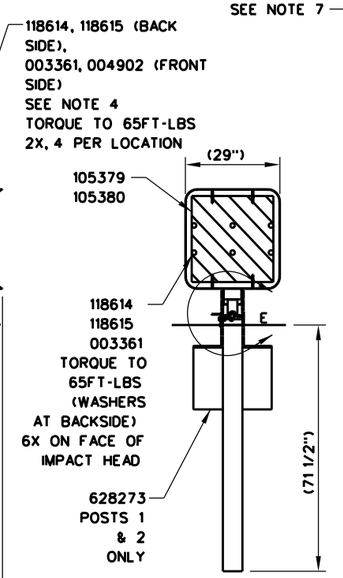
TRINITY HIGHWAY ENERGY ABSORPTION CRASH CUSHION (CONCRETE BARRIER)

CATCB(1)-17

FILE: catcb17.dgn	DN: TxDOT	CK: KM	DW: BD	CK: VP
© TxDOT: 1997	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED 03.2016 VP REVISED 03.2017 KM	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		45







PARTS LIST		
PART NO.	DESCRIPTION	QTY.
628276	MATT CR POST #1 BOTTOM	1
628271	6'0POST/W6X8.5/7/S PL/SYT	4
628285	MATT CR POST #1 TOP	1
628280	MATT DOUBLE SPACER	2
628281	MATT SINGLE SPACER	6
628279	MATT ANGLE GROUND STRUT	1
003340	5/8" GR HEX NUT	36
033909	CRP-CBL BRKT FOR CRP PST	1
119506	CBL 3/4X7'5"/DBL SWG	1
003910	1" HEX NUT A563	2
628289	MATT 12G TRANS,W FIN-4	2
628337	MATT 12G INT,W FIN-3	4
628274	MATT 12G,W/O FIN-2	2
628342	MATT IMPACT HEAD	1
628275	MATT HEAD TUBE	1
628339	MATT 10G HEAD RAIL	2
628338	MATT BACKING PLATE	8
SEE NOTE 7 → 118614	BOLT,RAIL,5/8X2,A325/G5,G	62
118615	WASHER,FLAT,5/8,THICK,G	62
003361	5/8" HVY HEX NUT A563 DH	66
003360	5/8"X1.25" GR BOLT	16
003391	5/8"X1.75" HEX BOLT A325	6
004211	5/16"X1.75 HXBTA307 1-1/8	2
003240	WASHER,FLAT,5/16 W,TY A,G	2
003245	5/16" HEX NUT A563	2
628348	MATT STRUT ADAPTER PLATE	1
628347	MATT 10G FRONT,W/O FIN-1	2
004902	1" ROUND WASHER F436	10
004372	WASHER,FLAT,5/8,HRD,TY1,G	8
003403	5/8"X2" HEX BOLT A307	6
628270	6'0 POST/W6X8.5/7/S PL	1
003500	5/8"X10" GR BOLT A307	2
113660	BOLT,HX,5/8X3 1/2,G5,G	10
628273	1/4"X18"X24" SOIL PL/4 H	2
628269	1/4"X15"X17" SOIL PL/MULT	4
118009	WASHER,FLAT,1/2X1 3/8,G	8
115939	NUT,HX,1/2,A563,G	4
113457	BOLT,HX,1/2X1 1/2,G2,G	4
VARIOUS	8" NOM DEPTH COMPOSITE BLOCKS	2
SEE TABLE	DELINEATION	REF

TABLE	
PART NO.	DESCRIPTION
105379	REF 25X25 BLK/YEL MEDIAN
105380	REFL 25X25 BLK/YEL GORE

NOTES:
1. PROPER SITE GRADING MUST BE ACCOMPLISHED BEFORE ASSEMBLY AND IN ACCORDANCE WITH STATE/SPECIFYING AGENCY GUIDELINES AND/OR THE AASHTO ROADSIDE DESIGN GUIDE.
2. GUARDRAIL INSTALLATION HEIGHT TO BE 31" ABOVE FINISHED GRADE, +1", -0".
3. PRIOR TO TIGHTENING HARDWARE PUSH IMPACT HEAD UNTIL P/N 628275 TOUCHES UPPER PORTION OF POST 1.
4. ENSURE 004902 IS APPROXIMATELY CENTERED WITH P/N 118614 PRIOR TO TIGHTENING
5. THE INTEGRATED FINS IN THE PROVIDED MATT GUARDRAIL PANELS ARE ALWAYS POSITIONED UPSTREAM.
6. UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL PANELS WITHIN THE MATT BE CURVED OR RADIUSED.
7. ALL 62 LOCATIONS OF 118614 MUST BE TORQUED TO 65FT-LBS. (+/- 3 FT-LBS.)
8. ALL FASTENERS NOT REQUIRED TO BE TORQUED SHALL BE TIGHTENED TO A SNUG POSITION WITH A MINIMUM OF 2 BOLT THREADS PROTRUDING BEYOND THE NUT.
9. SEE MATT PRODUCT MANUAL FOR SOIL PLATE, STRUT AND ANCHOR CABLE ORIENTATION/LOCATION AS WELL AS SPECIFIC LAPPING GUIDANCE.

DATE:
FILE:

SACRIFICIAL

Texas Department of Transportation

DESCRIPTION

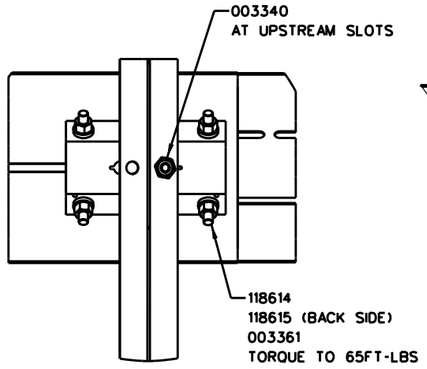
Design Division Standard

MATT (MEDIAN ATTENUATING TREND TERMINAL) (MASH TL-3)

MATT(1)-23

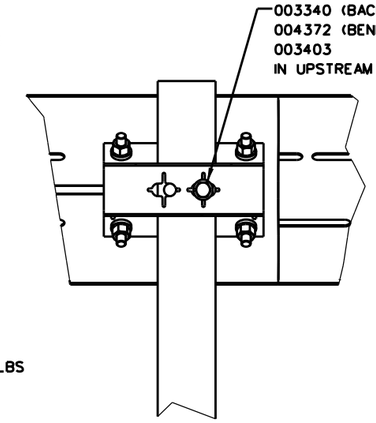
FILE: Matt23.dgn	DN: TxDOT	CK: KM	DW: CES	CK:
© TxDOT: 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		46

DATE:
FILE:



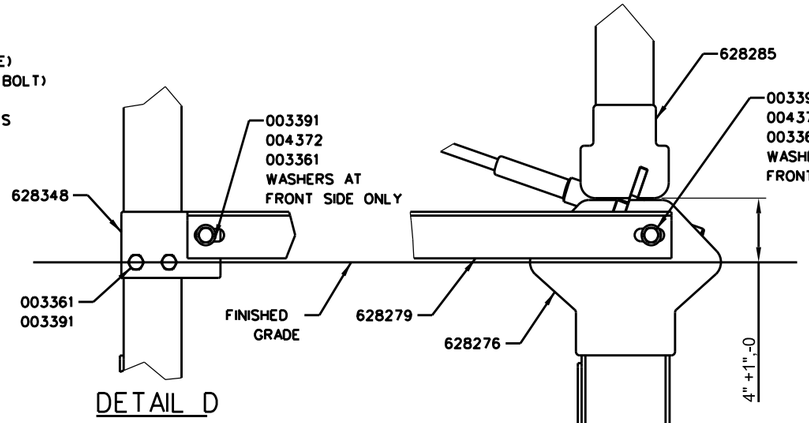
SECTION A-A

TYP AT SINGLE SPACERS ON POSTS 3,4,5
USE UPSTREAM SLOTS ONLY



SECTION B-B

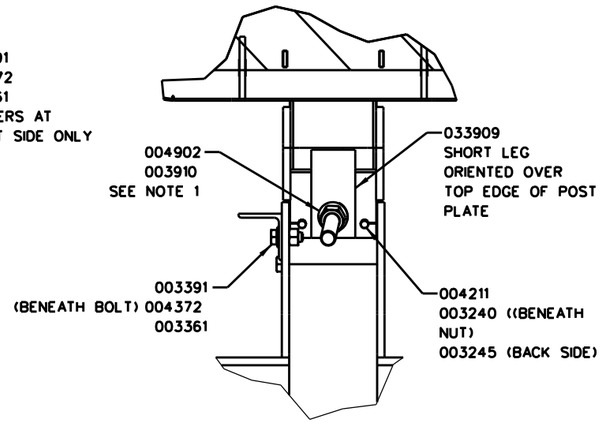
TYP AT SINGLE SPACERS ON POSTS 3,4,5
USE UPSTREAM SLOTS ONLY



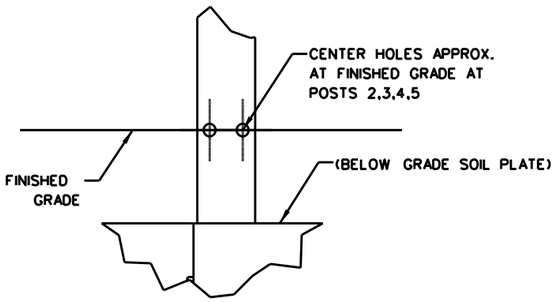
DETAIL D

←DOWNSTREAM UPSTREAM→

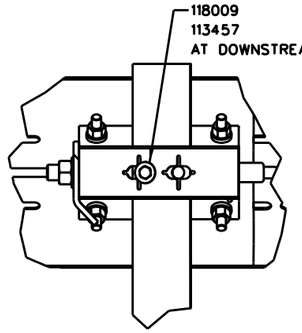
DETAIL C



DETAIL E

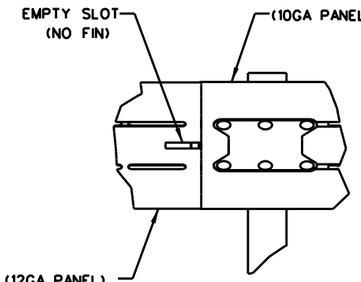


DETAIL F



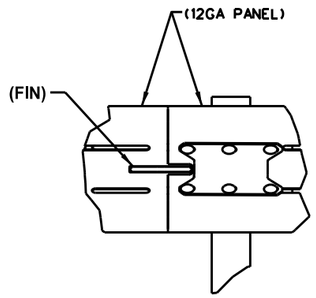
SECTION H-H

TYP AT DOUBLE SPACER ON POSTS 1 & 2



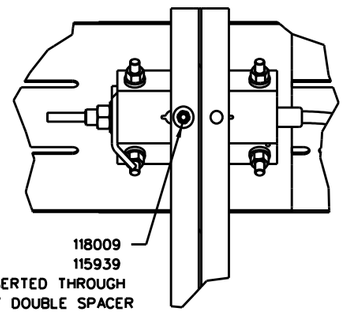
DETAIL J

POST 2 ONLY



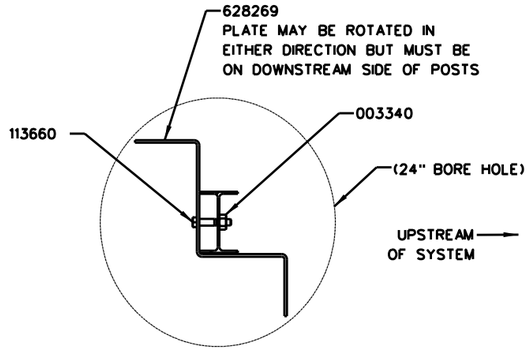
DETAIL K

TYP AT POSTS 3, 4, 5



SECTION G-G

TYP AT DOUBLE SPACER ON POSTS 1 & 2



SECTION I-I

TYP POSTS 3 THRU 6

NOTES:
1. TIGHTEN CABLE UNTIL TAUT. CABLE IS CONSIDERED TAUT WHEN IT DOES NOT DEFLECT MORE THAN 1" WHEN PRESSURE IS APPLIED BY HAND IN AN UP AND DOWN DIRECTION. RESTRAIN THE CABLE WITH PIPE WRENCH OR LOCKING PLIERS WHILE TIGHTENING NUT WITH A WRENCH TO PREVENT CABLE FROM TWISTING.
2. GUARDRAIL INSTALLATION HEIGHT TO BE 31" ABOVE FINISHED GRADE, +1", -0".
3. REFER TO MATT "ASSEMBLY MANUAL FOR ADDITIONAL DETAILS.
4. ONLY ATTACH THE MATT "DIRECTLY TO OTHER STRONG POST DOUBLE SIDED W-BEAM GUARDRAIL SYSTEMS, SEE MANUAL FOR DETAILS.

SACRIFICIAL

SHEET 2 OF 2

Texas Department of Transportation

Design Division Standard

MATT
(MEDIAN ATTENUATING TREND TERMINAL)
(MASH TL-3)

MATT(1)-23

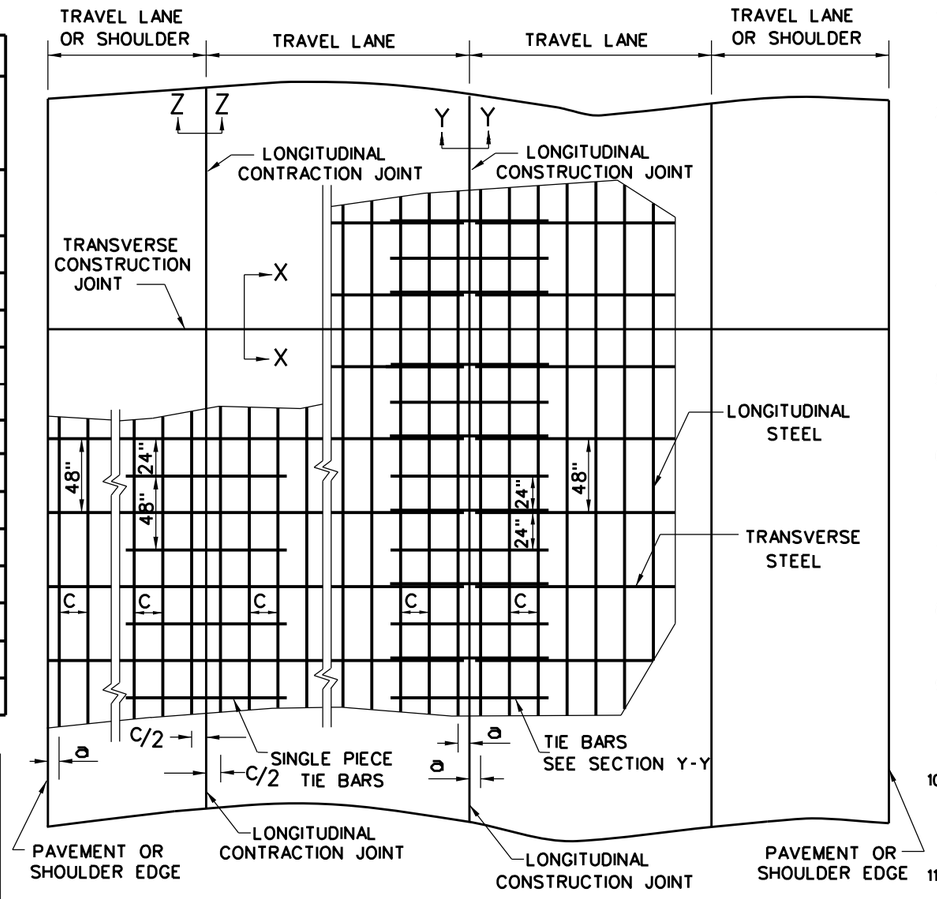
FILE: Matt23.dgn	DN: TxDOT	CK: KM	DW: CES	CK:
© TxDOT: 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		47

DATE:
FILE:

TABLE NO.1 LONGITUDINAL STEEL				
SLAB THICKNESS AND BAR SIZE		LONGITUDINAL STEEL BARS	FIRST SPACING AT EDGE OR JOINT	LONG. STEEL VERTICAL POSITION FROM BOTTOM OF PAVEMENT
T (IN.)	BAR SIZE	SPACING C (IN.)	SPACING a (IN.)	T1 (IN.)
7.0	#5	6.5	3 TO 4	3.5
7.5	#5	6.0	3 TO 4	3.75
8.0	#6	9.0	3 TO 4	4.0
8.5	#6	8.5	3 TO 4	4.25
9.0	#6	8.0	3 TO 4	4.5
9.5	#6	7.5	3 TO 4	4.75
10.0	#6	7.0	3 TO 4	5.0
10.5	#6	6.75	3 TO 4	5.5
11.0	#6	6.5	3 TO 4	6.0
11.5	#6	6.25	3 TO 4	6.5
12.0	#6	6.0	3 TO 4	7.0
12.5	#6	5.75	3 TO 4	7.5
13.0	#6	5.5	3 TO 4	8.0

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

* CONTRACTOR MAY USE #6 REINFORCING STEEL INSTEAD OF #5 REINFORCING STEEL OR COMBINATION OF EACH SIZE

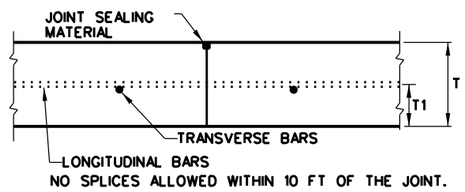


TYPICAL PAVEMENT LAYOUT

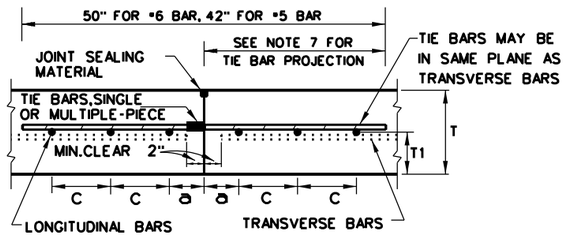
PLAN VIEW (NOT TO SCALE)

GENERAL NOTES

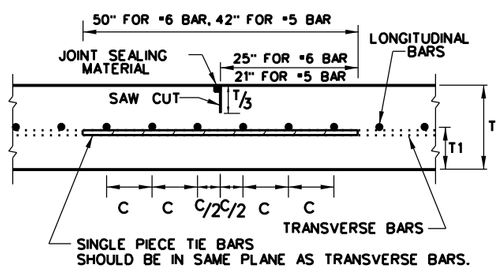
1. DETAILS FOR PAVEMENT WIDTH, PAVEMENT THICKNESS AND THE CROWN CROSS-SLOPE SHALL BE SHOWN ELSEWHERE IN THE PLANS. FOR PAVEMENTS WIDER THAN 100 FT. WITHOUT A FREE LONGITUDINAL JOINT, ADDITIONAL DETAIL MAY BE SHOWN ELSEWHERE IN THE PLANS.
2. USE COARSE AGGREGATES WITH A RATED COEFFICIENT OF THERMAL EXPANSION (CoTE) OF NOT MORE THAN 5.5 X 10 IN^6/IN/ °F AS LISTED IN THE CONCRETE RATED SOURCE QUALITY CATALOG (CRSQC).
3. ALL THE REINFORCING STEEL AND TIE BARS SHALL BE DEFORMED STEEL BARS CONFORMING TO ASTM A 615 (GRADE 60) OR ASTM A 996 (GRADE 60) OR ABOVE. STEEL BAR SIZES AND SPACINGS SHALL CONFORM TO TABLE NO.1 AND TABLE NO.2.
4. STEEL BAR PLACEMENT TOLERANCE SHALL BE +/- 1 IN. HORIZONTALLY AND +/- 0.5 IN. VERTICALLY. CALCULATED AVERAGE BAR SPACING (CONCRETE PLACEMENT WIDTH / NUMBER OF LONGITUDINAL BARS) SHALL CONFORM TO TABLE NO.1.
5. ADJUST REINFORCING STEEL VERTICALLY USING SHIMS OR OTHER METHODS, AS APPROVED, TO MEET VERTICAL TOLERANCES PRIOR TO CONCRETE PLACEMENT.
6. PAVEMENT WIDTHS OF MORE THAN 15 FT. SHALL HAVE A LONGITUDINAL JOINT (SECTION Z-Z OR SECTION Y-Y). THESE JOINTS SHALL BE LOCATED WITHIN 6 IN. OF THE LANE LINE UNLESS THE JOINT LOCATION IS SHOWN ELSEWHERE ON THE PLANS.
7. THE MINIMUM PROJECTION OF TIE BARS INTO THE ADJACENT PLACEMENT IS 22.5 IN. for #6 BARS AND 18.5 IN. FOR #5 BARS.
8. SEE STANDARD SHEET "CONCRETE CURB AND CURB AND GUTTER," FOR DETAILS WHEN TYING CONCRETE CURB OR CURB GUTTER AT A LONGITUDINAL JOINT.
9. REPLACE MISSING OR DAMAGED TIE BARS WITHOUT ADDITIONAL COMPENSATION BY DRILLING MIN.10 IN. DEEP AND GROUTING TIE BARS WITH TYPE III, CLASS C EPOXY. MEET THE PULL-OUT TEST REQUIREMENTS IN ITEM 361.
10. OMIT TIE BARS LOCATED WITHIN 18-IN. OF THE TRANSVERSE CONSTRUCTION JOINTS (SECTION X-X). USE HAND-OPERATED IMMERSION VIBRATORS TO CONSOLIDATE THE CONCRETE ADJACENT TO ALL FORMED JOINTS.
11. THE DETAIL FOR THE JOINT SEALANT AND RESERVOIR IS SHOWN ON STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."



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

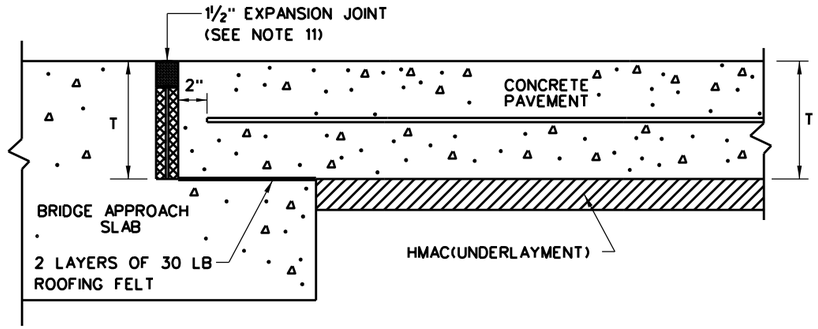
CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

ONE LAYER STEEL BAR PLACEMENT T - 7 to 13 INCHES

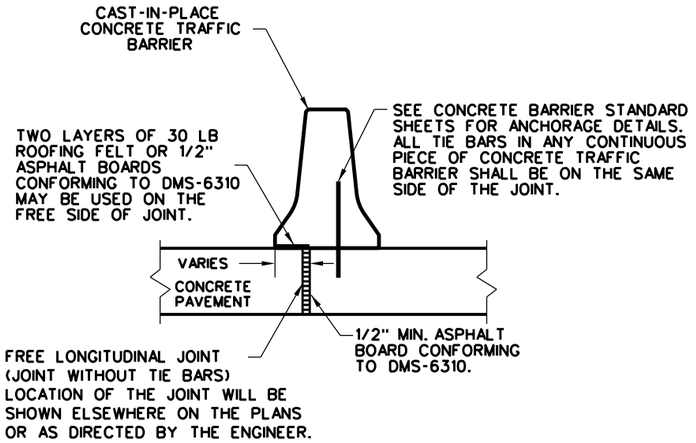
CRCP(1)-23

FILE: crcp123.dgn	DN: TxDOT	CK: KM	DW: CES	CK:
©TxDOT: APRIL 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
APRIL 2023: REVISED LONG. STEEL VERTICAL LOCATION REMOVED ADDITIONAL TIEBAR AT TRANSVERSE CONSTRUCTION JOINTS	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		48

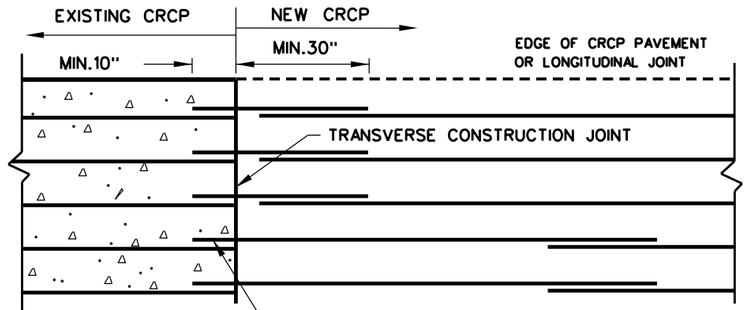
DATE:
FILE:



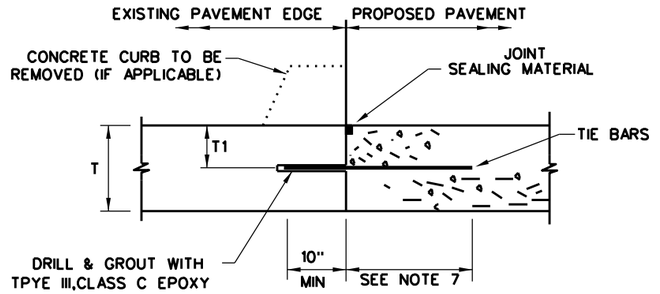
TRANSVERSE EXPANSION JOINT DETAIL AT BRIDGE APPROACH



CENTERLINE FREE LONGITUDINAL JOINT DETAIL

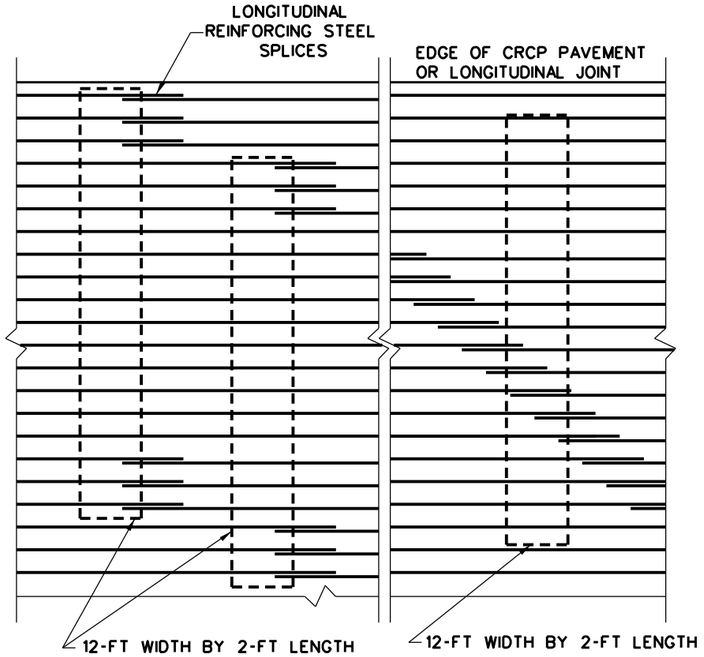


OPTION A: DRILL AND EPOXY
PLAN VIEW (NOT TO SCALE)



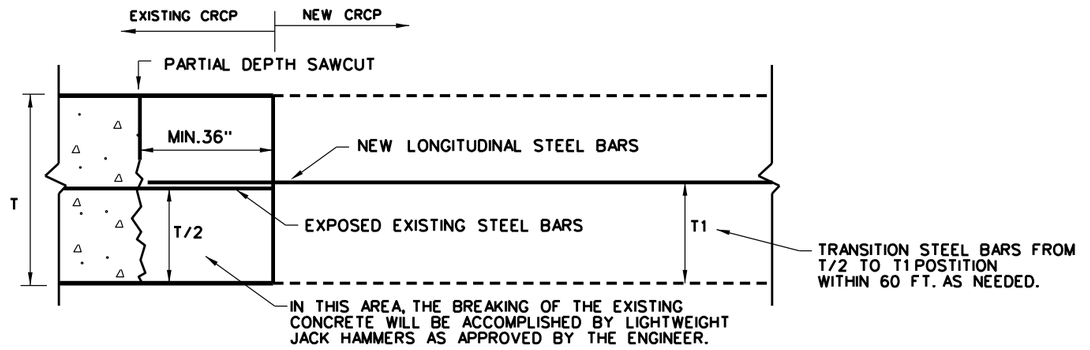
1. BEFORE CONCRETE PLACEMENT, PERFORM PULL-OUT TESTS ON EPOXY-GROUTED TIE BARS IN ACCORDANCE WITH ITEM 360.
2. SPACE TIE BARS AT 24" SPACING. USE #6 TIE BARS FOR 8" AND THICKER PAVEMENTS, USE #5 TIE BARS FOR LESS THAN 8" THICK PAVEMENTS.

LONGITUDINAL WIDENING 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 B: BREAKBACK AND LAP

TRANSVERSE TIE JOINT DETAIL
NEW CRCP TO EXISTING CRCP

Texas Department of Transportation

Design Division Standard

CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

ONE LAYER STEEL BAR PLACEMENT
T - 7 to 13 INCHES

CRCP(1)-23

FILE: crcp123.dgn	DN: TxDOT	CK: KM	DW: CES	CK:
© TxDOT: APRIL 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
APRIL 2023: MODIFIED EXPANSION JOINT DETAIL AT BRIDGE APPROACH SLAB	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		49

DATE:
FILE:

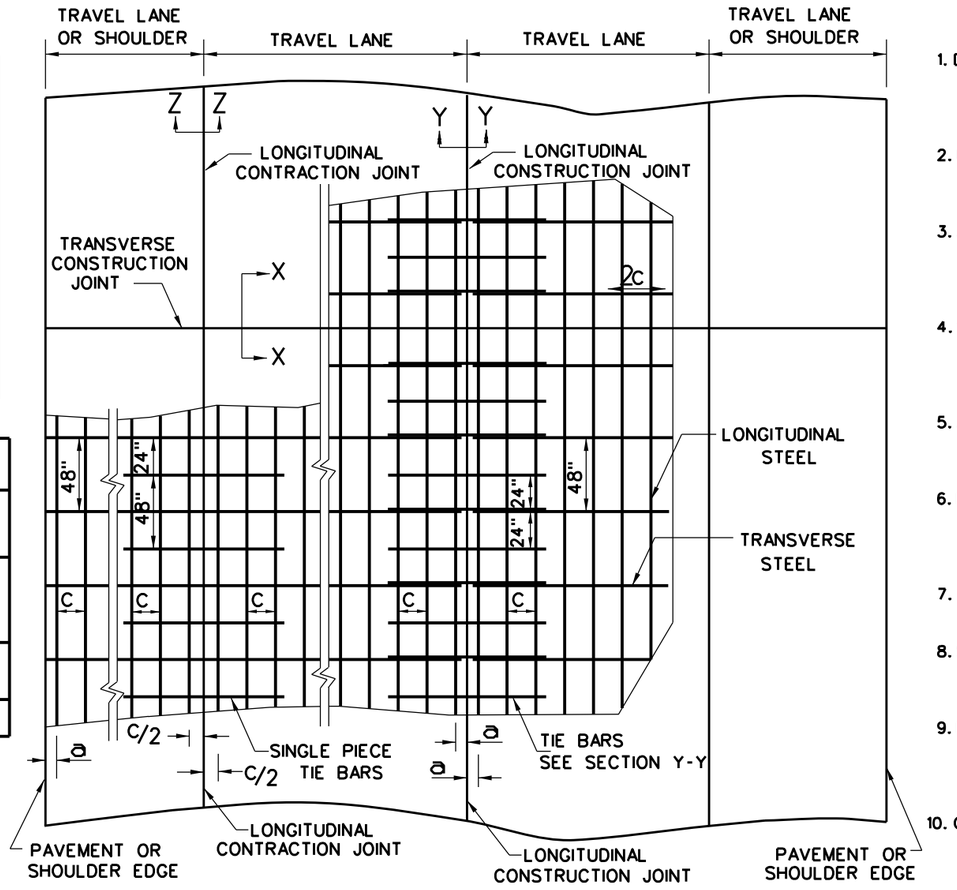
TABLE NO.1 LONGITUDINAL STEEL

SLAB THICKNESS AND BAR SIZE		FOR BOTH STEEL MATS		LOWER STEEL MAT HEIGHT	TOP STEEL MAT HEIGHT
		LONGITUDINAL STEEL BARS	FIRST SPACING AT EDGE OR JOINT		
T (IN.)	BAR SIZE	SPACING c (IN.)	SPACING a (IN.)	T1 (IN.)	T2 (IN.)
14	#6	9.5	3 TO 4	4.5	8.0
15	#6	8.5	3 TO 4	5.0	8.5

TABLE NO.2 TRANSVERSE STEEL AND TIE BARS

SLAB THICKNESS T (IN.)	FOR BOTH STEEL MATS		FOR LOWER STEEL MAT ONLY		FOR BOTH STEEL MATS	
	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.)
14 - 15	#5	48	#6	48	#6	24

* CONTRACTOR MAY USE #6 REINFORCING STEEL INSTEAD OF #5 REINFORCING STEEL OR COMBINATION OF EACH SIZE

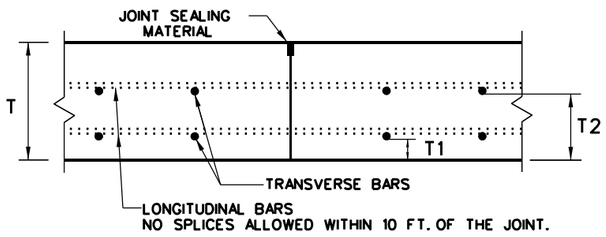


TYPICAL PAVEMENT LAYOUT

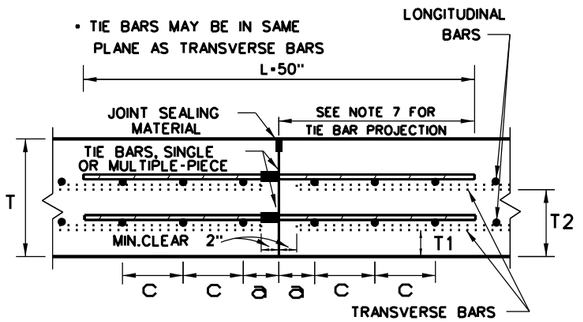
PLAN VIEW (NOT TO SCALE)

GENERAL NOTES

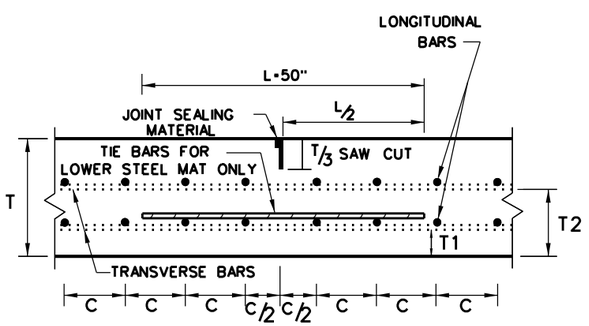
1. DETAILS FOR PAVEMENT WIDTH, PAVEMENT THICKNESS AND THE CROWN CROSS-SLOPE SHALL BE SHOWN ELSEWHERE IN THE PLANS. FOR PAVEMENTS WIDER THAN 100 FT. WITHOUT A FREE LONGITUDINAL JOINT, ADDITIONAL DETAIL MAY BE SHOWN ELSEWHERE IN THE PLANS.
2. USE COARSE AGGREGATES WITH A RATED COEFFICIENT OF THERMAL EXPANSION (CoTE) OF NOT MORE THAN 5.5 X 10^{-6} IN/IN/ °F AS LISTED IN THE CONCRETE RATED SOURCE QUALITY CATALOG (CRSQC).
3. ALL THE REINFORCING STEEL AND TIE BARS SHALL BE DEFORMED STEEL BARS CONFORMING TO ASTM A 615 (GRADE 60) OR ASTM A 996 (GRADE 60) OR ABOVE. STEEL BAR SIZES AND SPACINGS SHALL CONFORM TO TABLE NO.1 AND TABLE NO.2.
4. STEEL BAR PLACEMENT TOLERANCE SHALL BE +/- 1 IN. HORIZONTALLY AND +/- 0.5 IN. VERTICALLY. CALCULATED AVERAGE BAR SPACING (CONCRETE PLACEMENT WIDTH / NUMBER OF LONGITUDINAL BARS IN A SINGLE LAYER) SHALL CONFORM TO TABLE NO.1.
5. ADJUST REINFORCING STEEL VERTICALLY USING SHIMS OR OTHER METHODS, AS APPROVED, TO MEET VERTICAL TOLERANCES PRIOR TO CONCRETE PLACEMENT.
6. PAVEMENT WIDTHS OF MORE THAN 15 FT. SHALL HAVE A LONGITUDINAL JOINT (SECTION Z-Z OR SECTION Y-Y). THESE JOINTS SHALL BE LOCATED WITHIN 6 IN. OF THE LANE LINE UNLESS THE JOINT LOCATION IS SHOWN ELSEWHERE ON THE PLANS.
7. THE MINIMUM PROJECTION OF TIE BARS INTO THE ADJACENT PLACEMENT IS 22.5 IN. for #6 BARS AND 18.5 IN. FOR #5 BARS.
8. SEE STANDARD SHEET "CONCRETE CURB AND CURB AND GUTTER," FOR DETAILS WHEN TYING CONCRETE CURB OR CURB GUTTER AT A LONGITUDINAL JOINT.
9. REPLACE MISSING OR DAMAGED TIE BARS WITHOUT ADDITIONAL COMPENSATION BY DRILLING MIN.10 IN. DEEP AND GROUTING TIE BARS WITH TYPE III, CLASS C EPOXY. MEET THE PULL-OUT TEST REQUIREMENTS IN ITEM 361.
10. OMIT TIE BARS LOCATED WITHIN 18-IN. OF THE TRANSVERSE CONSTRUCTION JOINTS (SECTION X-X). USE HAND-OPERATED IMMERSION VIBRATORS TO CONSOLIDATE THE CONCRETE ADJACENT TO ALL FORMED JOINTS.
11. THE DETAIL FOR THE JOINT SEALANT AND RESERVOIR IS SHOWN ON STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."



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

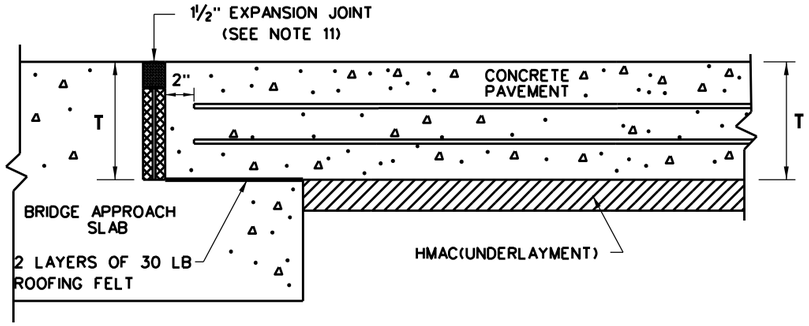
CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

TWO LAYER STEEL BAR PLACEMENT T - 14 & 15 INCHES

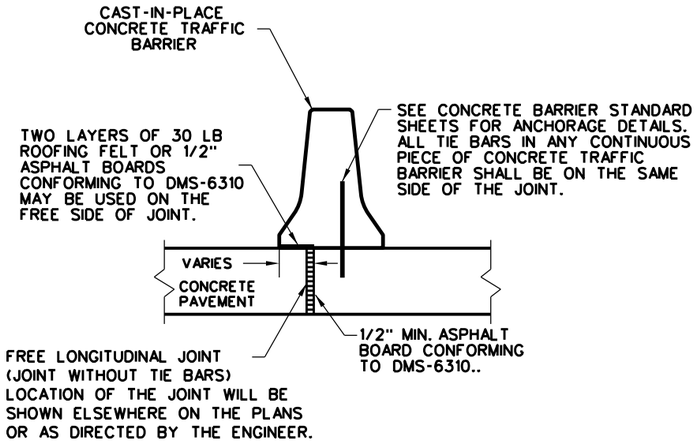
CRCP(2)-23

FILE: crcp223.dgn	DN: TxDOT	CK: KM	DW: CES	CK:
©TxDOT: APRIL 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
APRIL 2023: REMOVED ADDITIONAL TIEBAR AT TRANSVERSE CONSTRUCTION JOINTS	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		50

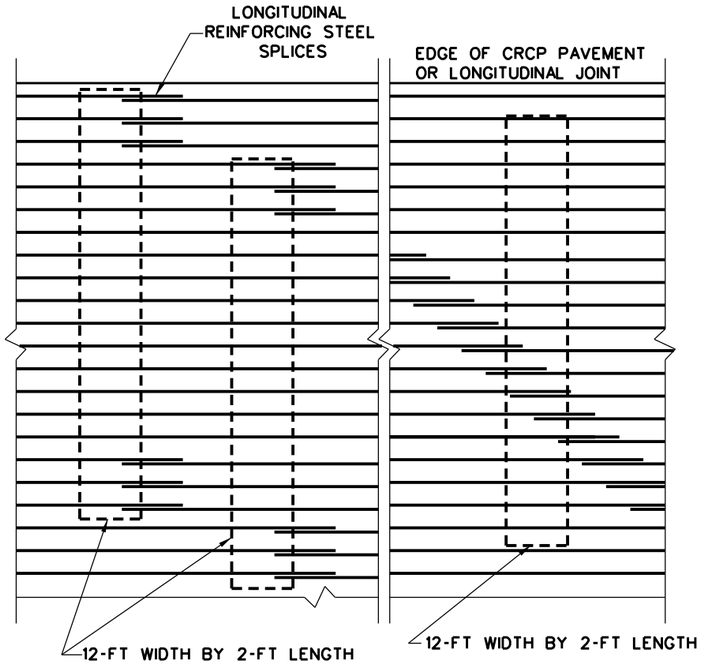
DATE:
FILE:



TRANSVERSE EXPANSION JOINT DETAIL AT BRIDGE APPROACH



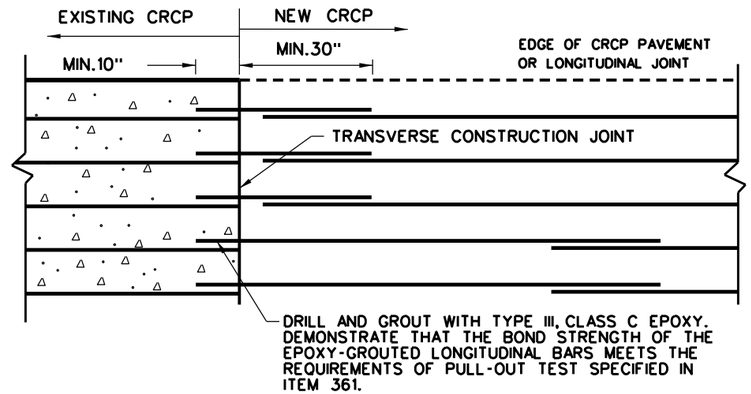
CENTERLINE FREE LONGITUDINAL JOINT DETAIL



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.

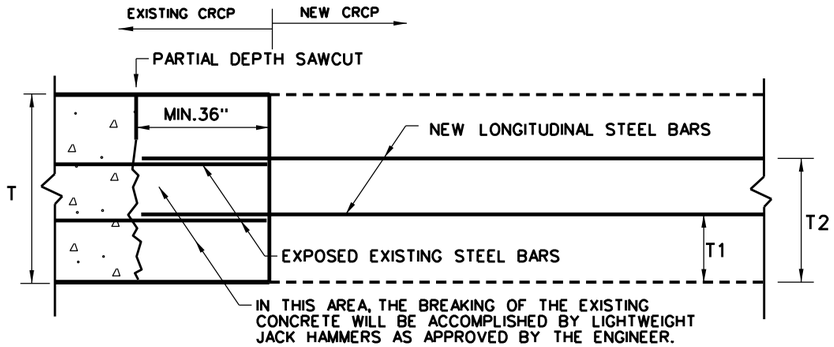
EXAMPLES OF LAP CONFIGURATION

PLAN VIEW (NOT TO SCALE)



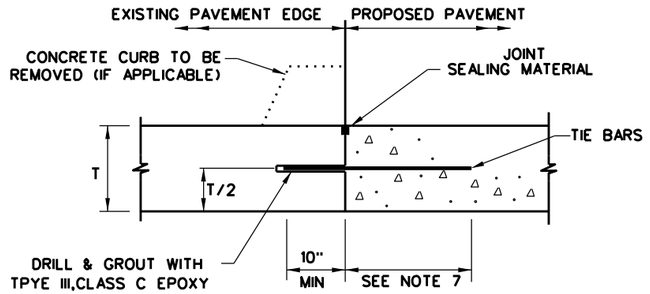
OPTION A: DRILL AND EPOXY

PLAN VIEW (NOT TO SCALE)



OPTION B: BREAKBACK AND LAP

TRANSVERSE TIE JOINT DETAIL
NEW CRCP TO EXISTING CRCP



1. BEFORE CONCRETE PLACEMENT, PERFORM PULL-OUT TESTS ON EPOXY-GROUTED TIE BARS IN ACCORDANCE WITH ITEM 360.
2. SPACE TIE BARS AT 24" SPACING.

LONGITUDINAL WIDENING JOINT DETAIL

SHEET 2 OF 2

Texas Department of Transportation

Design Division Standard

CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

TWO LAYER STEEL BAR PLACEMENT
T - 14 & 15 INCHES

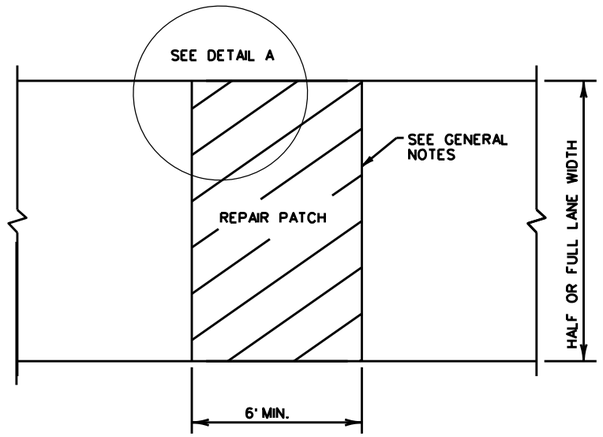
CRCP(2)-23

FILE: crcp223.dgn	DN: TxDOT	CK: KM	DW: CES	CK:
© TxDOT: APRIL 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
APRIL 2023: MODIFIED EXPANSION JOINT DETAIL AT BRIDGE APPROACH SLAB	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		51

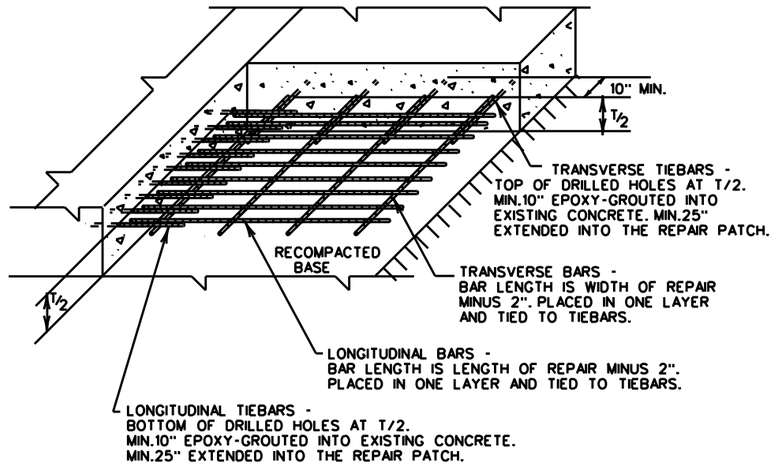
DATE:
FILE:

TABLE NO.1 STEEL BAR SIZE AND SPACING						
TYPE PAVEMENT	SLAB THICKNESS AND BAR SIZE		LONGITUDINAL*		TRANSVERSE*	
			REGULAR BARS	TIEBARS	BARS	TIEBARS
	T (IN.)	BAR SIZE	SPACING (IN.)	SPACING (IN.)	SPACING (IN.)	SPACING (IN.)
CRCP	6.0	#5	7.5	7.5	24	24
	6.5		7.0	7.0		
	7.0		6.5	6.5		
	7.5		6.0	6.0		
	8.0	#6	9.0	9.0	24	24
	8.5		8.5	8.5		
	9.0		8.0	8.0		
	9.5		7.5	7.5		
	10.0		7.0	7.0		
	10.5		6.75	6.75		
	11.0		6.5	6.5		
	11.5		6.25	6.25		
	≥12.0		6.0	6.0		
JRCP	<8.0	#5	24.0	12.0	24	24
	≥8.0	#6	24.0	12.0	24	24
CPCD	<8.0	#5	NONE	12.0	NONE	24
	≥8.0	#6	NONE	12.0	NONE	24

* USE 12" SPACING AS FIRST AND LAST SPACING AT END OR SIDE FOR ALL BARS.



PLAN VIEW



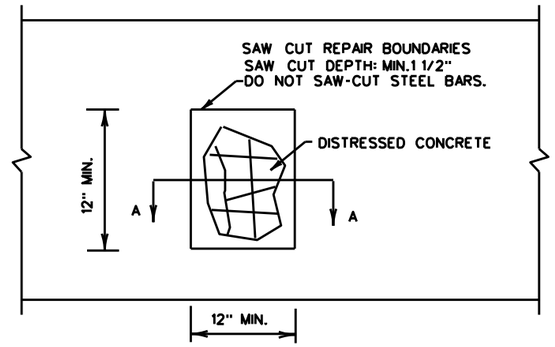
DETAIL A
GROUTED TIEBARS & REINFORCEMENT

GENERAL NOTES

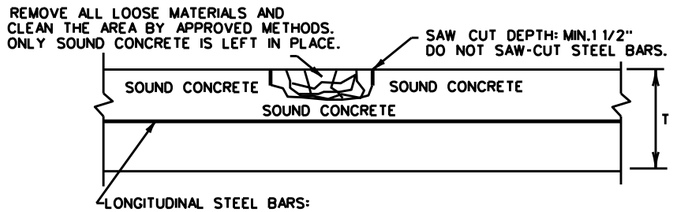
1. ITEM 361, "REPAIR OF CONCRETE PAVEMENT" SHALL GOVERN FOR THIS WORK.
2. MULTIPLE PIECE TIEBARS SHALL BE USED WHEN THE REPAIR AREA MUST BE PLACED IN TWO STAGES DUE TO SEQUENCE OF CONSTRUCTION.
3. FULL DEPTH SAW CUTS SHALL BE MADE AROUND THE PERIMETER OF THE AREA TO BE REPAIRED. THE CUT SHALL BE MADE AT A RIGHT ANGLE TO THE PAVEMENT EDGE AND TO THE CENTER LINE OF THE PAVEMENT.
4. AT LEAST ONE LONGITUDINAL FULL DEPTH SAW CUT SHALL BE AT AN EXISTING LONGITUDINAL JOINT.
5. ADDITIONAL SAW CUTS MAY BE REQUIRED WITHIN THE AREA OF THE REPAIR TO FACILITATE REMOVAL OF THE CONCRETE OR TO ALLEVIATE BINDING OF THE FULL DEPTH SAW CUT AT THE REPAIR EDGE.
6. THE SAW CUTS WHICH EXTEND OUTSIDE THE AREA OF THE REPAIR WILL BE CLEANED AND FILLED WITH A CEMENTITIOUS GROUT APPROVED BY THE ENGINEER.
7. EXISTING LONGITUDINAL AND TRANSVERSE JOINTS REMOVED DUE TO REPAIR OPERATION SHOULD BE RESTORED IN ACCORDANCE WITH STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."

GENERAL NOTES

1. ITEM 361, "REPAIR OF CONCRETE PAVEMENT" SHALL GOVERN FOR THIS WORK.
2. THE SAW CUTS WHICH EXTEND OUTSIDE THE AREA OF THE REPAIR WILL BE CLEANED AND FILLED WITH A CEMENTITIOUS GROUT APPROVED BY THE ENGINEER.
3. EXISTING LONGITUDINAL AND TRANSVERSE JOINTS REMOVED DUE TO REPAIR OPERATION SHOULD BE RESTORED IN ACCORDANCE WITH STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."



PLAN VIEW



LONGITUDINAL STEEL BARS:

* REPAIR AREAS MAY BE ADJUSTED AFTER REMOVING DISTRESSED CONCRETE. SWITCH THE HALF-DEPTH REPAIR TO FULL-DEPTH REPAIR IF EXPOSED EXISTING LONGITUDINAL BARS ARE DEFICIENT, AS APPROVED. COMPENSATION WILL BE MADE FOR UNEXPECTED VOLUMES OF REPAIR AREAS OR CHANGES IN SCOPE OF WORK.
* INCREASE THE REPAIR AREA AND PERFORM A FULL-DEPTH REPAIR AS DIRECTED IF LONGITUDINAL STEEL BARS WERE DAMAGED BY THE REMOVAL OPERATIONS. NO ADDITIONAL COMPENSATION WILL BE MADE.

SECTION A-A

HALF-DEPTH REPAIR

FULL-DEPTH REPAIR OF CRCP, JRCP, AND CPCD

Texas Department of Transportation

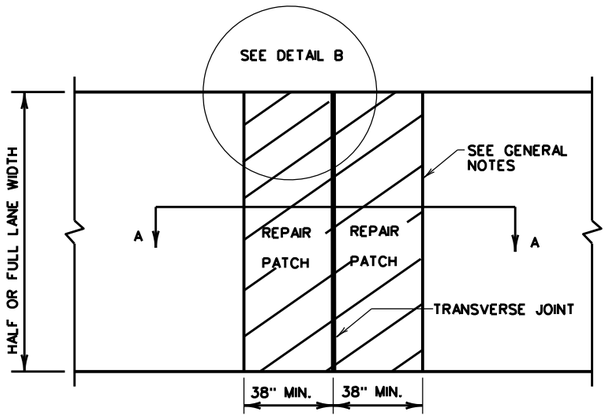
Design Division Standard

REPAIR OF CONCRETE PAVEMENT

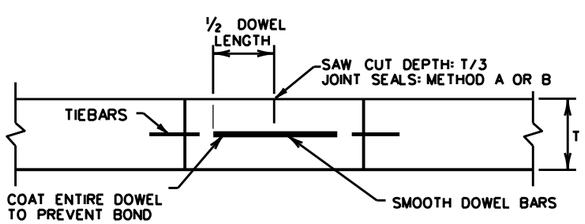
REPCP-14

FILE: repcp14.dgn	DN: TxDOT		DN: HC	DW: HC	CK: AN
©TxDOT: DECEMBER 2014	CONT	SECT	JOB		HIGHWAY
REVISIONS	6464	74	001		IH0030
	DIST	COUNTY			SHEET NO.
	DAL	DALLAS			52

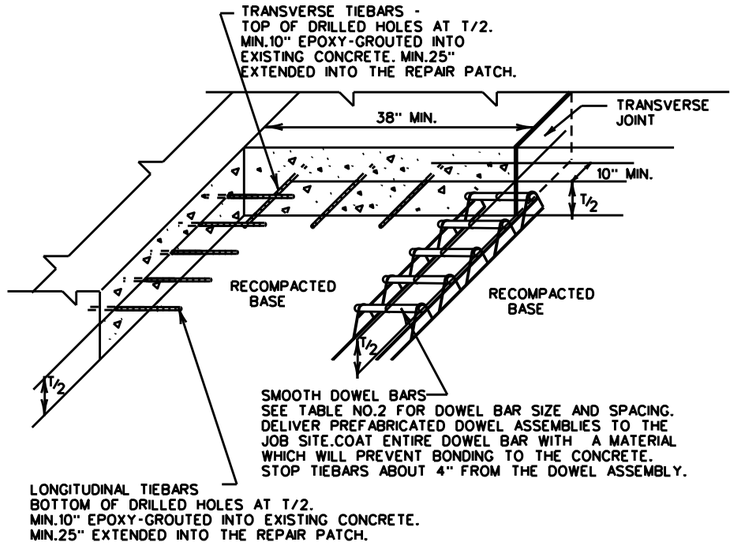
DATE:
FILE:



PLAN VIEW



SECTION A-A



DETAIL B
GROUTED TIEBARS & DOWELS

GENERAL NOTES

1. ITEM 361,"REPAIR OF CONCRETE PAVEMENT"SHALL GOVERN FOR THIS WORK.
2. MULTIPLE PIECE TIEBARS SHALL BE USED WHEN THE REPAIR AREA MUST BE PLACED IN TWO STAGES DUE TO SEQUENCE OF CONSTRUCTION.
3. FULL DEPTH SAW CUTS SHALL BE MADE AROUND THE PERIMETER OF THE AREA TO BE REPAIRED. THE CUT SHALL BE MADE AT A RIGHT ANGLE TO THE PAVEMENT EDGE AND TO THE CENTER LINE OF THE PAVEMENT.
4. AT LEAST ONE LONGITUDINAL FULL DEPTH SAW CUT SHALL BE AT AN EXISTING LONGITUDINAL JOINT.
5. ADDITIONAL SAW CUTS MAY BE REQUIRED WITHIN THE AREA OF THE REPAIR TO FACILITATE REMOVAL OF THE CONCRETE OR TO ALLEVIATE BINDING OF THE FULL DEPTH SAW CUT AT THE REPAIR EDGE.
6. THE SAW CUTS WHICH EXTEND OUTSIDE THE AREA OF THE REPAIR WILL BE CLEANED AND FILLED WITH A CEMENTITIOUS GROUT APPROVED BY THE ENGINEER.
7. EXISTING LONGITUDINAL AND TRANSVERSE JOINTS REMOVED DUE TO REPAIR OPERATION SHOULD BE RESTORED IN ACCORDANCE WITH STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."
8. DOWEL BAR PLACEMENT TOLERANCE SHALL BE +/- 1/4 IN. HORIZONTALLY AND VERTICALLY UNLESS OTHERWISE SPECIFIED. WHERE DOWEL BAR BASKETS ARE USED, REMOVE THE SHIPPING WIRES.

TABLE NO. 2 DOWELS (SMOOTH BARS)			
PAVEMENT THICKNESS (INCHES)	SIZE AND DIA.	LENGTH (IN.)	SPACING (IN.)
<10	•8 (1 IN.)	18.0	12.0
≥10	•10 (1 1/4 IN.)		

REPAIR OF TRANSVERSE JOINT OF CPCD

Texas Department of Transportation

Design Division Standard

REPAIR OF CONCRETE PAVEMENT

REPCP-14

FILE: repcp14.dgn	DN: TxDOT		DN: HC	DW: HC	CK: AN
© TxDOT: DECEMBER 2014	CONT	SECT	JOB	HIGHWAY	
REVISIONS	6464	74	001	IH0030	
	DIST	COUNTY		SHEET NO.	
	DAL	DALLAS		53	

DATE:
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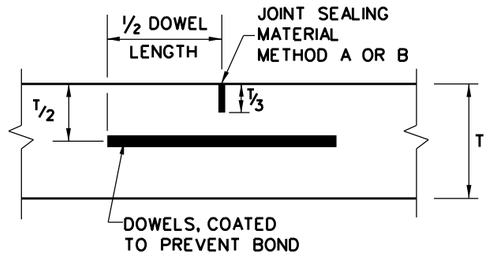
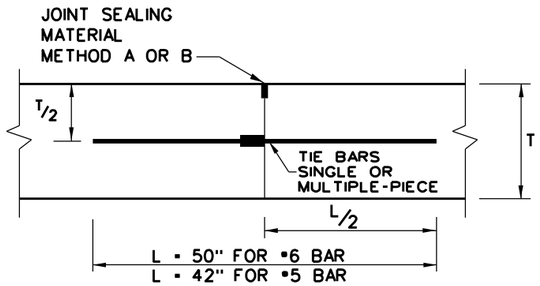
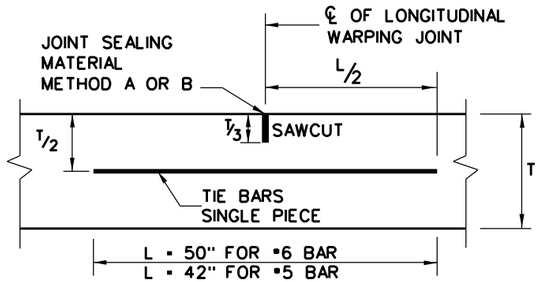


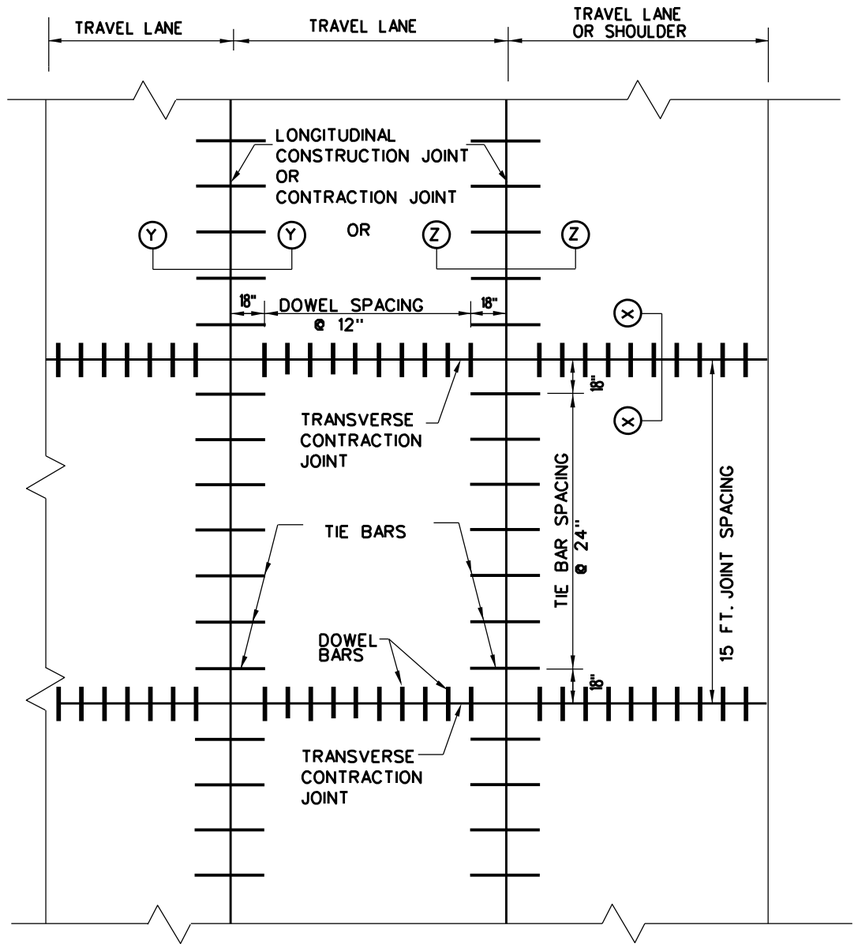
TRANSVERSE CONTRACTION JOINT
SECTION X-X



LONGITUDINAL CONSTRUCTION JOINT
SECTION Y-Y



LONGITUDINAL CONTRACTION JOINT
SECTION Z-Z



TYPICAL PAVEMENT LAYOUT
PLAN VIEW (NOT TO SCALE)

GENERAL NOTES

1. DETAILS FOR PAVEMENT WIDTH, PAVEMENT THICKNESS AND THE CROWN CROSS-SLOPE SHALL BE SHOWN ELSEWHERE IN THE PLANS. PAVEMENTS WIDER THAN 100 FT. WITHOUT A FREE LONGITUDINAL JOINT ARE NOT COVERED BY THIS STANDARD.
2. FOR FURTHER INFORMATION REGARDING THE PLACEMENT OF CONCRETE AND LOAD TRANSFER DEVICES REFER TO THE GOVERNING SPECIFICATION FOR "CONCRETE PAVEMENT".
3. THE SPACING BETWEEN TRANSVERSE CONTRACTION JOINTS SHALL BE 15 FT. UNLESS OTHERWISE SHOWN IN THE PLANS.
4. TRANSVERSE CONSTRUCTION JOINTS MAY BE FORMED BY USE OF METAL OR WOOD FORMS EQUAL IN DEPTH TO THE DEPTH OF PAVEMENT, OR BY METHODS APPROVED BY THE ENGINEER.
5. USE HAND-OPERATED IMMERSION VIBRATORS TO CONSOLIDATE THE CONCRETE ADJACENT TO ALL THE FORMED JOINTS.
6. PAVEMENT WIDTHS OF MORE THAN 15 FT. SHALL HAVE A LONGITUDINAL JOINT (SECTION Z-Z OR SECTION Y-Y). THESE JOINTS SHALL BE LOCATED WITHIN 6 IN. OF THE LANE LINE UNLESS THE JOINT LOCATION IS SHOWN ELSEWHERE ON THE PLANS.
7. THE JOINT BETWEEN OUTSIDE LANE AND SHOULDER SHALL BE A LONGITUDINAL CONTRACTION JOINT (SECTION Z-Z) UNLESS OTHERWISE SHOWN IN THE PLANS. THE SAW CUT DEPTH FOR THE LONGITUDIANL CONTRACTION JOINT (SECTION Z-Z) SHALL BE ONE THIRD OF THE SLABTHICKNESS (T/3).
8. WHEN TYING CONCRETE GUTTER AT A LONGITUDINAL JOINT, THE TIE BAR LENGTH OR POSITION MAY BE ADJUSTED. PROVIDE 3 IN. OF CONCRETE COVER FROM THE BACK OF GUTTER TO THE END OF TIE BAR.
9. REPLACE MISSING OR DAMAGED TIE BARS WITHOUT ADDITIONAL COMPENSATION BY DRILLING MIN. 10 IN. DEEP AND GROUTING TIE BARS WITH TYPE III, CLASS C EPOXY. MEET THE PULL-OUT TEST REQUIREMENTS IN ITEM 361.
10. WHEN AN MONOLITHIIC CURB IS SPECIFIED, THE JOINT IN THE CURB SHALL COINCIDE WITH PAVEMENT JOINTS AND MAY BE FORMED BY ANY MEANS APPROVED BY THE ENGINEER.
11. DOWEL BAR PLACEMENT TOLERANCE SHALL BE +/- 1/4 IN. HORIZONTALLY AND VERTICALLY UNLESS OTHERWISE SPECIFIED.WHERE DOWEL BAR BASKETS ARE USED, REMOVE THE SHIPPING WIRES.
12. THE DETAIL FOR JOINT SEALANT AND RESERVOIR IS SHOWN ON STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."

TABLE NO.1 DOWELS (SMOOTH BARS)		
SLAB THICKNESS T (IN.)	BAR DIA. AND LENGTH	AVERAGE SPACING (IN.)
6 to 7.5	1" X 18"	12
8 to 10	1 1/4" X 18"	12
>= 10.5	1 1/2" X 18"	12

TABLE NO.2 TIE BARS (DEFORMED BARS)		
SLAB THICKNESS T (IN.)	BAR SIZE	AVERAGE SPACING (IN.)
6 to 7.5	#5	24
>= 8	#6	24

SHEET 1 OF 2

Texas Department of Transportation

Design Division Standard

CONCRETE PAVEMENT DETAILS
CONTRACTION DESIGN
T-6 to 12 INCHES

CPCD-14

FILE: cpcd14.dgn	DN: TxDOT	DN: HC	DW: HC	CK: AN
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REVISIONS	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		54

DATE:
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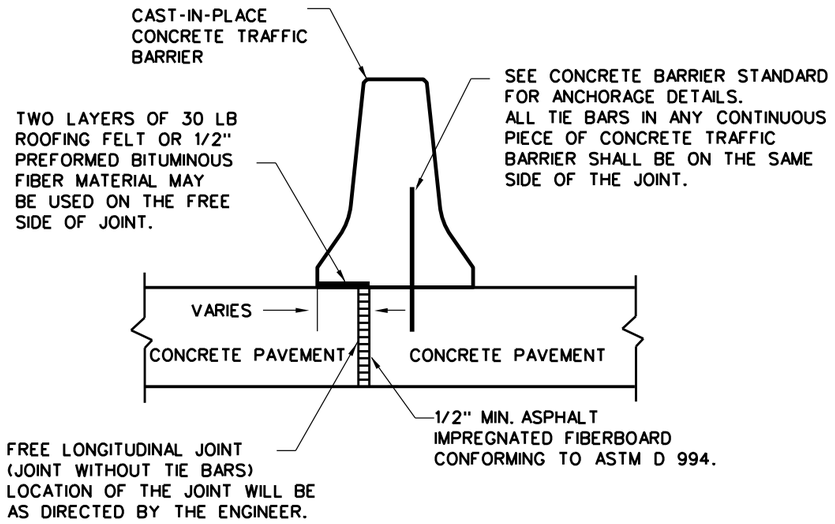
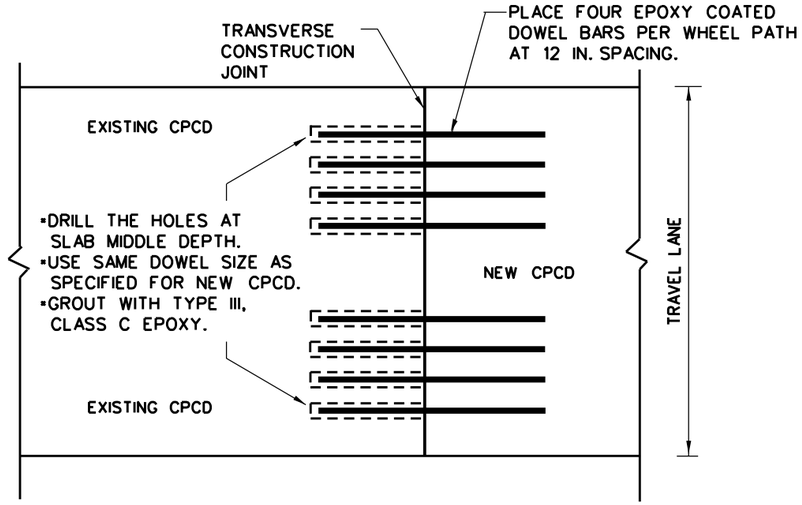
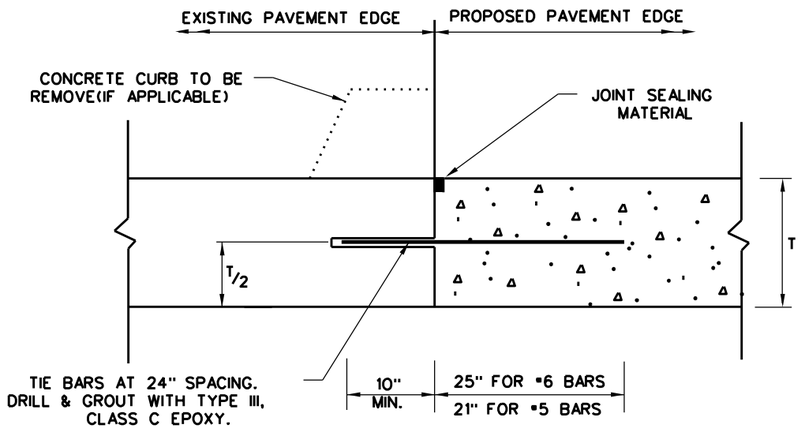


FREE LONGITUDINAL JOINT DETAIL



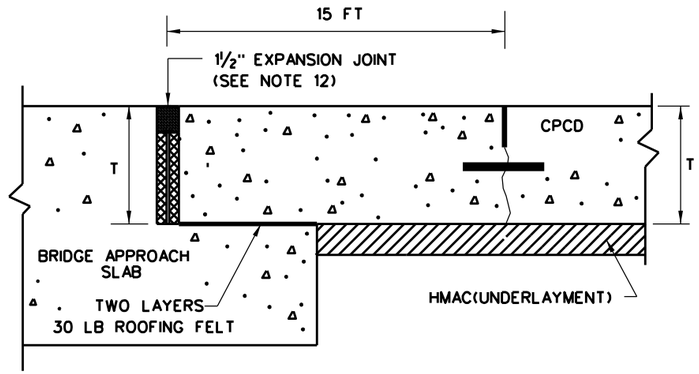
TRANSVERSE JOINT DETAIL
EXISTING CPCD TO NEW CPCD

PLAN VIEW (NOT TO SCALE)



1. BEFORE WIDENING WORK, DEMONSTRATE THAT THE BOND STRENGTH OF THE EPOXY-GROUTED TIE BARS MEETS THE REQUIREMENTS OF PULL-OUT TEST SPECIFIED IN ITEM 361.
2. SPACE TIE BARS AT 24" SPACING. USE #6 BARS FOR 8" AND THICKER SLABS, USE #5 BARS FOR LESS THAN 8" THICK SLABS.
3. THE TRANSVERSE JOINTS OF PROPOSED PAVEMENT SHALL COINCIDE WITH EXISTING PAVEMENT JOINTS UNLESS OTHERWISE SHOWN ON THE PLANS.

LONGITUDINAL WIDENING JOINT DETAIL



TRANSVERSE EXPANSION JOINT DETAIL
AT BRIDGE APPROACH

Texas Department of Transportation

Design Division Standard

CONCRETE PAVEMENT DETAILS
CONTRACTION DESIGN
T-6 to 12 INCHES

CPCD-14

FILE: cpcd14.dgn	DN: TxDOT		DN: HC		DW: HC	CK: AN
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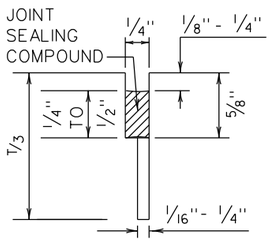
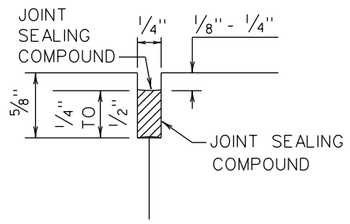
REVISIONS	6464	74	001		IH0030	
	DIST	COUNTY			SHEET NO.	
	DAL	DALLAS			55	

DATE:
FILE:

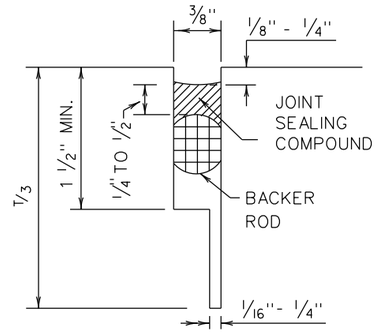
METHOD B: JOINT SEALING COMPOUND



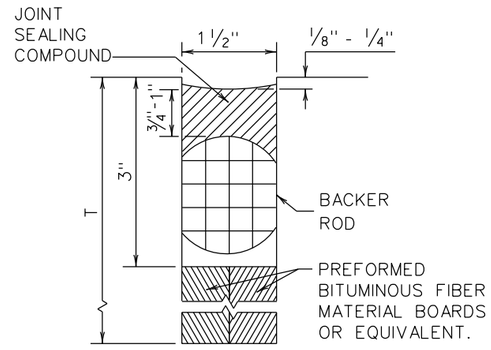
LONGITUDINAL SAWED
CONTRACTION JOINT



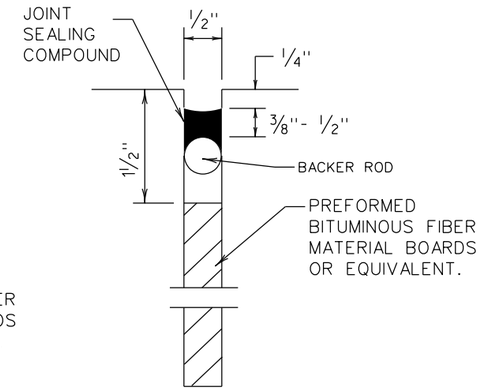
LONGITUDINAL OR TRANSVERSE
CONSTRUCTION JOINT



TRANSVERSE SAWED
CONTRACTION JOINT

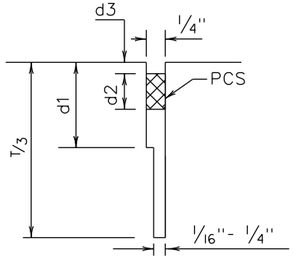


TRANSVERSE FORMED
EXPANSION JOINT

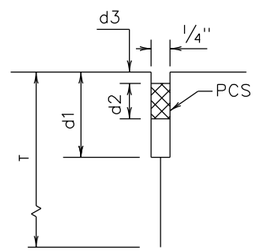


FORMED
ISOLATION JOINT

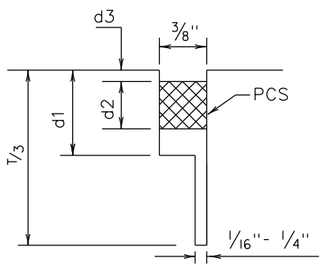
METHOD A: PREFORMED COMPRESSION SEALS (PCS)(DMS-6310 CLASS 6)



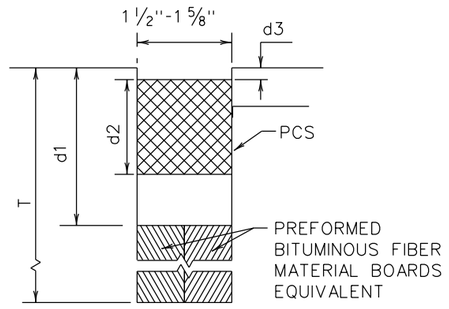
LONGITUDINAL SAWED
CONTRACTION JOINT



LONGITUDINAL
CONSTRUCTION JOINT



TRANSVERSE SAWED
CONTRACTION JOINT



TRANSVERSE FORMED
EXPANSION JOINT

GENERAL NOTES

1. UNLESS OTHERWISE SHOWN IN THE PLANS, EITHER METHOD "A" OR METHOD "B" MAY BE USED.
2. THE LOCATION OF JOINTS SHALL BE AS SHOWN ELSEWHERE IN THE PLANS.
3. THE JOINT RESERVOIR FOR SEALANT OR PCS SHALL BE SAWED UNLESS OTHERWISE SHOWN ON THE PLANS FOR THE LONGITUDINAL AND TRANSVERSE CONSTRUCTION JOINTS AND THE SAWED JOINTS.
4. DIMENSIONS d1, d2, AND d3 SHOWN IN METHOD A SHALL BE IN ACCORDANCE WITH THE PREFORMED COMPRESSION SEAL MANUFACTURER'S RECOMMENDATION.
5. REFER TO DMS-6310 "JOINT SEALANTS AND FILLERS" FOR THE CLASSIFICATIONS.
6. FOR SAWED LONGITUDINAL JOINT, LONGITUDINAL OR TRANSVERSE CONSTRUCTION JOINT, USE JOINT SEALANT CLASS 5 OR 8 UNLESS OTHERWISE SHOWN ON THE PLAN OR APPROVED.
7. FOR TRANSVERSE SAWED CONTRACTION, TRANSVERSE FORMED EXPANSION JOINT, AND ISOLATION JOINT 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 JOINTS ACCOMMODATE HORIZONTAL AND VERTICAL MOVEMENTS THAT OCCUR BETWEEN A PAVEMENT AND A STRUCTURE. ISOLATION 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

Design Division Standard

CONCRETE PAVING DETAILS

JOINT SEALS

JS-14

FILE: js14.dgn	DN: TxDOT	DN: HC	DW: HC	CK: AN
©TxDOT: DECEMBER 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		56

DATE:
FILE:

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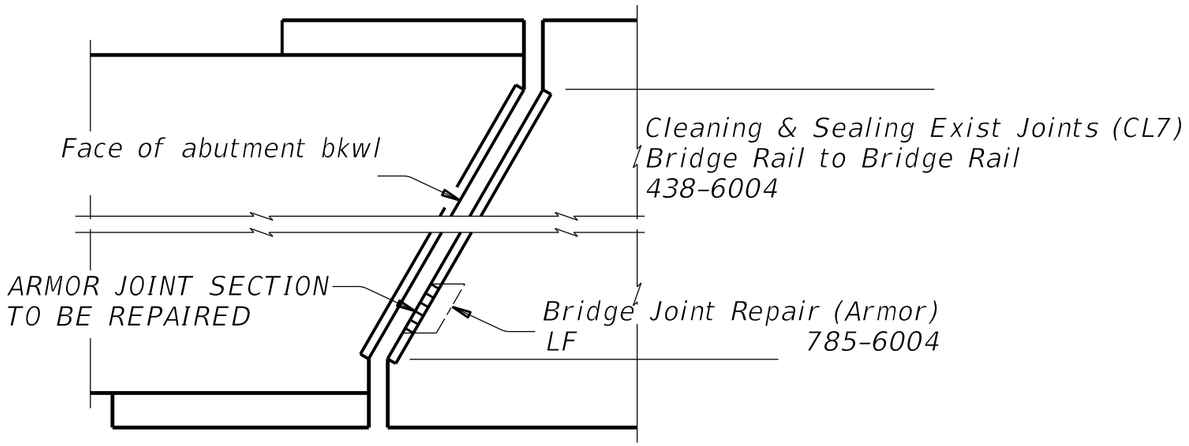
Texas Department of Transportation

Traffic Safety Division Standard

OMIT

FILE: fpm(5)-22.dgn	DN:	CK:	DW:	CK:
© TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-19 10-22	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		57

23E



Notes:
1. Only repair damaged section.
2. Do not terminate repair in middle of wheel path.
3. Full armor plate replacement will be determined in eld.
   Item 785-6010 Bridge Joint Replacement (Armor) will be approved by the engineer.

STATE OF TEXAS
DARIUS J. HAGGARD
145313
LICENSED
PROFESSIONAL ENGINEER

2/29/2024

DocuSigned by:
Darius Haggard
6A840329DA5948F...

5/3/2024

Texas Department of Transportation

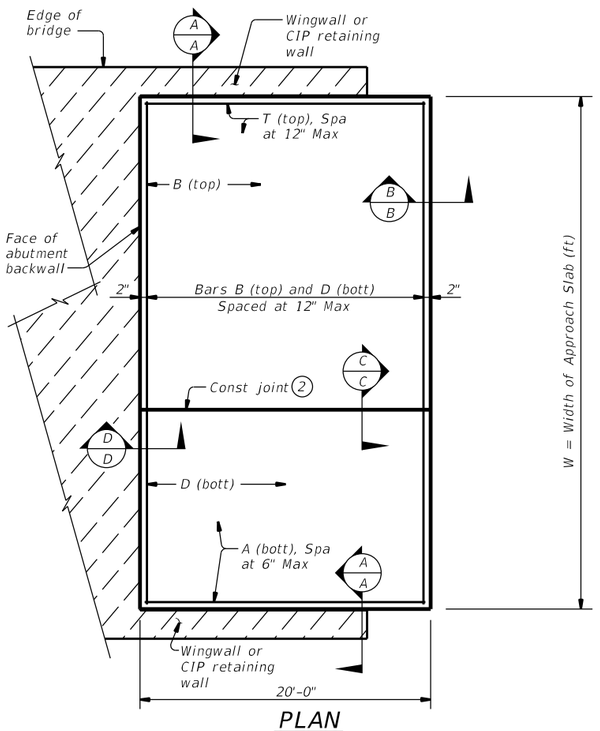
Bridge Division Standard

ARMOR JOINT WORK DETAIL

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		58

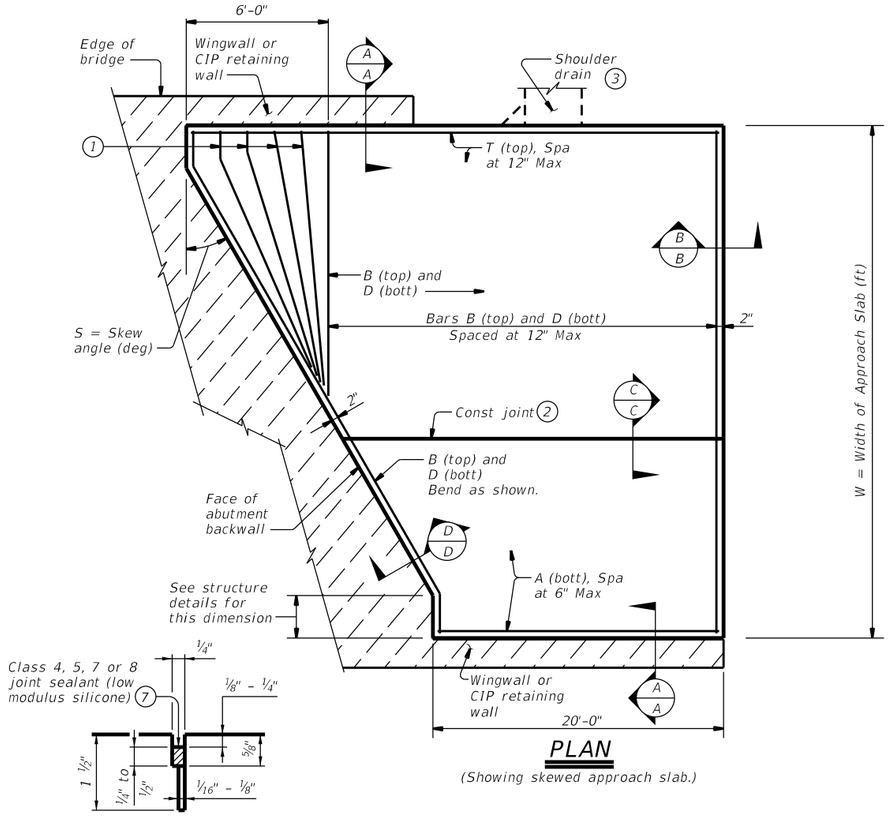
DATE:
FILE:

DATE:
FILE:



PLAN

(Showing non-skewed approach slab.)



PLAN

(Showing skewed approach slab.)

LONGITUDINAL SAW CUT JOINT DETAIL

BAR TABLE	
BAR	SIZE
A	#8
B	#5
D	#5
T	#5

APPROXIMATE QUANTITIES (4)

Reinf steel weight = 8.5 Lbs/SF of Approach Slab

Volume of Appr Slab Conc (CY) = $0.802W + 0.02W^2 \tan S$

W = Width of Approach Slab (ft)

S = Skew Angle (deg)

(1) Flare Bars B and D in this region (1'-6" Max Spa, 3" Min Spa). Minimum ared bar length = 2'-6". Bend bars as necessary.

(2) Provide longitudinal construction joints that align with longitudinal construction joints in the bridge slab with bridges built in stages. Other longitudinal construction joints must receive approval of the Engineer.

(3) See details elsewhere in plans for shoulder drain location and details.

(4) For Contractor's information only. Quantities shown are for one approach slab.

(5) Multiple piece tie bars are acceptable at longitudinal construction joints provided minimum laps shown are achieved.

(6) See details elsewhere in plans for required cross-slope.

(7) Place in accordance with Item 438.

(8) Provide backer rod that is 25% larger than joint opening and compatible with the sealant.

(9) If bridge rail is present at the wingwall or CIP retaining wall, place ½" rebonded recycled tire rubber between concrete railing and top of approach slab as shown when concrete railing projects over the approach slab.

GENERAL NOTES:

Construct approach slab in accordance with Item 422.

Provide Class "S" concrete with a minimum compressive strength of 4,000 psi.

Provide Grade 60 reinforcing steel.

Provide longitudinal joints as shown on the Longitudinal Saw Cut Joint Detail at lane lines and shoulders when width between longitudinal construction joints or edges of approach slab exceeds 16 feet. Saw cut joints within 24 hours of concrete placement to a depth of 1 ½" and seal in accordance with Item 438. Alternately, provide a controlled joint consisting of 1 ½" vinyl or plastic joint former (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)

Provide rebonded recycled tire rubber joint filler that meets the requirements of DMS-6310, "Joint Sealants and Fillers."

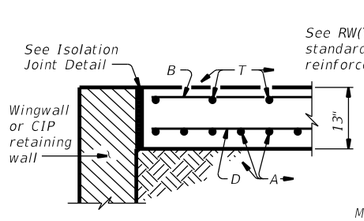
Construct the subgrade or subbase away from the bridge for a minimum distance of 100 feet prior to the approach slab, unless otherwise indicated on the plans.

Compact and finish the subgrade or foundation for the approach slab to the typical cross-section and to the lines and grades shown on the plans.

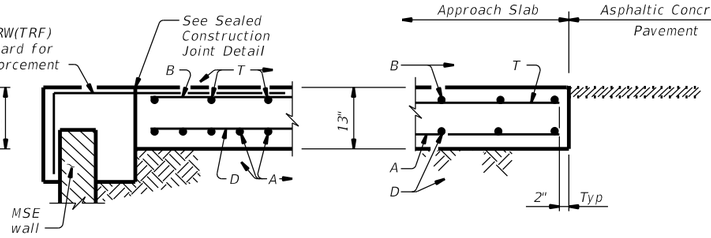
Cure for 4 days using water or membrane curing per Item 422.

All details shown herein are subsidiary to bridge approach slab.

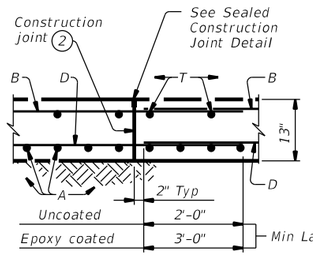
Cover dimensions are clear dimensions, unless noted otherwise.



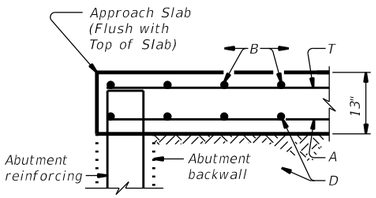
SHOWING WINGWALL OR CIP RETAINING WALL



SHOWING MSE WALL



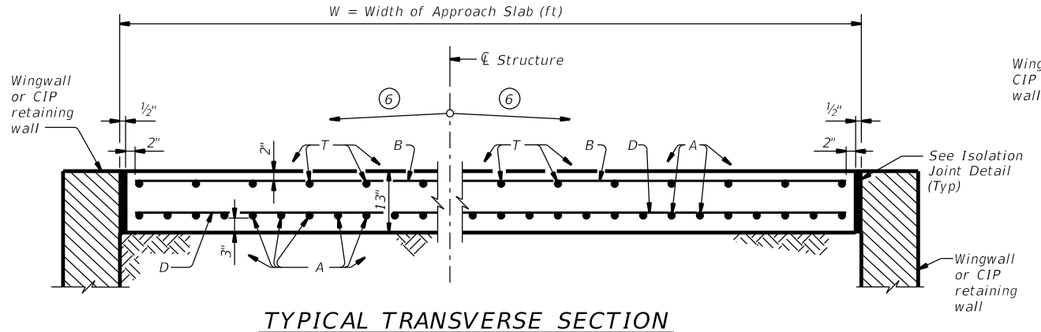
SECTION A-A



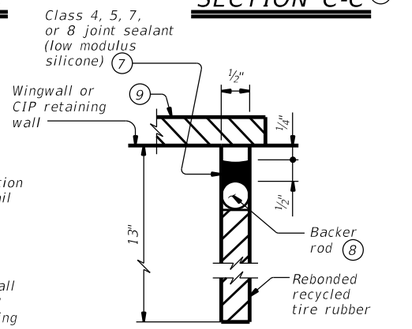
SECTION B-B

SECTION C-C (5)

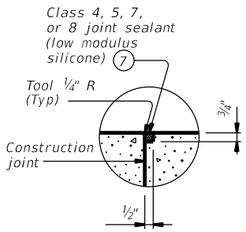
SECTION D-D



TYPICAL TRANSVERSE SECTION



ISOLATION JOINT DETAIL



SEALED CONSTRUCTION JOINT DETAIL

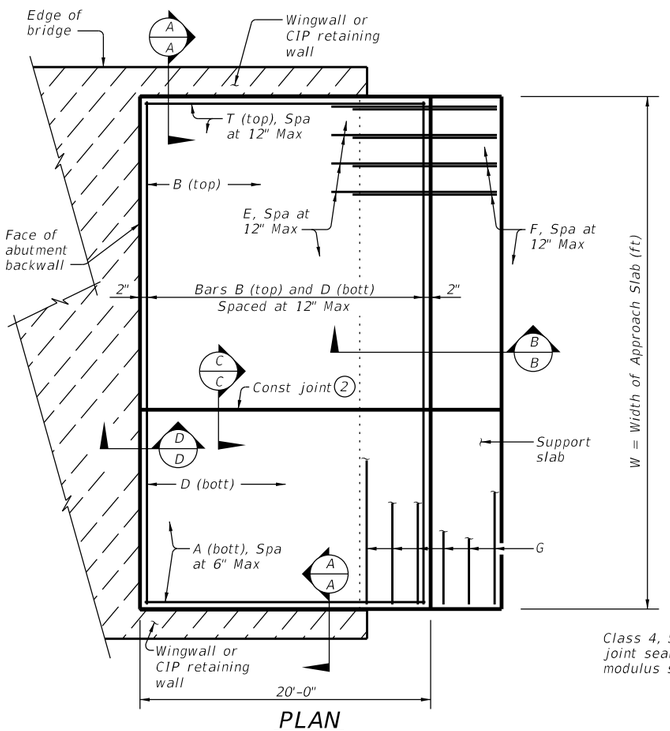
Texas Department of Transportation

Bridge Division Standard

BRIDGE APPROACH SLAB
ASPHALTIC CONCRETE PAVEMENT

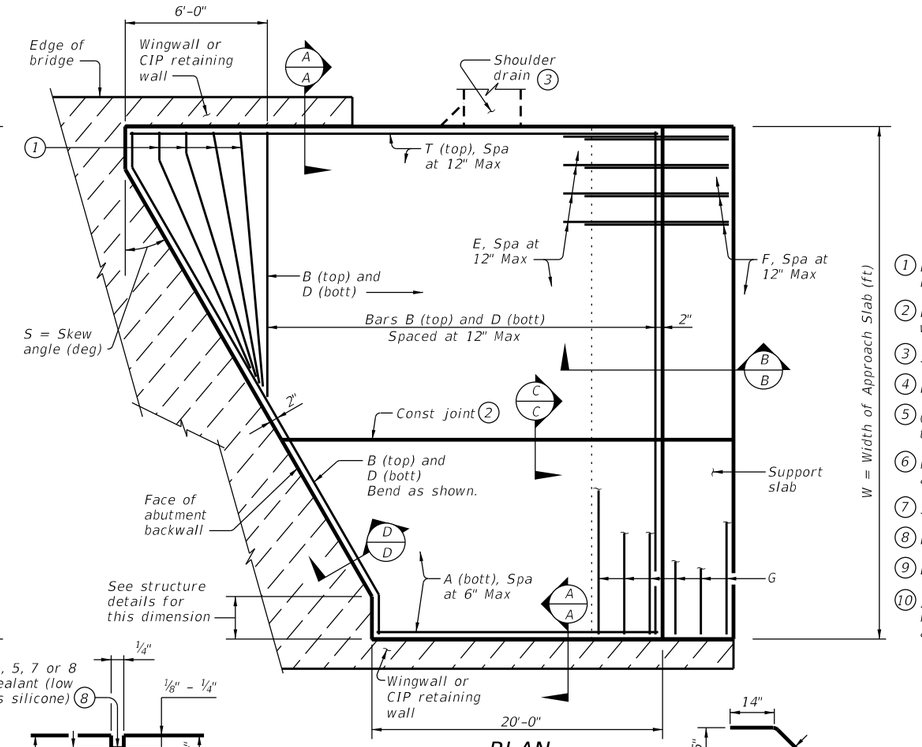
BAS-A

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
02-20: Removed stress relieving pad.	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		59



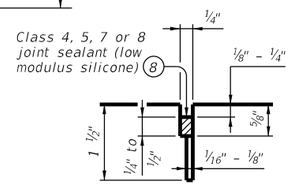
PLAN

(Showing non-skewed approach slab.)

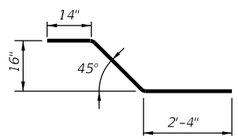


PLAN

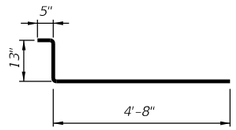
(Showing skewed approach slab.)



LONGITUDINAL SAW CUT JOINT DETAIL



BARS E (#5)



BARS F (#5)

BAR TABLE	
BAR	SIZE
A	#8
B	#5
D	#5
E	#5
F	#5
G	#5
T	#5

APPROXIMATE QUANTITIES (4)

Reinf steel weight = 8.5 Lbs/SF of Approach Slab
= 18.4 Lbs/LF of Support Slab

Vol of Appr Slab Conc (CY) = 1.057W – 0.008W x T + 0.02W² Tan S
(Includes Support Slab)

W = Width of Approach Slab (ft)

T = Conc Pavement Thickness (in)

S = Skew Angle (deg)

(1) Flare Bars B and D in this region (1'-6" Max Spa, 3" Min Spa). Minimum ared bar length = 2'-6". Bend bars as necessary.

(2) Provide longitudinal construction joints that align with longitudinal construction joints in the bridge slab with bridges built in stages. Other longitudinal construction joints must receive approval of the Engineer.

(3) See details elsewhere in plans for shoulder drain location and details.

(4) For Contractor's information only. Quantities shown are for one approach slab only.

(5) On portion of support slab that supports the concrete pavement, adjust top surface elevation, if required, to accommodate concrete pavement thickness. Smooth trowel nish. Place two layers of 30# roo ng felt.

(6) Multiple piece tie bars are acceptable at longitudinal construction joints provided minimum laps shown are achieved.

(7) See details elsewhere in plans for required cross-slope.

(8) Place in accordance with Item 438.

(9) Provide backer rod that is 25% larger than joint opening and compatible with the sealant.

(10) If bridge rail is present at the wingwall or CIP retaining wall, place ½" rebonded recycled tire rubber between concrete railing and top of approach slab as shown when concrete railing projects over the approach slab.

GENERAL NOTES:

Construct approach slab in accordance with Item 422.

Provide Class "S" concrete with a minimum compressive strength of 4,000 psi.

Provide Grade 60 reinforcing steel.

Provide longitudinal joints as shown on the Longitudinal Saw Cut Joint Detail at lane lines and shoulders when width between longitudinal construction joints or edges of approach slab exceeds 16 feet. Saw cut joints within 24 hours of concrete placement to a depth of 1 ½" and seal in accordance with Item 438. Alternately, provide a controlled joint consisting of 1 ½" vinyl or plastic joint former (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)

Provide rebonded recycled tire rubber joint ller that meets the requirements of DMS-6310. "Joint Sealants and Fillers."

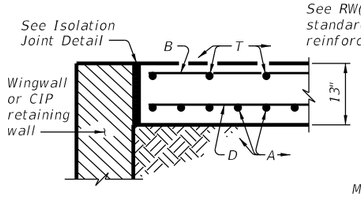
Construct the subgrade or subbase away from the bridge for a minimum distance of 100 feet prior to the approach slab, unless otherwise indicated on the plans.

Compact and nish the subgrade or foundation for the approach slab to the typical cross-section and to the lines and grades shown on the plans.

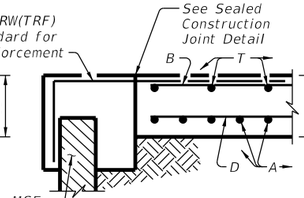
Cure for 4 days using water or membrane curing per Item 422.

All details shown herein are subsidiary to bridge approach slab.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.

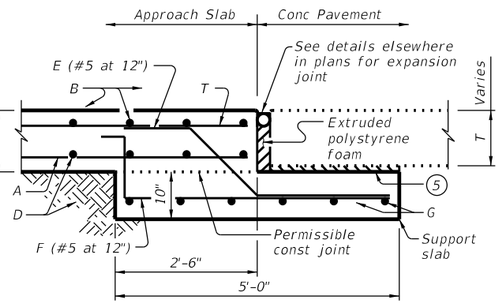


SHOWING WINGWALL OR CIP RETAINING WALL

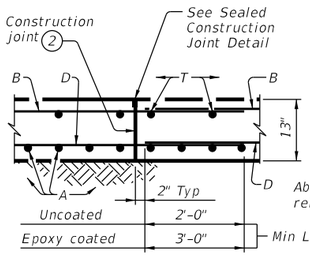


SHOWING MSE WALL

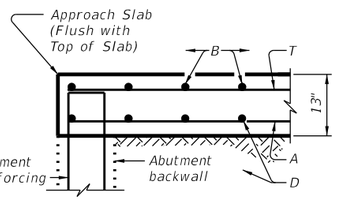
SECTION A-A



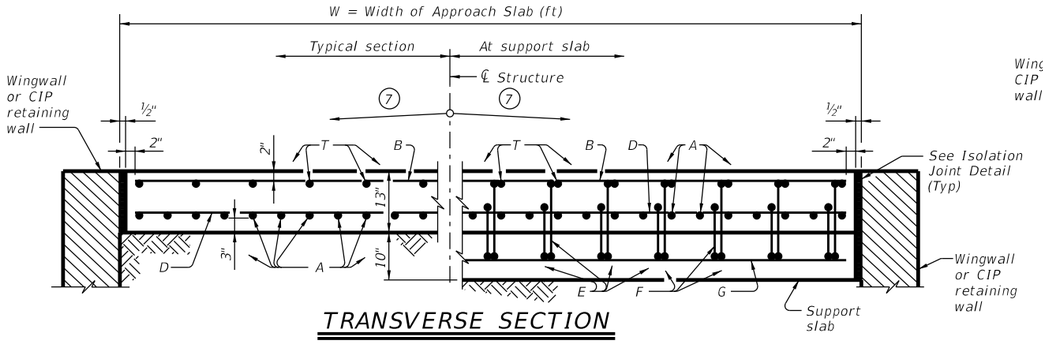
SECTION B-B



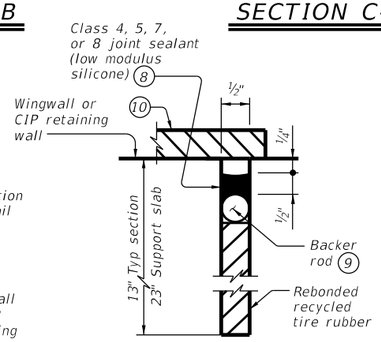
SECTION C-C (6)



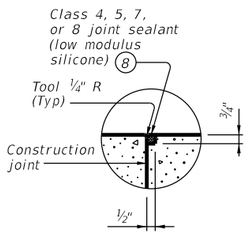
SECTION D-D



TRANSVERSE SECTION



ISOLATION JOINT DETAIL



SEALED CONSTRUCTION JOINT DETAIL

Texas Department of Transportation

Bridge Division Standard

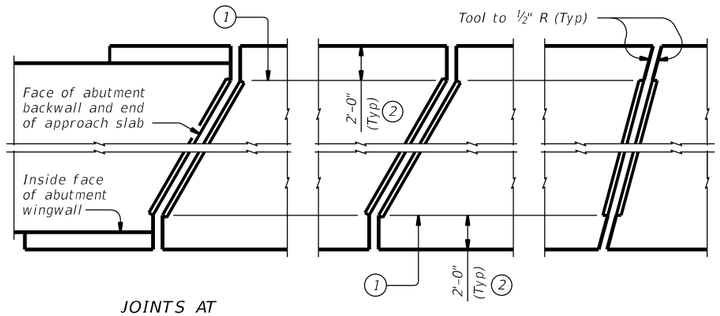
BRIDGE APPROACH SLAB
CONCRETE PAVEMENT

BAS-C

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
02-20: Removed stress relieving pad. 03-23: Note 5 changed.	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		60

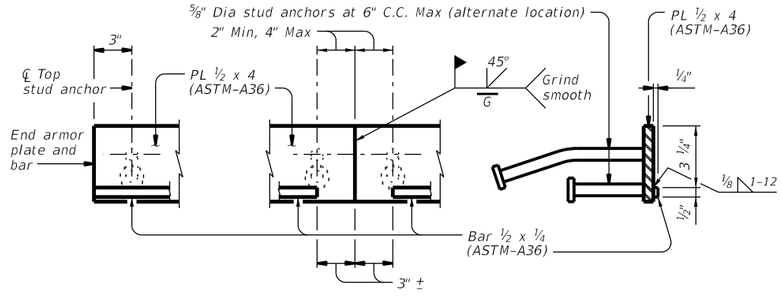
DATE:
FILE:

DATE:
FILE:



JOINTS AT ABUTMENTS | SKEWS OVER 15° | SKEWS THRU 15°

PLANS OF ARMOR PLATES



END VIEW | FIELD SPLICE | SECTION

(Studs are not shown for clarity.)

ELEVATION OF ARMOR PLATE

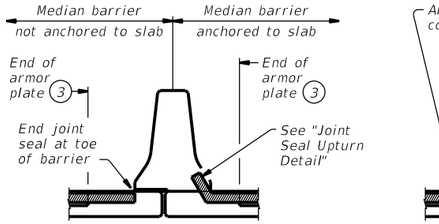
TABLE OF SEALED EXPANSION JOINT INFORMATION			
MANUFACTURER	STEEL SECTION (7)	STRIP SEAL 4" JOINT	
		Seal Type	Joint Opening (8)
D.S. Brown	As shown	V-400	2 ¼"
R.J. Watson	As shown	SF-400	2 ½"
SSI	As shown	SSS-400	2 ½"
Watson Bowman Acme	As shown	SPS-400	2"

REDUCED LONGITUDINAL MOVEMENT RANGE	
SKEW (deg)	JOINT SIZE 4"
0	4.0"
15	4.0"
30	3.5"
45	2.8"

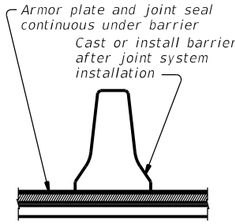
DESIGN NOTES:

Joints installed on a skew have reduced ability to accommodate longitudinal movement. Use table values to determine the correct joint size for skewed installations.

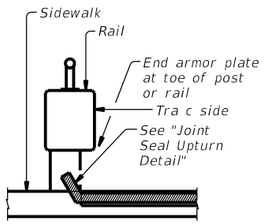
For other skews over 25 degrees, calculate reduced movement range by multiplying joint size by cosine (skew).



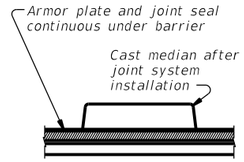
WITH OPEN DECK JOINT BELOW MEDIAN BARRIER



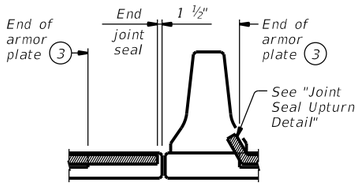
AT MEDIAN BARRIER



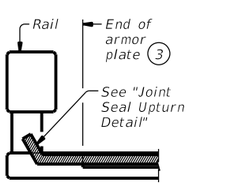
AT SIDEWALK BEHIND BRIDGE RAIL



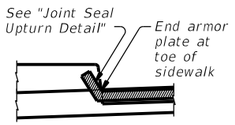
AT RAISED MEDIAN



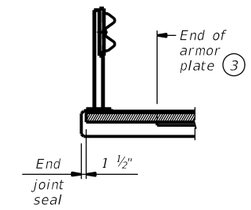
WITH OPEN DECK JOINT ADJACENT TO MEDIAN BARRIER



AT CONCRETE BRIDGE RAIL



AT SIDEWALK



AT STEEL POST BRIDGE RAIL

TYPICAL SECTIONS OF ARMOR PLATES AND SEALS (4)

(1) At Fabricator's option, armor plate may extend up to 6" beyond this point for skews through 15°.

(2) Unless shown otherwise, terminate armor plate at slab break point if break is more than 2'-0" from slab edge.

(3) See "Plans of Armor Plates".

(4) Other conditions a ecting the joint pro le should be noted elsewhere.

(5) Align shipping angle perpendicular to joint.

(6) Coat with Manufacturer's supplied epoxy primer above bar before installing sealant.

(7) Shape of steel section shown is typical. Variations in sections must be approved by the Engineer.

(8) These openings are also the recommended minimum installation openings.

FABRICATION NOTES:

Temporarily shop assemble corresponding sections of sealed expansion joints (SEJ), check for t, and match mark for shipment. Secure corresponding sections together for shipment with shipping angle. Do not use erection bolts.

The seal must be continuous and included in the price bid for sealed expansion joint.

Ship steel sections in convenient lengths of 10'-0" Min and 24'-0" Max unless necessary for staged construction or widenings. One shop splice is permitted in each shipping length provided no piece is less than 2'-0" long and su cient studs are added to limit the stud to shop splice distance to 2" Min and 4" Max.

Weld studs in accordance with AWS D1.1.

Butt weld all shop and eld splices and grind smooth areas in contact with seal. Make all necessary eld splice joint preparations in the shop.

Paint the entire steel section with System II or IV primer in accordance with Item 446, "Field Cleaning and Painting Steel." Provide paints in accordance with Item 446.2. Prepare steel and apply paint in accordance with Item 446.4.7.3 and 446.4.7.4.

Shop drawings for the fabrication of sealed expansion joints will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.

CONSTRUCTION NOTES:

Secure the sealed expansion joint in position and place to the proper grade and alignment by welding braces to adjacent reinforcing steel, to prestressed beam stirrups, or to anchors cast in concrete diaphragms. Include cost of temporary bracing in the price bid for sealed expansion joint.

Remove shipping angle immediately after each joint half is secured in place. Grind smooth, and touch up with organic zinc-rich paint.

Clean and prepare seal cavity for seal installation as per the Manufacturer's installation procedures.

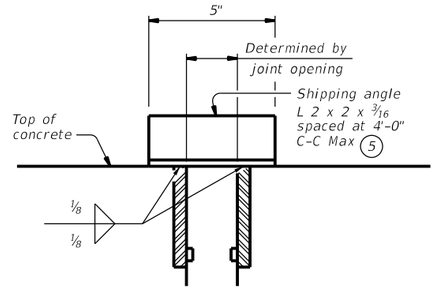
Splice and install seal in accordance with the Manufacturer's directions and with the adhesive provided by the Manufacturer.

Splice in joint seal may be performed in the eld.

GENERAL NOTES:

Provide sealed expansion joints in the size and at locations shown on the plans.

Minimum slab and overhang thickness required for the use of SEJ-B is 6 ½".

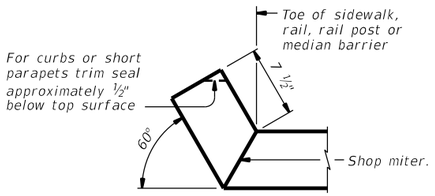


SHOWING ARMOR PLATE

(Studs not shown for clarity)

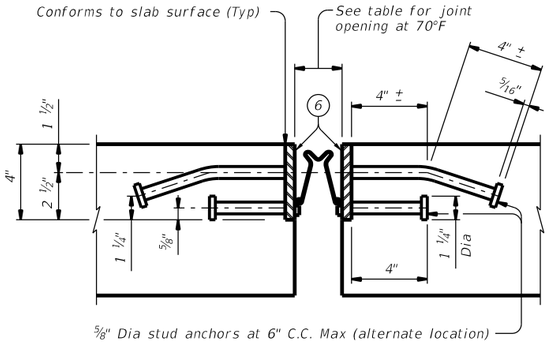
SHIPPING ANGLE

An alternate method of securing joint sections may be used if approved by the Bridge Division. Erection bolts are not allowed.



JOINT SEAL UPTURN DETAIL

Upturn seal only. Terminate armor plates as shown in "Plans of Armor Plates" and "Typical Sections of Armor Plates & Seals."



JOINT SECTION

Showing R J Watson strip seal. Other strip seals are similar.

Texas Department of Transportation

Bridge Division Standard

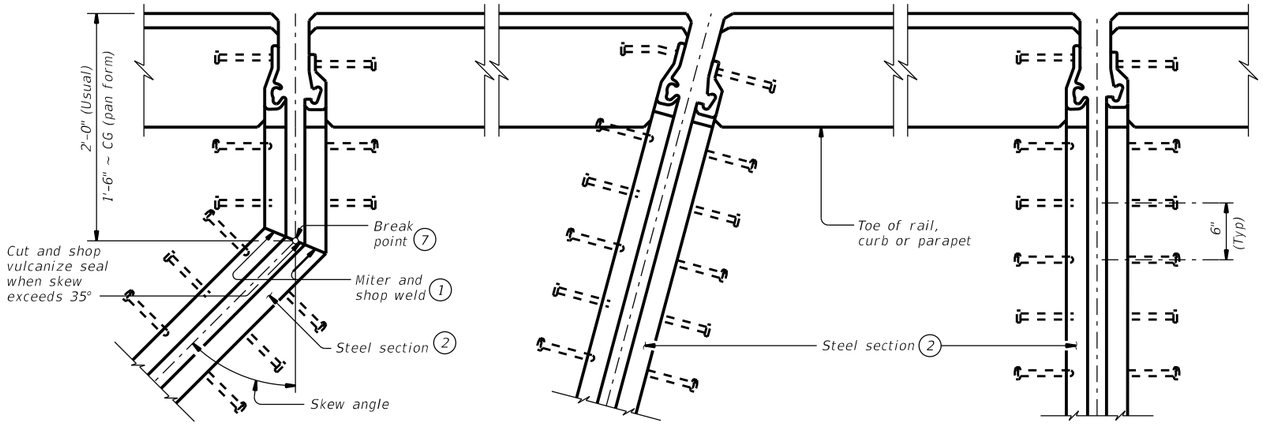
SEALED EXPANSION JOINT TYPE B

WITHOUT OVERLAY

SEJ-B

FILE:	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		61

DATE:
FILE:

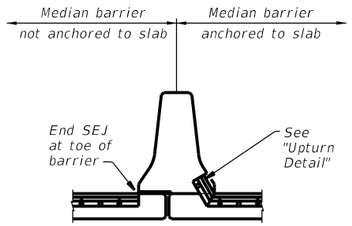


SHOWING SKEWS WITH SLAB BREAKBACKS

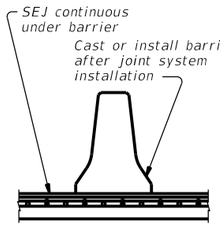
SHOWING SKEWS WITHOUT SLAB BREAKBACKS

SHOWING WITHOUT SKEWS AND SLAB BREAKBACKS

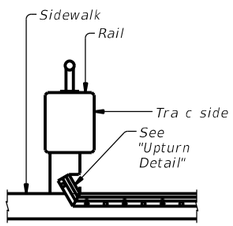
PLANS OF END CONDITIONS



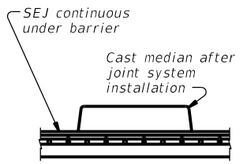
WITH OPEN DECK JOINT BELOW MEDIAN BARRIER



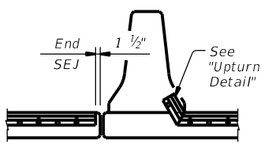
AT MEDIAN BARRIER



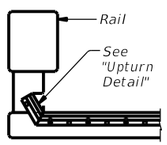
AT SIDEWALK BEHIND BRIDGE RAIL



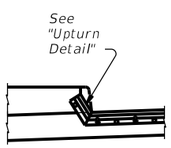
AT RAISED MEDIAN



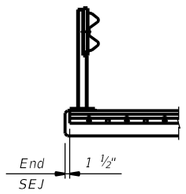
WITH OPEN DECK JOINT ADJACENT TO MEDIAN BARRIER



AT CONCRETE BRIDGE RAIL

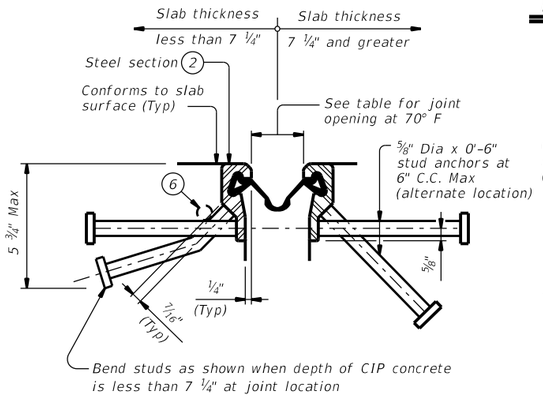


AT SIDEWALK

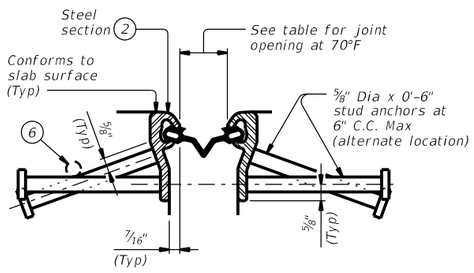


AT STEEL POST BRIDGE RAIL

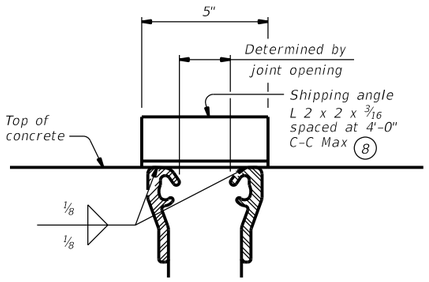
TYPICAL SECTIONS (5)



SECTION THRU WATSON BOWMAN ACME (SE-400 OR SE-500) JOINTS



SECTION THRU D.S. BROWN (A2R-400 OR A2R-XTRA) JOINTS



SHOWING D.S. BROWN (Ty SSCM2)
(All joints are similar.) (Studs are not shown for clarity.)

SHIPPING ANGLE

An alternate method of securing joint sections may be used if approved by the Bridge Division. Erection bolts are not allowed.

TABLE OF SEALED EXPANSION JOINT INFORMATION

MANUFACTURER	STEEL SECTION (2)	STRIP SEAL			
		4" JOINT		5" JOINT	
		Seal Type	Joint Opening (3)	Seal Type	Joint Opening (3)
D.S. Brown	Type SSCM2	A2R-400	1 ¾"	A2R-XTRA	2"
Watson Bowman Acme	Type R	SE-400	1 ¾"	SE-500	2"

REDUCED LONGITUDINAL MOVEMENT RANGE

SKEW (deg)	JOINT SIZE	
	4"	5"
0	4.0"	5.0"
15	4.0"	5.0"
30	3.5"	4.3"
45	2.8"	3.5"

DESIGN NOTES:

Joints installed on a skew have reduced ability to accommodate longitudinal movement. Use table values to determine the correct joint size for skewed installations.

For other skews over 25 degrees, calculate reduced movement range by multiplying joint size by cosine (skew).

(1) Remove all burrs which will be in contact with seal prior to making splice.

(2) Shape of steel section shown is typical. Variations in sections must be approved by the Engineer.

(3) These openings are also the recommended minimum installation openings.

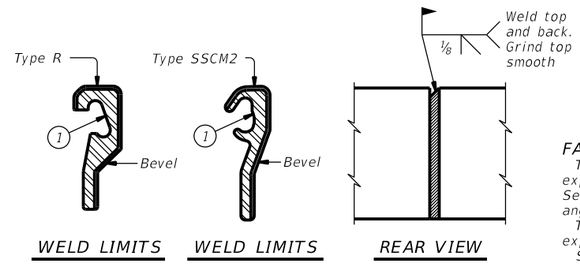
(4) Reduce for sidewalk or parapet heights less than 6".

(5) Other conditions a ecting the joint pro le should be noted elsewhere.

(6) Move transverse bars that are in con ict with SEJ studs, in either the bridge slab or approach slab, to rest at the junction of the studs.

(7) See Span details for location of break point.

(8) Align shipping angle perpendicular to joint.



WELD LIMITS WELD LIMITS REAR VIEW

FIELD SPLICE DETAIL

FABRICATION NOTES:

Temporarily shop assemble corresponding sections of sealed expansion joints (SEJ), check for t, and match mark for shipment. Secure corresponding sections together for shipment with shipping angle. Do not use erection bolts.

The seal must be continuous and included in the price bid for sealed expansion joint.

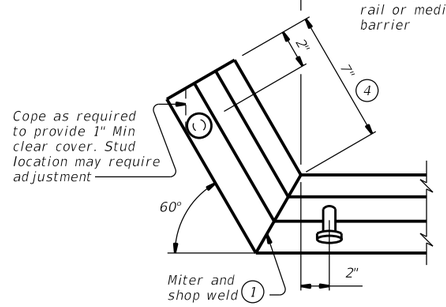
Ship steel sections in convenient lengths of 10'-0" Min and 24'-0" Max unless necessary for staged construction or widenings. One shop splice is permitted in each shipping length provided no piece is less than 2'-0" long and su cient studs are added to limit the stud to shop splice distance to 2" Min and 4" Max.

Weld studs in accordance with AWS D1.1.

Butt weld all shop and eld splices and grind smooth areas in contact with seal. Make all necessary eld splice joint preparations in the shop.

Paint the entire steel section with System II or IV primer in accordance with Item 446, "Field Cleaning and Painting Steel", unless required to galvanize when shown in the plans. Provide galvanizing in accordance with Item 445, "Galvanizing". Provide paints in accordance with Item 446.2. Prepare steel and apply paint in accordance with Item 446.4.7.3 and 446.4.7.4.

Shop drawings for the fabrication of sealed expansion joints will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.



UPTURN DETAIL

CONSTRUCTION NOTES:

Secure the sealed expansion joint in position and place to the proper grade and alignment by welding braces to adjacent reinforcing steel, to prestressed beam stirrups, or to anchors cast in concrete diaphragms. Include cost of temporary bracing in the price bid for sealed expansion joint.

Remove shipping angle immediately after each joint half is secured in place. Grind smooth, and touch up with organic zinc-rich paint.

Clean and prepare seal cavity for seal installation as per the Manufacturer's installation procedures.

GENERAL NOTES:

Provide sealed expansion joints in the size and at locations shown on the plans.

Minimum slab and overhang thickness required for the use of SEJ-M is 6 ½".

Texas Department of Transportation

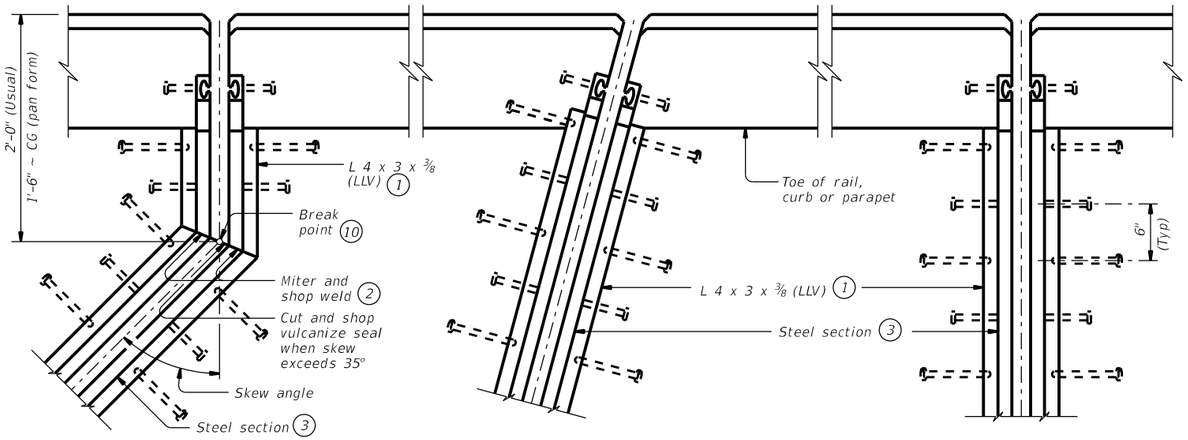
Bridge Division Standard

SEALED EXPANSION JOINT TYPE M WITHOUT OVERLAY

SEJ-M

FILE:	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		62

DATE:
FILE:



SHOWING SKEWS WITH SLAB BREAKBACKS

SHOWING SKEWS WITHOUT SLAB BREAKBACKS

SHOWING WITHOUT SKEWS AND SLAB BREAKBACKS

TABLE OF SEALED EXPANSION JOINT INFORMATION

MANUFACTURER	STEEL SECTION (3)	STRIP SEAL			
		4" JOINT		5" JOINT	
		Seal Type	Joint Opening (4)	Seal Type	Joint Opening (4)
D.S. Brown	Type SSA2	A2R-400	1 3/4"	A2R-XTRA	2"
Watson Bowman Acme	Type A	SE-400	1 3/4"	SE-500	2"

REDUCED LONGITUDINAL MOVEMENT RANGE		
SKEW (deg)	JOINT SIZE 4"	5"
0	4.0"	5.0"
15	4.0"	5.0"
30	3.5"	4.3"
45	2.8"	3.5"

DESIGN NOTES:

Joints installed on a skew have reduced ability to accommodate longitudinal movement. Use table values to determine the correct joint size for skewed installations.

For other skews over 25 degrees, calculate reduced movement range by multiplying joint size by cosine (skew).

(1) Use ASTM A36 steel for angles.

(2) Remove all burrs which will be in contact with seal prior to making splice.

(3) Shape of steel section shown is typical. Variations in sections must be approved by the Engineer.

(4) These openings are also the recommended minimum installation openings.

(5) Other conditions a ecting the joint pro le should be noted elsewhere.

(6) Reduce for sidewalk or parapet heights less than 6".

(7) 1/4" Max or as directed by the Engineer.

(8) Move transverse bars that are in con ict with SEJ studs, in either the bridge slab or approach slab, to rest at the junction of the studs.

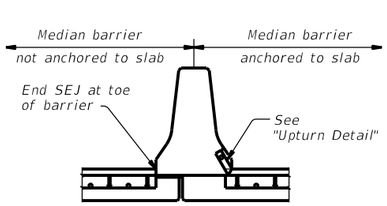
(9) Ensure grout ows into holes to obtain proper concrete consolidation under angle.

(10) See Span details for location of break point.

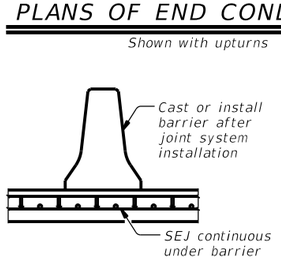
(11) Align shipping angle perpendicular to joint.

PLANS OF END CONDITIONS

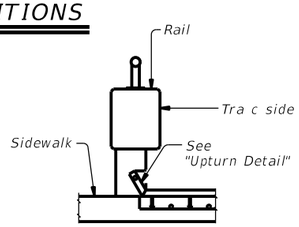
Shown with upturns



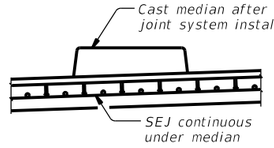
WITH OPEN DECK JOINT BELOW MEDIAN BARRIER



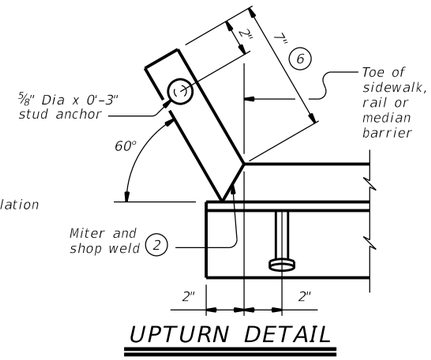
AT MEDIAN BARRIER



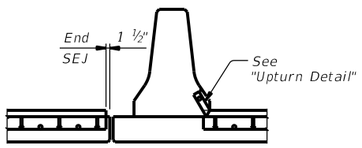
AT SIDEWALK BEHIND BRIDGE RAIL



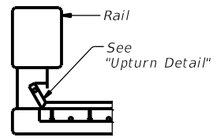
AT RAISED MEDIAN



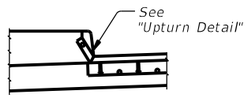
UPTURN DETAIL



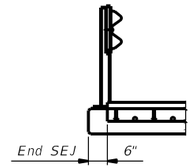
WITH OPEN DECK JOINT ADJACENT TO MEDIAN BARRIER



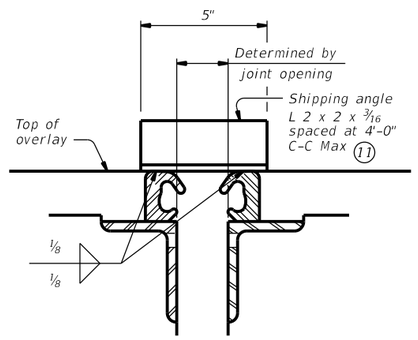
AT CONCRETE BRIDGE RAIL



AT SIDEWALK



AT STEEL POST BRIDGE RAIL

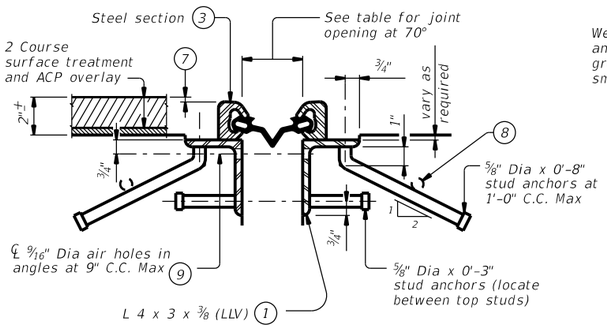


SHOWING D.S. BROWN (Ty SSA2)
Watson Bowman Acme (Type A) similar

SHIPPING ANGLE

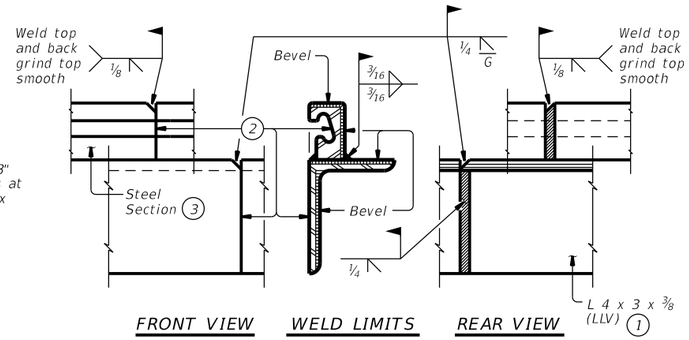
An alternate method of securing joint sections may be used if approved by the Bridge Division. Erection bolts are not allowed.

TYPICAL SECTIONS (5)



SHOWING D.S. BROWN (Ty SSA2)
Watson Bowman Acme (Type A) similar

SECTION THRU SEALED EXPANSION JOINT



FRONT VIEW WELD LIMITS REAR VIEW

SHOWING WATSON BOWMAN ACME (Ty A)
D.S. BROWN (Type SSA2) similar

FIELD SPLICE AND WELDING DETAILS

Weld preparation must be done by shop

FABRICATION NOTES:

Temporarily shop assemble corresponding sections of sealed expansion joints (SEJ), check for t, and match mark for shipment. Secure corresponding sections together for shipment with shipping angle. Do not use erection bolts.

The seal must be continuous and included in the price bid for sealed expansion joint.

Ship steel sections in convenient lengths of 10'-0" Min and 24'-0" Max unless necessary for stage construction or widenings. One shop splice is permitted in each shipping length provided no piece is less than 2'-0" long and su cient studs are added to limit the stud to shop splice distance to 2" Min and 4" Max.

Weld studs in accordance with AWS D1.1.

Butt weld all shop and eld splices and grind smooth areas in contact with seal. Make all necessary eld splice joint preparations in the shop.

Paint the entire steel section with System II or IV primer in accordance with Item 446, "Field Cleaning and Painting Steel". Provide paints in accordance with Item 446.2. Prepare steel and apply paint in accordance with Item 446.4.7.3 and 446.4.7.4.

Shop drawings for the fabrication of sealed expansion joints will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.

CONSTRUCTION NOTES:

Secure the sealed expansion joint in position and place to the proper grade and alignment by welding braces to adjacent reinforcing steel, to prestressed beam stirrups, or to anchors cast in concrete diaphragms. Include cost of temporary bracing in the price bid for sealed expansion joint.

Remove shipping angle immediately after each joint half is secured in place. Grind smooth, and touch up with organic zinc-rich paint.

Clean and prepare seal cavity for seal installation as per the manufacturer's installation procedures.

GENERAL NOTES:

Provide sealed expansion joints in the size and at locations shown on the plans.

Minimum slab and overhang thickness required for the use of SEJ-S(0) is 6 1/2".

Texas Department of Transportation

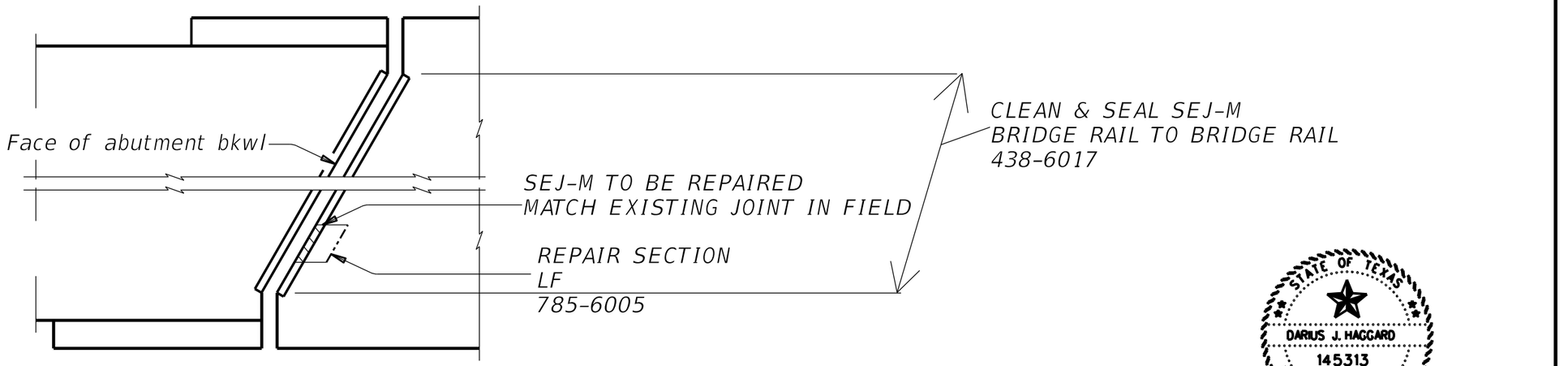
Bridge Division Standard

SEALED EXPANSION JOINT TYPE S WITH OVERLAY

SEJ-S(O)

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		63

DATE:
FILE:



STATE OF TEXAS
DARIUS J. HAGGARD
145313
LICENSED
PROFESSIONAL ENGINEER

2/29/2024

DocuSigned by:
Darius Haggard
6AB40329DA5948E...

5/3/2024

Texas Department of Transportation

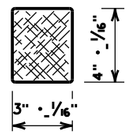
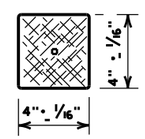
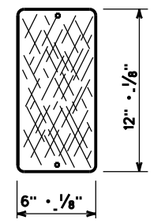
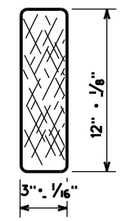
Bridge Division Standard

WORK DETAIL

SEJ-REPAIR

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		64

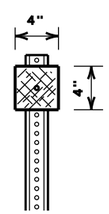
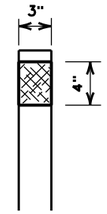
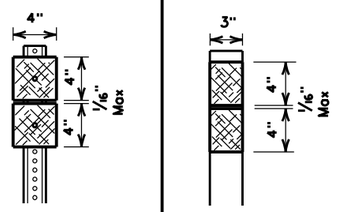
REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			

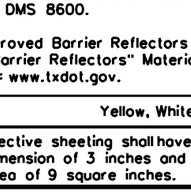
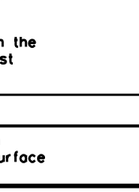
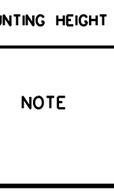
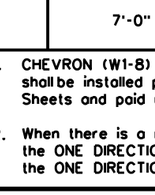
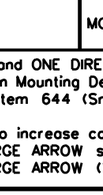
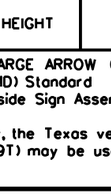
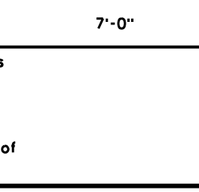
NOTE

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

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 or C Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B or C Sheeting			Red -Type B or C Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

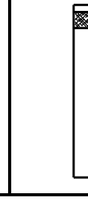
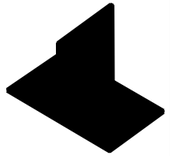
- NUMBER OF REFLECTORS
  - S • Single
  - D • Double
- COLOR OF REFLECTORS
  - W • White
  - Y • Yellow
  - R • Red
- REFLECTOR UNIT SIZE
  - 1 or 2
- TYPE OF POST OR DELINEATOR
  - WC • Wing Channel Post
  - YFLX • Yellow Flexible Post
  - WFLX • White Flexible Post
  - BRF • Barrier Reflector
- TYPE 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

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

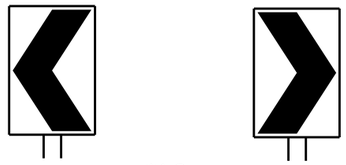
BARRIER REFLECTORS (BRF)

	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 

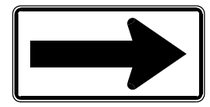
W1-8

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"	

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	6464	74	001	IH0030
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	DAL	DALLAS		65

20A

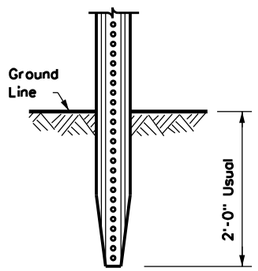
DATE:
FILE:

DATE:
FILE:

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

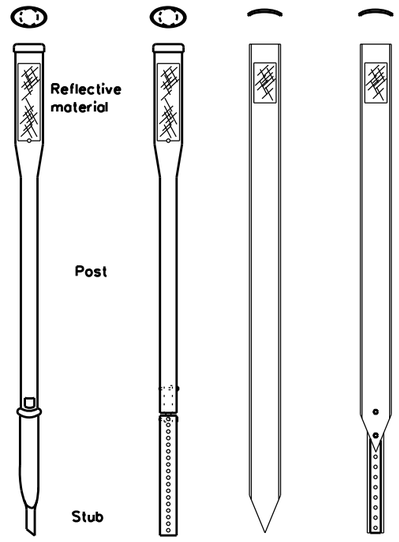


NOTES

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.

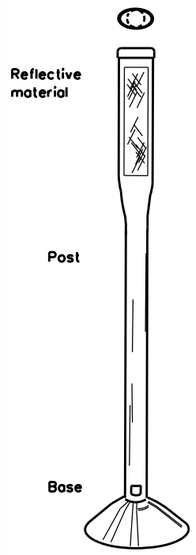
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



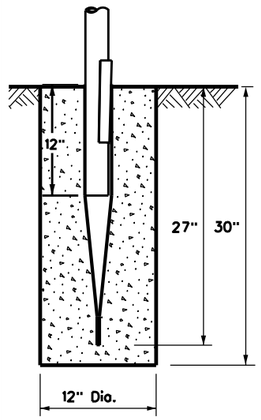
SURFACE MOUNT

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.

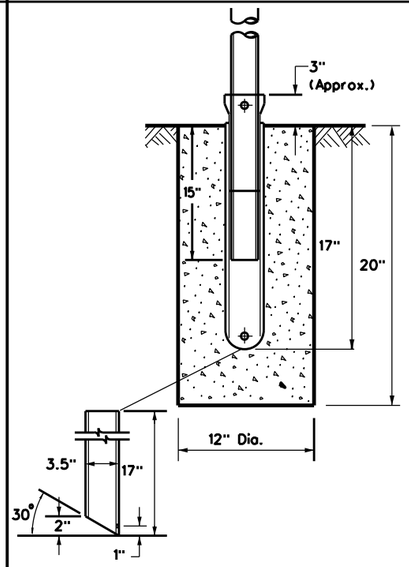
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

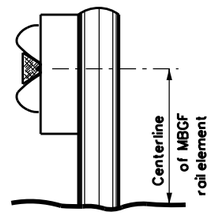
NOTE

1. Install per manufacturer's recommendations.

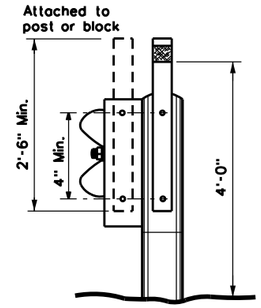
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

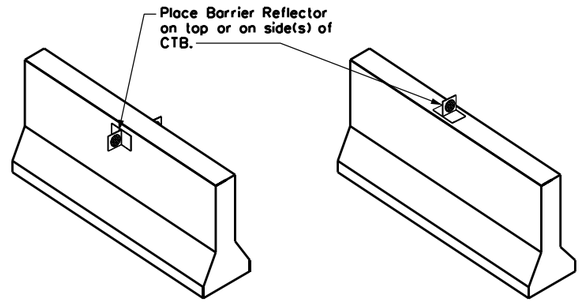
GF1



GF2



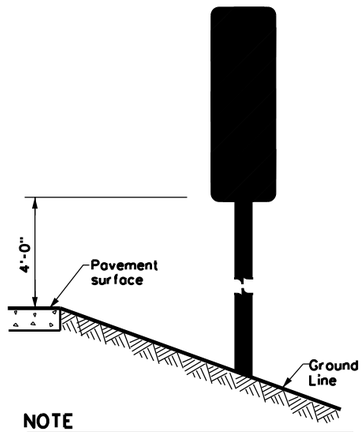
CONCRETE TRAFFIC BARRIER (CTB)



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.

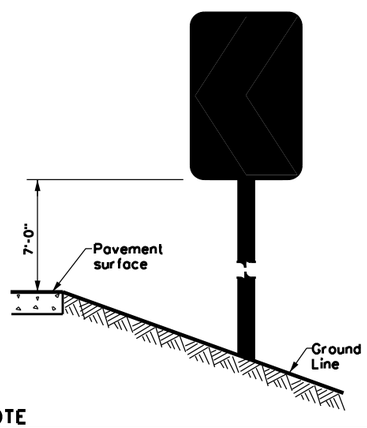
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



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)

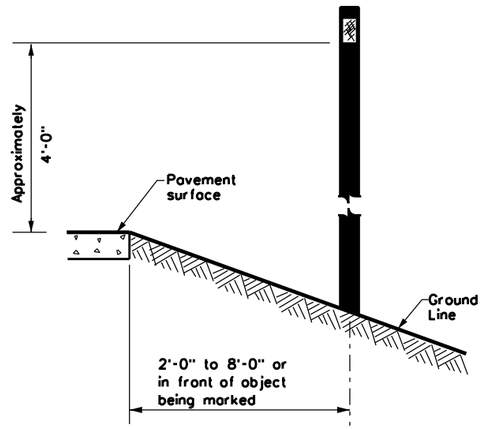
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



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
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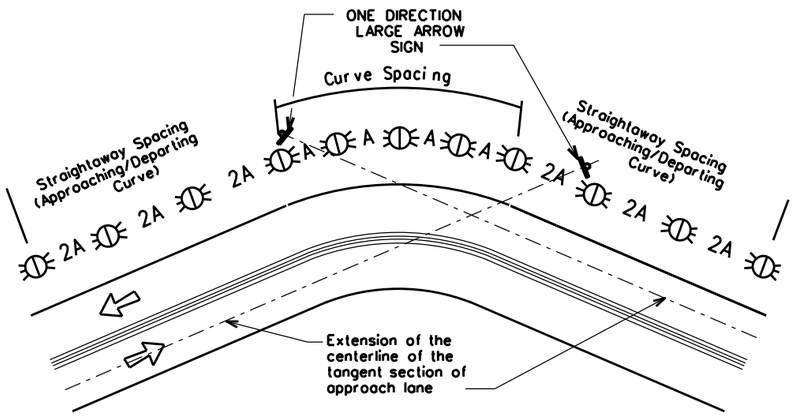
REVISIONS	6464	74	001	IH0030
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	DAL	DALLAS		66

DATE:
FILE:

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

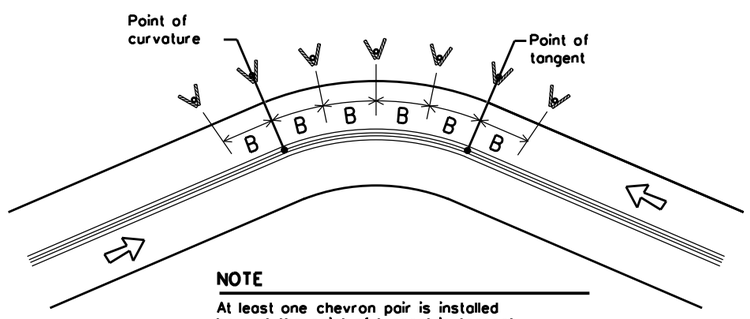
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



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
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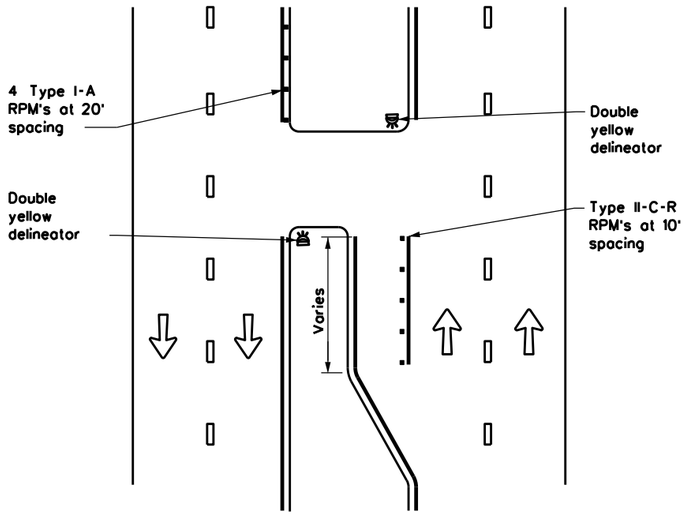
REVISIONS	6464	74	001	IH0030
3-15 8-15 8-15 7-20	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		67

20C

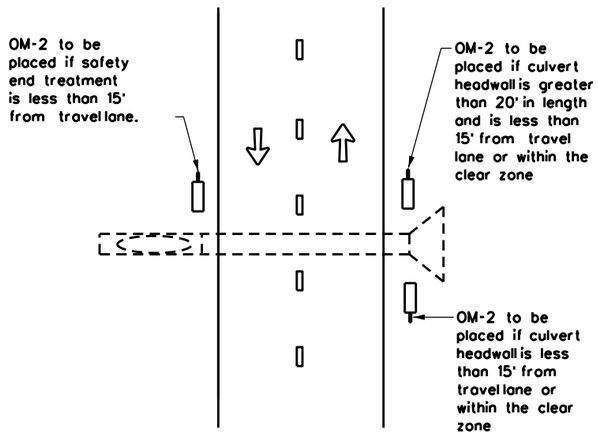
DATE:
FILE:

CROSSOVERS



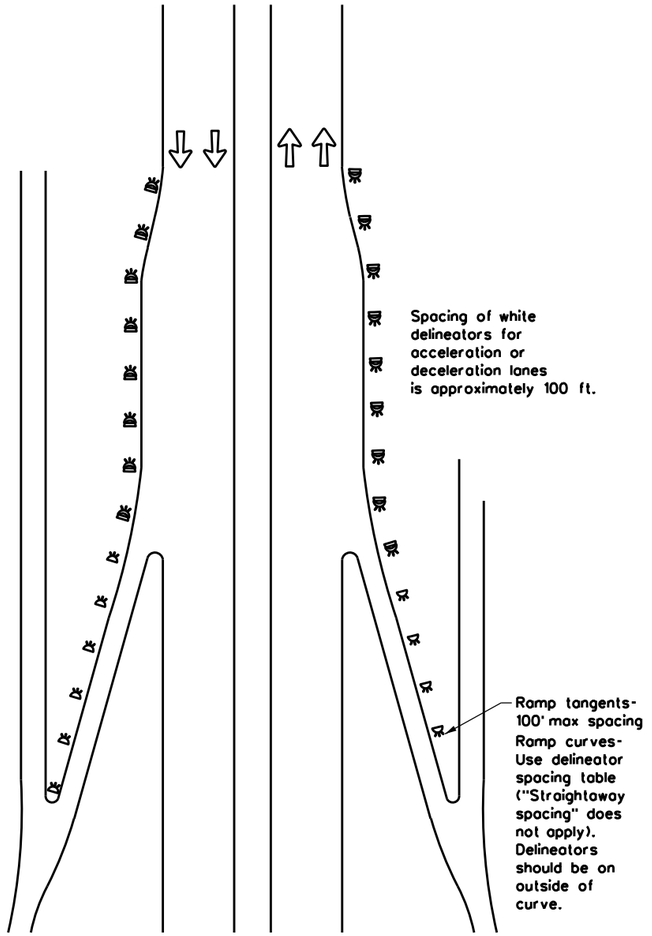
DETAIL 1

FOR CULVERTS WITHOUT MBGF



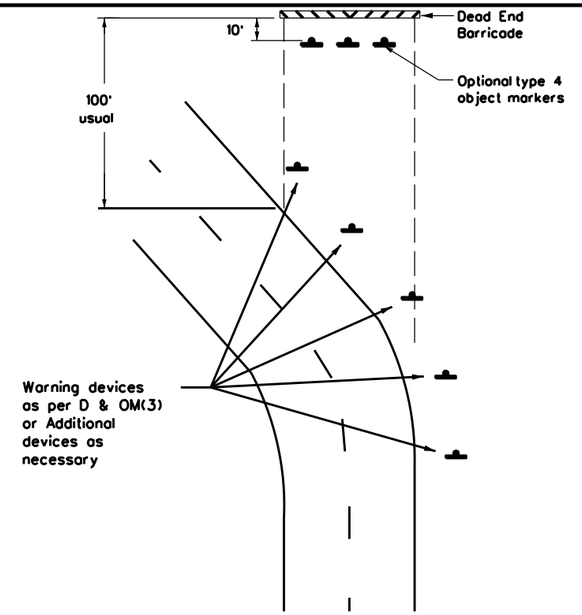
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



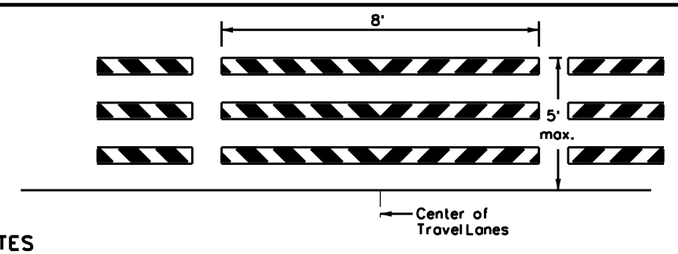
DETAIL 3

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

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

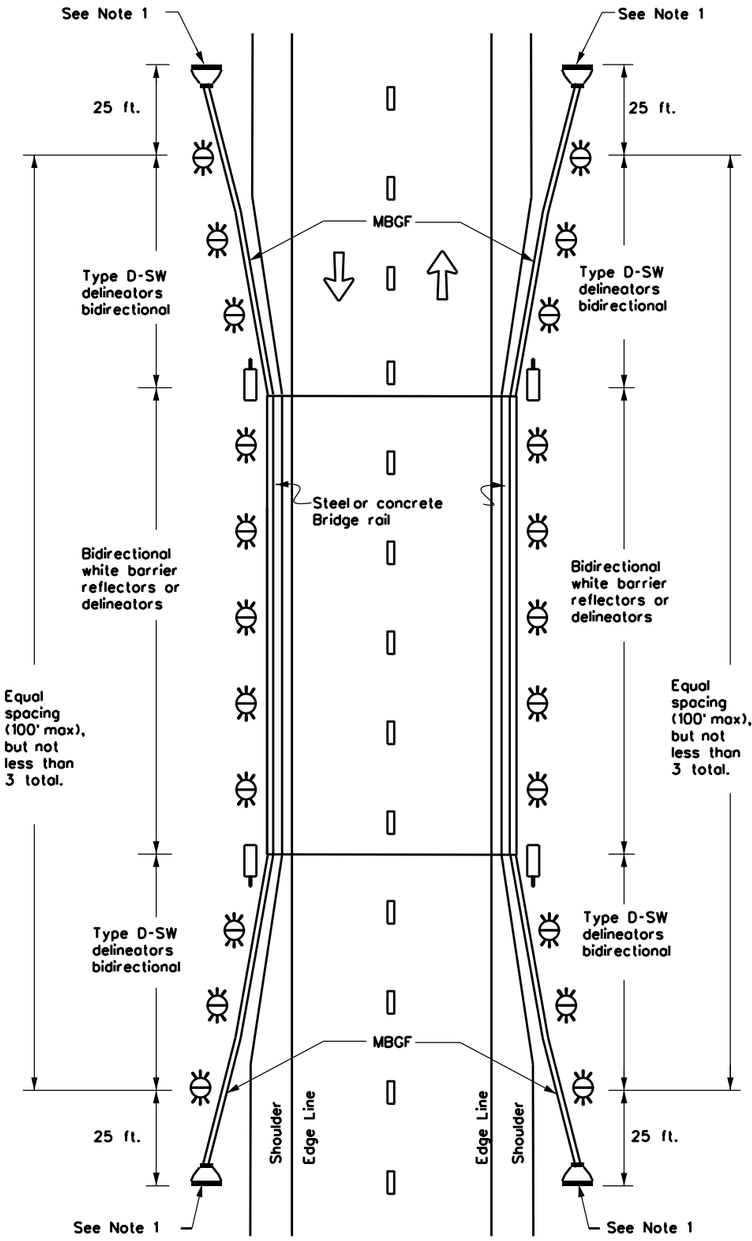
D & OM(4)-20

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
3-15 7-20	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		68

200

DATE:
FILE:

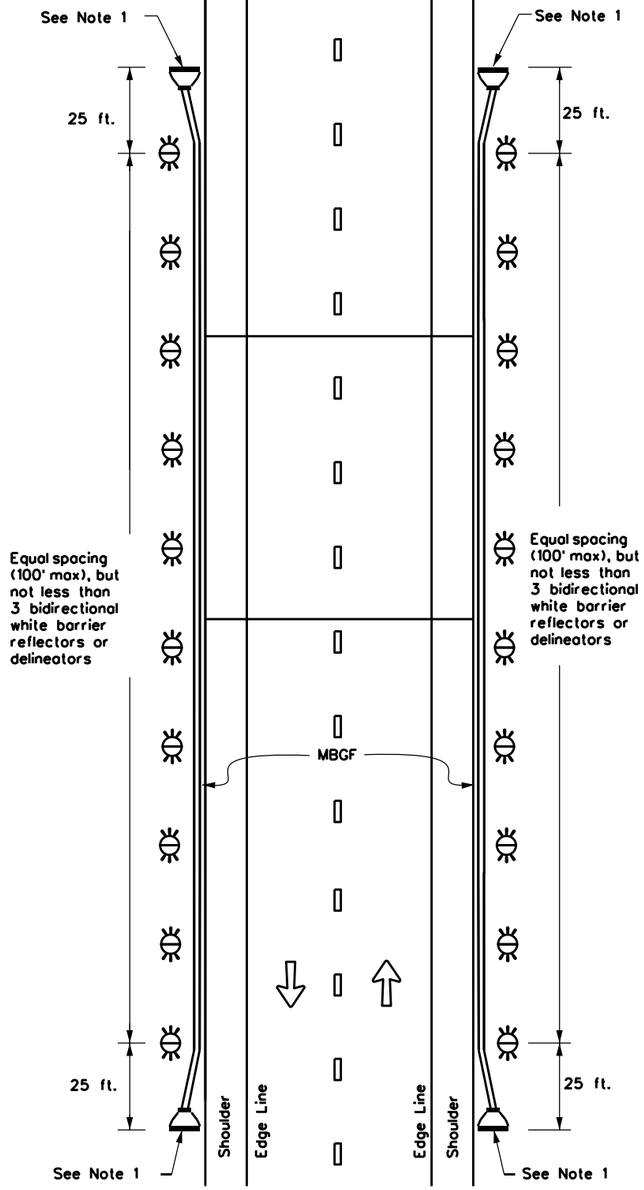
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

1. 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.

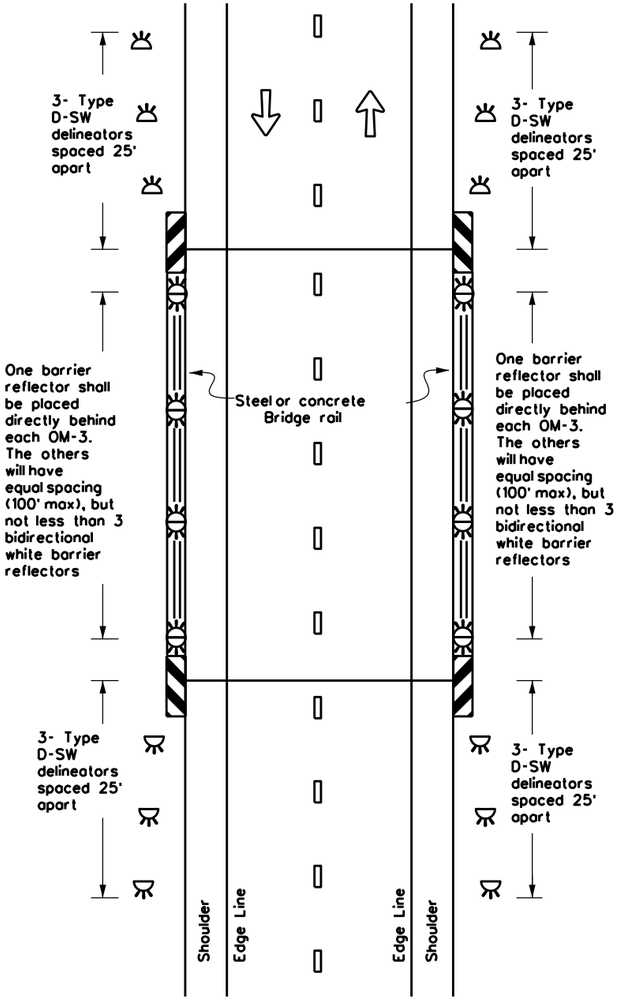
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

1. 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.

TWO-WAY, TWO LANE ROADWAY BRIDGE WITH NO APPROACH RAIL



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

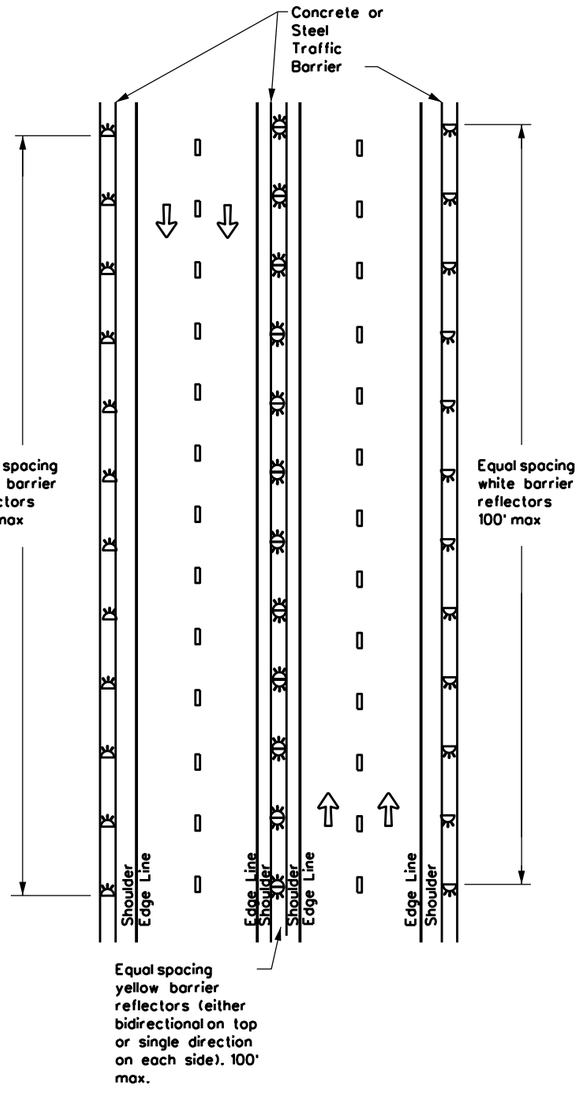
D & OM(5)-20

FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
7-20	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		69

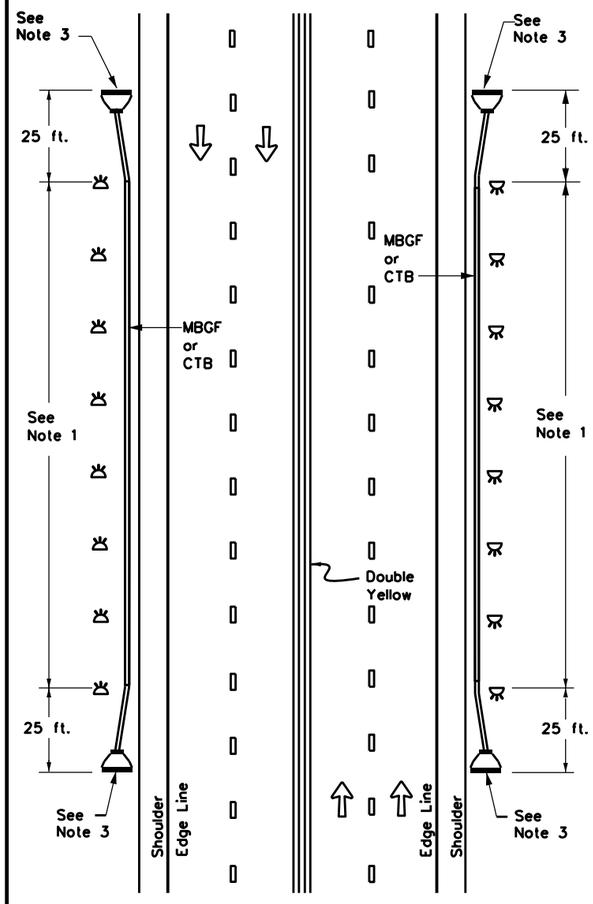
20E

DATE:
FILE:

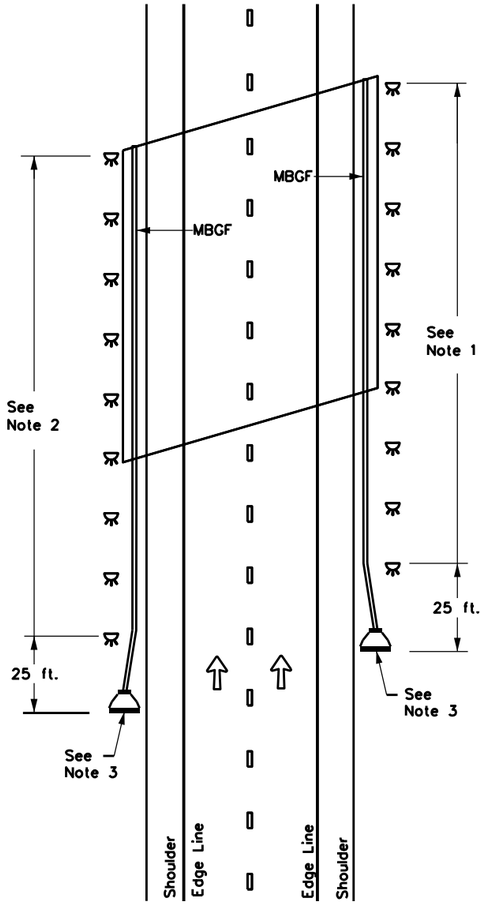
CONTINUOUS CONCRETE OR STEEL BARRIER



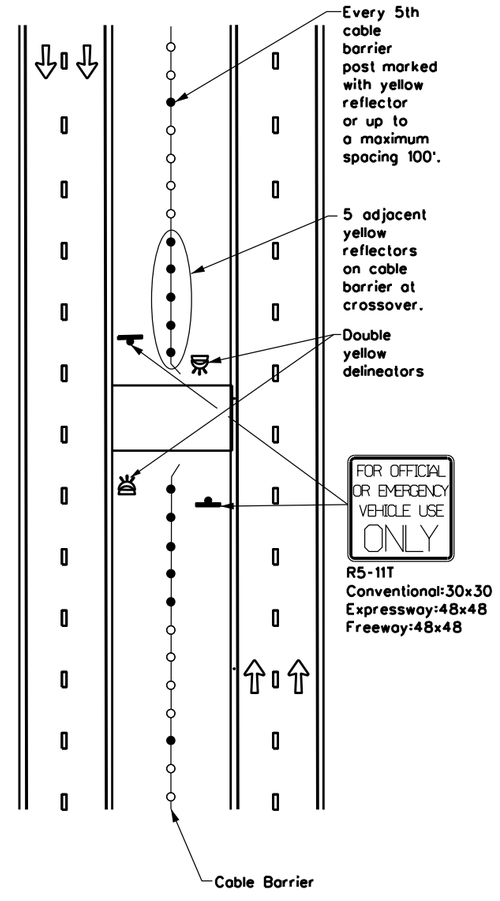
MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



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

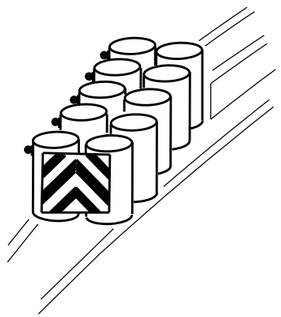
Traffic Safety Division Standard

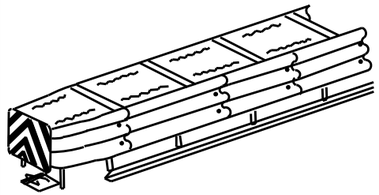
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

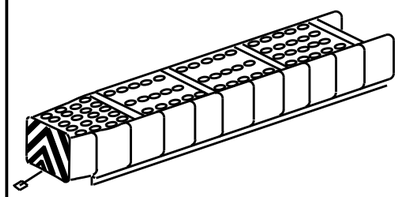
D & OM(6)-20

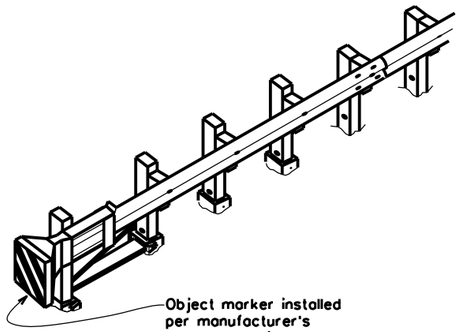
FILE: dom6-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
7-20	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		70

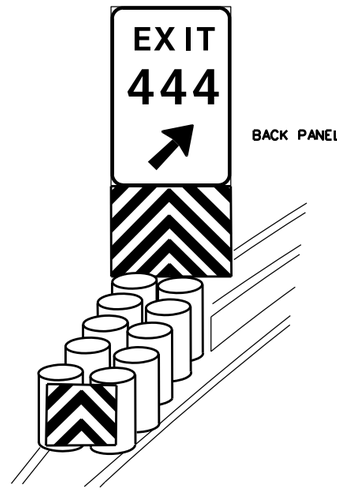
20F

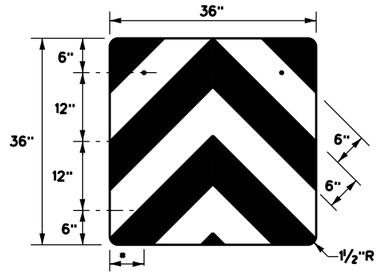


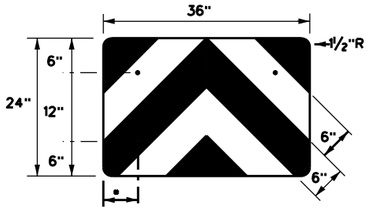




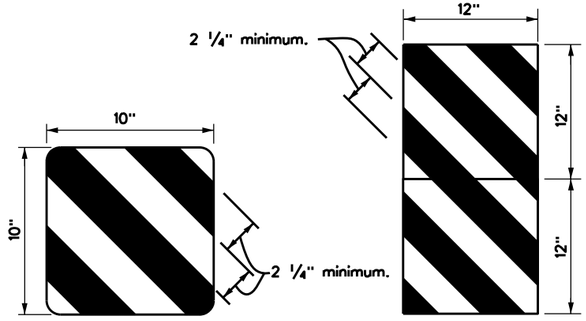




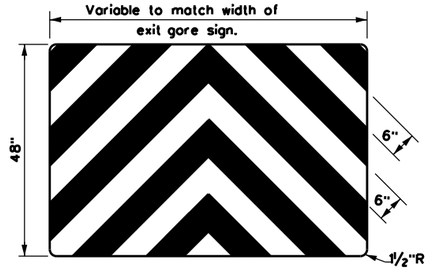


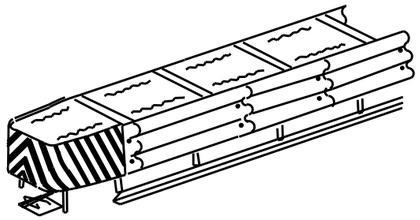


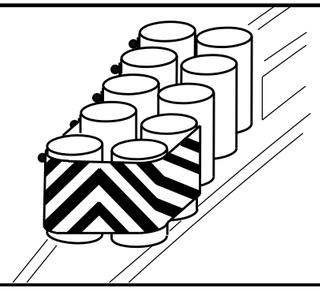
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

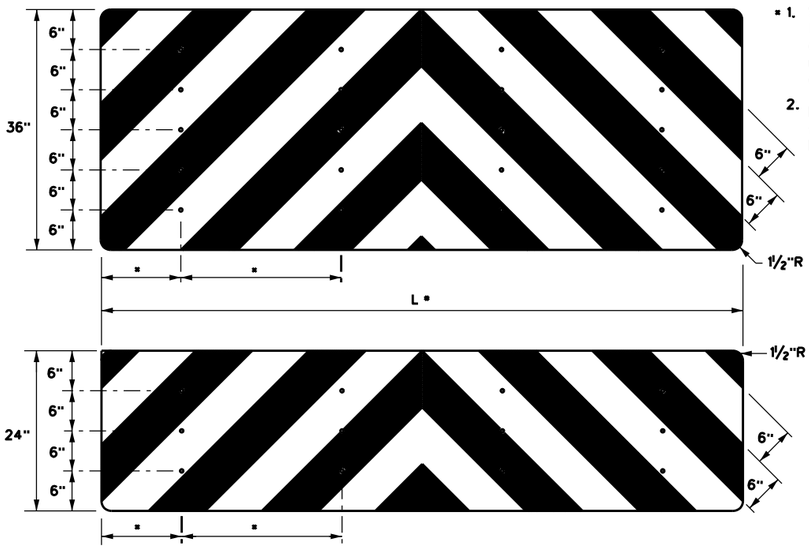


OBJECT MARKERS SMALLER THAN 3 FT^2









* 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.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-20

FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	DAL	DALLAS		71
4-98 7-20				

20G

DATE:
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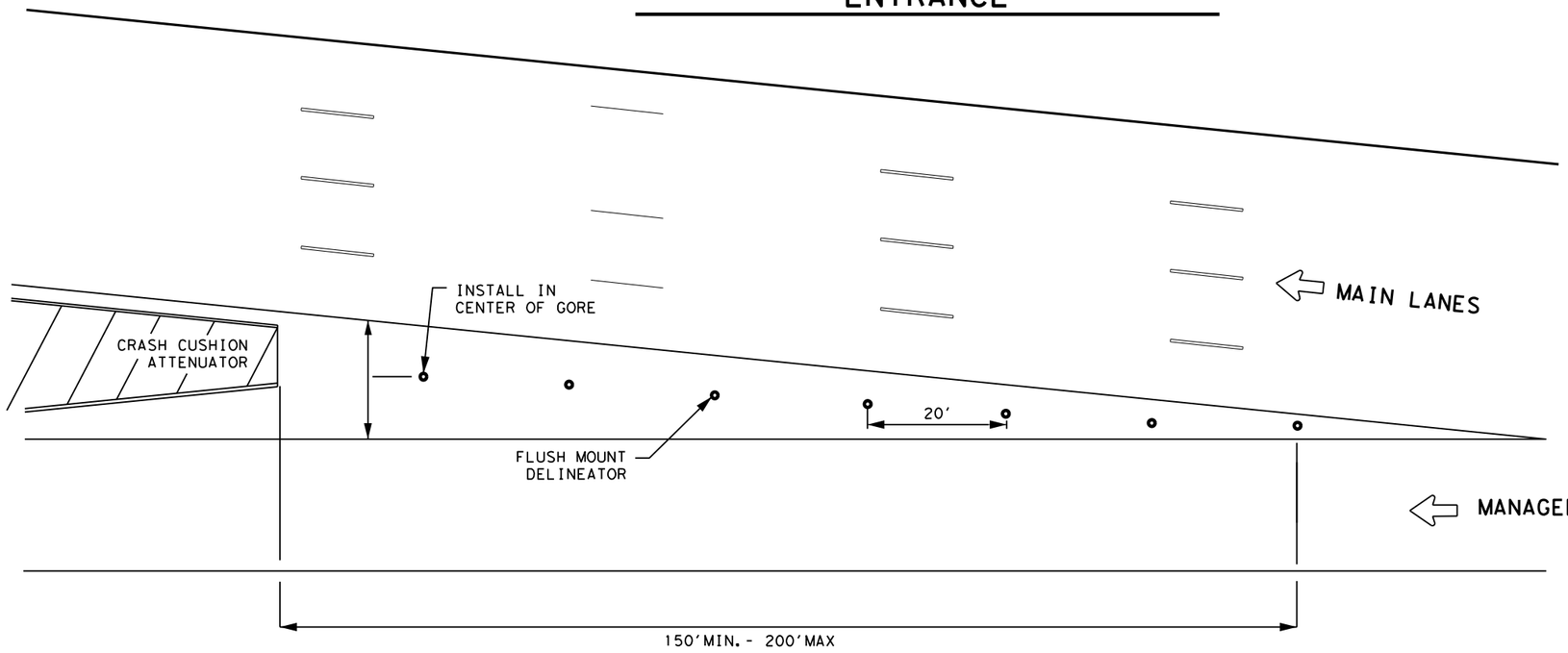
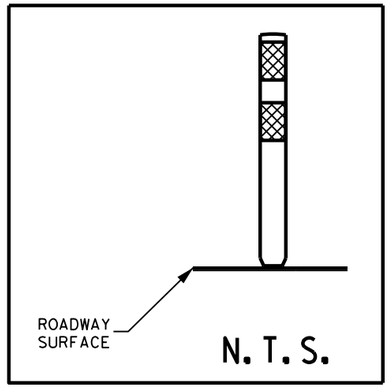
DATE:
FILE:

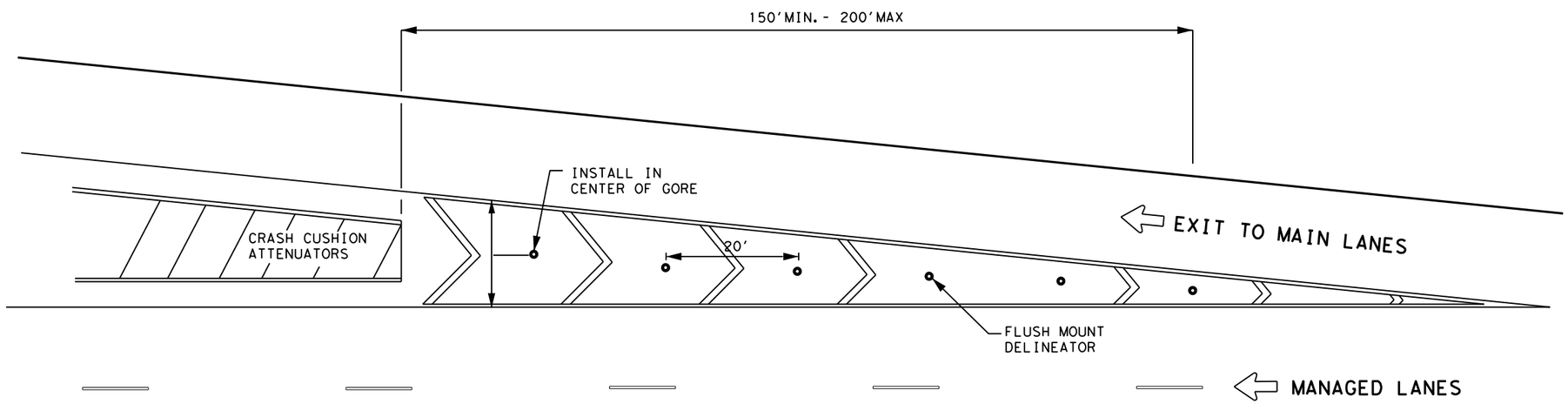
ENTRANCE



LEGEND	
⇦	Traffic flow
o	GROUND MOUNT DELINEATORS



EXIT



STATE OF TEXAS
DARIUS J. HAGGARD
145313
LICENSED
PROFESSIONAL ENGINEER

2/29/2024

DocuSigned by:
Darius Haggard
6A840329DA5B4BE...

5/3/2024

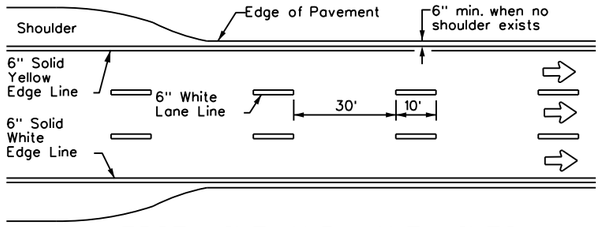
Texas Department of Transportation

Traffic Safety Division Standard

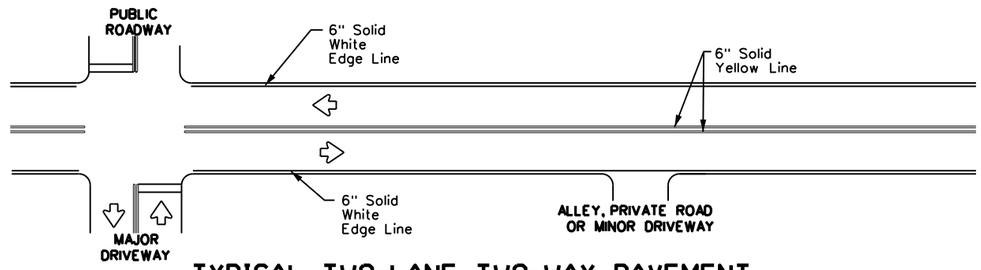
ENTRANCE/EXIT GORE FLUSH MOUNT DELINEATORS

FILE:	DN:	CK:	DW:	CK:
© TxDOT February 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		72

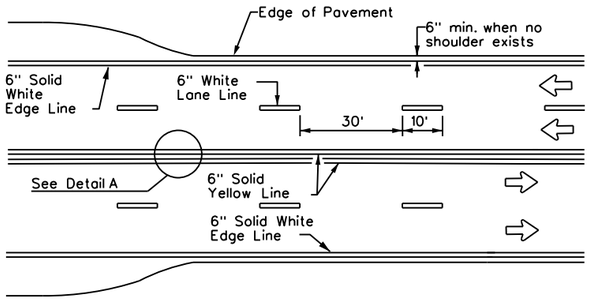
23E

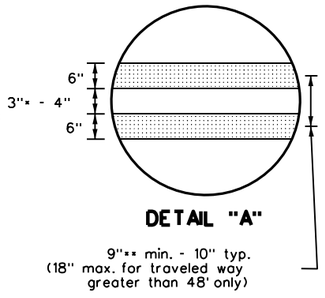


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

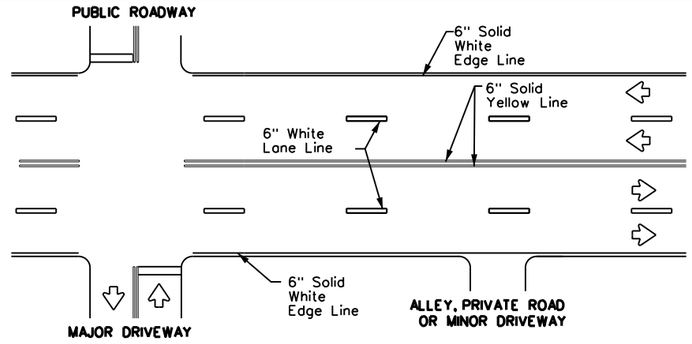




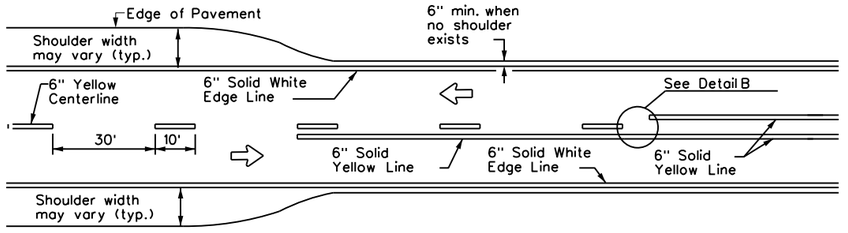
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

* 2" minimum for restripe projects when approved by the Engineer.

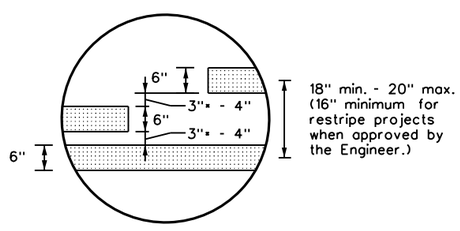
** 8" minimum for restripe projects when approved by the Engineer.



TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

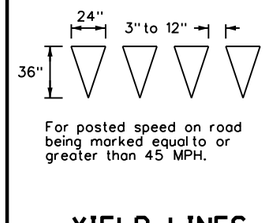


TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



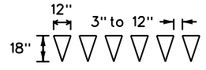
DETAIL "B"

* 2" minimum for restripe projects when approved by the Engineer.

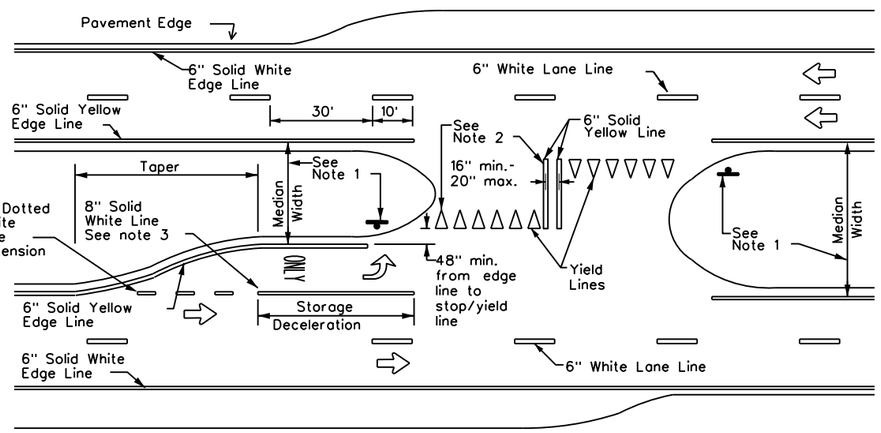


For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES



For posted speed on road being marked equal to or less than 40 MPH.



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

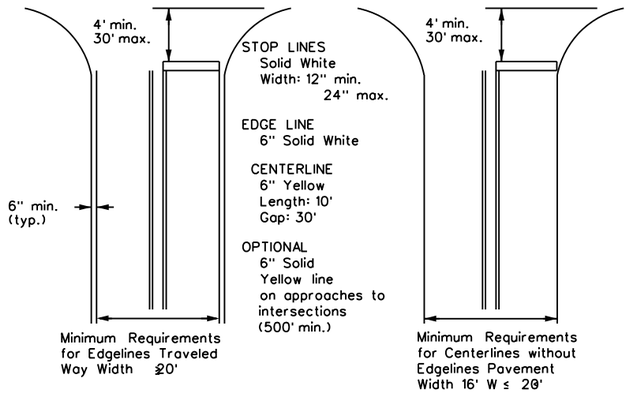
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections.
   Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.
2. Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines shall only be used with yield signs.
3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

GENERAL NOTES

1. Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines are not required in curb and gutter sections of roadways.
2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the center of edge line to the center of edge line of a two lane roadway.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



NOTE: Traveled way is exclusive of shoulder widths. Refer to General Note 2 for additional details.

GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Roadways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

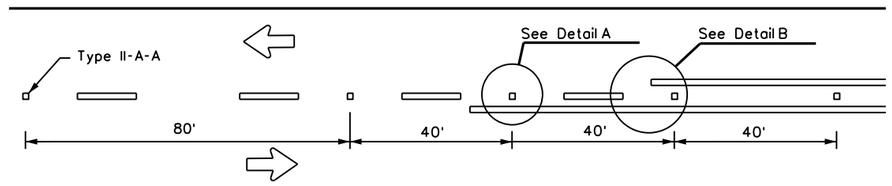
PM(1)-22

FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
11-78 8-00 6-20	DIST	COUNTY		SHEET NO.
8-95 3-03 12-22	DAL	DALLAS		73
5-00 2-12				

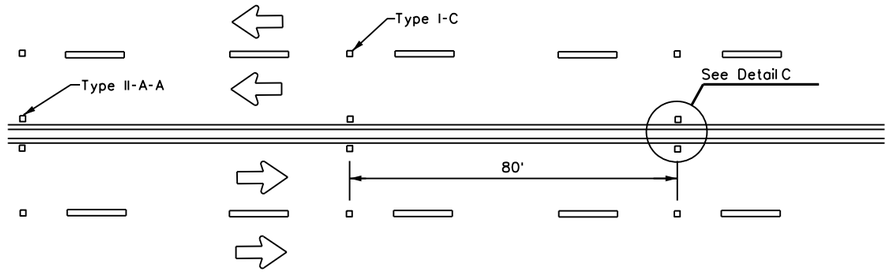
22A

DATE:
FILE:

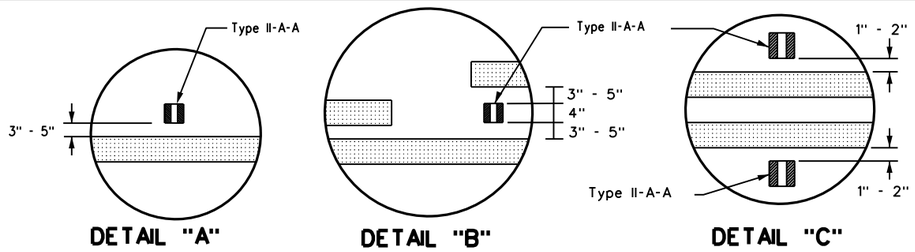
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

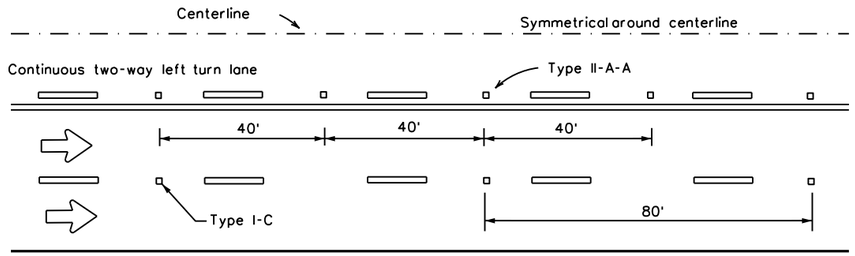


CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS

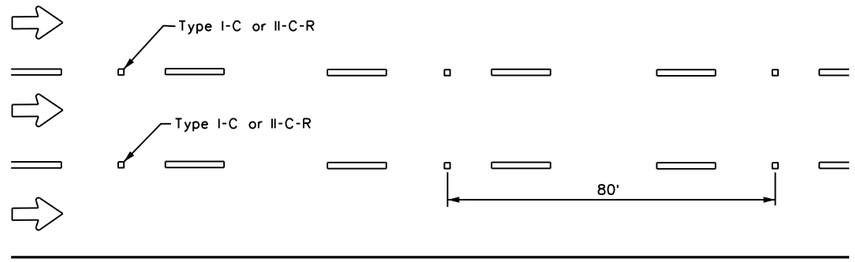


CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS





CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



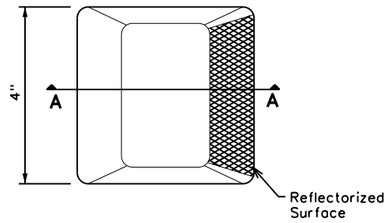
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.

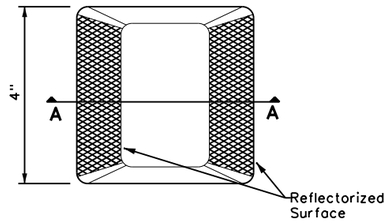
See Note 3.

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

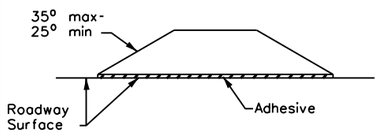
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

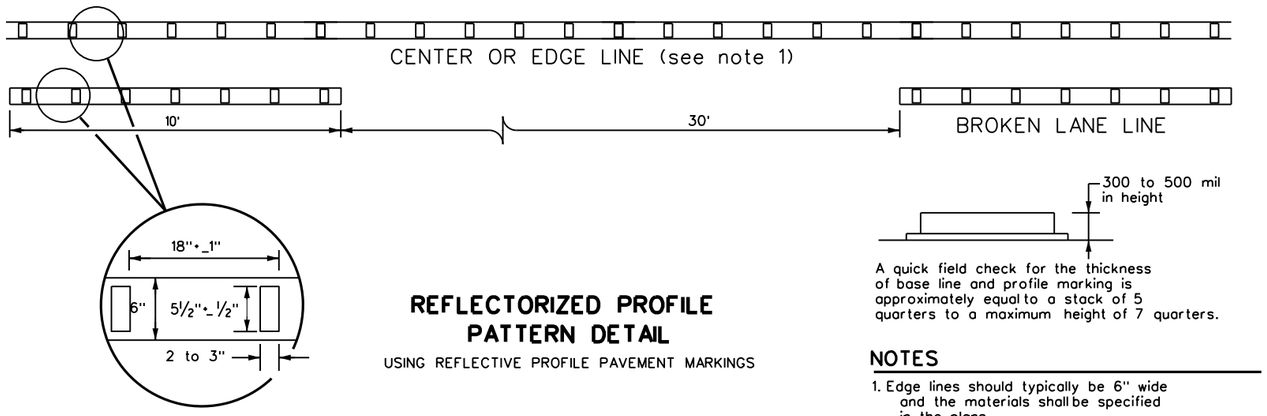


Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS



REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

NOTES

1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

1. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements, the raised pavement markers should be placed to one side of the longitudinal joints.
3. Use raised pavement marker Type I-C with undivided roadways, flush medians, and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.

Texas Department of Transportation

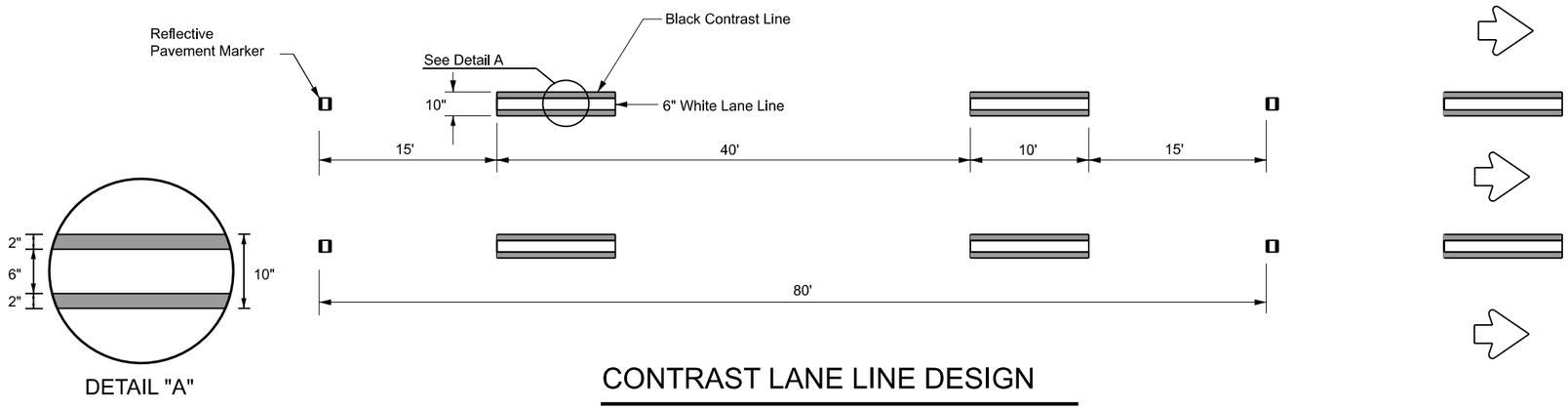
Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS REFLECTORIZED PROFILE MARKINGS PM(2)-22

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-77 8-00 6-20 4-92 2-10 12-22 5-00 2-12	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		74

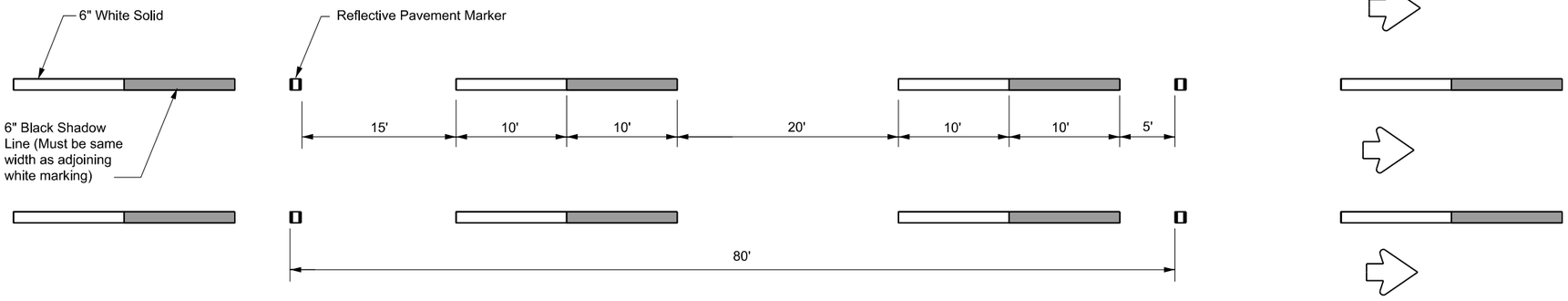
22B

DATE:
FILE:

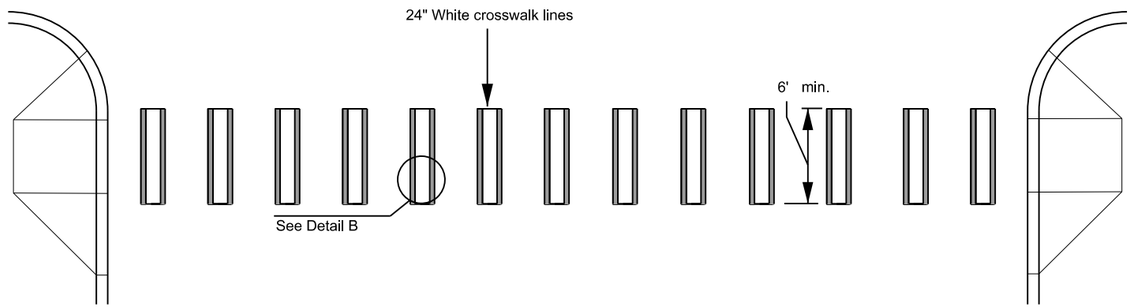


DETAIL "A"

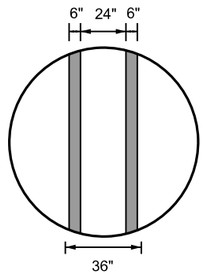
CONTRAST LANE LINE DESIGN



SHADOW LANE LINE DESIGN



CONTRAST CROSSWALK DESIGN



DETAIL "B"

(See PM(4) for crosswalk line placement details)

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 Safety Division Standard

CONTRAST AND SHADOW PAVEMENT MARKINGS

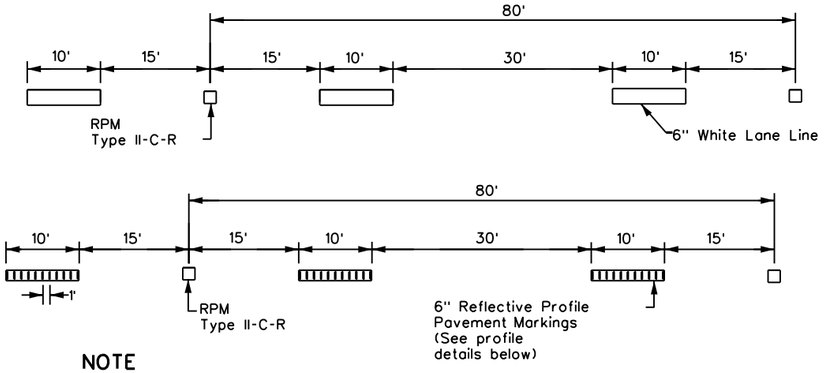
CPM(1)-23

FILE: CPM(1)-23.dgn	DN:	CK:	DW:	CK:
© TxDOT February 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
5-14	DIST	COUNTY		SHEET NO.
2-23	DAL	DALLAS		75

22N

DATE:
FILE:

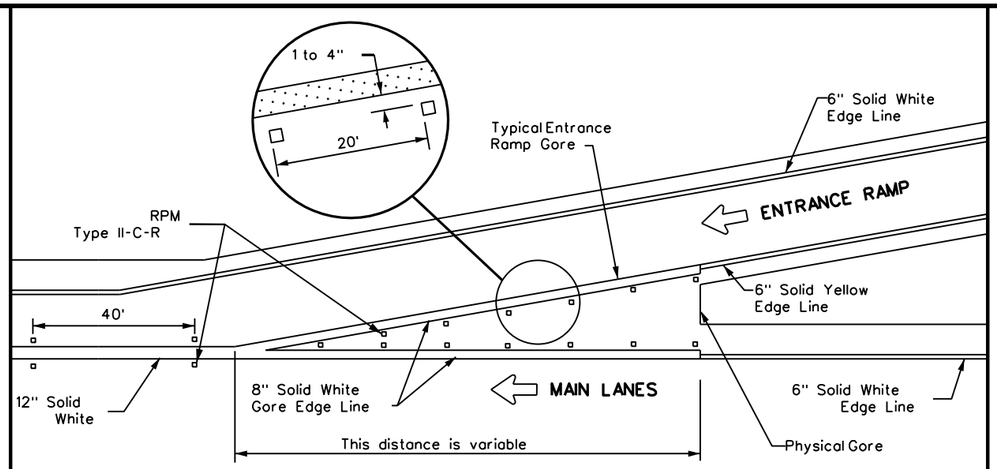
DATE:
FILE:



NOTE

Reflectorized raised pavement markers 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. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.

TRAFFIC LANE LINES PAVEMENT MARKING

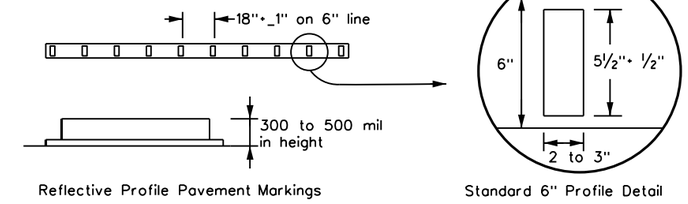


TYPICAL ENTRANCE RAMP GORE MARKING

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.

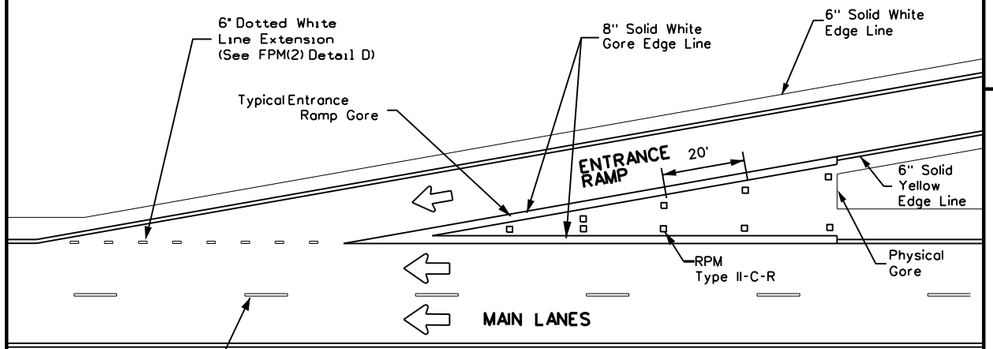
LEGEND	
⇦	Traffic flow
↱	Pavement marking arrows (white)
▫	Reflectorized Raised Markers (RPM) Type II-C-R



NOTE

Edge lines should typically be 6" wide and the materials shall be as specified in the plans. See details above if reflective profile pavement markings are to be used.

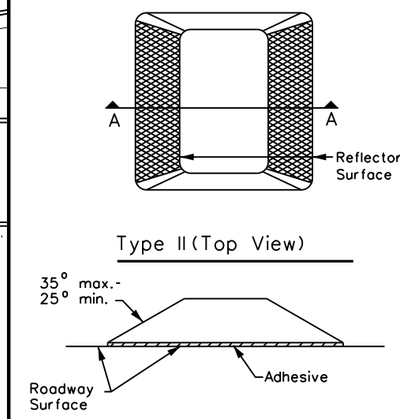
EDGE LINE PAVEMENT MARKINGS



NOTE

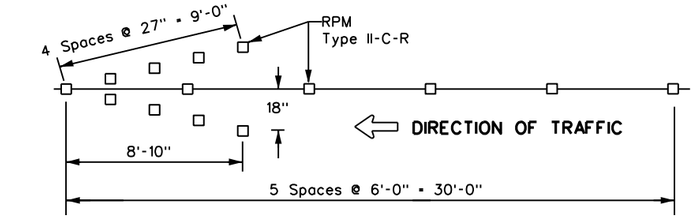
See the Roadway Design Manual Chapter 3 to determine if a tapered acceleration lane may be used.

TAPERED ACCELERATION LANE



SECTION A

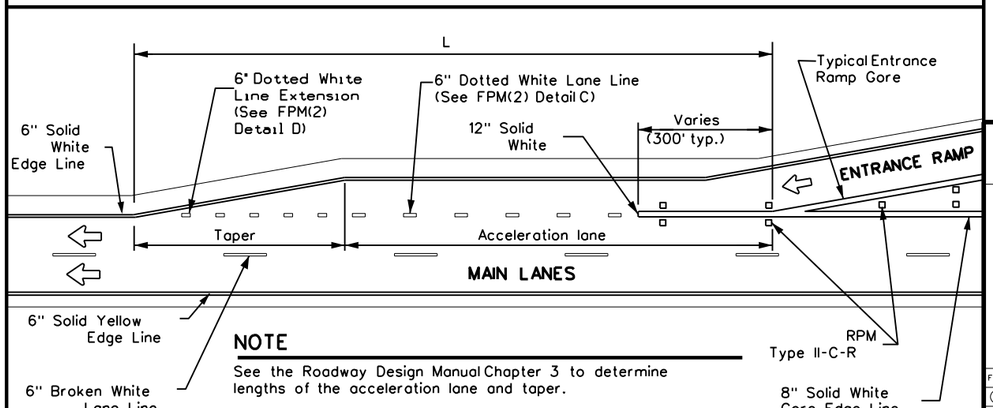
REFLECTORIZED RAISED PAVEMENT MARKER (RPM)



NOTES

1. Reflectorized raised pavement markers Type-II-C-R in the wrong way arrow shall have the clear face toward normal traffic and the red face toward the wrong way traffic.
2. Red reflectorized wrong way arrows, not to exceed two, may be placed on exit ramps. Locations of the arrows shall be as shown in the plans or as directed by the engineer.

WRONG WAY ARROW



NOTE

See the Roadway Design Manual Chapter 3 to determine lengths of the acceleration lane and taper.

PARALLEL ACCELERATION LANE

GENERAL NOTE

On concrete pavements the raised pavement markers shall be placed to one side of the longitudinal joints.

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS WITH RAISED PAVEMENT MARKERS

FPM(1)-22

FILE: fpm(1)-22.dgn	DN:	CK:	DW:	CK:
© TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
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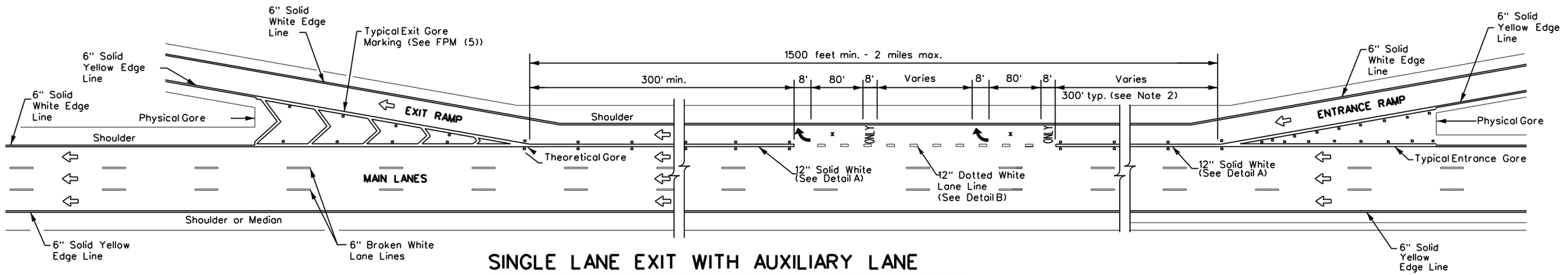
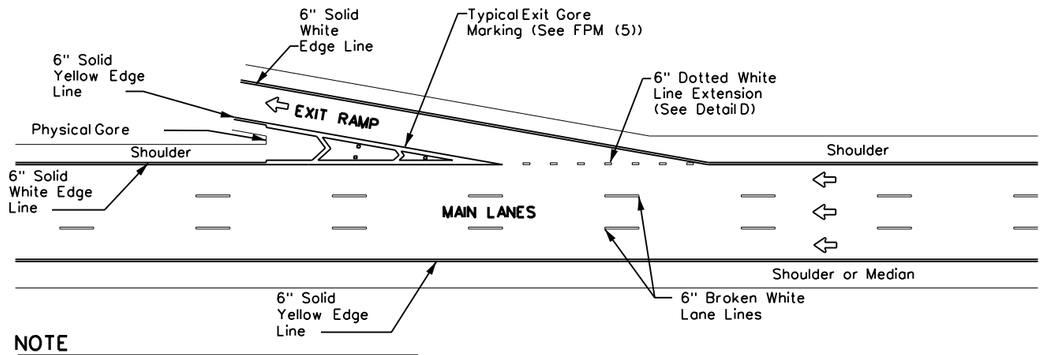
4-92 2-08 10-22	DAL	DALLAS		76
5-00 2-10				

23A



SINGLE LANE EXIT WITH AUXILIARY LANE

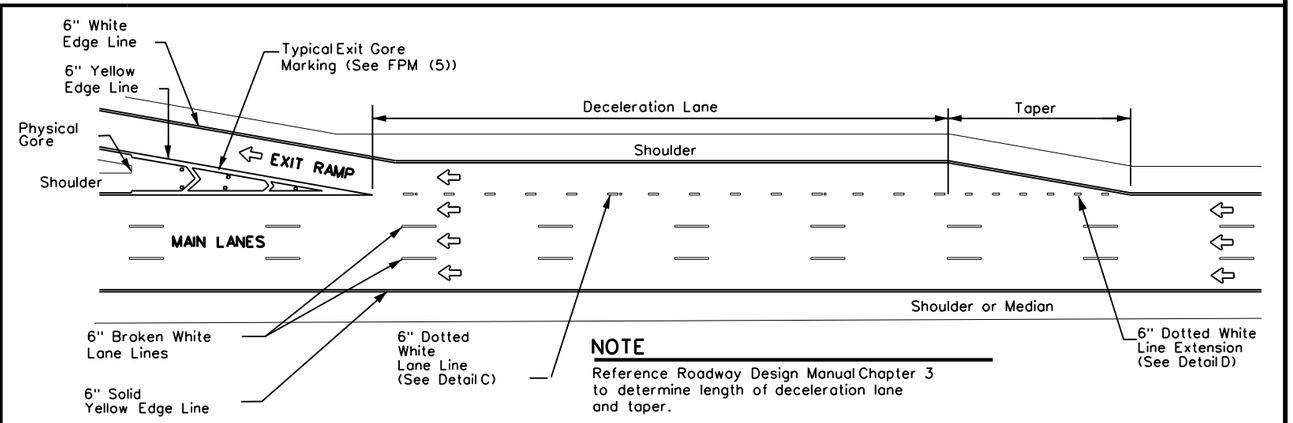
(See Note 2)



NOTE

Reference Roadway Design Manual Chapter 3 to determine if tapered deceleration lane may be used.

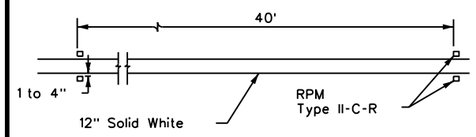
TAPERED DECELERATION LANE



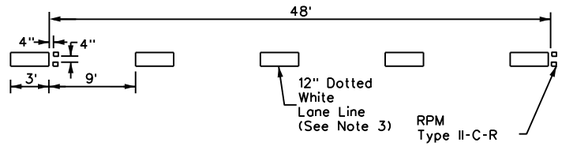
NOTE

Reference Roadway Design Manual Chapter 3 to determine length of deceleration lane and taper.

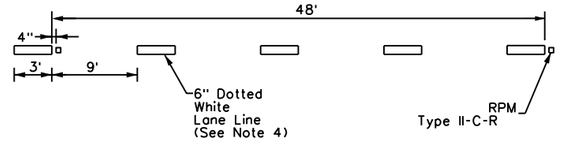
PARALLEL DECELERATION LANE



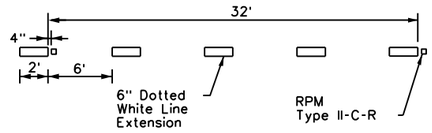
DETAIL A



DETAIL B



DETAIL C



DETAIL D

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 that continues beyond the interchange from an adjacent mandatory exit lane.
4. Normal (6") dotted lane line (see Detail C) is used at parallel acceleration and deceleration lanes.
5. See FPM(1) for traffic lane line pavement marking details.

LEGEND	
⇦	Traffic flow
↱	Pavement marking arrows (white)
▫	Reflectorized Raised Markers (RPM) Type II-C-R
✱	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 Safety Division Standard

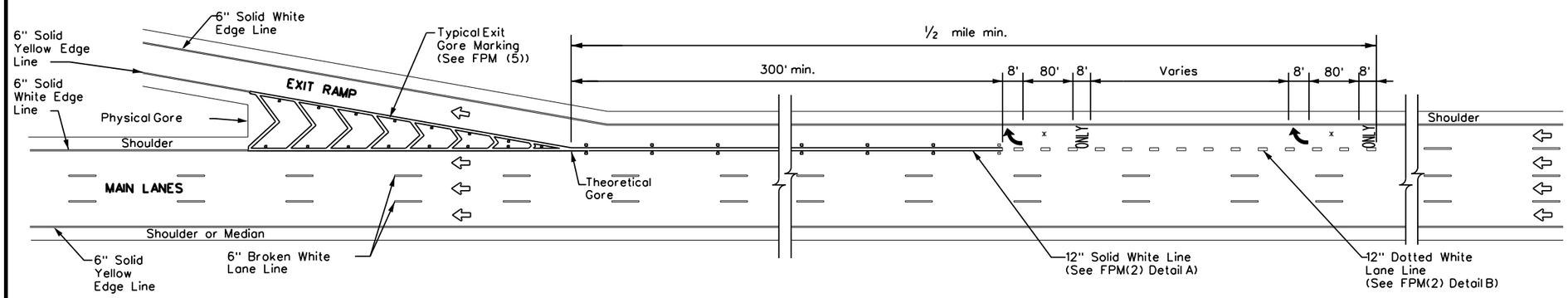
TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS ENTRANCE AND EXIT RAMPS

FPM(2)-22

FILE: fpm(2)-22.dgn	DN:	CK:	DW:	CK:
© TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
2-77 5-00 2-12	DIST	COUNTY		SHEET NO.
4-92 8-00 10-22	DAL	DALLAS		77
8-95 2-10				

23B

DATE:
FILE:

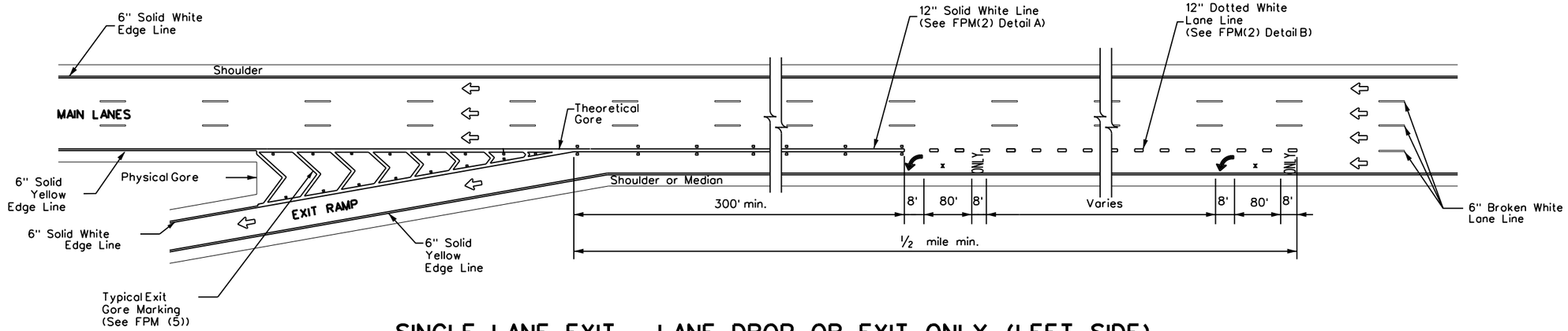


SINGLE LANE EXIT - LANE DROP OR EXIT ONLY

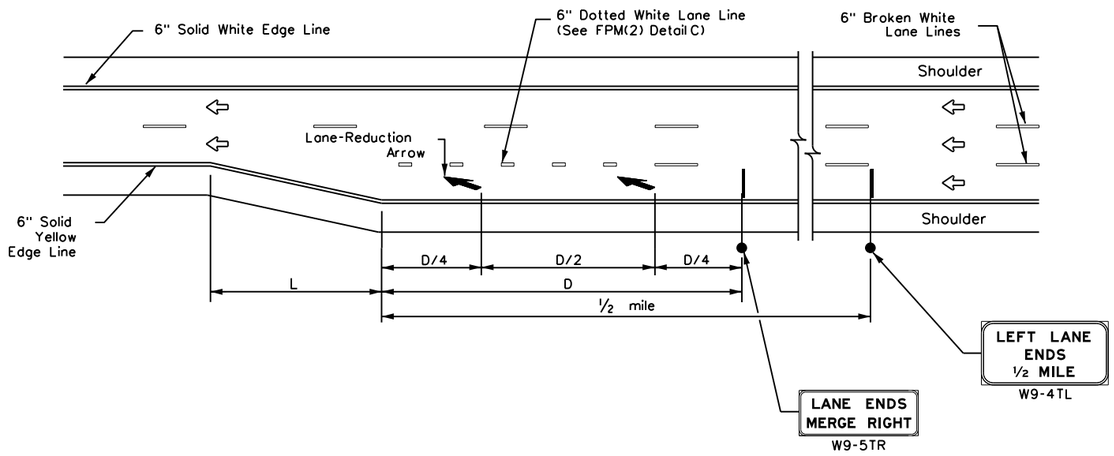
MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.

LEGEND	
⇦	Traffic flow
↱	Pavement marking arrows (white)
▫	Reflectorized Raised Markers (RPM) Type II-C-R
x	Arrow markings are optional, however "ONLY" is required if arrow is used



SINGLE LANE EXIT - LANE DROP OR EXIT ONLY (LEFT SIDE)



FREEWAY LANE REDUCTION

NOTES

1. Large Guide signs shall conform to the TxDOT Freeway Signing Handbook.
2. 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.
3. Arrows and sign details can be found in the Standard Highway Sign Designs for Texas (SHSD) at http://www.txdot.gov.
4. These guidelines may also be applied to the design of a right side lane reduction. Use LANE ENDS MERGE LEFT (W9-5TL) and RIGHT LANE ENDS 1/2 MILE (W9-4TR) signs in lieu of what is shown on drawing.

ADVANCED WARNING SIGN DISTANCE (D)		
Posted Speed	D (ft)	L (ft)
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	
80 MPH	1,500	
85 MPH	1,625	

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 FPM(2) Detail B) is used to separate a through lane that continues beyond the interchange from an adjacent mandatory exit lane.
4. Edge lines are not required in curb and gutter sections of frontage roads.
5. See FPM(1) for traffic lane line pavement marking details.

Texas Department of Transportation

Traffic Safety Division Standard

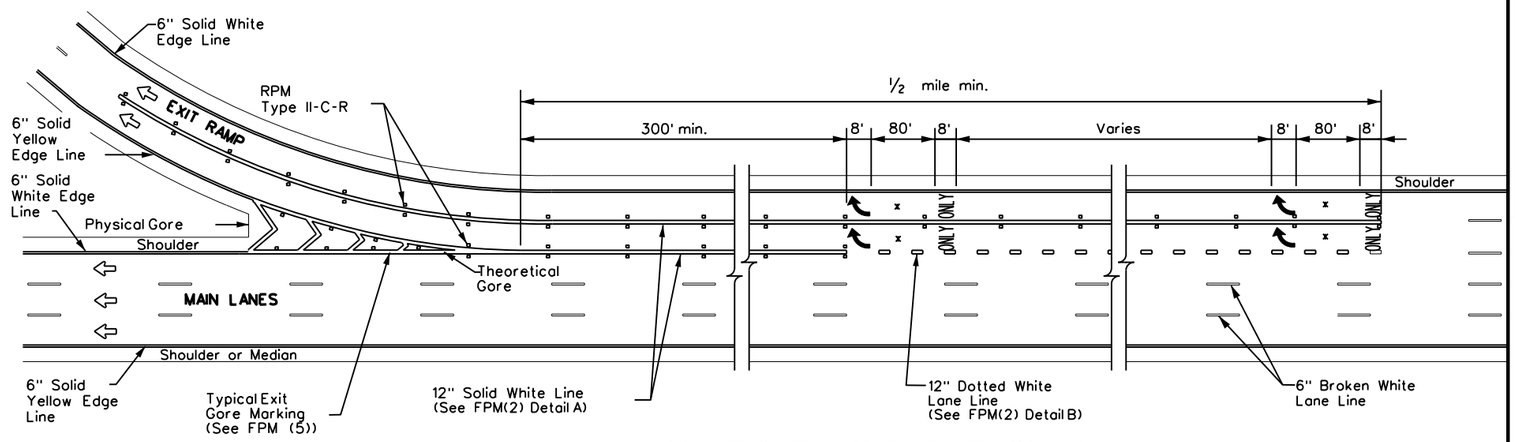
TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS SINGLE LANE DROP(EXIT ONLY) AND LANE REDUCTION DETAILS

FPM(3)-22

FILE: fpm(3)-22.dgn	DN:	CK:	DW:	CK:
© TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
4-92 2-10	DIST	COUNTY		SHEET NO.
5-00 2-12	DAL	DALLAS		78
8-00 10-22				

23C

DATE:
FILE:



MULTIPLE LANE EXIT ONLY

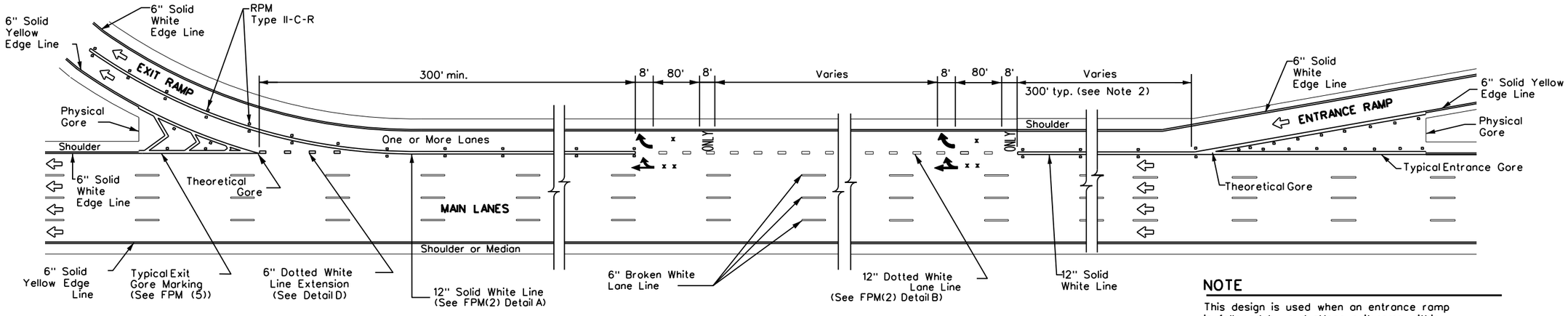
LEGEND	
⇦	Traffic Flow
▫	Reflectorized Raised Markers (RPM) Type II-C-R
↱	Pavement marking arrow (white)
x	Arrow markings are optional, however "ONLY" is required if arrow is used
x x	Arrow markings are optional

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.

GENERAL NOTES

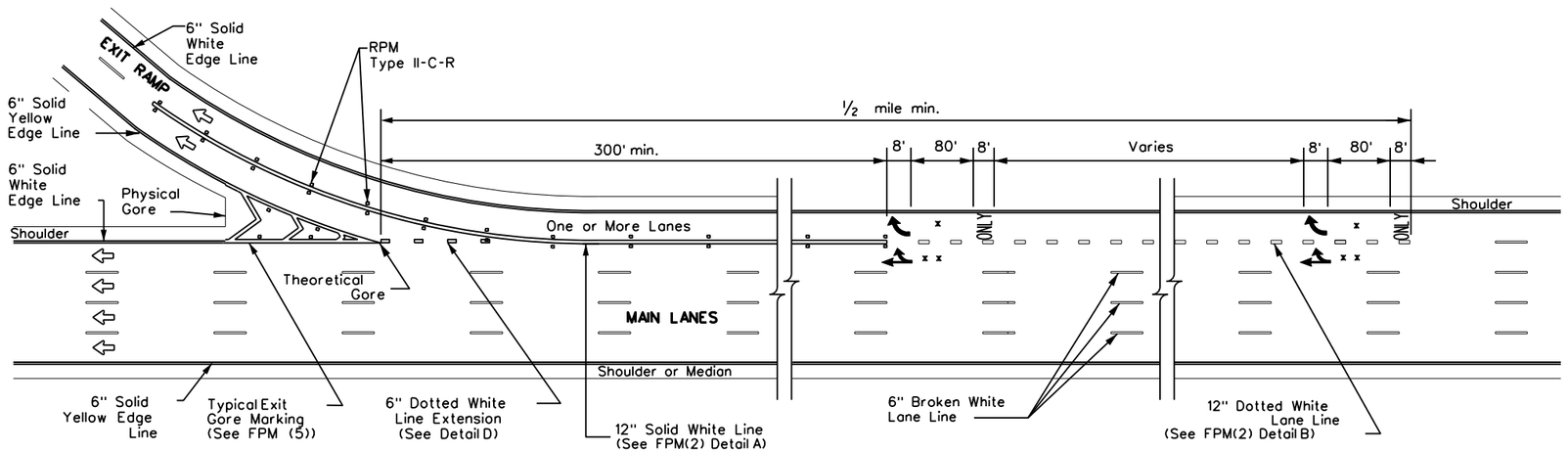
1. Pavement markings shall be white except as otherwise noted.
2. Length of 12" white line may vary depending on location.
3. Wide (12") dotted lane line (see FPM(2) Detail B) is used to separate a through lane that continues beyond the interchange from an adjacent mandatory exit lane.
4. Edge lines are not required in curb and gutter sections of frontage roads.
5. See FPM(1) for traffic lane line pavement marking details.



SINGLE LANE ENTRANCE WITH MULTIPLE LANE EXIT - EXIT ONLY WITH OPTION LANE

NOTE

This design is used when an entrance ramp is followed by a dual lane exit ramp within 2400' downstream (theoretical gore to theoretical gore).



MULTIPLE LANE EXIT - EXIT ONLY WITH OPTION LANE

DATE:
FILE:

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS MULTIPLE LANE DROP (EXIT) DETAILS

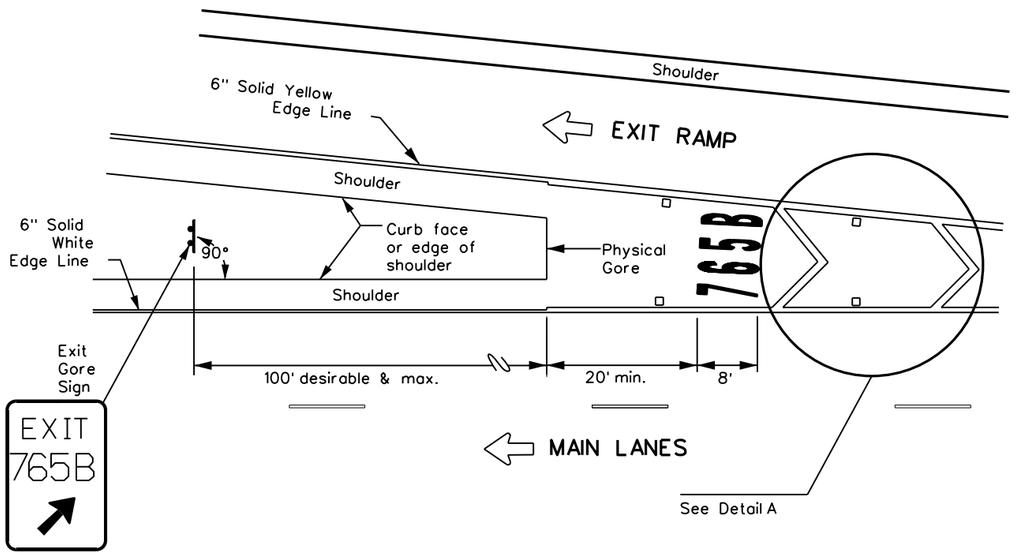
FPM(4)-22

FILE: fpm(4)-22.dgn	DN:	CK:	DW:	CK:
© TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
2-77 2-10	DIST	COUNTY		SHEET NO.
5-00 2-12	DAL	DALLAS		79
8-00 10-22				

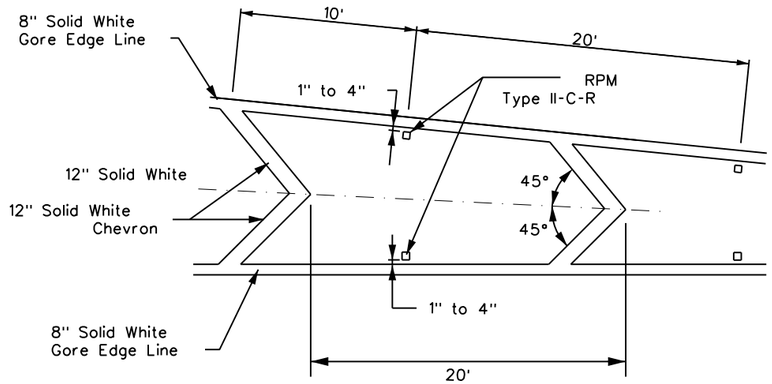
230

EXIT NUMBER PAVEMENT MARKING NOTES

1. Minimum 8 foot white exit number pavement 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. Numbers and Letters details can be found in the Standard Highway Design for Texas (SHSD) Section 12 at http://www.txdot.gov



MARKINGS WITH EXIT NUMBER



NOTES

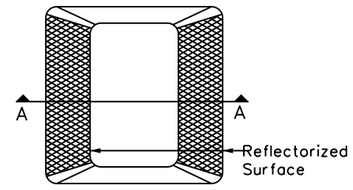
1. Raised pavement markers shall be centered between each chevron or neutral area line.
2. For more information, see Reflectorized Raised Pavement Marker Detail.

DETAIL A

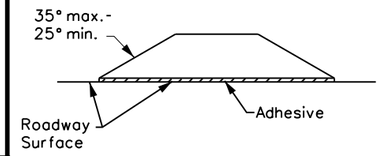
MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

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

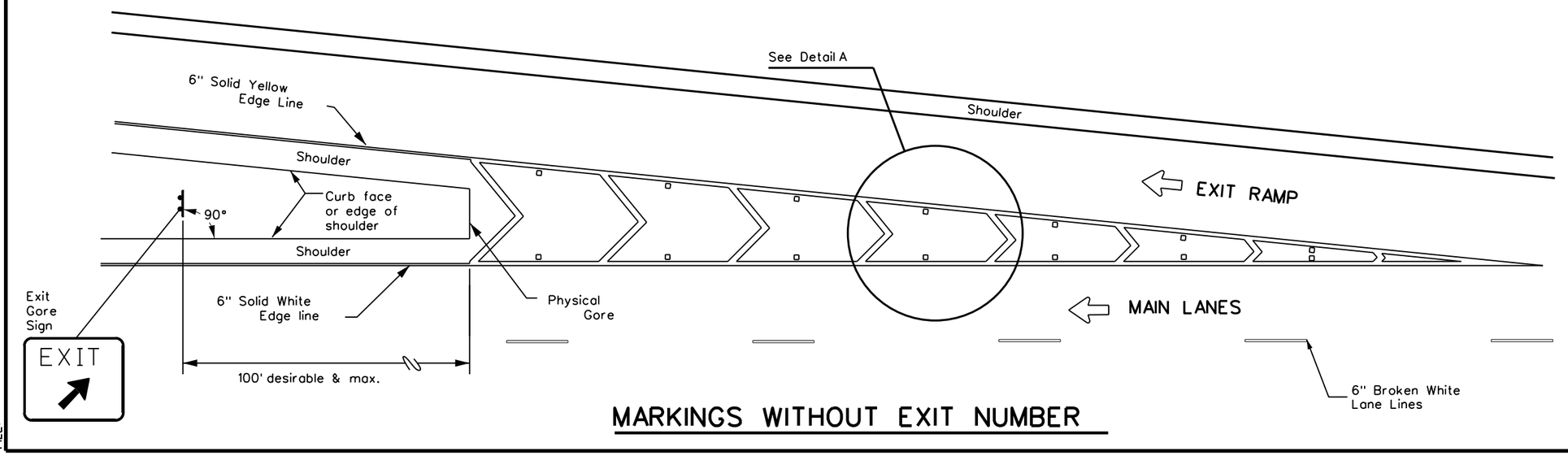


Type II (Top View)



SECTION A

REFLECTORIZED RAISED PAVEMENT MARKER (RPM)



MARKINGS WITHOUT EXIT NUMBER

Texas Department of Transportation

Traffic Safety Division Standard

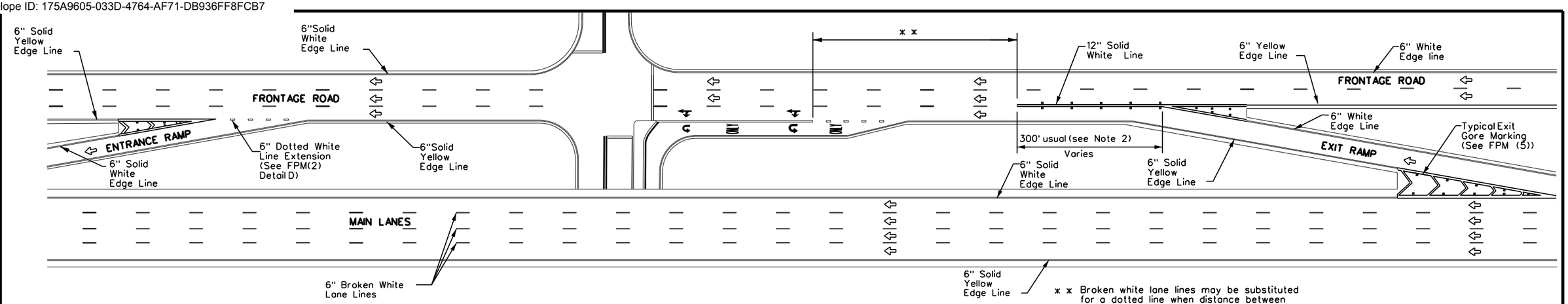
EXIT GORE PAVEMENT MARKINGS

FPM(5)-22

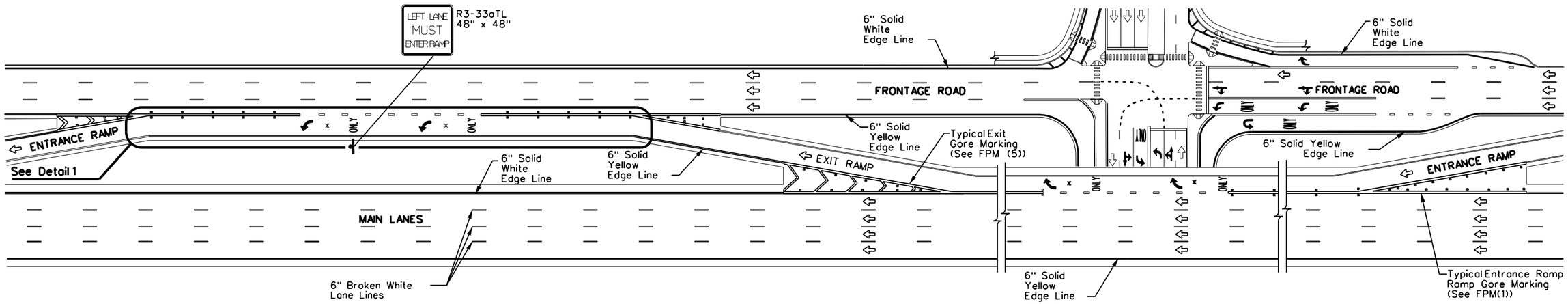
FILE: fpm(5)-22.dgn	DN:	CK:	DW:	CK:
© TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-19 10-22	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		80

23E

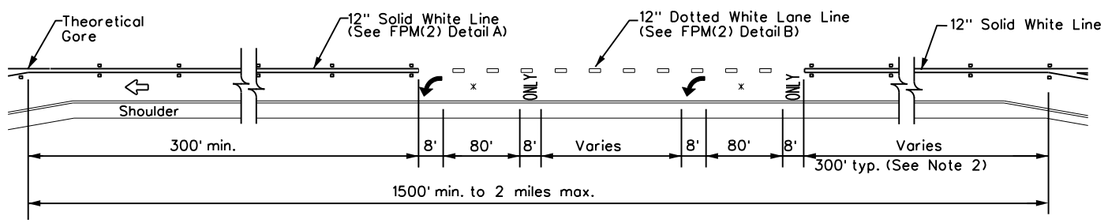
DATE:
FILE:



DIAMOND INTERCHANGE



URBAN X-RAMP WITH FRONTAGE ROAD AUXILIARY LANE



DETAIL 1

(Frontage Road Auxiliary Lane for X-Ramps)

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
↱	Pavement marking arrows (white)
▫	Reflectorized Raised Markers (RPM) Type II-C-R
x	Arrow markings are optional, however "ONLY" is required if arrow is used

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 FPM(2) Detail B) is used to separate a through lane that continues beyond the interchange from an adjacent mandatory exit lane.
4. Edge lines are not required in curb and gutter sections of frontage roads.
5. See FPM(1) for traffic lane line pavement marking details.

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD FREEWAY AND FRONTAGE ROAD PAVEMENT MARKINGS

FPM(6)-22

FILE: fpm(6)-22.dgn	DN:	CK:	DW:	CK:
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REVISIONS 10-22	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		81

DATE:
FILE:

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)

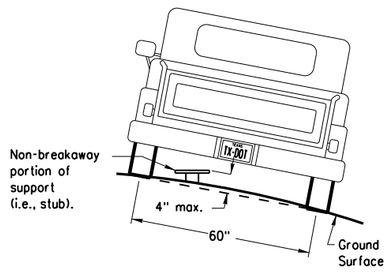
Anchor Type

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) to (SLIP-3))

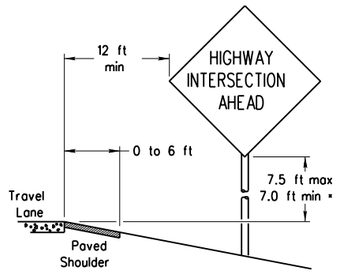
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

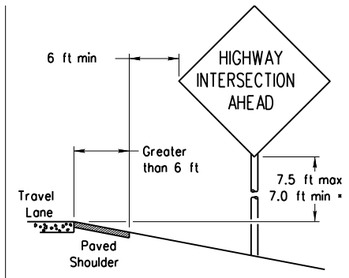
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

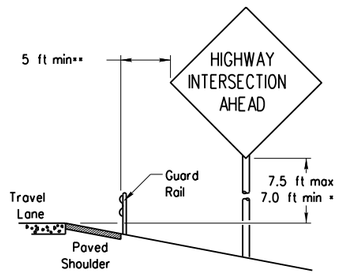
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



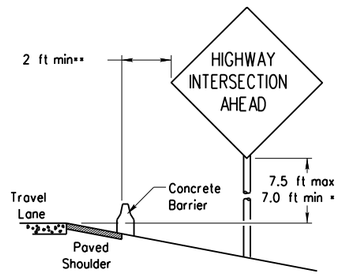
GREATER THAN 6 FT. WIDE

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.

BEHIND BARRIER



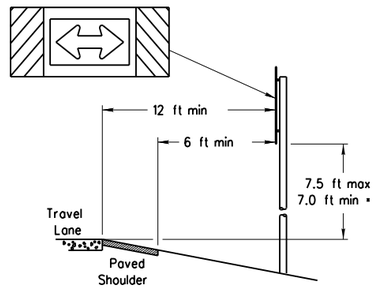
BEHIND GUARDRAIL



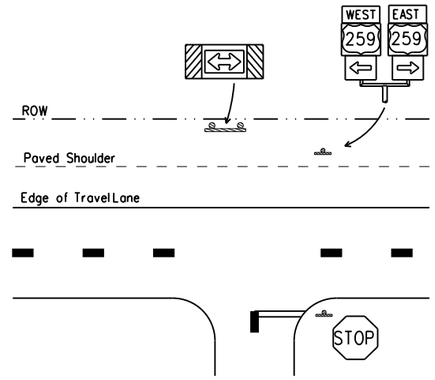
BEHIND CONCRETE BARRIER

••Sign clearance based on distance required for proper guard rail or concrete barrier performance.

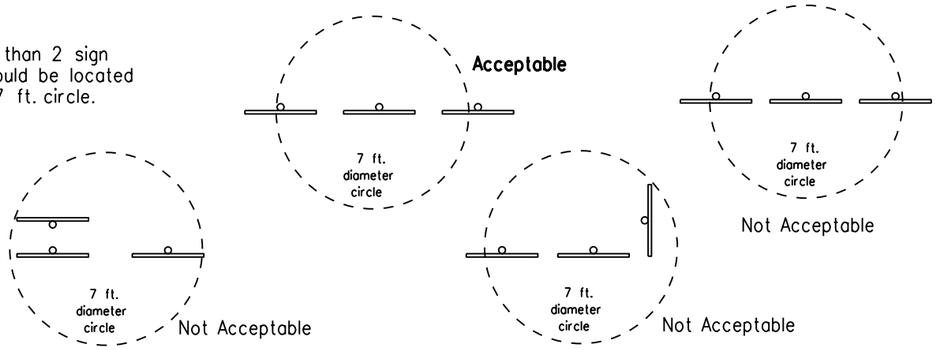
T-INTERSECTION



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.

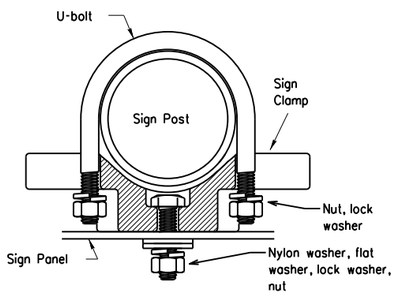


No more than 2 sign posts should be located within a 7 ft. circle.

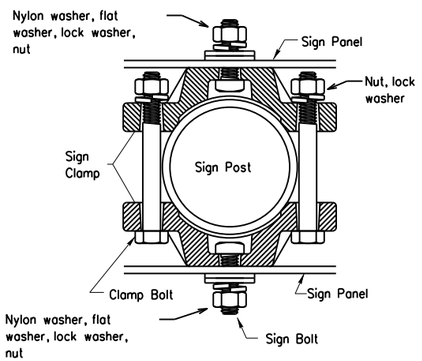


TYPICAL SIGN ATTACHMENT DETAIL

Single Signs



Back-to-Back Signs



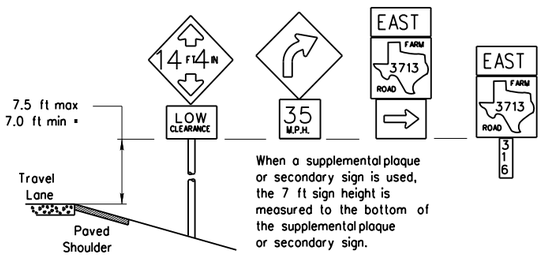
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

Sign clamps may be either the specific size clamp or the universal clamp.

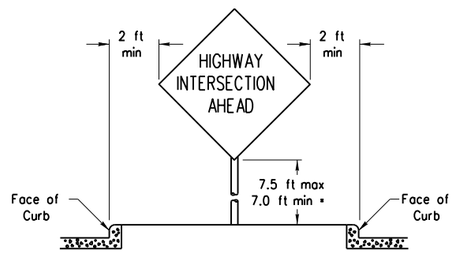
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



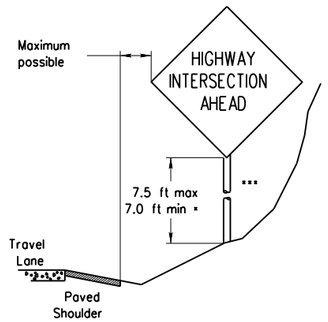
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

* 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

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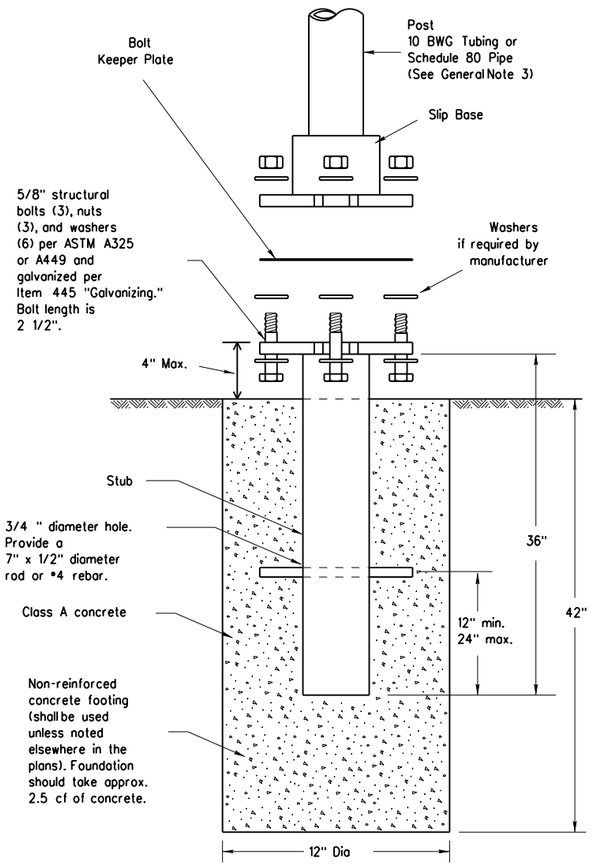
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		82

DATE:
FILE:

TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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

NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.txdot.gov/business/producer list.htm_ The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   - 10 BWG Tubing (2.875" outside diameter)
     - 0.134" nominal wall thickness
     - Seamless or electric-resistance welded steel tubing or pipe
     - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
     - Other steels may be used if they meet the following:
       - 55,000 PSI minimum yield strength
       - 70,000 PSI minimum tensile strength
       - 20% minimum elongation in 2"
     - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
     - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
     - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.
   - Schedule 80 Pipe (2.875" outside diameter)
     - 0.276" nominal wall thickness
     - Steel tubing per ASTM A500 Gr C
     - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
       - 46,000 PSI minimum yield strength
       - 62,000 PSI minimum tensile strength
       - 21% minimum elongation in 2"
     - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
     - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
     - Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

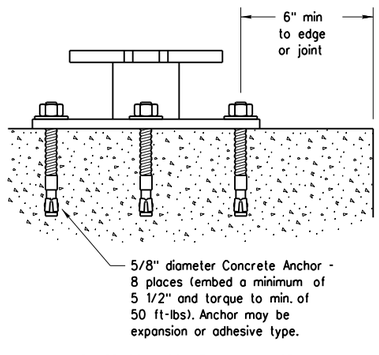
Foundation

1. Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
4. Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
5. The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support

1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



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

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

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9-08	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		83

DATE:
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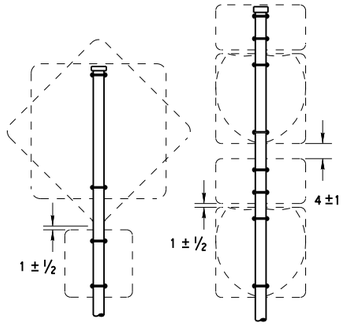
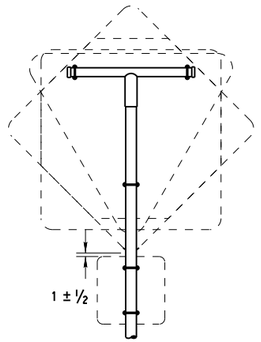


SM RD SGN ASSM TY XXXXX(1)XX(P)



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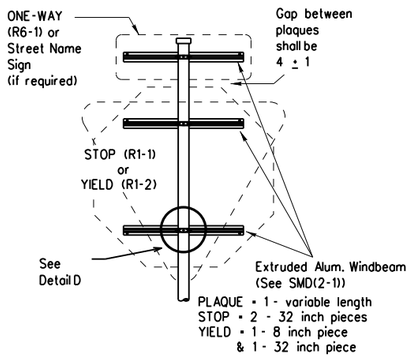

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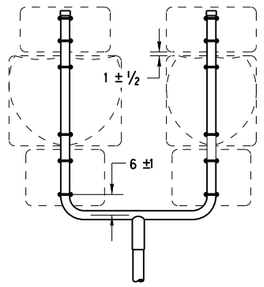

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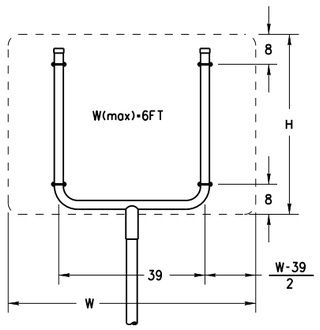

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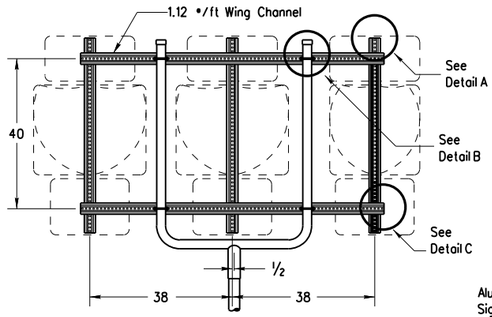
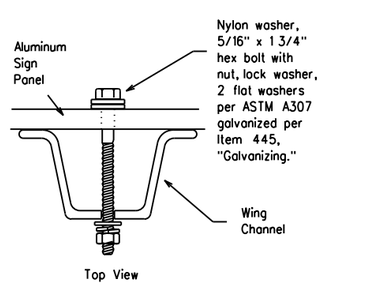
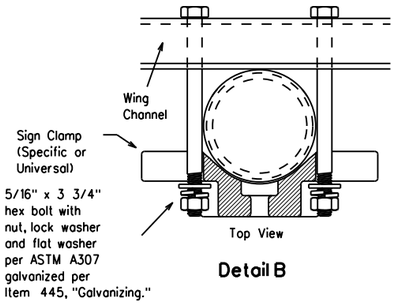


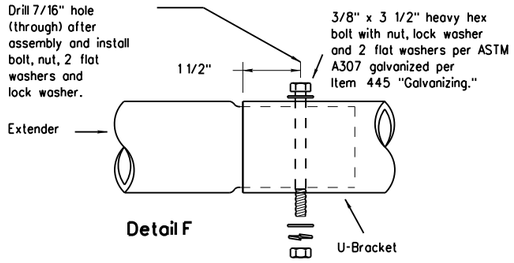
SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)



Detail A

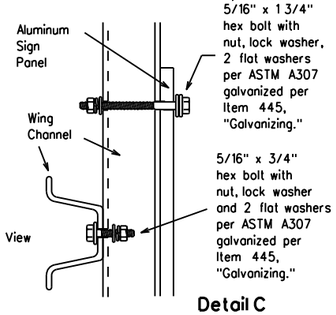


Detail B

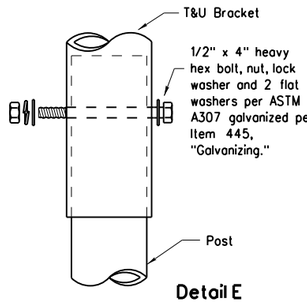


Detail F

Splices shall only be allowed behind the sign substrate.



Detail C



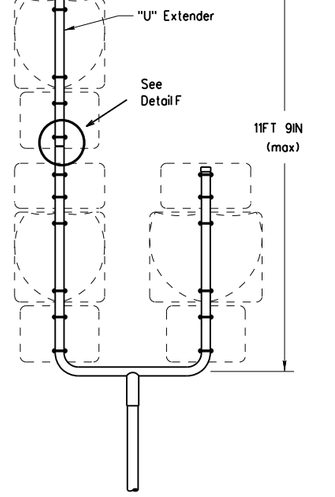
Detail E

GENERAL NOTES:

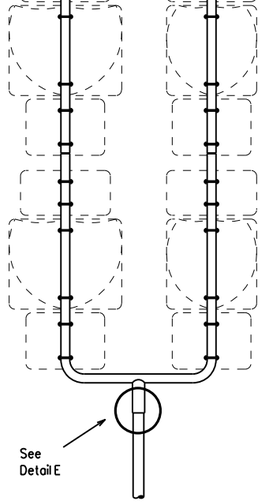
1.

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

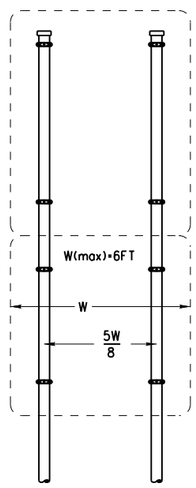
2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material 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)

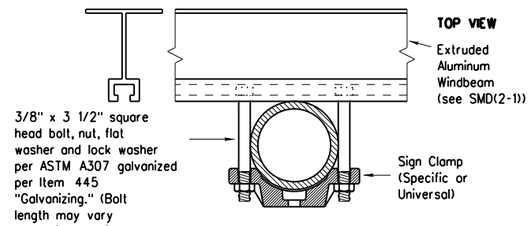


SM RD SGN ASSM TY S80(1)XX(U-2EXT)

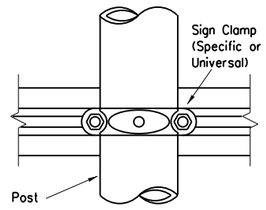


SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW

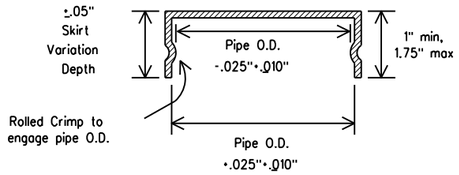


Detail D



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)

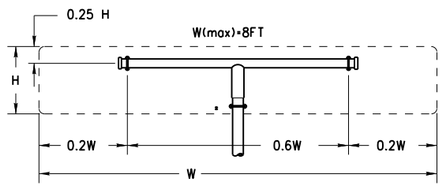
FRICTION CAP DETAIL



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.



All dimensions are in english unless detailed otherwise.

SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

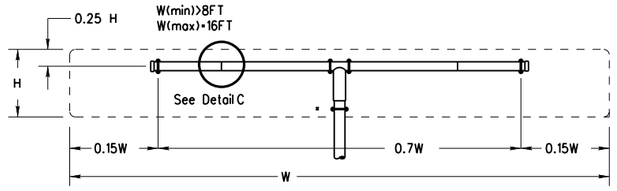
SMD(SLIP-2)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
CONT	SECT	JOB	HIGHWAY
6464	74	001	IH0030
DIST	COUNTY		SHEET NO.
DAL	DALLAS		84

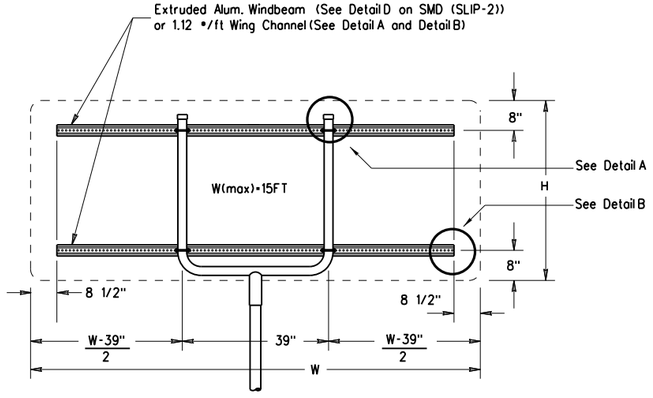
REVISIONS
9-08

DATE:
FILE:

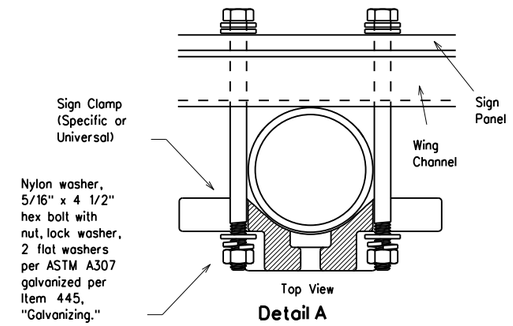
DATE:
FILE:



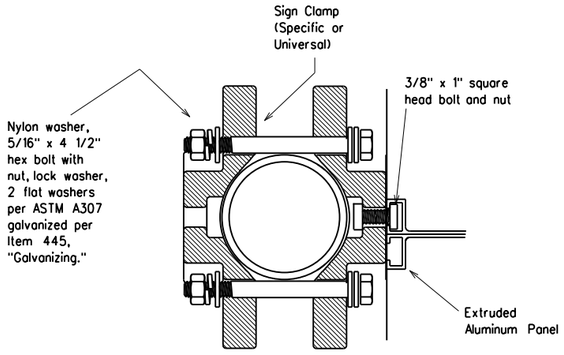
SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(• - See Note 12)



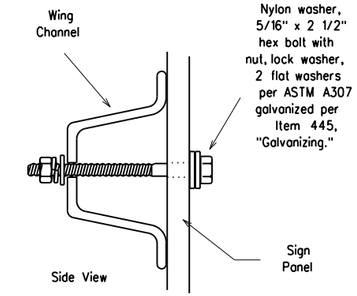
SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



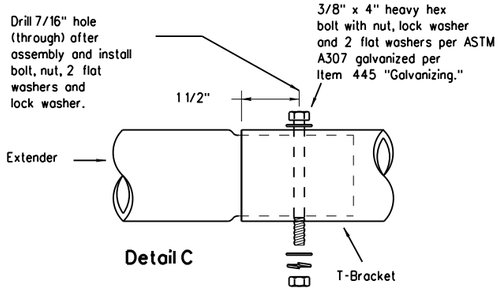
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET

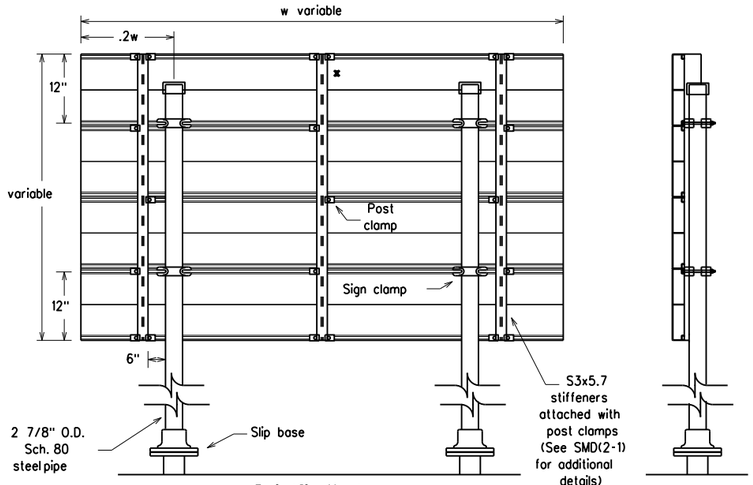


Detail B



Detail C

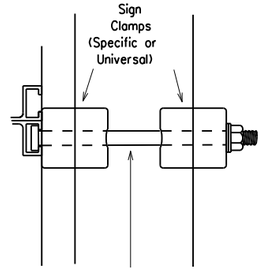
Splices shall only be allowed behind the sign substrate.



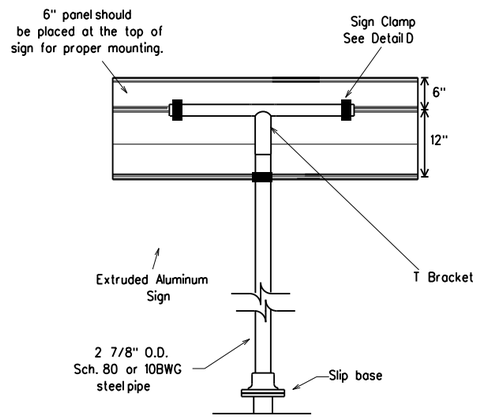
Typical Sign Mount

SM RD SGN ASSM TY S80(2)XX(P-EXAL)

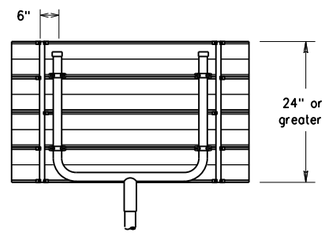
✖ Additional stiffener placed at approximate center of signs when sign width is greater than 10'.



Detail E



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

GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

1. 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.
2. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
3. 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.
4. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
5. 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.
6. 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.
7. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
8. 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."
9. Sign blanks shall be the sizes and shapes shown on the plans.
10. 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.
11. Post open ends shall be fitted with Friction Caps.

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)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

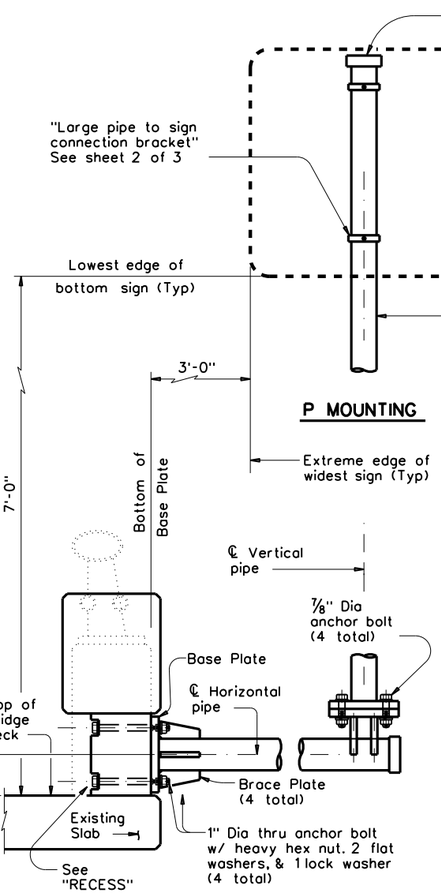
REVISIONS
9-08

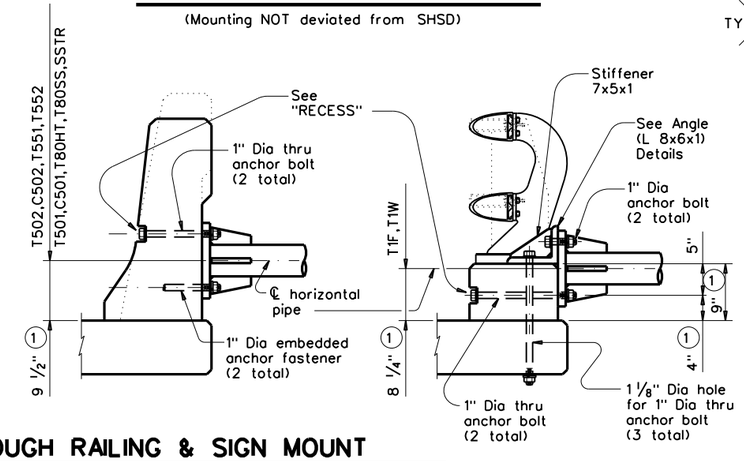
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
6464	74	001	IH0030

DIST	COUNTY	SHEET NO.
DAL	DALLAS	85

DATE:
FILE:

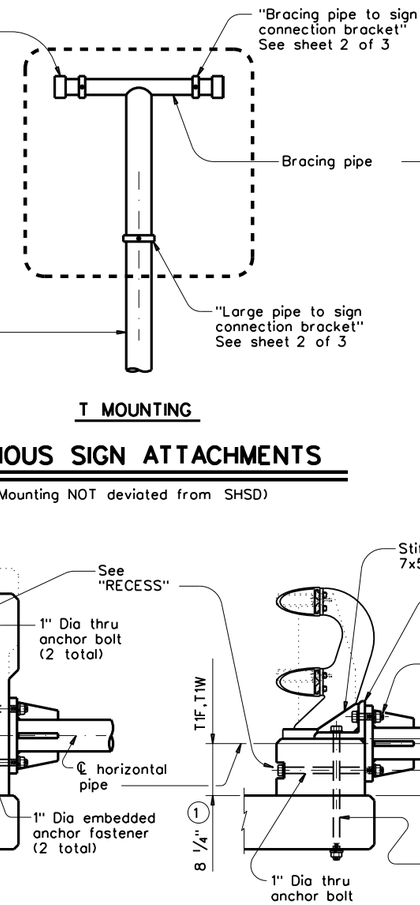




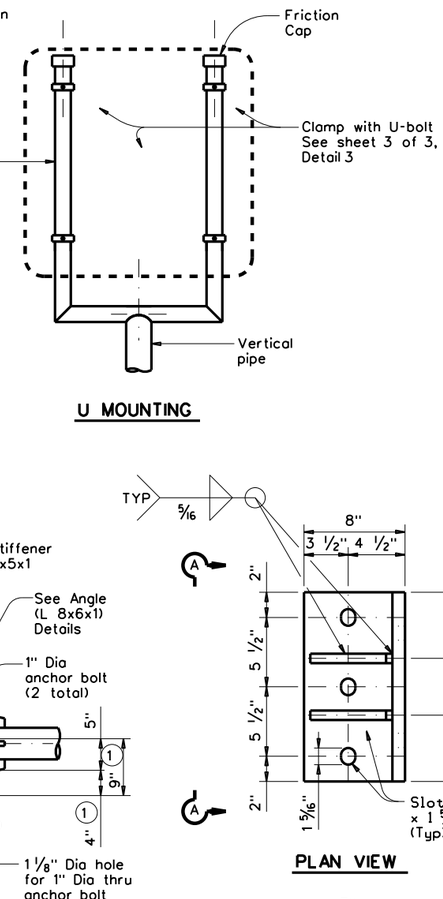
VARIOUS SIGN ATTACHMENTS

(Mounting NOT deviated from SHSD)

P MOUNTING



T MOUNTING

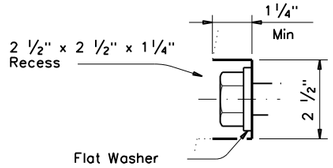


U MOUNTING

LONGITUDINAL SECTION THROUGH RAILING & SIGN MOUNT

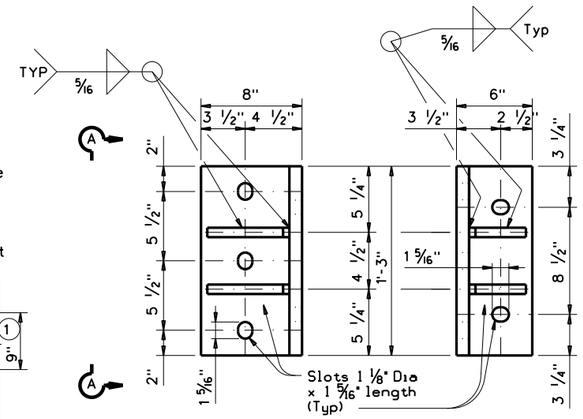
(1) Increase 2" for structure with overlay.

(2) Attached at L Post.

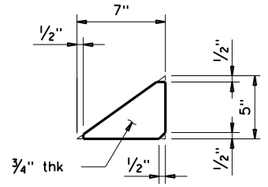


RECESS

PIPE SIZE AND THICKNESS			
Pipe Placement / Design Wind Speed	Horizontal	Vertical	Bracing
90 mph	5" X-Strong (.375")	4" X-Strong (.337")	2 1/2" Standard (.203")
130 mph	6" X-Strong (.432")	5" X-Strong (.375")	3" X-Strong (.300")



PLAN VIEW SECTION A-A



STIFFENER

ANGLE (L 8x6x1) DETAILS

GENERAL NOTES:

Design conforms to 2013 AASHTO Standard Specifications for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design 3-second gust wind speeds of 90 mph and 130 mph with a 1.14 gust factor,and a wind importance factor of 1.0 (50-year mean recurrence interval) for the supporting structures. For mounting connection between sign panel and pipe, wind importance factors of 0.71 and 0.54, for 90 mph and 130 mph winds, respectively, are applied to adjust the wind speeds to a 10-year mean recurrence interval.

See standard sheet WV & IZ(LTS2013) for the boundaries of each design wind zone. All mounting shall be based on 130 mph wind speed design except when located in 90 mph wind zone. Maximum panel area is 30 sq. ft. Maximum design height is 50 ft, with design height defined as the distance between natural ground (average elevation of surrounding terrain) and the center of sign(s) at the mounting location.

Material for pipe shall be ASTM A53 Grade B, or A501. Structural steel plates shall be ASTM A36, A572 Grade 50, or A588. Bolts used to connect pipe and mounting bracket, and wind beam to sign panel shall be ASTM A307. Anchor bolts shall be ASTM A325 or A193 B7. Each anchor bolt shall be provided with 2 flat washers, 1 lock washer, and 1 heavy hex nut. All parts shall be galvanized in accordance with Standard Specifications Item 445, "Galvanizing".

Attach horizontal pipe at least 2'-0" from the edge of any nearby drain slot.

Contractor shall verify applicable field dimensions before fabrication. Holes drilled through the railing parapet wall shall be drilled with rotary (coring or masonry drill) type equipment. Percussion (star) drilling shall not be allowed. Anchorage for pipe attached to rail shall be placed using an anchoring system approved by the engineer. Installation of anchor fasteners including hole depth, diameter and material shall be in accordance with the manufacturers' recommendation.

Each embedded anchor fastener shall resist an allowable design loading (after applying the reduction factors of bolt spacing and bolt edge distance) of:

	130 mph	90 mph
Tension	12.5 kips	7.5 kips
Shear	9.0 kips	5.0 kips

Each anchoring system shall provide a capacity to resist the required tension and shear acting simultaneously.

For sign connection to mounting, shop drill holes on sign blank in accordance with the current Standard Highway Sign Designs for Texas (SHSD). Additional hole(s) needed to meet a stipulated-type mounting may be field drilled. For multi-sign or back-to-back signs mounting, the engineer shall determine the proper type which ensures each individual mounting meets requirements.

Refer to Standard sheets SMD(GEN), SMD(SLIP-2 and SMD(2-1) for details not covered here.

SHEET 1 OF 3

Texas Department of Transportation

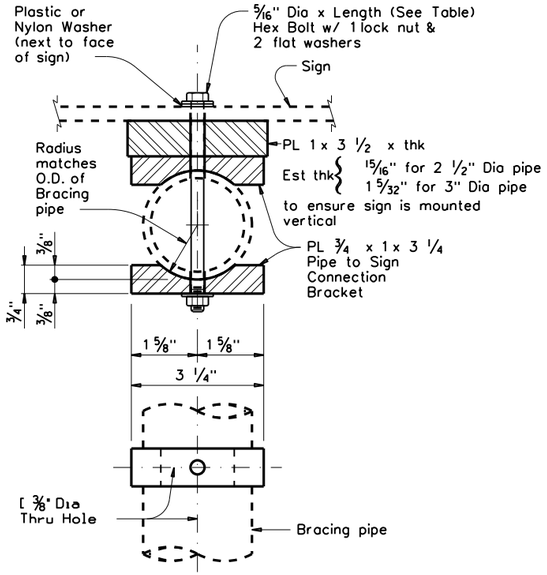
Traffic Operations Division Standard

BRIDGE RAILING SIGN MOUNT DETAILS

SMD(BR-1)-14

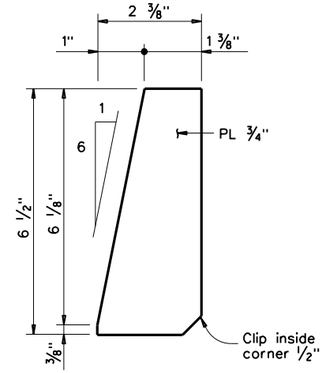
FILE: smdbr-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		86

DATE:
FILE:

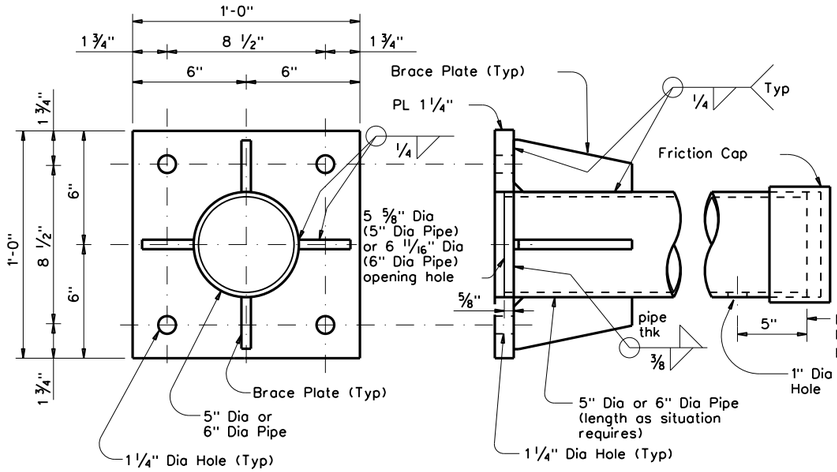


BRACING PIPE TO SIGN CONNECTION BRACKET DETAILS

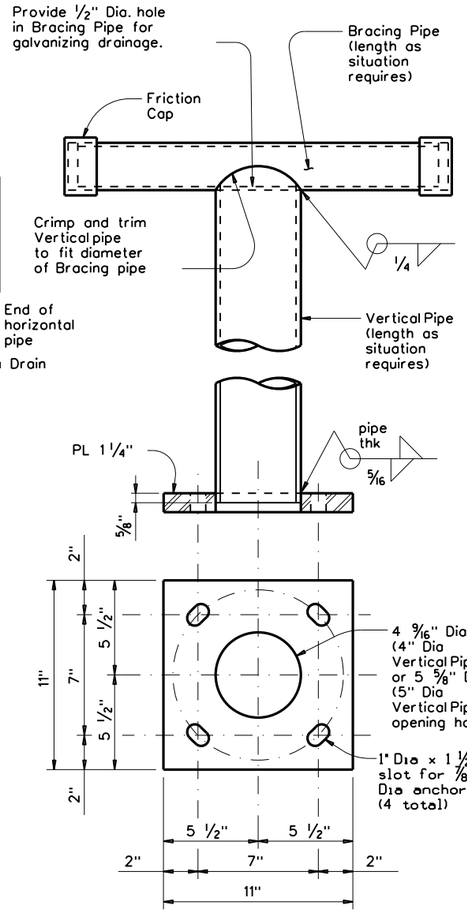
(Showing T Mounting)



BRACE PLATE DETAILS

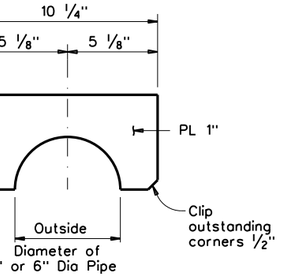


BASE PLATE DETAILS

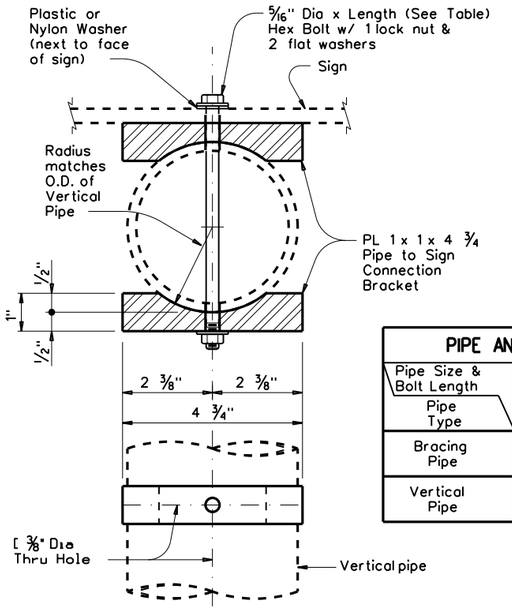


SIGN POLE & POLE BASE PLATE DETAILS

(Showing only T Mounting)



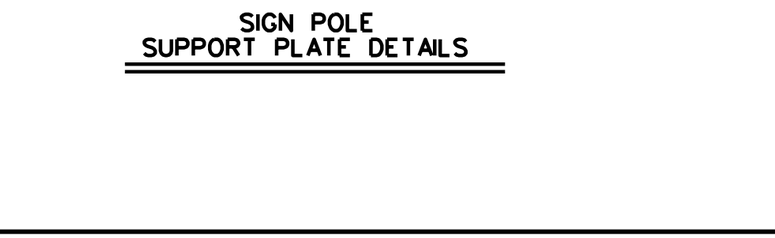
SIGN POLE SUPPORT PLATE BRACKET DETAILS



LARGE PIPE TO SIGN CONNECTION BRACKET DETAILS

(Showing P or T Mounting)

PIPE AND BOLT SPECIFICATIONS		
Pipe Size & Bolt Length / Pipe Type	Nominal Pipe Dia (in.)	Bolt Length (in.)
Bracing Pipe	2 1/2	6
	3	7
Vertical Pipe	4	7
	5	8



SIGN POLE SUPPORT PLATE DETAILS

SHEET 2 OF 3

Texas Department of Transportation

Traffic Operations Division Standard

BRIDGE RAILING SIGN MOUNT DETAILS

SMD(BR-2)-14

FILE: smdbr-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		87

26H

DATE:
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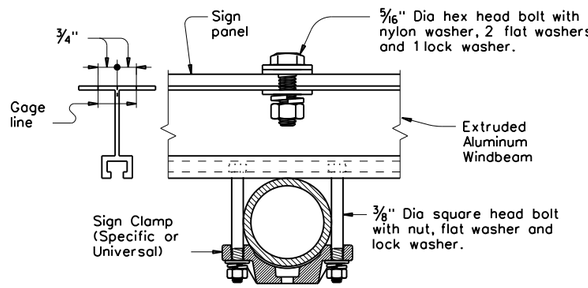
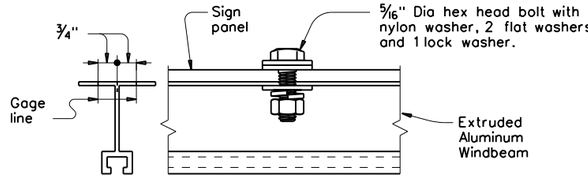
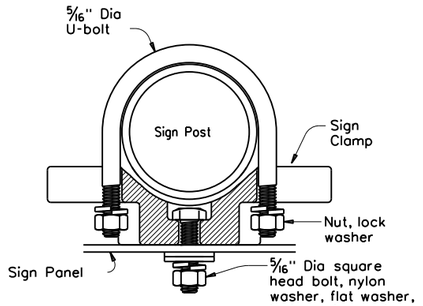


DETAIL 1



DETAIL 2

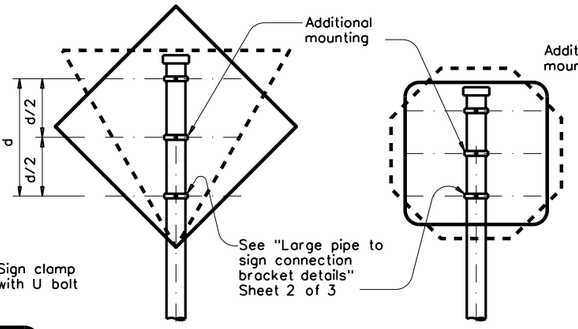


DETAIL 3

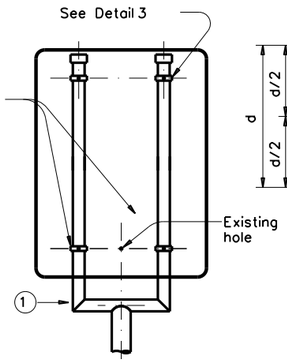
SIGN SHAPE	SQUARE			HORIZONTAL RECTANGLE			VERTICAL RECTANGLE			DIAMOND			OCTAGON			EQUILATERAL TRIANGLE			INTERSTATE SHIELD	PENTAGON (SCHOOL)	
Type of Sign Mounting on SHSD / Design Wind Speed	P	T	U	P	T	U	P	T	U	P	T	U	P	T	U	P	T	U	P	P	T
90 mph					(Type 23) 60"x48"	(Type 3) 72"x36" 78"x36" (Type 23) 72"x30" 84"x24"		(Type 2) 36"x48" (Type 32) 36"x60" 36"x72" 42"x60" 48"x54" 48"x60" 48"x72" (Type 3) 48"x84"			(Type 3) 60"x60"									(Type Special) 45"x36"		
130 mph	(Type 1) 30"x30" 36"x36"	(Type 3) 48"x48"		(Type 1) 36"x24" 36"x30"	(Type 23) 48"x42" 54"x42" 60"x30" 66"x36" 84"x24" (Type 3) 60"x48"	(Type 3) 72"x36" 78"x36" (Type 23) 72"x30" 84"x24"	(Type 1) 30"x36" 30"x42"	(Type 3) 36"x48" 36"x60" 36"x72" 42"x60" 48"x54" 48"x60" (Type 4) 48"x72" 48"x84"	(Type 3) 48"x60"	(Type 1) 36"x36"	(Type 3) 48"x48" 60"x60"					(Type 1) 48"x48"			(Type Special) 36"x36" 45"x36"		

Notes:
1. Drill holes in addition to the hole pattern of the Standard Highway Sign Designs for Texas (SHSD) at specified locations to meet a stipulated-type mounting indicated in the parenthesis ( ).
2. "Blank" in the above table indicates all other signs excluded from stipulated mounting shall be mounted in accordance with SHSD.

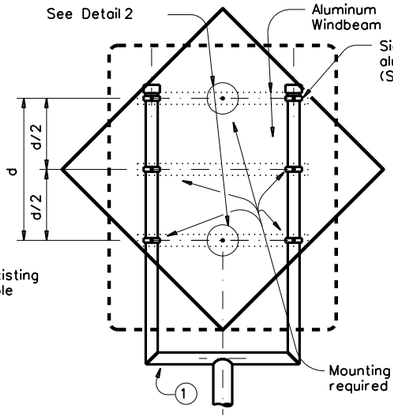
(1) In lieu of welding, the Fabricator may bend bracing pipe elbows if the following conditions are met:
a. Spacing between vertical bracing pipes is equal to or greater than 2'-6".
b. Bending radius is 12".
c. The distance between the lowest clamp and centerline of horizontal bent pipe is 13" max.

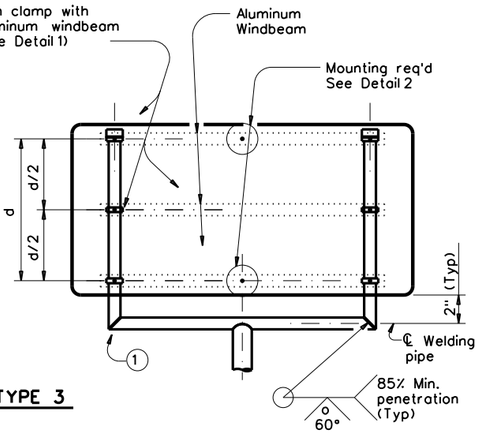


TYPE 1

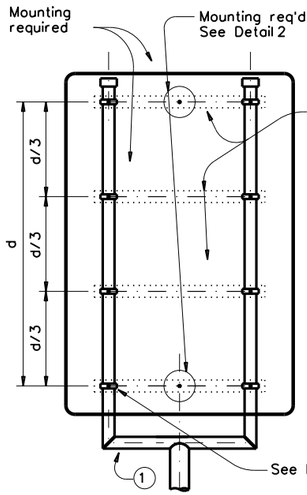


TYPE 2

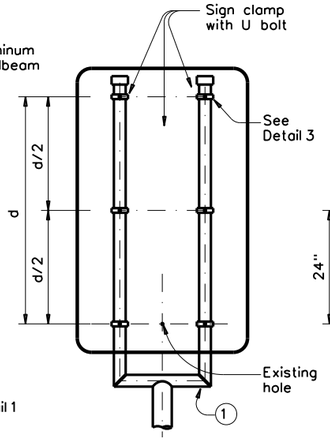




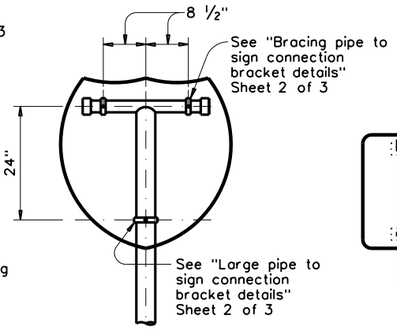
TYPE 3



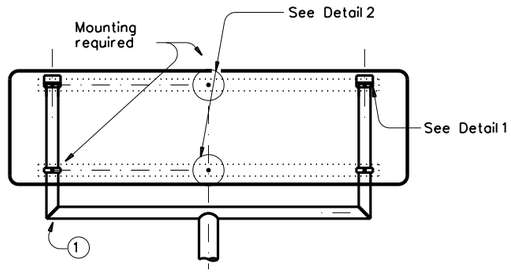
TYPE 4



TYPE 32



TYPE SPECIAL



TYPE 23

SHEET 3 OF 3

Texas Department of Transportation

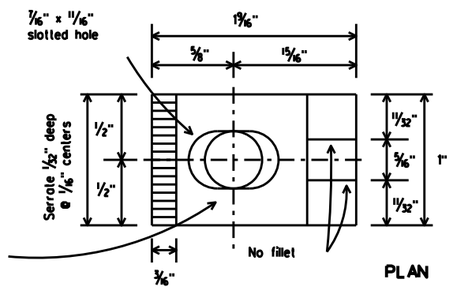
Traffic Operations Division Standard

BRIDGE RAILING SIGN MOUNT DETAILS

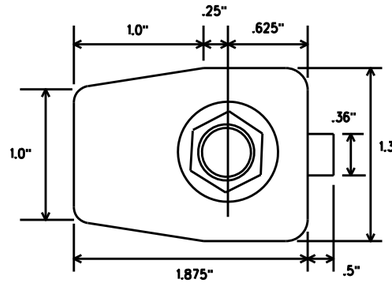
SMD(BR-3)-14

FILE: smdbr-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		88

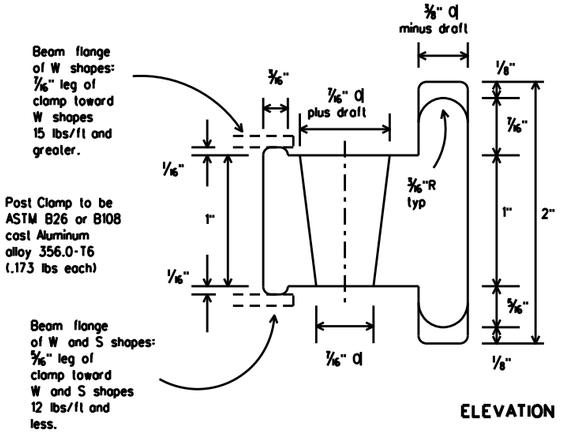
NOTE: centerline of hole for 3/8" diameter squarehead bolt x 2 1/4" long with a flat washer and self-locking nut, or lock washer and hex. nut. Bolt head dimensions shall be in accordance with ANSI B 18.2.1 as referred to in the AISC Manual of steel construction. Bolt assembly shall be galvanized.



PLAN

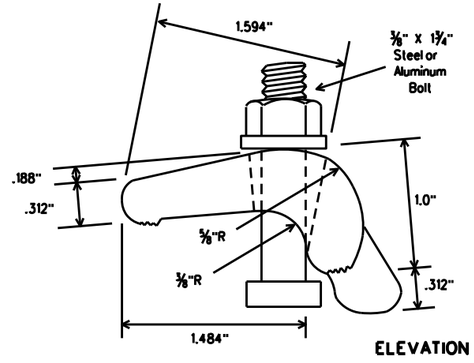


PLAN



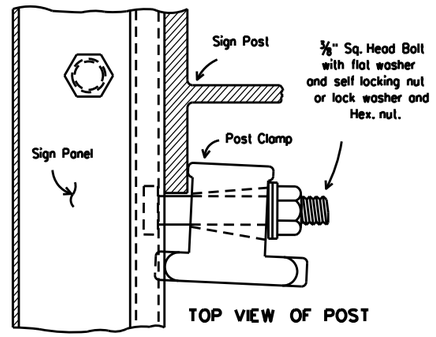
ELEVATION

POST CLAMP DETAIL

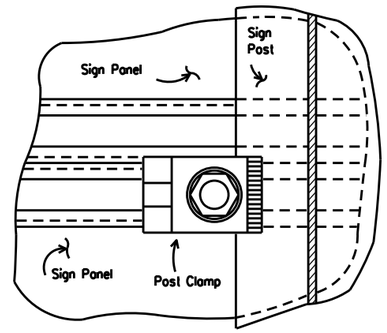


ELEVATION

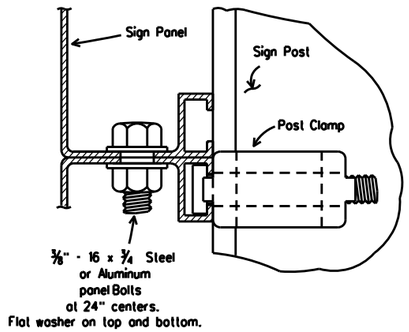
ALTERNATE POST CLAMP DETAIL



TOP VIEW OF POST



TOP VIEW OF CLAMP



SIDE VIEW OF PANELS

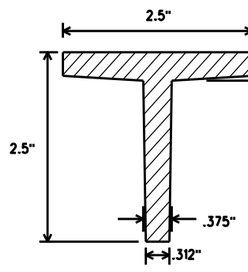
CONNECTION DETAILS

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.

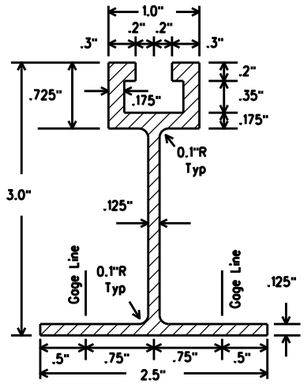


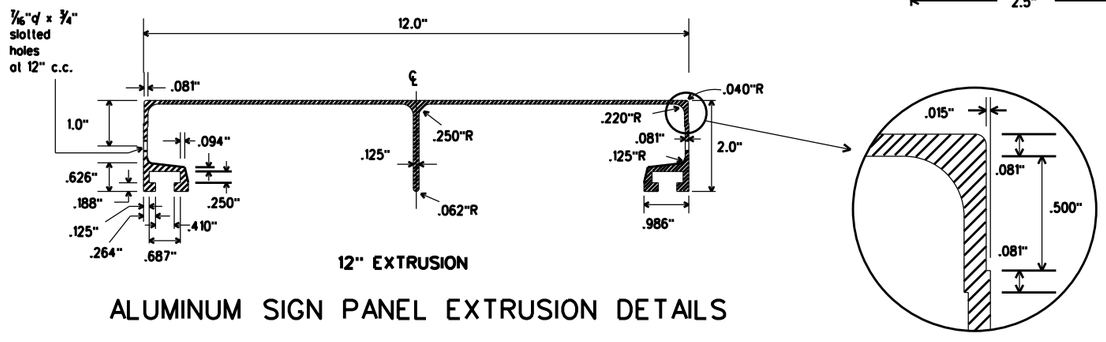
1.912 lbs/ft

ALUMINUM T SECTION OR APPROVED ALTERNATIVE

WINDBEAM CROSS SECTION

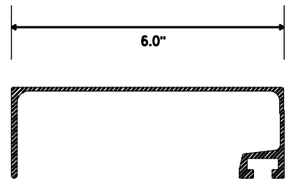
Windbeam to be extruded aluminum (1.175 lbs/ft) or approved alternative



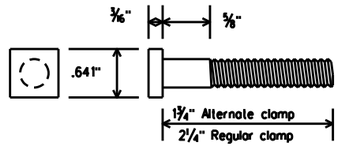


12" EXTRUSION

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

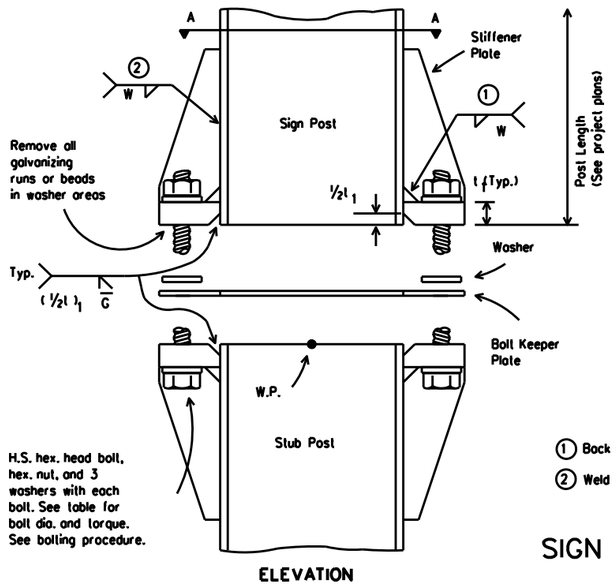
SMD(2-1)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
CONT	SECT	JOB	HIGHWAY
6464	74	001	IH0030
DIST	COUNTY		SHEET NO.
DAL	DALLAS		89

9-08 REVISIONS

DATE:
FILE:

27A

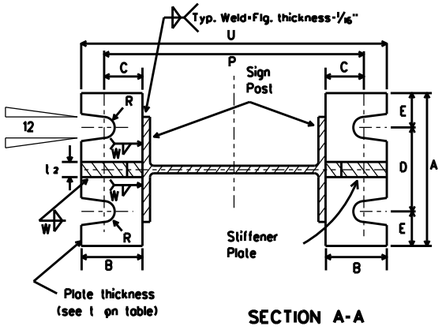


ELEVATION

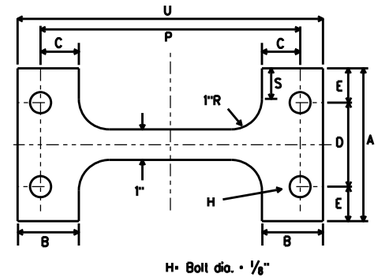
1. Back up weld to be made before installing stiffener plate
2. Weld W may be continued ocross clips to seal joint

SIGN POST AND STUB POST

(For W Shapes)



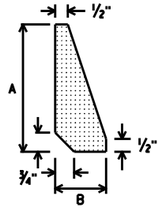
SECTION A-A



H• Bolt dia. • ⅛"

BOLT KEEPER PLATE

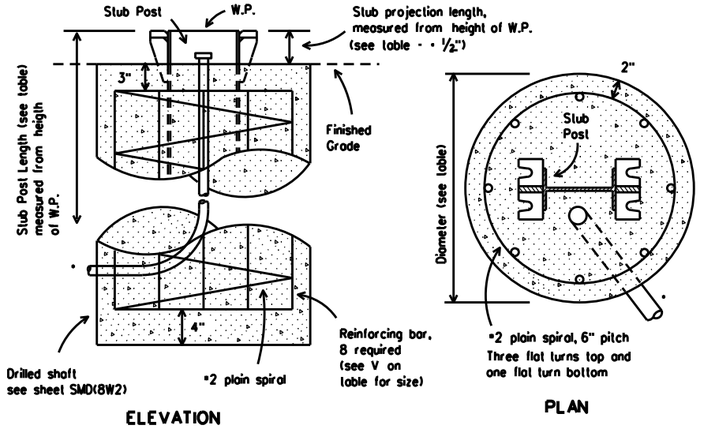
30 Ga galv. sheet steel



STIFFENER PLATE DETAIL

Steel Plate (thickness • t 2)

(See table for dimensions)

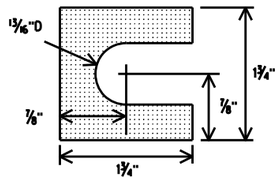


ELEVATION

PLAN

FOUNDATION DETAIL

•Note: For signs with electrical apparatus, see ED(10) for conduit required in founation.



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.

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.

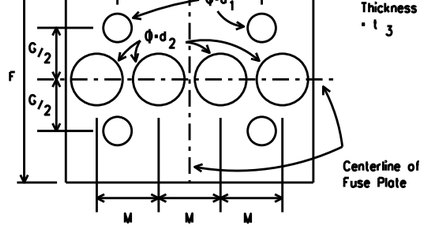
Dimensions / Post Size	Bolt Size & Torque	A	B	C	D	E	t_1	t_2	W	R
W6x9	⅝"ϕ x 2¾" 440-450 inch pounds 36-38 foot pounds	5"	2"	1¼"	2¾"	1⅛"	¾"	½"	¼"	11/32"
W6x12										
W6x15										
W8x18										
W8x21	¾"ϕ x 3½" 740-750 inch pounds 62-63 foot pounds	6"	2¼"	1⅜"	3½"	1¼"	1"	¾"	5/16"	13/32"
W10x22										
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											
F	G	J	K	M	d_1	d_2	t_3	Bolt Dia.	Wt. (ea.) (lbs.)	Bolt length
4¼"	2"	4"	2¼"	1"	9/16"	¾"	¼"	½"	1.01	1½"
5"	2½"	6"	3½"	1½"	11/16"	1¼"	⅜"	⅝"	2.51	2¼"
5"	2½"	5¼"	2¾"	1¼"	11/16"	1 1/16"	⅜"	⅝"	2.26	2¼"
5½"	2½"	5¼"	2¾"	1¼"	13/16"	1"	½"	¾"	3.35	2¼"
6"	3"	5¾"	2¾"	1⅜"	13/16"	1⅛"	½"	¾"	4.03	2¼"
6"	3"	6½"	3½"	1⅝"	13/16"	1 5/16"	½"	¾"	4.47	2¼"
3¾"	1½"	2⅝"	1½"	⅝"	9/16"	⅜"	¼"	½"	0.60	1½"

Bolt Keeper Data		
P	S	U
8⅜"	1"	9⅞"
8½"		10"
8½"		10"
10⅝"		12⅛"
11"	1½"	12¾"
12⅞"		14⅝"
13⅛"		14⅞"
15"		16¾"
See Detail Below		

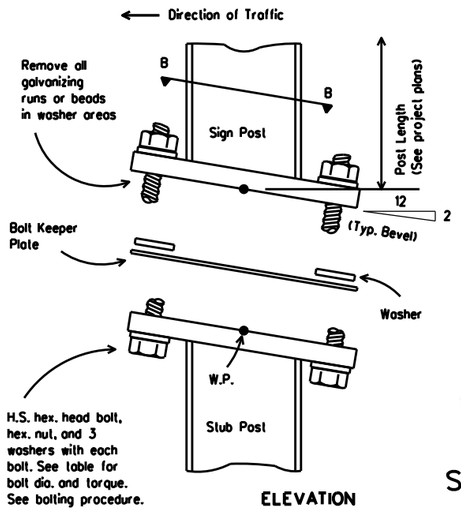
Foundation Data			
Stub length	Stub projection	Dr. Shaft diameter	Bar V Size
2'-0"	3"	24"	•5
2'-0"	3"		•5
2'-6"	3"		•6
2'-6"	3"		•7
3'-0"	2½"		•8
3'-0"	2½"		•9
3'-0"	2½"		•10
3'-0"	2½"		•11
3'-3½"	3½"	12"	Non-reinforced ③

③ Foundation design shall be Type G Mount, see SMD (TY G).

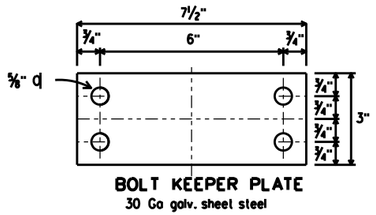


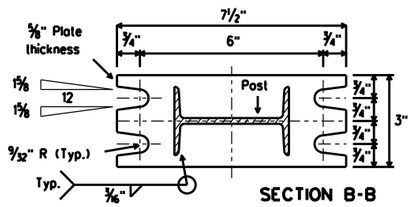
PERFORATED FUSE PLATE DETAIL

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.



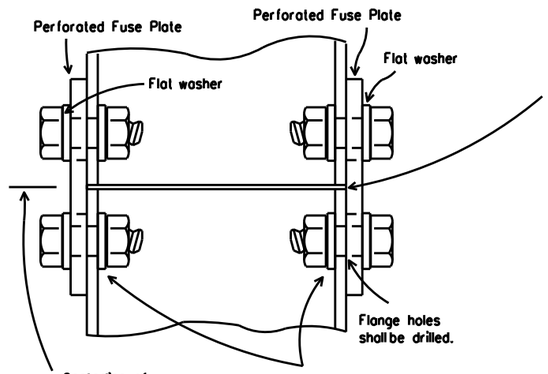
ELEVATION





SIGN POST AND STUB POST

(For S4x7.7 and S3x5.7)



DETAIL "A"

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."

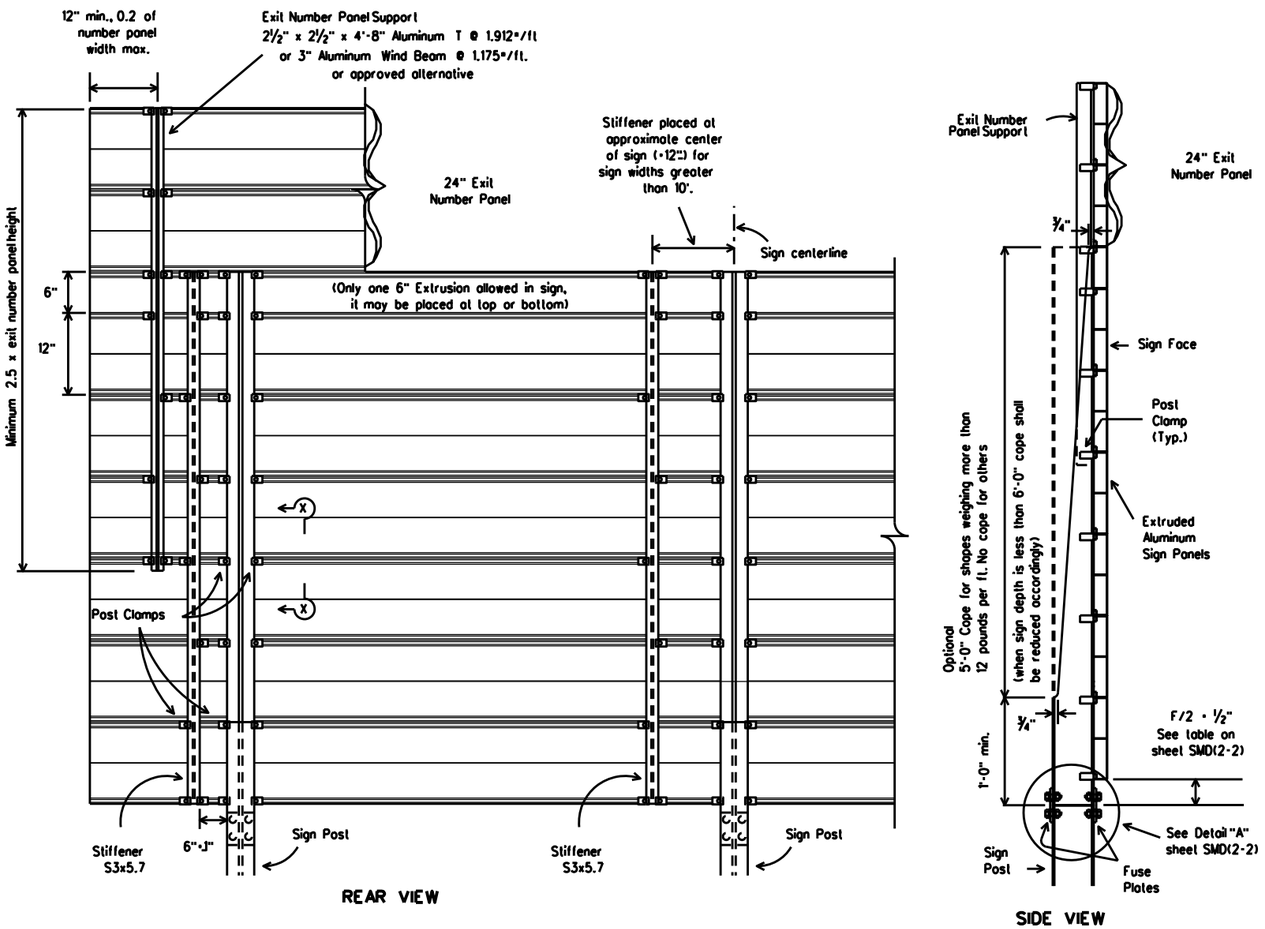
Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS- LARGE ROADSIDE SIGNS FOUNDATION & STUB

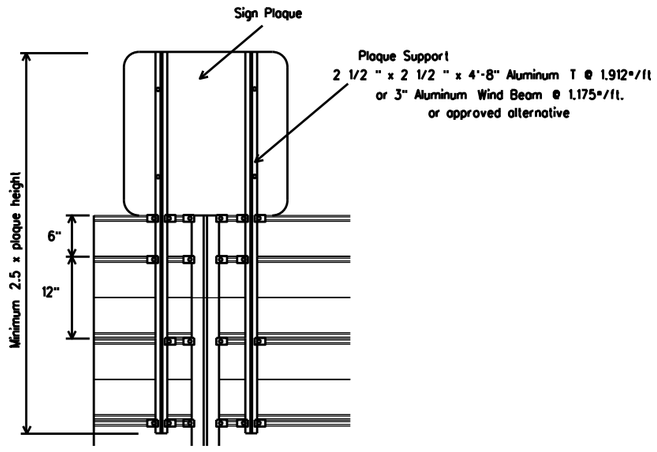
SMD(2-2)-08

© TxDOT August 1995	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
REVISIONS 4-98 9-08	CONT	SECT	JOB	HIGHWAY
	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		90

DATE:
FILE:

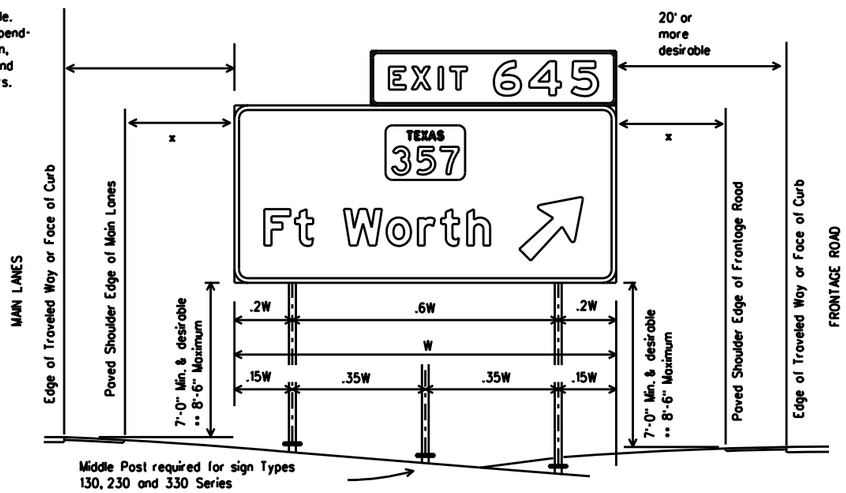


ALUMINUM PARENT SIGN & EXIT NUMBER PANEL MOUNTING DETAILS



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.

x - 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

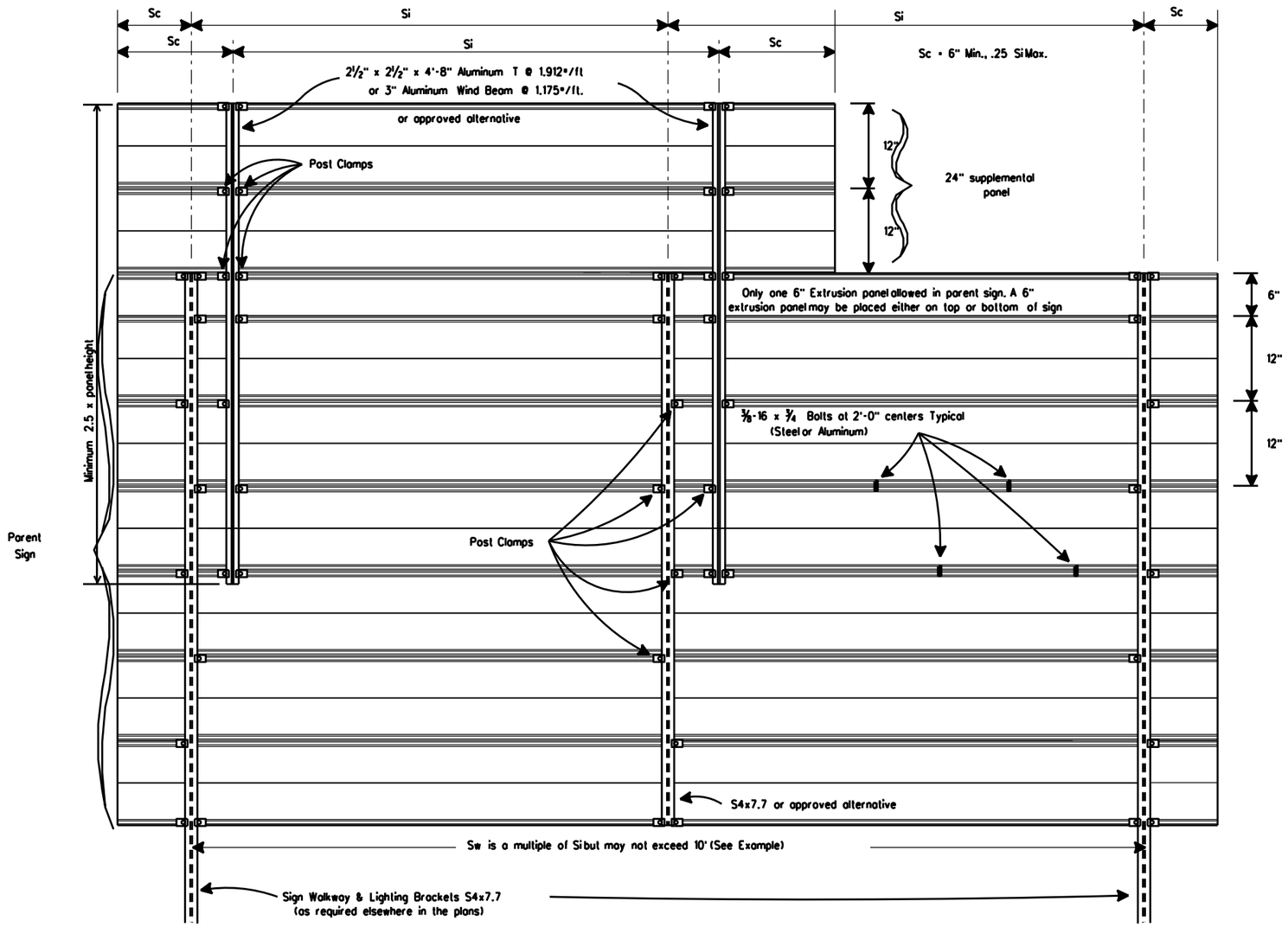
REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
6464	74	001	IH0030

DIST	COUNTY	SHEET NO.
DAL	DALLAS	91

DATE:
FILE:

DATE:
FILE:

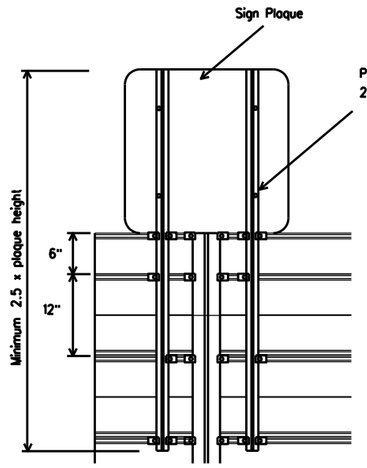


REAR VIEW

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=2*(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	
13	7.5	9	10	10	7.5	9	10	10	9	10	10	10	10	10	10	
12	8.5	10	10	10	8.5	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		

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

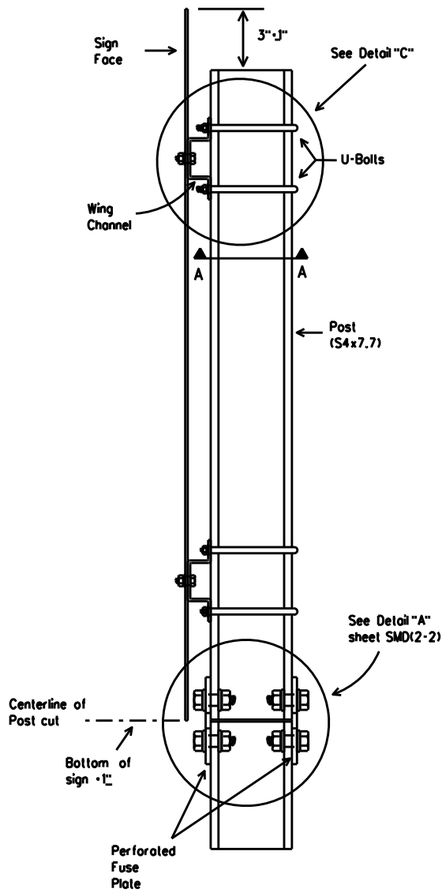
REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
6464	74	001	IH0030

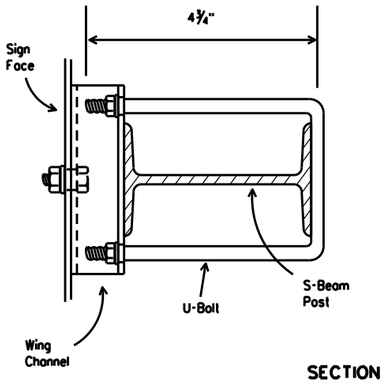
DIST	COUNTY	SHEET NO.
DAL	DALLAS	92

DATE:
FILE:

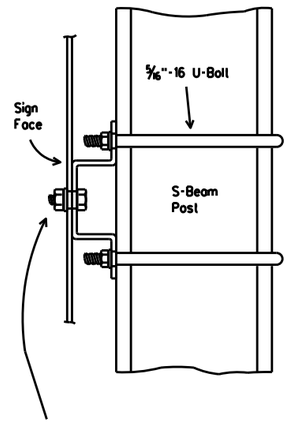
WING CHANNEL CLAMP DETAIL FOR TYPE G MOUNT



SIDE VIEW

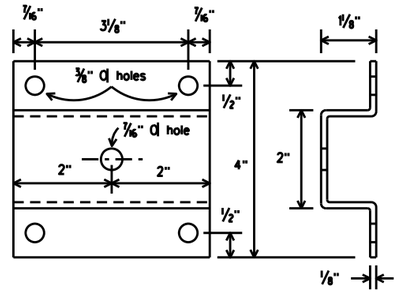


SECTION A-A



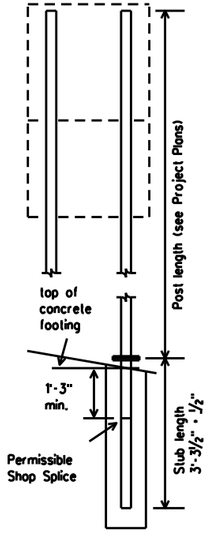
Galvanized steel or aluminum self-locking hex. head nut. 3/8 " - 16 x 3/4 " hex. head bolt for sheet metal. 3/8 " - 16 x 1 1/4 " hex. head bolt for plywood. 3/8 " galvanized medium washer.

DETAIL "C"



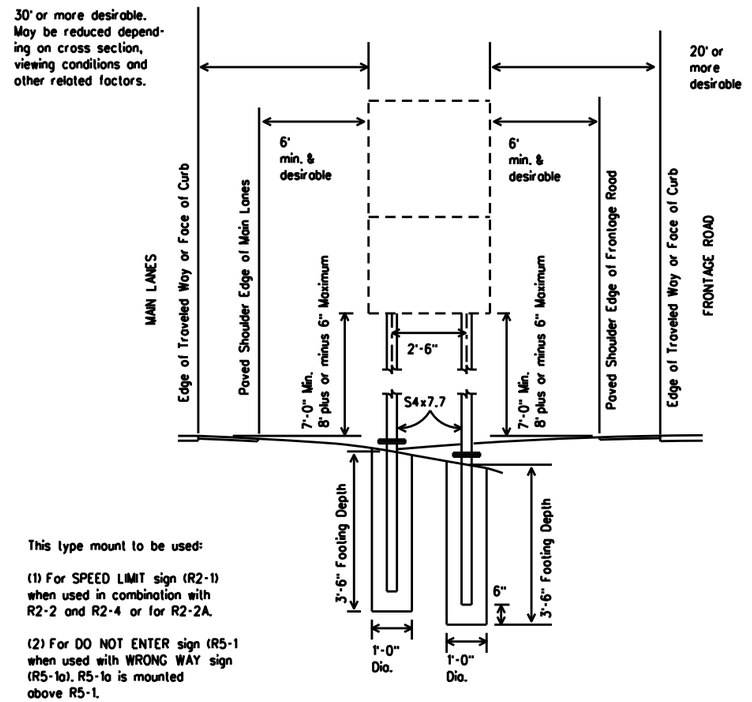
WING CHANNEL

Wing channel, 4" width x 1/8" depth x 1/8" 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

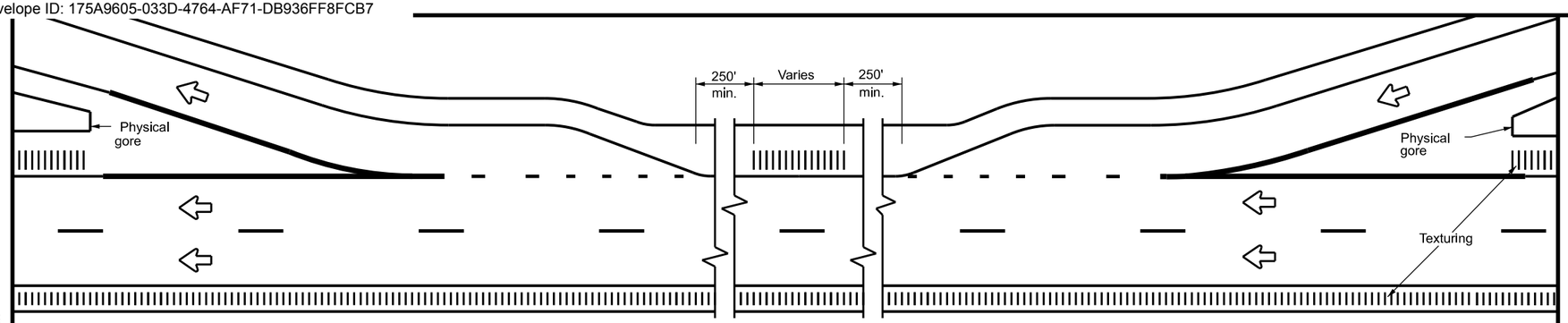
SMD(TY G)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

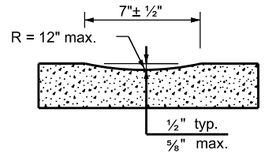
REVISIONS
1-97
9-08

CONT	SECT	JOB	HIGHWAY
6464	74	001	IH0030

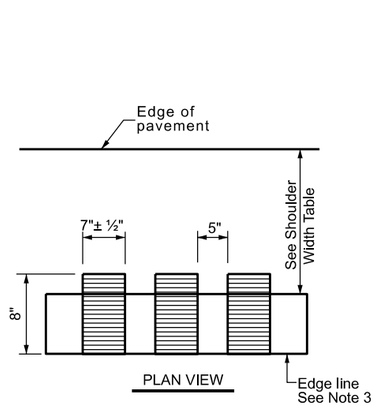
DIST	COUNTY	SHEET NO.
DAL	DALLAS	93



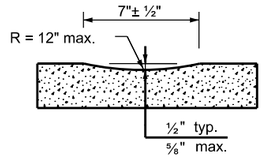
TYPICAL RUMBLE STRIP PLACEMENT AT EXIT AND ENTRANCE RAMPS



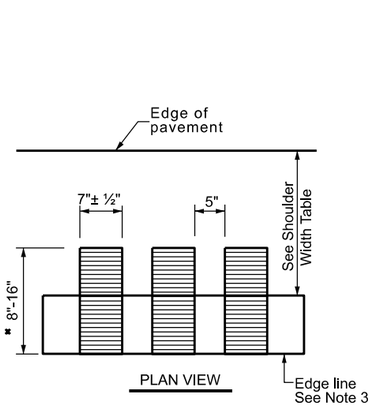
PROFILE VIEW
OPTION 1



CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)

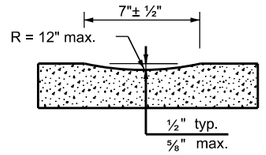


PROFILE VIEW
OPTION 2

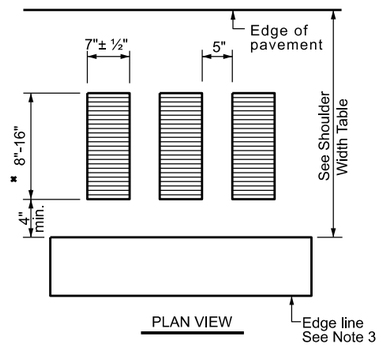


✖ This distance may vary based on width of shoulder

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)

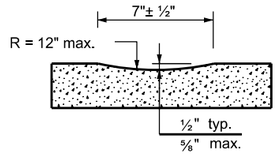


PROFILE VIEW
OPTION 3

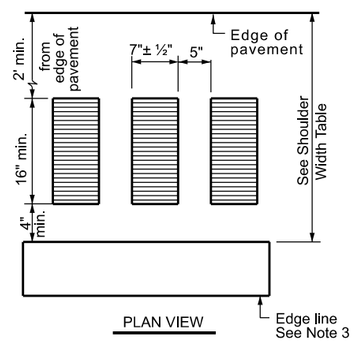


✖ This distance may vary based on width of shoulder

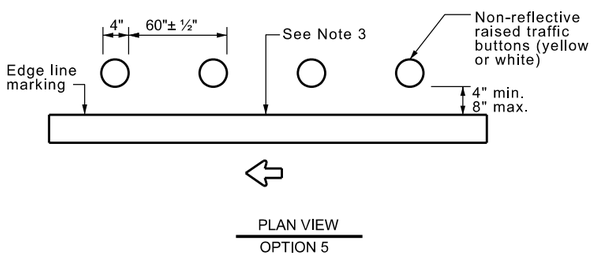
CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



PROFILE VIEW
OPTION 4

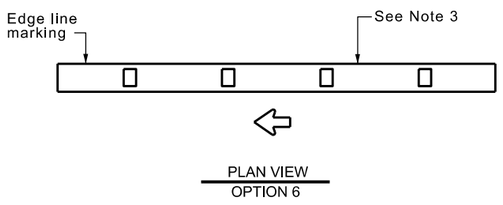


CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



PLAN VIEW
OPTION 5

RAISED EDGE LINE
(Rumble Strips)



PLAN VIEW
OPTION 6

PROFILE EDGE LINE MARKINGS
(Rumble Strips)

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 sheets PM(2) and FPM(1) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings, and profile markings.
4. See the Shoulder Width Table below for determining what options may be used for edge line rumble strips.
5. Breaks in edge line rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections, or driveways with high usage of large trucks when installed on conventional highways.
6. Rumble strips shall not be placed across exit or entrance ramps, acceleration or deceleration lanes, crossovers, gore areas, or intersections with other roadways.
7. Consideration should be given to noise levels when edge line rumble strips are to be installed near residential areas, schools, churches, etc. A 3/8 inch deep (minimum) milled rumble strip may be considered in these areas.
8. Consideration shall be given to bicyclists. See RS(6).

WHEN INSTALLING MILLED DEPRESSION EDGE LINE RUMBLE STRIPS:

9. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Safety Division.
10. Pavement markings can be applied over milled shoulder rumble strips to create an edge line rumble stripe.

WHEN INSTALLING RAISED OR PROFILE EDGE LINE 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 edge line when used as a rumble strip. The color of the button should match the color of the adjacent edge line 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. The minimum distance between the edge line and the buttons should be used if the shoulder is less than 8 feet in width.
15. Raised profile thermoplastic markings used as edge lines 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 Safety Division Standard

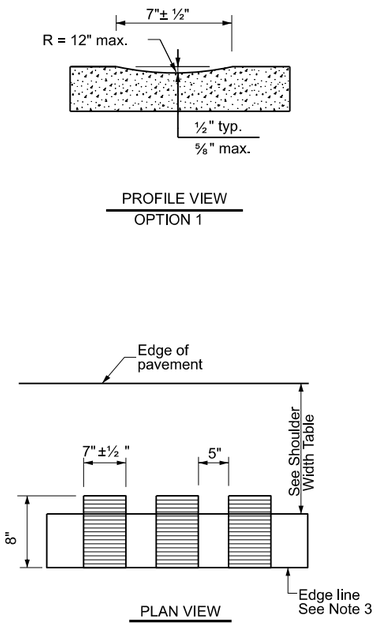
EDGE LINE RUMBLE STRIPS ON FREEWAYS AND DIVIDED HIGHWAYS

RS(1)-23

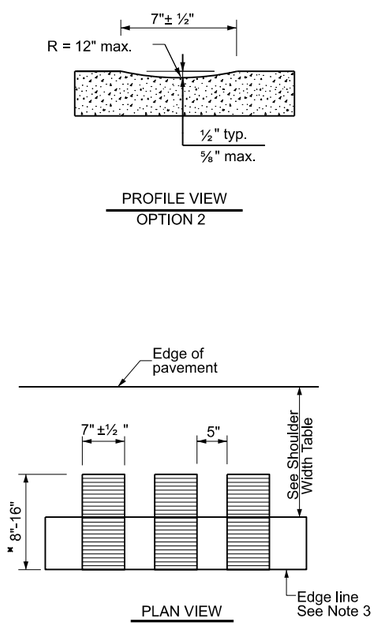
FILE: rs(1)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT January 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
4-06 1-23	DIST	COUNTY		SHEET NO.
2-10	DAL	DALLAS		94
10-13				

DATE:
FILE:

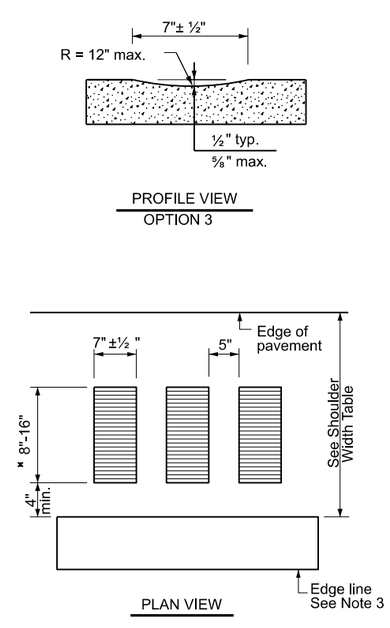
DATE:
FILE:



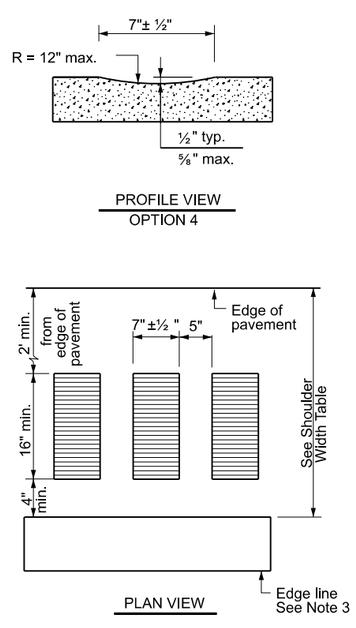
CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



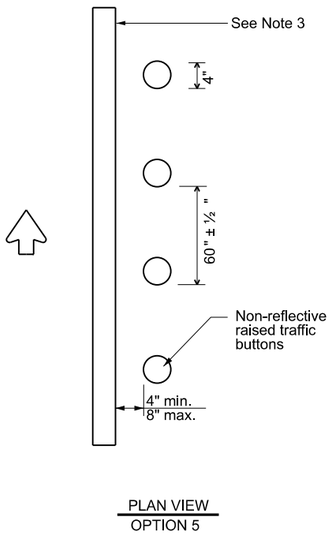
CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



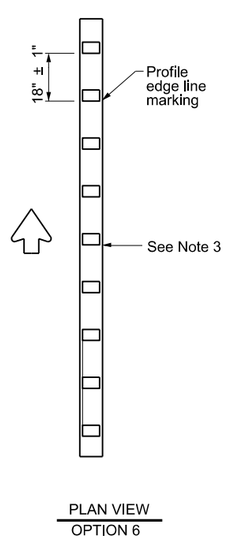
CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



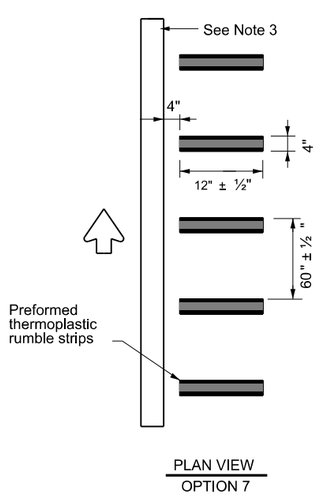
CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



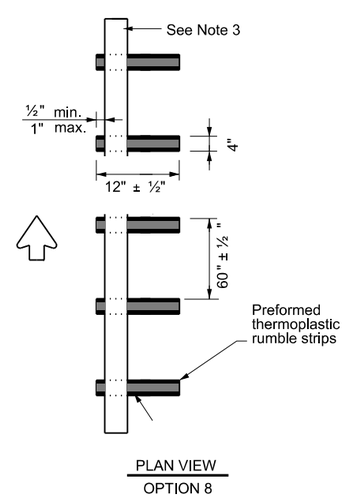
RAISED EDGE LINE (Rumble Strips)



PROFILE EDGE LINE MARKINGS (Rumble Strips)



PREFORMED THERMOPLASTIC EDGE LINE (Rumble Strips)



PREFORMED THERMOPLASTIC EDGE LINE (Rumble Strips)

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, 6 or 8	Option 1, 2, 3 5, 6 or 7	Option 2, 4, 5 6 or 7

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) and FPM(1) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings, and profile markings.
4. See the Shoulder Width Table below for determining what options may be used for edge line rumble strips.
5. Breaks in edge line rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections, or driveways with high usage of large trucks when installed on conventional highways.
6. Rumble strips shall not be placed across exit or entrance ramps, acceleration or deceleration lanes, crossovers, gore areas, or intersections with other roadways.
7. Consideration should be given to noise levels when edgeline rumble strips are to be installed near residential areas, schools, churches, etc. A 3/8 inch deep (minimum) milled rumble strip may be considered in these areas.
8. Consideration shall be given to bicyclists. See RS(6).

WHEN INSTALLING MILLED DEPRESSION EDGE LINE RUMBLE STRIPS:

9. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Safety Division.
10. Pavement markings can be applied over milled shoulder rumble strips to create an edge line rumble strip.

WHEN INSTALLING RAISED OR PROFILE EDGE LINE RUMBLE STRIPS:

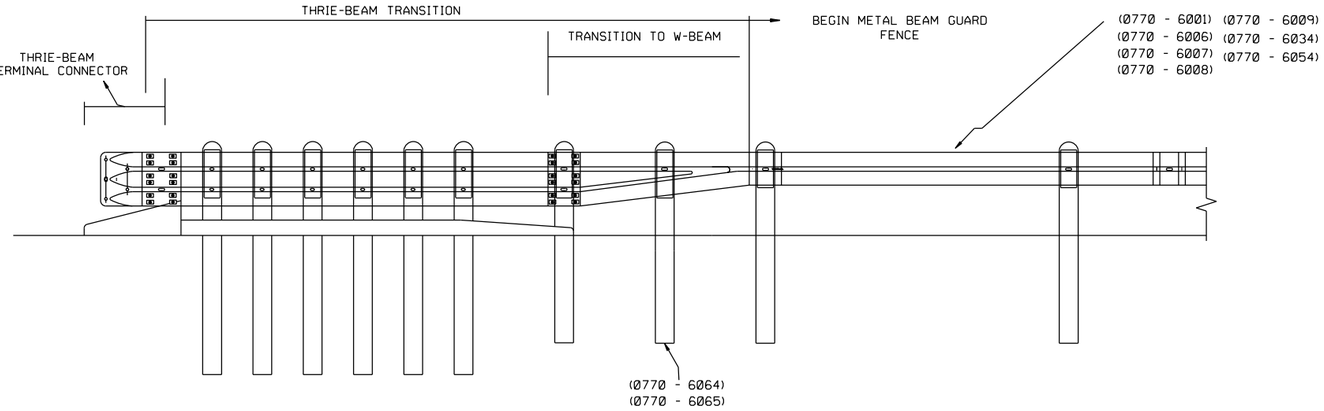
11. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per the manufacturer's recommendations.
12. Non-reflective traffic buttons shall be placed adjacent to the pavement marking delineating the edge line when used as a rumble strip. The color of the button should match the color of the adjacent edge line 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. The minimum distance between the edge line and the buttons should be used if the shoulder is less than 8 feet in width.
15. Raised profile thermoplastic markings used as edge lines may substitute for buttons.

Texas Department of Transportation

Traffic Safety Division Standard

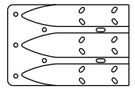
EDGE LINE RUMBLE STRIPS ON UNDIVIDED OR TWO LANE HIGHWAYS RS(2)-23

FILE: rs(2)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT January 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
10-13	DIST	COUNTY		SHEET NO.
1-23	DAL	DALLAS		95

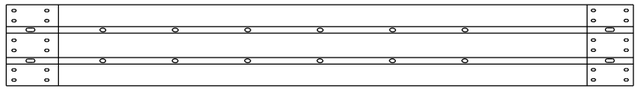


ELEVATION VIEW

(0770 - 6002)
(0770 - 6035)

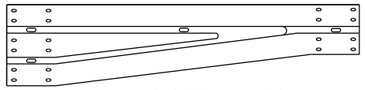


THRIE-BEAM TERMINAL CONNECTOR.



NESTED THRIE-BEAM RAIL

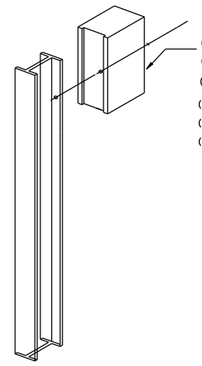
(0770 - 6003) (0770 - 6066)
(0770 - 6036) (0770 - 6067)



NON-SYMMETRICAL W-BEAM TO THRIE-BEAM TRANSISTION 10GA.

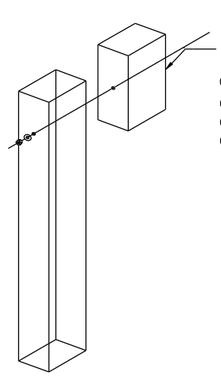
BID CODE	DESCRIPTION	UNIT
0770 - 6001	REPAIR RAIL ELEMENT (W - BEAM)	LF
0770 - 6002	REPAIR RAIL ELEMENT (THRIE - BEAM)	LF
0770 - 6003	REPAIR RAIL ELMNT (THRIE - BM TO W-BM)	LF
0770 - 6006	RAISE RAIL ELEMENT	LF
0770 - 6007	RAISE RAIL (TYPE SPECIFIED)	LF
0770 - 6008	REALIGN EXISTING RAIL	LF
0770 - 6009	REPAIR RAIL ELEMENT (T4S)	LF
0770 - 6010	REM/REPL TIMBER/STL POST W/O CONC FND	EA
0770 - 6011	REM / REPL TIMBER / STL POST W/CONC FND	EA
0770 - 6012	REM / REPL TIMBER POST W / O CONC FND	EA
0770 - 6013	REM / REPL STEEL POST W / O CONC FND	EA
0770 - 6014	REM / REPL TIMBER POST W / CONC FND	EA
0770 - 6015	REM / REPL STEEL POST W / CONC FND	EA
0770 - 6016	REPAIR STEEL POST WITH BASE PLATE	EA
0770 - 6017	REALIGN POSTS	EA
0770 - 6018	INSTALL BLOCKOUT (TYPE SPECIFIED)	EA
0770 - 6019	REMOVE & REPLACE BLOCKOUT	EA
0770 - 6020	REPLACE STL BLOCKOUTS W /WOOD BLOCKOUTS	EA
0770 - 6034	REPAIR RAIL ELEMENT(W - BEAM FURNISHED)	LF
0770 - 6035	REPAIR RAIL ELEMENT(THRIE - BEAM)(FURN)	LF
0770 - 6036	REP RAIL ELMNT (THRIE - BM TRANS)(FURN)	LF
0770 - 6038	REM / REPL TIM POST W/O CONC FND (FURN)	EA
0770 - 6039	REM / REPL STL POST W/O CONC FND (FURN)	EA
0770 - 6040	REM / REPL TIM POST W / CONC FND (FURN)	EA
0770 - 6041	REM / REPL STL POST W / CONC FND (FURN)	EA
0770 - 6042	REM/ REPL TIM/STL POST W CONC FND(FURN)	EA
0770 - 6043	REM/REP TIM/STL POST W/O CONC FND(FURN)	EA
0770 - 6044	INSTALL BLOCKOUTS (FURNISHED)	EA
0770 - 6045	REM & REPLACE BLOCKOUTS (FURNISHED)	EA
0770 - 6052	REPAIR STEEL POST WITH BASE PLATE	EA
0770 - 6054	REPAIR RAIL ELEMENT (W - BEAM) (LABOR)	LF
0770 - 6056	REMOVE TIMBER POST	EA
0770 - 6057	REMOVE & REPLACE STL BLOCKOUT	EA
0770 - 6058	REPAIR (SMTC)(N)(BAY)	EA
0770 - 6064	REM/REPL 84"(THRIE-BM TR TO W-BM)POST	EA
0770 - 6065	REM/REPL 72"(THRIE-BM TR TO W-BM)POST	EA
0770 - 6066	REPLACE THRIE-BEAM TRANSITION	EA
0770 - 6067	REPLACE NON-SYMMETRICAL TRANSITION	EA

NOTE:THE PAY ITEMS ON THIS SHEET ARE ONLY USED WHEN DAMAGED GUARDRAIL COMPONENTS ARE BEING REPAIRED OR ROUTINE MAINTENANCE WORK OCCURS. THE CALLOUTS ON THIS SHEET ARE FOR CLARIFICATION ON HOW WORK WILL BE PAID. THIS SHEET WILL NOT BE USED FOR DETERMINING HOW TO PAY FOR WHEN NEW SECTIONS OF GUARDRAIL ARE INSTALLED, EXISTING SECTIONS ARE REMOVED WITHOUT BEING REPLACED, OR BLANKET MASH UPGRADES ARE INSTALLED.



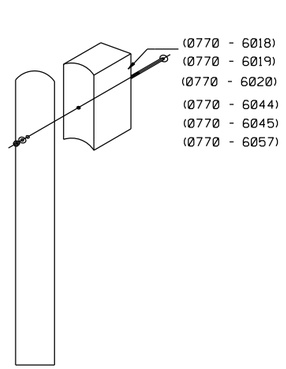
ROUTED WOOD BLOCK-OUT TO STEEL POST

(0770 - 6010)	(0770 - 6039)
(0770 - 6011)	(0770 - 6041)
(0770 - 6013)	(0770 - 6042)
(0770 - 6015)	(0770 - 6043)
(0770 - 6016)	(0770 - 6052)
(0770 - 6017)	



WOOD BLOCK TO RECTANGULAR WOOD POST

(0770 - 6010)	(0770 - 6038)
(0770 - 6011)	(0770 - 6040)
(0770 - 6012)	(0770 - 6042)
(0770 - 6014)	(0770 - 6043)
(0770 - 6017)	(0770 - 6056)



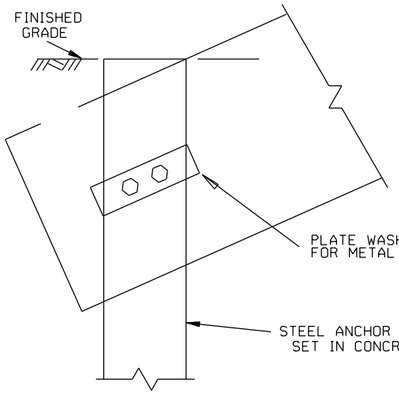
WOOD BLOCK TO RECTANGULAR WOOD POST

(0770 - 6010)	(0770 - 6038)
(0770 - 6011)	(0770 - 6040)
(0770 - 6012)	(0770 - 6042)
(0770 - 6014)	(0770 - 6043)
(0770 - 6017)	(0770 - 6056)

Texas Department of Transportation

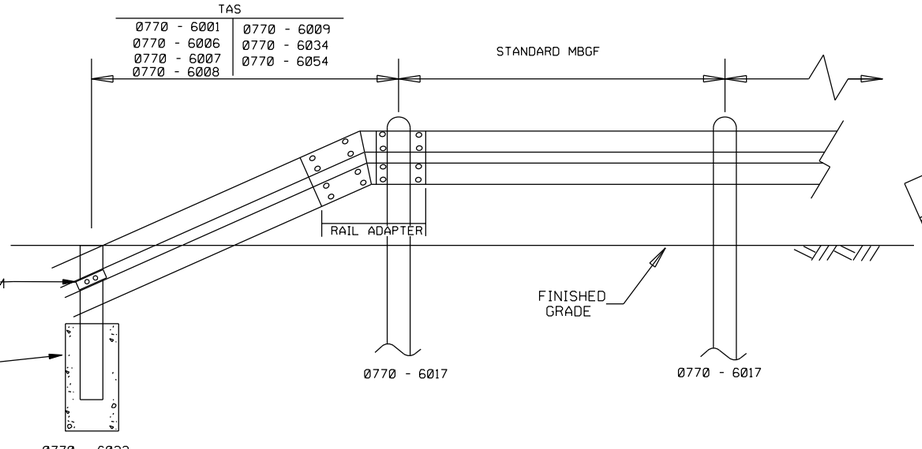
PAY ITEM DETAILS
METAL BEAM GUARD FENCE

FILE:	DN:	CK:	DW:	CK:
©TxDOT: SEPTEMBER 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		96



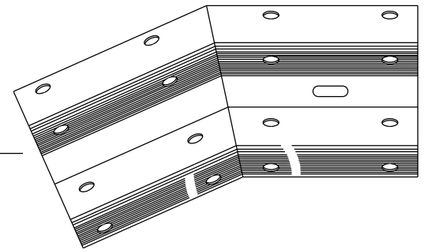
ANCHOR POST

0770 - 6023
0770 - 6024



TERMINAL ANCHOR SECTION (TAS)

PLATE WASHER FOR METAL BEAM



RAIL ADAPTER

BID CODE	DESCRIPTION	UNIT
0770 - 6001	REPAIR RAIL ELEMENT (W - BEAM)	LF
0770 - 6002	REPAIR RAIL ELEMENT (THRIE - BEAM)	LF
0770 - 6006	RAISE RAIL ELEMENT	LF
0770 - 6007	RAISE RAIL (TYPE SPECIFIED)	LF
0770 - 6008	REALIGN EXISTING RAIL	LF
0770 - 6009	REPAIR RAIL ELEMENT (T4S)	LF
0770 - 6017	REALIGN POSTS	EA
0770 - 6023	REPAIR OF TERMINAL ANCHORS POSTS	EA
0770 - 6024	REPLACE TERMINAL ANCHOR POSTS	EA
0770 - 6030	REPLACE SGT CABLE ASSEMBLY	EA
0770 - 6031	REPLACE SGT CABLE ANCHOR	EA
0770 - 6032	REPLACE SGT STRUT	EA
0770 - 6034	REPAIR RAIL ELEMENT(W - BEAM FURNISHED)	LF
0770 - 6035	REPAIR RAIL ELEMENT(THRIE - BEAM)(FURN)	LF
0770 - 6049	REPLACE SGT CABLE ANCHOR (FURN)	EA
0770 - 6050	REPLACE SGT CABLE ASSEMBLY (FURN)	EA
0770 - 6051	REPLACE SGT STRUT (FURN)	EA
0770 - 6054	REPAIR RAIL ELEMENT (W - BEAM)(LABOR)	LF
0770 - 6060	REMOVE AND REPLACE DAT	EA

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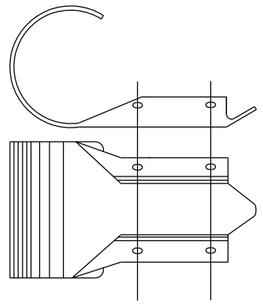
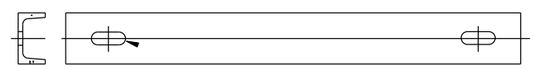


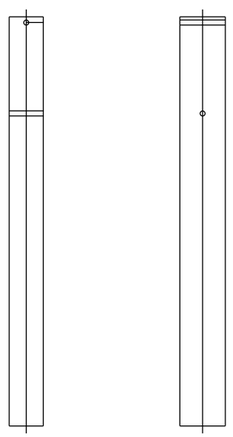
W-BEAM END SECTION (ROUNDED)

0770 - 6001
0770 - 6008
0770 - 6009
0770 - 6034
0770 - 6054



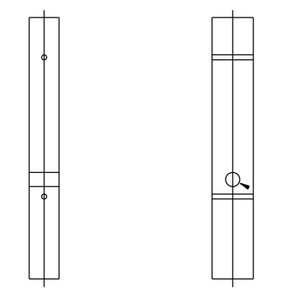
CHANNEL STRUT

0770 - 6032
0770 - 6051



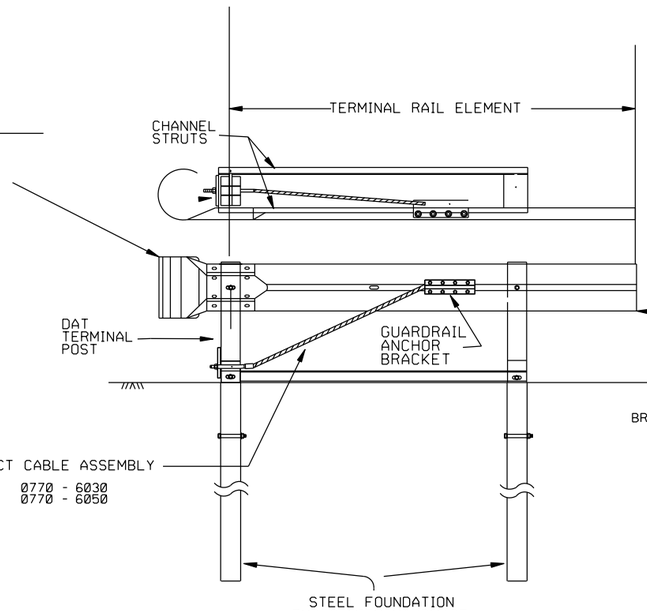
STEEL FOUNDATION TUBE

0770 - 6017
0770 - 6023
0770 - 6024



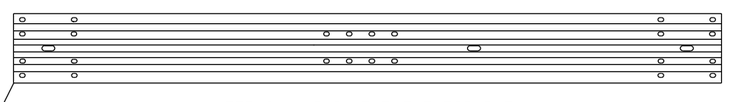
TERMINAL WOOD POST

0770 - 6017
0770 - 6023
0770 - 6024



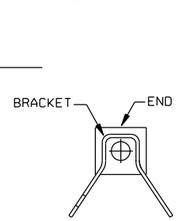
DOWNSTREAM ANCHOR TERMINAL (DAT)

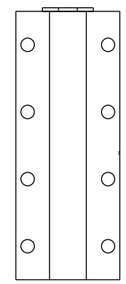
0770 - 6060



TERMINAL RAIL ELEMENT FOR DAT

0770 - 6002
0770 - 6006
0770 - 6008
0770 - 6009
0770 - 6035





GUARDRAIL ANCHOR BRACKET

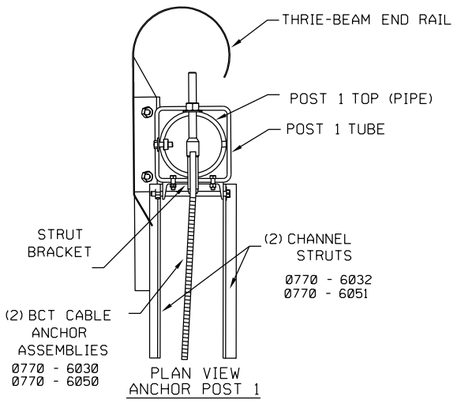
0770 - 6031
0770 - 6049

Texas Department of Transportation

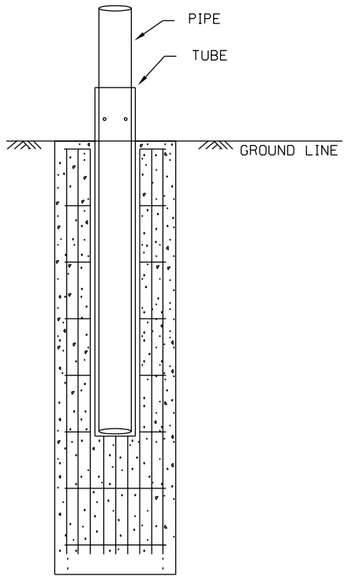
PAY ITEM DETAILS
TERMINAL ANCHOR SECTION
&
DOWNSTREAM ANCHOR TERMINAL

FILE:	DN: TxDOT	CK:	DW:	CK:
©TxDOT: SEPTEMBER 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		97

DATE:
FILE:

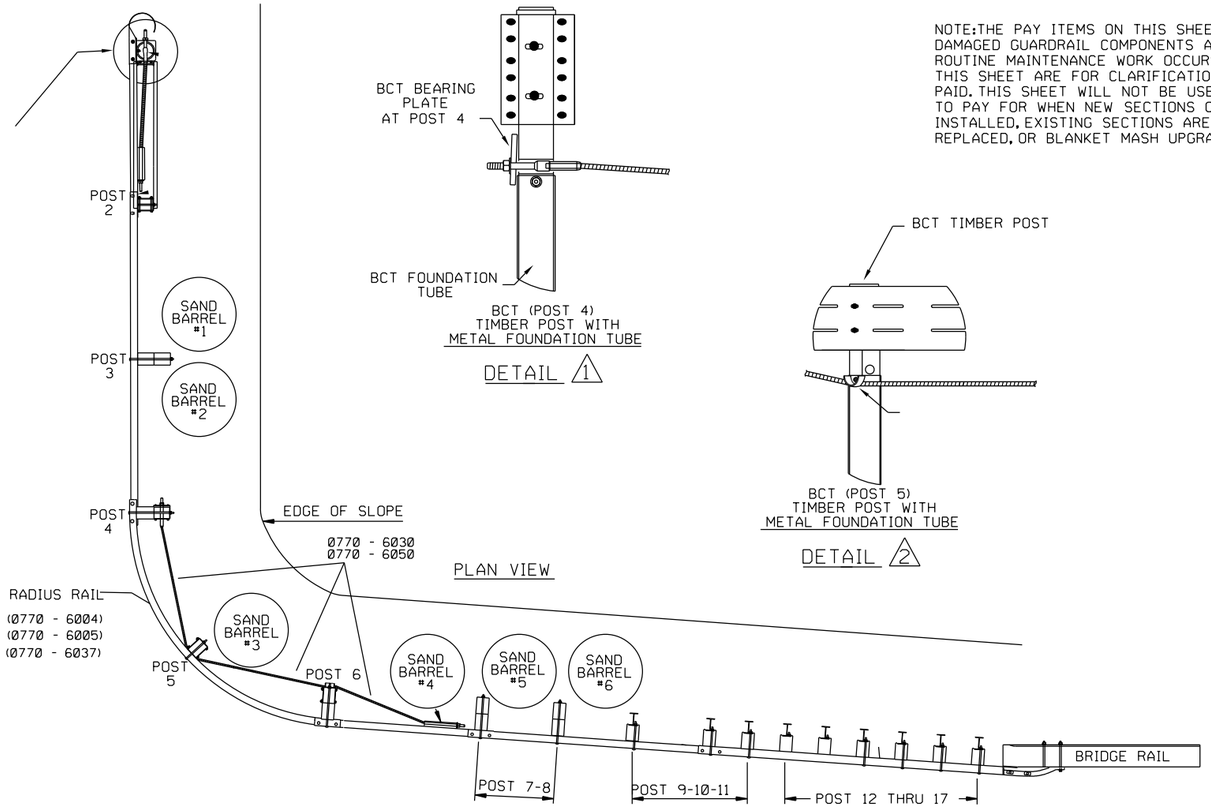


PLAN VIEW
ANCHOR POST 1



ELEVATION VIEW
ANCHOR POST 1

0770 - 6017
0770 - 6023
0770 - 6024



PLAN VIEW

BCT (POST 4)
TIMBER POST WITH
METAL FOUNDATION TUBE

DETAIL 1

BCT (POST 5)
TIMBER POST WITH
METAL FOUNDATION TUBE

DETAIL 2

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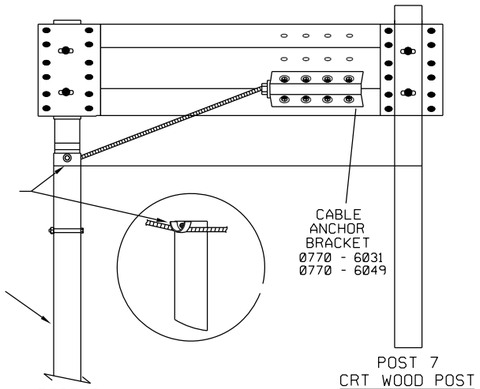
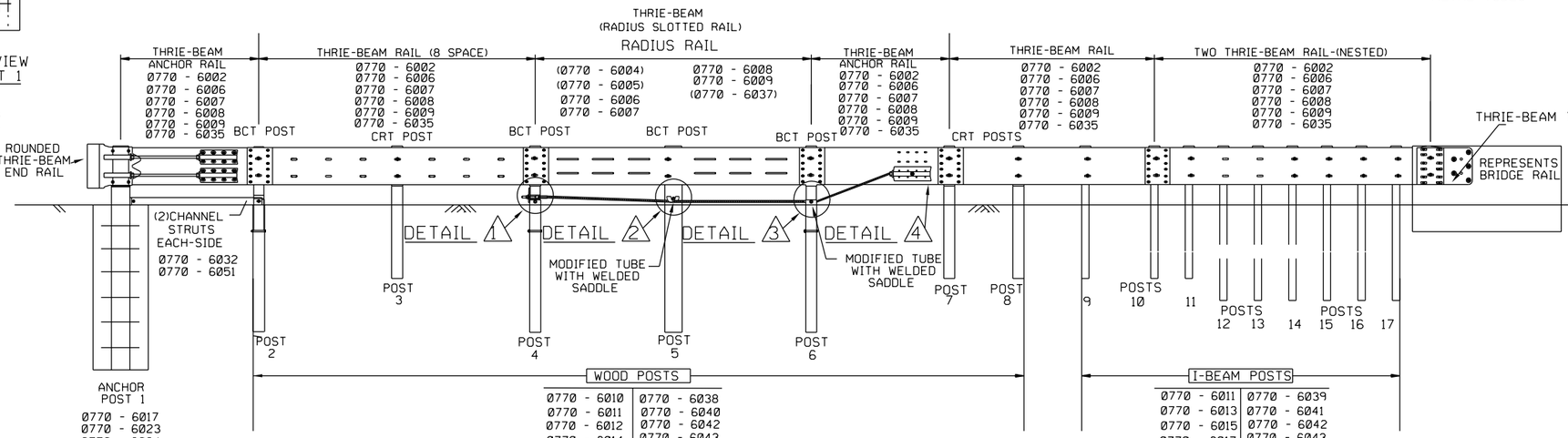
BID CODE	DESCRIPTION	UNIT
0770 - 6002	REPAIR RAIL ELEMENT (THRIE - BEAM)	LF
0770 - 6004	REPAIR RAIL ELEMENT (CURVED RAIL)	LF
0770 - 6005	REM/REPAIR RAIL ELEMENT (CURVED RAIL)	LF
0770 - 6006	RAISE RAIL ELEMENT	LF
0770 - 6007	RAISE RAIL (TYPE SPECIFIED)	LF
0770 - 6008	REALIGN EXISTING RAIL	LF
0770 - 6009	REPAIR RAIL ELEMENT (T4S)	LF
0770 - 6010	REM/REPL TIMBER/STL POST W/O CONC FND	EA
0770 - 6011	REM / REPL TIMBER / STL POST W/CONC FND	EA
0770 - 6012	REM / REPL TIMBER POST W / O CONC FND	EA
0770 - 6013	REM / REPL STEEL POST W / O CONC FND	EA
0770 - 6014	REM / REPL TIMBER POST W / CONC FND	EA
0770 - 6015	REM / REPL STEEL POST W / CONC FND	EA
0770 - 6017	REALIGN POSTS	EA
0770 - 6023	REPAIR OF TERMINAL ANCHORS POSTS	EA
0770 - 6024	REPLACE TERMINAL ANCHOR POSTS	EA
0770 - 6030	REPLACE SGT CABLE ASSEMBLY	EA
0770 - 6031	REPLACE SGT CABLE ANCHOR	EA
0770 - 6032	REPLACE SGT STRUT	EA
0770 - 6035	REPAIR RAIL ELEMENT(THRIE - BEAM)(FURN)	LF
0770 - 6037	REPAIR RAIL ELEMENT (CURVED RAIL)(FURN)	LF
0770 - 6038	REM / REPL TIM POST W/O CONC FND (FURN)	EA
0770 - 6039	REM / REPL STL POST W/O CONC FND (FURN)	EA
0770 - 6040	REM / REPL TIM POST W / CONC FND (FURN)	EA
0770 - 6041	REM / REPL STL POST W / CONC FND (FURN)	EA
0770 - 6042	REM/ REPL TIM/STL POST W CONC FND(FURN)	EA
0770 - 6043	REM/REP TIM/STL POST W/O CONC FND(FURN)	EA
0770 - 6049	REPLACE SGT CABLE ANCHOR (FURN)	EA
0770 - 6050	REPLACE SGT CABLE ASSEMBLY (FURN)	EA
0770 - 6051	REPLACE SGT STRUT (FURN)	EA
0770 - 6056	REMOVE TIMBER POST	EA



DETAILS 3 & 4

FULL-LENGTH ELEVATION VIEW



WOOD POSTS

0770 - 6010	0770 - 6038
0770 - 6011	0770 - 6040
0770 - 6012	0770 - 6042
0770 - 6014	0770 - 6043
0770 - 6017	0770 - 6056

I-BEAM POSTS

0770 - 6011	0770 - 6039
0770 - 6013	0770 - 6041
0770 - 6015	0770 - 6042
0770 - 6017	0770 - 6043

Texas Department of Transportation

PAY ITEM DETAILS
TL-3
SHORT RADIUS GUARDRAIL
MASH COMPLIANT

FILE: SEPTEMBER 2021	TxDOT	CK:	DN:		CK:
© TxDOT:	CONT	SECT	JOB		HIGHWAY
REVISIONS	6464	74	001		IH0030
	DIST	COUNTY			SHEET NO.
	DAL	DALLAS			98

DATE:
FILE:

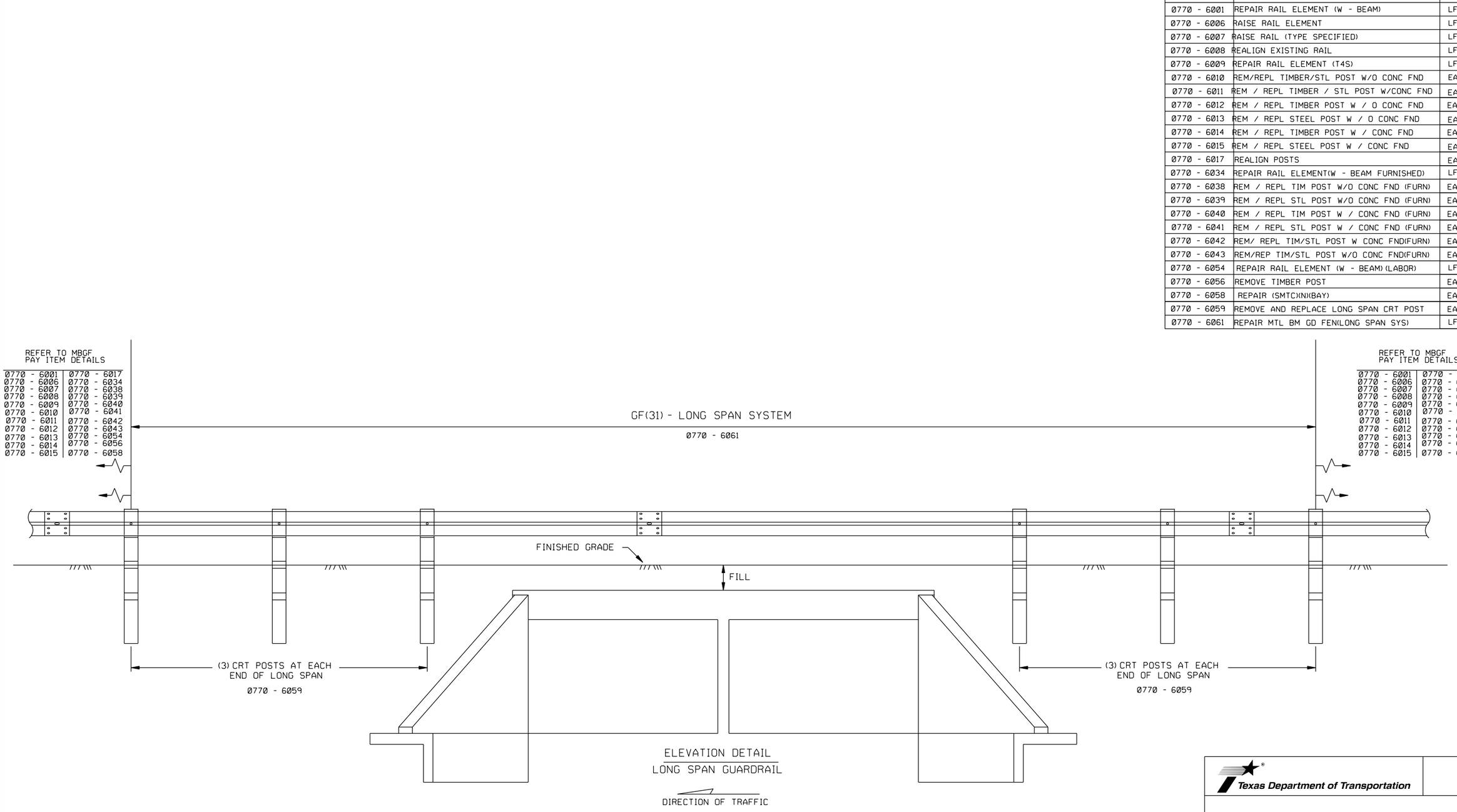
BID CODE	DESCRIPTION	UNIT
0770 - 6001	REPAIR RAIL ELEMENT (W - BEAM)	LF
0770 - 6006	RAISE RAIL ELEMENT	LF
0770 - 6007	RAISE RAIL (TYPE SPECIFIED)	LF
0770 - 6008	REALIGN EXISTING RAIL	LF
0770 - 6009	REPAIR RAIL ELEMENT (T4S)	LF
0770 - 6010	REM/REPL TIMBER/STL POST W/O CONC FND	EA
0770 - 6011	REM / REPL TIMBER / STL POST W/CONC FND	EA
0770 - 6012	REM / REPL TIMBER POST W / O CONC FND	EA
0770 - 6013	REM / REPL STEEL POST W / O CONC FND	EA
0770 - 6014	REM / REPL TIMBER POST W / CONC FND	EA
0770 - 6015	REM / REPL STEEL POST W / CONC FND	EA
0770 - 6017	REALIGN POSTS	EA
0770 - 6034	REPAIR RAIL ELEMENT(W - BEAM FURNISHED)	LF
0770 - 6038	REM / REPL TIM POST W/O CONC FND (FURN)	EA
0770 - 6039	REM / REPL STL POST W/O CONC FND (FURN)	EA
0770 - 6040	REM / REPL TIM POST W / CONC FND (FURN)	EA
0770 - 6041	REM / REPL STL POST W / CONC FND (FURN)	EA
0770 - 6042	REM/ REPL TIM/STL POST W CONC FND(FURN)	EA
0770 - 6043	REM/REP TIM/STL POST W/O CONC FND(FURN)	EA
0770 - 6054	REPAIR RAIL ELEMENT (W - BEAM) (LABOR)	LF
0770 - 6056	REMOVE TIMBER POST	EA
0770 - 6058	REPAIR (SMTC)(N)(BAY)	EA
0770 - 6059	REMOVE AND REPLACE LONG SPAN CRT POST	EA
0770 - 6061	REPAIR MTL BM GD FEN(LONG SPAN SYS)	LF

REFER TO MBGF
PAY ITEM DETAILS

0770 - 6001	0770 - 6017
0770 - 6006	0770 - 6034
0770 - 6007	0770 - 6038
0770 - 6008	0770 - 6039
0770 - 6009	0770 - 6040
0770 - 6010	0770 - 6041
0770 - 6011	0770 - 6042
0770 - 6012	0770 - 6043
0770 - 6013	0770 - 6054
0770 - 6014	0770 - 6056
0770 - 6015	0770 - 6058

GF(31) - LONG SPAN SYSTEM

0770 - 6061



ELEVATION DETAIL
LONG SPAN GUARDRAIL

DIRECTION OF TRAFFIC

REFER TO MBGF
PAY ITEM DETAILS

0770 - 6001	0770 - 6017
0770 - 6006	0770 - 6034
0770 - 6007	0770 - 6038
0770 - 6008	0770 - 6039
0770 - 6009	0770 - 6040
0770 - 6010	0770 - 6041
0770 - 6011	0770 - 6042
0770 - 6012	0770 - 6043
0770 - 6013	0770 - 6054
0770 - 6014	0770 - 6056
0770 - 6015	0770 - 6058

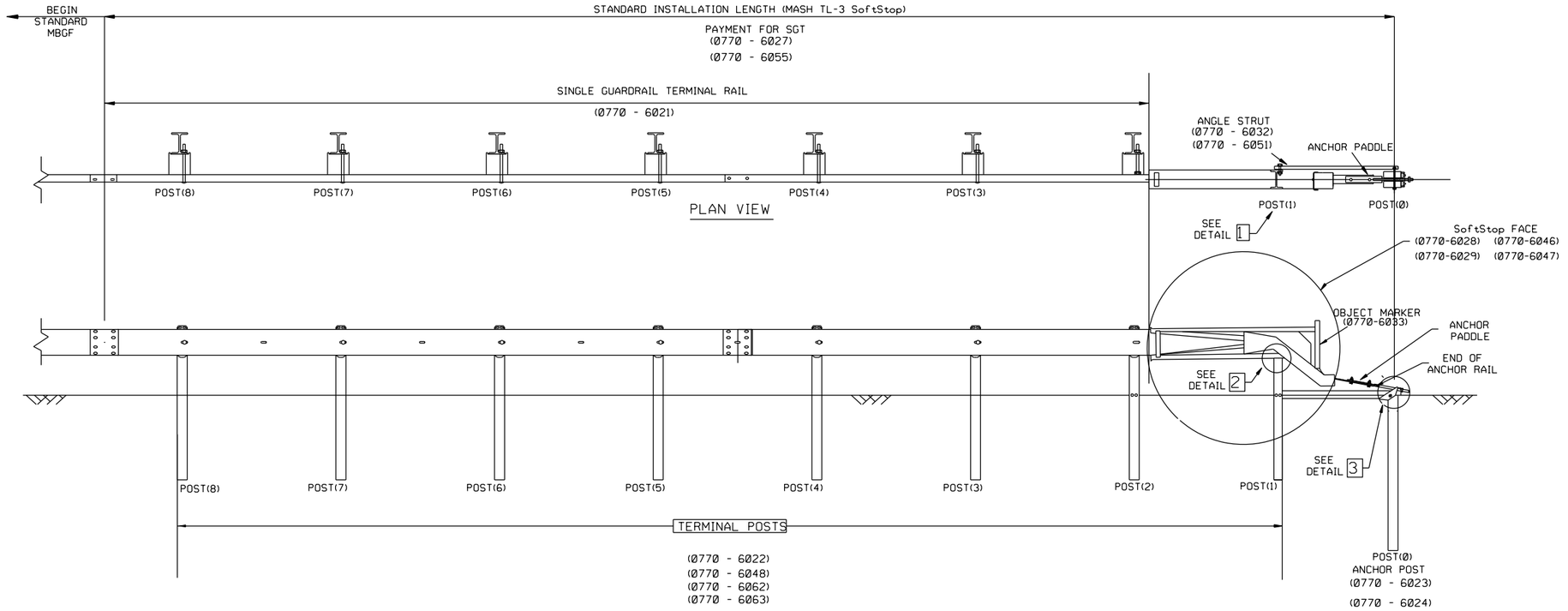
NOTE:THE PAY ITEMS ON THIS SHEET ARE ONLY USED WHEN DAMAGED GUARDRAIL COMPONENTS ARE BEING REPAIRED OR ROUTINE MAINTENANCE WORK OCCURS. THE CALLOUTS ON THIS SHEET ARE FOR CLARIFICATION ON HOW WORK WILL BE PAID. THIS SHEET WILL NOT BE USED FOR DETERMINING HOW TO PAY FOR WHEN NEW SECTIONS OF GUARDRAIL ARE INSTALLED, EXISTING SECTIONS ARE REMOVED WITHOUT BEING REPLACED, OR BLANKET MASH UPGRADES ARE INSTALLED.

Texas Department of Transportation

PAY ITEM DETAILS
METAL BEAM GUARDFENCE
LONG SPAN
TL-3 MASH COMPLIANT

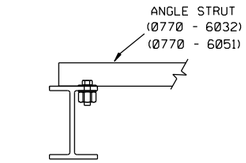
FILE:	DN: TxDOT	CK:	DW:	CK:
©TxDOT: SEPTEMBER 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		99

DATE:
FILE:

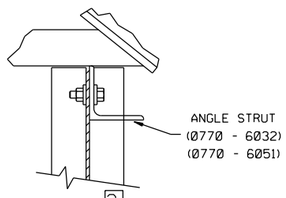


BID CODE	DESCRIPTION	UNIT
Ø770 - 6021	REPLACE SINGLE GDRAIL TERMINAL RAIL	LF
Ø770 - 6022	REPLACE SINGLE GDRAIL TERMINAL POST	EA
Ø770 - 6023	REPAIR OF TERMINAL ANCHORS POSTS	EA
Ø770 - 6024	REPLACE TERMINAL ANCHOR POSTS	EA
Ø770 - 6027	REMOVE GDRAIL END TRT / REPL WITH SGT	EA
Ø770 - 6028	REPL SINGLE GDRAIL TERM IMPACT HEAD	EA
Ø770 - 6029	REM & RESET SGT IMPACT HEAD	EA
Ø770 - 6032	REPLACE SGT STRUT	EA
Ø770 - 6033	REPLACE SGT OBJECT MARKER	EA
Ø770 - 6046	REM & RESET SGT IMPACT HEAD (FURNISHED)	EA
Ø770 - 6047	REPL SGT IMPACT HEAD (FURNISHED)	EA
Ø770 - 6048	REPLACE SINGLE GDRAIL TERM POST (FURN)	EA
Ø770 - 6051	REPLACE SGT STRUT (FURN)	EA
Ø770 - 6055	REPAIR SINGLE GUARDRAIL TERMINAL	EA
Ø770 - 6063	REPLACE SINGLE GDRAIL TERM POST(STEEL)	EA

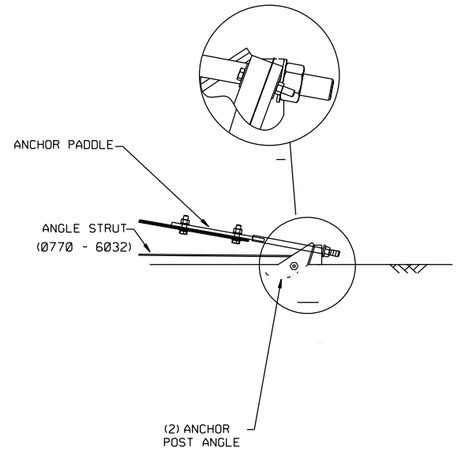
NOTE: THE PAY ITEMS ON THIS SHEET ARE ONLY USED WHEN DAMAGED GUARDRAIL COMPONENTS ARE BEING REPAIRED OR ROUTINE MAINTENANCE WORK OCCURS. THE CALLOUTS ON THIS SHEET ARE FOR CLARIFICATION ON HOW WORK WILL BE PAID. THIS SHEET WILL NOT BE USED FOR DETERMINING HOW TO PAY FOR WHEN NEW SECTIONS OF GUARDRAIL ARE INSTALLED, EXISTING SECTIONS ARE REMOVED WITHOUT BEING REPLACED, OR BLANKET MASH UPGRADES ARE INSTALLED.



DETAIL 1
SHOWN AT POST(1)
NEAR GROUND



DETAIL 2
SHOWN AT POST(1)



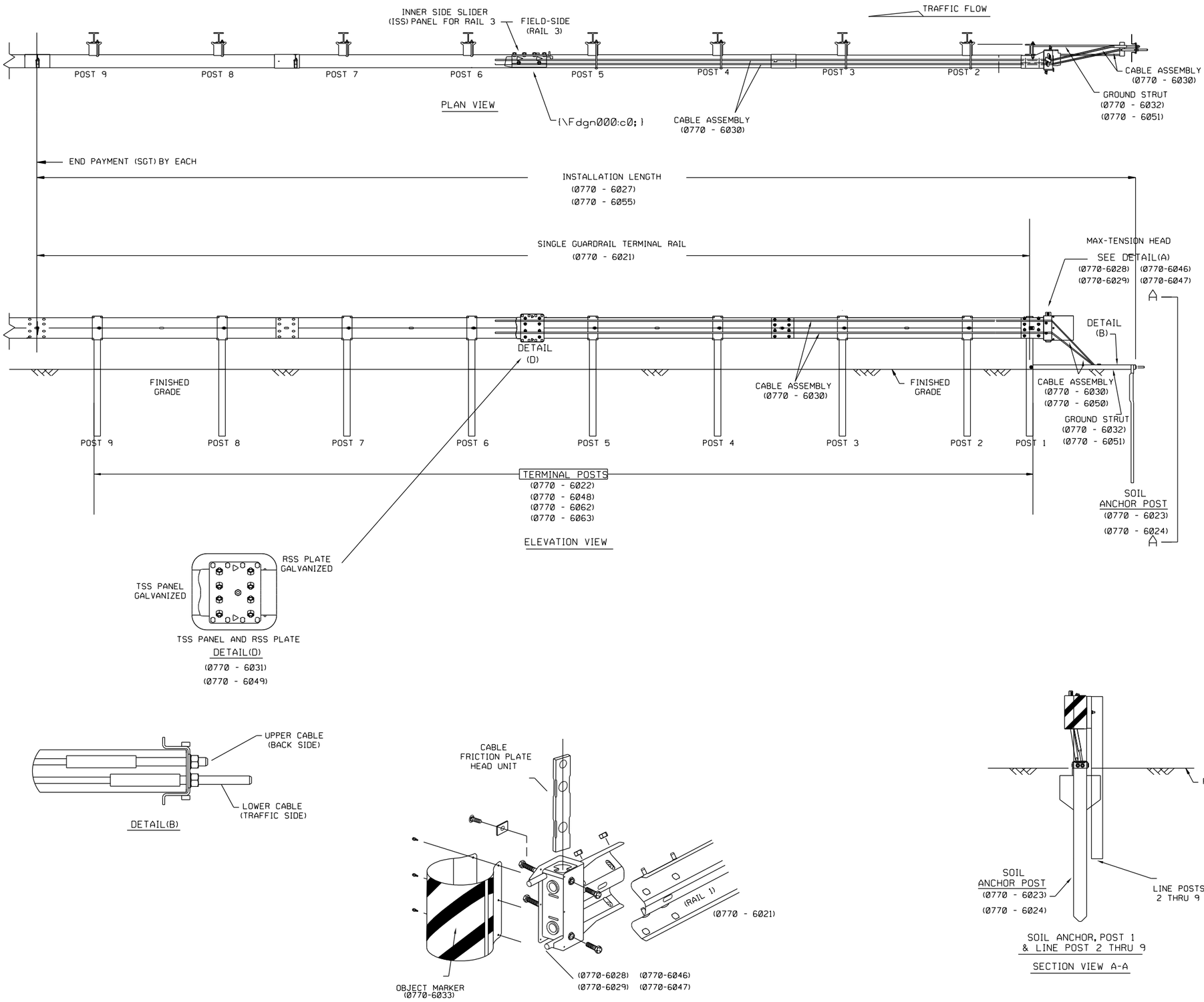
DETAIL 3
AT POST(Ø)
I-BEAM POST

Texas Department of Transportation

PAY ITEM DETAILS
TRINITY HIGHWAY
SOFTSTOP END TERMINAL
MASH - TL-3

FILE:	DN: TxDOT	CK:	DW:	CK:
©TxDOT: SEPTEMBER 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		100

DATE:
FILE:



BID CODE	DESCRIPTION	UNIT
0770 - 6021	REPLACE SINGLE GDRAIL TERMINAL RAIL	LF
0770 - 6022	REPLACE SINGLE GDRAIL TERMINAL POST	EA
0770 - 6023	REPAIR OF TERMINAL ANCHORS POSTS	EA
0770 - 6024	REPLACE TERMINAL ANCHOR POSTS	EA
0770 - 6027	REMOVE GDRAIL END TRT / REPL WITH SGT	EA
0770 - 6028	REPL SINGLE GDRAIL TERM IMPACT HEAD	EA
0770 - 6029	REM & RESET SGT IMPACT HEAD	EA
0770 - 6030	REPLACE SGT CABLE ASSEMBLY	EA
0770 - 6031	REPLACE SGT CABLE ANCHOR	EA
0770 - 6032	REPLACE SGT STRUT	EA
0770 - 6033	REPLACE SGT OBJECT MARKER	EA
0770 - 6046	REM & RESET SGT IMPACT HEAD (FURNISHED)	EA
0770 - 6047	REPL SGT IMPACT HEAD (FURNISHED)	EA
0770 - 6048	REPLACE SINGLE GDRAIL TERM POST (FURN)	EA
0770 - 6049	REPLACE SGT CABLE ANCHOR (FURN)	EA
0770 - 6050	REPLACE SGT CABLE ASSEMBLY (FURN)	EA
0770 - 6051	REPLACE SGT STRUT (FURN)	EA
0770 - 6055	REPAIR SINGLE GUARDRAIL TERMINAL	EA
0770 - 6062	REPLACE SINGLE GDRAIL TERM POST(WOOD)	EA
0770 - 6063	REPLACE SINGLE GDRAIL TERM POST(STEEL)	EA

NOTE:THE PAY ITEMS ON THIS SHEET ARE ONLY USED WHEN DAMAGED GUARDRAIL COMPONENTS ARE BEING REPAIRED OR ROUTINE MAINTENANCE WORK OCCURS. THE CALLOUTS ON THIS SHEET ARE FOR CLARIFICATION ON HOW WORK WILL BE PAID. THIS SHEET WILL NOT BE USED FOR DETERMINING HOW TO PAY FOR WHEN NEW SECTIONS OF GUARDRAIL ARE INSTALLED, EXISTING SECTIONS ARE REMOVED WITHOUT BEING REPLACED, OR BLANKET MASH UPGRADES ARE INSTALLED.

TSS PANEL AND RSS PLATE

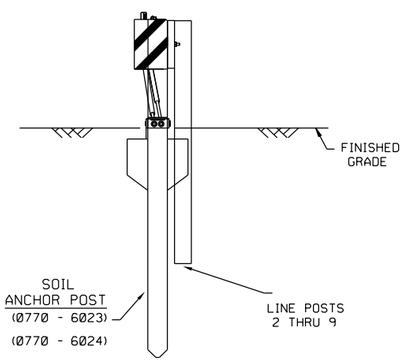
DETAIL(D)

(0770 - 6031)

(0770 - 6049)

DETAIL(B)

DETAIL(A)



SOIL ANCHOR, POST 1
& LINE POST 2 THRU 9

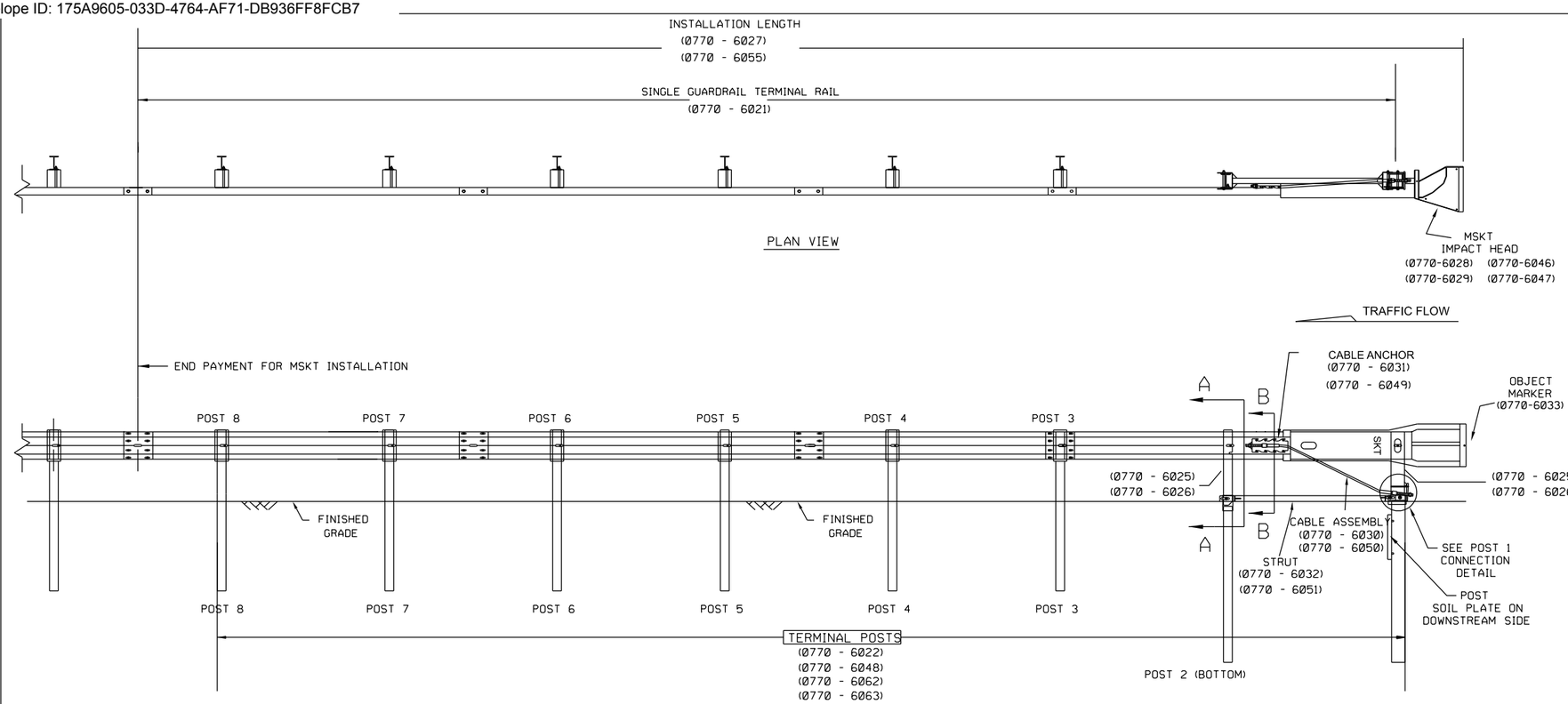
SECTION VIEW A-A

Texas Department of Transportation

PAY ITEM DETAILS
MAX-TENSION END TERMNAL
MASH - TL-3

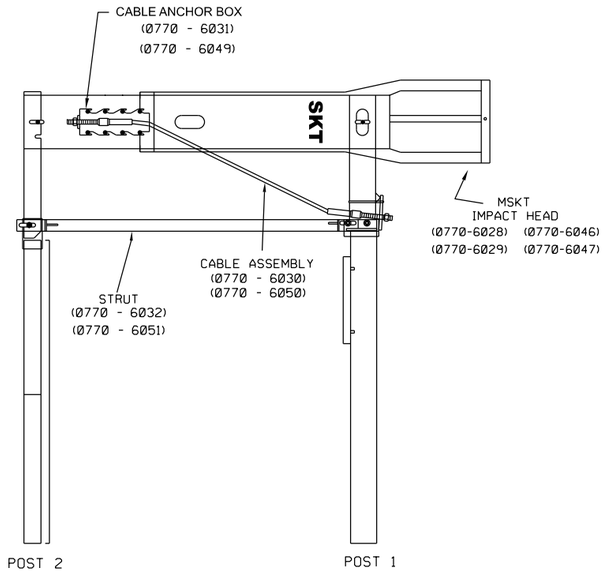
FILE:	DN: TxDOT	CK:	DW:	CK:
© TxDOT:SEPTEMBER 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		101

DATE:
FILE:



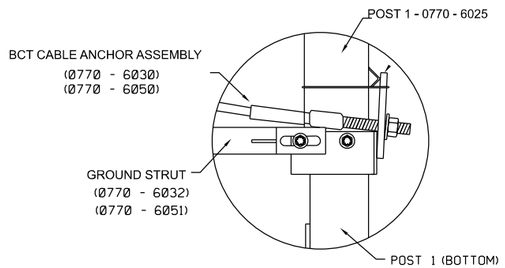
BID CODE	DESCRIPTION	UNIT
Ø770 - 6021	REPLACE SINGLE GDRAIL TERMINAL RAIL	LF
Ø770 - 6022	REPLACE SINGLE GDRAIL TERMINAL POST	EA
Ø770 - 6025	REPLACE HINGED TOP SGT STEEL POST	EA
Ø770 - 6026	RESET HINGED TOP SGT STL POST	EA
Ø770 - 6027	REMOVE GDRAIL END TRT / REPL WITH SGT	EA
Ø770 - 6028	REPL SINGLE GDRAIL TERM IMPACT HEAD	EA
Ø770 - 6029	REM & RESET SGT IMPACT HEAD	EA
Ø770 - 6030	REPLACE SGT CABLE ASSEMBLY	EA
Ø770 - 6031	REPLACE SGT CABLE ANCHOR	EA
Ø770 - 6032	REPLACE SGT STRUT	EA
Ø770 - 6033	REPLACE SGT OBJECT MARKER	EA
Ø770 - 6046	REM & RESET SGT IMPACT HEAD (FURNISHED)	EA
Ø770 - 6047	REPL SGT IMPACT HEAD (FURNISHED)	EA
Ø770 - 6048	REPLACE SINGLE GDRAIL TERM POST (FURN)	EA
Ø770 - 6049	REPLACE SGT CABLE ANCHOR (FURN)	EA
Ø770 - 6050	REPLACE SGT CABLE ASSEMBLY (FURN)	EA
Ø770 - 6051	REPLACE SGT STRUT (FURN)	EA
Ø770 - 6055	REPAIR SINGLE GUARDRAIL TERMINAL	EA
Ø770 - 6062	REPLACE SINGLE GDRAIL TERM POST(WOOD)	EA
Ø770 - 6063	REPLACE SINGLE GDRAIL TERM POST(STEEL)	EA

NOTE: THE PAY ITEMS ON THIS SHEET ARE ONLY USED WHEN DAMAGED GUARDRAIL COMPONENTS ARE BEING REPAIRED OR ROUTINE MAINTENANCE WORK OCCURS. THE CALLOUTS ON THIS SHEET ARE FOR CLARIFICATION ON HOW WORK WILL BE PAID. THIS SHEET WILL NOT BE USED FOR DETERMINING HOW TO PAY FOR WHEN NEW SECTIONS OF GUARDRAIL ARE INSTALLED, EXISTING SECTIONS ARE REMOVED WITHOUT BEING REPLACED, OR BLANKET MASH UPGRADES ARE INSTALLED.



ELEVATION VIEW

CONNECTION DETAIL A
IMPACT HEAD (POST 1 & POST 2)



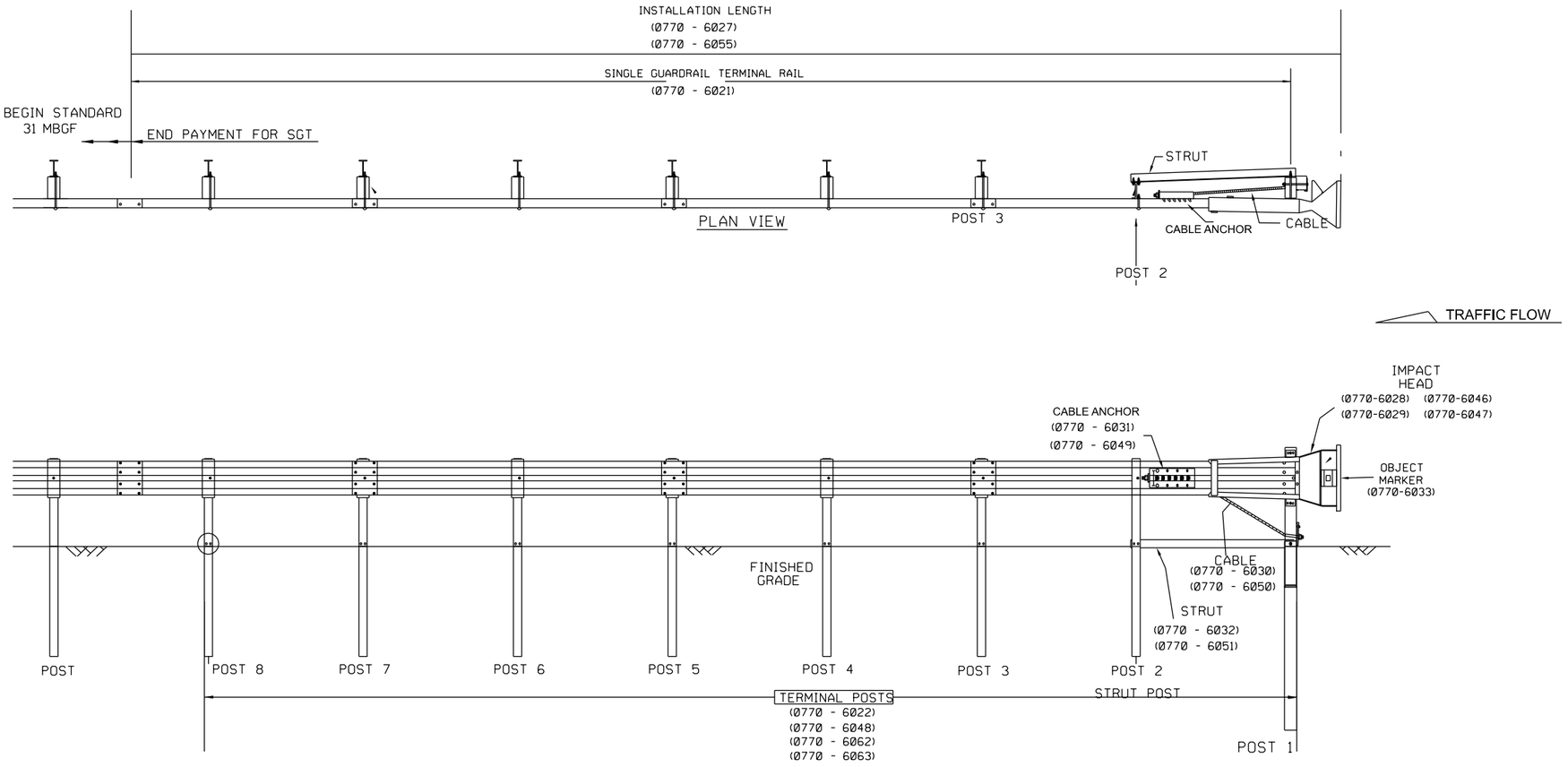
POST 1
CONNECTION DETAIL

Texas Department of Transportation

PAY ITEM DETAILS
SINGLE GUARDRAIL TERMINAL
MSKT-MASH-TL-3

FILE:	DN: TxDOT	CK:	DW:	CK:
©TxDOT: SEPTEMBER 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		102

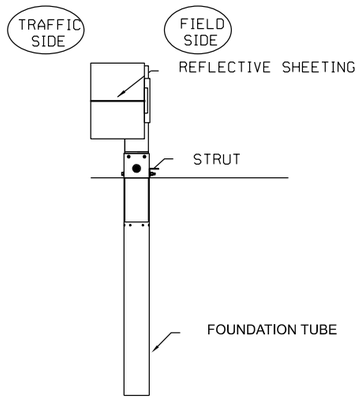
DATE:
FILE:



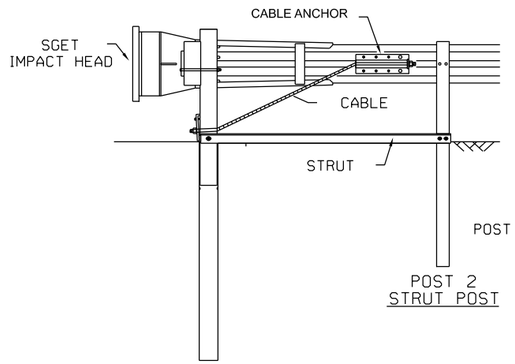
BID CODE	DESCRIPTION	UNIT
0770 - 6021	REPLACE SINGLE GDRAIL TERMINAL RAIL	LF
0770 - 6022	REPLACE SINGLE GDRAIL TERMINAL POST	EA
0770 - 6027	REMOVE GDRAIL END TRT / REPL WITH SGT	EA
0770 - 6028	REPL SINGLE GDRAIL TERM IMPACT HEAD	EA
0770 - 6029	REM & RESET SGT IMPACT HEAD	EA
0770 - 6030	REPLACE SGT CABLE ASSEMBLY	EA
0770 - 6031	REPLACE SGT CABLE ANCHOR	EA
0770 - 6032	REPLACE SGT STRUT	EA
0770 - 6033	REPLACE SGT OBJECT MARKER	EA
0770 - 6046	REM & RESET SGT IMPACT HEAD (FURNISHED)	EA
0770 - 6047	REPL SGT IMPACT HEAD (FURNISHED)	EA
0770 - 6048	REPLACE SINGLE GDRAIL TERM POST (FURN)	EA
0770 - 6049	REPLACE SGT CABLE ANCHOR (FURN)	EA
0770 - 6050	REPLACE SGT CABLE ASSEMBLY (FURN)	EA
0770 - 6051	REPLACE SGT STRUT (FURN)	EA
0770 - 6055	REPAIR SINGLE GUARDRAIL TERMINAL	EA
0770 - 6062	REPLACE SINGLE GDRAIL TERM POST(WOOD)	EA
0770 - 6063	REPLACE SINGLE GDRAIL TERM POST(STEEL)	EA

NOTE:THE PAY ITEMS ON THIS SHEET ARE ONLY USED WHEN DAMAGED GUARDRAIL COMPONENTS ARE BEING REPAIRED OR ROUTINE MAINTENANCE WORK OCCURS. THE CALLOUTS ON THIS SHEET ARE FOR CLARIFICATION ON HOW WORK WILL BE PAID. THIS SHEET WILL NOT BE USED FOR DETERMINING HOW TO PAY FOR WHEN NEW SECTIONS OF GUARDRAIL ARE INSTALLED. EXISTING SECTIONS ARE REMOVED WITHOUT BEING REPLACED, OR BLANKET MASH UPGRADES ARE INSTALLED.

ELEVATION VIEW



POST 1
FRONT END VIEW



POST 2
STRUT POST

POST 1
FIELD SIDE VIEW

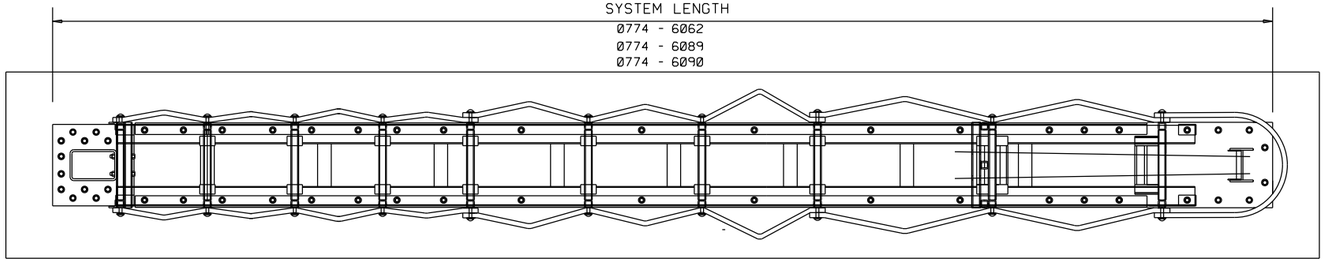
Texas Department of Transportation

PAY ITEM DETAILS
SPIG INDUSTRY, LLC
SINGLE GUARDRAIL TERMINAL
SGET - TL-3 - MASH

FILE:	DN: TxDOT	CK:	DW:	CK:
©TxDOT: SEPTEMBER 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		10.3

DATE:
FILE:

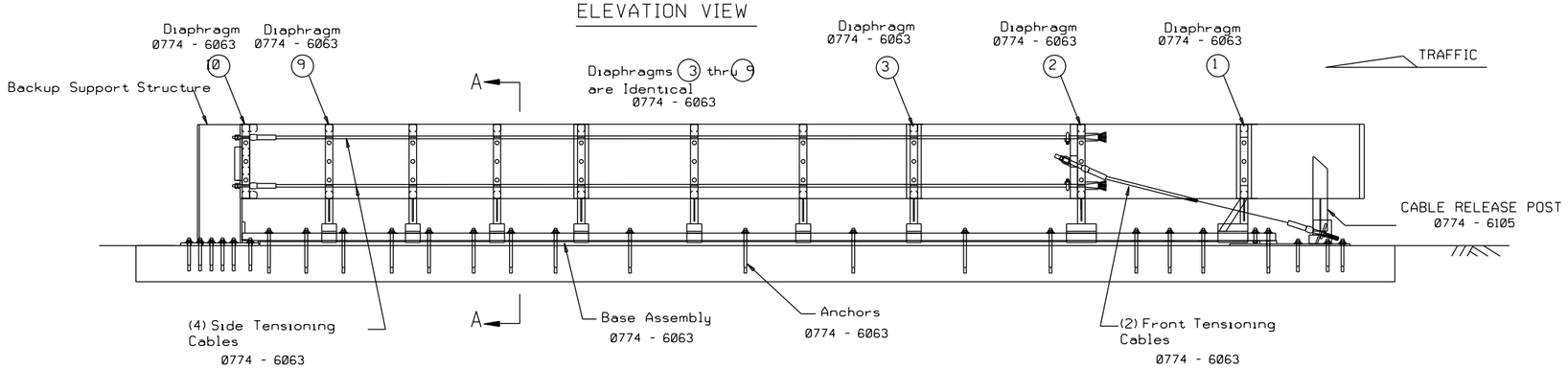
PLAN VIEW

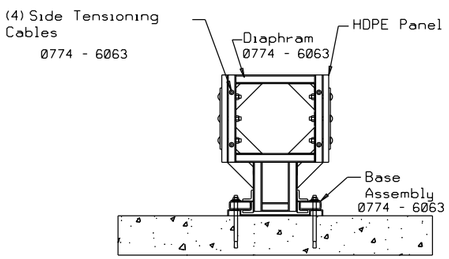


BID CODE	DESCRIPTION	UNIT
0774 - 6062	REMOVE AND REPLACE (HEART)	EA
0774 - 6063	REPAIR HEART (MISC HARDWARE)	EA
0774 - 6089	REM AND REPL (HEART)(TXDOT FURNISHED)	EA
0774 - 6090	REPAIR (HEART)	EA
0774 - 6105	CABLE RELEASE POST	EA

NOTE:THE PAY ITEMS ON THIS SHEET ARE ONLY USED WHEN DAMAGED ATTENUATOR/CRASH CUSHION COMPONENTS ARE BEING REPAIRED OR ROUTINE MAINTENANCE WORK OCCURS.THE CALLOUTS ON THIS SHEET ARE FOR CLARIFICATION ON HOW WORK WILL BE PAID. THIS SHEET WILL NOT BE USED FOR DETERMINING HOW TO PAY FOR WHEN NEW ATTENUATOR/CRASH CUSHIONS ARE INSTALLED, EXISTING SECTION ARE REMOVED WITHOUT BEING REPLACED, OR BLANKET MASH UPGRADES ARE INSTALLED. THIS IS NOT A STANDARD SHEET FOR CLARIFYING HOW WORK WILL BE PERFORMED.

ELEVATION VIEW





SECTION A-A

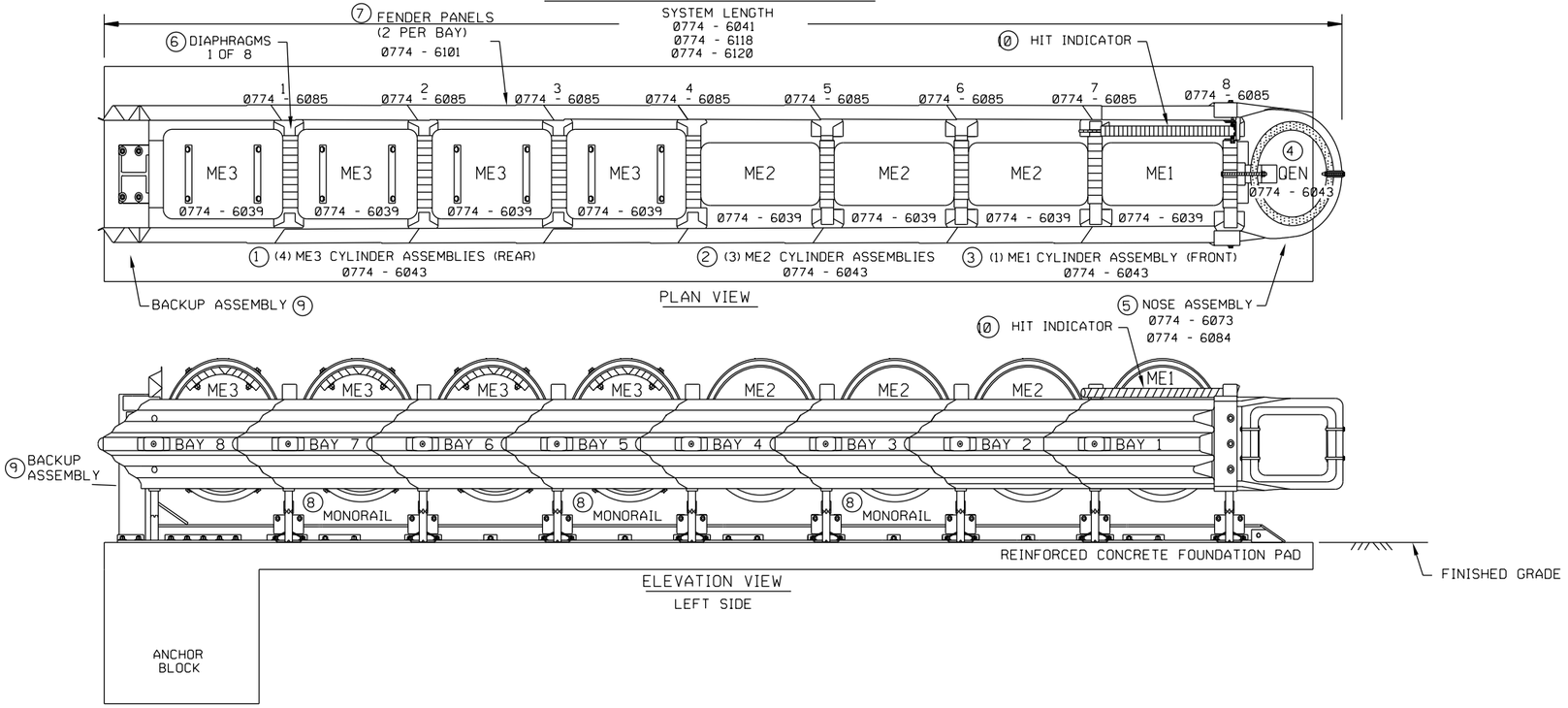
LOW MAINTENANCE

Texas Department of Transportation

PAY ITEM DETAILS
TRINITY HIGHWAY
HEART HYBRID ENERGY ABSORBING TERMINAL

FILE:	DN:	CK:	DW:	CK:
©TxDOT: SEPTEMBER 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		104

QUADGUARD EITE M10 NARROW SYSTEM



BID CODE	DESCRIPTION	UNIT
0774 - 6039	REPAIR (QUAD - ELITE) NARROW (BAY)	EA
0774 - 6040	REPAIR (QUAD - ELITE) WIDE (BAY)	EA
0774 - 6041	REMOVE/REPLACE (QUAD - ELITE) NARROW	EA
0774 - 6042	REMOVE/REPLACE (QUAD - ELITE) WIDE	EA
0774 - 6043	REPAIR (QUADGUARD - ELITE) (CYLINDER)	EA
0774 - 6073	REPAIR (QUAD) (N) (NOSE)	EA
0774 - 6074	REPAIR (QUAD) (W) (NOSE)	EA
0774 - 6076	REPAIR (QUAD) (W) (MISC HARDWARE)	EA
0774 - 6084	(QUAD)(N)(BAY)NOSE ASSMBLY(REMOVE&REPLAC)	EA
0774 - 6085	(QUAD)(N)(BAY) DIAPHRAM (REMOVE & REPLACE)	EA
0774 - 6087	(QUAD)(W)(BAY)NOSE ASSMBLY(REMOVE&REPLAC)	EA
0774 - 6088	(QUAD)(W)(BAY) DIAPHRAM (REMOVE & REPLACE)	EA
0774 - 6101	QUAD FENDER PANEL	EA
0774 - 6110	REPAIR (QUAD - ELITE) WIDE	EA
0774 - 6118	REPAIR (QUADGUARD)(MASH)(N)	EA
0774 - 6120	REPAIR (QUADGUARD)(MASH)(N)	LF

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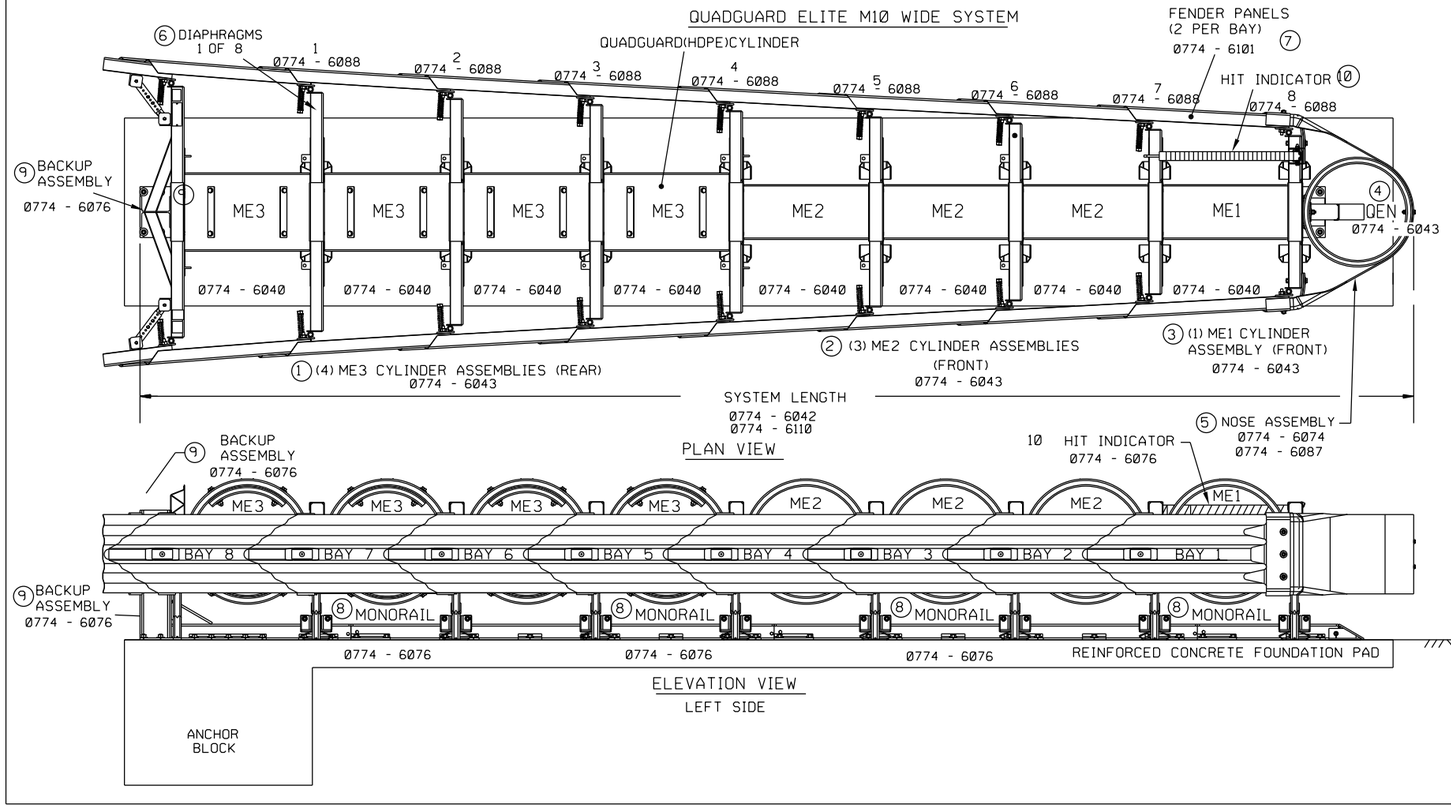
QUADGUARD ELITE M10 WIDE SYSTEM



KEY		KEY	
1	ME3 CYLINDER ASSEMBLIES	6	DIAPHRAGMS
2	ME2 CYLINDER ASSEMBLIES	7	FENDER PANELS
3	ME1 CYLINDER ASSEMBLY	8	MONORAILS
4	QEN CYLINDER	9	TYPE OF BACKUP
5	NOSE BELT ASSEMBLY	10	HIT INDICATOR

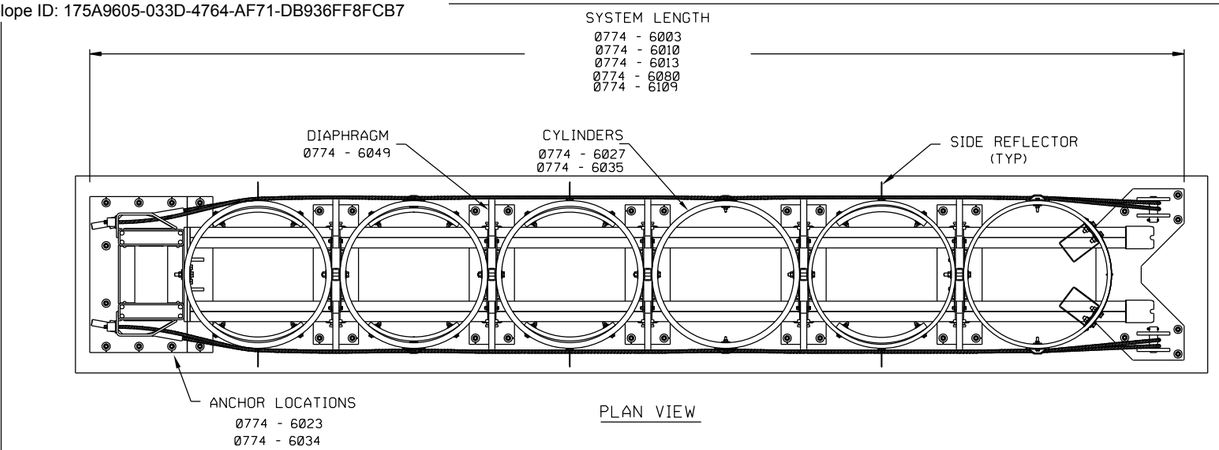
Texas Department of Transportation

PAY ITEM DETAILS
TRINITY HIGHWAY
ENERGY ABSORPTION
QUADGUARD ELITE M10
WIDE & NARROW
(MASH TL-3)

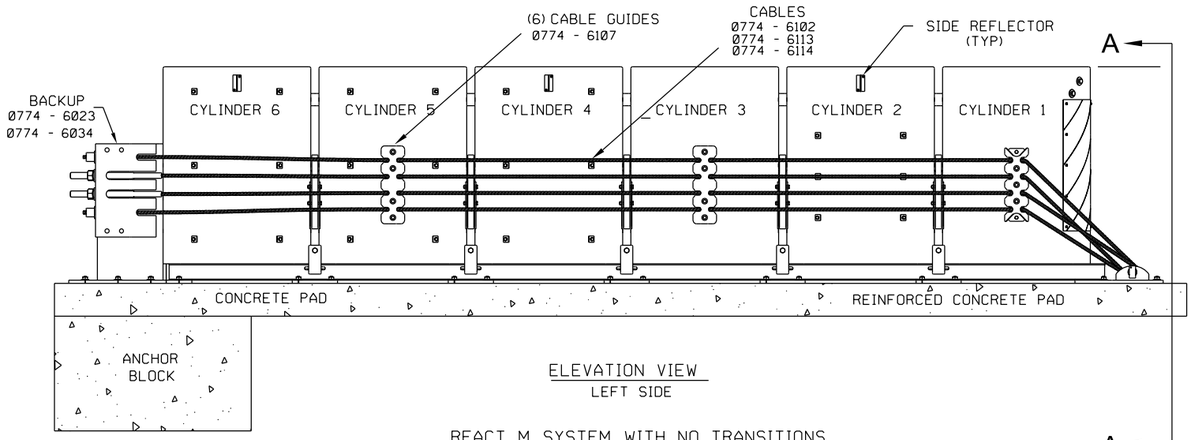
FILE:	DN: TxDOT	CK:	DW:	CK:
©TxDOT: SEPTEMBER 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		105

LOW MAINTENANCE

DATE:
FILE:



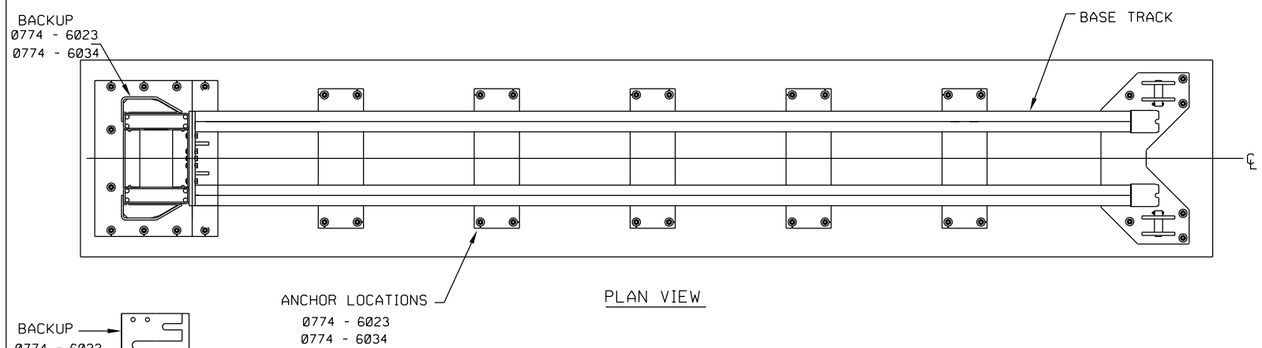
PLAN VIEW



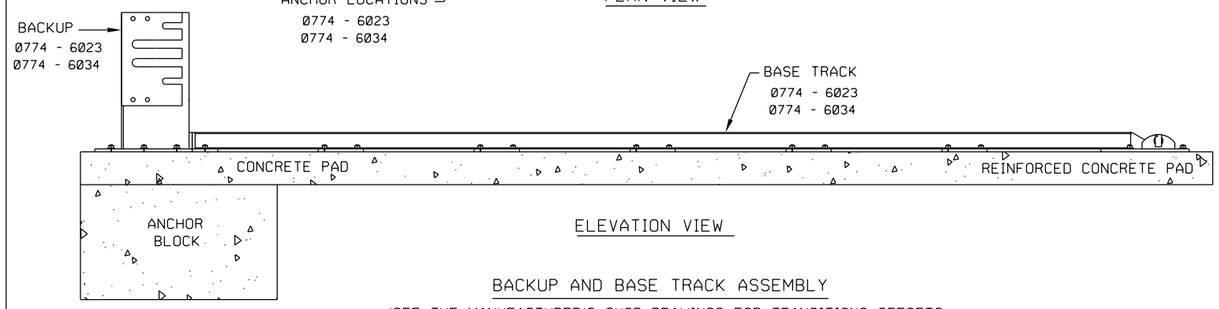
ELEVATION VIEW
LEFT SIDE

REACT M SYSTEM WITH NO TRANSITIONS

(SEE THE MANUFACTURER'S SHOP DRAWINGS FOR TRANSITIONS AND OFFSET INSTALLATION DETAILS.)



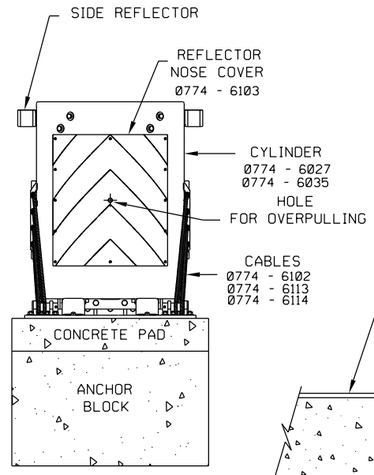
PLAN VIEW



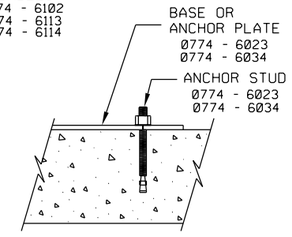
ELEVATION VIEW

BACKUP AND BASE TRACK ASSEMBLY

(SEE THE MANUFACTURER'S SHOP DRAWINGS FOR TRANSITIONS, OFFSETS, BIDIRECTIONAL AND UNIDIRECTIONAL INSTALLATION DETAILS.)

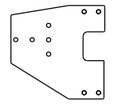


VIEW A-A

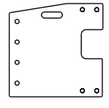


ANCHORING DETAIL
•SEE FOUNDATION TYPES TABLE

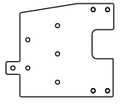
BACKUP ASSEMBLY TYPES FOR SYSTEM TRANSITIONS



SAFETY SHAPE BARRIER TRANSITION (ADAPTER)
0774 - 6023
0774 - 6034



VERTICAL WALL BARRIER TRANSITION (ADAPTER)
0774 - 6023
0774 - 6034



VERTICAL WALL BARRIER TRANSITION (ADAPTER)
0774 - 6023
0774 - 6034

BID CODE	DESCRIPTION	UNIT
0774 - 6003	REMOVE AND REPLACE (NARROW REACT 350)	EA
0774 - 6010	REPAIR (REACT)	EA
0774 - 6013	REPAIR (NARROW REACT 350)	LF
0774 - 6023	REPAIR REACT (N) (MISC HARDWARE)	EA
0774 - 6024	REPAIR REACT (N) (REAR SEC "S")	EA
0774 - 6025	REPAIR REACT (N) (REAR SEC "B")	EA
0774 - 6026	REPAIR REACT (N) (FRONT SECTION)	EA
0774 - 6027	REPAIR REACT (N) (CYLINDERS)	EA
0774 - 6034	REPAIR REACT (MISC) (HARDWARE)	EA
0774 - 6035	REPAIR REACT (CYLINDERS)	EA
0774 - 6049	REPAIR REACT (W) (DIAPHRAM)	EA
0774 - 6080	REMOVE & REPLACE REACT 350 (TXDOT FRNSH)	EA
0774 - 6102	REACT CABLE 350 (6 BAY)	EA
0774 - 6103	REACT DECAL	EA
0774 - 6104	REACT CABLE 350 (9 BAY)	EA
0774 - 6107	REACT 350 CABLE HOLDERS	EA
0774 - 6109	REPAIR (NARROW REACT 350)	EA
0774 - 6113	REPAIR REACT CABLE 350 (BAY)	EA
0774 - 6114	REPAIR REACT CABLE 350	LF

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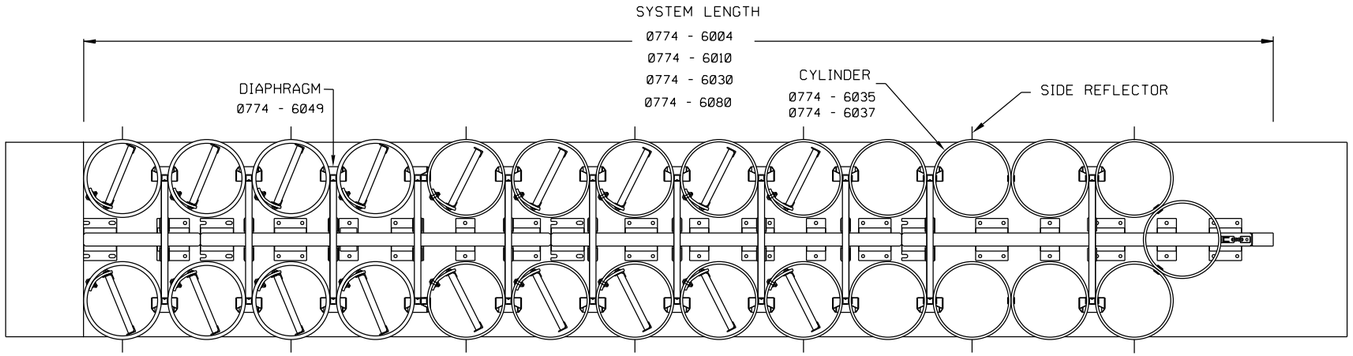
Texas Department of Transportation

PAY ITEM DETAILS
TRINITY HIGHWAY
ENERGY ABSORPTION
CRASH CUSHION
REACT M (NARROW)
(MASH TL-3)

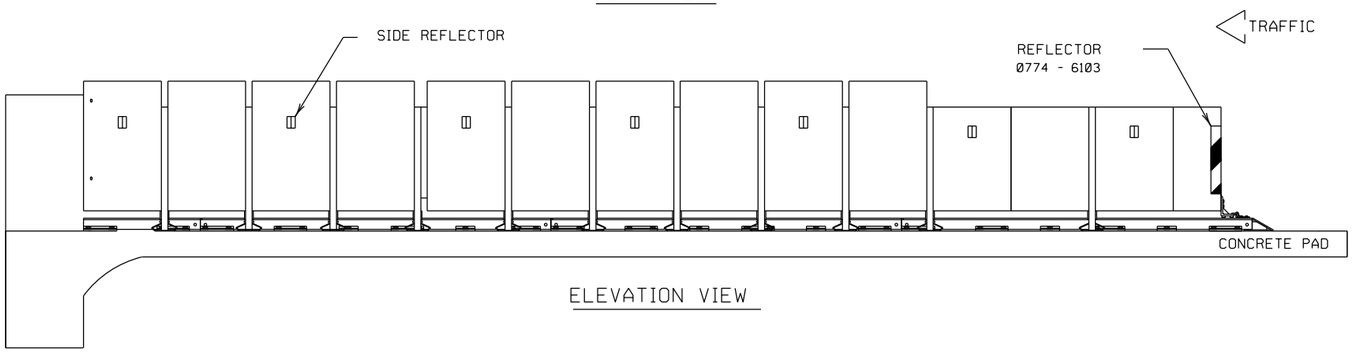
FILE:	DN: TxDOT	CK:	DW:	CK:
©TxDOT: SEPTEMBER 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		106

LOW MAINTENANCE

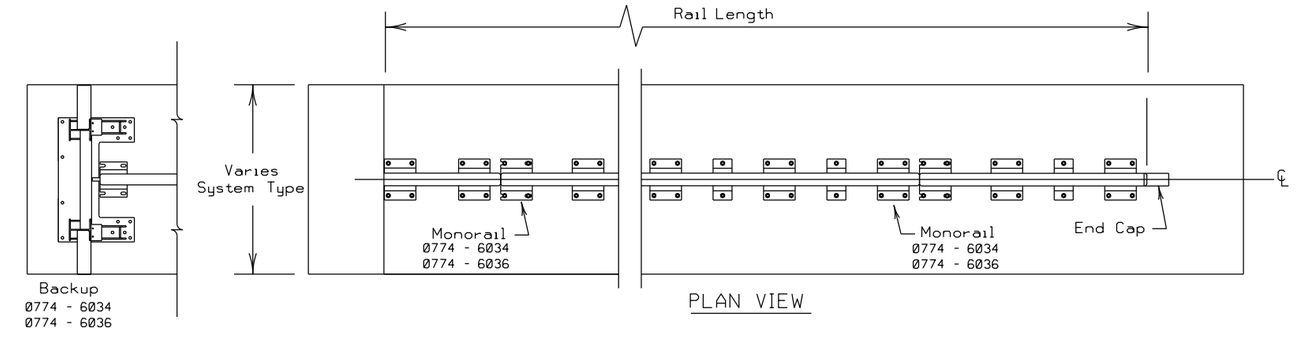
DATE:
FILE:



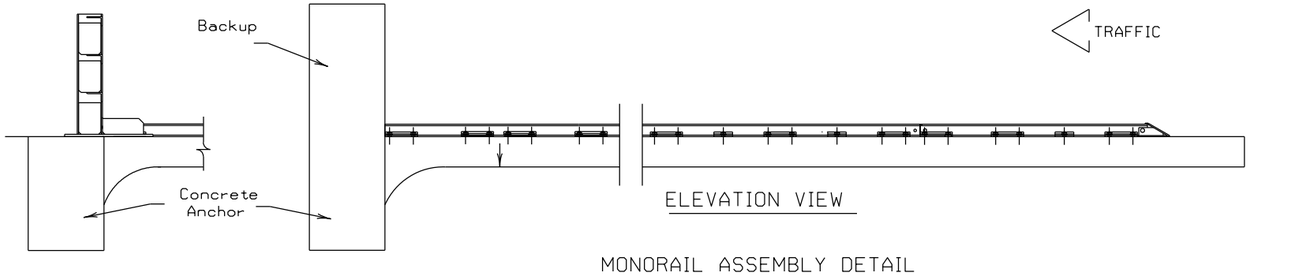
PLAN VIEW



ELEVATION VIEW



PLAN VIEW



ELEVATION VIEW

MONORAIL ASSEMBLY DETAIL

BID CODE	DESCRIPTION	UNIT
0774 - 6004	REMOVE AND REPLACE (WIDE REACT 350)	EA
0774 - 6010	REPAIR (REACT)	EA
0774 - 6030	REPAIR (REACT 350)(W)	EA
0774 - 6034	REPAIR REACT (MISC)(HARDWARE)	EA
0774 - 6035	REPAIR REACT (CYLINDERS)	EA
0774 - 6036	REPAIR REACT (W)(MISC)(HARDWARE)	EA
0774 - 6037	REPAIR REACT (W)(CYLINDERS)	EA
0774 - 6049	REPAIR REACT (W)(DIAPHRAM)	EA
0774 - 6080	REMOVE & REPLACE REACT 350 (TXDOT FRNSH)	EA
0774 - 6103	REACT DECAL	EA

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Texas Department of Transportation

PAY ITEM DETAILS
TRINITY HIGHWAY
ENERGY ABSORPTION
CRASH CUSHION
(REACT 350 WIDE)

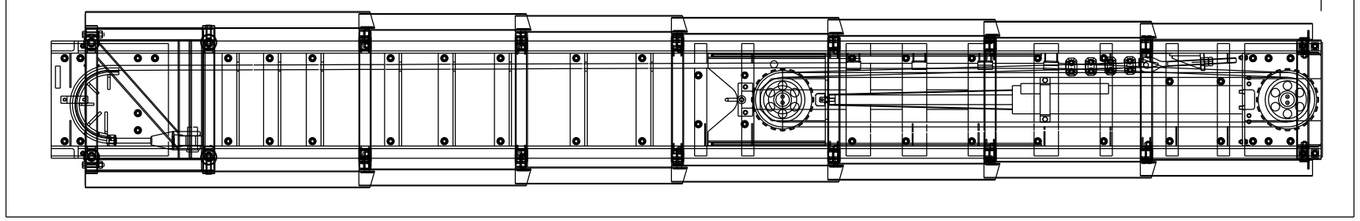
FILE:	DN: TxDOT	CK:	DW:	CK:
	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		107

LOW MAINTENANCE

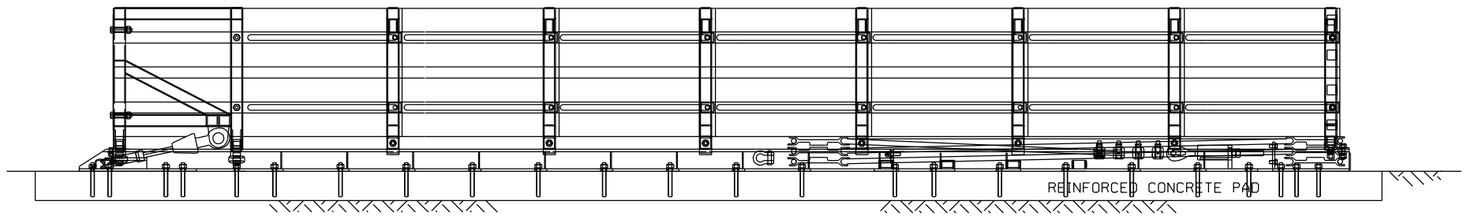
DATE:
FILE:

SMART NARROW

SYSTEM LENGTH
0774 - 6044
0774 - 6045
0774 - 6068



PLAN VIEW



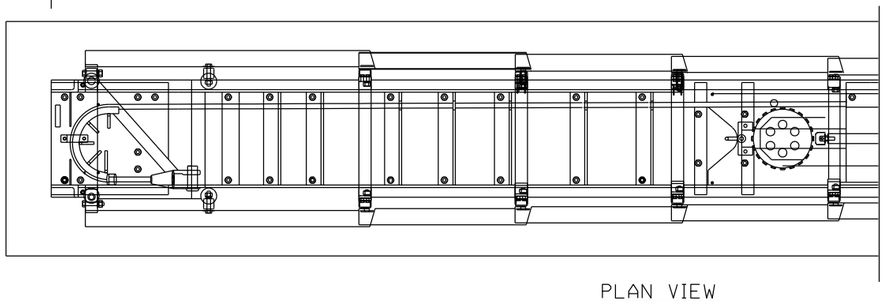
ELEVATION VIEW

BID CODE	DESCRIPTION	UNIT
0774 - 6044	REMOVE AND REPLACE (SMTC)(N)	EA
0774 - 6045	REPAIR (SMTC)(N)	EA
0774 - 6046	REMOVE AND REPLACE (SMTC)(W)	EA
0774 - 6047	REPAIR (SMTC)(W)	EA
0774 - 6068	REPAIR (SMTC)(N)	LF
0774 - 6111	REPAIR (SMTC)(W)(BAY)	EA
0774 - 6112	REPAIR (SMTC)(W)	LF

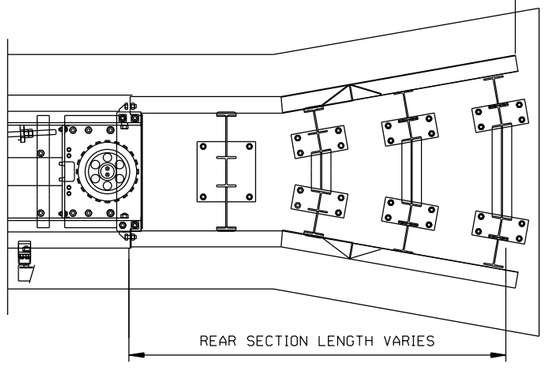
NOTE:THE PAY ITEMS ON THIS SHEET ARE ONLY USED WHEN DAMAGED ATTENUATOR/CRASH CUSHION COMPONENTS ARE BEING REPAIRED OR ROUTINE MAINTENANCE WORK OCCURS.THE CALLOUTS ON THIS SHEET ARE FOR CLARIFICATION ON HOW WORK WILL BE PAID. THIS SHEET WILL NOT BE USED FOR DETERMINING HOW TO PAY FOR WHEN NEW ATTENUATOR/CRASH CUSHIONS ARE INSTALLED, EXISTING SECTION ARE REMOVED WITHOUT BEING REPLACED, OR BLANKET MASH UPGRADES ARE INSTALLED. THIS IS NOT A STANDARD SHEET FOR CLARIFYING HOW WORK WILL BE PERFORMED.

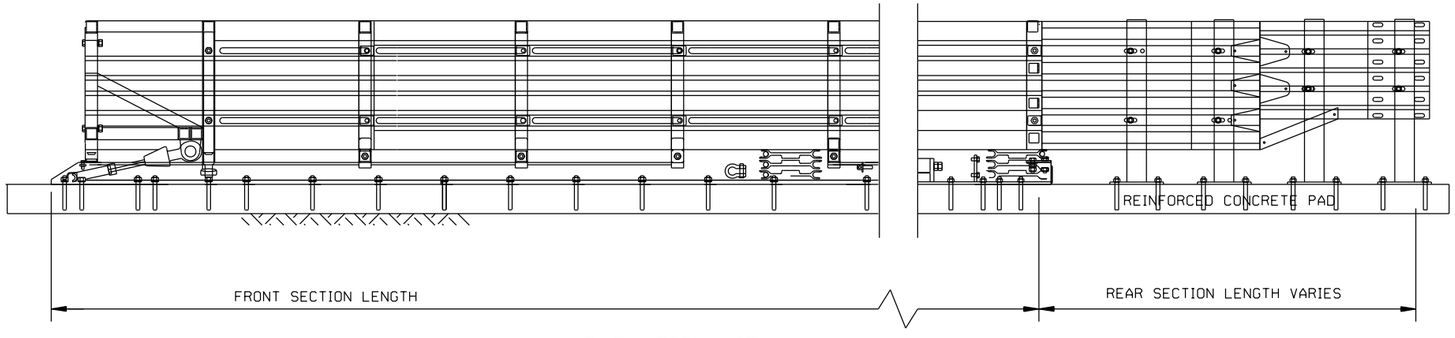
SMART WIDE

SYSTEM LENGTH
0774 - 6046
0774 - 6047
0774 - 6111
0774 - 6112



PLAN VIEW





ELEVATION VIEW

Texas Department of Transportation

PAY ITEM DETAILS
WORK AREA PROTECTION CORP
SMART (NARROW)
&
SMART (WIDE)

FILE:	DN: TxDOT	CK:	DW:	CK:
© TxDOT:SEPTEMBER 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		108

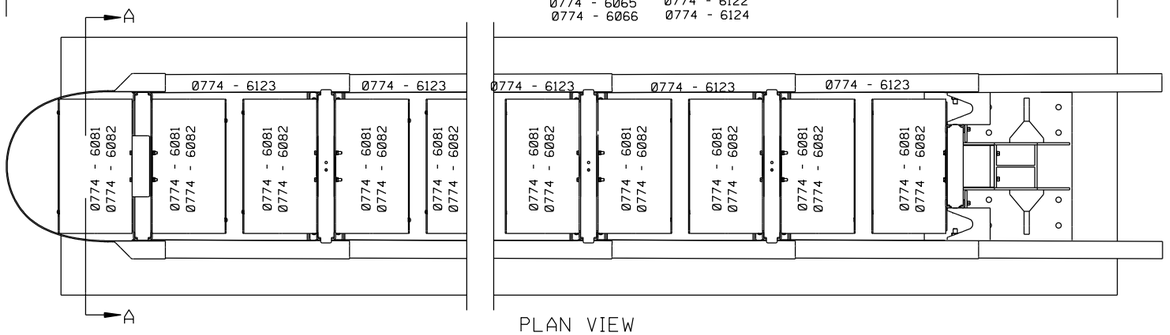
LOW MAINTENANCE

DATE:
FILE:

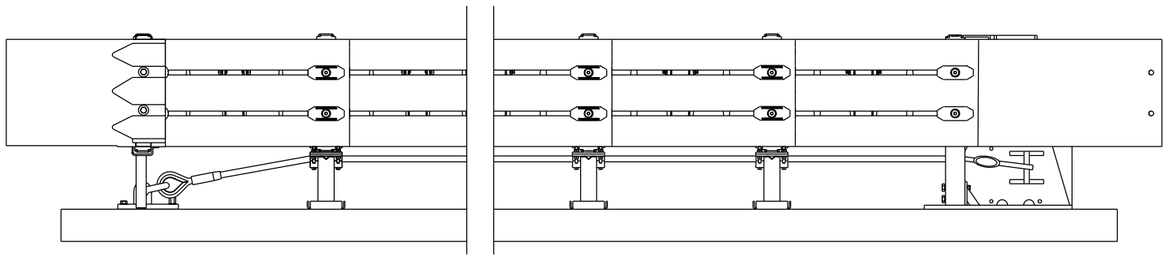
TAU-II NARROW

SYSTEM LENGTH

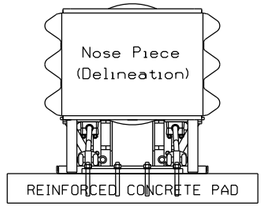
Ø774 - 6064 Ø774 - 6121
Ø774 - 6065 Ø774 - 6122
Ø774 - 6066 Ø774 - 6124



PLAN VIEW



ELEVATION VIEW



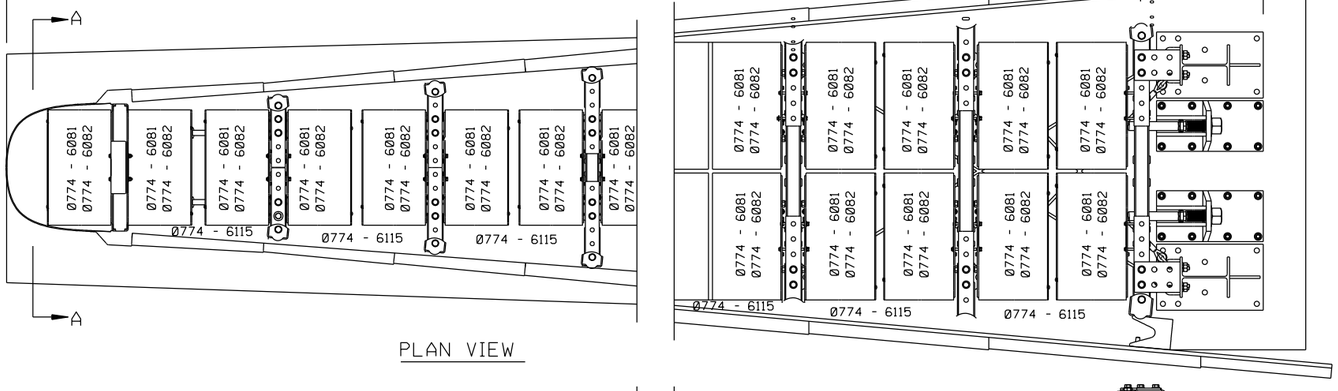
SECTION A-A

BID CODE	DESCRIPTION	UNIT
Ø774 - 6064	REMOVE AND REPLACE (TAU II) (N)	EA
Ø774 - 6065	REPAIR TAU II (N) (MISC HARDWARE)	EA
Ø774 - 6066	REPAIR TAU II (N)	LF
Ø774 - 6067	REPAIR TAU II (W)	LF
Ø774 - 6077	REMOVE AND REPLACE TAU II (W)	EA
Ø774 - 6078	REPAIR TAU II (W) (MISC HARDWARE)	EA
Ø774 - 6081	REPLACE TYPE A CATRIDGE TAU II (N & W) NOTES: SP REQ FOR CNSTRN	EA
Ø774 - 6082	REPLACE TYPE B CATRIDGE TAU II (N & W) NOTES: SP REQ FOR CNSTRN	EA
Ø774 - 6115	REPAIR (TAU) (II) (W) (BAY)	EA
Ø774 - 6121	REMOVE AND REPLACE (TAU) (MASH) (N)	EA
Ø774 - 6122	REPAIR (TAU) (MASH) (N)	EA
Ø774 - 6123	REPAIR (TAU) (MASH) (N) (BAY)	EA
Ø774 - 6124	REPAIR (TAU) (MASH) (N)	LF

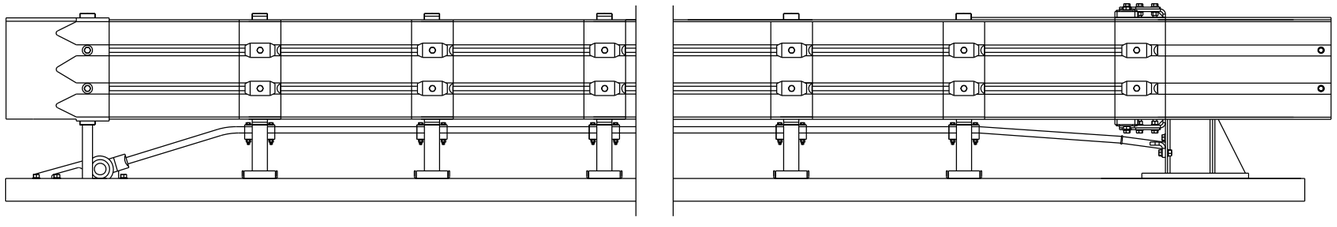
NOTE:THE PAY ITEMS ON THIS SHEET ARE ONLY USED WHEN DAMAGED ATTENUATOR/CRASH CUSHION COMPONENTS ARE BEING REPAIRED OR ROUTINE MAINTENANCE WORK OCCURS.THE CALLOUTS ON THIS SHEET ARE FOR CLARIFICATION ON HOW WORK WILL BE PAID. THIS SHEET WILL NOT BE USED FOR DETERMINING HOW TO PAY FOR WHEN NEW ATTENUATOR/CRASH CUSHIONS ARE INSTALLED. EXISTING SECTION ARE REMOVED WITHOUT BEING REPLACED, OR BLANKET MASH UPGRADES ARE INSTALLED. THIS IS NOT A STANDARD SHEET FOR CLARIFYING HOW WORK WILL BE PERFORMED.

TAU-II WIDE

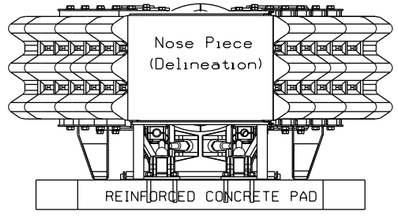
SYSTEM LENGTH
Ø774 - 6067
Ø774 - 6077
Ø774 - 6078



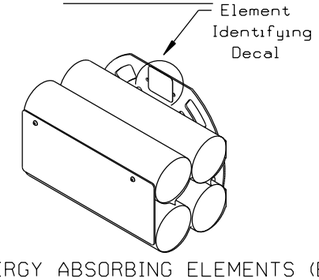
PLAN VIEW



ELEVATION VIEW



SECTION A-A



ENERGY ABSORBING ELEMENTS (EAE)

LOW MAINTENANCE

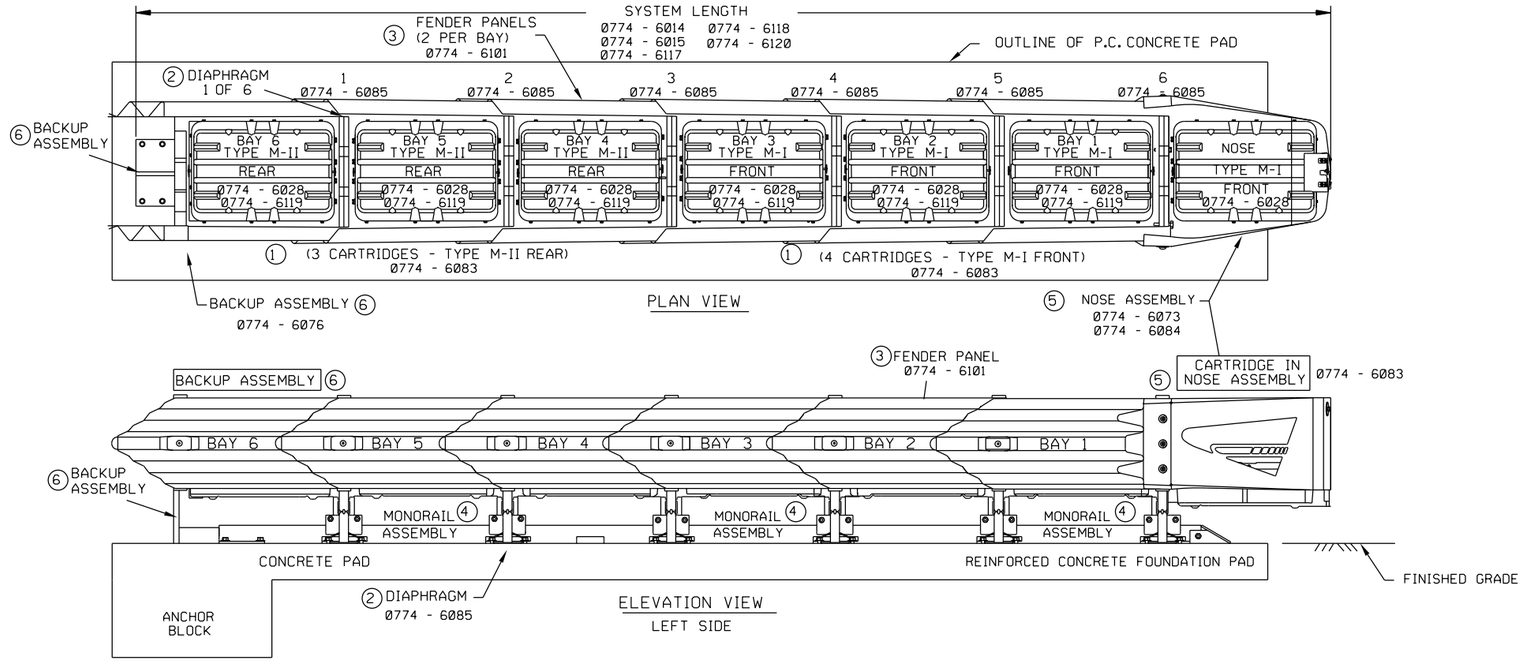
Texas Department of Transportation

PAY ITEM DETAILS
LTS-BARRIER SYSTEMS
CRASH CUSHION
TAUII-R-NARROW &TAUII-R-WIDE

FILE:	DN: TxDOT	CK:	DW:	CK:
©TxDOT: SEPTEMBER 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		109

DATE:
FILE:

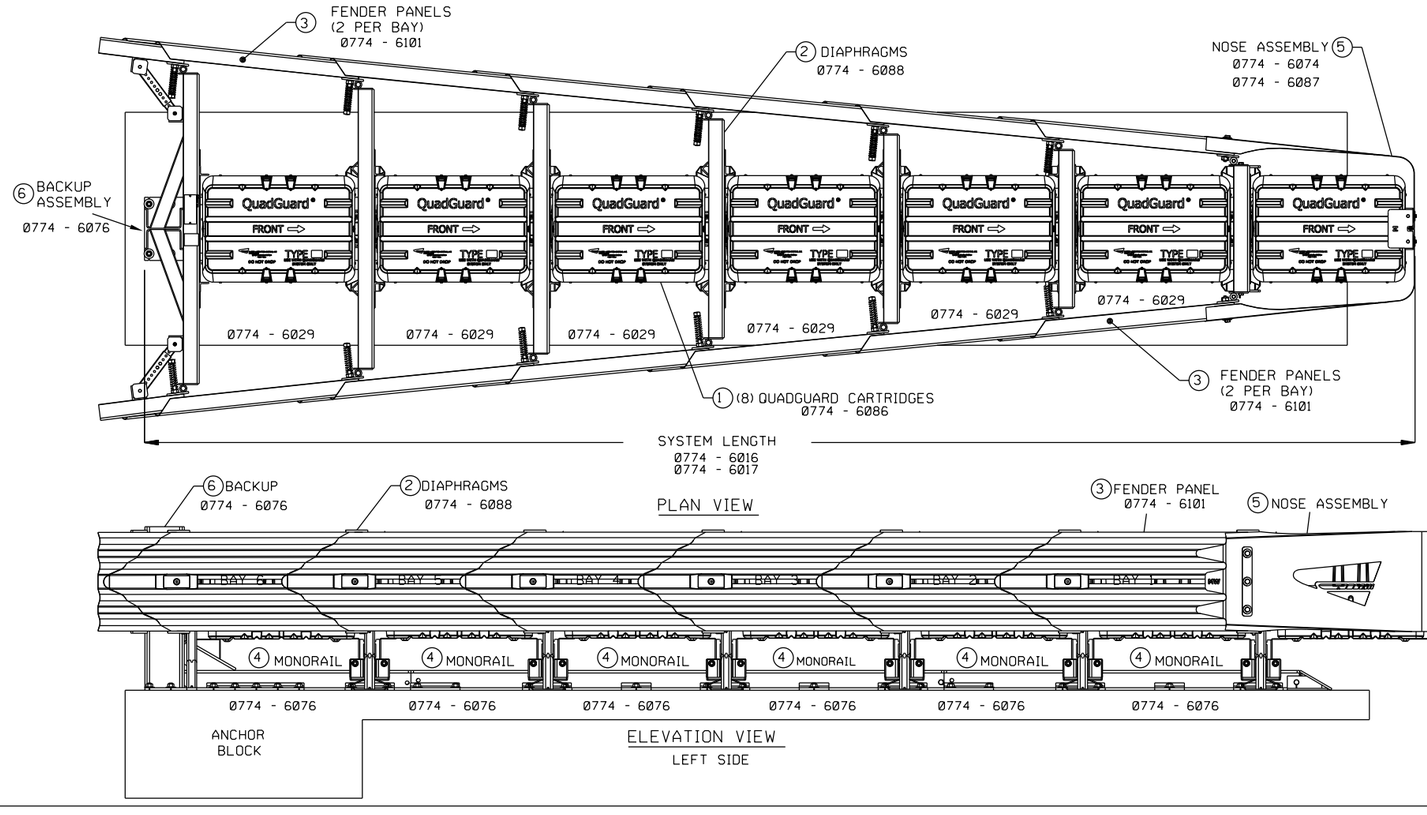
QUADGUARD M10 NARROW 6-BAY SYSTEM



BID CODE	DESCRIPTION	UNIT
0774 - 6014	REMOVE AND REPLACE (NARROW QUAD)	EA
0774 - 6015	REPAIR (NARROW QUAD)	EA
0774 - 6016	REMOVE AND REPLACE (WIDE QUAD)	EA
0774 - 6017	REPAIR (WIDE QUAD)	EA
0774 - 6028	REPAIR (QUAD)(N)(BAY)	EA
0774 - 6029	REPAIR (QUAD)(W)(BAY)	EA
0774 - 6073	REPAIR (QUAD)(N)(NOSE)	EA
0774 - 6074	REPAIR (QUAD)(W)(NOSE)	EA
0774 - 6076	REPAIR (QUAD)(W)(MISC HARDWARE)	EA
0774 - 6083	(QUAD)(N)(BAY)CARTRIDGE(REMOVE & REPLACE)	EA
0774 - 6084	(QUAD)(N)(BAY)NOSE ASSMBLY(REMOVE&REPLAC)	EA
0774 - 6085	(QUAD)(N)(BAY) DIAPHRAM (REMOVE & REPLACE)	EA
0774 - 6086	(QUAD)(W)(BAY)CARTRIDGE(REMOVE & REPLACE)	EA
0774 - 6087	(QUAD)(W)(BAY)NOSE ASSMBLY(REMOVE&REPLAC)	EA
0774 - 6088	(QUAD)(W)(BAY) DIAPHRAM (REMOVE & REPLACE)	EA
0774 - 6101	QUAD FENDER PANEL	EA
0774 - 6117	REMOVE AND REPLACE (QUADGUARD)(MASH)(N)	EA
0774 - 6118	REPAIR (QUADGUARD)(MASH)(N)	EA
0774 - 6119	REPAIR (QUADGUARD)(MASH)(N)(BAY)	EA
0774 - 6120	REPAIR (QUADGUARD)(MASH)(N)	LF

NOTE:THE PAY ITEMS ON THIS SHEET ARE ONLY USED WHEN DAMAGED ATTENUATOR/CRASH CUSHION COMPONENTS ARE BEING REPAIRED OR ROUTINE MAINTENANCE WORK OCCURS.THE CALLOUTS ON THIS SHEET ARE FOR CLARIFICATION ON HOW WORK WILL BE PAID. THIS SHEET WILL NOT BE USED FOR DETERMINING HOW TO PAY FOR WHEN NEW ATTENUATOR/CRASH CUSHIONS ARE INSTALLED, EXISTING SECTION ARE REMOVED WITHOUT BEING REPLACED, OR BLANKET MASH UPGRADES ARE INSTALLED. THIS IS NOT A STANDARD SHEET FOR CLARIFYING HOW WORK WILL BE PERFORMED.

QUADGUARD M WIDE (6 BAY) SYSTEM



KEY		KEY	
1	QUADGUARD CARTRIDGE	4	MONORAILS
2	DIAPHRAGM	5	NOSE ASSEMBLY
3	FENDER PANEL	6	BACKUP ASSEMBLY

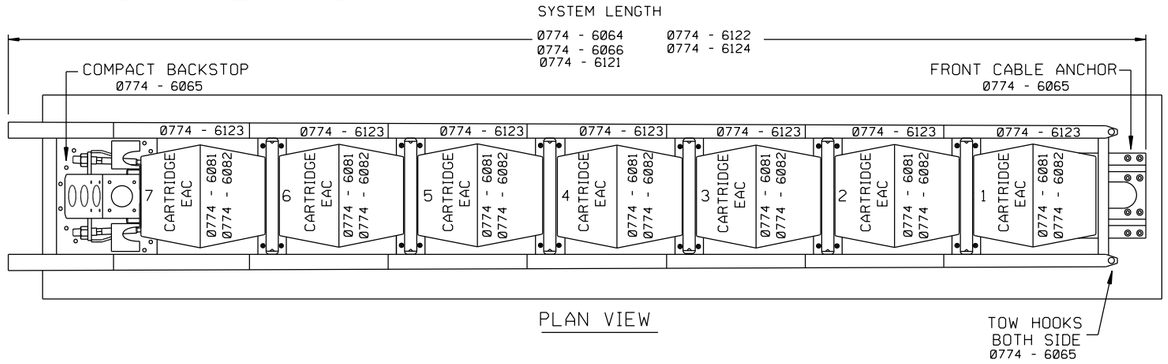
Texas Department of Transportation

PAY ITEM DETAILS TRINITY HIGHWAY ENERGY ABSORPTION QUADGUARD M & M10 WIDE & NARROW (MASH TL-3)

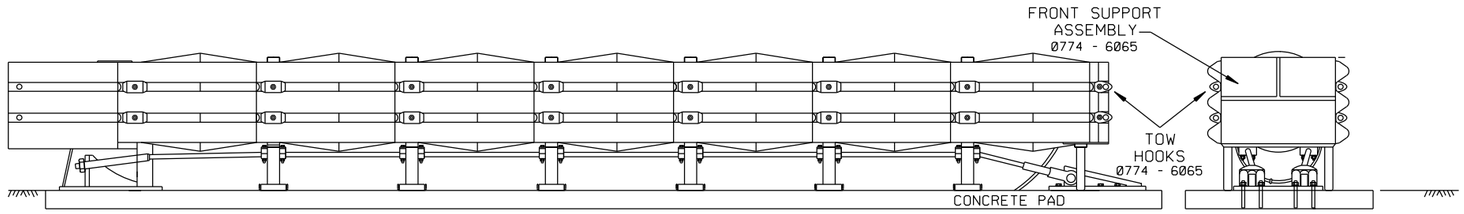
FILE: SEPTEMBER 2021	TxDOT	CK:	DN:	CK:
© TxDOT:	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		110

REUSABLE

DATE:
FILE:



PLAN VIEW



TAU(M)(N)

ELEVATION VIEW

END VIEW

BID CODE	DESCRIPTION	UNIT
0774 - 6064	REMOVE AND REPLACE (TAU II) (N)	EA
0774 - 6065	REPAIR TAU II (N) (MISC HARDWARE)	EA
0774 - 6066	REPAIR TAU II (N)	LF
0774 - 6067	REPAIR TAU II (W)	LF
0774 - 6077	REMOVE AND REPLACE TAU II (W)	EA
0774 - 6078	REPAIR TAU II (W) (MISC HARDWARE)	EA
0774 - 6081	REPLACE TYPE A CATRIDGE TAU II (N & W) NOTES: SP REQ FOR CNSTRN	EA
0774 - 6082	REPLACE TYPE B CATRIDGE TAU II (N & W) NOTES: SP REQ FOR CNSTRN	EA
0774 - 6115	REPAIR (TAU) (II) (W) (BAY)	EA
0774 - 6121	REMOVE AND REPLACE (TAU) (MASH) (N)	EA
0774 - 6122	REPAIR (TAU) (MASH) (N)	EA
0774 - 6123	REPAIR (TAU) (MASH) (N) (BAY)	EA
0774 - 6124	REPAIR (TAU) (MASH) (N)	LF

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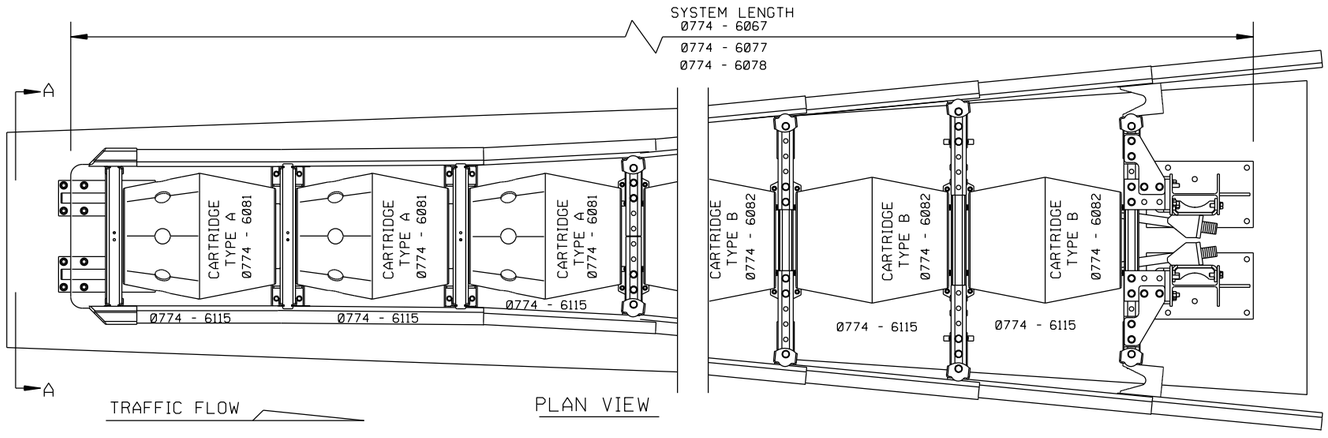
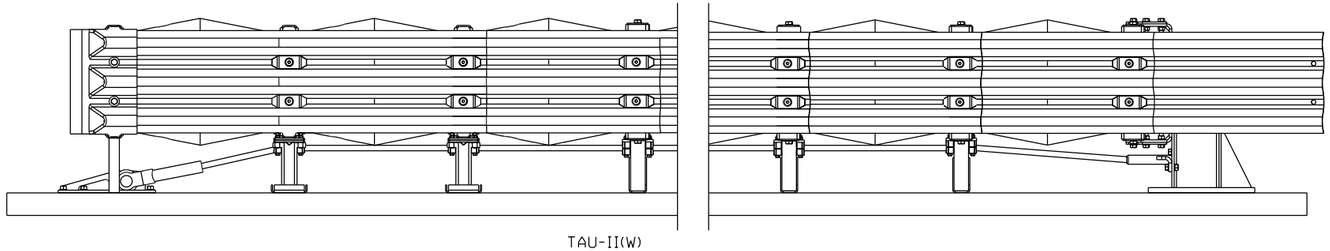
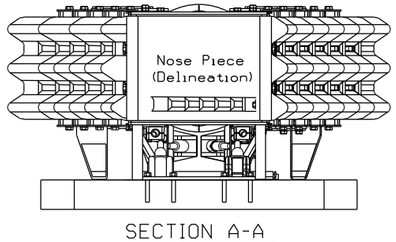


PLAN VIEW



TAU-II(W)

ELEVATION VIEW



SECTION A-A

REUSABLE

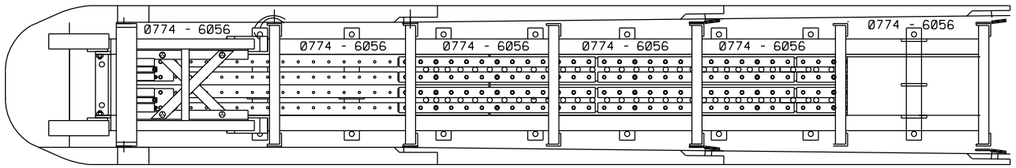
DATE:
FILE:

Texas Department of Transportation

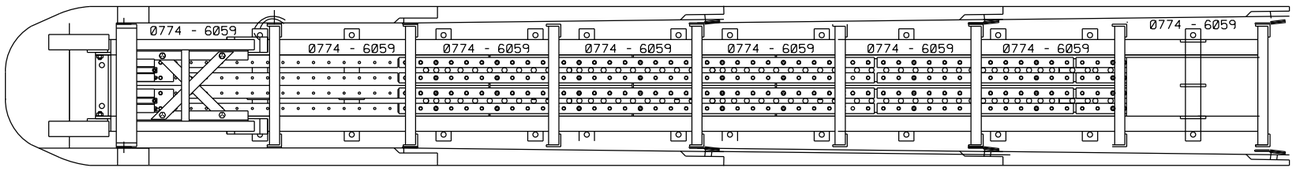
PAY ITEM DETAILS
LTS-BARRIER SYSTEMS
CRASH CUSHION
TAU(M)(N) & TAU-II(W)

FILE:	DN: TxDOT	CK:	DW:	CK:
©TxDOT: SEPTEMBER 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		111

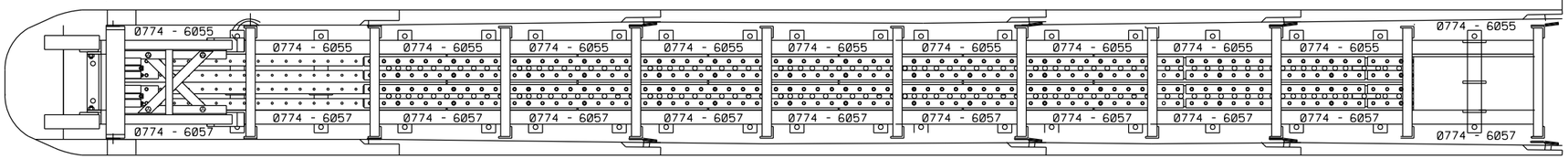
SHORTRACC SYSTEM LENGTH (14')
0774 - 6050
0774 - 6053



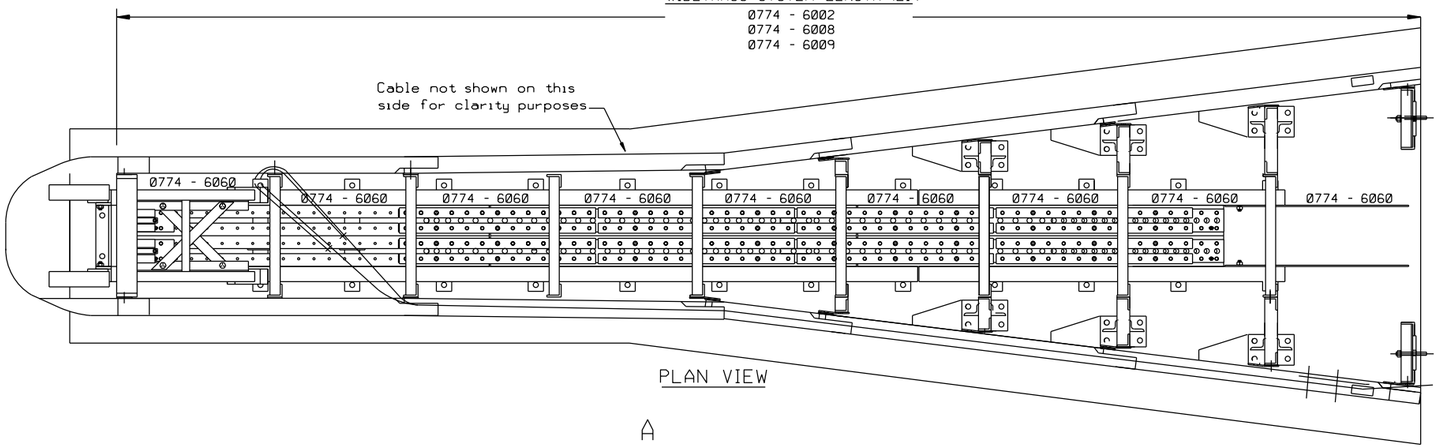
TRACC SYSTEM LENGTH (21')
0774 - 6001
0774 - 6006
0774 - 6007
0774 - 6079



FASTRACC SYSTEM LENGTH (25'-8")
0774 - 6038
0774 - 6051
0774 - 6052
0774 - 6054
0774 - 6116



WIDETRACC SYSTEM LENGTH (21')
0774 - 6002
0774 - 6008
0774 - 6009



PLAN VIEW

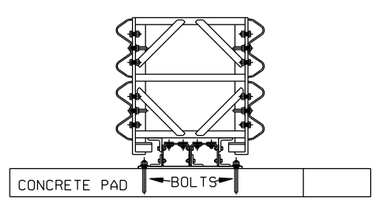
ELEVATION VIEW

BID CODE	DESCRIPTION	UNIT
0774 - 6001	REMOVE AND REPLACE (TRACC)	EA
0774 - 6002	REMOVE AND REPLACE (WIDE TRACC)	EA
0774 - 6006	REPAIR (TRACC)	EA
0774 - 6007	REPAIR (TRACC)	LF
0774 - 6008	REPAIR (WIDE TRACC)	EA
0774 - 6009	REPAIR (WIDE TRACC)	LF
0774 - 6038	REMOVE AND REPLACE (FASTRACC)	EA
0774 - 6050	REMOVE AND REPLACE (SHORTRACC)	EA
0774 - 6051	REMOVE AND REPLACE (FASTRACC)(W)	EA
0774 - 6052	REPAIR (FASTRACC)	LF
0774 - 6053	REPAIR (SHORTRACC)	LF
0774 - 6054	REPAIR (FASTRACC)(W)	LF
0774 - 6055	REPAIR (FASTRACC)(BAY)	EA
0774 - 6056	REPAIR (SHORTRACC)(BAY)	EA
0774 - 6057	REPAIR (FASTRACC)(W)(BAY)	EA
0774 - 6059	REPAIR (TRACC)(BAY)	EA
0774 - 6060	REPAIR (WIDE TRACC)(BAY)	EA
0774 - 6079	REMOVE AND REPLACE TRACC (TXDOT FURNISHD)	EA
0774 - 6108	FAST TRACK CENTER PANELS	EA
0774 - 6116	REMOVE AND REPLACE (FASTRACC)(N)	EA

NOTE:THE PAY ITEMS ON THIS SHEET ARE ONLY USED WHEN DAMAGED ATTENUATOR/CRASH CUSHION COMPONENTS ARE BEING REPAIRED OR ROUTINE MAINTENANCE WORK OCCURS.THE CALLOUTS ON THIS SHEET ARE FOR CLARIFICATION ON HOW WORK WILL BE PAID. THIS SHEET WILL NOT BE USED FOR DETERMINING HOW TO PAY FOR WHEN NEW ATTENUATOR/CRASH CUSHIONS ARE INSTALLED. EXISTING SECTION ARE REMOVED WITHOUT BEING REPLACED, OR BLANKET MASH UPGRADES ARE INSTALLED. THIS IS NOT A STANDARD SHEET FOR CLARIFYING HOW WORK WILL BE PERFORMED.

SYSTEM LENGTH: THE NUMBER OF STAGES/ "SLED SECTIONS" VARIES WITH THE SYSTEM TYPE AND BACKUP WIDTH.

PAD LENGTH: VARIES WITH THE SYSTEM TYPE AND BACKUP WIDTH.



SECTION A-A

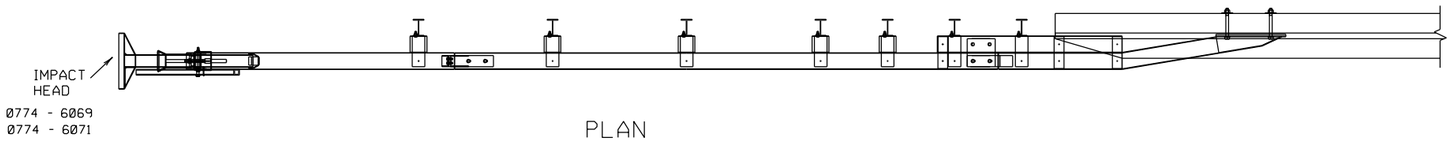
REUSABLE

Texas Department of Transportation

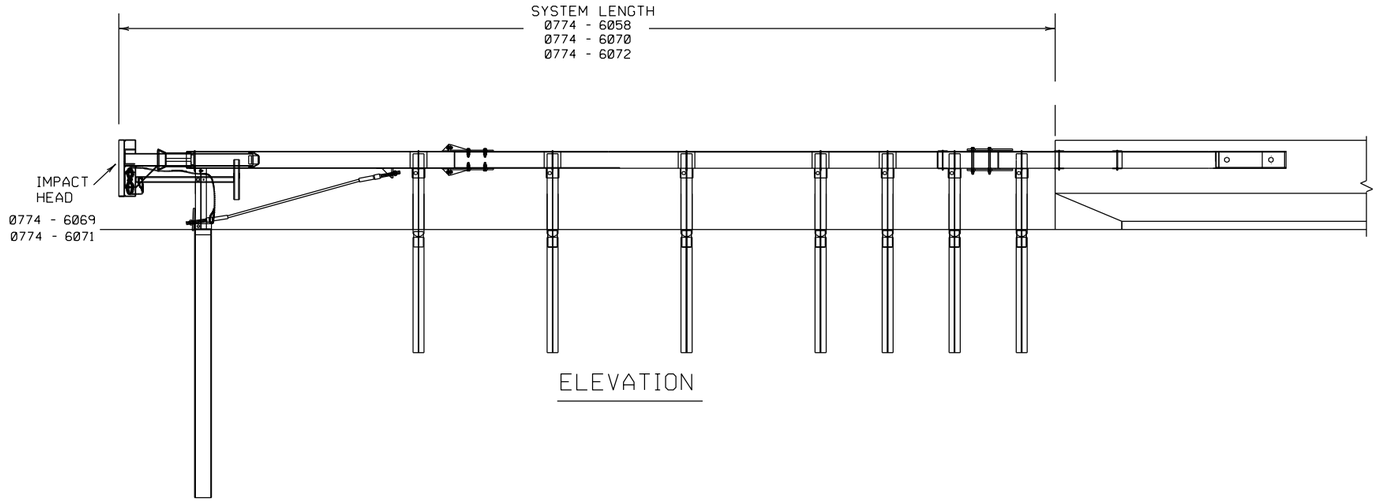
PAY ITEM DETAILS TRINITY HIGHWAY CRASH CUSHION (TRACC UNITS)

FILE:	DN: TxDOT	CK:	DW:	CK:
©TxDOT: SEPTEMBER 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		112

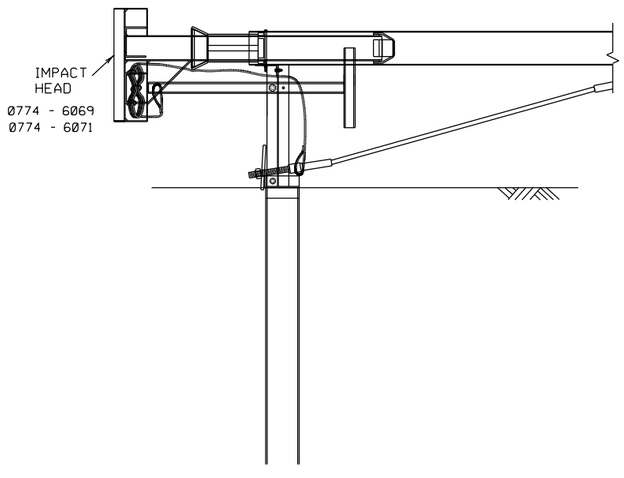
DATE:
FILE:



PLAN



ELEVATION



IMPACT HEAD DETAIL

BID CODE	DESCRIPTION	UNIT
0774 - 6058	REPAIR (BEAT-SSCC)	EA
0774 - 6069	REMOVE & RESET IMPACT HEAT(BEAT-SSCC)	EA
0774 - 6070	REMOVE & REPLACE BEAT - SSCC	LF
0774 - 6071	REMOVE & REPLACE IMPACT HEAD (BEAT-SSCC)	EA
0774 - 6072	REPAIR (BEAT-SSCC)	LF

NOTE:THE PAY ITEMS ON THIS SHEET ARE ONLY USED WHEN DAMAGED ATTENUATOR/CRASH CUSHION COMPONENTS ARE BEING REPAIRED OR ROUTINE MAINTENANCE WORK OCCURS.THE CALLOUTS ON THIS SHEET ARE FOR CLARIFICATION ON HOW WORK WILL BE PAID. THIS SHEET WILL NOT BE USED FOR DETERMINING HOW TO PAY FOR WHEN NEW ATTENUATOR/CRASH CUSHIONS ARE INSTALLED, EXISTING SECTION ARE REMOVED WITHOUT BEING REPLACED, OR BLANKET MASH UPGRADES ARE INSTALLED. THIS IS NOT A STANDARD SHEET FOR CLARIFYING HOW WORK WILL BE PERFORMED.

Texas Department of Transportation

PAY ITEM DETAILS
ROAD SYSTEMS INC
CRASH CUSHION
(BEAT)

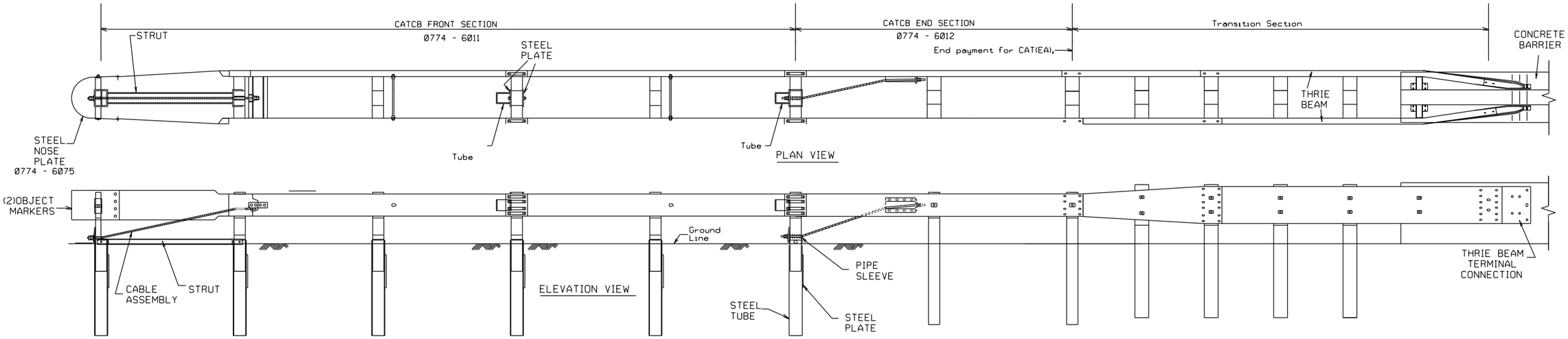
FILE:	DN: TxDOT	CK:	DW:	CK:
© TxDOT:SEPTEMBER 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		113

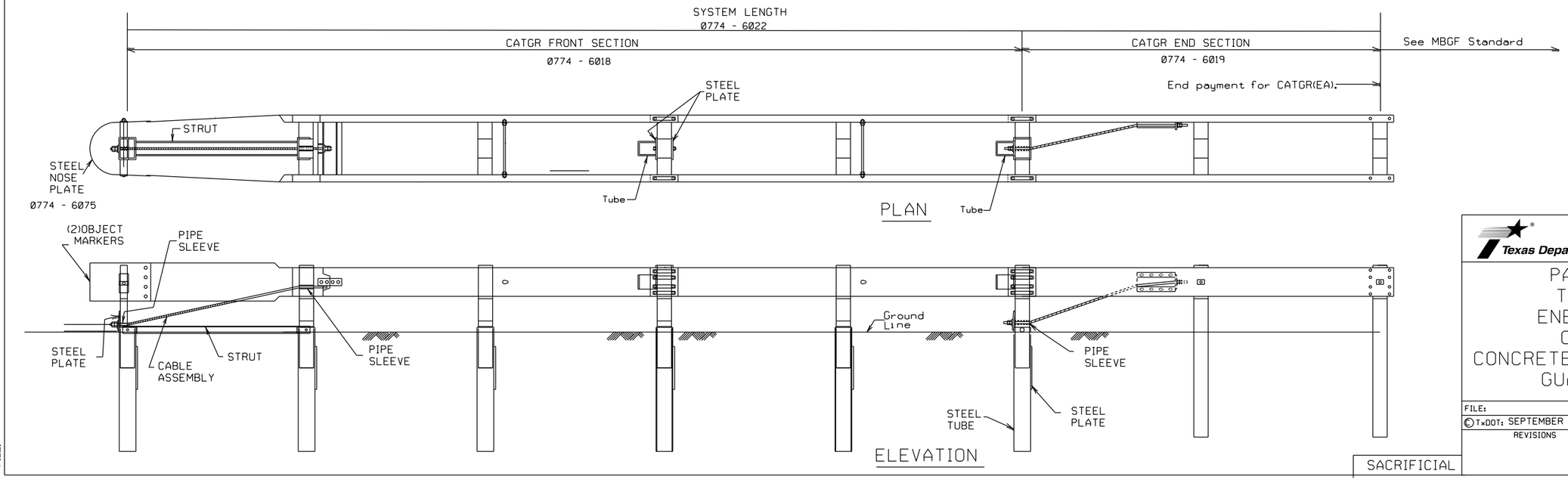
SACRIFICIAL

DATE:
FILE:

BID CODE	DESCRIPTION	UNIT
0774 - 6011	REPAIR (CATCB - FRNT SECT)	EA
0774 - 6012	REPAIR (CATCB - REAR SECT)	EA
0774 - 6018	REPAIR (CATGR - FRONT SECT)	EA
0774 - 6019	REPAIR (CATGR - END SECT)	EA
0774 - 6022	REMOVE AND REPLACE (CATGR)	EA
0774 - 6075	REM AND REPL (CAT)(NOST PLATE (ROLLED)	EA

NOTE:THE PAY ITEMS ON THIS SHEET ARE ONLY USED WHEN DAMAGED ATTENUATOR/CRASH CUSHION COMPONENTS ARE BEING REPAIRED OR ROUTINE MAINTENANCE WORK OCCURS.THE CALLOUTS ON THIS SHEET ARE FOR CLARIFICATION ON HOW WORK WILL BE PAID. THIS SHEET WILL NOT BE USED FOR DETERMINING HOW TO PAY FOR WHEN NEW ATTENUATOR/CRASH CUSHIONS ARE INSTALLED, EXISTING SECTION ARE REMOVED WITHOUT BEING REPLACED, OR BLANKET MASH UPGRADES ARE INSTALLED. THIS IS NOT A STANDARD SHEET FOR CLARIFYING HOW WORK WILL BE PERFORMED.





SACRIFICIAL

Texas Department of Transportation

PAY ITEM DETAILS
TRINITY HIGHWAY
ENERGY ABSORBTION
CRASH CUSHION
CONCRETE BARRIER (CATCB) AND GUARDRAIL (CATGR)

FILE:	DN: TxDOT	CK:	DW:	CK:
©TxDOT: SEPTEMBER 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		114

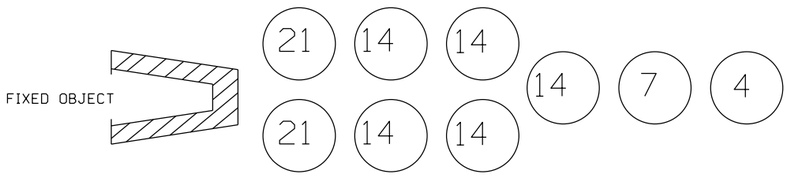
DATE:
FILE:

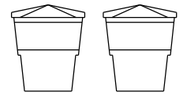
BID CODE	DESCRIPTION	UNIT
0774 - 6005	RMV/REPL (VIA-SAND FILL PLASTIC BARRELS)	EA
0774 - 6020	REMOVE AND REPLACE (VIA-STEEL BARRELS)	EA
0774 - 6021	REPAIR (VIA-STEEL BARRELS)	EA
0774 - 6048	REPAIR (VIA- AND FILL PLASTIC BARRELS)	EA

NOTE:THE PAY ITEMS ON THIS SHEET ARE ONLY USED WHEN DAMAGED ATTENUATOR/CRASH CUSHION COMPONENTS ARE BEING REPAIRED OR ROUTINE MAINTENANCE WORK OCCURS.THE CALLOUTS ON THIS SHEET ARE FOR CLARIFICATION ON HOW WORK WILL BE PAID. THIS SHEET WILL NOT BE USED FOR DETERMINING HOW TO PAY FOR WHEN NEW ATTENUATOR/CRASH CUSHIONS ARE INSTALLED, EXISTING SECTION ARE REMOVED WITHOUT BEING REPLACED, OR BLANKET MASH UPGRADES ARE INSTALLED. THIS IS NOT A STANDARD SHEET FOR CLARIFYING HOW WORK WILL BE PERFORMED.

TYPICAL MODULE ARRAY

TYPICAL MODULE ARRAYS WITH CORRESPONDING DESIGN SPEED AND SAND WEIGHT (X 100 LB) SHOWN IN CIRCLES.





ELEVATION VIEW

0774 - 6005
0774 - 6048

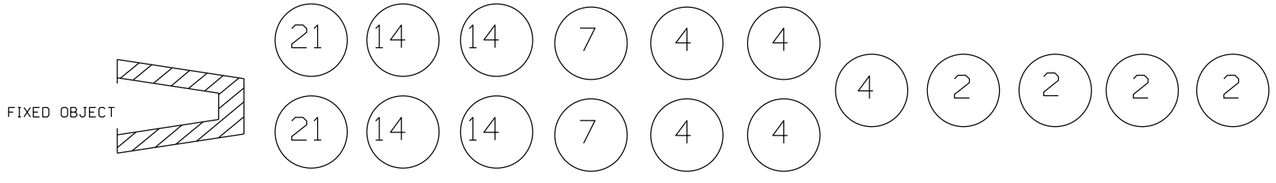
TL-2 = 45 MPH OR LOWER

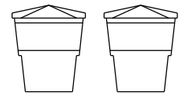
CONFIGURATION = 12,300 LB

PLAN

TYPICAL MODULE ARRAY

TYPICAL MODULE ARRAYS WITH CORRESPONDING DESIGN SPEED AND SAND WEIGHT (X 100 LB) SHOWN IN CIRCLES.





ELEVATION VIEW

0774 - 6005
0774 - 6048

TL-3 = 50 MPH OR GREATER

CONFIGURATION = 14,000 LB

PLAN

SACRIFICIAL

Texas Department of Transportation

PAY ITEM DETAILS
VEHICLE IMPACT ATTENUATOR
(SAND FILLED PLASTIC MODULES)

FILE:	DN: TxDOT	CK:	DW:	CK:
©TxDOT: SEPTEMBER 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	6464	74	001	IH0030
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		115

DATE:
FILE: