FOR INDEX OF SHEETS SEE SHEET 2

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
ROUTINE MAINTENANCE CONTRACT

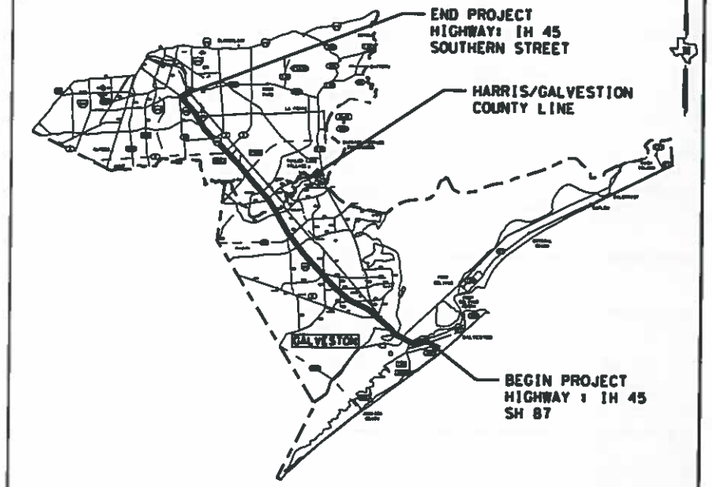
6375-52-001

IH 45 SOUTH

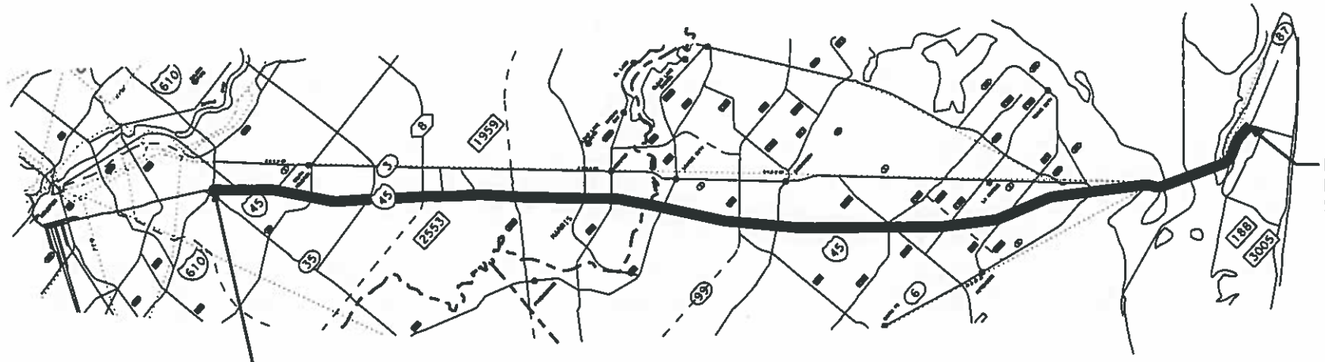
GENERAL MAINTENANCE OF IH 45
HARRIS AND GALVESTON COUNTIES
LIMITS: FROM SH 87 TO SOUTHERN STREET

DESIGN SPEED & ADT		
MAINLANES	70 MPH	
FRONTAGE ROADS	45 MPH	
	MAINLANES	FRONTAGE RD
2020	161,800	57,200
2040	226,800	79,200

FED. REG. DIV. NO.	PROJECT NO.		SHEET NO.
6	6375-52-001		1
STATE	STATE DIST. NO.	COUNTY	
TEXAS	HOU	HARRIS/GAL	
CONT	SECT.	JOB	HIGHWAY NO.
6375	52	001	IH 45



VICINITY MAP



HARRIS/GAL RMC 6375-52-001

COUNTY HARRIS/GAL PROJ. NO. 6375-52-001
HWY. NO. IH 45 LETTING DATE MAY 2021
CONTRACTOR NAME
CONTRACT BEGIN DATE
WORK COMPLETED DATE
DATE OF ACCEPTANCE

STATE OF TEXAS
MELODY I. GALLAND
102489
LICENSED
PROFESSIONAL ENGINEER

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

Melody I. Galland, P.E., PE 2-22-2021
DATE

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT.

TEXAS DEPARTMENT OF TRANSPORTATION

SUBMITTED FOR LETTING February 22 2021
Melody I. Galland, P.E.
AREA ENGINEER

APPROVED FOR LETTING 3-8- 2021
DIRECTOR OF MAINTENANCE

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TX	HOU	HARRIS/GAL	
CONT	SECT.	JOB	HIGHWAY NO.
6375	52	001	IH 45

FILE: $FILES$
DATE: $DATE$
PROJECT: $CSJS$

PAVEMENT MARKINGS STANDARDS

#	203	CONTRAST AND SHADOW PAVEMENT MARKINGS CPM(1)-14
#	204	FREEWAY PAVEMENT MARKINGS ("FPM") WITH RAISED PAVEMENT MARKERS FPM(1)-12
#	205	FPM ENTRANCE AND EXIT RAMPS FPM(2)-12
#	206	FPM LANE DROP (EXIT ONLY) EXIT RAMPS FPM(3)-12
#	207	FPM LANE DROP (EXIT ONLY) DETAILS FPM(4)-12
#	208	PAVEMENT MARKINGS PM(1)-20
#	209	POSITION GUIDANCE USING RAISED MARKERS REFLECTORIZED PROFILE MARKINGS PM(2)-20
#	210	PM FOR TWO-WAY LEFT TURN LANES DIVIDED HIGHWAY AND RUAL LEFT TURN BAYS PM(3)-20
#	211	CROSSWALK PAVEMENT MARKINGS PM(4)-20
#	212	RAILROAD CROSSING DETAILS SIGNING, STRIPING, AND DEVICE PLACEMENT RCD(1)-16
#	213	RAILROAD CROSSING DETAILS SIGNING, STRIPING RCD(2)-16
#	214	EDGELINE RUMBLE STRIPS ON FREEWAY AND DIVIDED HIGHWAY RS(1)-13
#	215	EXIT GORE PAVEMENT MARKING EGPM TC6001-04 (HOU)
#	216-217	SIGNING AND PAVEMENT MARKING DETAILS EXIT RAMPS- FRONTAGE ROAD ER-FR(1)-09 & ER-FR(2)-09 (HOU) (2 SHEETS)
#	218	PAVEMENT MARKINGS PM-20 (HOU)
#	219	PM (CONTRAST LANE LINES) PM(CLL)-14 (HOU)
#	220	PM (RAMP AND GORE DETAILS) PM(R&G)-10 (HOU)
#	221	PM (SHIELD) PM(SHIELD-1)-17 (HOU)
#	222	PM (SHIELD) PM(SHIELD-2)-17 (HOU)
#	223	PM (WORD, ARROWS &SYMBOLS) PM(WAS)-07 (HOU)

CURB AND GUTTER STANDARDS

#	224	CONCRETE CURB AND CURB AND GUTTER CCCG-12
#	225-228	PEDSTRIAN FACILITIES CURB RAMPS PED-18 (4 SHEETS)
#	229	CURB INLET TYPE C (WITH OR WITHOUT EXTENSION) HIL-C (HOU)
#	230	CURB INLET TYPE C1 (WITH OR WITHOUT EXTENSION) HIL-C1 (HOU)

FENCE & HANDRAIL STANDARDS

#	231	CHAIN LINK FENCE CLF-10
#	232	POST & CABLE FENCE PCF-05
#	233	BARBED WIRE AND WOVEN WIRE FENCE (WOOD POSTS) WF(1)-10
#	234	BARBED WIRE AND WOVEN WIRE FENCE (STEEL POSTS) WF(2)-10
#	235-237	PEDESTRIAN HANDRAIL DETAILS PRD-13 (3 SHEETS)
#	238	CHAIN-LINK BARRIER FENCE (4 AND 6 FOOT HEIGHT) CLF (HOU)

EROSION STANDARDS

#	239	TEMPORARY EROSION, SEDIMENT AND WATER POLUTION CONTROL MEASURES FENCE & VERTICAL TRACKING ("TESWPCM") EC(1)-16
#	240	TESWPCM ROCK FILTER DAMS EC(2)-16
#	241	TESWPCM CONSTRUCTION EXITS EC(3)-16
#	242	TESWPCM DIKES (EARTHWORK FOR EROSION CONTROL) EC(4)-16
#	243	TESWPCM SWALES (EARTHWORK FOR EROSION CONTROL) EC(5)-16
#	244	TESWPCM SEDIMENT BASINS AND TRAPS (EARTHWORK FOR EROSION CONTROL) EC(6)-16
#	245	TESWPCM TEMPORARY PIPE SLOPE DRAINS EC(7)-16
#	246	TESWPCM TEMPORARY PAVED FLUMES EC(8)-16
#	247-249	TESWPCM EROSION CONTROL LOG EC(9)-16 (3 SHEETS)
#	250	EROSION CONTROL LOG ECL-12 (HOU)
#	251	FERTILIZER, SEED, SOD, STRAW, COMPOST, AND WATER (HOU)

MISC STANDARDS

#	252	STRIP MOWING (DIVIDED HIGHWAYS) STRIP-MOW-D-04
#	253	SWEEPING HIGHWAYS SWEEP-04
#	254-255	TREE AND BRUSH REMOVAL TRB-15(1) & TRB-15-(2) (2 SHEETS)

STATE OF TEXAS
YEE-CHENG CHANG
96492
LICENSED PROFESSIONAL ENGINEER

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ON THIS SHEET HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

Eddy Chang
YEE-CHENG CHANG

1-5-21
DATE

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CONT	SECT.	JOB	HIGHWAY NO.
6375	52	001	IH45

FILE: T:\0*GEN-AO\0*Maintenance\000*New Contracts\IH 45 General Maintenance\DGN\INDEX2of2.dgn
DATE: 1/5/2021
PROJECT: 6375-52-001

General Notes:

General:

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

Melody Galland, P.E.
Melody.Galland@txdot.gov

Eddy Chang, P.E.
Eddy.chang@txdot.gov

Contractor questions will be accepted through email, phone, and in person by the above individuals. Contractor questions will be reviewed by the Area Engineer or Assistant Area Engineer. Once a response is developed, it will be posted to TxDOT's Public FTP at the following address:

https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting Responses/

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

The project will be managed by and requests for payment addressed to:

Larry Whittington, Maintenance Supervisor
TxDOT Southeast Harris Area Office
702 FM 1959
Houston, TX 77034
281-464-5540

This is a Routine Maintenance Non-Site-Specific Call-Out contract.

This contract is for the general maintenance of IH 45 in Harris and Galveston County. To arrange for a site visit, please contact Larry Whittington at 281-464-5540.

Ensure that the Contractor Project Manager or designated representative will be available 24 hours / 7 days a week including holidays. The Contractor shall have at all times a satisfactory and competent English-speaking superintendent on the project, authorized to receive orders and to act on the Contractor's behalf. The Contractor shall designate to the Engineer the name of the superintendent. The Engineer may suspend work without suspending working days charges if a Superintendent is not available or does not meet the above criteria.

Commence work upon the issuance of a work order. Work orders will be issued for no less than $1,000 per day plus callout and emergency costs when applicable. Contract will continue work for two (2) years or until funds are expended, whichever occurs first.

Work requests are made on a call out basis. Contractor shall begin work within 48 hours of notification. Contractor shall begin work within 2 hours of notification for emergency call outs and complete within 48 hours, unless otherwise approved. Failure to begin work within 48 hours of notification or (2 hours for emergency calls), will result in the assessment of liquidated damages. Liquidated damages will also be assessed for failure to complete the contract, work order or call out work.

The Contractor will begin call out work within the required time for each work order. Work orders are expected to be completed per the contract plans within the number of days allowed for each work order. All call out work orders will have a begin date and number of working days. The Contractor will begin work within 48 hours of notification for routine call outs, unless otherwise approved by the Engineer. Work will be completed within the required number of working days. The Contractor will begin work within 4 hours of notification for emergency call outs and complete within 48 hours, unless otherwise approved by the Engineer. Failure to begin work within the required time and proceed to completion within the required time will result in the assessment of liquidated damages.

Work will be performed as call out work or emergency call out work. Begin and complete work within the specified time.

Refer to Items 545, 636,738, and 740 for specific response times.

Have multiple crews available to respond 7 days a week, 24 hours a day for the duration of the contract.

Work will be issued weekly as required. The time frame allowed per item of work is shown on the plans.

Plans are available and should be obtained online or from one of the reproduction firms listed in the Notice to Contractors.

This project consists of mowing highway right of way, litter pickup, sweeping, graffiti removal, snow and ice control, small and large sign repair and replacement, the repair of: guardrail, attenuators, concrete barrier, pedestrian rail, chain link fence, concrete curb, delineation, and pot holes, and the cleaning of: pump house wells, drain inlets, bridge joints and storm drains in Harris and Galveston County.

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

Provide and maintain an e-mail address for receipt of work order and correspondence throughout the term of this contract. Respond to any correspondence within 24 hours to confirm receipt.

Notify the appropriate inspector by telephone each morning by 7:00 AM for any daytime or nighttime operations that is scheduled, with work location and time of arrival or reason for not working that day.

Remove materials or debris within the construction limits not incorporated in the project.

There may be locations within the contract limits that are under construction by other contractors. Work shall be performed in these areas, unless directed otherwise by the Engineer. If this construction prevents any item of work from being performed, payment of the work quantities due to the contractor will be reduced to the percent of work actually completed. When construction is completed and work on this contract can be resumed, payment will be made according to the actual amount of work performed, and will be paid for in accordance with the contract items.

All work for guardrail, delineation, attenuator, chain link fence, concrete rail/concrete barrier, concrete curb repair, concrete and asphalt road repairs, small and large sign repair, and pedestrian/metal rail repair is considered callout work and a written work order will be issued as work is needed. A work order will consist of the location of each repair. Work orders will not include a list of required materials for the repairs. Order all materials and related components for each work order.

All materials must be on verified by Materials Sourcing List and approved by the Area Engineer before work begins. Quantities on work orders are approximate and additional materials and work may be necessary to complete the repairs. Any additional work performed not specified in the work order will require prior approval. Complete all work on each call out work order for these work items within 7 days from the date of the work order unless otherwise specified.

Perform work on an as-needed basis where directed.

The Engineer will determine the exact location of a day's work.

Reference the summary chart located in the plans for litter pick up, mowing, debris and sweeping which defines the type of work to be performed and the limits of the work area.

Notify the Southeast Maintenance Office at 281-464-5540 by 7:30 a.m. when scheduled work is cancelled for any reason.

Work will not be permitted when impending bad weather or inclement weather may impair the quality of the work.

It is the Contractor's responsibility to ensure familiarity with the existing site conditions and all aspect of the contract prior to bidding.

Immediately notify the Engineer or a designated representative of all emergency situations. An after-hours / holiday emergency number will be provided to the Contractor.

Protect all areas of the right of way from destruction. Restore any area that is disturbed as a result of the Contractor's operations to a condition that is as good as or better than before their operations.

Employees shall wear approved safety equipment.

An experienced crew will be used in the various applications of this contract.

Prior to beginning excavation or other work in the area of existing utilities, the Contractor shall consult with the utility companies for exact locations to prevent any damage or interference with present facilities. This action shall in no way be interpreted as relieving the Contractor of his responsibilities, under the terms of the contract and as set out in the plans and specifications. The Contractor shall repair any damage caused by his operations, at his own expense and shall restore facilities to service in a timely manner.

The Contractor is responsible for third party damages.

The contractor will not be responsible for incident response.

Grade street intersections and median openings for surface drainage.

The cost for materials, labor, and incidentals to provide for traffic across the roadway and for ingress and egress to private property in accordance with Section 7.2.4 of the standard specifications is subsidiary to the various bid items. Restore access roadways to their original condition upon completing construction.

References to manufacturer's trade name or catalog numbers are for the purpose of identification only. Similar materials from other manufacturers are permitted if they are of equal quality, comply with the specifications for this project, and are approved, except for roadway illumination, electrical, and traffic signal items.

Tolls incurred by the Contractor are incidental to the various bid items.

Procure permits and licenses, which are to be issued by the City, County, or Municipal Utility District.

If a foundation is to be placed where a riprap surface or an asphalt concrete surface presently exists, use caution in breaking out the existing surface for placement. Break out no greater area than is required to place the foundation. After placing the foundation, wrap the periphery with 0.5 in. pre-molded mastic expansion joint. Then replace the remaining portion of the broken out surface with Class A or Class C concrete or cold mix asphalt concrete to the exact slope, pattern, and thickness of the existing riprap or asphalt. Payment for breaking out the existing surface, wrapping the foundation, and replacing the surface is subsidiary to the various bid items.

The following standard detail sheets are modified:

Modified Standards

Traffic Control Plan, Emergency Road Closures (Ice Conditions)

Contractor Performance:

Allowable completion times and response times for each item of work are shown on the plans. The Contractor will be charged liquidated damages for each work item not complete in accordance with Special Provision 000-658, "Schedule of Liquidated Damages" or at the rates shown below per day including Saturdays, Sundays, and Holidays until the work is complete and accepted by the Engineer. The costs associated with these measures will be deducted from any payment due the Contractor.

Failure to complete work within the allowable time as noted on the plans except for Snow and Ice.	Based on the total contract amount in accordance with the Schedule of Liquidated Damages per item of work per day. (Including Saturdays, Sundays, and Holidays)
Failure to Re-Open Main Lanes Closed for Maintenance Work	$ 7,000.00 per hour per lane closed
Failure to Respond to Snow and Ice.	$ 16,000.00 per hour

In addition, the Department may take steps to have the work corrected. This may include the use of State Forces or Emergency Contracts. Once the Contractor is notified that the Department is taking corrective action, the Contractor shall refrain from performing work on the item in question unless approved by the Engineer. The costs associated with these measures will be deducted from any payment due the Contractor.

Project Limits:

The specific limits of work are as shown on the attached plans. The limits of work shall include all areas within the IH 45 right of way (ROW). The areas shall include main lanes, frontage roads, ramps, bridges, islands, medians, turn-a-rounds, detention ponds, cross streets, direct connectors/flyovers, etc.

The limits of construction on the cross roads shall generally be as follows except as noted below:

1. To the set-back ROW line on city streets.
2. Intersecting highways and county roads as shown on the attached plans.
3. Interchange areas as shown on the attached plans.

Limits include approach and departure signs, stop signs, junction assemblies, advance turn assemblies, directional assemblies, and confirmation/reassurance assemblies within the project limits and/or within 500 feet of the project limits, on county roads, city streets, highway intersections and interchanges, shall be maintained by the Contractor.

General: Site Management
Contractor will be required to remove all debris surrounding the Sweeping and Debris dumpsters at the end of each day.

Do not mix or store materials, or store or repair equipment, on top of concrete pavement or bridge decks unless authorized by the Engineer. Permission will be granted to store materials on surfaces if no damage or discoloration will result.

Personal vehicles of employees are not permitted to park within the right of way, including sections closed to public traffic. Employees may park on the right of way at the Contractor's office, equipment, and materials storage yard sites.

Assume ownership of debris and dispose of at an approved location. Do not dispose of debris on private property unless approved in writing by the District Engineer.

Control the dust caused by construction operations. For sweeping the base material in preparation for laying asphalt and for sweeping the finished concrete pavement, use one of the following types of sweepers or approved equal:

Tricycle Type	**Truck Type - 4 Wheel**
Wayne Series 900	M-B Cruiser II
Elgin White Wing	Wayne Model 945
Elgin Pelican	Mobile TE-3
	Mobile TE-4
	Murphy 4042

General: Traffic Control and Construction

When design details are not shown on the plans, provide signs and arrows conforming to the latest "Standard Highway Sign Designs for Texas" manual.

Schedule construction operations such that preparing individual items of work follows in close sequence to constructing storm drains in order to provide as little inconvenience as practical to the businesses and residents along the project.

Existing pavement markings removed or damaged by more than 20 ft. will be replaced with temporary striping. Temporary striping shall be paint based unless otherwise directed by the engineer. This work will be considered incidental to the item of work.

Schedule work so that the base placement operations follows the subgrade work as closely as practical to reduce the hazard to the traveling public and to prevent undue delay caused by wet weather.

General: Utilities

If the Contractor damages or causes damage (breaks, leaks, nicks, dents, gouges, etc.) to the utility, contact the utility facility owner or operator immediately.

Be aware that an operational Computerized Transportation Management System (CTMS) exists within the limits of this project and that the system must remain operational throughout construction. If the Contractor damages or causes damage to this system, repair such damage within 8 hours of occurrence at no cost to the Department. In the event of system damage, notify the Director of Traffic Management Systems at 713-881-3283 within one hour of occurrence. Failure of the Contractor to repair damage to the main fiber optic cable and CCTV cable trunk lines, which convey all corridor information to TranStar, will result in the Contractor being billed for the full cost of emergency repairs.

At least 72 hours before starting work, make arrangements for locating existing Department-owned above ground and underground fiber optic, communications, power, illumination, and traffic signal cabling and conduit. Do this by calling the Department's Houston District Traffic Signal Operations Office at 713-802-5662 to schedule marking of underground lines on the ground. Use caution if working in these areas to avoid damaging or interfering with existing facilities.

Notify the Engineer at least 48 hours before constructing junction boxes at storm drain and utility intersections.

Install or remove poles and luminaires located near overhead or underground electrical lines using established industry and utility safety practices. Consult the appropriate utility company before beginning such work.

If overhead or underground power lines need to be de-energized, contact the electrical service provider to perform this work. Costs 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.

Perform electrical work in conformance with the National Electrical Code (NEC) and Department standard sheets.

Before beginning any underground work, notify the City of Houston's Chief Inspector, Public Works and Engineering, to establish the locations of any existing electrical systems for lighting facilities within the limits of this project.

Item 5: Control of Work

Submit shop drawings electronically for the fabrication of items as documented in Table 1 below. Information and requirements for electronic submittals can be viewed in the "Guide to Electronic Shop Drawing Submittal" which can be accessed through the following web link, ftp://ftp.dot.state.tx.us/pub/txdot-info/library/pubs/bus/bridge/e_submit_guide.pdf. References to 11 in. x 17 in. sheets in individual specifications for structural items imply electronic CAD sheets.

Table 1

2014 Construction Specification Required Shop/Working Drawing Submittals - TxDOT Generated Plans

Spec Item No.'s	Product	Submittal Required	Approval Required (Y/N)	Contractor/ Fabricator P.E. Seal Required	Reviewing Party	Shop or Working Drawing (Note 1)
7.16.1&.2	Construction Load Analyses	Y	Y	Y	B	WD
400	Excavation and Backfill for Structures (cofferdams)	Y	N	Y	A	WD
403	Temporary Special Shoring	Y	N	Y	C	WD
420	Formwork/Falsework	Y	N	Y	A	WD
423	Retaining Walls, (calcs req'd.)	Y	Y	Y	C	SD
425	Optional Design Calculations (Prstrs Bms)	Y	Y	Y	B	SD
425	Prestr Concr Sheet Piling	Y	Y	N	B	SD
425	Prestr Concr Beams	Y	Y	N	B	SD
425	Prestr Concr Bent	Y	Y	N	B	SD
426	Post Tension Details	Y	Y	N	B	SD
434	Elastomeric Bearing Pads (All)	Y	Y	N	B	SD
441	Bridge Protective Assembly	Y	Y	N	B	SD
441	Misc Steel (various steel assemblies)	Y	Y	N	B	SD
441	Steel Pedestals (bridge raising)	Y	Y	N	B	SD
441	Steel Bearings	Y	Y	N	B	SD
441	Steel Bent	Y	Y	N	B	SD
441	Steel Diaphragms	Y	Y	N	B	SD
441	Steel Finger Joint	Y	Y	N	B	SD
441	Steel Plate Girder	Y	Y	N	B	SD
441	Steel Tub-Girders	Y	Y	N	B	SD
441	Erection Plans, including Falsework	Y	N	Y	A	WD
449	Sign Structure Anchor Bolts	Y	Y	N	T	SD
450	Railing	Y	Y	N	A	SD
462	Concrete Box Culvert	Y	Y	N	C	SD
462	Concrete Box Culvert (Alternate Designs Only,calcs reqd.)	Y	Y	Y	B	SD
464	Reinforced Concrete Pipe (Jack and Bore only; ONLY when	Y	Y	Y	A	SD

	requested)					
465	Pre-cast Junction Boxes, Grates, and Inlets	Y	Y	N	A	SD
465	Pre-cast Junction Boxes, Grates, and Inlets (Alternate Designs Only, calcs req'd.)	Y	Y	Y	B	SD
466	Pre-cast Headwalls and Wingwalls	Y	Y	N	A	SD
467	Pre-cast Safety End Treatments	Y	Y	N	A	SD
495	Raising Existing Structure (calcs reqd.)	Y	Y	Y	B	SD
610	Roadway Illumination Supports (Non-Standard only, calcs reqd.)	Y	Y	Y	BRG	SD
613	High Mast Illumination Poles (Non-standard only, calcs reqd.)	Y	Y	Y	BRG	SD
627	Treated Timber Poles	Y	Y	N	T	SD
644	Special Non-Standard Supports (Bridge Mounts, Barrier Mounts, Etc.)	Y	Y	Y	T	SD
647	Large Roadside Sign Supports	Y	Y	Y	T	SD
650	Cantilever Sign Structure Supports - Alternate Design Calcs.	Y	Y	Y	T	SD
650	Sign Structures	Y	Y	N	T	SD
680	Installation of Highway Traffic Signals	Y	Y	N	T	SD
682	Vehicle and Pedestrian Signal Heads	Y	Y	N	T	SD
684	Traffic Signal Cables	Y	Y	N	T	SD
685	Roadside Flashing Beacon Assemblies	Y	Y	N	T	SD
686	Traffic Signal Pole Assemblies (Steel) (Non-Standard only)	Y	Y	Y	T	SD
687	Pedestal Pole Assemblies	Y	Y	N	T	SD
688	Detectors	Y	Y	N	A	SD
784	Repairing Steel Bridge Members	Y	Y	Y	B	WD
SS	Prestr Concr Crown Span	Y	Y	N	B	SD
SS	Sound Barrier Walls	Y	Y	Y	A	SD
SS	Camera Poles	Y	Y	Y	TMS	SD
SS	Pedestrian Bridge (Calcs req'd.)	Y	Y	Y	B	SD
SS	Screw-In Type Anchor Foundations	Y	Y	N	T	SD
SS	Fiber Optic/Communication Cable	Y	Y	N	TMS	SD
SS	Spread Spectrum Radios for Signals	Y	Y	N	T	SD
SS	VIVDS System for Signals	Y	Y	N	T	SD
SS	CTMS Equipment	Y	Y	N	TMS	SD

Notes:

1. Document flow for Working Drawings differs from Shop Drawings in that Working Drawings must be submitted to the Engineer rather than the Engineer of Record and they are for the information of the Engineer only; an approval stamp and distribution to all project offices is not required.

Key to Reviewing Party

A - Area Office

Area Office	Email Address
Southeast Area Office	HOU-SEHAShpDrwgs@txdot.gov

Item 7: Legal Relations and Responsibilities

Do not initiate activities in a Project Specific Location (PSL), associated with a U.S. Army Corps of Engineers (USACE) permit area, that have not been previously evaluated by the USACE as part of the permit review of this project. Such activities include those pertaining to, but are not limited to, haul roads, equipment staging areas, borrow and disposal sites. Associated defined here means materials are delivered to or from the PSL. The permit area includes the waters of the U.S. or associated wetlands affected by activities associated with this project. Special restrictions may be required for such work. Assume responsibility for consultations with the USACE regarding activities, including PSLs that have not been previously evaluated by the USACE. Provide the Department with a copy of consultations or approvals from the USACE before initiating activities.

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

This project does not require a U.S. Army Corps of Engineers (USACE) Section 404 Permit before letting, but if a permit is needed during construction, assume responsibility for preparing the permit application. Submit the permit application to the Department's District Environmental Section for approval. Once the permit application is approved, the Department will submit it to the USACE. Assume responsibility for the requested revisions, in coordination with the Department's District Environmental Section.

Maintain the roadway slope stability. Maintaining slope stability is subsidiary to the various bid items.

If the work is on or in the vicinity of an at-grade railroad crossing, involves incidental work on railroad right of way, or involves construction of a railroad grade separation structure, notify the railroad company's Division Engineer and the Department's Project Engineer at least 30 days before performing any work on the railroad right of way and make arrangements for railroad flaggers unless otherwise shown in the contract. Obtain the required Railroad Right of Entry Permit from the railroad company. Payment of applicable permit fees is the responsibility of the Contractor. Acquiring the Railroad Right of Entry Permit is a lengthy process, allow sufficient time for this.

The nesting / breeding season for migratory birds is February 15 through September 30.

Conduct any tree removal outside of the migratory bird nesting season. If this is not possible due to scheduling, then exercise caution to remove only those trees with no active nests. Do not destroy nests on structures or in trees within the project limits during the nesting / breeding season.

Take measures to prevent the building of nests on any structures or trees within the project limits throughout the duration of the construction if work / removal will be performed during the nesting / breeding season. This can be accomplished by application of bird repellent gel, netting by hand every 3 to 4 days, or any other non-threatening method approved by the Houston District Environmental Section. Obtain this approval well in advance of the planned use. Contact the Houston District Environmental Section at 713-802-5244. The cost of this work is subsidiary to the various bid items.

This project is on a hurricane evacuation route. Provide at the pre-construction meeting a written plan outlining procedures to suspend work, secure the job site, and safely handle traffic through and across the project in the event of a hurricane evacuation.

During the hurricane season (June 1 through November 30), do not close any travel lanes except when the Contractor can demonstrate that he/she can provide labor, equipment, material, a work plan, and quality of work to satisfactorily return all lanes to an open, all-weather travel surface within 3 days of receiving written or verbal notice but no later than 3 days before the predicted hurricane landfall. Construction of temporary lanes to an all-weather surface will be paid for in accordance with Article 9.7, “Payment for Extra Work and Force Account Method.”

In addition to lane closures, cease work 3 days before the predicted hurricane landfall on or near the roadway that adversely impacts the flow of traffic and reduces the capacity of the highway during an evacuation. Vehicles of the Contractor, subcontractors, or material suppliers will not be allowed to enter or exit the traffic stream, including those for the purpose of material hauling and delivery, and mobilization or demobilization of equipment. When directed, this prohibition will include a reasonable time period for the evacuees to return to their point of origin.

No significant traffic generator events have been identified.

Item 8: Prosecution and Progress

The road-user cost liquidated damages are $ 970.00 per day. After the project is substantially complete, the liquidated damages become those based on contract administration costs.

The Department will not adjust the number of days for the project and milestones, if any, due to differences in opinion regarding any assumptions made in the preparation of the schedule or for errors, omissions, or discrepancies found in the time determination schedule.

Working days will be computed and charged based on **calendar days** in accordance with Section 8.3.1.5

The Lane Closure Assessment Fee is as stated in the chart below. This fee applies to the Contractor for closures or obstructions that overlap into restricted hour traffic for each hour or portion thereof, per lane, regardless of the length of lane closure or obstruction. For Restricted Hours subject to Lane Assessment Fee refer to the Item, “Barricades, Signs, and Traffic Handling.”

Lane Closure Assessment Fee Table

Roadway Limits	Mainlanes	Frontage Roads
IH 45: From SH 87 to IH 610	**$ 4,000.000**	**$ 1,000.00**

Item 104: Removing Concrete

Removing concrete curb is paid as a separate bid item if the existing pavement on which it rests is not removed at the same time.

Saw cuts are subsidiary to the various bid items.

Item 150: Blading

Blade the shoulders in accordance with this Item and as directed.

Perform blading for ditch grading to ensure proper drainage between the existing and proposed ditches.

Cut edges flush with the edge of pavement to re-establish drainage. If an edge condition is created by removing excess material, backfill the pavement edges as directed by the Engineer. This work will be incidental to Item 150.

The roadway must be swept clean upon completion of each area of blading shoulders. This work will be incidental to Item 150.

If using native soil for reshaping the shoulders, no separate payment for materials will be made.

Item 351: Flexible Pavement Structure Repair

Contractor will be responsible for notifying the Southeast Area Office lab at (281)-464-5530 for all scheduled work that may require testing.

The repaired surface will be finished smooth to match the slopes of existing roadway.

Use asphalt stabilized base for the base material.

For base repair, place the asphalt stabilized base in compacted lifts of 4 in. maximum, unless otherwise directed.

Provide surface mix designs for approval before work commences.

Tack coat will be Emulsified Asphalt SS-1, meeting the requirements of Item 300, “

Remove only the quantity of pavement replaceable during the daily allowable work schedule.

Item 361: Repair of Concrete Pavement

For full depth repair, remove only the quantity of pavement replaceable during the daily allowable work schedule.

Remove loose sub-base material and replace it with concrete. Use a bondbreaker, such as a polyethylene sheet, at the interface between the replaced sub-base material and the new concrete pavement.

Supply polyethylene fabric on the job site sufficient to cover the area of repair.

Do not place concrete if impending weather may result in rainfall or low temperatures that may impair the quality of the finished work.

Repair portions of the concrete pavement surfaces that are damaged while in a plastic state before those areas receive permanent pavement markings and open to traffic. Perform repairs that are structurally equivalent to and cosmetically uniform with adjacent undamaged areas. Do not repair by grouting onto the surface.

Ready mix concrete will be permitted if the equipment and construction methods can produce the desired results. Hand finishing will be permitted.

For the Department's concrete cylinder split samples, transport the test cylinders to the Houston District Laboratory located at 7600 Washington Avenue in Houston, or to the appropriate Area Laboratory, when applicable. Transporting the test cylinders is subsidiary to the various bid items.

Provide a wheelbarrow or other container, acceptable for sampling the concrete. Furnish all test molds, meeting the requirements of test method TEX-447-A, and maintain them properly.

Furnish all concrete mix designs for approval prior to the beginning of work. Any subsequent changes in concrete mix design will require approval.

Fasten all tie-bars using a fast setting epoxy; do not exceed a setting time of three hours.

The repair of joints and load transfer devices will be of like kind as that removed from the repair area or as directed.

Provide a self-propelled transverse metal tine device equipped with 4-in to 6-in. steel tines and with cross-section approximately 1/32 in. thick by 1/2 in. wide, spaced at 1 in. center-to-center. Hand-operated tinning equipment that produces an equivalent texture may be used only on small or irregularly shaped areas or, when permitted, in emergencies due to equipment breakdowns.

Furnish personnel to remove test specimens from molds and to properly maintain all test molds. Any cost associated with providing the molds, equipment, handling, and disposal of test specimens will be incidental to the various bid items.

The sealant required around the perimeter of the patch will be cold poured rubber.

Provide Class 5 or Class 8 joint-sealant materials and fillers unless otherwise shown on the plans or approved and other sealant materials of the size, shape, and type shown on the plans in accordance with DMS-6310, "Joint Sealants and Fillers."

Perform saw cutting as shown on the plans in accordance with Section 360.4.10, "Sawing Joints." This saw cutting is subsidiary to this bid Item.

Item 416: Drilled Shaft Foundations

Include the cost for furnishing and installing anchor bolts mounted in the drilled shafts in the unit bid price for the various diameter drilled shafts.

The Department may test using ultrasonic methods the anchor bolts for overhead sign supports, light standards, and traffic signal poles after they are installed. Replace faulty anchor bolts as directed. Do not weld the anchor bolts.

Item 429: Concrete Structure Repair

Repair depths of two inches or less will be paid as Item 429 "Concrete Structure Repair".

Furnish rapid setting epoxy mortar for repairing spalled and deteriorated areas on the bridge deck. Achieve a minimum strength of 300 psi within three hours or as directed.

Item 500: Mobilization

This contract consists of Call-out Mobilization for routine work and Emergency Mobilization for any emergency or unexpected work.

Item 502: Barricades, Signs, and Traffic Handling

Center median and outside main lane sweeping operations will require a State approved sign at all entrance ramps. Frontage roads and ramps will require a State approved sign at all exit ramps during sweeping operations.

Sweeping Operations Signs will be placed every (2) two miles.

Sweeping Operations Signs will be placed at all entrance and exit ramps.

The Engineer may direct that operations be curtailed, halted or rescheduled in consideration of holiday traffic to and from public gatherings, which may result in undue congestion and delays to the traveling public.

Use a traffic control plan for handling traffic through the various phases of construction. Follow the phasing sequence unless otherwise agreed upon by the Area Engineer and the Project Manager. Ensure this plan conforms to the latest "Texas Manual on Uniform Traffic Control Devices" and the latest Barricade and Construction (BC) Standard Sheets. The latest versions of Work Zone Standard Sheets WZ (BTS-1) and WZ (BTS-2) are the traffic control plan for the signal installations.

Submit changes to the traffic control plan to the Area Engineer. Provide a layout showing the construction phasing, signs, striping, and signalizations for changes to the original traffic control plan.

Furnish and maintain the barricades and warning signs, including the necessary temporary and portable traffic control devices, during the various phases of construction. Place and construct these barricades and warning signs in accordance with the latest "Texas Manual on Uniform Traffic Control Devices" for typical construction layouts.

Cover work zone signs when work related to the signs is not in progress, or when any hazard related to the signs no longer exists.

Keep the delineation devices, signs, and pavement markings clean. This work is subsidiary to the Item, "Barricades, Signs, and Traffic Handling."

Erect temporary signs when exit ramps are closed or moved to new locations during construction.

If a section is not complete before the end of the workday, pull back the base material to the existing pavement edge on a 6H: 1V slope. Edge drop-offs during the hours of darkness are not permitted

Before detouring traffic onto the main lane shoulders, remove dirt, debris, vegetation, and other deleterious material from the surface of the shoulder. Appropriately sign the detour in an approved manner. This work is subsidiary to the various bid items.

Coordinate and schedule the work with the appropriate Metro representative if requiring access to the High Occupancy Vehicle lanes.

Cover the permanent signs and construction signs that are incorrect or that do not apply to the current situation for a particular phase.

Replace the overhead signs, informational signs, and exit signs to be removed, with temporary signs providing the correct information to the traveling public. Size the replacement signs and include them in the traffic control plan.

Do not mount signs on drums or barricades, except those listed in the latest Barricades and Construction standard sheets.

Use traffic cones for daytime work only. Replace the cones with plastic drums during nighttime hours.

Place positive barriers to protect drop-off conditions greater than 2 ft. within the clear zone that remain overnight.

Do not reduce the existing number of lanes open to traffic except as shown on the following time schedule:

One Lane Closure

IH 45 Frontage Road

Day	Daytime Closure Hours	Nighttime Closure Hours	Restricted Hours Subject to Lane Assessment Fee
Monday Through Friday	9:00 AM - 3:00 PM	12:00 AM - 5:00 AM 7:00 PM – 12:00 AM	5:00 AM - 9:00 AM 3:00 PM - 7:00 PM

Two Lane Closure
IH 45 Frontage Road

Day	Daytime Closure Hours	Nighttime Closure Hours	Restricted Hours Subject to Lane Assessment Fee
Monday Through Friday	None	12:00 AM – 5:00 AM 9:00 PM – 12:00 AM	5:00 AM – 9:00 PM

One/Two or More Lane Closure
IH 45 Mainlane

Day	Daytime Closure Hours	Nighttime Closure Hours	Restricted Hours Subject to Lane Assessment Fee
Monday Through Friday	None	12:00 AM – 5:00 AM 9:00 PM – 12:00 AM	5:00 AM – 9:00 PM

Full Closure
IH 45 Mainlane, IH 45 Frontage Road, Ramps, Direct Connector

Day	Daytime Closure Hours	Nighttime Closure Hours	Restricted Hours Subject to Lane Assessment Fee
Monday Through Sunday	None	12:00 AM – 5:00 AM 10:00 PM – 12:00 AM	5:00 AM – 10:00 PM

Weekend One/Two Lane Closure
IH 45 Frontage Road

Day	Daytime Closure Hours	Nighttime Closure Hours	Restricted Hours Subject to Lane Assessment Fee
Saturday Through Sunday	None	12:00 AM – 11:00 AM 8:00 PM – 12:00 AM	11:00 AM – 8:00 PM

Weekend One/Two Lane Closure
IH 45 Mainlane

Day	Daytime Closure Hours	Nighttime Closure Hours	Restricted Hours Subject to Lane Assessment Fee
Saturday Through Sunday	None	12:00 AM – 10:00 AM 9:00 PM – 12:00 AM	10:00 AM – 9:00 PM

Sweeping Operation
IH 45 Frontage Road

Day	Daytime Closure Hours	Nighttime Closure Hours	Restricted Hours Subject to Lane Assessment Fee
Monday Through Sunday	9:00 AM – 3:00 PM	9:00 PM – 5:00 AM	5:00 AM – 9:00 AM 3:00 PM – 9:00 PM

Sweeping Operation
IH 45 Mainlane

Day	Daytime Closure Hours	Nighttime Closure Hours	Restricted Hours Subject to Lane Assessment Fee
Monday Through Sunday	None	9:00 PM – 5:00 AM	5:00 AM – 9:00 PM

The above times are approved for the traffic control conditions listed. The Area Engineer may approve other closure times if traffic counts warrant. The Area Engineer may reduce the above times for special events.

The Contractor Force Account "Safety Contingency" that has been established for this project is intended to be utilized for work zone enhancements, to improve the effectiveness of the Traffic Control Plan, that could 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.

Law enforcement assistance will be required for this project and is expected to be required for major traffic control changes and lane closures. Coordinate with local law enforcement and arrange for law enforcement as directed or agreed by the Engineer. Before payment will be made, complete the "Daily Report on Law Enforcement Force Account Work" (Form 318), provided by the Department and submit daily invoices that agree with this form for any day during the month in which approved services were provided.

Provide full-time, off-duty, uniformed, certified peace officers, as part of traffic control operations. The peace officers must be able to show proof of certification by the Texas Commission on Law Enforcement Officers Standards. The cost of the officers is paid for on a force account basis.

A minimum of 7 days in advance of any total closure, notify the Houston District Public Information Office of which roadways, ramps, intersections, or lanes will be closed, the dates they will remain closed, and when they will be opened again to traffic.

A minimum of 7 days in advance of any total closure, place a portable changeable message (PCM) sign at the location of each total closure which informs the traveling public of the details of the closure. Alternately, if the Traffic Control Plan provides a positive barrier at the location, a non-trailer mounted static message board sign behind the positive barrier may be used in place of a PCM.

Before closing any City of Houston sidewalk, one or more city street lanes, or entire city streets during construction, obtain a permit to do so from the City. Obtain the required permit in person at the City of Houston Permit Office, or apply online at http://www.gims.houstontx.gov.

During the various phases of construction, maintain and relocate Logo signs/Specific Service signs located within the project limits. Maintenance and relocation of these signs are subsidiary to the Item, "Barricades, Signs, and Traffic Handling." These signs are Department-owned and administered by LoneStar Logos, a Department signage contractor.

Relocate a logo sign to avoid interference with construction phases as necessary. Assure that relocated signs meet clearance requirements. If clearance requirements cannot be met using the existing sign, contact the logo sign contractor to manufacture and deliver to the jobsite a smaller logo sign within 3 weeks. If there is absolutely no room to display the relocated logo sign, 2 weeks before relocating, contact the logo sign contractor to remove the sign and place it in storage. The telephone number for LoneStar Logos is (512) 462-1310 and the email address for the regional manager, Tyler Starr, is tstarr@lonestarlogos.com.

When relocating a logo sign, provide wooden skid mounted sign supports for the sign that are crashworthy and in accordance with the latest edition of the "Texas Manual on Uniform Traffic Control Devices." Specific information on crash worthy skid mounted signs can be found at: http://d2dtl5nnlpfr0r.cloudfront.net/tti.tamu.edu/documents/0-6782-2.pdf

The Contractor Force Account "Safety Contingency" that has been established for this project is intended to be utilized for work zone enhancements, to improve the effectiveness of the Traffic Control Plan, that could 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.

Temporary rumble strips will be required for traffic control at the Engineers discretion.

Center median and outside main lane sweeping operations will require a State approved sign at all entrance ramps. Frontage roads and ramps will require a State approved sign at all exit ramps during sweeping operations.

All lane closures are considered subsidiary to the various bid items.

All work and materials furnished with this item are subsidiary to the pertinent bid items except:

- Emergency lane closures payable under Item 500 6034
- Portable changeable message boards payable under Item 6001 6001
- Truck mounted attenuators payable under Item 6185 6002
- Law enforcement personnel payable under force account

Item 506: Temporary Erosion, Sedimentation and Environmental Controls

The use of hay bales is not permitted as Storm Water Pollution Prevention Plan (SWP3) measures.

The Storm Water Pollution Prevention Plan (SWP3) consists of temporary erosion control measures needed and provided for under this Item. The disturbed area is less than one acre and use of erosion control measures is not anticipated. If physical conditions encountered at the job site require necessary controls, BMP installation, maintenance, and removal will be paid as extra work on a force account basis per Articles 4.4 and 9.7. Since the disturbed area is less than 5 acres, a "Notice of Intent" (NOI) is not required.

Use appropriate measures to prevent, minimize, and control the spill of hazardous materials in the construction staging area. Remove and dispose of materials in compliance with State and Federal laws.

Before starting construction, review with the Engineer the SWP3 used for temporary erosion control as outlined on the plans. Before construction, place the temporary erosion and sedimentation control features as shown on the SWP3.

Implement temporary and permanent erosion control measures to comply with the National Pollution Discharge Elimination System (NPDES) general permit under the Clean Water Act.

Before starting grading operations and during the project duration, place the temporary or permanent erosion control measures to prevent sediment from leaving the right of way.

Item 512: Portable Concrete Traffic Barrier

Transport Standard Height Portable Traffic Barriers (including JJ Hook and Safety Shape) used for traffic handling from the Department stockpile located on the south side of IH 610 at Cedar Crest Blvd. (located across IH 610 from Long Drive).

Use only the J-J Hook type connection between barriers.

Where required by the Engineer, provide anchor pins for Type 2 Low Profile Concrete Barriers as shown on the current LPCB standard. Anchor pins are subsidiary to the Low Profile Concrete Barrier.

After completing the project, return Low Profile Concrete Barriers (LPCB) used for traffic handling, to the Department stockpile located on the north side of IH 610 at Long Drive. After completing the project, return the associated PTB connecting hardware to the area office or as directed.

After completing the project, return Standard Height Portable Traffic Barriers (including J-J Hook and Single Slope) used for traffic handling, to the Department stockpile located on the south side of at IH 610 at Cedar Crest Blvd. (located across IH 610 from Long Drive). After completing the project, return the associated connecting hardware to the area office or as directed.

After completing the project, Standard Height Safety Shape Portable Traffic Barriers used for traffic handling and the associated connecting hardware will become the property of the Contractor.

If placing the portable traffic barrier on pre-stressed concrete box beams with exposed reinforcing steel, protect the reinforcing steel by supporting the portable traffic barrier on 4 in. by 4 in. timbers. Place the timbers transversely and space them on 4 ft. centers. The cost of the labor and materials to perform this work are subsidiary to the Item, "Portable Traffic Barrier."

Item 529: Concrete Curb, Gutter, and Combined Curb and Gutter

An air-entraining admixture is not required.

For concrete curbs, use Grade 7 aggregate conforming to Section 421.2.6 of the Item, "Hydraulic Cement Concrete."

For driveways and turnouts, coarse aggregate Grade No. 3 through No. 8 conforming to the gradation requirements specified in the Item, "Hydraulic Cement Concrete" will be permitted.

For reinforcing steel in sidewalks and pedestrian ramps, use No. 4 bars at a maximum 18 in. spacing center-to-center in both directions.

Item 540: Metal Beam Guard Fence

Painting the timber posts is not required.

Use timber posts for galvanized steel metal beam guard fence, except for anchorage at turned down ends.

Furnish and install wood blocks between the rail elements and the timber posts as detailed on the plans. These block-outs are subsidiary to this bid Item.

The quantity of the metal beam guard fence is subject to change.

Provide a mow strip as shown on the plans, at metal beam guard fence locations, including any guardrail end treatments.

Galvanize the rail elements supplied for this project by using a Type II Zinc Coating.

At locations requiring attachment of Metal Beam Guard Fence (MBGF) to concrete railing or concrete traffic barrier, repair and fill any existing holes in the railing or barrier that are not in the correct location for attaching the new MBGF. Perform this work in accordance with the Item, "Concrete Structure Repair." Existing anchor bolt holes that cannot be utilized must be filled with an epoxy grout before drilling new holes. Then core-drill new holes in the correct locations and repair any resulting spalls at no expense to the Department. This work is considered subsidiary to the MBGF transition section (Item 540).

Item 545: Crash Cushion Attenuators

After completing the project, return remaining unused crash cushion attenuators units to the Area Office Maintenance yard or as directed, at no cost to the Department.

Unless otherwise shown on the plans, Test Level 70 is required for all temporary and permanent Crash Cushion Attenuator (CCA) installations on freeways where the backup support width is 36 in. or less. Test Level TL-3 is required for all temporary and permanent CCA installations at all other locations requiring a CCA.

Removal of existing crash cushions attenuators units is incidental. Once salvageable units are removed, they shall be delivered to the Area Office Maintenance yard as directed, at no cost to the Department.

SGT systems, guardrail and crash attenuator damage shall be secured within 4 hours of notification during normal work hours. Securing of the site shall be incidental.

Repairs shall be made within 48 hours of notification.

A MASH compliant crash cushion attenuator is required for every temporary and permanent installation.

Item 636: Signs

Include aluminum rout markers, exit only panels, routing sigs, and other special panels attached to guide signs in the unit bid price for the parent guide sign material

The lengths of the posts for ground mounted signs and tower legs for the overhead sign supports are approximate. Verify the lengths before ordering these materials to meet the existing field conditions and to conform to the minimum sigh mounting heights shown in the plans.

Furnish aluminum Type A sigs instead of plywood signs for signs on the Summary of Small Sign sheet.

STOP signs and YIELD signs shall be repaired within 2 hours of notification DO NOT ENTER and WRONG WAY signs shall be repaired within 24 hours of notification. All other regulatory signs shall be repaired within 48 hours of notification. WARNING sighs shall be repaired within 48 hours of notification. GUIDE signs shall be repaired within 7 days of notification.

SMALL SIGNS/TYPE OF DAMAGE	USE BID CODES(S)
Sign down and/or loose - no damage	6044-6001
Sign damaged, post and/or foundation damage	6044-6002
Sign damaged, post and/or foundation damage	6044-6002 and 636-6001
Sign damaged/Faded, post and/or foundation good	636-6001

LARGE SIGNS/TYPE OF	USE BID CODE(S)
Sign down and /or loose - no damage	6043-6001
Sign damaged/Faded, post and/or foundation good	636-6002
Overhead sign damaged or faded	636-6003

Item 666: Reflectorized Pavement Markings (See Item 668)
Item 668: Prefabricated Pavement Markings

Use Type III glass beads for thermoplastic and multipolymer pavement markings.

Use a 0.100 in. (100 mil) thickness for thermoplastic pavement markings, measured to the top of the thermoplastic, not including the exposed glass beads.

Use a 0.022 in. (22 mil) thickness for multipolymer pavement markings, measured to the top of the multipolymer, not including the exposed glass beads.

For roadways with asphalt surfaces to be striped with work zone or permanent thermoplastic markings, the Contractor has the option to apply paint and beads markings for a maximum 30-day period until placing the thermoplastic markings, or until starting the succeeding phase of work on the striped area. Maintain the paint and beads markings, at no expense to the Department, until placing the thermoplastic

markings or starting the succeeding phase of work on the striped area. The work zone markings, whether paint and beads or thermoplastic, are paid under the Item, "Work Zone Pavement Markings" and the markings are paid for only once for the given phase of construction.

If using paint and bead markings as described above, purchase the traffic paint from the open market.

If the Type II markings become dirty and require cleaning by washing, brushing, compressed air, or other approved methods before applying the Type I thermoplastic markings, this additional cleaning is subsidiary to the Item, "Reflectorized Pavement Markings."

Establish the alignment and layout for work zone striping and permanent striping.

Stripe all roadways before opening them to traffic.

Place pavement markings under these items in accordance with details shown on the plans, the latest "Texas Manual on Uniform Traffic Control Devices," or as directed.

When design details are not shown on the plans, provide pavement markings for arrows, words, and symbols conforming to the latest "Standard Highway Sign Designs for Texas" manual.

Place the pedestrian crosswalk pavement markings only after the pedestrian signals and push buttons are installed and operating.

Retro Reflectivity testing is required for all Site Specific projects and all call out work order.

Words are paid by each word and number respectively and not by letter or digit.

Item 672: Raised Pavement Markers

If other operations are complete on the project and if the curing time period is not yet elapsed, the contract time will be suspended until the curing is done.

Before placing the raised pavement markers on concrete pavement, blast clean the surface using an abrasive-blasting medium. This work is subsidiary to the Item, "Raised Pavement Markers."

Provide epoxy adhesive that is machine-mixed or nozzle-mixed and dispensed. Equip the machine or nozzle with a mechanism to ensure positive mix measurement control.

Item 677: Eliminating Existing Pavement Markings and Markers

Remove existing pavement markings on concrete or asphalt surfaces by flail milling or as directed.

Item 678: Pavement Surface Preparation for Markings

Do not blast clean asphalt concrete pavement. Clean asphalt concrete pavement as required under the applicable specifications or as directed.

On new concrete pavement or on existing concrete pavement when placing a new stripe on a new location, remove the curing compounds and contamination from the pavement surface by flail milling or as directed. In addition, air-blast the surface with compressed air just before placing the new stripe.

On existing concrete pavement when placing a new stripe on an existing location, after removing the existing stripe under the Item, "Eliminating Existing Pavement Markings and Markers," air-blast the surface with compressed air just before placing the new stripe.

Perform air blasting with a compressor that is capable of generating air at a minimum of 100 psi using 5/16 or larger hosing for the air blast (equipment should have sufficient capacity to remove contaminants but not damage the pavement surface).

Do not clean concrete pavement by grinding.

Item 721 Fiber Reinforced Patching Materials

Production quantity will be required in writing at the end of each working day.

The color of the patching material must match with existing roadway. The Contractor cannot start the job until an agreement is made between the Area Engineer and the Contractor as to the color of the material.

Removal of unsound concrete will not be paid for directly and will be considered subsidiary to the bid item.

Item 730: Roadside Mowing

Outfall ditches will be mowed and will be paid for under Full Width Mowing.

Time charges will be suspended between mowing cycles.

The Contractor will be given written notification of when to begin mowing each cycle. Within the written notification, the specified areas (tracts) to be mowed, number of acres required for the mowing cycle, the number of working days allowed to complete the mowing cycle, and the date when the time charges for that mowing cycle to begin will be given. The Area Engineer may, at his/her discretion, reduce or alter the limits of each cycle.

> ***Mowing on this contract will be completed in increments known as a cycle. A cycle is defined as a group of mowing tracts or areas that must be completed one time within the time period specified herein.***

Provide adequate equipment meeting all requirements, to average 75 acres per day for Full Width Mowing. The State will inspect the equipment to ensure that all mowers are adjusted properly for the correct mowing heights and meet all safety requirements prior to beginning mowing operations and at any time during the contract period.

Adjust mowers for cutting heights of approximately 5-7 in. or as directed. Trim around all poles, signs, trees and other appurtenances located with the R.O.W. hand trimming is required; cut and/or trim the grass to the heights of 7 inches.

Complete hand trimming on each roadway within 24 hr. of mowing. Ensure trees and shrubs are not damaged.

Avoid mowing over large items of litter. On roads where the mowing cycles coincides with the litter pickup cycle, cooperate with others to avoid mowing of litter as directed. Contractor shall direct all coordination of these activities. Delays may occur to allow the litter pickup to advance ahead of mowers.

In addition to debris removal, mud that is tracked or dragged onto the roadway by mowers shall be removed immediately.

Areas with minimal to no access for equipment. Therefore, these areas shall be maintained via handwork.

Item 734: Litter Removal

Pickup whole tires and dispose of as directed at the maintenance office indicated above. Once work has started on an item, proceed in a timely manner until all work is complete on that item, unless otherwise directed.

Provide a litter crew capable of completing each area/cycle twice a month.

Weekend work will not be allowed unless approved by the Area Engineer.

Correct discrepancies pointed out by the Department within 24 hours or as set forth in the Conflict Resolution Schedule.

The limits of each cycle will be defined on the Summary of Locations and Quantities sheet located in the plans. The Engineer may, at his/her discretion, reduce or alter the limits as shown in this contract.

The Contractor shall provide a schedule for all areas of Litter Pickup and Removal at the beginning of each month.

Item 738: Cleaning and Sweeping Highways

Sweeping and Debris dumpsters must be removed off the State Rght of Way by Friday at 4:00 p.m.

Sweeping of the main lanes including the entrance/exit ramps and direct connectors will be performed three times a month. Frontage Roads sweeping will be performed twice a month.

Provide a minimum of 2 (two) fully operational sweepers, equip the debris transport vehicles with some type of device to prevent accumulated debris from being strewn along roadway. Debris removal is incidental to Item 738 Cleaning and Sweeping Highways.

The Contractor shall provide the schedule for all roadways to be cleaned and swept, including the cleaning of drain slots. Alterations of this schedule will be as directed.

Night and weekend work will not be allowed unless approved by the Area Engineer.

The limits of each cycle will be as defined on the Summary of Locations and Quantities sheet located in the plans. The Engineer may, at his/her discretion, reduce or alter the limits as shown in this contract.

Pick up all whole tires and tire fragments which become the property of the Contractor. Do not dispose of tires on State right of way.

On all sweeping operations where the Contractor's personnel, vehicles and/or equipment are exposed to direct traffic, TMA with arrow boards will be required as shadow vehicles.

Debris is defined as trash, garbage or refuse and includes but is not limited to all scrap tires, rubber products (including whole tires), rags, paper, wood, glass, mattresses, scrap metals, furniture and auto parts. Remove all debris from the designated areas to the satisfaction of the Engineer. Debris removal is incidental to Item 738 Cleaning and Sweeping Highways.

In the event that aggregate is placed on roadways as part of a deicing operation, the Contractor will be required to remove all aggregate from the roadway. This work will be considered incidental to the Item "Cleaning and Sweeping Highways".

The emergency response time for the Item 738, “Spot Sweeping,” will be 2 hours after verbal notice.

In the event that a cycle may not be completed due to construction activities, the Engineer may direct partial payment to be paid. Prorate the amount paid based on the amount of work (lane mile cleaned and swept) completed on the subject cycle. No additional monetary compensation is due to the Contractor when this occurs.

Any "Concrete Traffic Barrier" (CTB), T5 or T501 rail with drain openings or weep holes will be cleaned quarterly and as directed. Blading will be required behind the CTB after debris, dirt or grass are removed from drain openings or weep holes.

The Handwork areas include bull pens, cross walks, islands, slopes, U-turns, drain slots, concrete flumes, and riprap and other areas as directed.

Make ready item must be performed and completed within 60 days of the date time charges begin. This item of work will not be paid until all debris have been removed and disposed at the approved site.

Sweeping and debris schedule will continue while the make ready item is performed. Additional crews will be required to insure there is no delay in the sweeping and debris operations.

Following the make ready item cleaning of raised pavement markers, barrier drain slots, slotted drains, inlet openings, and areas adjacent to attenuators and guardrail supports will be cleaned according to the schedule in the plans and are subsidiary to Debris Removal and Cleaning and Sweeping. Failure to complete the items on the work order including completing subsidiary items will result in LD being assessed.

Item 730: Roadside Mowing (See Item 738 below)
Item 734: Litter Removal (See Item 738 below)
Item 735: Debris Removal (See Item 738 below)
Item 738: Cleaning and Sweeping Highways

Mow areas of existing vegetation, collect and dispose of litter, and sweep the roadway within the project limits according to the following chart for the duration of the project or as directed. This work is paid for under their respective bid items.

Roadside Mowing	Litter Removal	Debris Removal	Cleaning and Sweeping Highways
8 cycles	48 cycles	*24* cycles	*48* cycles

Spot Mowing, Litter Removal (spot), Debris Removal (spot), and Cleaning/Sweeping (spot) will be used in work orders, and emergency callouts. All will be used as needed.

Item 740: Graffiti Removal and Anti-Graffiti Coating

Anti-Graffiti Coating will be “Clear” in color on exposed aggregate surfaces.

Repairs of a sensitive nature to the general public will begin within a 2 hours notification and will be considered emergency call out.

When painting over graffiti on a concrete or metal surface match the color of the existing surface and texture. Paint the treated area to blend with the appearance over the entire surface area.

Item 752: Tree and Brush Removal

Obtain approval prior to storing equipment on State property. Vehicles used in transporting underbrush or chip must be equipped with some type of device that prevents the accumulated debris from being strewn along the roadway, Equipment must be equipped with safety warning lights.

For trees that are on private property but have fallen onto the right of way, cut trees off at the right of way line and remove only the part on the right of way. For trees that were on the right of way but have fallen onto private property, the Provider will be responsible for securing permission from the landowner to enter the property and remove all debris.

Where approved chip tree and brush debris to a maximum size of 1 inch thick may be spread out to provide a uniformed appearance to a maximum total depth of 4 inches. Do not obstruct drainage when spreading chips on the right of way.

Any diseased or infected trees will be disposed of as directed. Diseased and/or infected vegetation removed under this contract will be isolated from all other vegetation, so as not to spread disease. Diseased vegetation from the right of way will be disposed of in an approved manner.

The Provider will be responsible for repairs to any roadway or roadside environment damaged during tree removal operations, at the Providers sole expense.

Exercise caution whenever working near any utilities, such as telephone or power lines.

Item 764: Pump Station and Drainage System Cleaning

Follow confined space procedures as outlined in OSHA Standard 29 CFR 1910.146. Provide a copy of the entry permit at the work site whenever entering a confined workspace.

The Contractor will supply all pipe plugs to stop any flow as needed. This work is subsidiary to Item 764.

Remove and replace culvert grates. Bolting and unbolting is subsidiary to Item 764. The State will furnish nuts, bolts, and washers, as replacements for those that are no longer usable.

Remove and dispose of all debris, dirt, silt, litter, lumber, auto parts, paper, grass clippings, etc. from the designated area.

Have tested, debris or wash water removed that smells of volatiles or shows signs of environmental contamination by an approved laboratory. For material testing positive for contamination, provide written receipts showing disposal at licensed disposal facilities.

The Department will verify and note daily in the project diary prior to any work, the vactor truck is clean and empty. A small amount of normal wash in the tank will be permitted.

A list of water availability at the work site may be requested for records.

Item 770: Guard Fence Repair

Object markers will be incidental to the various bid items.

All new holes for guardrail connections to any concrete structure (wingwalls, CTB, etc.) which require drilling will be considered subsidiary to the various bid items. This will include holes required when raising or upgrading guardrail.

For purposes of guardrail post replacement, a mowing strip is considered a foundation. When replacing posts, replace a damaged mow strip with a matching new one. Supply all materials used to repair mow strips. Mow strip repair requires repairing the leave out as shown on the plans. This work is subsidiary to the various bid items.

Furnish a welding unit and a cutting torch, with competent operators, each day of work.

Provided the work is available and weather permitting, satisfactory prosecution of the work will be based on each crew placing not less than 20 posts and 250 feet of railing or fence in any one day's period.

If in the opinion of the Engineer, a terminal anchor post is beyond repair, replace the entire terminal anchor in accordance with the standard detail sheet.

Removing and replacing reusable items for the Contractor's convenience will not be paid for directly, but will be incidental to the various bid items. An example is when an undamaged section of rail is removed from the post and set on the ground in order to make a repair to damaged post or another damaged item. In this case the rail is not damaged and is to be reused at this same location; therefore it will not be paid for because no repair was done to the rail.

When repairing damaged rail in the center median, repairing and/ or replacing (6") channel rail will not be paid for directly, but will be considered incidental to the various bid items.

Item 774: Attenuator Repair

Repairs shall be made within 48 hour of notification.

Make repairs and installations in accordance with the manufacturer's instructions and recommendations.

All damaged material not reusable will become the property of the Contractor or, as directed.

Measurement for the Repair of (Energy Absorbing System) will be made by each bay complete in place.

Repair of (Quad Guard Narrow Bay) System will consist of repairing each damaged bay. Removing and replacing reusable items for the Contractor's convenience will not be paid for directly, but will be incidental to the bid items.

Item 785: Bridge Joint Repair

Contractor shall verify actual joint conditions and bridge configuration prior to beginning work. The conditions and configurations of existing joints may be different than what is shown.

Along the length of sealed expansion joint section to be repaired, saw cut and remove a 2-ft wide section of the concrete deck on the abutment side and replace in accordance with Item 429, "Concrete Structure Repair." Due to lane closure time constraints, the use of Calcium Aluminate Cement (CAC) concrete is a permissible option for this repair. Concrete deck removal and replacement will not be paid for directly and is subsidiary to Item 785-6011, "Bridge Joint Replacement (SEJ)."

The portion of the steel rail that extends into the concrete barrier or curb may be left in place if intact. Expose, clean and salvage existing steel reinforcement.

Item 4003-6001 type CAC Concrete

Contractor shall provide CAC or an alternate mix design that can achieve the required strength. Such alternate design must be submitted by the Contractor and approved by the Area Engineer.

Item 6185: Truck Mounted Attenuator (TMA) and Trailer Attenuator (TA)

A shadow vehicle with Truck Mounted Attenuators (TMAs) or Trailer Attenuators (TAs) is required as shown on the appropriate Traffic Control Plan (TCP) sheets. TMAs/TAs must meet the requirements of the Compliant Work Zone Traffic Control Device List.

Level 3 Compliant TMAs/TAs are required for this project.

A total of one (1) shadow vehicle with a TMA/TA is required for the work with the exception of Pavement Marking Operations. The Contractor is 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 on the project.

A total of three (3) shadow vehicles with a TMA/TA are required for Pavement Marking Operations. The Contractor is 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 on the project.

Item 6043: Repair, Replace and Relocate Large Signs & Support Assemblies

The lengths of the posts for ground mounted signs and the tower legs for the overhead sign supports are approximate. Verify the lengths before ordering these materials to meet the existing field conditions and to conform to the minimum sign mounting heights shown in the plans.

Repair will include stubs, posts, signs, sign supports and other components to complete the assembly. In all instances, match existing materials.

Item 6044: Repair, Replace and Relocate Small Signs & Support Assemblies

Repair will include stubs, posts, signs, sign supports and other components to complete the assembly. In all instances, match existing materials.

Item 7093: Snow and Ice Control

Contractor shall have the following equipment available (on standby) during the month of December, January and February:

Truck with V Box – 6 each

Shadow Vehicle – 6 each (additional TMAs may be required if sanding and spraying operations are simultaneous at different locations.

Loader – 1 each

Spray Rig – 6 each (minimum 500 gallon units) (if unit can cover 2 lanes or more then only 3 each spray rigs will be required versus 6 each).

Contractor shall ensure that the quantity of such vehicles is sufficient to service the entire area in this contract.

De-icing brine shall be applied approximately every 2 hours. Contractor shall have sufficient manpower to operate for multiple days.

2 locations for brine:
TxDOT Southeast Harris Area Office
702 FM 1959
Houston, TX 77034

TxDOT Galveston Co. Area Office
5407 Gulf Freeway
La Marque, TX 77568

Or as directed

Contractor shall provide a pump (minimum 2”), with connections, at the location as directed for brine. Pump shall be available for TxDOT use also. Pump is subsidiary to this item. Contractor may be required to load TxDOT sand trucks at stockpile locations.

Failure to respond within the designated time as stated in the Special Specification will result in a penalty of $16,000 per hour assessed to the Contractor until all required equipment and personnel have been deployed.

Basis of Estimate

Item	Description	Limit and Rate	Unit
150	Blading	1 Hr. / Station	HR

QUANTITY SHEET

CONTROLLING PROJECT ID 6375-52-001 **DISTRICT** Houston **COUNTY** Harris
HIGHWAY IH0045

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**6375-52-001**			
		PROJECT ID		**A00139431**			
		COUNTY		**Harris**			
		HIGHWAY		**IH0045**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	104-6021	REMOVING CONC (CURB)	LF	100.000		100.000	
	104-6023	REMOVING CONC (CTB)	LF	60.000		60.000	
	150-6001	BLADING	STA	100.000		100.000	
	150-6003	BLADING	LF	1,000.000		1,000.000	
	351-6002	FLEXIBLE PAVEMENT STRUCTURE REPAIR(6")	SY	100.000		100.000	
	351-6012	FLEXIBLE PAVEMENT STRUCTURE REPAIR(2")	SY	10,000.000		10,000.000	
	351-6013	FLEXIBLE PAVEMENT STRUCTURE REPAIR(4")	SY	10,000.000		10,000.000	
	351-6043	FLEX PAVEMENT STRUCTURE REPAIR (7"-13")	SY	100.000		100.000	
	361-6004	FULL - DEPTH REPAIR CRCP (10")	SY	1,500.000		1,500.000	
	361-6006	FULL - DEPTH REPAIR CRCP (12")	SY	500.000		500.000	
	361-6008	FULL - DEPTH REPAIR CRCP (14")	SY	200.000		200.000	
	361-6051	FULL-DPTH REP(BR APPROACH SLAB)(9"-13")	SY	500.000		500.000	
	416-6016	DRILL SHAFT (SIGN MTS) (12 IN)	LF	100.000		100.000	
	416-6018	DRILL SHAFT (SIGN MTS) (24 IN)	LF	75.000		75.000	
	429-6003	CONC STR REPAIR(DECK REP(PART DEPTH))	SF	50.000		50.000	
	429-6005	CONC STR REPAIR(DECK REP (FULL DEPTH))	SF	50.000		50.000	
	432-6046	RIPRAP (MOW STRIP)(5 IN)	CY	10.000		10.000	
	438-6001	CLEANING AND SEALING EXISTING JOINTS	LF	500.000		500.000	
	500-6033	MOBILIZATION (CALLOUT)	EA	48.000		48.000	
	500-6034	MOBILIZATION (EMERGENCY)	EA	12.000		12.000	
	512-6063	PORT CTB (MOVE) (SAFETY SH) (TY 2)	LF	120.000		120.000	
	512-6064	PORT CTB (REMOVE) (SAFETY SH) (TY 2)	LF	30.000		30.000	
	512-6065	PORT CTB (DES SOURCE) (SAFETY SH)(TY 2)	LF	30.000		30.000	
	529-6010	CONC CURB (U-TURN)	LF	200.000		200.000	
	529-6011	CONC CURB (DOWEL)	LF	100.000		100.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	2.000		2.000	
	540-6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	10.000		10.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	1.000		1.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA	1.000		1.000	
	545-6002	CRASH CUSH ATTEN (DES SOURCE)	EA	1.000		1.000	
	545-6004	CRASH CUSH ATTEN (STKPL)	EA	1.000		1.000	
	545-6005	CRASH CUSH ATTEN (REMOVE)	EA	1.000		1.000	
	550-6001	CHAIN LINK FENCE (INSTALL) (6')	LF	20.000		20.000	
	550-6002	CHAIN LINK FENCE (REPAIR) (6')	LF	20.000		20.000	
	550-6004	GATE (INSTALL) (DOUBLE) (6' X 14')	EA	1.000		1.000	
	636-6001	ALUMINUM SIGNS (TY A)	SF	300.000		300.000	
	636-6002	ALUMINUM SIGNS (TY G)	SF	200.000		200.000	

QUANTITY SHEET

CONTROLLING PROJECT ID 6375-52-001 **DISTRICT** Houston **COUNTY** Harris
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						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**6375-52-001**			
		PROJECT ID		**A00139431**			
		COUNTY		**Harris**			
		HIGHWAY		**IH0045**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	636-6003	ALUMINUM SIGNS (TY O)	SF	30.000		30.000	
	658-6013	INSTL DEL ASSM (D-SW)SZ (BRF)CTB	EA	25.000		25.000	
	658-6014	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	EA	25.000		25.000	
	658-6018	INSTL DEL ASSM (D-SY)SZ 1(FLX)GND	EA	25.000		25.000	
	658-6026	INSTL DEL ASSM (D-SY)SZ (BRF)CTB	EA	25.000		25.000	
	658-6027	INSTL DEL ASSM (D-SY)SZ (BRF)CTB (BI)	EA	25.000		25.000	
	658-6060	REMOVE DELIN & OBJECT MARKER ASSMS	EA	10.000		10.000	
	658-6061	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	EA	10.000		10.000	
	666-6018	REFL PAV MRK TY I (W)6"(DOT)(100MIL)	LF	100.000		100.000	
	666-6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	5,000.000		5,000.000	
	666-6042	REFL PAV MRK TY I (W)12"(SLD)(100MIL)	LF	2,000.000		2,000.000	
	666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	1,000.000		1,000.000	
	666-6054	REFL PAV MRK TY I (W)(ARROW)(100MIL)	EA	10.000		10.000	
	666-6057	REFL PAV MRK TY I(W)(DBL ARROW)(100MIL)	EA	10.000		10.000	
	666-6060	REFL PAV MRK TY I(W)(TPL ARRW)(100MIL)	EA	1.000		1.000	
	666-6063	REFL PAV MRK TY I(W)(UTURN ARW)(100MIL)	EA	10.000		10.000	
	666-6078	REFL PAV MRK TY I (W)(WORD)(100MIL)	EA	25.000		25.000	
	666-6081	REFL PAV MRK TY I(W)(ENTR GORE)(100MIL)	EA	8.000		8.000	
	666-6084	REFL PAV MRK TY I(W)(EXIT GORE)(100MIL)	EA	8.000		8.000	
	666-6087	REFL PAV MRK TY I (W) (ISLAND) (100MIL)	SF	1.000		1.000	
	666-6090	REF PAV MRK TY I (W)(MED NOSE)(100MIL)	EA	10.000		10.000	
	666-6096	REFL PAV MRK TY I (W)(SYMBOL)(100MIL)	EA	1.000		1.000	
	666-6138	REFL PAV MRK TY I (Y)8"(SLD)(100MIL)	LF	1,000.000		1,000.000	
	666-6141	REFL PAV MRK TY I (Y)12"(SLD)(100MIL)	LF	100.000		100.000	
	666-6147	REFL PAV MRK TY I (Y)24"(SLD)(100MIL)	LF	50.000		50.000	
	666-6156	REFL PAV MRK TY I(Y)(MED NOSE)(100MIL)	EA	5.000		5.000	
	666-6162	RE PV MRK TY I(BLACK)6"(SHADOW)(100MIL)	LF	12,000.000		12,000.000	
	666-6225	PAVEMENT SEALER 6"	LF	36,000.000		36,000.000	
	666-6226	PAVEMENT SEALER 8"	LF	6,000.000		6,000.000	
	666-6228	PAVEMENT SEALER 12"	LF	2,000.000		2,000.000	
	666-6230	PAVEMENT SEALER 24"	LF	1,000.000		1,000.000	
	666-6231	PAVEMENT SEALER (ARROW)	EA	10.000		10.000	
	666-6232	PAVEMENT SEALER (WORD)	EA	25.000		25.000	
	666-6233	PAVEMENT SEALER (MED NOSE)	EA	10.000		10.000	
	666-6234	PAVEMENT SEALER (DBL ARROW)	EA	10.000		10.000	
	666-6235	PAVEMENT SEALER (TPL ARROW)	EA	1.000		1.000	
	666-6236	PAVEMENT SEALER (UTURN ARROW)	EA	10.000		10.000	

QUANTITY SHEET

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HIGHWAY IH0045

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**6375-52-001**			
		PROJECT ID		**A00139431**			
		COUNTY		**Harris**			
		HIGHWAY		**IH0045**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	666-6239	PAVEMENT SEALER (ENTR GORE)	EA	8.000		8.000	
	666-6240	PAVEMENT SEALER (EXIT GORE)	EA	8.000		8.000	
	666-6241	PAVEMENT SEALER (SYMBOL)	EA	1.000		1.000	
	666-6247	PAVEMENT SEALER (ISLAND)	SF	1.000		1.000	
	666-6248	PAVEMENT SEALER (NUMBER)	EA	1.000		1.000	
	666-6306	RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)	LF	12,000.000		12,000.000	
	666-6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	LF	20,000.000		20,000.000	
	666-6318	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	LF	500.000		500.000	
	666-6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	LF	20,000.000		20,000.000	
	668-6084	PREFAB PAV MRK TY C (W) (NUMBER)	EA	2.000		2.000	
	668-6085	PREFAB PAV MRK TY C (W) (WORD)	EA	2.000		2.000	
	672-6006	REFL PAV MRKR TY I-A	EA	25.000		25.000	
	672-6007	REFL PAV MRKR TY I-C	EA	100.000		100.000	
	672-6008	REFL PAV MRKR TY I-R	EA	100.000		100.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	100.000		100.000	
	672-6010	REFL PAV MRKR TY II-C-R	EA	1,000.000		1,000.000	
	677-6001	ELIM EXT PAV MRK & MRKS (4")	LF	100.000		100.000	
	677-6002	ELIM EXT PAV MRK & MRKS (6")	LF	1,042,500.000		1,042,500.000	
	677-6003	ELIM EXT PAV MRK & MRKS (8")	LF	315,000.000		315,000.000	
	677-6005	ELIM EXT PAV MRK & MRKS (12")	LF	16,000.000		16,000.000	
	677-6007	ELIM EXT PAV MRK & MRKS (24")	LF	2,100.000		2,100.000	
	677-6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	35.000		35.000	
	677-6009	ELIM EXT PAV MRK & MRKS (DBL ARROW)	EA	25.000		25.000	
	677-6010	ELIM EXT PAV MRK & MRKS (TPL ARROW)	EA	1.000		1.000	
	677-6012	ELIM EXT PAV MRK & MRKS (WORD)	EA	1.000		1.000	
	677-6013	ELIM EXT PAV MRK & MRKS (ENTR GORE)	EA	8.000		8.000	
	677-6014	ELIM EXT PAV MRK & MRKS (EXIT GORE)	EA	8.000		8.000	
	677-6016	ELIM EXT PAV MRK & MRKS (RR XING)	EA	1.000		1.000	
	677-6017	ELIM EXT PAV MRK & MRKS (SYMBOL)	EA	1.000		1.000	
	677-6020	ELIM EXT PAV MRK & MRKS (MED NOSE)	EA	10.000		10.000	
	677-6036	ELIM EXT PAV MRK & MRKS (UTURN ARROW)	EA	1.000		1.000	
	678-6002	PAV SURF PREP FOR MRK (6")	LF	1,042,500.000		1,042,500.000	
	678-6004	PAV SURF PREP FOR MRK (8")	LF	315,000.000		315,000.000	
	678-6006	PAV SURF PREP FOR MRK (12")	LF	7,000.000		7,000.000	
	678-6008	PAV SURF PREP FOR MRK (24")	LF	2,100.000		2,100.000	
	678-6009	PAV SURF PREP FOR MRK (ARROW)	EA	35.000		35.000	
	678-6010	PAV SURF PREP FOR MRK (DBL ARROW)	EA	25.000		25.000	

QUANTITY SHEET

CONTROLLING PROJECT ID 6375-52-001 **DISTRICT** Houston **COUNTY** Harris
HIGHWAY IH0045

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**6375-52-001**			
		PROJECT ID		**A00139431**			
		COUNTY		**Harris**			
		HIGHWAY		**IH0045**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	678-6011	PAV SURF PREP FOR MRK (TPL ARROW)	EA	1.000		1.000	
	678-6012	PAV SURF PREP FOR MRK (UTURN ARR)	EA	20.000		20.000	
	678-6015	PAV SURF PREP FOR MRK (NUMBER)	EA	2.000		2.000	
	678-6016	PAV SURF PREP FOR MRK (WORD)	EA	50.000		50.000	
	678-6017	PAV SURF PREP FOR MRK (ENTR GORE)	EA	8.000		8.000	
	678-6018	PAV SURF PREP FOR MRK (EXIT GORE)	EA	8.000		8.000	
	678-6021	PAV SURF PREP FOR MRK (SYMBOL)	EA	1.000		1.000	
	678-6024	PAV SURF PREP FOR MRK (MED NOSE)	EA	1.000		1.000	
	721-6002	FIBER REINFORCED POLYMER PATCHING MATLS	LB	10,000.000		10,000.000	
	730-6054	FULL - WIDTH MOWING - TRACT (1)	AC	2,552.000		2,552.000	
	730-6055	FULL - WIDTH MOWING - TRACT (2)	AC	1,008.000		1,008.000	
	730-6056	FULL - WIDTH MOWING - TRACT (3)	AC	4.000		4.000	
	730-6057	FULL - WIDTH MOWING - TRACT (4)	AC	16.800		16.800	
	730-6058	FULL - WIDTH MOWING - TRACT (5)	AC	24.000		24.000	
	730-6059	FULL - WIDTH MOWING - TRACT (6)	AC	15.200		15.200	
	731-6007	PAVEMENT EDGES, STRUCTURES & FIXTURES	MI	200.000		200.000	
	734-6003	LITTER REMOVAL (SPOT)	AC	4.000		4.000	
	734-6054	LITTER REMOVAL - TRACT (1)	CYC	48.000		48.000	
	734-6055	LITTER REMOVAL - TRACT (2)	CYC	48.000		48.000	
	735-6068	DEBRIS-CNTR MEDIANS/MAINLANES-AREA (1)	CYC	24.000		24.000	
	735-6069	DEBRIS-CNTR MEDIANS/MAINLANES-AREA (2)	CYC	24.000		24.000	
	735-6108	DEBRIS-ENTRANCE/EXIT RAMPS - AREA (1)	CYC	24.000		24.000	
	735-6109	DEBRIS-ENTRANCE/EXIT RAMPS - AREA (2)	CYC	24.000		24.000	
	735-6128	DEBRIS-DIRECT CONNECTOR - AREA (1)	CYC	24.000		24.000	
	735-6129	DEBRIS-DIRECT CONNECTOR - AREA (2)	CYC	24.000		24.000	
	738-6011	CLEANING / SWEEPING (HANDWORK)	SY	50,000.000		50,000.000	
	738-6094	CLEAN / SWEEP - CENTER MEDIAN - AREA(1)	CYC	48.000		48.000	
	738-6095	CLEAN / SWEEP - CENTER MEDIAN - AREA(2)	CYC	48.000		48.000	
	738-6114	CLEAN / SWEEP-OUTSIDE MAIN LANE-AREA(1)	CYC	48.000		48.000	
	738-6115	CLEAN / SWEEP-OUTSIDE MAIN LANE-AREA(2)	CYC	48.000		48.000	
	738-6134	CLEAN / SWEEP - FRONTAGE ROAD - AREA(1)	CYC	24.000		24.000	
	738-6135	CLEAN / SWEEP - FRONTAGE ROAD - AREA(2)	CYC	24.000		24.000	
	738-6154	CLEAN / SWEEP - (ENTR /EXT RMP)(AREA 1)	CYC	48.000		48.000	
	738-6155	CLEAN / SWEEP - (ENTR /EXT RMP)(AREA 2)	CYC	48.000		48.000	
	738-6174	CLEAN/SWEEPING-DIRECT CONNECT-AREA(1)	CYC	48.000		48.000	
	738-6175	CLEAN/SWEEPING-DIRECT CONNECT-AREA(2)	CYC	48.000		48.000	
	738-6358	MAKE READY: DRAIN SLOTS, BARRIER SLOTS	LS	1.000		1.000	

QUANTITY SHEET

CONTROLLING PROJECT ID 6375-52-001 **DISTRICT** Houston **COUNTY** Harris
HIGHWAY IH0045

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**6375-52-001**			
		PROJECT ID		**A00139431**			
		COUNTY		**Harris**			
		HIGHWAY		**IH0045**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	740-6002	GRAFFITI REMOVAL (PAINTING)	SF	50.000		50.000	
	752-6003	TREE TRIMMING / BRUSH REMOVAL	MI	10.000		10.000	
	752-6005	TREE REMOVAL (4" - 12" DIA)	EA	15.000		15.000	
	752-6006	TREE REMOVAL (12" - 18" DIA)	EA	15.000		15.000	
	752-6007	TREE REMOVAL (18" - 24" DIA)	EA	15.000		15.000	
	752-6008	TREE REMOVAL (24" - 30" DIA)	EA	15.000		15.000	
	752-6009	TREE REMOVAL (30" - 36" DIA)	EA	6.000		6.000	
	752-6010	TREE REMOVAL (36" - 42" DIA)	EA	6.000		6.000	
	752-6011	TREE REMOVAL (42" - 48" DIA)	EA	6.000		6.000	
	764-6001	DRAIN INLET CLEANING	EA	800.000		800.000	
	764-6002	PUMP STATION WELL CLEANING	EA	1.000		1.000	
	764-6003	BASKET AND INLET PIPE CLEANING	EA	2.000		2.000	
	764-6004	DOWNSPOUT CLEANING	EA	1.000		1.000	
	764-6005	SUMP CLEANING	EA	1.000		1.000	
	764-6006	STORM SEWER CLEANING (PIPE) (<12" DIA)	LF	300.000		300.000	
	764-6007	STORM SEWER CLEANING (PIPE)(12"-18"DIA)	LF	15,000.000		15,000.000	
	764-6008	STORM SEWER CLEANING (PIPE)(19"-24"DIA)	LF	45,000.000		45,000.000	
	764-6009	STORM SEWER CLEANING (PIPE)(25"-30"DIA)	LF	7,500.000		7,500.000	
	764-6010	STORM SEWER CLEANING (PIPE)(31"-36"DIA)	LF	1,000.000		1,000.000	
	764-6011	STORM SEWER CLEANING (PIPE)(37"-42"DIA)	LF	30.000		30.000	
	764-6012	STORM SEWER CLEANING (PIPE)(43"-54"DIA)	LF	30.000		30.000	
	764-6013	STORM SEWER CLEANING (PIPE)(55"-74"DIA)	LF	30.000		30.000	
	764-6014	STORM SEWER CLEANING (PIPE)(75"-96"DIA)	LF	30.000		30.000	
	764-6015	STORM SEWER CLEAN (BOX CULV) (<6 SF)	LF	100.000		100.000	
	764-6016	STORM SEWER CLEAN (BOX CULV) (6-<12 SF)	LF	100.000		100.000	
	764-6017	STORM SEWER CLEAN (BOX CULV)(12-<24 SF)	LF	100.000		100.000	
	764-6018	STORM SEWER CLEAN (BOX CULV)(24-<48 SF)	LF	1,000.000		1,000.000	
	764-6019	STORM SEWER CLEAN (BOX CULV)(48-<96 SF)	LF	100.000		100.000	
	764-6020	STORM SEWER CLEAN (BOX CULV) (>96 SF)	LF	25.000		25.000	
	764-6021	SLOTTED DRAIN CLEANING	LF	25.000		25.000	
	770-6001	REPAIR RAIL ELEMENT (W - BEAM)	LF	5,000.000		5,000.000	
	770-6002	REPAIR RAIL ELEMENT (THRIE - BEAM)	LF	3.000		3.000	
	770-6003	REP RAIL ELMNT(THRIE-BM TRANS TO W -BM)	LF	3.000		3.000	
	770-6006	RAISE RAIL ELEMENT	LF	500.000		500.000	
	770-6010	REM / REPL TIMBER/STL POST W/O CONC FND	EA	200.000		200.000	
	770-6011	REM / REPL TIMBER / STL POST W/CONC FND	EA	150.000		150.000	
	770-6016	REPAIR STEEL POST WITH BASE PLATE	EA	3.000		3.000	

QUANTITY SHEET

CONTROLLING PROJECT ID 6375-52-001 **DISTRICT** Houston **COUNTY** Harris
HIGHWAY IH0045

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**6375-52-001**			
		PROJECT ID		**A00139431**			
		COUNTY		**Harris**			
		HIGHWAY		**IH0045**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	770-6017	REALIGN POSTS	EA	200.000		200.000	
	770-6021	REPLACE SINGLE GDRAIL TERMINAL RAIL	LF	3,000.000		3,000.000	
	770-6022	REPLACE SINGLE GDRAIL TERMINAL POST	EA	500.000		500.000	
	770-6027	REMOVE GDRAIL END TRT / REPL WITH SGT	EA	5.000		5.000	
	770-6028	REPL SINGLE GDRAIL TERM IMPACT HEAD	EA	75.000		75.000	
	770-6029	REM & RESET SGT IMPACT HEAD	EA	50.000		50.000	
	770-6030	REPLACE SGT CABLE ASSEMBLY	EA	35.000		35.000	
	770-6031	REPLACE SGT CABLE ANCHOR	EA	35.000		35.000	
	770-6032	REPLACE SGT STRUT	EA	25.000		25.000	
	770-6033	REPLACE SGT OBJECT MARKER	EA	5.000		5.000	
	770-6052	REPAIR STEEL POST WITH BASE PLATE	EA	3.000		3.000	
	774-6003	REMOVE AND REPLACE (NARROW REACT 350)	EA	1.000		1.000	
	774-6004	REMOVE AND REPLACE (WIDE REACT 350)	EA	1.000		1.000	
	774-6006	REPAIR (TRACC)	EA	3.000		3.000	
	774-6008	REPAIR (WIDE TRACC)	EA	1.000		1.000	
	774-6011	REPAIR (CATCB - FRNT SECT)	EA	1.000		1.000	
	774-6012	REPAIR (CATCB - REAR SECT)	EA	1.000		1.000	
	774-6017	REPAIR (WIDE QUAD)	EA	1.000		1.000	
	774-6023	REPAIR REACT (N) (MISC HARDWARE)	EA	7.000		7.000	
	774-6024	REPAIR REACT (N) (REAR SEC "S")	EA	3.000		3.000	
	774-6025	REPAIR REACT (N) (REAR SEC "B")	EA	2.000		2.000	
	774-6026	REPAIR REACT (N) (FRONT SECTION)	EA	2.000		2.000	
	774-6027	REPAIR REACT (N) (CYLINDERS)	EA	2.000		2.000	
	774-6035	REPAIR REACT (CYLINDERS)	EA	5.000		5.000	
	774-6036	REPAIR REACT (W) (MISC) (HARDWARE)	EA	8.000		8.000	
	774-6037	REPAIR REACT (W) (CYLINDERS)	EA	8.000		8.000	
	774-6065	REPAIR TAU II (N) (MISC HARDWARE)	EA	3.000		3.000	
	774-6066	REPAIR TAU II (N)	LF	35.000		35.000	
	774-6067	REPAIR TAU II (W)	LF	5.000		5.000	
	774-6078	REPAIR TAU II (W) (MISC HARDWARE)	EA	1.000		1.000	
	774-6080	REMOVE & REPLACE REACT 350(TXDOT FRNSH)	EA	1.000		1.000	
	776-6009	REPAIR (STL PIPE PEDESTRIAN RAIL - PR1)	LF	15.000		15.000	
	776-6010	REPAIR (STL PIPE PED RAILW/PARAPET-PR2)	LF	15.000		15.000	
	785-6011	BRIDGE JOINT REPLACEMENT (SEJ)	LF	50.000		50.000	
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	75.000		75.000	
	6043-6001	REPAIR LG RDSD SIGN SUPT & ASSEMBLIES	EA	50.000		50.000	
	6044-6001	REPAIR SMALL RDSD SIGN SUPT & ASSEM	EA	200.000		200.000	

QUANTITY SHEET

CONTROLLING PROJECT ID 6375-52-001 **DISTRICT** Houston **COUNTY** Harris
HIGHWAY IH0045

			CONTROL SECTION JOB	**6375-52-001**		TOTAL EST.	TOTAL FINAL
			PROJECT ID	**A00139431**			
			COUNTY	**Harris**			
			HIGHWAY	**IH0045**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	6044-6002	RELOC SMALL RDSD SIGN SUPT & ASSEM	EA	10.000		10.000	
	6185-6002	TMA (STATIONARY)	DAY	200.000		200.000	
	6185-6003	TMA (MOBILE OPERATION)	HR	2,000.000		2,000.000	
	7019-6001	STORM SEWER (TELEVISION INSPECTION)	LF	25.000		25.000	
	7093-6001	SNOW AND ICE CONTROL (TRUCK)	HR	100.000		100.000	
	7093-6002	SNOW AND ICE CONTROL (SHADOW VEHICLE)	HR	400.000		400.000	
	7093-6003	SNOW AND ICE CONTROL (LOADER)	HR	25.000		25.000	
	7093-6004	SNOW AND ICE CONTROL (SEASON)	MO	6.000		6.000	
	7093-6005	SNOW AND ICE CONTROL (SPRAY RIG)	HR	500.000		500.000	

TRAFFIC CONTROL			
ITEM	DESCRIPTIONS	UNIT	QUANTITIES
500 6033	MOBILIZATION (CALLOUT)	EA	48
500 6034	MOBILIZATION (EMERGENCY)	EA	12
6001 6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	75
6185 6001	TMA (STATIONARY)	EA	200
6185 6002	TMA (MOBILE OPERATION)	DAY	2000
PAVEMENT			
351 6002	FLEXIBLE PAVEMENT STRUCTURE REPAIR(6")	SY	100
351 6012	FLEXIBLE PAVEMENT STRUCTURE REPAIR(2")	SY	10000
351 6013	FLEXIBLE PAVEMENT STRUCTURE REPAIR(4")	SY	10000
351 6043	FLEX PAVEMENT STRUCTURE REPAIR (7"-13")	SY	100
361 6004	FULL - DEPTH REPAIR CRCP (10")	SY	1500
361 6006	FULL - DEPTH REPAIR CRCP (12")	SY	500
361 6008	FULL - DEPTH REPAIR CRCP (14")	SY	200
361 6051	FULL-DPTH REP(BR APPROACH SLAB)(9"-13"	SY	500
700 6001	POTHOLE REPAIR (STANDARD)	SY	100
END TREATMENTS			
774 6003	REMOVE AND REPLACE (NARROW REACT 350)	EA	1
774 6004	REMOVE AND REPLACE (WIDE REACT 350)	EA	1
774 6006	REPAIR (TRACC)	EA	3
774 6008	REPAIR (WIDE TRACC)	EA	1
774 6011	REPAIR (CATCB - FRNT SECT)	EA	1
774 6012	REPAIR (CATCB - REAR SECT)	EA	1
774 6017	REPAIR (WIDE QUAD)	EA	1
774 6023	REPAIR REACT (N) (MISC HARDWARE)	EA	7
774 6024	REPAIR REACT (N) (REAR SEC "S")	EA	3
774 6025	REPAIR REACT (N) (REAR SEC "B")	EA	2
774 6026	REPAIR REACT (N) (FRONT SECTION)	EA	2
774 6027	REPAIR REACT (N) (CYLINDERS)	EA	2
774 6035	REPAIR REACT (CYLINDERS)	EA	5
774 6036	REPAIR REACT (W) (MISC) (HARDWARE)	EA	8
774 6037	REPAIR REACT (W) (CYLINDERS)	EA	8
774 6065	REPAIR TAU II (N) (MISC HARDWARE)	EA	3
774 6066	REPAIR TAU II (N)	LF	35
774 6067	REPAIR TAU II (W)	LF	5
774 6078	REPAIR TAU II (W) (MISC HARDWARE)	EA	1
774 6080	REMOVE & REPLACE REACT 350(TXDOT FRNSH	EA	1
776 6009	REPAIR (STL PIPE PEDESTRIAN RAIL - PR1)	LF	15
776 6010	REPAIR (STL PIPE PED RAILW/PARAPET-PR2)	LF	15

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DATE: 1/4/2021
PROJECT: 6375-52-001

SUMMARY OF QUANTITIES

Texas Department of Transportation

FED. RD. DIV. NO.	MAINTENANCE PROJECT NO.		SHEET NO.
6	RMC 6375-52-001		10
STATE	DIST. NO.	COUNTY	
TEXAS	12	HARRIS/GAL	
CONT	SECT.	JOB	HIGHWAY NO.
6375	52	001	IH45

ITEM	DESCRIPTIONS	UNIT	QUANTITIES
432 6046	RIPRAP (MOW STRIP)(5 IN)	CY	10
540 6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	2
540 6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	10
544 6001	GUARDRAIL END TREATMENT (INSTALL)	EA	1
544 6003	GUARDRAIL END TREATMENT (REMOVE)	EA	1
545 6002	CRASH CUSH ATTEN (DES SOURCE)	EA	1
545 6004	CRASH CUSH ATTEN (STKPL)	EA	1
770 6001	REPAIR RAIL ELEMENT (W - BEAM)	LF	5000
770 6002	REPAIR RAIL ELEMENT (THRIE - BEAM)	LF	3
770 6003	REP RAIL ELMNT(THRIE-BM TRANS TO W -BM	LF	3
770 6006	RAISE RAIL ELEMENT	LF	500
770 6010	REM / REPL TIMBER/STL POST W/O CONC FN	EA	200
770 6011	REM / REPL TIMBER / STL POST W/CONC FN	EA	150
770 6016	REPAIR STEEL POST WITH BASE PLATE	EA	3
770 6017	REALIGN POSTS	EA	200
770 6021	REPLACE SINGLE GDRAIL TERMINAL RAIL	LF	3000
770 6022	REPLACE SINGLE GDRAIL TERMINAL POST	EA	500
770 6027	REMOVE GDRAIL END TRT / REPL WITH SGT	EA	5
770 6028	REPL SINGLE GDRAIL TERM IMPACT HEAD	EA	75
770 6029	REM & RESET SGT IMPACT HEAD	EA	50
770 6030	REPLACE SGT CABLE ASSEMBLY	EA	35
770 6031	REPLACE SGT CABLE ANCHOR	EA	35
770 6032	REPLACE SGT STRUT	EA	25
770 6033	REPLACE SGT OBJECT MARKER	EA	5
770 6052	REPAIR STEEL POST WITH BASE PLATE	EA	3
	CONCRETE TRAFFIC BARRIERS		
104 6021	REMOVING CONC (CURB)	LF	100
104 6023	REMOVING CONC (CTB)	LF	60
512 6063	PORT CTB (MOVE) (SAFETY SH) (TY 2)	LF	120
512 6064	PORT CTB (REMOVE) (SAFETY SH) (TY 2)	LF	30
512 6065	PORT CTB (DES SOURCE) (SAFETY SH)(TY 2	LF	30
529 6010	CONC CURB (U-TURN)	LF	200
529 6011	CONC CURB (DOWEL)	LF	100

SIGNS			
ITEM	DESCRIPTIONS	UNIT	QUANTITIES
416 6016	DRILL SHAFT (SIGN MTS) (12IN)	LF	100
416 6018	DRILL SHAFT (SIGN MTS) (24IN)	LF	75
636 6001	ALUMINUM SIGNS (TY A)	SF	300
636 6002	ALUMINUM SIGNS (TY G)	SF	200
636 6003	ALUMINUM SIGNS (TY O)	SF	30

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SUMMARY OF QUANTITIES

Texas Department of Transportation

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FED. RD. DIV. NO.	MAINTENANCE PROJECT NO.		SHEET NO.
6	RMC 6375-52-001		11
STATE	DIST. NO.	COUNTY	
TEXAS	12	HARRIS/GAL	
CONT	SECT.	JOB	HIGHWAY NO.
6375	52	001	IH45

SIGNS			
ITEM	DESCRIPTIONS	UNIT	QUANTITIES
416 6016	DRILL SHAFT (SIGN MTS) (12IN)	LF	100
416 6018	DRILL SHAFT (SIGN MTS) (24IN)	LF	75
636 6001	ALUMINUM SIGNS (TY A)	SF	300
636 6002	ALUMINUM SIGNS (TY G)	SF	200
636 6003	ALUMINUM SIGNS (TY O)	SF	30
6043 6001	REPAIR LG RDSD SIGN SUPT & ASSEMBLIES	EA	50
6044 6001	REPAIR SMALL RDSD SIGN SUPT & ASSEM	EA	200
6044 6002	RELOC SMALL RDSD SIGN SUPT & ASSEM	EA	10
DELINATOR & OBJECT MARKERS			
658 6013	INSTL DEL ASSM (D-SW)SZ (BRF)CTB	EA	25
658 6014	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	EA	25
658 6018	INSTL DEL ASSM (D-SW)SZ 1 (FLX) GND	EA	25
658 6026	INSTL DEL ASSM (D-SY)SZ (BRF)CTB (BI)	EA	25
658 6027	INSTL DEL ASSM (D-SY)SZ (BRF)CTB	EA	25
658 6060	REMOVE DELIN & OBJECT MARKER ASSMS	EA	10
658 6061	INSTL DEL ASSM (D-SY)SZ 1 (BRF)GF2	EA	10
PAVEMENT MARKINGS			
666 6018	REFL PAV MRK TY I (W)6"(DOT)(100MIL)	LF	100
666 6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	5000
666 6042	REFL PAV MRK TY I (W)12"(SLD)(100MIL)	LF	2000
666 6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	1000
666 6054	REFL PAV MRK TY I (W)(ARROW)(100MIL)	EA	10
666 6057	REFL PAV MRK TY I(W)(DBL ARROW)(100MIL	EA	10
666 6060	REFL PAV MRK TY I(W)(TPL ARRW)(100MIL)	EA	1
666 6063	REFL PAV MRK TY I(W)(UTURN ARW)(100MIL	EA	10
666 6078	REFL PAV MRK TY I (W)(WORD)(100MIL)	EA	25
666 6081	REFL PAV MRK TY I(W)(ENTR GORE)(100MIL	EA	8
666 6084	REFL PAV MRK TY I(W)(EXIT GORE)(100MIL	EA	8
666 6087	REFL PAV MRK TY I (W) (ISLAND) (100MIL	SF	1
666 6090	REF PAV MRK TY I (W)(MED NOSE)(100MIL)	EA	10
666 6096	REFL PAV MRK TY I (W)(SYMBOL)(100MIL)	EA	1
666 6138	REFL PAV MRK TY I (Y)8"(SLD)(100MIL)	LF	1000
666 6141	REFL PAV MRK TY I (Y)12"(SLD)(100MIL)	LF	100
666 6147	REFL PAV MRK TY I (Y)24"(SLD)(100MIL)	LF	50
666 6156	REFL PAV MRK TY I(Y)(MED NOSE)(100MIL)	EA	5
666 6162	RE PV MRK TY I(BLACK)6"(SHADOW)(100MIL	LF	12000

SUMMARY OF QUANTITIES

Texas Department of Transportation

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FED. RD. DIV. NO.	MAINTENANCE PROJECT NO.		SHEET NO.
6	RMC 6375-52-001		12
STATE	DIST. NO.	COUNTY	
TEXAS	12	HARRIS/GAL	
CONT	SECT.	JOB	HIGHWAY NO.
6375	52	001	IH45

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PAVEMENT MARKINGS			
ITEM	DESCRIPTIONS	UNIT	QUANTITIES
666 6225	PAVEMENT SEALER 6"	LF	36000
666 6226	PAVEMENT SEALER 8"	LF	6000
666 6228	PAVEMENT SEALER 12"	LF	2000
666 6230	PAVEMENT SEALER 24"	LF	1000
666 6231	PAVEMENT SEALER (ARROW)	EA	10
666 6232	PAVEMENT SEALER (WORD)	EA	25
666 6233	PAVEMENT SEALER (MED NOSE)	EA	10
666 6234	PAVEMENT SEALER (DBL ARROW)	EA	10
666 6235	PAVEMENT SEALER (TPL ARROW)	EA	1
666 6236	PAVEMENT SEALER (UTURN ARROW)	EA	10
666 6239	PAVEMENT SEALER (ENTR GORE)	EA	8
666 6240	PAVEMENT SEALER (EXIT GORE)	EA	8
666 6241	PAVEMENT SEALER (SYMBOL)	EA	1
666 6242	PAVEMENT SEALER (RR XING)	EA	1
666 6247	PAVEMENT SEALER (ISLAND)	SF	1
666 6248	PAVEMENT SEALER (NUMBER)	EA	1
666 6306	RE PM W/RET REQ TY I (W)6"(BRK)(100MIL	LF	12000
666 6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL	LF	20000
666 6318	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL	LF	500
666 6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL	LF	20000
668 6084	PREFAB PAV MRK TY C (W) (NUMBER)	EA	2
668 6085	PREFAB PAV MRK TY C (W) (WORD)	EA	2
672 6006	REFL PAV MRKR TY I-A	EA	25
672 6007	REFL PAV MRKR TY I-C	EA	100
672 6008	REFL PAV MRKR TY I-R	EA	100
672 6009	REFL PAV MRKR TY II-A-A	EA	100
672 6010	REFL PAV MRKR TY II-C-R	EA	1000
677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	100
677 6002	ELIM EXT PAV MRK & MRKS (6")	LF	1042500
677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	315000
677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	16000
677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	2100
677 6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	35
677 6009	ELIM EXT PAV MRK & MRKS (DBL ARROW)	EA	25
677 6010	ELIM EXT PAV MRK & MRKS (TPL ARROW)	EA	1
677 6012	ELIM EXT PAV MRK & MRKS (WORD)	EA	1
677 6013	ELIM EXT PAV MRK & MRKS (ENTR GORE)	EA	8
677 6014	ELIM EXT PAV MRK & MRKS (EXIT GORE)	EA	8
677 6016	ELIM EXT PAV MRK & MRKS (RR XING)	EA	1
677 6017	ELIM EXT PAV MRK & MRKS (SYMBOL)	EA	1
677 6020	ELIM EXT PAV MRK & MRKS (MED NOSE)	EA	10
677 6036	ELIM EXT PAV MRK & MRKS (UTURN ARROW)	EA	1

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PROJECT: 6375-52-001

SUMMARY OF QUANTITIES

Texas Department of Transportation

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FED. RD. DIV. NO.	MAINTENANCE PROJECT NO.		SHEET NO.
6	RMC 6375-52-001		13
STATE	DIST. NO.	COUNTY	
TEXAS	12	HARRIS/GAL	
CONT	SECT.	JOB	HIGHWAY NO.
6375	52	001	IH45

PAVEMENT MARKINGS			
ITEM	DESCRIPTIONS	UNIT	QUANTITIES
678 6002	PAV SURF PREP FOR MRK (6")	LF	1042500
678 6004	PAV SURF PREP FOR MRK (8")	LF	315000
678 6006	PAV SURF PREP FOR MRK (12")	LF	7000
678 6008	PAV SURF PREP FOR MRK (24")	LF	2100
678 6009	PAV SURF PREP FOR MRK (ARROW)	EA	35
678 6010	PAV SURF PREP FOR MRK (DBL ARROW)	EA	25
678 6011	PAV SURF PREP FOR MRK (TPL ARROW)	EA	1
678 6012	PAV SURF PREP FOR MRK (UTURN ARR)	EA	20
678 6015	PAV SURF PREP FOR MRK (NUMBER)	EA	2
678 6016	PAV SURF PREP FOR MRK (WORD)	EA	50
678 6017	PAV SURF PREP FOR MRK (ENTR GORE)	EA	8
678 6018	PAV SURF PREP FOR MRK (EXIT GORE)	EA	8
678 6021	PAV SURF PREP FOR MRK (SYMBOL)	EA	1
678 6024	PAV SURF PREP FOR MRK (MED NOSE)	EA	1
BRIDGE			
429 6003	CONC STR REPAIR(DECK REP(PART DEPTH))	SF	50
429 6005	CONC STR REPAIR(DECK REP (FULL DEPTH))	SF	50
438 6001	CLEANING AND SEALING EXISTING JOINTS	LF	500
721 6002	FIBER REINFORCED POLYMER PATCHING MATL	LB	10000
785 6011	BRIDGE JOINT REPLACEMENT (SEJ)	LF	50
4003 6001	TYPE CAC CONCRETE	CY	10
FENCE/GATE			
550 6001	CHAIN LINK FENCE (INSTALL) (6')	LF	20
550 6002	CHAIN LINK FENCE (REPAIR) (6')	LF	20
550 6004	GATE (INSTALL) (DOUBLE) (6' X 14')	EA	1

FILE: t:\0*gen-ao\0*maintenance\000*new contracts\ih 45 general maintenance\dgn\Summary*quantities*5of7.dgn
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SUMMARY OF QUANTITIES

Texas Department of Transportation

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FED. RD. DIV. NO.	MAINTENANCE PROJECT NO.		SHEET NO.
6	RMC 6375-52-001		14
STATE	DIST. NO.	COUNTY	
TEXAS	12	HARRIS/GAL	
CONT	SECT.	JOB	HIGHWAY NO.
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MOWING/LITTER/DEBRIS/CLEAN			
ITEM	DESCRIPTIONS	UNIT	QUANTITIES
150 6001	BLADING	STA	100
150 6003	BLADING	LF	10000
730 6054	FULL - WIDTH MOWING - TRACT (1)	AC	2552
730 6055	FULL - WIDTH MOWING - TRACT (2)	AC	1008
730 6056	FULL - WIDTH MOWING - TRACT (3)	AC	4
730 6057	FULL - WIDTH MOWING - TRACT (4)	AC	16.8
730 6058	FULL - WIDTH MOWING - TRACT (5)	AC	24
730 6059	FULL - WIDTH MOWING - TRACT (6)	AC	15.2
731 6007	PAVEMENT EDGES, STRUCTURES & FIXTURES	MI	200
734 6003	LITTER REMOVAL (SPOT)	AC	4
734 6054	LITTER REMOVAL - TRACT (1)	CYC	48
734 6055	LITTER REMOVAL - TRACT (2)	CYC	48
735 6068	DEBRIS-CNTR MEDIANS/MAINLANES-AREA (1)	CYC	24
735 6069	DEBRIS-CNTR MEDIANS/MAINLANES-AREA (2)	CYC	24
735 6108	DEBRIS-ENTRANCE/EXIT RAMPS - AREA (1)	CYC	24
735 6109	DEBRIS-ENTRANCE/EXIT RAMPS - AREA (2)	CYC	24
735 6128	DEBRIS-DIRECT CONNECTOR - AREA (1)	CYC	24
735 6129	DEBRIS-DIRECT CONNECTOR - AREA (2)	CYC	12
738 6011	CLEANING / SWEEPING (HANDWORK)	SY	50000
738 6094	CLEAN / SWEEP - CENTER MEDIAN - AREA(1	CYC	48
738 6095	CLEAN / SWEEP - CENTER MEDIAN - AREA(2	CYC	48
738 6114	CLEAN / SWEEP-OUTSIDE MAIN LANE-AREA(1	CYC	48
738 6115	CLEAN / SWEEP-OUTSIDE MAIN LANE-AREA(2	CYC	48
738 6134	CLEAN / SWEEP - FRONTAGE ROAD - AREA(1	CYC	24
738 6135	CLEAN / SWEEP - FRONTAGE ROAD - AREA(2	CYC	24
738 6154	CLEAN / SWEEP - (ENTR /EXT RMP)(AREA 1	CYC	48
738 6155	CLEAN / SWEEP - (ENTR /EXT RMP)(AREA 2	CYC	48
738 6174	CLEAN/SWEEPING-DIRECT CONNECT-AREA(1)	CYC	48
738 6175	CLEAN/SWEEPING-DIRECT CONNECT-AREA(2)	CYC	48
738 6358	MAKE READY-DRAIN SLOTS/BARRIER SLOLTS	LS	1
740 6002	GRAFFITI REMOVAL (PAINTING)	SF	50

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SUMMARY OF QUANTITIES

Texas Department of Transportation

			6 of 7
FED. RD. DIV. NO.	MAINTENANCE PROJECT NO.		SHEET NO.
6	RMC 6375-52-001		15
STATE	DIST. NO.	COUNTY	
TEXAS	12	HARRIS/GAL	
CONT	SECT.	JOB	HIGHWAY NO.
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TREE REMOVAL			
ITEM	DESCRIPTIONS	UNIT	QUANTITIES
752 6003	TREE TRIMMING / BRUSH REMOVAL	MI	10
752 6005	TREE REMOVAL (4" - 12" DIA)	EA	15
752 6006	TREE REMOVAL (12" - 18" DIA)	EA	15
752 6007	TREE REMOVAL (18" - 24" DIA)	EA	15
752 6008	TREE REMOVAL (24" - 30" DIA)	EA	15
752 6009	TREE REMOVAL (30" - 36" DIA)	EA	6
752 6010	TREE REMOVAL (36" - 42" DIA)	EA	6
752 6011	TREE REMOVAL (42" - 48" DIA)	EA	6
CLEANING			
764 6001	DRAIN INLET CLEANING	EA	800
764 6002	PUMP STATION WELL CLEANING	EA	1
764 6003	BASKET AND INLET PIPE CLEANING	EA	2
764 6004	DOWNSPOUT CLEANING	EA	1
764 6005	SUMP CLEANING	EA	1
764 6006	STORM SEWER CLEANING (PIPE) (<12" DIA)	LF	300
764 6007	STORM SEWER CLEANING (PIPE)(12"-18"DIA	LF	15000
764 6008	STORM SEWER CLEANING (PIPE)(19"-24"DIA	LF	45000
764 6009	STORM SEWER CLEANING (PIPE)(25"-30"DIA	LF	7500
764 6010	STORM SEWER CLEANING (PIPE)(31"-36"DIA	LF	1000
764 6011	STORM SEWER CLEANING (PIPE)(37"-42"DIA	LF	30
764 6012	STORM SEWER CLEANING (PIPE)(43"-54"DIA	LF	30
764 6013	STORM SEWER CLEANING (PIPE)(55"-74"DIA	LF	30
764 6014	STORM SEWER CLEANING (PIPE)(75"-96"DIA	LF	30
764 6015	STORM SEWER CLEAN (BOX CULV) (<6 SF)	LF	100
764 6016	STORM SEWER CLEAN (BOX CULV) (6-<12 SF	LF	100
764 6017	STORM SEWER CLEAN (BOX CULV)(12-<24 SF	LF	100
764 6018	STORM SEWER CLEAN (BOX CULV)(24-<48 SF	LF	1000
764 6019	STORM SEWER CLEAN (BOX CULV)(48-<96 SF	LF	100
764 6020	STORM SEWER CLEAN (BOX CULV) (>96 SF)	LF	25
764 6021	SLOTTED DRAIN CLEANING	LF	25
7019 6001	STORM SEWER (TELEVISION INSPECTION)	LF	25
SNOW & ICE			
7093 6001	SNOW AND ICE CONTROL (TRUCK)	HR	100
7093 6002	SNOW AND ICE CONTROL (SHADOW VEHICLE)	HR	400
7093 6003	SNOW AND ICE CONTROL (LOADER)	HR	25
7093 6004	SNOW AND ICE CONTROL (SEASON)	MO	6
7093 6005	SNOW AND ICE CONTROL (SPRAY RIG)	HR	500

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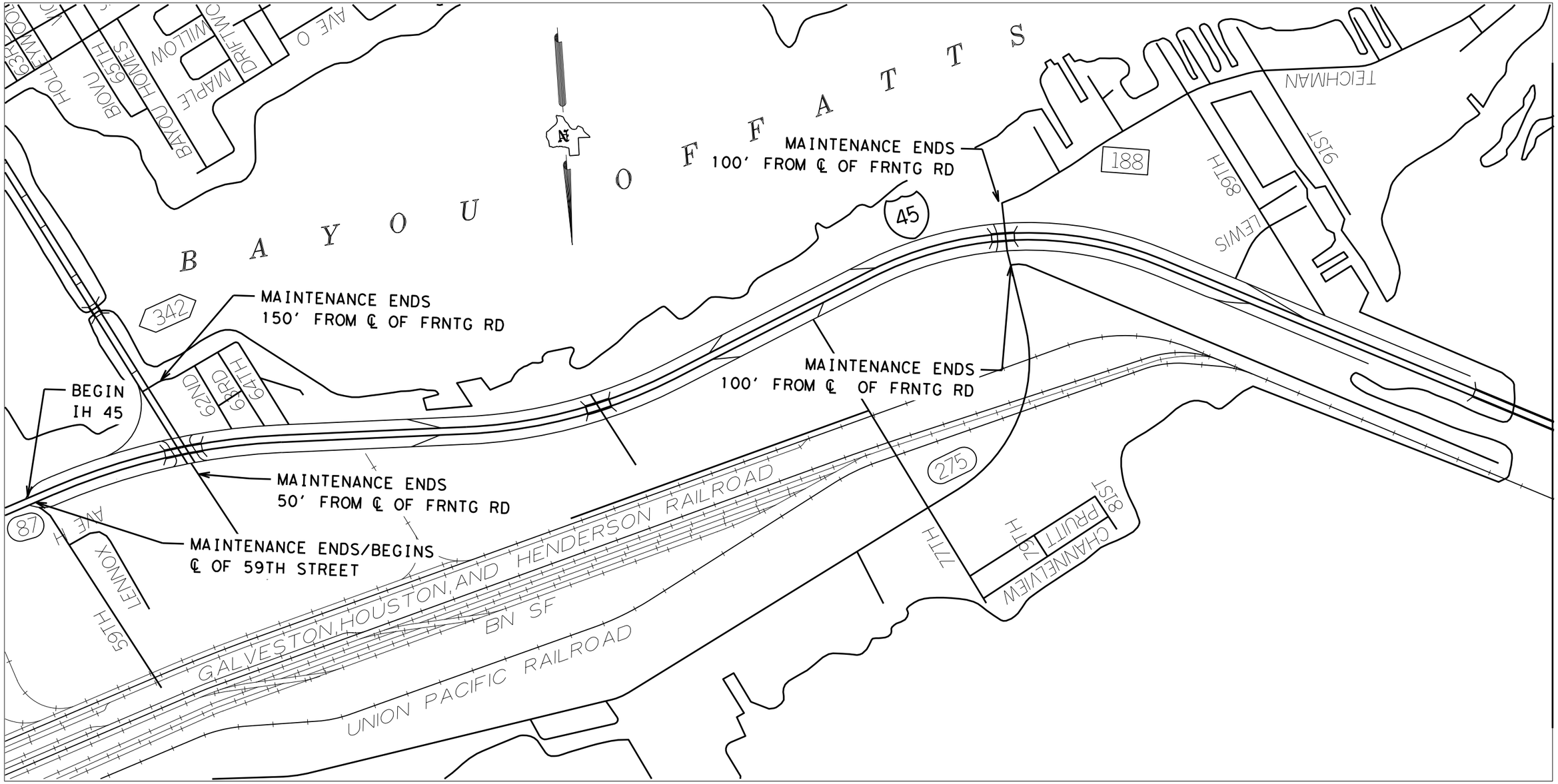
SUMMARY OF QUANTITIES

Texas Department of Transportation

FED. RD. DIV. NO.	MAINTENANCE PROJECT NO.		SHEET NO.
6	RMC 6375-52-001		16
STATE	DIST. NO.	COUNTY	
TEXAS	12	HARRIS/GAL	
CONT	SECT.	JOB	HIGHWAY NO.
6375	52	001	IH45



PROJECT LAYOUT

IH45
HOUSTON DISTRICT
HARRIS & GALVESTON COUNTY

NOTE:
1. EVERYTHING WITHIN IH 45 ROW AND VARIOUS SIDE STREETS THAT ARE NOT SHOWN ARE TO BE MAINTAINED UNDER THIS CONTRACT.
2. DRAINAGE EASEMENTS ASSOCIATED WITH IH 45 ARE TO BE MAINTAINED UNDER THIS CONTRACT.

NTS

SHEET 1 OF 17			
TEXAS DEPARTMENT OF TRANSPORTATION			
FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	RMC 6375-52-001		17
STATE	STATE DIST. NO.	COUNTY	
TEXAS	12	HARRIS/GAL	
CONT.	SECT.	JOB	HIGHWAY NO.
6375	52	001	IH45

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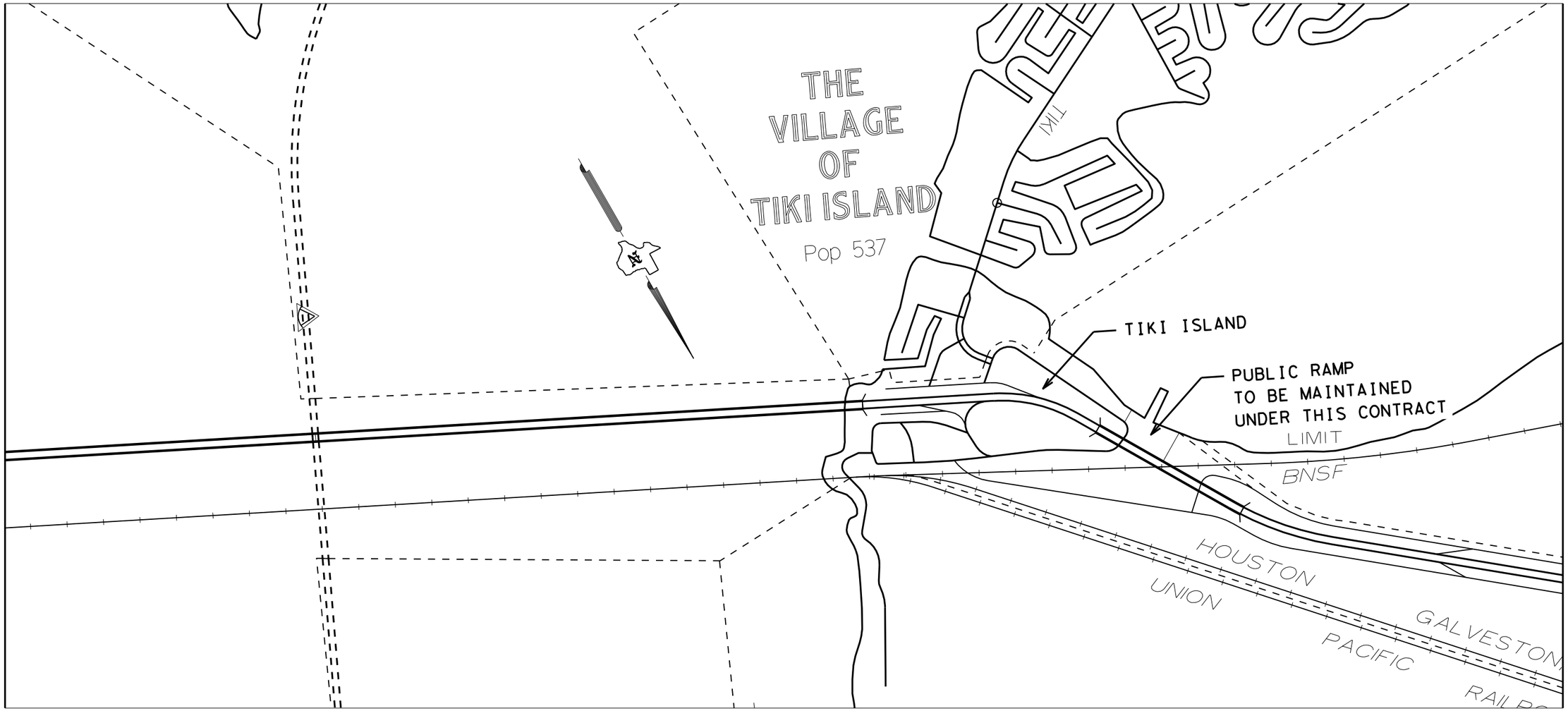
PROJECT: 6375-52-001



PROJECT LAYOUT

IH45
HOUSTON DISTRICT
HARRIS & GALVESTON COUNTY

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NTS

SHEET 2 OF 17

TEXAS DEPARTMENT OF TRANSPORTATION

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6	RMC 6375-52-001		18
STATE	STATE DIST.NO.	COUNTY	
TEXAS	12	HARRIS/GAL	
CONT.	SECT.	JOB	HIGHWAY NO.
6375	52	001	IH45

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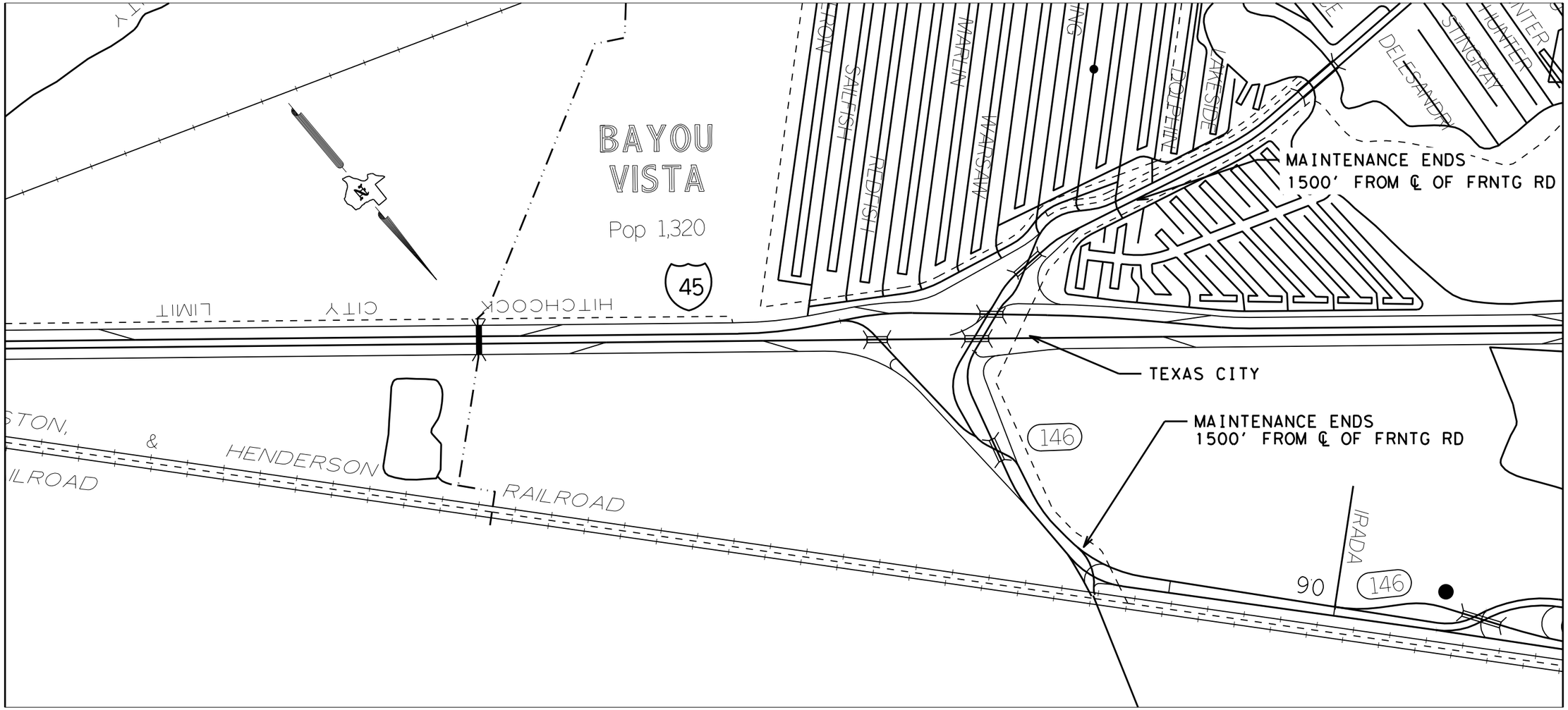
PROJECT: 6375-52-001



PROJECT LAYOUT

IH45
HOUSTON DISTRICT
HARRIS & GALVESTON COUNTY

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NTS

SHEET 3 OF 17

TEXAS DEPARTMENT OF TRANSPORTATION

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6	RMC 6375-52-001		19
STATE	STATE DIST.NO.	COUNTY	
TEXAS	12	HARRIS/GAL	
CONT.	SECT.	JOB	HIGHWAY NO.
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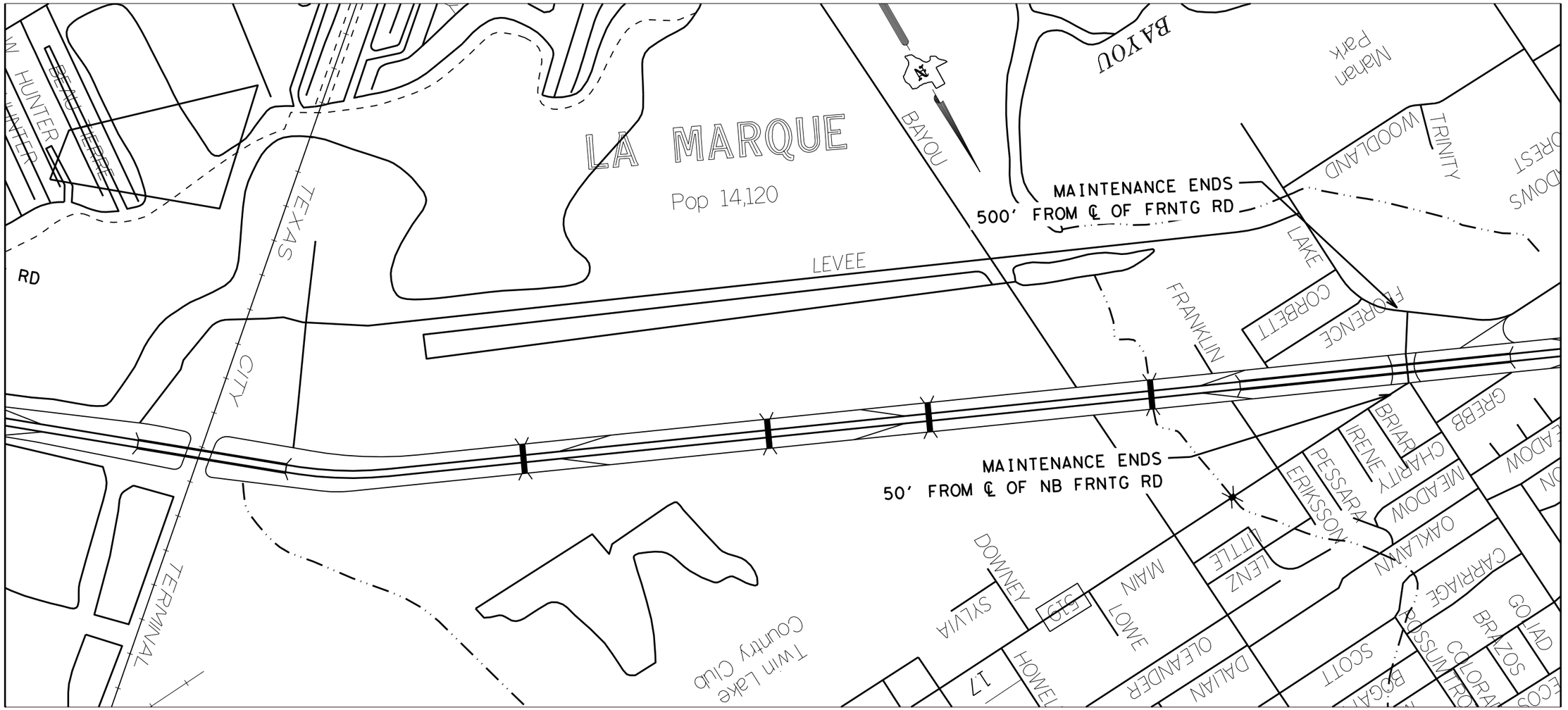
DATE: 2/22/2021
PROJECT: 6375-52-001



PROJECT LAYOUT

IH45
HOUSTON DISTRICT
HARRIS & GALVESTON COUNTY

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NTS

SHEET 4 OF 17			
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FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	RMC 6375-52-001		20
STATE	STATE DIST. NO.	COUNTY	
TEXAS	12	HARRIS/GAL	
CONT.	SECT.	JOB	HIGHWAY NO.
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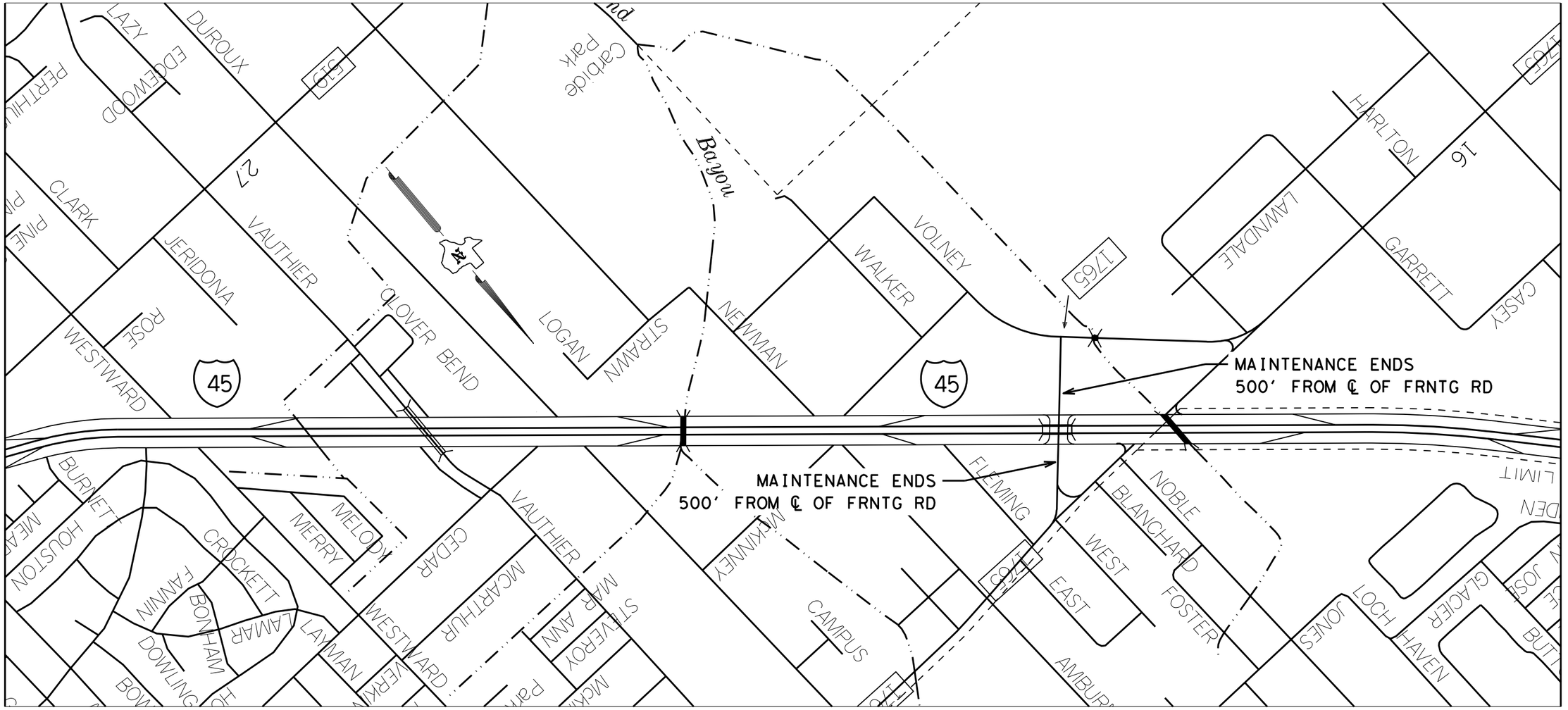
PROJECT: 6375-52-001



PROJECT LAYOUT

IH45
HOUSTON DISTRICT
HARRIS & GALVESTON COUNTY

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NTS

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TEXAS DEPARTMENT OF TRANSPORTATION

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6	RMC 6375-52-001		21
STATE	STATE DIST.NO.	COUNTY	
TEXAS	12	HARRIS/GAL	
CONT.	SECT.	JOB	HIGHWAY NO.
6375	52	001	IH45

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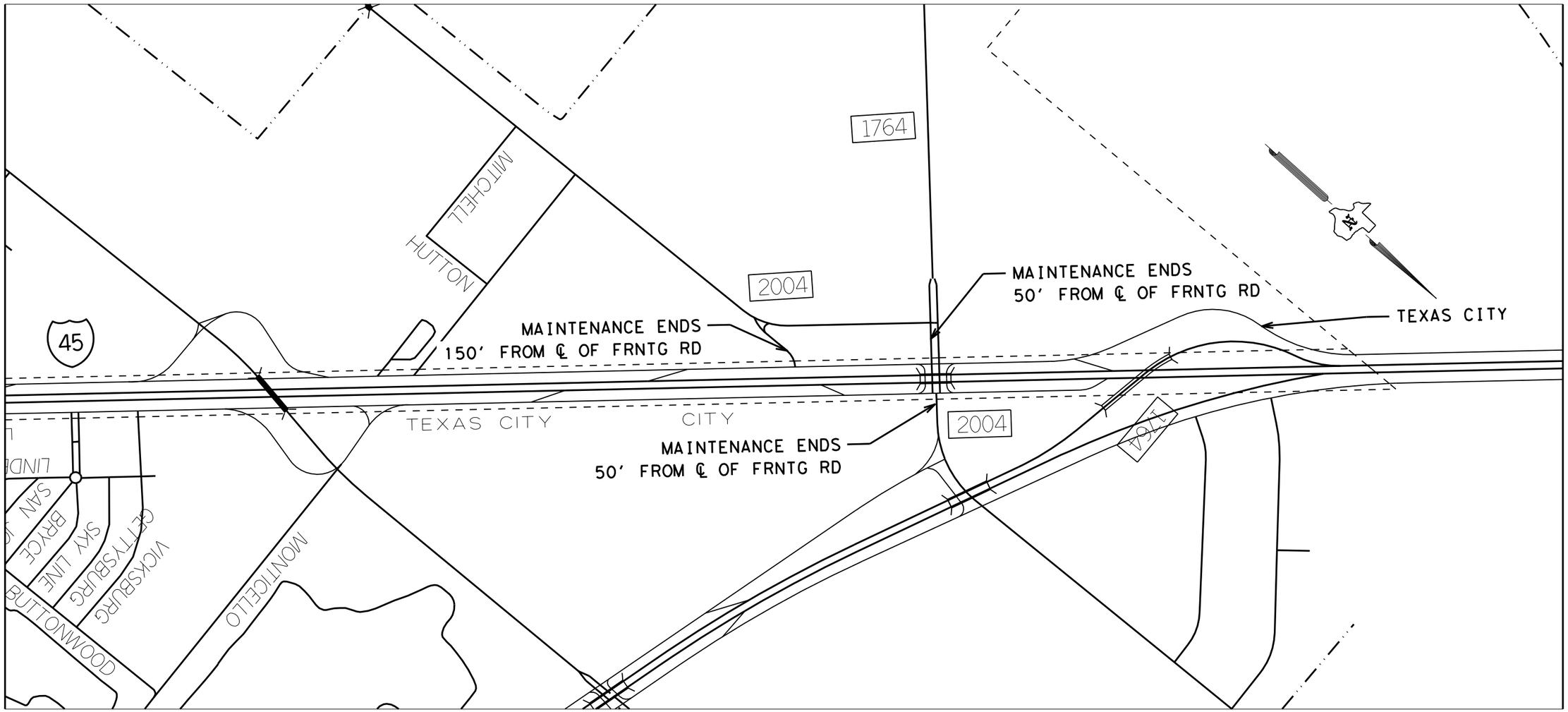
PROJECT: 6375-52-001



PROJECT LAYOUT

IH45
HOUSTON DISTRICT
HARRIS & GALVESTON COUNTY

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NTS

SHEET 6 OF 17

TEXAS DEPARTMENT OF TRANSPORTATION

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
6	RMC 6375-52-001	22

STATE	STATE DIST.NO.	COUNTY	
TEXAS	12	HARRIS/GAL	
CONT.	SECT.	JOB	HIGHWAY NO.
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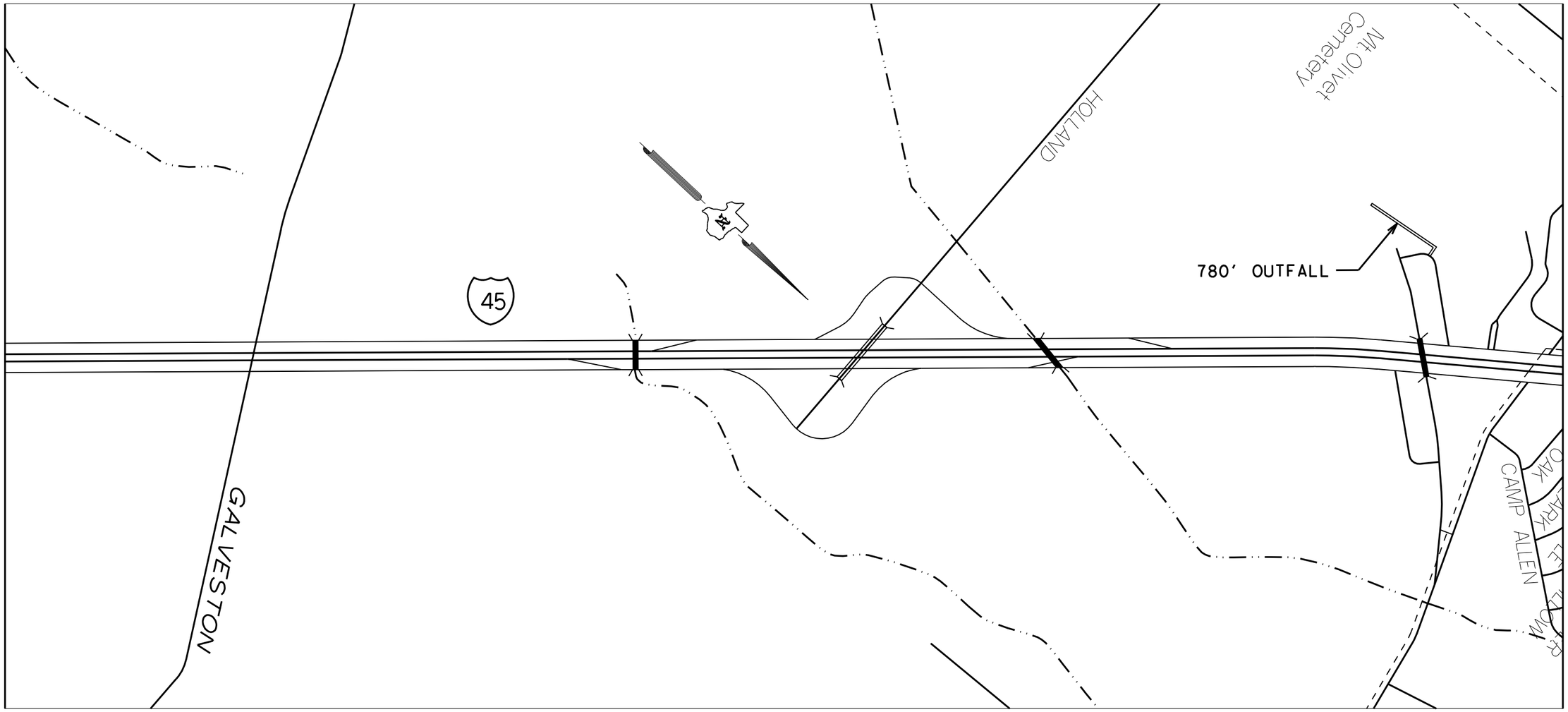
PROJECT: 6375-52-001



PROJECT LAYOUT

IH45
HOUSTON DISTRICT
HARRIS & GALVESTON COUNTY

NOTE:
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NTS

SHEET 7 OF 17

TEXAS DEPARTMENT OF TRANSPORTATION

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
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STATE	STATE DIST.NO.	COUNTY	
TEXAS	12	HARRIS/GAL	
CONT.	SECT.	JOB	HIGHWAY NO.
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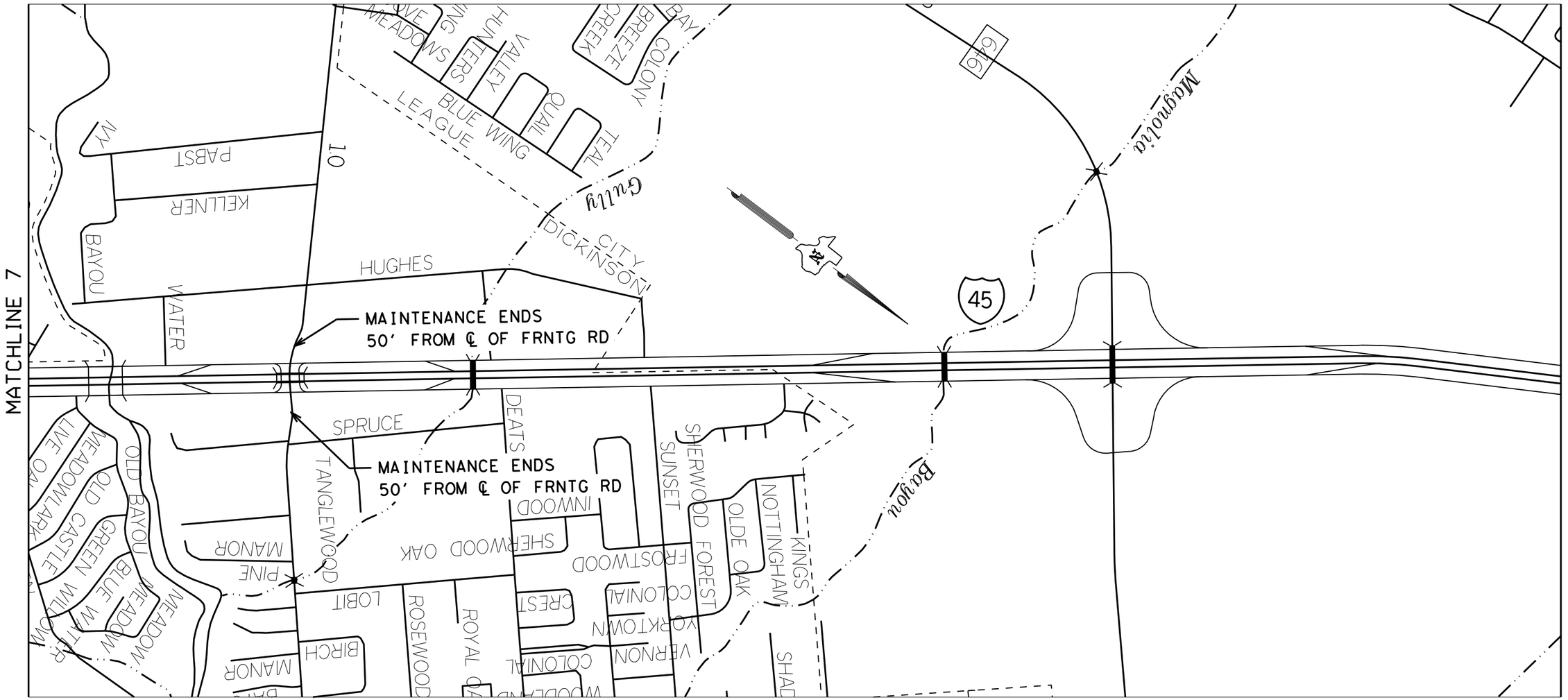
DATE: 2/22/2021
PROJECT: 6375-52-001



PROJECT LAYOUT

IH45
HOUSTON DISTRICT
HARRIS & GALVESTON COUNTY

NOTE:
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NTS

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TEXAS DEPARTMENT OF TRANSPORTATION

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	RMC 6375-52-001		24
STATE	STATE DIST. NO.	COUNTY	
TEXAS	12	HARRIS/GAL	
CONT.	SECT.	JOB	HIGHWAY NO.
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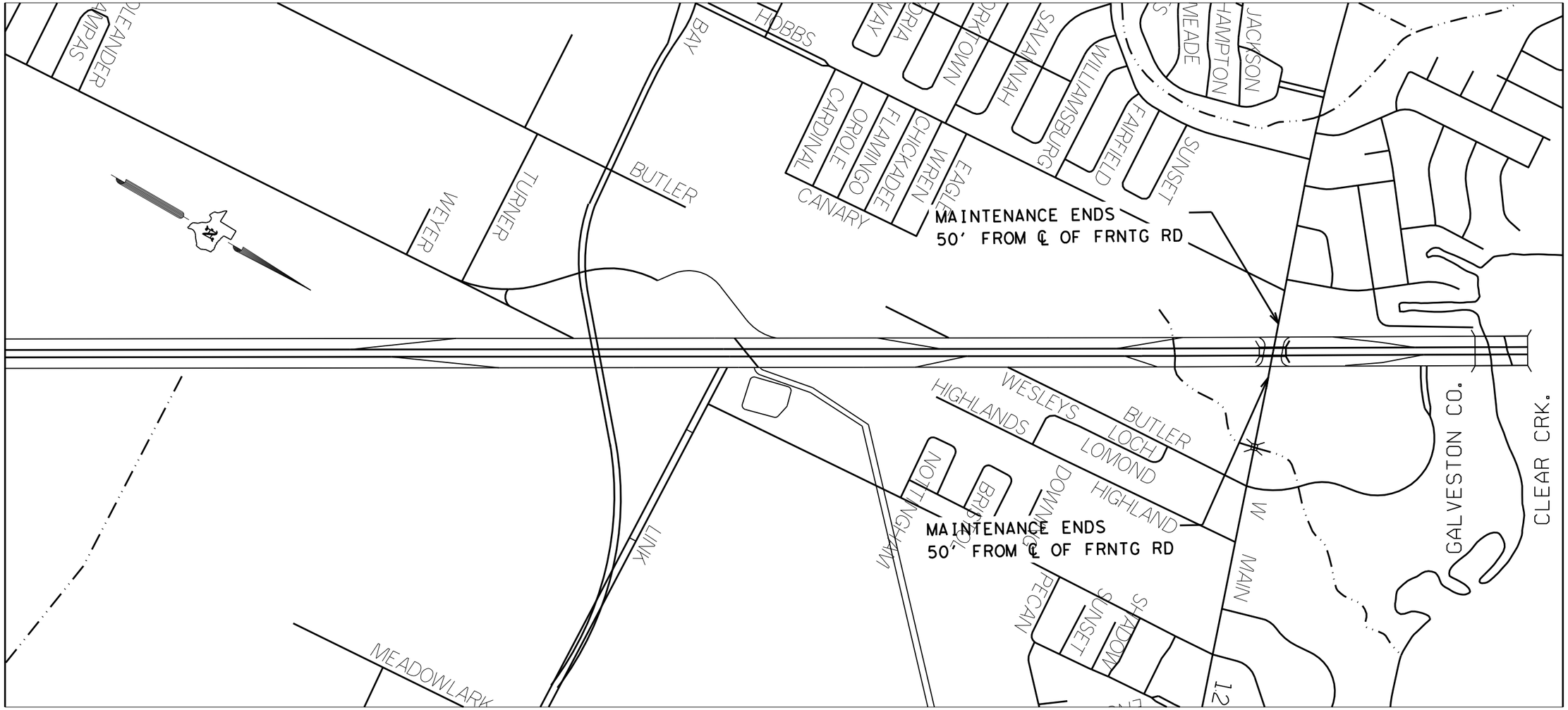
DATE: 2/22/2021
PROJECT: 6375-52-001



PROJECT LAYOUT

IH45
HOUSTON DISTRICT
HARRIS & GALVESTON COUNTY

NOTE:
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FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6	RMC 6375-52-001		25
STATE	STATE DIST.NO.	COUNTY	
TEXAS	12	HARRIS/GAL	
CONT.	SECT.	JOB	HIGHWAY NO.
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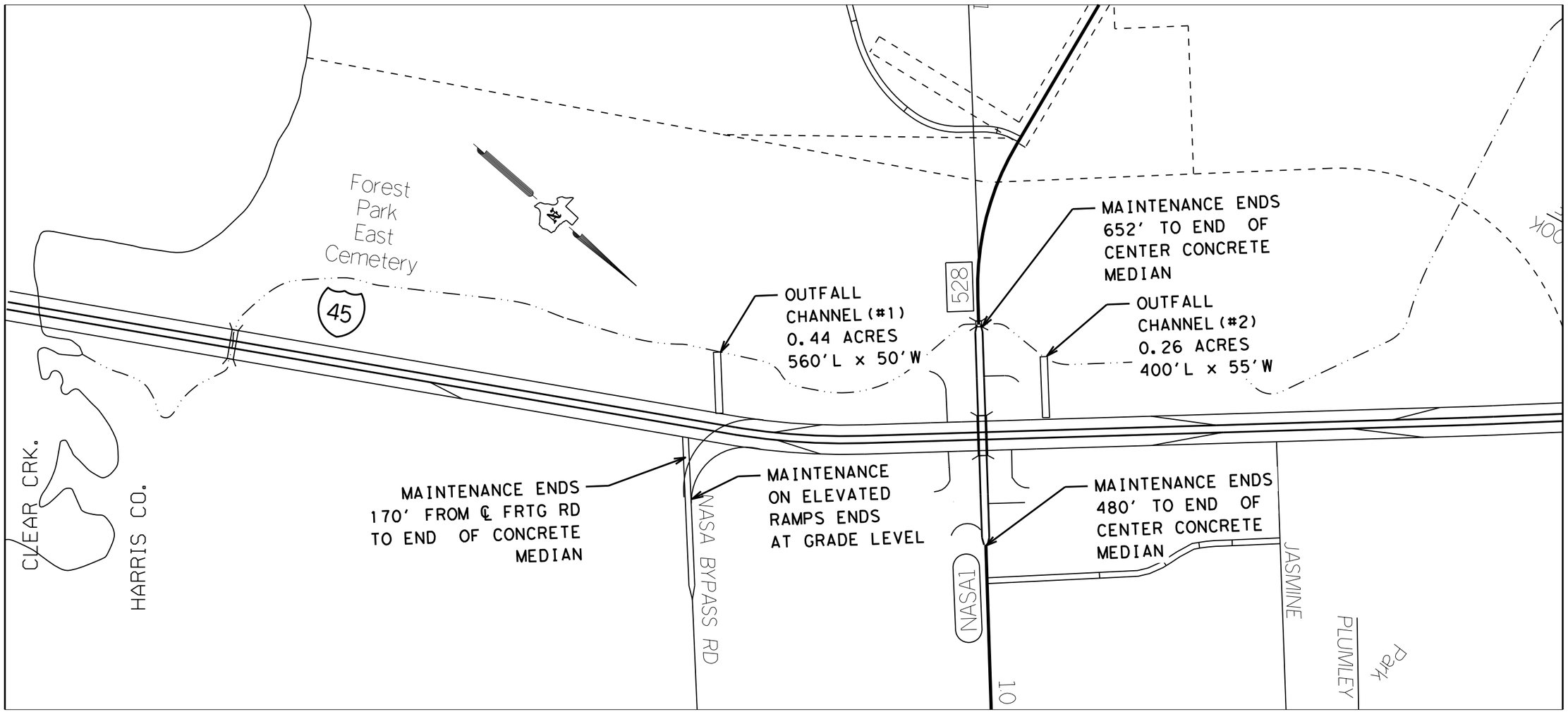

PROJECT LAYOUT

IH45
HOUSTON DISTRICT
HARRIS & GALVESTON COUNTY

NOTE:
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NTS

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TEXAS DEPARTMENT OF TRANSPORTATION

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6	RMC 6375-52-001	26

STATE	STATE DIST. NO.	COUNTY	
TEXAS	12	HARRIS/GAL	
CONT.	SECT.	JOB	HIGHWAY NO.
6375	52	001	IH45

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DATE: 2/22/2021
PROJECT: 6375-52-001

PROJECT LAYOUT

IH45
HOUSTON DISTRICT
HARRIS & GALVESTON COUNTY

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 TEXAS DEPARTMENT OF TRANSPORTATION

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6	RMC 6375-52-001	27

STATE	STATE DIST. NO.	COUNTY
TEXAS	12	HARRIS/GAL

CONT.	SECT.	JOB	HIGHWAY NO.
6375	52	001	IH45

NTS

NOTE:
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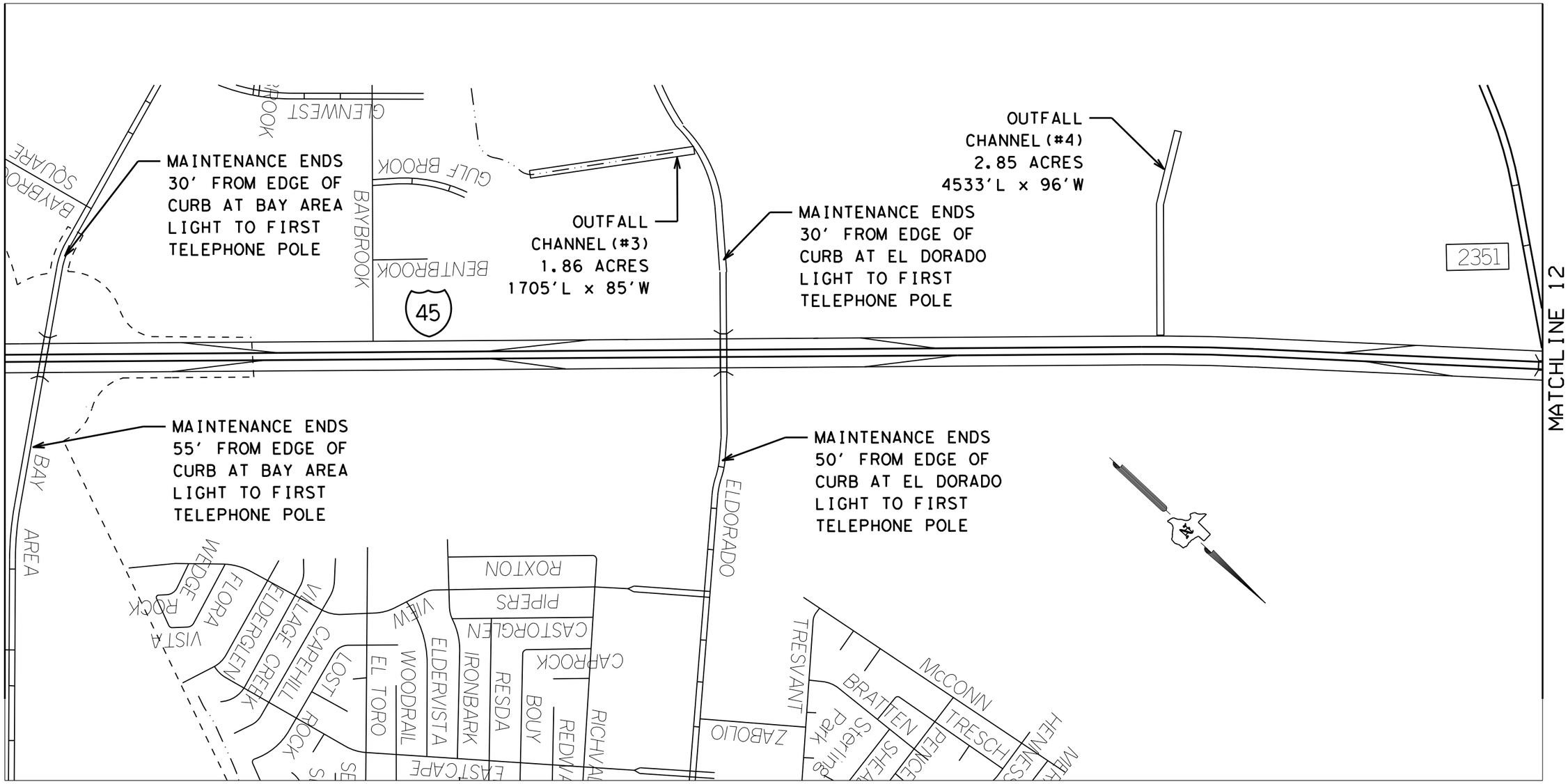
FILE: t:\0*gen-ao\0*maintenance\000*new contracts\6375-52-001 ih 45 general maintenance\dgn\harris and galv county layouts\HarCoLay11.dgn
DATE: 2/22/2021
PROJECT: 6375-52-001



PROJECT LAYOUT

IH45
HOUSTON DISTRICT
HARRIS & GALVESTON COUNTY

NOTE:
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2. DRAINAGE EASEMENTS ASSOCIATED WITH IH 45 ARE TO BE MAINTAINED UNDER THIS CONTRACT.

NTS

SHEET 12 OF 17

TEXAS DEPARTMENT OF TRANSPORTATION

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
6	RMC 6375-52-001	28

STATE	STATE DIST.NO.	COUNTY
TEXAS	12	HARRIS/GAL

CONT.	SECT.	JOB	HIGHWAY NO.
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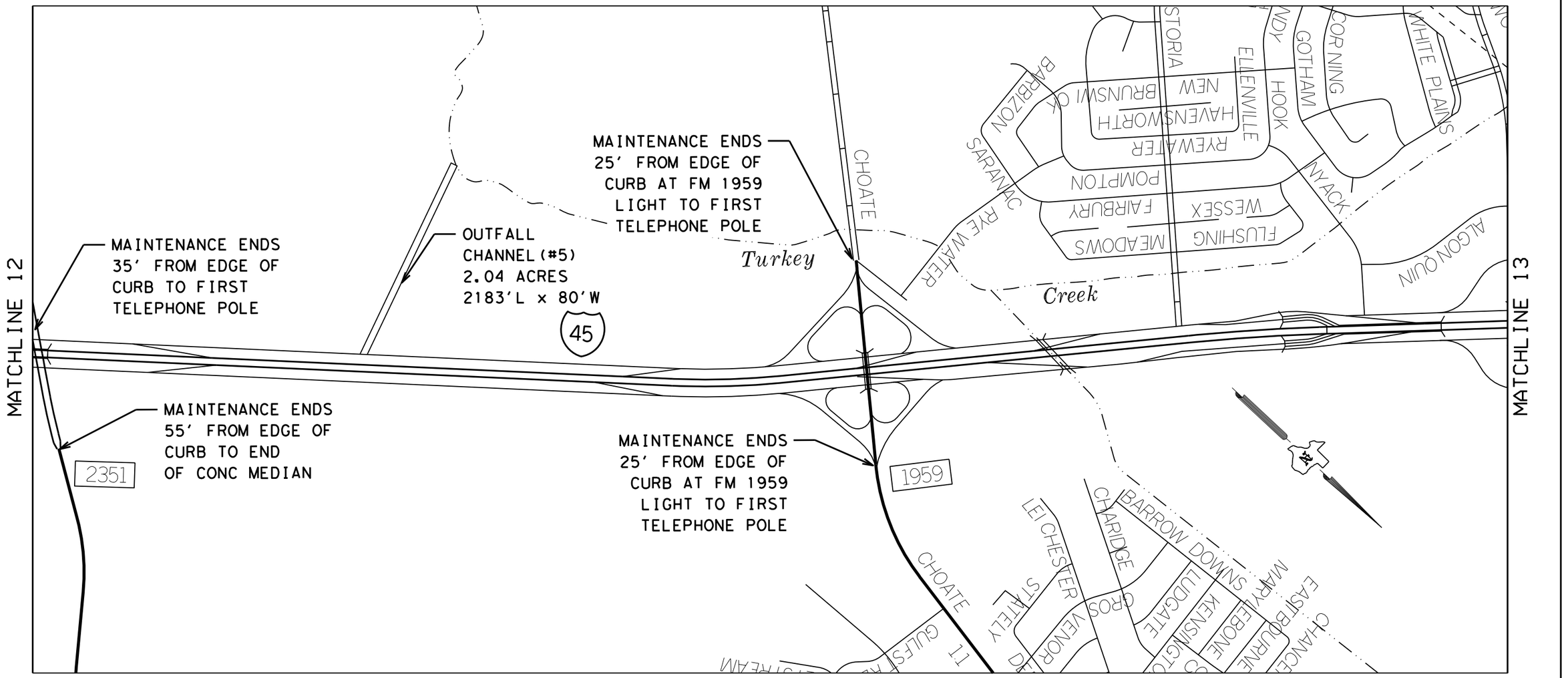
PROJECT: 6375-52-001



PROJECT LAYOUT

IH45
HOUSTON DISTRICT
HARRIS & GALVESTON COUNTY

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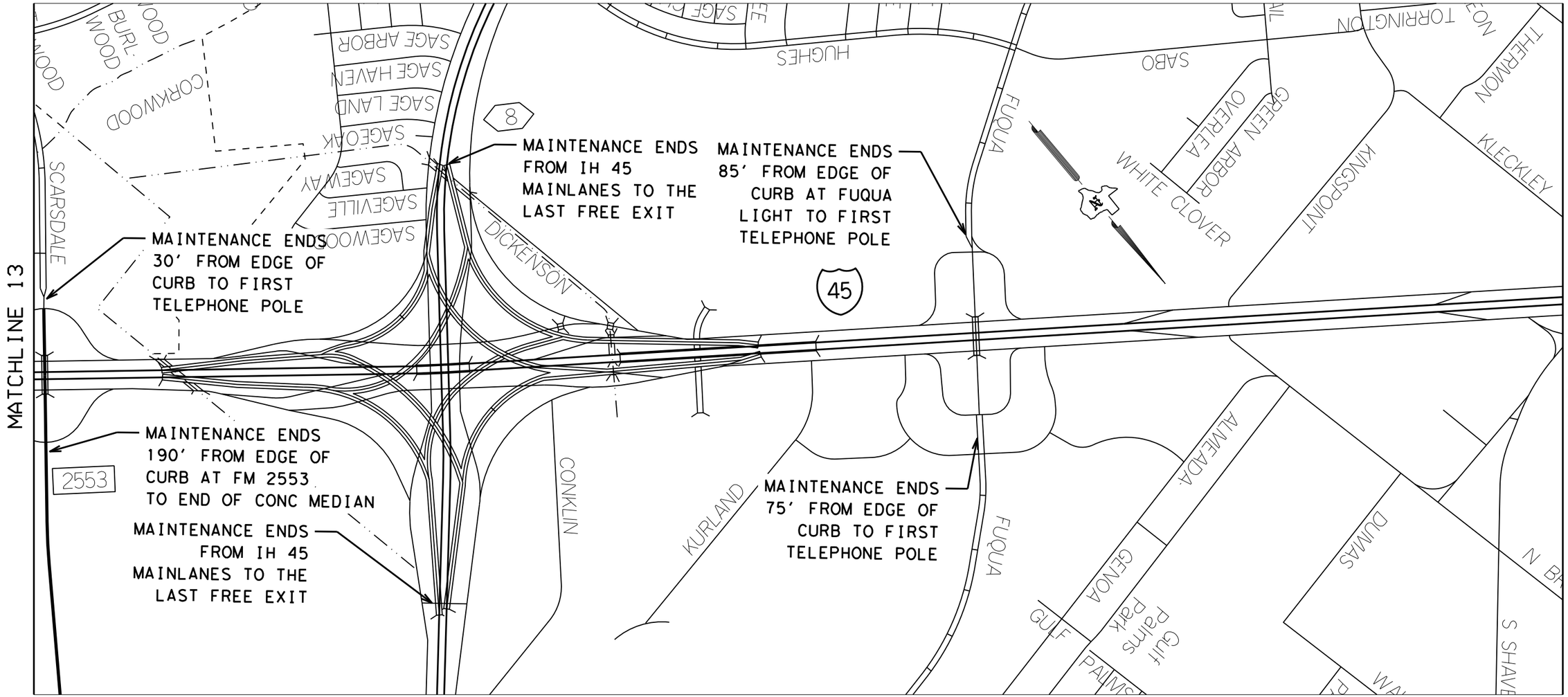
SHEET 13 OF 17

TEXAS DEPARTMENT OF TRANSPORTATION

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6	RMC 6375-52-001	29

STATE	STATE DIST. NO.	COUNTY	
TEXAS	12	HARRIS/GAL	
CONT.	SECT.	JOB	HIGHWAY NO.
6375	52	001	IH45



PROJECT LAYOUT

IH45
HOUSTON DISTRICT
HARRIS & GALVESTON COUNTY

NOTE:
1. EVERYTHING WITHIN IH 45 ROW AND VARIOUS SIDE STREETS THAT ARE NOT SHOWN ARE TO BE MAINTAINED UNDER THIS CONTRACT.
2. DRAINAGE EASEMENTS ASSOCIATED WITH IH 45 ARE TO BE MAINTAINED UNDER THIS CONTRACT.

NTS

SHEET 14 OF 17

TEXAS DEPARTMENT OF TRANSPORTATION

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	RMC 6375-52-001		30
STATE	STATE DIST. NO.	COUNTY	
TEXAS	12	HARRIS/GAL	
CONT.	SECT.	JOB	HIGHWAY NO.
6375	52	001	IH45

FILE: t:\Orgen-oo\Omaintenance\000*new contracts\6375-52-001 ih 45 general maintenance\dgn\harris and galv county layouts\HarCoLay14.dgn
DATE: 2/22/2021
PROJECT: 6375-52-001

PROJECT LAYOUT

IH45
HOUSTON DISTRICT
HARRIS & GALVESTON COUNTY

NOTE:
1. EVERYTHING WITHIN IH 45 ROW AND VARIOUS SIDE STREETS THAT ARE NOT SHOWN ARE TO BE MAINTAINED UNDER THIS CONTRACT.
2. DRAINAGE EASEMENTS ASSOCIATED WITH IH 45 ARE TO BE MAINTAINED UNDER THIS CONTRACT.

NTS

SHEET 15 OF 17

TEXAS DEPARTMENT OF TRANSPORTATION

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	RMC 6375-52-001		31
STATE	STATE DIST. NO.	COUNTY	
TEXAS	12	HARRIS/GAL	
CONT.	SECT.	JOB	HIGHWAY NO.
6375	52	001	IH45

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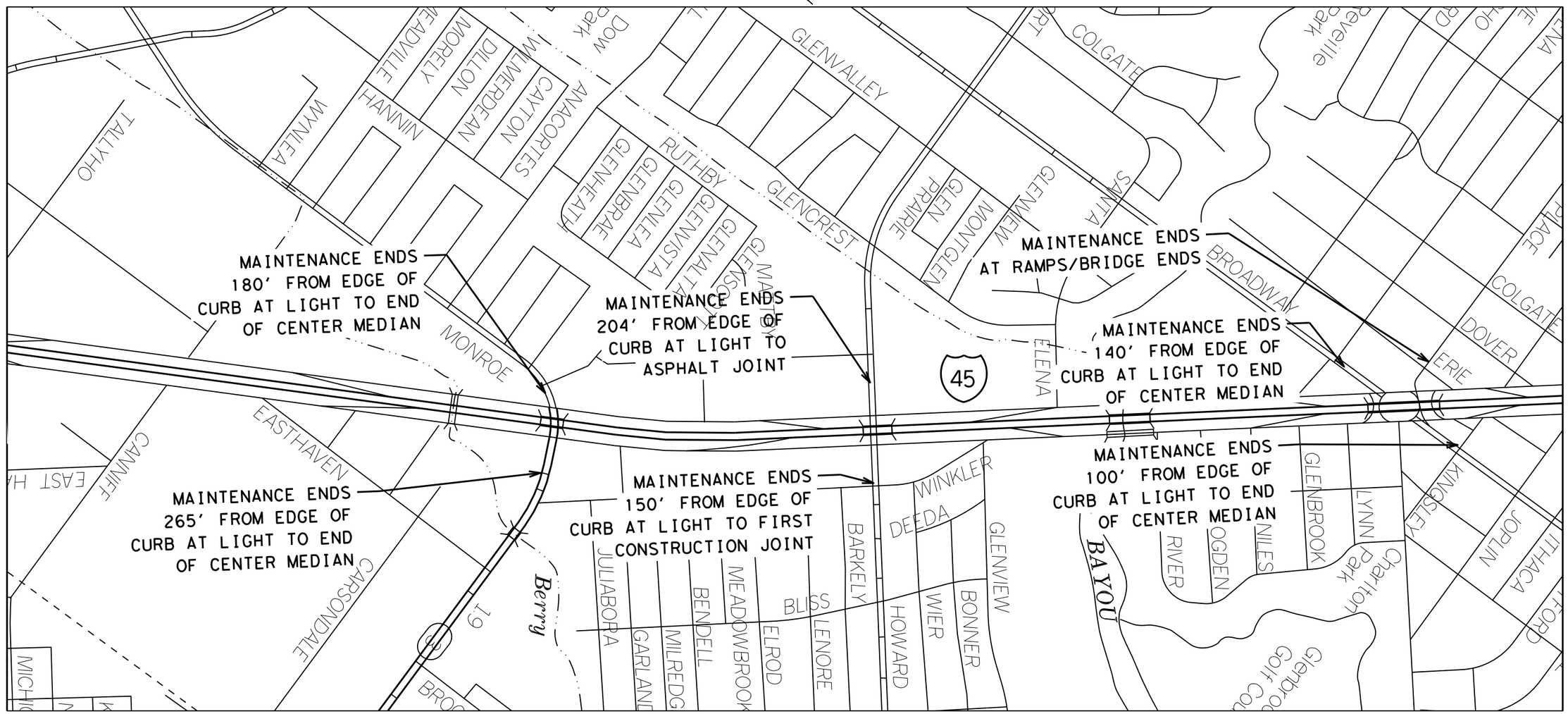
DATE: 2/22/2021
PROJECT: 6375-52-001



PROJECT LAYOUT

IH45
HOUSTON DISTRICT
HARRIS & GALVESTON COUNTY

NOTE:
1. EVERYTHING WITHIN IH 45 ROW AND VARIOUS SIDE STREETS THAT ARE NOT SHOWN ARE TO BE MAINTAINED UNDER THIS CONTRACT.
2. DRAINAGE EASEMENTS ASSOCIATED WITH IH 45 ARE TO BE MAINTAINED UNDER THIS CONTRACT.

NTS

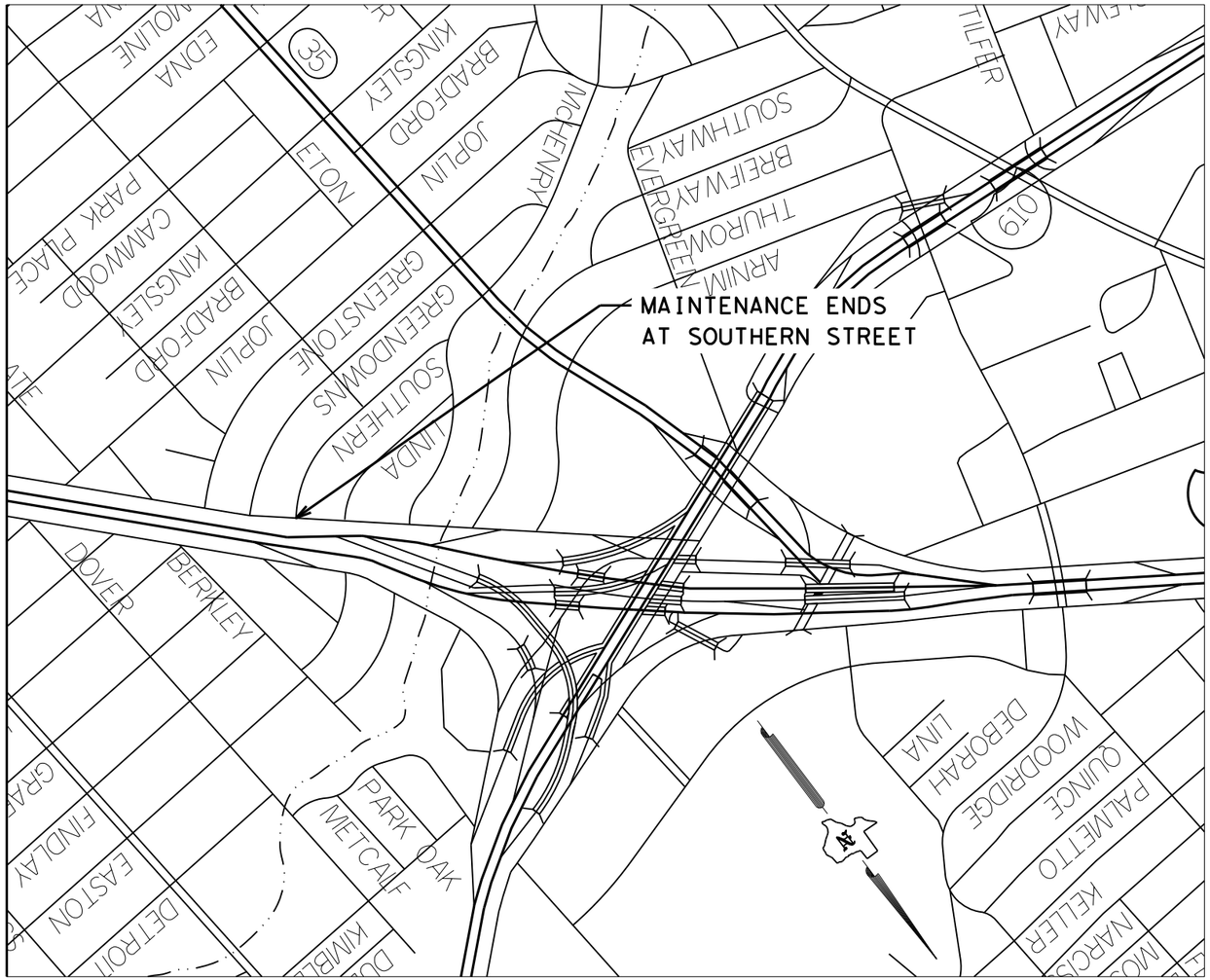
SHEET 16 OF 17

TEXAS DEPARTMENT OF TRANSPORTATION

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6	RMC 6375-52-001	32

STATE	STATE DIST. NO.	COUNTY	
TEXAS	12	HARRIS/GAL	
CONT.	SECT.	JOB	HIGHWAY NO.
6375	52	001	IH45

FILE: t:\Oxgen-oo\O*maintenance\000*new contracts\6375-52-001 ih 45 general maintenance\dgn\harris and galv county layouts\HarCoLay16.dgn
DATE: 2/22/2021
PROJECT: 6375-52-001



NOTE:

1. EVERYTHING WITHIN IH 45 ROW AND VARIOUS SIDE STREETS THAT ARE NOT SHOWN ARE TO BE MAINTAINED UNDER THIS CONTRACT.
2. DRAINAGE EASEMENTS ASSOCIATED WITH IH 45 ARE TO BE MAINTAINED UNDER THIS CONTRACT.

PROJECT LAYOUT

IH45
HOUSTON DISTRICT
HARRIS & GALVESTON COUNTY

NTS

SHEET 17 OF 17

TEXAS DEPARTMENT OF TRANSPORTATION

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6	RMC 6375-52-001		33
STATE	STATE DIST. NO.	COUNTY	
TEXAS	12	HARRIS/GAL	
CONT.	SECT.	JOB	HIGHWAY NO.
6375	52	001	IH45

FILE: t:\0*gen-ao\0*maintenance\000*new contracts\6375-52-001 ih 45 general maintenance\dgn\harris and galv county layouts\HarCoLay17.dgn
DATE: 2/22/2021
PROJECT: 6375-52-001

LITTER\MOWING	
GALVESTON AREA OFFICE	
TRACT 1	FROM SH 87 TO SH 146
	FROM SH 146 TO FM 519
	FROM FM 519 TO FM 1764
	FROM FM 1764 TO SH 646
	FROM SH 646 TO FM 518
SOUTHEAST AREA OFFICE	
TRACT 2	FROM FM 518 TO FM 2351
	FROM FM 2351 TO FM 2553
	FROM RM 2553 TO FUQUA
	FROM FUQUA TO COLLEGE
	FROM COLLEGE TO LP 610
SOUTHEAST AREA OFFICE(OUTFALLS)	
TRACT 3	BETWEEN FM 528 &HARRIS C/L
TRACT 4	BETWEEN DIXIE FARM RD. AND FM 2351
TRACT 5	BETWEEN FM 2351 AND EL DORADO BLVD
TRACT 6	BETWEEN EL DORADO AND BAYBROOK MALL

LITTER	
GALVESTON AREA OFFICE	
	AREA(ACRES)
TRACT 1	527
SOUTHEAST AREA OFFICE	
TRACT 2	354
TOTAL	881 ACRES PER CYCLE

MOWING	
GALVESTON AREA OFFICE	
	AREA(ACRES)
TRACT 1	319
SOUTHEAST AREA OFFICE	
TRACT 2	126
SOUTHEAST AREA OFFICE(OUTFALLS)	
TRACT 3	0.5
TRACT 4	2.1
TRACT 5	3
TRACT 6	1.9
TOTAL	452.5 ACRES PER CYCLE

DEBRIS/CLEAN&SWEEPING	
GALVESTON AREA OFFICE	
TRACT 1	FROM SH 87 TO SH 146
	FROM SH 146 TO FM 519
	FROM FM 519 TO FM 1764
	FROM FM 1764 TO SH 646
	FROM SH 646 TO FM 518
SOUTHEAST AREA OFFICE	
TRACT 2	FROM FM 518 TO FM 2351
	FROM FM 2351 TO FM 2553
	FROM RM 2553 TO FUQUA
	FROM FUQUA TO COLLEGE
	FROM COLLEGE TO LP 610

CLEAN/DEBRIS/SWEEPING (CENTER MEDIAN)	
	LENGTH(MILE)
TRACT 1-GALVESTON AREA OFFICE	23.4
TRACT 2-SOUTHEAST AREA OFFICE	17.5
TOTAL	40.9 MILES PER CYCLE

CLEAN/DEBRIS/SWEEPING (OUTSIDE MAINLANES)	
TRACT 1-GALVESTON AREA OFFICE	23.4
TRACT 2-SOUTHEAST AREA OFFICE	17.5
TOTAL	40.9 MILES PER CYCLE

CLEAN/DEBRIS/SWEEPING (FRONTAGE)	
TRACT 1-GALVESTON AREA OFFICE	28.9
TRACT 2-SOUTHEAST AREA OFFICE	24.6
TOTAL	53.5 MILES PER CYCLE

CLEAN/DEBRIS/SWEEPING (ENTR/EXIT RAMPS)	
TRACT 1-GALVESTON AREA OFFICE	16.8
TRACT 2-SOUTHEAST AREA OFFICE	13.6
TOTAL	24.6 MILESS PER CYCLE

CLEAN/DEBRIS/SWEEPING (DIRECT CONNECTOR)	
SOUTHEAST AREA OFFICE	
TRACT 1-NASA	6.5
TRACT 2-SL 8	7.9
TOTAL	14.4 MILES PER CYCLE

NOTE:
ALL DISTANCE ARE BASED ON CENTERLINE MILE.
LITTER - REMOVE AND DISPOSE OF LITTER FROM THE ROW, EXCLUDING THE TRAVELED LANES AND INSIDE SHOULDERS.

SUMMARY OF LOCATIONS

FILE: $FILES$
DATE: $DATE$
PROJECT: CSJ

			1 of 1
FED. RD. DIV. NO.	MAINTENANCE PROJECT NO.		SHEET NO.
6	6374-52-001		34
STATE	DIST. NO.	COUNTY	
TEXAS	12	HARRIS/GAL	
CONT	SECT.	JOB	HIGHWAY NO.
6375	52	001	IH 45

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. As shown on BC(2), the OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER (see Sign Detail G20-10T) and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. However, the TRAFFIC FINES DOUBLE sign will not be required on projects consisting solely of mobile operation work, such as striping or milling edgeline rumble strips. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits.

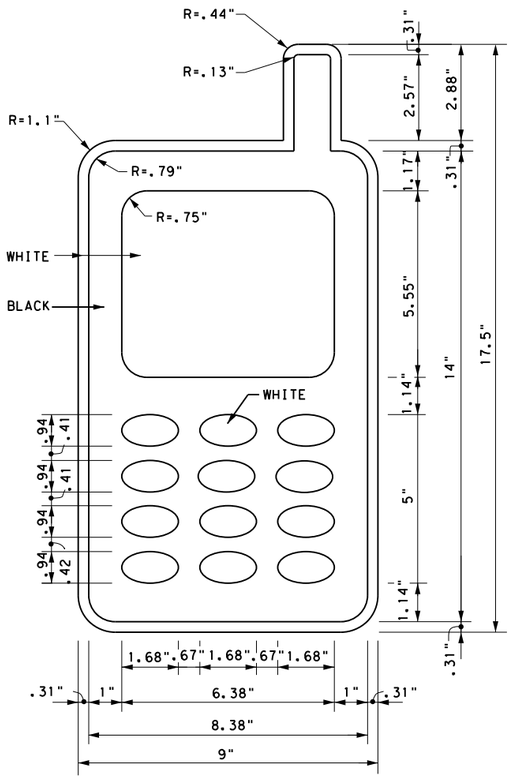
11. Except for devices required by Note 10, traffic control devices should be in place only while work is actually in progress or a definite need exists.

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 APPAREL 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.



3.0" Radius, 1.25" Border, 0.75" Indent, Black on Yellow;
[STAY ALERT] Font: D
3.0" Radius, 1.25" Border, 0.75" Indent, Black on Orange;
[TALK OR TEXT LATER] Font: C specified length;

SIGN DETAIL (G20-10T)

Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found on-line at the web address given below or by contacting:

Texas Department of Transportation
Traffic Operations Division - TE
Phone (512) 416-3118

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 Operations Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-14

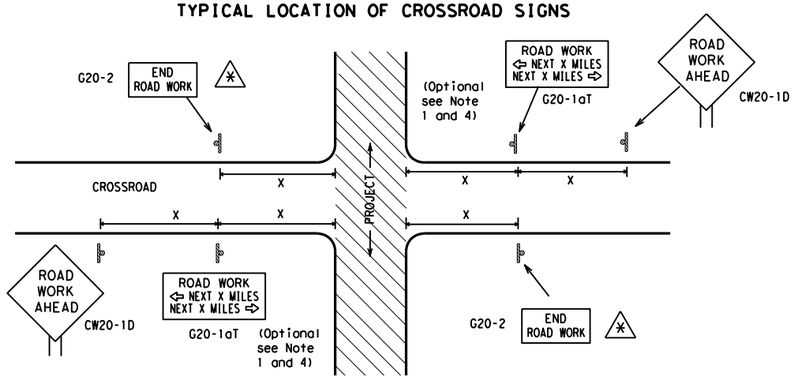
FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 5-10 8-14 9-07 7-13	6375	52	001	IH45
	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		35

95

FILE: h:\00maintenance\south harris maintenance\2020 contracts\6357-02-001
DATE: 1/4/2021
PROJECT: 6375-52-001

FILE: h:\00maintenance\south harris maintenance\2020 contracts\6357-02-001
DATE: 1/4/2021
PROJECT: 6375-52-001

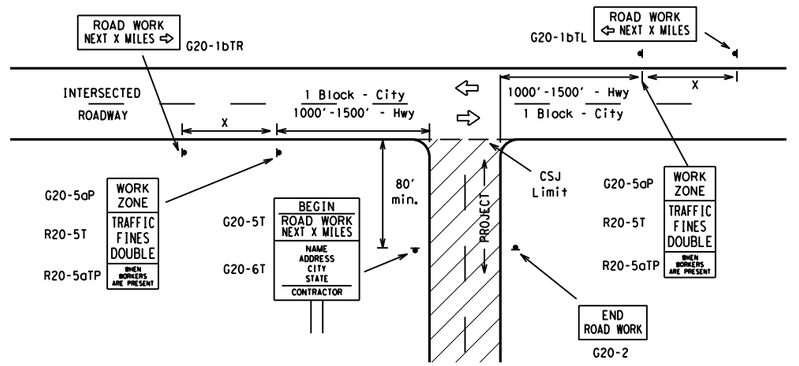
TYPICAL LOCATION OF CROSSROAD SIGNS



(*) 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. 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" (Δ)
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]

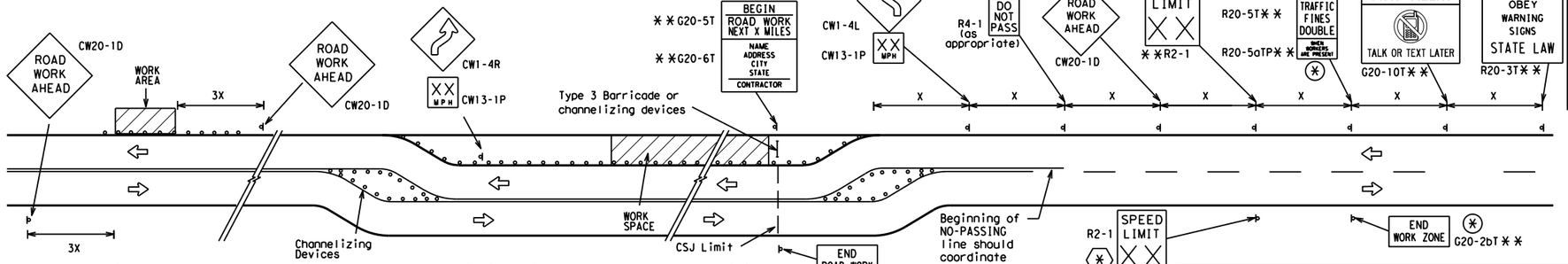
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

Δ 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. See Note 2 under "Typical Location of Crossroad Signs".
5. Only diamond shaped warning sign sizes are indicated.
6. See sign size listing in "TMUTCD", Sign Appendix or the "Standard Highway Sign Designs for Texas" manual for complete list of available sign design sizes.

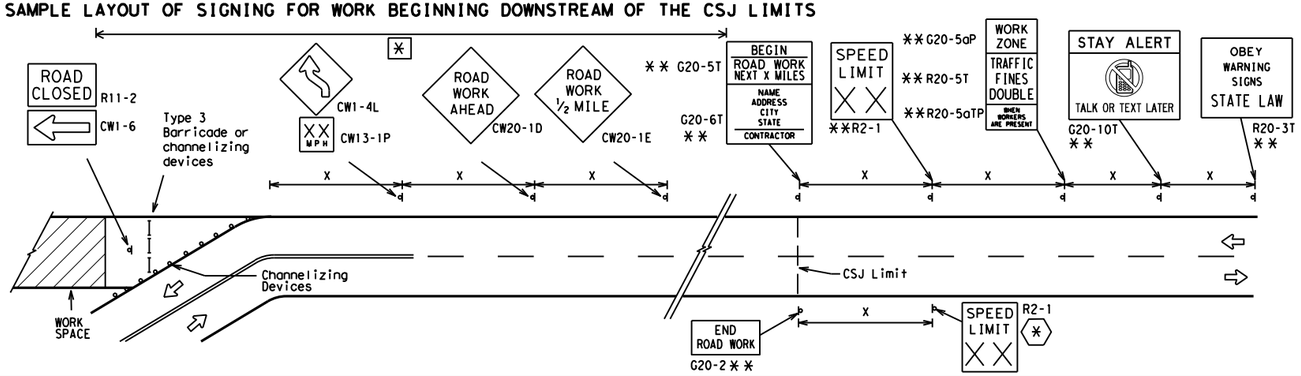
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

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



NOTES

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

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

** Required CSJ Limit signing. See Note 10 on BC(1). TRAFFIC FINES DOUBLE signs will not be required on projects consisting solely of mobile operations work.

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

(*) Contractor will install a regulatory speed limit sign at the end of the work zone.

LEGEND

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

SHEET 2 OF 12

Texas Department of Transportation — Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	12	HARRIS/GAL		36

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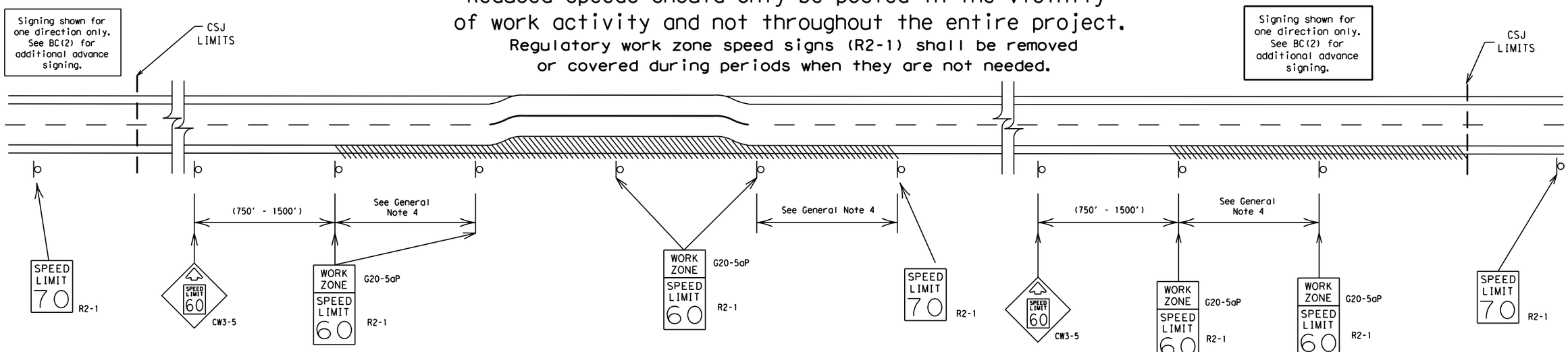
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-14

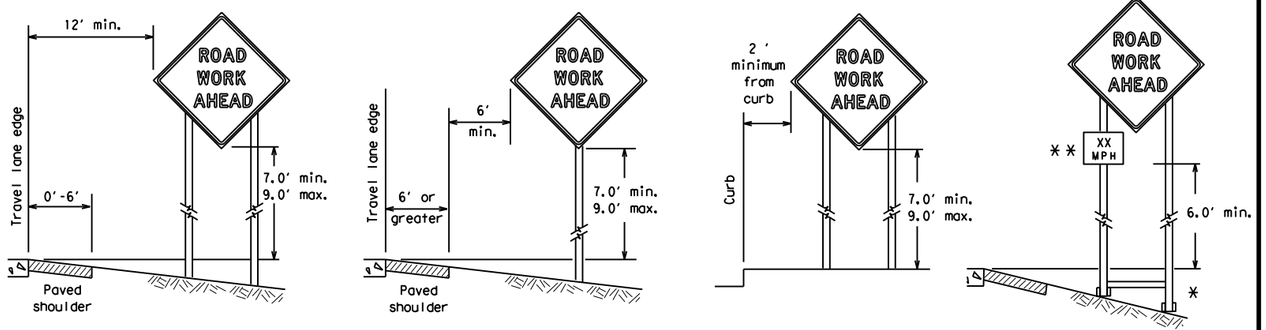
FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13	6375	52	001	IH45
	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		37

97

FILE: h:\00xmaintenance\south harris maintenance\2020 contracts\6357-02-001
DATE: 1/4/2021
PROJECT: 6375-52-001

FILE: h:\00maintenance\south harris maintenance\2020 contracts\6357-02
DATE: 1/4/2021
PROJECT: 6375-52-001

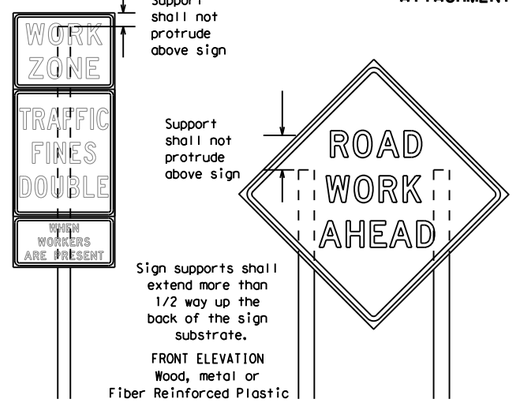
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

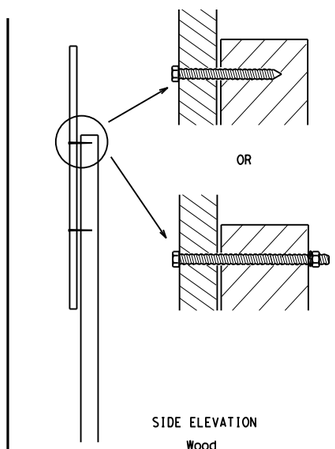


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





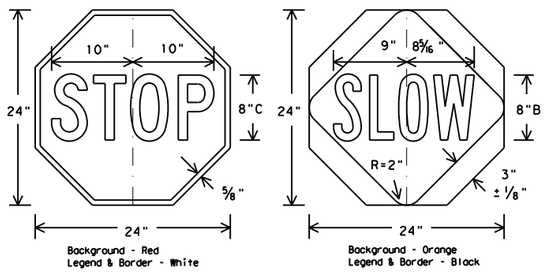
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

1. STOP/SLOW paddles are the primary method to control traffic by flaggers. The STOP/SLOW paddle size should be 24" x 24" as detailed below.
2. When used at night, the STOP/SLOW paddle shall be retroreflectorized.
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.



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, 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.
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 sheets or the CWZTCD. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards 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). The Contractor shall install the sign support in accordance with the manufacturer's recommendations. If there is a question regarding installation procedures, the Contractor shall furnish the Engineer a copy of the manufacturer's installation recommendations so the Engineer can verify the correct procedures are being followed.
7. The Contractor is responsible for installing signs on approved supports and replacing signs with damaged or cracked substrates and/or damaged or marred reflective sheeting as directed by the Engineer/Inspector.
8. Identification markings may be shown only on the back of the sign substrate. The maximum height of letters and/or company logos used for identification shall be 1 inch.
9. The Contractor shall replace damaged wood posts. New or damaged wood sign posts shall not be spliced.

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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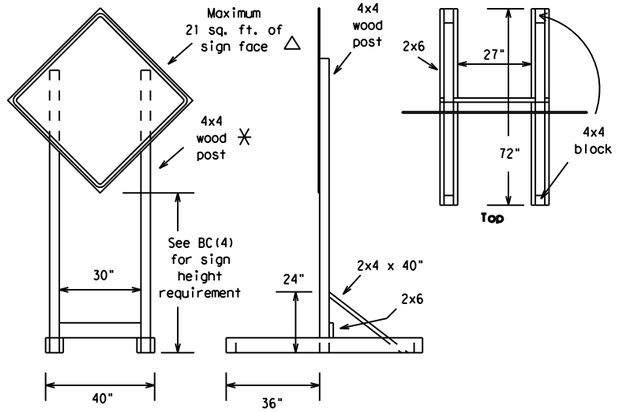
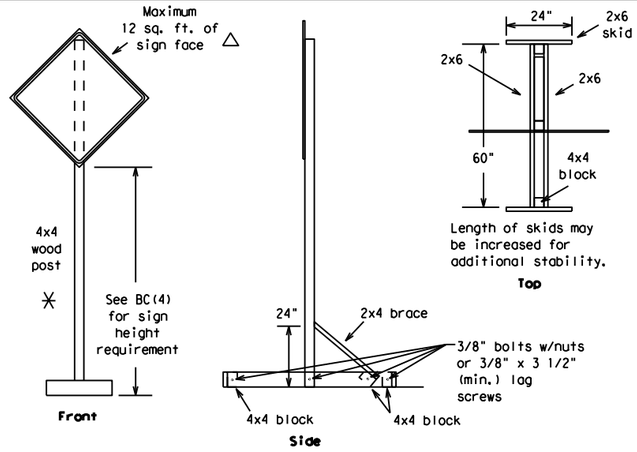
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	12	HARRIS/GAL		38

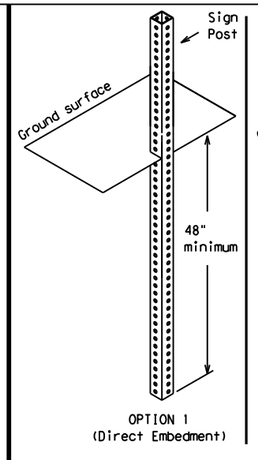
98

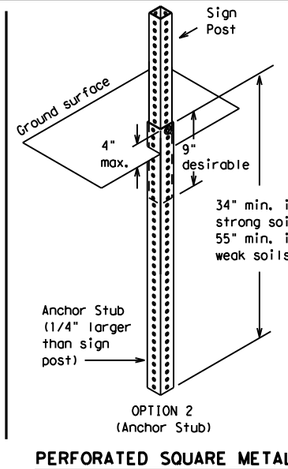


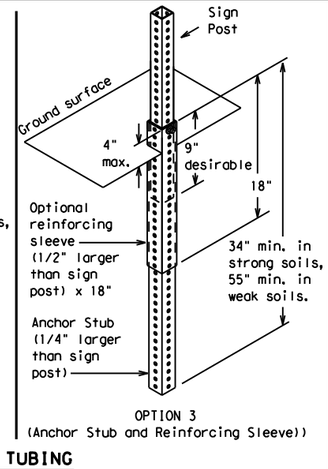


SKID MOUNTED WOOD SIGN SUPPORTS

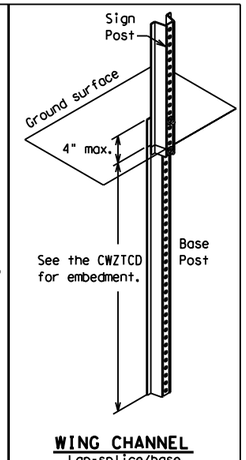
LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS □







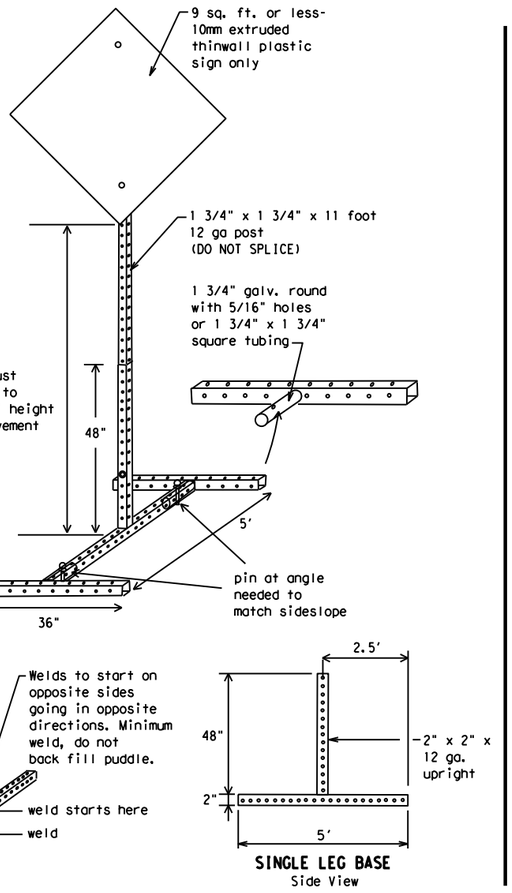
PERFORATED SQUARE METAL TUBING

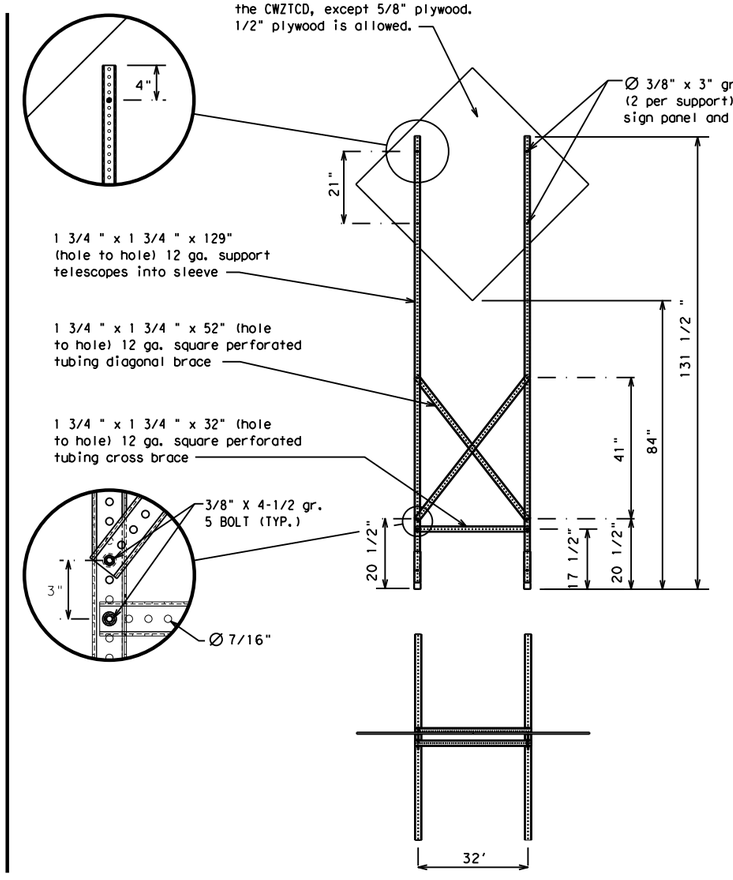


WING CHANNEL
Lap-splice/base bolted anchor

GROUND MOUNTED SIGN SUPPORTS

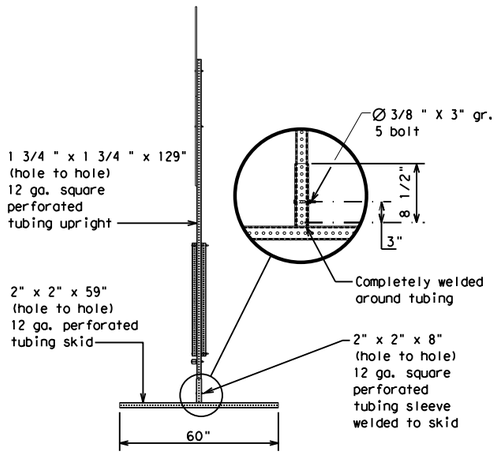
Refer to the CWZTCD and the manufacturer's installation procedure for each type sign support.
The maximum sign square footage shall adhere to the manufacturer's recommendation.
Two post installations can be used for larger signs.





Nominal Post Size	Number of Posts	Maximum Sq. feet of Sign Face	Minimum Soil Embedment	Drilled Hole(s) Required
4 x 4	1	12	36"	NO
4 x 4	2	21	36"	NO
4 x 6	1	21	36"	YES
4 x 6	2	36	36"	YES

WOOD POST SYSTEM FOR GROUND MOUNTED SIGN SUPPORTS



SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	12	HARRIS/GAL		39

FILE: h:\00xmaintenance\south harris maintenance\2020 contracts\6357-02-001
DATE: 1/4/2021
PROJECT: 6375-52-001

FILE: h:\00xmaintenance\south harris maintenance\2020 contracts\6357-02-001
DATE: 1/4/2021
PROJECT: 6375-52-001

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

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

** 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 Operations Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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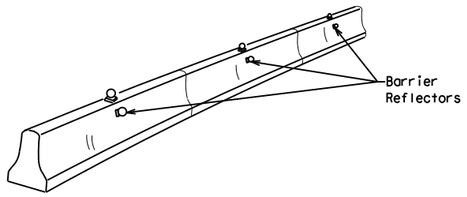
7-13	12	HARRIS/GAL		40

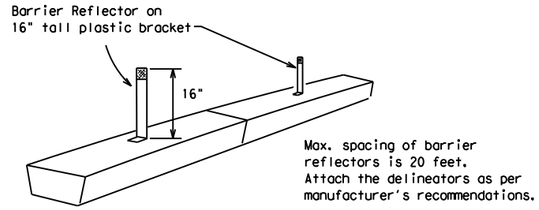
100

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.

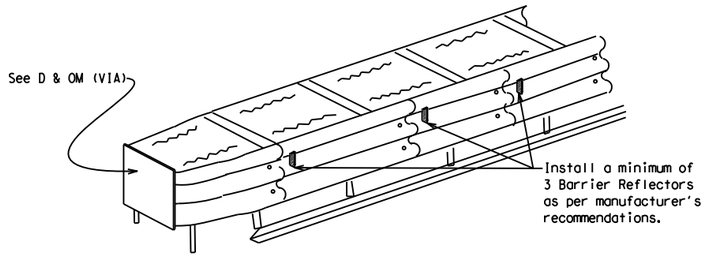


CONCRETE TRAFFIC BARRIER (CTB)

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.



LOW PROFILE CONCRETE BARRIER (LPCB)

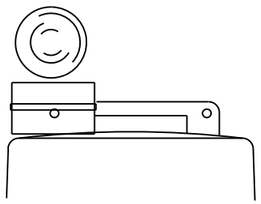


DELINEATION OF END TREATMENTS

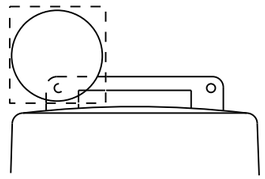
END TREATMENTS FOR CTB'S USED IN WORK ZONES

End treatments used on CTB's in work zones shall meet crashworthy standards as defined in the National Cooperative Highway Research Report 350. Refer to the CWZTCD List for approved end treatments and manufacturers.

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

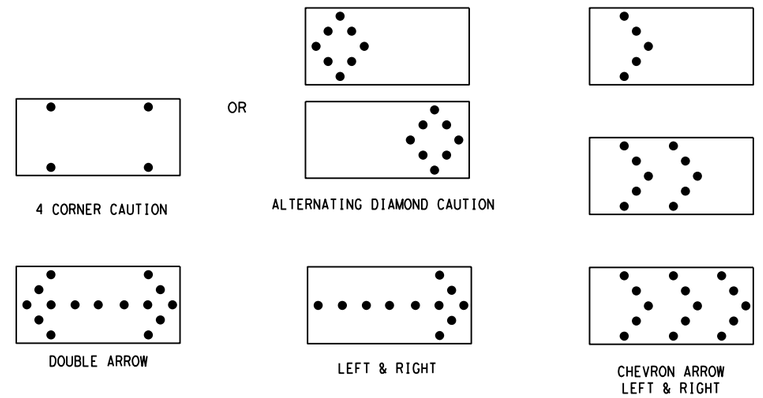
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

1. Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the National Cooperative Highway Research Report No. 350 (NCHRP 350) or the Manual for Assessing Safety Hardware (MASH).
2. Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
3. Refer to the CWZTCD for a list of approved TMAs.
4. TMAs are required on freeways unless otherwise noted in the plans.
5. A TMA should be used anytime that it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the work performance.
6. The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is an extended distance from the TMA.

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

BC(7)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	12	HARRIS/GAL		41

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DATE: 1/4/2021
PROJECT: 6375-52-001

FILE: h:\00maintenance\south harris maintenance\2020 contracts\6357-02
DATE: 1/4/2021
PROJECT: 6375-52-001

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:

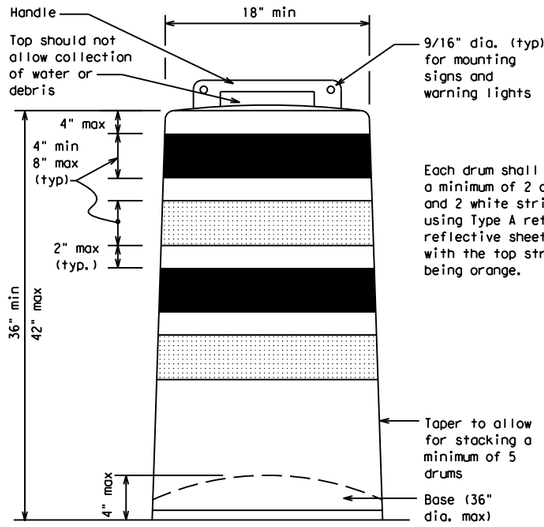
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

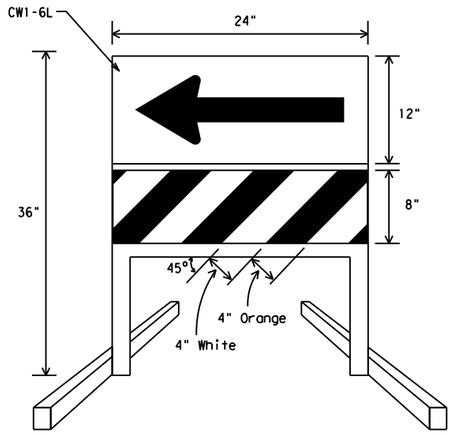
RETROREFLECTIVE SHEETING

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 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

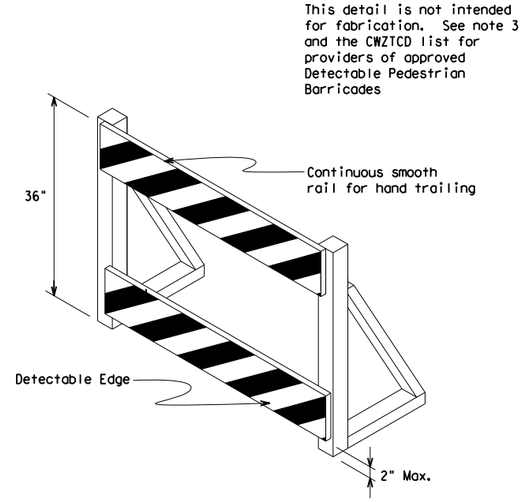
1. Unballasted bases shall be large enough to hold up to 50 lbs. of sand. This base, when filled with the ballast material, should weigh between 35 lbs (minimum) and 50 lbs (maximum). The ballast may be sand in one to three sandbags separate from the base, sand in a sand-filled plastic base, or other 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.





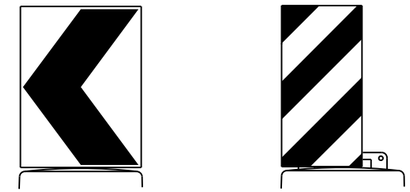
DIRECTION INDICATOR BARRICADE

1. The Direction Indicator Barricade may be used in tapers, transitions, and other areas where specific directional guidance to drivers is necessary.
2. If used, the Direction Indicator Barricade should be used in series to direct the driver through the transition and into the intended travel lane.
3. The Direction Indicator Barricade shall consist of One-Direction Large Arrow (CW1-6) sign in the size shown with a black arrow on a background of Type B_{FL} or Type C_{FL} Orange retroreflective sheeting above a rail with Type A retroreflective sheeting in alternating 4" white and orange stripes sloping downward at an angle of 45 degrees in the direction road users are to pass. Sheeting types shall be as per DMS 8300.
4. Double arrows on the Direction Indicator Barricade will not be allowed.
5. Approved manufacturers are shown on the CWZTCD List. Ballast shall be as approved by the manufacturers instructions.



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.
2. Where pedestrians with visual disabilities normally use the closed sidewalk, a device that is detectable by a person with a visual disability traveling with the aid of a long cane shall be placed across the full width of the closed sidewalk.
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 for Buildings and Facilities (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 may use 8" nominal barricade rails as shown on BC(10) provided that the top rail provides a smooth continuous rail suitable for hand trailing with no splinters, burrs, or sharp edges.



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

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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

1. Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
2. Chevrons and other work zone signs with an orange background shall be manufactured with Type B_{FL} or Type C_{FL} Orange sheeting meeting the color and retroreflectivity requirements of DMS-8300, "Sign Face Material," unless otherwise specified in the plans.
3. Vertical Panels shall be manufactured with orange and white sheeting meeting the requirements of DMS-8300 Type A 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 Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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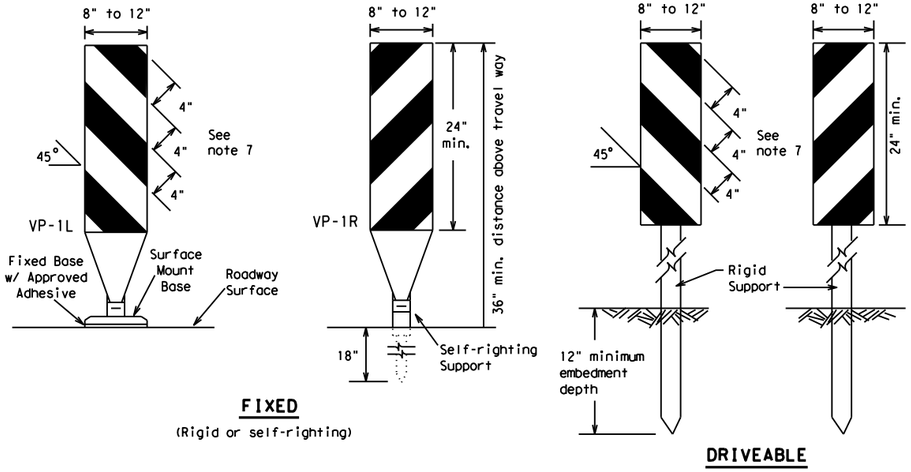
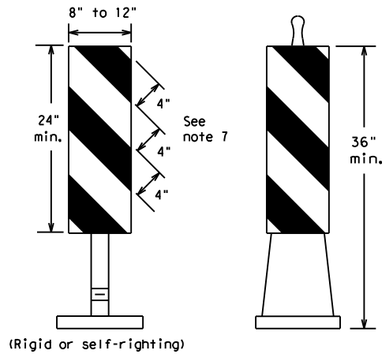


FIXED
(Rigid or self-righting)

DRIVEABLE

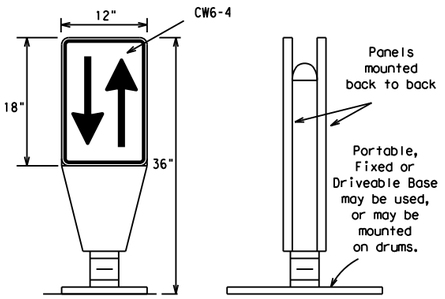


(Rigid or self-righting)

PORTABLE

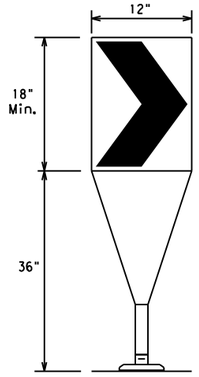
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is required. The Engineer/Inspector shall refer to the Roadway Design Manual Appendix B "Treatment of Pavement Drop-offs in Work Zones" for additional guidelines on the use of 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 conforming to Departmental Material Specification DMS-8300, unless noted otherwise.
7. Where the height of reflective material on the vertical panel is 36 inches or greater, a panel stripe of 6 inches shall be used.

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



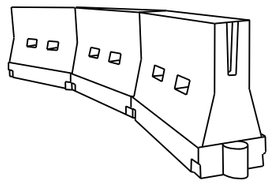
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

1. LCDs are crashworthy, lightweight, deformable devices that are highly visible, have good target value and can be connected together. They are not designed to contain or redirect a vehicle on impact.
2. LCDs may be used instead of a line of cones or drums.
3. LCDs shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. LCDs should not be used to provide positive protection for obstacles, pedestrians or workers.
5. LCDs shall be supplemented with retroreflective delineation as required for temporary barriers on BC(7) when placed roughly parallel to the travel lanes.
6. LCDs used as barricades placed perpendicular to traffic should have at least one row of reflective sheeting meeting the requirements for barricade rails as shown on BC(10) placed 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 NCHRP 350 crashworthiness requirements based on roadway speed and barrier application.
2. Water ballasted systems used to channelize vehicular traffic shall be supplemented with retroreflective delineation or channelizing devices to improve daytime/nighttime visibility. They may also be supplemented with pavement markings.
3. Water ballasted systems used as barriers shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. Water ballasted systems used as barriers should not be used for a merging taper except in low speed (less than 45 MPH) urban areas. When used on a taper in a low speed urban area, the taper shall be delineated and the taper length should be designed to optimize road user operations considering the available geometric conditions.
5. When water ballasted systems used as barriers have blunt ends exposed to traffic, they should be attenuated as per manufacturer recommendations or flared to a point outside the clear zone.

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

Texas Department of Transportation | Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

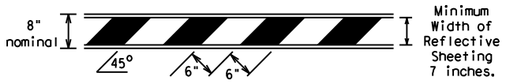
BC(9)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13	6375	52	001	IH45
	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		43

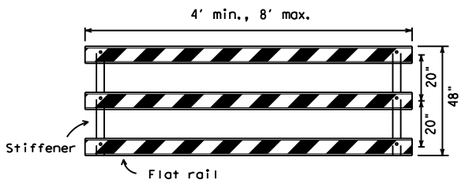
TYPE 3 BARRICADES

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 conforming to Departmental Material Specification DMS-8300 unless otherwise noted.

Barricades shall NOT be used as a sign support.



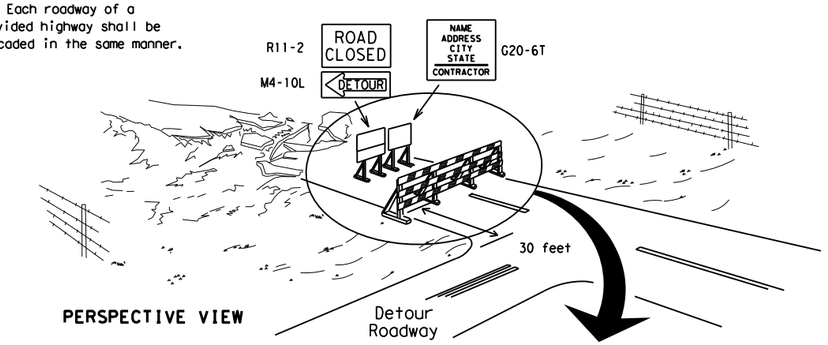
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

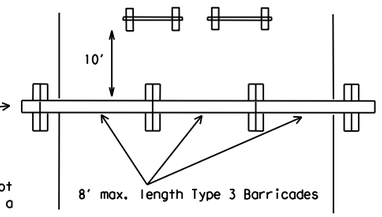
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

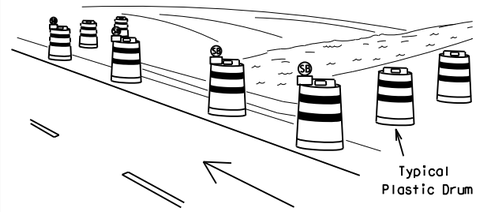
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

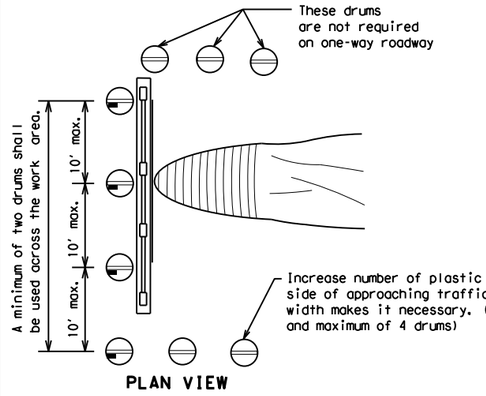
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

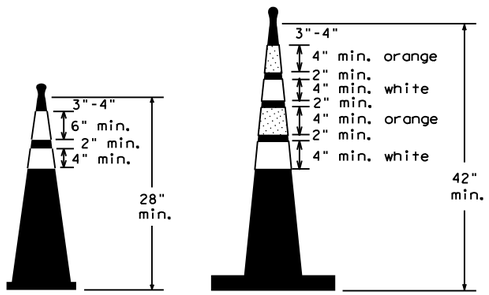
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



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

PLAN VIEW

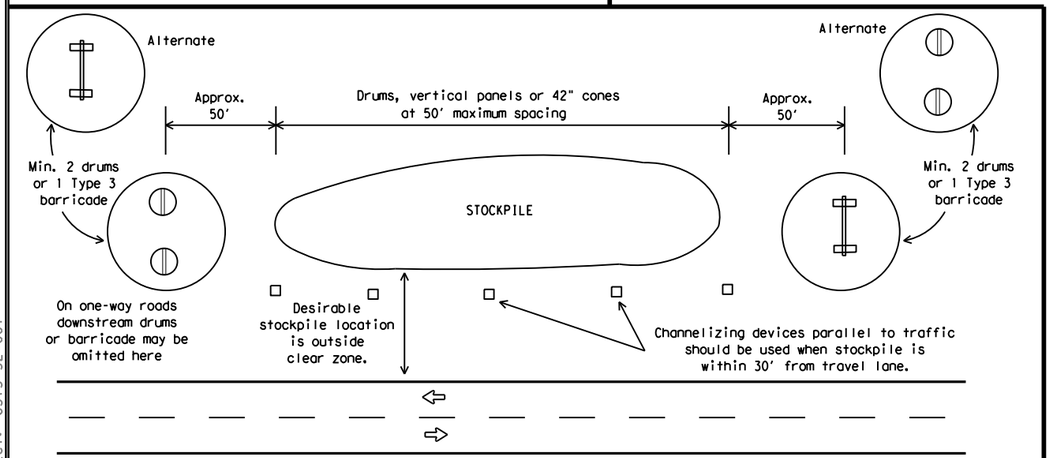
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

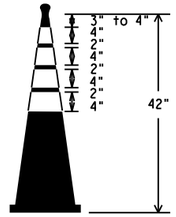
42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

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 used at night 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.
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

THIS DEVICE SHALL NOT BE USED ON PROJECTS LET AFTER MARCH 2014.



EDGELINE CHANNELIZER

1. This device is intended only for use in place of a vertical panel to channelize traffic by indicating the edge of the travel lane. It is not intended to be used in transitions or tapers.
2. This device shall not be used to separate lanes of traffic (opposing or otherwise) or warn of objects.
3. This device is based on a 42 inch, two-piece cone with an alternate striping pattern: four 4 inch retroreflective bands, with an approximate 2 inch gap between bands. The color of the band should correspond to the color of the edgeline (yellow for left edgeline, white for right edgeline) for which the device is substituted or for which it supplements. The reflectorized bands shall be retroreflective Type A conforming to Departmental Material Specification DMS-8300, unless otherwise noted.
4. The base must weigh a minimum of 30 lbs.

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-14

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	DIST	COUNTY		SHEET NO.
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DATE: 1/4/2021
PROJECT: 6375-52-001

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DATE: 1/4/2021
PROJECT: 6375-52-001

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.

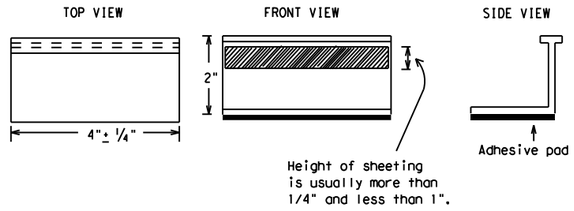
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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).

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BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-14

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1-02 7-13	12	HARRIS/GAL		45
11-02 8-14				

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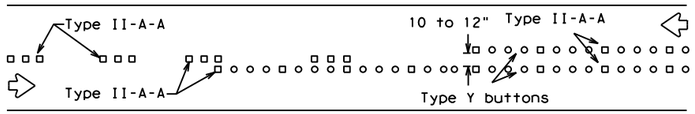
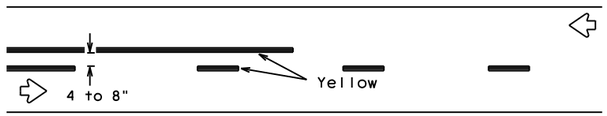
DATE: 1/4/2021
PROJECT: 6375-52-001

PAVEMENT MARKING PATTERNS

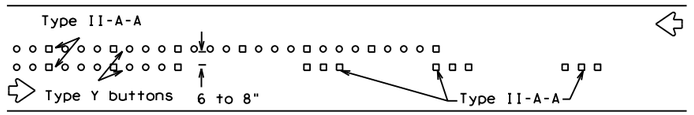
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



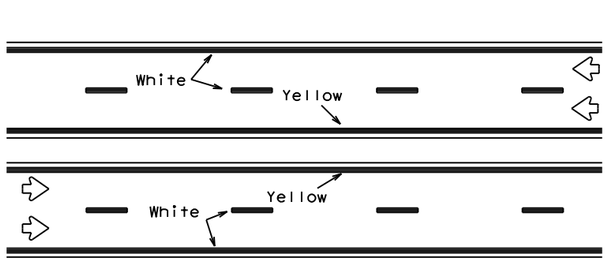
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



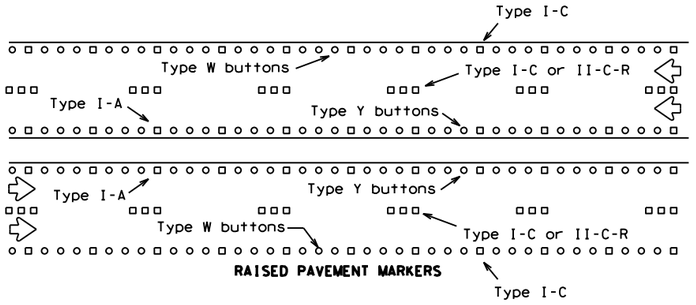
RAISED PAVEMENT MARKERS - PATTERN B

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



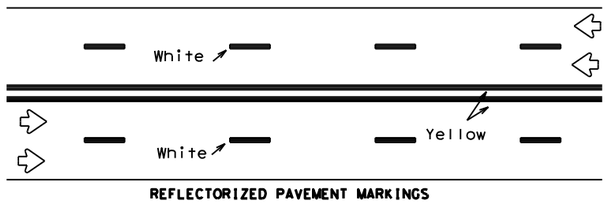
REFLECTORIZED PAVEMENT MARKINGS



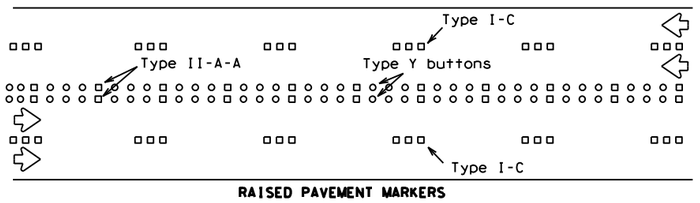
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



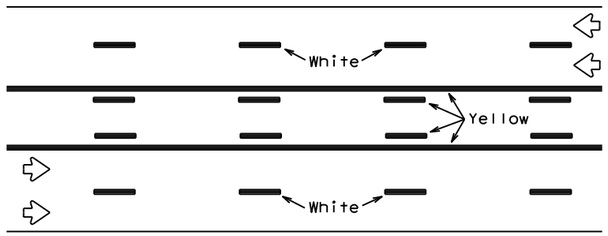
REFLECTORIZED PAVEMENT MARKINGS



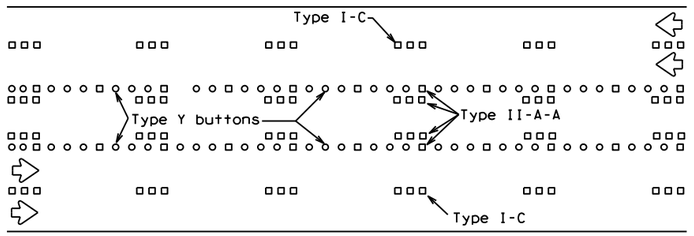
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

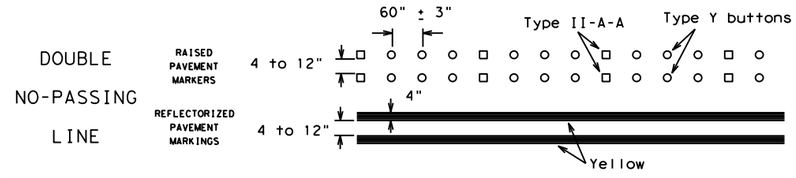
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

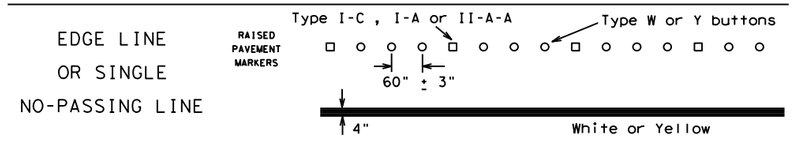
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

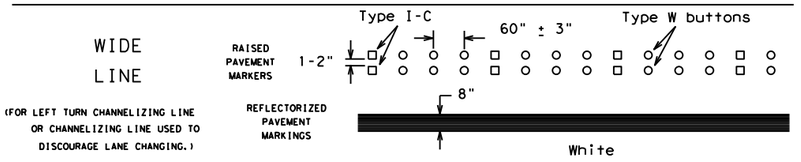


EDGE LINE OR SINGLE NO-PASSING LINE



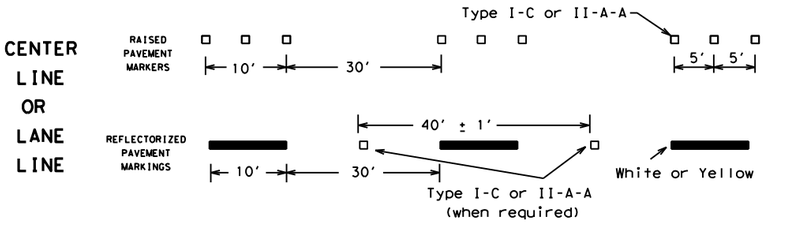
WIDE LINE

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

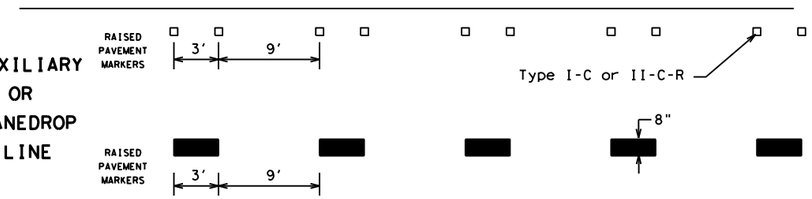


BROKEN LINES

CENTER LINE OR LANE LINE

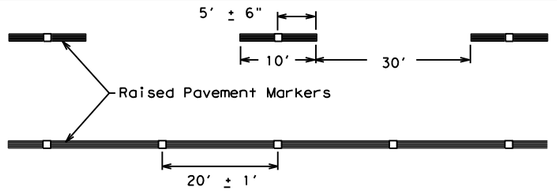


AUXILIARY OR LANEDROP LINE



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 Operations Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
1-97 9-07	DIST	COUNTY		SHEET NO.
2-98 7-13	12	HARRIS/GAL		46
11-02 8-14				

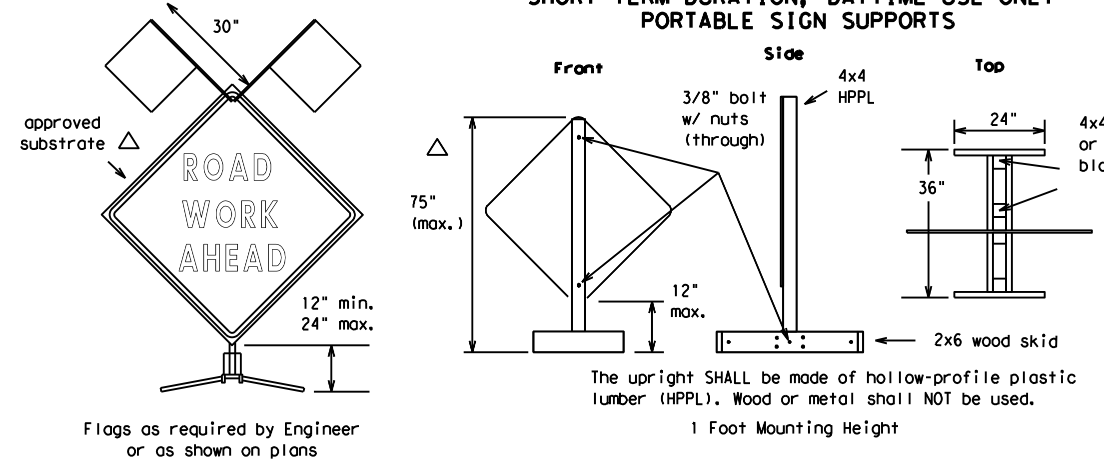
106

FILE: h:\00*maintenance\south harris...\rstcp05.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001

EXAMPLES OF SIGN SUPPORTS

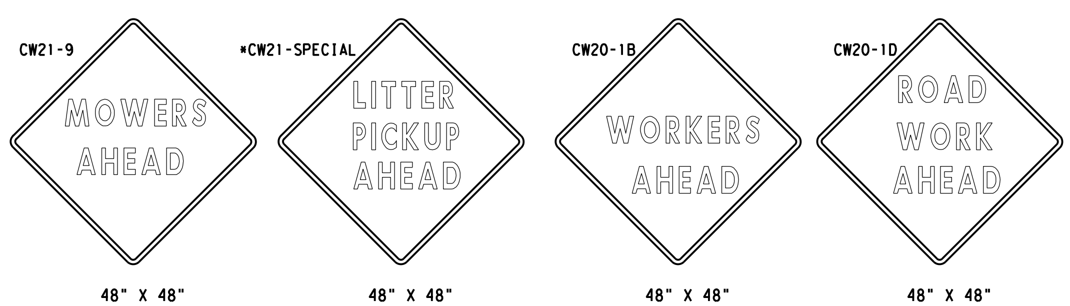
△ See the CWZTCD for the type of sign substrate that can be used for each approved sign support.

SHORT TERM DURATION, DAYTIME USE ONLY PORTABLE SIGN SUPPORTS



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

Nails will NOT be allowed.



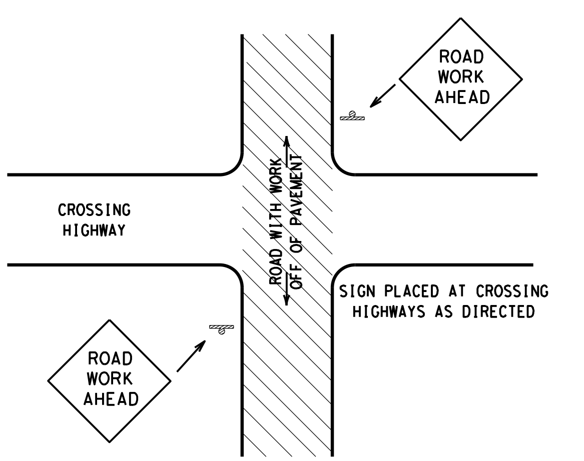
SIGN IN ACCORDANCE WITH THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS

MOWERS AHEAD SIGNS ARE USED FOR MOWING OPERATIONS.

LITTER PICKUP AHEAD, ROAD WORK AHEAD AND WORKER AHEAD SIGNS ARE USED AS DIRECTED FOR OTHER MAINTENANCE OPERATIONS WHEN ALL WORK OCCURS OFF OF THE PAVED HIGHWAY SURFACE.

ROLL-UP SIGNS CONFORMING TO DMS-8310 AND THE CWZTCD ALLOWED

*Letter dimensions and spacing for "CW21-SPECIAL" is the same as C20-1D)



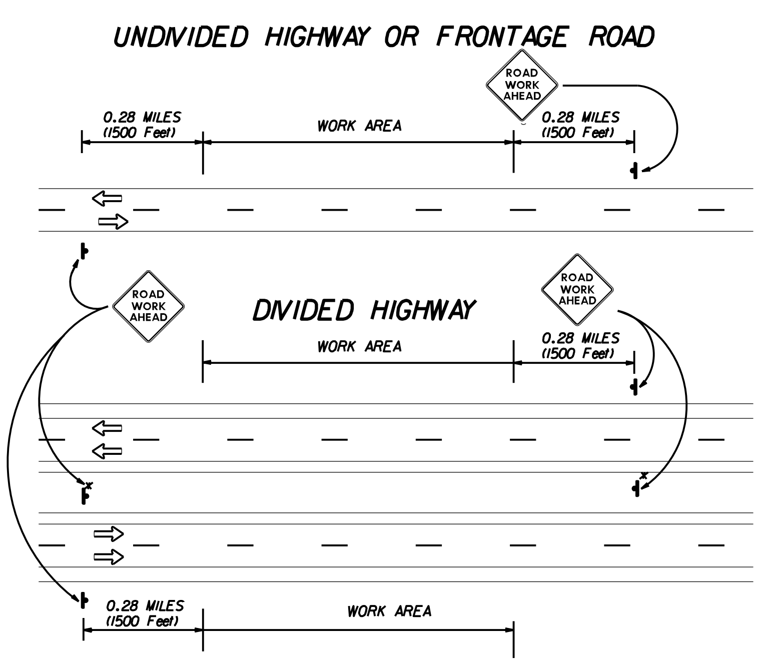
TYPICAL LOCATION OF SIGNS AT HIGHWAY CROSSING

WORK AREA IS A MAXIMUM OF 2.0 MILES UNLESS OTHERWISE DIRECTED. SIGNS MAY REMAIN IN PLACE ONLY DURING DAYLIGHT HOURS.

SIGNS ARE TO BE PLACED 6' TO 12' OFF OF THE PAVED SURFACE UNLESS OTHERWISE DIRECTED.

ROAD WORK AHEAD SIGNS SHOWN AS EXAMPLES. ONE OF THE FOUR TYPE SIGNS WILL BE USED AS DIRECTED.

* *SIGNS IN THE MEDIAN ARE REQUIRED WHEN WORK OCCURS IN MEDIAN*



TRAFFIC CONTROL PLAN FOR WORK OFF OF THE PAVED SURFACE.

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. Nails shall NOT be used to attach signs to any support.
5. All signs shall be installed in accordance with the plans or as directed by the Engineer. Signs shall be used to regulate, warn, and guide the traveling public safely through the work zone.
6. 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. The additional signs requested by the Engineer/Inspector shall not be subsidiary.
7. The Contractor shall furnish sign supports listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD). 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 that the Engineer can verify the correct procedures are being followed.
8. The Contractor is responsible for sign installations and replacing signs with damaged or cracked substrates and/or damaged or marred reflective sheeting as directed by the Engineer/Inspector.
9. Identification markings may be shown only on the back of the sign substrate. The maximum height of letters and/or company logos used for identification shall be 1".
10. 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 VI)

1. The Contractor is responsible for ensuring the sign support and substrate meets crashworthiness. For mowing operation all signs and supportS are Short-term Duration for daytime work.
2. The Contractor shall furnish the sign sizes shown on this sheet or as directed by the Engineer.

SIGN SUBSTRATES

1. The Contractor shall ensure that the sign substrate is allowed 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.
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 faces.

REFLECTIVE SHEETING

1. Reflectorized signs shall be constructed of sheeting meeting the color and retro-reflectivity requirements of DMS-8300 or DMS-8310. The DMS specifications can be accessed from the following web address:
   http://manuals.dot.state.tx.us:80/dynaweb/colmates/@Generic__CollectionView;cs=default;ts=default
2. White sheeting, meeting the requirements of DMS-8300 Type C (High Specific Intensity), shall be used for signs with white background and channelizing devices.
3. Orange sheeting, meeting the requirements of DMS-8300 Type E (Fluorescent Prismatic), shall be used for 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. Signs should be removed or completely covered when not mowing.
2. Duct tape or other adhesive material shall NOT be affixed to a sign face.
3. Signs and supports shall be removed by the end of the day.

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 is recommended.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects will not be permitted for use as sign support weights.
4. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs.
5. Sandbags shall be made of a durable material that tears upon vehicular impact.
6. Rubber (such as tire inner tubes) shall NOT be used for sandbags.
7. Rubber ballasts (such as those used with cones or edgeline channelizers) shall NOT be used as sign support weights.
8. 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 supports.
9. Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

Any sign, sign support or traffic control device that is struck or damaged by the Contractor or his/her construction equipment shall be replaced or repaired as soon as possible by the Contractor at the Contractor's expense.

Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be obtained by contacting:

Standards Engineer
Traffic Operations Division - TE
Texas Department of Transportation
125 East 11th Street
Austin, Texas 78701-2483
Phone (512) 416-3120
Fax (512) 416-3299

Instructions to locate the "CWZTCD" on TxDOT website are:

Start at website - www.dot.state.tx.us
Click on "About TxDOT",
Click on "Organizational Chart",
Click on Traffic Operations Box,
Click on "Compliant Work Zone Traffic Control Devices",
Click on "View PDF".
This site is printable.

Texas Department of Transportation
Maintenance Division Standard Plans

ROADSIDE TRAFFIC CONTROL PLAN

SHEET 1 OF 1 | RS-TCP-05 | NOT TO SCALE

FILE: RSTCP05.DGN	DN: LJB	CK: JG	DW: -	CK: -	NEG NO.:
© TxDOT February 2005	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT		SHEET
REVISED: September 17, 2004	12	6	RMC 6375-52-001		47
REVISED: FEBRUARY 2, 2005 Sign placement in TCP	COUNTY		CONTROL	SECTION JOB	HIGHWAY
REVISED:	HARRIS/GAL		6375	52 001	IH45

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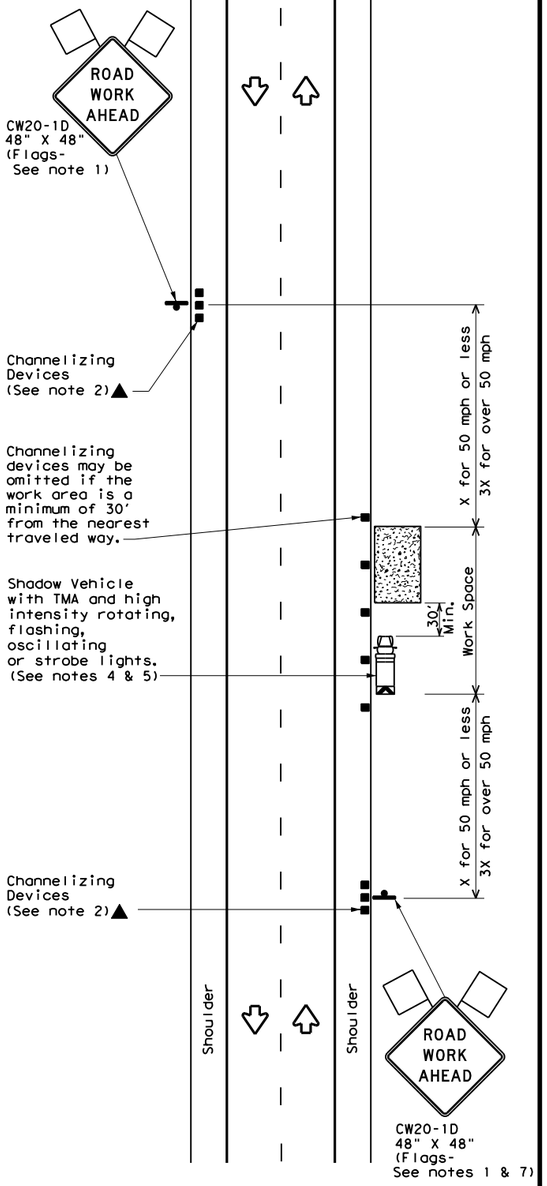
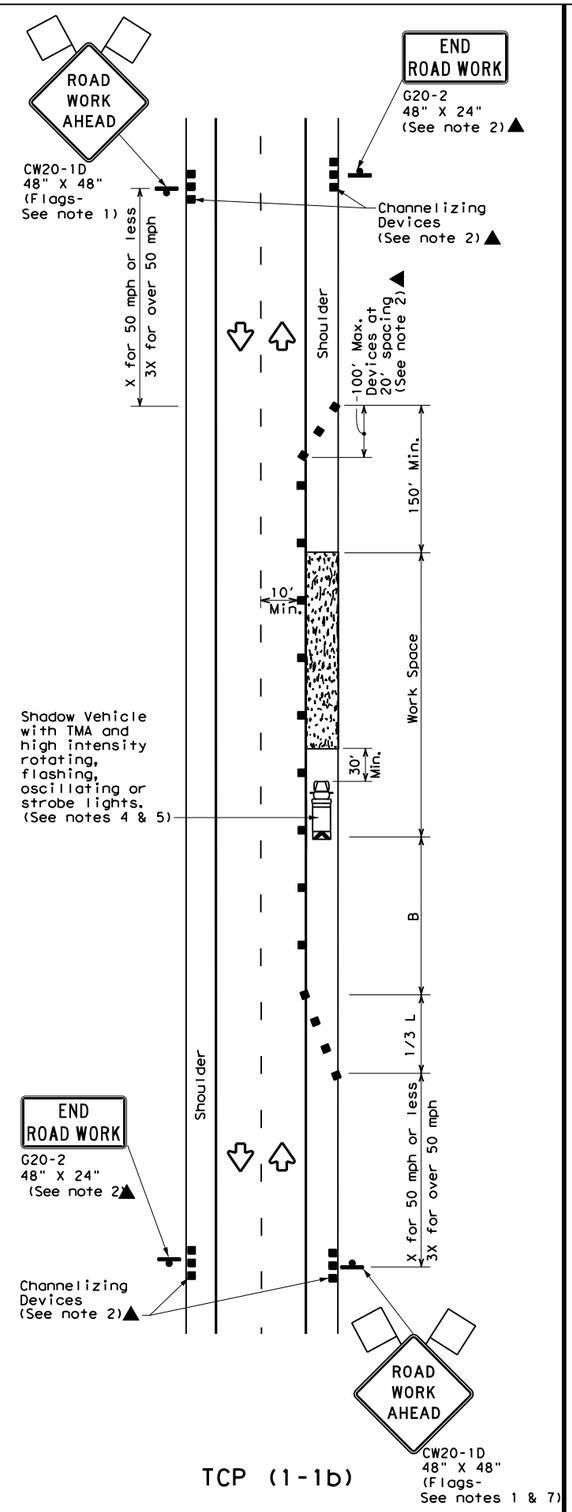
DATE: 1/4/2021
PROJECT: 6375-52-001



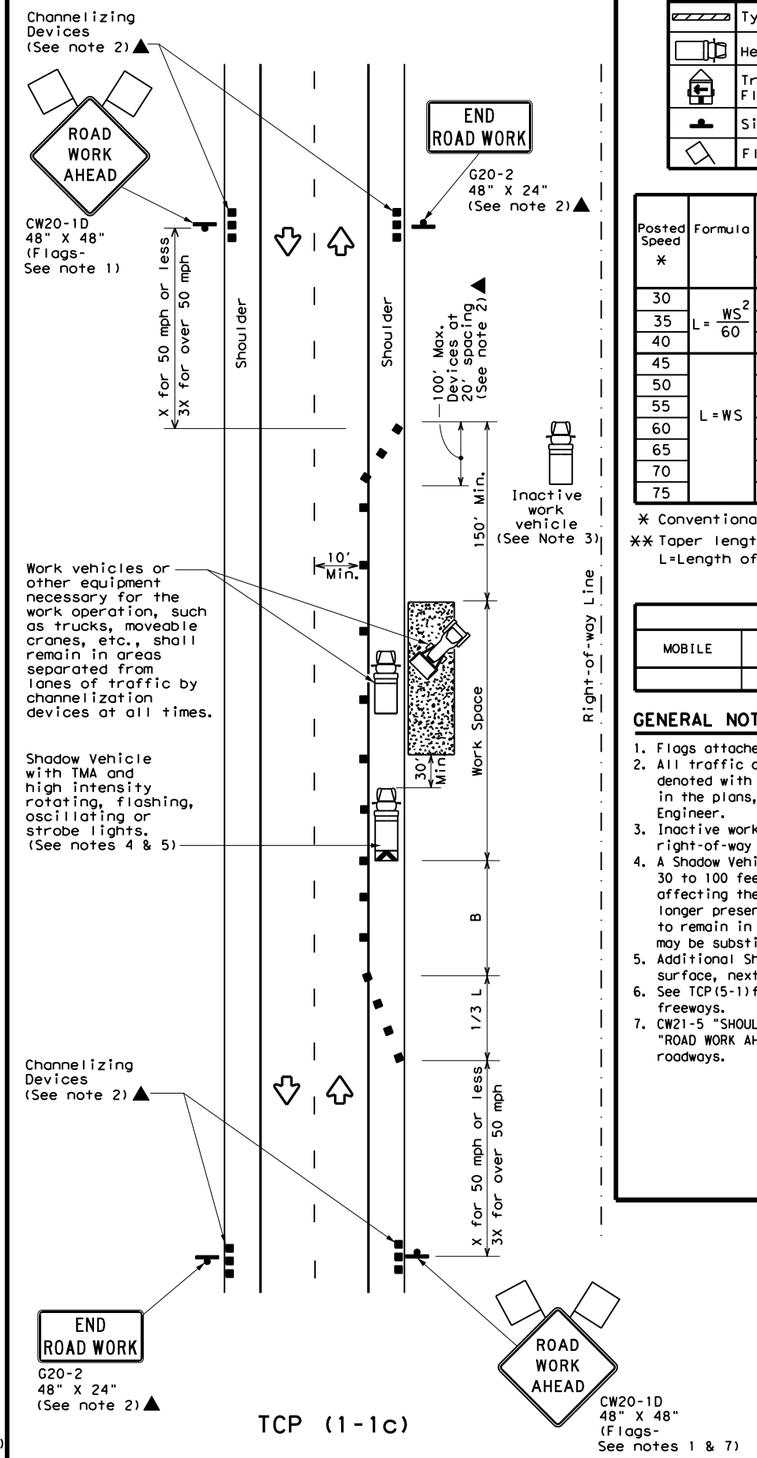
TCP (1-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (1-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (1-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
4. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
6. See TCP(5-1)for shoulder work on divided highways, expressways and freeways.
7. CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(1-1)-18

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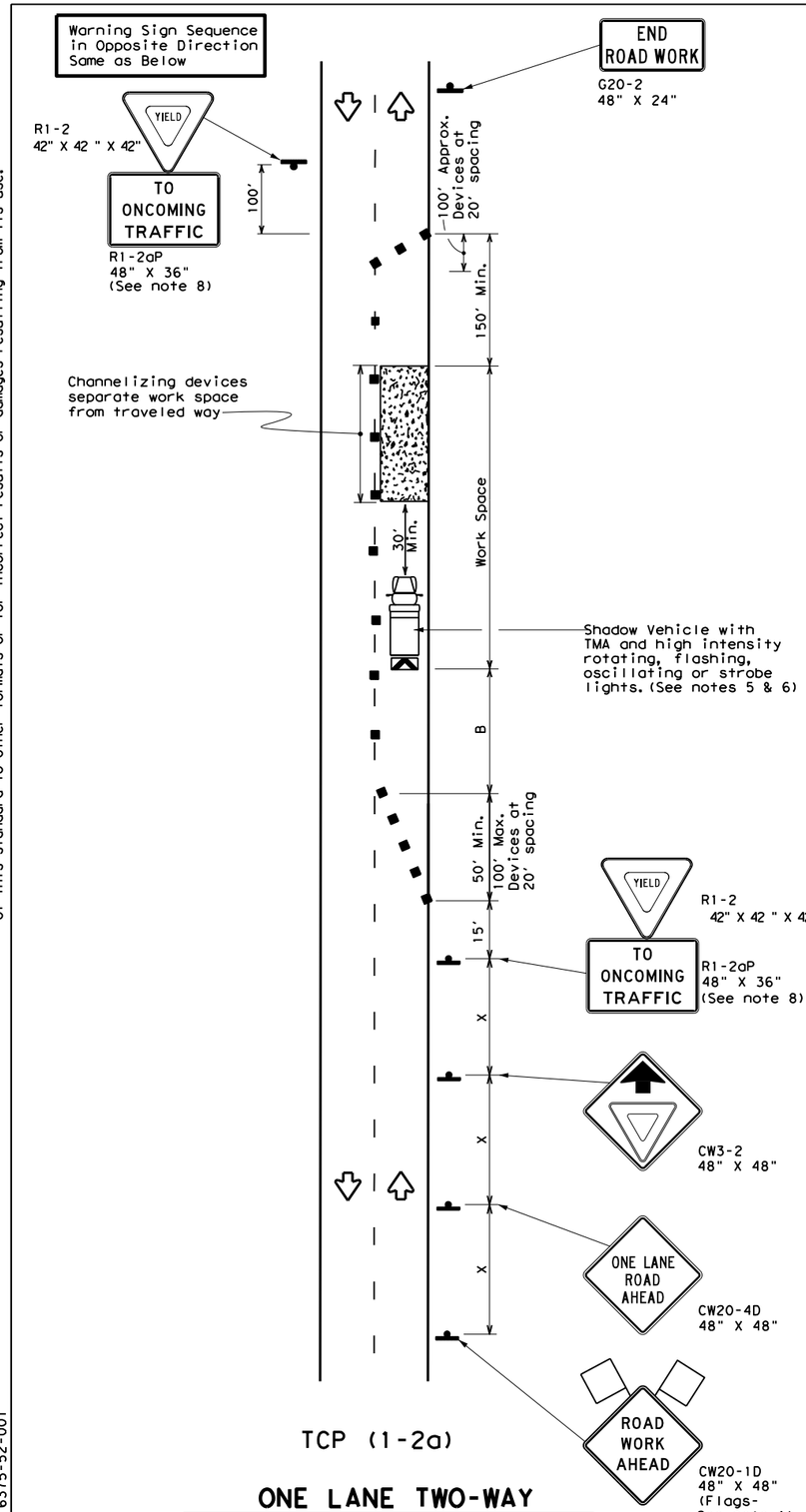
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98	6375	52	001	IH45
8-95 2-12	DIST	COUNTY		SHEET NO.
1-97 2-18	12	HARRIS/GAL		48

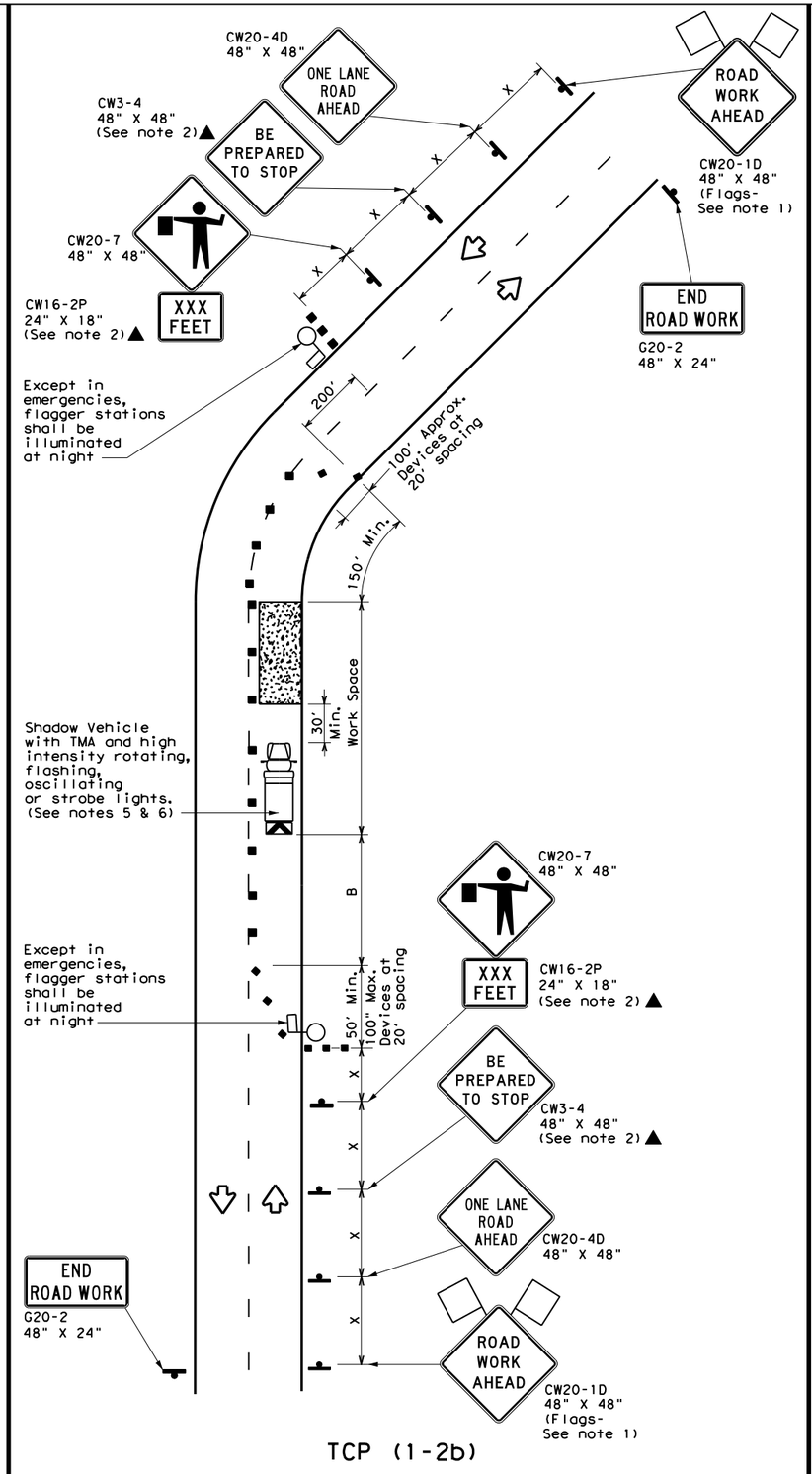
151

FILE: h:\00xmaintenance\south harris maintenance\2020 contracts\6357-02-001 Miscellaneous\tcp1-2-18.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001



TCP (1-2a)

ONE LANE TWO-WAY
CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See note 7)



TCP (1-2b)

ONE LANE TWO-WAY
CONTROL WITH FLAGGERS

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

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

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

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4D "ONE LANE ROAD AHEAD" sign, but proper sign spacing shall be maintained.
4. Sign spacing may be increased or an additional CW20-1D "ROAD WORK AHEAD" sign may be used if advance warning ahead of the flagger or R1-2 "YIELD" sign is less than 1500 feet.
5. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
6. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.

TCP (1-2a)

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

TCP (1-2b)

9. Flaggers should use two-way radios or other methods of communication to control traffic.
10. Length of work space should be based on the ability of flaggers to communicate.
11. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain adequate stopping sight distance to the flagger and a queue of stopped vehicles (see table above).
12. Channelizing devices on the center-line may be omitted when a pilot car is leading traffic and approved by the Engineer.
13. Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situations.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY
TRAFFIC CONTROL

TCP(1-2)-18

FILE: tcp1-2-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-90 4-98	6375	52	001	IH45
2-94 2-12	DIST	COUNTY		SHEET NO.
1-97 2-18	12	HARRIS/GAL		49

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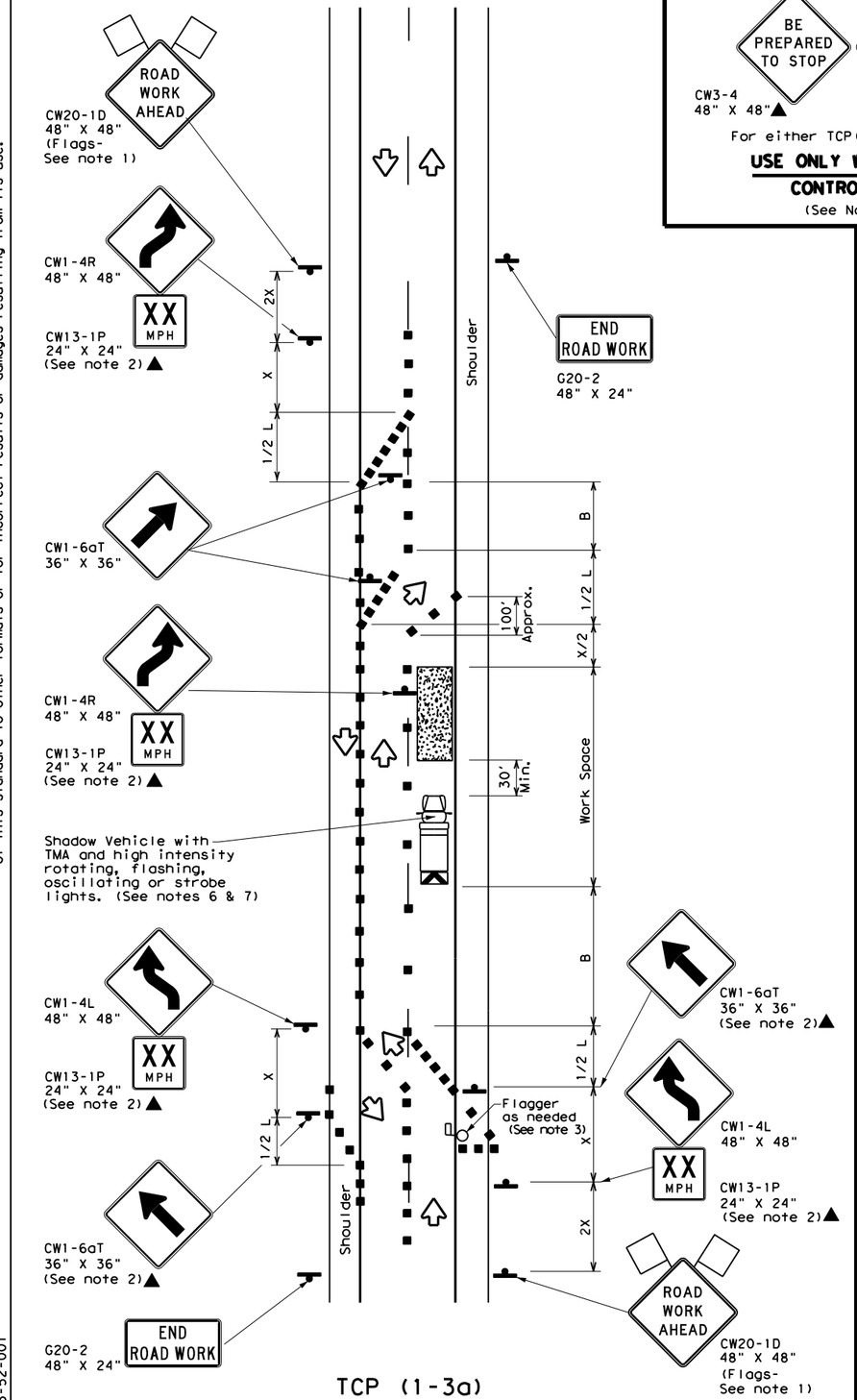
DATE: 1/4/2021
PROJECT: 6375-52-001



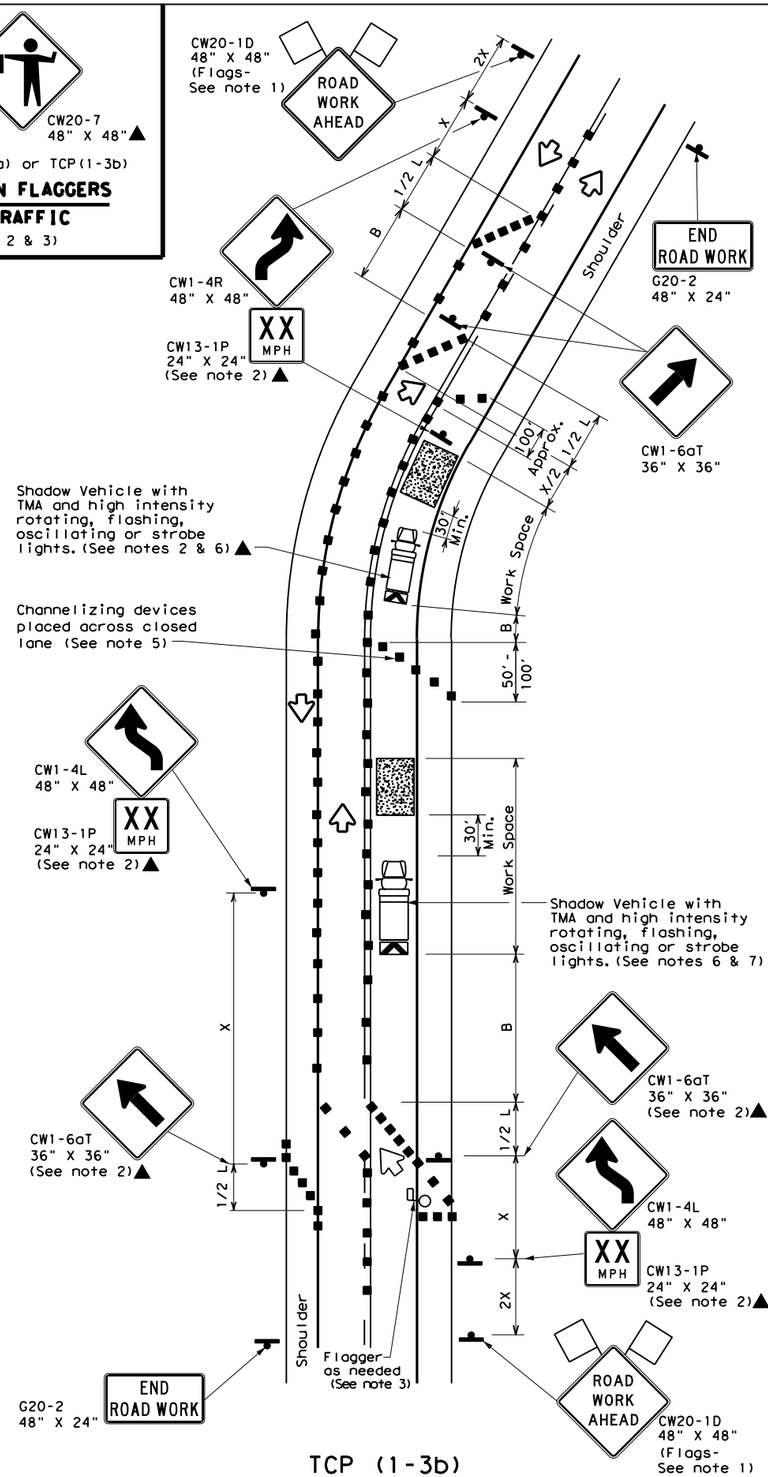
TCP (1-3a)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
ADEQUATE FIELD OF VIEW

BE PREPARED TO STOP
CW3-4 48" X 48"
CW20-7 48" X 48"

For either TCP(1-3a) or TCP(1-3b)

USE ONLY WHEN FLAGGERS CONTROL TRAFFIC
(See Notes 2 & 3)



TCP (1-3b)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
INADEQUATE FIELD OF VIEW

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

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

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

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Additional flaggers may be positioned in advance of traffic queues to alert traffic to reduce speed.
4. DO NOT PASS, PASS WITH CARE and construction regulatory speed zone signs may be installed downstream of the ROAD WORK AHEAD signs.
5. When the work zone is made up of several work spaces, channelizing devices should be placed laterally across the closed lane to re-emphasize closure. Laterally placed channelizing devices should be repeated every 500 to 1000 feet in urban areas and every 1/4 to 1/2 mile in rural areas.
6. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
7. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
8. Where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20', or 15' if posted speed are 35 mph or slower, and for tangent sections, at 1/2S where S is the speed in mph. This tighter device spacing is intended for the area of conflicting markings not the entire work zone.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
TRAFFIC SHIFTS ON TWO LANE ROADS

TCP(1-3)-18

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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	12	HARRIS/GAL		50
1-97 2-18				

153

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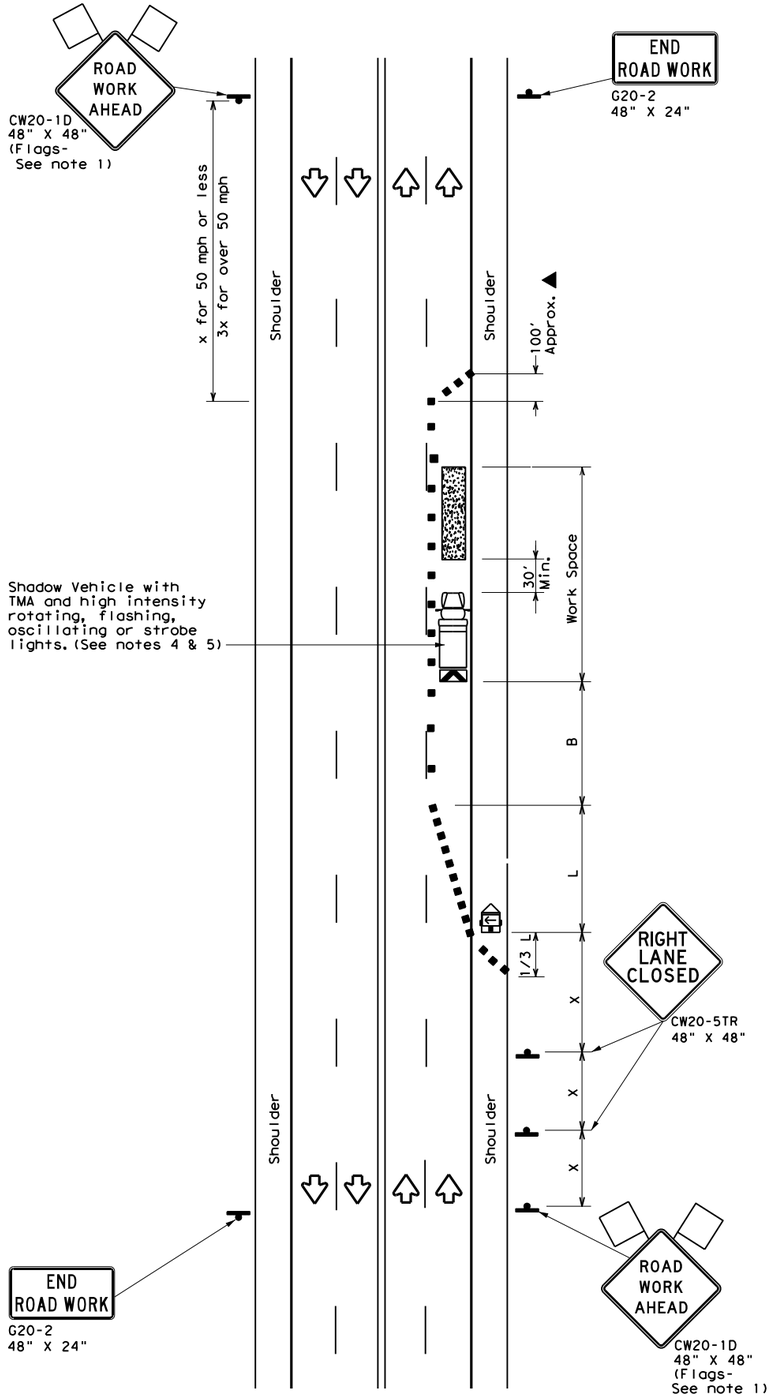
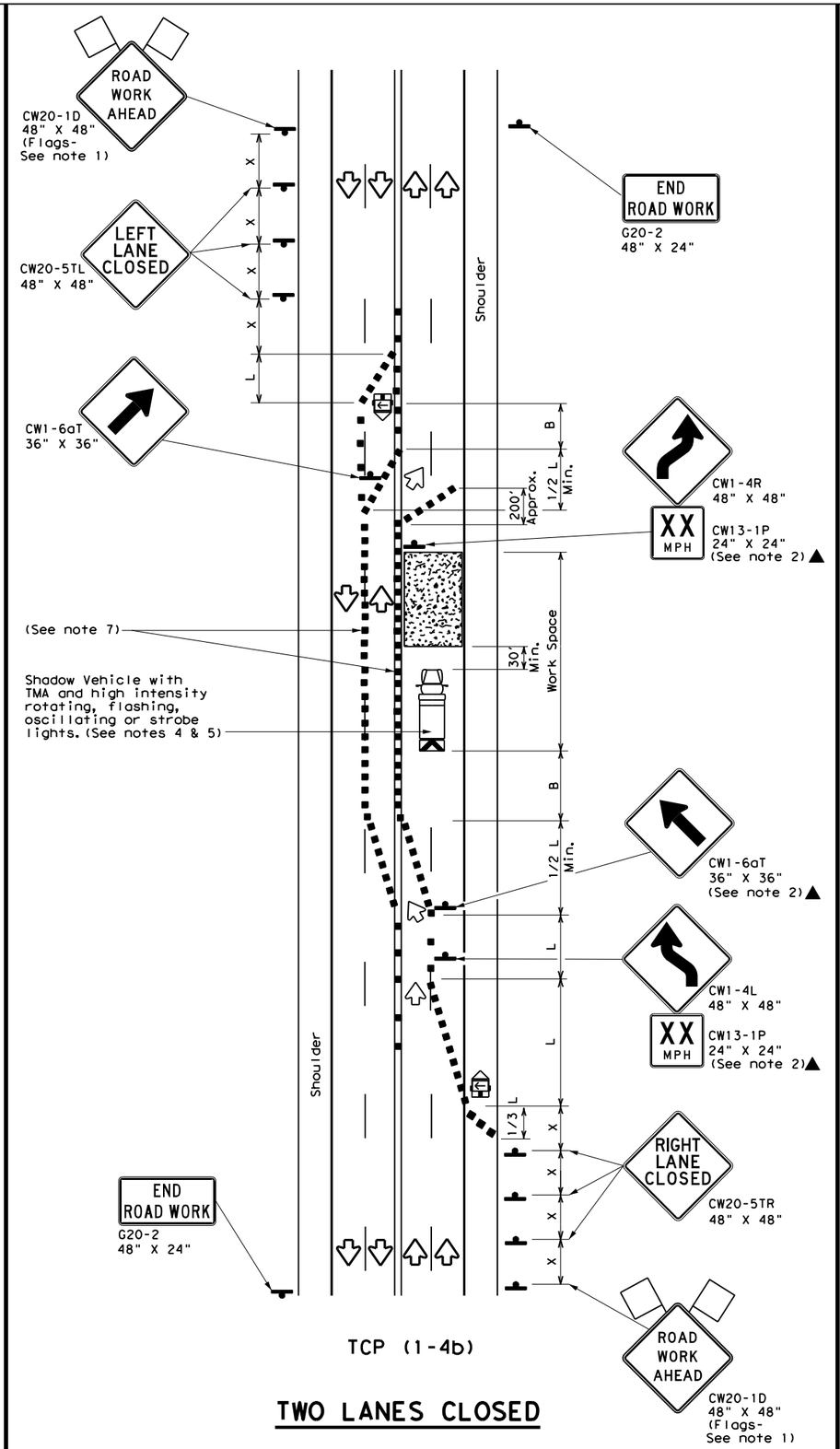
PROJECT: 6375-52-001



TCP (1-4a)

ONE LANE CLOSED



TCP (1-4b)

TWO LANES CLOSED

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

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

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

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW20-1D "ROAD WORK AHEAD" sign may be repeated if the visibility of the work zone is less than 1500 feet.
4. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.

TCP (1-4a)

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

TCP (1-4b)

7. Where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2S where S is the speed in mph. This tighter device spacing is intended for the areas of conflicting markings, not the entire work zone.

Texas Department of Transportation

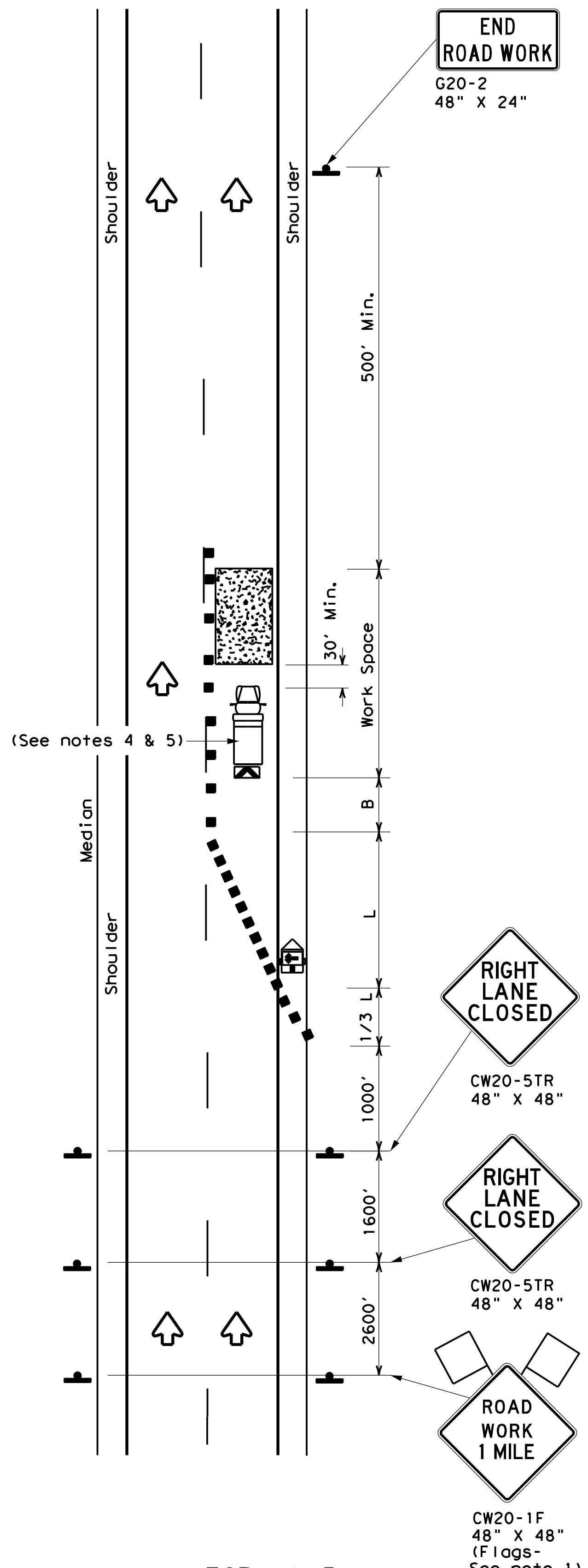
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(1-4)-18

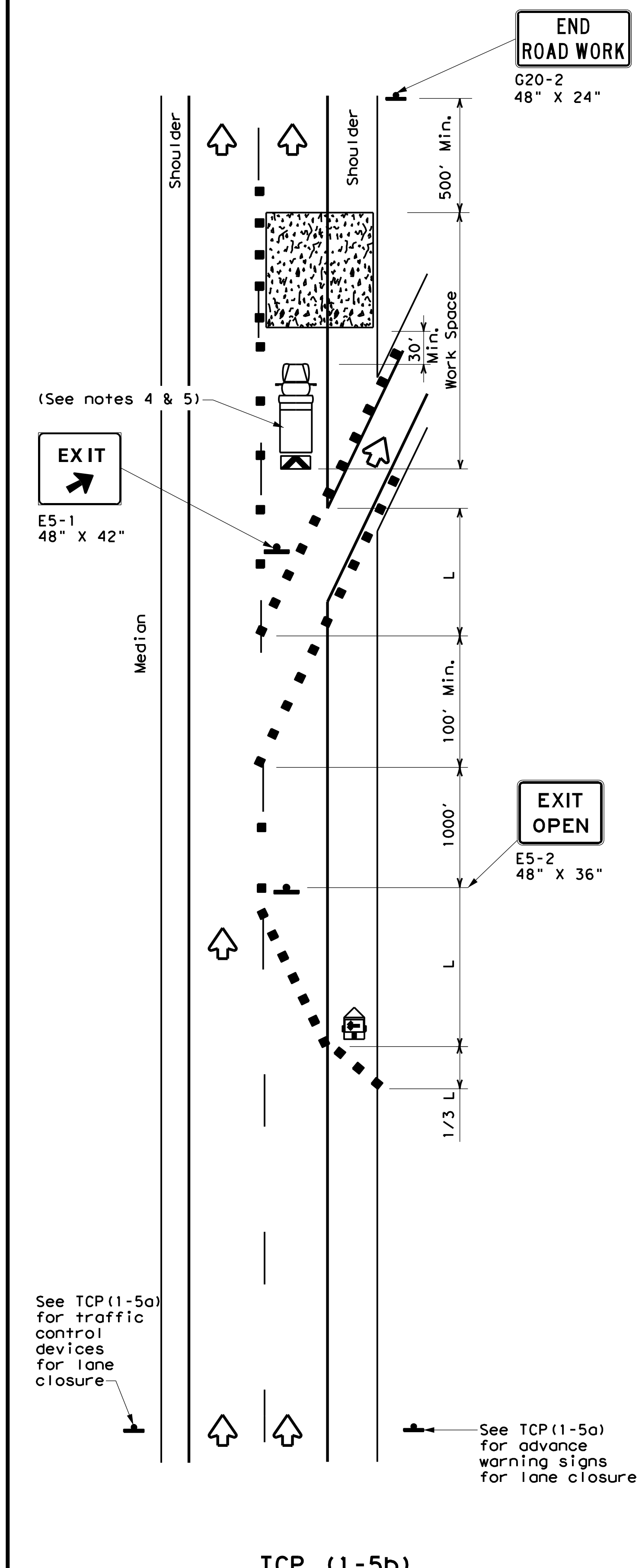
FILE: tcp1-4-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	12	HARRIS/GAL		51
1-97 2-18				

FILE: h:\00#maintenance\south harris maintenance\2020 contracts\6357-02-001
DATE: 1/4/2021
PROJECT: 6375-52-001



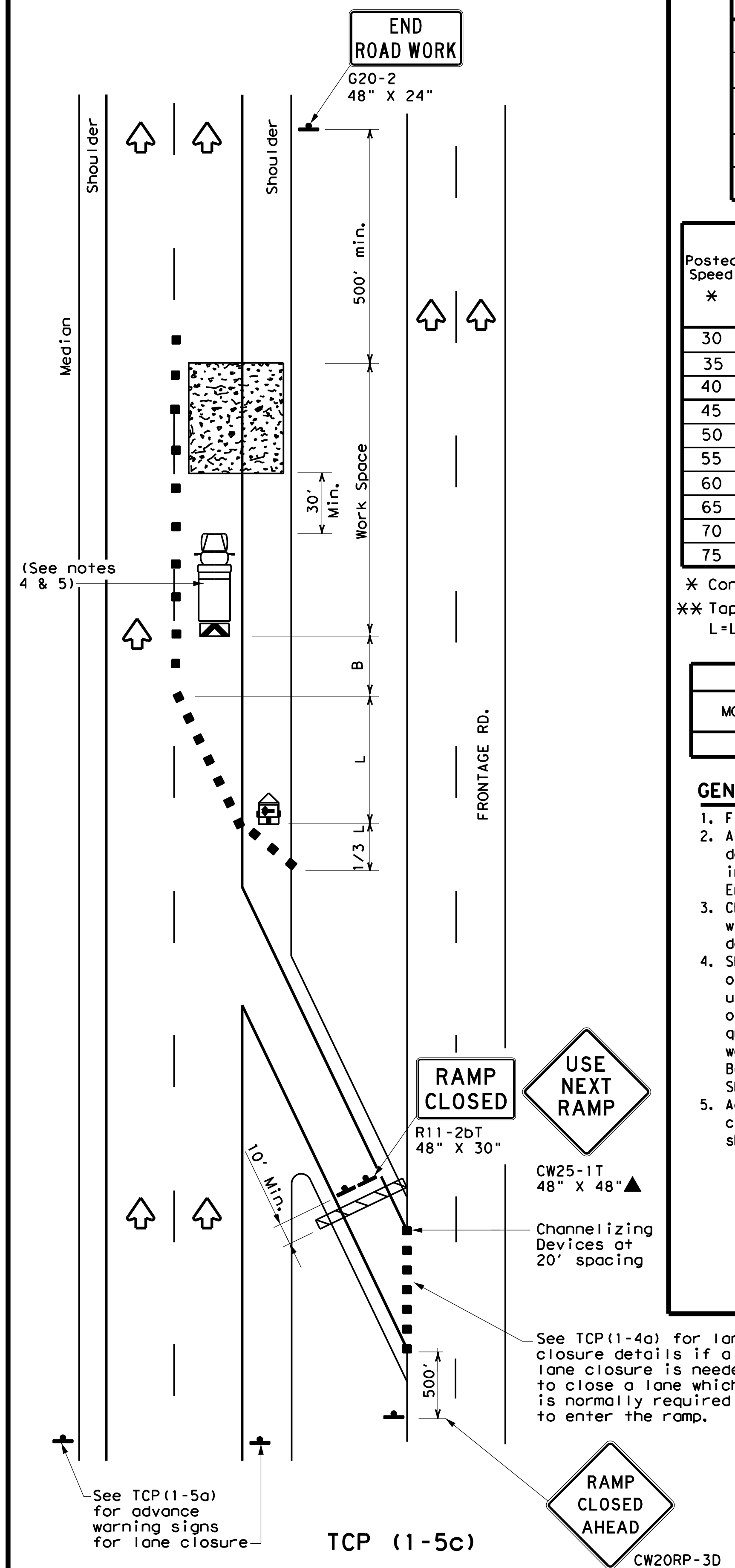
TCP (1-5a)

ONE LANE CLOSURE



TCP (1-5b)

LANE CLOSURE NEAR EXIT RAMPS



TCP (1-5c)

LANE CLOSURE NEAR ENTRANCE RAMPS

LEGEND

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

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

* Conventional Roads Only

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

TYPICAL USAGE

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. Channelizing devices used to close lanes may be supplemented with the Chevron Alignment Sign placed on every other channelizing device. Chevrons may be attached to plastic drums as per BC Standards.
4. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

Texas Department of Transportation

Traffic Operations Division Standard

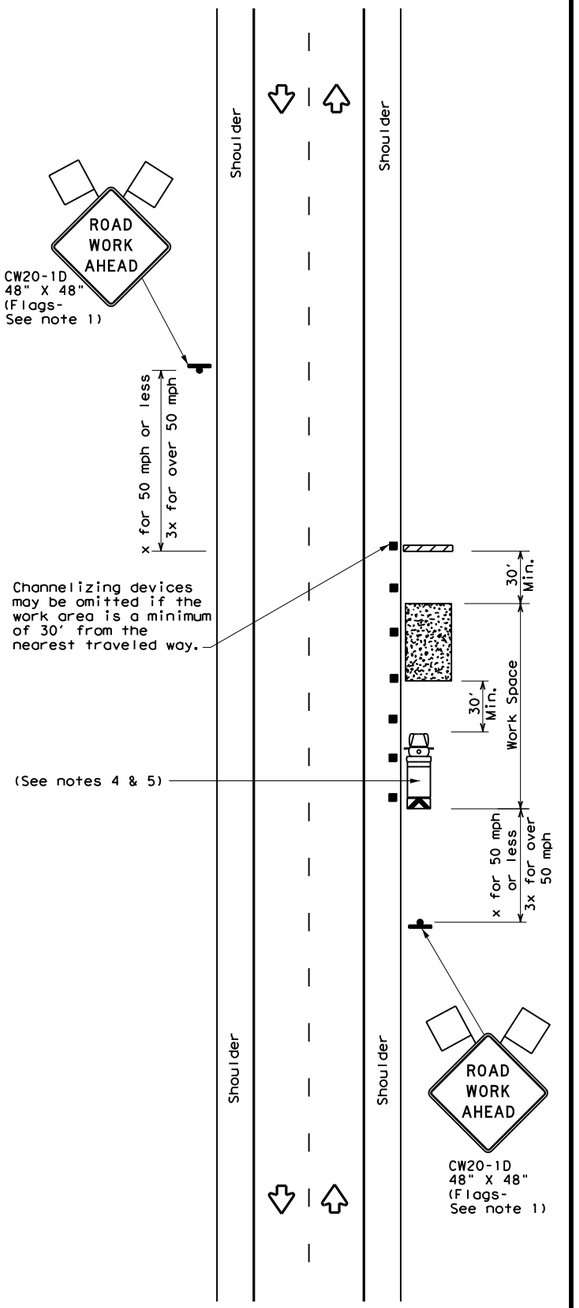
TRAFFIC CONTROL PLAN LANE CLOSURES FOR DIVIDED HIGHWAYS

TCP(1-5)-18

FILE: tcp1-5-18.dgn	DN:	CK:	DW:	CK:
© TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
2-18	DIST		COUNTY	SHEET NO.
	12		HARRIS/GAL	52

155

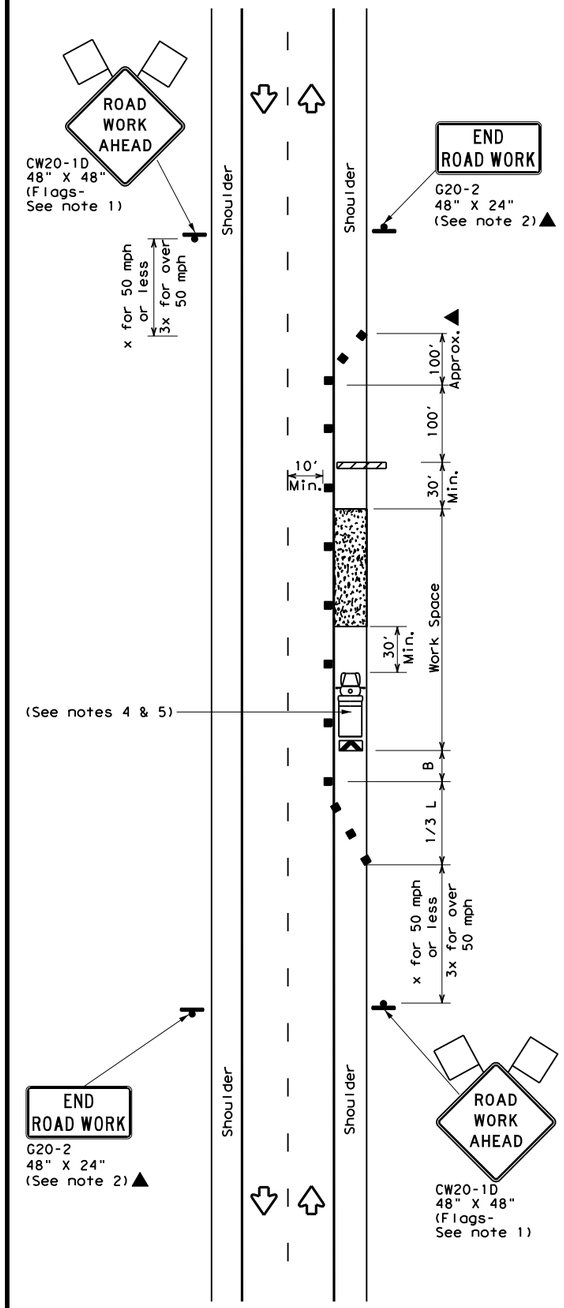
FILE: h:\00maintenance\south harris maintenance\2020 contracts\6357-02-001\tcp2-1-18.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001



TCP (2-1a)

WORK SPACE NEAR SHOULDER

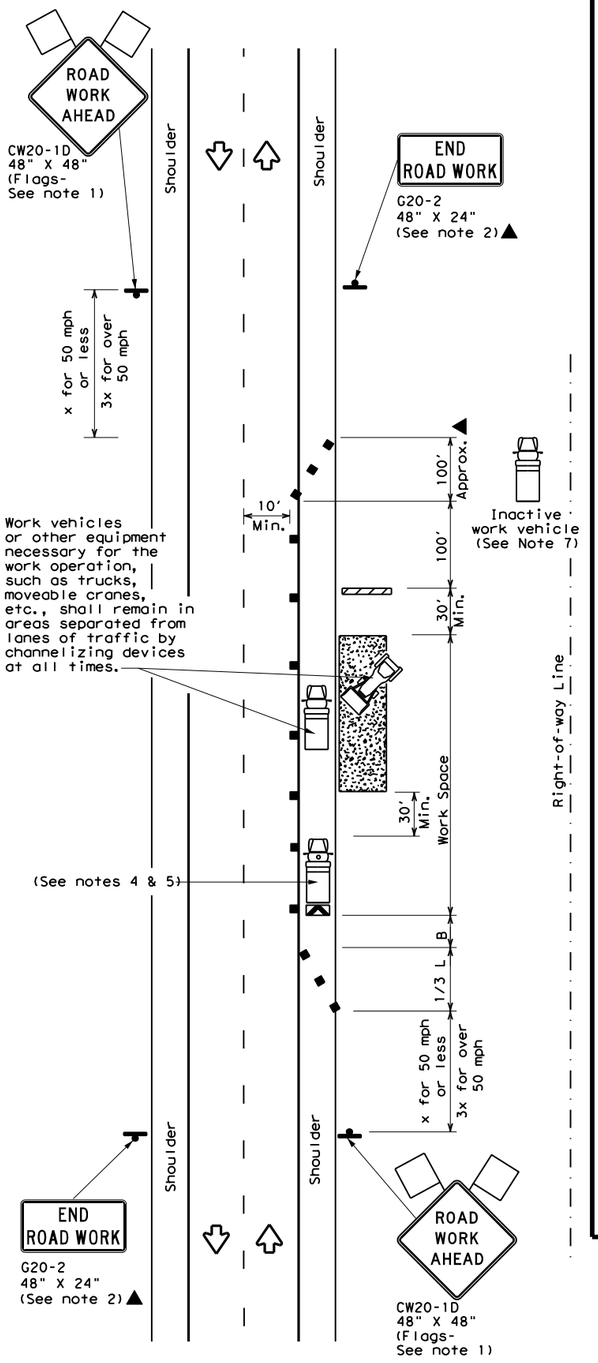
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER

Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER

Conventional Roads

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated in the plans, or for routine maintenance work, when approved by the Engineer.
3. Stockpiled material should be placed a minimum of 30 feet from nearest traveled way.
4. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.
6. See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
7. Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
8. CW21-5 "SHOULDER WORK" signs may be used in place of CW21-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

Texas Department of Transportation

Traffic Operations Division Standard

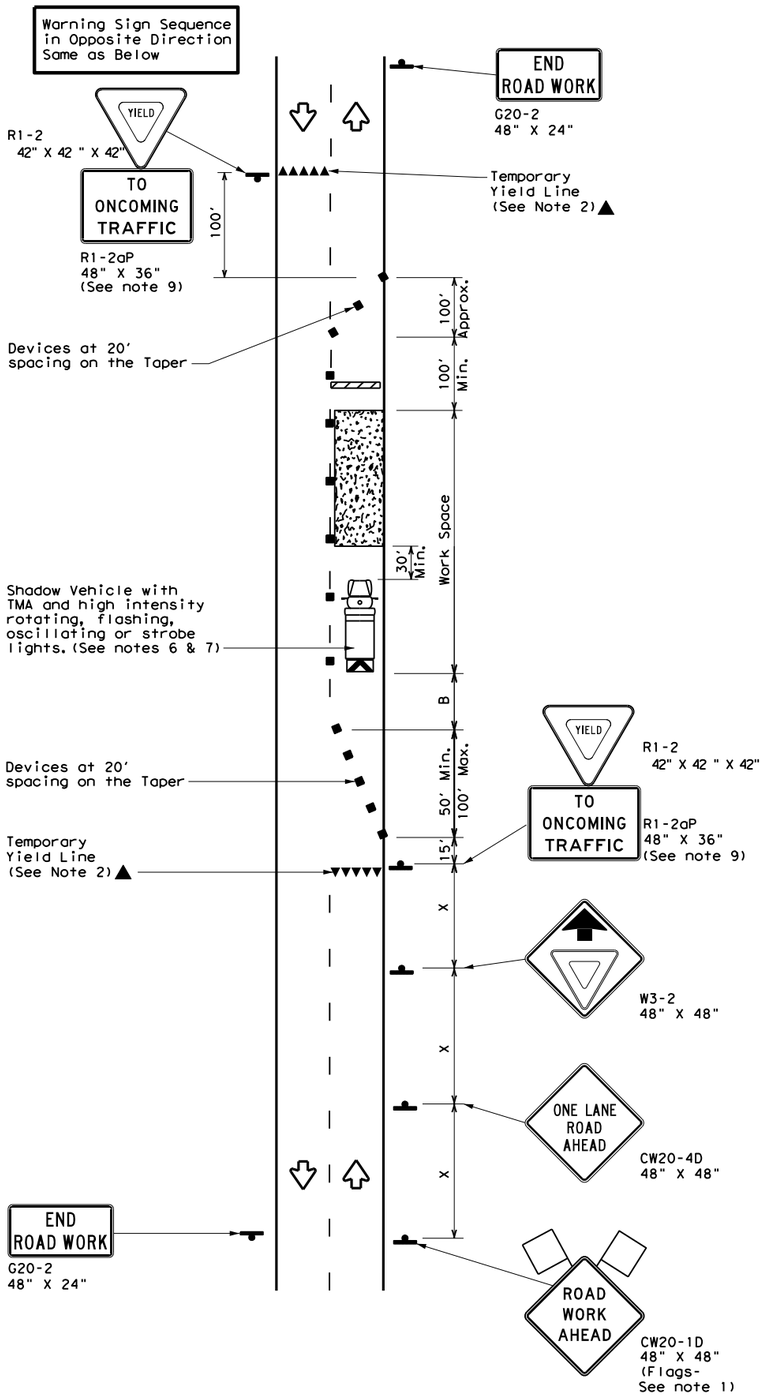
TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-18

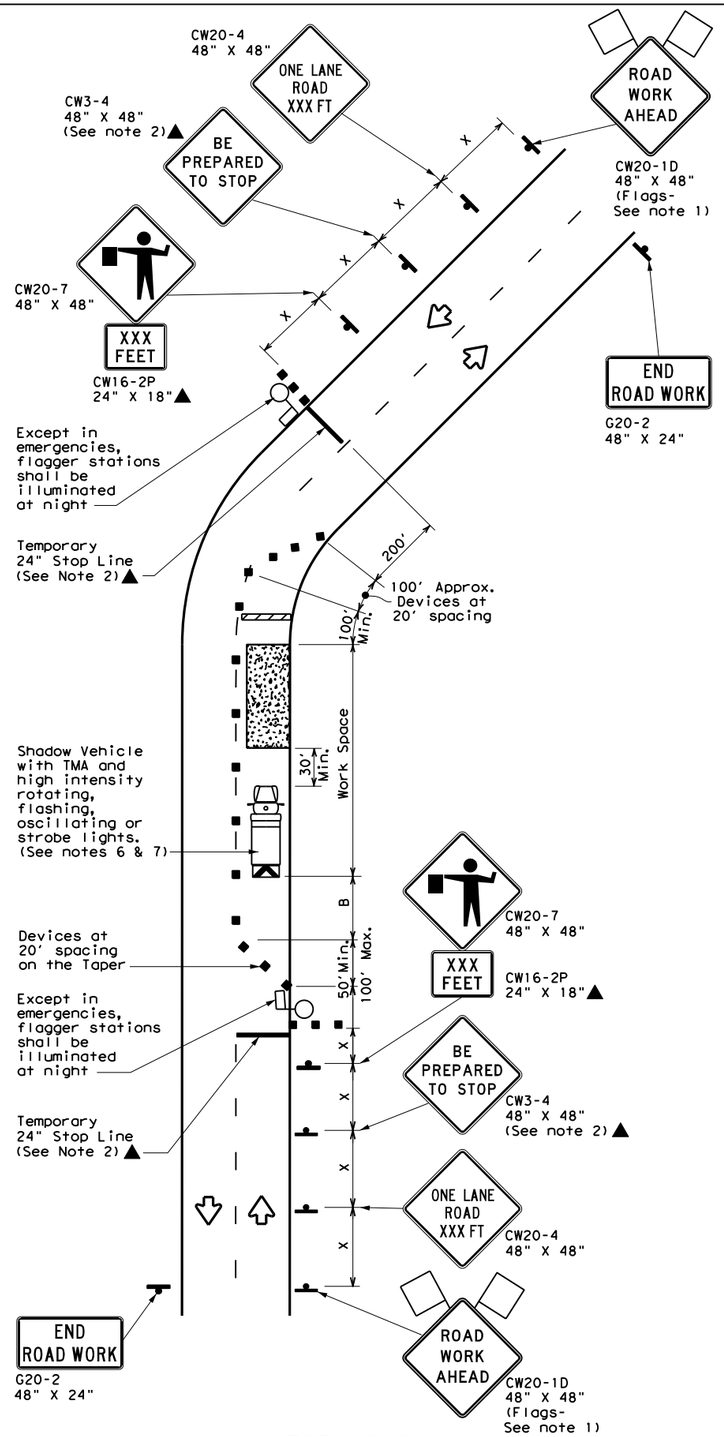
FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	12	HARRIS/GAL		53
1-97 2-18				

161

FILE: h:\00maintenance\south harris maintenance\2020 contracts\6357-02-001\tcp2-2-18.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001



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



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

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

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

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

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

GENERAL NOTES

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

TCP (2-2a)

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

TCP (2-2b)

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

Texas Department of Transportation
Traffic Operations Division Standard

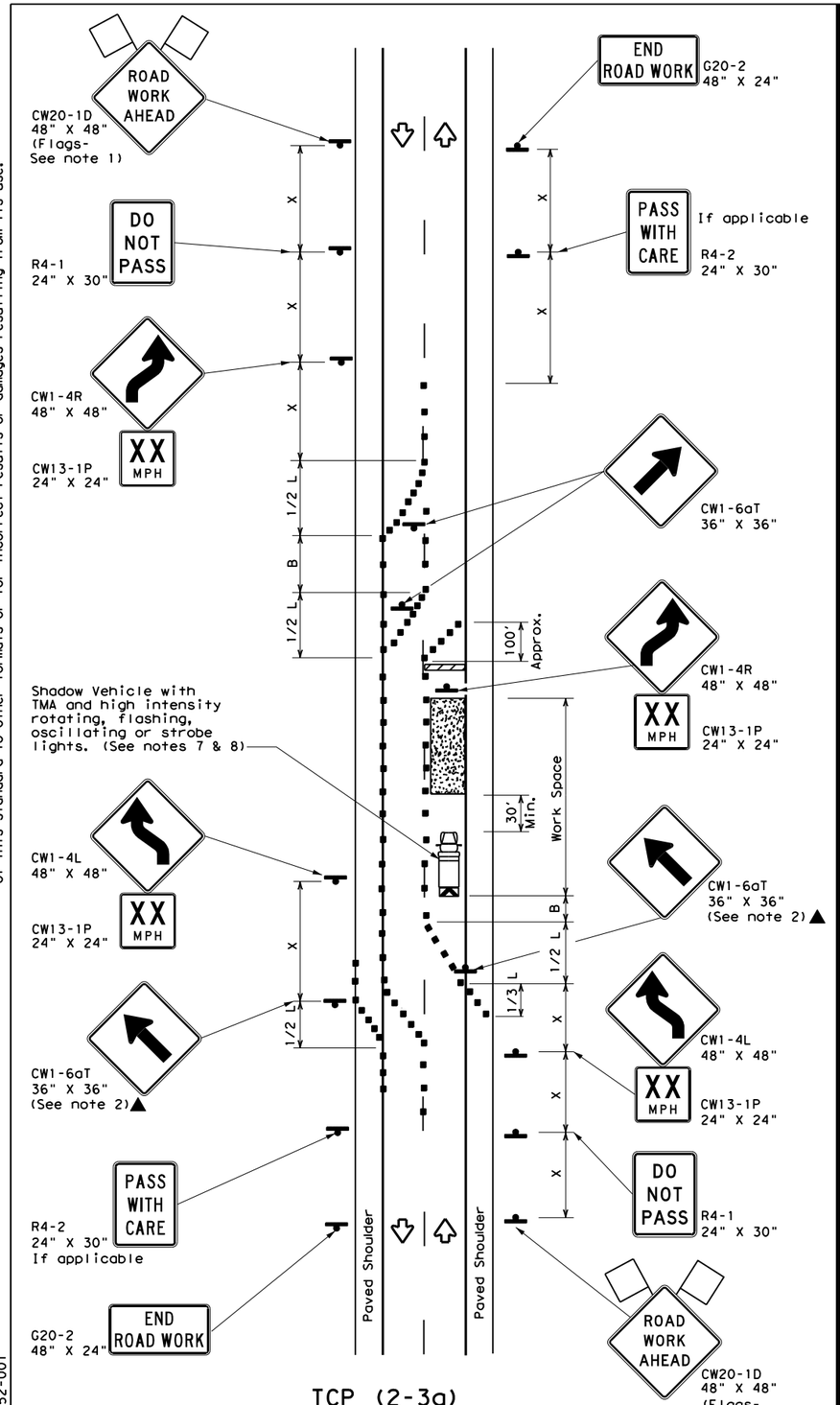
TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(2-2)-18

FILE: tcp2-2-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
8-95 3-03	DIST	COUNTY		SHEET NO.
1-97 2-12	12	HARRIS/GAL		54
4-98 2-18				

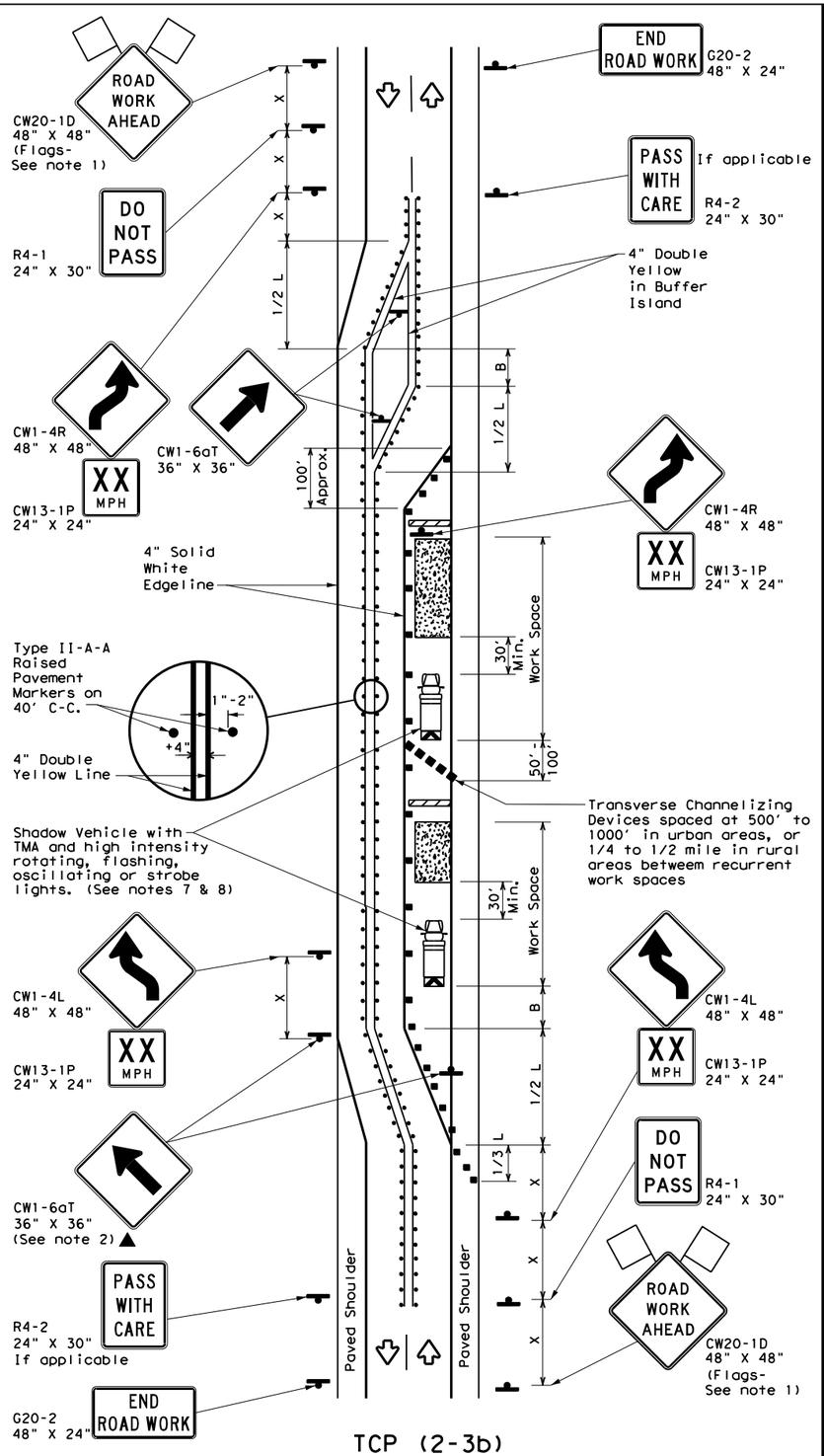
162

FILE: h:\00maintenance\south harris maintenance\2020 contracts\6357-02-001 Mill&Overlay\tcp(2-3)-18e.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001



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

ONE LANE CLOSED
ADEQUATE FIELD OF VIEW



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

ONE LANE CLOSED
INADEQUATE FIELD OF VIEW

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

TCP (2-3a)

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

Texas Department of Transportation — *Traffic Operations Division Standard*

TRAFFIC CONTROL PLAN TRAFFIC SHIFTS ON TWO-LANE ROADS

TCP(2-3)-18

FILE: tcp(2-3)-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
8-95 3-03	DIST	COUNTY		SHEET NO.
1-97 2-12	12	HARRIS/GAL		55
4-98 2-18				

163

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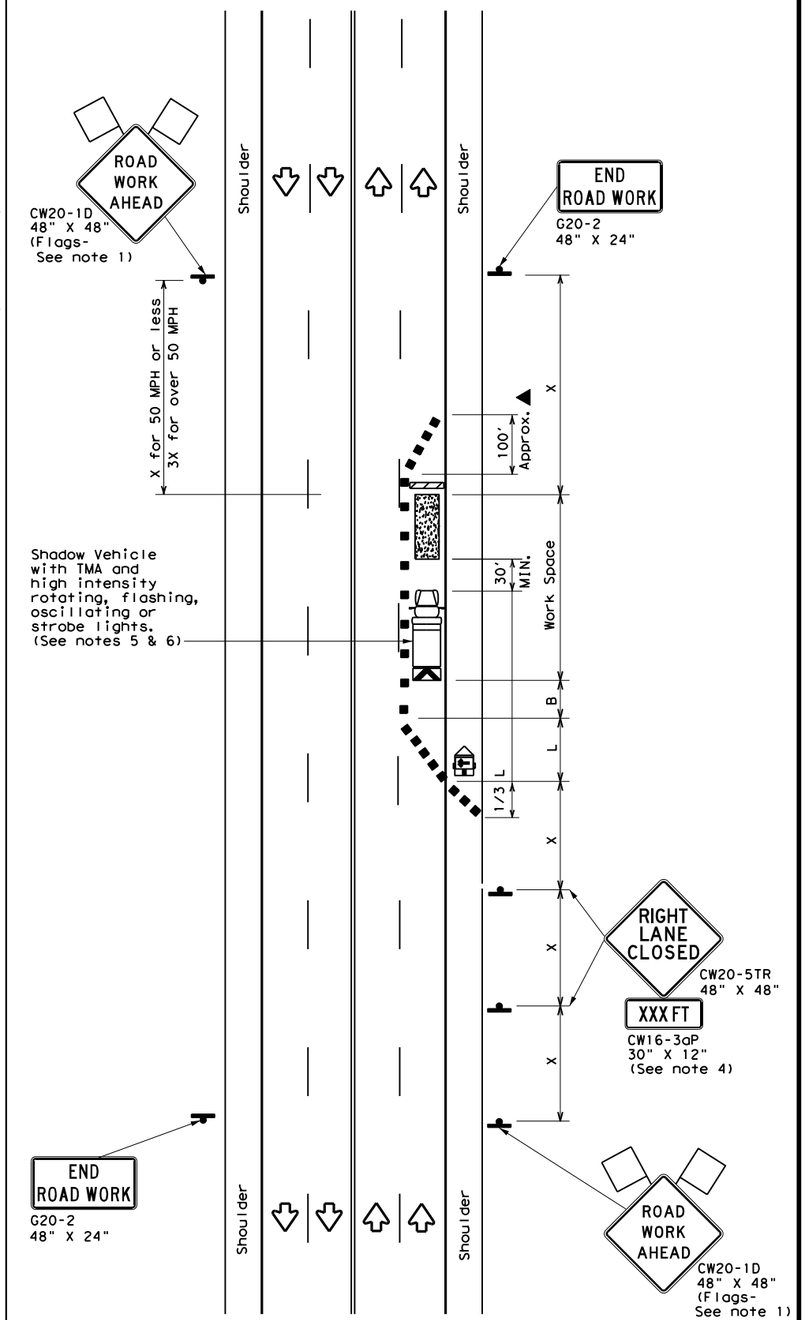
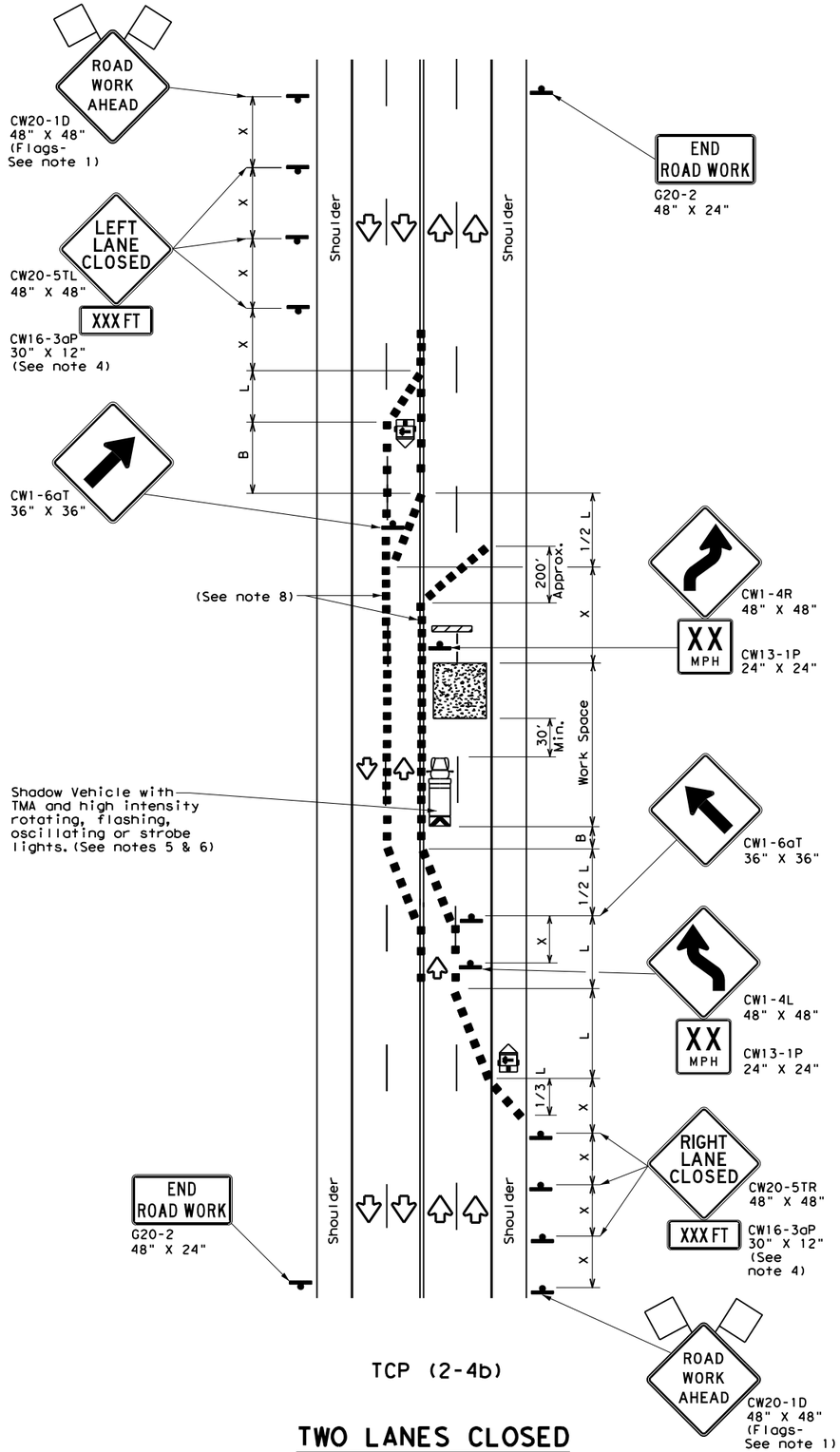
DATE: 1/4/2021
PROJECT: 6375-52-001



TCP (2-4a)



TCP (2-4b)

TWO LANES CLOSED

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The downstream taper is optional. When used, it should be 100 feet minimum length per lane.
4. For short term applications, when post mounted signs are not used, the distance legend may be shown on the sign face rather than on a CW16-3aP supplemental plaque.
5. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
6. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-4a)

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

TCP (2-4b)

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

Texas Department of Transportation | Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(2-4)-18

FILE: tcp2-4-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	6375	52	001	IH45
1-97 2-12	DIST	COUNTY		SHEET NO.
4-98 2-18	12	HARRIS/GAL		56

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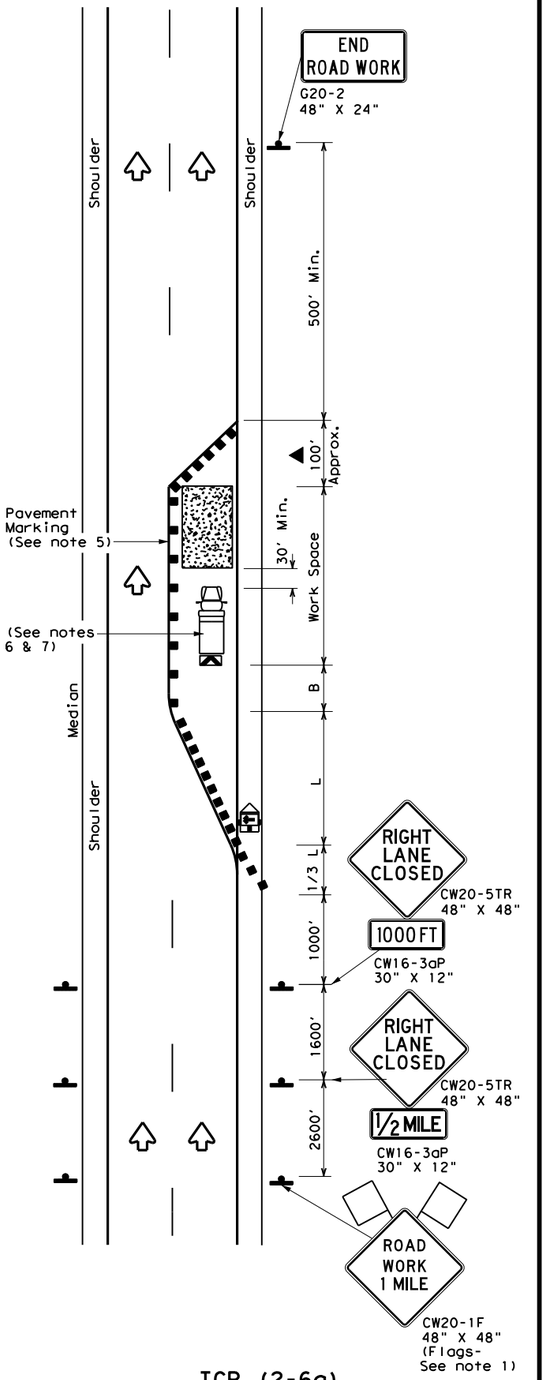
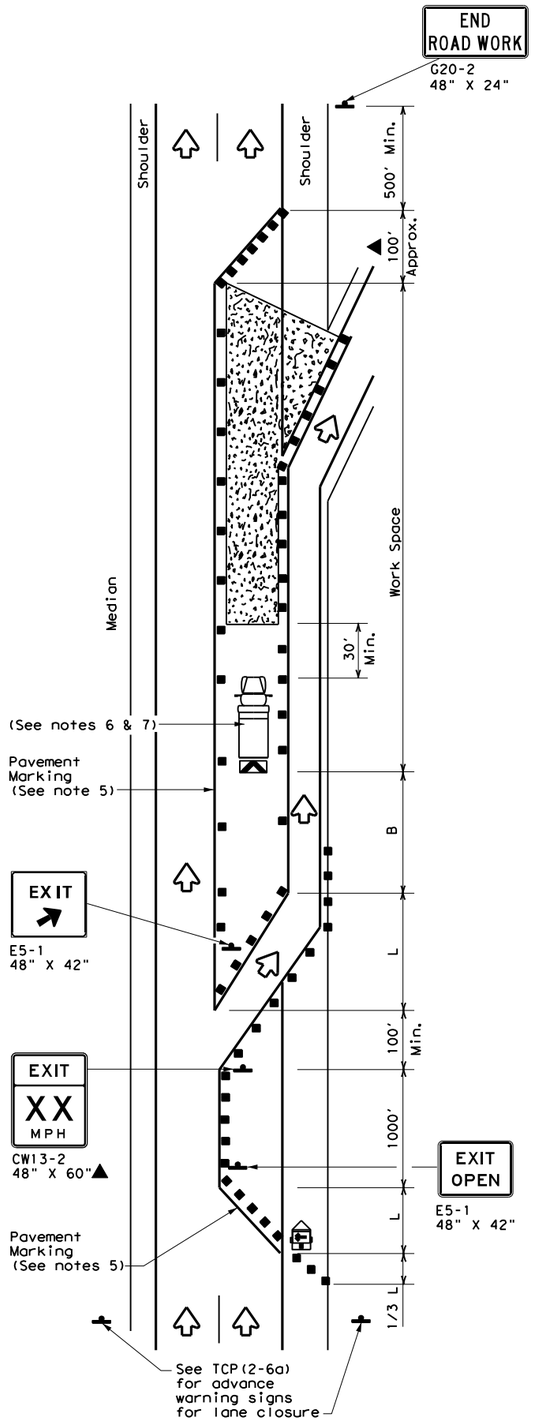
DATE: 1/4/2021
PROJECT: 6375-52-001



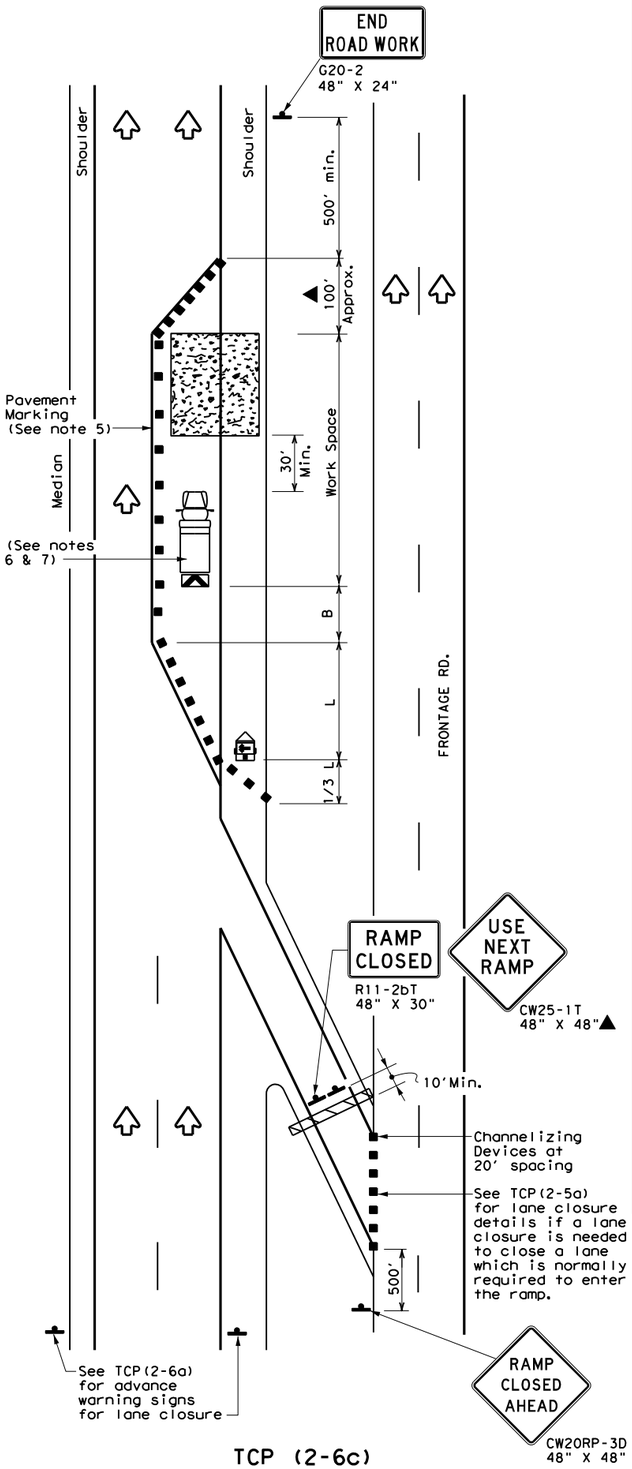
TCP (2-6a)

ONE LANE CLOSURE



TCP (2-6b)

LANE CLOSURE NEAR EXIT RAMPS



TCP (2-6c)

LANE CLOSURE NEAR ENTRANCE RAMPS

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. Channelizing devices used to close lanes may be supplemented with the Chevron Alignment Sign placed on every other channelizing device. Chevrons may be attached to plastic drums as per BC Standards.
4. Channelizing devices used along the work space or along tangent sections may be supplemented with vertical panels (VP) placed on everyother channelizing device. If night time conditions make it difficult to see at least two VPs, the VPs may be placed on each channelizing device.
5. The placement of pavement markings may be omitted on Intermediate-term stationary work zones with the approval of the Engineer.
6. Shadow Vehicle with TMA and high intensity rotating, flashing,oscillating or strobe lights. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
7. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

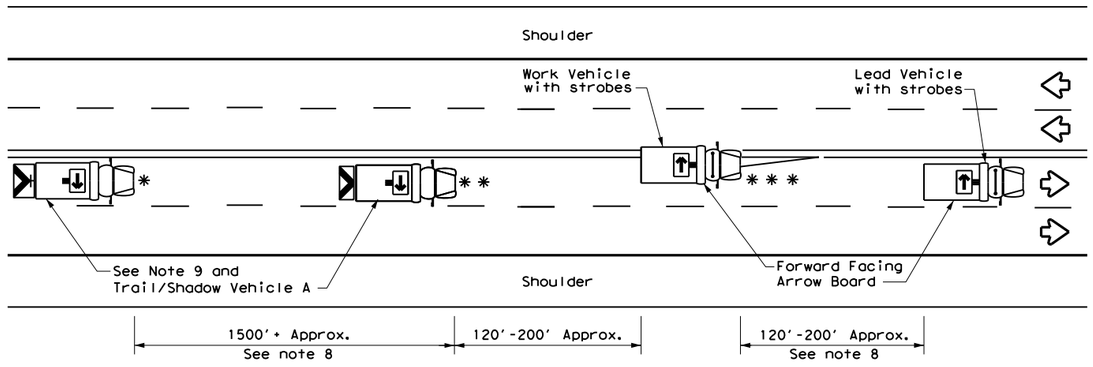
Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON DIVIDED HIGHWAYS

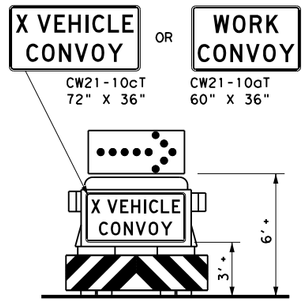
TCP(2-6)-18

FILE: tcp2-6-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 2-12 1-97 2-18	6375	52	001	IH45
	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		57



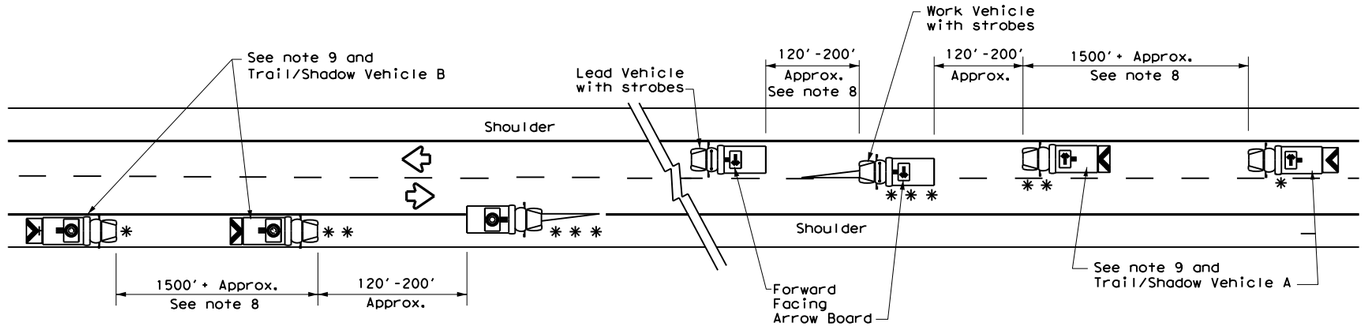
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

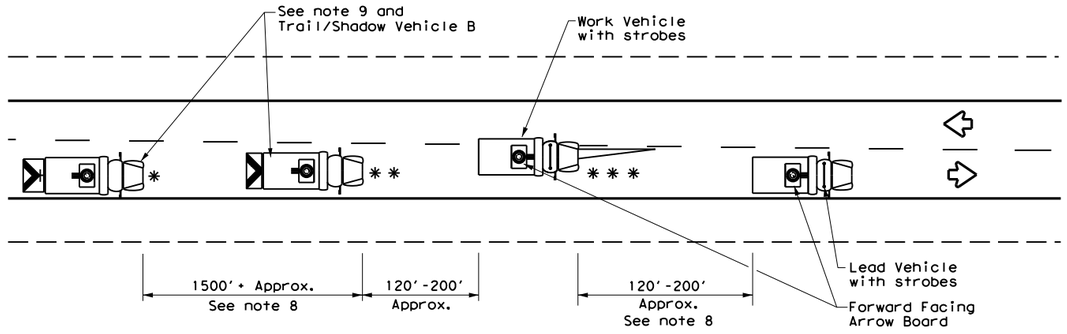


WORK ON SHOULDER

WORK ON TRAVEL LANE

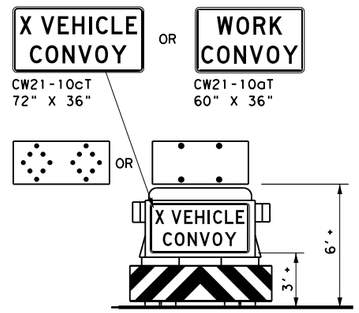
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

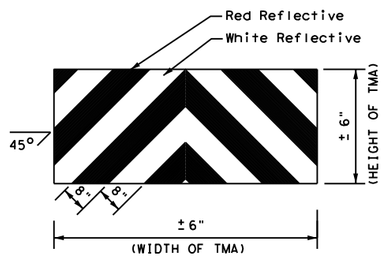
with Flashing Arrow Board in CAUTION display

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

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

GENERAL NOTES

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



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

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©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 7-13 1-97	6375	52	001	IH45
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	12	HARRIS/GAL		58

175

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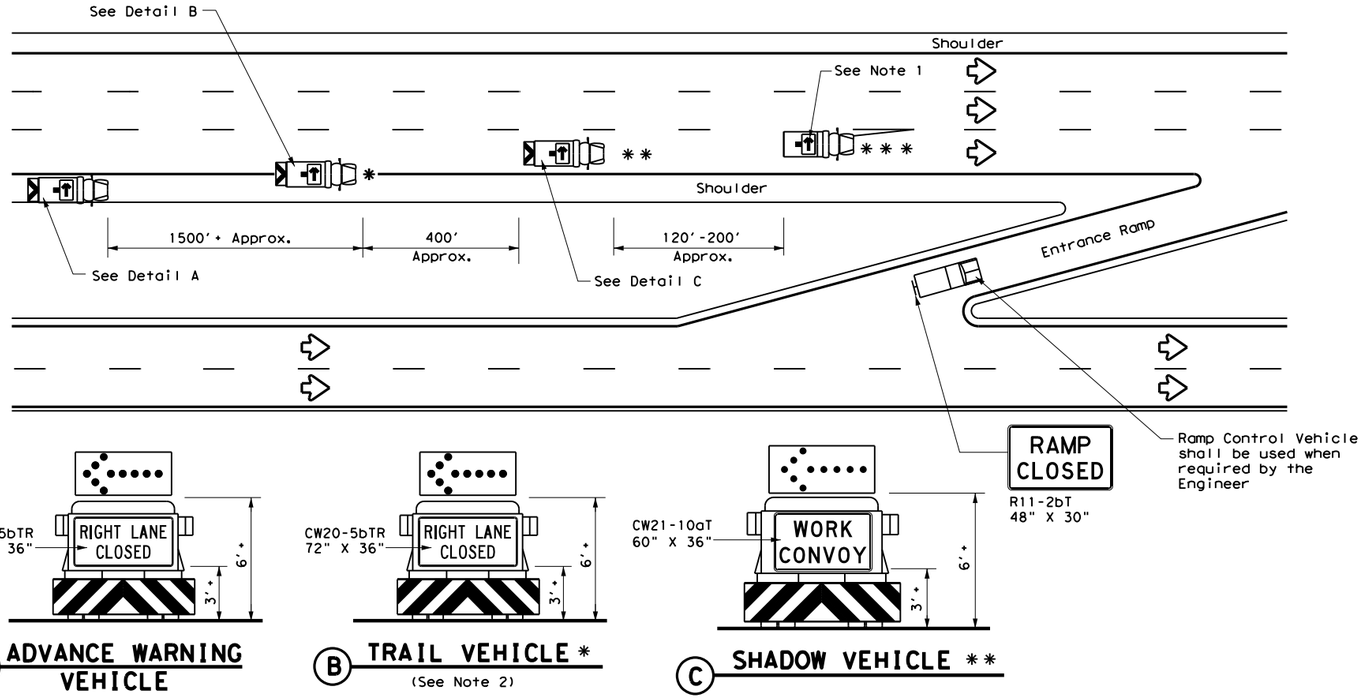
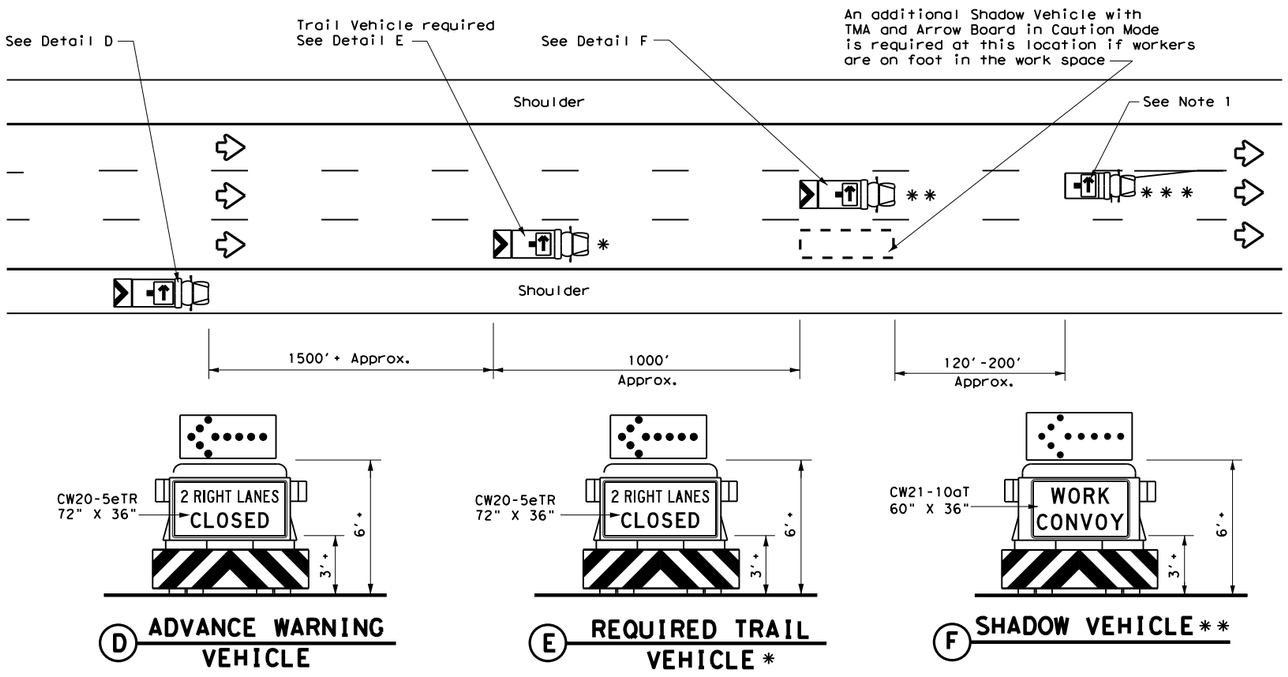
DATE: 1/4/2021
PROJECT: 6375-52-001



RIGHT LANE CLOSURE ON DIVIDED HIGHWAY - TCP(3-2a)



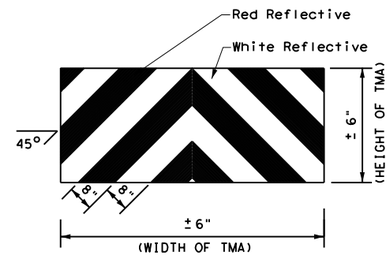
INTERIOR LANE CLOSURE ON MULTI-LANE DIVIDED HIGHWAY - TCP(3-2b)

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

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

GENERAL NOTES

1. ADVANCE WARNING, TRAIL and SHADOW vehicles shall be equipped with Type B or Type C flashing arrow boards as per the Barricade and Construction (BC) standards. Arrow boards on WORK vehicles will be optional based on the type of work being performed. The arrow boards shall be operated from inside the vehicle.
2. For TCP(3-2a) the Engineer will determine if the TRAIL VEHICLE is required based on prevailing roadway conditions, traffic volume, and sight distance restrictions. All other vehicles shown for both TCP(3-2a) and TCP(3-2b) are required.
3. The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
4. The use of truck mounted attenuators (TMA) on the ADVANCE WARNING, SHADOW, and TRAIL vehicles are required.
5. Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DMS 8300, Type A.
6. Each vehicle shall have two-way radio communication capability.
7. When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles.
8. Vehicle spacing between the TRAIL VEHICLE and the SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE. Vehicle spacing between the WORK VEHICLE and SHADOW VEHICLE may vary according to terrain, work activity and other factors.
9. Standard 48" X 48" diamond shaped warning signs with the same message as those shown may be used where adequate mounting space exists.
10. The signs shown should be used on the Advance Warning Vehicle. As an option, a portable changeable message sign (PCMS) or a truck mounted changeable message sign (TMCMS) with a minimum character height of 12", and displaying the same legend may be substituted for these signs. An appropriate directional arrow display, simulating the size and legibility of the flashing arrow board, must be used in the second phase of the PCMS/TMCMS message. When this is done, the arrow board will not be required on the Advance Warning Vehicle.
11. Standard diamond shape versions of the CW20-5 series signs may be used as an option if the rectangular signs shown are not available.
12. The principles on this sheet may be used to close lanes from the left side of the roadway considering the number of lanes, shoulder width, sight distance, and ramp frequency.
13. Signs and flashing arrow board modes shall be appropriately altered when implementing left lane closures or interior closures which close the left lanes.
14. The Advance Warning Vehicle may straddle the edgeline when shoulder width makes it necessary.



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS DIVIDED HIGHWAYS

TCP(3-2)-13

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©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 7-13 1-97	6375	52	001	IH45
	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		59

176

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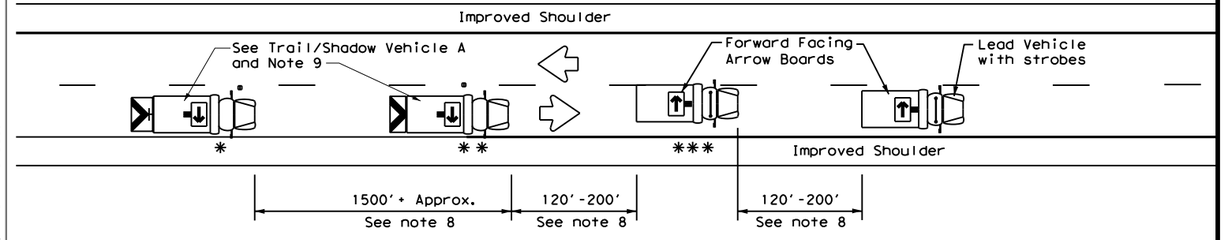
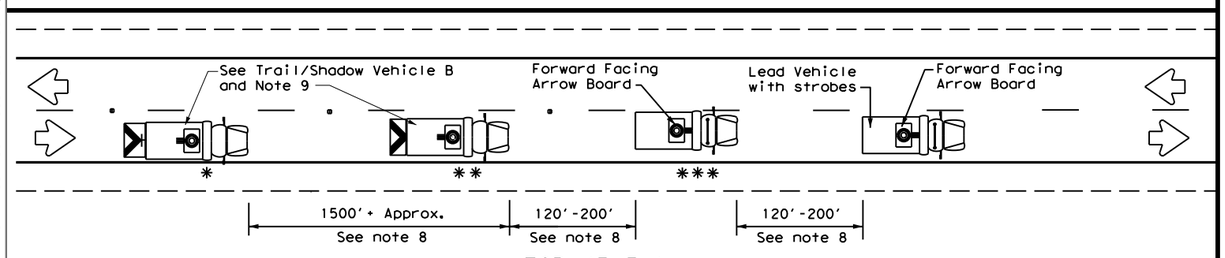
DATE: 1/4/2021
PROJECT: 6375-52-001



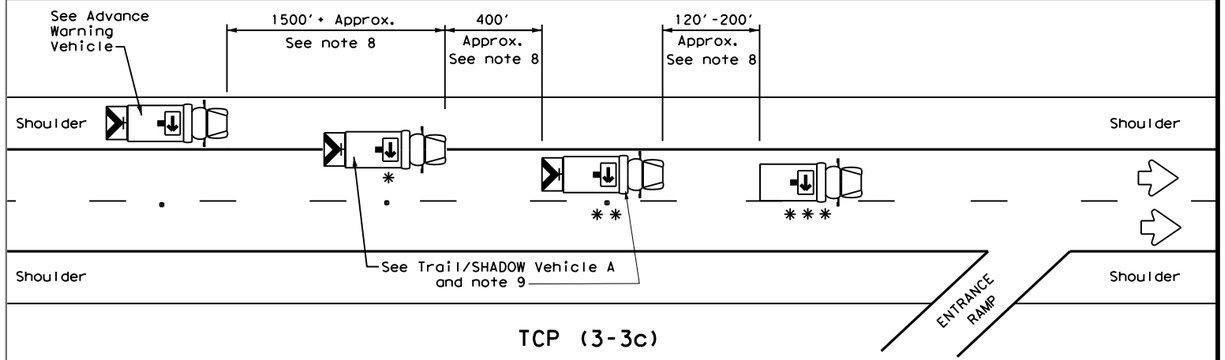
TCP (3-3a)

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



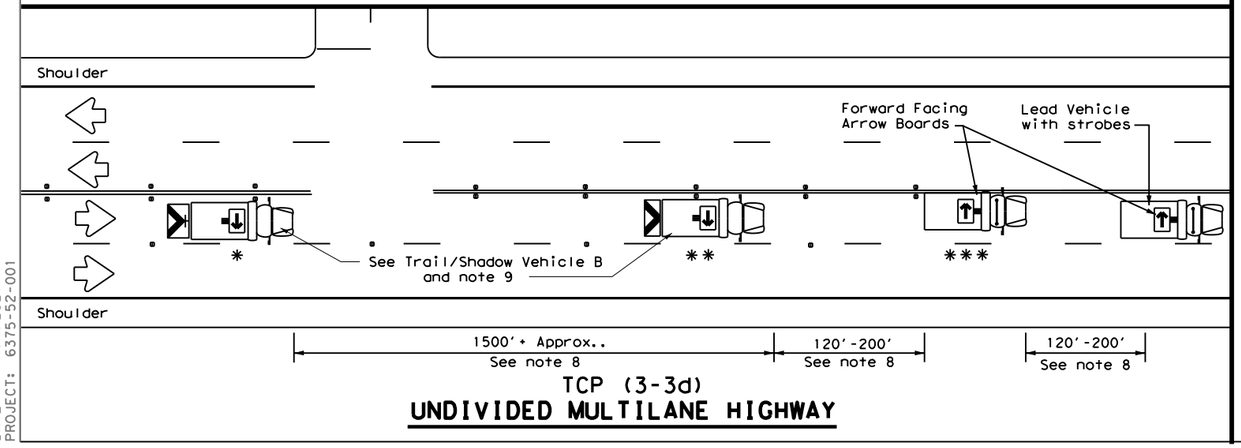
TCP (3-3b)

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



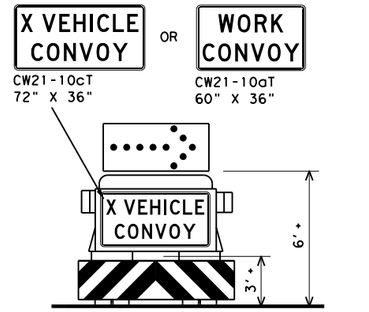
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



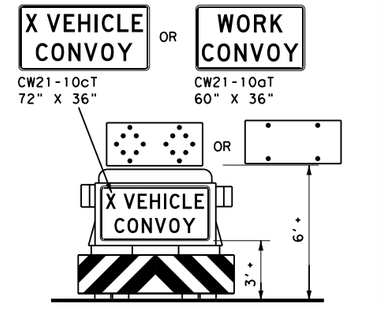
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



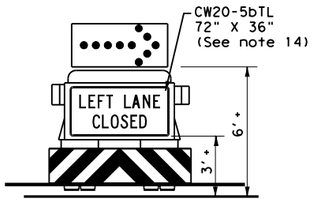
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

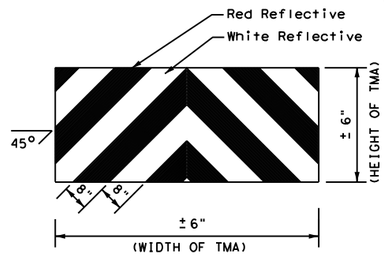


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board
in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL
TCP(3-3)-14

FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	12	HARRIS/GAL		60
1-97 7-14				

177

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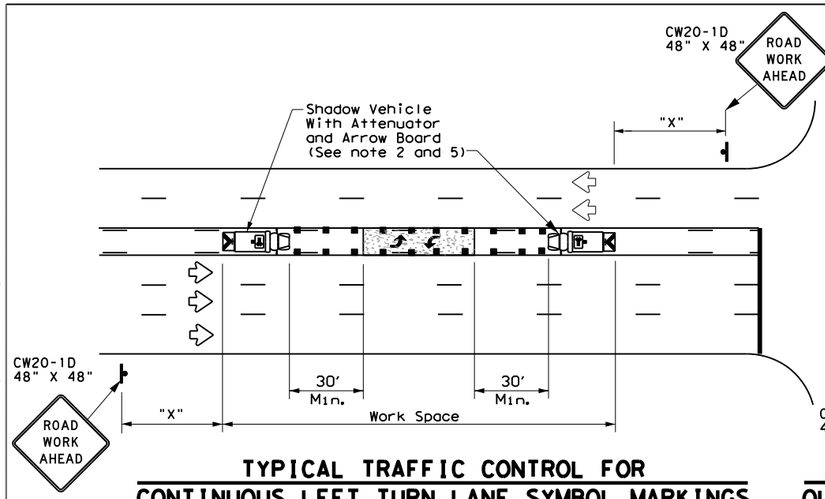
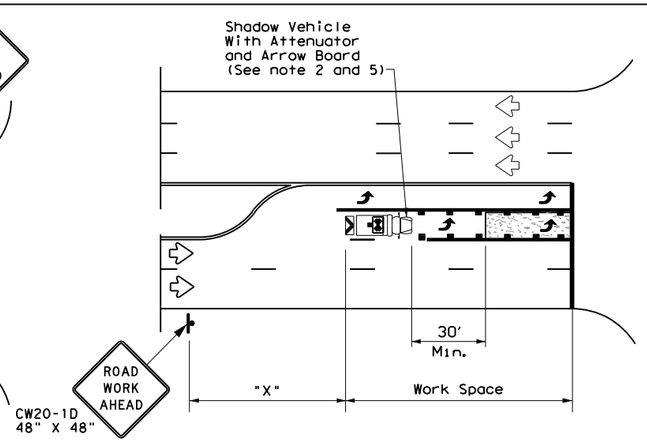
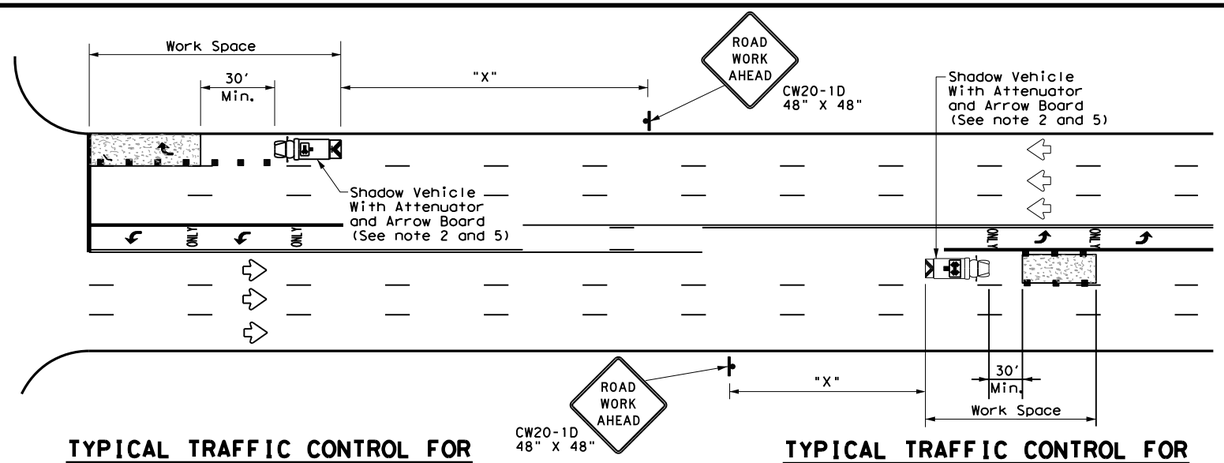
PROJECT: 6375-52-001



TYPICAL TRAFFIC CONTROL FOR CONTINUOUS LEFT TURN LANE SYMBOL MARKINGS

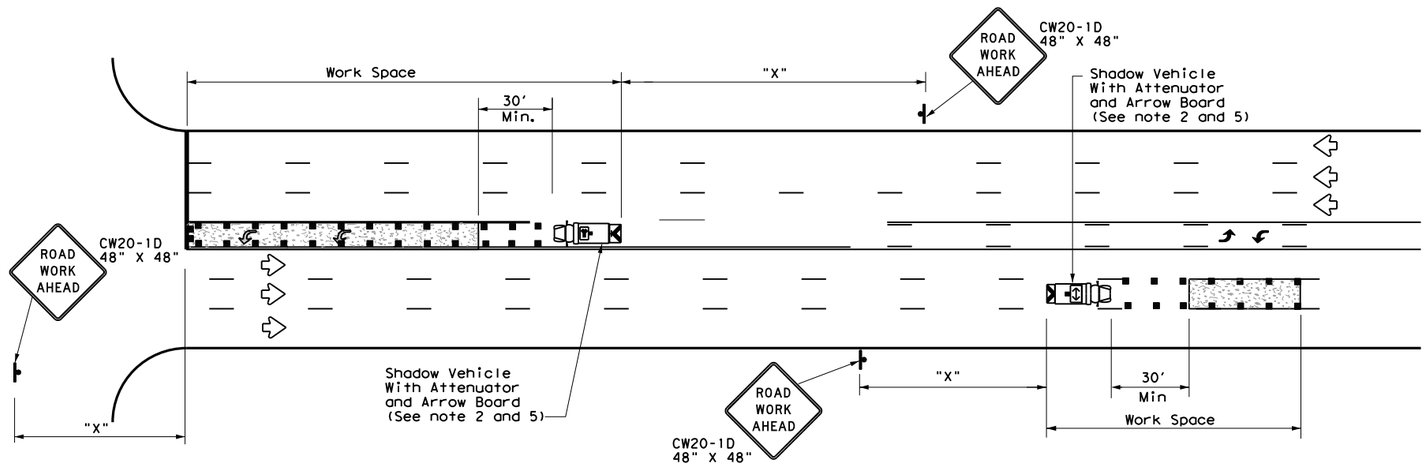


TYPICAL TRAFFIC CONTROL FOR OUTSIDE DUAL LEFT TURN LANE SYMBOL MARKINGS



TYPICAL TRAFFIC CONTROL FOR OUTSIDE LANE MARKINGS

TYPICAL TRAFFIC CONTROL FOR INSIDE LANE MARKINGS



TYPICAL TRAFFIC CONTROL FOR LEFT TURN LANE MARKINGS

TYPICAL TRAFFIC CONTROL FOR CENTER LANE MARKINGS

LEGEND			
*	Trail Vehicle	ARROW BOARD DISPLAY	
**	Shadow Vehicle		
***	Work Vehicle		RIGHT Directional
	Heavy Work Vehicle		LEFT Directional
	Truck Mounted Attenuator (TMA)		Double Arrow
	Traffic Flow		Channelizing Devices

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

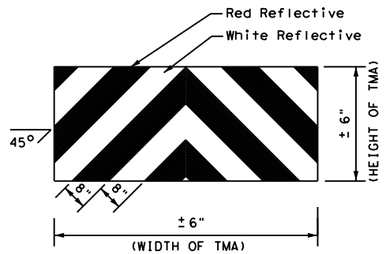
* Conventional Roads Only

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

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

GENERAL NOTES

1. This traffic control plan is for use on conventional roads posted at 45 mph or less and is intended for mobile operations that move continuously or intermittently (stopping up to approximately 15 minutes) such as short-line striping and in-lane rumble strips. When activities are anticipated to take longer amounts of time or traffic conditions warrant, a short duration or short-term stationary traffic control plan should be used.
2. A Truck Mounted Attenuator shall be used on Shadow Vehicle. Striping on the back panel of all truck mounted attenuators shall be 8" red and white reflective sheeting placed in an inverted "V" design. Reflective sheeting shall meet or exceed the reflectivity and color requirements of departmental material specification DMS-8300, Type A.
3. All traffic control devices shall be in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD), latest edition.
4. The use of yellow rotating beacons or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating or strobe lights when mounted on the drivers side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
5. Flashing arrow board shall be used on Shadow Vehicle. Flashing arrow board shall be Type B or Type C as per BC Standards. The arrow board operation shall be controlled from inside the truck.



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

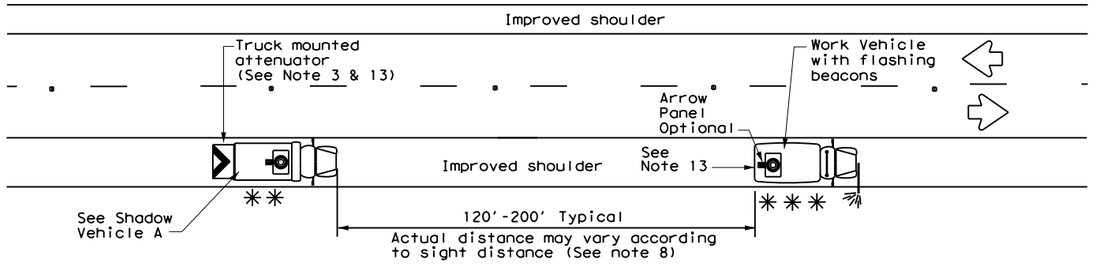
TRAFFIC CONTROL PLAN MOBILE OPERATIONS FOR ISOLATED WORK AREAS UNDIVIDED HIGHWAYS

TCP(3-4)-13

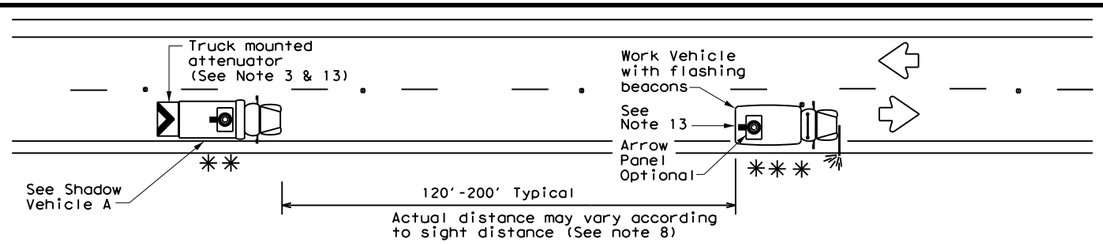
FILE: tcp3-4.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT July 2013	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		61

178

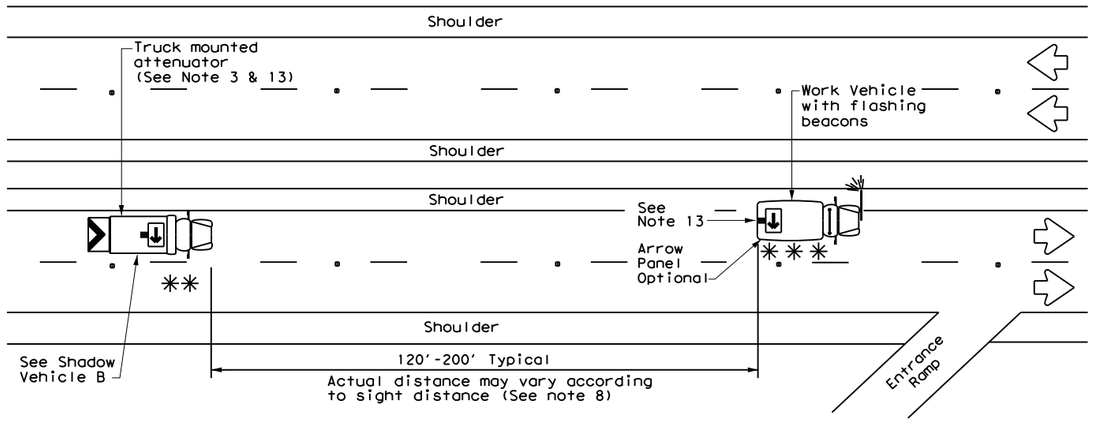
FILE: h:\00maintenance\south harris maintenance\2020 contracts\6357-02-001\
DATE: 1/4/2021
PROJECT: 6375-52-001



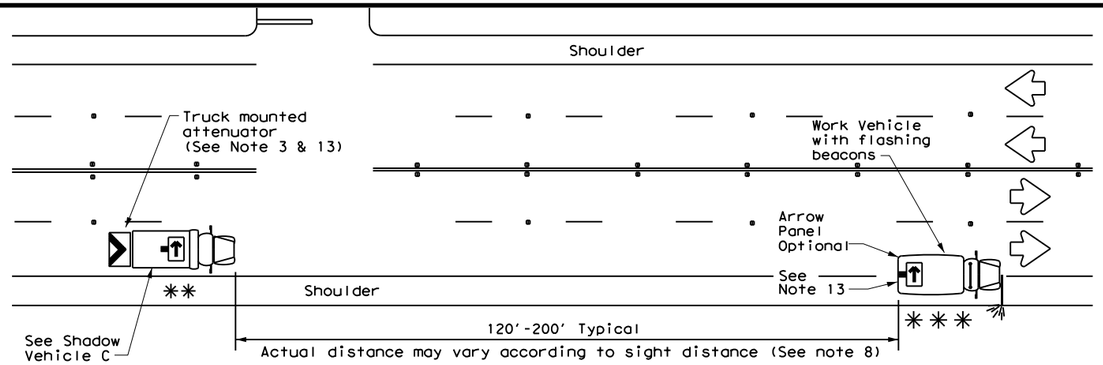
TWO LANE HIGHWAY WITH PAVED SHOULDERS MINIMUM 8'



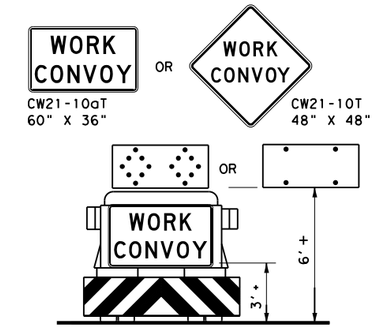
TWO LANE HIGHWAY WITH NO SHOULDER OR NARROW SHOULDER



MULTILANE HIGHWAY

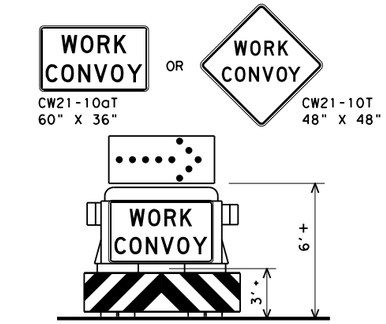


MULTILANE HIGHWAY



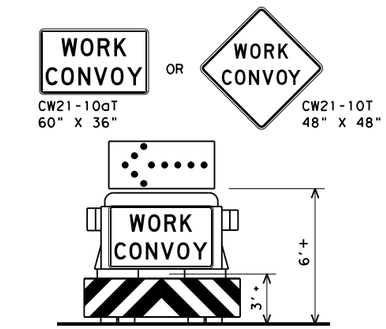
SHADOW VEHICLE A

with Flashing Arrow Board in Caution Mode



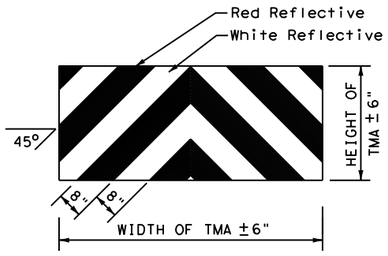
TYPICAL SHADOW VEHICLE B

with RIGHT Directional display Flashing Arrow Board



TYPICAL SHADOW VEHICLE C

with LEFT Directional display Flashing Arrow Board



STRIPING FOR TMA

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

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

GENERAL NOTES

1. All traffic control devices shall be in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD), latest edition.
2. The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
3. The use of truck mounted attenuators (TMA) on the Shadow Vehicle is required.
4. Striping on the back panel of all TMAs shall be 8" red reflective sheeting with white background, placed in an inverted "V" design. Reflective sheeting shall meet or exceed the reflectivity and color requirements of DEPARTMENTAL MATERIAL SPECIFICATION DMS-8300, TYPE A.
5. Flashing Arrow Panels shall be Type B or Type C as per BC Standards. The panel operation shall be controlled from inside the vehicle.
6. Each vehicle shall have two-way radio communication capability.
7. When the work convoy must change lanes, the Shadow Vehicle should change lanes first to protect the Work Vehicle.
8. Spacing between Shadow and Work Vehicle will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the Shadow Vehicle in time to slow down and/or change lanes as they approach the Work Convoy.
9. Use of an arrow panel on the Work Vehicle is optional except as provided in note 13, but may be required by the Engineer. If an arrow panel is not used, dual flashing beacons, mounted as high and as widely separated as practicable at the rear of the Work Vehicle shall be required.
10. On two-lane two-way roadways, the Work and Shadow Vehicles should pull over periodically to allow motor vehicle traffic to pass.
11. Work and Shadow Vehicles should stay on the shoulder of highways having 8' or wider shoulders when possible.
12. A Trail Vehicle may be added to the operation when approved by the Engineer. See TCP(3) series standards.
13. The shadow vehicle may be omitted on conventional roadways when a TMA or TA and arrow panel is mounted to the herbicide vehicle. A separate shadow vehicle will be required on expressways and Freeways.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS HERBICIDE TRUCK OPERATIONS

TCP(3-5)-18

FILE: tcp3-5.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT July 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
4-18	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		62

FILE: h:\00maintenance\south harris maintenance\2020 contracts\6357-02-001
DATE: 1/4/2021
PROJECT: 6375-52-001

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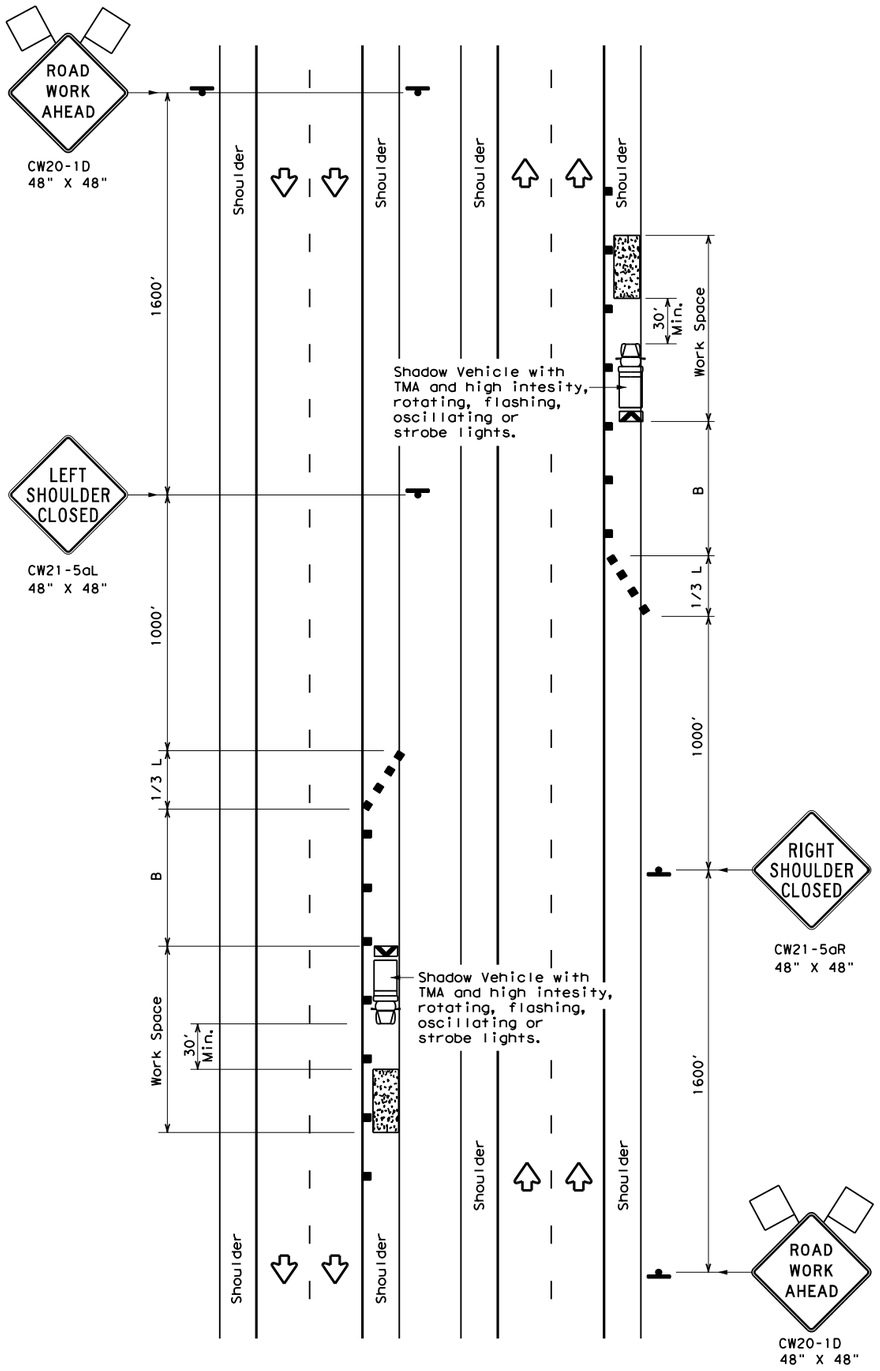
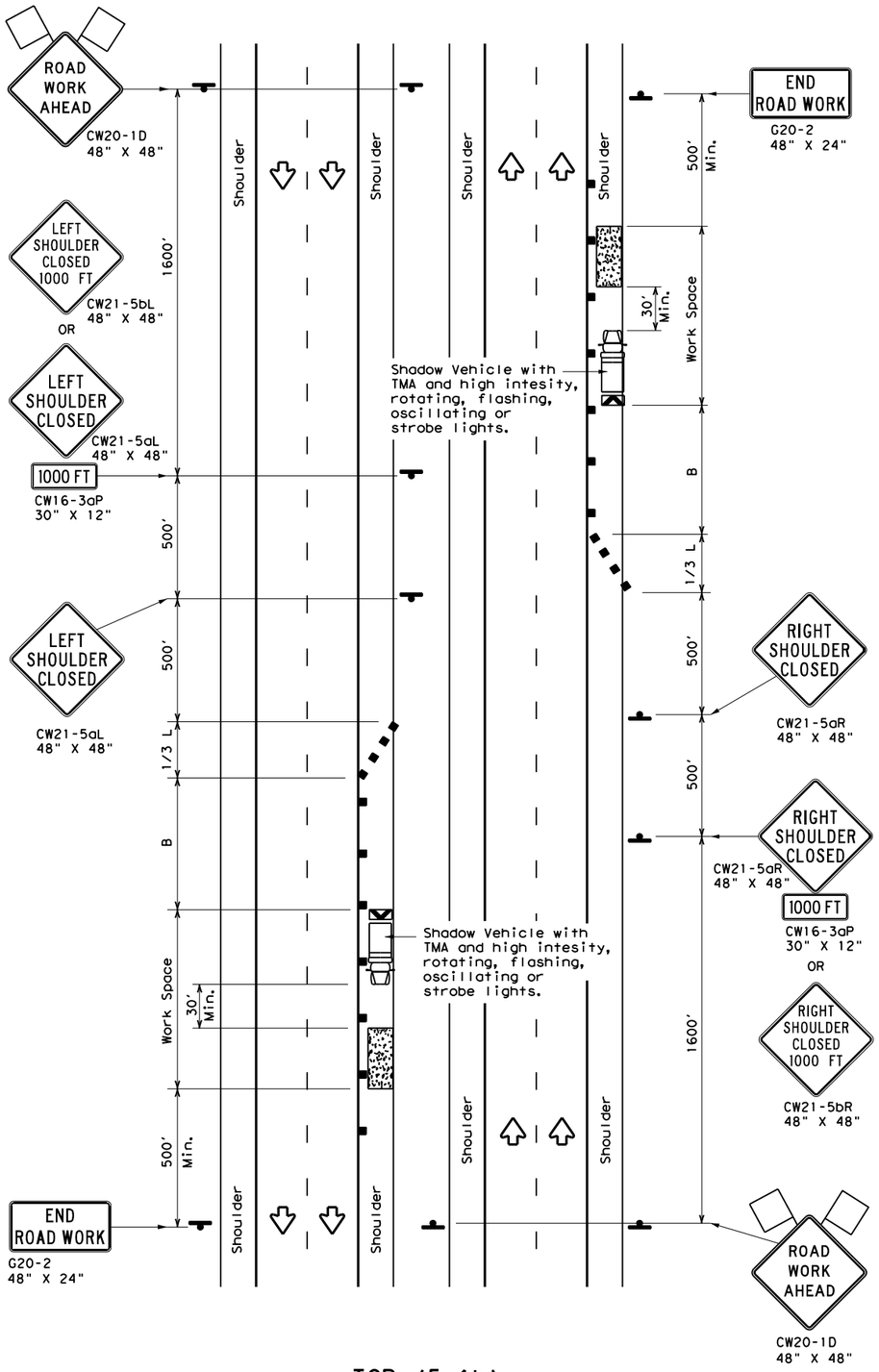
DATE: 1/4/2021
PROJECT: 6375-52-001



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	6375	52	001	IH45
2-18	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		63

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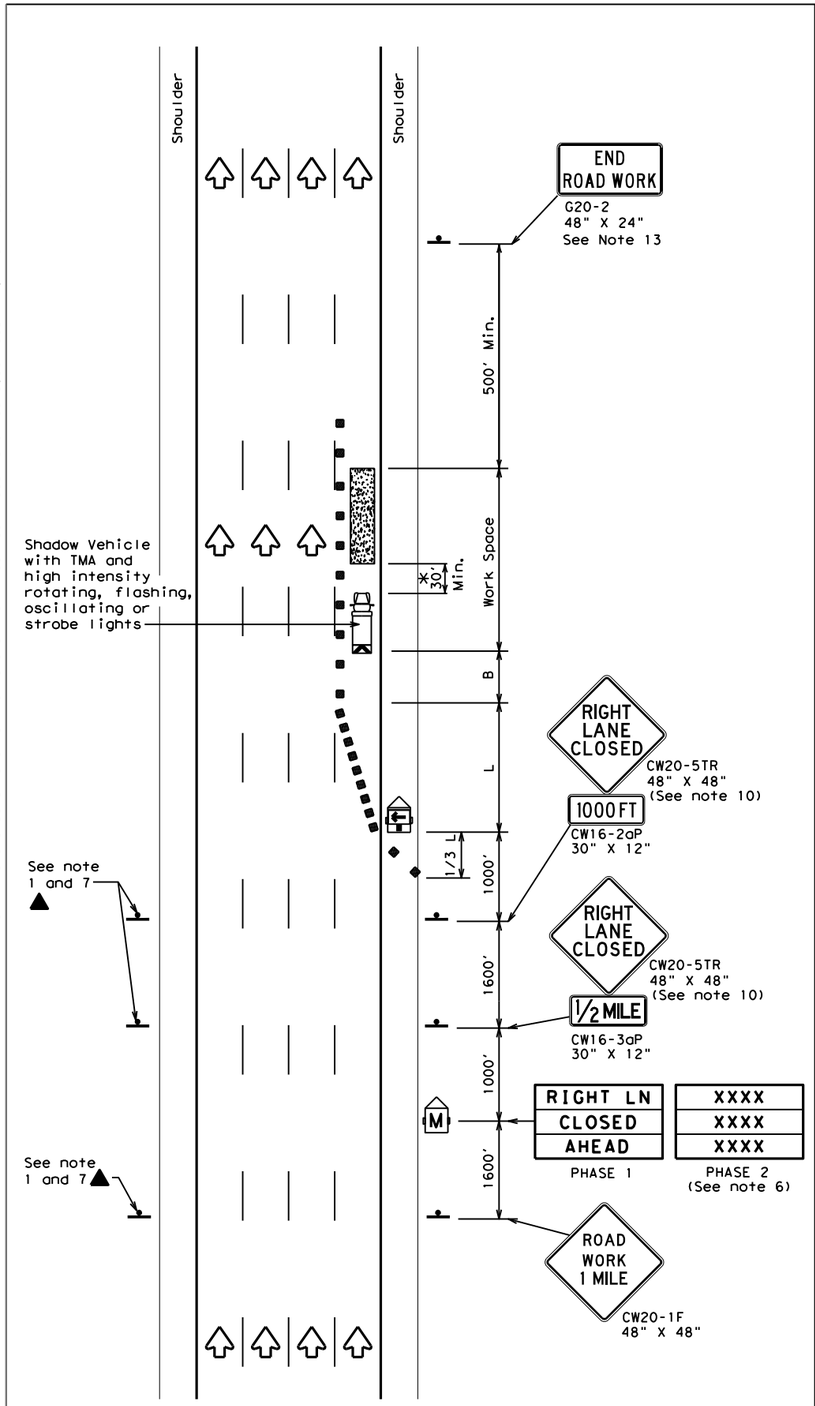
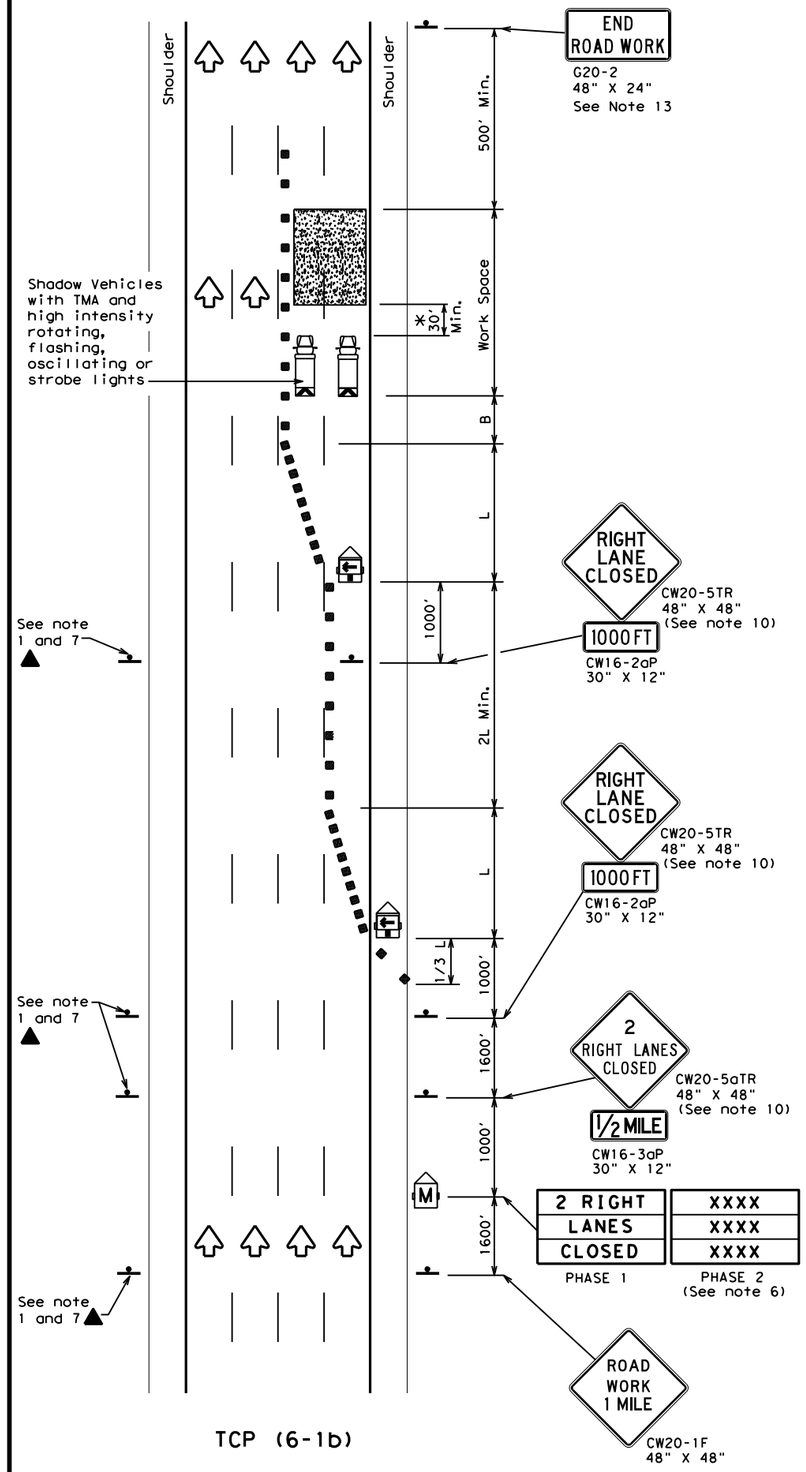
DATE: 1/4/2021
PROJECT: 6375-52-001



TCP (6-1a)

TYPICAL FREEWAY ONE LANE CLOSURE



TCP (6-1b)

TYPICAL FREEWAY TWO LANE CLOSURE

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

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

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

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

GENERAL NOTES

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

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

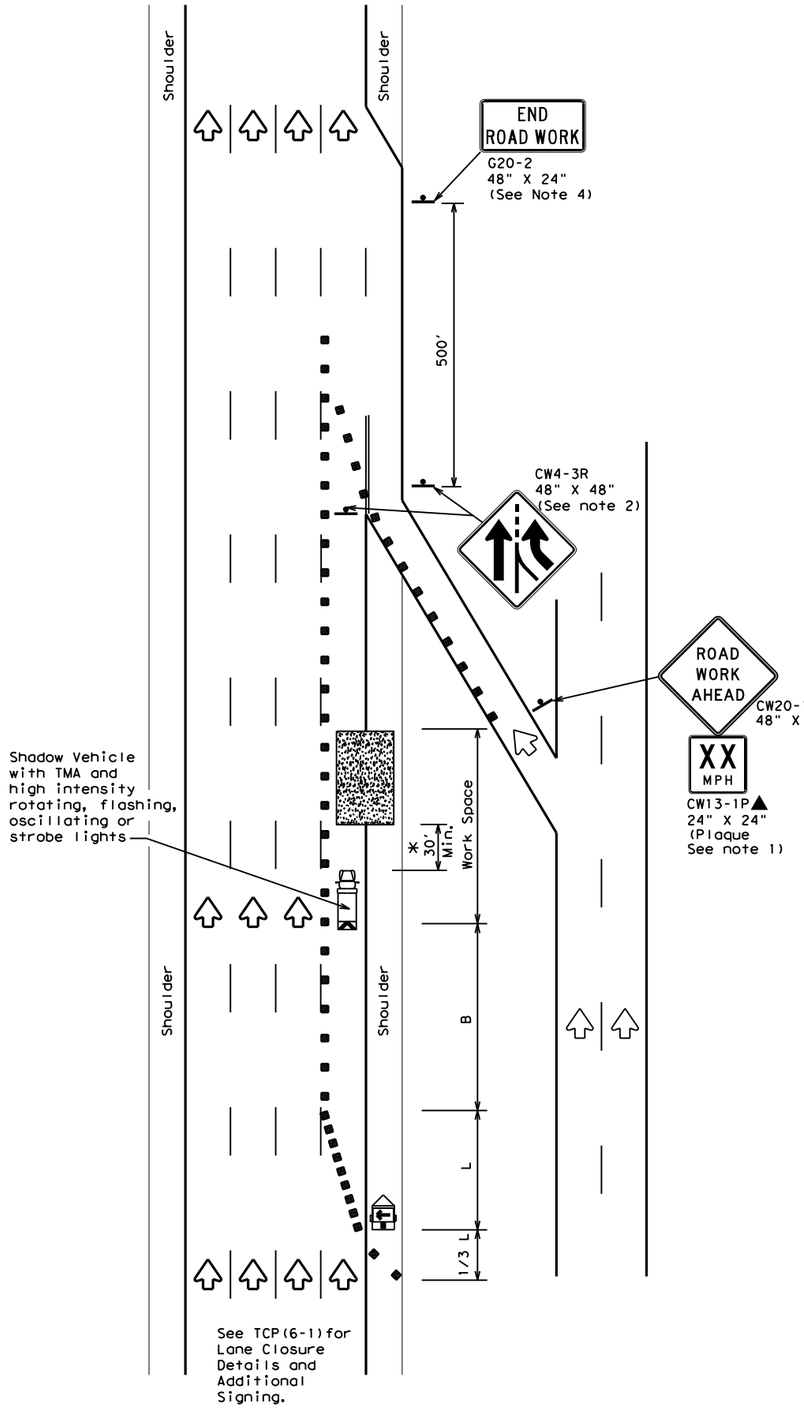
Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN FREEWAY LANE CLOSURES

TCP(6-1)-12

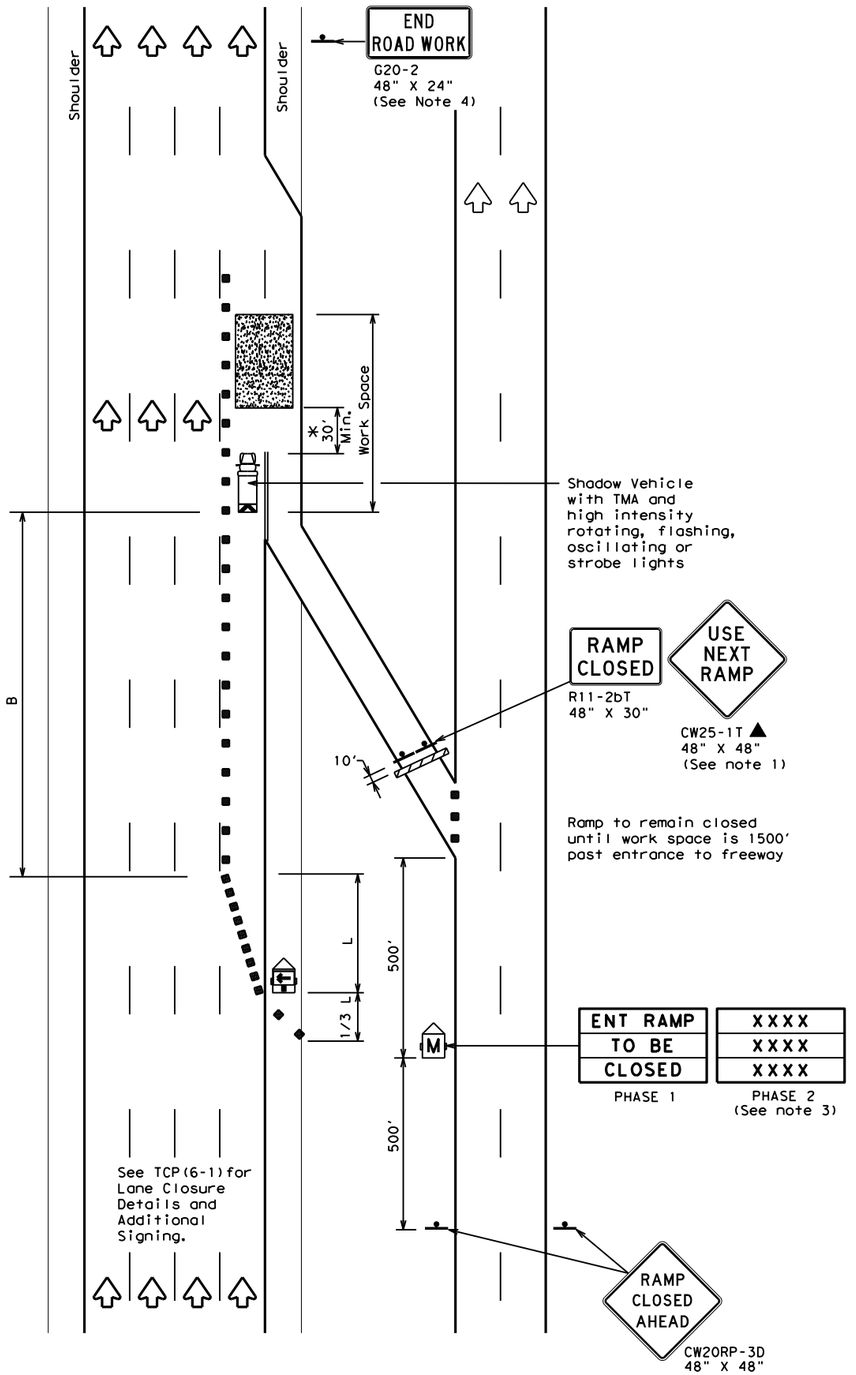
FILE: tcp6-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-12	6375	52	001	IH45
	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		64

201



TCP (6-2a)

ENTRANCE RAMP OPEN
WORK WITHIN 500' OF RAMP



TCP (6-2b)

ENTRANCE RAMP CLOSED

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

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

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

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

GENERAL NOTES

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

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

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

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA NEAR RAMP

TCP(6-2)-12

FILE: tcp6-2.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	12	HARRIS/GAL		65
202				

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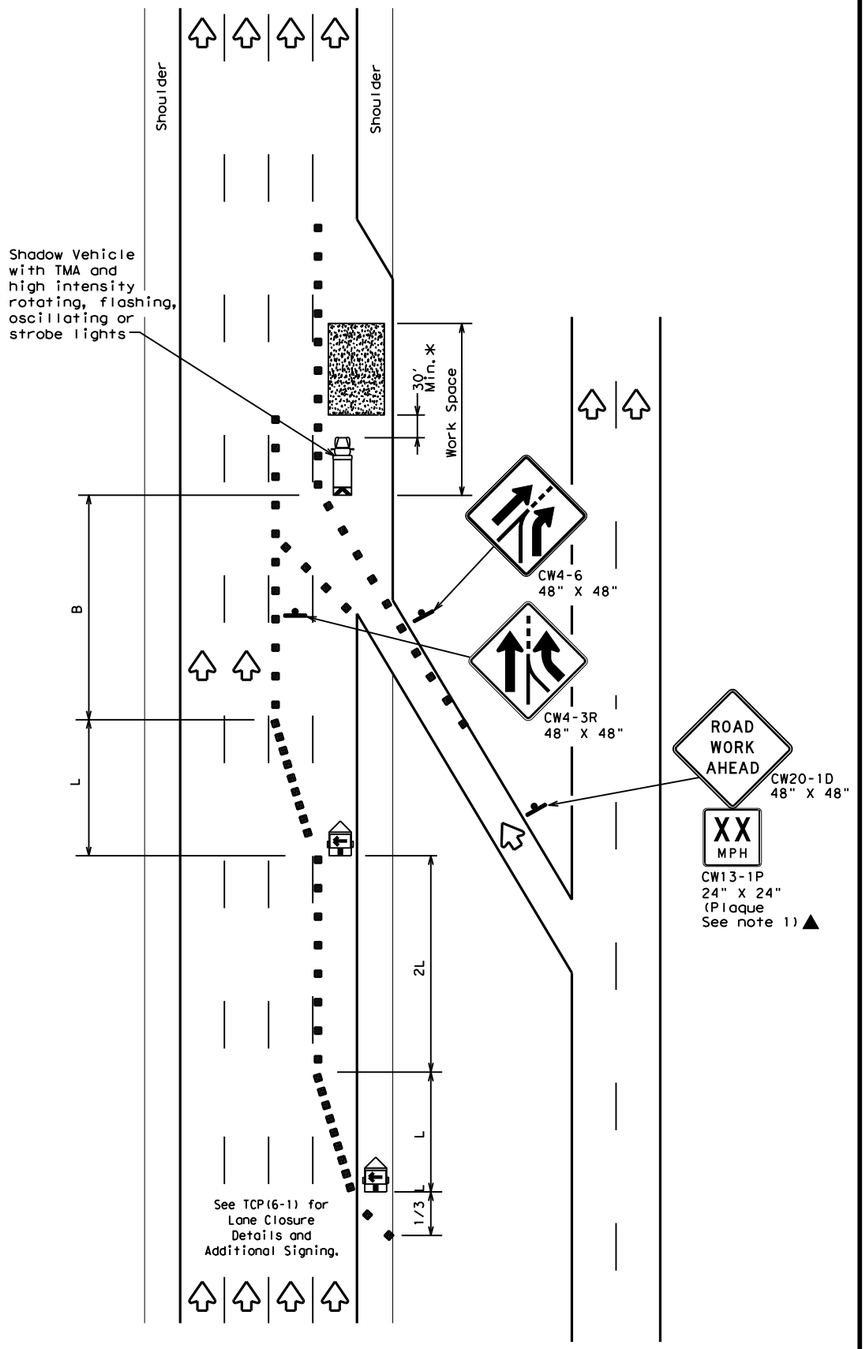
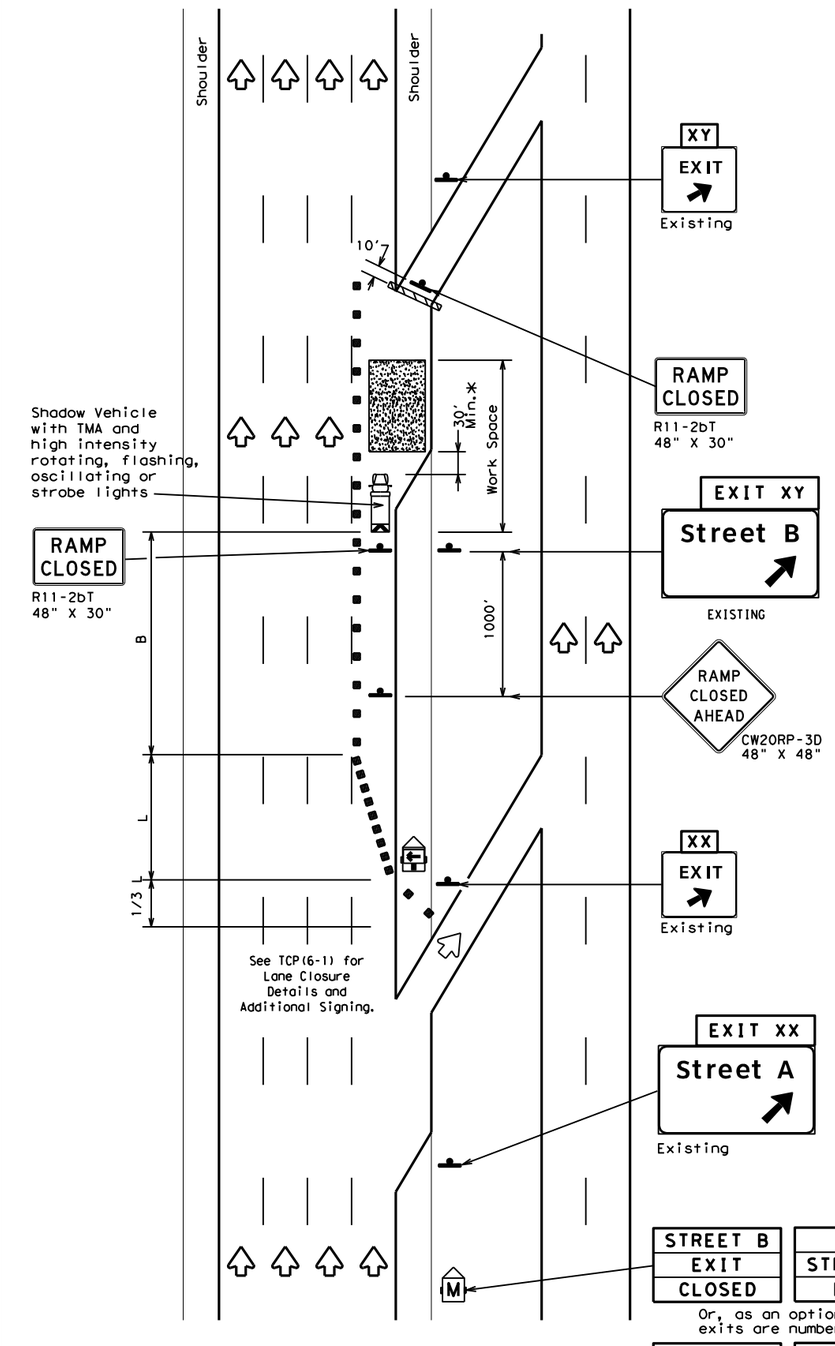
DATE: 1/4/2021
PROJECT: 6375-52-001



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

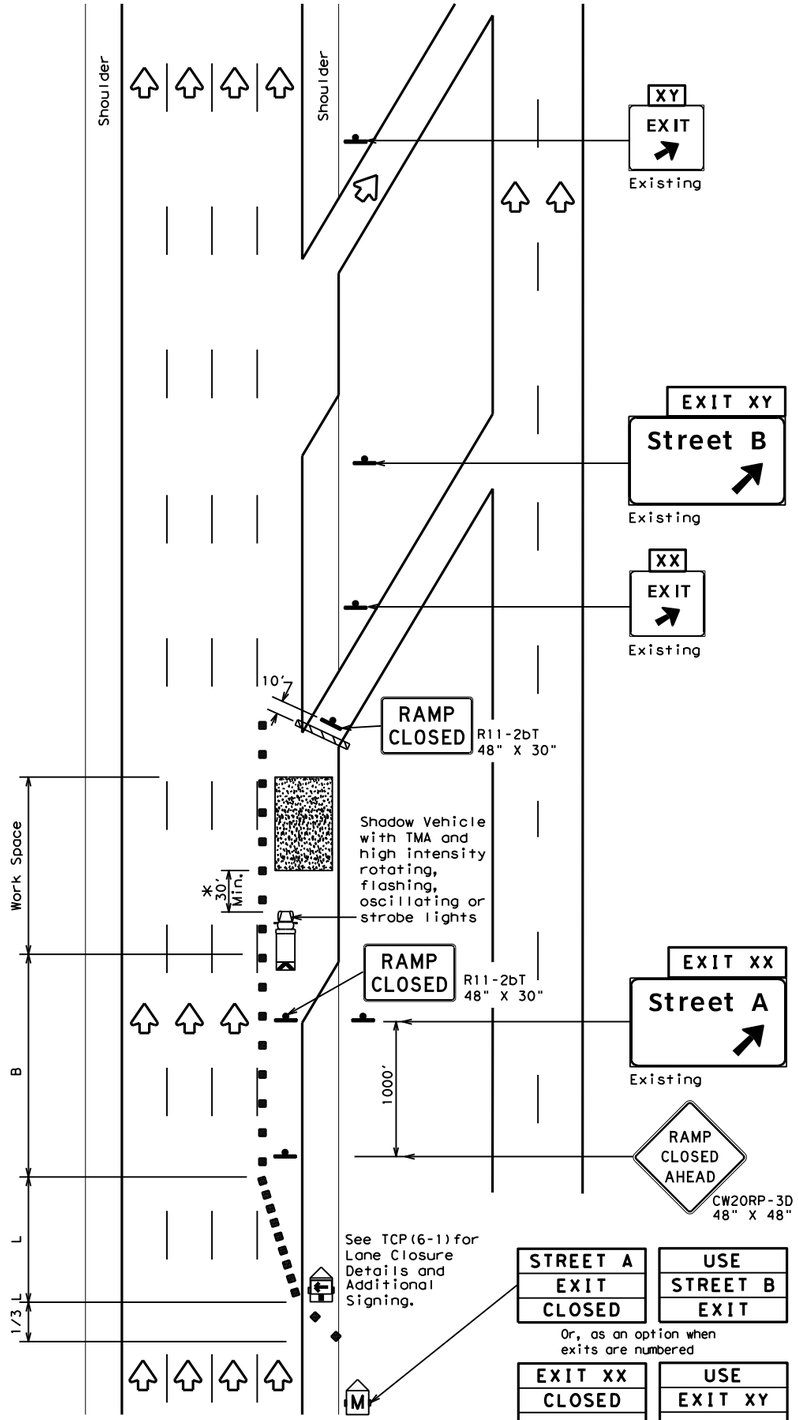
TRAFFIC CONTROL PLAN
WORK AREA BEYOND RAMP

TCP(6-3)-12

FILE: tcp6-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	12	HARRIS/GAL		66

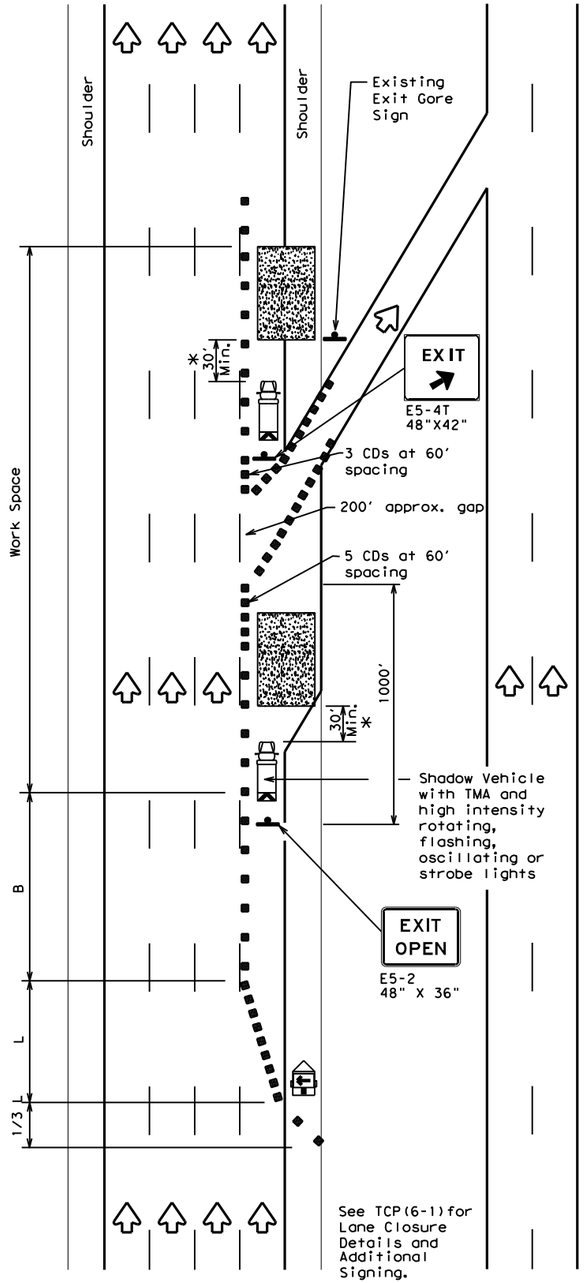
203

FILE: h:\00#maintenance\south harris maintenance\2020 contracts\6357-02-001
DATE: 1/4/2021
PROJECT: 6375-52-001



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

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

TYPICAL USAGE

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

GENERAL NOTES

1. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
2. See BC Standards for sign details.

*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

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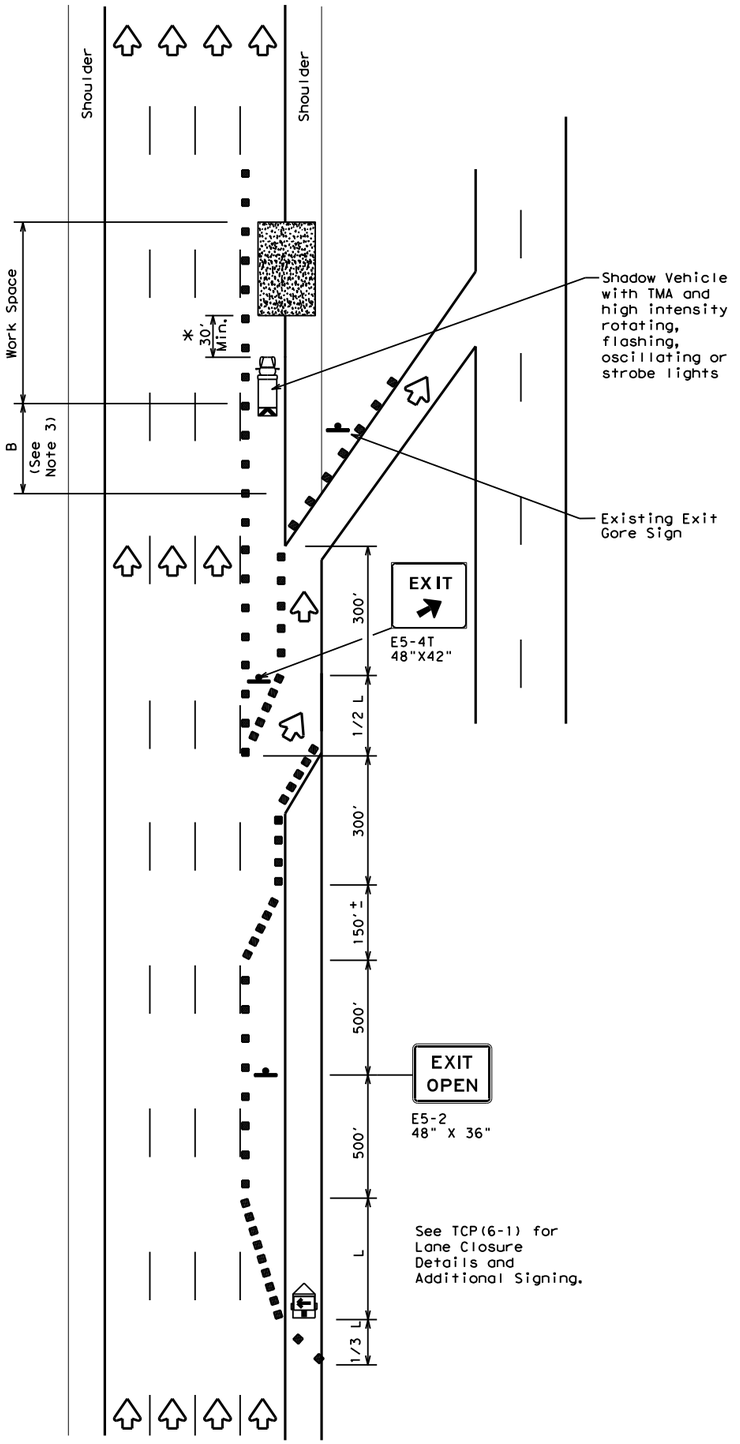
©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	12	HARRIS/GAL		67

204

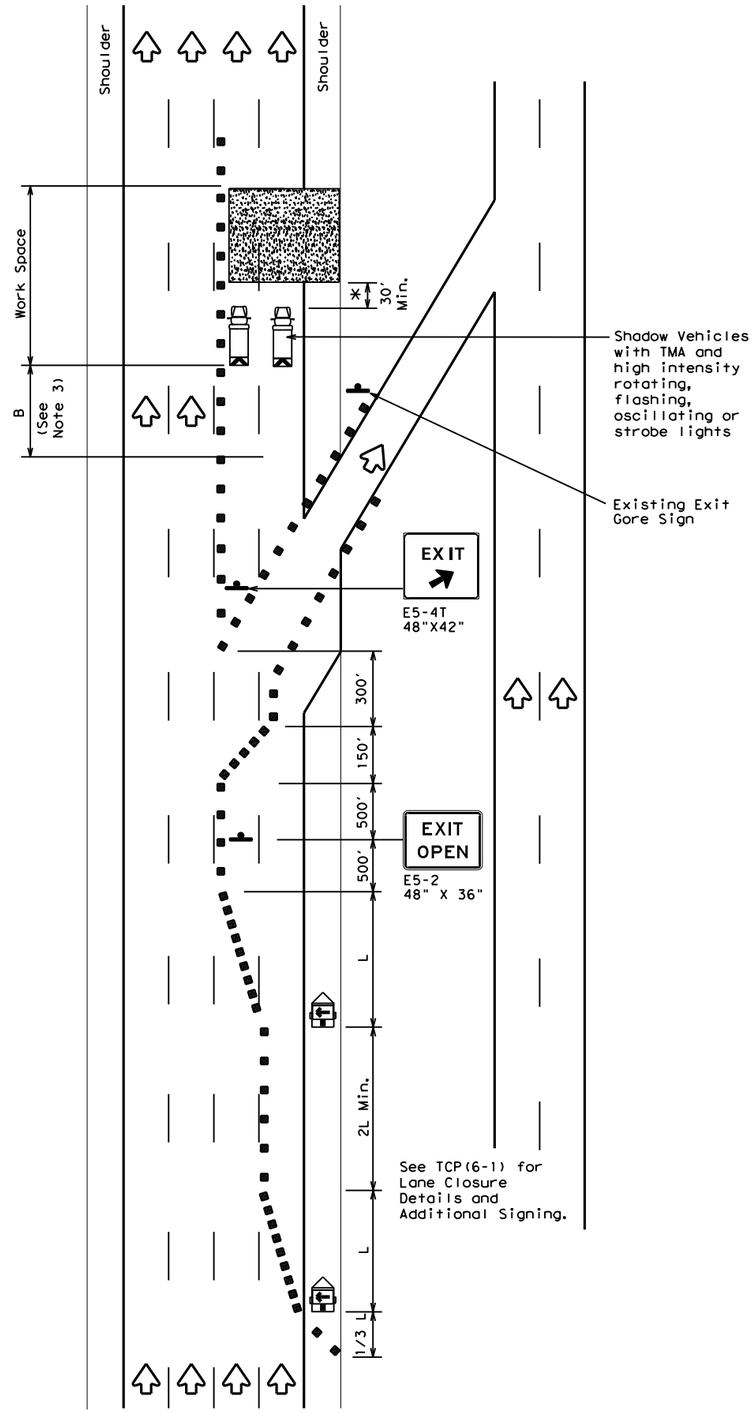
FILE: h:\00maintenance\south harris maintenance\2020 contracts\6357-02-001\
DATE: 1/4/2021
PROJECT: 6375-52-001

FILE: h:\00maintenance\south harris maintenance\2020 contracts\6357-02-001\traffic control plans\tcp6-5.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001



TCP (6-5a)

EXIT RAMP OPEN



TCP (6-5b)

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

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

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

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

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

GENERAL NOTES

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

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

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

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA BEYOND EXIT RAMP

TCP(6-5)-12

FILE: tcp6-5.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	12	HARRIS/GAL		68

205

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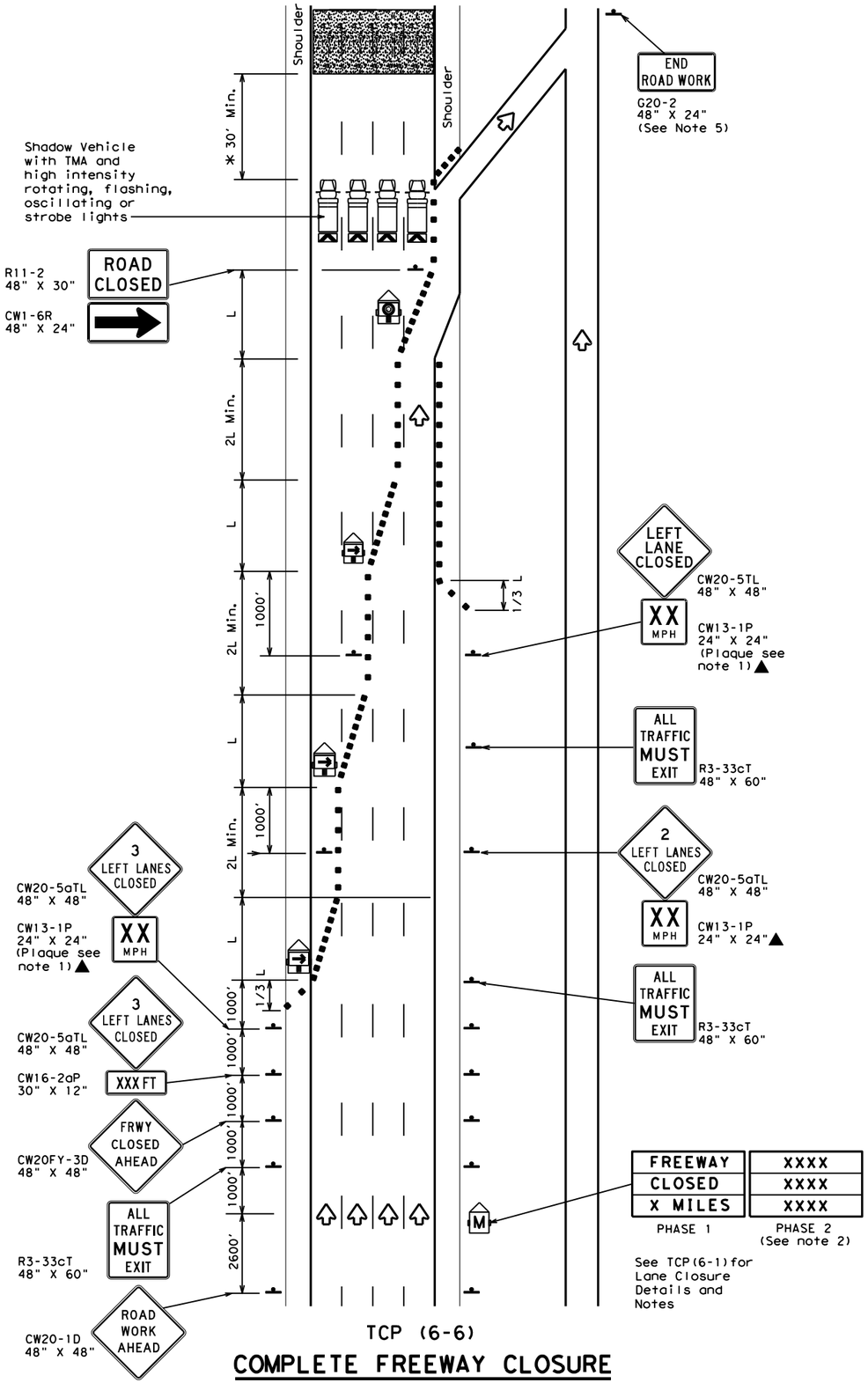
DATE: 1/4/2021
PROJECT: 6375-52-001



TCP (6-6)

COMPLETE FREEWAY 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)
	Flashing Arrow Board in Caution Mode		Traffic Flow
	Sign		

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. Phase 2 of the PCMS message should include appropriate information formatted as shown on BC(6), such as "MERGE RIGHT," recommended speed, delay, exit information, or other specific warnings.
3. Where queuing is anticipated beyond signing shown, additional PCMS signs, other warning signs, devices or Law Enforcement Officers should be available to warn approaching high speed traffic of the end of the queue, as directed by the Engineer.
4. Entrance ramps located from the advance warning area to the exit ramp should be closed whenever possible.
5. The END ROAD WORK (G20-2) sign may be omitted when it conflicts with G20-2 signs already in place on the project.

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

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

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN FREEWAY CLOSURE

TCP(6-6)-12

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©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
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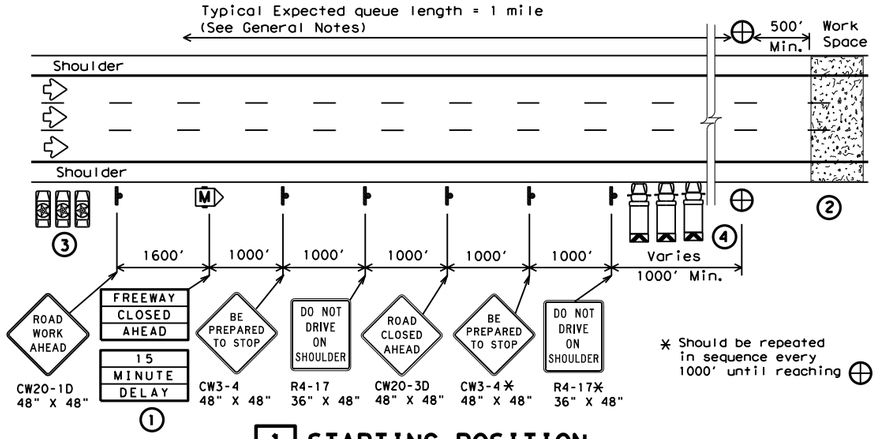
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	12	HARRIS/GAL		69

206



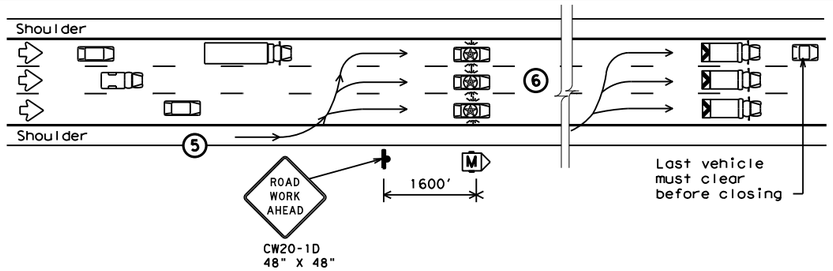
1 STARTING POSITION

(1) Traffic control devices should be installed or located near their intended position prior to beginning temporary roadway closure sequence. Duplicate signs should be erected on the median side of the roadway when median width permits. Warning signs should not be placed on the paved shoulders that will be used by the WARNING LEOV, or where movement of the LEOVs or barrier vehicles will be impeded.

(2) Prior to beginning the roadway closure sequence, all equipment, materials, personnel, and other items necessary to complete the work should be gathered near the work area. Entrance ramps located in the area where a queue is expected to build should be closed.

(3) There should be one LEOV for every lane to be controlled, plus a minimum of one to warn traffic approaching a queue. An additional lead law enforcement officer is desirable to remain with the Engineer's or Contractor's point of contact (POC) during the operation in order to improve communication with all LEOVs involved.

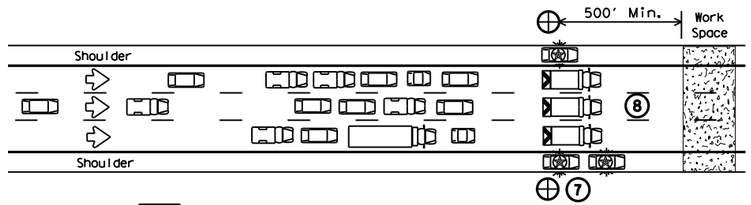
(4) One barrier vehicle with a Truck Mounted Attenuator and amber or blue and amber high intensity flashing/oscillating/strobe lighting shall be used for each lane to be closed.



2 REDUCING SPEED OPERATION

(5) Starting position of the LEOVs should be in advance of the most distant warning signs.

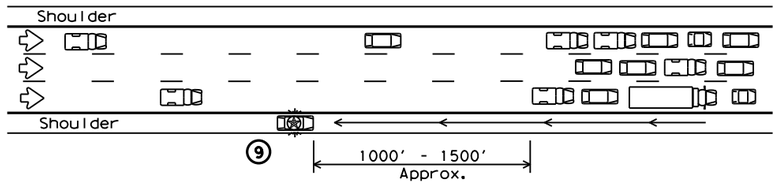
(6) Once the LEOVs have achieved an abreast blocking formation while traveling toward the CP, emergency lights and headlights should be turned "ON". The LEOVs should maintain formation, not allow traffic to pass, and begin to decelerate. The LEOVs should continue to decelerate, giving the barrier vehicles opportunity to be staged upstream of the work space after traffic has cleared. The LEOVs should then continue to decelerate slowly until bringing traffic to a stop near the barrier vehicles.



3 ALL TRAFFIC STOPPED AT CP

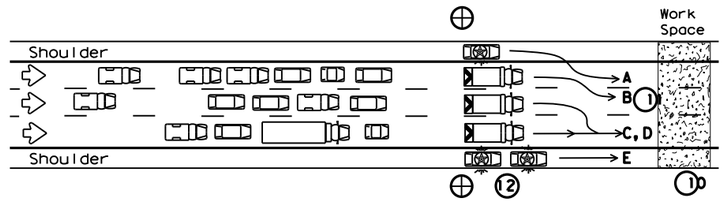
(7) Once traffic is stopped the LEOVs should park on the shoulders with emergency lighting "ON" in order to provide law enforcement presence at the closure and keep shoulders blocked ahead of the work space. They should stay in radio contact with the WARNING LEOV.

(8) The barrier vehicles should be parked, one in each lane, the parking brake set, with the high visibility flashing/oscillating/strobe lighting "ON," and the transmission in gear.



4 WARNING THE TRAFFIC QUEUE

(9) The WARNING LEOV should proceed to the right shoulder of the roadway, with emergency lights on approximately 1000' in advance of the traffic queue (stopped traffic) as the queue develops. When determined that limited sight distance situations (crest of hills, sharp roadway curvature, etc.) may occur to motorists approaching the queue, the WARNING LEOV may proceed ¼ mile or more in advance of the queue.



5 RELEASING STOPPED TRAFFIC

(10) All equipment, materials, personnel, and other items should be removed from the roadway and maintain an adequate clear zone.

(11) When the roadway is clear for traffic, the LEOV should proceed forward from the left shoulder followed by the barrier vehicles, from left to right, as shown alphabetically in the plan view.

(12) The LEOV or LEOVs on the right shoulder may remain on the shoulder until satisfied that traffic is moving satisfactorily before merging or proceeding.

(13) LEOVs and barrier vehicles should re-group at their respective starting positions if necessary.

LEGEND			
■ ■	Channelizing Devices	⊕	Control Position (CP)
(M)	Portable Changeable Message Sign (PCMS)		Barrier Vehicle with Truck Mounted Attenuator
	Law Enforcement Officer's Vehicle(LEOV)		Traffic Flow

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

GENERAL NOTES

1. All traffic control devices shall conform with the latest edition of the Texas Manual on Uniform Traffic Control Devices (TMUTCD). Additional guidelines for traffic control devices may be found in the TMUTCD. Signs conflicting with the roadway closure sequence should be completely removed or covered. Additional traffic control devices may be required for closure of access roads, cross streets, exit and entrance ramps as directed by the Engineer.

2. Law enforcement officers and all workers involved should review and understand all procedures before the roadway closure sequence begins. Pre-work meetings may be held for this purpose. Local emergency services and media should have advance notification of roadway closure, expected dates and approximate times of closures.

3. Law enforcement officers shall be in uniform and have jurisdiction in the locale of the work area. An additional WARNING Law Enforcement Officer's Vehicle (LEOV) may be used on the median side of the roadway where median shoulder width permits (See sequence #9).

4. The roadway closure should be during off-peak hours, as shown in the plans, or as directed by the Engineer.

5. Work should be limited to approximately 15 minutes maximum duration unless otherwise directed by the Engineer based on existing roadway conditions. If the work is not complete within 15 minutes, or if the end of the traffic queue extends past the most distant advance warning signs, the work area should be cleared of all equipment, materials, personnel, and other items, and the roadway reopened. When the queue has dissipated and the traffic flow appears normal the roadway closure sequence may be repeated.

6. For traffic volumes greater than 1000 Passenger Cars Per Hour Per Lane (PCPHPL), or for roadway closures that exceed 15 minutes, see details elsewhere in the plan.

7. If traffic queues beyond the advance warning signs during one road closure sequence, the advance warning should be extended prior to repeating the road closure sequence. When possible, PCMS signs should be located in advance of the last available exit prior to the closure to allow motorists the choice of an alternate route.

THIS PLAN IS INTENDED TO BE USED AT LOCATIONS/TIMES WHEN TRAFFIC VOLUMES ARE LESS THAN 1000 PASSENGER CARS PER HOUR PER LANE.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN SHORT DURATION FREEWAY CLOSURE SEQUENCE

TCP (6-7)-12

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©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
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1-97 8-12	DIST	COUNTY		SHEET NO.
4-98	12	HARRIS/GAL		70

207

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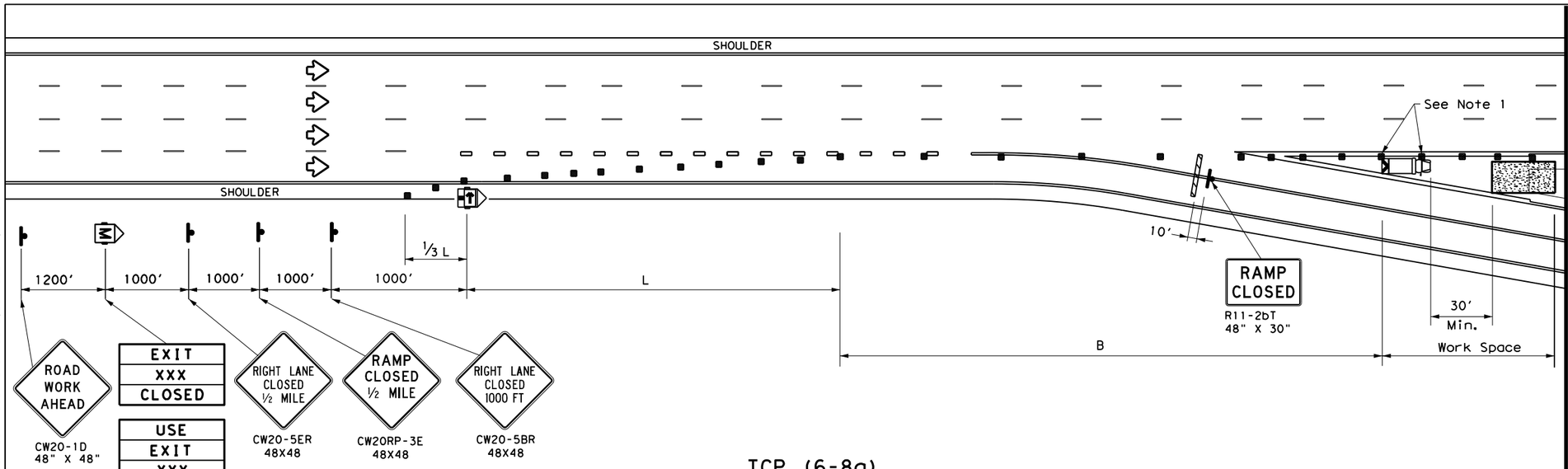
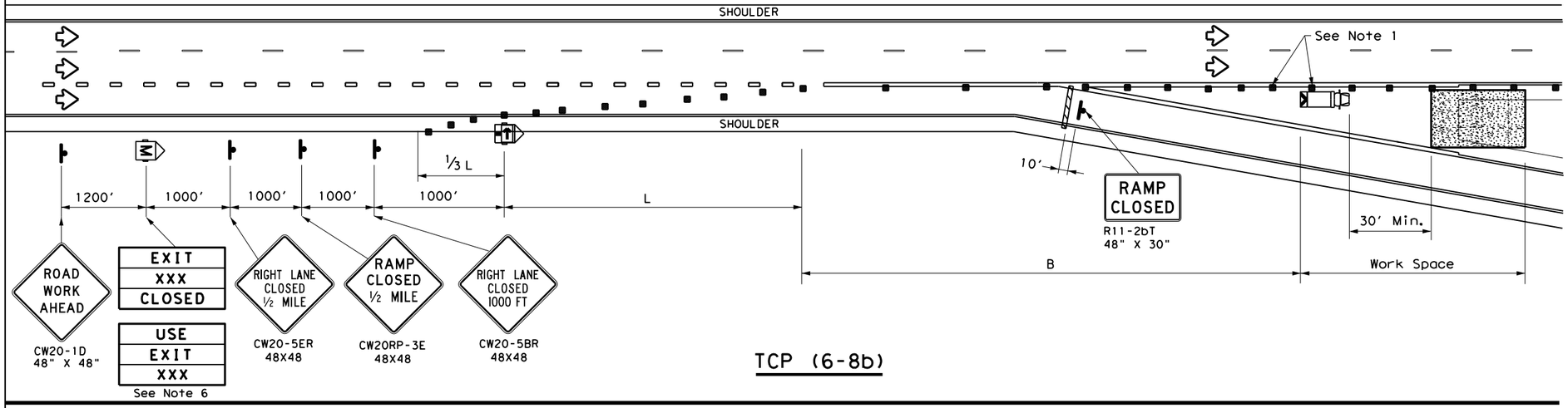
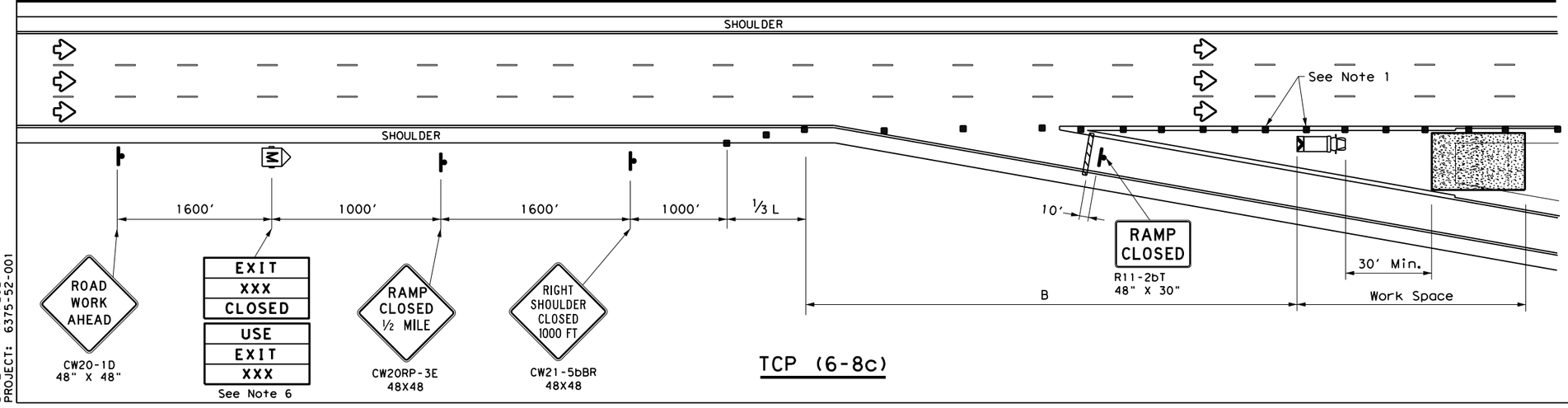
DATE: 1/4/2021
PROJECT: 6375-52-001



TCP (6-8a)



TCP (6-8b)



TCP (6-8c)

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" ** 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

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©TxDOT February 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
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	12	HARRIS/GAL		71

208

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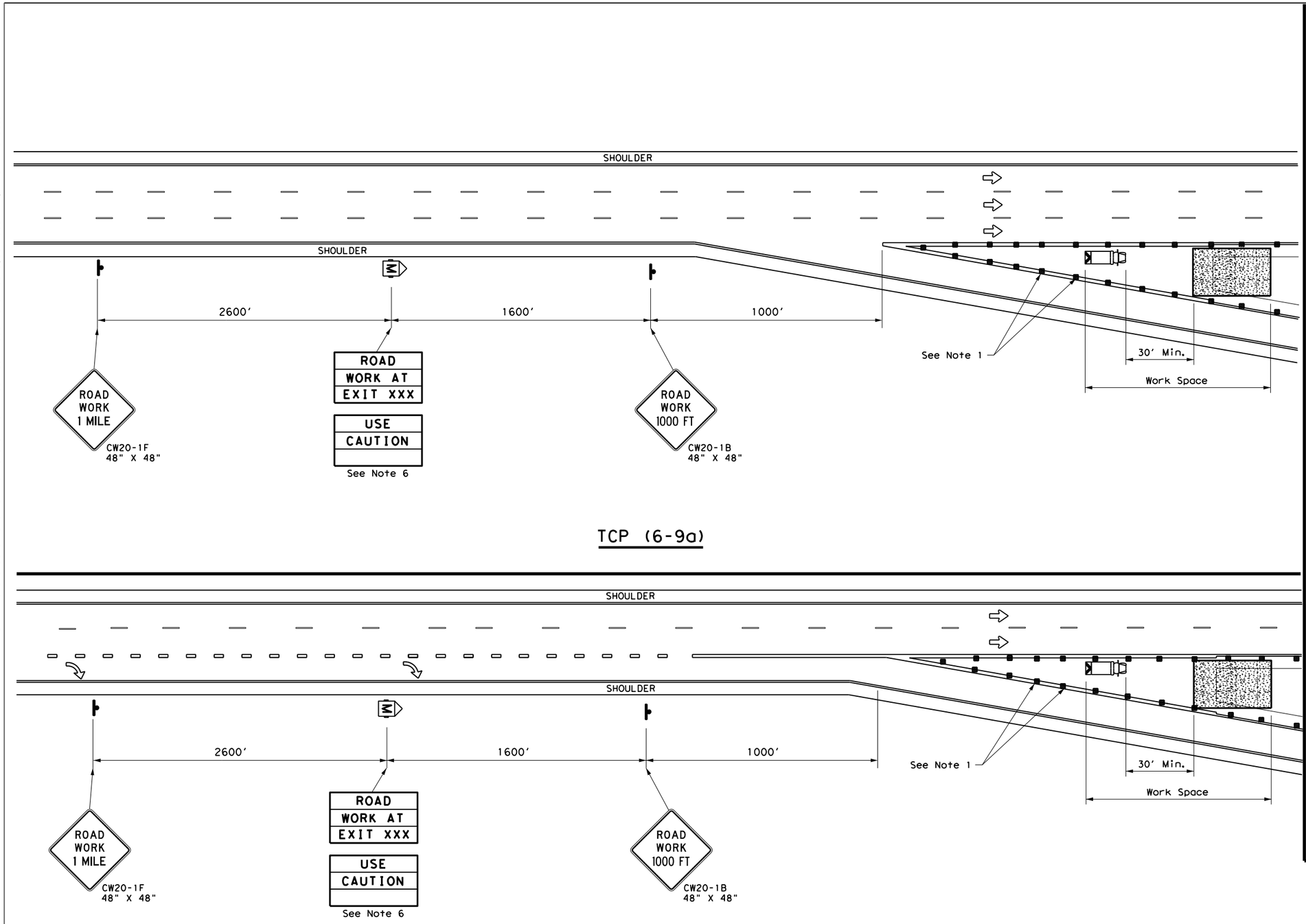
PROJECT: 6375-52-001



TCP (6-9a)

TCP (6-9b)

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) and TCP(6-8) for traffic control details.
5. Truck mounted attenuators are required.
6. The PCMS may be omitted if replaced with a "ROAD WORK ½ MILE" (CW20-1E).
7. Roadway ADT should be less than 10,000.

Texas Department of Transportation

Traffic Operations Division Standard

WORK IN EXIT GORE FOR ADT LESS THAN 10,000

TCP(6-9)-14

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©TxDOT February 2014	CONT	SECT	JOB	HIGHWAY
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PROJECT: 6375-52-001

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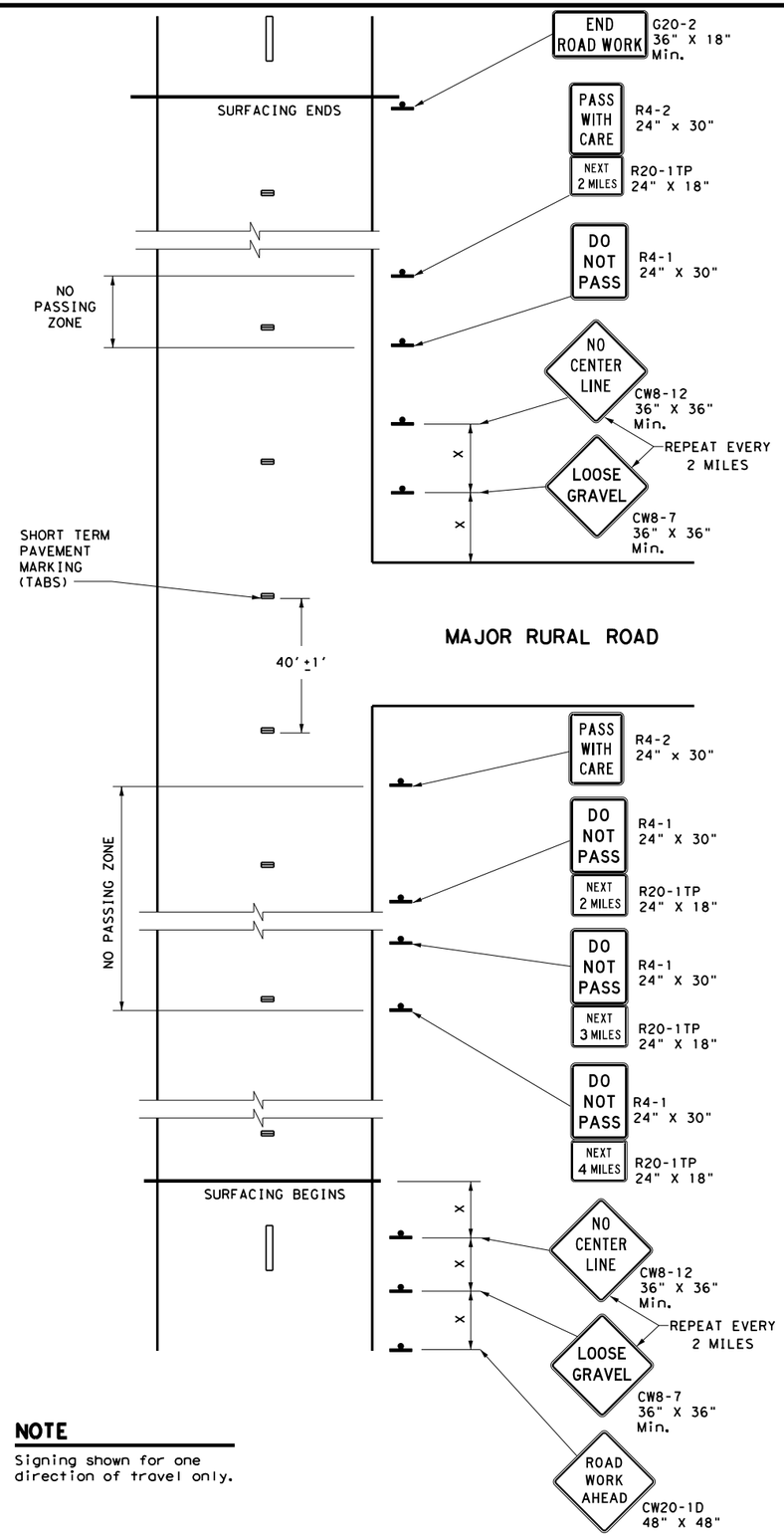
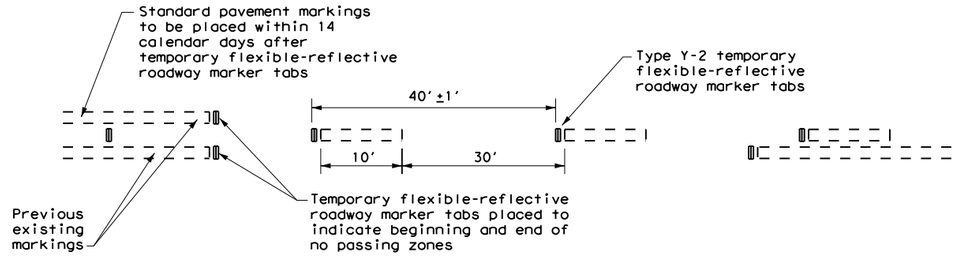


NOTE

Signing shown for one direction of travel only.

NO PASSING ZONES ON TWO-LANE TWO-WAY ROADS



For seal coat, micro-surface or similar operations

"DO NOT PASS" SIGN (R4-1) and NO-PASSING ZONES

A. Prior to the beginning of construction, all currently striped no-passing zones shall be signed with the DO NOT PASS (R4-1) signs and PASS WITH CARE (R4-2) signs placed at the beginning and end of each zone for each direction of travel except as otherwise provided herein. Signs marking these individual no-passing zones need not be covered prior to construction if the signs supplement the existing pavement markings.

B. At the discretion of the Engineer, in areas of numerous no-passing zones, several zones may be combined as a single zone. If passing is to be prohibited over one or more lengthy sections, a DO NOT PASS sign and a NEXT XX MILES (R20-1TP) plaque may be used at the beginning of such zones. The DO NOT PASS sign and the NEXT XX MILES plaque should be repeated every mile to the end of the no-passing zone. In areas where there is considerable distance between no-passing zones, the end of the no-passing zone may be signed with a PASS WITH CARE sign and a NEXT XX MILES plaque.

C. Depending on traffic volumes and length of sections, it may be desirable to prohibit passing throughout the project to prevent damage to windshield and lights. The DO NOT PASS sign and NEXT XX MILES plaque should be used and repeated as often as necessary for this purpose. Where several existing zones are to be combined into one individual no-passing zone, the sign at the beginning of the zone should be covered until the surfacing operation has passed this location so as not to have the DO NOT PASS sign conflict with the existing pavement markings. Also, unless one days operation completes the entire length of such combined zones, appropriate DO NOT PASS and PASS WITH CARE signs should be placed at the beginning and end of the no-passing zones where the surfacing operation has stopped for the day.

D. R4-1 and R4-2 are to remain in place until standard pavement markings are installed.

"NO CENTER LINE" SIGN (CW8-12)

A. Center line markings are yellow pavement markings that delineate the separation of travel lanes that have opposite directions of travel on a roadway. Divided highways do not typically have center line markings.

B. At the time construction activity obliterates the existing center line markings(low volume roads may not have an existing centerline), a NO CENTER LINE (CW8-12) sign should be erected at the beginning of the work area, at approximately 2 mile intervals within the work area, beyond major intersections and other locations deemed necessary by the Engineer.

C. The NO CENTER LINE signs are to remain in place until standard pavement markings are installed.

"LOOSE GRAVEL" SIGN (CW8-7)

A. When construction begins, a LOOSE GRAVEL (CW8-7) sign should be erected at each end of the work area and repeated at intervals of approximately 2 miles in rural areas and closer in urban areas.

B. The LOOSE GRAVEL signs are to remain in place until the condition no longer exists.

PAVEMENT MARKINGS

A. Temporary markings for surfacing projects shall be Temporary Flexible-reflective Roadway Marker Tabs unless otherwise approved by the Engineer. Tabs are to be installed to provide true alignment for striping crews or as directed by the Engineer. Tabs will be placed at the spacing indicated. Tabs should be applied to the pavement
no more than two (2) days before the surfacing is applied. After the surfacing is rolled and swept, the cover over the reflective strip shall be removed.

B. Tabs shall not be used to simulate edge lines.

C. Tab placement for overlay/inlay operations shall be as shown on the WZ(STPM) standard sheet.

COORDINATION OF SIGN LOCATIONS

A. The location of warning signs at the beginning and end of a work area are to be coordinated with other signing typically shown on the Barricade and Construction Standards for project limits to ensure adequate sign spacing.

B. Where possible the ROAD WORK AHEAD (CW20-1D), LOOSE GRAVEL (CW8-7), and NO CENTER LINE (CW8-12) signs should be placed in the sequence shown following the OBEY WARNING SIGNS STATE LAW (R20-3T) and the TRAFFIC FINES DOUBLE (R20-5T) sign, and one "X" sign spacing prior to the CONTRACTOR (G20-6T)sign typically located at or near the limits of surfacing. LOOSE GRAVEL and NO CENTER LINE signs will then be repeated as described above.

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

* Conventional Roads Only

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

GENERAL NOTES

1. The traffic control devices detailed on this sheet will be furnished and erected as directed by the Engineer on sections of roadway where tabs must be placed prior to the surfacing operation which will cover or obliterate the existing pavement markings.
2. The devices shown on this sheet are to be used to supplement those required by the BC Standards or others required elsewhere in the plans.
3. Signs shall be erected as detailed on the BC Standards or the Compliant Work Zone Traffic Control Devices List (CWZTCD) on supports approved for Long-Term / Intermediate-Term Work Zone Sign Supports.
4. When surfacing operations take place on divided highways, freeways or expressways, the size of diamond shaped construction warning signs shall be 48" x 48".
5. Signs on divided highways, freeways and expressways will be placed on both right and left sides of the roadway based on roadway conditions as directed by the Engineer.

Texas Department of Transportation — Traffic Operations Division Standard

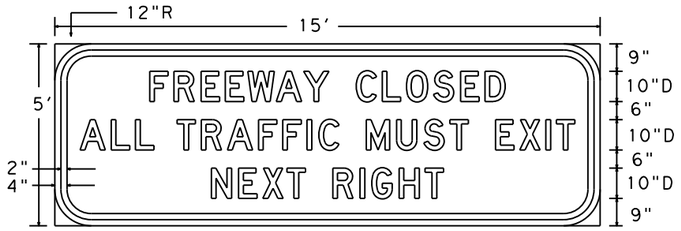
TRAFFIC CONTROL DETAILS FOR SURFACING OPERATIONS

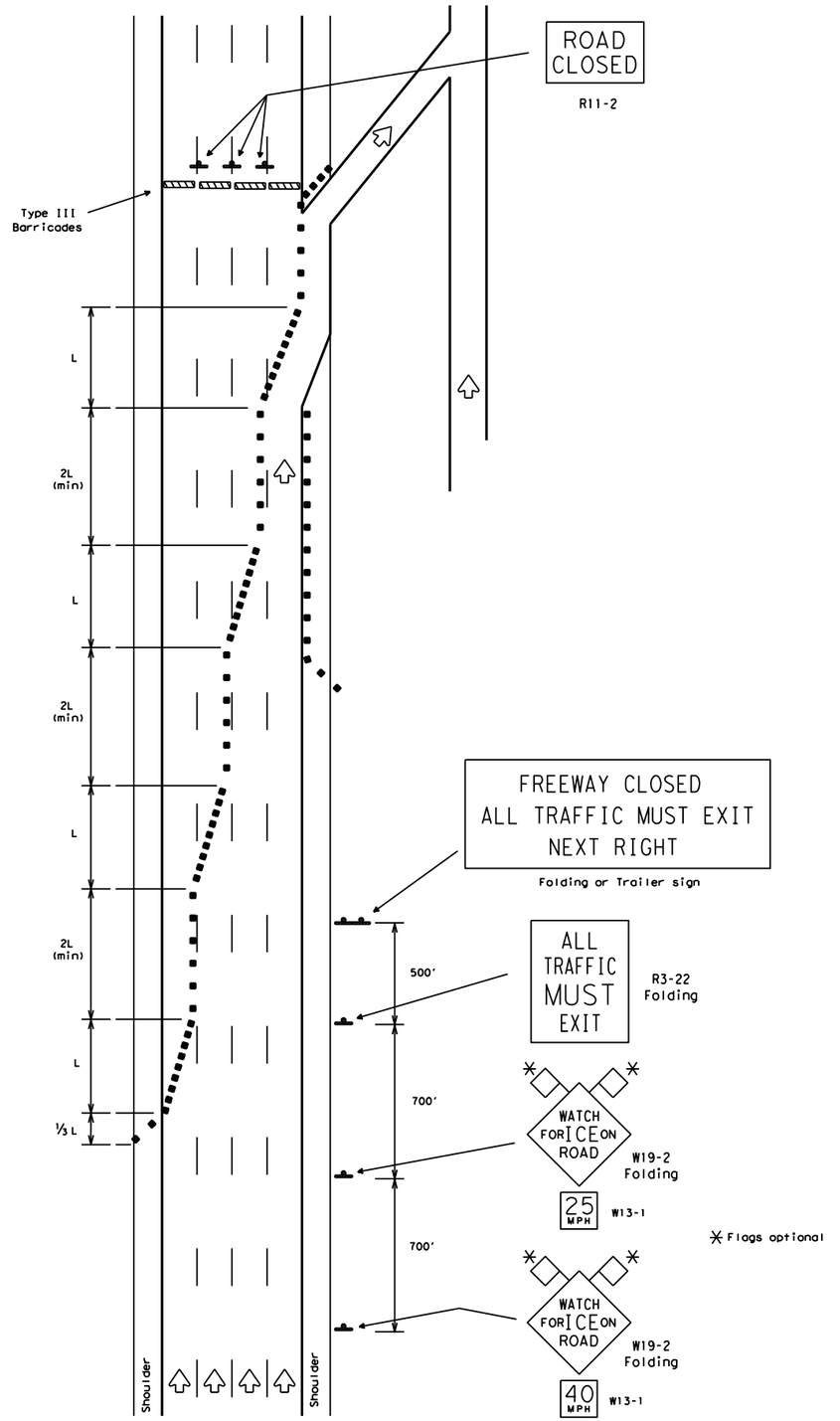
TCP(7-1)-13

FILE: tcp7-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 1991	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
4-92 4-98	DIST	COUNTY		SHEET NO.
1-97 7-13	12	HARRIS/GAL		73

210

FILE: T:\0*GEN-AO\0*Maintenance\000*New Contracts\IH 45 General Maintenance\Standards\Standards\Traffic Control Plan Emergency Road Closure (Ice Conditions).dgn
DATE: 1/5/2021
PROJECT: 6375-52-001





Complete Road Closure

LEGEND

Type III Barricade ■ ■ Channelizing Devices Flag
Heavy Work Vehicle Truck Mounted Attenuator
Trailer Mounted Flashing Arrow Panel (arrow mode)
Portable Changeable Message Sign
Trailer Mounted Flashing Arrow Panel (caution mode)
Flagger
Sign Post

Posted Speed	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Device On a Taper	On a Tangent
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'-75'
35		205'	225'	245'	35'	70'-90'
40		265'	295'	320'	40'	80'-100'
45	L=WS	450'	495'	540'	45'	90'-110'
50		500'	550'	600'	50'	100'-125'
55		550'	605'	660'	55'	110'-140'
60		600'	660'	720'	60'	120'-150'
65		650'	715'	780'	65'	130'-165'
70		700'	770'	840'	70'	140'-175'

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

GENERAL NOTES:

1. Channelizing devices may be cones, drums or combination thereof. Devices shall be reflectorized for nighttime usage.
2. Emergency conditions and the necessity of the freeway's closure as quickly as possible allows the Engineer to authorize reduced length tapers and tangents of chennelizing devices.

ENGINEER SEAL

STATE OF TEXAS
YEE-CHENG CHANG
96492
LICENSED PROFESSIONAL ENGINEER

Date 1-5-21

Sign: Eddy Chang

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN EMERGENCY ROAD CLOSURE (ICE CONDITIONS)

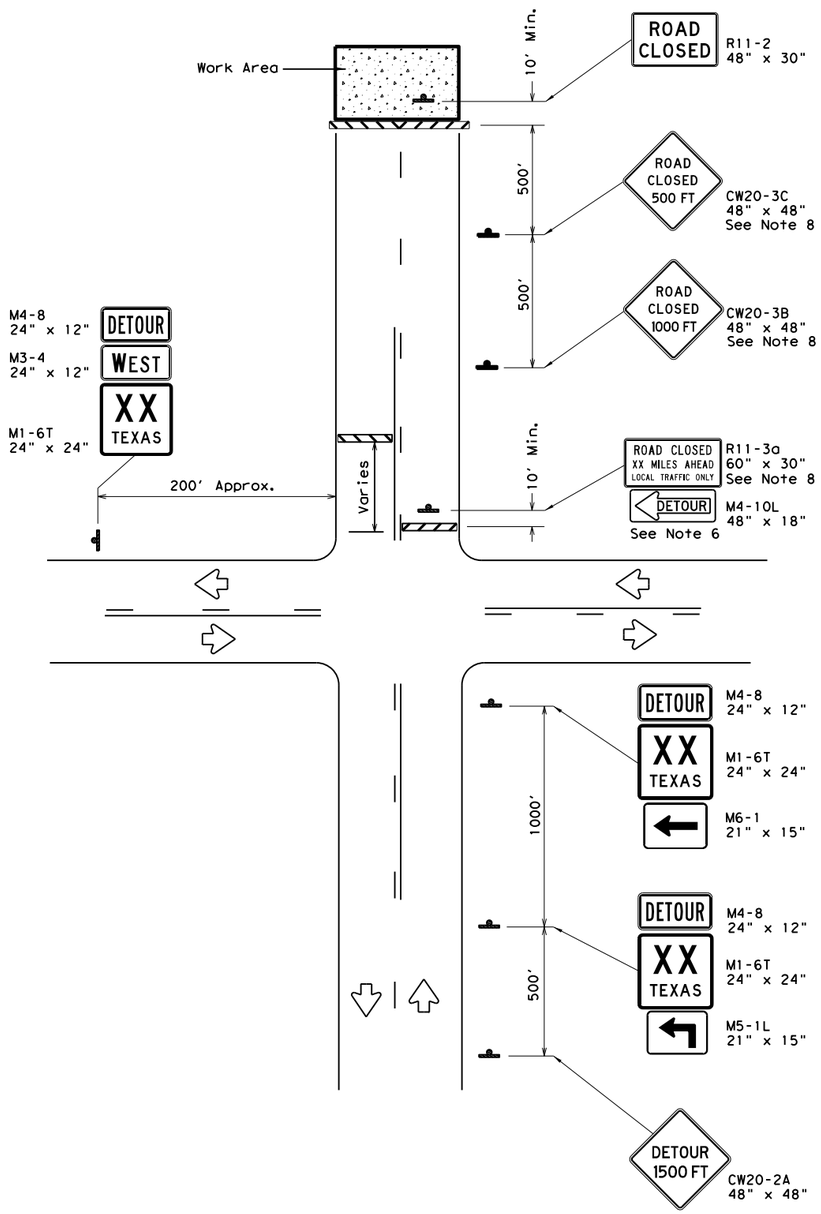
REVISIONS

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

CONT	SECT	JOB	HIGHWAY
6375	52	001	IH45

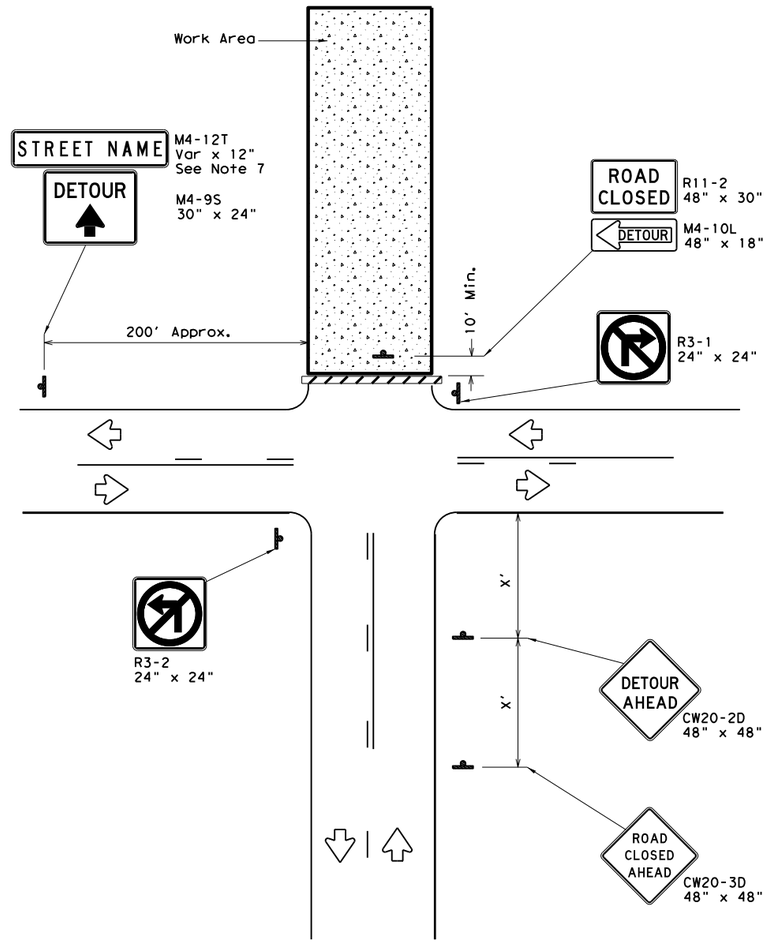
DIST	COUNTY	SHEET NO.
12	HARRIS/GAL	74

FILE: h:\00rmaintenance\south harris maintenance\2020 contracts\6357-02-001
DATE: 1/4/2021
PROJECT: 6375-52-001



ROAD CLOSURE BEYOND THE INTERSECTION

Signing for a Numbered Route with an Off-Site Detour



ROAD CLOSURE AT THE INTERSECTION

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

LEGEND	
	Type 3 Barricade
	Sign

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

* Conventional Roads Only

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE ROAD CLOSURE DETAILS

WZ(RCD)-13

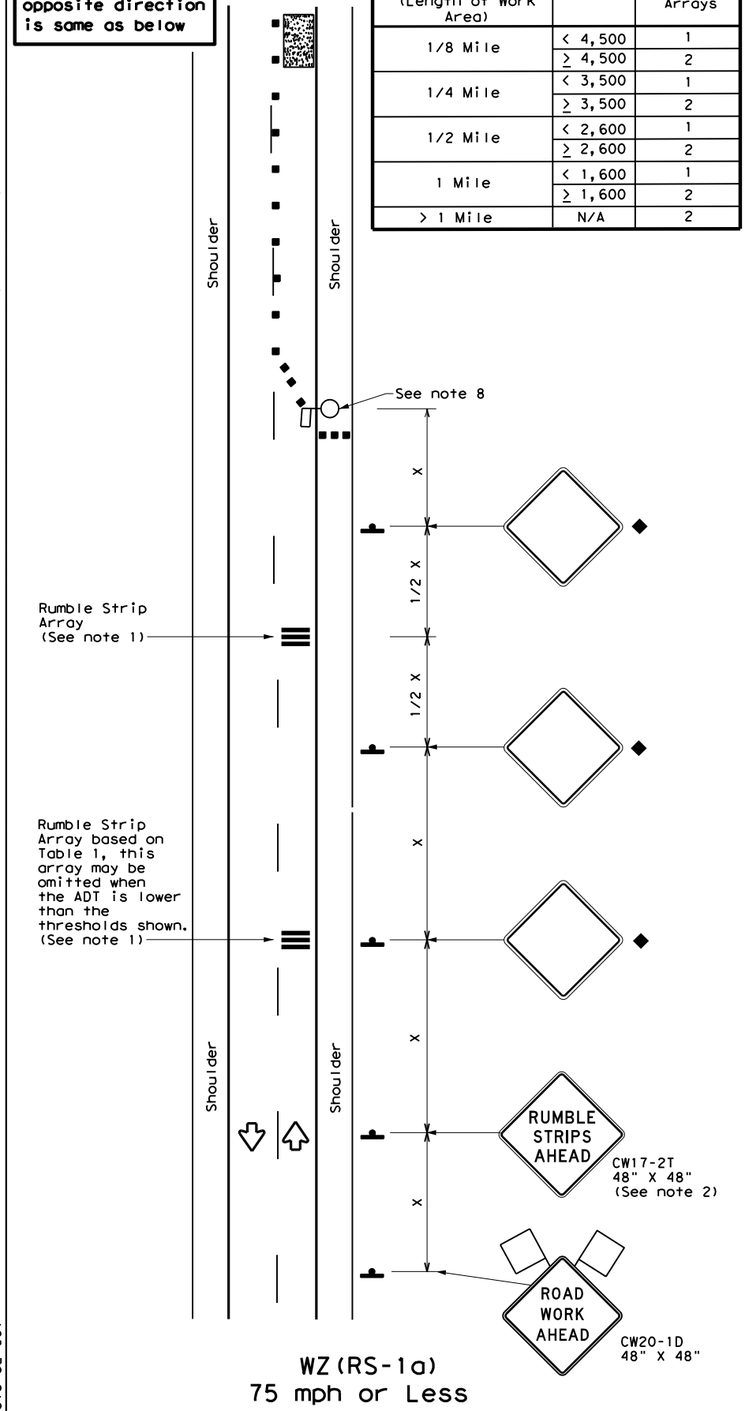
FILE: wzrcd-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
1-97 4-98 7-13	DIST	COUNTY		SHEET NO.
2-98 3-03	12	HARRIS/GAL		75

113

FILE: h:\00maintenance\south harris maintenance\2020 contracts\6357-02-001\wzrs16.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001

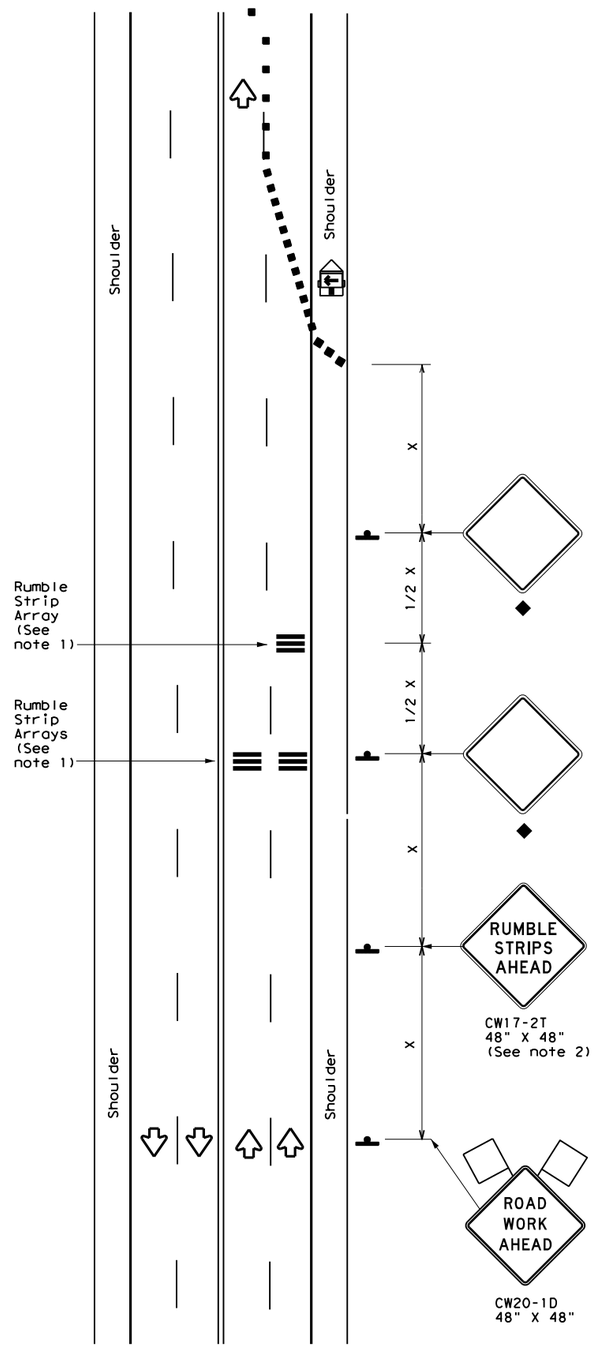
Warning sign and rumble strip sequence in opposite direction is same as below

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



WZ(RS-1a)
75 mph or Less

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



WZ(RS-1b)
75 mph or Less

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. Removal of the Temporary Rumble Strips should be accomplished before removing the advance 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 AFAD or a portable traffic signal.
9. Temporary Rumble Strips may be used on freeways or expressways based on engineering judgment.

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.**

TABLE 2	
Speed	Approximate distance between strips in an Array
≤ 40 MPH	10'
> 40 MPH & ≤ 55 MPH	15'
> 55 MPH	20'

Texas Department of Transportation

Traffic Operations Division Standard

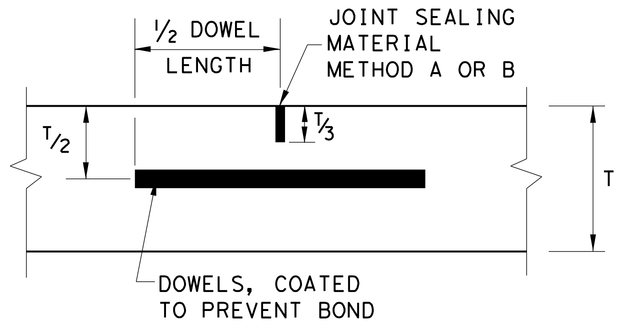
TEMPORARY RUMBLE STRIPS

WZ(RS)-16

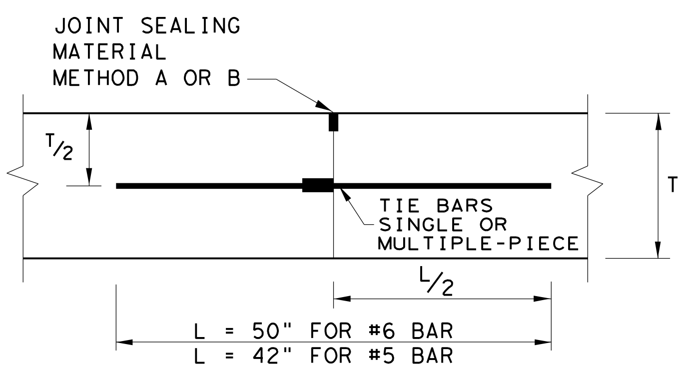
FILE: wzrs16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
2-14	DIST	COUNTY		SHEET NO.
4-16	12	HARRIS/GAL		76

118

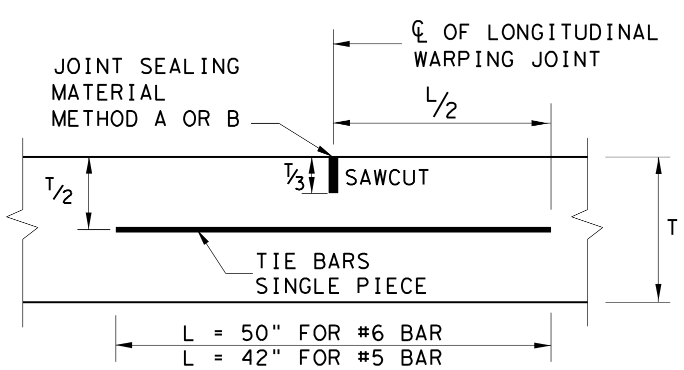
FILE: h:\00+maintenance\south harris maintenance
DATE: 1/4/2021
PROJECT: 6375-52-001



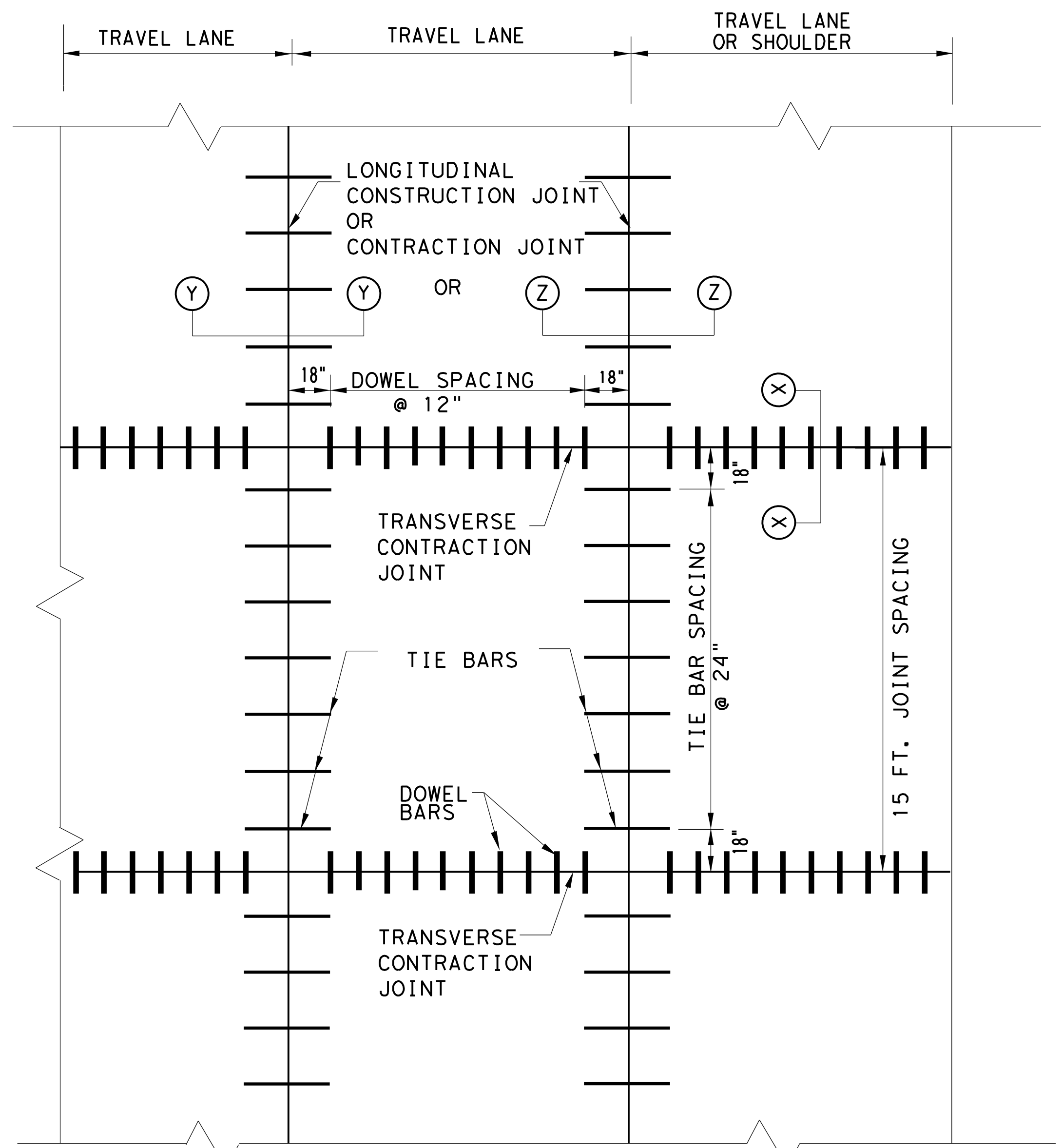
TRANSVERSE CONTRACTION JOINT
SECTION X-X



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 ¼" X 18"	12
>= 10.5	1 ½" 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

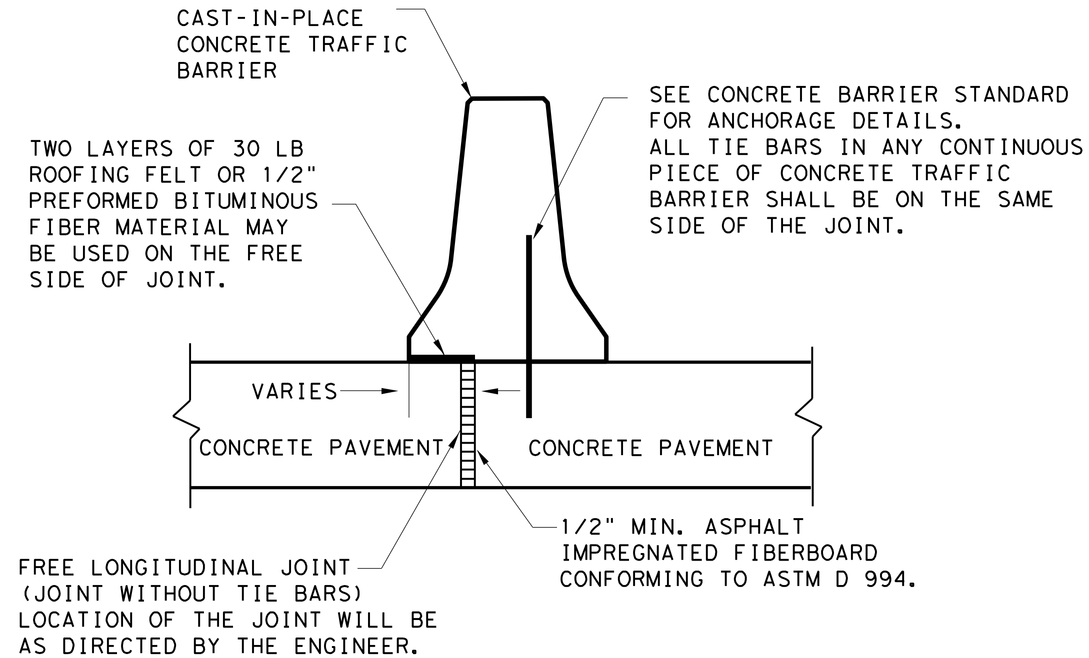
Texas Department of Transportation — Design Division Standard

CONCRETE PAVEMENT DETAILS
CONTRACTION DESIGN
T-6 to 12 INCHES

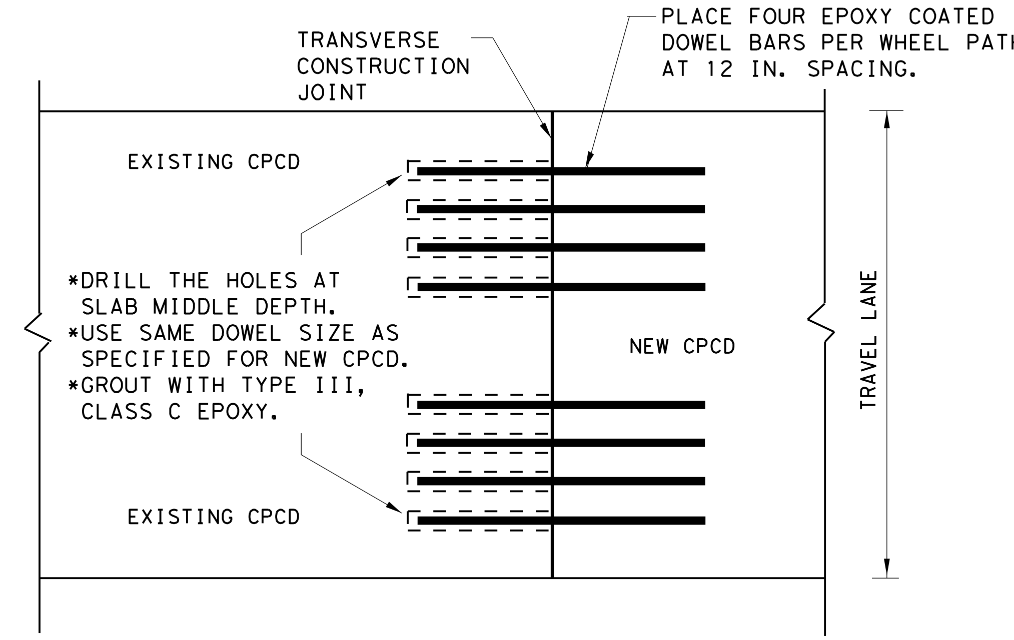
CPCD-14

FILE: cpcd14.dgn	DN: TxDOT	CK: HC	DW: HC		CK: AN
© TxDOT: December 2014	CONT	SECT	JOB		HIGHWAY
REVISIONS	6375	52	001		IH45
	DIST		COUNTY		SHEET NO.
	12		HARRIS/GAL		77

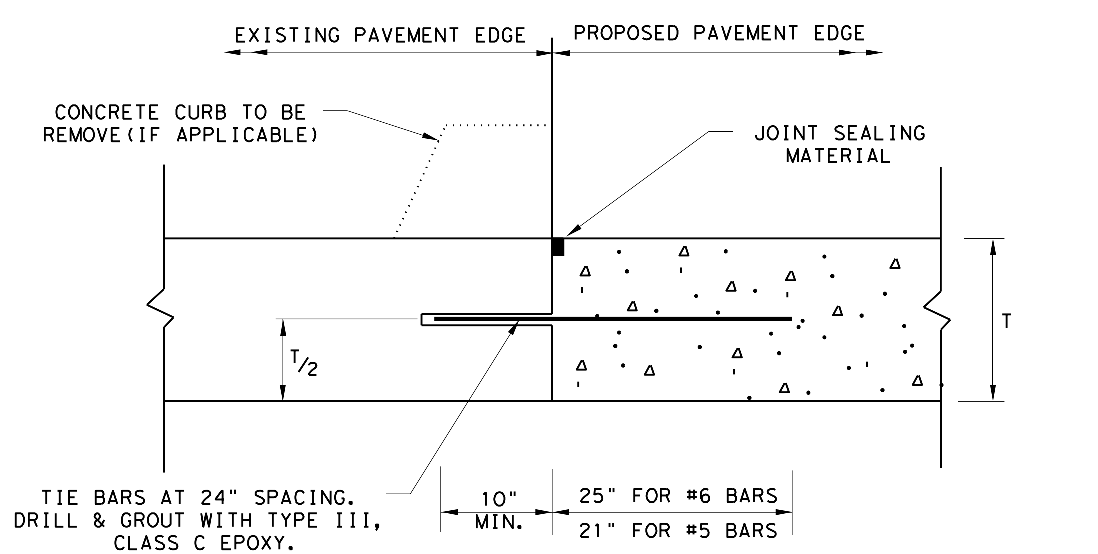
FILE: h:\00*maintenance\south harris maintenance\2020\south harris\2020 standards\CPCD-14
DATE: 1/4/2021
PROJECT: 6375-52-001



FREE LONGITUDINAL JOINT DETAIL

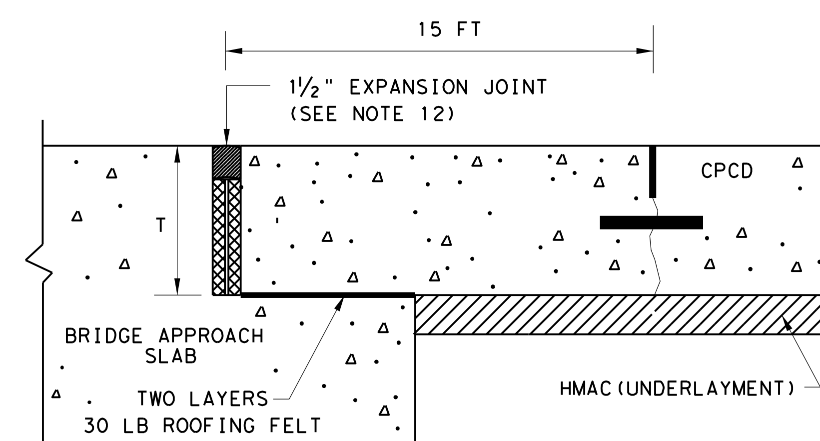


TRANSVERSE JOINT DETAIL
EXISTING CPCD TO NEW CPCD
PLAN VIEW (NOT TO SCALE)



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

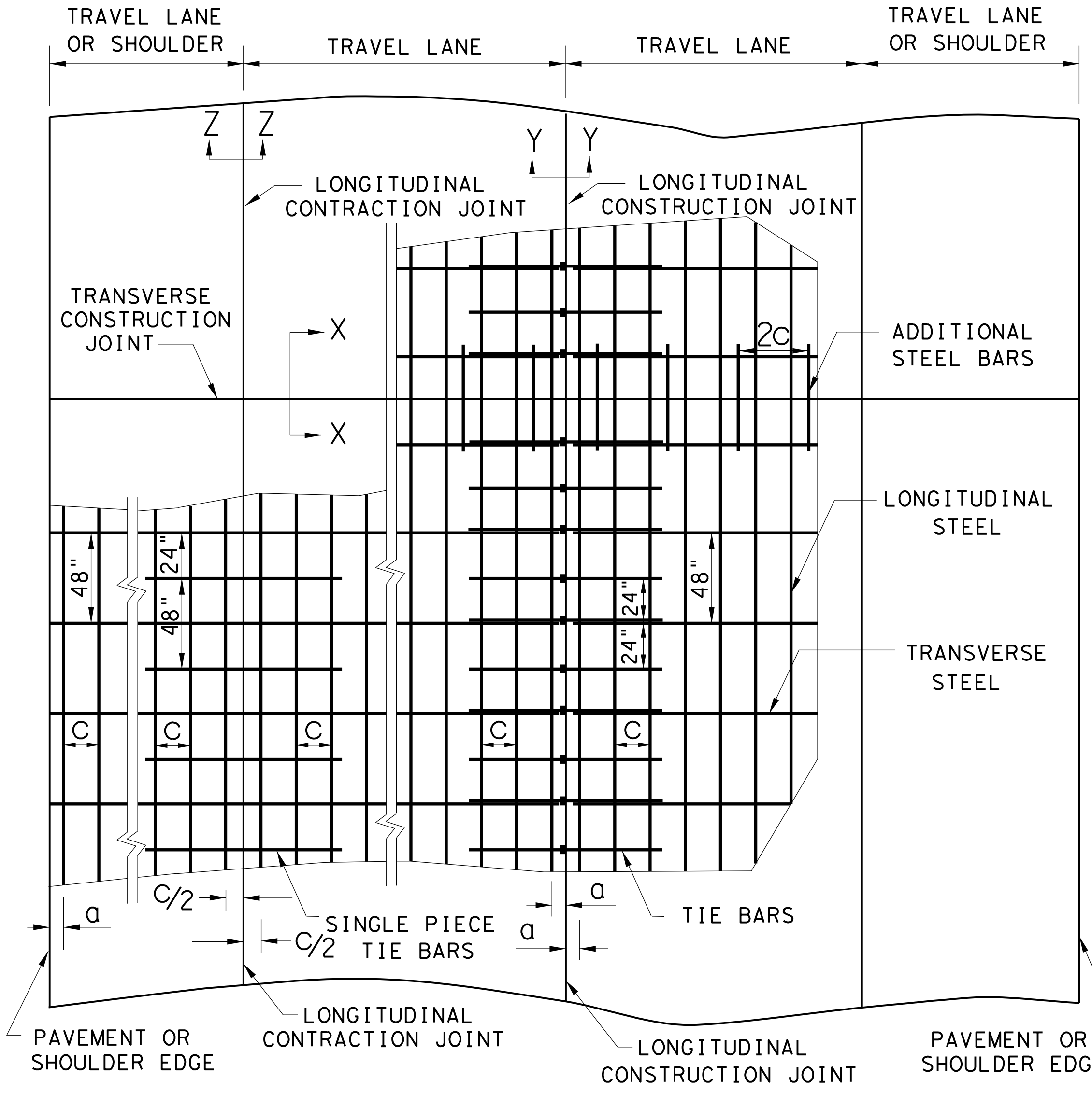
CPCD-14

FILE: cpcd14.dgn	DN: TxDOT	CK: HC	DW: HC	CK: AN
© TxDOT: December 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
	DIST		COUNTY	SHEET NO.
	12		HARRIS/GAL	78

FILE: t:\0*gen-ao\0*maintenance\000*new contract...
DATE: 1/4/2021
PROJECT: 6375-52-001

TABLE NO. 1 LONGITUDINAL STEEL					
SLAB THICKNESS AND BAR SIZE		REGULAR STEEL BARS	FIRST SPACING AT EDGE OR JOINT	ADDITIONAL STEEL BARS AT TRANSVERSE CONSTRUCTION JOINT (SECTION X-X)	
T (IN.)	BAR SIZE	SPACING C (IN.)	SPACING a (IN.)	SPACING 2 x C (IN.)	LENGTH L (IN.)
7.0	#5	6.5	3 TO 4	13	50
7.5	#5	6.0	3 TO 4	12	50
8.0	#6	9.0	3 TO 4	18	50
8.5	#6	8.5	3 TO 4	17	50
9.0	#6	8.0	3 TO 4	16	50
9.5	#6	7.5	3 TO 4	15	50
10.0	#6	7.0	3 TO 4	14	50
10.5	#6	6.75	3 TO 4	13.5	50
11.0	#6	6.5	3 TO 4	13	50
11.5	#6	6.25	3 TO 4	12.5	50
12.0	#6	6.0	3 TO 4	12	50
12.5	#6	5.75	3 TO 4	11.5	50
13.0	#6	5.5	3 TO 4	11	50

TABLE NO. 2 TRANSVERSE STEEL AND TIE BARS						
SLAB THICKNESS (IN.)	TRANSVERSE STEEL		TIE BARS AT LONGITUDINAL CONTRACTION JOINT (SECTION Z-Z)		TIE BARS AT LONGITUDINAL CONSTRUCTION JOINT (SECTION Y-Y)	
	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
7.0 - 7.5	#5	48	#5	48	#5	24
8.0 - 13.0	#5	48	#6	48	#6	24

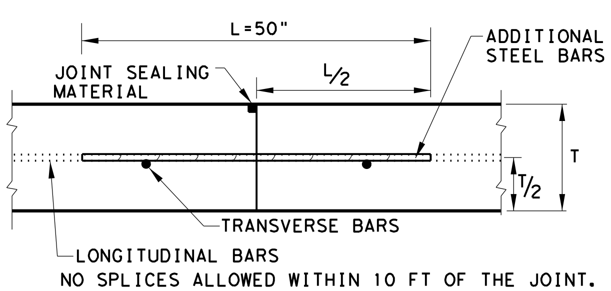


TYPICAL PAVEMENT LAYOUT

PLAN VIEW (NOT TO SCALE)

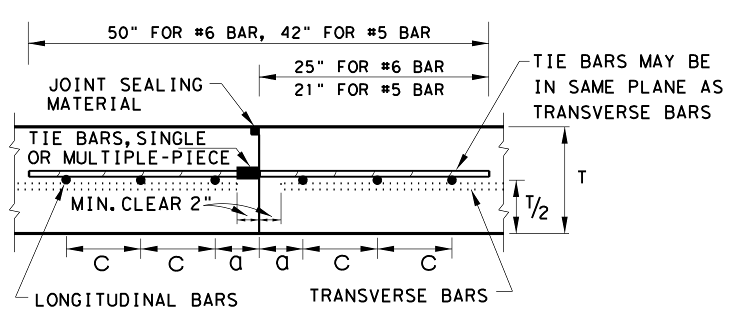
GENERAL NOTES

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. 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) SHALL CONFORM TO TABLE NO. 1
5. 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.
6. THE SAW CUT DEPTH FOR THE LONGITUDINAL CONTRACTION JOINT (SECTION Z-Z) SHALL BE ONE THIRD OF THE SLAB THICKNESS (T/3).
7. 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.
8. 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.
9. 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.
10. LONGITUDINAL REINFORCING STEEL SPLICES SHALL BE A MINIMUM OF 25 IN. 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.
11. THE DETAIL FOR THE JOINT SEALANT AND RESERVOIR IS SHOWN ON STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."



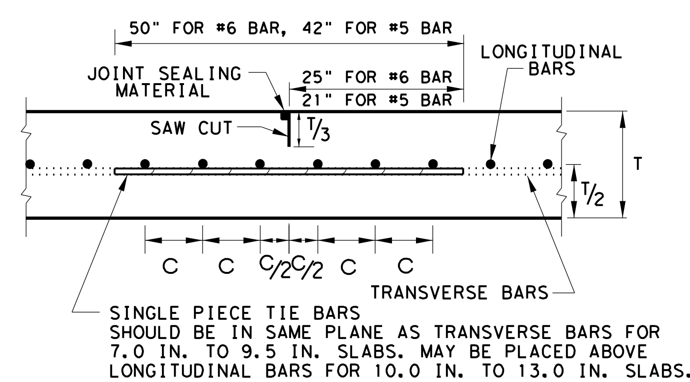
TRANSVERSE CONSTRUCTION JOINT

SECTION X - X



LONGITUDINAL CONSTRUCTION JOINT

SECTION Y - Y



LONGITUDINAL CONTRACTION JOINT

SECTION Z - Z

SHEET 1 OF 2

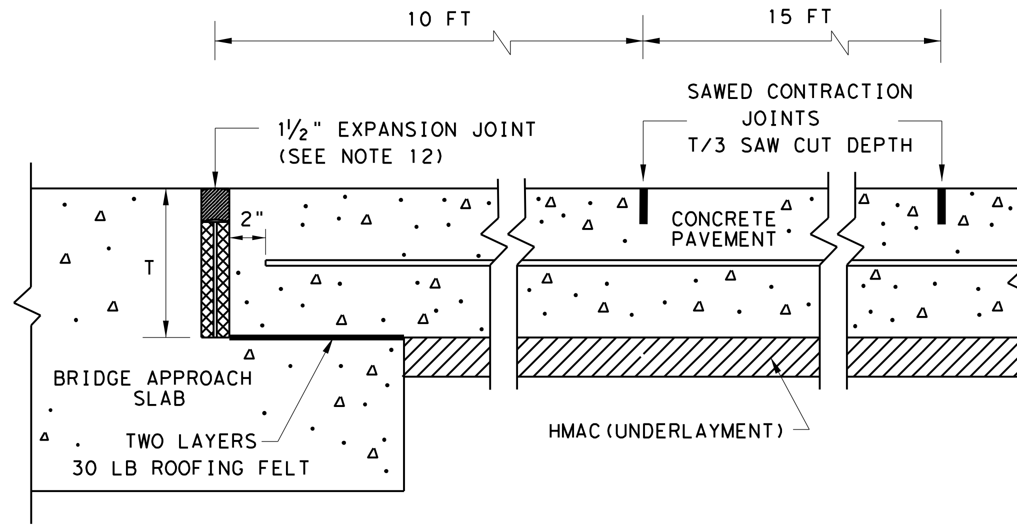
Texas Department of Transportation — Design Division Standard

CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

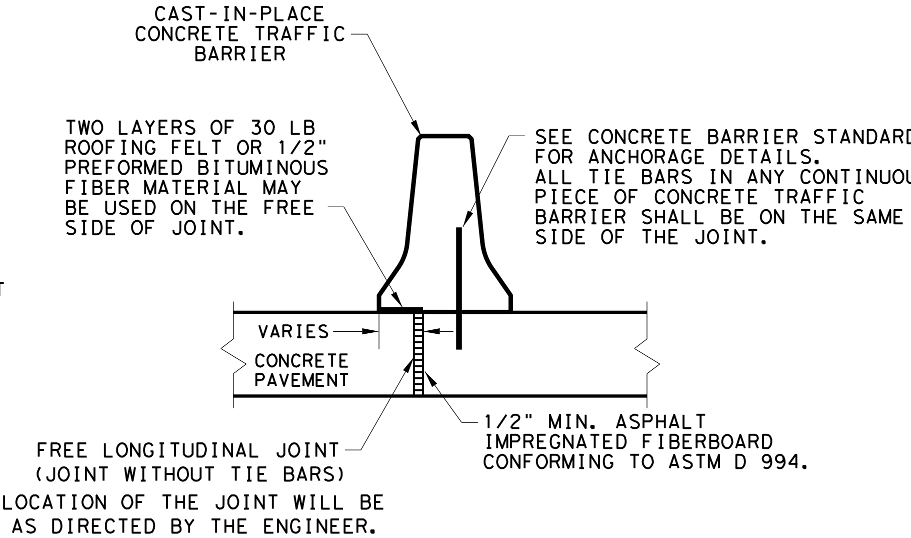
ONE LAYER STEEL BAR PLACEMENT T - 7 to 13 INCHES

CRCP(1)-20

FILE: crcp120.dgn	DN: TxDOT	CK: KM	DW: AN	CK: VP
	CONT 6375	SECT 52	JOB 001	HIGHWAY IH45
REVISIONS: 10/10/2011 ADD ON #12; 04/09/2013 REMOVE 6" AND 6.5" ADD CTE REQUIREMENTS; 05/05/2017 CoTE AS RATED 4.3	DIST 12		COUNTY HARRIS/GAL	SHEET NO. 79

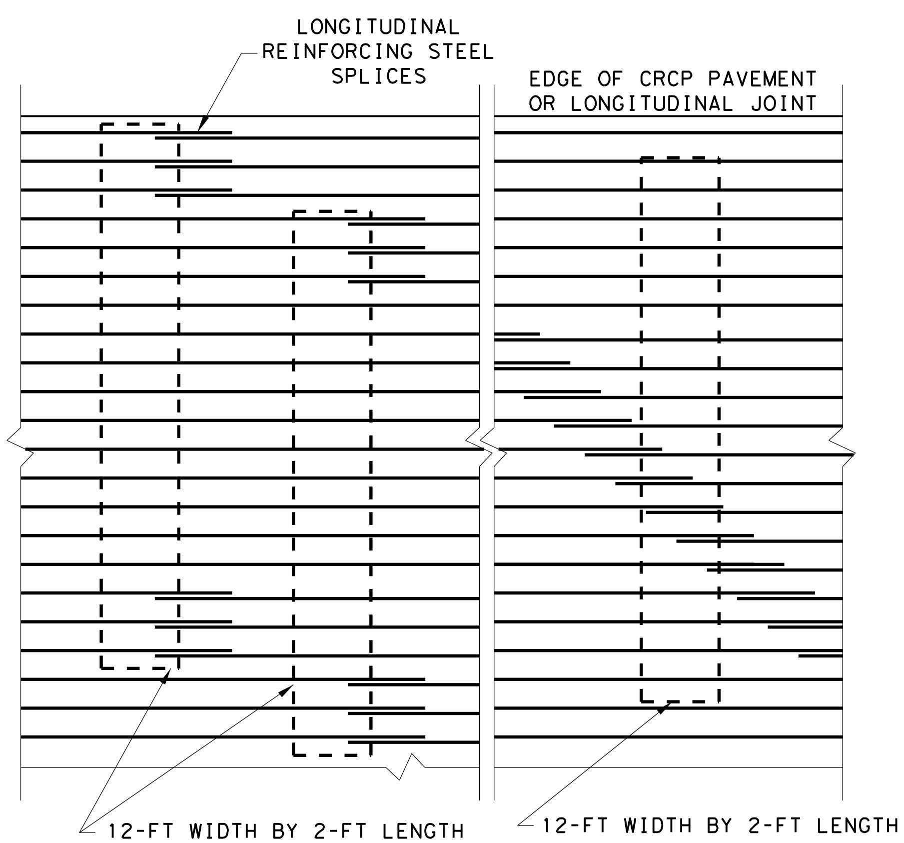


TRANSVERSE EXPANSION JOINT DETAIL
AT BRIDGE APPROACH



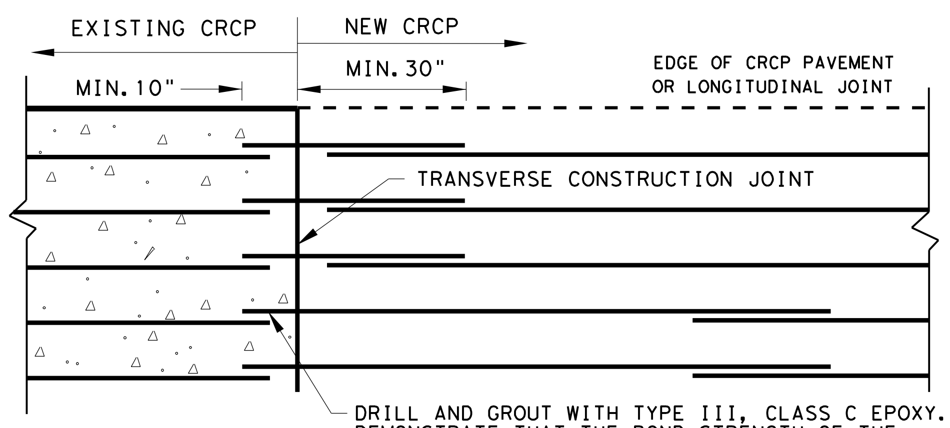
LOCATION OF THE JOINT WILL BE
AS DIRECTED BY THE ENGINEER.

FREE LONGITUDINAL JOINT DETAIL



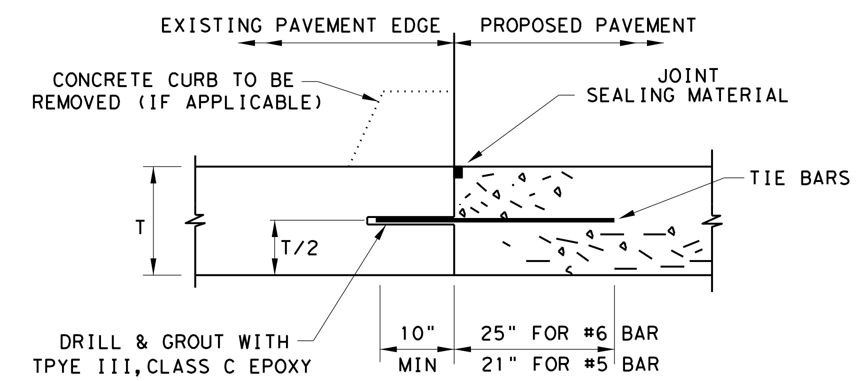
STAGGER THE LAP LOCATIONS SO THAT NO MORE THAN 1/3 OF THE LONGITUDINAL STEEL IS SPLICED IN ANY GIVEN 12-FT. WIDTH AND 2-FT. LENGTH OF THE PAVEMENT. ANY OTHER LAP CONFIGURATION MEETING THIS REQUIREMENT WILL BE ALLOWED.

EXAMPLES OF LAP CONFIGURATION
PLAN VIEW (NOT TO SCALE)



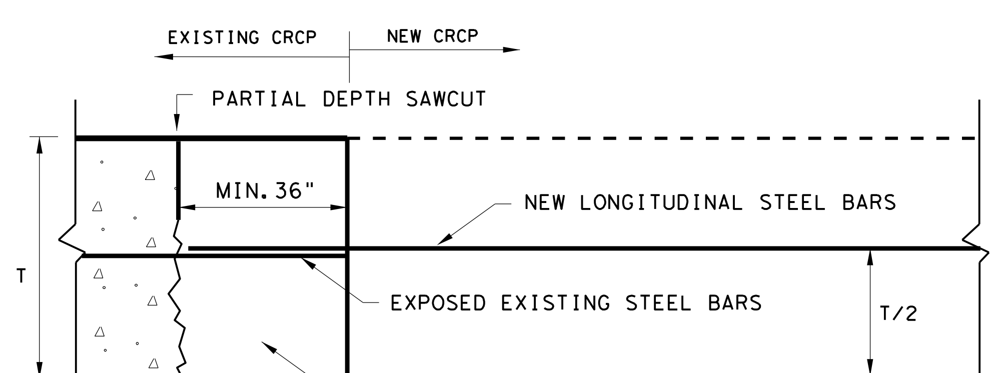
DRILL AND GROUT WITH TYPE III, CLASS C EPOXY. DEMONSTRATE THAT THE BOND STRENGTH OF THE EPOXY-GROUTED LONGITUDINAL BARS MEETS THE REQUIREMENTS OF PULL-OUT TEST SPECIFIED IN ITEM 361.

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



1. BEFORE WIDENING WORK, DEMONSTRATE THAT THE BOND STRENGTH OF THE EPOXY-GROUTED TIE BARS MEETS THE REQURIMENTS OF PULL-OUT TEST SPECIFIED IN ITEM 361.
2. SPACE TIE BARS AT 24" SPACING. USE #6 TIE BARS FOR 8" AND THICKER SLABS, USE #5 TIE BARS FOR LESS THAN 8" THICK SLABS.

LONGITUDINAL WIDENING JOINT DETAIL



IN THIS AREA, THE BREAKING OF THE EXISTING CONCRETE WILL BE ACCOMPLISHED BY LIGHTWEIGHT JACK HAMMERS AS APPROVED BY THE ENGINEER.

OPTION B: BREAKBACK AND LAP

TRANSVERSE TIE JOINT DETAIL
EXISTING CRCP TO NEW CRCP

SHEET 2 OF 2

Texas Department of Transportation — Design Division Standard

CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

ONE LAYER STEEL BAR PLACEMENT
T - 7 to 13 INCHES

CRCP(1)-20

FILE: crcp120.dgn	DN: TxDOT	CK: KM	DW: AN	CK: VP
© TxDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
03/16/2020 REMOVED TABLE 1A	DIST		COUNTY	SHEET NO.
	12		HARRIS/GAL	80

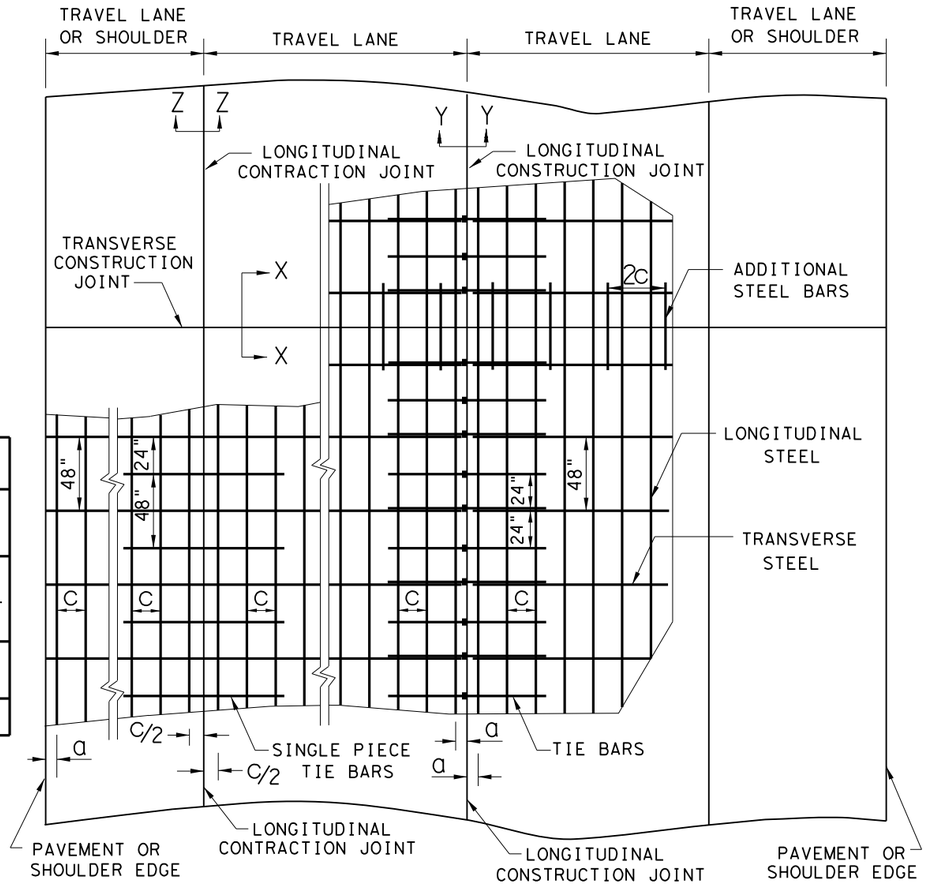
FILE: t:\0*gen-ao\0*maintenance\000*new contract...
DATE: 1/4/2021
PROJECT: 6375-52-001

FILE: t:\0xgen-ao\0xmaintenance\000xnew contracts\crcp220.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001

TABLE NO. 1 LONGITUDINAL STEEL					
SLAB THICKNESS AND BAR SIZE		FOR BOTH STEEL MATS		FOR TOP STEEL MAT ONLY	
		REGULAR STEEL BARS	FIRST SPACING AT EDGE OR JOINT	ADDITIONAL STEEL BARS AT TRANSVERSE CONSTRUCTION JOINT (SECTION X-X)	
T (IN.)	BAR SIZE	SPACING c (IN.)	SPACING a (IN.)	SPACING 2 x c (IN.)	LENGTH L (IN.)
14	#6	9.5	3 TO 4	19	50
15	#6	8.5	3 TO 4	17	50

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

TABLE NO. 3 TWO LAYER STEEL PLACEMENT HEIGHT OF STEEL MATS		
SLAB THICKNESS T (IN.)	LOWER STEEL MAT HEIGHT T1 (IN.)	TOP STEEL MAT HEIGHT T2 (IN.)
14	4.5	8.0
15	5.0	8.5

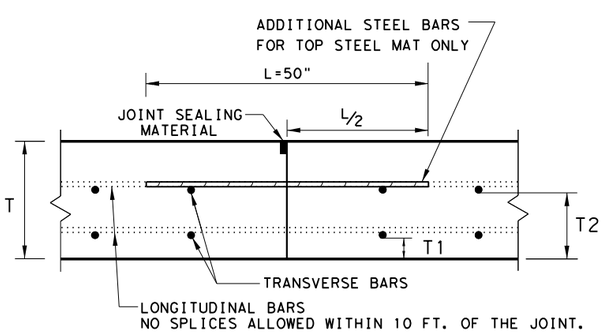


TYPICAL PAVEMENT LAYOUT

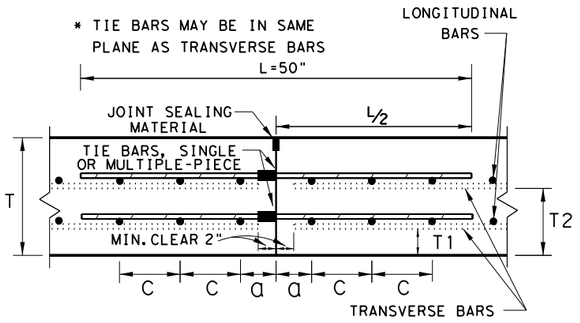
PLAN VIEW (NOT TO SCALE)

GENERAL NOTES

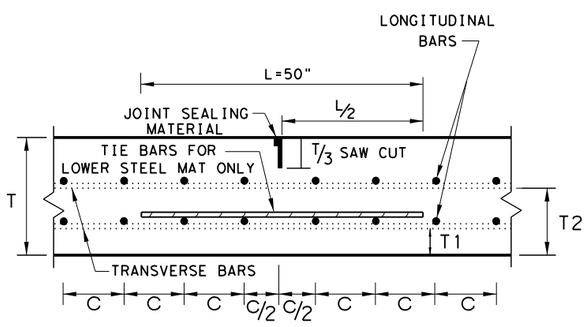
1. DETAILS FOR PAVEMENT WIDTH, PAVEMENT THICKNESS AND THE CROWN CROSS-SLOPE SHALL BE SHOWN ELSEWHERE IN THE PLANS. PAVEMENTS WIDER THAN 100 FT. WITHOUT A FREE LONGITUDINAL JOINT ARE NOT COVERED BY THIS STANDARD.
2. USE COARSE AGGREGATES WITH A RATED COEFFICIENT OF THERMAL EXPANSION (CoTE) OF NOT MORE 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 ANS SPACINGS SHALL CONFORM TO TABLE NO.1, TABLE NO.2 AND TABLE NO.3.
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. 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.
6. THE SAW CUT DEPTH FOR THE LONGITUDINAL CONTRACTION JOINT (SECTION Z-Z) SHALL BE ONE THIRD OF THE SLAB THICKNESS (T/3).
7. 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.
8. 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.
9. 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.
10. LONGITUDINAL REINFORCING STEEL SPLICES SHALL BE A MINIMUM OF 25 IN. 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.
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

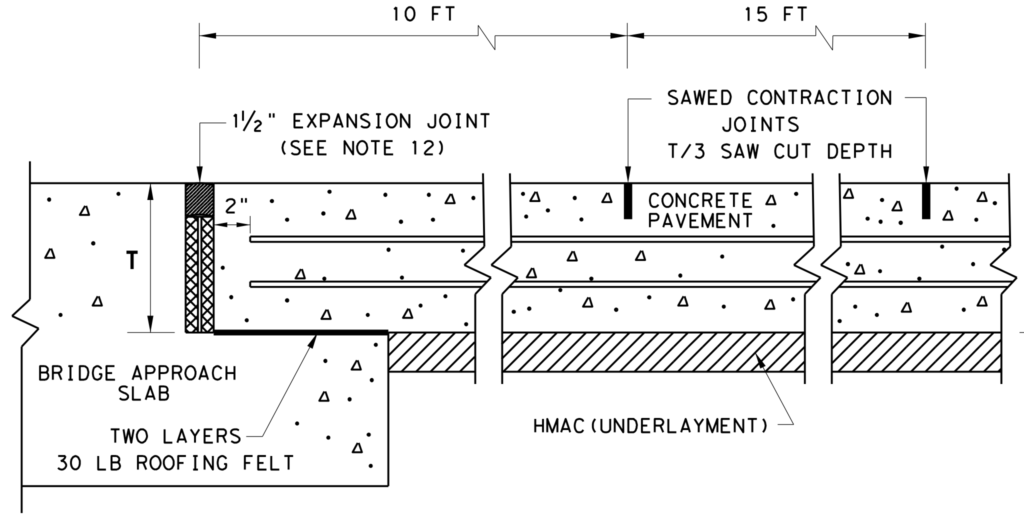
CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

TWO LAYER STEEL BAR PLACEMENT T - 14 & 15 INCHES

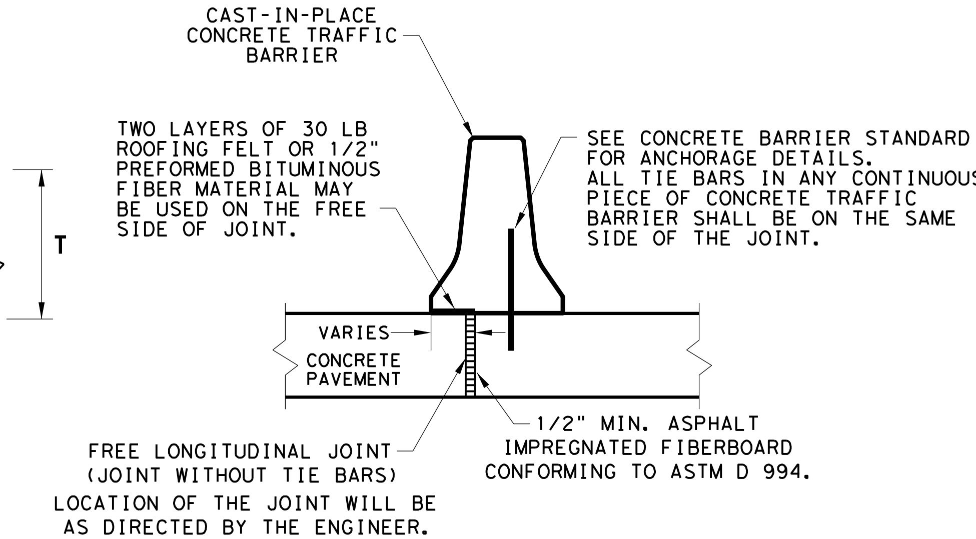
CRCP(2)-20

FILE: crcp220.dgn	DN: TxDOT	CK: KM	DW: AN	CK: VP
©TxDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 10/10/2011 ADD GN #12 04/09/2013 REMOVE 6" AND 6.5" ADD CTE REQUIREMENTS 04/19/2017 CoTE AS RATED 4.3	6375	52	001	IH45
	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		81

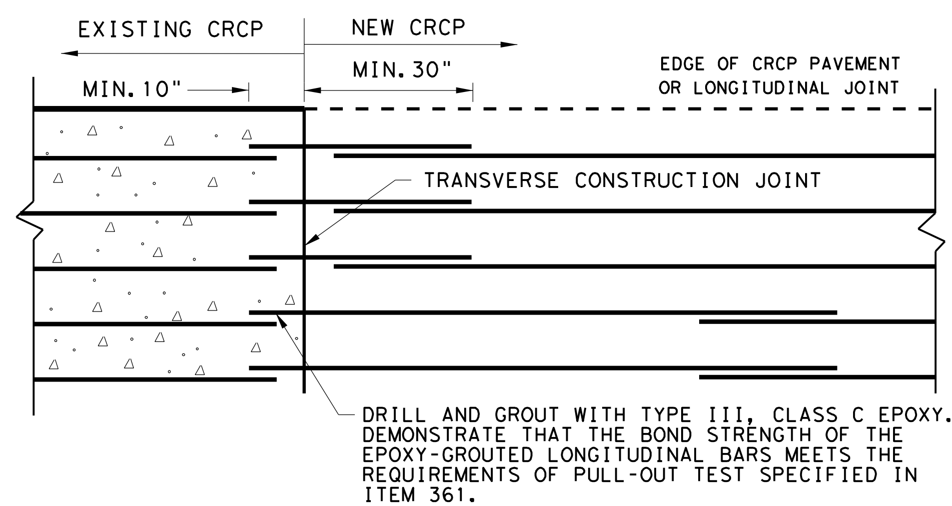
FILE: t:\0*gen-oo\0*maintenance\000*new contract...
DATE: 1/4/2021
PROJECT: 6375-52-001



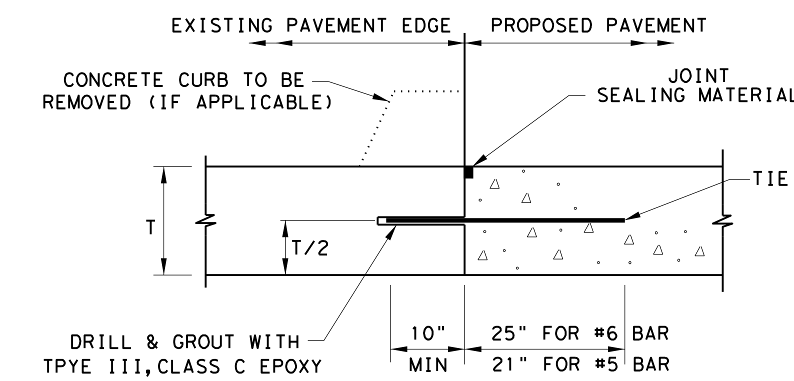
TRANSVERSE EXPANSION JOINT DETAIL
AT BRIDGE APPROACH



FREE LONGITUDINAL JOINT DETAIL

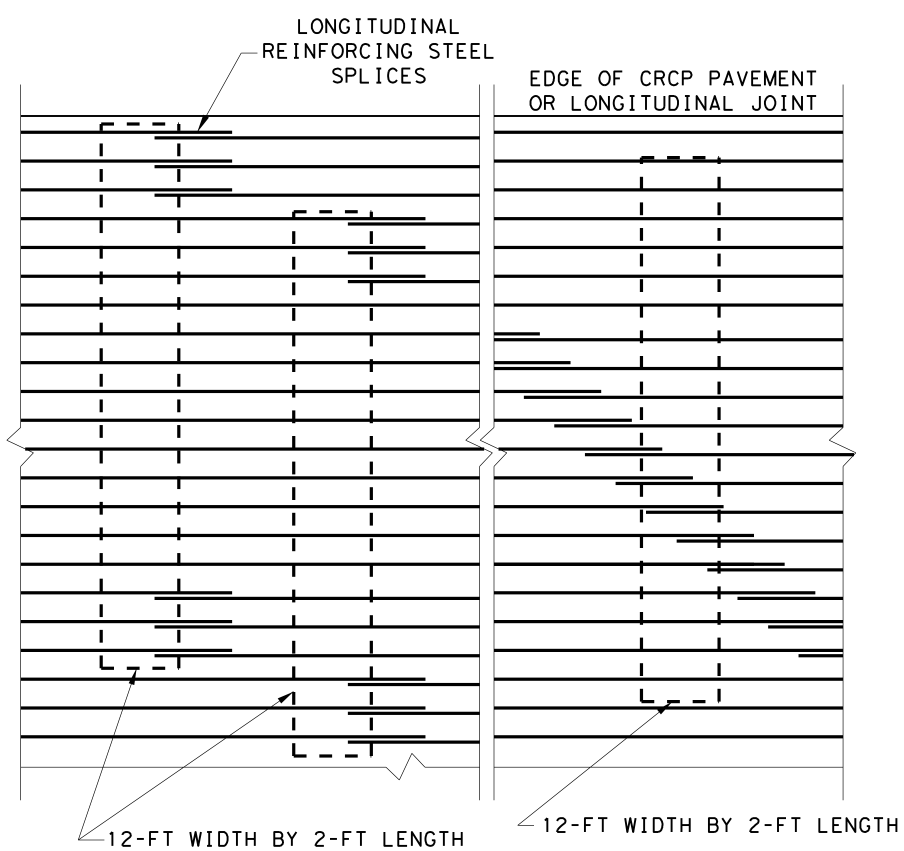


OPTION A: DRILL AND EPOXY
PLAN VIEW (NOT TO SCALE)



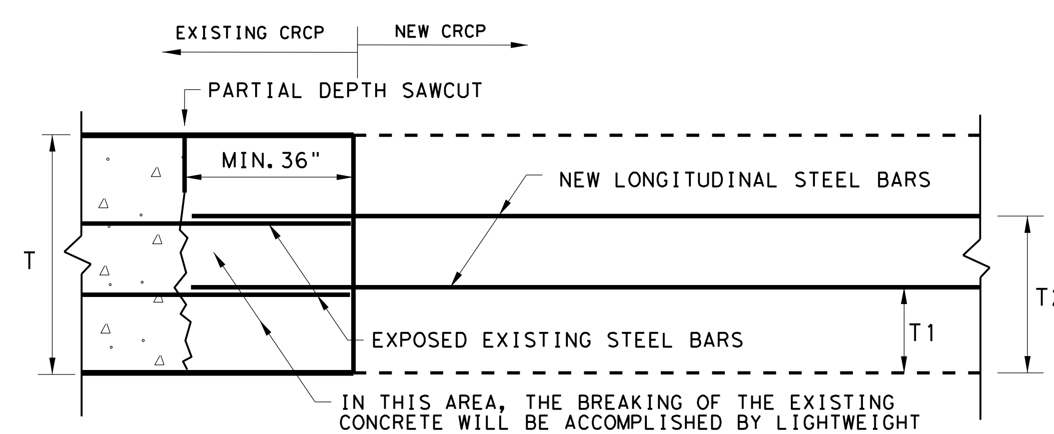
1. BEFORE WIDENING WORK, DEMONSTRATE THAT THE BOND STRENGTH OF THE EPOXY-GROUTED TIE BARS MEETS THE REQURIMENTS OF PULL-OUT TEST SPECIFIED IN ITEM 361.
2. SPACE TIE BARS AT 24" SPACING. USE #6 TIE BARS FOR 8" AND THICKER SLABS, USE #5 TIE BARS FOR LESS THAN 8" THICK SLABS.

LONGITUDINAL WIDENING JOINT DETAIL



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
EXISTING CRCP TO NEW CRCP

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) -20

FILE: crcp220.dgn	DN: TxDOT	CK: KM	DW: AN	CK: VP
© TxDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
03/16/2020 REMOVED TABLE 1A	DIST		COUNTY	SHEET NO.
	12		HARRIS/GAL	82

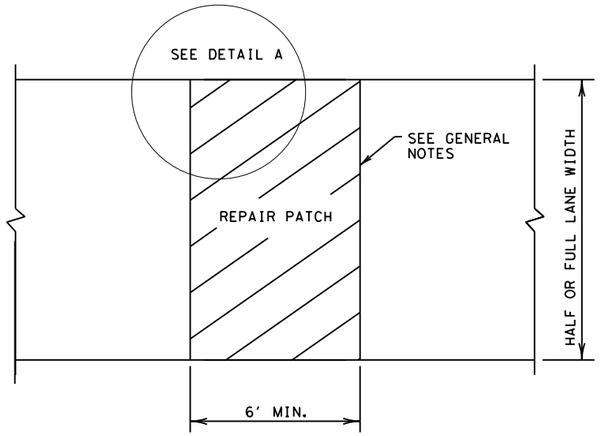
FILE: h:\00wmaintenance\south harris maintenance\MISC\repcp14.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001

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

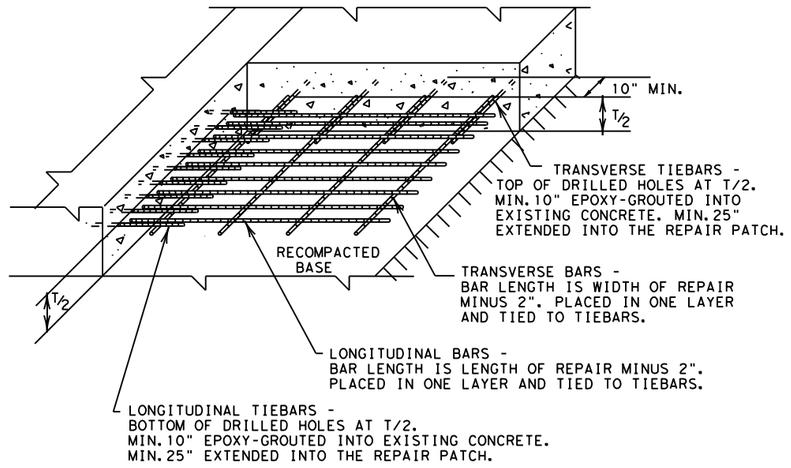
* USE 12" SPACING AS FIRST AND LAST SPACING AT END OR SIDE FOR ALL BARS.

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."



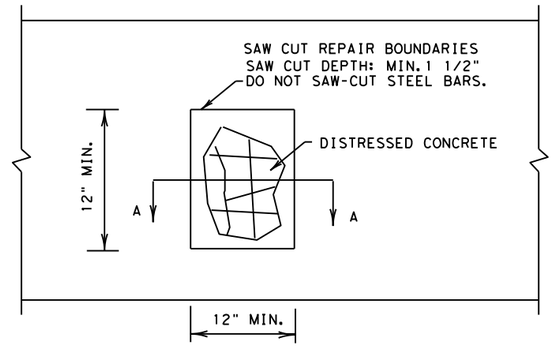
PLAN VIEW



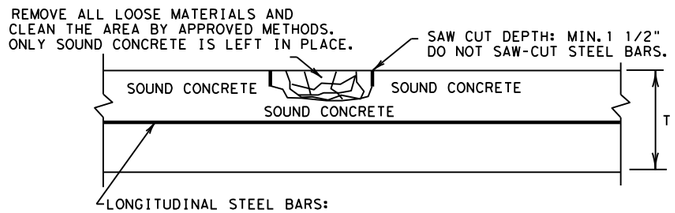
DETAIL A
GROUTED TIEBARS & REINFORCEMENT

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

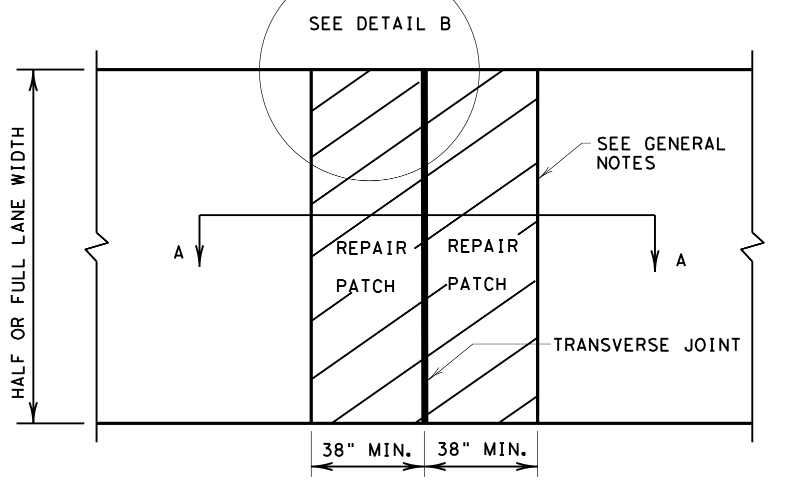
Texas Department of Transportation | Design Division Standard

REPAIR OF CONCRETE PAVEMENT

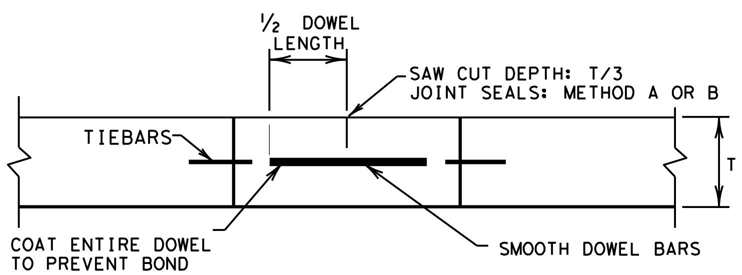
REPCP-14

FILE: repcp14.dgn	DN: TxDOT		CK: HC	DW: HC	CK: AN
©TxDOT: December 2014	CONT	SECT	JOB	HIGHWAY	
REVISIONS	6375	52	001	IH45	
	DIST	COUNTY		SHEET NO.	
	12	HARRIS/GAL		83	

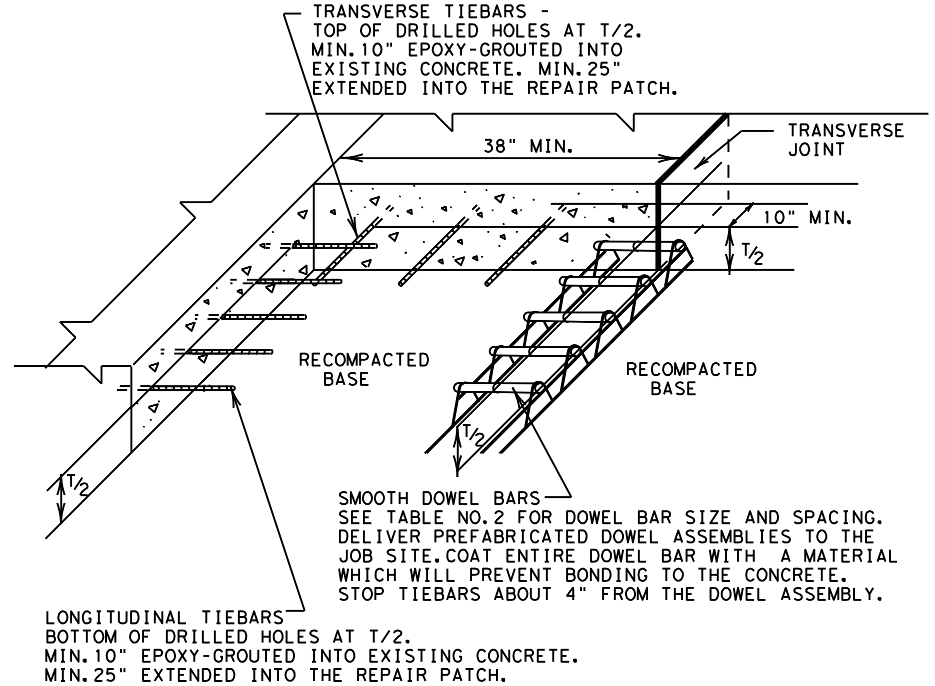
FILE: h:\00+maintenance\south harris maintenance\...
DATE: 1/4/2021
PROJECT: 6375-52-001



PLAN VIEW



SECTION A-A



DETAIL B
GROUTED TIEBARS & DOWELS

REPAIR OF TRANSVERSE JOINT OF CPCD

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 (1¼ IN.)		

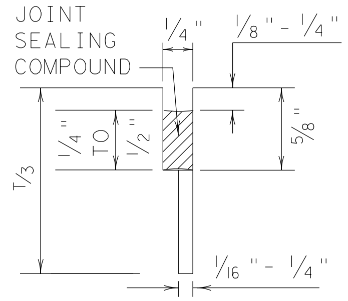
Texas Department of Transportation — Design Division Standard

REPAIR OF CONCRETE PAVEMENT

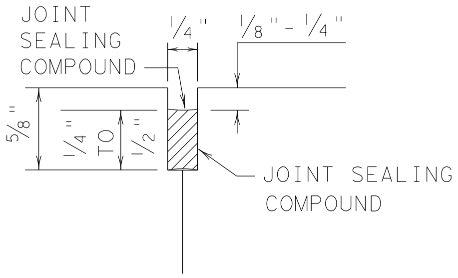
REPCP-14

FILE: repcp14.dgn	DN: TxDOT	CK: HC	DW: HC	CK: AN
©TxDOT: December 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
	DIST		COUNTY	SHEET NO.
	12		HARRIS/GAL	84

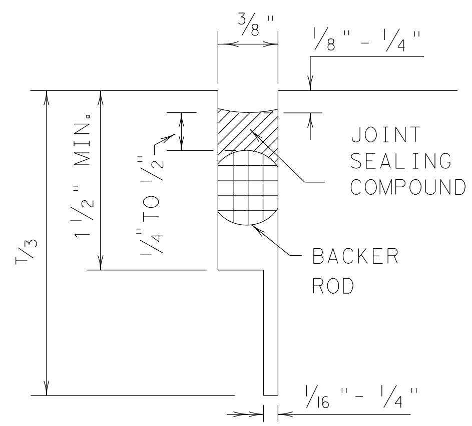
METHOD B: JOINT SEALING COMPOUND



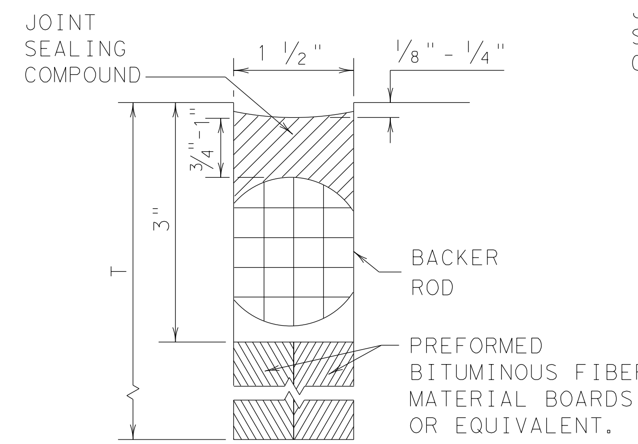
LONGITUDINAL SAWED CONTRACTION JOINT



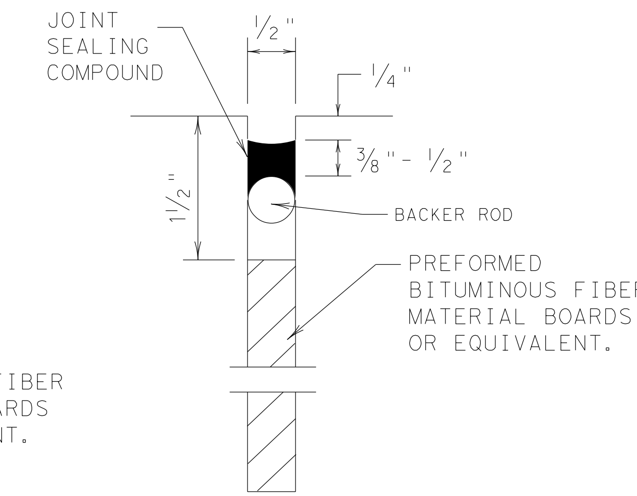
LONGITUDINAL OR TRANSVERSE CONSTRUCTION JOINT



TRANSVERSE SAWED CONTRACTION JOINT

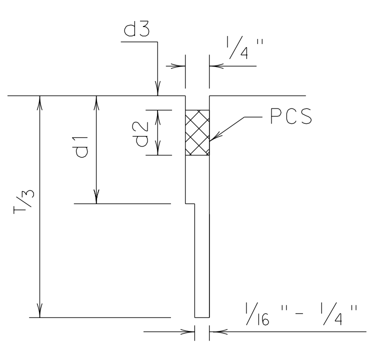


TRANSVERSE FORMED EXPANSION JOINT

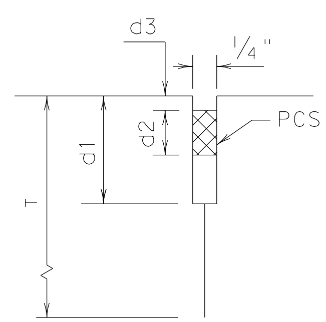


FORMED ISOLATION JOINT

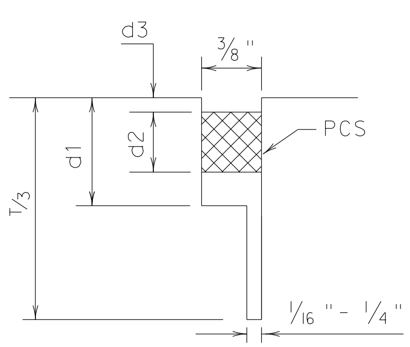
METHOD A: PREFORMED COMPRESSION SEALS (PCS) (DMS-6310 CLASS 6)



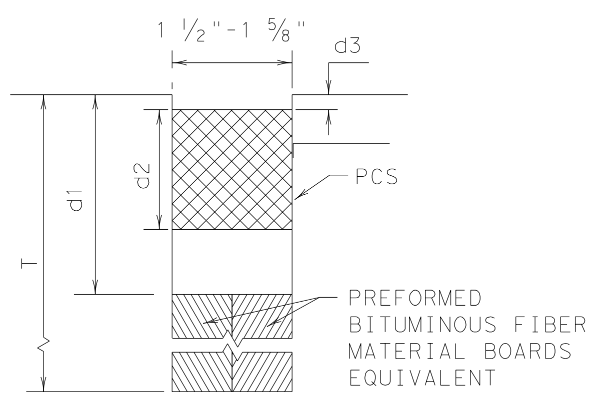
LONGITUDINAL SAWED CONTRACTION JOINT



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.

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CONCRETE PAVING DETAILS

JOINT SEALS

JS-14

FILE: js14.dgn	DN: TxDOT	CK: HC	DW: HC	CK: AN
© TxDOT: December 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
	DIST		COUNTY	SHEET NO.
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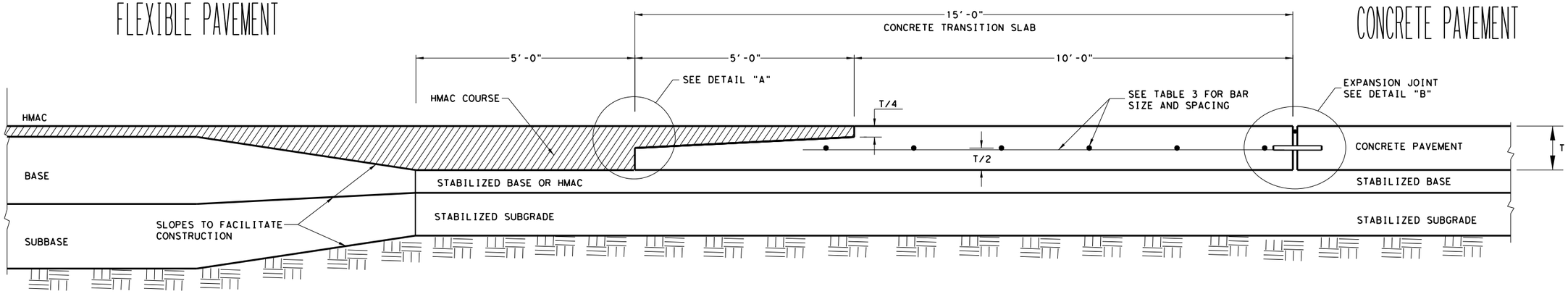
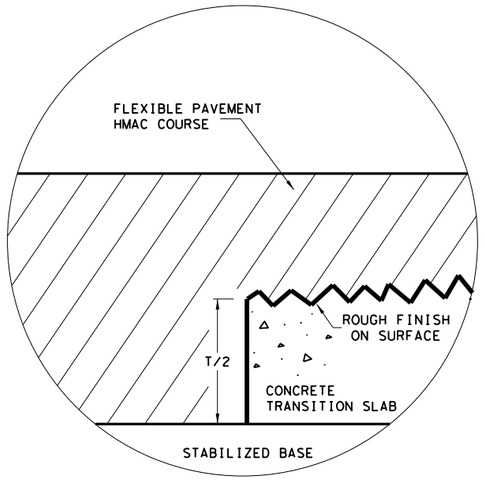
FILE: h:\00*maintenance\south harris maintenance\[illegible]
DATE: 1/4/2021
PROJECT: 6375-52-001

FILE: T:\0*GEN-AO\0*Maintenance\000*New Contracts\IH 45 General Maintenance\Standards\PAVEMENTS Standard 20\transitslab20.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001

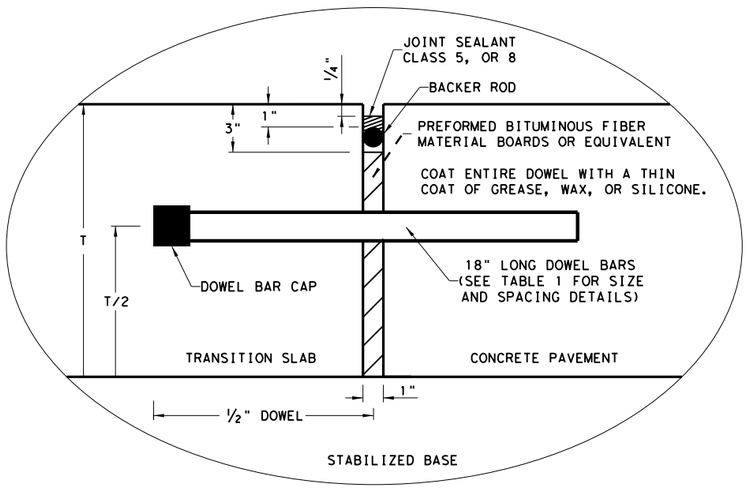


TYPICAL JUNCTION OF CONCRETE PAVEMENT WITH FLEXIBLE PAVEMENT

(NOT TO SCALE)



DETAIL "A"



DETAIL "B"

GENERAL NOTES

1. FOR FURTHER INFORMATION REGARDING THE PLACEMENT OF CONCRETE AND LOAD TRANSFER DEVICES REFER TO THE GOVERNING SPECIFICATIONS FOR "CONCRETE PAVEMENT" AND "REINFORCING STEEL."
2. DETAILS FOR PAVEMENT WIDTH AND THE CROWN CROSS-SLOPE SHALL BE SHOWN ELSEWHERE IN THE PLANS.
3. MATCH THE LONGITUDINAL JOINTS OF THE CONCRETE TRANSITION SLAB WITH ADJOINING CONCRETE PAVEMENT. PROVIDE EQUIVALENT TIEBARS OR TRANSVERSE BARS AT THESE LONGITUDINAL JOINTS, SEE TABLE NO. 2.
4. REFER TO DMS-6310, "JOINT SEALANTS AND FILLERS" FOR THE CLASSIFICATIONS.
5. TRANSITION SLABS WILL BE PAID UNDER ITEM 360, "CONCRETE PAVEMENTS."

TABLE NO. 1 DOWELS (SMOOTH BARS)

SLAB THICKNESS T (IN.)	BAR DIA. AND LENGTH	SPACING (IN.)
7 TO 7.5	1" X 18"	12
8 TO 10	1 1/4" X 18"	12
10 TO 13	1 1/2" X 18"	12

TABLE NO. 2 TIE BARS (DEFORMED BARS)

SLAB THICKNESS T (IN.)	BAR SIZE	SPACING (IN.)
7 TO 7.5	#5	24
8 TO 13	#6	24

TABLE NO. 3 TRANSITION SLAB STEEL (DEFORMED BARS)

SLAB THICKNESS T (IN.)	BAR SIZE	SPACING (IN.) TRANSVERSE DIRECTION	SPACING (IN.) LONGITUDINAL DIRECTION
7 TO 7.5	#5	24	12
8 TO 13	#6	24	12

ADJUST SPACING OF LONGITUDINAL BARS AS NEEDED TO ACCOMDATE DOWEL BAR SPACING.

Texas Department of Transportation

Design Division Standard

CONCRETE PAVEMENT DETAILS TRANSITION SLAB

T-7 to 13 INCHES

TRANS-20

FILE: transitslab20.dgn	DN: TxDOT	DN: TxDOT	DW: AN	CK: KM
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
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	12	HARRIS/GAL		86

FILE: h:\00maintenance\south harris maintenance\2020 submittal\PAVEMENTS\Standards\TE\tehmac11.dgn
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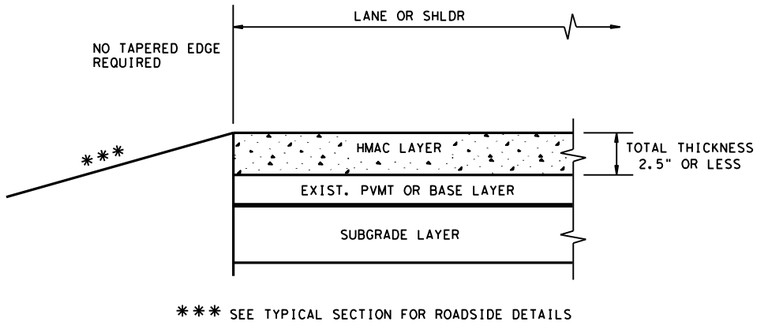
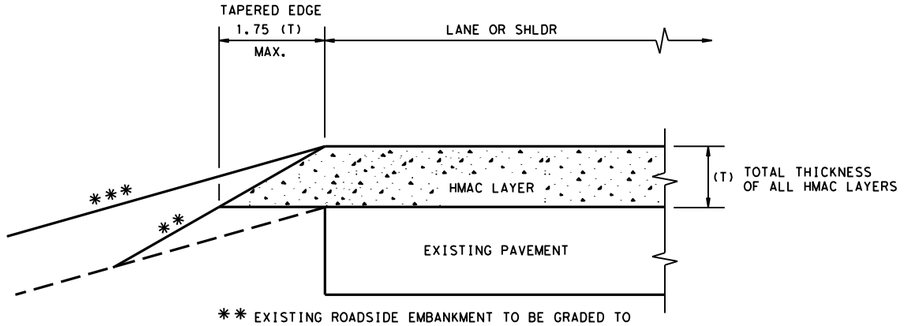
PROJECT: 6375-52-001



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

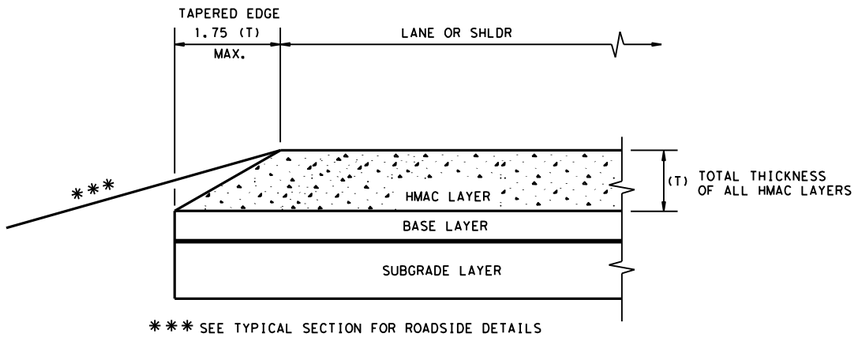
CONDITION - 1
THIN HMAC SURFACES OR HMAC OVERLAY WITH THICKNESS OF 2.5" OR LESS



** EXISTING ROADSIDE EMBANKMENT TO BE GRADED TO PRODUCE A SMOOTH LEVEL SURFACE FOR PLACEMENT OF TAPERED EDGE. THIS WORK IS SUBSIDIARY TO THE VARIOUS BID ITEMS.

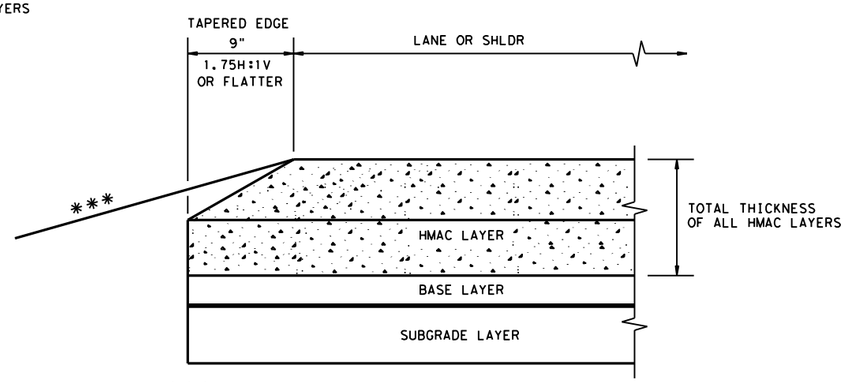
*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 2
OVERLAY OF EXISTING PAVEMENT HMAC THICKNESS 2.5" TO 5"



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 3
NEW OR RECONSTRUCTED PAVEMENT HMAC THICKNESS 2.5" TO 5"



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 4
NEW OR RECONSTRUCTED PAVEMENT HMAC THICKNESS 5" OR GREATER

(NOT TO SCALE)

GENERAL NOTES

1. UNLESS OTHERWISE SHOWN IN THE PLANS, A VERTICAL EDGE IS PERMISSIBLE FOR HMAC PLACED GREATER THAN 5" BELOW THE EDGE OF PAVEMENT AND FOR THICKNESS OF HMAC LESS THAN 2.5".
2. FOR FURTHER INFORMATION REGARDING THE ROADSIDE AND PAVEMENT DETAILS, SEE TYPICAL SECTIONS.
3. PAYMENT FOR TAPERED EDGE WILL BE IN ACCORDANCE WITH APPLICABLE ITEMS IN THE CONTRACT.
4. THE SLOPE OF THE TAPERED EDGE SHALL BE 1.75H:1V OR FLATTER.
5. THE TAPERED EDGE SHALL BE PRODUCED BY USE OF A SCREED ATTACHMENT CAPABLE OF PRODUCING A SMOOTH COMPACTED SURFACE. ADDITIONAL COMPACTING EFFORT BEHIND THE SCREED IS NOT REQUIRED.

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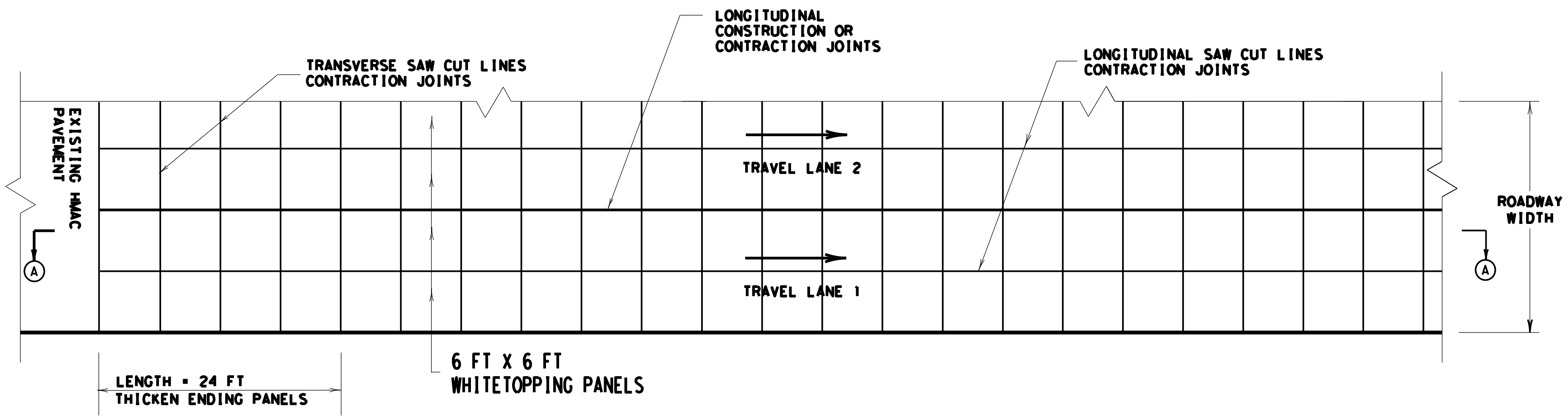
TAPERED EDGE DETAILS
HMAC PAVEMENT

TE(HMAC)-11

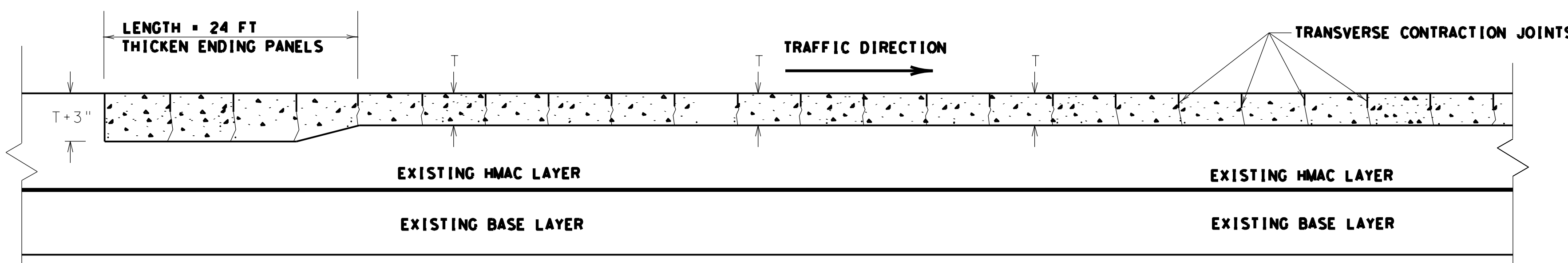
FILE: tehmac11.dgn	DN: TxDOT	CK: RL	DW: KB	CK:
©TxDOT January 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		87



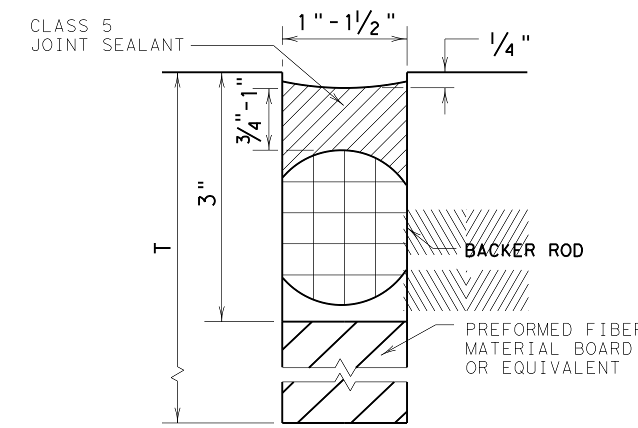
TYPICAL LAYOUT FOR 4" TO 7" THICK OVERLAY
(NOT TO SCALE)

GENERAL NOTES

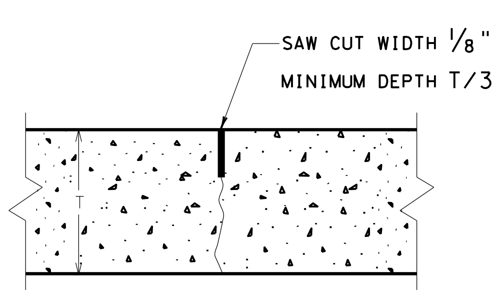
1. WHITETOPPING CONCRETE OVERLAY LESS THAN 4 INCHES THICK, ARE NOT COVERED BY THIS STANDARD.
2. FOR FURTHER INFORMATION REGARDING THE PLACEMENT OF CONCRETE REFER TO THE GOVERNING SPECIFICATIONS FOR "CONCRETE PAVEMENT."
3. DETAILS FOR PAVEMENT WIDTH, PAVEMENT THICKNESS, AND CROWN CROSS SLOPE SHALL BE SHOWN ELSEWHERE IN THE PLAN.
4. THE SAWED JOINT SPACINGS SHALL BE 6 FEET. JOINT SPACINGS MAY BE MADE SLIGHTLY LONGER OR SHORTER AS APPROVED BY THE ENGINEER. LONGITUDINAL SAW CUT LINES SHALL BE LOCATED AT LANE DIVIDER LINES AND LANE CENTERLINES. ALL SAWED TWT PANELS SHALL BE SQUARE EXCEPT AS NECESSARY IN PAVEMENT WIDTH TRANSITIONS.
5. THE SAW CUT DEPTH SHALL BE MINIMUM OF ONE THIRD THE SLAB THICKNESS. THE SAW CUT DEPTH MUST BE ADJUSTED TO ACCOUNT FOR THICKENED PANELS.
6. MATCH TRANSVERSE JOINTS ON ADJOINING LANES. WHEN POSSIBLE, MATCH CURB-GUTTER JOINTS TO TRANSVERSE JOINTS.
7. LONGITUDINAL EXPANSION JOINTS MAY BE PROVIDED IF THE PAVEMENT IS WIDE ENOUGH TO CAUSE EXPANSIONS AND BLOWUPS.



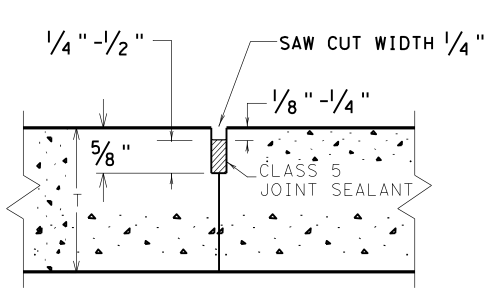
SECTION A-A
(NOT TO SCALE)



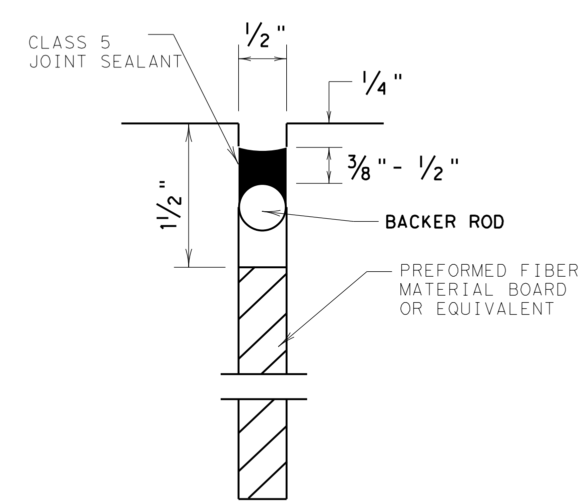
OPTIONAL LONGITUDINAL EXPANSION JOINTS



LONGITUDINAL AND TRANSVERSE CONTRACTION JOINTS DETAIL



LONGITUDINAL AND TRANSVERSE CONSTRUCTION JOINTS DETAIL



ISOLATION JOINTS

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, between old and new pavements, or around drainage inlets, manholes, footings, and lighting structures.

Texas Department of Transportation | Design Division Standard

THIN WHITETOPPING DETAILS
T- 4 TO 7 INCHES
TWT-04

FILE: twt04.dgn	DN: TxDOT	CK: MCW	DW: HC	CK:
© TxDOT July 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
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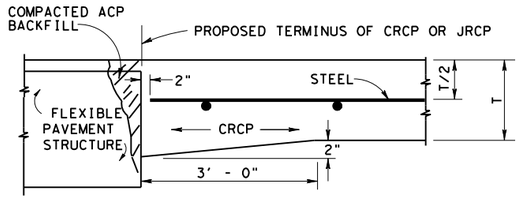
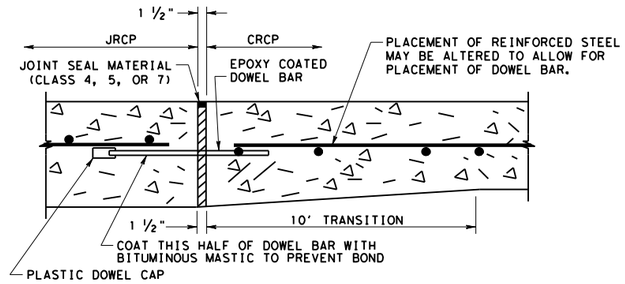
	12		HARRIS/GAL	88

FILE: h:\00#maintenance\south harris maintenance\...
DATE: 1/4/2021
PROJECT: 6375-52-001



NOTE:
ADDITIONAL CONCRETE FOR THICKENED EDGE IS SUBSIDIARY TO VARIOUS BID ITEMS. BACKFILL DISTURBED MATERIAL IN THE FLEXIBLE PAVEMENT WITH ACP. THIS ACP IS SUBSIDIARY TO VARIOUS BID ITEMS.

JUNCTURE A & B - CRCP OR JRCP WITH FLEXIBLE TYPE PAVEMENT STRUCTURE

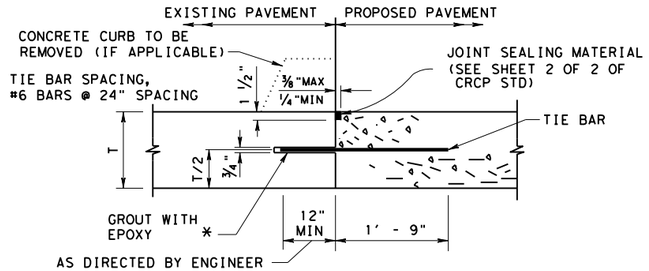


FOR DETAILS NOT SHOWN, SEE TRANSVERSE EXPANSION JOINT DETAILS ELSEWHERE IN PLANS.

DETAIL "B" - DOWEL ASSEMBLY AT EXPANSION JOINT

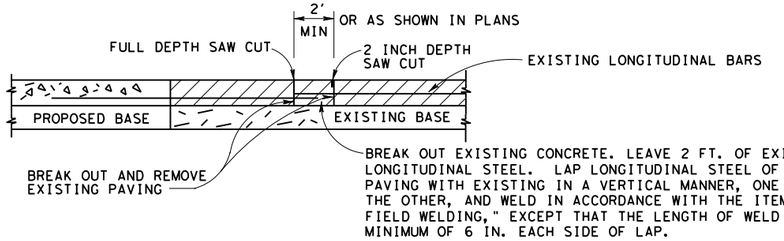
DOWEL BAR DATA			
SLAB THICKNESS(T)	6"-7.5"	8"-10"	10.5"-15"
DOWEL SIZE	1"	1 ¼"	1 ½"
DOWEL LENGTH	18"	20"	22"
DOWEL BAR SPACING	12"	12"	12"

TABLE A - DOWEL BAR DATA



JUNCTURE D - TYPICAL CONNECTION TO EXISTING CONCRETE

*FOR EPOXY TYPE SEE ITEM 361.



JUNCTURE F - "BREAK BACK" CONCRETE CRCP WITH CRCP OR JRCP WITH JRCP

GENERAL NOTES

1. FOR FURTHER INFORMATION REGARDING PLACING CONCRETE AND REINFORCEMENT, REFER TO THE GOVERNING SPECIFICATION FOR CONCRETE PAVEMENT.
2. THE DESIGN REQUIREMENTS FOR THE PAVEMENT STRUCTURE, I.E. BAR SPACING, BAR SIZE LAP REQUIREMENTS, ETC., ARE SHOWN ON THE APPROPRIATE PAVEMENT DESIGN DETAIL.
3. SLEEPER SLAB AND ADDITIONAL REINFORCING REQUIRED ON THIS DRAWING ARE INCIDENTAL TO THE VARIOUS BID ITEMS.
4. USE THE SIZE, SPACING, AND LENGTH OF DOWEL BARS SHOWN IN TABLE "A".
5. WHERE THERE WILL BE A JUNCTURE AND ADDITIONAL JRCP PAVING WILL BE PLACED AT A FUTURE DATE, MULTIPLE PIECE DOWEL BARS WILL BE PERMITTED AT THE JUNCTURE. PROVIDE MULTIPLE PIECE DOWEL BAR ASSEMBLIES WITH A MINIMUM ULTIMATE TENSILE STRENGTH OF 60.0 KIPS AND THAT HAVE SMOOTH EPOXY COATED BARS. ENSURE THE MULTIPLE PIECE DOWEL BAR ASSEMBLIES HAVE STOP TYPE COUPLINGS AND HAVE HAVE ROLLED THREADS ON THE BARS. DISMANTLE THE BAR AND FIT THE COUPLING PORTION USED IN CONSTRUCTION, WITH A PLASTIC CAP. FURNISH THE REMAINING PORTION OF THE BAR TO THE ENGINEER.
6. WHERE THE PAVING IS CRCP AND A RAMP COMPOSED OF A FLEXIBLE PAVEMENT WILL BE USED AT THE JUNCTURE UNTIL FUTURE PAVING IS CONSTRUCTED, MULTIPLE PIECE TIE BARS MAY BE USED IF PERMITTED BY THE ENGINEER. IF USED, ENSURE THE MULTIPLE PIECE TIE BAR ASSEMBLIES HAVE STOP TYPE COUPLINGS AND ROLLED THREADS ON THE BARS. FURNISH MULTIPLE PIECE TIE BAR ASSEMBLIES THAT DEVELOP A MINIMUM ULTIMATE TENSILE STRENGTH EQUAL TO 1.25 TIMES THE YIELD STRENGTH OF THE TRANSVERSE BARS BEING JOINED. FOR TIE BARS, USE DEFORMED REINFORCING BARS. TIE BAR ASSEMBLIES MADE FROM STEELS OTHER THAN ASTM GRADE 60 AND WITH DEFORMATIONS OTHER THAN ASTM STD. MAY BE USED PROVIDED THEY PROVE SATISFACTORY TO THE ENGINEER AND ARE IN EVERY RESPECT THE EQUAL TO THE ASSEMBLIES SPECIFIED. LABORATORY TESTING OF THE PROPOSED ASSEMBLIES, AT THE CONTRACTOR'S EXPENSE, MAY BE REQUIRED. LAP AND WELD ONE PORTION OF THE TIE BAR ASSEMBLY TO EACH LONGITUDINAL BAR IN ACCORDANCE WITH THE ITEM "STRUCTURAL FIELD WELDING "AND THE OTHER PORTION INTO THE COUPLING PRIOR TO PAVING. ENSURE MULTIPLE PIECE TIE BAR LENGTHS CONFORM TO THE TIE BAR LENGTHS SHOWN ELSEWHERE IN THE PLANS. ADDITIONAL "SHEAR STEEL" WILL ALSO BE REQUIRED AND MAY BE USED WITH MULTIPLE PIECE ASSEMBLIES AS PREVIOUSLY DESCRIBED. USE ADDITIONAL STEEL BARS OF EQUAL DIAMETER AT A SPACING DOUBLE THAT OF THE LONGITUDINAL STEEL AND ENSURE THE LENGTH IS 66 TIMES THE TIE BAR DIAMETER.
7. DO NOT SHEAR CUT DOWEL BARS.
8. ENSURE DOWEL BAR EPOXY COATING CONFORMS TO ARTICLE 440.2.7., "EPOXY COATING".
9. REPLACE ANY BENT LONGITUDINAL REINFORCING. IF THERE IS NOT SUFFICIENT EXPOSED REINFORCING TO PROVIDE A MINIMUM OF A 33 TIMES BAR DIAMETER LAP, REMOVE THE EXISTING PAVEMENT AND SUFFICIENTLY EXPOSE THE EXISTING REINFORCING TO PROVIDE A 33 TIMES BAR DIAMETER LAP. REPLACE ANY SHEAR BARS THAT ARE DISTURBED, BY DRILLING AND GROUTING AS REQUIRED BY NOTE 12 BELOW. PERFORM THIS CORRECTIVE ACTION AT NO EXPENSE TO THE DEPARTMENT.
10. TIE BARS AND DOWEL BARS OMITTED, LOST, OR DAMAGED SHALL BE REPAIRED BY DRILLING AND EPOXY GROUTING AT NO EXPENSE TO THE DEPARTMENT.
11. JUNCTURES A & B ARE ONLY SUITABLE FOR MINOR STREETS WITH LOW TRAFFIC VOLUMES.
12. FURNISH ADDITIONAL SHEAR BARS (DIAMETER "D") OF THE SAME SIZE AS LONGITUDINAL BARS AND SPACE THEM MIDWAY BETWEEN ALTERNATE LONGITUDINAL BARS ALONG THE TRANSVERSE CONSTRUCTION JOINT FORMED AT THE LEAVE-OUT.

LEGEND

ACP - ASPHALT CONCRETE PAVEMENT
CRCP - CONTINUOUSLY REINFORCED CONCRETE PAVEMENT
JRCP - JOINTED REINFORCED CONCRETE PAVEMENT
T - THICKNESS

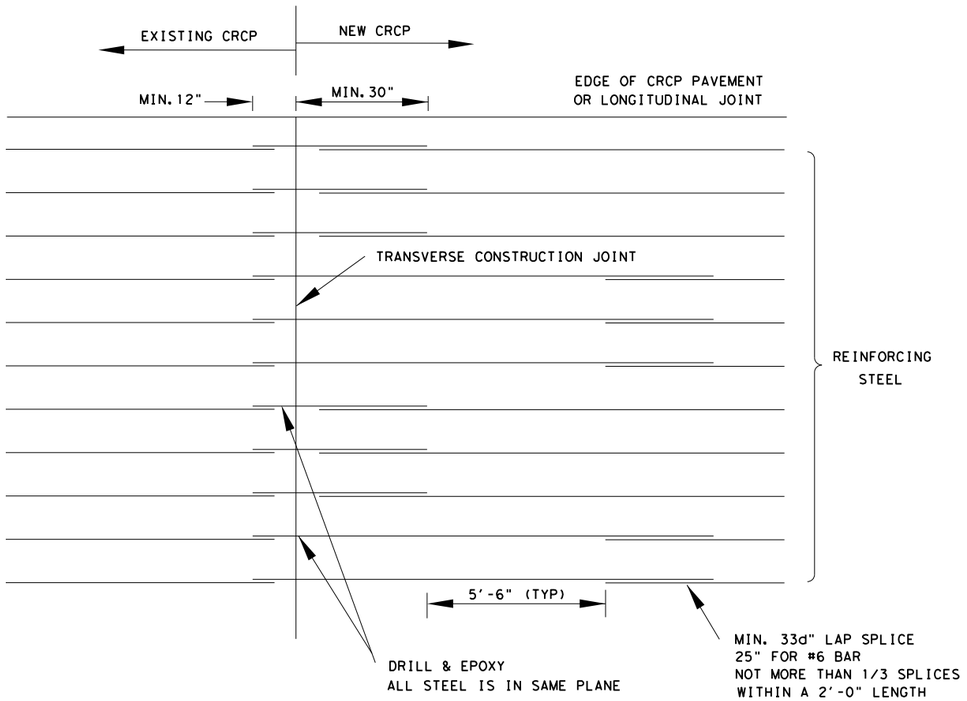
Texas Department of Transportation
Houston District

CONCRETE PAVEMENT JUNCTURES

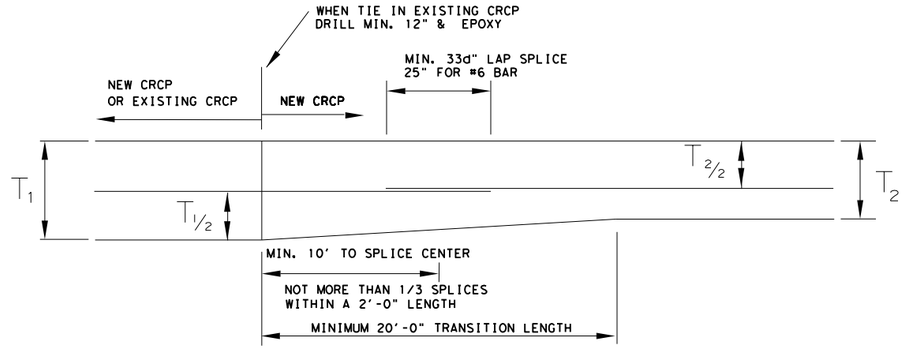
CPJ

FILE: STDB-5.dgn	DN:	CK:	DW:	CK:	
© TxDOT December 2009	DIST	FED REG	PROJECT NO.		SHEET
REVISIONS 5/05 2004 SPECS REVISED 4/2008 2/15 2014 SPECS	12	6	RMC 6375-52-001		89
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	HARRIS/GAL		6375	52	001	IH45

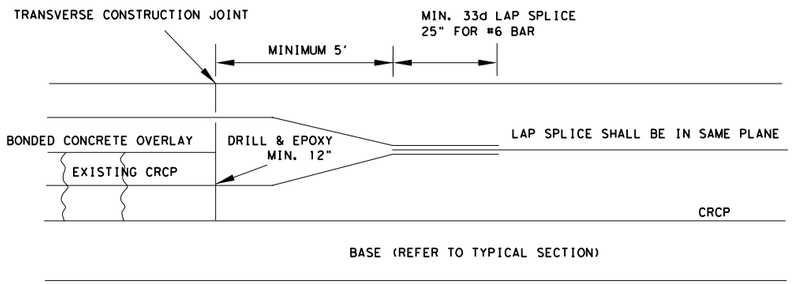
FILE: n:\00*maintenance\south harris maintenance\2020 contracts\6357-02-001*ih45 general maintenance\Standards\PAVEMENTS Standard 20\stdb5*1.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001



EXISTING CRCP TO NEW CRCP

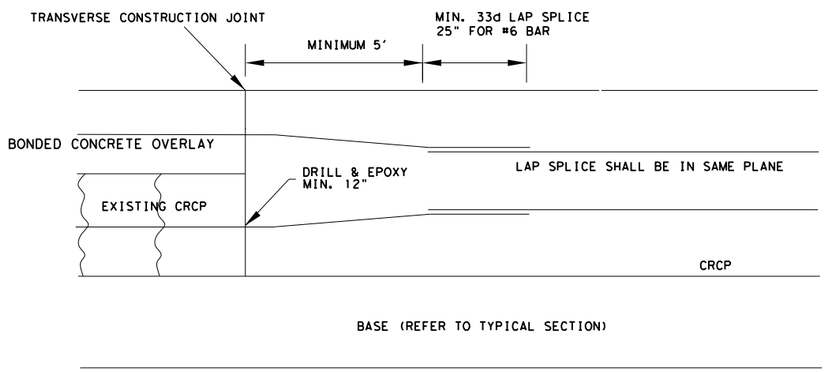


CRCP THICKNESS TRANSITION



CRCP BONDED OVERLAY TO CRCP TRANSITION

(ONE LAYER STEEL)



CRCP BONDED OVERLAY TO CRCP TRANSITION

(TWO LAYER STEEL)

Texas Department of Transportation
Houston District

CONCRETE PAVEMENT JUNCTURES

CPJ

FILE: STDB-5.dgn	DN:	CK:	DW:	CK:	
© TxDOT December 2009	DIST	FED REG	PROJECT NO.		SHEET
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	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	HARRIS/GAL		6375	52	001	IH45

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DATE: 1/4/2021
PROJECT: 6375-52-001

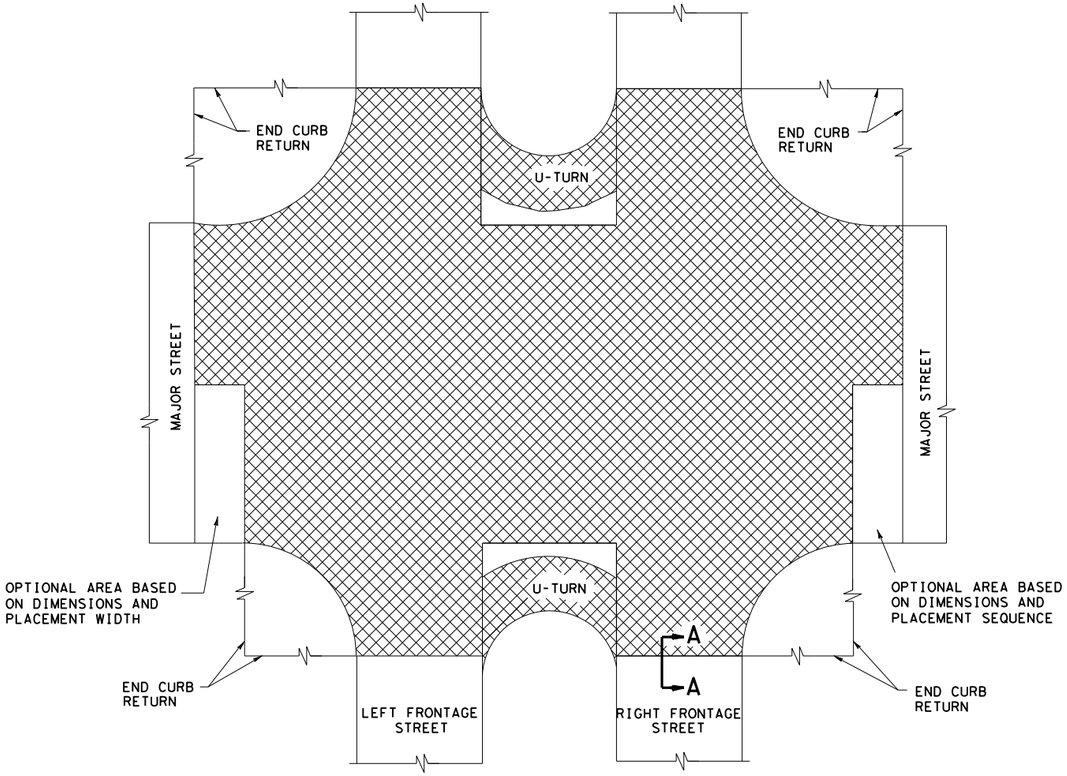


FIGURE 2

INTERSECTION OF MAJOR STREET
WITH FRONTAGE STREET

TABLE 1

EQUIVALENT PAVEMENT THICKNESS	
T * (IN.)	T_{FS} ** (IN.)
<=12"	T+3"
>12"	15"

*WITH BASE STRUCTURE OF:
1" ASPHALT STABILIZED BASE
6" PORTLAND CEMENT TREATED BASE
6" LIME TREATED SUBGRADE

**ON AS CUT SUBGRADE

***SEE JOINT SEALING DETAILS ON CRCP STANDARDS

GENERAL NOTES

1. DEFINITION OF TERMS

   T_{FS} - FAST TRACK CONCRETE PAVING DEPTH AT INTERSECTIONS AND LEAVE OUTS.
   T - NOMINAL CONCRETE PAVING DEPTH AS SHOWN IN THE PLANS.
   DETERMINE FAST TRACK CONCRETE PAVING DEPTH USING TABLE 1 AND THE NOMINAL CONCRETE PAVING DEPTH "T" SHOWN IN THE PLANS.

2. AT INTERSECTIONS AND LEAVE-OUT LOCATIONS USE THE SAME LONGITUDINAL AND TRANSVERSE BAR SPACING FOR THE FAST TRACK PAVING AREA AS THAT USED FOR THE ADJACENT CONCRETE PAVING DEPTH "T"(EXCEPT BAR SIZE SHALL BE #7 ON SINGLE MAT). FOR SINGLE MAT FAST TRACK PAVING, PLACE THE LONGITUDINAL AND TRANSVERSE BARS FOR THE FAST TRACK PAVING AREA AT THE HORIZONTAL PLANE ELEVATION THAT IS TWO TIE-BAR DIAMETERS LOWER THAN THAT USED FOR THE ADJACENT CONCRETE PAVEMENT DEPTH "T", AS SHOWN IN FIGURE 1. USE SINGLE MAT STEEL IN FAST TRACK PAVING AREAS ADJACENT TO PAVEMENT SLABS WITH SINGLE MAT REINFORCING. USE DOUBLE MAT STEEL IN FAST TRACK PAVING AREAS ADJACENT TO PAVEMENT SLABS WITH DOUBLE MAT REINFORCING.

3. THE REQUIRED FAST TRACK PAVING AREAS WILL BE SHOWN ON THE PLANS. THE CONTRACTOR HAS THE OPTION TO UTILIZE FAST TRACK CONCRETE PAVING AT U-TURNS, AT INTERSECTIONS, AT MINOR STREETS, AND AT DRIVEWAYS WITH FRONTAGE ROAD LEAVE-OUT AREAS THAT ARE NOT SHOWN ON THE PLANS, WITH PRIOR WRITTEN APPROVAL FROM THE ENGINEER. TYPICAL PAVING PLANS FOR THE INTERSECTION OF A MAJOR STREET WITH THE FRONTAGE ROAD ARE SHOWN AS FIGURE 2, AND FOR THE INTERSECTION OF A MINOR STREET OR DRIVEWAY WITH THE FRONTAGE ROAD AS FIGURE 3. FAST TRACK PAVE THE FRONTAGE ROAD FOR THE FULL FRONTAGE ROAD WIDTH AND PLACE IN STAGES AS REQUIRED.

4. USE ADDITIONAL #6 REINFORCING STEEL BARS (MINIMUM 42 INCHES LONG) AND SPACE THEM MIDWAY BETWEEN ALTERNATE LONGITUDINAL BARS ALONG THE THE TRANSVERSE CONSTRUCTION JOINT FORMED AT THE FAST TRACK PAVING INTERFACE (T_{FS}) WITH THE ADJACENT PAVEMENT SLAB (T).

5. SPLICE LENGTH IS A MINIMUM OF 33 TIMES THE NOMINAL STEEL DIAMETER.

6. PLACE THE CONCRETE PLACEMENT AT A UNIFORM DEPTH THROUGHOUT THE FAST TRACK CONCRETE PAVING AREA.

7. FOR CONTINUOUS SECTIONS OF ROADWAY WHERE FAST TRACK PAVING IS THE PRIMARY PAVEMENT TYPE, USE THE BAR SIZE AND SPACING FROM THE CRCP STANDARDS THAT CORRESPONDS TO THE FAST TRACK SLAB THICKNESS.

8. USE LONGITUDINAL TIE-BARS OF THE SAME SIZE DIAMETER AND SPACING AS THE LONGITUDINAL BAR. A SINGLE PIECE TIE-BAR MAY BE USED IF THE 33 TIMES DIAMETER TIE-BAR PROJECTION DOES NOT INTERFERE WITH THE SAFE HANDLING OF TRAFFIC.

9. BASE THE DEPTH OF SAW CUTS FOR SAWED JOINTS ON THE FAST TRACK CONCRETE PAVEMENT THICKNESS.

10. THIS STANDARD IS NOT INTENDED TO REPLACE OTHER STANDARDS EXCEPT WHERE SPECIFICALLY STATED HEREIN. FOR PAVING DETAILS NOT SHOWN ON THIS DRAWING, REFER TO THE STANDARD SHEETS FOR CONTINUOUSLY REINFORCED CONCRETE PAVEMENT SHOWN ELSEWHERE IN THE PLANS.

FAST TRACK PAVING AREA

TYPICAL PAVING PLANS

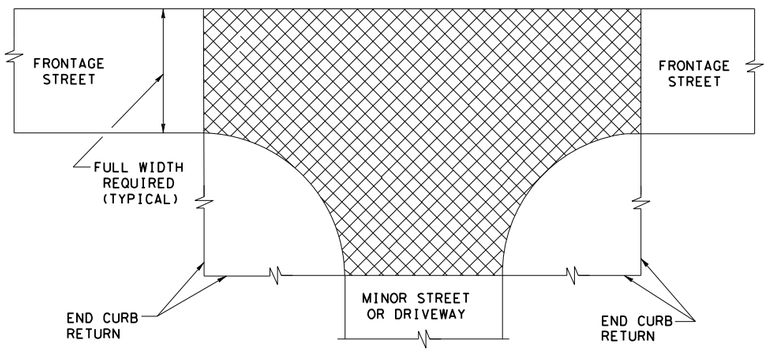
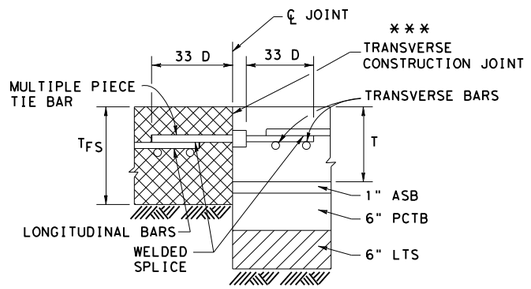


FIGURE 3

INTERSECTION OF MINOR STREET OR
DRIVEWAY WITH FRONTAGE STREET



SINGLE MAT

TRANSVERSE CONSTRUCTION JOINTS

SECTION A - A
FIGURE 1

LEGEND

ASB - ASPHALT STABILIZED BASE
CRCP - CONTINUOUSLY REINFORCED CONCRETE PAVEMENT
D - DIAMETER
LTS - LIME TREATED SUBGRADE
PCTB - PORTLAND CEMENT TREATED BASE

SHEET 1 OF 1

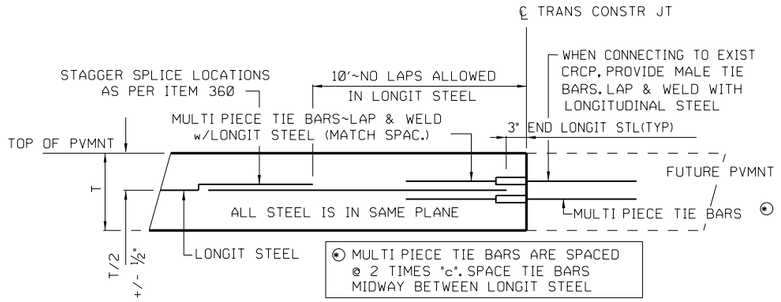
Texas Department of Transportation
Houston District

FAST TRACK CONTINUOUSLY REINFORCED CONCRETE PAVEMENT DETAILS

CRCP-FT

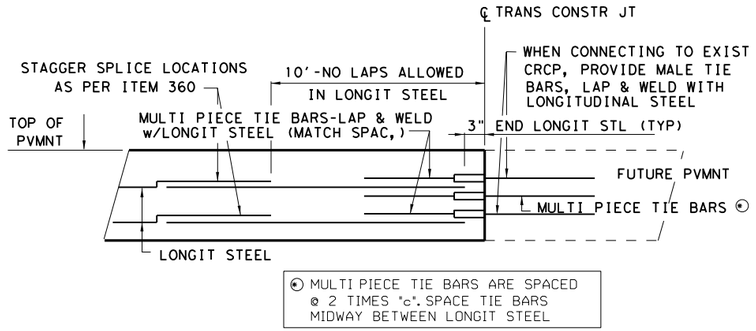
FILE: STDB-4.dgn	DN:	CK:	DW:	CK:	
© TxDOT December 2009	DIST	FED REG	PROJECT NO.		SHEET
REVISIONS 5/05 2004 SPECS 2/15 2014 SPECS	12	6	RMC 6375-52-001		91
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	HARRIS/GAL		6375	52	001	IH45

FILE: h:\00*maintenance\south harris maintenance\2020 contracts\6357-02-001*ih45 general maintenance\Standards\PAVEMENTS Standard 20\stdb4.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001



SECTION - SINGLE STEEL MAT

AT END OF PROJECT OR TEMPORARY END OF PAVEMENT



SECTION - DOUBLE STEEL MAT

AT END OF PROJECT OR TEMPORARY END OF PAVEMENT

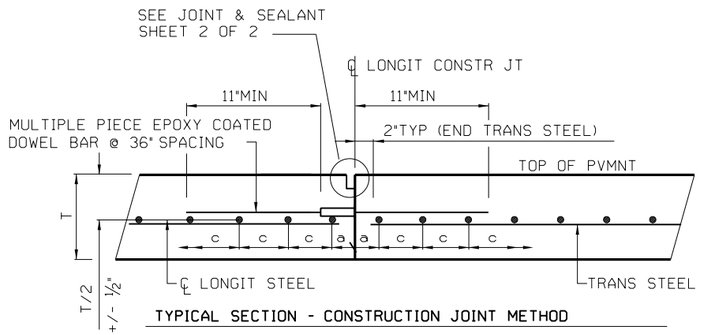
GENERAL NOTES

1. DETAILS FOR 7.0 IN. TO 13.0 IN. THICK CONCRETE PAVEMENT ARE SHOWN ON STANDARD CRCP(1)-13. DETAILS FOR 14 IN. TO 15 IN. THICK CONCRETE PAVEMENT ARE SHOWN ON STANDARD CRCP(2)-13.
2. DOWELS AND TIE BARS - DOWELS ARE ONE INCH MINIMUM DIAMETER. ENSURE DOWELS ARE FREE OF GREASE AND ARE EPOXY COATED. DO NOT SHEAR CUT DOWELS DURING FABRICATION. PROVIDE TIE BARS PER ITEM 360. FURNISH MULTI PIECE TIE BARS AND DOWELS WITH STOP COUPLINGS AND WITH THREADS ON THE BARS.
3. USE CHAIRS OF SUFFICIENT STRUCTURAL QUALITY AND NUMBER TO SUPPORT THE MAT TO THE VERTICAL TOLERANCES. CHAIRS WILL BE APPROVED BY THE ENGINEER AND DO NOT REQUIRE GALVANIZING.
4. MECHANICALLY PLACING REINFORCING STEEL IS NOT ALLOWED. NO BARS, DOWELS OR TIE BARS MAY BE VIBRATED INTO POSITION.
5. WHERE DIFFERENT THICKNESS PAVEMENTS MEET, TRANSITION THE THINNER SECTION TO THE THICKER SECTION OVER A DISTANCE OF 20 FT. PLACE REINFORCING STEEL WITHIN THE TRANSITION THE SAME AS IN THE THICKER PAVEMENT.
6. PERFORM WELDING PER ITEM 448. FURNISH WELDABLE REBAR PER ITEM 440.

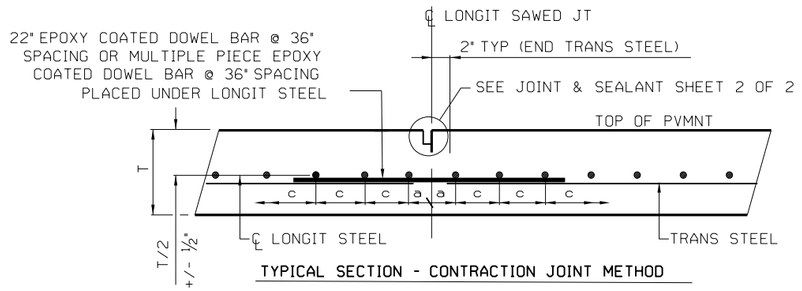
LONGITUDINAL DOWEL JOINT DETAILS

LOCATE WHERE SHOWN IN THE PLANS OR AS APPROVED. CONTRACTOR MAY USE EITHER METHOD

SINGLE STEEL MAT

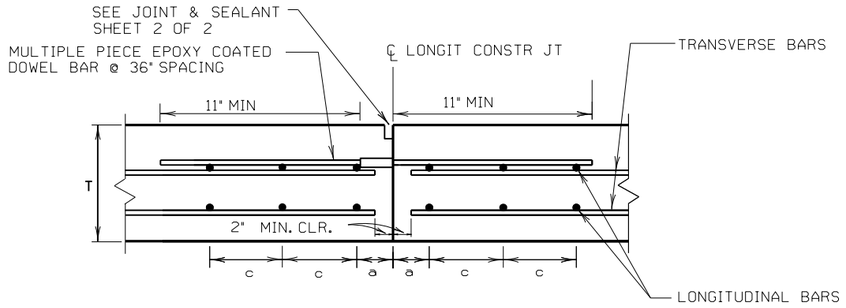


TYPICAL SECTION - CONSTRUCTION JOINT METHOD

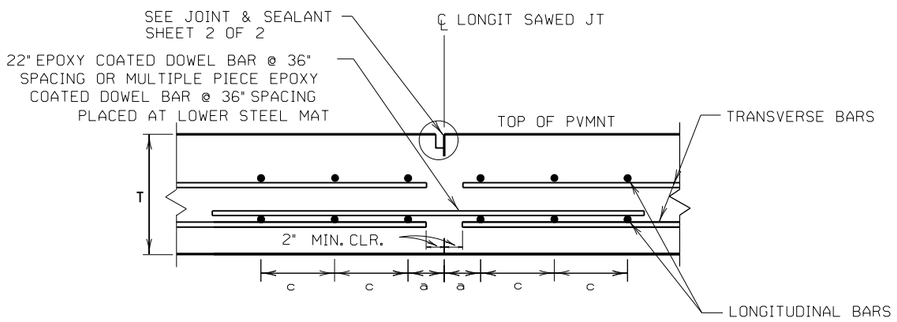


TYPICAL SECTION - CONTRACTION JOINT METHOD

DOUBLE STEEL MAT



TYPICAL SECTION - CONSTRUCTION JOINT METHOD



TYPICAL SECTION - CONTRACTION JOINT METHOD

SHEET 1 OF 2

Texas Department of Transportation
Houston District

CONTINUOUSLY REINFORCED CONCRETE PAVEMENT HOUSTON SUPPLEMENT CRCP-HS

REVISIONS
4/12 CHANGED CTE FROM 6.0 TO 5.0
8/14 UPDATE TO REFERENCE CRCP-13 STND.
2/15 REVISED GENERAL NOTES, MINOR CORRECTIONS.
4/17 REVISED NOTE #3 OF GENERAL NOTES, MINOR CORRECTIONS.

DN: -	CK: -	DW: -	CK: -	
DISTRICT	PROJECT NO.			SHEET
12	RMC 6375-52-001			92
COUNTY		CONTROL	SECTION	JOB	HIGHWAY
HARRIS/GAL		6375	52	001	IH45

STD-B1A

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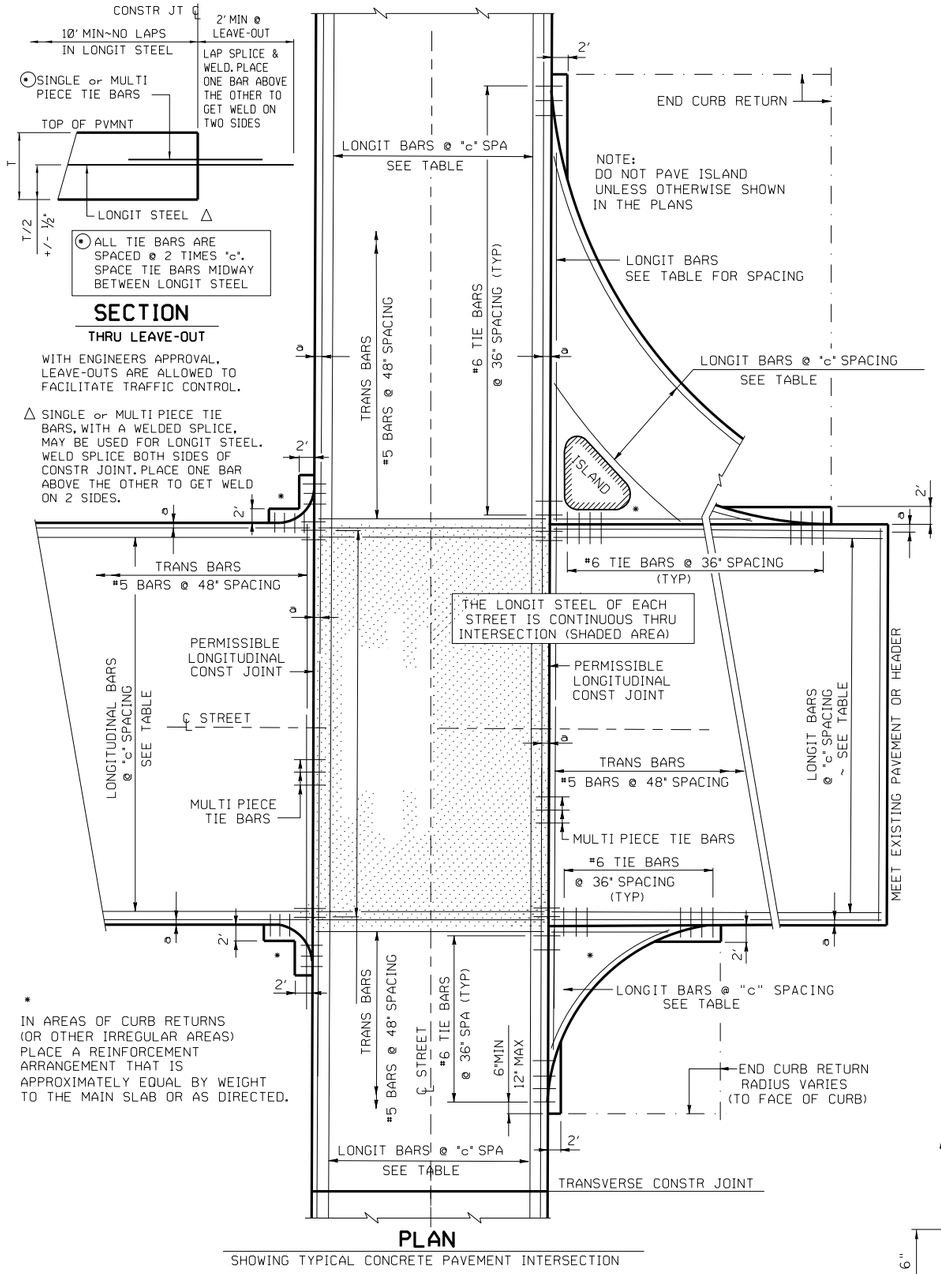
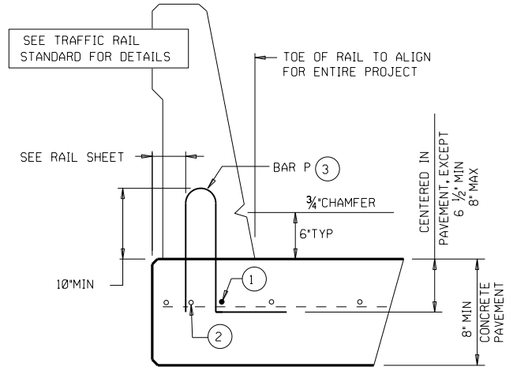
PROJECT: 6375-52-001



PLAN

SHOWING TYPICAL CONCRETE PAVEMENT INTERSECTION



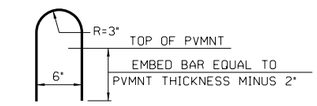
RAIL DETAIL

FOR ADDITIONAL DETAILS, SEE RAIL STANDARD SHEET.
THE MINIMUM LENGTH OF A CONCRETE RAILING PANEL IS FIVE FEET.

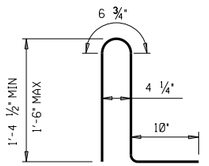
(1) AS AN AID IN SUPPORTING REINFORCEMENT, ADDITIONAL LONGITUDINAL BARS MAY BE USED IN THE SLAB WITH THE APPROVAL OF THE ENGINEER. FURNISH SUCH BARS AT NO EXPENSE TO THE DEPARTMENT.

(2) LONGITUDINAL SLAB BAR MAY BE ADJUSTED LATERALLY 3" +/- TO TIE REINFORCING.

(3) ANCHORAGE BAR SHOWN IS FOR AN SSTR OR T551 RAIL. SEE RAILING DETAIL SHEET FOR SPACING OF BAR P. FOR OTHER RAIL TYPES SEE RAILING DETAIL SHEET.

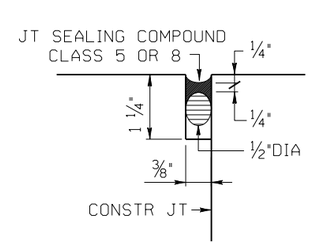


BAR A (#3)

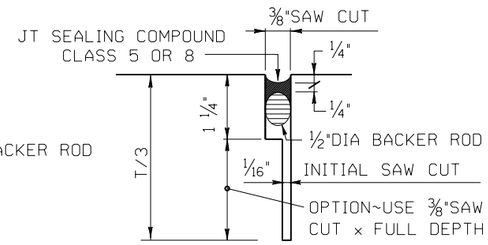


BAR P (#5)

RAIL ANCHOR INSTALLED IN PAVEMENT (3)

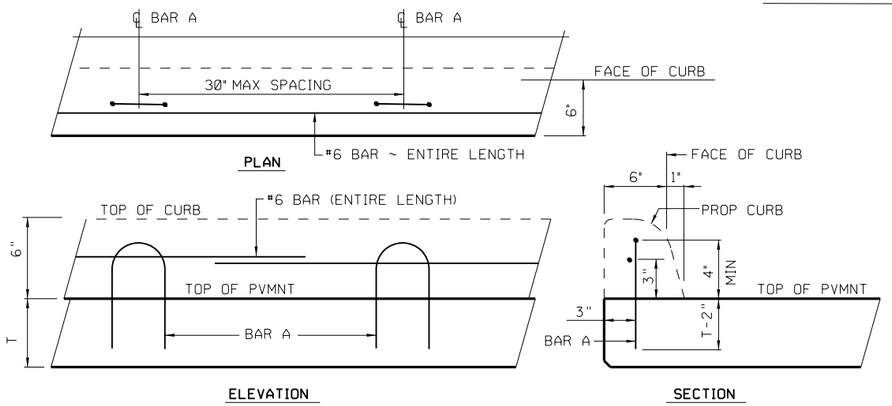


DETAIL 1 ~ CONSTR JOINT



DETAIL 2 ~ SAWED JOINT

JOINT AND SEALANT DETAILS



CURB DETAIL

SEE CC & DID STANDARD

SHEET 2 OF 2

Texas Department of Transportation
Houston District

CONTINUOUSLY REINFORCED CONCRETE PAVEMENT HOUSTON SUPPLEMENT CRCP-HS

DN: -	CK: -	DW: -	CK: -	
REVISIONS 4/12 CHANGED CTE FROM 6.0 TO 5.0 (ON SHEET 1) 2/15 MINOR CORRECTIONS.	DISTRICT	PROJECT NO.		SHEET
	12	RMC 6375-52-001		93
	COUNTY	CONTROL	SECTION	JOB	HIGHWAY
	HARRIS/GAL	6375	52	001	IH45

STD-B1B

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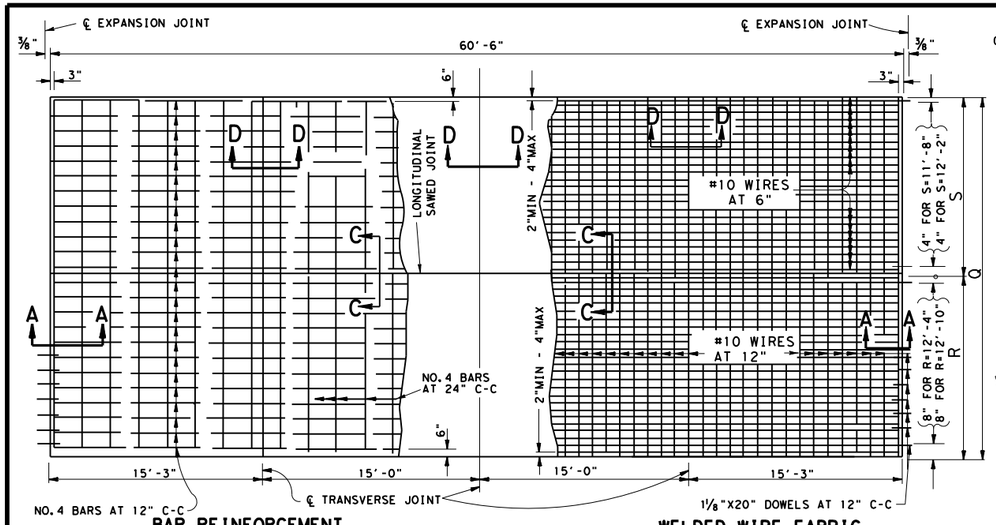
DATE: 1/4/2021
PROJECT: 6375-52-001

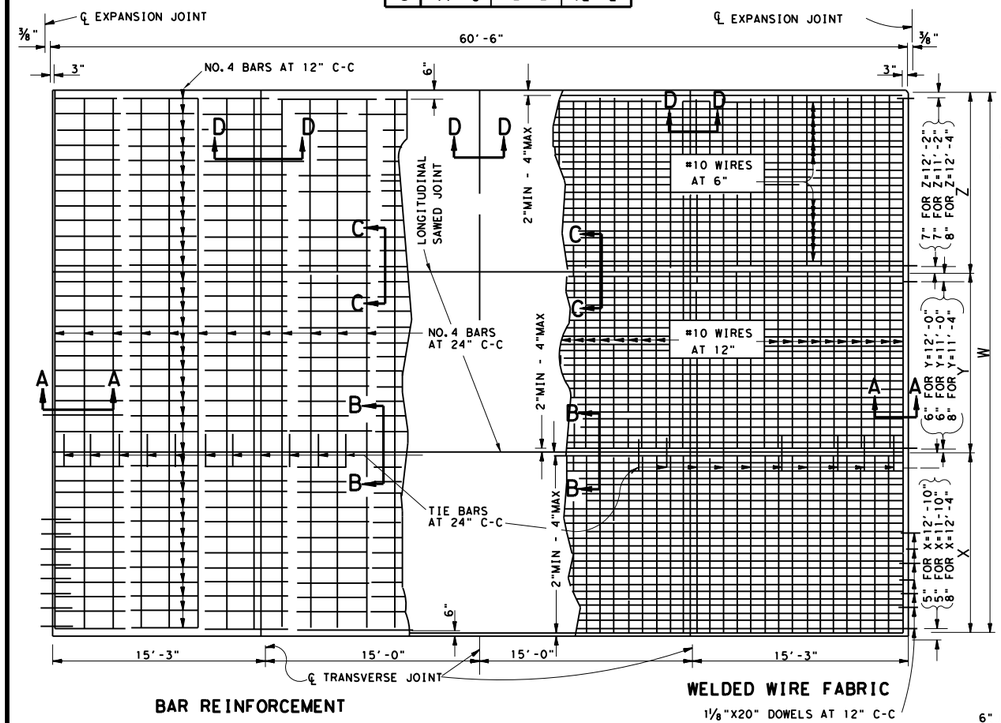


BAR REINFORCEMENT

WELDED WIRE FABRIC

TWO LANE PAVEMENT PLAN

	WIDTH - Q		
	24'-0"	24'-6"	25'-0"
R	12'-4"	12'-4"	12'-10"
S	11'-8"	12'-2"	12'-2"



BAR REINFORCEMENT

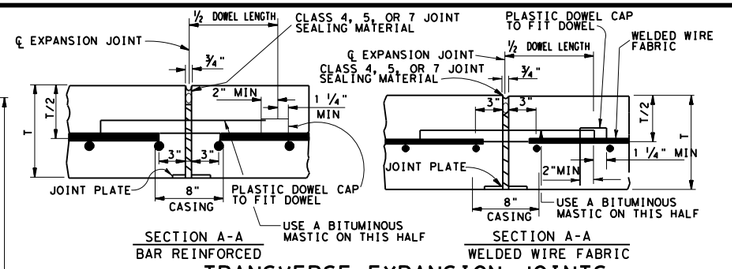
WELDED WIRE FABRIC

1⅛"X20" DOWELS AT 12" C-C

THREE LANE PAVEMENT PLAN

	WIDTH - W		
	37'-0"	36'-0"	34-0"
X	12'-10"	12'-4"	11'-10"
Y	12'-0"	11'-4"	11'-0"
Z	12'-2"	12'-4"	11'-2"

D = DIAMETER
R = RADIUS
T = THICKNESS

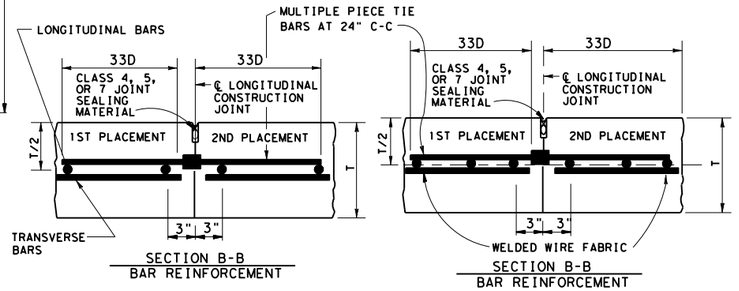


SECTION A-A
BAR REINFORCED

SECTION A-A
WELDED WIRE FABRIC

TRANSVERSE EXPANSION JOINTS

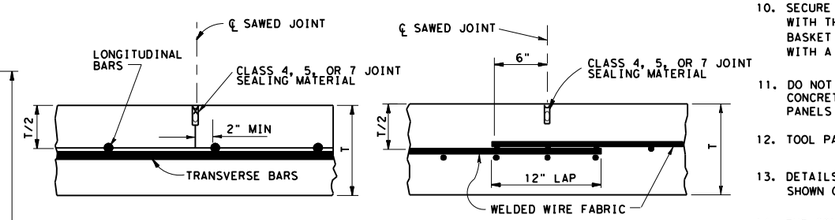
NOTE: DOWEL BARS CONFORMING TO ASTM A615 OR A616 GRADE 60 ARE ACCEPTABLE



SECTION B-B
BAR REINFORCEMENT

SECTION B-B
BAR REINFORCEMENT

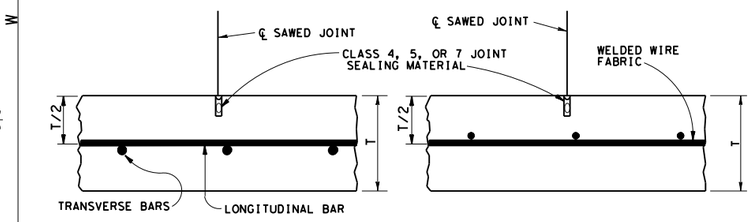
LONGITUDINAL CONSTRUCTION JOINTS



SECTION C-C
BAR REINFORCEMENT

SECTION C-C
WELDED WIRE FABRIC

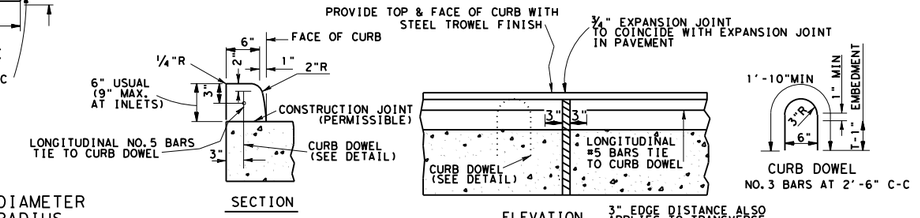
LONGITUDINAL SAWED JOINTS



SECTION D-D
BAR REINFORCEMENT

SECTION D-D
BAR REINFORCEMENT

TRANSVERSE SAWED JOINTS



SECTION

ELEVATION

3" EDGE DISTANCE ALSO APPLIES TO TRANSVERSE GROOVED PLANE JOINT IN CURB

TYPICAL 6" CURB (DETAIL)

GENERAL NOTES

1. MULTIPLE PIECE TIE BARS ARE REQUIRED AT LONGITUDINAL CONSTRUCTION JOINTS. USE MULTIPLE PIECE TIE BAR ASSEMBLIES WITH STOP TYPE COUPLINGS AND WITH THREADS ON THE BARS. ENSURE THE MULTIPLE PIECE TIE BAR ASSEMBLIES DEVELOP A MINIMUM ULTIMATE TENSILE STRENGTH EQUAL TO 1.25 TIMES THE YIELD STRENGTH OF THE TRANSVERSE BARS BEING JOINED. USE DEFORMED REINFORCING BARS FOR TIE BARS. TIE BAR ASSEMBLIES MADE FROM STEELS OTHER THAN ASTM GRADE 60 AND WITH DEFORMATIONS OTHER THAN ASTM STANDARD MAY BE USED IF IT CAN BE PROVEN TO THE ENGINEER THAT THEY ARE IN EVERY RESPECT THE EQUAL OF THE ASSEMBLIES SPECIFIED. LABORATORY TESTING OF THE PROPOSED ASSEMBLIES, AT THE CONTRACTOR'S EXPENSE, MAY BE REQUIRED.
2. FORM CONSTRUCTION JOINTS WITH METAL OR WOOD FORMS EQUAL IN DEPTH TO THE NOMINAL DEPTH OF THE PAVEMENT OR BY OTHER MEANS APPROVED PRIOR TO THEIR USE.
3. SAW LONGITUDINAL AND TRANSVERSE JOINTS AS SOON AS SAWING CAN BE ACCOMPLISHED WITHOUT DAMAGE TO THE PAVEMENT AND BEFORE 24 HOURS AFTER PLACING THE CONCRETE, THE EXACT TIME WILL BE APPROVED BY THE ENGINEER. PREFORMED JOINT WITH ASPHALT STRIP IS NOT ACCEPTABLE.
4. LONGITUDINAL JOINTS ARE SHOWN OFFSET FOUR INCHES FROM THE THEORETICAL LANE LINE AND MAY BE OFFSET TO EITHER SIDE IF THE WIDTH OF THE WIRE FABRIC IS PROPERLY ADJUSTED.
5. ONE OF THE LONGITUDINAL JOINTS OF PAVEMENT SLABS WIDER THAN TWO LANES MAY BE A CONSTRUCTION JOINT. FOR PAVEMENT SLABS WIDER THAN 15 FT. PROVIDE A LOGITUDINAL SAWED JOINT UNLESS OTHERWISE DIRECTED.
6. FORM THE JOINT SEAL SPACE AT TRANSVERSE EXPANSION JOINTS BY USING A STRAIGHT FORM PLACED BEHIND THE LONGITUDINAL FLOAT. LOOSEN THE FORM AS SOON AS THE CONCRETE WILL RETAIN ITS SHAPE AND EDGE WITH AN APPROVED EDGING TOOL. TOOL BOTH EDGES OF LONGITUDINAL CONSTRUCTION JOINTS TO A ⅛ IN. RADIUS AT THE PAVEMENT SURFACE.
7. DO NOT DISCHARGE CONCRETE FROM THE MIXER DIRECTLY ON TOP OF OR ON THE SIDES OF THE EXPANSION JOINT ASSEMBLIES.
8. LAP TRANSVERSE EDGES OF SHEETS OF WELDED WIRE FABRIC 12 INCHES EXCEPT AT TRANSVERSE EXPANSION JOINTS. LAP LONGITUDINAL EDGES 6 INCHES EXCEPT AT LONGITUDINAL CONSTRUCTION JOINTS.
9. DOWEL BARS MAY BE COATED WITH STAINLESS STEEL, MONEL METAL, OR IN ACCORDANCE WITH THE ITEM "REINFORCING STEEL" SECTION ON EPOXY COATING; WITH A WELDED DOWEL ASSEMBLY SUPPORT, AS APPROVED. ENSURE THE CASING CONFORMS TO THE REQUIREMENTS OF ONE OF THE GRADES OF ASTM A167-70 OR A176-71 AND IS NOT LESS THAN 0.010 INCH THICK. PROVIDE A CASING AT LEAST 8 INCHES LONG AND THAT COVERS THE MIDDLE 8 INCHES OF THE DOWEL.
10. SECURE DOWELS PARALLEL TO THE PAVEMENT SURFACE AND PERPENDICULAR TO THE JOINT WITH THE AID OF APPROVED WELDED WIRE BASKET ARRANGEMENTS. ENSURE WELDED WIRE BASKET ARRANGEMENTS DO NOT CROSS THE EXPANSION JOINT. UNIFORMLY COAT DOWELS WITH A BITUMINOUS MASTIC ON THE END WITH THE DOWEL CAP.
11. DO NOT BEND TIE BARS AND DOWEL BARS. TO PREVENT DISPLACEMENT OF WIRE FABRIC BY CONCRETE PLACEMENT, TIE THE FABRIC PANEL TOGETHER AND TIE THE INITIAL FABRIC PANELS OF EACH SLAB TO THE DOWEL BASKET OR AS DIRECTED.
12. TOOL PAVEMENT EDGES TO A RADIUS OF ⅛ IN. WITH AN APPROVED EDGING TOOL.
13. DETAILS FOR PAVEMENT WIDTH, PAVEMENT THICKNESS, AND CROWN-SLOPE ARE ELSEWHERE SHOWN ON THE PLANS.
14. THE CONTRACTOR HAS THE OPTION OF USING WELDED WIRE FABRIC OR BAR REINFORCEMENT. LOCATE THE LONGITUDINAL STEEL AT THE CENTER OF THE SLAB. TAKE NECESSARY PRECAUTIONS TO INSURE THAT THE FINAL POSITION OF STEEL IS WITHIN ½ IN. OF THE SLAB CENTER. ENSURE THE LONGITUDINAL AND TRANSVERSE STEEL SPACING DOES NOT VARY MORE THAN ONE-TWELFTH OF SPACING SHOWN.
15. LONGITUDINAL STEEL MAY BE SPLICED WITH 33 TIMES BAR DIAMETER LAPS.
16. FOR LANE WIDTHS NOT SHOWN OR FOR VARIABLE PANEL LENGTHS AND WIDTHS, SPACE REINFORCING STEEL AND DOWELS AS DIRECTED.
17. USE APPROVED BAR MAT CHAIRS. DO NOT EXCEED CHAIR SPACING OF 30 IN. C-C (TRANSVERSE) AND 48 IN. C-C (LONGITUDINAL). GALVANIZING THE CHAIRS IS NOT REQUIRED.
18. OBTAIN BOARDS FOR EXPANSION JOINT FILLER FROM REDWOOD TIMBER.
19. PROVIDE AND CONSTRUCT THE JOINT PLATE AS APPROVED.
20. WHEN CURB IS PLACED SEPARATELY FROM THE CONCRETE PAVEMENT, PROVIDE THE REINFORCING STEEL AS SHOWN IN THE CURB DETAIL. THE CURB REINFORCING STEEL MAY BE OMITTED WHEN THE CURB IS PLACED MONOLITHICALLY.

(GENERAL NOTES CONTINUED ON SHEET 2 OF 2)

Texas Department of Transportation
Houston District

JOINTED REINFORCED CONCRETE PAVEMENT DETAILS

(FOR PAVEMENT THICKNESS 10 INCHES OR LESS)

JRCP SHEET 1 OF 2

FILE: STDB-2.dgn	DN:	CK:	DW:	CK:
© TxDOT March 2004	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 5/05 2004 SPECS 7/2010 ADDED NOTE 8/2015 MODIFIED NOTES	12	6	RMC 6375-52-001	94
	COUNTY	CONTROL	SECT JOB	HIGHWAY
	HARRIS/GAL	6375	52 001	IH45

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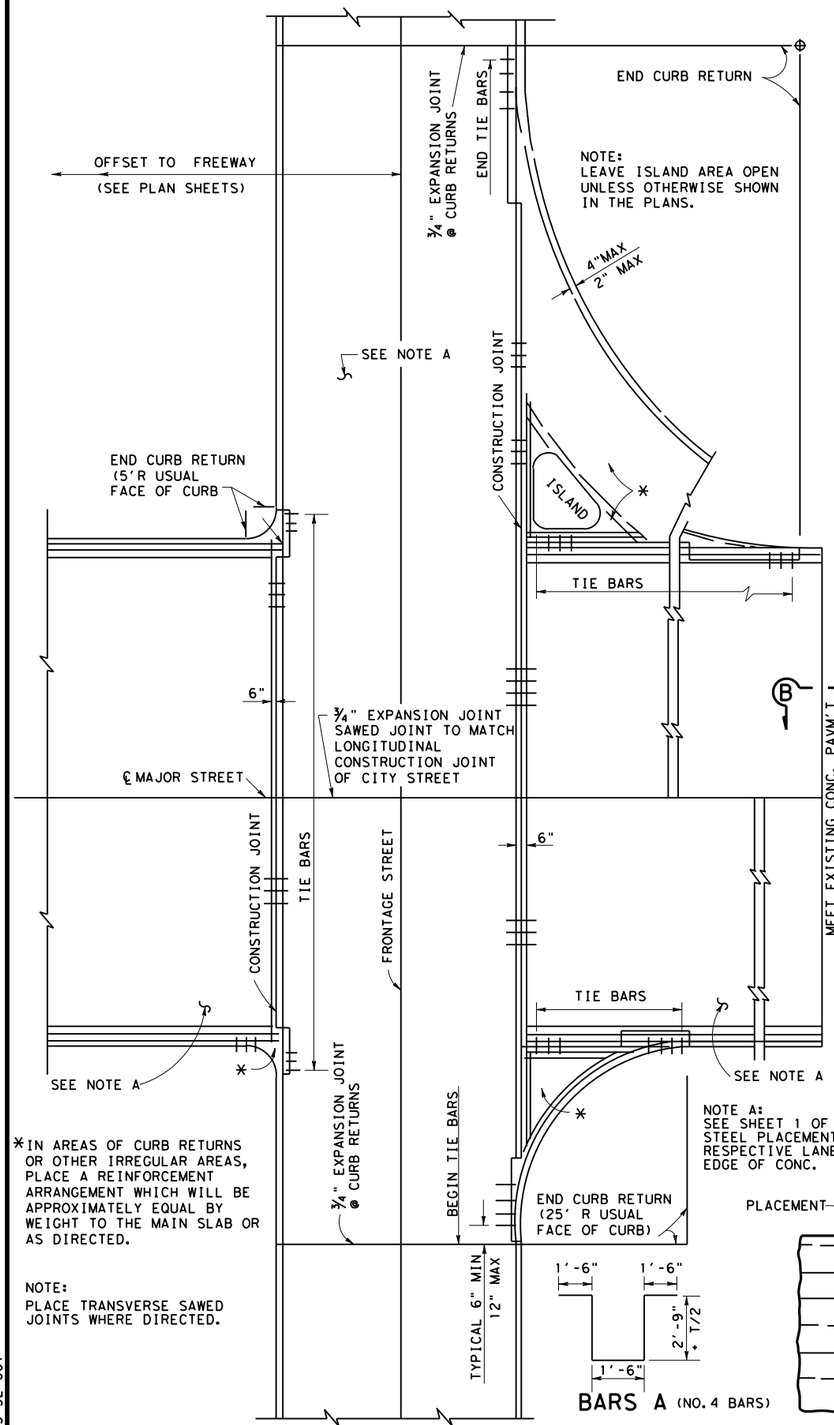
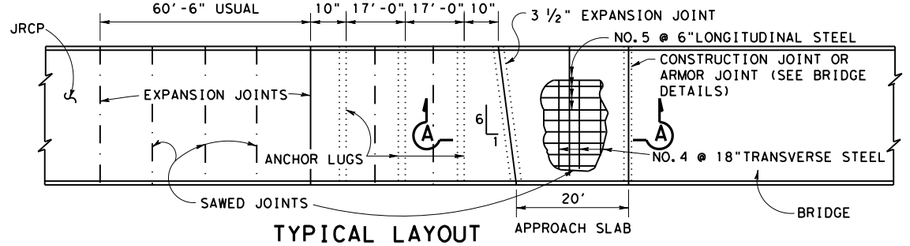
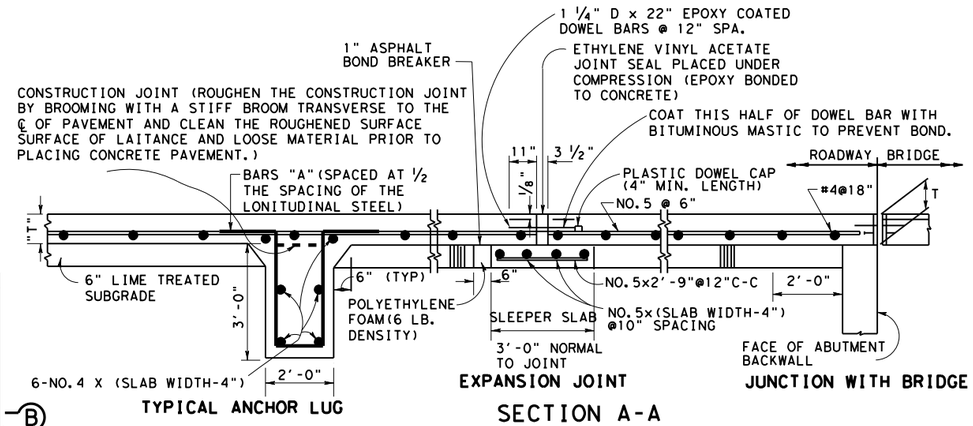
PROJECT: 6375-52-001



INTERSECTION OF MAJOR STREET WITH FRONTAGE STREET TYPICAL REINFORCING PLAN

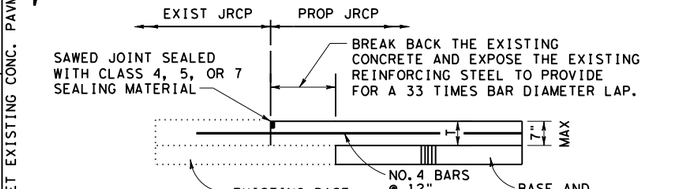


TYPICAL LAYOUT
(TERMINAL ANCHORAGE AT BRIDGES)



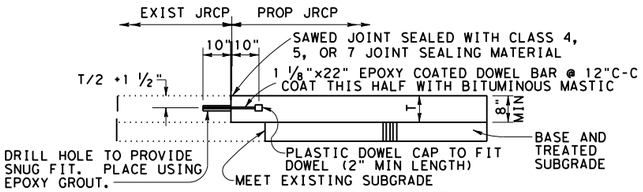
TYPICAL ANCHOR LUG | **EXPANSION JOINT** | **JUNCTION WITH BRIDGE**

SECTION A-A

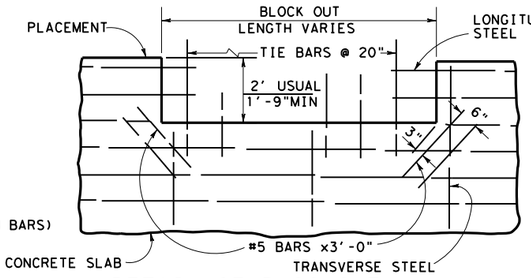


SECTION B-B
(FOR PROPOSED PAVEMENT DEPTHS OF 7" MAX)

REPLACE ANY BENT LONGITUDNIAL REINFORCING. IF THERE IS NOT SUFFICIENT EXPOSED REINFORCING TO PROVIDE A MINIMUM OF A 33 TIMES BAR DIAMETER LAP, REMOVE THE EXISTING PAVEMENT AND SUFFICIENTLY EXPOSE THE EXISTING REINFORCING TO PROVIDE A 33 TIMES BAR DIAMETER LAP. REPLACE ANY SHEAR BARS THAT ARE DISTURBED, BY DRILLING AND GROUTING AS REQUIRED BY NOTE #29. PERFORM THIS CORRECTIVE ACTION AT NO EXPENSE TO THE DEPARTMENT.

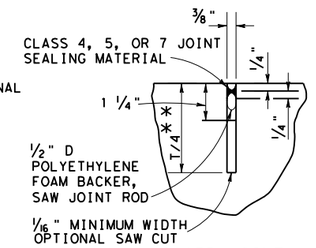


SECTION B-B
(FOR PROPOSED PAVEMENT DEPTHS OF 8" MIN)

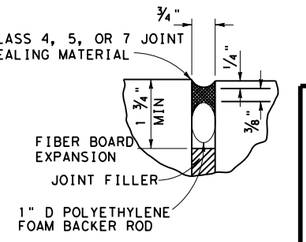


DETAIL OF BLOCKOUT

*OMIT TIE BARS @ INLET BLOCK-OUT



SAWED JOINT



EXPANSION JOINTS

** IF SILICEOUS RIVER GRAVEL IS USED AS THE COARSE AGGREGATE, THIS DEPTH IS T/3.

JOINT SEALING DETAILS

GENERAL NOTES (CONTINUED FROM SHEET 1 OF 2)

21. CONSTRUCT ANCHOR LUGS, EXPANSION JOINTS, AND SLEEPER SLABS AS DETAILED IN SECTION A-A. THESE WILL BE PAID FOR IN ACCORDANCE WITH ITEM, "CONCRETE PAVEMENT TERMINALS."
22. REINFORCING STEEL FOR TERMINAL ANCHOR SYSTEMS MAY BE GRADE 40 OR GRADE 60.
23. PLACE CONCRETE FOR ANCHOR LUGS AS SOON AS POSSIBLE AFTER COMPLETING EXCAVATION, TO PRESERVE THE INHERENT SOIL CHARACTERISTICS. EXCAVATING FOR AND PLACING CONCRETE FOR ANCHOR SYSTEM MAY BE IN PREFORMED SECTIONS CORRESPONDING TO THE WIDTH OF PAVING PLACEMENT.
24. APPLY A STEEL TROWEL FINISH TO SLEEPER SLABS AND AND COAT WITH AN ASPHALT BOND BREAKER.
25. THE DETAILS FOR ANCHORS, LUGS, EXPANSION JOINTS, AND SLEEPER SLABS ARE NOT APPLICABLE UNLESS SHOWN ELSEWHERE IN THE PLANS.
26. APPROACH SLAB WILL BE PAID FOR IN ACCORDANCE WITH THE ITEM "CONCRETE STRUCTURES."
27. WITHIN 5 MINUTES OF SAWING, COMPLETELY REMOVE THE RESULTING SLURRY FROM THE JOINT BY FLUSHING WITH HIGH PRESSURE WATER. THEN ALLOW THE JOINT TO DRY FOR A MINIMUM OF 48 HOURS BEFORE SANDBLASTING THE JOINT.
28. DO NOT SHEAR CUT DOWEL BARS.
29. SIZE ADDITIONAL SHEAR BARS AS LONGITUDIAL BARS AND SPACE THEM MIDWAY BETWEEN ALTERNATE LONGITUDINAL BARS ALONG THE TRANSVERSE CONSTRUCTION JOINT FORMED AT THE LEAVE-OUT.
30. IF THE CONCRETE DESIGN REQUIRES GREATER THAN 5.5 SACKS OF CEMENTITIOUS MATERIAL PER CUBIC YARD, WRITTEN APPROVAL BY THE AREA ENGINEER WILL BE REQUIRED. ENSURE CONCRETE PAVEMENT MIXES PLACED FROM APRIL 1 TO OCTOBER 31 CONTAIN A MINIMUM OF 25 PERCENT BY WEIGHT OF CLASS "F" FLY ASH.
31. IN LOCATIONS WHERE THE PLANS CALL FOR FAST TRACK CONCRETE PAVEMENT IN LIEU OF JRCP (LAID ON COMPACTED OR STABILIZED SUBGRADE), USE DETAILS IN THIS STANDARD IN CONJUNCTION WITH THE APPROPRIATE FAST TRACK CONCRETE SPECIFICATION. IF THE JRCP IS LAID UPON A BASE STRUCTURE, ADD 3" TO THE FAST TRACK PAVEMENT THICKNESS TO COMPENSATE FOR THE BASE.

Texas Department of Transportation
Houston District

JOINTED REINFORCED CONCRETE PAVEMENT DETAILS
EXPANSION JOINT DESIGN
(FOR PAVEMENT THICKNESS 10 INCHES OR LESS)

JRCP — SHEET 2 OF 2

FILE: STDB-2.dgn	DN:	CK:	DW:	CK:
© TxDOT March 2004	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 5/05 2004 SPECS 7/2010 ADDED NOTE 9/2013 ADDED NOTE 8/2015 MODIFIED NOTES	12	6	RMC 6375-52-001	95
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	HARRIS/GAL	6375	52	001	IH45

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PROJECT: 6375-52-001

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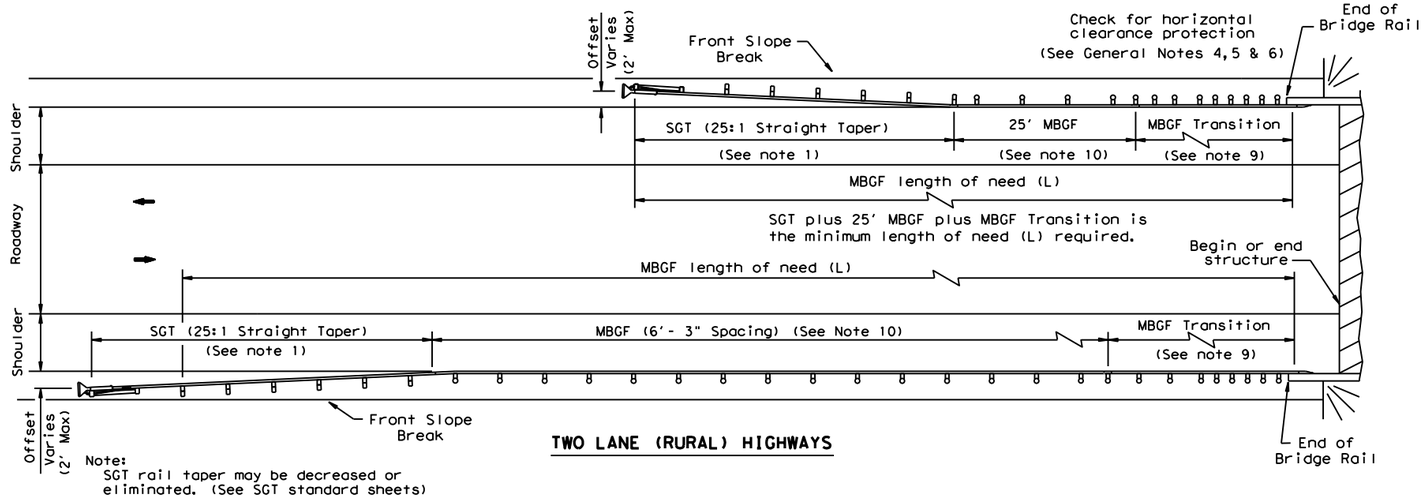
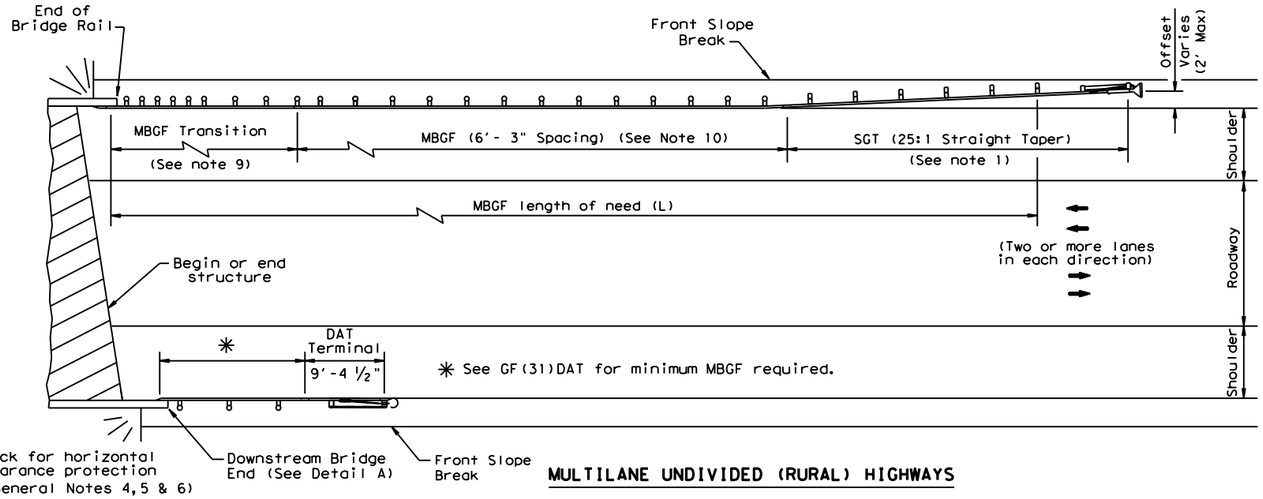
PROJECT: 6375-52-001

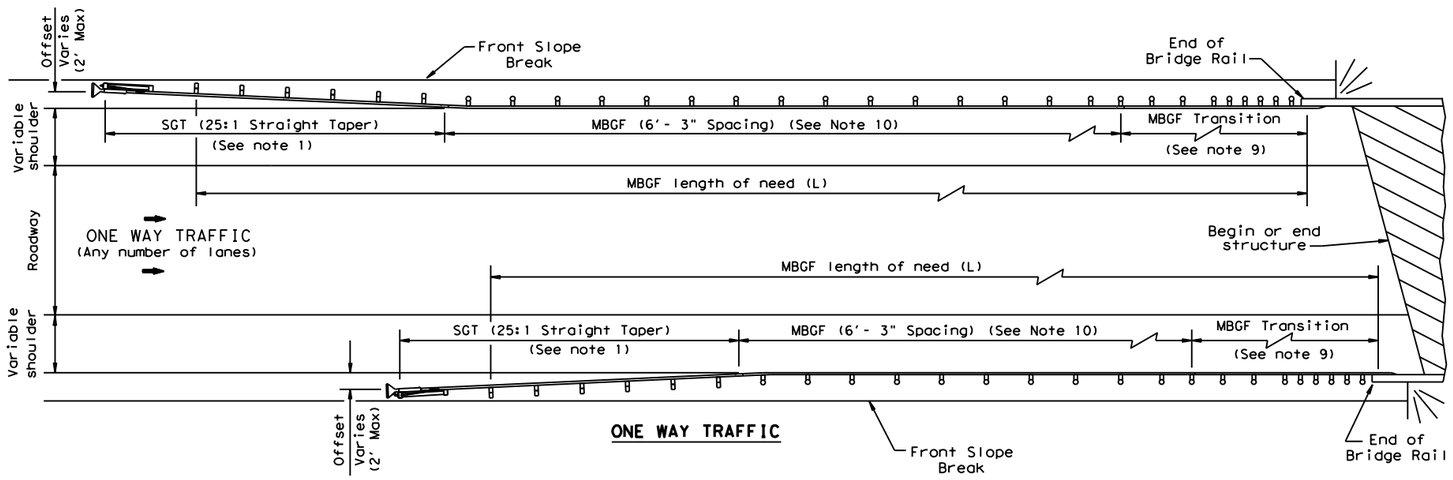


TWO LANE (RURAL) HIGHWAYS

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



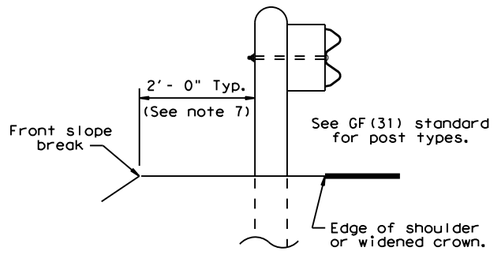
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



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. <u>For restrictive bridge widths:</u> 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

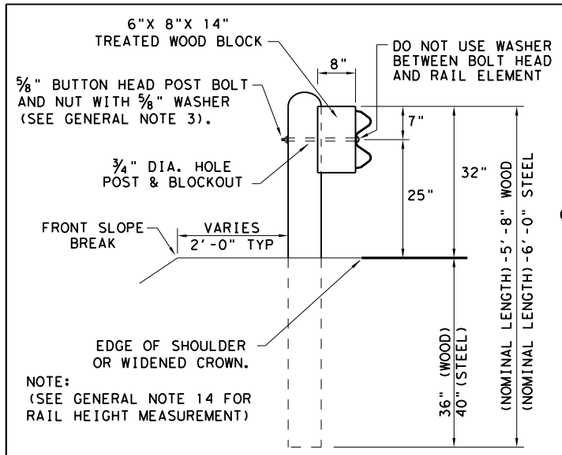
BRIDGE END DETAILS

(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

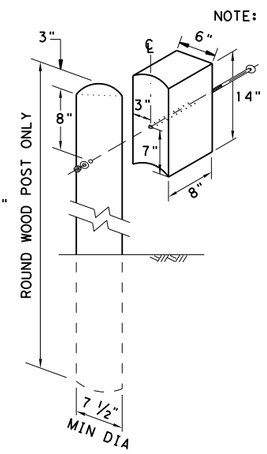
BED-14

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
© TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
REVISED APRIL 2014 SEE (MEMO 0414)	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		96

FILE: h:\00maintenance\south harris maintenance\20265\sheets\gf3119.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001

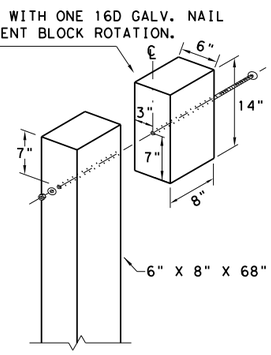


TYPICAL POST PLACEMENT

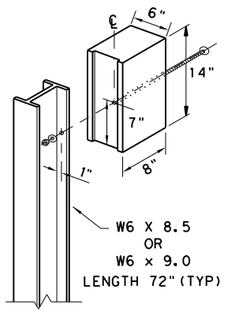


WOOD BLOCK TO ROUND WOOD POST

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

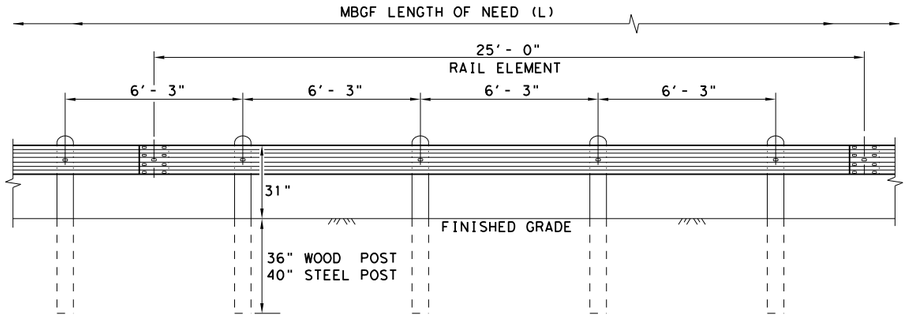


WOOD BLOCK TO RECTANGULAR WOOD POST



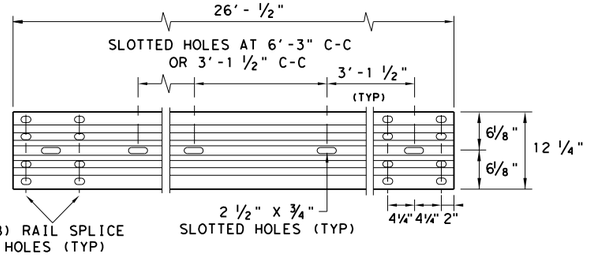
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



ELEVATION
MID-SPAN RAIL SPLICE

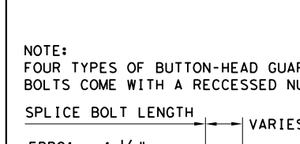
SHOWING A 25'- 0" SECTION OF W-BEAM RAIL. (SEE GENERAL NOTE 2)



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

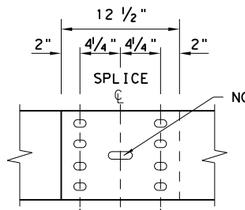
NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES.
SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.

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



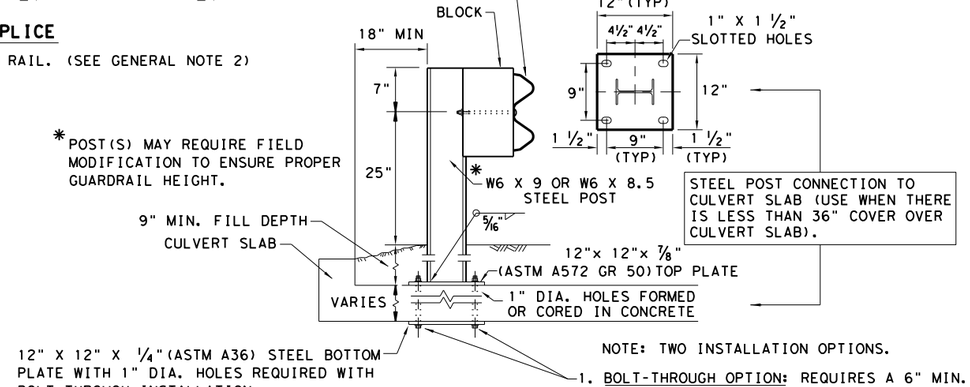
BUTTON HEAD BOLT

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.



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.

GENERAL NOTES

1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'- 0", OR 12'- 6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'-1 ½" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE DOWNSTREAM ANCHOR TERMINAL (DAT) AND THE TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
5. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
6. THE LATERAL APPROACH TO THE GUARD FENCE, SHALL HAVE A MAXIMUM SLOPE OF 1V:10H.
7. IF SHOWN ELSEWHERE IN THE PLANS OR AS DIRECTED BY THE ENGINEER, THE GUARD FENCE MAY BE FLARED AT A RATE OF 25:1 OR FLATTER.
8. UNLESS OTHERWISE SHOWN IN THE PLANS, GUARD FENCE PLACED IN THE VICINITY OF CURBS SHALL BE POSITIONED SO THAT THE FACE OF CURB IS LOCATED DIRECTLY BELOW OR BEHIND THE FACE OF THE RAIL. RAIL PLACED OVER CURBS SHALL BE INSTALLED SO THAT THE POST BOLT IS LOCATED APPROXIMATELY 25 INCHES ABOVE THE GUTTER PAN OR EDGE OF SHOULDER.
9. APPLICATIONS IN SOLID ROCK ARE ONLY ALLOWED WITH STEEL POSTS. IF SOLID ROCK IS ENCOUNTERED WITHIN 0 TO 18" OF THE FINISHED GRADE, DRILL A 24" DIA. HOLE, 24" INTO THE ROCK. IF SOLID ROCK IS ENCOUNTERED BELOW 18", DRILL A 12" DIA. HOLE, 12" INTO THE ROCK OR TO THE STANDARD EMBEDMENT DEPTH, WHICHEVER MAYBE LESS. ANY EXCESS POST LENGTH, AFTER MEETING THESE DEPTHS, MAY BE FIELD CUT TO ENSURE PROPER GUARDRAIL MOUNTING HEIGHT. BACKFILL WITH COARSE AGGREGATE MATERIAL.
10. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
11. SPECIAL FABRICATION WILL BE REQUIRED AT INSTALLATION LOCATIONS HAVING A CURVATURE OF LESS THAN 150 FT. RADIUS.
12. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. THE CONSTRUCTION DIVISION, TXDOT MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210 ONLY PRODUCERS ON THE MPL MAY FURNISH COMPOSITE MATERIAL BLOCKS.
13.

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE
TL-3 MASH COMPLIANT
GF(31)-19

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REVISIONS	6375	52	001	IH45
	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		97

FILE: h:\00maintenance\south harris maintenance\gf31dat19.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001

BREAKAWAY CABLE TERMINAL (BCT) CABLE ANCHOR ASSEMBLY WITH CABLE BRACKET, BEARING PLATE AND STANDARD HARDWARE.

C3 X 5 X 80" (3) GROUND STRUTS

7 ¼" x 5 ¼" x 46" (2) DAT TERMINAL POST

NON-SYMMETRICAL TRANSITION RAIL SECTION (SEE APPLICABLE TRANSITION STANDARD)

(11) (15) (17)

(5) SHELF ANGLE BRACKET (SEE NOTE 2)

(8) (14) (17) (11)

PLAN VIEW

END PAYMENT FOR DAT SYSTEM (EA.)

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

DIRECTION OF TRAFFIC

(4) 9'- 4 ½" Rail Section (SEE GENERAL NOTE 2)

12'-6" (Min.) MBGF

PAYMENT FOR NON-SYMMETRICAL TRANSITION RAIL (EA)

(9) (ROUNDED) W-BEAM END SECTION

6'- 3" | 3'-1 ½" | 3'-1 ½" | BEGIN LENGTH OF NEED (LON)

(11) (12)

(7) BCT POST SLEEVE 2" x 5 ½" (SCH 40 GALV. PIPE)

(11) (13) (17)

31"

* 68 ¼" (MIN.) TUBE EMBEDMENT

(11) (16) (17)

To properly install and maintain the anchor system, a 3 ¼" (±) ½" tube projection is required above the finished grade.

FINISHED GRADE

FINISHED GRADE

(10) (8)

BCT CABLE ANCHOR AND ANCHOR BRACKET WITH HARDWARE

(1) STEEL FOUNDATION TUBES WITH HARDWARE (1)

ELEVATION VIEW

(SEE NOTE 1)

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 ¾" 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 ¼" BUTTON HEAD BOLT	4
(13)	10" BUTTON HEAD BOLT	2
(14)	⅝" X 2" HEX HEAD BOLT	8
(15)	⅝" X 8" HEX HEAD BOLT	4
(16)	⅝" X 10" HEX HEAD BOLT	2
(17)	⅝" FLAT WASHER	18

10'- 4 ¾" | 9'- 4 ½" | 4'- 1" | 12" | 3'- 1 ½"

3 SPACES AT 4"

(4) TERMINAL RAIL ELEMENT FOR DAT

80" | 3" | 1½" | 2 ½" | ¾" X 2" SLOTS (TYP) | 2 ½"

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

WELD END PLATE TO BRACKET | 3" | ¼" | THREE SIDES 5½"

2" | 4" | 4" | 4" | 2" | 16" | ¾" DIA. HOLES | BENT PLATE 16" x 12 ½" x ⅜"

BRACKET | END PLATE | ⅜" | 1⅝" | 2¾" | 3⅜" | 2⅜" | 35° | 2.5" (TYP) | 1¾" | 2" | ⅜"

(8) GUARDRAIL ANCHOR BRACKET

3" MIN | SPLICE BOLT SLOT (TYP) 1" x 1⅜" | 6 ¼" R | 30° | 12" | 16" | 2" | 8 ½" | 7 ½"

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

8" (TYP) | 4" | 2-NAILS | 5" TO TOP OF PLATE | 8" | 1 ⅛" DIA

NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

(6) BEARING PLATE
8"x 8"x ⅝" ℄

3" | 1½" | 1" DIA. HOLE | 2¾" | ⅜" | 1⅜"

END PLATE

6" | 3" | 1⅜" | 7½" | ¼" | ¾" x 1" SLOTS (TYP) | 1 ½"

(5) SHELF ANGLE BRACKET

5 ¼" | 7" | ⅞" DIA. HOLES | 31 ½"

SIDE VIEW

7 ¼" | 28 ½" | 46" | 2 ½" DIA. HOLE

FRONT VIEW

(2) TERMINAL POST
7 ¼"x 5 ¼"x 46" WOOD POST

6" | 1" | 17" | ⅞" DIA. HOLES | 72"

SIDE VIEW

8" | FRONT VIEW

(1) STEEL FOUNDATION TUBE
6"x 8"x ⅛" 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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FILE: h:\00maintenance\south harris maintenance\GF31LS19.dgn
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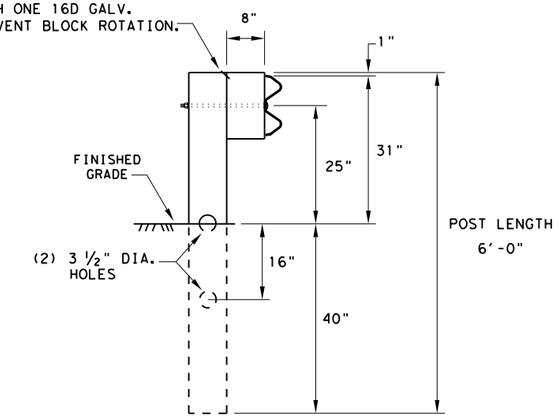
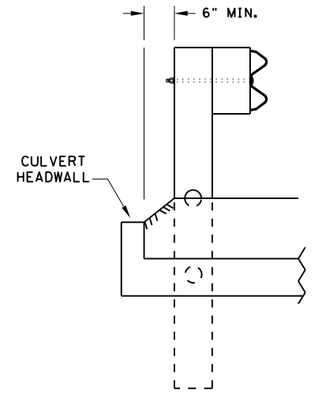
PROJECT: 6375-52-001

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



RECTANGULAR CRT POST (6"X 8" X 6' LONG)

(6) CRT REQUIRED
SEE ELEVATION DETAIL FOR LOCATIONS



LATERAL OFFSET BETWEEN THE GUARDRAIL AND THE CULVERT HEADWALL

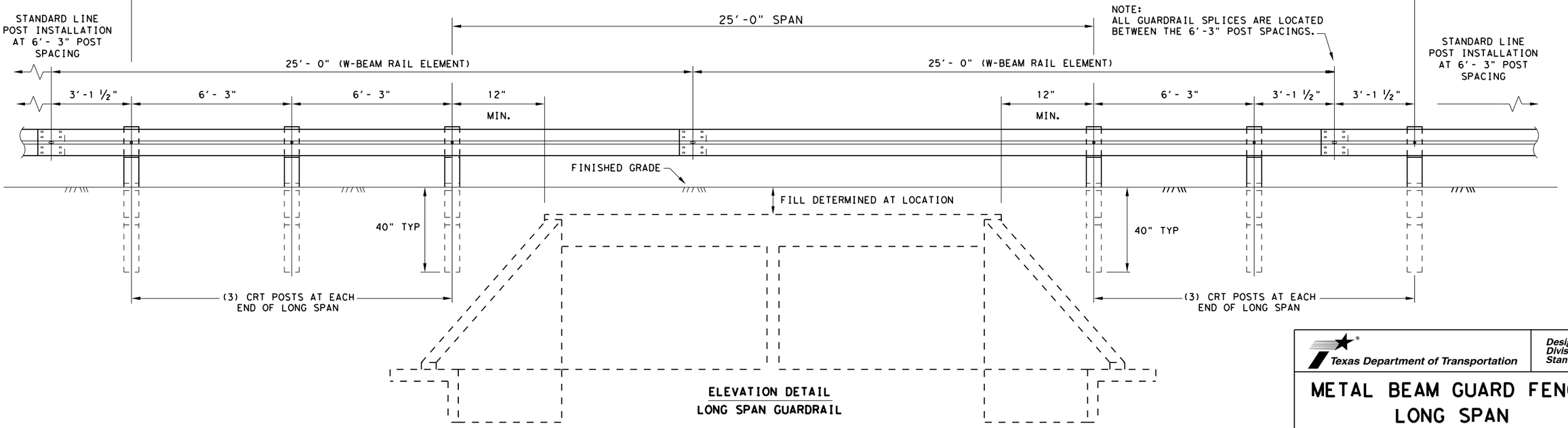
GENERAL NOTES

1. THE TYPE OF LINE POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF THE TRANSITIONS SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENT SHALL MEET ALL REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 12'- 6" OR 25'- 0" NOMINAL LENGTHS.
3. RAIL POST HOLES ARE OFFSET 3'- 1 ½" FROM STANDARD GUARDRAIL TO ACCOMMODATE THE MIDSPAN SPLICING.
4. 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 NO MORE THAN 1" BEYOND IT.
5. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
7. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
8. REFER TO GF(31) STANDARD SHEET FOR ADDITIONAL DETAILS.
9. FLAME CUTTING OF HOLES IN GUARDRAIL SHALL NOT BE PERMITTED. IF YOU ENCOUNTER MIS-ALIGNED BOLT HOLES IN GUARDRAIL CONTACT THE DESIGN DIVISION FOR ADDITIONAL INFORMATION & OPTIONS.

NOTE: SEE GF(31) STANDARD FOR STANDARD LINE POSTS.

DIRECTION OF TRAFFIC

GF(31) - LONG SPAN SYSTEM (PAID FOR BY THE EACH)



ELEVATION DETAIL
LONG SPAN GUARDRAIL

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE LONG SPAN TL-3 MASH COMPLIANT

GF(31)LS-19

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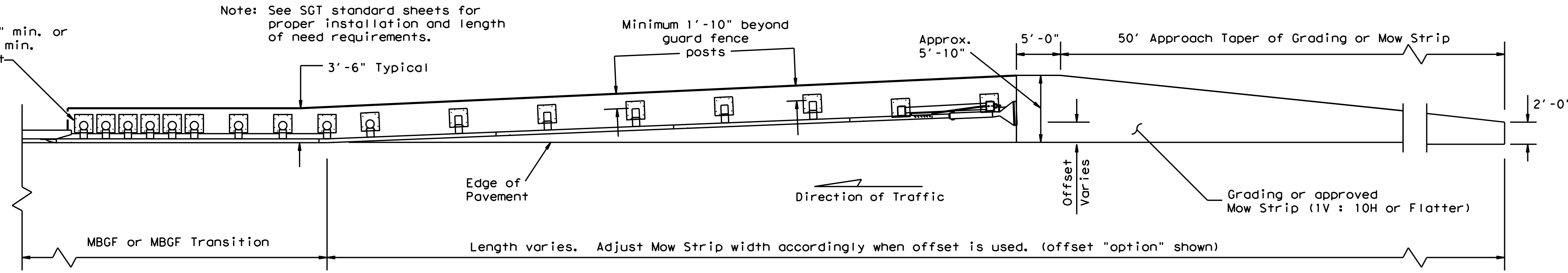
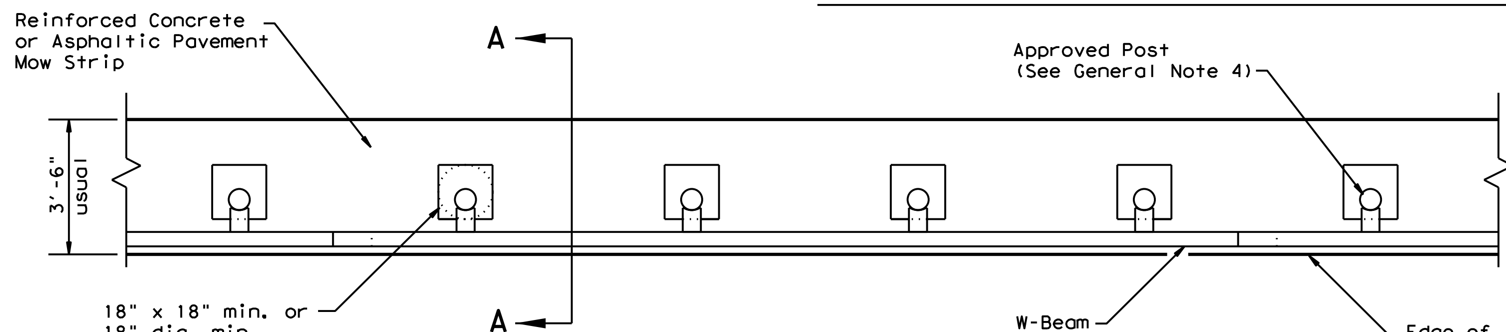


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS

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.

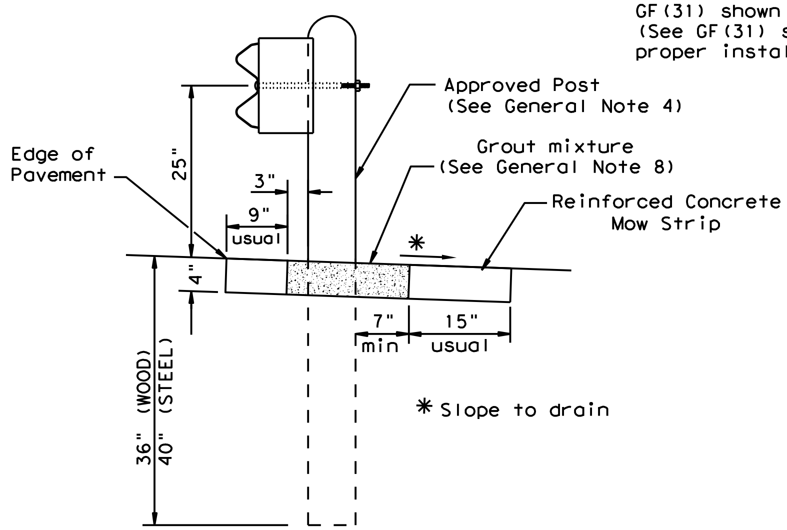


PLAN

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

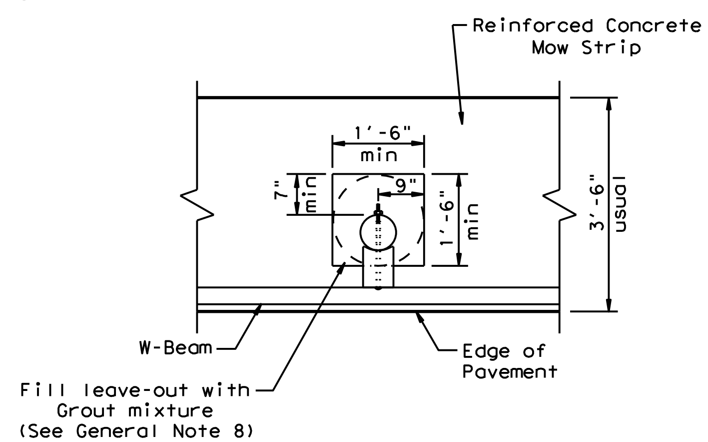
GENERAL NOTES

1. This mow strip design is for use with metal beam guard fence, guard fence transitions, and guard fence end treatments. See applicable GF(31) MBGF or GF(31) Transition Standard sheet for additional information.
2. Mow strips shall be reinforced concrete with (wire mesh or synthetic fiber), as shown on the plans and will be paid for under the pertinent bid item. Reinforced concrete shall be placed in accordance with Item 432, "Riprap." The use of the synthetic fiber in lieu of steel reinforcing is acceptable, provided the fiber producer is on the Department Material Producer List (MPL), maintained by TxDOT, Construction Division.
3. The leave-out behind the post shall be a minimum of 7".
4. Only steel (W6 x 8.5 or W6 x 9.0), or 7 ½" Dia. round wood posts are acceptable for use in the mow strip. See GF(31) Standard for additional details.
5. Other curb placement options may be used. Curbs are not considered part of the mow strip and will be paid for under other pertinent bid item.
6. Thickness of the mow strip will be 4".
7. The limits of payment for reinforced concrete will include leave-outs for the posts.
8. The leave-outs shall be filled with a Grout mixture consisting of: 2719 pounds sand, 188 pounds Type 1 or II cement, and 550 pounds of water per cubic yard, with a 28-day compressive strength of approximately 230 psi or less. Provide grout with a consistency that will flow into and completely fill all voids. Due to auger size, larger leave-out dimensions are acceptable from both an impact performance and maintenance repair standpoint (Suggested Maximum leave-out of 20"). Payment for furnishing and placing the grout mixture will be subsidiary to the pay item of riprap mow strip.



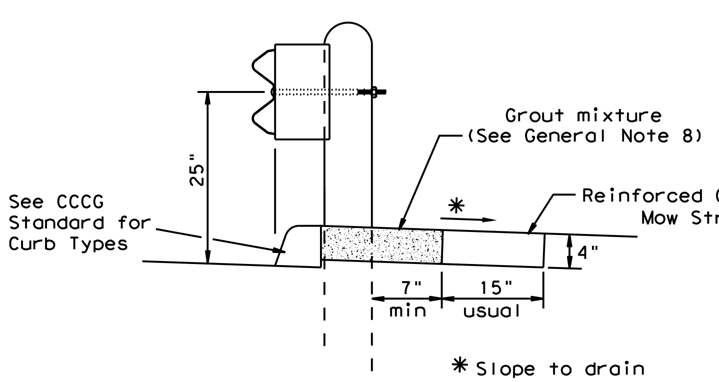
SECTION A-A

Typical



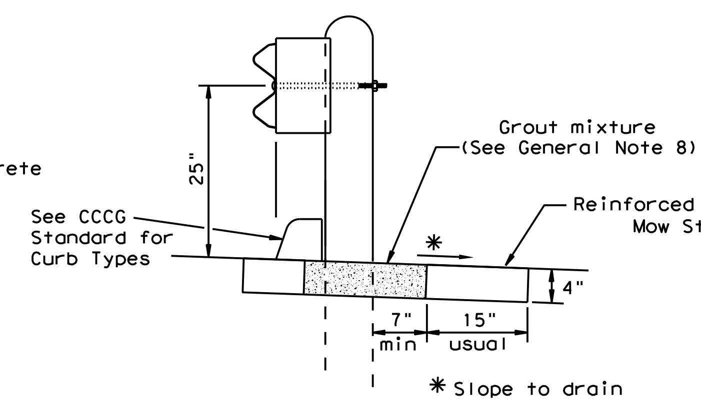
MOW STRIP DETAIL

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



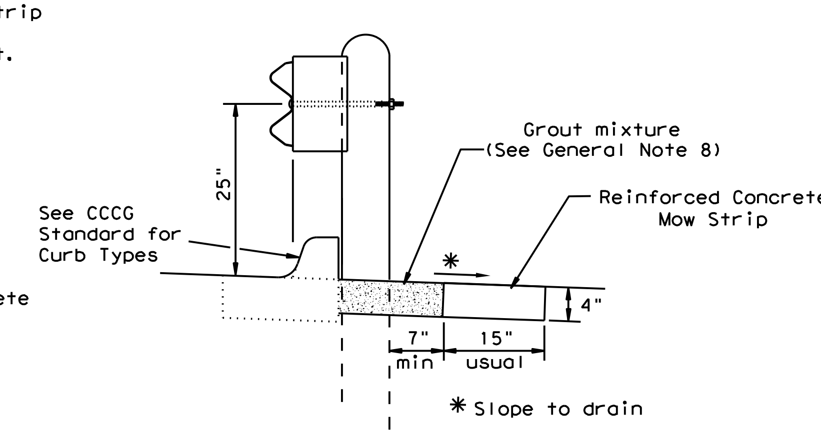
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

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METAL BEAM GUARD FENCE (MOW STRIP) TL-3 MASH COMPLIANT

GF(31)MS-19

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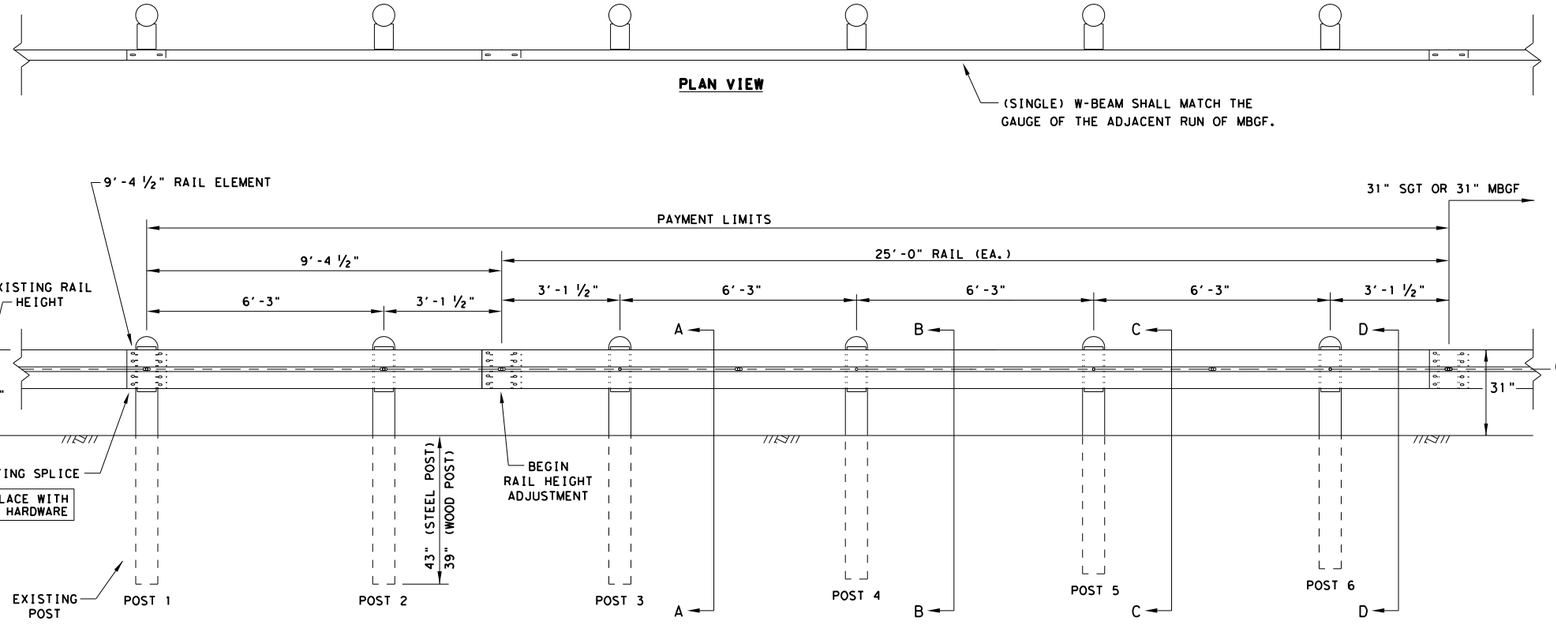
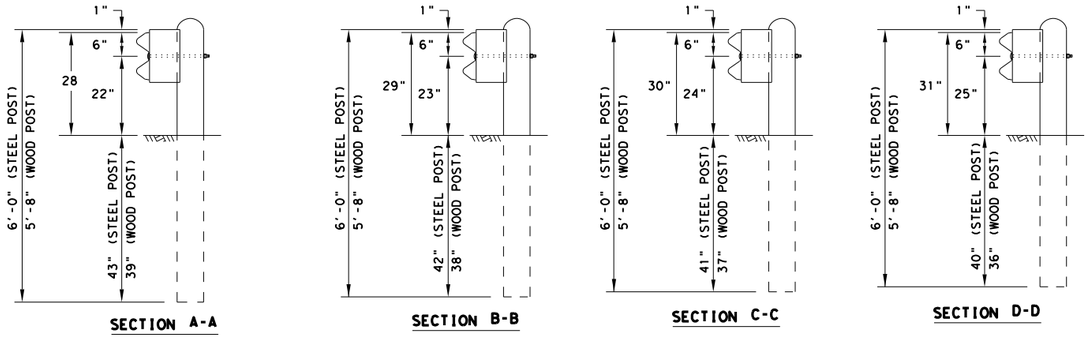
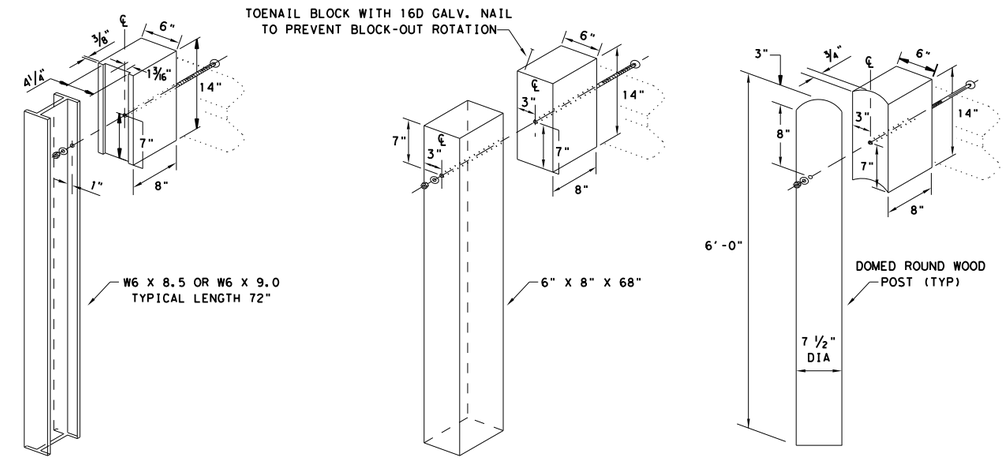
PROJECT: 6375-52-001



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





POST AND BLOCK-OUT TYPES AVAILABLE

FOR WOOD POST

FOR STEEL POST

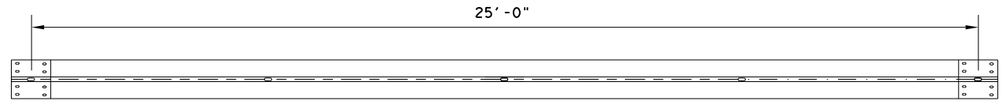
HARDWARE LIST	
QTY	DESCRIPTION
1	9'-4 ½" W-BEAM RAIL ELEMENT 12GA.
1	25'-0" W-BEAM RAIL ELEMENT 12GA. (TYP)
6	7 ½" DIA X 6'-0" DOMED ROUND WOOD POSTS (TYP)
6	6" X 8" X 68" RECTANGULAR WOOD POSTS (TYP)
6	W6 X 8.5 OR W6 X 9 X 72" STEEL POSTS (TYP)
6	6" X 8" X 14" WOOD BLOCKS OR COMPOSITE (TYP)
6	⅝" X 18" GUARDRAIL BOLTS WITH NUTS (FBB04)
6	⅝" ROUND WASHERS (ASTM F436) (FWC16a)
6	⅝" X 10" GUARDRAIL BOLTS WITH NUTS (FBB03)
24	⅝" X 1- ¼" GUARDRAIL SPLICE BOLTS WITH DOUBLE RECESSED NUTS (ASTM A563) (FBB01)

NOTE: HARDWARE SHALL MEET THE FOLLOWING REQUIREMENTS.

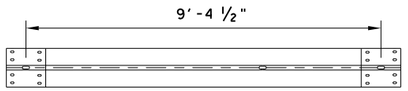
GUARDRAIL POST BOLTS (ASTM A307 GR.A)
GUARDRAIL ROUND WASHERS (ASTM F436)
GUARDRAIL DOUBLE RECESSED NUTS (ASTM A563)
GUARDRAIL SPLICE BOLTS (ASTM A307 GR.A)
GUARDRAIL SPLICE NUTS (ASTM A563)

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 AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENT SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'-0", OR 12'-6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'-1 ½" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST" BOLTS (ASTM A307) SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT (ASTM A563) AND ⅝" ROUND WASHER (ASTM F436) AND NOT MORE THAN 1" BEYOND IT. BUTTON HEAD "SPLICE" BOLTS (ASTM A307) ARE ⅝" X 1-¼" WITH ⅝" NUTS (ASTM A563).
4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM REQUIRING CONSTRUCTION OF THE TRANSITION.
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. APPLICATIONS IN SOLID ROCK ARE ONLY ALLOWED WITH STEEL POSTS. SEE GF(31) STANDARD FOR INSTALLATION GUIDANCE.
9. POSTS SHALL NOT BE SET IN CONCRETE.
10. 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.
11. REFER TO STANDARD GF(31) FOR ADDITIONAL DETAILS.
12. RAIL HEIGHT ADJUSTMENT IS ASSESSED AT TL-3 MASH COMPLIANT FOR STEEL POST HEIGHT TRANSITION TO 28" STEEL POST GUARDRAIL.



25'-0" (NOM.) W-BEAM RAIL ELEMENT



9'-4 ½" (NOM.) W-BEAM RAIL ELEMENT

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE RAIL HEIGHT ADJUSTMENT (28" TO 31") TL-3 MASH COMPLIANT RAIL-ADJ(A)-19

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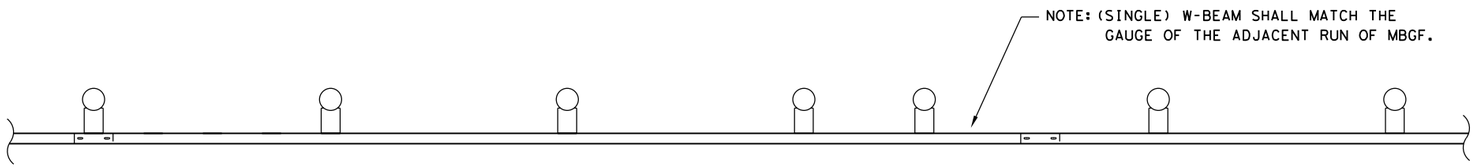
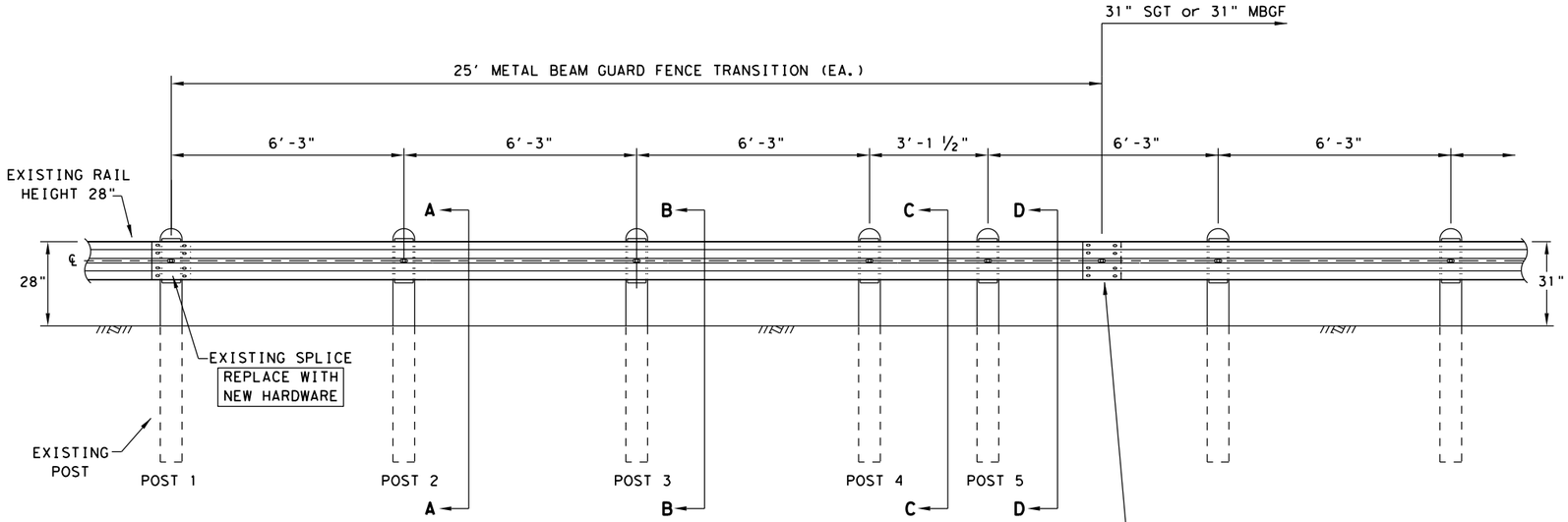
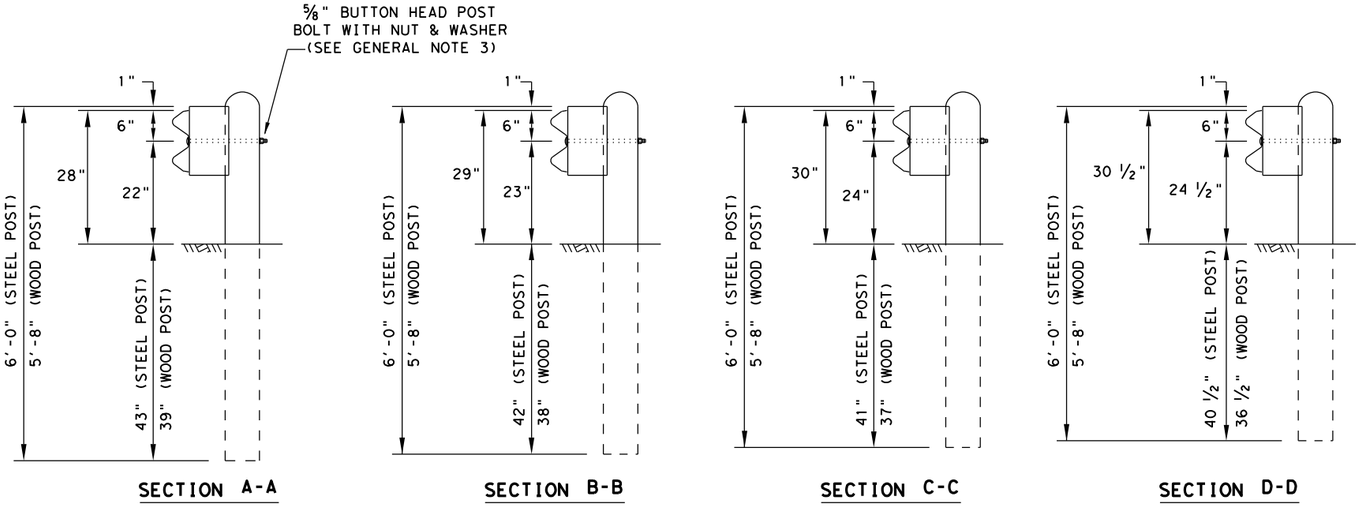


PLAN VIEW



ELEVATION VIEW

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



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 AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENT SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'- 0", OR 12'- 6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'- 1 1/2" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST" BOLTS (ASTM A307) SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT (ASTM A563) AND 5/8" ROUND WASHER (ASTM F436) AND NOT MORE THAN 1" BEYOND IT. BUTTON HEAD "SPLICE" BOLTS (ASTM A307) ARE 5/8" X 1- 1/4" WITH 5/8" NUTS (ASTM A563).
4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM REQUIRING CONSTRUCTION OF THE TRANSITION.
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. APPLICATIONS IN SOLID ROCK ARE ONLY ALLOWED WITH STEEL POSTS. SEE GF(31) STANDARD FOR INSTALLATION GUIDANCE.
9. POSTS SHALL NOT BE SET IN CONCRETE.
10. 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.
11. REFER TO STANDARD GF(31) FOR ADDITIONAL DETAILS.
12. RAIL HEIGHT ADJUSTMENT IS ASSESSED AT TL-3 MASH COMPLIANT FOR STEEL POST HEIGHT TRANSITION TO 28" STEEL POST GUARDRAIL.

POST AND BLOCK-OUT TYPES AVAILABLE

HARDWARE LIST	
QTY	DESCRIPTION
1	25'-0" W-BEAM RAIL ELEMENT 12GA. (TYP)
5	7 1/2" DIA X 6'-0" DOMED ROUND WOOD POSTS (TYP)
5	6" X 8" X 68" RECTANGULAR WOOD POSTS (TYP)
5	W6 X 8.5 OR W6 X 9 X 72" STEEL POSTS (TYP)
5	6" X 8" X 14" WOOD BLOCKS OR COMPOSITE (TYP)
FOR WOOD POST — 5	5/8" X 18" GUARDRAIL BOLTS AND NUTS (FBB04)
5	5/8" ROUND WASHERS (ASTM F436) (FWC16a)
FOR STEEL POST — 5	5/8" X 10" GUARDRAIL BOLTS AND NUTS (FBB03)
16	5/8" X 1- 1/4" GUARDRAIL SPLICE BOLTS WITH DOUBLE RECESSED NUTS (ASTM A563) (FBB01)

NOTE: HARDWARE SHALL MEET THE FOLLOWING REQUIREMENTS.

GUARDRAIL POST BOLTS (ASTM A307 GR.A)
GUARDRAIL ROUND WASHERS (ASTM F436)
GUARDRAIL DOUBLE RECESSED NUTS (ASTM A563)
GUARDRAIL SPLICE BOLTS (ASTM A307 GR.A)
GUARDRAIL SPLICE NUTS (ASTM A563)

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE RAIL HEIGHT ADJUSTMENT (28" TO 31") TL-3 MASH COMPLIANT

RAIL-ADJ(B)-19

FILE: railadjb19	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY	
REVISIONS	6375	52	001	IH45	
	DIST	COUNTY		SHEET NO.	
	HOU	HARRIS/GAL		102	

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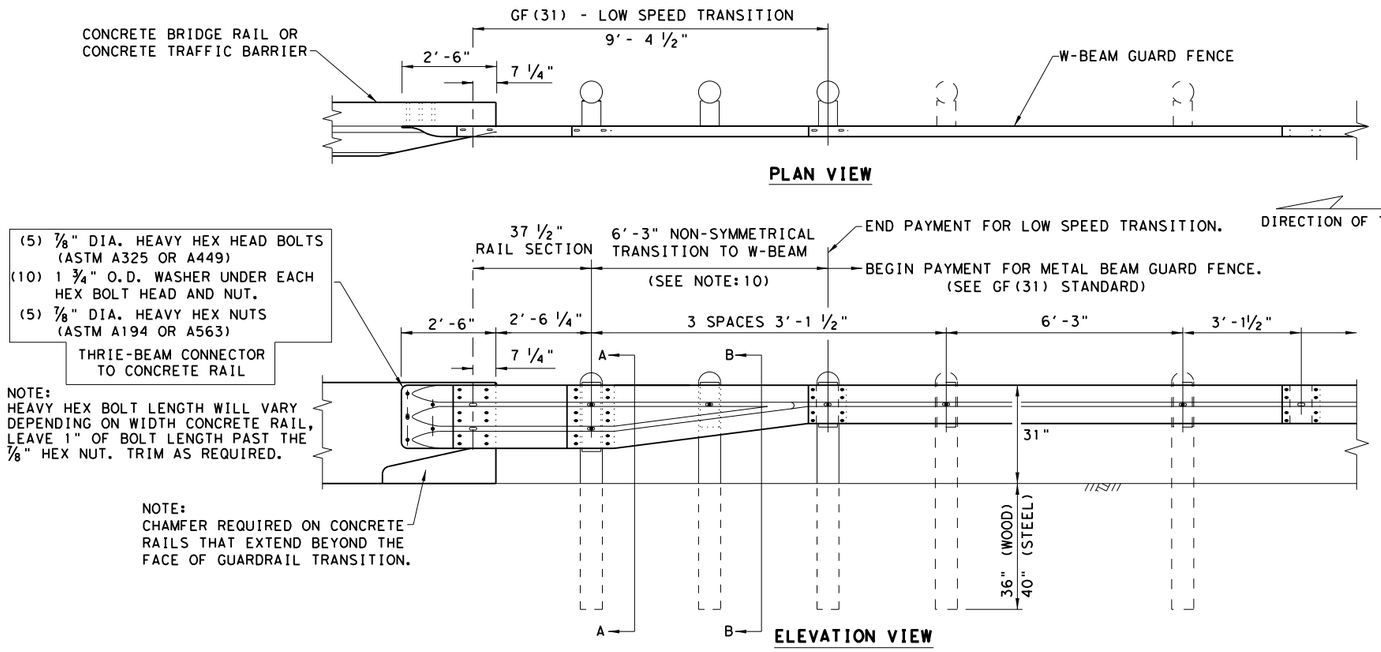
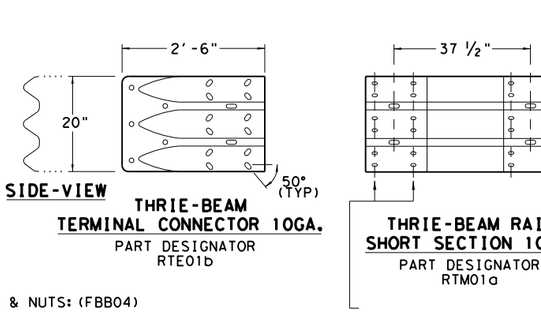
DATE: 1/4/2021
PROJECT: 6375-52-001



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 TRANSITIONS SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. REFER TO GF(31)STANDARD SHEET.
2. RAIL ELEMENT SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS.
3. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM REQUIRING CONSTRUCTION OF THE TRANSITION.
4. 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 BOLT LENGTH TO MEET REQUIRED LENGTH.
5. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
6. CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
7. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
8. 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 CAN FURNISH COMPOSITE MATERIAL BLOCKS.
9. REFER TO GF(31)STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
10. FOR ROUND WOOD POSTS SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 ½" DIA. MINIMUM THROUGHOUT THE TRANSITION.



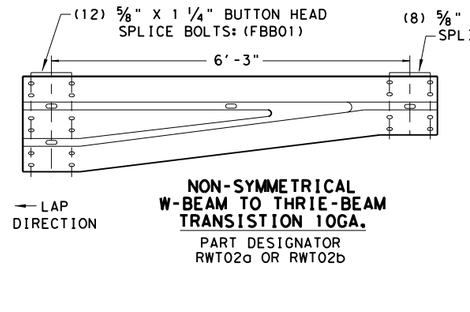
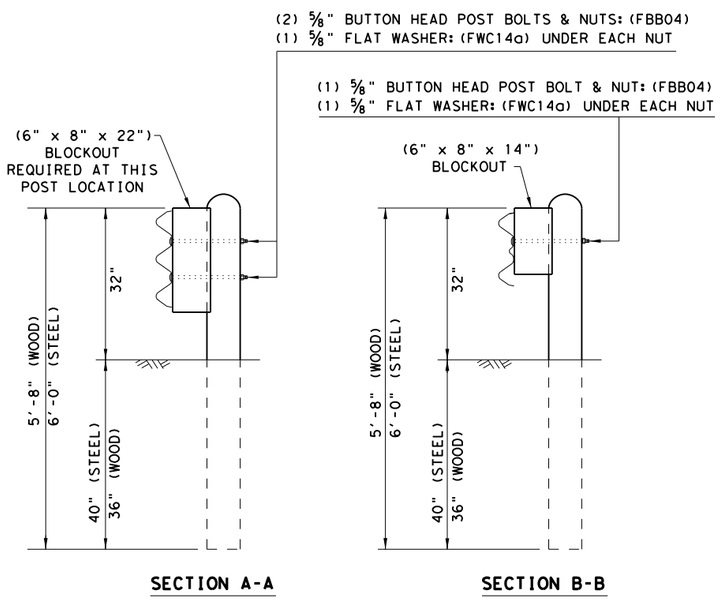
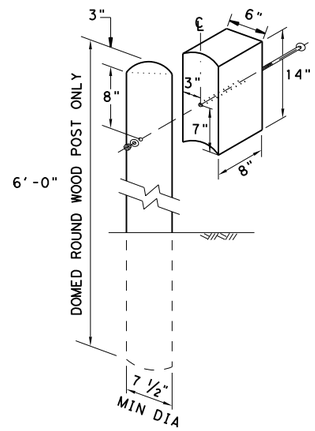
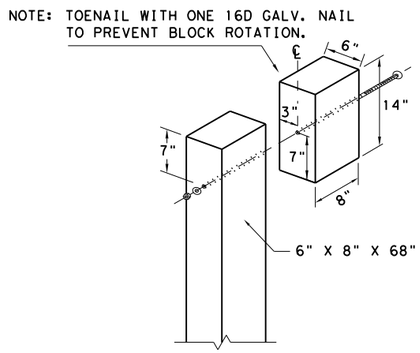


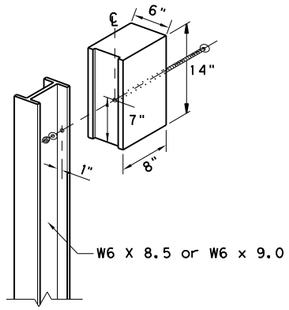
PLATE WASHER INSTRUCTIONS

BRIDGE APPROACH - UPSTREAM: THE SHORT 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.









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

LOW-SPEED TRANSITION

Texas Department of Transportation | Design Division Standard

METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-2 MASH COMPLIANT

GF(31)TR TL2-19

FILE: gf31tr1219.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY	
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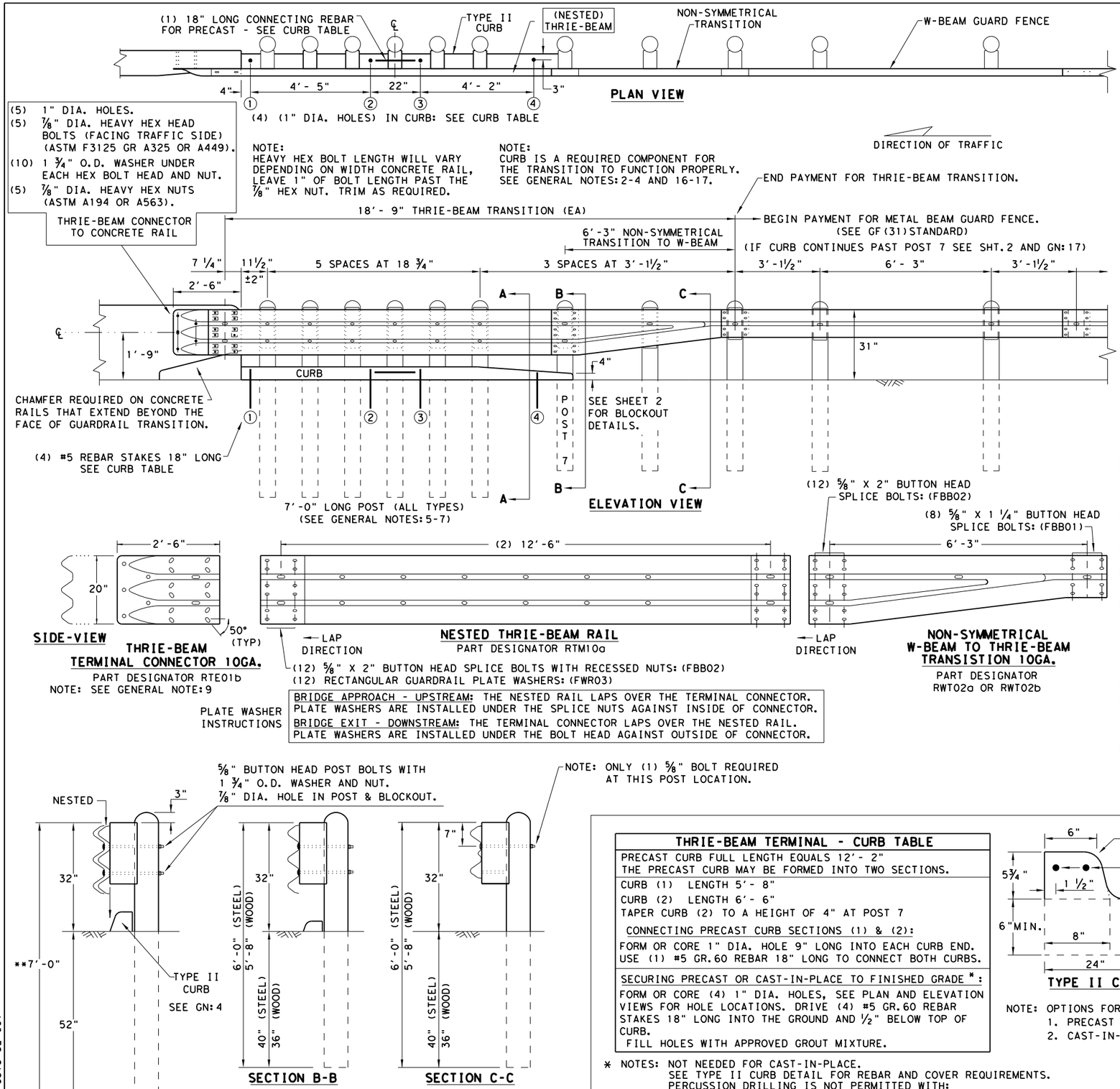
DATE: 1/4/2021
PROJECT: 6375-52-001



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.

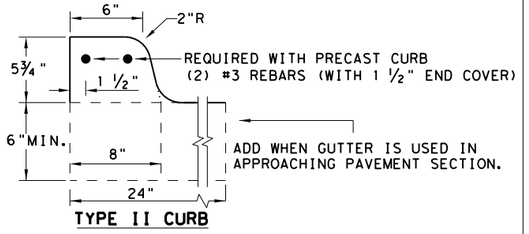
THRIE-BEAM TERMINAL - CURB TABLE

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.



TYPE II CURB

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

* NOTES: NOT NEEDED FOR CAST-IN-PLACE.
SEE TYPE II CURB DETAIL FOR REBAR AND COVER REQUIREMENTS.
PERCUSSION DRILLING IS NOT PERMITTED WITH:
TYPE II CURB, BRIDGE RAIL OR CONCRETE TRAFFIC RAIL.

TYPE II CURB DETAILS

HIGH-SPEED TRANSITION

Texas Department of Transportation — Design Division Standard

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

GF(31)TR TL3-20

FILE: gf31tr+1320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		104

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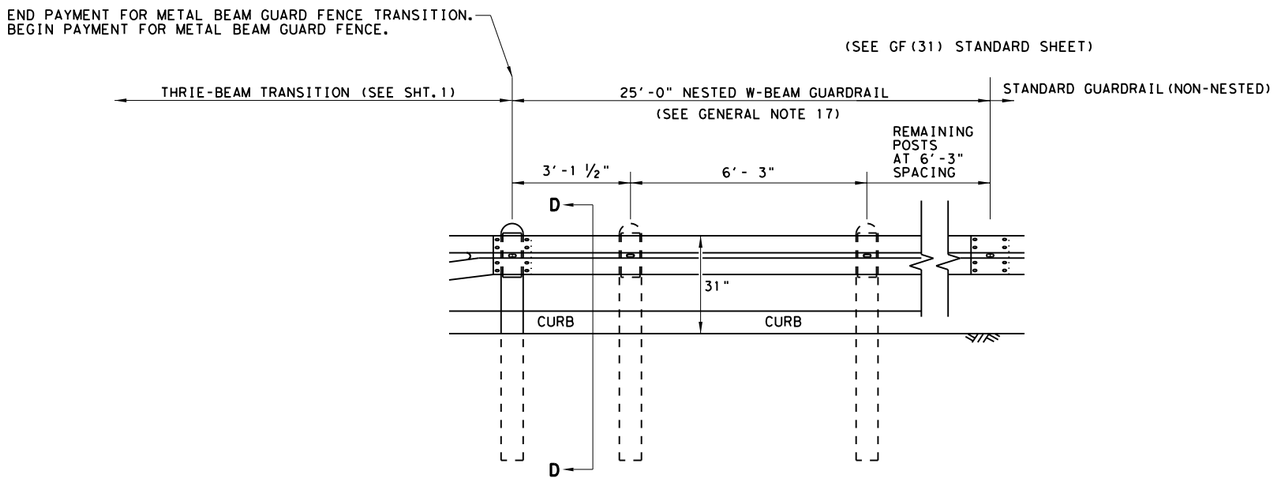
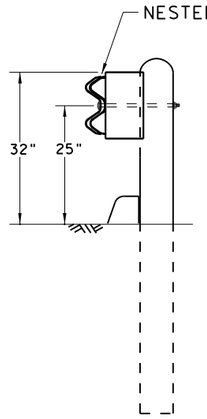
DATE: 1/4/2021
PROJECT: 6375-52-001

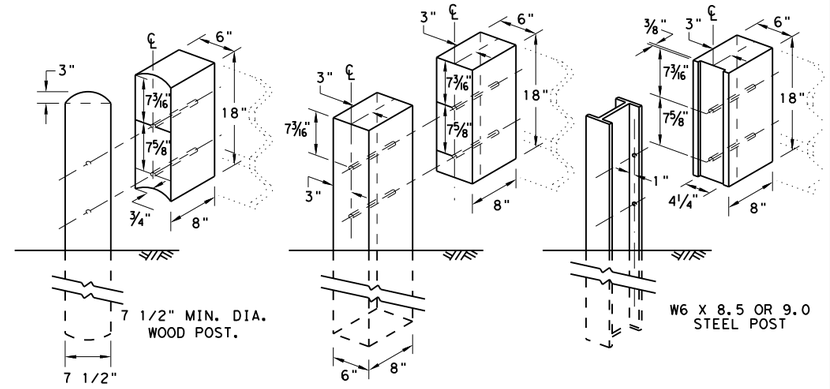
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

Texas Department of Transportation | Design Division Standard

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

GF(31)TR TL3-20

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©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY	
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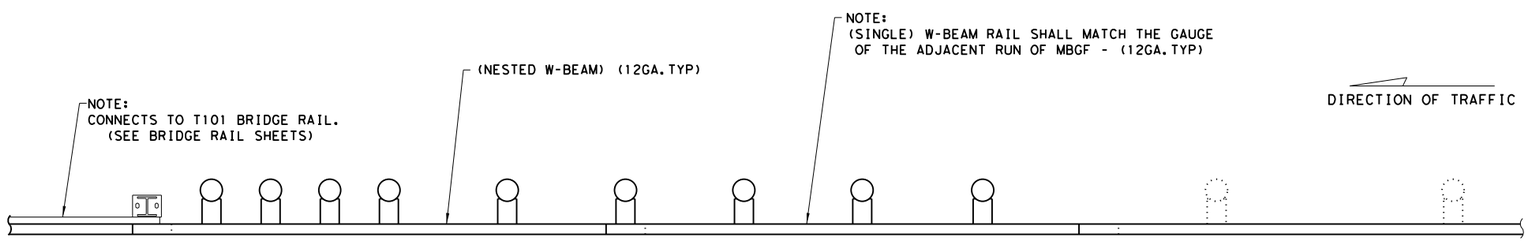
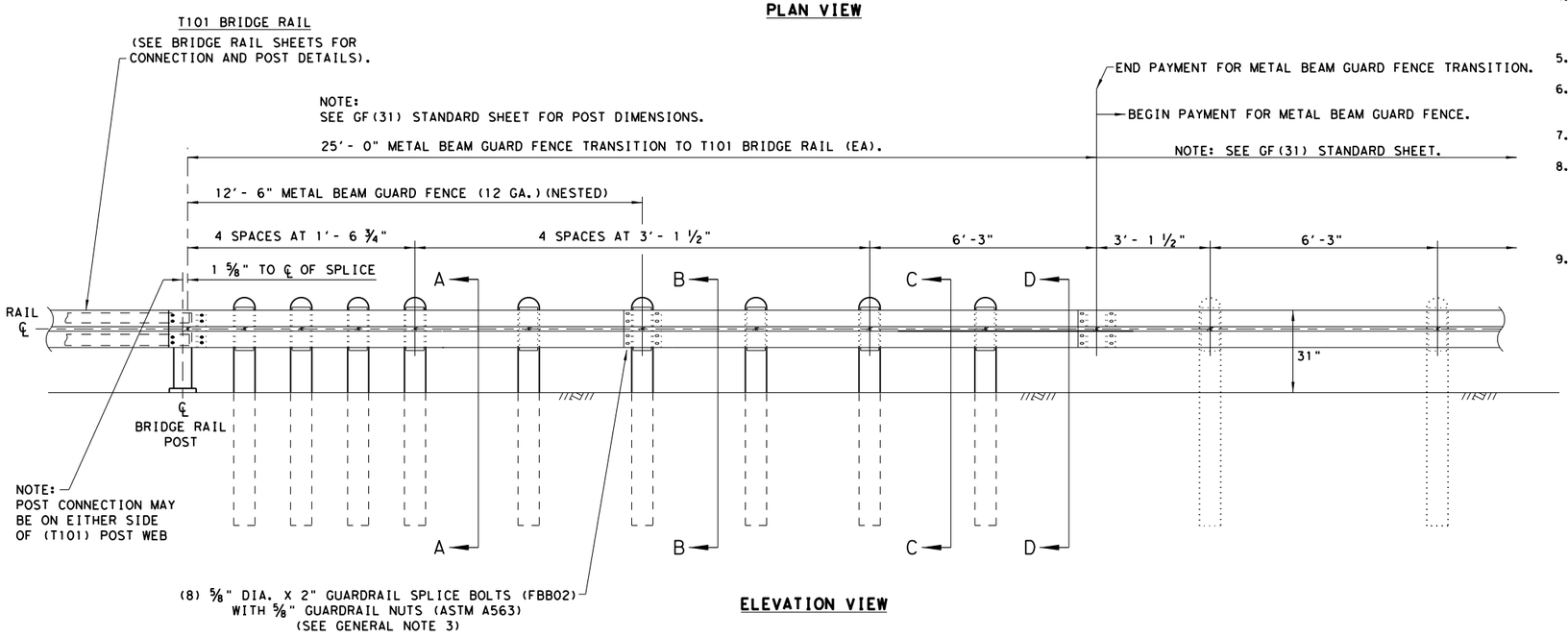
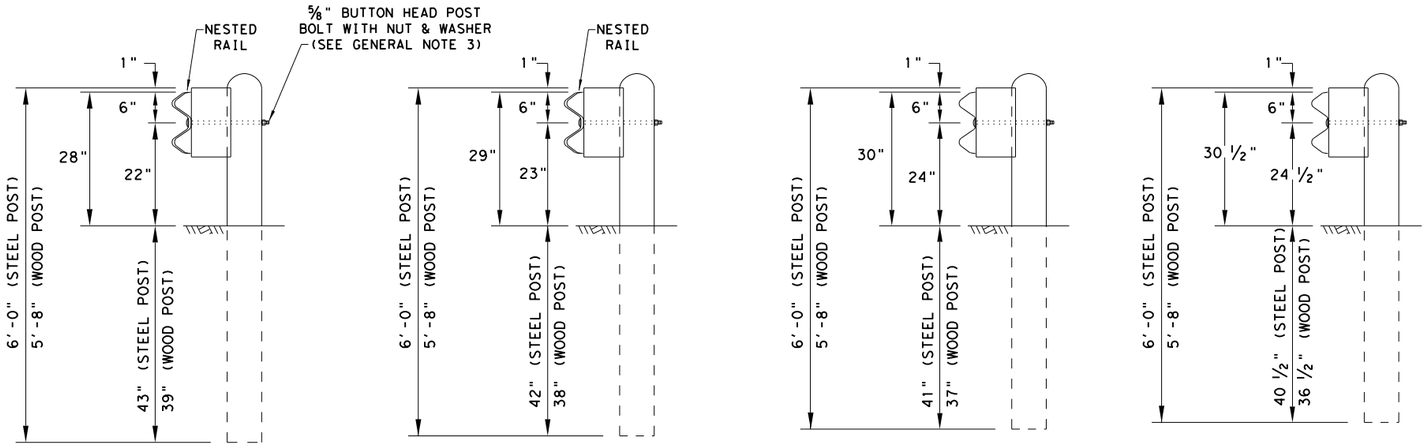


PLAN VIEW



ELEVATION VIEW

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



SECTION A-A SECTION B-B SECTION C-C SECTION D-D

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 ELEMENT SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'- 0", OR 12'- 6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'- 1 1/2" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST" BOLTS (ASTM A307 GR.A) SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT (ASTM A563) AND 5/8" ROUND WASHER (ASTM F436) AND NOT MORE THAN 1" BEYOND IT. BUTTON HEAD "SPLICE" BOLTS (ASTM A307) ARE 5/8" X 1- 1/4" WITH 5/8" NUTS (ASTM A563).
4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM REQUIRING CONSTRUCTION OF THE TRANSITION.
5. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
6. WHERE SOLID ROCK IS ENCOUNTERED. CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
7. POSTS SHALL NOT BE SET IN CONCRETE.
8. 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.
9. REFER TO STANDARD GF(31) AND APPLICABLE BRIDGE RAILING STANDARD FOR ADDITIONAL DETAILS.

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE TRANSITION (T101)

GF(31)T101-19

FILE: gf31t10119	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
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	12	HARRIS/GAL		106

FILE: h:\00maintenance\south harris maintenance\GF31T619.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001

NOTE:
CONNECTS TO T6 BRIDGE RAIL.
(SEE BRIDGE RAIL SHEETS)

NOTE:
(SINGLE) W-BEAM RAIL SHALL MATCH THE GAUGE OF THE ADJACENT RUN OF MBGF - (12GA.TYP)

DIRECTION OF TRAFFIC

PLAN VIEW

T6 BRIDGE RAIL
(SEE BRIDGE RAIL SHEETS FOR CONNECTION AND POST DETAILS).

NOTE:
SEE GF(31) STANDARD SHEET FOR POST DIMENSIONS.

25'- 0" METAL BEAM GUARD FENCE TRANSITION TO T6 BRIDGE RAIL (EA).

END PAYMENT FOR T6 TRANSITION.

BEGIN PAYMENT FOR METAL BEAM GUARD FENCE.

NOTE: SEE GF(31) STANDARD SHEET.

6'-3" | 6'-3" | 6'-3" | 3'- 1 ½" | 6'-3" | 6'-3"

1 ⅝" TO ℄ OF SPLICE

RAIL ℄

℄ BRIDGE RAIL POST

31"

NOTE:
POST CONNECTION MAY BE ON EITHER SIDE OF (T6) POST WEB

A B C D

ELEVATION VIEW

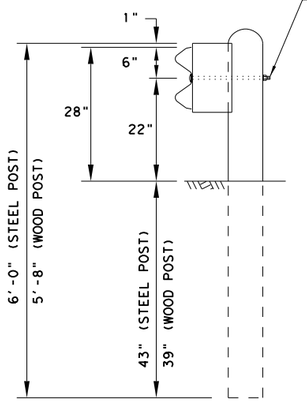
(8) ⅝" DIA. X 1 ¼" GUARDRAIL SPLICE BOLTS (FBB02)
WITH ⅝" GUARDRAIL NUTS (ASTM A563)
(SEE GENERAL NOTE 3)

GENERAL NOTES

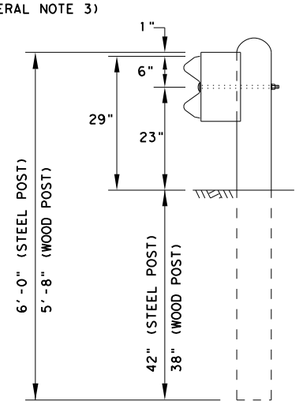
1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENT SHALL MEET THE REQUIREMENTS OF ITEM 540,"METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'- 0", OR 12'- 6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'- 1 ½" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST" BOLTS (ASTM A307 GR.A) SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT (ASTM A563) AND ⅝" ROUND WASHER (ASTM F436) AND NOT MORE THAN 1" BEYOND IT. BUTTON HEAD "SPLICE" BOLTS (ASTM A307) ARE ⅝" X 1- ¼" WITH ⅝" NUTS (ASTM A563).
4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM REQUIRING CONSTRUCTION OF THE TRANSITION.
5. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
6. WHERE SOLID ROCK IS ENCOUNTERED. CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
7. POSTS SHALL NOT BE SET IN CONCRETE.
8. 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.
9. REFER TO STANDARD GF(31) & APPLICABLE BRIDGE RAILING STANDARD FOR ADDITIONAL DETAILS.

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

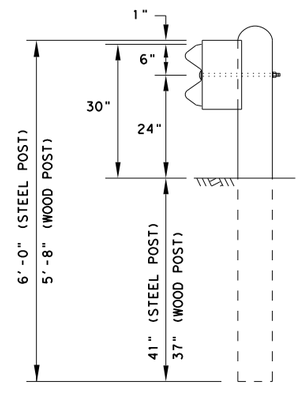
⅝" BUTTON HEAD POST BOLT WITH NUT & WASHER (SEE GENERAL NOTE 3)



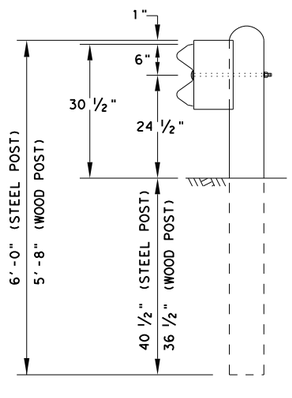
SECTION A-A



SECTION B-B



SECTION C-C



SECTION D-D

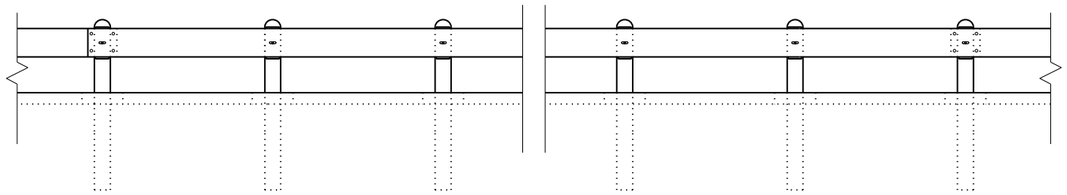
Texas Department of Transportation

Design Division Standard

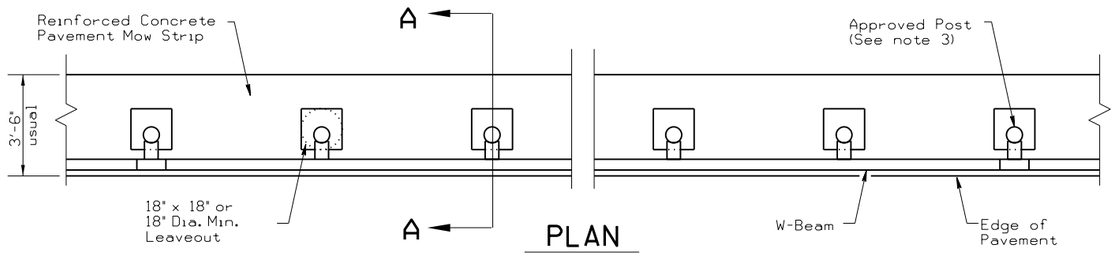
METAL BEAM GUARD FENCE TRANSITION (T6)

GF(31)T6-19

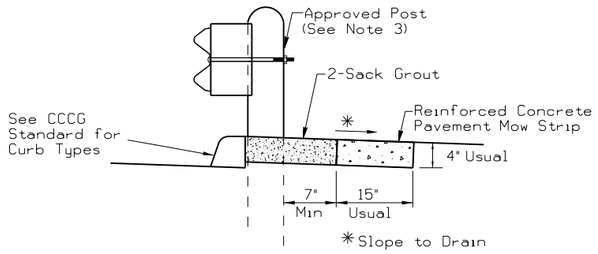
FILE: gf31t619.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		107



ELEVATION

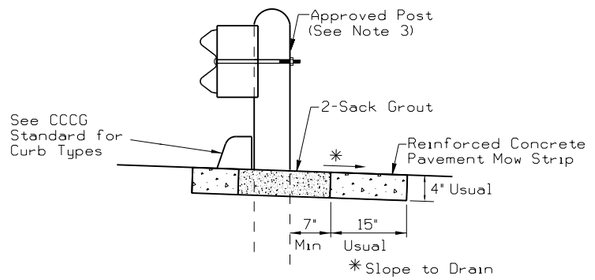


PLAN



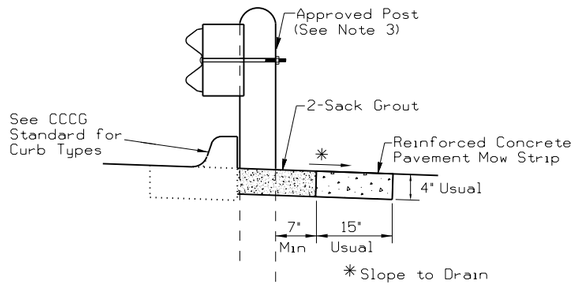
CURB OPTION (1)

Shown at Curbed Location

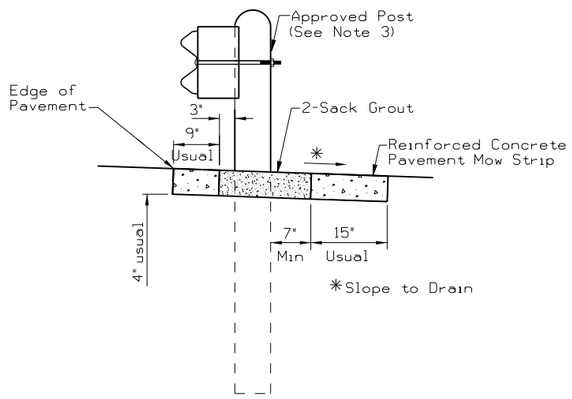


CURB OPTION (2)

Curb Shown on Top of Mow Strip

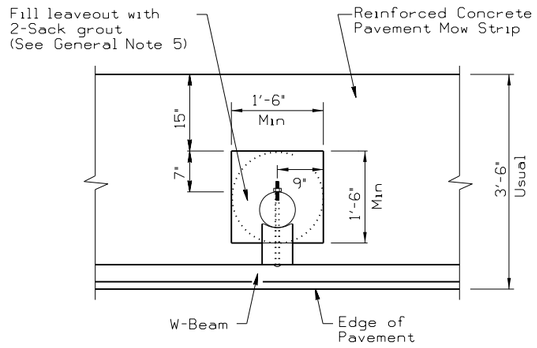


CURB OPTION (3)



SECTION A-A

Typical



MOW STRIP DETAIL

Reinforced Concrete Pavement
Mow Strip with 18" x 18"or 18"
dia. minimum leaveout.

GENERAL NOTES

1. Place concrete riprap mow strips at all Metal Beam Guard Fence locations, and in accordance with Item 432, "Riprap". Use Class B Concrete, reinforced with No. 3 bars spaced at 18 in. centers each direction and 2 in. below the surface.
2. Provide a minimum of 7 in. leave out behind the post. Do not place concrete in the leave out.
3. The type of approved post is shown elsewhere on the plans. See the applicable standard sheets for additional details and information.
4. Other curb placement options may be used. Curbs are not considered part of the mow strip and are paid for under other pertinent bid items.
5. Fill the leave outs with no more than a 2-sack grout mixture and place in accordance with Section 421.2.7, ""Mortar and Grout." Payment for furnishing and placing the grout mixture is subsidiary to the Item 432, "RIPRAP."
6. Place the mow strip the entire length of the guard fence plus any Terminal Anchor Section (TAS) or Single Guardrail Terminal (SGT) to 2 ft. beyond the face of the object marker at the end of the SGT. Do not allow concrete to adhere to the ground line strut shown on the SGT standard sheet.

Texas Department of Transportation
Houston District

MOW STRIP

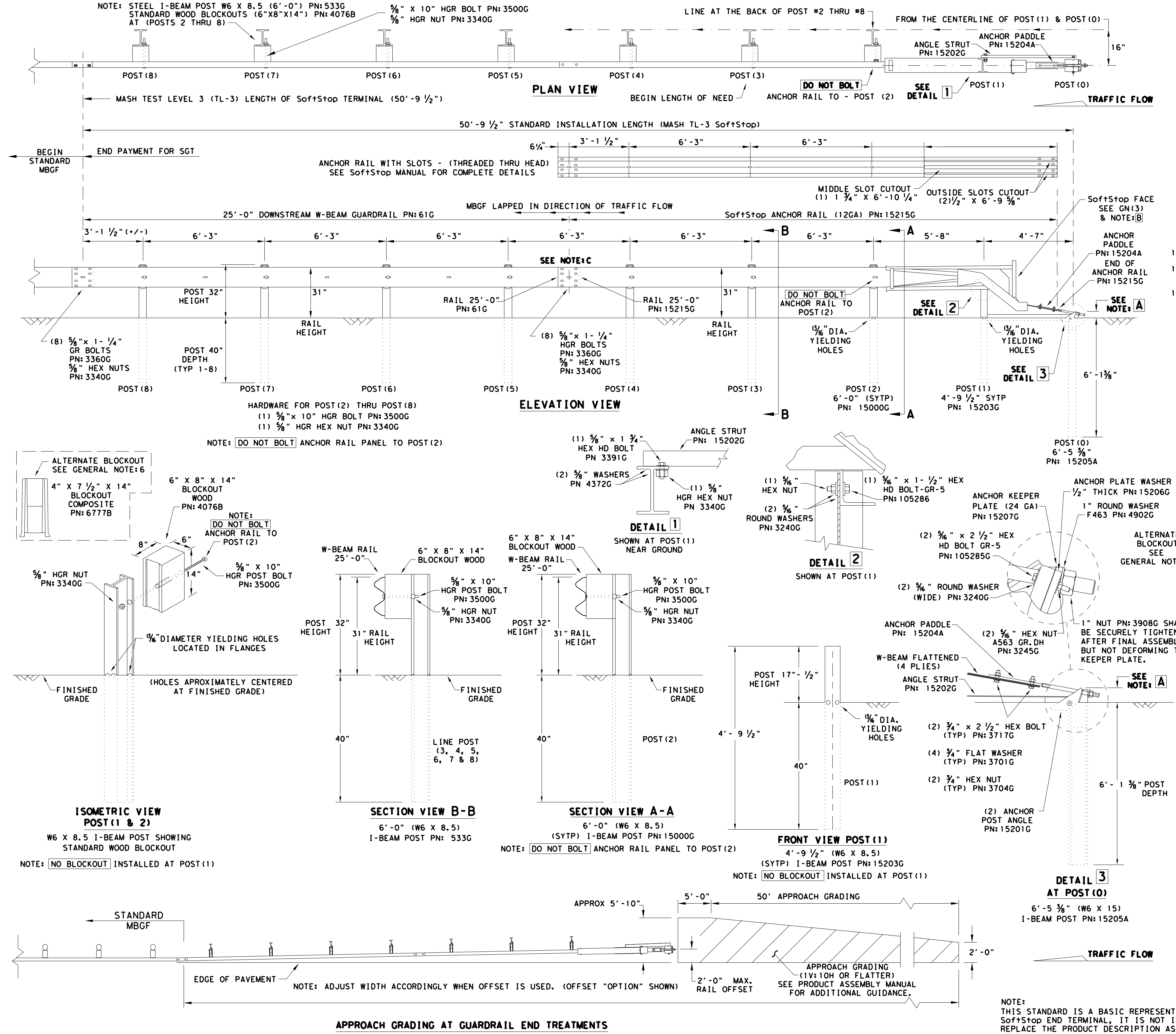
MS

FILE:	DN:	CK:	DW:	CK:	
©TxDOT 2014	DIST	FED REG	PROJECT NO.		SHEET
REVISIONS	12	6	RMC 6375-52-001		108
03/15 2014 SPECS	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	HARRIS/GAL		6375	52	001	IH45

STDE5.DGN

FILE: h:\00*maintenance\south harris maintenance\2020 contracts\6357-02-001*ih45 general mainteance\Standards\Metal Beam Guard Fence 20\stde5.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001

FILE: h:\00=maintenance\south harris maintenance\2020\...
DATE: 1/4/2021
PROJECT: 6375-52-001



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

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:620237B
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 3-3/4" MIN. TO 4" MAX. ABOVE FINISHED GRADE.
NOTE: B	PART PN:5852B RIGHT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING) PART PN:5851B 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.

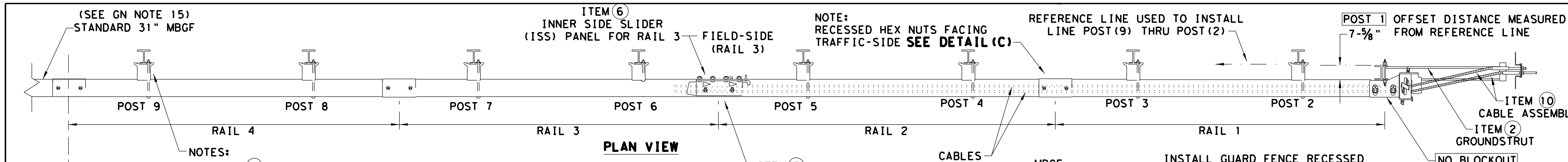
PART	QTY	MAIN SYSTEM COMPONENTS
620237B	1	PRODUCT DESCRIPTION ASSEMBLY MANUAL (LATEST REV.)
15208A	1	SoftStop HEAD (SEE MANUAL FOR RIGHT-LEFT APPROACH)
15215G	1	SoftStop ANCHOR RAIL (12GA) WITH CUTOUT SLOTS
61G	1	SoftStop DOWNSTREAM W-BEAM RAIL (12GA) (25'- 0")
15205A	1	POST #0 - ANCHOR POST (6'- 5 7/8")
15203G	1	POST #1 - (SYTP) (4'- 9 1/2")
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 1/2" x 14")
15204A	1	ANCHOR PADDLE
15207G	1	ANCHOR KEEPER PLATE (24 GA)
15206G	1	ANCHOR PLATE WASHER (1/2" 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	3/4" x 2 1/2" HEX BOLT A325
3701G	4	3/4" ROUND WASHER F436
3704G	2	3/4" HEAVY HEX NUT A563 GR.DH
3360G	16	5/8" x 1 1/4" W-BEAM RAIL SPLICE BOLTS HGR
3340G	25	5/8" W-BEAM RAIL SPLICE NUTS HGR
3500G	7	5/8" x 10" HGR POST BOLT A307
3391G	1	5/8" x 1 3/4" HEX HD BOLT A325
4489G	1	5/8" x 9" HEX HD BOLT A325
4372G	4	5/8" WASHER F436
105285G	2	5/16" x 2 1/2" HEX HD BOLT GR-5
105286G	1	5/16" x 1 1/2" HEX HD BOLT GR-5
3240G	6	5/16" ROUND WASHER (WIDE)
3245G	3	5/16" HEX NUT A563 GR.DH
5852B	1	HIGH INTENSITY REFLECTIVE SHEETING - SEE NOTE:B

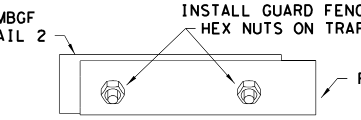
Texas Department of Transportation — Design Division Standard

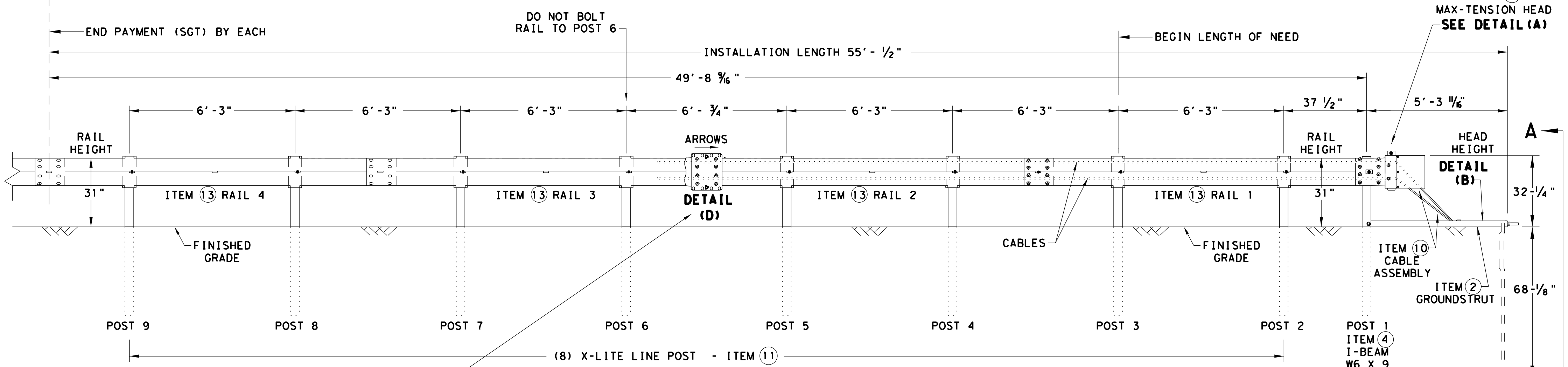
TRINITY HIGHWAY SOFTSTOP END TERMINAL MASH - TL-3

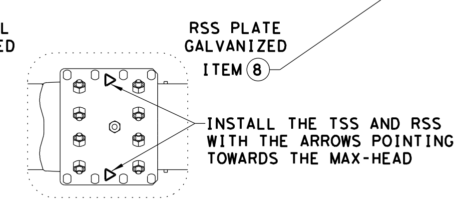
SGT(10S)31-16

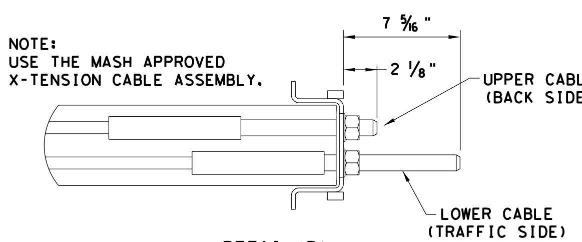
FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP
© TxDOT: July 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		109

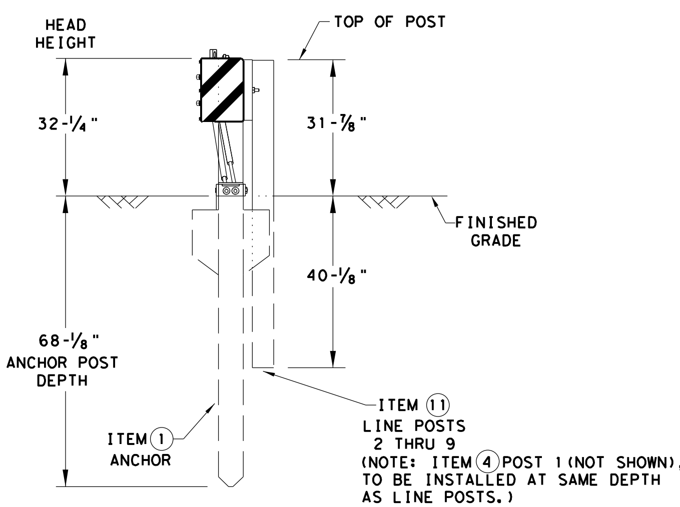

(SEE GN NOTE 15)
STANDARD 31" MBGF
ITEM 6
INNER SIDE SLIDER
(ISS) PANEL FOR RAIL 3
FIELD-SIDE (RAIL 3)
NOTE:
RECESSED HEX NUTS FACING TRAFFIC-SIDE SEE DETAIL (C)
REFERENCE LINE USED TO INSTALL LINE POST(9) THRU POST(2)
POST 1 OFFSET DISTANCE MEASURED FROM REFERENCE LINE
7-5/8"
POST 9
POST 8
POST 7
POST 6
POST 5
POST 4
POST 3
POST 2
RAIL 4
RAIL 3
RAIL 2
RAIL 1
ITEM 10
CABLE ASSEMBLY
ITEM 2
GROUNDSTRUT
NO BLOCKOUT AT (POST 1)
PLAN VIEW
NOTES:
1. ITEM 12 COMPOSITE BLOCKOUTS INSTALLED AT LINE POST(9) THRU LINE POST(2).
2. DO NOT INSTALL A BLOCKOUT AT LINE POST(1).
ITEM 5
TRAFFIC SIDE SLIDER
(TSS) PANEL FOR RAIL 2
NOTE: SECURE THE (TSS) PANEL TO OUTSIDE OF RAIL 2 WITH THE PANEL ARROWS POINTING TOWARDS THE HEAD.
CABLES
TRAFFIC FLOW

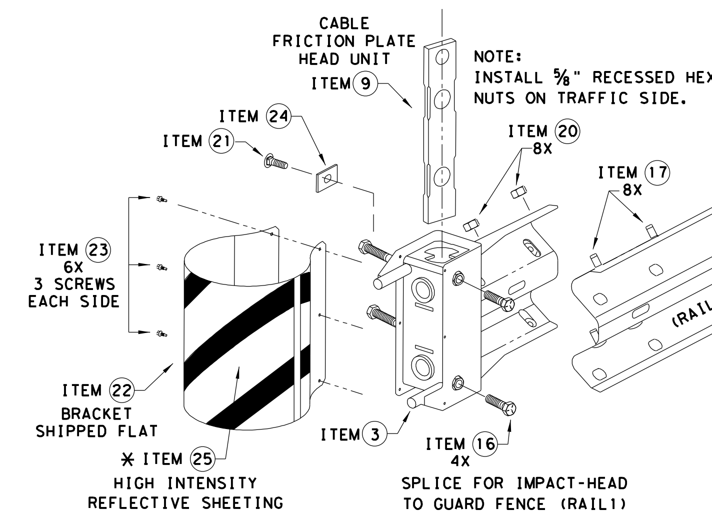



END PAYMENT (SGT) BY EACH
DO NOT BOLT RAIL TO POST 6
INSTALLATION LENGTH 55'- 1/2"
BEGIN LENGTH OF NEED
ITEM 25
MAX-TENSION HEAD
SEE DETAIL (A)
49'-8 9/16"
6'-3"
6'- 3/4"
37 1/2"
5'-3 11/16"
RAIL HEIGHT
31"
ARROWS
ITEM 13 RAIL 4
ITEM 13 RAIL 3
DETAIL (D)
ITEM 13 RAIL 2
ITEM 13 RAIL 1
HEAD HEIGHT
DETAIL (B)
32-1/4"
A
FINISHED GRADE
CABLES
ITEM 10
CABLE ASSEMBLY
ITEM 2
GROUNDSTRUT
68-1/8"
POST 9
POST 8
POST 7
POST 6
POST 5
POST 4
POST 3
POST 2
POST 1
ITEM 4
I-BEAM
W6 X 9
NO BLOCKOUT AT (POST 1)
(8) X-LITE LINE POST - ITEM 11
SOIL ANCHOR POST
ITEM 1
ELEVATION VIEW








CABLE FRICTION PLATE HEAD UNIT
ITEM 9
NOTE:
INSTALL 5/8" RECESSED HEX NUTS ON TRAFFIC SIDE.
ITEM 24
ITEM 21
ITEM 20
8X
ITEM 17
8X
ITEM 23
6X
3 SCREWS EACH SIDE
(RAIL 1)
ITEM 22
BRACKET SHIPPED FLAT
ITEM 3
ITEM 16
4X
* ITEM 25
HIGH INTENSITY REFLECTIVE SHEETING
NOTE: DELINEATION MARKER IN ACCORDANCE WITH TEXAS MUTCD.
SPLICE FOR IMPACT-HEAD TO GUARD FENCE (RAIL1)
DETAIL (A)

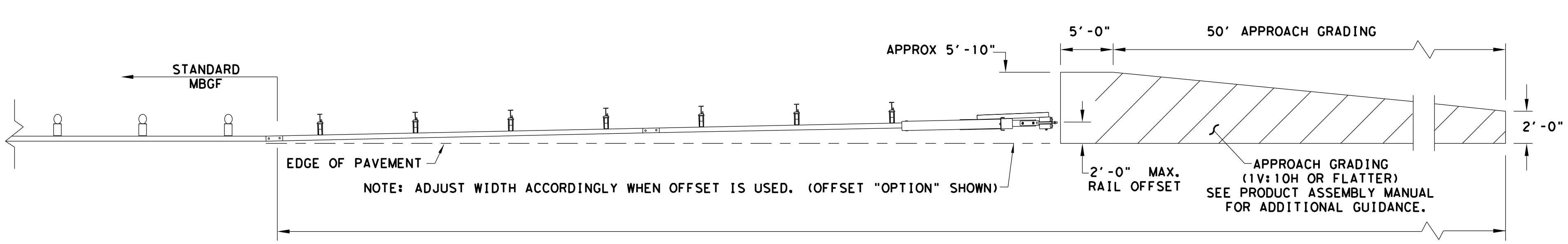
GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: LINDSAY TRANSPORTATION SOLUTIONS (LTS) - BARRIER SYSTEMS, INC. AT (707) 374-6800
2. FOR INSTALLATION, REPAIR, & MAINTENANCE REFER TO THE; MAX-TENSION INSTALLATION INSTRUCTION MANUAL. P/N MANMAX REV D (ECN 3516).
3. APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURE'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. ALL STEEL COMPONENTS ARE GALVANIZED PER ASTM A123 OR EQUIVALENT UNLESS OTHERWISE STATED.
6. SYSTEM SHOWN USING STEEL WIDE FLANGE POST WITH COMPOSITE BLOCKOUTS.
7. COMPOSITE MATERIAL BLOCKOUT THAT MEETS THE REQUIREMENTS OF DMS-7210, MAY BE SUBSTITUTED FOR BLOCKOUTS SIMILAR DIMENSIONS. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST(MPL)FOR CERTIFIED PRODUCERS.
8. REFER TO INSTALLATION MANUAL FOR SPECIFIC PANEL LAPPING GUIDANCE.
9. IF SOLID ROCK IS ENCOUNTERED SEE THE MANUFACTURER'S INSTALLATION MANUAL FOR INSTALLATION GUIDANCE.
10. POSTS SHALL NOT BE SET IN CONCRETE.
11. A DRIVING CAP WITH A TIMBER OR PLASTIC INSERT SHALL BE USED WHEN DRIVING POST TO PREVENT DAMAGE TO THE GALVANIZING ON TOP OF THE POST.
12. MAX-TENSION SYSTEM SHALL NEVER BE INSTALLED WITHIN A CURVED SECTION OF GUARDRAIL.
13. IF A DELINEATION MARKER IS REQUIRED, MARKER SHALL BE IN ACCORDANCE WITH TEXAS MUTCD.
14. THE SYSTEM IS SHOWN WITH 12'-6" MBGF PANELS, 25'-0" MBGF PANELS ARE ALSO ALLOWED.
15. A MINIMUM OF 12'-6" OF 12GA. MBGF IS REQUIRED IMMEDIATELY DOWNSTREAM OF THE MAX-TENSION SYSTEM.

	ITEM#	PART NUMBER	DESCRIPTION	QTY
	1	BSI-1610060-00	SOIL ANCHOR - GALVANIZED	1
	2	BSI-1610061-00	GROUND STRUT - GALVANIZED	1
	3	BSI-1610062-00	MAX-TENSION IMPACT HEAD	1
	4	BSI-1610063-00	W6x9 I-BEAM POST 6FT.-GALVANIZED	1
	5	BSI-1610064-00	TSS PANEL - TRAFFIC SIDE SLIDER	1
	6	BSI-1610065-00	ISS PANEL - INNER SIDE SLIDER	1
	7	BSI-1610066-00	TOOTH - GEOMET	1
	8	BSI-1610067-00	RSS PLATE - REAR SIDE SLIDER	1
	9	B061058	CABLE FRICTION PLATE - HEAD UNIT	1
	10	BSI-1610069-00	CABLE ASSEMBLY - MASH X-TENSION	2
	11	BSI-1012078-00	X-LITE LINE POST-GALVANIZED	8
	12	B090534	8" W-BEAM COMPOSITE-BLOCKOUT XT110	8
	13	BSI-4004386	12'-6" W-BEAM GUARD FENCE PANELS 12GA.	4
	14	BSI-1102027-00	X-LITE SQUARE WASHER	1
	15	BSI-2001886	5/8" X 7" THREAD BOLT HH (GR.5)GEOMET	1
	16	BSI-2001885	3/4" X 3" ALL-THREAD BOLT HH (GR.5)GEOMET	4
	17	4001115	5/8" X 1 1/4" GUARD FENCE BOLTS (GR.2)MGAL	48
	18	2001840	5/8" X 10" GUARD FENCE BOLTS MGAL	8
	19	2001636	5/8" WASHER F436 STRUCTURAL MGAL	2
	20	4001116	5/8" RECESSED GUARD FENCE NUT (GR.2)MGAL	59
	21	BSI-2001888	5/8" X 2" ALL THREAD BOLT (GR.5)GEOMET	1
	22	BSI-1701063-00	DELINEATION MOUNTING (BRACKET)	1
	23	BSI-2001887	1/4" X 3/4" SCREW SD HH 410SS	7
	24	4002051	GUARDRAIL WASHER RECT AASHTO FWR03	1
*	25	SEE NOTE BELOW	HIGH INTENSITY REFLECTIVE SHEETING	1
**	26	4002337	8" W-BEAM TIMBER-BLOCKOUT, PDB01B	8
**	27	BSI-4004431	25' W-BEAM GUARDRAIL PANEL, 8-SPACE, 12GA.	2
	28	MANMAX Rev-(D)	MAX-TENSION INSTALLATION INSTRUCTIONS	1

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

** ALTERNATIVE ITEMS NOT SHOWN.
ITEM(26) 8" WOOD-BLOCKOUTS
ITEM(27) 25' GUARD FENCE PANELS


STANDARD MBGF
APPROX 5'-10"
5'-0"
50' APPROACH GRADING
2'-0"
TRAFFIC FLOW
EDGE OF PAVEMENT
2'-0" MAX. RAIL OFFSET
APPROACH GRADING (1V:10H OR FLATTER) SEE PRODUCT ASSEMBLY MANUAL FOR ADDITIONAL GUIDANCE.
NOTE: ADJUST WIDTH ACCORDINGLY WHEN OFFSET IS USED. (OFFSET "OPTION" SHOWN)

NOTE: TXDOT GENERIC APPROACH GRADING LAYOUT USED FOR ALL TANGENT TYPE END TREATMENTS.

APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

Texas Department of Transportation

Design Division Standard

MAX-TENSION END TERMINAL MASH - TL-3

SGT(11S)31-18

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: February 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
	DIST		COUNTY	SHEET NO.
	12		HARRIS/GAL	110

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DATE: 1/4/2021
PROJECT: 6375-52-001

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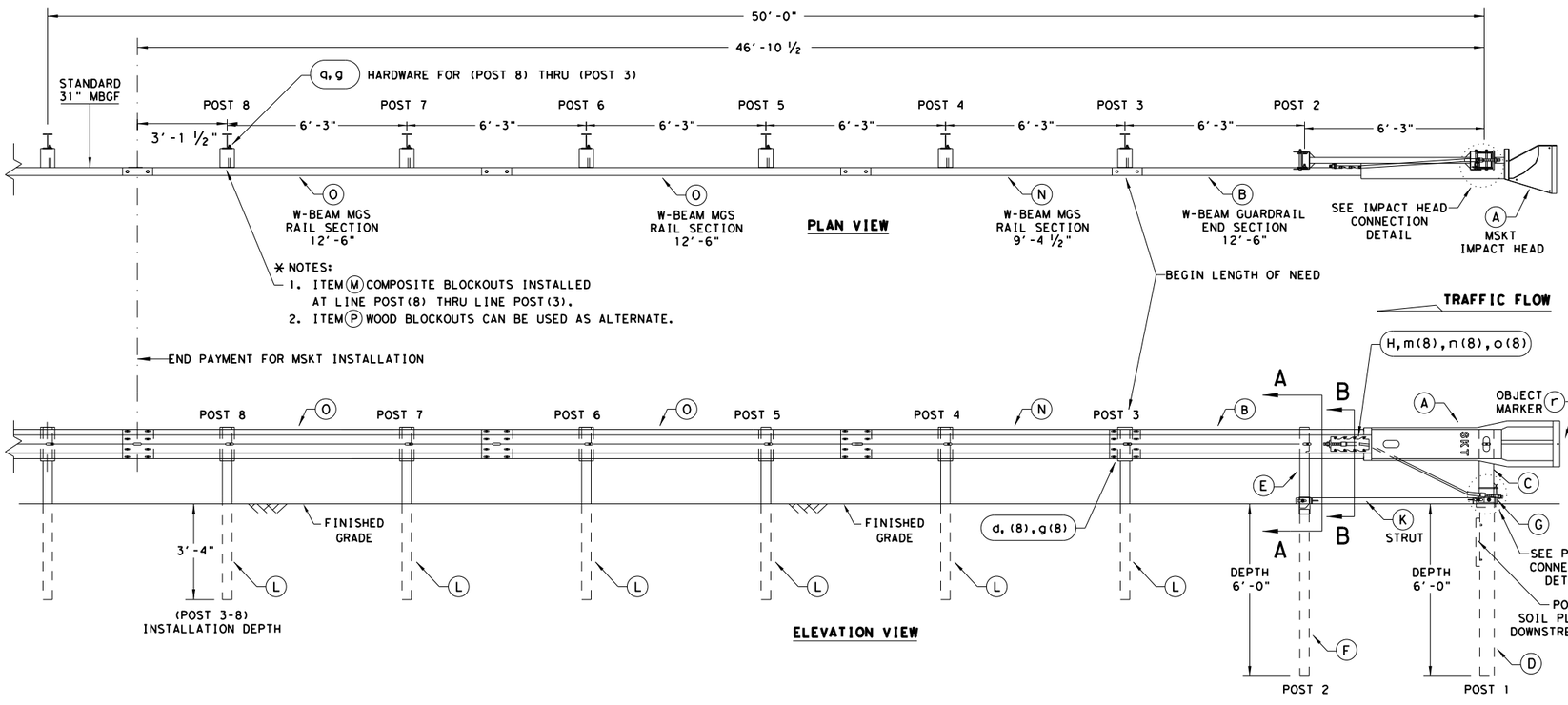
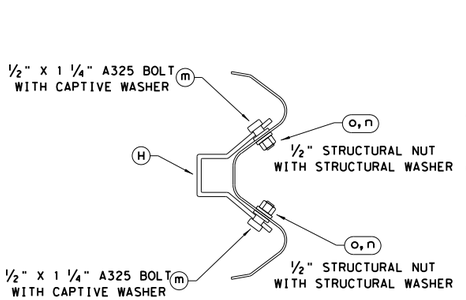
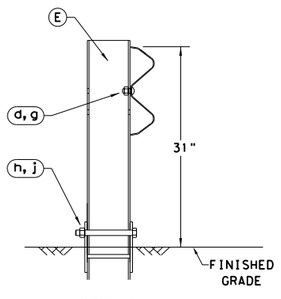


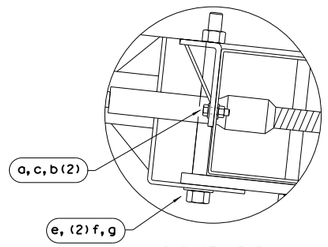
NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.



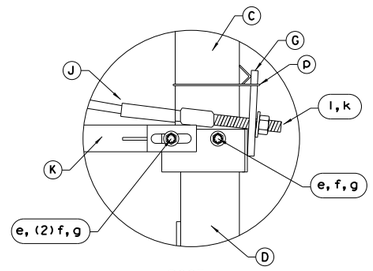
SECTION B-B
ANCHOR BRACKET



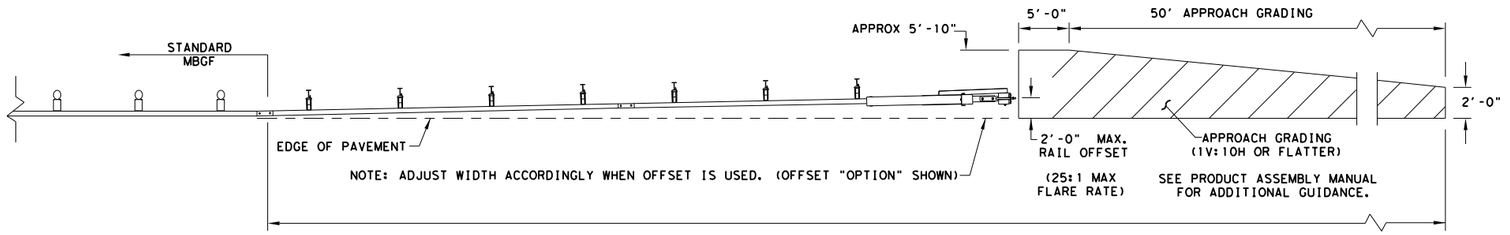
POST 2
SECTION A-A



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.

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	⅝" Dia. x 1 ¼" SPLICE BOLT (POST 2)	B580122
e	2	⅝" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	⅝" WASHER	W050
g	33	⅝" 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 1 ¼" A325 BOLT WITH CAPTIVE WASHER	SB12A
n	8	½" STRUCTURAL NUTS	N012A
o	8	1 1/16" O.D. x ⅜" 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

Texas Department of Transportation

Design Division Standard

SINGLE GUARDRAIL TERMINAL
MSKT-MASH-TL-3
SGT(12S)31-18

FILE: sgt12s3118.dgn	DN:TxDOT	CK:KM	DW:VP	CK:CL
© TxDOT: April 2018	CONT	SECT	JOB	HIGHWAY
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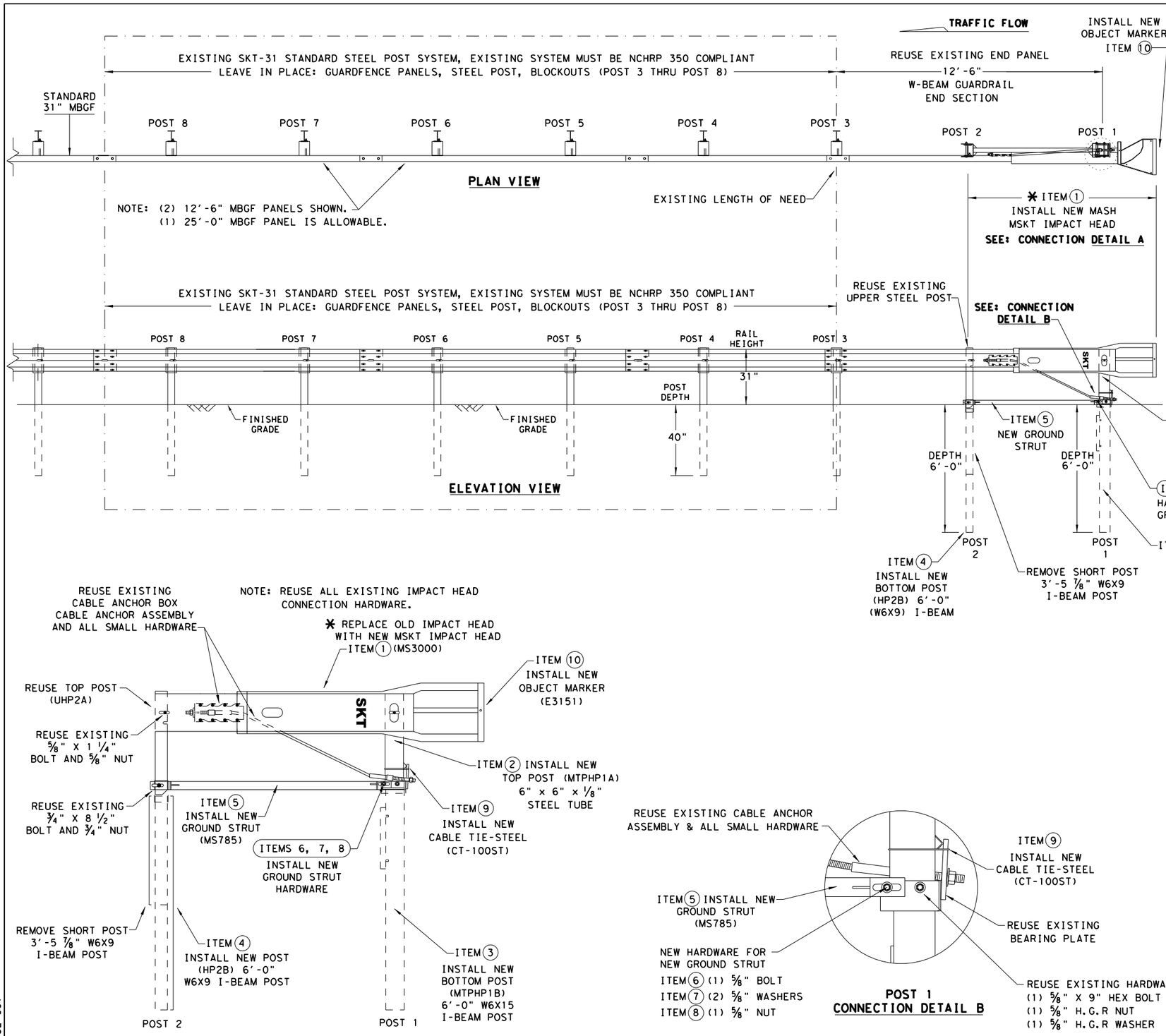
	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		111

FILE: h:\00maintenance\south harris maintenance\SGT13S3118.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001



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 STEEL 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" STEEL 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.

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

POST 1
CONNECTION DETAIL B

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 BOTTOM (6' W6X9)	HP2B
5	1	GROUND STRUT	MS785
6	1	5/8" X 9" HEX BOLT (GRD A449)	B580904A
7	2	5/8" WASHERS	W050
8	1	5/8" H.G.R NUT	N050
9	1	CABLE TIE-STEEL	CT-100ST
* 10	1	OBJECT MARKER 18" X 18"	E3151

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

*** IF THE EXISTING NCHRP 350 (31" STEEL 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.**

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" STEEL POST SYSTEM TO MASH MSKT

SGT(13S)31-18

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© TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		112

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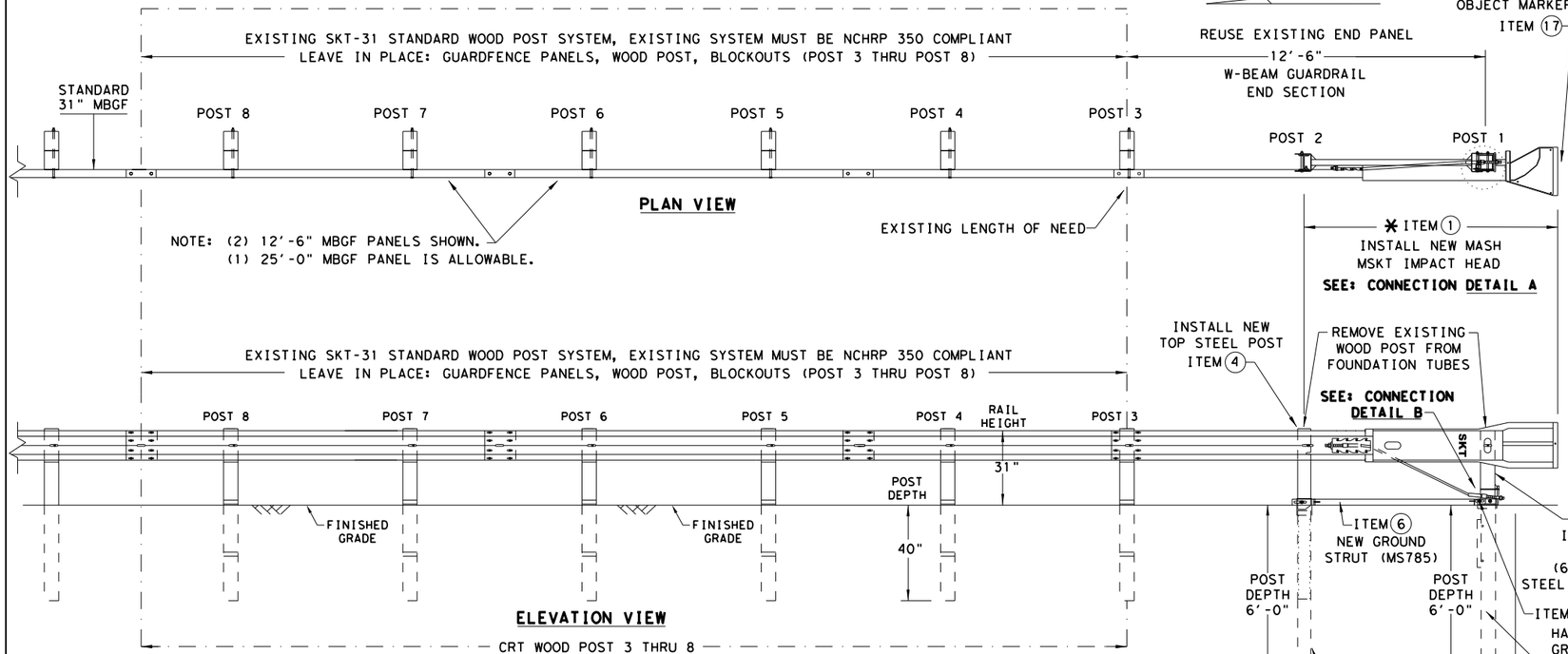
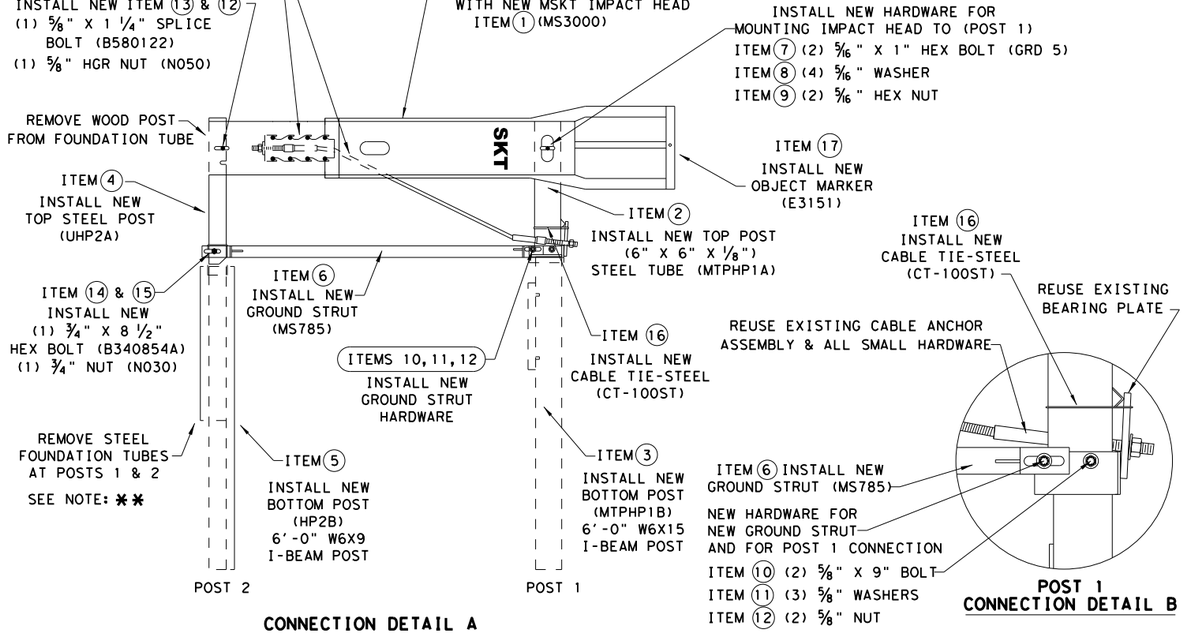
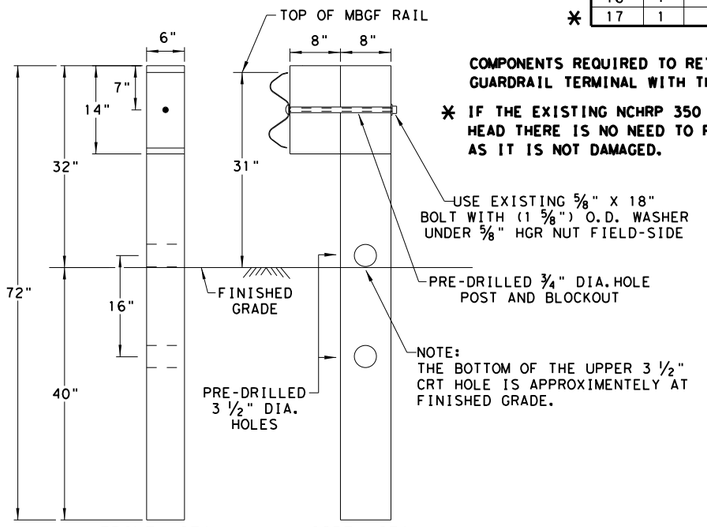


** NOTE: EXTRA SOIL COMPACTION WILL BE NEEDED AROUND NEW (POSTS 1 & 2) DUE TO THE REMOVAL OF THE STEEL FOUNDATION TUBES.



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

POST 1
CONNECTION DETAIL B



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.

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.**

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
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	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		113

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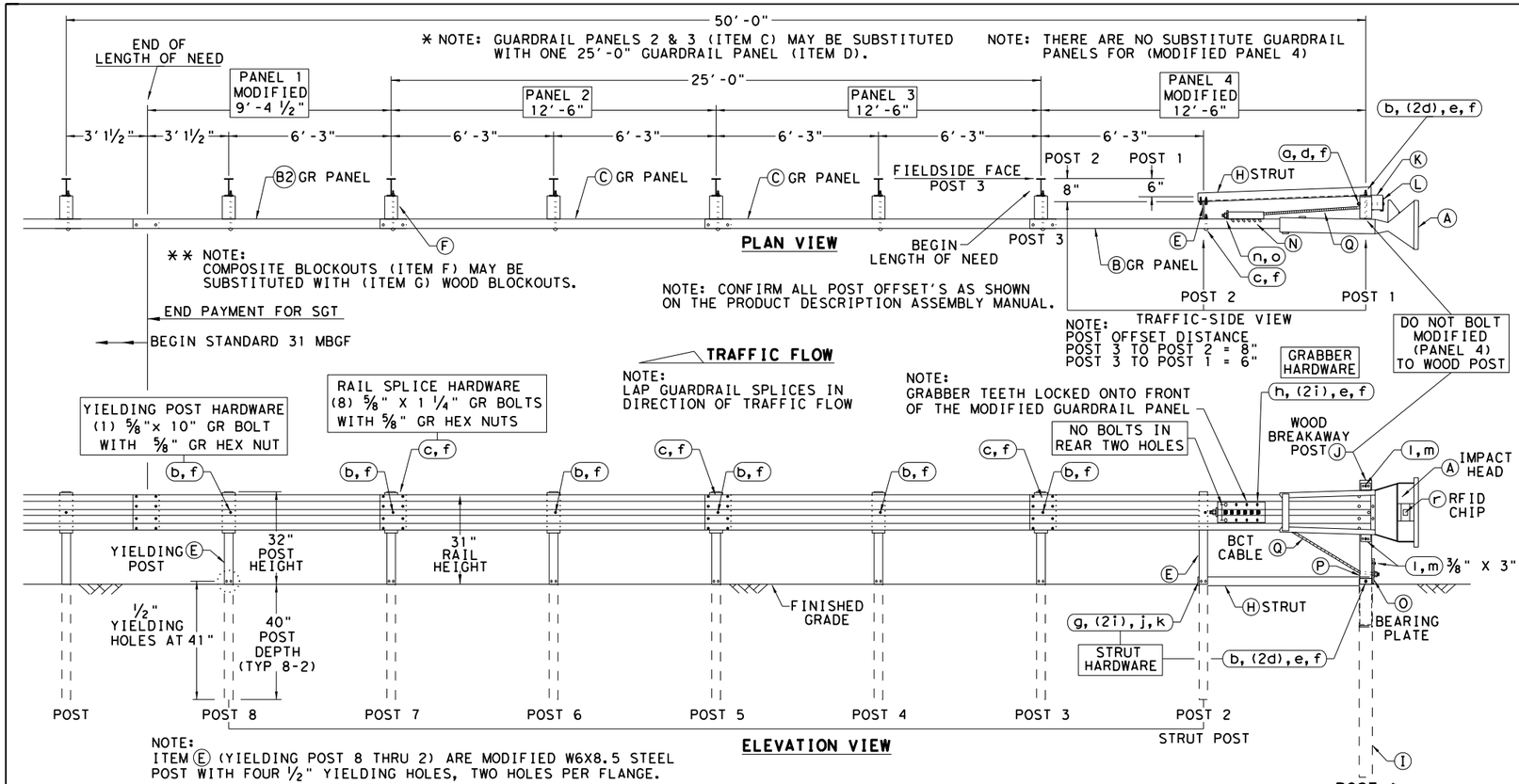
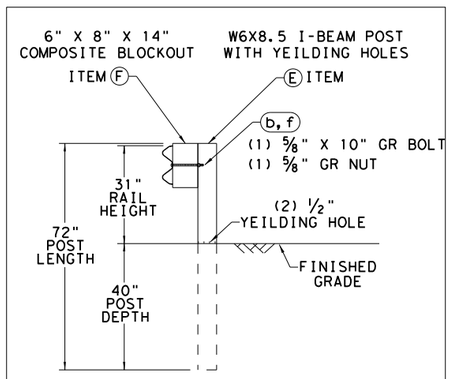


GENERAL NOTES

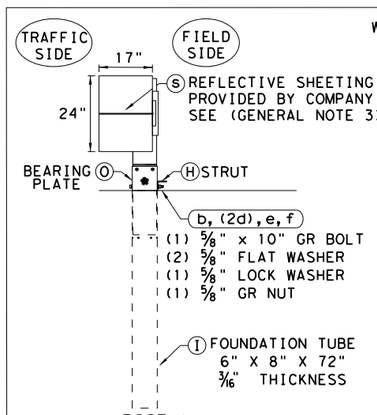
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL.
3. MANUFACTURER WILL APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" TO THE FACE PLATE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. THE OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
4. THE NOMINAL HEIGHT OF THE GUARDRAIL BEAM IS 31 INCHES WITH A TOLERANCE OF +/- ONE INCH.
5. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
6. (POST 2 THROUGH POST 8) ARE MODIFIED STEEL-YIELDING POSTS WITH YIELDING HOLES AT GROUND LEVEL. THERE ARE NO SUBSTITUTE POSTS.
7. POSTS SHALL NOT BE SET IN CONCRETE.
8. IF SOLID ROCK IS ENCOUNTERED FOR ANY OF THE POSTS IN THE SYSTEM, CONTACT THE MANUFACTURER FOR SPECIFIC INSTALLATION GUIDANCE.
9. HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445,"GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
10. A COMPOSITE MATERIAL BLOCKOUT THAT MEETS DMS-7210 REQUIREMENTS MAY BE SUBSTITUTED FOR AN APPROVED WOOD BLOCKOUT. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
11. THE ENTIRE SYSTEM MUST BE INSTALLED IN A STRAIGHT LINE WITHOUT ANY CURVE. HOWEVER, THE SYSTEM CAN BE OFFSET BY TWO FEET AS SHOWN ON THE APPROACH GRADING DETAIL TO HELP OFF-SET THE IMPACT HEAD FROM SHOULDER OF THE ROAD.

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM #
A	1	SGET IMPACT HEAD	SIH1A
B	1	MODIFIED GUARDRAIL PANEL 12'-6" 12GA	126SPZGP
B2	1	MODIFIED GUARDRAIL PANEL 9'-4 1/2" 12GA	GP94
C	2	STANDARD GUARDRAIL PANEL 12'-6" 12GA	GP126
D *	1	STANDARD GUARDRAIL PANEL 25'-0" 12GA	GP25
E	7	MODIFIED YIELDING I-BEAM POST W6x8.5	YP6MOD
F	6	COMPOSITE BLOCKOUT 6" X 8" X 14"	CBO8
G **	6	WOOD BLOCKOUT 6" X 8" X 14"	WBO8
H	1	STRUT 3" X 3" X 80" x 1/4" A36 ANGLE	STR80
I	1	FOUNDATION TUBE 6" X 8" X 72" x 3/16"	FNDT6
J	1	WOOD BREAKAWAY POST 5 1/2" x 7 1/2" x 50"	WBRK50
K	1	WOOD STRIKE BLOCK	WSBLK14
L	1	STRIKE PLATE 1/4" A36 BENT PLATE	SPLT8
M	1	REINFORCEMENT PLATE 12 GA. GR55	REPLT17
N	1	GUARDRAIL GRABBER 2 1/2" X 2 1/2" X 16 1/2"	GGR17
O	1	BEARING PLATE 8" X 8 5/8" X 5/8" A36	BPLT8
P	1	PIPE SLEEVE 4 1/4" X 2 3/8" O.D. (2 1/8" I.D.)	PSLV4
Q	1	BCT CABLE 3/4" X 81" LENGTH	CBL81
		SMALL HARDWARE	
a	1	5/8" X 12" GUARDRAIL BOLT 307A HDG	12GRBLT
b	7	5/8" X 10" GUARDRAIL BOLT 307A HDG	10GRBLT
c	33	5/8" X 1 1/4" GR SPLICE BOLTS 307A HDG	1GRBLT
d	3	5/8" FLAT WASHER F436 A325 HDG	58FW436
e	1	5/8" LOCK WASHER HDG	58LW
f	39	5/8" GUARDRAIL HEX NUT HDG	58HN563
g	2	1/2" X 2" STRUT BOLT A325 HDG	2BLT
h	6	1/2" X 1 1/4" PLATE BOLT A325 HDG	125BLT
i	16	1/2" FLAT WASHER F436 A325 HDG	12FWF436
j	8	1/2" LOCK WASHER HDG	12LW
k	8	1/2" HEX NUT A563 HDG	12HN563
l	4	3/8" X 3" HEX LAG SCREW GR5 HDG	38LS
m	4	3/8" FLAT WASHER F436 A325 HDG	38FW844
n	2	1" FLAT WASHER F436 A325 HDG	1FWF436
o	2	1" HEX NUT A563DH HDG	1HN563
p	1	18" TO 24" LONG ZIP TIE RATED 175-200LB	ZPT18
q	1	1 1/2" X 4" SCH-40 PVC PIPE	PSPCR4
r	1	RFID CHIP RATED MIL-STD-810F	RFID810F
s	1	IMPACT HEAD REFLECTIVE SHEETING	RS30M

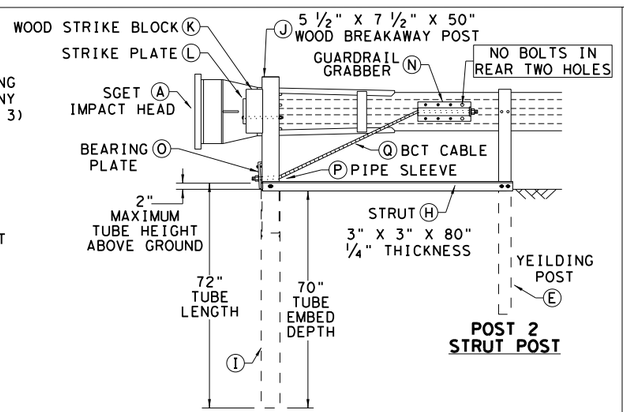
* ALTERNATIVE ITEMS
** NOTE: SEE PLAN VIEW



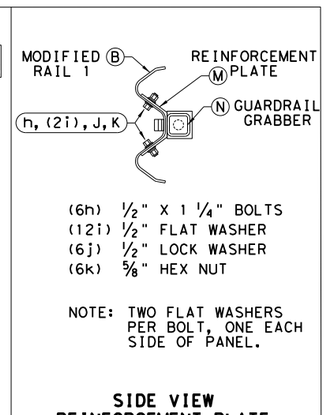
SIDE VIEW
POST 8 - POST 3 (TYP)



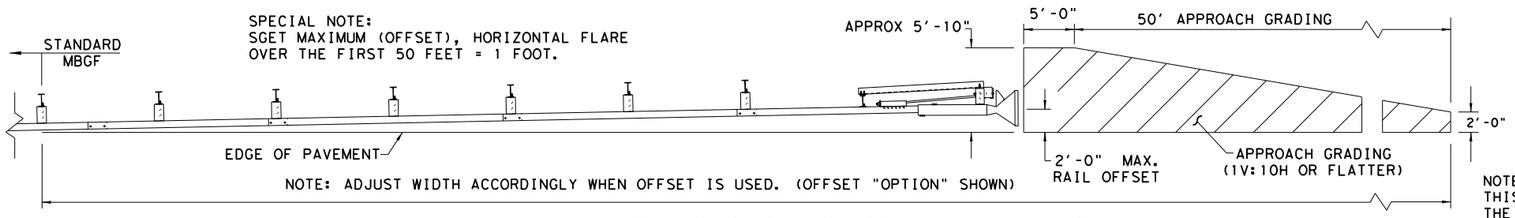
POST 1
FRONT END VIEW



POST 1
FIELD SIDE VIEW
POST 2
STRUT POST



SIDE VIEW
REINFORCEMENT PLATE
WITH GUARDRAIL GRABBER



APPROACH GRADING AT GUARDRAIL END TREATMENTS

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE SGET TERMINAL SYSTEM AND IS NOT INTENDED TO REPLACE THE MANUFACTURER'S ASSEMBLY MANUAL.

Texas Department of Transportation

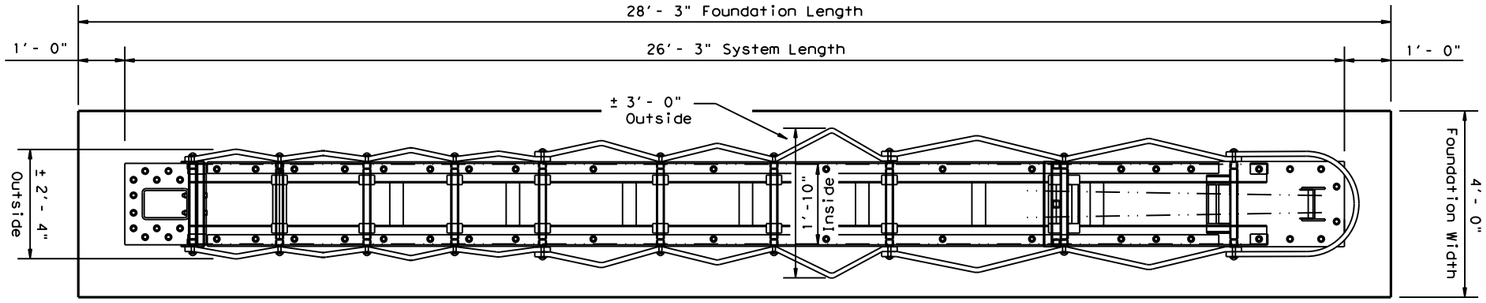
Design Division Standard

SPIG INDUSTRY, LLC
SINGLE GUARDRAIL TERMINAL
SGET - TL-3 - MASH
SGT(15)31-20

FILE: sgt153120.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP
©TxDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		114

FILE: h:\00maintenance\south harris maintenance\WORKING\heart16.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001

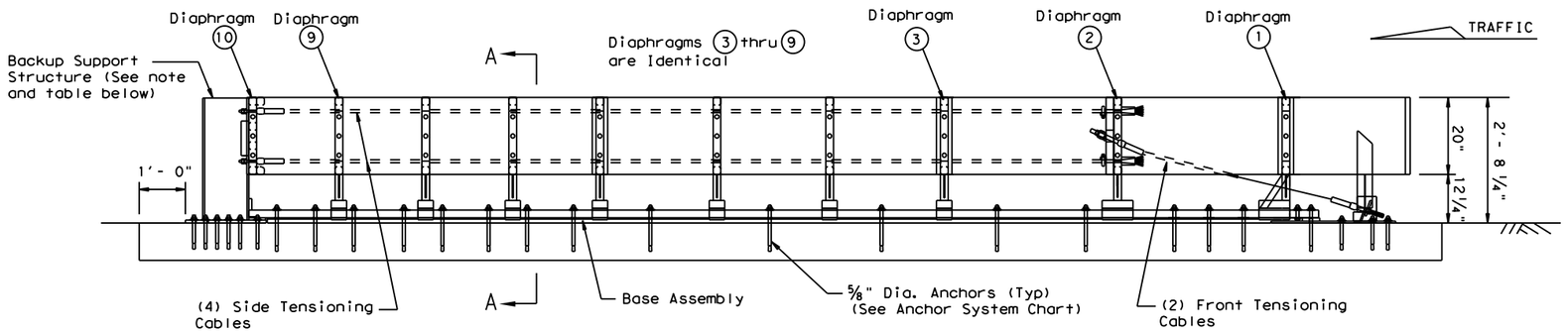
PLAN VIEW

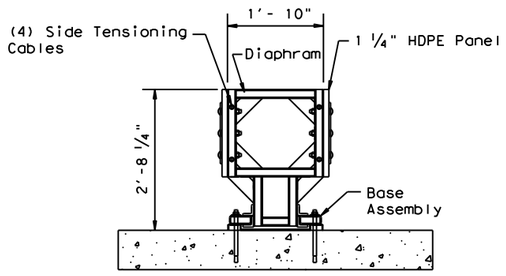


NOTE:
BACKUP SUPPORT SHOWN IS THE STEEL POST OPTION. THE HEART SYSTEM MAY BE CONNECTED WITH RECTANGULAR CROSS SECTIONS SUCH AS: PIERS, PARAPETS AND CONCRETE TRAFFIC BARRIERS.

SYSTEM SHOWN IS HEART (TL-3) WITH UNI-DIRECTIONAL TRAFFIC

ELEVATION VIEW





SECTION A-A

ANCHOR SYSTEM CHART
On Concrete: 10" Bolts used on base rails, 7 ½" Bolts used on base plates.
On Asphalt: 18" Bolts used on base rails and base plates.

HEART (NARROW) SYSTEM		
TEST LEVEL	SYSTEM LENGTH	PAD LENGTH
TL-2	13'- 9 ½"	15'- 9 ½"
TL-3	26'- 3"	28'- 3"
70	28'- 9"	30'- 9"

CONCRETE PAD LENGTH ON THE HEART SYSTEM DEPENDS ON BACKUP TYPE. (MINIMUM LENGTH SHOWN)

FOUNDATION OPTIONS
6" Reinforced Concrete
8" Unreinforced Concrete
8" Minimum Asphalt
For asphalt overlays on concrete, contact the manufacturer.

FOR STEEL PLACEMENT IN CONCRETE FOUNDATIONS (SEE MANUFACTURER'S PRODUCT MANUAL)

BACKUP SUPPORT OPTIONS
Steel Post Backup (Shown)
Rectangular Concrete Backup (18" Width Max.)
Concrete Barrier (CTB) Backup
Single Slope Concrete Barrier (SSCB)

TRANSITION OPTIONS
THE HEART SYSTEM IS APPROVED FOR USE AT BI-DIRECTIONAL SITES, ADDITIONAL HARDWARE IS REQUIRED. (SEE MANUFACTURER'S PRODUCT MANUAL)

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

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 bi-directional traffic, appropriate transition panels will be required.
3. Details of components for the HEART and backups and reinforcing details 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 p.s.i.
5. If the cross-slope varies more than 2% over the length of the system, the concrete pad will require levelling. Maximum permissible cross-slope is 8%.
6. The installation area should be free from curbs, elevated objects, or depressions.
7. The HEART system should be approximately parallel with the barrier or ℄ of merging barriers.

Texas Department of Transportation

Design Division Standard

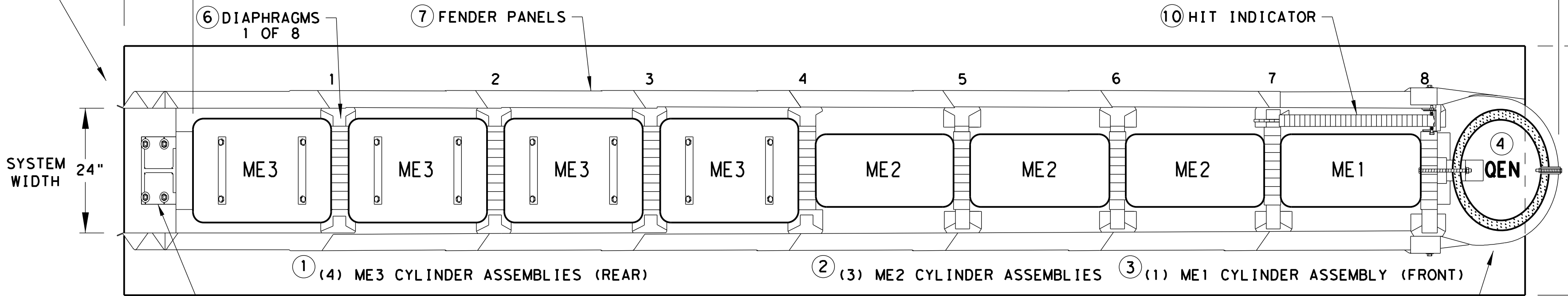
TRINITY HIGHWAY
HEART HYBRID ENERGY ABSORBING TERMINAL
HEART-16

LOW MAINTENANCE

FILE: heart16.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP
©TxDOT: March 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
REVISED 06,2013 (VP)	DIST	COUNTY		SHEET NO.
REVISED 03,2016 (VP)	12	HARRIS/GAL		115

NOTE:
A TRANSITION MAY BE REQUIRED TO INSTALL THE QUADGUARD ELITE M10 TO THE OBJECT BEING SHIELDED.

QUADGUARD EITE M10 24" WIDE (8 BAY) SYSTEM



PLAN VIEW

5 NOSE ASSEMBLY

CONCRETE PAD LENGTH (27'-0")
UNIDIRECTIONAL SYSTEM

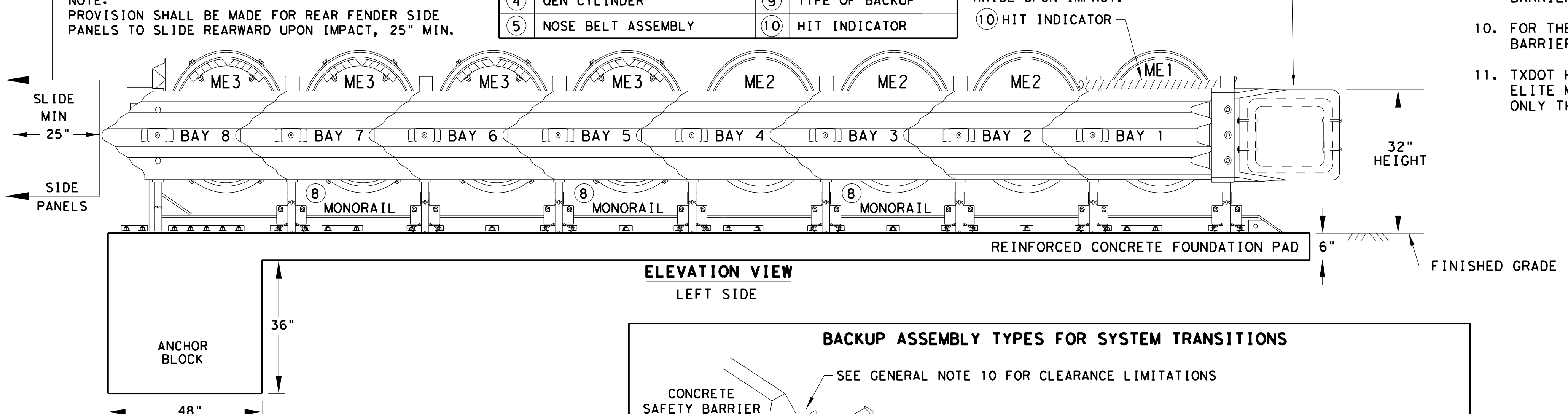
9 SHOWN WITH TENSION STRUT BACKUP ASSEMBLY

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

4 QEN CYLINDER INSTALLED INSIDE OF NOSE BELT ASSEMBLY 5

NOTE:
HIT INDICATOR WILL RAISE UPON IMPACT.

NOTE:
PROVISION SHALL BE MADE FOR REAR FENDER SIDE PANELS TO SLIDE REARWARD UPON IMPACT, 25" MIN.



ELEVATION VIEW
LEFT SIDE

NOTES:
CONTACT THE MANUFACTURER WITH SITE SPECIFIC DATA (SSD) FOR CONCRETE PAD AND ANCHOR BLOCK INSTALLATION REQUIREMENTS.

A MANUFACTURER'S DRAWING PACKAGE UNIQUE AND SPECIFIC FOR THE QUADGUARD ELITE M10 FIELD INSTALLATION AND INFORMATION REGARDING THE TYPE OF BACKUP ASSEMBLY REQUIRED FOR THE TRANSITION WILL BE PROVIDED BY THE MANUFACTURER TO THE ENGINEER AND INSTALLER.

6" REINFORCED CONCRETE PAD REQUIRES THE INSTALLATION OF AN ANCHOR BLOCK AS SHOWN ON THE MANUFACTURER'S DRAWING PACKAGE.

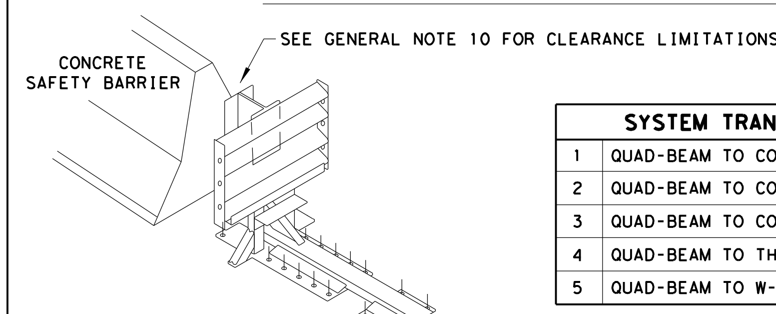
8" NON-REINFORCED CONCRETE PAD MAY NOT REQUIRE AN ANCHOR BLOCK, IF THE PAD IS INSTALLED AGAINST AN IMMOVABLE CONCRETE BACKUP.

CONCRETE PAD AND ANCHOR BLOCK COMBINATIONS SHALL BE CONFIRMED WITH THE MANUFACTURER BASED UPON SITE SPECIFIC DATA (SSD).

NOTE:
THE QUADGUARD ELITE M10 8-BAY, 24" WIDE - NARROW SYSTEM TESTED TO MASH TEST LEVEL 3.

TL-3 MODEL #	QM10024E	CYLINDER TYPES IN BAYS			
BAYS	8	TYPE-ME3	TYPE-ME2	TYPE-ME1	TYPE-QEN
DIAPHRAGMS	8	4	3	1	1
WIDTH	24"	REAR	FRONT		NOSE

BACKUP ASSEMBLY TYPES FOR SYSTEM TRANSITIONS

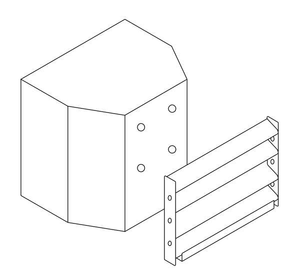


9 **TENSION STRUT BACKUP**

SYSTEM TRANSITIONS TYPES	
1	QUAD-BEAM TO CONCRETE SAFETY BARRIER
2	QUAD-BEAM TO CONCRETE BRIDGE RAIL
3	QUAD-BEAM TO CONCRETE END SHOE
4	QUAD-BEAM TO THRIE-BEAM RAIL
5	QUAD-BEAM TO W-BEAM RAIL

NOTE:
TRANSITION ASSEMBLIES FOR THE QUADGUARD ELITE M10 TO THRIE-BEAM OR W-BEAM FENCE REQUIRES I-BEAM POSTS:

ALL POSTS W6X8.5/9 I-BEAMS (78" LONG).



9 **CONCRETE BACKUP**

NOTES:
CONTACT THE MANUFACTURER WITH SITE SPECIFIC DATA (SSD) FOR THE CORRECT BACKUP ASSEMBLY AND TRANSITION PANELS OR SIDE PANELS USED FOR STANDARD AND BI-DIRECTIONAL INSTALLATIONS: AT DIVIDED-HIGHWAY MEDIANS OR UNDIVIDED ROADWAYS WHERE THE SYSTEM IS EXPOSED TO IMPACTS FROM ONE OR TWO DIFFERENT DIRECTIONS OF TRAFFIC FLOW.

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: TRINITY HIGHWAY - ENERGY ABSORPTION INC. AT 1(888)323-6374.
2. SEE THE RECENT QUADGUARD ELITE M10 PRODUCT DESCRIPTION ASSEMBLY MANUAL FOR IMPACT PERFORMANCE CHARACTERISTICS AND DESIGN LIMITATIONS AND THE DRAWING PACKAGE FOR THE NARROW 24" SYSTEM BEFORE INSTALLING THE QUADGUARD ELITE M10 AT ANY GIVEN LOCATION.
3. FOR BI-DIRECTIONAL TRAFFIC: THE LOCATION AND OR WIDTH OF THE QUADGUARD ELITE M10 IS RESTRICTED. AS BI-DIRECTIONAL TRAFFIC APPROACHES THE REAR OF THE QUADGUARD ELITE M10, THE QUADGUARD ELITE M10 SHOULD NOT EXTEND FURTHER INTO THE TRAFFIC-SIDE OF THE BARRIER THAN THE OBSTACLE. ANY TRANSITION INSTALLED MUST EITHER BE TANGENT TO BOTH QUADGUARD ELITE M10 AND OBSTACLE OR MUST ANGLE TOWARD FIELD SIDE OF THE BARRIER.
4. SYSTEM TRANSITION: APPROPRIATE TRANSITION PANELS OR SIDE PANELS WILL BE REQUIRED FOR PROPER IMPACT PERFORMANCE. THE CORRECT PANEL(S) TO USE WILL DEPEND ON THE DIRECTION OF TRAFFIC FLOW AND WHAT TYPE OF BARRIER OR ROAD FEATURE THE QUADGUARD ELITE M10 SYSTEM IS SHIELDING. SEE THE QUADGUARD ELITE M10 PRODUCT DESCRIPTION & ASSEMBLY MANUAL FOR FURTHER DETAILS.
5. COMPONENTS FOR THE QUADGUARD ELITE (M10) BACKUP AND REINFORCING DETAILS ARE SHOWN ON THE QUADGUARD ELITE M10 PRODUCT DESCRIPTION & ASSEMBLY MANUAL.
6. CONCRETE PAD SHALL BE 6" MIN. REINFORCED 28MPa [4,000 PSI] (P.C.) OR 8" MIN. NON-REINFORCED 28MPa [4,000 PSI] CONCRETE ROADWAY MEASURING AT LEAST 12'-0" WIDE BY 50'-0" LONG. ANCHOR BLOCK IS NOT REQUIRED WHEN USING 8" CONCRETE PAD INSTALLED AGAINST AN IMMOVABLE STRUCTURE, E.G. CONCRETE WALL.
7. IF THE CROSS-SLOPE VARIES MORE THAN 2% OVER THE LENGTH OF THE SYSTEM, THE CONCRETE PAD WILL REQUIRE LEVELING. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%.
8. THE INSTALLATION AREA SHOULD BE FREE OF CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
9. THE QUADGUARD ELITE M10 SYSTEM SHOULD BE INSTALLED APPROXIMATELY PARALLEL WITH THE BARRIER.
10. FOR THE TENSION STRUT BACKUP THE DISTANCE BETWEEN THE BACK OF BACKUP AND THE BARRIER WALL SHOULD NOT EXCEED 7" IN ANY CASE.
11. TXDOT HAS ONLY APPROVED THE 24" WIDE QUADGUARD ELITE M10 SYSTEM. THE QUADGUARD ELITE M10 PRODUCT DESCRIPTION AND ASSEMBLY MANUAL INCLUDES SYSTEM WIDTH OF 24". ONLY THE 24" SYSTEM IS ALLOWED TO BE INSTALLED ON TEXAS ROADWAYS.

FOUNDATION & ANCHORING REQUIREMENTS FOUNDATION TYPES: A, B, C, & D	
FOUNDATION TYPE: A	REINFORCED CONCRETE PAD OR ROADWAY
FOUNDATION:	6" MINIMUM DEPTH (P.C.C.)
ANCHORAGE:	7" STUDS EMBEDDED 5 1/2" - APPROVED ADHESIVE
FOUNDATION TYPE: B	ASPHALT OVER P.C.C.
FOUNDATION:	3" MIN. (A.C.) OVER 3" MIN. (P.C.C.)
ANCHORAGE:	18" THREADED ROD EMBEDDED 16 1/2" - APPROVED ADHESIVE
FOUNDATION TYPE: C	ASPHALT OVER SUBBASE
FOUNDATION:	6" MIN. (A.C.) OVER 6" MIN. (C.S.)
ANCHORAGE:	18" THREADED ROD EMBEDDED 16 1/2" - APPROVED ADHESIVE
FOUNDATION TYPE: D	ASPHALT ONLY
FOUNDATION:	8" MIN. (A.C.)
ANCHORAGE:	18" THREADED ROD EMBEDDED 16 1/2" - APPROVED ADHESIVE

KEY:
ASPHALT CONCRETE (A.C.)
COMPACTED SUBBASE (C.S.)
PORTLAND CEMENT CONCRETE (P.C.C.)

NOTE: SEE TRINITY'S PRODUCT DESCRIPTION ASSEMBLY MANUAL FOR THE APPROVED ADHESIVE.

IF THE UNIT IS ANCHORED TO ASPHALTIC CONCRETE, IT SHOULD BE RELOCATED TO FRESH, UNDISTURBED ASPHALT AND RE-ANCHORED AFTER EACH IMPACT TO ENSURE ADEQUATE FUTURE PERFORMANCE.

TENSION STRUT BACKUP MAY BE USED IN CONSTRUCTION ZONES ON ASPHALT CONCRETE (A.C.) FOR TEMPORARY USE ONLY.

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE QUADGUARD ELITE M10 SYSTEM AND IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

LOW MAINTENANCE

Texas Department of Transportation — Design Division Standard

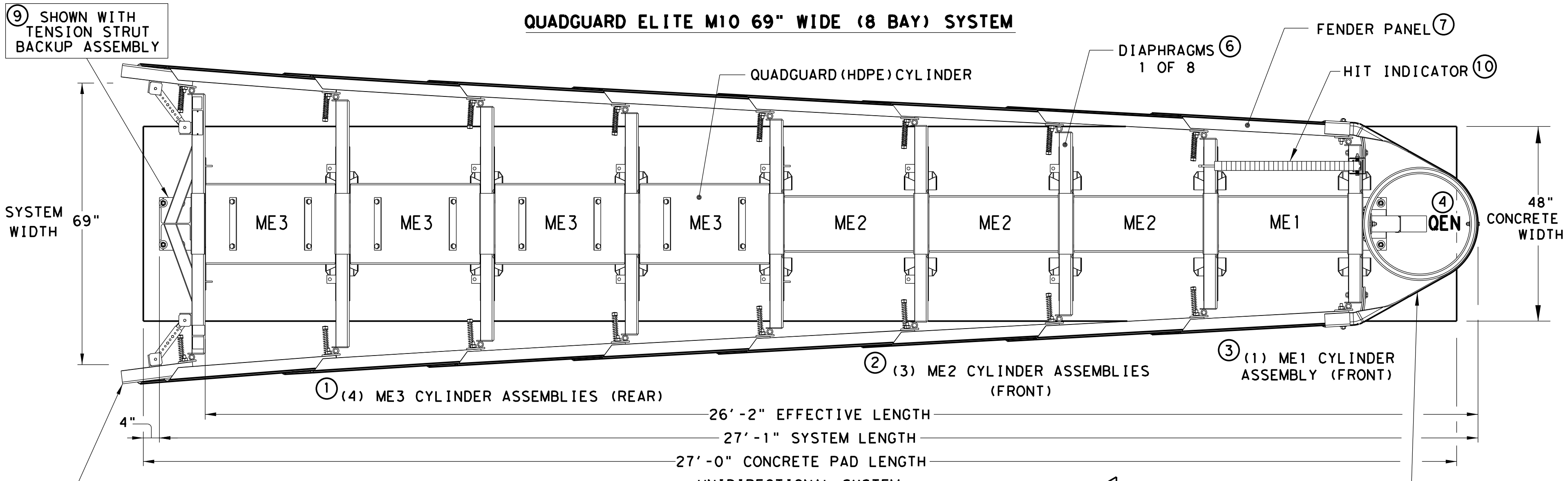
TRINITY HIGHWAY ENERGY ABSORPTION QUADGUARD ELITE M10 (MASH TL-3)

QGELITE(M10)(N)-20

FILE: qgelitem10n20.dgn	DN: TxDOT	CK: KM	DW: VP	CK: AG
© TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
	DIST		COUNTY	SHEET NO.
	12		HARRIS/GAL	116

FILE: t:\0*gen-ao\0*maintenance\000*new contrac...
DATE: 1/4/2021
PROJECT: 6375-52-001

QUADGUARD ELITE M10 69" WIDE (8 BAY) SYSTEM



NOTE:
A TRANSITION MAY BE REQUIRED TO INSTALL THE QUADGUARD ELITE M10 TO THE OBJECT BEING SHIELDED.

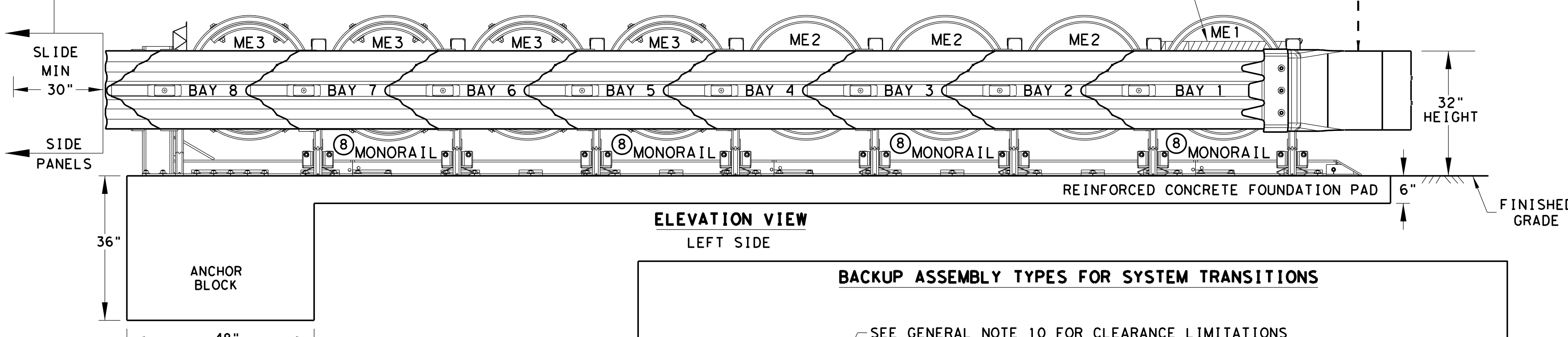
PLAN VIEW

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

4 QEN CYLINDER INSTALLED INSIDE OF NOSE BELT ASSEMBLY 5

NOTE:
PROVISION SHALL BE MADE FOR REAR FENDER SIDE PANELS TO SLIDE REARWARD UPON IMPACT, 30" MIN.

NOTE:
HIT INDICATOR WILL RAISE UPON IMPACT.
10 HIT INDICATOR



ELEVATION VIEW

LEFT SIDE

NOTES:
CONTACT THE MANUFACTURER WITH SITE SPECIFIC DATA (SSD) FOR CONCRETE PAD AND ANCHOR BLOCK INSTALLATION REQUIREMENTS.

A MANUFACTURER'S DRAWING PACKAGE UNIQUE AND SPECIFIC FOR THE QUADGUARD ELITE WIDE M10 FIELD INSTALLATION AND INFORMATION REGARDING THE TYPE OF BACKUP ASSEMBLY REQUIRED FOR THE TRANSITION WILL BE PROVIDED BY THE MANUFACTURER TO THE ENGINEER AND INSTALLER.

6" REINFORCED CONCRETE PAD REQUIRES THE INSTALLATION OF AN ANCHOR BLOCK AS SHOWN ON THE MANUFACTURER'S DRAWING PACKAGE.

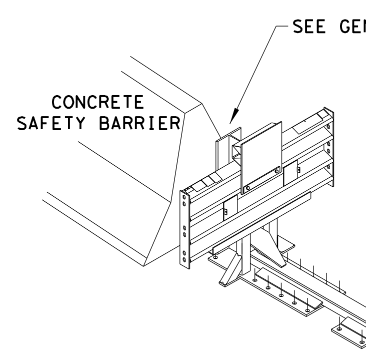
8" NON-REINFORCED CONCRETE PAD MAY NOT REQUIRE AN ANCHOR BLOCK, IF THE PAD IS INSTALLED AGAINST AN IMMOVABLE CONCRETE BACKUP.

CONCRETE PAD AND ANCHOR BLOCK COMBINATIONS SHALL BE CONFIRMED WITH THE MANUFACTURER BASED UPON SITE SPECIFIC DATA (SSD).

NOTE:
THE QUADGUARD ELITE M10 WIDE 8-BAY SYSTEM TESTED TO MASH TEST LEVEL 3.

TL-3 MODEL #	QM10069E	CYLINDER TYPES IN BAYS			
BAYS	8	TYPE-ME3	TYPE-ME2	TYPE-ME1	TYPE-QEN
DIAPHRAGMS	8	4	3	1	1
WIDTH	69"	REAR	FRONT		NOSE

BACKUP ASSEMBLY TYPES FOR SYSTEM TRANSITIONS



9 TENSION STRUT BACKUP

SYSTEM TRANSITIONS TYPES	
1	QUAD-BEAM TO CONCRETE SAFETY BARRIER
2	QUAD-BEAM TO CONCRETE BRIDGE RAIL
3	QUAD-BEAM TO SINGLE SLOPE OFFSET
4	QUAD-BEAM TO CONCRETE END SHOE
5	QUAD-BEAM TO THRIE-BEAM RAIL
6	QUAD-BEAM TO W-BEAM RAIL

NOTE:
TRANSITION ASSEMBLIES FOR THE QUADGUARD ELITE M10 TO THRIE-BEAM OR W-BEAM FENCE REQUIRES I-BEAM POSTS:

ALL POSTS W6X8.5/9 I-BEAMS (78" LONG).

NOTES:
CONTACT THE MANUFACTURER WITH SITE SPECIFIC DATA (SSD) FOR THE CORRECT BACKUP ASSEMBLY AND TRANSITION PANELS OR SIDE PANELS USED FOR STANDARD AND BI-DIRECTIONAL INSTALLATIONS: AT DIVIDED-HIGHWAY MEDIANS OR UNDIVIDED ROADWAYS WHERE THE SYSTEM IS EXPOSED TO IMPACTS FROM ONE OR TWO DIFFERENT DIRECTIONS OF TRAFFIC FLOW.

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE QUADGUARD ELITE M10 WIDE SYSTEM AND IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: TRINITY HIGHWAY - ENERGY ABSORPTION INC. AT 1(888)323-6374.
2. SEE THE RECENT QUADGUARD ELITE M10 WIDE PRODUCT DESCRIPTION ASSEMBLY MANUAL FOR IMPACT PERFORMANCE CHARACTERISTICS AND DESIGN LIMITATIONS AND THE DRAWING PACKAGE FOR THE WIDE 69" SYSTEM BEFORE INSTALLING THE QUADGUARD ELITE M10 AT ANY GIVEN LOCATION.
3. FOR BI-DIRECTIONAL TRAFFIC: THE LOCATION AND OR WIDTH OF THE QUADGUARD ELITE M10 WIDE 69" IS RESTRICTED. AS BI-DIRECTIONAL TRAFFIC APPROACHES THE REAR OF THE QUADGUARD ELITE M10 WIDE 69", THE QUADGUARD ELITE M10 SHOULD NOT EXTEND FURTHER INTO THE TRAFFIC-SIDE OF THE BARRIER THAN THE OBSTACLE. ANY TRANSITION INSTALLED MUST EITHER BE TANGENT TO BOTH QUADGUARD ELITE M10 AND OBSTACLE OR MUST ANGLE TOWARD FIELD SIDE OF THE BARRIER.
4. SYSTEM TRANSITION: APPROPRIATE TRANSITION PANELS OR SIDE PANELS WILL BE REQUIRED FOR PROPER IMPACT PERFORMANCE. THE CORRECT PANEL(S) TO USE WILL DEPEND ON THE DIRECTION OF TRAFFIC FLOW AND WHAT TYPE OF BARRIER OR ROAD FEATURE THE QUADGUARD ELITE M10 SYSTEM IS SHIELDING. SEE THE QUADGUARD ELITE M10 WIDE [69"] PRODUCT DESCRIPTION & ASSEMBLY MANUAL FOR FURTHER DETAILS.
5. COMPONENTS FOR THE QUADGUARD ELITE (M10) BACKUP AND REINFORCING DETAILS ARE SHOWN ON THE QUADGUARD ELITE M10 WIDE PRODUCT DESCRIPTION & ASSEMBLY MANUAL.
6. CONCRETE PAD SHALL BE 6" MIN. REINFORCED 28MPa [4,000 PSI] (P.C.) OR 8" MIN. NON-REINFORCED 28MPa [4,000 PSI] CONCRETE ROADWAY MEASURING AT LEAST 12'-0" WIDE BY 50'-0" LONG. ANCHOR BLOCK IS NOT REQUIRED WHEN USING 8" CONCRETE PAD INSTALLED AGAINST AN IMMOVABLE STRUCTURE, E.G. CONCRETE WALL.
7. IF THE CROSS-SLOPE VARIES MORE THAN 2% OVER THE LENGTH OF THE SYSTEM, THE CONCRETE PAD WILL REQUIRE LEVELING. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%.
8. THE INSTALLATION AREA SHOULD BE FREE OF CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
9. THE QUADGUARD ELITE M10 SYSTEM SHOULD BE INSTALLED APPROXIMATELY PARALLEL WITH THE BARRIER.
10. FOR THE TENSION STRUT BACKUP, THE DISTANCE BETWEEN THE BACK OF BACKUP AND THE BARRIER WALL SHOULD NOT EXCEED 7" IN ANY CASE.
11. THE WIDE QUADGUARD ELITE M10 SYSTEM IS ONLY AVAILABLE IN A 69" WIDTH.

FOUNDATION & ANCHORING REQUIREMENTS FOUNDATION TYPES: A, B, C, & D	
FOUNDATION TYPE: A	REINFORCED CONCRETE PAD OR ROADWAY
FOUNDATION:	6" MINIMUM DEPTH (P.C.C.)
ANCHORAGE:	7" STUDS EMBEDDED 5 1/2" - APPROVED ADHESIVE
FOUNDATION TYPE: B	ASPHALT OVER P.C.C.
FOUNDATION:	3" MIN. (A.C.) OVER 3" MIN. (P.C.C.)
ANCHORAGE:	18" THREADED ROD EMBEDDED 16 1/2" - APPROVED ADHESIVE
FOUNDATION TYPE: C	ASPHALT OVER SUBBASE
FOUNDATION:	6" MIN. (A.C.) OVER 6" MIN. (C.S.)
ANCHORAGE:	18" THREADED ROD EMBEDDED 16 1/2" - APPROVED ADHESIVE
FOUNDATION TYPE: D	ASPHALT ONLY
FOUNDATION:	8" MIN. (A.C.)
ANCHORAGE:	18" THREADED ROD EMBEDDED 16 1/2" - APPROVED ADHESIVE

KEY:
ASPHALT CONCRETE (A.C.)
COMPACTED SUBBASE (C.S.)
PORTLAND CEMENT CONCRETE (P.C.C.)

NOTE: SEE TRINITY'S PRODUCT DESCRIPTION ASSEMBLY MANUAL FOR THE APPROVED ADHESIVE.

IF THE UNIT IS ANCHORED TO ASPHALTIC CONCRETE, IT SHOULD BE RELOCATED TO FRESH, UNDISTURBED ASPHALT AND RE-ANCHORED AFTER EACH IMPACT TO ENSURE ADEQUATE FUTURE PERFORMANCE.

TENSION STRUT BACKUP MAY BE USED IN CONSTRUCTION ZONES ON ASPHALT CONCRETE (A.C.) FOR TEMPORARY USE ONLY.

LOW MAINTENANCE

Texas Department of Transportation — Design Division Standard

TRINITY HIGHWAY ENERGY ABSORPTION QUADGUARD ELITE M10 WIDE (MASH TL-3)

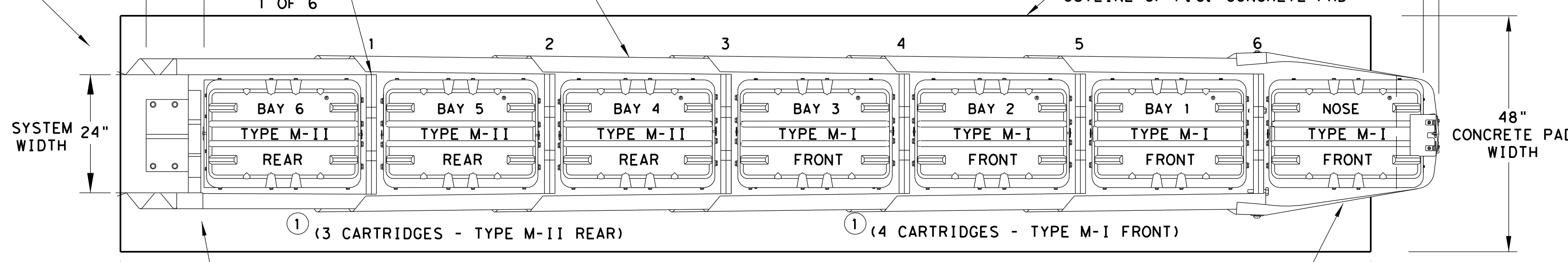
QGELITE(M10)(W)-20

FILE: qgelitem10w20.dgn	DN: TxDOT	CK: KM	DW: SS	CK: AG
© TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
	DIST		COUNTY	SHEET NO.
	12		HARRIS/GAL	117

FILE: t:\0*gen-ao\0*maintenance\000*new contract
DATE: 1/4/2021
PROJECT: 6375-52-001

NOTE:
A TRANSITION MAY BE REQUIRED TO INSTALL THE QUADGUARD M10 TO THE OBJECT BEING SHIELDED.

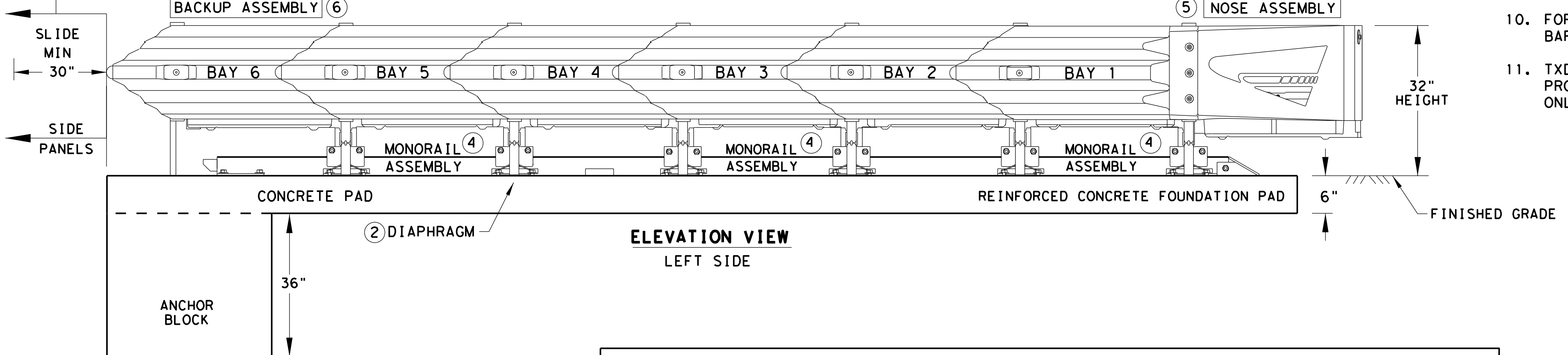
QUADGUARD M10 24" WIDE 6-BAY SYSTEM



PLAN VIEW

KEY		KEY	
1	QUADGUARD CARTRIDGE	4	MONORAILS
2	DIAPHRAGM	5	NOSE ASSEMBLY
3	FENDER PANEL	6	BACKUP ASSEMBLY

NOTE:
PROVISION SHALL BE MADE FOR REAR FENDER SIDE PANELS TO SLIDE REARWARD UPON IMPACT, 30" MIN.



ELEVATION VIEW
LEFT SIDE

NOTES:
CONTACT THE MANUFACTURER WITH SITE SPECIFIC DATA (SSD) FOR CONCRETE PAD AND ANCHOR BLOCK INSTALLATION REQUIREMENTS.

A MANUFACTURER'S DRAWING PACKAGE UNIQUE AND SPECIFIC FOR THE QUADGUARD M10 (N) INSTALATION AND DETAILED INFORMATION REGARDING THE TYPE OF BACKUP ASSEMBLY FOR THE REQUIRED TRANSITION WILL BE PROVIDED TO THE ENGINEER AND INSTALLER.

6" REINFORCED CONCRETE PAD REQUIRES THE INSTALLATION OF AN ANCHOR BLOCK AS SHOWN ON THE MANUFACTURER'S DRAWING PACKAGE.

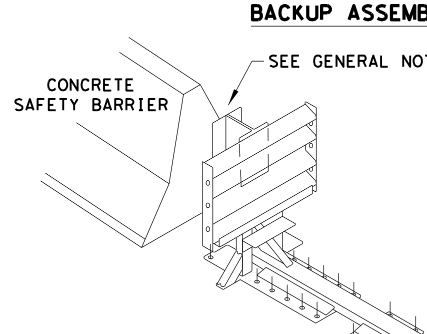
8" NON-REINFORCED CONCRETE PAD MAY NOT REQUIRE AN ANCHOR BLOCK, IF THE PAD IS INSTALLED AGAINST AN IMMOVABLE CONCRETE BACKUP.

CONCRETE PAD AND ANCHOR BLOCK COMBINATIONS SHALL BE CONFIRMED WITH THE MANUFACTURER BASED UPON SITE SPECIFIC DATA (SSD).

NOTE:
THE QUADGUARD M10 24" WIDE 6-BAY - NARROW SYSTEM HAS BEEN TESTED TO MASH TEST LEVEL 3.

TL-3 MODEL #	QM10024	CYLINDER TYPES IN BAYS		
BAYS	6	TYPE-MII	TYPE-MI	TYPE-MI
DIAPHRAGMS	6	3	3	1
WIDTH	24"	REAR	FRONT	NOSE

BACKUP ASSEMBLY TYPES FOR SYSTEM TRANSITIONS

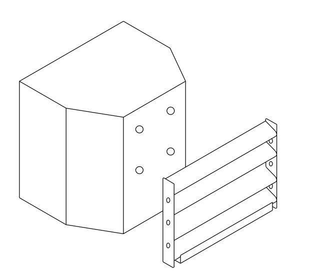


6 **TENSION STRUT BACKUP**

SYSTEM TRANSITIONS TYPES	
1	QUAD-BEAM TO CONCRETE SAFETY BARRIER
2	QUAD-BEAM TO CONCRETE BRIDGE RAIL
3	QUAD-BEAM TO CONCRETE END SHOE
4	QUAD-BEAM TO THRIE-BEAM RAIL
5	QUAD-BEAM TO W-BEAM RAIL

NOTE:
TRANSITION ASSEMBLIES FOR THE QUADGUARD M10 TO THRIE-BEAM OR W-BEAM FENCE REQUIRES I-BEAM POSTS:

10 (W6X9) I-BEAM POSTS.
POST 1 THRU 4 (84" LONG)
POST 5 THRU 10 (72" LONG)



6 **CONCRETE BACKUP**

NOTES:
CONTACT THE MANUFACTURER WITH SITE SPECIFIC DATA (SSD) FOR THE CORRECT BACKUP ASSEMBLY AND TRANSITION PANELS OR SIDE PANELS USED FOR STANDARD AND BI-DIRECTIONAL INSTALLATIONS: AT DIVIDED-HIGHWAY MEDIANS OR UNDIVIDED ROADWAYS WHERE THE SYSTEM IS EXPOSED TO IMPACTS FROM ONE OR TWO DIFFERENT DIRECTIONS OF TRAFFIC FLOW.

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE QUADGUARD M10 SYSTEM AND IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: TRINITY HIGHWAY - ENERGY ABSORPTION INC. AT 1(888)323-6374.
2. SEE THE RECENT QUADGUARD M10 PRODUCT DESCRIPTION ASSEMBLY MANUAL FOR IMPACT PERFORMANCE CHARACTERISTICS AND DESIGN LIMITATIONS AND THE DRAWING PACKAGE FOR THE NARROW 24" SYSTEM BEFORE INSTALLING THE QUADGUARD M10 SYSTEM AT ANY GIVEN LOCATION.
3. FOR BI-DIRECTIONAL TRAFFIC: THE LOCATION AND OR WIDTH OF THE QUADGUARD M10 IS RESTRICTED. AS BI-DIRECTIONAL TRAFFIC APPROACHES THE REAR OF THE QUADGUARD M10, THE QUADGUARD M10 SHOULD NOT EXTEND FURTHER INTO THE TRAFFIC-SIDE OF THE BARRIER THAN THE OBSTACLE. ANY TRANSITION INSTALLED MUST EITHER BE TANGENT TO BOTH QUADGUARD AND OBSTACLE OR MUST ANGLE TOWARD FIELD SIDE OF THE BARRIER.
4. SYSTEM TRANSITION: APPROPRIATE TRANSITION PANELS OR SIDE PANELS WILL BE REQUIRED FOR PROPER IMPACT PERFORMANCE. THE CORRECT PANEL(S) TO USE WILL DEPEND ON THE DIRECTION OF TRAFFIC FLOW AND WHAT TYPE OF BARRIER OR ROAD FEATURE THE QUADGUARD M10 SYSTEM IS SHIELDING. SEE THE QUADGUARD M10 PRODUCT DESCRIPTION & ASSEMBLY MANUAL FOR FURTHER DETAILS.
5. COMPONENTS FOR THE QUADGUARD M10 BACKUP AND REINFORCING DETAILS ARE SHOWN ON THE QUADGUARD M10 PRODUCT DESCRIPTION & ASSEMBLY MANUAL.
6. CONCRETE PAD SHALL BE 6" MIN. REINFORCED 28MPa [4,000 PSI] (P.C.) OR 8" MIN. NON-REINFORCED 28MPa [4,000 PSI] CONCRETE ROADWAY MEASURING AT LEAST 12'-0" WIDE BY 50'-0" LONG. ANCHOR BLOCK IS NOT REQUIRED WHEN USING 8" CONCRETE PAD INSTALLED AGAINST AN IMMOVABLE STRUCTURE, E.G. CONCRETE WALL.
7. IF THE CROSS-SLOPE VARIES MORE THAN 2% OVER THE LENGTH OF THE SYSTEM, THE CONCRETE PAD WILL REQUIRE LEVELING. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%.
8. THE INSTALLATION AREA SHOULD BE FREE OF CURBS, ELEVATED OBJECTS,OR DEPRESSIONS.
9. THE QUADGUARD M10 SYSTEM SHOULD BE INSTALLED APPROXIMATELY PARALLEL WITH THE BARRIER.
10. FOR THE TENSION STRUT BACKUP THE DISTANCE BETWEEN THE BACK OF BACKUP AND THE BARRIER WALL SHOULD NOT EXCEED 7" IN ANY CASE.
11. TXDOT HAS ONLY APPROVED THE 24" WIDE QUADGUARD M10 SYSTEM. THE QUADGUARD M10 PRODUCT DESCRIPTION AND ASSEMBLEY MANUAL INCLUDES SYSTEM WIDTH OF 24". ONLY THE 24" SYSTEM IS ALLOWED TO BE INSTALLED ON TEXAS ROADWAYS.

FOUNDATION & ANCHORING REQUIREMENTS FOUNDATION TYPES: A, B, C, & D	
FOUNDATION TYPE: A	REINFORCED CONCRETE PAD OR ROADWAY
FOUNDATION:	6" MINIMUM DEPTH (P.C.C.)
ANCHORAGE:	7" STUDS EMBEDDED 5 1/2" - APPROVED ADHESIVE
FOUNDATION TYPE: B	ASPHALT OVER P.C.C.
FOUNDATION:	3" MIN. (A.C.) OVER 3" MIN. (P.C.C.)
ANCHORAGE:	18" THREADED ROD EMBEDDED 16 1/2"
FOUNDATION TYPE: C	ASPHALT OVER SUBBASE
FOUNDATION:	6" MIN. (A.C.) OVER 6" MIN. (C.S.)
ANCHORAGE:	18" THREADED ROD EMBEDDED 16 1/2" - APPROVED ADHESIVE
FOUNDATION TYPE: D	ASPHALT ONLY
FOUNDATION:	8" MIN. (A.C.)
ANCHORAGE:	18" THREADED ROD EMBEDDED 16 1/2" - APPROVED ADHESIVE

KEY:
ASPHALT CONCRETE (A.C.)
COMPACTED SUBBASE (C.S.)
PORTLAND CEMENT CONCRETE (P.C.C.)

NOTE: SEE TRINITY'S PRODUCT DESCRIPTION ASSEMBLY MANUAL FOR THE APPROVED ADHESIVE.

IF THE UNIT IS ANCHORED TO ASPHALTIC CONCRETE, IT SHOULD BE RELOCATED TO FRESH, UNDISTURBED ASPHALT AND RE-ANCHORED AFTER EACH IMPACT TO ENSURE ADEQUATE FUTURE PERFORMANCE.

TENSION STRUT BACKUP MAY BE USED IN CONSTRUCTION ZONES ON ASPHALT CONCRETE (A.C.) FOR TEMPORARY USE ONLY.

Texas Department of Transportation — Design Division Standard

TRINITY HIGHWAY ENERGY ABSORPTION QUADGUARD M10 (MASH TL-3 NARROW-24"ONLY)

QGUARD(M10)(N)-20

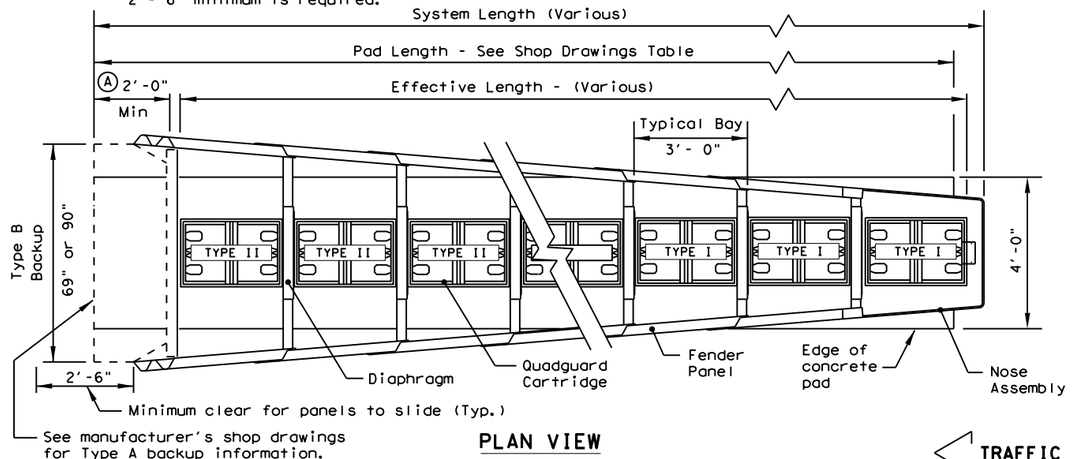
FILE: qguardm10n20.dgn	DN: TxDOT	CK: KM	DW: VP	CK: AG
© TxDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
	DIST		COUNTY	SHEET NO.
	12		HARRIS/GAL	118

REUSABLE

FILE: t:\0*gen-ao\0*maintenance\000*new contract
DATE: 1/4/2021
PROJECT: 6375-52-001

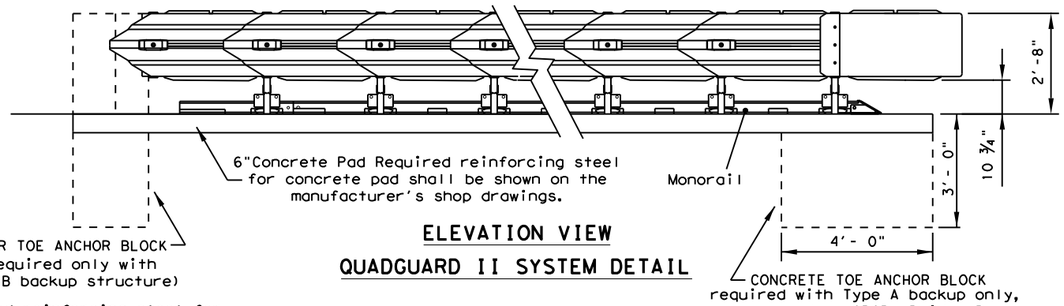
FILE: T:\O\GEN-AO\O\Maintenance\000\New Contracts\TxDOT Standards\TxDOT Standards\quadw17.dgn
DATE: 1/5/2021
PROJECT: 6375-52-001

Ⓐ If Quad endshoes are used, then 2′-6" minimum is required.



PLAN VIEW

TRAFFIC

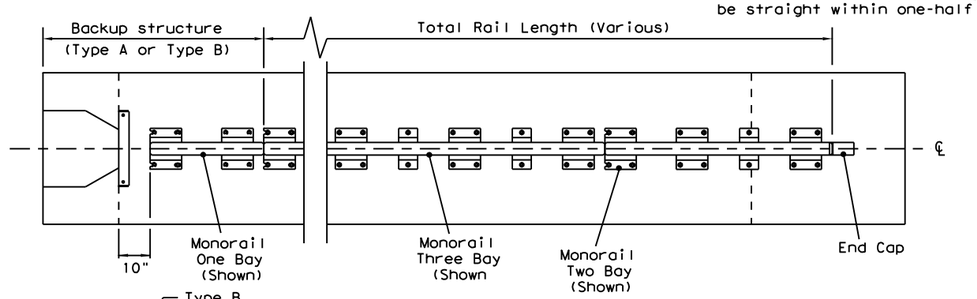


ELEVATION VIEW

QUADGUARD II SYSTEM DETAIL

Required reinforcing steel for concrete anchor shall be shown on the manufacturer's shop drawings.

Note: Monorail and Backup Assembly must be straight within one-half inch.



PLAN VIEW

TRAFFIC

ELEVATION VIEW

MONORAIL ASSEMBLY DETAIL

(See the manufacturer's shop drawings for monorail hardware installation.)

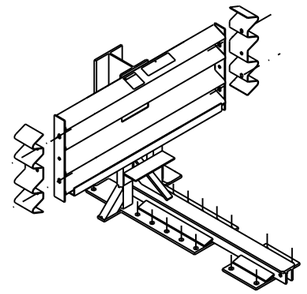
Concrete rear toe anchor block

Concrete toe anchor block (see additional information in System Detail.)

QUADGUARD II (WIDE) SYSTEM				
Test Level	NO. OF BAYS	UNIT EFFECTIVE LENGTH	PAD LENGTH TYPE A	PAD LENGTH TYPE B
TL-2	3	11′- 8"	12′- 0"	11′- 6"
TL-3	5	17′- 8"	18′- 0"	17′- 6"

Additional bays may be added if special considerations warrant and site conditions will accommodate additional length.

QUAD II (W) units are available in 69" and 90" widths from 3 to 8 bays.
Unit width, number of bays, and backup type shall be specified elsewhere in the plans.



TYPE A
TENSION STRUT BACKUP

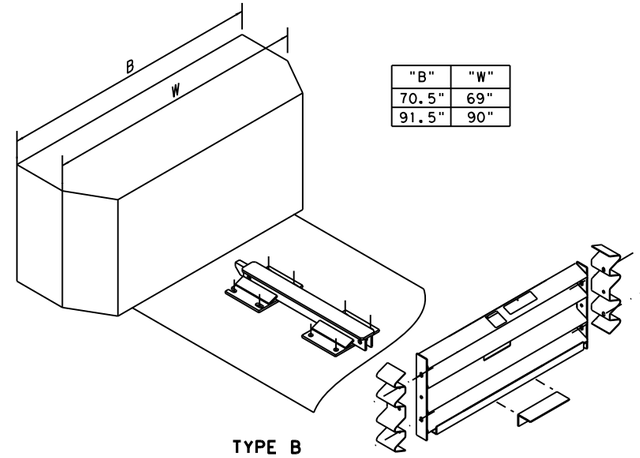
TENSION STRUT: Consists of diagonal struts, connections, and accessories, as detailed by the Manufacturer, located at the rear of the QUAD unit. Typical application is for QUAD units attached to double-face guardrail. When used, a 4′-0"x 4′-0"x 3′-0" concrete toe anchor block shall be provided beneath the front portion of the concrete pad, except where the QUAD unit is to be placed on continuously reinforced concrete pavement or bridge deck (7" minimum, 4,000 p.s.i.) or non-reinforced concrete pavement (8" minimum, 4,000 p.s.i.)

Anchorage requirements are as follows:

WITH FOUNDATION TYPE:	ANCHOR WITH:
Minimum six inch portland cement concrete pad	Epoxy anchoring system with 7" studs, 5.5" embedment

GENERAL NOTES

1. For specific information regarding installation and technical guidance of the system, contact: Trinity Highway - Energy Absorption at 1(888)323-6374. 70 W. Madison St. Suite 2350. Chicago, IL 60602
2. For bi-directional traffic, appropriate transition panels will be required.
3. Details of components for the QUAD and backups and reinforcing details 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 p.s.i.
5. If the cross-slope varies more than 2% over the length of the system, the concrete pad will require levelling. Maximum permissible cross-slope is 8%.
6. The installation area should be free from curbs, elevated objects, or depressions.
7. The QUAD system should be approximately parallel with the barrier or ℄ of merging barriers.
8. Unit width selected should be adequate to protect an errant vehicle travelling at 15 degrees to the roadway from the face or corner of the fixed object.



"B"	"W"
70.5"	69"
91.5"	90"

TYPE B
CONCRETE BACKUP

CAST-IN-PLACE CONCRETE WALL BACKUP: If cast-in-place structures such as bridge parapets, columns, or special walls are used as backup structures, then intermediate walls shall be provided between the structures and the QUAD unit. Intermediate walls shall be equal in height and width to the QUAD unit and reinforced with a steel cage. A cast-in-place transition section from concrete barrier may be used. Reinforcing steel should transition from the standard barrier section to the standard backup section. Details for the intermediate walls, cast-in-place transition sections, or other modifications will be shown elsewhere in the plans. Concrete wall backups may be used on continuously reinforced concrete pavement pavement or bridge deck (7" minimum, 4,000 p.s.i)or non-reinforced concrete pavement (8" minimum, 4,000 p.s.i.) In those cases, all vertical steel will be doweled (5 inch minimum) into existing decks or located and placed prior to pouring proposed decks as approved by the Engineer.

Texas Department of Transportation

Design Division Standard

TRINITY HIGHWAY ENERGY ABSORPTION (QUADGUARD II) (WIDE)

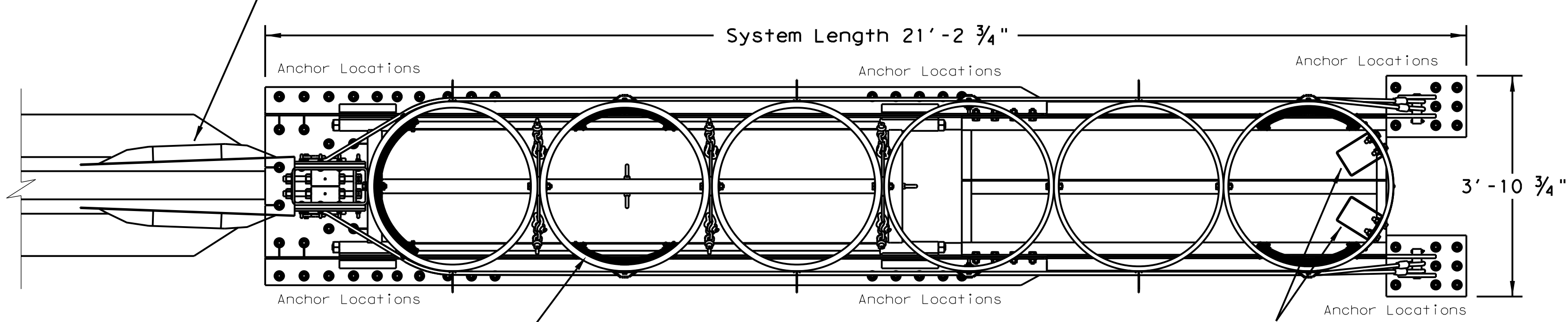
QUAD(W)-17

FILE: quadw17.dgn	DN: TxDOT	CK: KM	DW: VP	CK: KM
©TxDOT: February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
REVISED 06,2013 VP REVISED 03,2016 VP REVISED 03,2017 KM	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		119

REUSABLE

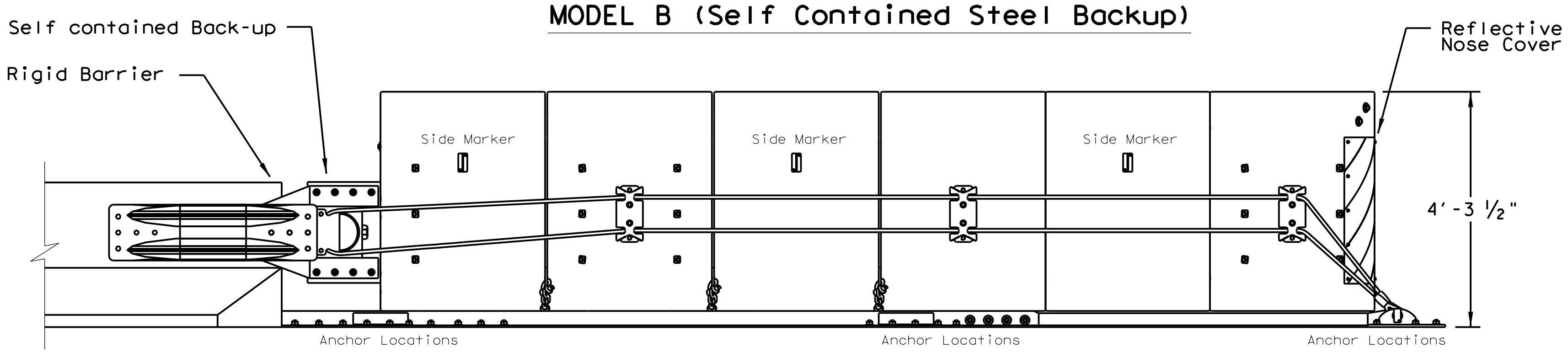
TYPICAL PLAN VIEW

MODEL B (Self Contained Steel Backup)



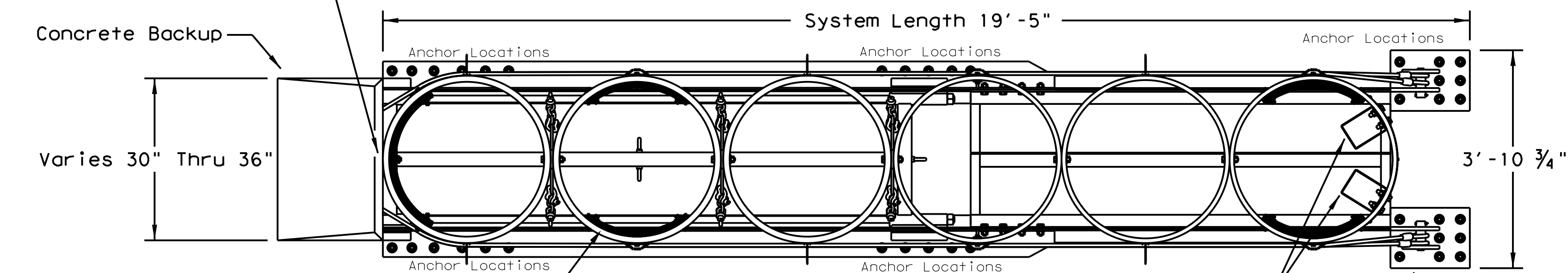
TYPICAL ELEVATION VIEW

MODEL B (Self Contained Steel Backup)



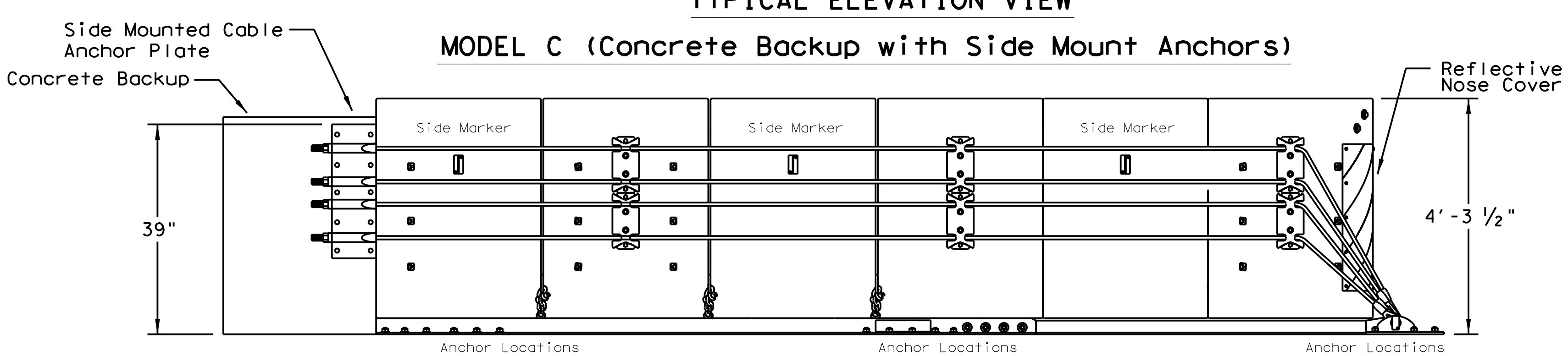
TYPICAL PLAN VIEW

MODEL C (Concrete Backup with Side Mount Anchors)



TYPICAL ELEVATION VIEW

MODEL C (Concrete Backup with Side Mount Anchors)

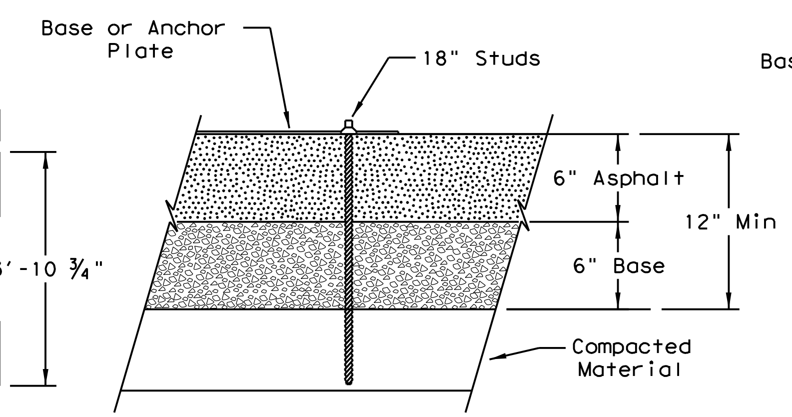


GENERAL NOTES

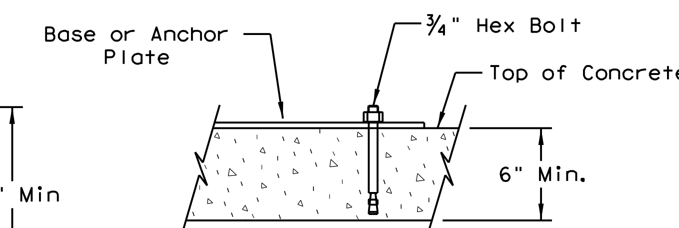
1. For specific information regarding installation and technical guidance of the system, contact: Trinity Highway - Energy Absorption at 1(888)323-6374. 70 W. Madison St. Suite 2350. Chicago, IL 60602
2. The nose of the REACT 350 shall be clad with a plastic wrap with standard delineation adhered to the wrap and shall have a series of side marker reflectors on both sides of the unit. See site plan views for marker and plastic wrap color orientation.
3. All steel components to be hot dipped galvanized except stakes, drive spikes, threaded bolts in backup unit, and wedge fittings on cables.
4. The installation area should be free from curbs, elevated objects, or depressions. If the REACT system is to span expansion joints contact the manufacturer.
5. The REACT system should be approximately parallel with the barrier or ℄ of merging barriers. The maximum permissible cross-slope is 8%.
6. REACT 350 II has laminated panels in cyliners 1, 5, & 6.

DESIGN DATA TABLE FOR REACT 350 AND REACT 350 II				
TYPE	REACT 350 4-B	REACT 350 4-C	REACT 350 II 6-B	REACT 350 II 6-C
Test Level	TL-2	TL-2	TL-3	TL-3
OVERALL LENGTH	15'-3"	13'-9"	21'-3"	19'-5"

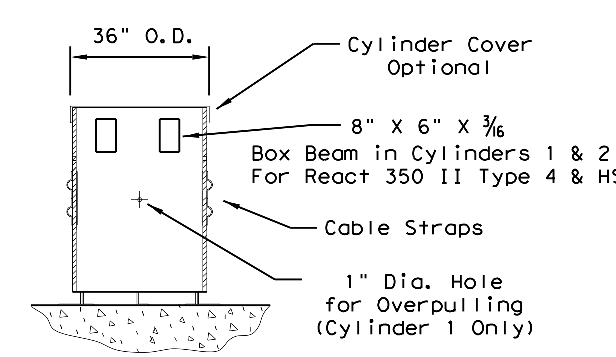
FOUNDATION AND ANCHORAGE TABLE FOR REACT 350 AND REACT 350 II			
FOUNDATION TYPE		MINIMUM THICKNESS	ANCHORAGE
A	CONCRETE PAD OR ROADWAY	6"	MP-3 WITH 7" STUDS [5.5" EMBEDMENT]
B	ASPHALT OVER CONCRETE PAVEMENT	6" CONCRETE PAVEMENT	ANCHOR LENGTH REQUIRED IS 7" STUD PLUS ASPHALT THICKNESS
C	ASPHALT OVER BASE	6" ACP + 6" BASE	MP-3 WITH 18" STUDS [16.5" EMBEDMENT]
D	ASPHALT ONLY	8"	MP-3 WITH 18" STUDS [16.5" EMBEDMENT]



ASPHALT PAVEMENT DETAIL



CONCRETE PAVEMENT DETAIL



TYPICAL CYLINDER

Texas Department of Transportation

Design Division Standard

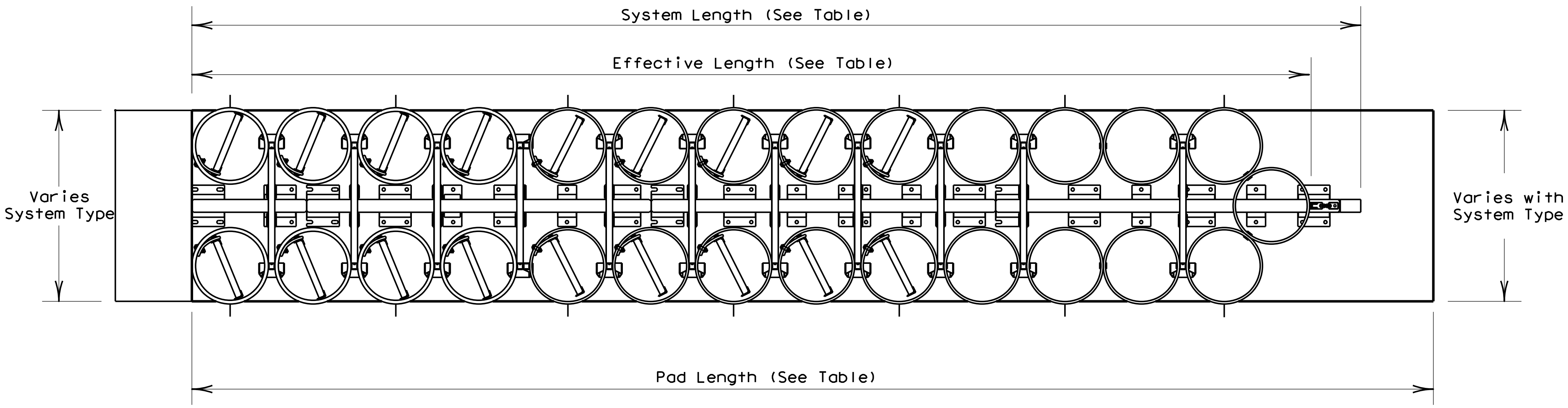
TRINITY HIGHWAY ENERGY ABSORPTION (REACT 350 NARROW) (REACT 350 II NARROW)

REACT(N)-16

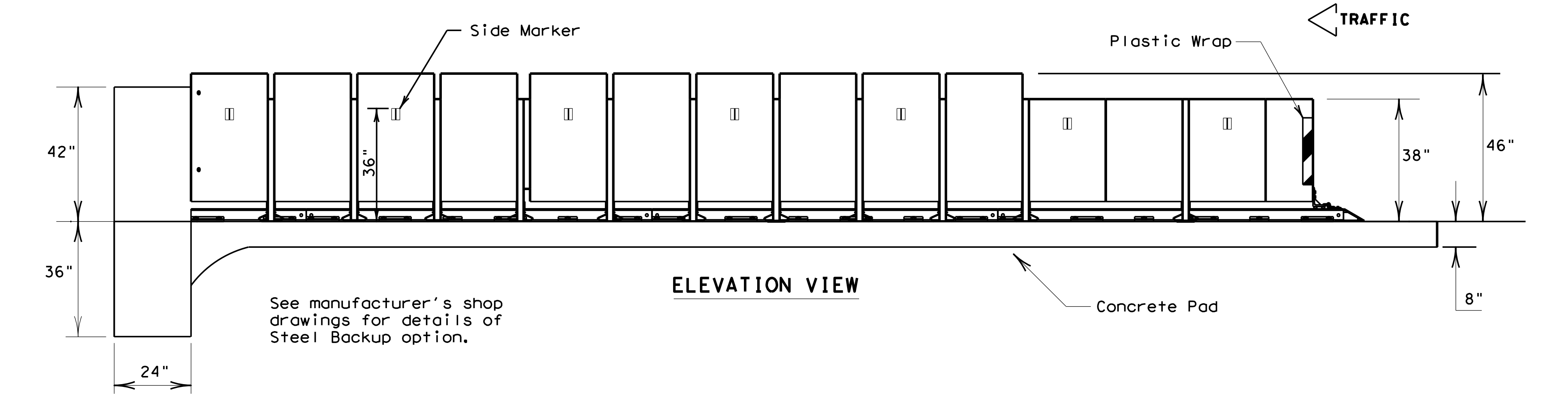
FILE: reactn16.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
REVISED 06,2013 (VP) REVISED 03,2016 (VP)	DIST		COUNTY	SHEET NO.
	12		HARRIS/GAL	120

LOW MAINTENANCE

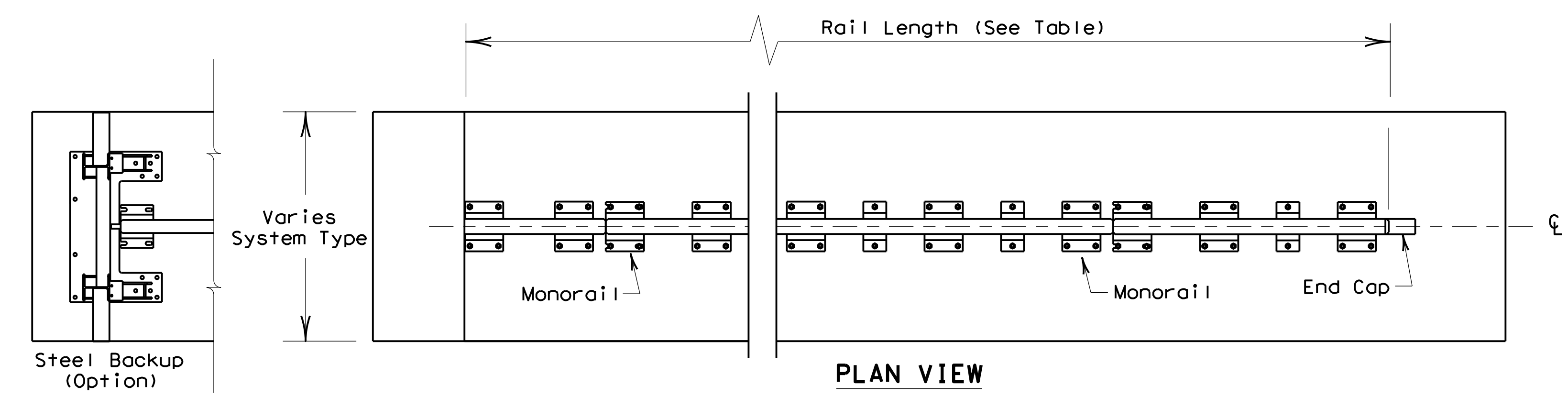
FILE: h:\00*maintenance\south harris maintenance\...
DATE: 1/4/2021
PROJECT: 6375-52-001



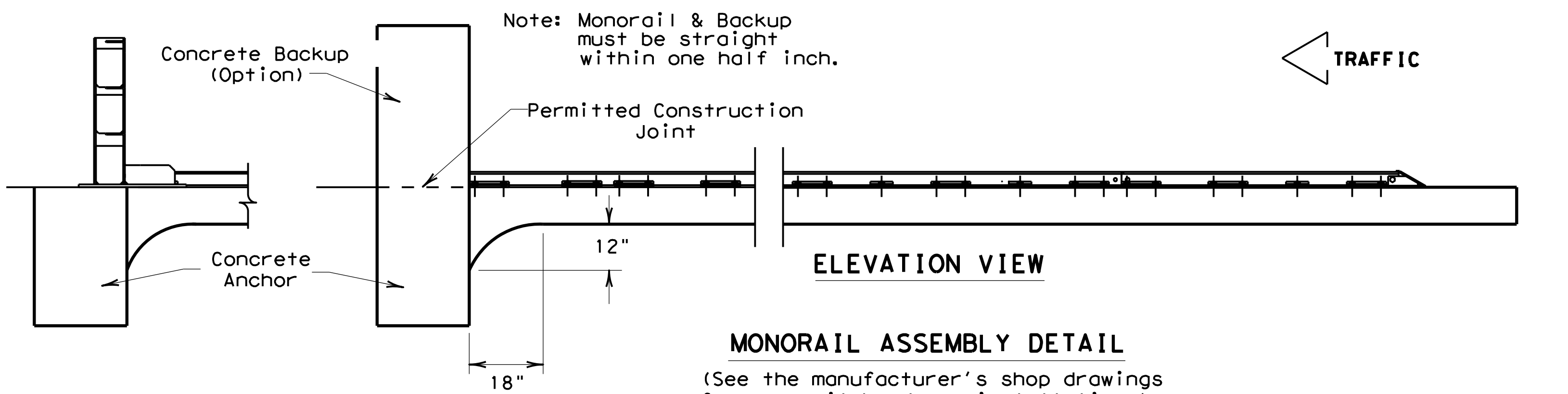
PLAN VIEW



ELEVATION VIEW



PLAN VIEW



ELEVATION VIEW

MONORAIL ASSEMBLY DETAIL

(See the manufacturer's shop drawings for monorail hardware installation.)

GENERAL NOTES

1. For specific information regarding installation and technical guidance of the system, contact: Trinity Highway - Energy Absorption at 1(888)323-6374. 70 W. Madison St. Suite 2350. Chicago, IL 60602
2. The nose of the REACT 350 shall be clad with a plastic wrap with standard delineation adhered to the wrap and shall have a series of side marker reflectors on both sides of the unit. See site plan views for marker and plastic wrap color orientation.
3. For bi-directional traffic, appropriate transition details will be as shown on the manufacturer's shop drawings.
4. Details of components for the REACT(W) and backups and reinforcing details will be shown on the manufacturer's shop drawings furnished to the Engineer.
5. If the cross-slope varies more than 2% over the length of the system, the concrete pad will require leveling. Maximum permissible cross-slope is 8%.
6. The installation area should be free from curbs, elevated objects, or depressions.
7. The REACT(W) system should be approximately parallel with the barrier or ℄ of merging barriers.
8. All steel components to be hot dipped galvanized except stakes, drive spikes, threaded bolts in backup unit, and wedge fittings on cables.

WIDE REACT SYSTEMS

SYSTEM TYPE	BACKUP WIDTH	TEST LEVEL	SYSTEM LENGTH	EFFECTIVE LENGTH	PAD LENGTH
W60	60"	TL-2 TL-3	18'-10" 30'-10"	16'-3" 29'-3"	19'-6" 32'-6"
W96	96"	TL-2 TL-3	18'-10" 34'-9"	17'-6" 32'-10"	19'-7" 35'-6"
W120	120"	TL-3	33'-10"	32'-2"	35'-6"

(See the manufacturer's shop drawings for additional details.)

ANCHOR SYSTEM TYPE

MP-3® polyester anchoring system with 7.5" studs, 5.5" embedment

FOUNDATION TYPES

Minimum 8" Reinforced concrete pad (Required reinforcing steel for concrete pad shall be shown on the manufacturer's shop drawings.

Minimum 8" Non-reinforced concrete roadway (Measuring at least 12' wide by 50' long)

Minimum 7" Concrete deck structure, or
Minimum 6" Reinforced concrete roadway

FILE: h:\00 maintenance\south harris maintenance\...
DATE: 1/4/2021
PROJECT: 6375-52-001

Texas Department of Transportation

Design Division Standard

TRINITY HIGHWAY ENERGY ABSORPTION CRASH CUSHION (REACT 350 WIDE)

REACT(W)-16

FILE: reactw16.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP
© TxDOT: October 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
REVISED 03,2016 (VP)	DIST		COUNTY	SHEET NO.
	12		HARRIS/GAL	121

LOW MAINTENANCE

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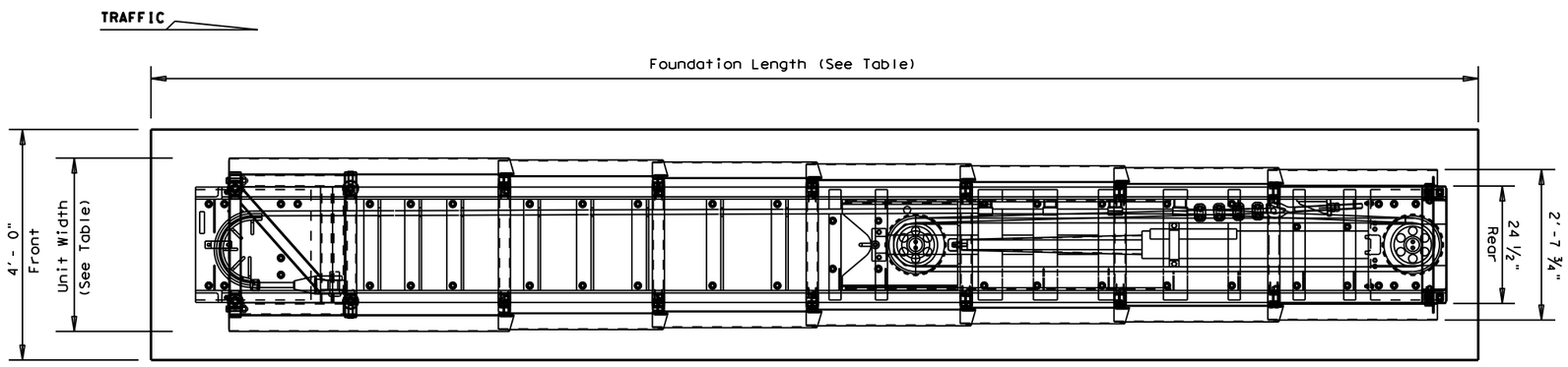
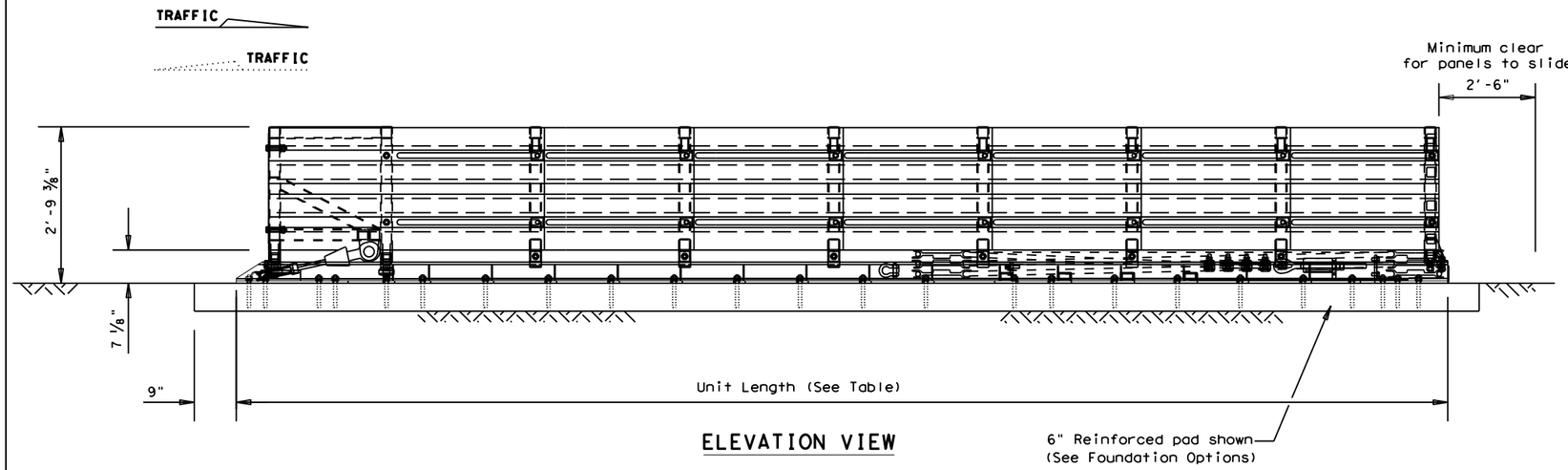
DATE: 1/4/2021
PROJECT: 6375-52-001



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 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 ℄ of merging barriers.

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.

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.

Texas Department of Transportation

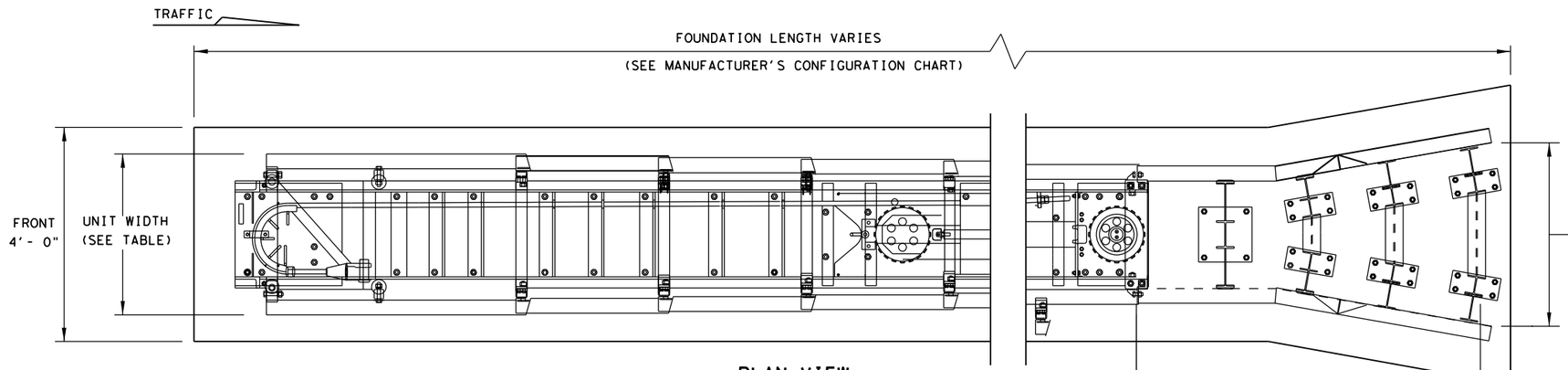
Design Division Standard

WORK AREA PROTECTION CORP (SMART-NARROW)

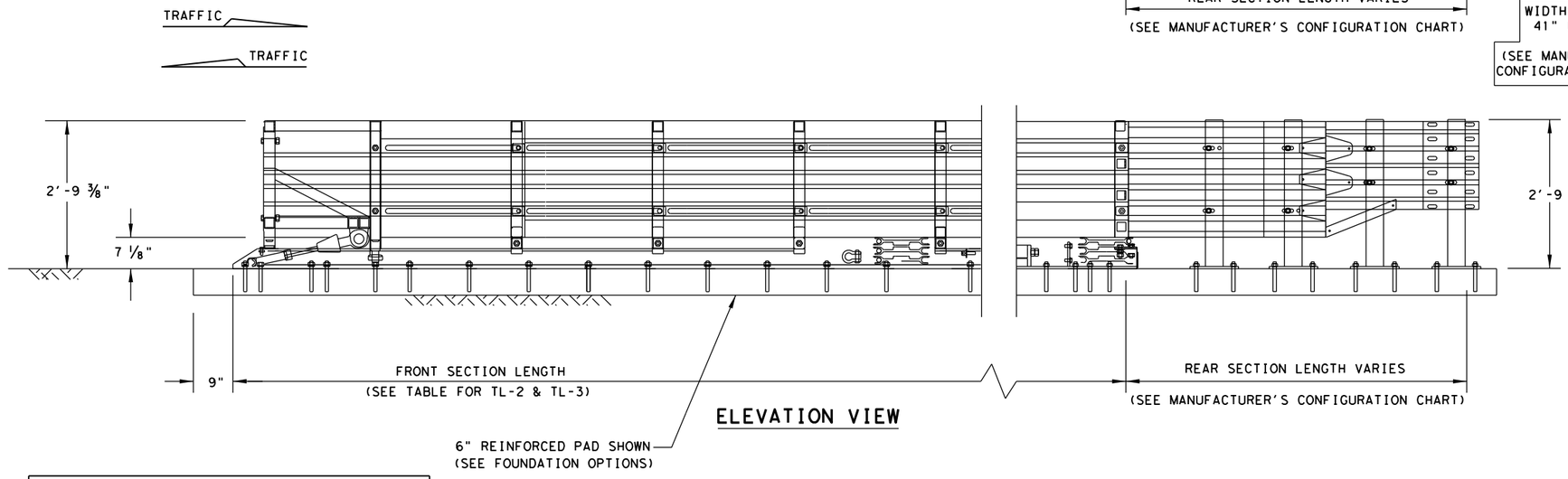
SMTC(N)-16

LOW MAINTENANCE

FILE: smtcn16.dgn	DN: TxDOT	CK: KM	DW: BD/VP	CK: VP
©TxDOT: February 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED 06, 2013 (VP) REVISED 03, 2016 (VP)	6375	52	001	IH45
	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		122



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 ℄ 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)

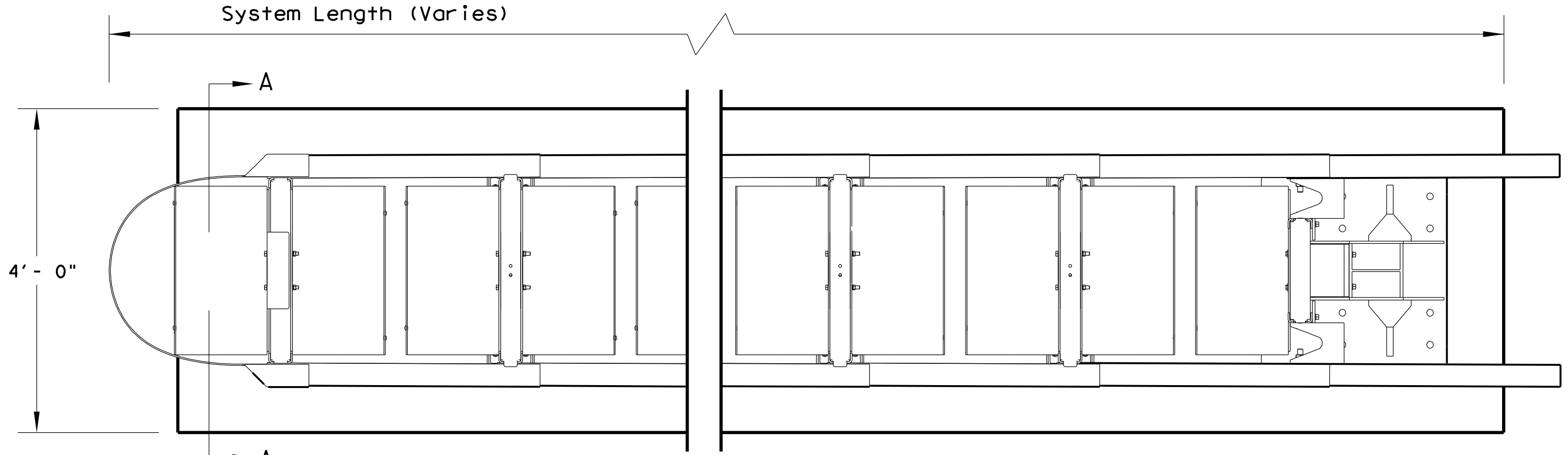
SMTC(W)-16

FILE: smtcw16.dgn	DN: TxDOT	CK:KM	DW:BD/VP	CK:VP	
©TxDOT: FEBRUARY 2006	CONT	SECT	JOB	HIGHWAY	
REVISIONS	6357	02	001	IH45	
REVISED 06, 2013 VP REVISED 03, 2016 VP REVISED 04, 2018 VP	DIST	COUNTY		SHEET NO.	
	12	HARRIS/GAL		123	

FILE: $FILES$
DATE: $DATE$
PROJECT: CSJ

GENERAL NOTES

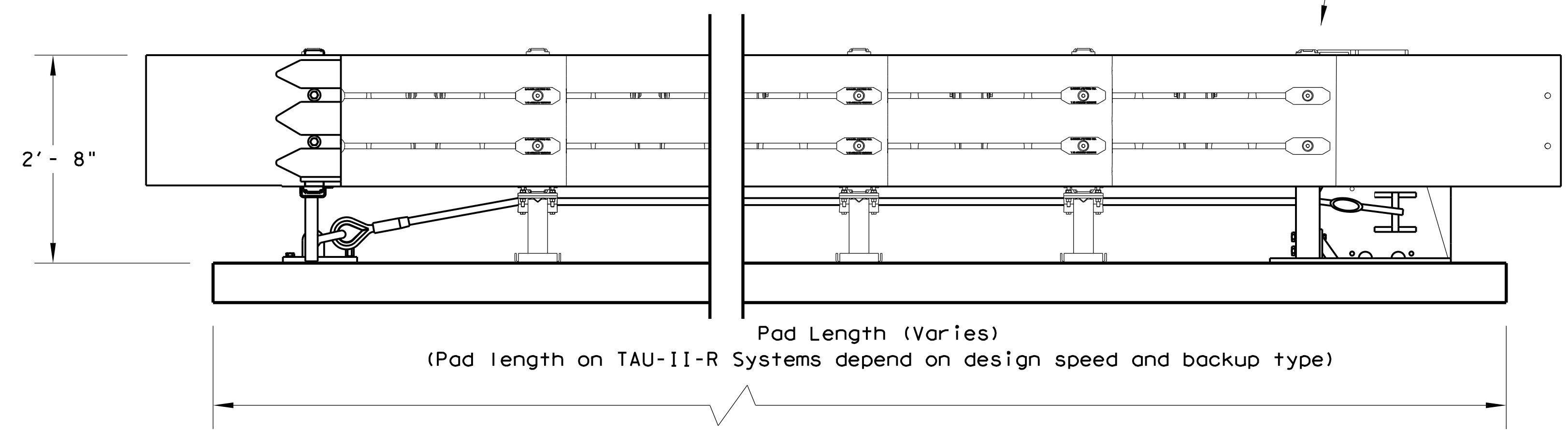
1. For specific information regarding installation and technical guidance of the system, contact: Lindsay Transportation Solutions - Barrier Systems, Inc. at (707) 374-6800. 180 River Road, Rio Vista, CA 94571
2. For bi-directional traffic, appropriate transition panels will be required.
3. Additional details for the backup support option, transition options 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 TAU-II-R system should be approximately parallel with the barrier or center of merging barriers.
8. Refer to Universal TAU-II-R configuration chart for specific systems configuration number and location of each type of energy absorbing element.
9. 30-inch (30") model shown, also avalable in 36-inch (36") configuration.



PLAN VIEW

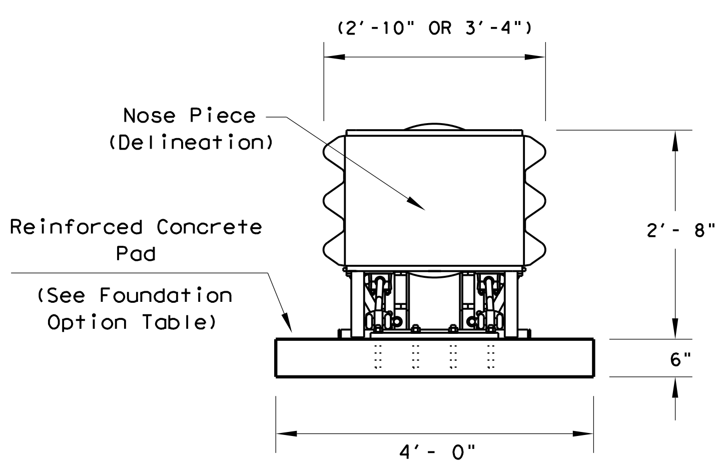
Attachments and transitions to various barrier shapes, barrier railings and bi-directional traffic flows are available.

(SEE MANUFACTURER'S PRODUCT MANUAL)



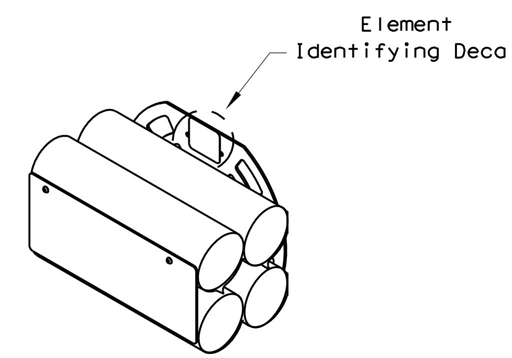
ELEVATION VIEW

TRAFFIC



SECTION A-A

Nose Piece delineation orientation, is shown elsewhere on the plans.



ENERGY ABSORBING ELEMENTS (EAE)

BILL OF MATERIAL		
PRODUCT CODE	QTY	DESCRIPTION
B030704	1	Front Support
B030703	TBD	Mid Support
TBD	1	Backstop Assembly (See Table)
TBD	1	Front Cable Anchor
TBD	1	Nose Assembly
B010202	TBD	Sliding Panel
B010659	2	End Panel
K001003	1	Slider Assembly Kit
BSI-1202006-KT	TBD	TAU-II-R Slider Kit
BSI-1107131-KT	TBD	TAU-II-R EAE Mounting Hw Kit
BSI-1012069-00	TBD	Energy Absorbing Element, Type 1
BSI-1012070-00	TBD	Energy Absorbing Element, Type 2
BSI-1012071-00	TBD	Energy Absorbing Element, Type 3
BSI-1110009-00	TBD	Energy Absorbing Element, Type 3N
TBD	TBD	Cable Assembly
K001004	TBD	Cable Guide Kit
K001005	2	Front Support Leg Kit
B010651	4	Pipe Panel Mount
TBD	1	Anchoring Package

(TBD) = To Be Determined, depending on Backup Type and System Length.

(See manufacturer's product manual for details)

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

For bi-directional transition panel and end shoe details.
(See manufacturer's product manual.)

FOUNDATION OPTIONS
6" Reinforced Concrete
8" Unreinforced Concrete
Asphalt over Concrete with Minimum 6" Embedment in Concrete
6" Asphalt over 6" Compact Subbase
8" Minimum Asphalt

For steel placement in concrete foundations.
(See manufacturer's product manual)

BACKUP SUPPORT OPTIONS
Compact(Stand Alone)
Flush Mount
PCB (Concrete Barrier)

TAU-II-R (NARROW) SYSTEM LENGTHS			
BACKSTOP	TL-2	TL-3	70 mph
PCB	13'-7"	27'-10"	30'-7"
Flush Mount	14'-0"	28'-3"	31'-0"
Compact	15'-3"	29'-6"	32'-3"

Backup and Transition types are shown elsewhere on the plans, (i.e. Attenuator location details or in the general notes).

Note: System lengths are ± 2"

LOW MAINTENANCE

Texas Department of Transportation

Design Division Standard

LTS-BARRIER SYSTEMS CRASH CUSHION (R-NARROW)

TAU-II-R(N)-16

FILE: tauiirn16.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL
©TxDOT: January 2013	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
REVISED 06,2013 (VP) REVISED 03,2016 (VP)	DIST		COUNTY	SHEET NO.
	12		HARRIS/GAL	124

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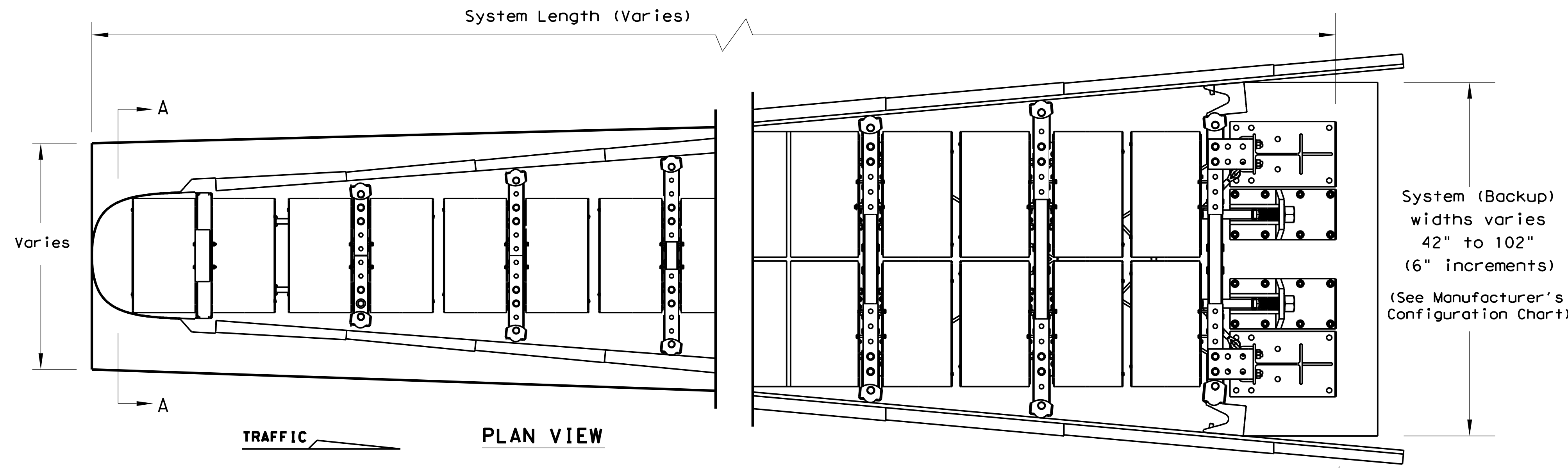
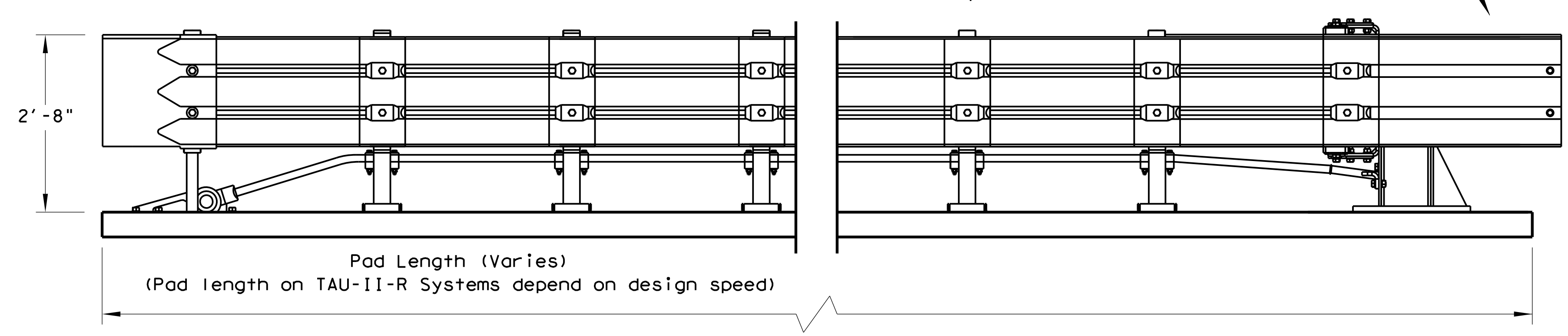
DATE: 1/4/2021
PROJECT: 6375-52-001



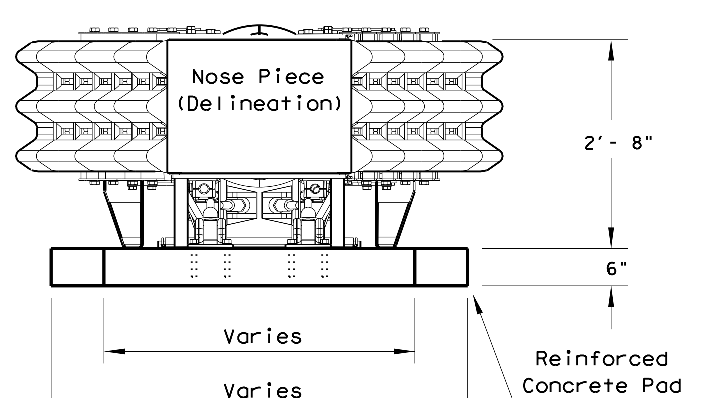
PLAN VIEW

Attachments and transitions to various barrier shapes, barrier railings and bi-directional traffic flows are available. (See manufacturer's product manual)



ELEVATION VIEW

TRAFFIC



SECTION A-A

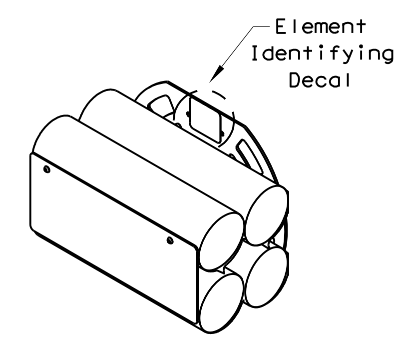
Nose Piece delineation orientation, is shown elsewhere on the plans.

GENERAL NOTES

1. For specific information regarding installation and technical guidance of the system, contact: Lindsay Transportation Solutions - Barrier Systems, Inc. at (707) 374-6800. 180 River Road, Rio Vista, CA 94571
2. For bi-directional traffic, appropriate transition panels will be required.
3. Additional details for the backup support option, 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 groud depressions.
7. The TAU-II-R system should be installed approximately parallel with the barrier or center of merging barriers.
8. Refer to Universal TAU-II-R configuration chart for system configuration numbers and location of each type of energy absorbing element.

TAU-II-R (WIDE) SYSTEM LENGTHS			
SYSTEM WIDTH	TL-2	TL-3	70 mph
42"	15'-4"	29'-5"	32'-3"
48"	15'-4"	29'-5"	32'-3"
54"	15'-4"	29'-5"	32'-3"
60"	12'-5"	29'-5"	32'-3"
66"	12'-5"	26'-7"	29'-5"
72"	12'-5"	26'-7"	26'-7"
78"	12'-5"	26'-7"	26'-7"
84"	12'-5"	26'-7"	26'-7"
90"	12'-5"	26'-7"	26'-7"
96"	12'-5"	26'-7"	26'-7"
102"			26'-7"

Note: System Lengths are +/-2"



ENERGY ABSORBING ELEMENTS (EAE)

BILL OF MATERIAL		
PRODUCT CODE	QTY	DESCRIPTION
B030704	1	Front Support
B030703	TBD	Mid Support
TBD	TBD	XL Bulkhead
TBD	TBD	XXL Bulkhead
TBD	TBD	XXXL Bulkhead
TBD	1	Backstop Assembly (See Table)
TBD	2	Front Cable Anchor
TBD	1	Nose Assembly
B010202	TBD	Sliding Panel
B010659	2	End Panel
K001003	1	Slider Assembly Kit
BSI-1202006-KT	TBD	TAU-II-R Slider Kit
BSI-1107131-KT	TBD	TAU-II-R EAE Mounting Hw Kit
BSI-1012069-00	TBD	Energy Absorbing Element, Type 1
BSI-1012070-00	TBD	Energy Absorbing Element, Type 2
BSI-1012071-00	TBD	Energy Absorbing Element, Type 3
BSI-1109042-00	TBD	Energy Absorbing Element, Type 1S
BSI-1107116-00	TBD	Energy Absorbing Element, Type 2S
BSI-1110009-00	TBD	Energy Absorbing Element, Type 3N
TBD	TBD	Cable Assembly
K001031	TBD	Lateral Support Kit
K001004	TBD	Cable Guide Kit
K001005	2	Front Support Leg Kit
TBD	1	Anchoring Package

(TBD) = To Be Determined, depending on Backup Type and System Length.
(See manufacturer's product manual for details)

BACKUP SUPPORT OPTIONS
Wide Flange (Stand alone)

Backup and Transition types are shown elsewhere on the plans, (i.e. Attenuator location details or in the general notes).

FOUNDATION OPTIONS
6" Reinforced Concrete
8" Unreinforced Concrete
Asphalt over Concrete with Minimum 6" Embedment in Concrete

For steel placement in concrete foundations.
(See manufacturer's product manual)

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

For bi-directional transition panel and end shoe details.
(See manufacturer's product manual)

LOW MAINTENANCE

Texas Department of Transportation | Design Division Standard

LTS-BARRIER SYSTEMS CRASH CUSHION (R-WIDE) TAU-II-R(W)-16

FILE: tauiirw16.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL
© TxDOT: January 2013	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
REVISED 06,2013 (VP) REVISED 02,2016 (VP)	DIST		COUNTY	SHEET NO.
	12		HARRIS/GAL	125

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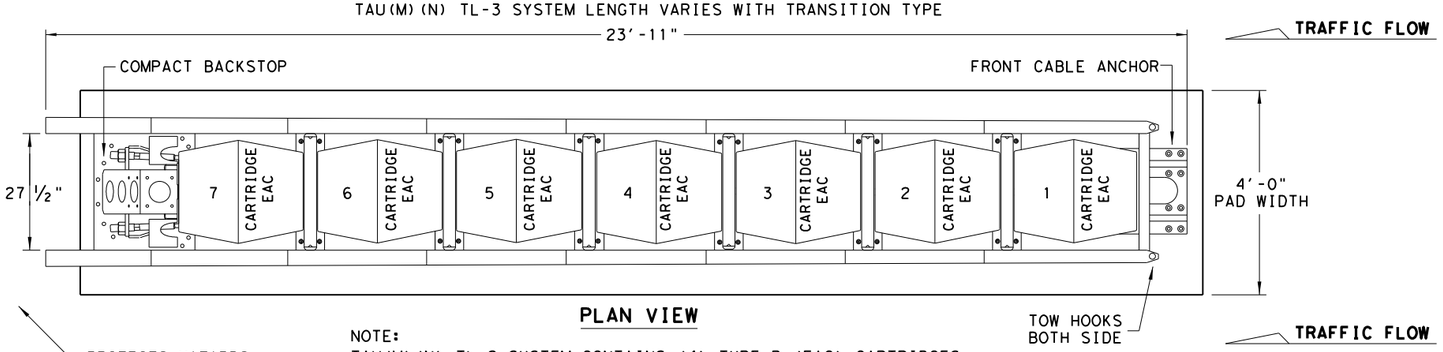
PROJECT: 6375-52-001

FILE: h:\00maintenance\south harris maintenance\2020 contracts\6357-02-001\plan sheets\tau(m)(n)19.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001

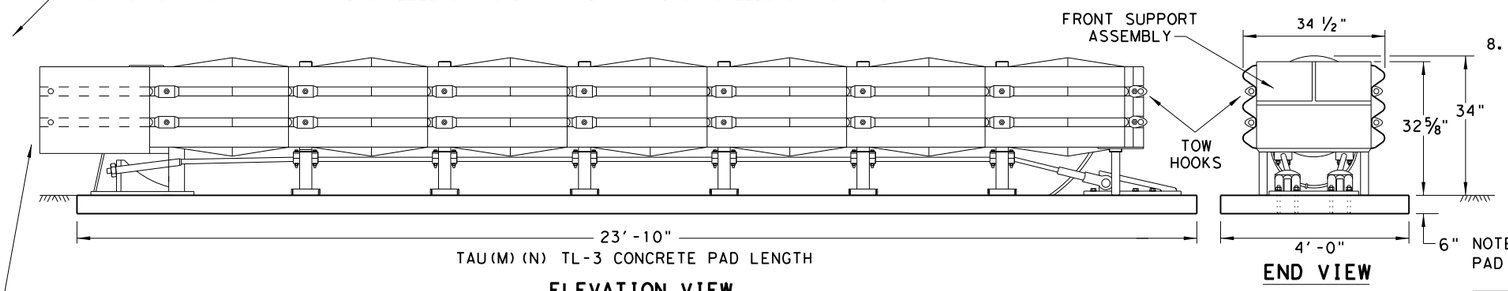
TAU(M)(N) TL-3 SYSTEM LENGTH VARIES WITH TRANSITION TYPE



PLAN VIEW

NOTE:
TAU(M)(N) TL-2 SYSTEM CONTAINS (4) TYPE B (EAC) CARTRIDGES. INSTALLED ON ROADWAYS WITH MAXIMUM SPEEDS OF 45 MPH.

PROTECTS HAZARDS UP TO 30" WIDTH



ELEVATION VIEW

END VIEW

NOTE:
PAD THICKNESS VARIES - SEE FOUNDATION OPTIONS

NOTES:
TRANSITIONS AND ATTACHMENTS TO VARIOUS BARRIER SHAPES, RAILINGS AND BI-DIRECTIONAL TRAFFIC FLOWS ARE AVAILABLE. SEE MANUFACTURER'S INSTALLATION INSTRUCTIONS MANUAL FOR ADDITIONAL TRANSITION DETAILS.

NOTE:
CONCRETE FOUNDATION PAD LENGTH VARIES WITH TL-3 AND TL-2 SYSTEMS, SEE SYSTEM & FOUNDATION LENGTH TABLE.

FOUNDATION OPTIONS
6" REINFORCED CONCRETE
8" UNREINFORCED CONCRETE
ASPHALT OVER CONCRETE WITH MINIMUM 6" EMBEDMENT IN CONCRETE
* 6" ASPHALT OVER 6" COMPACT SUBBASE
* 8" MINIMUM ASPHALT

SYSTEM & FOUNDATION LENGTH TABLE	
SYSTEM LENGTH	FOUNDATION LENGTH
TL-2 = 15'-5"	TL-2 = 15'-4"
TL-3 = 23'-11"	TL-3 = 23'-10"

* NOTE:
REQUIRES AN ASPHALT ANCHORAGE PACKAGE: INCLUDES ADDITIONAL BRACES FOR THE FRONT CABLE ANCHOR AND THE COMPACT BACKSTOP, AND ASPHALT HARDWARE KIT. THE TL-3 ASPHALT CONFIGURATION ALSO REQUIRES NESTED SLIDER PANELS AND SHIMS AT THE LAST TWO BAYS. SEE MANUFACTURER'S INSTALLATION INSTRUCTION MANUAL FOR DETAILS.

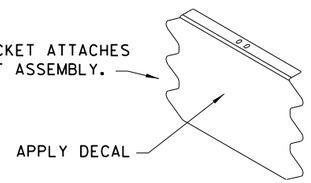
NOTE:
SEE MANUFACTURER'S INSTALLATION INSTRUCTION MANUAL FOR FOUNDATION SPECIFICATIONS THAT INCLUDE, STONE AGGREGATE MIX, COMPRESSION STRENGTH, STEEL SIZE, ANCHOR SIZE, AND EMBEDMENT DEPTH.

TRANSITION OPTIONS	
USE THE COMPACT BACKSTOP	VERTICAL WALL
	CONCRETE TRAFFIC BARRIERS
	W-BEAM GUARDRAIL
	THRIE BEAM GUARDRAIL

NOTE:
FOR BI-DIRECTIONAL TRANSITION PANELS AND BRIDGE RAIL END SHOE DETAILS. SEE MANUFACTURER'S INSTALLATION INSTRUCTIONS MANUAL.

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

NOTE:
DELINEATION BRACKET ATTACHES TO FRONT SUPPORT ASSEMBLY.



DELINEATION BRACKET

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

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING THE INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: LINDSAY TRANSPORTATION SOLUTIONS (LTS) - BARRIER SYSTEMS, INC. AT (707) 374-6800. 180 RIVER ROAD, RIO VISTA, CA 94571
2. REFER TO THE LATEST (LTS) INSTALLATION INSTRUCTION MANUAL FOR IMPORATANT SAFETY MESSAGES, COMPLETE SYSTEM ASSEMBLY, AND ANCHOR INSTALLATION REQUIREMENTS FOR THE NINE (9) DIFFERENT SITE TRANSITIONS.
3. INSTALLATION DETAILS FOR THE COMPACT BACKSTOP, FRONT CABLE ANCHOR AND FOUNDATION OPTIONS ARE SHOWN ON THE INSTALLATION INSTRUCTION MANUAL FURNISHED TO THE ENGINEER.
4. CONCRETE SHALL BE CLASS "S" WITH A MINIMUM COMPRESSIVE STRENGTH OF 4,000 P.S.I.
5. IF THE CROSS-SLOPES VARIES MORE THAN 2% OVER THE LENGTH OF THE SYSTEM, THE CONCRETE PAD WILL REQUIRE LEVELING. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%
6. THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
7. THE TAU(M)(N) SYSTEM SHOULD BE APPROXIMATELY PARALLEL WITH THE BARRIER OR CENTER LINE OF MERGING BARRIERS.
8. THIS DRAWING REPRESENTS THE UNIVERSAL TAU(M)(N) TL-3 SYSTEM, A RE-DIRECTIVE NON-GATING CRASH CUSHION THAT CAN PROTECT HAZARDS UP TO 30-INCHES IN WIDTH. ALSO AVAILABLE IN TL-2 CONFIGURATION.

BILL OF MATERIALS FOR TAU(M)(N) TL-3 & TL-2 SYSTEMS		QUANTITIES	
PART NUMBER	PART DESCRIPTION	TL-3 SYSTEM	TL-2 SYSTEM
BSI-1708019-00	SLIDING PANEL GALVANIZED TAU(M)(N)	14	8
BSI-1708030-00	END PANEL, THRIE BEAM, GALV, TAU(M)(N)	2	2
BSI-1706001-00	CABLE ASSEMBLY, 7 BAY, TAU(M)(N)	2	-
BSI-1805036-00	CABLE ASSEMBLY, 4 BAY, TAU(M)(N)	-	2
BSI-1708018-00	FRONT CABLE ANCHOR	1	1
BSI-1707034-00	COMPACT BACKSTOP	1	1
B030703	MIDDLE SUPPORT ASSEMBLY	6	3
B030704	FRONT SUPPORT	1	1
B010722	ENERGY ABSORBING CARTRIDGE, TYPE B	7	4
K001005	TAU-II FRONT SUPPORT LEG KIT	1	1
BSI-1709083-KT	TETHER KIT (INCLUDES ALL HARDWARE)	1	1
BSI-1809041-KT	SLIDER KIT (INCLUDES ALL HARDWARE)	7	4
BSI-1808033-KT	CABLE GUIDE KIT (INCLUDES ALL HARDWARE)	6	3
BSI-1809040-KT	TOW HOOK KIT (INCLUDES ALL HARDWARE)	1	1
BSI-1808034-KT	DELINEATION BRACKET KIT(INCLUDES ALL HARDWARE)	1	1
BSI-1808035-KT	END PANEL MOUNT KIT (INCLUDES ALL HARDWARE)	1	1
BSI-1808036-KT	CONCRETE ANCHORING KIT	1	1
** SEE NOTE	HIGH REFLECTIVE DECAL	1	1
ECN 3883	INSTALLATION AND INSTRUCTIONS MANUAL	1	1

NOTES:
UPGRADE KITS ARE AVAILABLE TO RETROFIT EXISTING NCHRP 350 TAU-II SYSTEMS TO MASH COMPLIANT SYSTEMS. SEE MANUFACTURER'S PRODUCT INFORMATION.

THE TAU(M)(N) UNIDIRECTIONAL SYSTEM IS FREE STANDING AND IS NOT REQUIRED TO BE CONNECTED TO THE HAZARD.

TRANSITIONS TO GUARD FENCE, BRIDGE RAILS AND ROADSIDE BARRIERS SHALL BE IN ACCORDANCE WITH TxDOT'S POLICY.

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE UNIVERSAL TAU(M)(N) SYSTEM, IT IS NOT INTENDED TO REPLACE THE INSTALLATION INSTRUCTION MANUAL.

REUSABLE

Texas Department of Transportation — Design Division Standard

LINDSAY TRANSPORTATION SOLUTIONS

UNIVERSAL CRASH CUSHION (MASH TL-3 & TL-2)

TAU(M)(N)-19

FILE: taumn19.dgn	DN: TxDOT	CK: KM	DW: VP	CK:
©TxDOT: APRIL 2019	CONT	SECT	JOB	HIGHWAY
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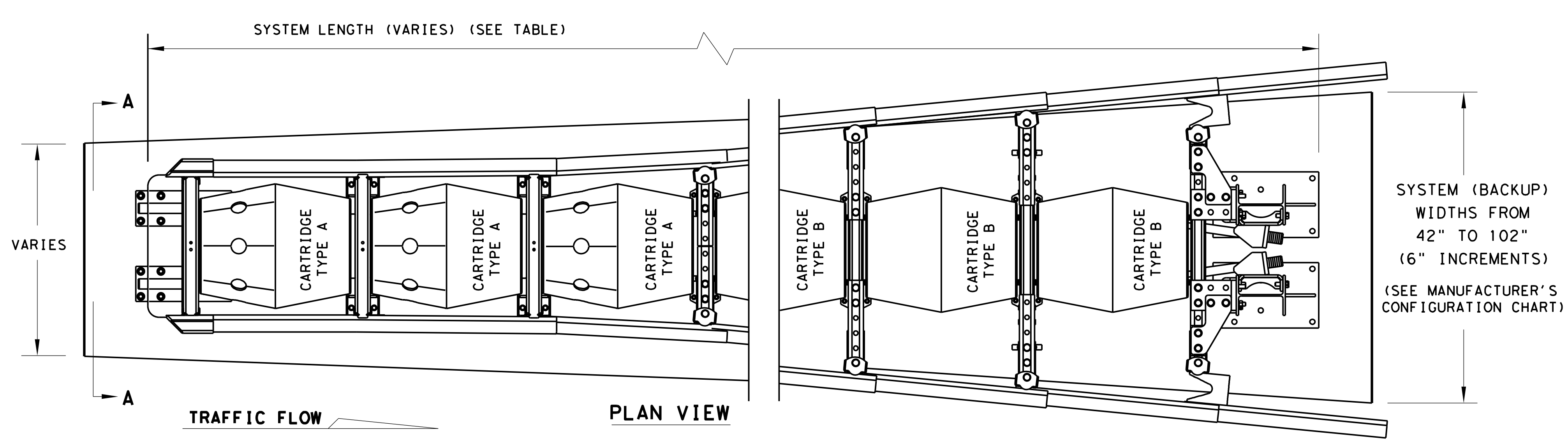
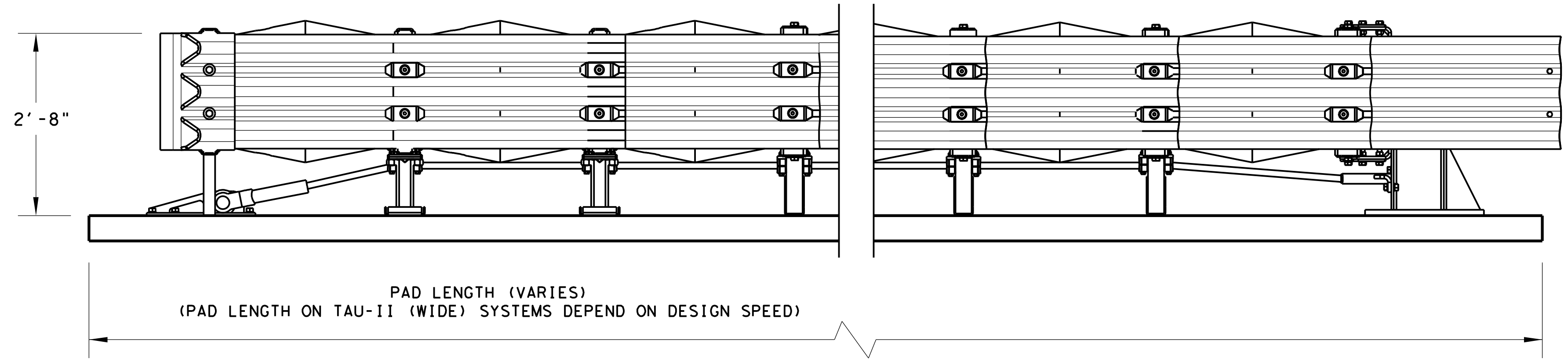
	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		126

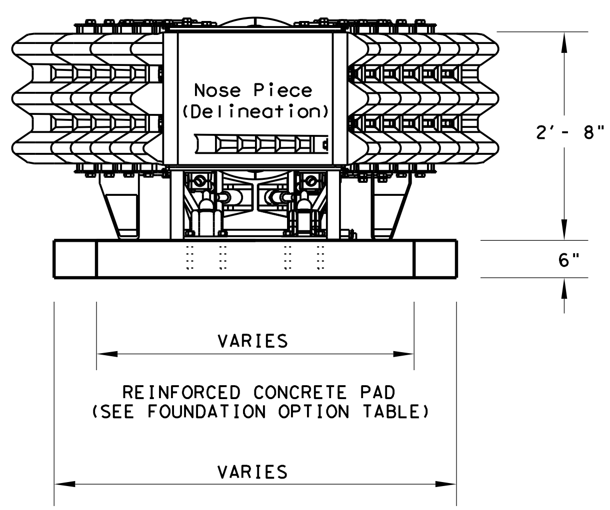


PLAN VIEW



ELEVATION VIEW

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



SECTION A-A

NOTE: NOSE PIECE DELINEATION ORIENTATION, IS SHOWN ELSEWHERE ON THE PLANS.

GENERAL NOTES

1. For specific information regarding installation and technical guidance of the system, contact: Lindsay Transportation Solutions - Barrier Systems, Inc. at (707) 374-6800. 180 River Road, Rio Vista, CA 94571
2. Refer to installation manual and configuration chart for specific system assembly and element orientation.
3. For unusual locations see the manufacturer's configuration chart. If the configuration chart does not offer a system suitable for the location a special design, or design details be made be required, contact the manufacturer for further information.
4. For bi-directional traffic, appropriate transition panels will be required.
5. Additional details for the backup support options, transition options and foundation options will be shown on the manufacturer's shop drawings furnished to the Engineer.
6. Concrete shall be class "S" with a minimum compressive strength of 4,000 p.s.i.
7. Maximum permissible cross-slope is 8%.
8. The installation area should be free from curbs, elevated objects, or depressions.
9. The TAU-II system should be approximately parallel with the barrier or ℄ of merging barriers.

FOUNDATION OPTIONS
6" REINFORCED CONCRETE
8" UNREINFORCED CONCRETE
ASPHALT OVER CONCRETE WITH MINIMUM 6" EMBEDMENT IN CONCRETE

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

TAU-II (WIDE) SYSTEM LENGTHS			
SYSTEM WIDTH	TL-2	TL-3	70 MPH
42"	14'-4"	28'-5"	31'-3"
48"	14'-4"	28'-5"	31'-3"
54"	14'-4"	28'-5"	31'-3"
60"	11'-5"	28'-5"	31'-3"
66"	11'-5"	25'-7"	28'-5"
72"	11'-5"	25'-7"	25'-7"
78"	11'-5"	25'-7"	25'-7"
84"	11'-5"	25'-7"	25'-7"
90"	11'-5"	25'-7"	25'-7"
96"	11'-5"	25'-7"	25'-7"
102"			25'-7"

NOTE: SYSTEM LENGTHS ARE +/-2"

BACKUP SUPPORT
WIDE FLANGE BACKUP (STAND ALONE)

TRANSITION OPTIONS
VERTICAL WALL
CONCRETE TRAFFIC BARRIER
W-BEAM GUARDRAIL
THRIE BEAM GUARDRAIL

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.

BILL OF MATERIAL		
PRODUCT CODE	QTY	DESCRIPTION
B030704	1	FRONT SUPPORT
B030703	TBD	MIDDLE SUPPORT
TBD	TBD	XL BULKHEAD
TBD	TBD	XXL BULKHEAD
TBD	TBD	XXXL BULKHEAD
TBD	TBD	XXXXL BULKHEAD
TBD	1	BACKUP SUPPORT
TBD	1	FRONT CABLE ANCHOR
TBD	1	NOSE
B010202	TBD	SLIDING PANEL
B010659	1	END PANEL
K001003	TBD	SLIDER ASSEMBLY KIT
B010802	TBD	ENERGY ABSORBING CARTRIDGE, TYPE A
B010722	TBD	ENERGY ABSORBING CARTRIDGE, TYPE B
TBD	2	CABLE
K001031	TBD	LATERAL SUPPORT KIT
K001004	TBD	CABLE GUIDE KIT
K001005	2	FRONT SUPPORT LEG KIT
TBD	1	ANCHORING PACKAGE
K001013	1	NOSE ATTACHING HARDWARE

(TBD) = To Be Determined, depending on Backup Width, Backup Type and System Length. (See manufacturer's product manual)

Texas Department of Transportation

Design Division Standard

LTS-BARRIER SYSTEMS CRASH CUSHION (WIDE UNIT)

TAU-II(W)-16

FILE: tauiiw16.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL
©TxDOT: September 2005	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
REVISED 06,2013 (VP) REVISED 03,2016 (VP)	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		127

REUSABLE

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DATE: 1/4/2021
PROJECT: 6375-52-001

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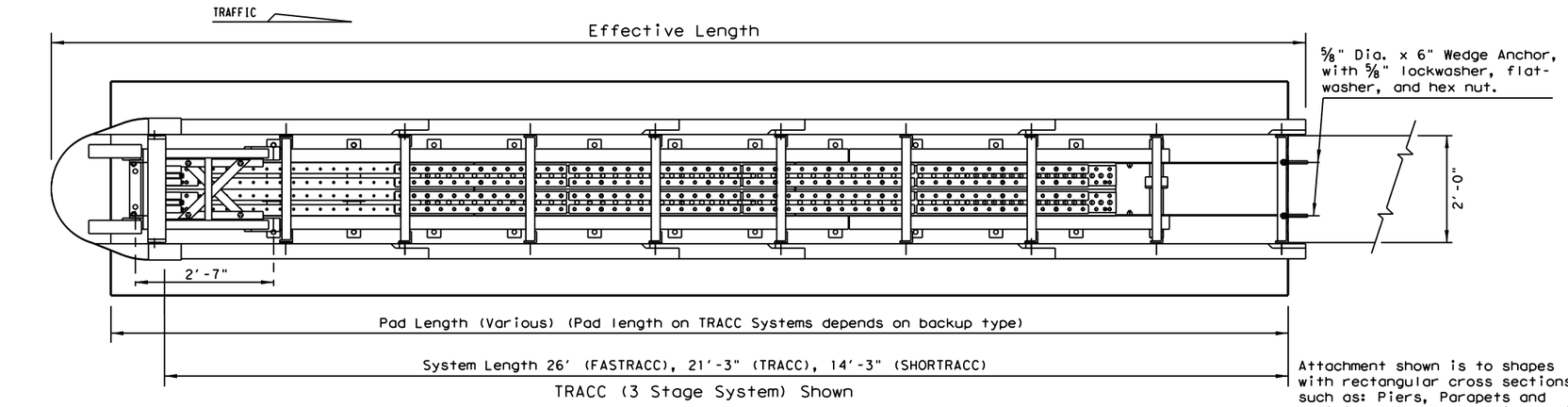
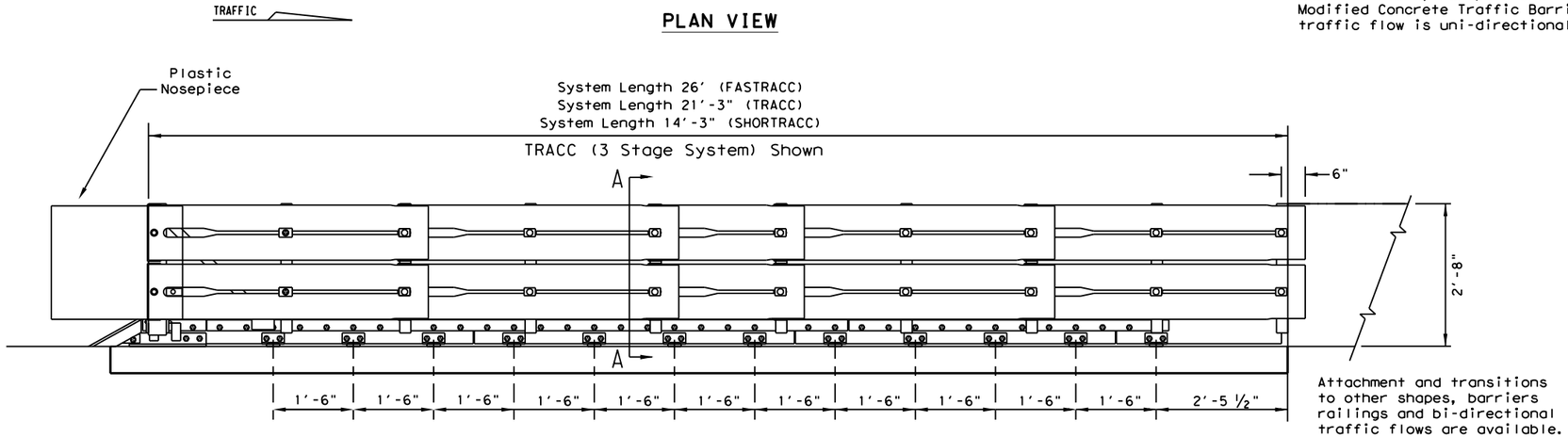
DATE: 1/4/2021
PROJECT: 6375-52-001



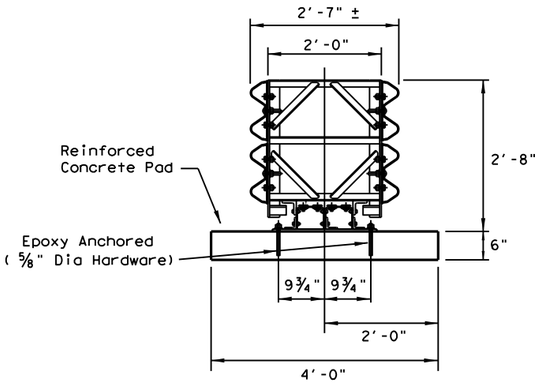
PLAN VIEW

Attachment shown is to shapes with rectangular cross sections such as: Piers, Parapets and Modified Concrete Traffic Barriers, traffic flow is uni-directional.



ELEVATION VIEW

Attachment and transitions to other shapes, barriers railings and bi-directional traffic flows are available. (See manufacturer's product manual)



SECTION A-A

BACKUP SUPPORT OPTIONS
Square Concrete Backup
Concrete Barrier (CTB) Backup
Single Slope Concrete Barrier (SSCB)
Guardrail Backup (Base-Plated Post)
Guardrail Backup (Driven Post)
TRANSITION OPTIONS
Vertical Wall
Modified (CTB) to Vertical Wall
Concrete Barrier (CTB)
Guardrail (W-Beam)
Guardrail (Thrie-Beam)

For bi-directional transition panel details (See manufacturer's product manual)

Backup and Transition types are shown elsewhere on the plans, (i.e. Attenuator location details or in the general notes).

TYPE (NARROW)	TEST LEVEL	SYSTEM LENGTH	EFFECTIVE LENGTH	PAD LENGTHS
FASTRACC (4 Stage System)	70	26'	27'- 9"	26'- 8"
TRACC (3 Stage System)	TL-3	21'- 3"	23'- 0"	22'- 0" 23'- 0" 24'- 0"
SHORTRACC (2 Stage System)	TL-2	14'- 3"	16'- 0"	15'- 0" 16'- 0" 17'- 0"

The Stage System refers to number of replaceable sled sections that could be replaced independently.

Concrete pad length on TRACC & SHORTRACC depends on backup type.

FOUNDATION OPTIONS
6" Reinforced Concrete
8" Unreinforced Concrete
3" Min. Asphalt over 3" Min. Concrete
6" Asphalt over 6" Compact Subbase
8" Minimum Asphalt

For steel placement in concrete foundations (See manufacturer's product manual)

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 bi-directional traffic, appropriate transition panels will be required.
3. Details of components for the TRACC and backups and reinforcing details 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 p.s.i.
5. If the cross-slope varies more than 2% over the length of the system, the concrete pad will require leveling. Maximum permissible cross-slope is 8%.
6. The installation area should be free from curbs, elevated objects, or depressions.
7. The TRACC system should be approximately parallel with the barrier or ℄ of merging barriers.

BILL OF MATERIAL

PART #	FAST TRACC QTY	TRACC QTY	SHORT TRACC QTY	DESCRIPTION
25936A	1			FASTRACC Unit Assembly
25980A		1		TRACC Unit Assembly
25997A			1	SHORTRACC Unit Assembly
3310G	4	4	4	5/8" Lockwasher
4451G	4	4	4	5/8" Dia x 6" Wedge Exp. Anchor
6531B	1	1	1	Plastic Nosepiece
6668B	4	4	4	Reflective Sheeting
✳ ANCHOR HARDWARE (CONCRETE BASE)				
5204G	32	26	18	5/8"Dia x 7 1/2" All Thd. Rod
3310G	32	26	18	5/8" Lockwasher
3361G	32	26	18	5/8" Hex Nut
3300G	32	26	18	5/8" Flat Washer
5206B	3	3	2	TRACC Adhesive HIT HY150 Kit
✳ ANCHOR HARDWARE (ASPHALT BASE)				
6380G	32	26	18	5/8" Dia x 18" All Thd. Rod
3310G	32	26	18	5/8" Lockwasher
3361G	32	26	18	5/8" Hex Nut
3300G	32	26	18	5/8" Flat Washer
5206B	7	5	4	TRACC Adhesive HIT HY150 Kit

✳ See manufacturer's product manual

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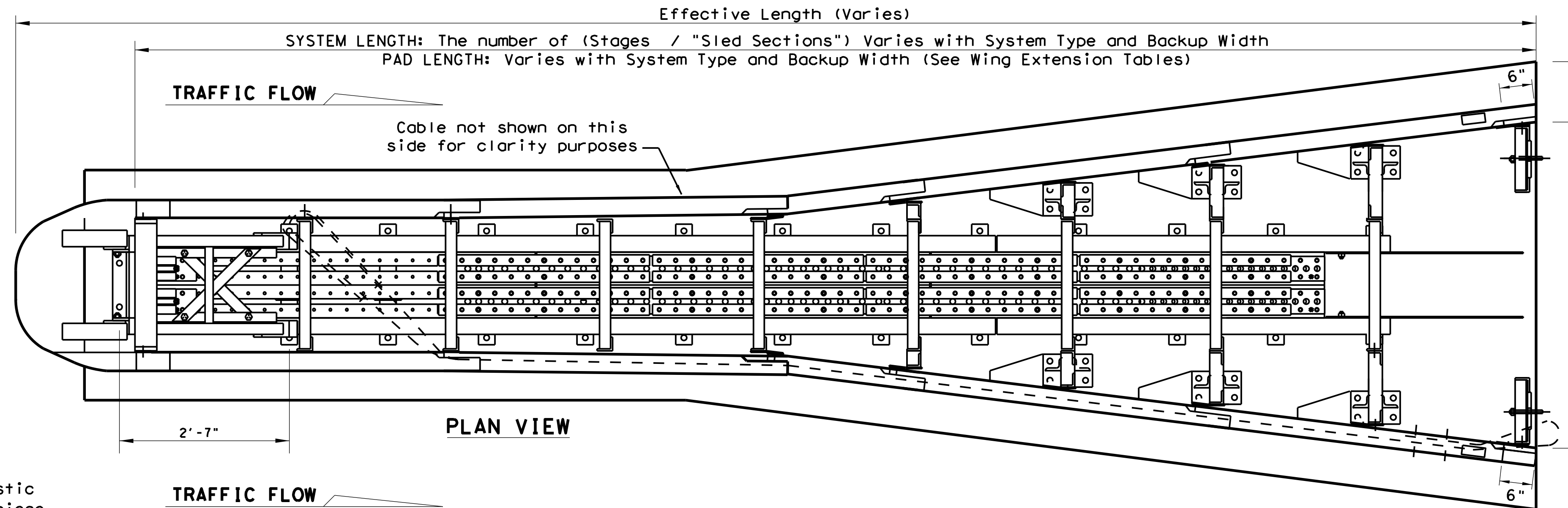
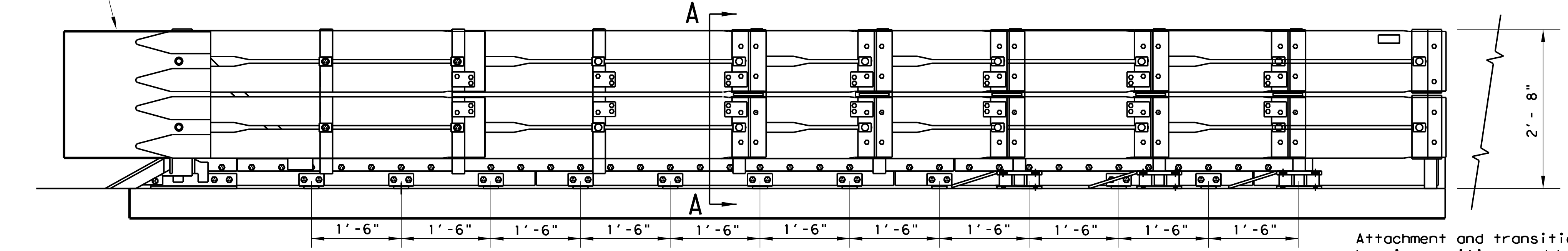
Texas Department of Transportation — Design Division Standard

TRINITY HIGHWAY
CRASH CUSHION (NARROW)
TRACC(N)-16

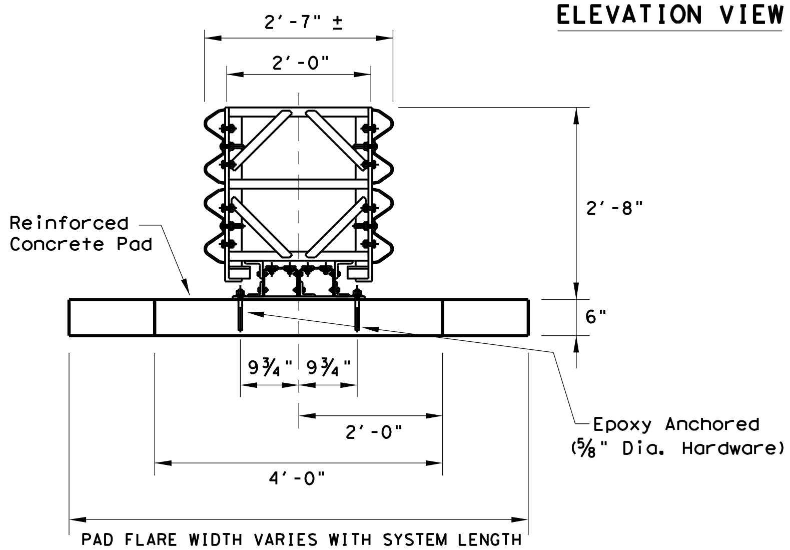
FILE: traccn16.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP
©TxDOT: February 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED 06, 2013 (VP) REVISED 03, 2016 (VP)	6375	52	001	IH45
	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		128



PLAN VIEW



ELEVATION VIEW



SECTION A-A

TYPE (WIDE)	TEST LEVEL
FASTRACC (4 Stage System)	70
TRACC (3 Stage System)	TL-3
SHORTRACC (2 Stage System)	TL-2

NOTE: The Stage System refers to number of replaceable "sled sections" that could be replaced independently.

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. Contact the company for: Custom widths from 31" up to 57" wide, and transition panels for bi-directional traffic applications.
3. Details of components for the WideTRACC, Backups and re-inforcing details will be shown on the manufacturer's shop drawings furnished to the Engineer.
4. Concrete shall be class "S" with a min. compressive strength 4,000 p.s.i.
5. If the cross-slope varies more than 2% over the length of the system, the concrete pad will require leveling. Maximum permissible cross-slope 8%.
6. The installation area should be free from curbs, elevated objects, or depressions.
7. The WideTRACC system should be approximately parallel with the barrier or ℄ of merging barriers.
8. The Unit shown is flared on both sides, but can be flared on a single side ether left or right. The flares will effect the length and width of the system. (See Wing Extension Tables)

Attachment and transitions to other shapes, barriers railings and bi-directional traffic flows are available. (See manufacturer's product manual).

Wide-FASTRACC WING EXTENSIONS

NUMBER OF WING EXTENSIONS	WIDTH	SYSTEM LENGTH	EFFECTIVE LENGTH	Wide-FASTRACC EXTENSION PART NUMBER (LEFT# / RIGHT#)
0 (BASE UNIT)	71"	25'-11"	27'-11"	
1	78"	28'-3"	30'-3"	33940
2	85"	30'-7"	32'-7"	33941 / 33942
3	92"	32'-11"	34'-11"	33943 / 33944
4	99"	35'-2"	37'-2"	33945 / 33946
5	106"	37'-6"	39'-6"	33947 / 33948
6	113"	39'-10"	41'-10"	33949 / 33950
7	120"	42'-2"	44'-2"	33951 / 33952
8	127"	44'-5"	46'-5"	33953 / 33954
9	134"	46'-9"	48'-9"	33955 / 33956
10	141"	49'-1"	51'-1"	33957 / 33958
10+				CONSULT TRINITY SALES PERSON

Wide-TRACC WING EXTENSIONS

NUMBER OF WING EXTENSIONS	WIDTH	SYSTEM LENGTH	EFFECTIVE LENGTH	Wide-TRACC EXTENSION PART NUMBER (LEFT# / RIGHT#)
0 (BASE UNIT)	58"	21'	23'	
1	65"	23'-4"	25'-4"	33940
2	72"	25'-8"	27'-8"	33941 / 33942
3	79"	28'	30'	33943 / 33944
4	86"	30'-4"	32'-4"	33945 / 33946
5	92"	32'-8"	34'-8"	33947 / 33948
6	99"	35'	37'	33949 / 33950
7	106"	37'-4"	39'-4"	33951 / 33952
8	113"	39'-8"	41'-8"	33953 / 33954
9	120"	42'	44'	33955 / 33956
10	127"	44'-4"	46'-4"	33957 / 33958
10+				CONSULT TRINITY SALES PERSON

Wide-SHORTRACC WING EXTENSIONS

NUMBER OF WING EXTENSIONS	WIDTH	SYSTEM LENGTH	EFFECTIVE LENGTH	Wide-SHORTRACC EXTENSION PART NUMBER (LEFT# / RIGHT#)
0 (BASE UNIT)	39"	15'	17'	
1	46"	17'-4"	19'-4"	33940
2	53"	18'-9"	20'-9"	33941 / 33942
3	60"	21'-1"	23'-1"	33943 / 33944
4	66"	23'-5"	25'-5"	33945 / 33946
5	73"	25'-8"	27'-8"	33947 / 33948
6	80"	28'-1"	30'-1"	33949 / 33950
7	87"	30'-4"	32'-4"	33951 / 33952
8	94"	32'-7"	34'-7"	33953 / 33954
9	101"	34'-11"	36'-11"	33955 / 33956
10	108"	37'-3"	39'-3"	33957 / 33958
10+				CONSULT TRINITY SALES PERSON

BACKUP SUPPORT OPTIONS
SQUARE CONCRETE BACKUP
CONCRETE BARRIER (CTB) BACKUP
SINGLE SLOPE CONCRETE BARRIER(SSCB)
GUARDRAIL BACKUP (BASE-PLATED POST)
GUARDRAIL BACKUP (DRIVEN POST)
TRANSITION OPTIONS
VERTICAL WALL
MODIFIED (CTB) TO VERTICAL WALL
CONCRETE BARRIER (CTB)
GUARDRAIL (W-BEAM)
GUARDRAIL (THRIE-BEAM)

FOR BI-DIRECTIONAL TRANSITION PANEL DETAILS (SEE MANUFACTORER'S PRODUCT MANUAL).

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

FOUNDATION OPTIONS
6" REINFORCED CONCRETE
8" UNREINFORCED CONCRETE
3" MIN. ASPHALT OVER 3" MIN. CONCRETE
6" ASPHALT OVER 6" COMPACT SUBBASE
8" MINIMUM ASPHALT

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

Wide-TRACC - BILL OF MATERIAL

PART #	FAST TRACC QTY	TRACC QTY	SHORT TRACC QTY	DESCRIPTION
25937A	1			WIDEFASTRACC UNIT ASSEMBLY
25939A		1		WIDETRACC UNIT ASSEMBLY
25997A			1	WIDESHORTRACC UNIT ASSEMBLY
3310G	4	4	4	⅝" LOCKWASHER
4372G	4	4	4	⅝" FLATWASHER
4451G	4	4	4	⅝" DIA X 6" EXP. WEDGE ANCHOR
6531B	1	1	1	PLASTIC NOSEPIECE
6668B	4	4	4	REFLECTIVE SHEETING
ANCHOR HARDWARE (CONCRETE BASE)				
5204B	72	50	18	⅝" DIA X 7-1⁄16" THD ANCHOR STUD
4372G	72	50	18	⅝" FLATWASHER
3310G	72	50	18	⅝" LOCKWASHER
3361G	72	50	18	⅝" HEX NUT
5206B	6	4	2	Adhesive, Hilti Hit HY-150
ANCHOR HARDWARE (ASPHALT BASE)				
6380G	72	50	18	⅝"Dia x 18" Thd Anchor Stud
4372G	72	50	18	⅝" Flatwasher
3310G	72	50	18	⅝" Lockwasher
3361G	72	50	18	⅝" HEX NUT
5206B	15	11	4	ADHESIVE, HILTI HIT HY-150
ANCHOR HARDWARE (OPTIONAL ITEMS, AS NEEDED)				
5207B	A/R	A/R	A/R	NOZZLE,MIXER,HILTI HIT HY-150
5208B	A/R	A/R	A/R	EXT.TUBE,MIXER,HILTI HIT HY-150
5205B	A/R	A/R	A/R	DISPENSER GUN,HILTI HIT HY-150
5209B	A/R	A/R	A/R	DRILL BIT, 11⁄16 ", HILTI SDS

Texas Department of Transportation — Design Division Standard

TRINITY HIGHWAY CRASH CUSHION (WIDE UNIT)

TRACC(W)-16

FILE: traccw16.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP
©TxDOT February 2006	CONT 6375	SECT 52	JOB 001	HIGHWAY IH45
REVISIONS: REVISED 06, 2013 (VP) REVISED 03, 2016 (VP)	DIST 12	COUNTY HARRIS/GAL		SHEET NO. 129

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FILE: h:\00*maintenance\south harris maintenance\...
DATE: 1/4/2021
PROJECT: 6375-52-001

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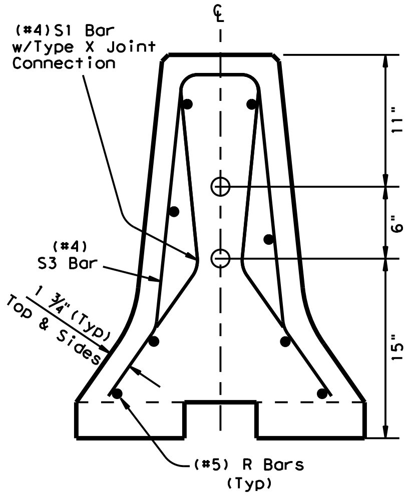
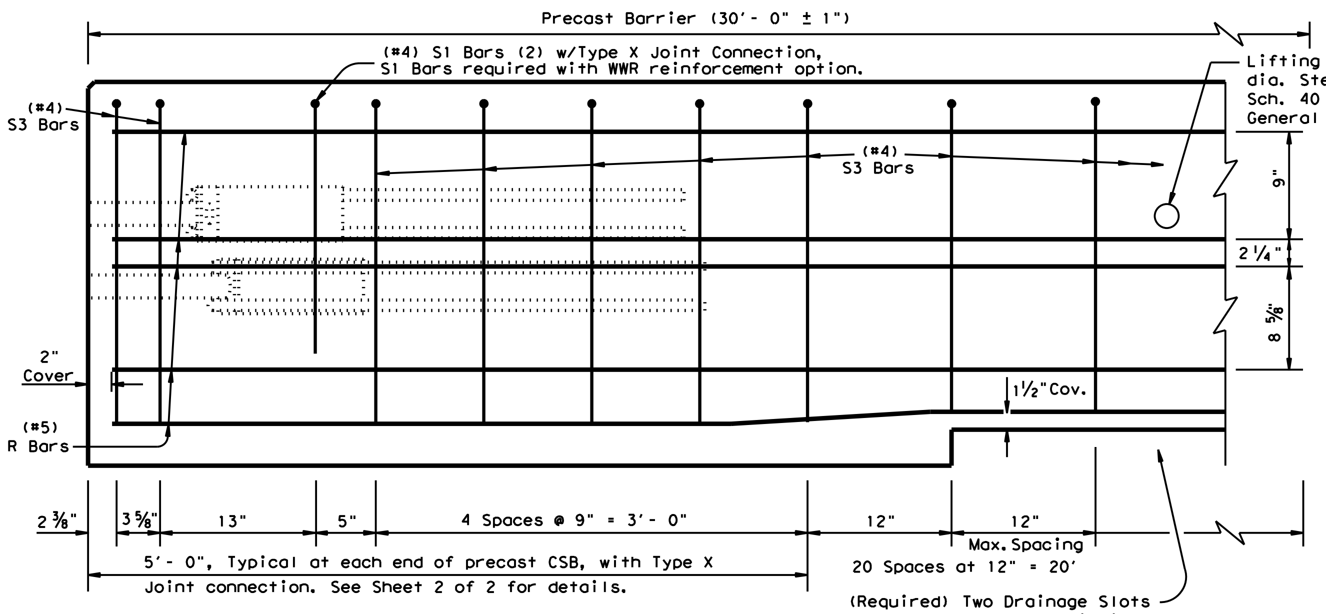


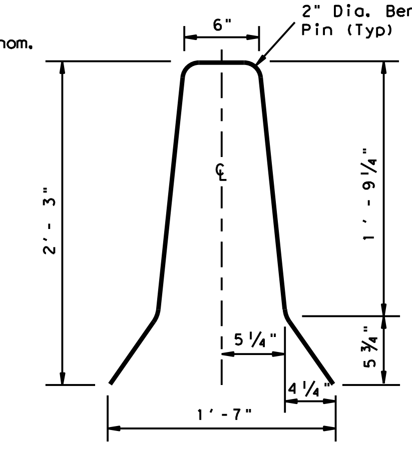
End View
Precast Barrier

See sheet 2 of 3 for Joint connection Type X

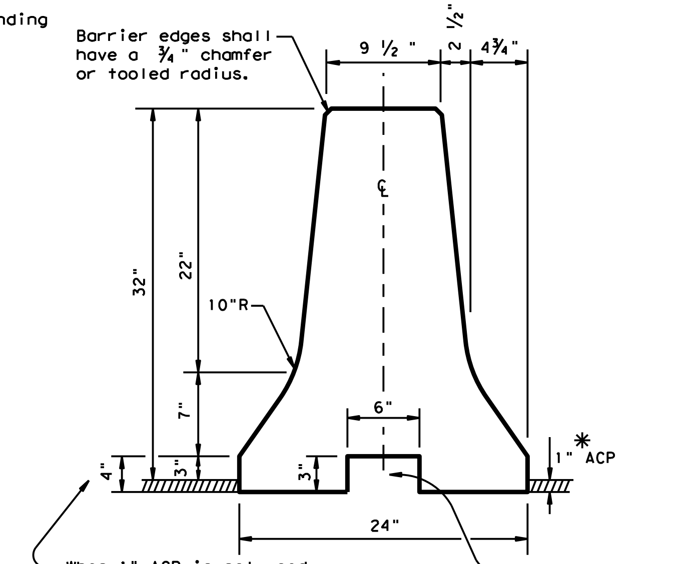


Reinforcement for Precast (CSB)
Concrete Safety Barrier (Type 1)

Showing reinforcement for Joint Type X

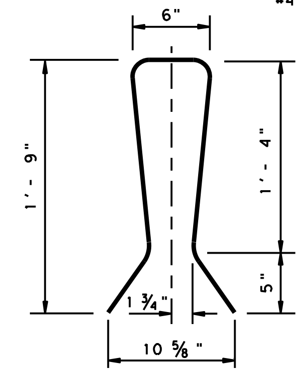


S3 Bar
#4 Bar

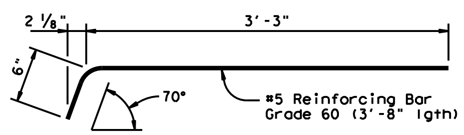


Concrete Safety Barrier

✱ When 1" ACP is "not" used as lateral support for permanent barrier placement. A permissible method of attaining the equivalent lateral support may be used, See CSB(6) sheet.

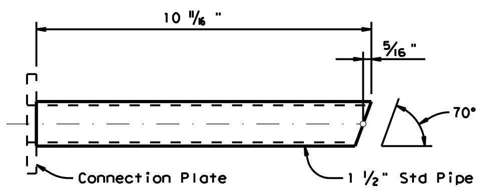


S1 Bar
#4 Bar (2)
(Joint Type X)



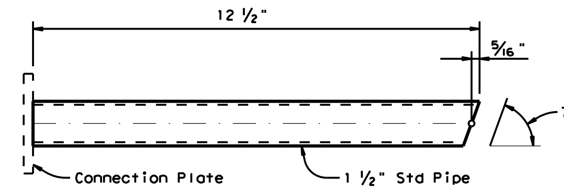
DEFORMED BAR ANCHOR DETAILS

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



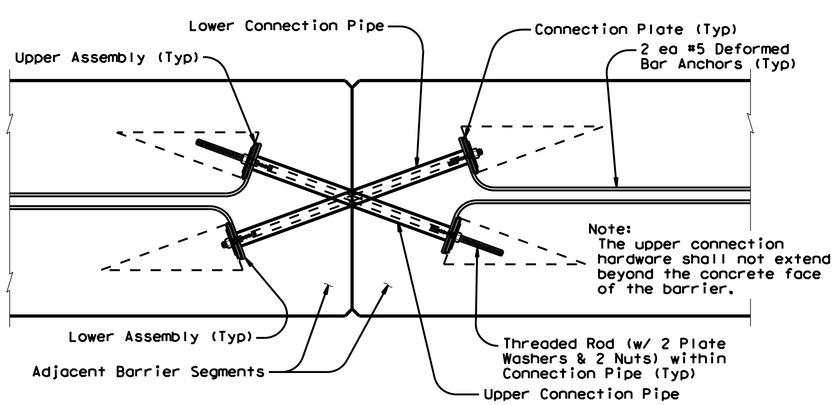
UPPER CONNECTION PIPE DETAILS

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



LOWER CONNECTION PIPE DETAILS

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



TYPE X JOINT INSTALLATION DETAIL

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

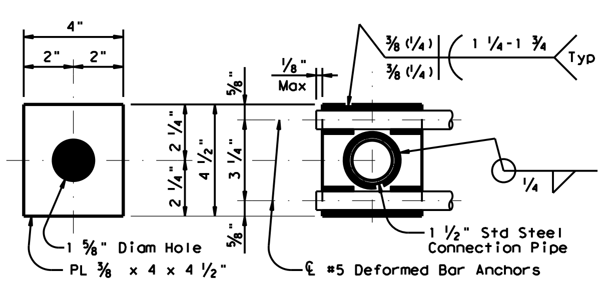
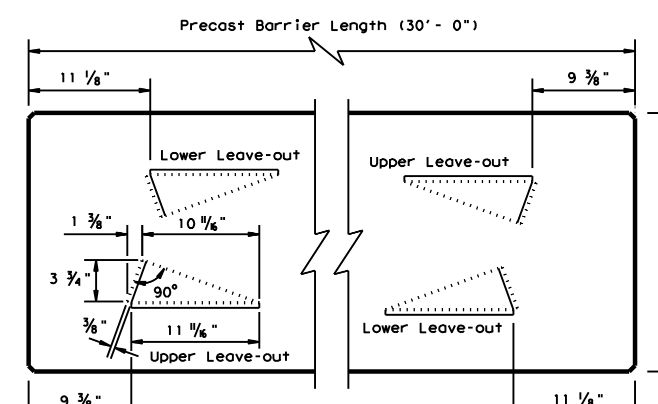


PLATE DIMENSIONS

WELDING DETAILS

CONNECTION PLATE DETAILS

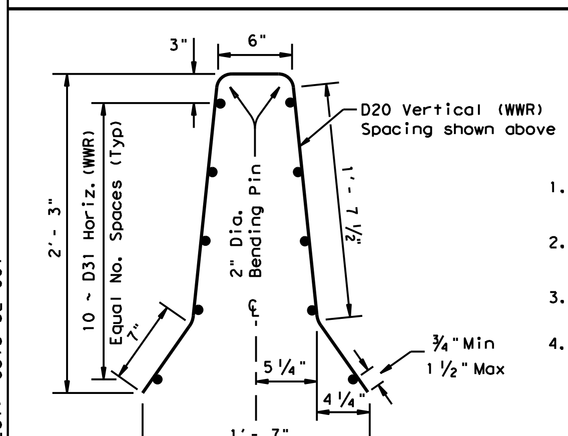
One (1) Plate required per assembly.
Four (4) required per Joint. All steel fittings for joint Type X shall be galvanized after fabrication in accordance with Item 445.



BARRIER PLAN AT END JOINTS

GENERAL NOTES

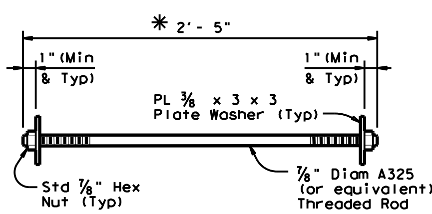
1. Concrete shall be Class H with a minimum compressive strength of 3,600 psi.
2. Where used, rebar reinforcement shall be Grade 60 and conform to ASTM A615.
3. Precast barrier length shall be 30 ft. unless otherwise specified on the plans.
4. All precast barrier edges shall have a 3/4" chamfer or tooled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



Welded Wire Reinforcement
(WWR) Option for Bars R and S3

(WWR) General Notes

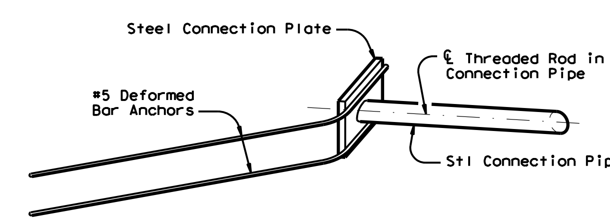
1. Deformed Welded Wire Reinforcement (WWR) shall conform to ASTM A497.
2. Welded wire cage may be cut or bent to accommodate the Type X joint connection and drainage slots, as directed by the Engineer.
3. All reinforcement shall comply with Item 440, "Reinforcing Steel."
4. Combinations of reinforcing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



CONNECTION BOLT OR
THREADED ROD DETAIL

Two (2) Threaded Rods (Or Equivalent Hex Hd. Bolts)
(w/ Two (2) PL 3/8 x 3 x 3 Plate Washers & Two (2) Std Hex Nuts) required per Joint.

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



ISOMETRIC OF
TYPICAL WELDED ASSEMBLY

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

Weight of one Precast 30 ft. (CSB) segment = Approx. 6.5 Tons or 440 lbs per ft.

SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

CONCRETE SAFETY BARRIER (F-SHAPE)

PRECAST BARRIER
(TYPE 1)

CSB(1)-10

FILE: csb110.dgn	DN: TxDOT	CK: AM	DW: BD	CK: VP
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
	DIST		COUNTY	SHEET NO.
	12		HARRIS/GAL	130

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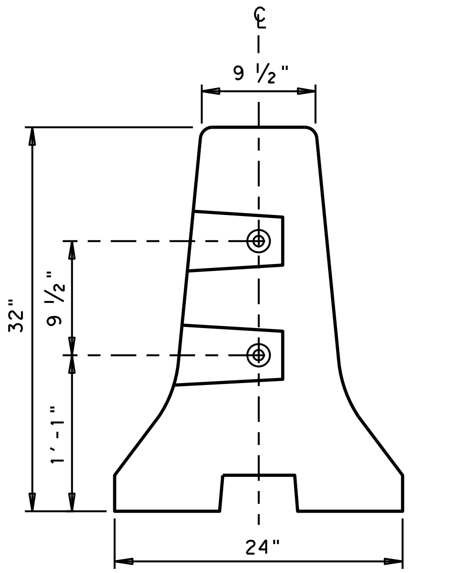
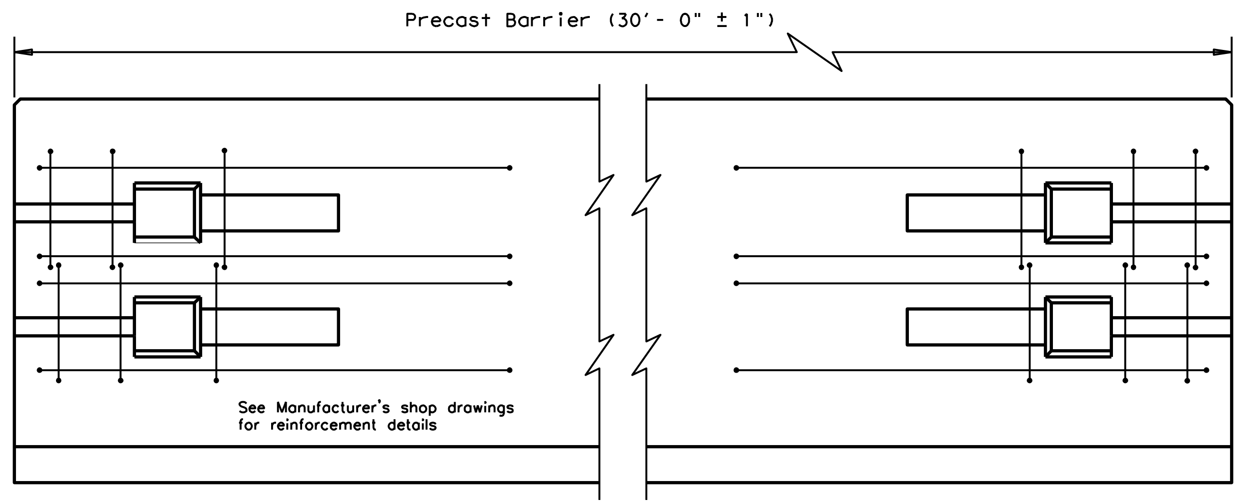
DATE: 1/4/2021
PROJECT: 6375-52-001



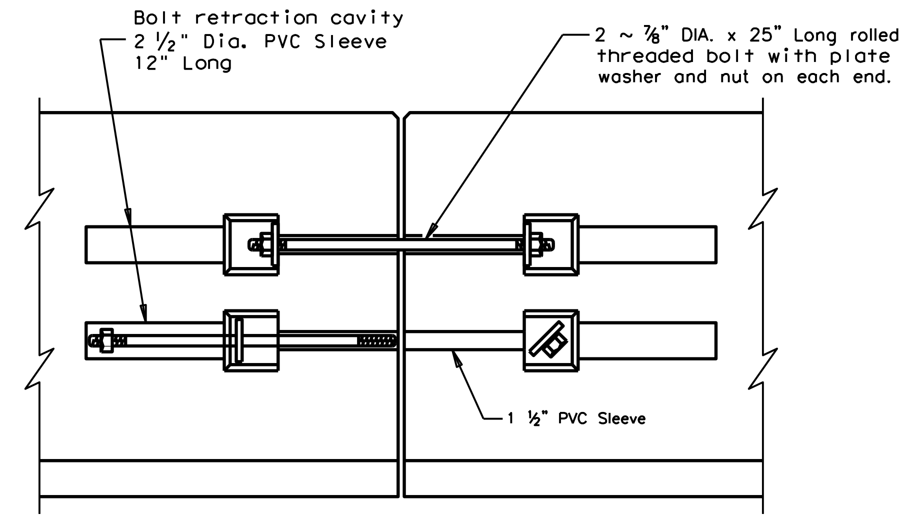
END VIEW (CSB) QUICK-BOLT

QUICK-BOLT POCKET LOCATIONS



ELEVATION (CSB) QUICK-BOLT

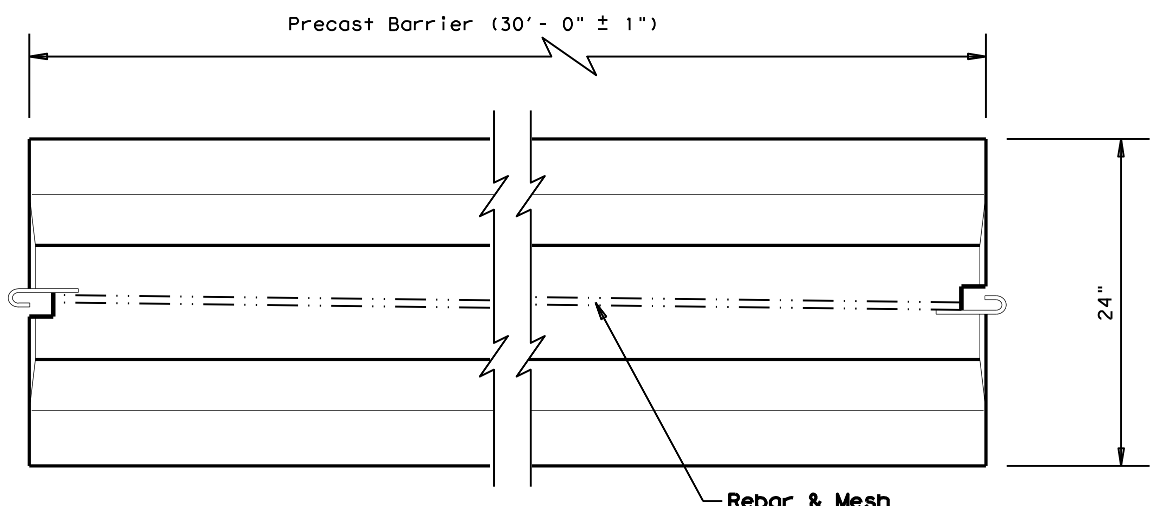
See Manufacturer's shop drawing for additional details



ELEVATION VIEW SHOWING JOINT CONNECTION

"QUICK-BOLT"

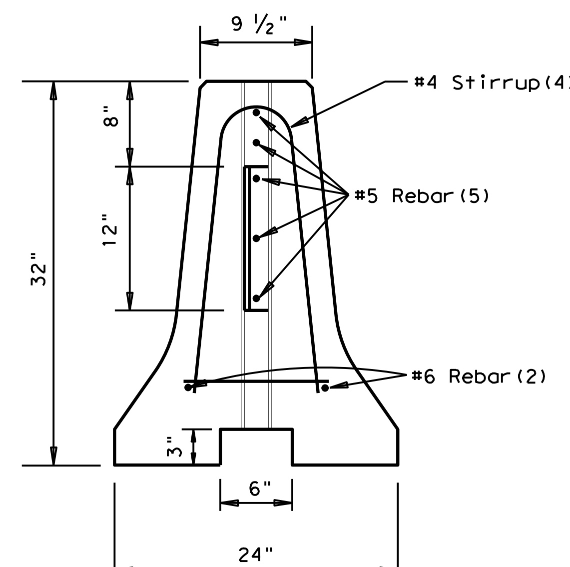
Joint Connection (Type Q)



TOP VIEW

PRECAST (CSB) WITH J-J HOOKS

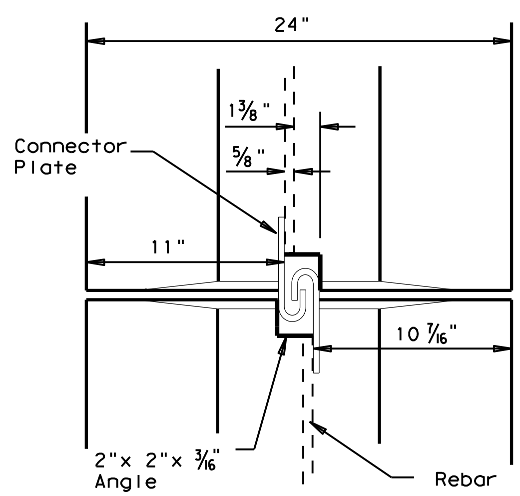
See Manufacturer's shop drawing for additional details



END VIEW

J-J HOOK CONNECTION

Proprietary Joint Connections (CSB)
Two proprietary joint connections are acceptable as alternates to the (Type X) connection shown, here on. These joint connections types are: J-J Hooks by Easi-Set Industries, (800)547-4045 Quick-Bolt by Bexar Concrete, (210)497-3773 If one of these connection systems are exclusively specified in the plans, prior approval for sole source use must be obtained. Details of the connection components and barrier reinforcement for these systems, will be shown on the manufacturer's shop drawing(s) furnished to the Engineer.



VIEW FROM ABOVE

J-J HOOK CONNECTION

Joint Connection (Type J)

SHEET 2 OF 2

Texas Department of Transportation

Design Division Standard

CONCRETE SAFETY BARRIER (F-SHAPE)

PRECAST BARRIER (TYPE 1)

CSB(1)-10

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©TxDOT December 2010		CONT	SECT	JOB	HIGHWAY
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		12		HARRIS/GAL	131

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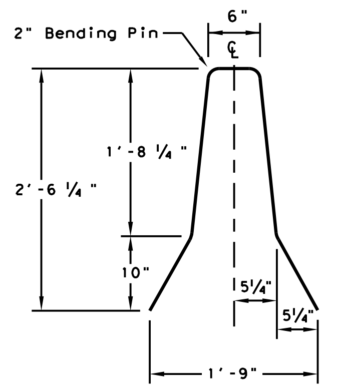
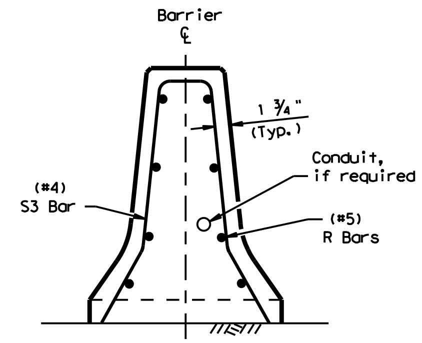
PROJECT: 6375-52-001

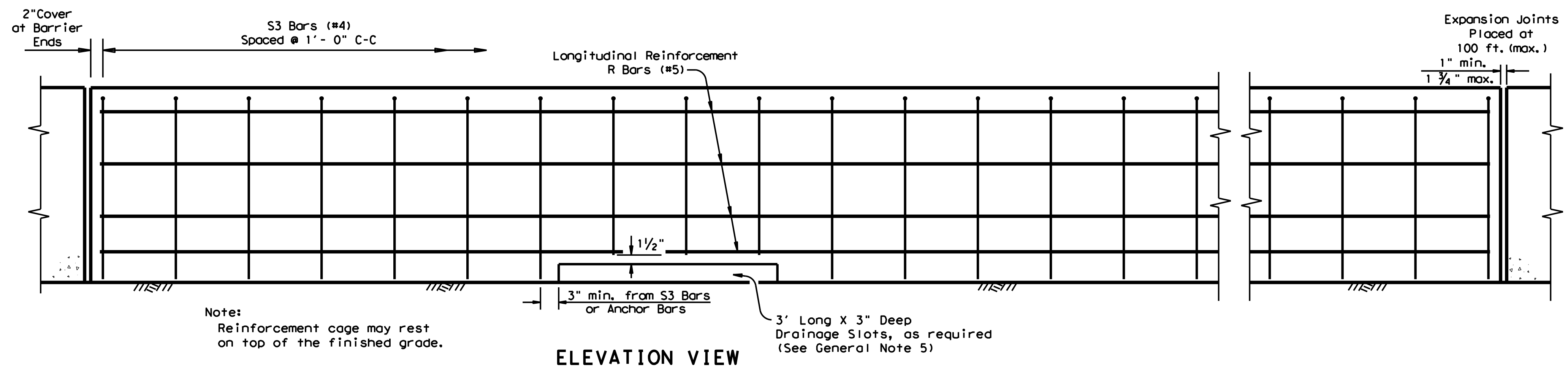
FILE: h:\00+maintenance\south harris maintenance\
DATE: 1/4/2021
PROJECT: 6375-52-001



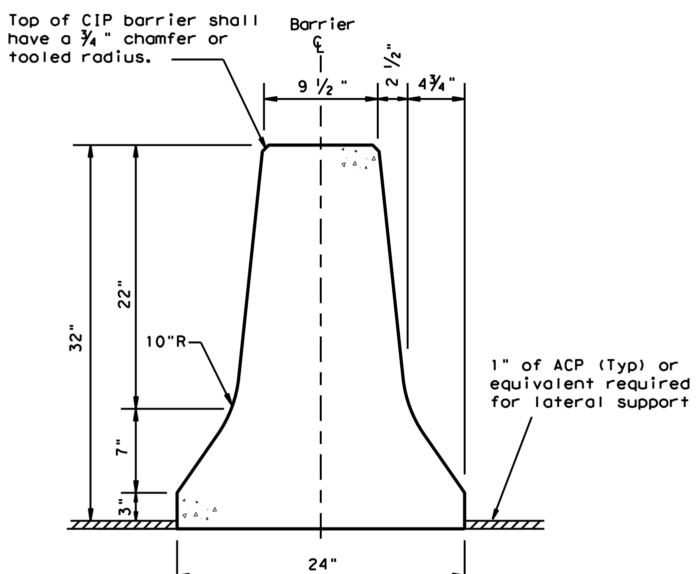
S3 Bar
(#4) Bar



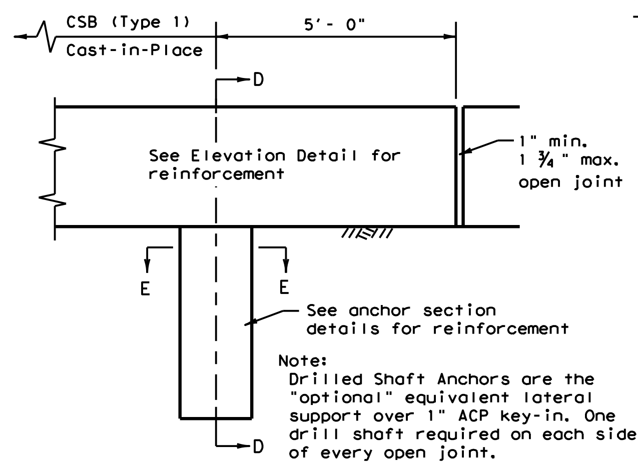
END VIEW
Cast-in-Place (CIP) Barrier
Barrier is Symmetrical About the Center Line



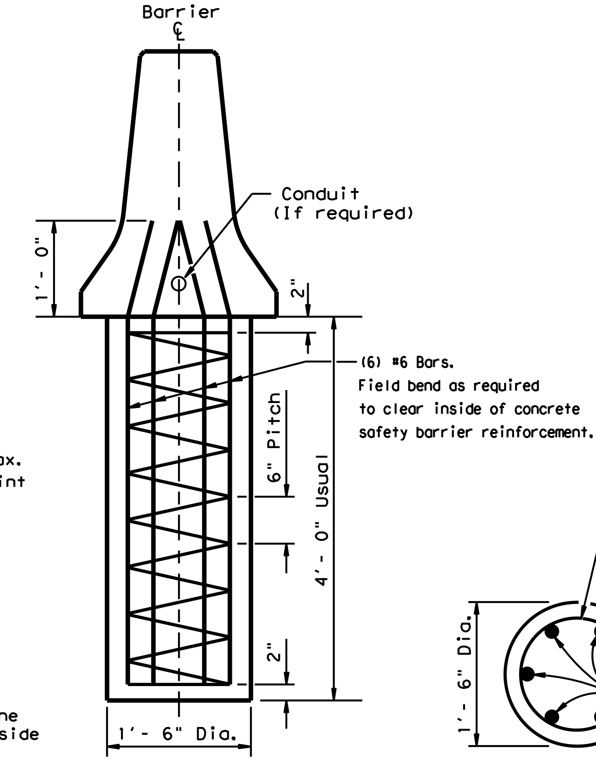
ELEVATION VIEW
Cast-in-Place (CSB) on Flexible Pavement



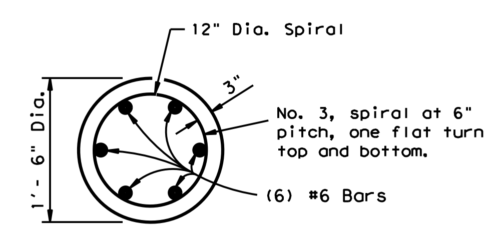
CONCRETE SAFETY BARRIER (CSB)



DRILLED SHAFT ANCHOR LOCATION DETAIL



SECTION D-D
DRILLED SHAFT ANCHOR



SECTION E-E
DRILLED SHAFT ANCHOR
See drilled shaft anchor location detail

GENERAL NOTES

1. Concrete shall be Class C, unless otherwise specified in the plans.
2. Where used, rebar reinforcement shall be Grade 60 and conform to ASTM A615.
3. Axis of cast-in-place barrier shall be vertical, except where roadway is superelevated, then axis is normal to roadway surface.
4. Top edges of cast-in-place barrier shall have a 3/4" chamfer or tooled radius.
5. Drainage slot depths may be increased 1" to accommodate ACP. Slot locations (12'-0", C-C Min. Spacing) are shown elsewhere, or as directed by the Engineer.
6. Cast-in-place barrier may be slip formed. Bracing may be tied or tack welded to the reinforcement cage to provide cage stability. Do not weld to anchor bars. The reinforcement cage may rest on top of the finished grade.
7. For locations where lighting is required, see the CSB(4) sheet for the proper reinforcement and anchorage.

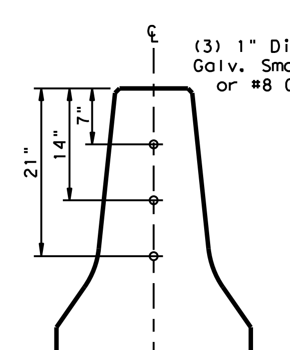
Cast-In-Place or Slip-Formed (CSB)

Cast-in-Place barrier may be connected to precast CSB. Joint connection "Types" may be used in Cast-in-Place barrier, to match the precast barrier connection. (See required connection "Type" elsewhere in the plans)

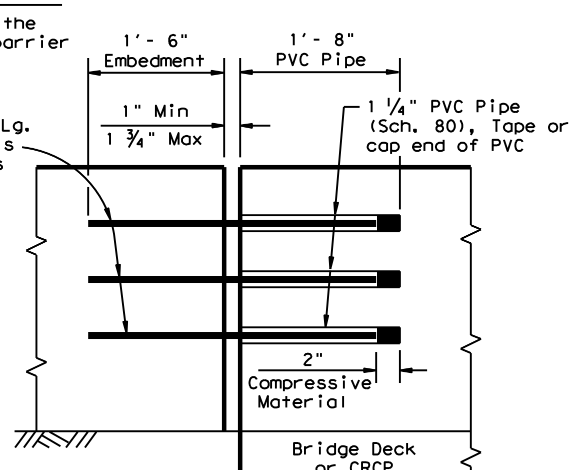
The weight of Cast-in-Place (CSB)(F-Shape) is approx. 440 lbs per ft.

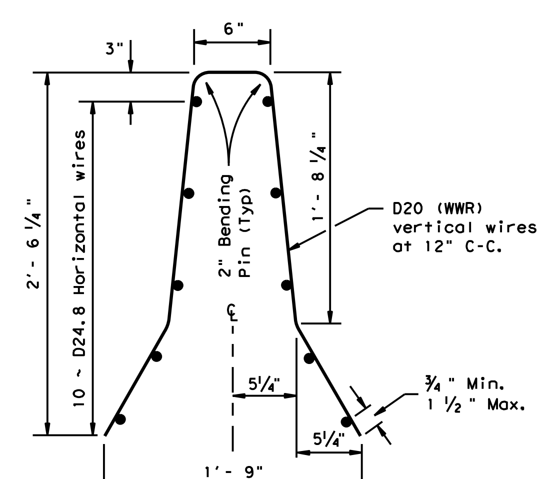
EXPANSION JOINT (Dowel Location)

Dowels may be used as directed by the Engineer, in locations where the barrier could be laterally displaced.



END VIEW
Dowel locations





WELDED WIRE REINFORCEMENT (WWR) OPTION FOR BARS S AND R

(WWR) General Notes

1. Deformed Welded Wire Reinforcement (WWR) shall conform to ASTM A497.
2. The welded wire cage at the drainage slots may be cut or bent to accommodate the edge and top clearances, as directed by the Engineer.
3. The welded wire splice locations shall have a "minimum" splice lap length of 12".
4. Combinations of reinforcing steel and WWR will be permitted, as directed by the Engineer. The dimension from the end of the barrier section to the first wire shall not exceed 3".

Texas Department of Transportation — Design Division Standard

CONCRETE SAFETY BARRIER (F-SHAPE)
CAST-IN-PLACE (TYPE 1) (FLEXIBLE PAVEMENT)
CSB(2)-13

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©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
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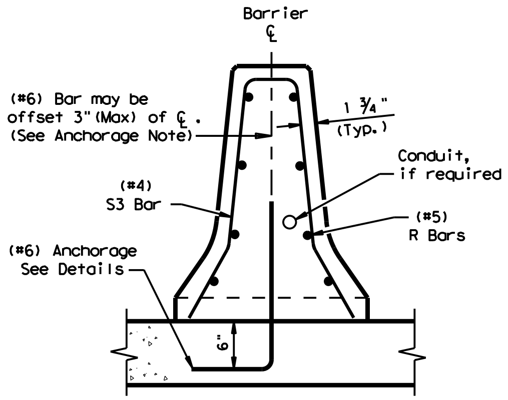
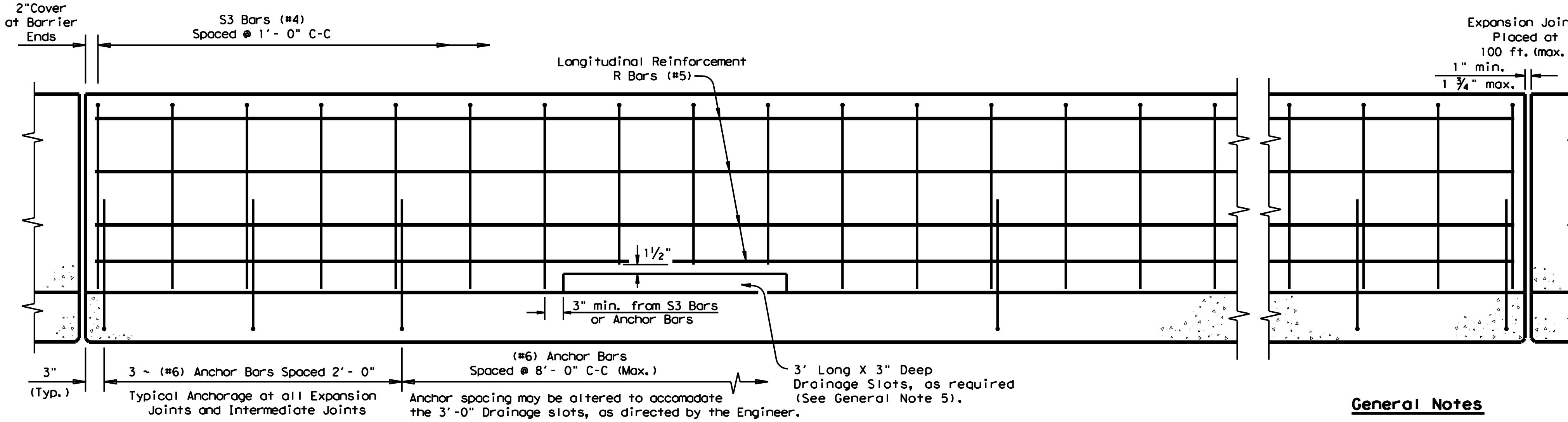


END VIEW

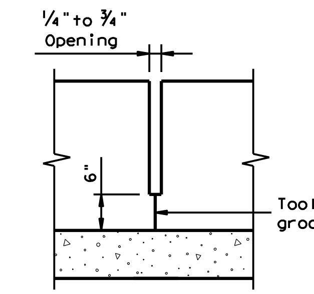
Cast-in-Place (CIP) Barrier

Barrier is Symmetrical About the Center Line



ELEVATION VIEW

Cast-in-Place (CSB) on Bridge Decks or Continuously Reinforced Concrete Pavement (CRCP) (Showing Reinforcement and Anchor Requirement)



BRIDGE INTERMEDIATE JOINT DETAIL

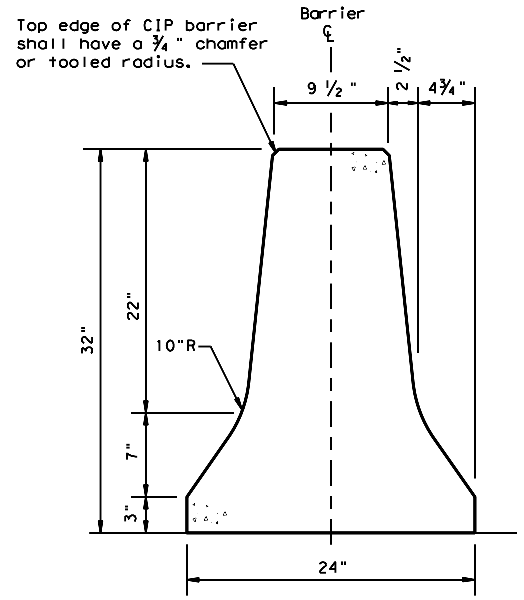
Place at all Bent ℄'s, without Exp. joints and spaced at 33 ft. (max.), 10 ft. (min.)

CRCP EXPANSION JOINT PLACEMENT

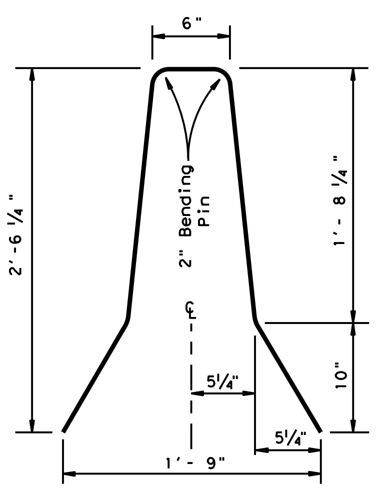
Place at all transverse joints or 100 ft. (max.), 10 ft. (min.)

General Notes

1. Concrete shall be Class C, unless otherwise specified in the plans.
2. Where used, rebar reinforcement shall be Grade 60 and conform to ASTM A615. If the bridge deck requires epoxy "coated" reinforcement, the barrier and/or anchorage may require the same, as shown elsewhere in the plans.
3. Axis of cast-in-place barrier shall be vertical, except where the roadway is superelevated, then axis shall be normal to roadway surface.
4. Top edges of cast-in-place barrier shall have a 3/4" chamfer or tooled radius.
5. Anchorage: The "Optional" Anchor system shall be embedded 6" into fresh concrete or using a Type III, Class C Epoxy anchorage system. Follow the manufacturer's directions for installing the expoxied anchor bars. All anchorage shown is the minimum required, and considered subsidiary to the bid item.
6. Drainage slot depths may be increased 1" to accommodate ACP. Slot locations (12'- 0", C-C Min. Spacing) are shown elsewhere, or as directed by the Engineer.
7. Cast-in-place barrier may be slip formed. Bracing may be tied or tack welded to the reinforcement cage to provide cage stability. Do not weld to anchor bars. The reinforcement cage may rest on the top of the finished grade.
8. For locations where lighting is required, see the CSB(4) sheet for the proper reinforcement and anchorage.



CONCRETE SAFETY BARRIER (CSB)

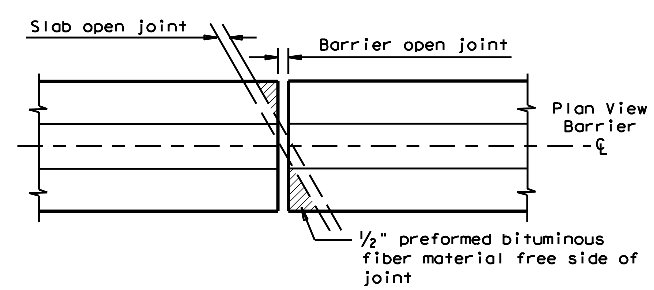


S3 Bar

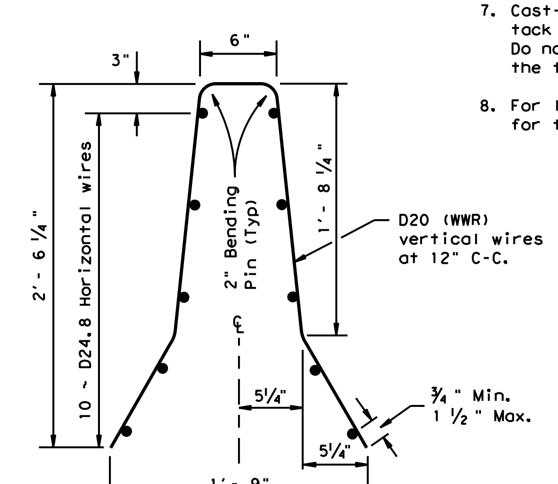
(#4) Bar

Note:
Reinforcement cage may rest on top of the finished grade.

BARRIER PLACEMENT OVER (CRCP) JOINTS
Barrier may be cast over a "Longitudinal" CRCP joint.
CRCP Joints (with or without tiebars): Two layers of 30# roofing felt or 1/2" preformed bituminous fiber material.
Barrier Anchorage Note: Anchorage must be located at least 3" from a longitudinal joint.



BARRIER OVER TRANSVERSE OPEN JOINT



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

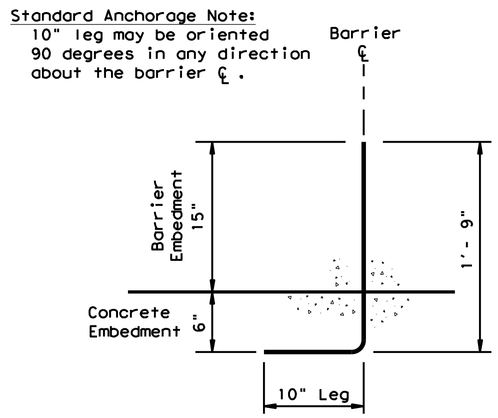
(WWR) General Notes

1. Deformed Welded Wire Reinforcement (WWR) shall conform to ASTM A497.
2. The welded wire cage at the drainage slots may be cut or bent to accommodate the edge and top clearances, as directed by the Engineer.
3. The welded wire splice locations shall have a "minimum" splice lap length of 12".
4. Combinations of reinforcing steel and WWR will be permitted, as directed by the Engineer. The dimension from the end of the barrier section to the first wire shall not exceed 3".

Cast-In-Place or Slip-Formed (CSB)
Cast-in-Place barrier may be connected to precast CSB. Joint connection "Types" may be used in Cast-in-Place barrier, to match the precast barrier connection. (See required connection "Type" elsewhere in the plans)

The weight of Cast-in-Place (CSB)(F-Shape) is approx. 440 lbs per ft.

Standard Anchorage Note:
10" leg may be oriented 90 degrees in any direction about the barrier ℄.

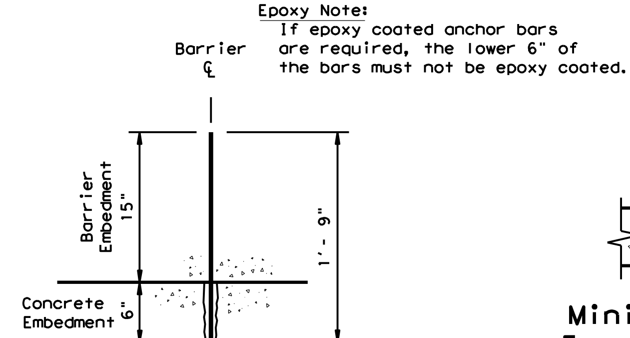


STANDARD ANCHORAGE

(#6) Bar

Concrete Pavement / Bridge Deck Anchorage:
Cast-in-Place or Slip-Formed Barrier
(See General Note 2)

Epoxy Note:
If epoxy coated anchor bars are required, the lower 6" of the bars must not be epoxy coated.

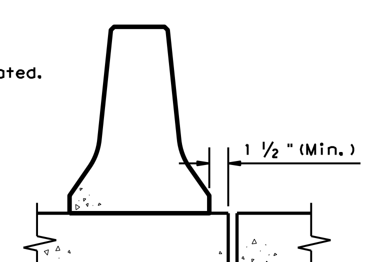


"OPTIONAL" ANCHORAGE

(#6) Bar

Fresh insertion method or Type III, Class C Epoxy Method

Concrete Pavement / Bridge Deck Anchorage:
Cast-in-Place or Slip-Formed Barrier
(See General Notes 2 & 5)



Minimum Edge Distance From Longitudinal Joint

Placement over a longitudinal bridge joint is not recommended.

Texas Department of Transportation — Design Division Standard

CONCRETE SAFETY BARRIER (F-SHAPE)

CAST-IN-PLACE (TYPE 1) (BRIDGE DECK or CRCP)

CSB(3)-16

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©TxDOT January 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
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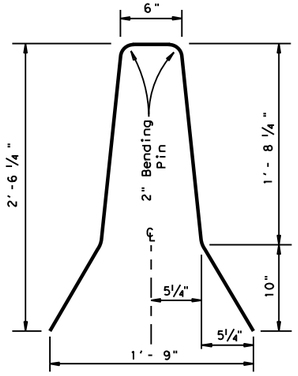
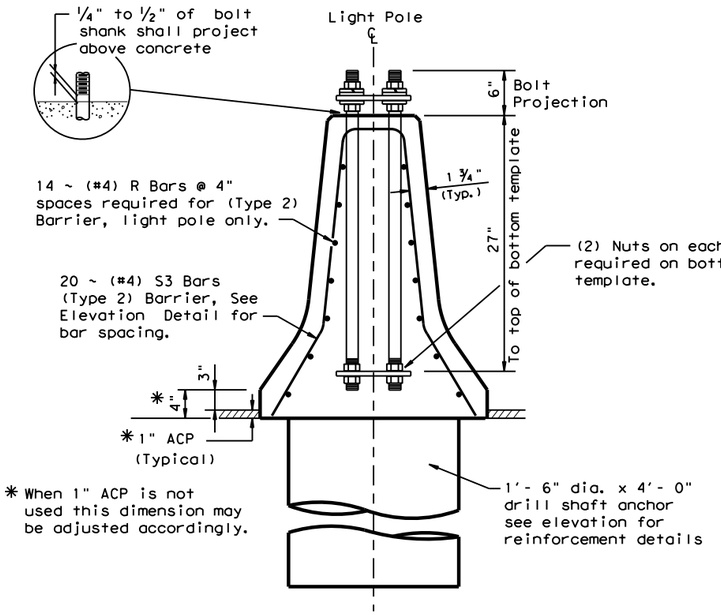


S3 BAR (#4)

(20) At each light pole section of barrier

Note:
The reinforcement cage may rest on top of the finished grade.



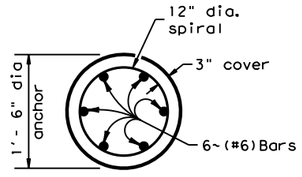
(ROADWAY) SECTION AT LIGHT POLE

Symmetrical about center line

Schedule of reinforcement for each 10 foot cast-in-place section at light poles (excluding anchorage)

BAR	SIZE	QUANTITY
S3	#4	20
R	#4	14

Welded Wire Reinforcement (WWR): IS NOT APPROVED FOR USE WITH (TYPE 2) BARRIER.

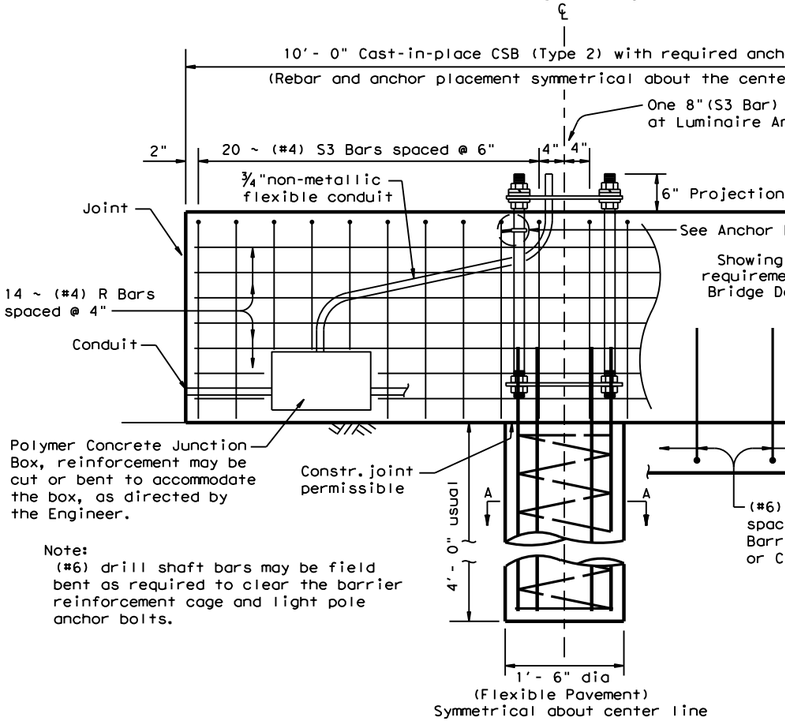


No.3 spiral at 6" pitch (one flat turn top and bottom)

SECTION A-A

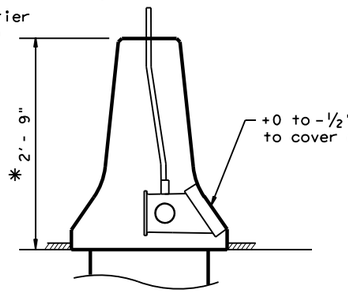
GENERAL NOTES

1. All concrete shall be Class C, unless otherwise specified in the plans.
2. Anchor bolts, junction box, non-metallic flexible conduit, and bonding to steel shall not be paid for directly, but will be subsidiary to the various bid items.
3. For proper installation and material requirements for the anchor bolts and light pole, see Traffic Engineering RIP standard sheets.
4. Junction boxes shall be polymer concrete, and shall be mounted flush (+0, - 1/2") with concrete surface. For details and material requirements on barrier junction box, see DMS-11030.
5. Install 12 AWG stranded conductors from load side of fused breakaway connector to luminaire. Fused breakaway connectors shall be installed as required on Traffic Engineering RID Sheets. Typically fused breakaway connectors are installed in the barrier junction box adjacent to each light pole. If fused breakaway connectors are installed in the pole's handhole, increase the size of the 3/4" flexible non-metallic conduit according to the NEC as needed to accomodate the branch circuit conductors.
6. Anchor bolts and their assemblies shall be in accordance with Item 449, "Anchor Bolts" High-Strength Steel or Alloy Steel. Galvanization requirements for anchor bolts are shown on RIP sheets.
7. The required anchorage for Type 2 barrier (drill shaft, standard or optional concrete anchorage) shall not be paid for directly, but is subsidiary to Item 514, "Permanent Concrete Traffic Barrier."
8. Bond anchor bolt to rebar cage with #6 bare stranded copper conductor. Use listed mechanical connectors rated for embedment in concrete. The bonded steel in the foundation creates a concrete encased grounding electrode which replaces the ground rod.



Note:
(#6) drill shaft bars may be field bent as required to clear the barrier reinforcement cage and light pole anchor bolts.

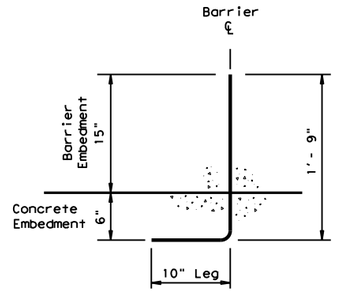
Each end of cast-in-place light pole section shall be formed to mate with the adjacent precast (Type 1) roadway barrier. The cast-in-place section shall be connected at each end to the precast sections in the same manner that precast sections are connected at joints as shown elsewhere.



SECTION SHOWING JUNCTION BOX CONCRETE SAFETY BARRIER (TYPE 2)

ELEVATION SHOWING THE REQUIRED REINFORCEMENT AND ANCHORAGE OF (TYPE 2) BARRIER

The "Drilled Shaft Anchor" is the required anchorage for (Type 2) barrier on roadways with Flexible Pavement.
The #6 Anchor Bars (Shown) is the required anchorage for (Type 2) barrier on Bridge Decks and CRCP.

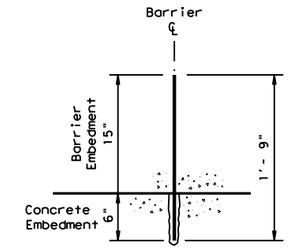


STANDARD "CONCRETE" ANCHORAGE

(#6) Bar

Concrete Pavement / Bridge Deck Anchorage: Cast-in-Place or Slip-Formed Barrier

Standard Anchorage Note:
10" leg may be oriented 90 degrees in any direction about the barrier ℄.

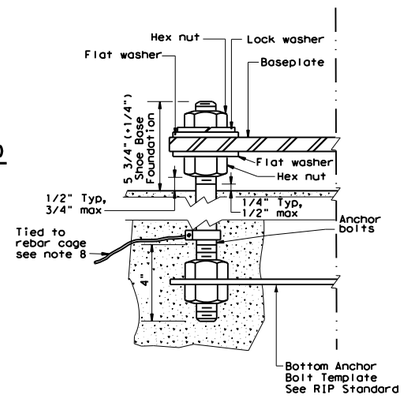


"OPTIONAL" EPOXY ANCHORAGE

(#6) Bar
Type III, Class C Epoxy

Concrete Pavement / Bridge Deck Anchorage: Cast-in-Place or Slip-Formed Barrier

Epoxy Note:
If epoxy coated anchor bars are required, the lower 6" of the bars must not be epoxy coated.



ANCHOR BOLT DETAIL

Texas Department of Transportation

Design Division Standard

CONCRETE SAFETY BARRIER (F-SHAPE) CAST-IN-PLACE (TYPE 2) AT LIGHT POLE TL-3 MASH COMPLIANT

CSB(4)-19

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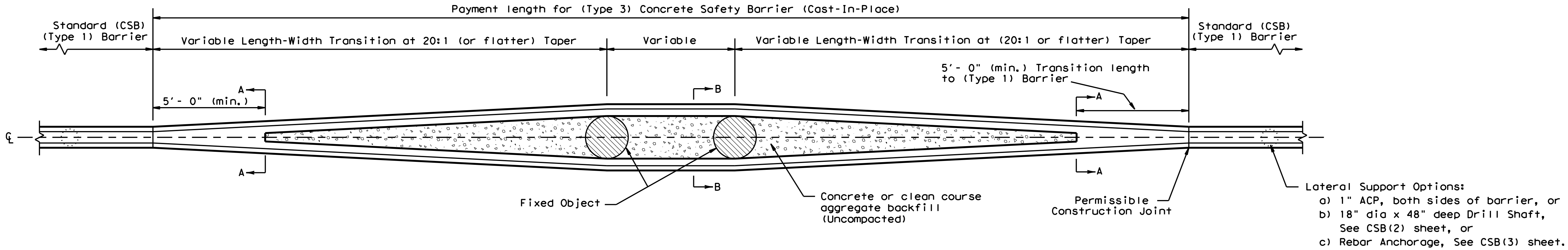
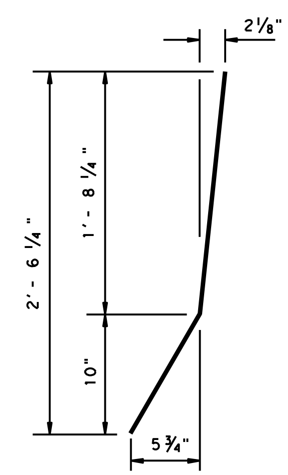
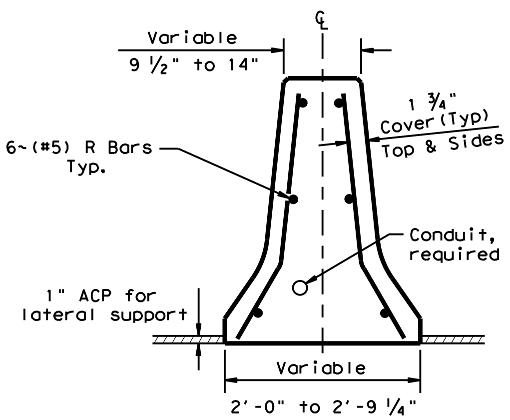


PLAN (TYPE 3) BARRIER

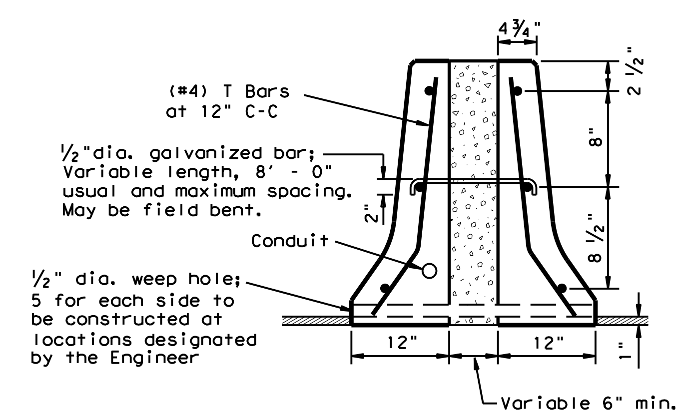


(#4) T Bar



SECTION A-A
TYPE 3 BARRIER

Note:
Bottom of the reinforcement cage may rest on top of the finished grade.



SECTION B-B
TYPE 3 BARRIER

Note:
Outside face dimensions and slopes for (Type 3) CSB are the same as for (Type 1) CSB.

GENERAL NOTES

1. Axis of concrete barrier shall be vertical, except where roadway is superelevated, then axis shall be normal to roadway surface.
2. All steel that requires galvanizing shall be in accordance with Item 445, "Galvanizing."
3. Unless otherwise shown in the plans the contractor has the option of placing either precast or cast-in-place (Type 1) CSB.
4. Bid price per liner foot of (Type 1) CSB and (Type 3) CSB, including terminal and anchor sections, shall include all of the concrete, reinforcement, drilled shaft foundations and aggregate backfill.
5. All concrete shall be Class C.
6. Longitudinal and vertical bars for roadway barrier shall conform to ASTM A615 (Grade 60), unless otherwise specified.
7. At construction joints the longitudinal bars shall extend beyond the joint so that bar splices will be a minimum of two feet from the construction joint.
8. Welded wire reinforcement (WWR) may be used as an option to conventional reinforcement and shall meet area requirement for the (Type 3) R and T bars.
9. Any method devised by the contractor and approved by the Engineer that will assure the longitudinal steel for (Type 1) CSB and (Type 3) CSB will be positioned ± ½ inch as dimensioned will be satisfactory.
10. Conduit to be provided only when called for elsewhere in the plans. Position of conduit may be adjusted to facilitate construction subject to the approval of the Engineer.
11. See CSB(4) standard for barrier with illumination.

Welded Wire Reinforcement (WWR) Option for Bars T and H1 (Type 3) Barrier

(WWR) General Notes

1. WWR design required for (Type 3) CSB barrier: D20 vertical (12" C-C) x D31 horizontal wires spaced as shown in Section B-B.
2. Deformed Welded Wire Reinforcement (WWR) shall conform to ASTM A497.
3. Welded wire cage may be cut and bent to accommodate the drainage slots, as directed by the Engineer.
4. Welded wire splice locations shall have a "minimum" splice lap length of 12".
5. Combinations of reinforcing steel and WWR will be permitted, as directed by the Engineer. The dimension from the end of the barrier section to the first wire shall not exceed 3".

Texas Department of Transportation — Design Division Standard

CONCRETE SAFETY BARRIER (F-SHAPE)
CAST-IN-PLACE (TYPE 3) AT FIXED OBJECTS
CSB(6)-10

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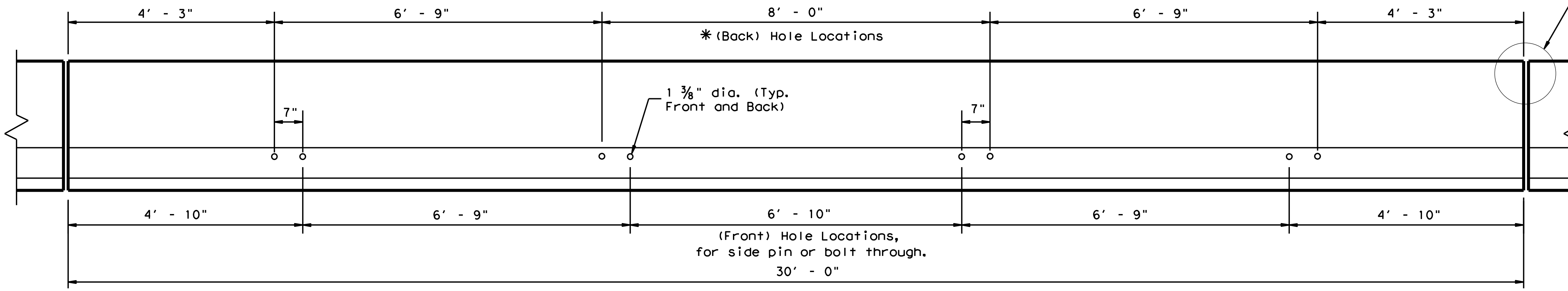
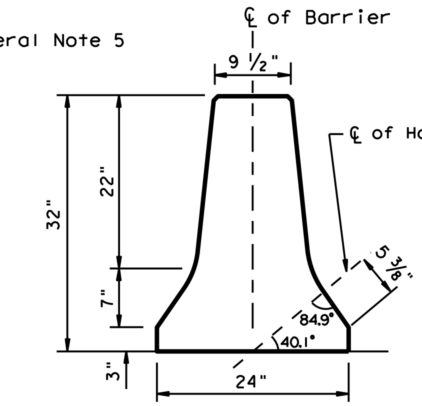
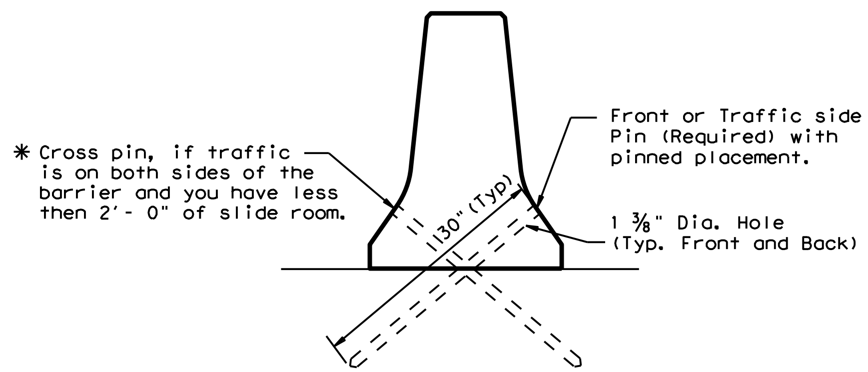
DATE: 1/4/2021
PROJECT: 6375-52-001



DETAIL 1

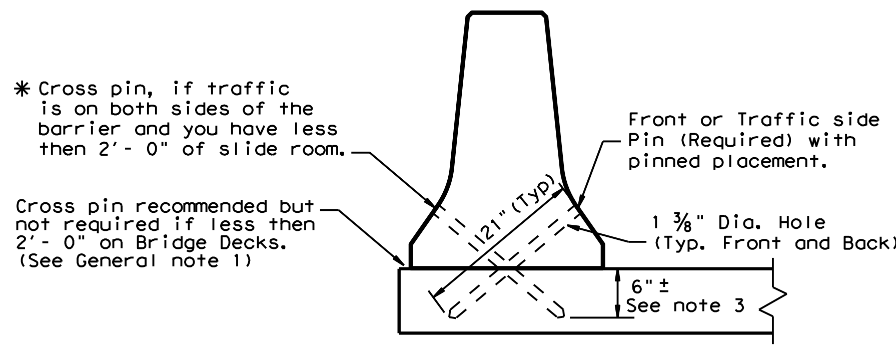


HOLE LOCATION DETAIL



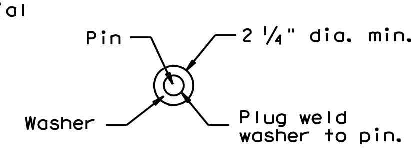
DETAIL 2

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



DETAIL 3

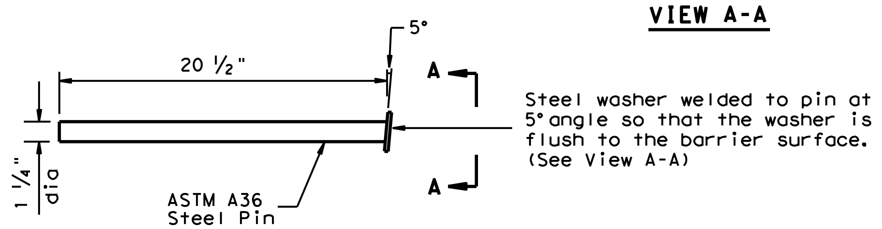
Bridge Deck or CRCP (21" pin required)



VIEW A-A

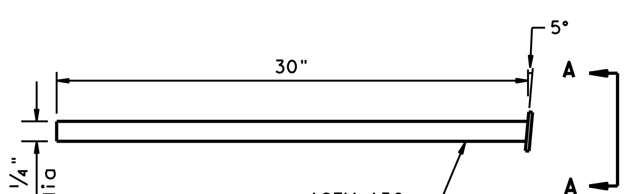
CORE DRILLING EXISTING BARRIER

Core drilling existing concrete barrier is permitted. Holes shall be drilled with coring or masonry drilling type equipment. Percussion (star) drilling shall not be used. A special drill bit (to cut through existing reinforcing) will likely be required. Spalls in the concrete exceeding 1/2" shall be patched.



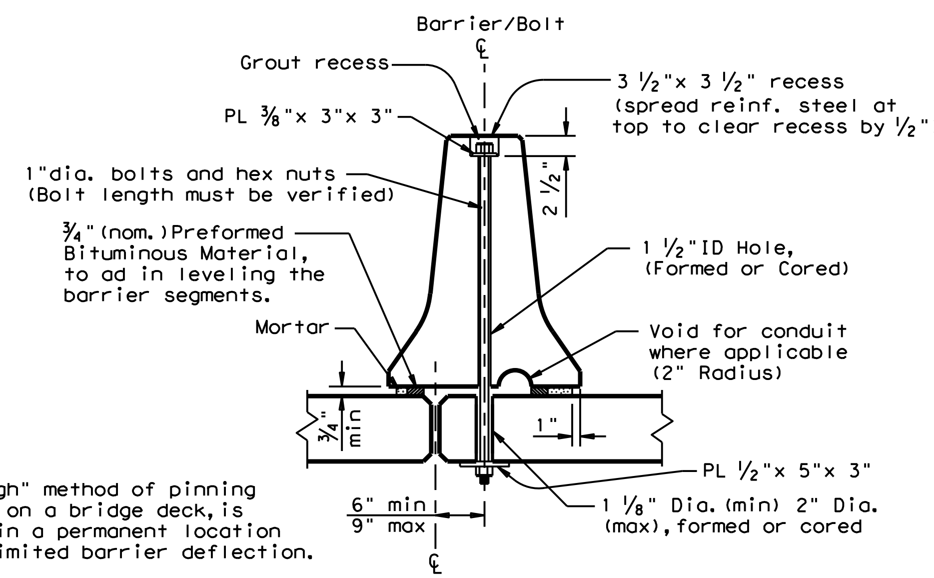
(21") PIN DETAIL

See Detail 3



(30") PIN DETAIL

See Detail 2



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

PRECAST CSB (BOLT THROUGH) PLACEMENT OVER LONGITUDINAL EXPANSION JOINT

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

GENERAL NOTES

1. These details provide a method of laterally restraining precast concrete barrier to limit deflections under normally expected passenger vehicle impacts. These details are intended for use in work zones, primarily on bridge decks, or pavement where temporary barrier must be placed less then 2 ft. from the longitudinal edge of the deck or dropoff and parallel to the direction of travel. Other applications of these details are acceptable as directed by the Engineer.
2. Each precast concrete barrier section shall have a minimum of four or total of eight 1 3/8" ID, holes formed or cored through the barrier. The center lines of the holes are shown in the hole location detail. If rebar is encountered, the entry point may be shifted 2" plus or minus longitudinally along the barrier. The eight holes are spaced along the length of the barrier as shown in Detail 1.
3. The drilling of the travel surface is accomplished by placing the pre-drilled barrier section on the travel surface in the desired position. Then the hole is drilled with the bit passing though the hole in the barrier. The bit is to be inserted into the hole in the barrier so that the travel surface is drilled to a point which is slightly more than the pin length.
4. Note that steel washers have been welded to the top of the steel pins to aid in the removal of the pins, when the barrier is removed.
5. See CSB(1) standard sheets for reinforcement requirements and joint connection types.
6. The forming or coring of holes in the barrier, drilling of holes in bridge deck or pavement, fabrication and materials for the 1 1/4" pins, installation of pins, and any repair to the barrier shall be considered as subsidiary to the barrier bid items.
7. The barrier and travel surface will be repaired as directed by the Engineer in accordance with Item 429, "Concrete Structure Repair."
8. Provide galvanized bolts, nuts, and plate washers. All steel pins shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."
9. Weight of barrier is approx. 440 lbs per foot.

Texas Department of Transportation — Design Division Standard

CONCRETE SAFETY BARRIER (F-SHAPE)

PRECAST BARRIER (TYPE 1) PINNED PLACEMENT

CSB(7)-10

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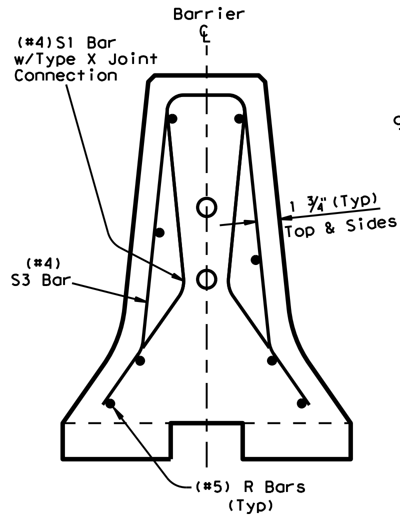
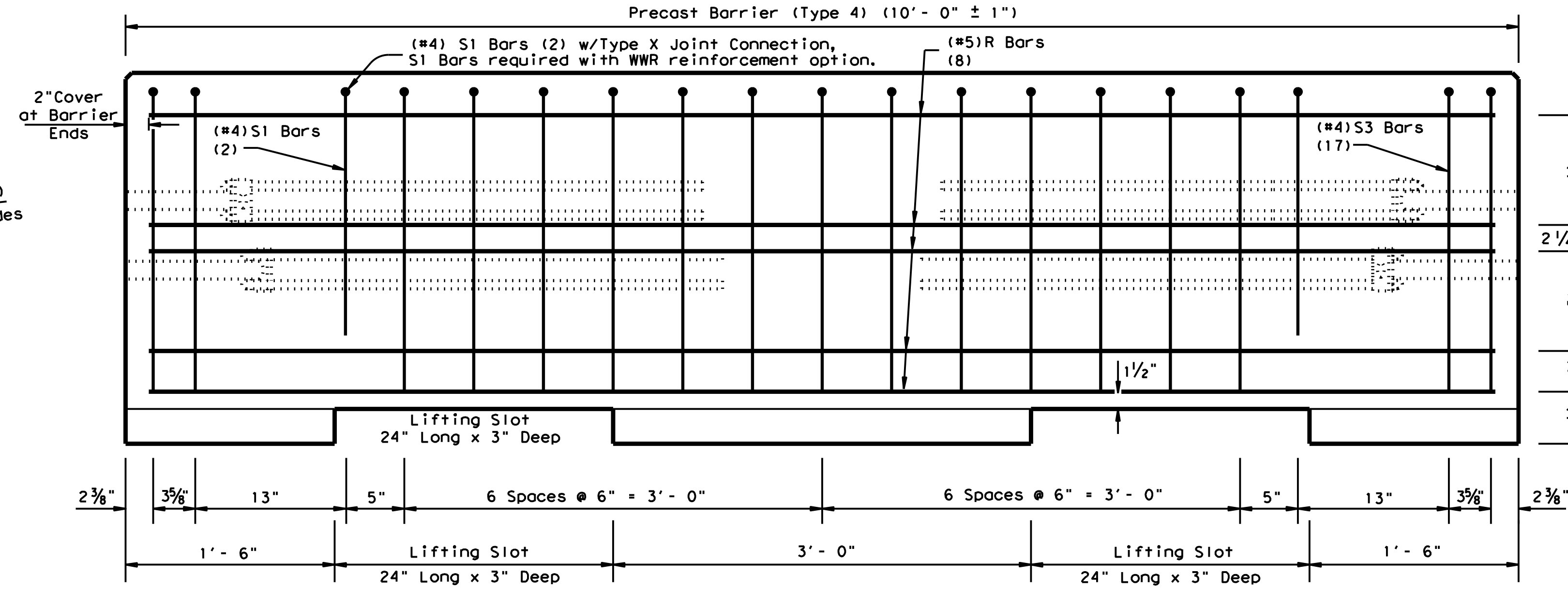
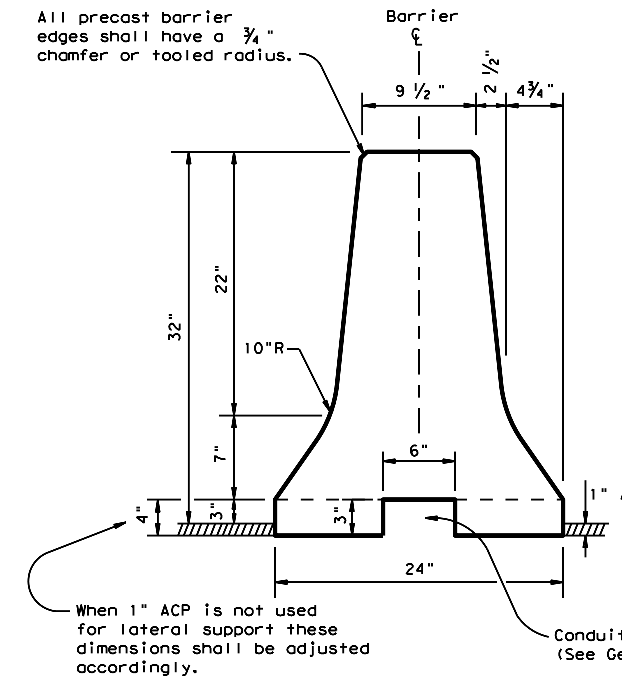


End View Precast Barrier



Reinforcement for (10 ft) Precast Concrete Safety Barrier (Type 4)

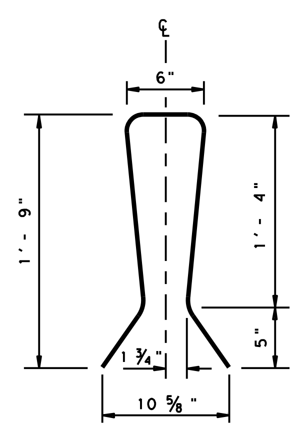


Concrete Safety Barrier

Schedule of reinforcement for each 10 foot precast section.

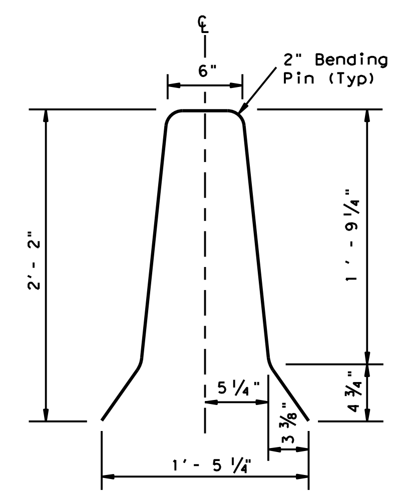
BAR	SIZE	QUANTITY
S1	#4	2
R3	#4	17
R	#5	8

Note:
Two S1 Bars are required with the use of WWR reinforcement option. The S1 Bars may need a slight modification to fit within the WWR cage, as directed by the Engineer.



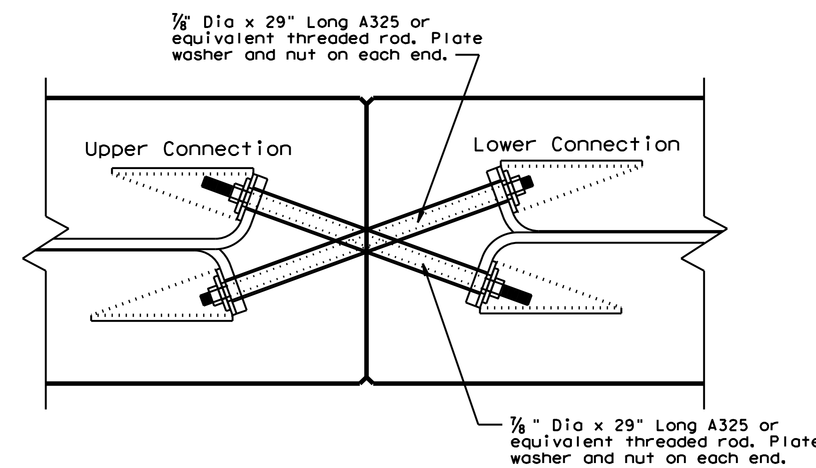
S1 Bar

#4 Bar (2)



S3 Bar

#4 Bar (17)



Top view showing Joint Connection Type X

Joint Type X Connection Required with (10 foot) barrier length, See CSB(1), sheet 1 of 2 for Joint Type X details.

General Notes

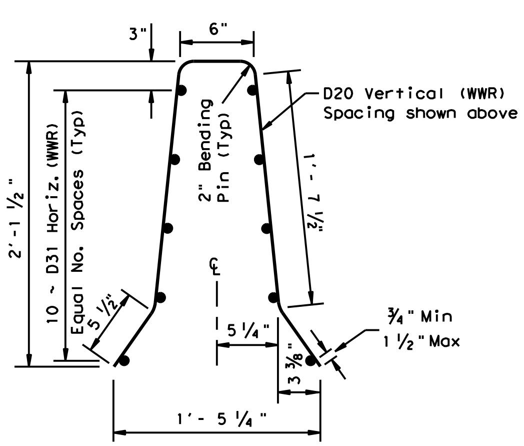
1. The 10 foot barrier is intended for maintenance applications of short duration periods. The 10 foot barrier is limited to use in temporary work zone conditions not to exceed 2 calendar months, unless approved in writing by the TxDOT engineer, noting the duration and location of the barrier placement in the written approval.
2. 30 ft. (Type 1) barrier and 10 ft. (Type 4) barrier sections shall not be mixed in a single run of barrier.
3. Barrier lengths other than 10 ft. for (Type 4) barrier are not allowed.
4. Concrete shall be Class H, with a minimum compressive strength of 3,600 psi.
5. Where used, rebar reinforcement shall be Grade 60 and conform to ASTM A615.
6. Only the Type X joint connection system is to be used with Type 4 barrier and is considered subsidiary. See CSB(1), Sheet 1 of 2 , for (Type X) connection details.
7. Conduit trough may be omitted, as shown elsewhere or as directed by the Engineer.

NOTE:
USAGE OF THE 10 FT (TYPE 4) CSB BARRIER REQUIRES A MINIMUM OF 100 LINEAR FEET.

SHORTER LENGTHS THAN THESE SHOULD BE DISCUSSED WITH THE DESIGN DIVISION.

Approximate Per L.F. Quantities		
		Precast
Concrete	CY.	0.108
Rebar	LB.	14.8

For Contractor's information only
Weight of one Precast 10 ft. unit = Approx. 2 Tons



Welded Wire Reinforcement (WWR) Option for Bars R and S3

(WWR) General Notes

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

Texas Department of Transportation — Design Division Standard

CONCRETE SAFETY BARRIER (F-SHAPE)

PRECAST BARRIER (TYPE 4) (10 FOOT, BARRIER SEGMENT)

CSB(8)-10

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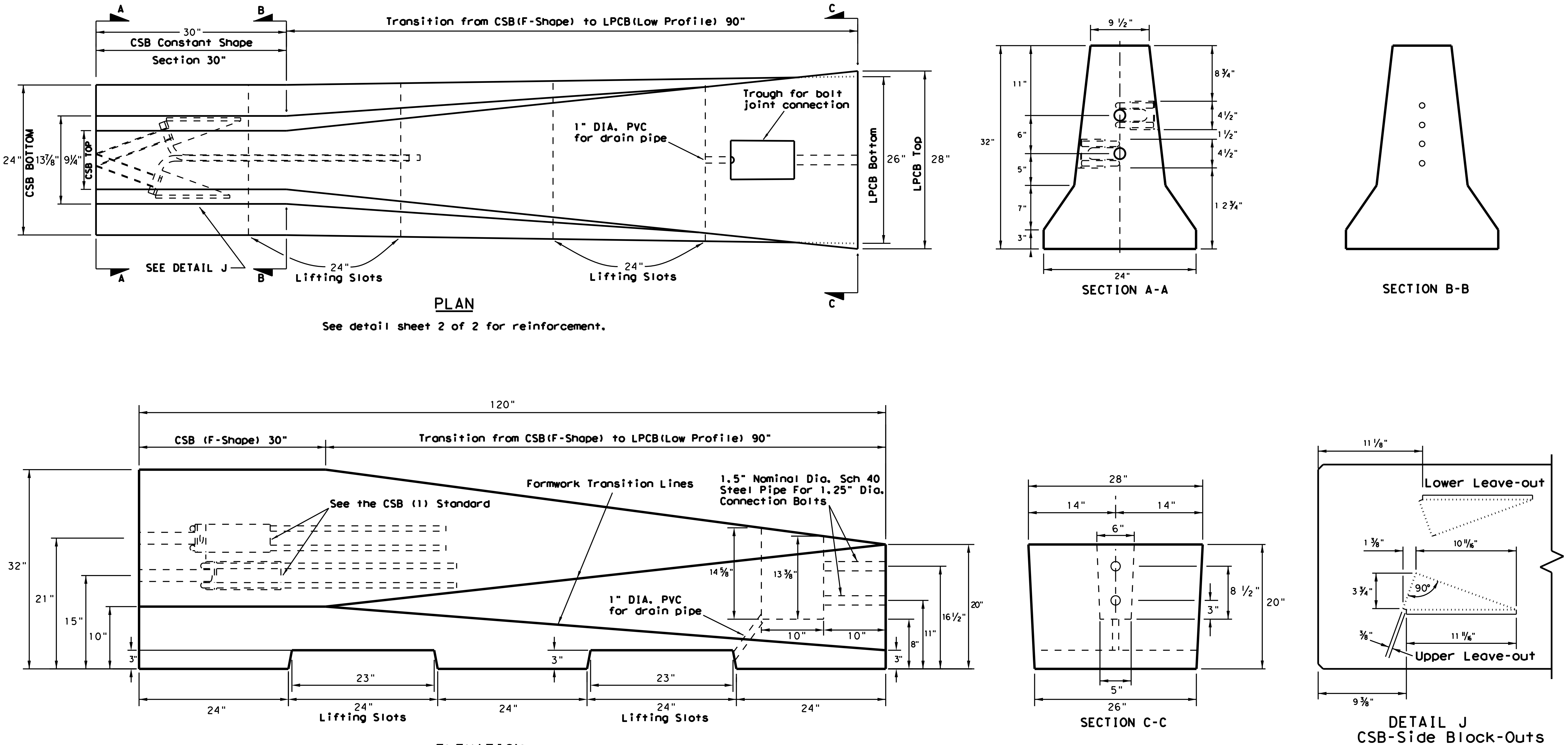

General Notes

1. Concrete shall be Class H for precast barrier with a minimum compressive strength of 3600 psi.
2. Where used, rebar reinforcement shall be Grade 60 and conform to ASTM A615.
3. These details cover barrier per Item 512, "Portable Concrete Traffic Barrier."
4. Barrier edges shall have a ¾ " chamfer or a tooled radius.
5. Precast barrier transition length shall be 10 ft.
6. Joint connection systems are considered subsidiary.
7. All steel assemblies for joint connections shall be galvanized after fabrication in accordance with Item 445, "Galvanizing".
8. For rebars, use 2" bending pin unless otherwise shown.

Texas Department of Transportation — Design Division Standard

F-SHAPE TO LOW PROFILE PRECAST BARRIER TRANSITION (TYPE T)

FSLP(TR)-10

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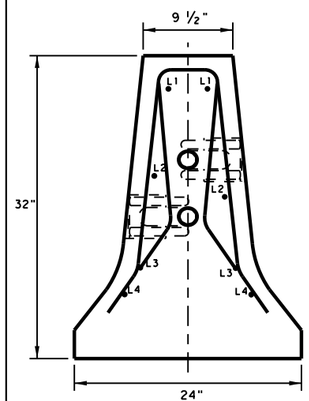
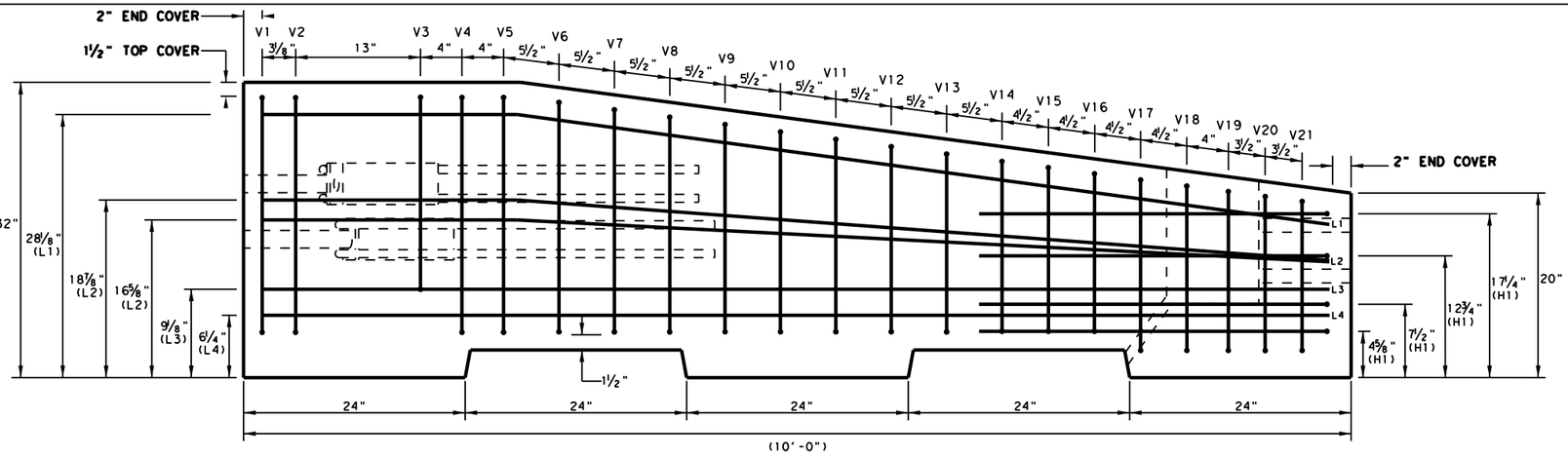
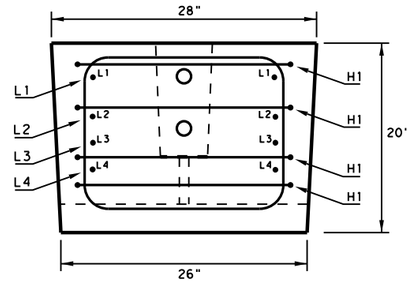


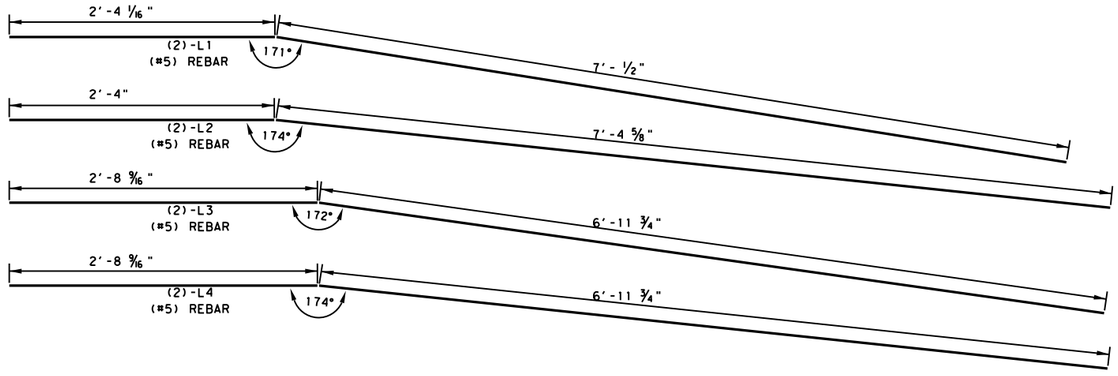
END SECTION AT
CSB (F-SHAPE) BARRIER
For Type X Connection
(See the CSB(1) Standard)

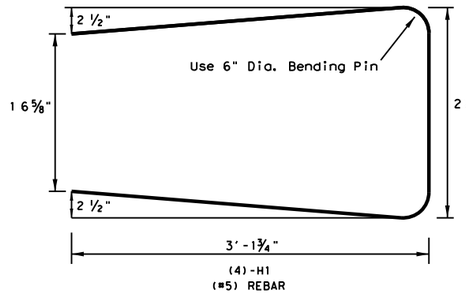


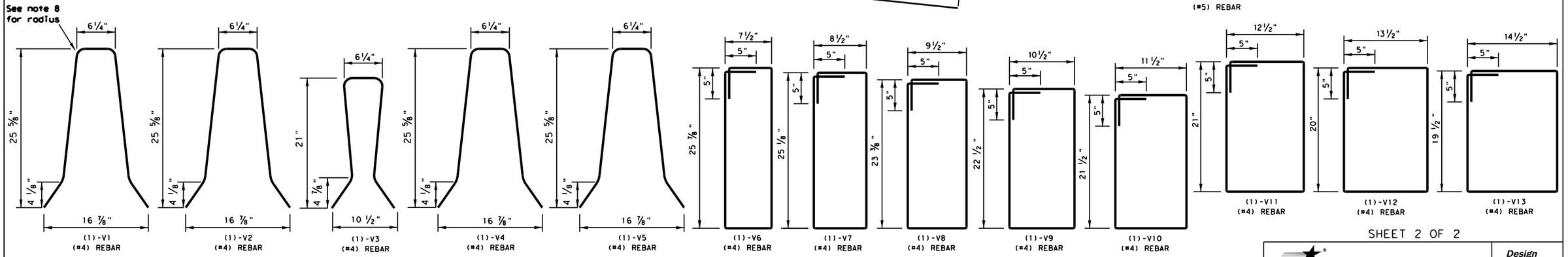
BARRIER TRANSITION ELEVATION
Showing Reinforcement Placement



END SECTION AT
LOW PROFILE BARRIER
For Connection Details
(See the LPCB Standard)







SHEET 2 OF 2

Texas Department of Transportation

Design Division Standard

F-SHAPE TO LOW PROFILE PRECAST BARRIER TRANSITION (TYPE T)

FSLP(TR)-10

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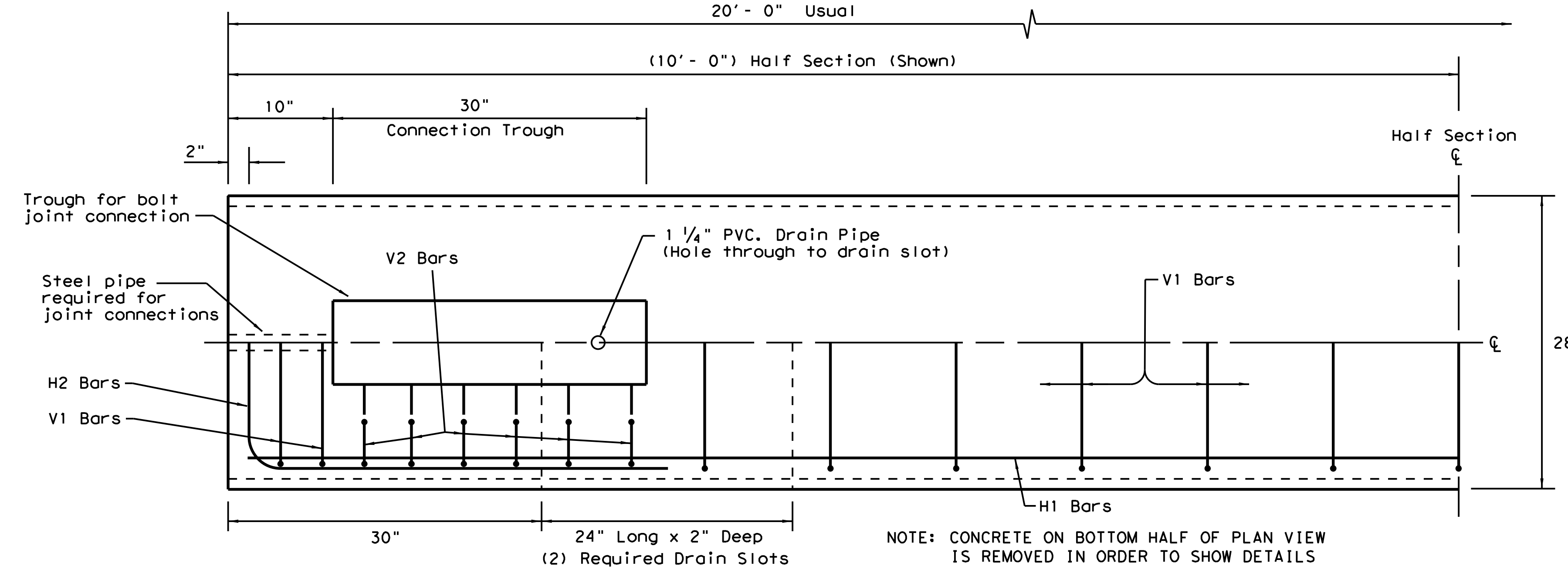
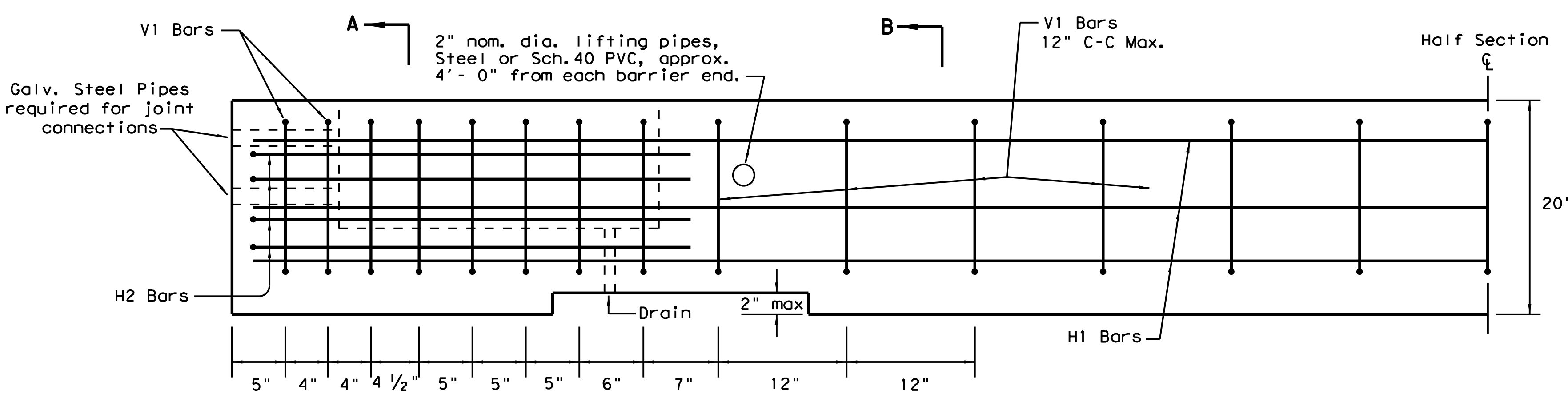
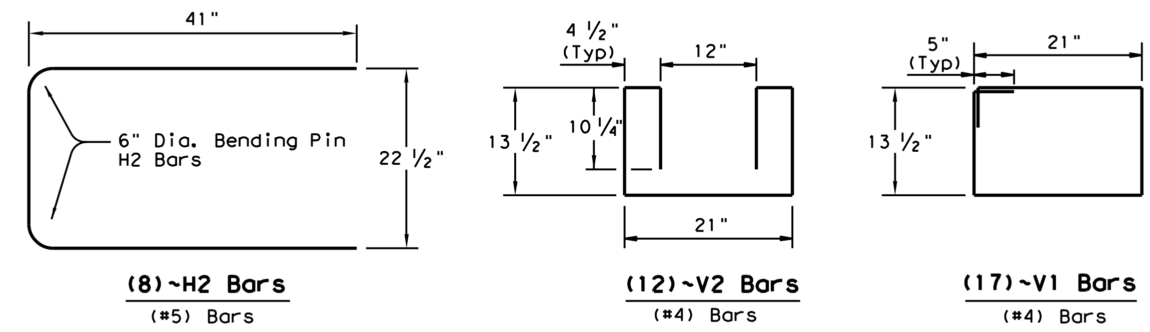


PLAN
(TYPE 1) BARRIER SEGMENT
(SYMMETRICAL ABOUT CENTER LINES)

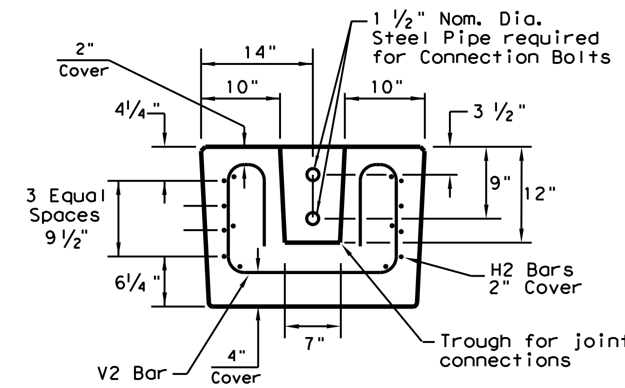


ELEVATION
(TYPE 1) BARRIER SEGMENT
(SYMMETRICAL ABOUT CENTER LINES)

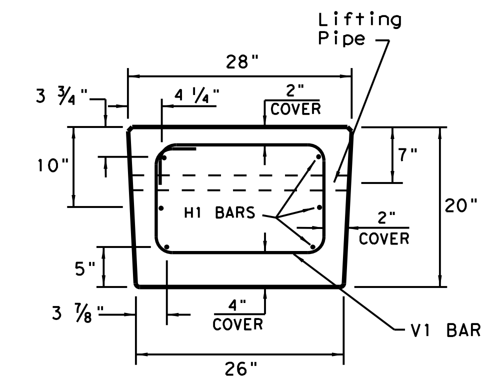


REINFORCING STEEL DETAILS
TYPE 1 - BARRIER SEGMENT

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



SECTION A-A



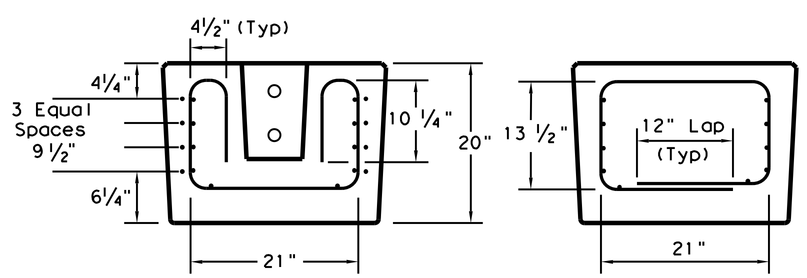
SECTION B-B

GENERAL NOTES

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

FOR CONTRACTORS INFORMATION ONLY

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



SECTION A-A **SECTION B-B**

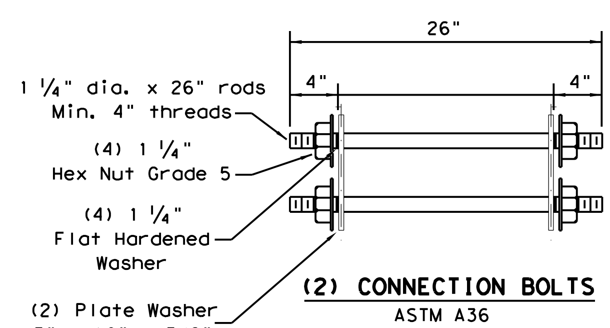
(WWR) GENERAL NOTES

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

REQUIRED (WWR) WIRE DESIGN

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

WELDED WIRE REINFORCEMENT (WWR)- OPTIONAL REINFORCING



(2) CONNECTION BOLTS
ASTM A36

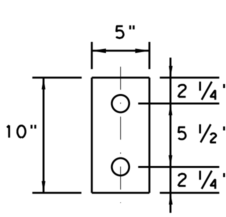


PLATE WASHER
5" x 10" x 3/8"

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

Texas Department of Transportation — Design Division Standard

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

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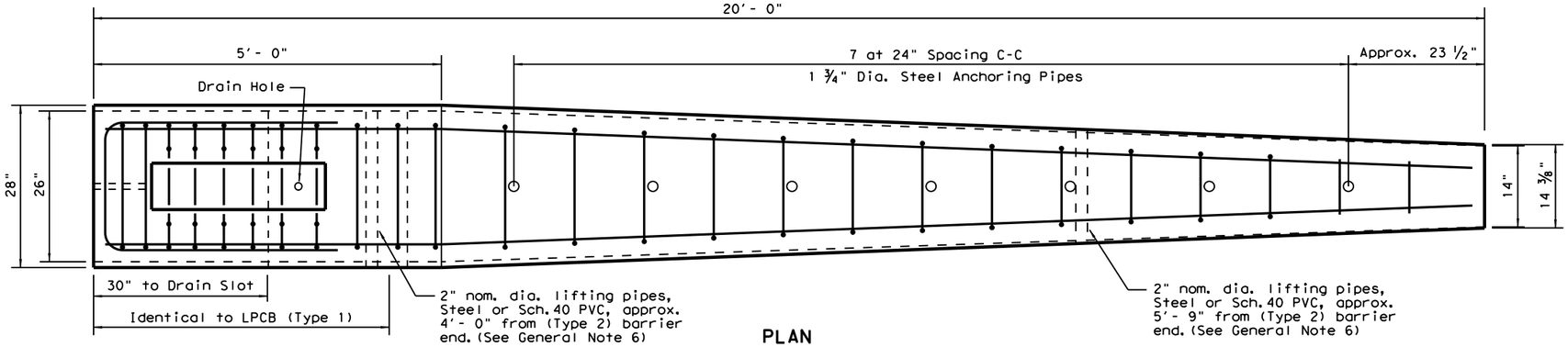
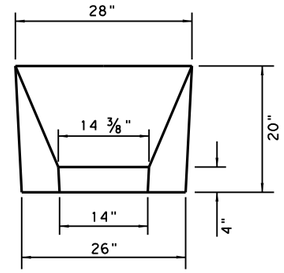
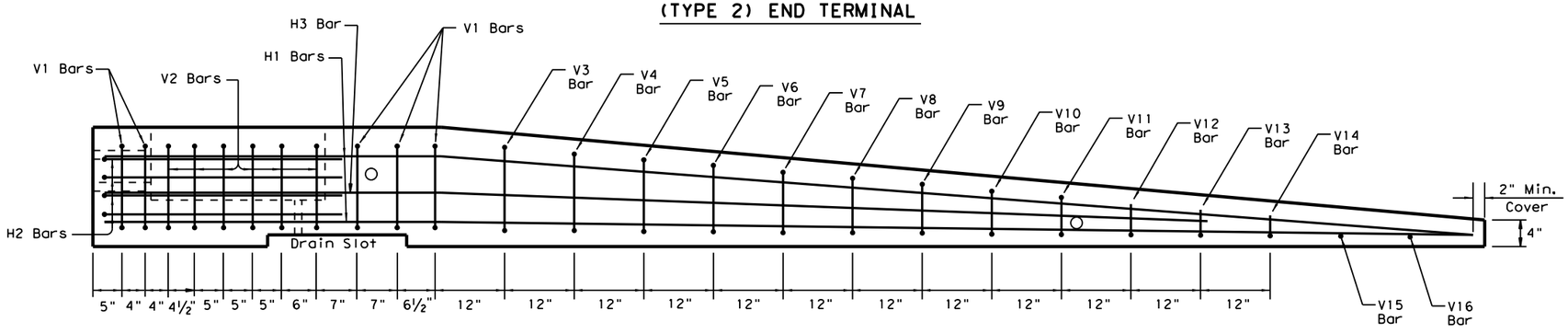


PLAN
(TYPE 2) END TERMINAL

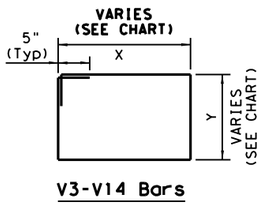


APPROACH VIEW

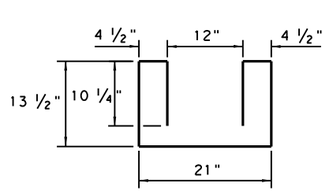


ELEVATION
(TYPE 2) END TERMINAL

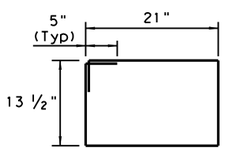
Note:
Anchoring pipes not shown in Elevation View



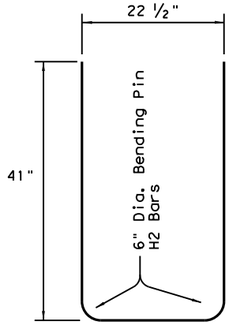
V3-V14 Bars



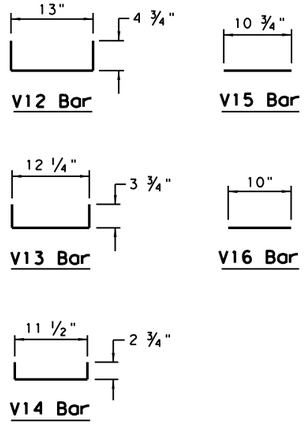
(6)~V2 Bars



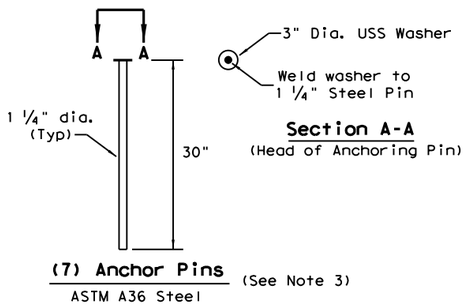
(5)~V1 Bars



(4)~H2 Bars
(#5) Bars

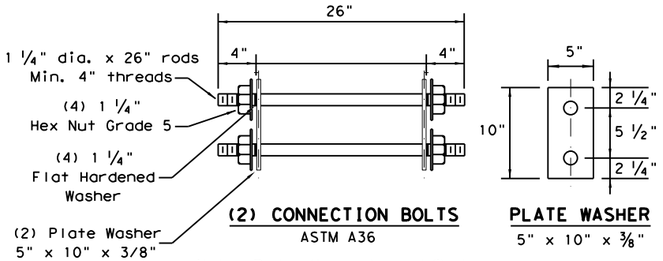


Note: All V Bars are (#4)



Section A-A
(Head of Anchoring Pin)

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



(2) CONNECTION BOLTS
ASTM A36

PLATE WASHER
5" x 10" x ⅜"

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

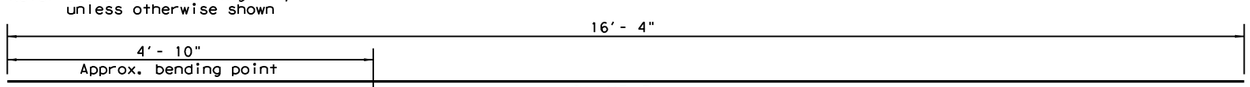
TYPE 2 - NOTES

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

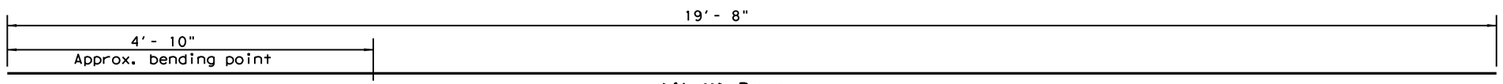
BAR(#4)	X (IN.)	Y (IN.)
V3 BAR	20 ¼	14 ½
V4 BAR	19 ½	13 ½
V5 BAR	18 ½	12 ¼
V6 BAR	17 ½	11 ¼
V7 BAR	17	10 ¼
V8 BAR	16 ¼	9
V9 BAR	15 ½	8
V10 BAR	14 ½	7
V11 BAR	13 ¾	6

REINFORCING STEEL DETAILS
TYPE 2 - END TERMINAL

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



(2)~H3 Bars
(#5) Bar



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

(4)~H1 Bars
(#5) Bar

FOR CONTRACTORS INFORMATION ONLY

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

Texas Department of Transportation

Design Division Standard

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

FILE: lpcb13.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		141

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DATE: 1/4/2021
PROJECT: 6375-52-001
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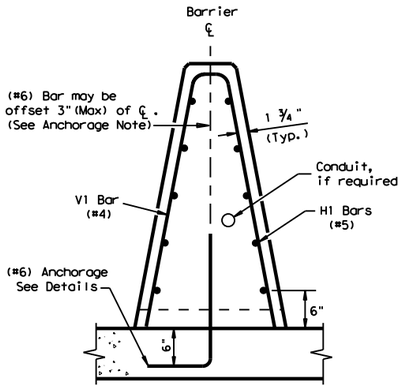
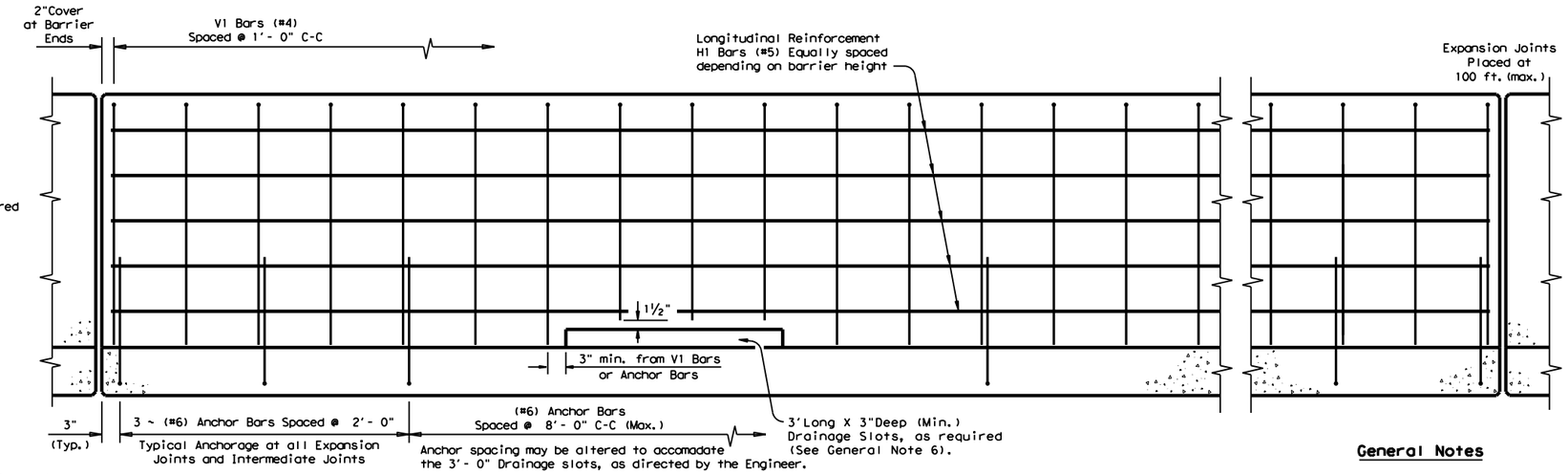
DATE: 1/4/2021
PROJECT: 6375-52-001



END VIEW

CAST-IN-PLACE (CIP) BARRIER

Barrier is Symmetrical About the Center Line

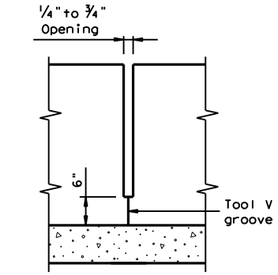


Note:
Reinforcement around the drainage slots may be cut or bent to accommodate the edge and top clearances.

The bottom of the reinforcement cage may rest on the top of the Concrete Bridge Deck or CRCP.

ELEVATION VIEW

Cast-in-Place (SSCB) on Bridge Decks or Continuously Reinforced Concrete Pavement (CRCP) (Showing Reinforcement and Anchor Placement)



INTERMEDIATE JOINT DETAIL

Place at all Bent ℄'s, without expansion joints and spaced at 33 ft. (max), 10 ft. (min).

EXPANSION JOINT PLACEMENT

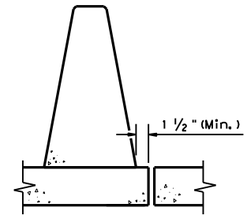
Place at all transverse joints or 100 ft. (max.), 10 ft. (min).

BARRIER PLACEMENT OVER (CRCP) JOINTS

Barrier may be cast over a "Longitudinal" CRCP joint.

CRCP Joints (with or without tiebars): Two layers of 30 lb roofing felt or ½" preformed bituminous fiber material.

Barrier Anchorage Note: Anchorage must be located at least 3" from a longitudinal joint.



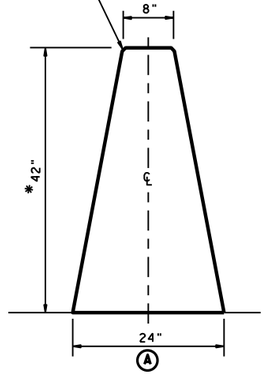
MINIMUM EDGE DISTANCE FROM LONGITUDINAL JOINT

Barrier placement over a longitudinal bridge joint is not recommended.

General Notes

1. Concrete shall be Class C. Unless otherwise specified in the plans.
2. Where used, rebar reinforcement shall be Grade 60 and conform to ASTM A615. If the bridge slab requires epoxy "coated" reinforcement, the barrier and/or anchorage may require the same, if shown elsewhere in the plans.
3. These details cover barrier per Item 514, "Permanent Concrete Traffic Barrier".
4. Anchorage: The "Optional" Anchor system shall be embedded 6" into fresh concrete or using a Type III, Class C Epoxy anchorage system. Follow the manufacturer's directions for installing the expoxied anchor bars. All anchorage shown is the minimum required, and considered subsidiary to the bid item.
5. Top edges of CIP barrier shall have a ¾" chamfer or tooled radius.
6. Drainage slot locations (12'- 0", C-C Min. Spacing) are shown elsewhere, or as directed by the Engineer. Drainage slot heights on the SSCB may be increased to a maximum of 5 inches, without geometric changes to the barrier face.
7. Cast-in-place barrier may be slip formed. Bracing may be tied or tack welded to the reinforcement cage to provide cage stability. Do not weld to anchor bars. The reinforcement cage may rest on the top of the finished grade.
8. For locations where lighting is required, see the SSCB(4) sheet for the proper reinforcement and anchorage.

Top edges of CIP barrier shall have a ¾" chamfer or tooled radius.

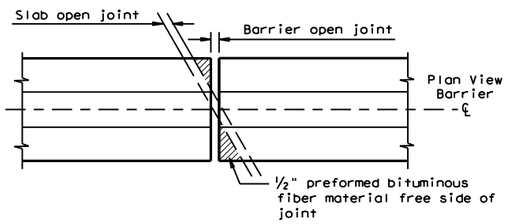


* Barrier height (IN.)	Dimensions (IN.)		
	Ⓐ	Ⓑ	Ⓒ
42	24	40 ¼	20 ½
48	26 ¼	46 ¼	22 ¾
54	28 ½	52 ¼	25 ⁱ⁄₁₆

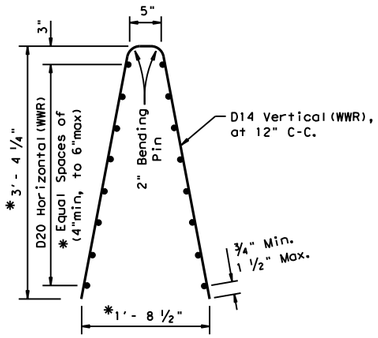
*(SSCB)(42") Barrier height may be increased to 48" or 54". This would increase the barrier and reinforcement dimensions accordingly.

SINGLE SLOPE CONCRETE BARRIER

(SSCB)(42")



BARRIER OVER TRANSVERSE OPEN JOINT

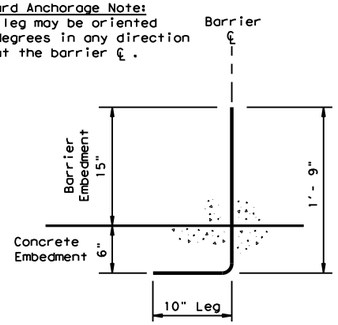


Cast-In-Place (CIP) or Slip-Formed (SSCB)

Cast-in-Place barrier may be connected to precast SSCB. Joint connection "Types" may be used in Cast-in-Place barrier, to match the precast barrier connection. (See required connection "Type" elsewhere in the plans)

The weight of Cast-in-Place (SSCB)42" is approx. 717 lbs per ft.

Standard Anchorage Note:
10" leg may be oriented 90 degrees in any direction about the barrier ℄.

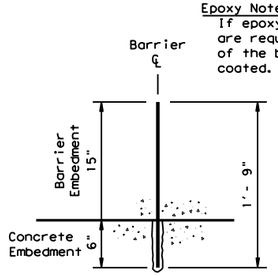


STANDARD ANCHORAGE

(#6) Bar

Concrete Pavement / Bridge Deck Anchorage: Cast-in-Place or Slip-Formed Barrier (See General Notes 2)

Epoxy Note:
If epoxy coated anchor bars are required, the lower 6" of the bars must not be epoxy coated.

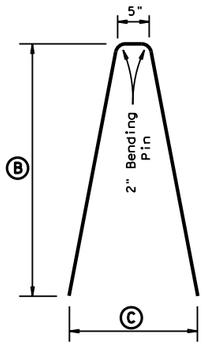


"OPTIONAL" ANCHORAGE

(#6) Bar

Fresh insertion method or Type III, Class C Epoxy Method

Concrete Pavement / Bridge Deck Anchorage: Cast-in-Place or Slip-Formed Barrier (See General Notes 2 & 4)



V1 Bar

(#4) Bar

Welded Wire Reinforcement (WWR) Option for Bars V1 and H1

(WWR) General Notes

1. Deformed Welded Wire Reinforcement (WWR) shall conform to ASTM A497.
2. Welded wire cage may be cut and bent to accommodate the drainage slots, as directed by the Engineer.
3. Welded wire spilce locations shall have a "minimum" splice lap length of 12".
4. Combinations of reinforcing steel and WWR will be permitted, as directed by the Engineer. The dimension from the end of the barrier section to the first wire shall not exceed 3".

Texas Department of Transportation — Design Division Standard

SINGLE SLOPE CONCRETE BARRIER

CAST-IN-PLACE
(TYPE 1)
(BRIDGE DECK OR CRCP)

SSCB(1)-16

FILE: sscb116.dgn	DN: TxDOT	CK: HC/AN	DW: BD/VP	CK: KM
©TxDOT January 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
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DATE: 1/4/2021
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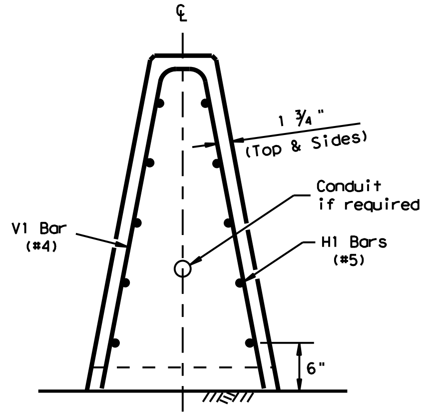
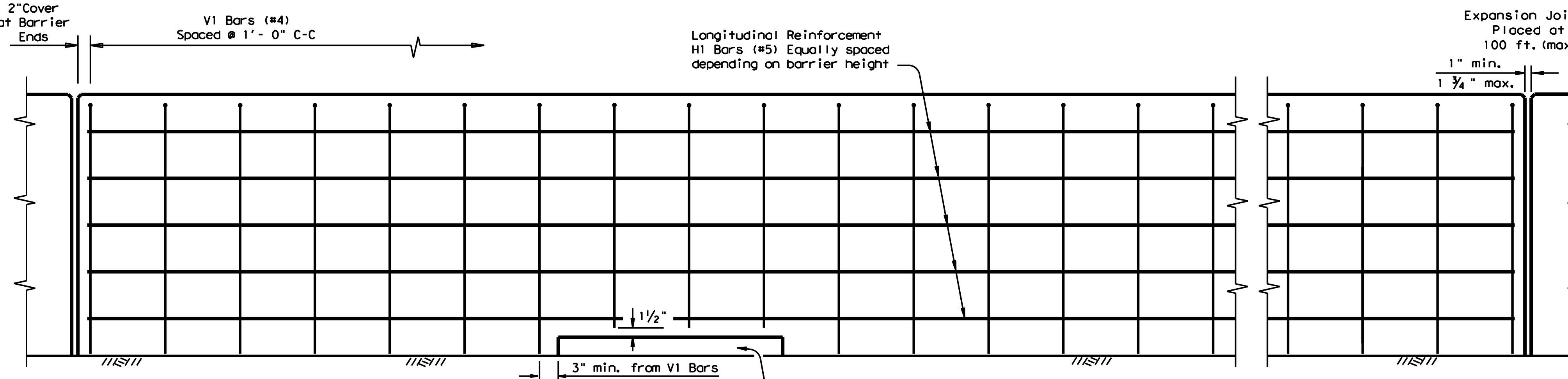


END VIEW

CAST-IN-PLACE (CIP) BARRIER

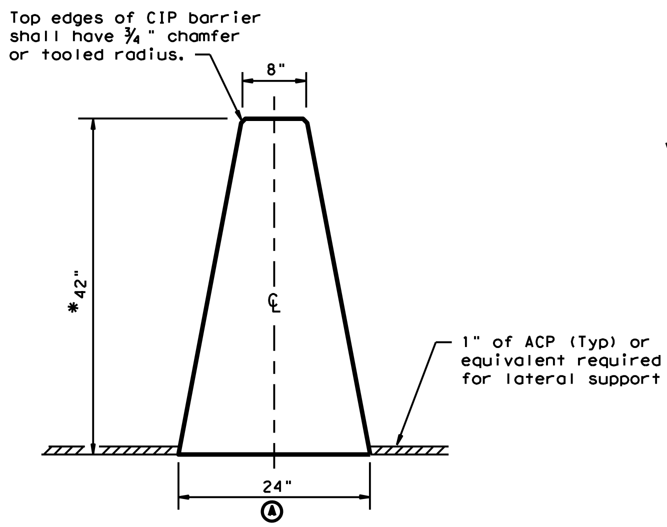
Barrier is Symmetrical About the Center Line



Note:
Bottom of reinforement cage may rest on top of the finished grade.
Reinforcement around the drainage slots may be cut or bent to accommodate the edge and top clearances.

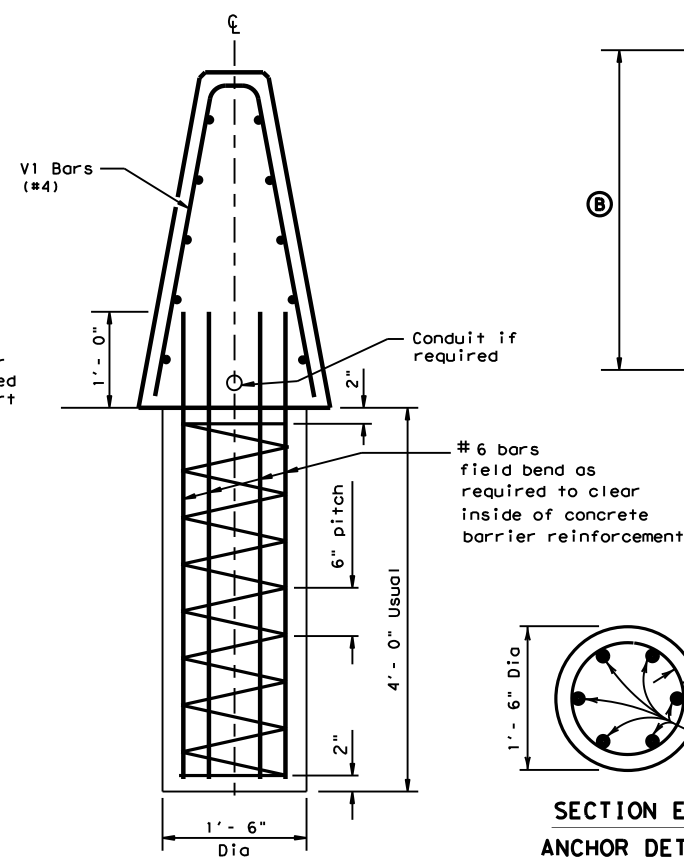
ELEVATION VIEW

Cast-in-Place (SSCB)(Type 2)on Roadway



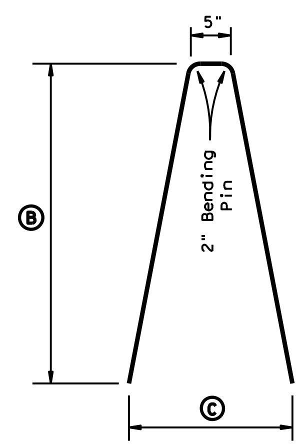
SINGLE SLOPE CONCRETE BARRIER

(SSCB)(42")



SECTION D-D

ANCHOR DETAIL



V1 Bar

#4 Rebar

BARRIER HEIGHT (IN.)	* DIMENSIONS (IN.)		
	Ⓐ	Ⓑ	Ⓒ
42	24	40 ¼	20 ½
48	26 ¼	46 ¼	22 ¾
54	28 ½	52 ¼	25 ⅛

*(SSCB)(42") Barrier height may be increased to 48" or 54". This would increase the barrier and reinforcement dimensions accordingly.

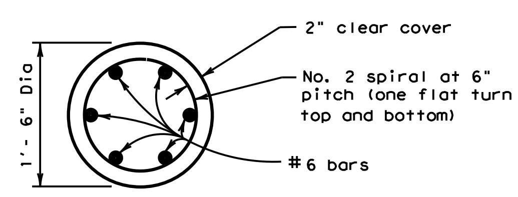
GENERAL NOTES

1. Concrete shall be Class C. Unless otherwise specified in the plans.
2. Where used, rebar reinforcement shall be Grade 60 and conform to ASTM A615.
3. These details cover barrier per Item 514,"Permanent Concrete Traffic Barrier".
4. The Anchorage shown is considered subsidiary to the bid item.
5. Top edges of CIP barrier shall have a ¾" chamfer or tooled radius.
6. Drainage slot locations (12'- 0", C-C Min. Spacing) are shown elsewhere, or as directed by the Engineer. Drainage slot heights on the SSCB may be increased to a maximum of 5 inches, without geometric changes to the barrier face.
7. Cast-in-place barrier may be slip formed. Bracing may be tied or tack welded to the reinforcement cage to provide cage stability. Do not weld to anchorage.
8. For locations where lighting is required, see the SSCB(4) sheet for the proper reinforcement and anchorage.

Cast-In-Place (CIP) or Slip-Formed (SSCB)

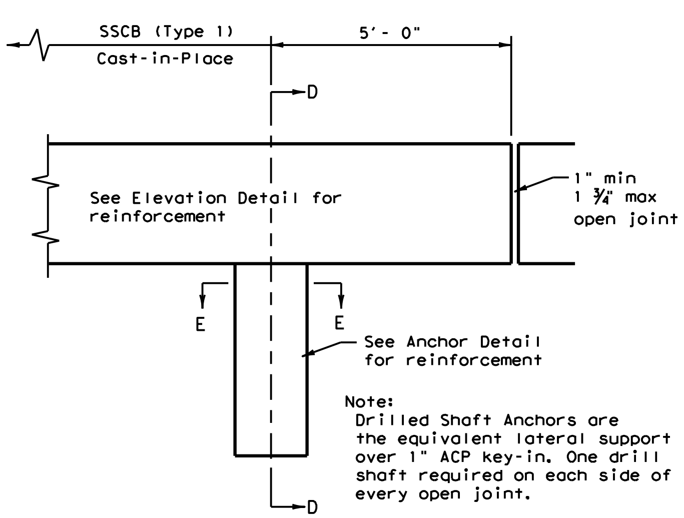
Cast-in-Place barrier may be connected to precast SSCB. Joint connection "Types" may be used in Cast-in-Place barrier, to match the precast barrier connection. (See required connection "Type" elsewhere in the plans)

The weight of Cast-in-Place (SSCB)42" is approx. 717 lbs per ft.



SECTION E-E

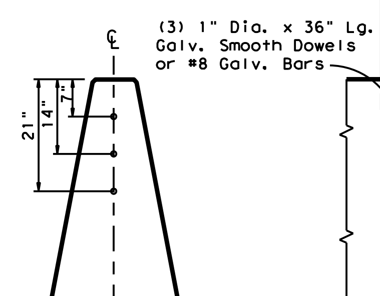
ANCHOR DETAIL



Note:
Drilled Shaft Anchors are the equivalent lateral support over 1" ACP key-in. One drill shaft required on each side of every open joint.

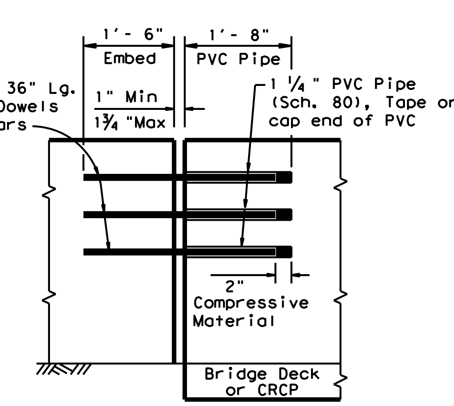
ELEVATION

ANCHOR LOCATION



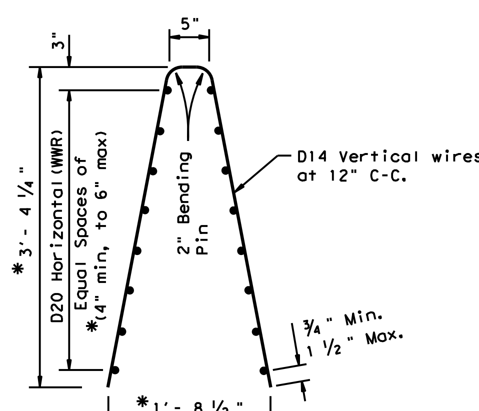
END VIEW

Dowel locations



EXPANSION JOINT (Dowel Connection)

Dowels may be used, as directed by the Engineer, in locations where the barrier could be laterally displaced.



Welded Wire Reinforcement (WWR) Option for Bars V1 and H1

(WWR) General Notes

1. Deformed Welded Wire Reinforcement (WWR) shall conform to ASTM A497.
2. Welded wire cage may be cut and bent to accommodate the drainage slots, as directed by the Engineer.
3. Weled wire splice locations shall have a "minimum" splice lap length of 12".
4. Combinations of reinforcing steel and WWR will be permitted, as directed by the Engineer. The dimension from the end of the barrier section to the first wire shall not exceed 3".

Texas Department of Transportation — Design Division Standard

SINGLE SLOPE CONCRETE BARRIER

CAST-IN-PLACE
(TYPE 1)
(FLEXIBLE PAVEMENT)

SSCB(1F)-10

FILE: sscb1f10.dgn	DN: TxDOT	CK: AM	DW: BD	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
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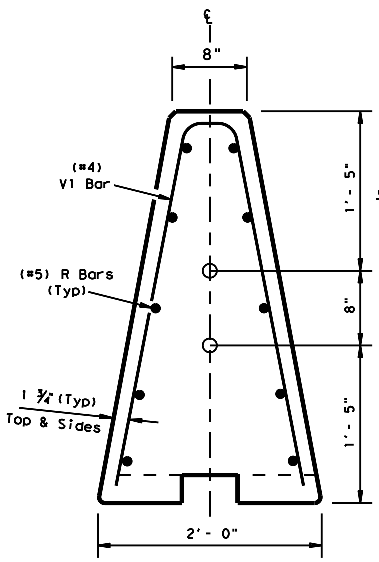
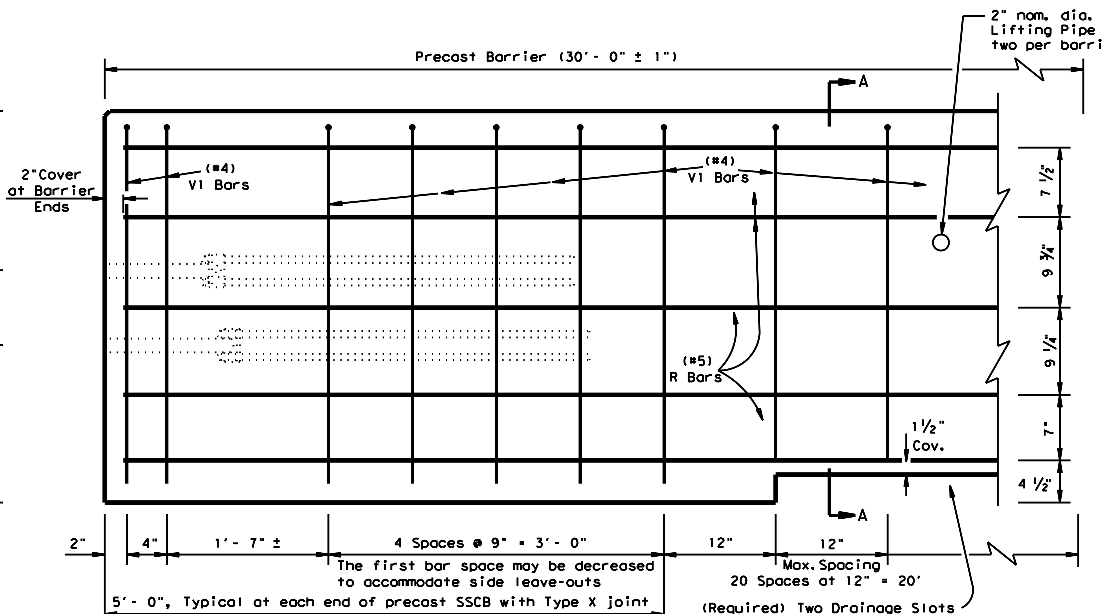
	12		HARRIS/GAL	143



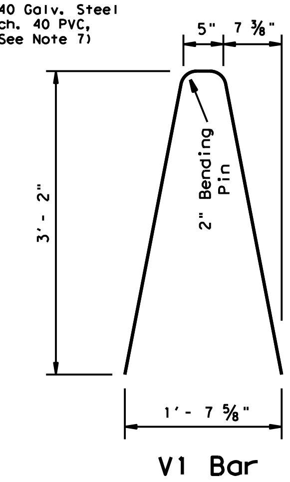
End View Precast Barrier

Pipe locations for Joint Type X connection



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

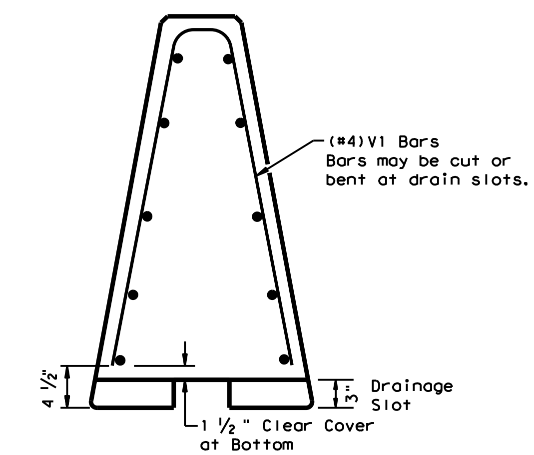
Showing reinforcement for Joint Connection (Type X)



V1 Bar

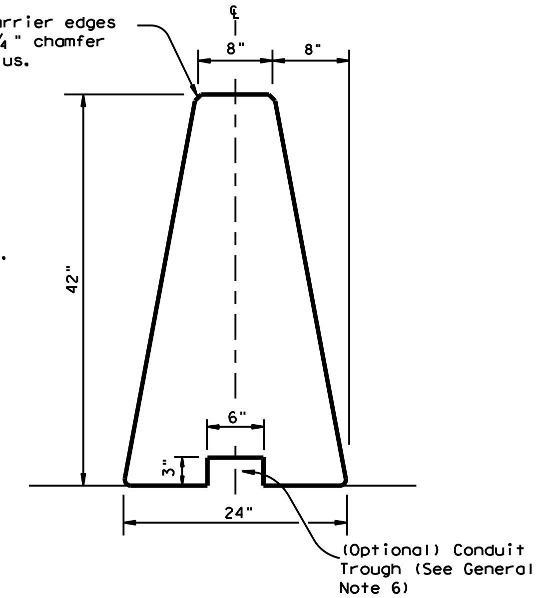
#4 Rebar

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



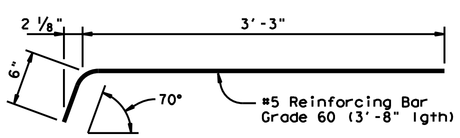
Section A-A

Steel Placement at (Required) Drainage Slots



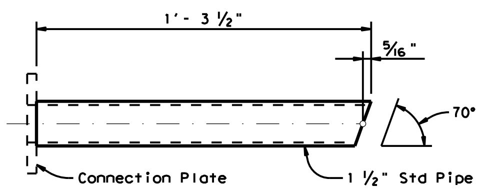
Single Slope Concrete Traffic Barrier

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



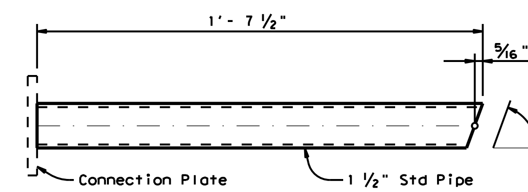
DEFORMED BAR ANCHOR DETAILS

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



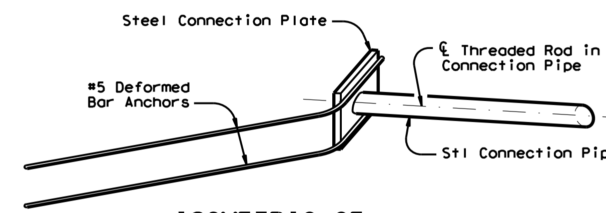
UPPER CONNECTION PIPE DETAILS

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



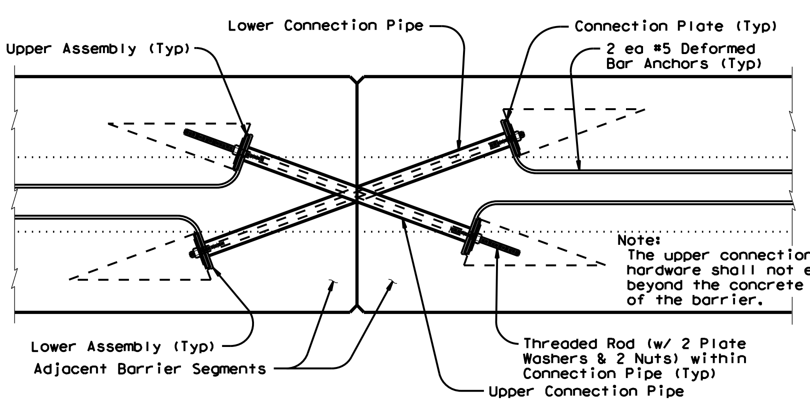
LOWER CONNECTION PIPE DETAILS

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



ISOMETRIC OF TYPICAL WELDED ASSEMBLY

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



TYPE X JOINT INSTALLATION DETAIL

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

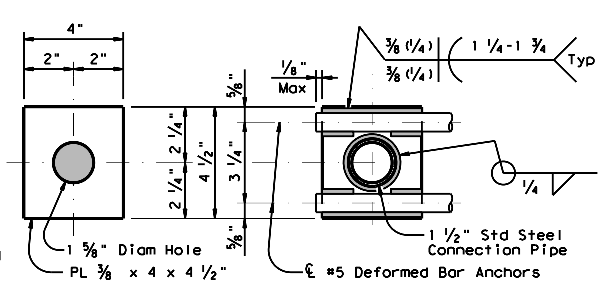
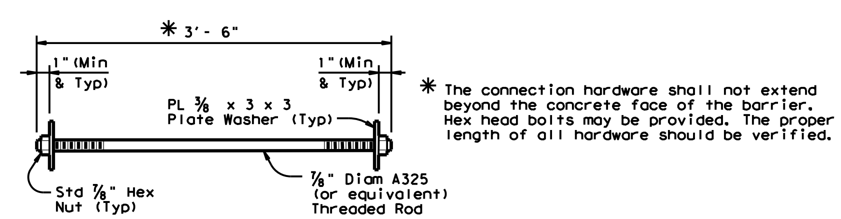


PLATE DIMENSIONS

WELDING DETAILS

CONNECTION PLATE DETAILS

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



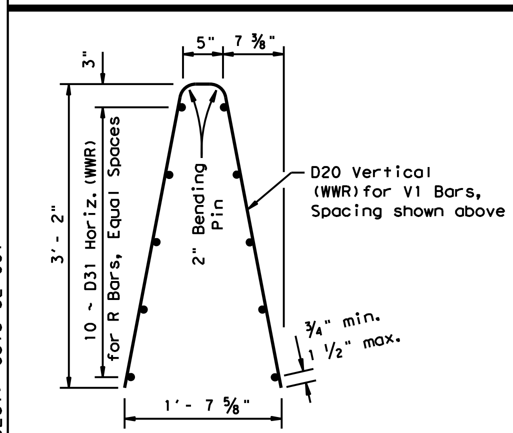
CONNECTION BOLT OR THREADED ROD DETAIL

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

General Notes

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

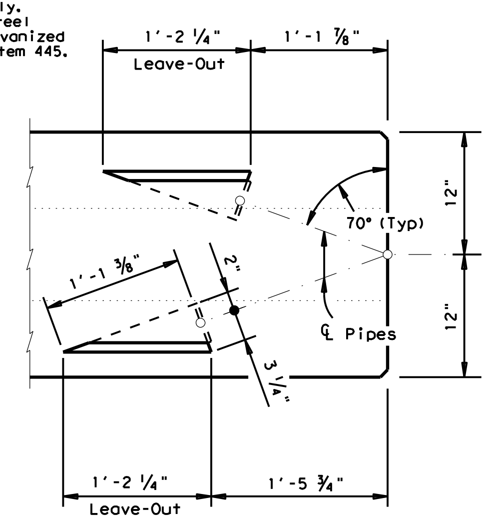
Weight of one precast 30 ft. (SSCB) segment = Approx. 10.5 Tons or 717 lbs per ft.



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

(WWR) General Notes

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



BARRIER PLAN AT JOINT

SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

SINGLE SLOPE CONCRETE BARRIER

PRECAST BARRIER (TYPE 1)

SSCB(2)-10

FILE: sscb210.dgn	DN: TxDOT	CK: AM	DW: BD	CK:
© TxDOT December 2010	CONT 6375	SECT 52	JOB 001	HIGHWAY IH45
REVISIONS	DIST 12	COUNTY HARRIS/GAL		SHEET NO. 144

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PROJECT: 6375-52-001

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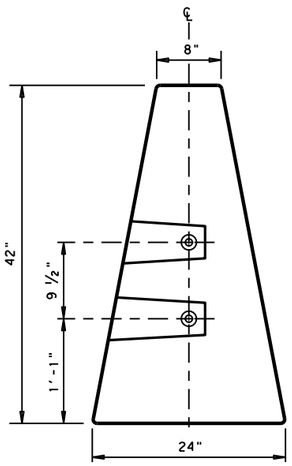
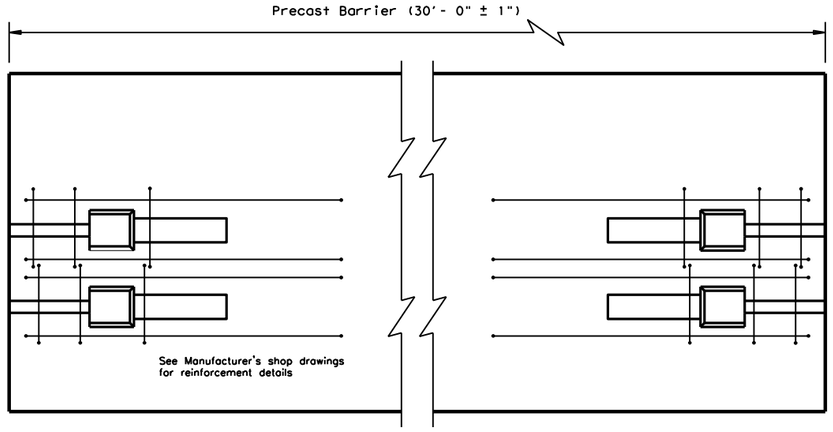
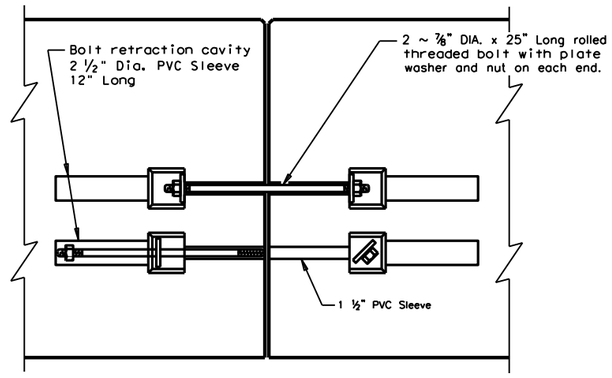
DATE: 1/4/2021
PROJECT: 6375-52-001



END VIEW
"QUICK-BOLT" POCKET LOCATIONS

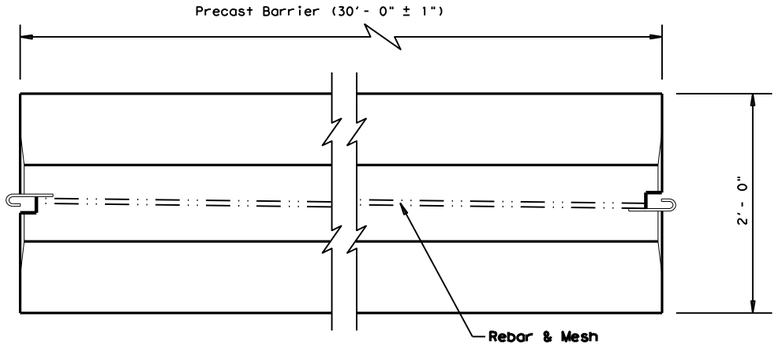


ELEVATION VIEW
"QUICK-BOLT" (SSCB)
See Manufacturer's shop drawing for additional details

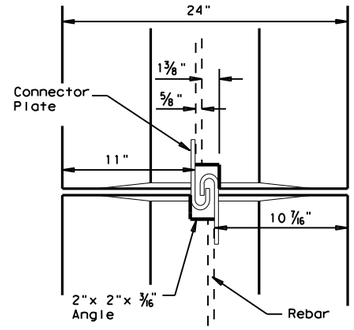


ELEVATION VIEW SHOWING JOINT CONNECTION
"QUICK-BOLT"

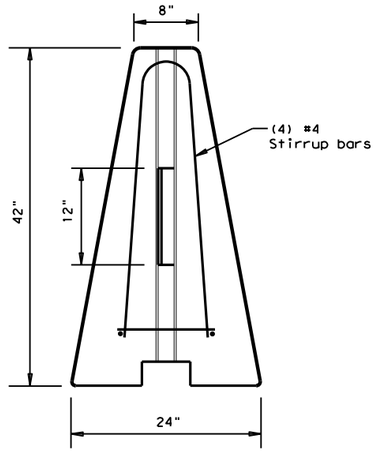
Joint Connection (Type Q)



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



VIEW FROM ABOVE
J-J HOOK CONNECTION



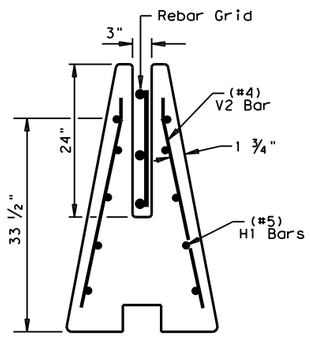
END VIEW

Proprietary Joint Connections (SSCB)

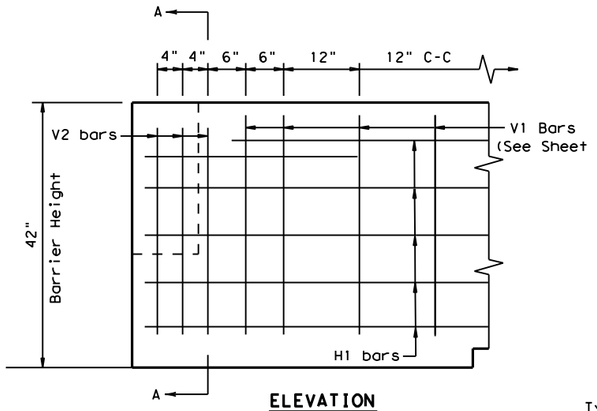
Two proprietary joint connections are acceptable as alternates to the (Type X) connection shown, here on. These joint connections types are:

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

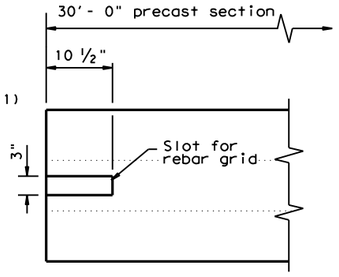
If one of these connection systems are exclusively specified in the plans, prior approval for sole source use must be obtained. Details of the connection components and barrier reinforcement for these systems, will be shown on the manufacturer's shop drawing(s) furnished to the Engineer.



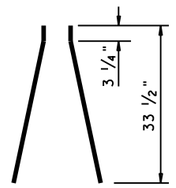
SECTION A-A
Showing (Type R)
Rebar Grid



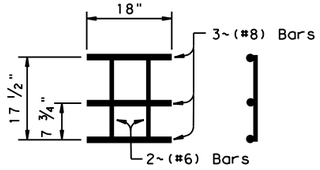
ELEVATION
V1 Bars (See Sheet 1)



TOP VIEW
JOINT CONNECTION
Typical at both ends of barrier segment



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



WELDED REBAR GRID

Joint Connection (Type R)

SHEET 2 OF 2

Texas Department of Transportation — Design Division Standard

SINGLE SLOPE CONCRETE BARRIER

PRECAST BARRIER
(TYPE 1)

SSCB(2)-10

FILE: sscb210.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
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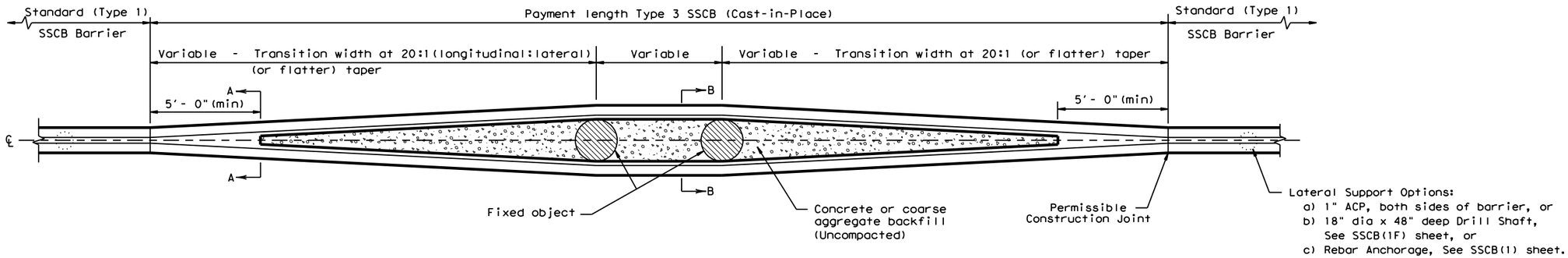
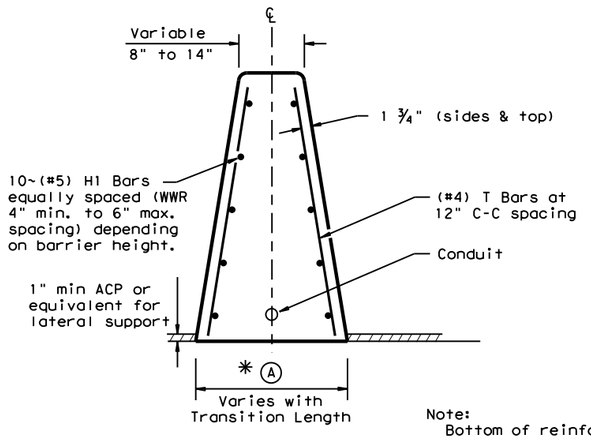
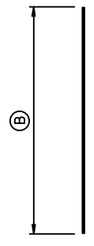


PLAN (TYPE 3) BARRIER

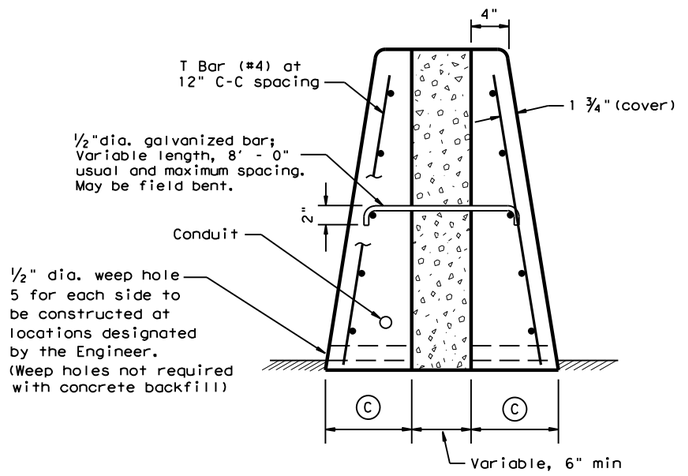


SECTION A-A



T BAR (#4)

Note:
Bottom of reinforcement cage may rest on top of finished grade.



SECTION B-B

Barrier Height (IN.)	* Dimensions (IN.)		
	(A)	(B)	(C)
42	24 Plus	40 ¼	12
48	26 ¼ Plus	46 ¼	13 ⅛
54	28 ½ Plus	52 ¼	14 ¼

*(SSCB)(42") Barrier height may be increased to 48" or 54". This would increase the barrier and reinforcement dimensions accordingly.

Welded Wire Reinforcement (WWR) Option for Bars T and H1 (Type 3) Barrier

(WWR) General Notes

1. WWR design required for (Type 3) SSCB barrier: D14 vertical (12" C-C) x D20 horizontal wires spaced (4" min. to 6" max.) as height requires.
2. Deformed Welded Wire Reinforcement (WWR) shall conform to ASTM A497.
3. Welded wire cage may be cut and bent to accommodate the drainage slots, as directed by the Engineer.
4. Welded wire splice locations shall have a "minimum" splice lap length of 12".
5. Combinations of reinforcing steel and WWR will be permitted, as directed by the Engineer. The dimension from the end of the barrier section to the first wire shall not exceed 3".

GENERAL NOTES

1. Axis of concrete barrier shall be vertical, except where roadway is superelevated, then axis shall be normal to roadway surface.
2. All steel that requires galvanizing shall be in accordance with Item 445, "Galvanizing."
3. Bid price per liner foot of (Type 3) SSCB, including anchor sections, shall include all of the concrete, reinforcement, and aggregate backfill.
4. All concrete shall be Class C.
5. Longitudinal and vertical bars for roadway barrier shall conform to ASTM A615 (Grade 60), unless otherwise specified.
6. At construction joints the longitudinal bars shall extend beyond the joint so that bar splices will be a minimum of two feet from the construction joint.
7. Welded wire reinforcement (WWR) may be used as an option to conventional reinforcement and shall meet requirements shown.
8. Any method devised by the contractor and approved by the Engineer that will assure the longitudinal steel for and (Type 3) SSCB will be positioned ± ½inch as dimensioned will be satisfactory.
9. Conduit to be provided only when called for elsewhere in the plans. Position of conduit may be adjusted to facilitate construction subject to the approval of the Engineer.
10. See SSCB(4) standard for barrier with illumination.

Texas Department of Transportation

Design Division Standard

SINGLE SLOPE CONCRETE BARRIER

CAST-IN-PLACE
(TYPE 3)
AT FIXED OBJECTS

SSCB(3)-10

FILE: sscb310.dgn	DN: TxDOT	CK: AM	DW: BD	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
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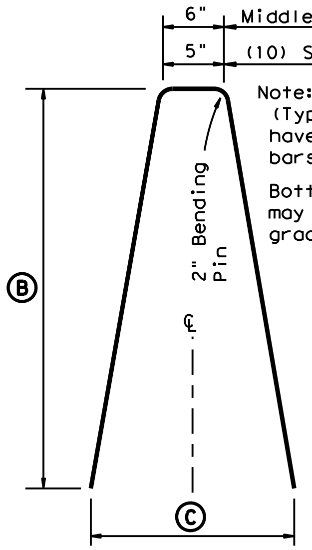


S3 BAR (#4)

Note:
(Type 4) barrier first (5) S3 bars have 5" top dimension, middle (10) bars require 6" top dimension.

Bottom of reinforcement cage may rest on top of the finished grade.

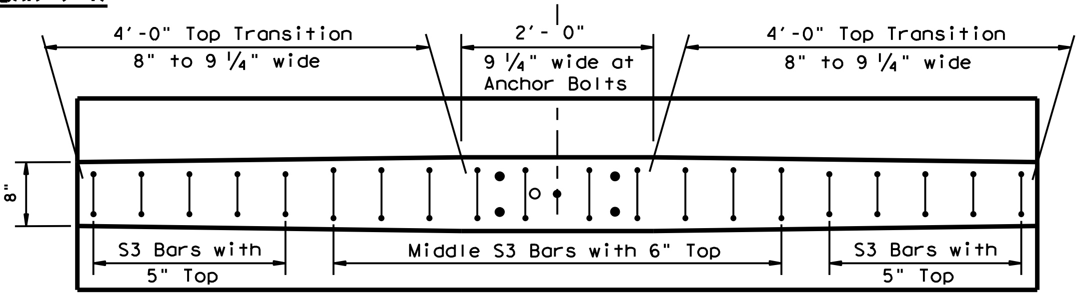
* Barrier height (IN.)	Dimensions (IN.) B	Dimensions (IN.) C
42	40 1/4	20 1/2
48	46 1/4	22 3/4
54	52 1/4	25 1/16

Schedule of reinforcement for each 10 foot cast-in-place section at light poles (excluding anchorage)

BAR	SIZE	QUANTITY
S3	#4	20
R	#4	18

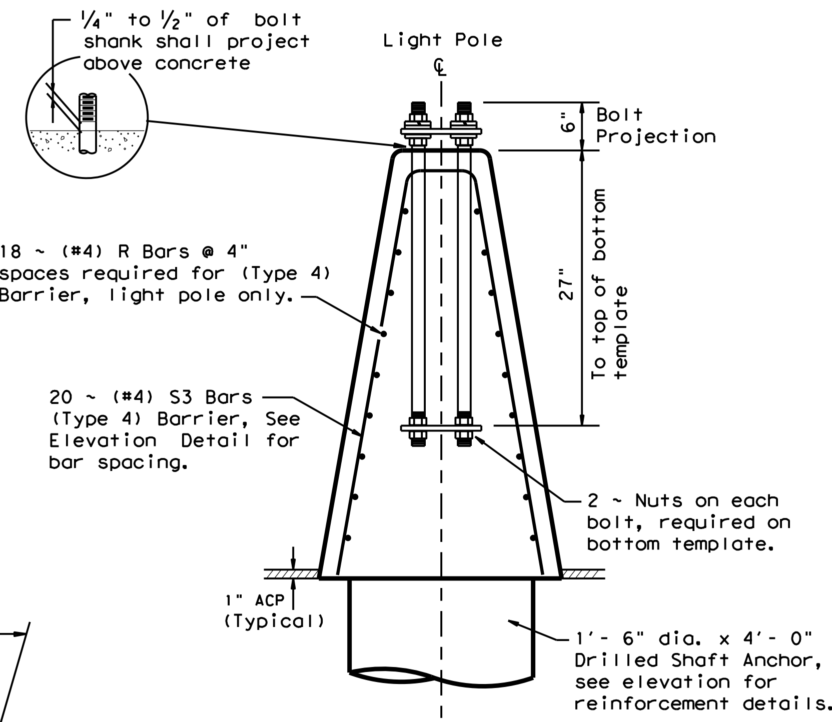
Welded Wire Reinforcement (WWR):
IS NOT APPROVED FOR USE WITH (TYPE 4) BARRIER.

* (SSCB)(42")(Type 4) Barrier height may be increased to 48" or 54". This would increase the barrier and reinforcement dimensions accordingly.



Note:
Top of barrier transitions from 8" to 9 1/4" to clear anchor bolts.

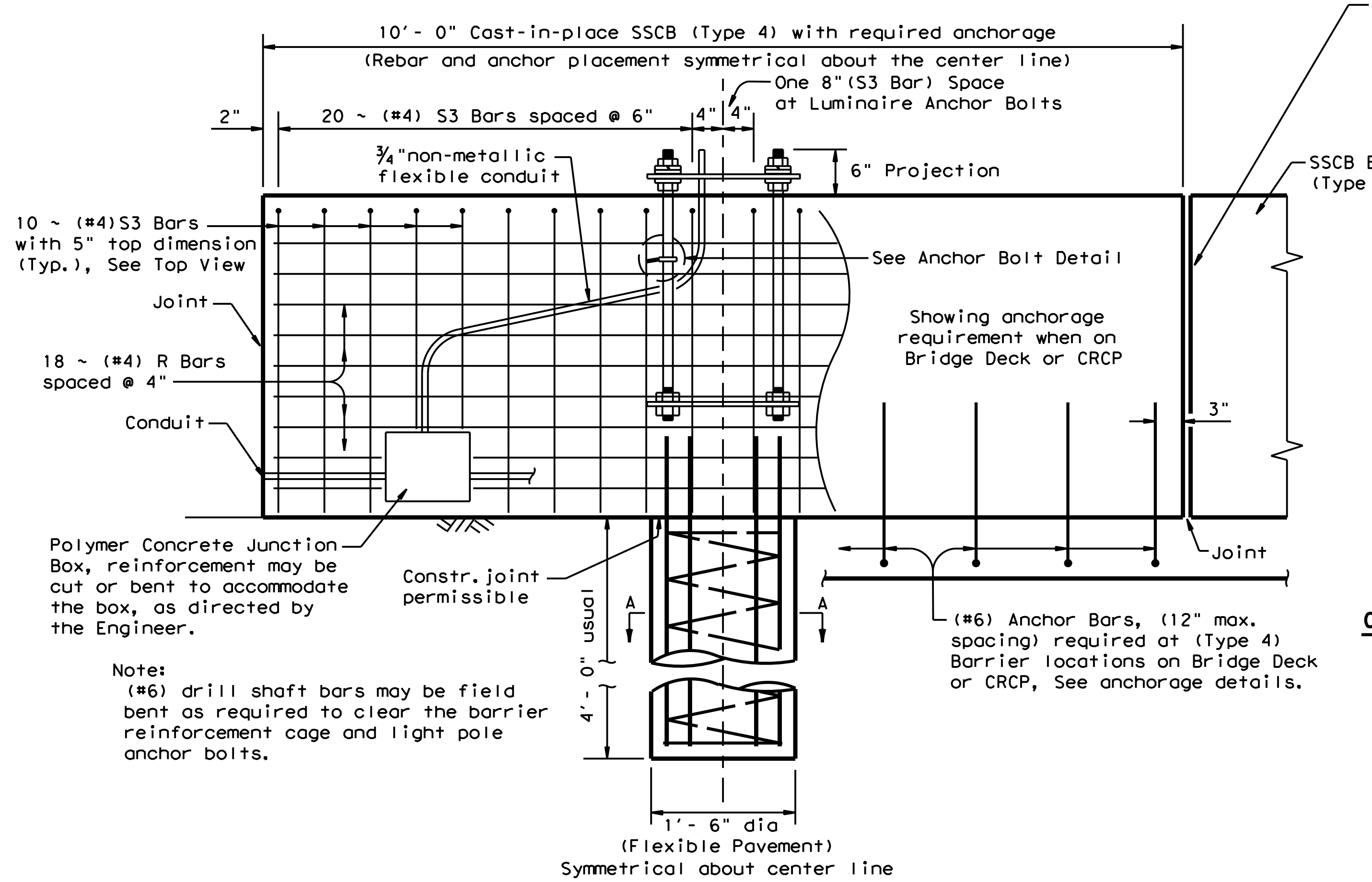
BARRIER (TYPE 4)
TOP VIEW
Showing S3 Bars and top dimension.


1/4" to 1/2" of bolt shank shall project above concrete
Light Pole
℄
6"
Bolt Projection
27"
To top of bottom template
18 ~ (#4) R Bars @ 4" spaces required for (Type 4) Barrier, light pole only.
20 ~ (#4) S3 Bars (Type 4) Barrier, See Elevation Detail for bar spacing.
2 ~ Nuts on each bolt, required on bottom template.
1" ACP (Typical)
1'- 6" dia. x 4'- 0" Drilled Shaft Anchor, see elevation for reinforcement details.

(ROADWAY) SECTION AT LIGHT POLE
Symmetrical about center line

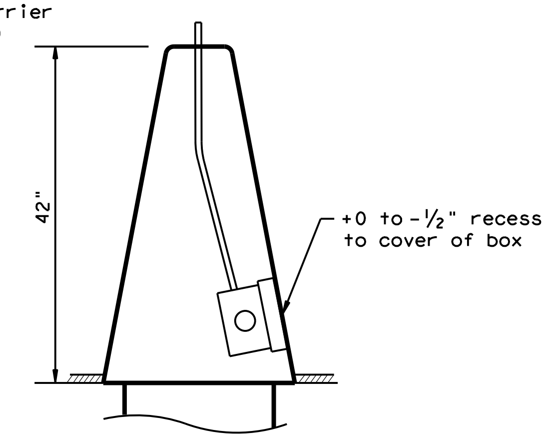
GENERAL NOTES

1. All concrete shall be Class C.
2. Anchor bolts, junction box, non-metallic flexible conduit, and bonding to steel shall not be paid for directly, but will be considered subsidiary to the various bid items.
3. For proper installation and material requirements for the anchor bolts and light pole, see Traffic Engineering RIP standard sheets.
4. Junction boxes shall be polymer concrete, and shall be mounted flush (+0, - 1/2") with concrete surface. For details and material requirements on barrier junction box, see DMS-11030.
5. Install 12 AWG stranded conductors from load side of fused breakaway connector to luminaire. Fused breakaway connectors shall be installed as required on Traffic Engineering RID Sheets. Typically fused breakaway connectors are installed in the barrier junction box adjacent to each light pole. If fused breakaway connectors are installed in the pole's handhole, increase the size of the 3/4" flexible non-metallic conduit according to the NEC as needed to accomodate the branch circuit conductors.
6. Anchor bolts and their assemblies shall be in accordance with Item 449, "Anchor Bolts" High-Strength Steel or Alloy Steel. Galvanization requirements for anchor bolts are shown on RIP sheets.
7. The required anchorage for Type 4 barrier (drill shaft, standard or optional concrete anchorage) shall not be paid for directly, but is subsidiary to Item 514, "Permanent Concrete Traffic Barrier."
8. Bond anchor bolt to rebar cage with #6 bare stranded copper conductor. Use listed mechanical connectors rated for embedment in concrete. The bonded steel in the foundation creates a concrete encased grounding electrode which replaces the ground rod.

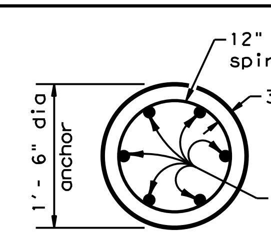

10'- 0" Cast-in-place SSCB (Type 4) with required anchorage
(Rebar and anchor placement symmetrical about the center line)
One 8"(S3 Bar) Space at Luminaire Anchor Bolts
2"
20 ~ (#4) S3 Bars spaced @ 6"
4"
4"
3/4"non-metallic flexible conduit
6" Projection
10 ~ (#4)S3 Bars with 5" top dimension (Typ.), See Top View
See Anchor Bolt Detail
Showing anchorage requirement when on Bridge Deck or CRCP
Joint
18 ~ (#4) R Bars spaced @ 4"
Conduit
3"
Each end of cast-in-place light pole section shall be formed to mate with the adjacent precast (Type 1) roadway barrier. The cast-in-place section shall be connected at each end to the precast sections in the same manner that precast sections are connected at joints as shown elsewhere.
SSCB Barrier (Type 1)
Joint
Polymer Concrete Junction Box, reinforcement may be cut or bent to accommodate the box, as directed by the Engineer.
Constr. joint permissible
A
A
4'- 0" usual
(#6) Anchor Bars, (12" max. spacing) required at (Type 4) Barrier locations on Bridge Deck or CRCP, See anchorage details.
Note:
(#6) drill shaft bars may be field bent as required to clear the barrier reinforcement cage and light pole anchor bolts.
1'- 6" dia
(Flexible Pavement)
Symmetrical about center line

ELEVATION SHOWING THE REQUIRED REINFORCEMENT AND ANCHORAGE FOR (TYPE 4) BARRIER

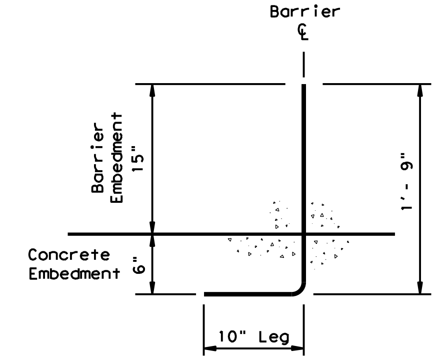
The "Drilled Shaft Anchor" is the required anchorage for (Type 4) barrier on roadways with Flexible Pavement.
The #6 Anchor Bars (Shown) is the required anchorage for (Type 4) barrier on Bridge Decks and CRCP.



SECTION SHOWING JUNCTION BOX
CONCRETE SAFETY BARRIER (TYPE 4)

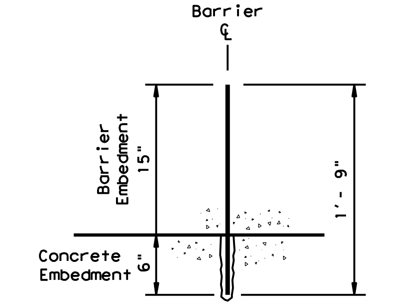


No.3 spiral at 6" pitch
(one flat turn top and bottom)
SECTION A-A



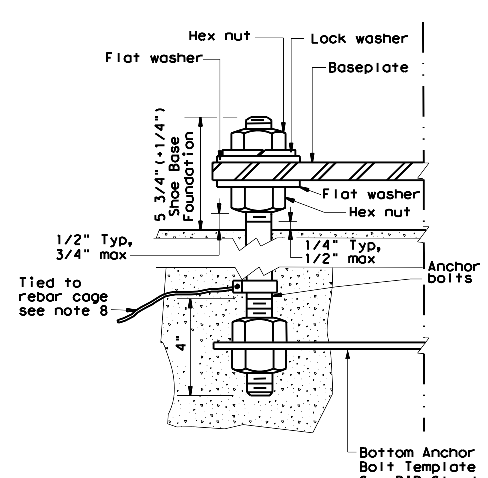
STANDARD "CONCRETE" ANCHORAGE
(#6) Bar
Concrete Pavement / Bridge Deck Anchorage:
Cast-in-Place or Slip-Formed Barrier

Standard Anchorage Note:
10" leg may be oriented 90 degrees in any direction about the barrier ℄.



"OPTIONAL" EPOXY ANCHORAGE
(#6) Bar
Type III, Class C Epoxy
Concrete Pavement / Bridge Deck Anchorage:
Cast-in-Place or Slip-Formed Barrier

Epoxy Note:
If epoxy coated anchor bars are required, the lower 6" of the bars must not be epoxy coated. Follow the manufacturer's directions for installing the epoxied anchor bars.



ANCHOR BOLT DETAIL

Texas Department of Transportation | Design Division Standard

SINGLE SLOPE CONCRETE BARRIER
CAST-IN-PLACE (TYPE 4) AT LIGHT POLE
TL-4 MASH COMPLIANT
SSCB(4)-19

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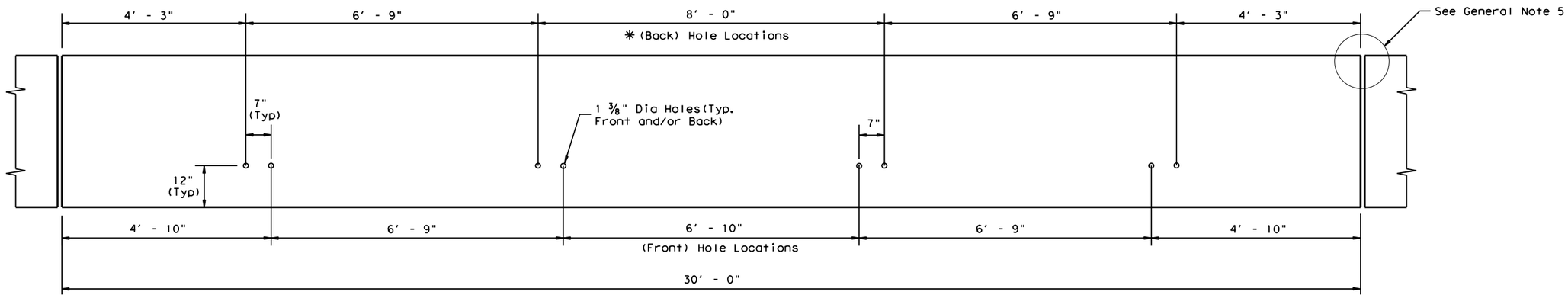
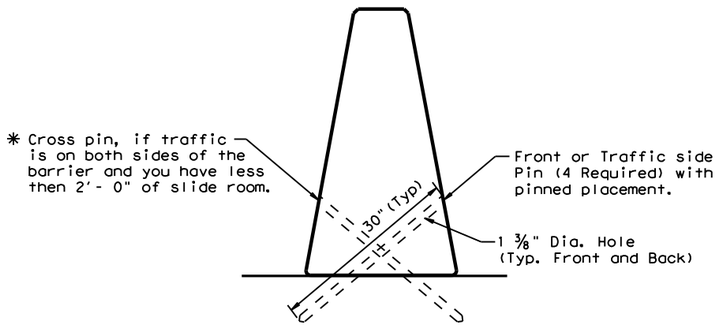
PROJECT: 6375-52-001



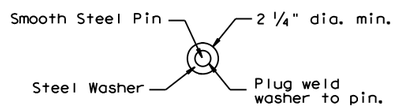
DETAIL 1

Precast SSCB(42")
Showing hole locations

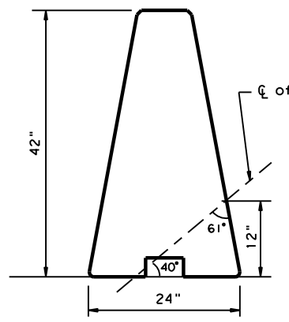


DETAIL 2

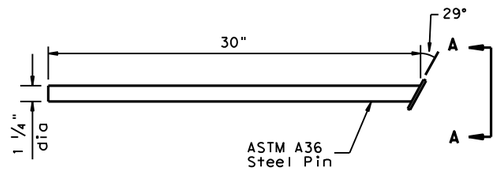
Placement on (ACP)
Asphalt Conc. Pavement
or Treated Base Material
(30" Pin required)



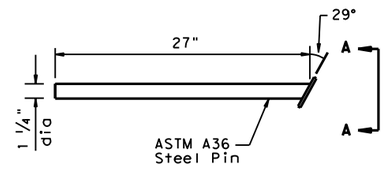
VIEW A-A



HOLE LOCATION DETAIL



(30") PIN DETAIL
See Detail 2

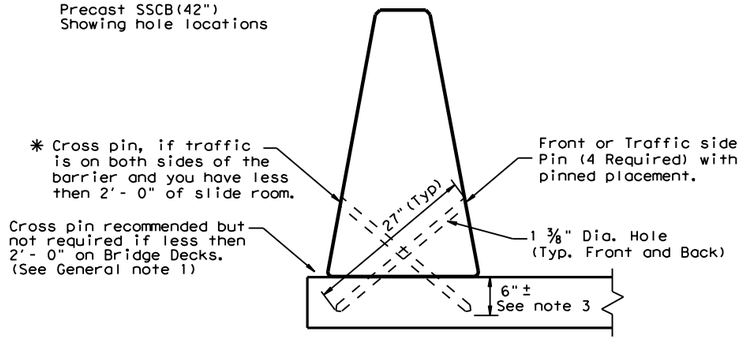


(27") PIN DETAIL
See Detail 3

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

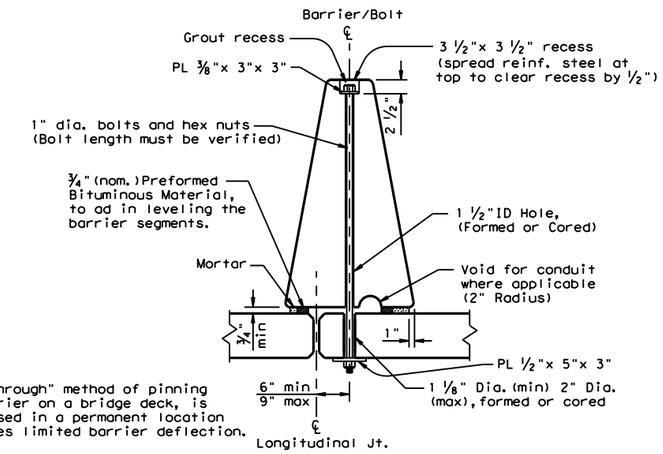
DETAIL 3

Bridge Deck or CRCP
(27" Pin required).



CORE DRILLING EXISTING BARRIER

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



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

PRECAST SSCB (BOLT THROUGH) PLACEMENT OVER LONGITUDINAL EXPANSION JOINT

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

GENERAL NOTES

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

Texas Department of Transportation

Design Division Standard

SINGLE SLOPE CONCRETE BARRIER

PRECAST BARRIER
(TYPE 1)
PINNED PLACEMENT

SSCB(5)-10

FILE: sscb510.dgn	DN: TxDOT	CK: AM	DW: BD	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
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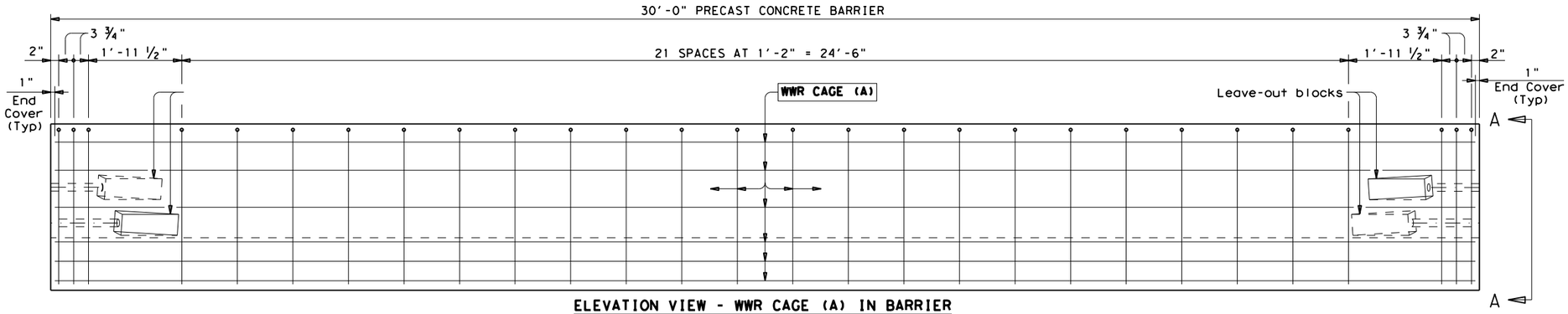
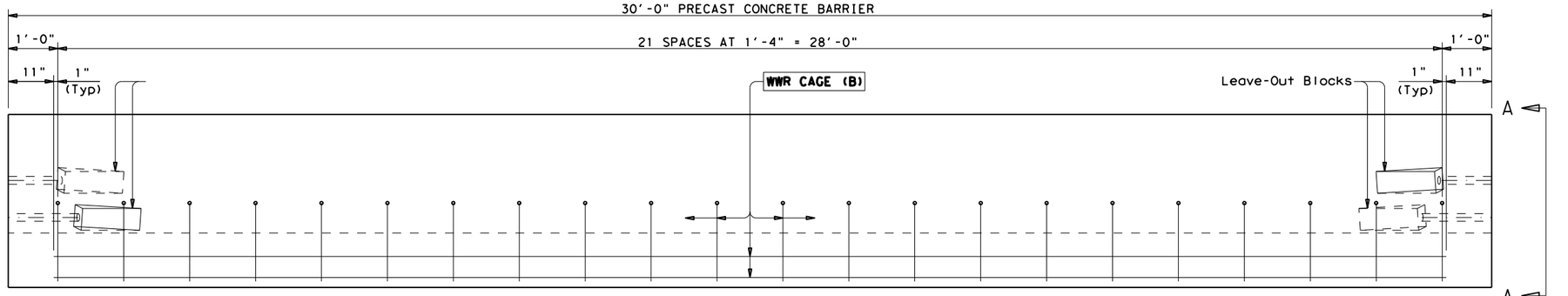
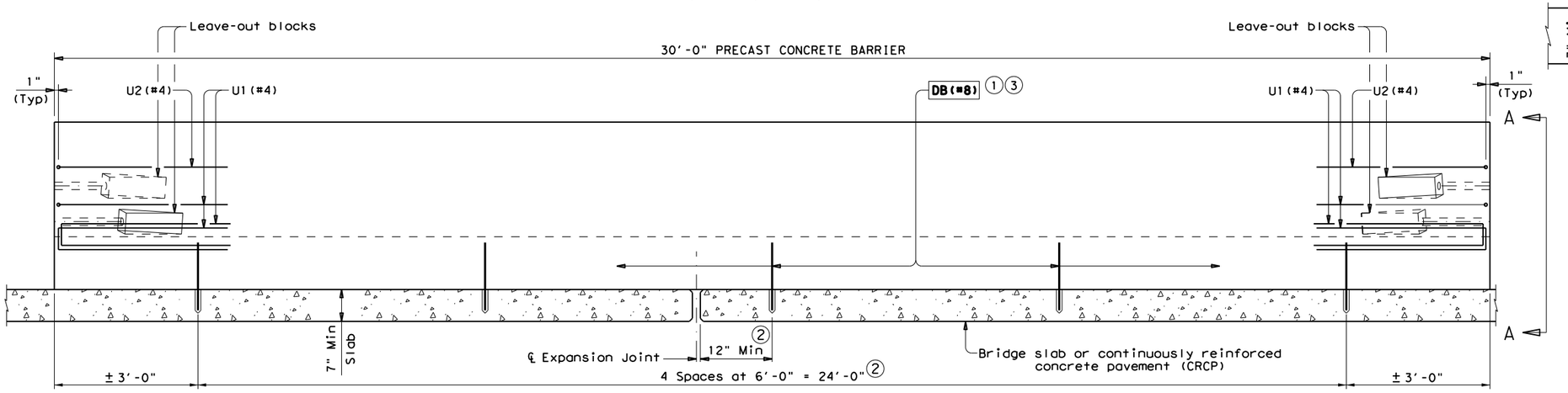
FILE: T:\0*GEN-AO\0*Maintenance\000*New Contracts\IH 45 General Maintenance\Standards\Concrete Traffic Barrier 20\sscbpxb120*1.dgn
DATE: 1/5/2021
PROJECT: 6375-52-001



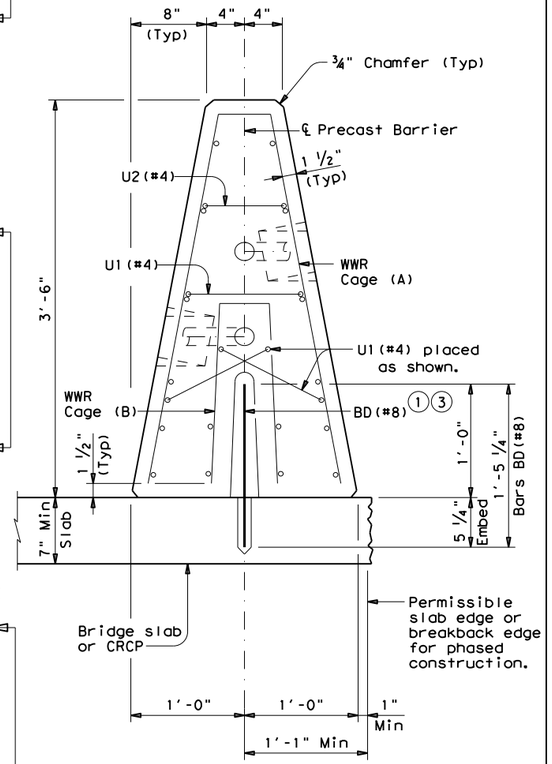
ELEVATION VIEW - WWR CAGE (A) IN BARRIER
(REINFORCING STEEL CAGE B, U1(#4), U2(#4), & DB(#8) NOT SHOWN FOR CLARITY)



ELEVATION VIEW - WWR CAGE (B) IN BARRIER
(REINFORCING STEEL CAGE A, U1(#4), U2(#4),& DB(#8) NOT SHOWN FOR CLARITY)



ELEVATION VIEW - DB(#8) ANCHORS & U(#4) BAR PLACEMENT IN BARRIER
(REINFORCING STEEL CAGE A & CAGE B NOT SHOWN FOR CLARITY)



VIEW A-A

NOTE: THREADED RODS WITH NUTS AND WASHERS FOR X-BOLT CONNECTION NOT SHOWN FOR CLARITY.

① Embed DB(#8) anchor bars plumb with a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 5 ¼". Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 26 kips. Submit signed and sealed calculations or the manufacturers published literature showing the proposed adhesives anchor ability to develop this load to the Engineer for approval prior to use. Anchor installation, including the hole size, drilling and clean out, must be in accordance with Item 450, "Railing".

② DB(#8) anchor bar nearest to a slab expansion joint, construction joint or end of structure may be shifted up to 12" longitudinally along center of barrier in order to satisfy the minimum offset dimension.

③ Provide stainless steel for BD(#8) when bar is to remain embedded in finished bridge slab or CRCP.

SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

SINGLE SLOPE CONCRETE BARRIER (PRECAST) X-BOLT CONNECTION RESTRAINED MASH TL-4

SSCB-P(XB1)-20

FILE: sscbpxb120.dgn	DN: TxDOT	CK: KM	DW: JTR	CK: CGL
© TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
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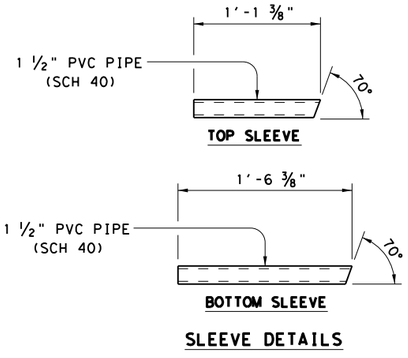
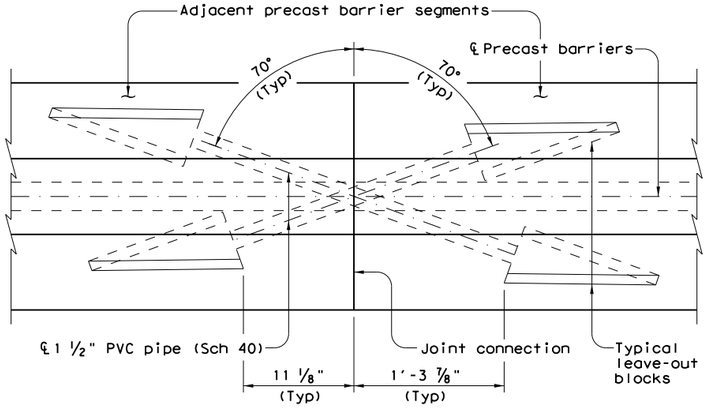
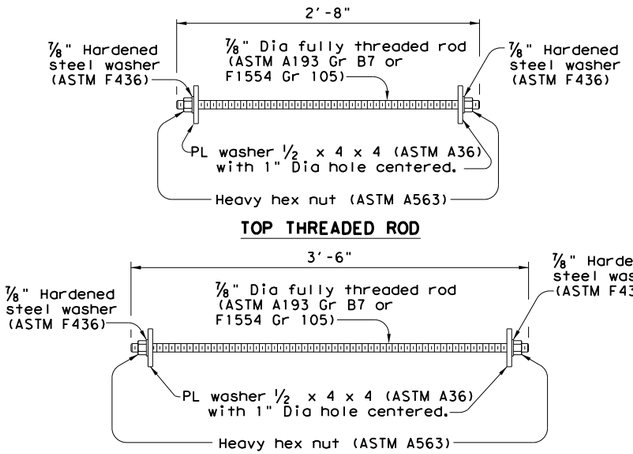


SLEEVE DETAILS

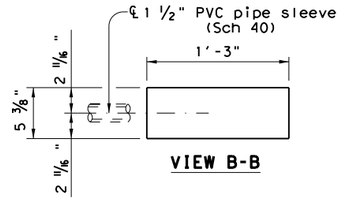


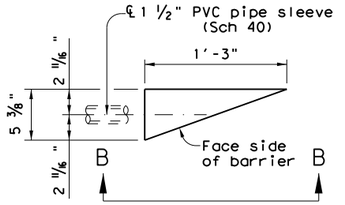
PLAN VIEW



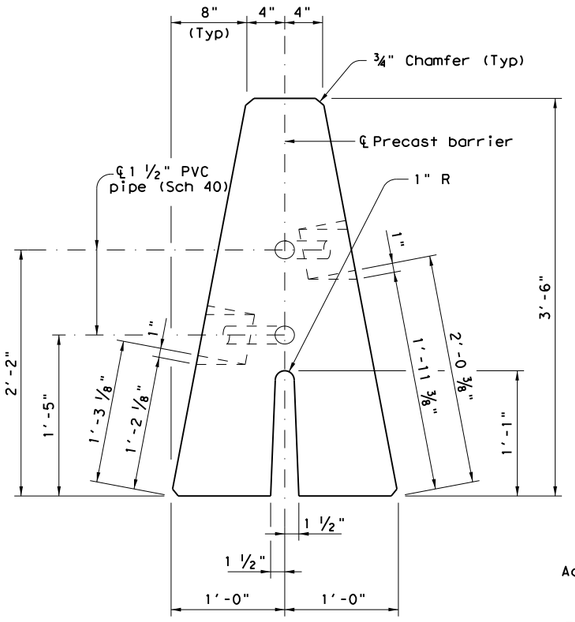
THREADED ROD ASSEMBLY DETAILS

Showing hardware for one complete X-bolt connection.
Installation of threaded rods must not extend beyond face of barrier.

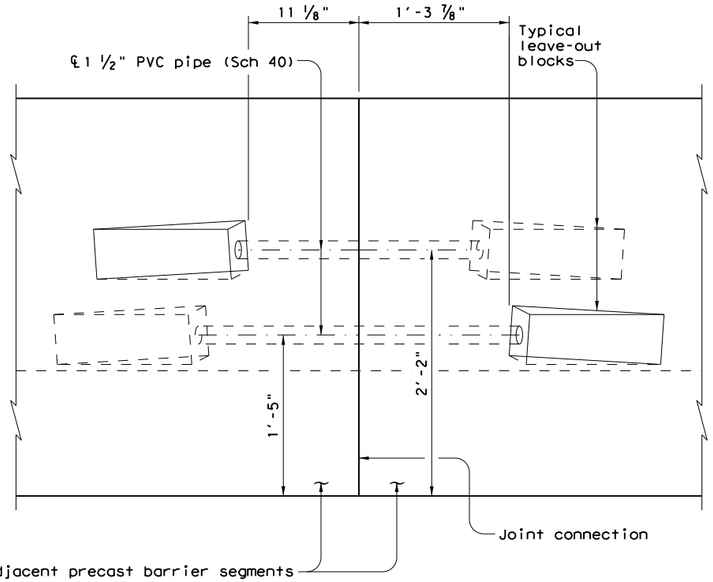




LEAVE-OUT BLOCK DETAILS



SECTION AT BARRIER JOINT

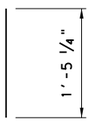


ELEVATION VIEW

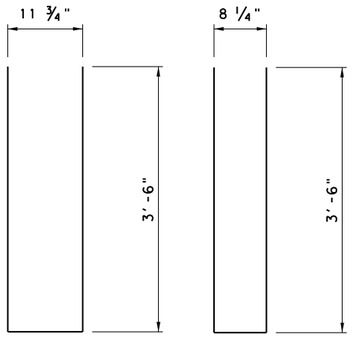
X-BOLT CONNECTION WITH
FORMING & LEAVE-OUT BLOCK PLACEMENT DETAILS

REINFORCING STEEL AND THREADED RODS WITH NUTS AND WASHERS NOT SHOWN FOR CLARITY.

③ Provide stainless steel for BD(#8) when bar is to remain embedded in finished bridge slab or CRCP.

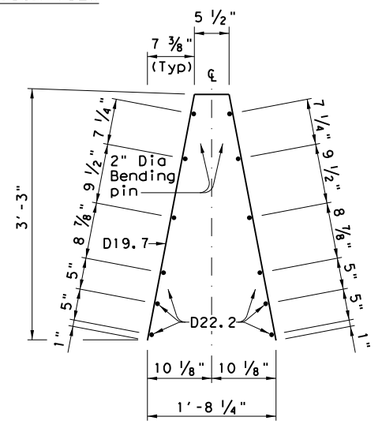


BARS BD (#8) ③

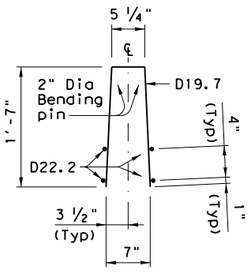


BARS U1 (#4)

BARS U2 (#4)



CAGE (A)



CAGE (B)

WELDED WIRE REINFORCEMENT (WWR) DETAILS

CONSTRUCTION NOTES:

At the Contractor's or Engineer's direction provide lifting devices (lugs, loops, etc.) in the rail. Locate lifting devices in rail so as to not exceed tensile strength of the concrete during lifting. Galvanize all permanent steel lifting components.
Chamfer all exposed corners.
Remove bars BD(#8) when barrier is removed. Cut bars and grind flush to finished bridge slab or CRCP unless directed otherwise by Engineer.
Test adhesive anchors in accordance with Item 450.3.3, "Tests". Test 3 anchors per 100 anchors installed. Perform corrective measures to provide adequate capacity if any of the tests do not meet the required test load. Repair damage from testing as directed.

MATERIAL NOTES:

Galvanize all metal components of barrier system.
Provide Class "S" concrete (f'c = 4,000 psi). Provide Class "S" (HPC) if required elsewhere.
Galvanize all reinforcing steel and WWR if required or shown elsewhere.
Provide stainless steel in accordance with Item 440.2.10., for BD(#8) when bar is to remain embedded in finished bridge slab or continuously reinforced concrete pavement (CRCP).
Provide Grade 60 reinforcing steel.
Provide deformed welded wire reinforcement (WWR) (ASTM A1064).
Provide welded wire reinforcement (WWR) laps, where required, as follows:
Uncoated or galvanized ~ D22.2 = 1'-7"

GENERAL NOTES:

This barrier system has been successfully evaluated by full-scale crash test to meet MASH TL-4 criteria. This barrier system had approximately 7 inches of dynamic deflection and 1.5 inches of permanent deflection as it contains and redirects the TL-4 (single-unit truck) errant vehicle.
Average weight of one 30' precast barrier is 19,960 Lb.
Average weight of precast barrier is 665 plf.

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

Texas Department of Transportation

Design Division Standard

SINGLE SLOPE CONCRETE BARRIER (PRECAST)
X-BOLT CONNECTION RESTRAINED MASH TL-4
SSCB-P(XB1)-20

FILE: sscbpxb120.dgn	DN: TxDOT	CK: KM	DW: JTR	CK: CGL
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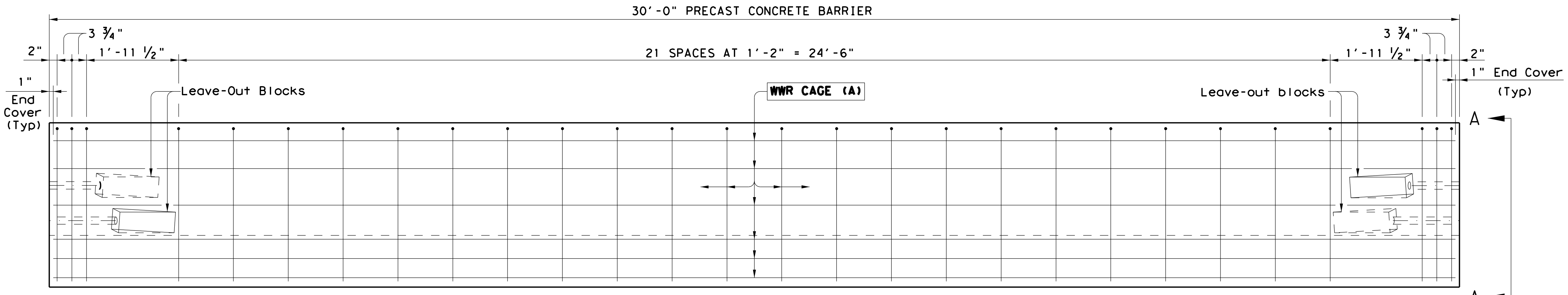
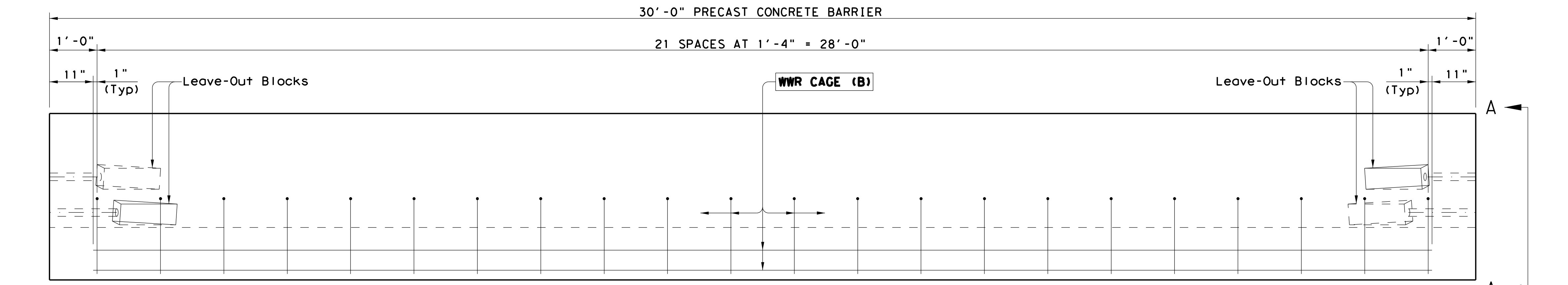


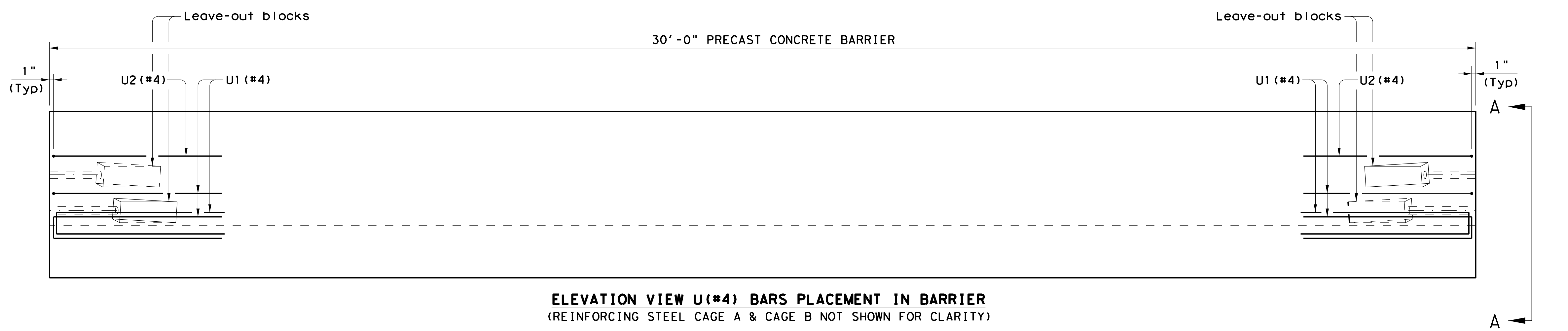
ELEVATION VIEW - WWR CAGE (A) IN BARRIER

(REINFORCING STEEL CAGE B, U1(#4), U2(#4), NOT SHOWN FOR CLARITY)



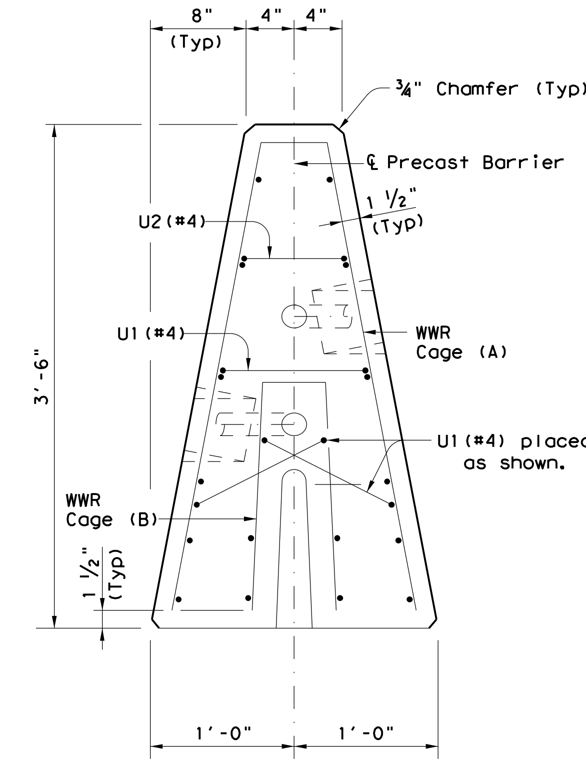
ELEVATION VIEW - WWR CAGE (B) IN BARRIER

(REINFORCING STEEL CAGE A, U1(#4), U2(#4), NOT SHOWN FOR CLARITY)



ELEVATION VIEW U(#4) BARS PLACEMENT IN BARRIER

(REINFORCING STEEL CAGE A & CAGE B NOT SHOWN FOR CLARITY)



VIEW A-A

NOTE: THREADED RODS WITH NUTS AND WASHERS FOR X-BOLT CONNECTION NOT SHOWN FOR CLARITY.

SHEET 1 OF 2

Texas Department of Transportation

Design Division Standard

SINGLE SLOPE CONCRETE BARRIER (PRECAST)
X-BOLT CONNECTION UNRESTRAINED MASH TL-4

SSCB-P(XB2)-20

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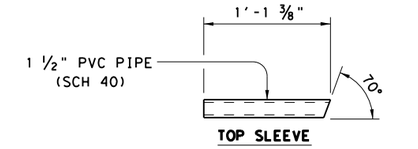
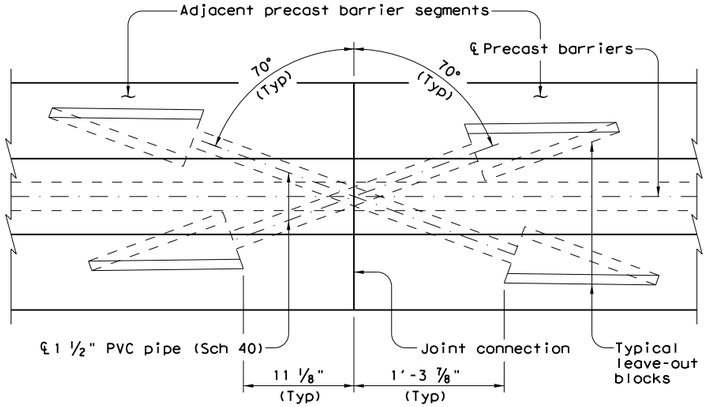
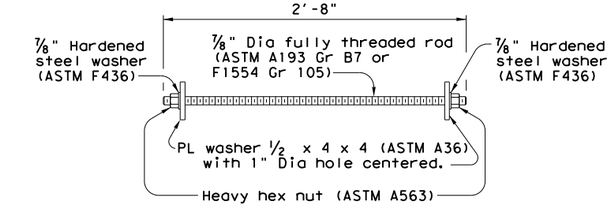


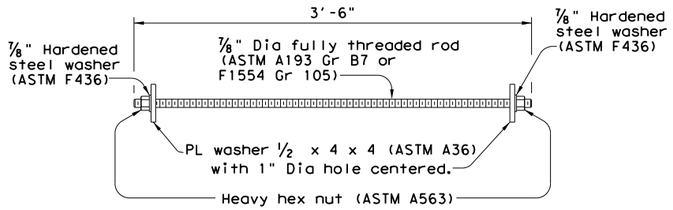
SLEEVE DETAILS



PLAN VIEW



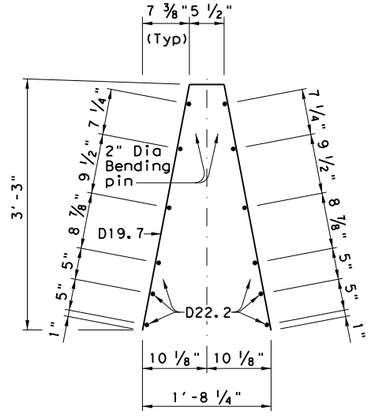
TOP THREADED ROD



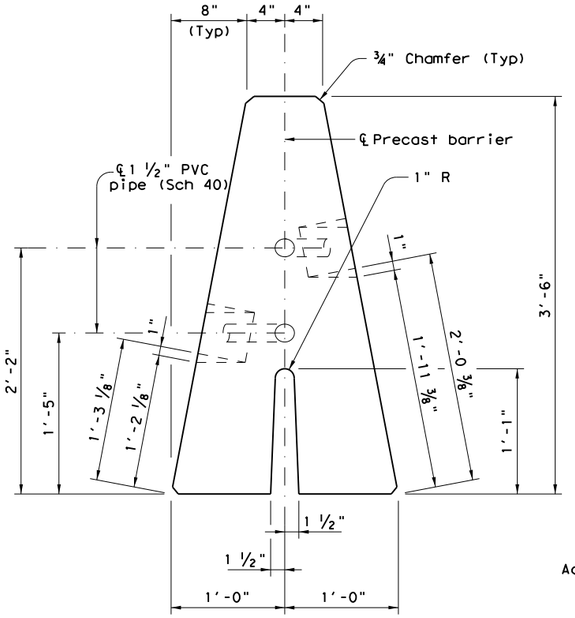
BOTTOM THREADED ROD

THREADED ROD ASSEMBLY DETAILS

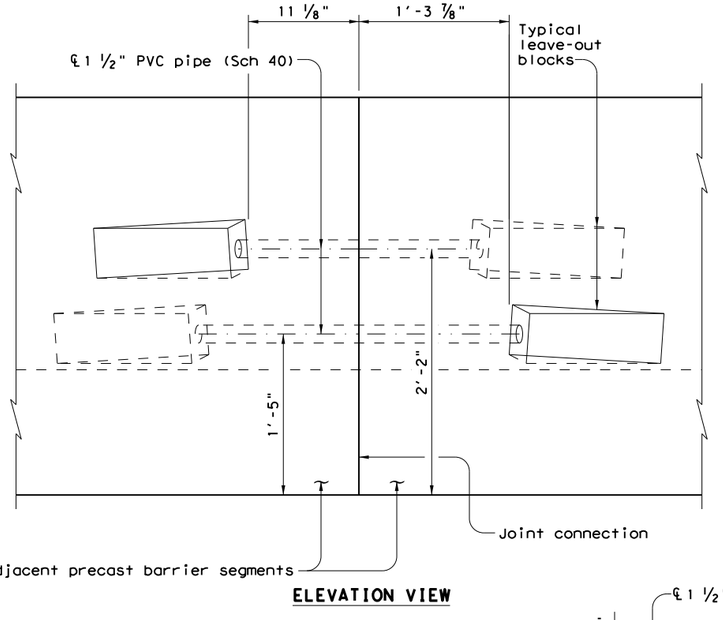
Showing hardware for one complete X-bolt connection.
Installation of threaded rods must not extend beyond face of barrier.



WELDED WIRE REINFORCEMENT (WWR) CAGE (A)



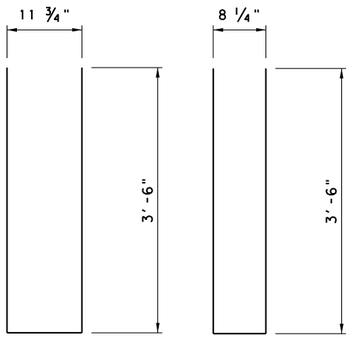
SECTION AT BARRIER JOINT



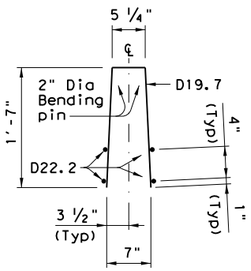
ELEVATION VIEW

X-BOLT CONNECTION WITH
FORMING & LEAVE-OUT BLOCK PLACEMENT DETAILS

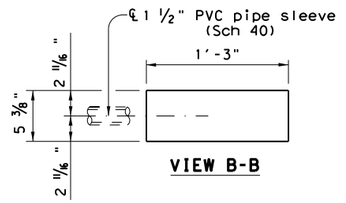
REINFORCING STEEL AND THREADED RODS WITH NUTS AND WASHERS NOT SHOWN FOR CLARITY.



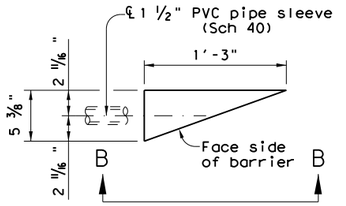
BARS U1 (#4) BARS U2 (#4)



WELDED WIRE REINFORCEMENT (WWR) CAGE (B)



VIEW B-B



TOP VIEW

LEAVE-OUT BLOCK DETAILS

CONSTRUCTION NOTES:
At the Contractor's or Engineer's direction provide lifting devices (lugs, loops, etc.) in the rail. Locate lifting devices in rail so as to not exceed tensile strength of the concrete during lifting. Galvanize all permanent steel lifting components.
Chamfer all exposed corners.

MATERIAL NOTES:
Galvanize all metal components of barrier system.
Provide Class "S" concrete (f'c = 4,000 psi). Provide Class "S" (HPC) if required elsewhere.
Galvanize all reinforcing steel and WWR if required or shown elsewhere.
Provide Grade 60 reinforcing steel.
Provide deformed welded wire reinforcement (WWR) (ASTM A1064).
Provide welded wire reinforcement (WWR) laps, where required, as follows:
Uncoated or galvanized ~ D22.2 = 1'-7"

GENERAL NOTES:
This barrier system has been successfully evaluated by full-scale crash test to meet MASH TL-4 criteria. This barrier system is designed to have approximately 33 inches of dynamic or permanent deflection as it contains and redirects the TL-4 (single-unit truck) errant vehicle. This barrier system is designed to have approximately 15 inches of dynamic or permanent deflection as it contains and redirects the TL-3 (pickup truck) errant vehicle.

Average weight of one 30' precast barrier is 19,960 Lb.
Average weight of precast barrier is 665 plf.

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

Texas Department of Transportation — Design Division Standard

SINGLE SLOPE CONCRETE BARRIER (PRECAST) X-BOLT CONNECTION UNRESTRAINED MASH TL-4

SSCB-P(XB2)-20

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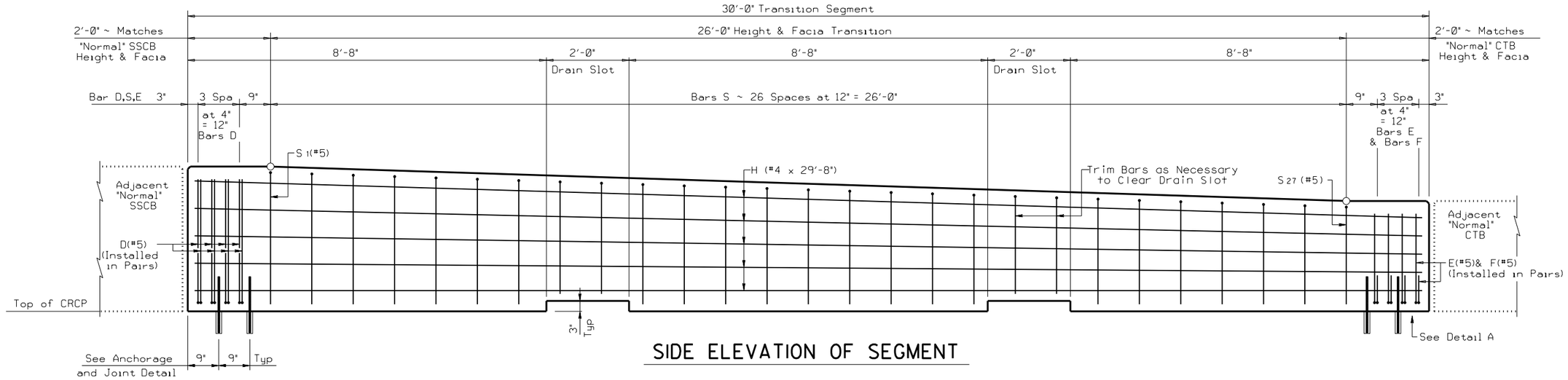
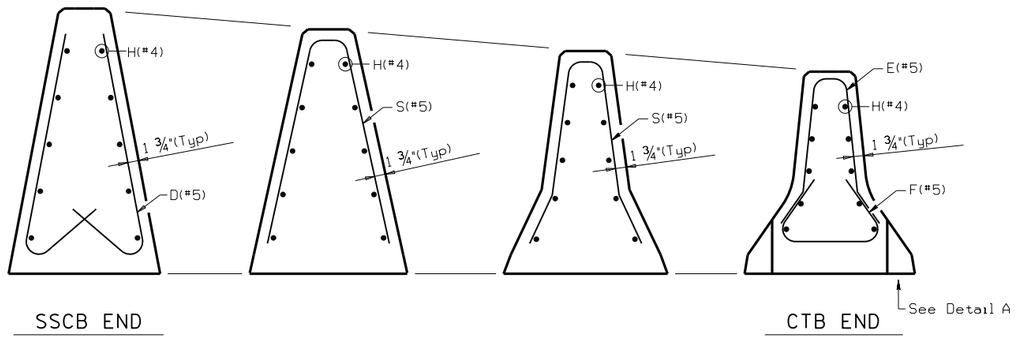
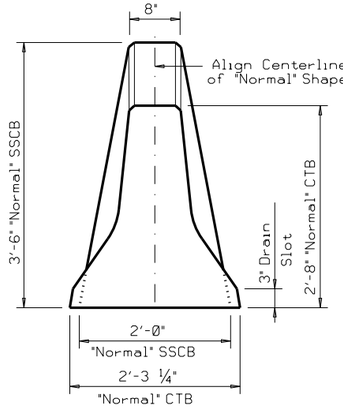


SIDE ELEVATION OF SEGMENT



TYPICAL SECTIONS THRU TRANSITION SEGMENT

Showing Reinforcing and Shape Transitions Only



END ELEVATION OF SEGMENT

Showing Geometry Only

General Notes:

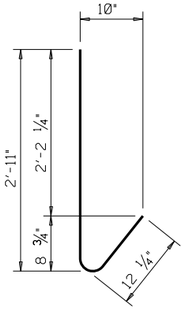
This Concrete Safety Barrier Transition Segment has been evaluated and approved to be of equal strength to barriers with similar geometry, which have been crash tested to meet NCHRP Report 350 TL-3 criteria. This Transition may be used for design speeds of 50 mph and greater.

Reinforcing for the Transition Segment shall be Grade 60. All concrete shall be Class "C". Chamfer all exposed corners 3/4" x 3/4".

This Transition Segment is cast-in-place. The Transition Segment shall have end faces that are parallel to the adjacent "normal" Barriers.

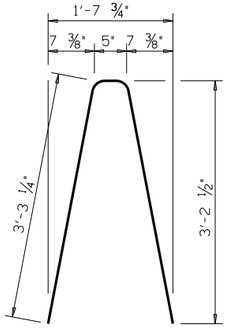
Height and face profile of the Transition Segment shall be gradually changed, within the limits detailed, so as to match the height and profile of the adjacent "normal" Barriers. Adjust (bend and relocate) the reinforcing within the transition portion of the segment as necessary to conform to the altered barrier shape. Cover and minimum spacing requirements of the reinforcing shall not be violated.

See elsewhere in the plans for barrier dimensions and joint connection details not included herein.



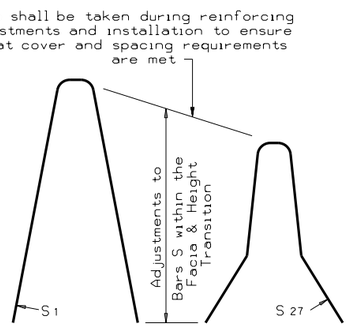
BARS D (#5)

Installed in Pairs
(Lgth = 4'-0 1/4")



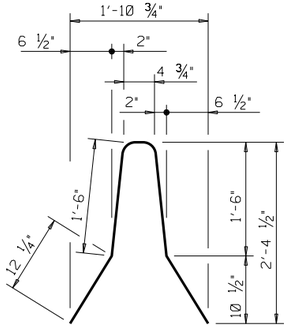
BARS S1 (#5)

(Lgth = 6'-10 1/2")



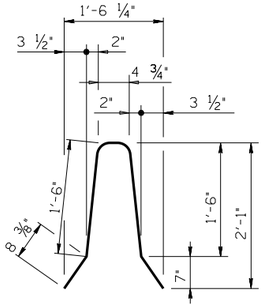
BARS S1-27 (#5)

Trim lower legs as necessary to clear Drain Slots



BARS S27 (#5)

(Lgth = 5'-4 1/2")



BARS E (#5)

(Lgth = 4'-8 1/2")

STATE OF TEXAS
YEE-CHENG CHANG
96492
LICENSED PROFESSIONAL ENGINEER

Eddy Chang

YEE-CHENG CHANG
12-4-2020

THIS SHEET MUST BE SIGNED, SEALED AND DATED FOR USE

SHEET 1 OF 2

Texas Department of Transportation
Houston District

BARRIER TRANSITION DETAILS (SSCB to CTB)

BTD (I)

DATE

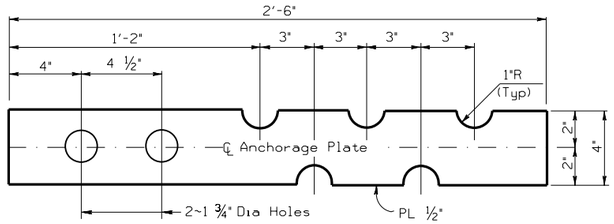
FILE: STDC5.DGN	DN: TxDot	CK: TxDot	DW: TxDot	CK: TxDot
© TxDOT May 2010	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 3/2015 2014 SPECS	HOU	6	RMC 6375-52-001	153
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	HARRIS/GAL	6375	52	001	IH45

FILE: T:\0*GEN-AO\0*Maintenance\000*New Contracts\IH 45 General Maintenance\Standards\Concrete Traffic Barrier 20\stdc5*1.dgn
DATE: 1/5/2021
PROJECT: 6375-52-001

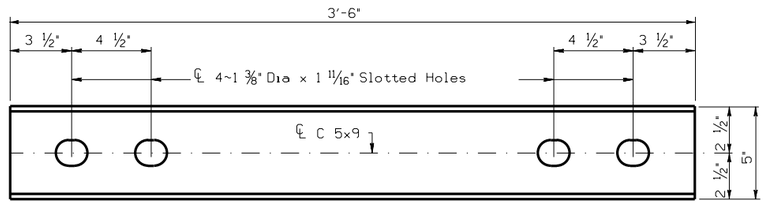
APPROXIMATE QUANTITIES FOR A 30 FT. SECTION		
CONCRETE	CY	3.27
REINFORCING STEEL	LBS	390

Approximate Weight Per Foot is 442 Lbs.
For Contractor's Information Only.

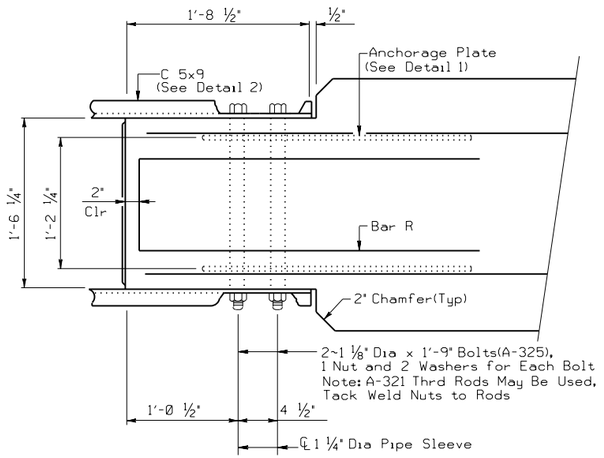
R = Radius
Dia = Diameter



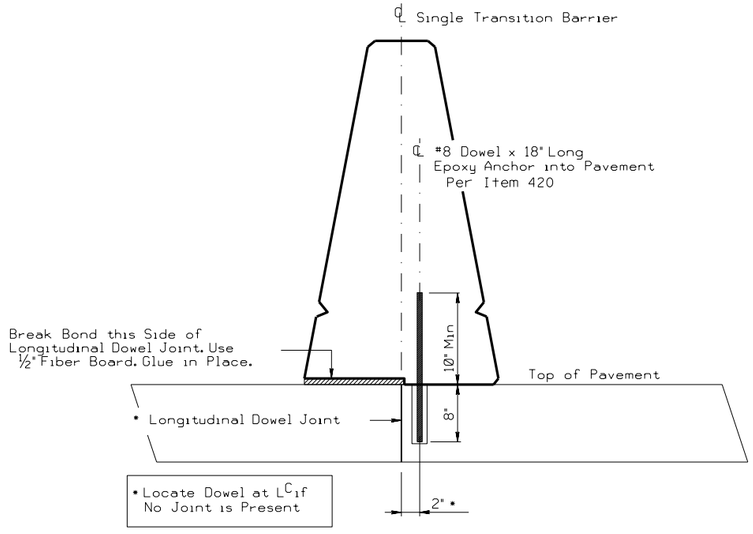
DETAIL 1



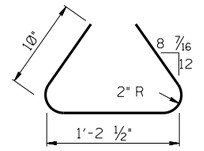
DETAIL 2



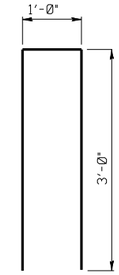
PLAN
CTB END
Showing Bolt Anchorage, Rebar & Block-out



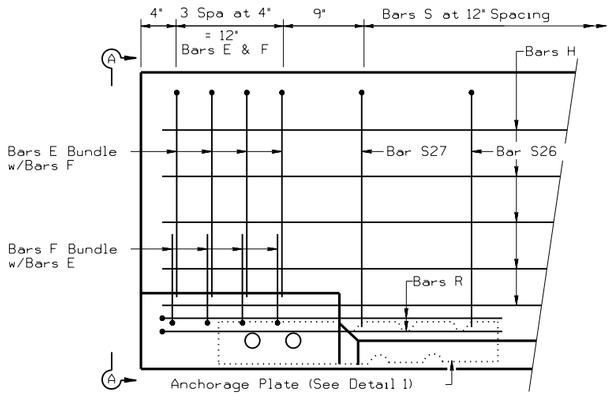
ANCHORAGE AND JOINT DETAIL



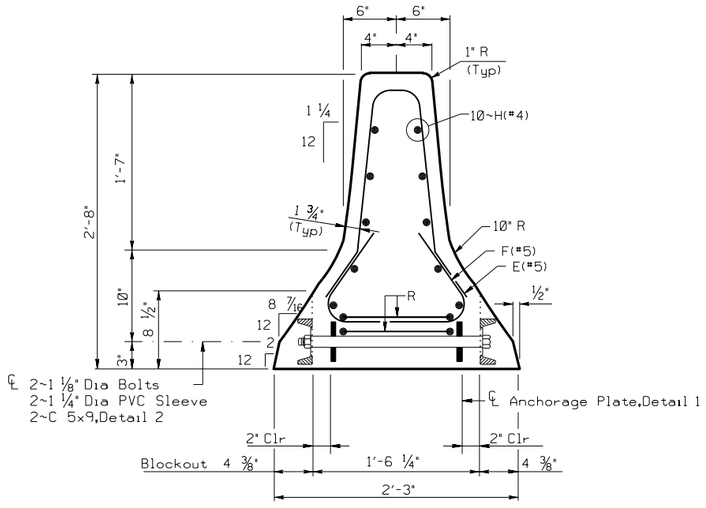
BAR F
(#5)



BAR R
(#6)



ELEVATION
CTB END



SECTION A-A

DETAIL A
CTB END

STATE OF TEXAS
YEE-CHENG CHANG
96492
LICENSED
PROFESSIONAL ENGINEER

Eddy Chang

YEE-CHENG CHANG
12-4-2020

THIS SHEET MUST BE SIGNED, SEALED AND DATED FOR USE

SHEET 2 OF 2

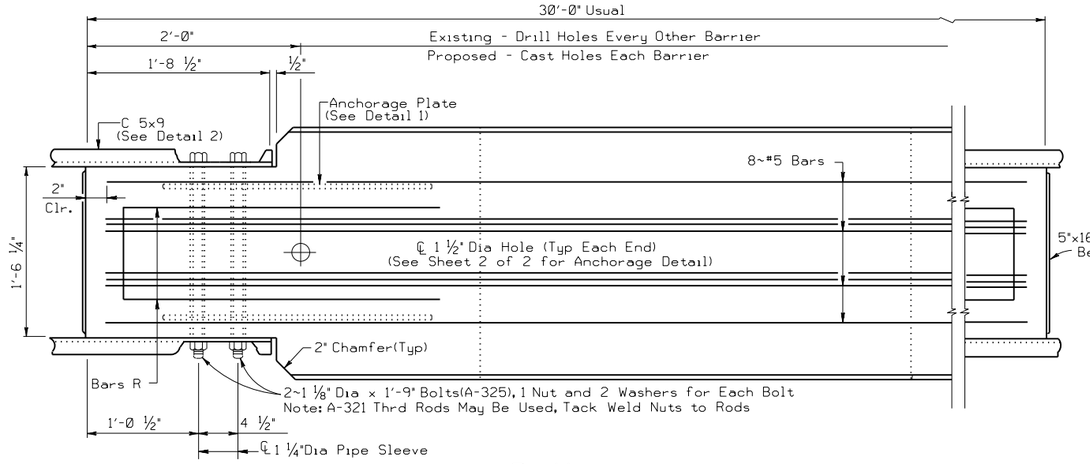
Texas Department of Transportation
Houston District

BARRIER TRANSITION DETAILS (SSCB to CTB)

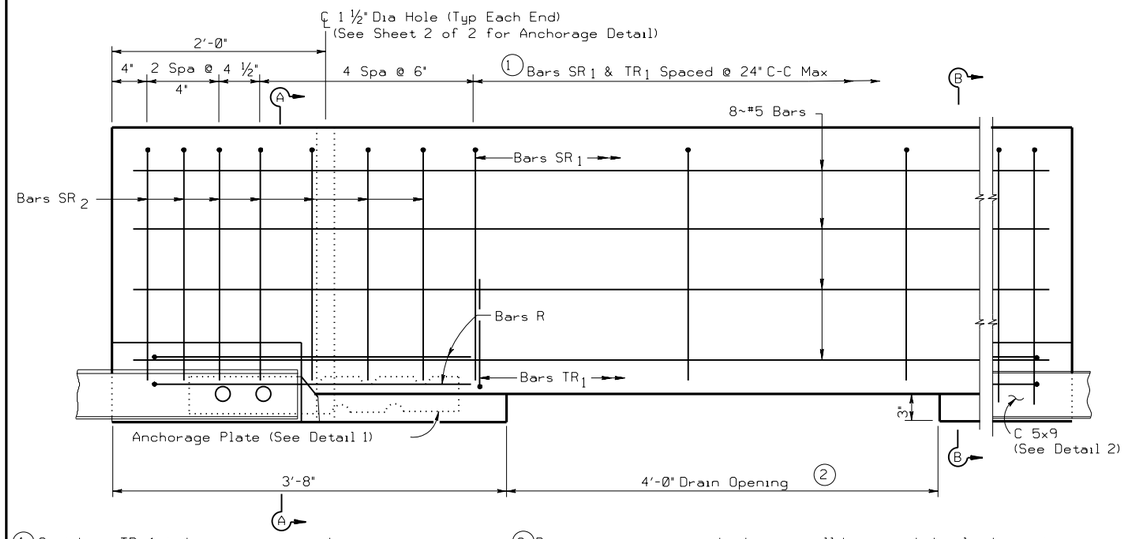
BTD (2)

FILE: STDC5.DGN	DN: TxDot	CK: TxDot	DW: TxDot	CK: TxDot
© TxDOT May 2010	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 3/2015 2014 SPECS	HOU	6	RMC 6375-52-001	154
	COUNTY		CONTROL SECT JOB	HIGHWAY
	HARRIS/GAL		6375 52 001	IH45

FILE: T:\0*GEN-AO\0*Maintenance\000*New Contracts\IH 45 General Maintenance\Standards\Concrete Traffic Barrier 20\stdc5*2.dgn
DATE: 1/5/2021
PROJECT: 6375-52-001



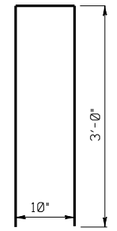
PLAN
(Typ Both Ends)



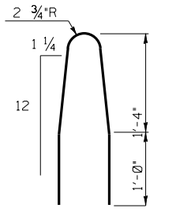
① Omit bars TR 1at drain openings and field cut bars SR 1to clear drain openings by 1½".

ELEVATION
(Typ Both Ends)

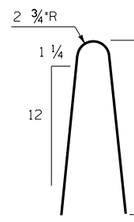
② Drainage openings in the barrier will be provided only where it is necessary to accommodate a flow of water through the barrier. Approval of the engineer will be obtained for location of drainage openings. At all other locations the drainage openings will be omitted and the barrier cast solid. Where drainage openings are required, there will be three 4'-0" openings in each 30' section, one of which to be centered within the length of the barrier.



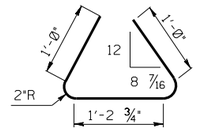
BAR R
(#6)



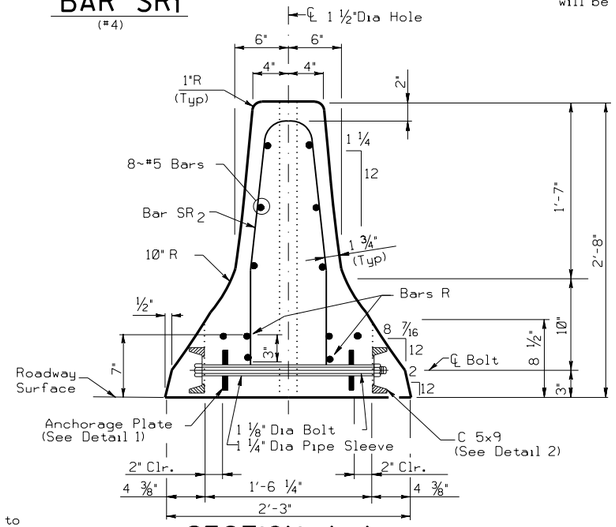
BAR SR2
(#4)



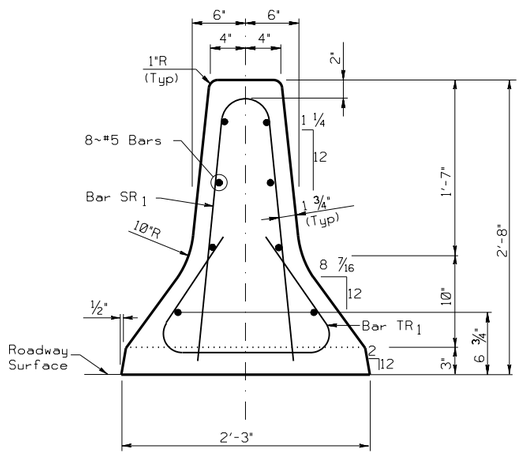
BAR SR1
(#4)



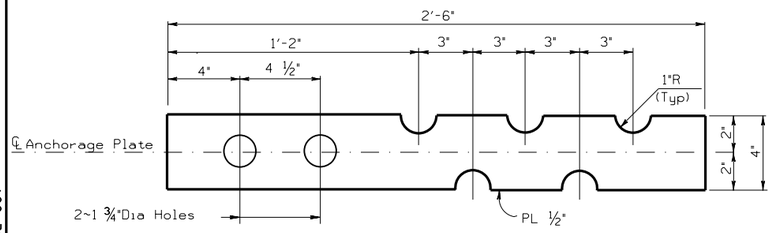
BAR TR1
(#4)



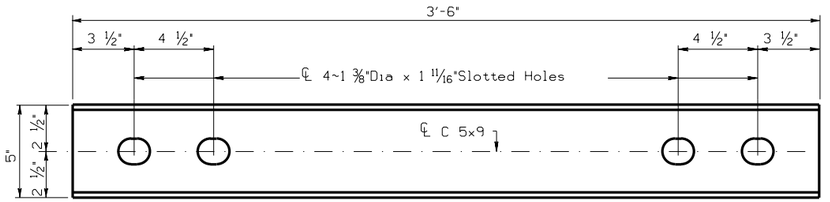
SECTION A-A



SECTION B-B



DETAIL 1



DETAIL 2

APPROXIMATE QUANTITIES FOR A 30 FT. SECTION		
CONCRETE	CY	3.27
REINFORCING STEEL	LBS	390

Approximate weight per foot is 442 Lbs.
For Contractor's Information Only.

R = Radius
Dia = Diameter

GENERAL NOTES

1. Channel sections and all steel plates will conform to ASTM designation A36.
2. Bearing pads will be made of an elastomeric material with a hardness of 70 durometer and are to be epoxied to barrier unit after casting.
3. All concrete will be Class C.
4. All reinforcing steel will be Grade 60.
5. Each barrier will be delivered with 2 channel shapes (C 5x9) and connecting hardware.
6. When barrier is to be placed in a curving alignment, the C 5x9 channel sections may be heated at the mid-point and pre-bent.
7. All C 5x9 channels will be hot-dip galvanized in conformance to ASTM designation A123. Bolts, nuts, and washers will be hot-dip galvanized to conform to ASTM designation A153.
8. 2" diameter lifting holes will be formed in each section of concrete traffic barrier. They will be located 1'-5" above the base, 5'-0" from each end and at the mid-point.
9. Reinforcing steel, bolts, nuts, washers, channel sections, and anchorage plates will be included in the price paid per linear foot for concrete traffic barrier.
10. When serving to channelize traffic in nighttime situations, the barrier should be light in color and will be supplemented by the use of standard delineation or channelization markings or devices such as delineators or vertical panels.
11. When directed by the Engineer, a ½" thick (nominal) grout leveling pad may be required beneath the barrier when it is permanently installed on the roadway crown. See Item "Hydraulic Cement Concrete" for grout mixture. The work will be incidental to pertinent items.

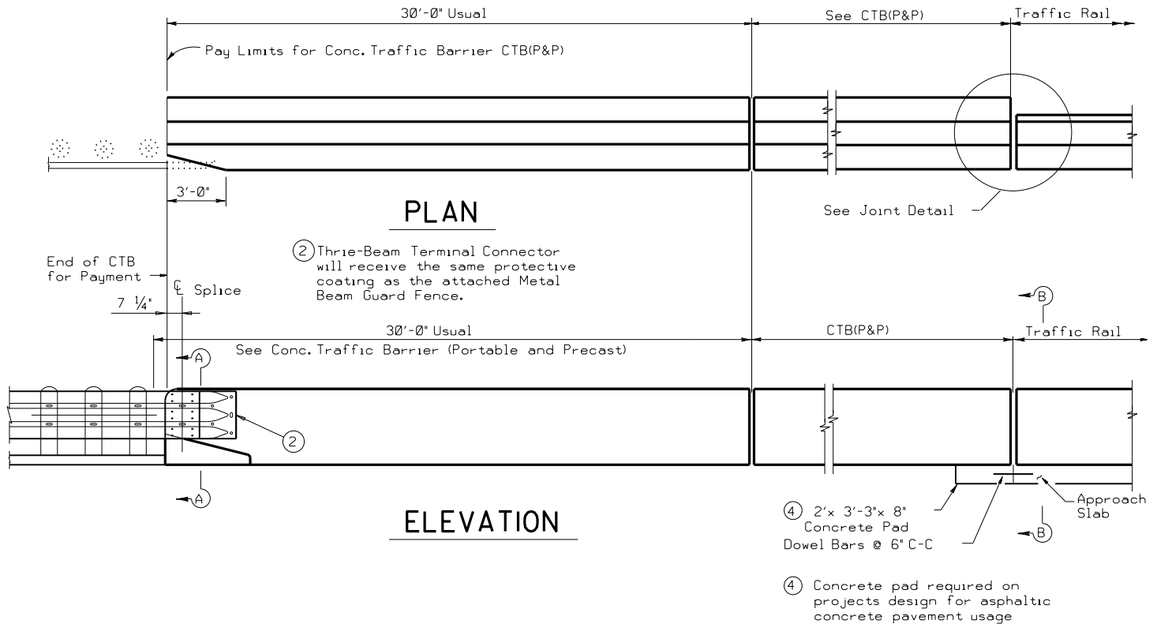
Texas Department of Transportation
Houston District

PRECAST CONCRETE TRAFFIC BARRIER

PCTB

FILE: STDC1.DGN	DN: TxDot	CK: TxDot	DW: TxDot	CK: TxDot
© TxDOT November 2011	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS	HOUSTON	6	RMC 6375-52-001	155
	COUNTY		CONTROL SECT JOB	HIGHWAY
	HARRIS/GAL		6375 52 001	IH45

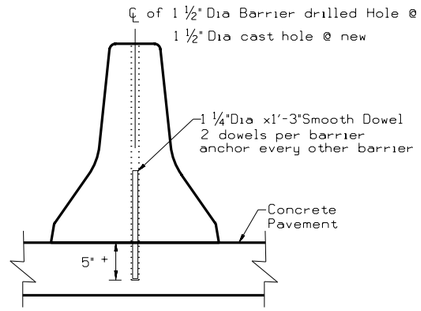
FILE: h:\00*maintenance\south harris maintenance\2020 contracts\6357-02-001*ih45 general maintenance\Standards\Concrete Traffic Barrier 20\stdc1*1.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001



PLAN

ELEVATION

4 Concrete pad required on projects design for asphaltic concrete pavement usage

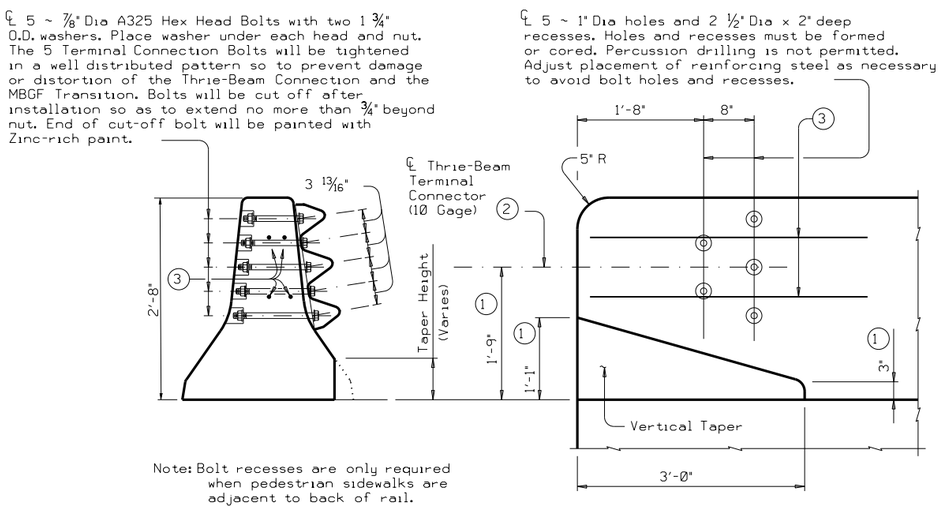


ANCHORAGE DETAIL

End View
Dowel Anchorage Not Required for Traffic Control or Other Non-Permanent Installations.

CTB DOWEL ANCHORAGE NOTES:

1. These details provide a method of restraining precast concrete barrier to limit lateral movement.
2. Drill the concrete pavement by placing the barrier section on the concrete pavement in the desired location. Then drill the hole into the concrete pavement with the bit passing through the hole in the barrier. Drill the hole in the concrete pavement to a point which is slightly more than 5" below the surface of the concrete pavement.
3. Drilling holes in the barrier, drilling holes in the concrete pavement, fabrication and materials for the 1 ¼" steel pins, and any repair of the concrete pavement or barrier will be considered as subsidiary to the barrier bid items.



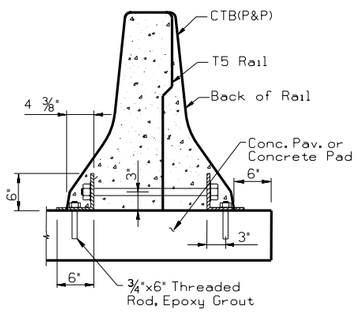
SECTION A-A

ELEVATION

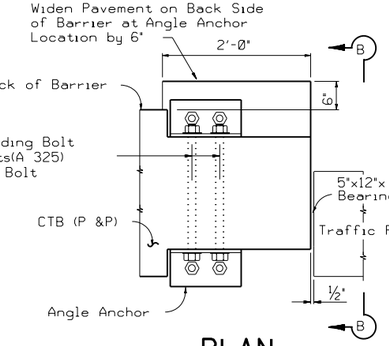
TERMINAL CONNECTION DETAIL

1 Increase 2" for Structures with Overlay.

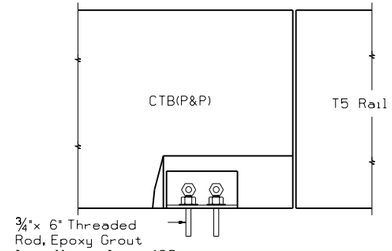
3 4 additional Bars R(#4) 3'-8" in length will be placed inside Bars S(#5) and centered 2'-0" from end of rail when Terminal Connections are required.



SECTION B-B



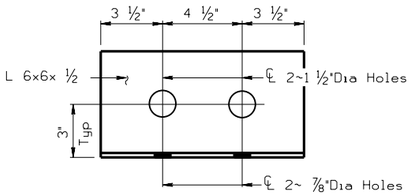
PLAN



ELEVATION

JOINT DETAIL

Showing end of barrier



ANGLE ANCHOR

Galvanize Per Item 445
N.T.S.

R = Radius
Dia = Diameter

SHEET 2 OF 2

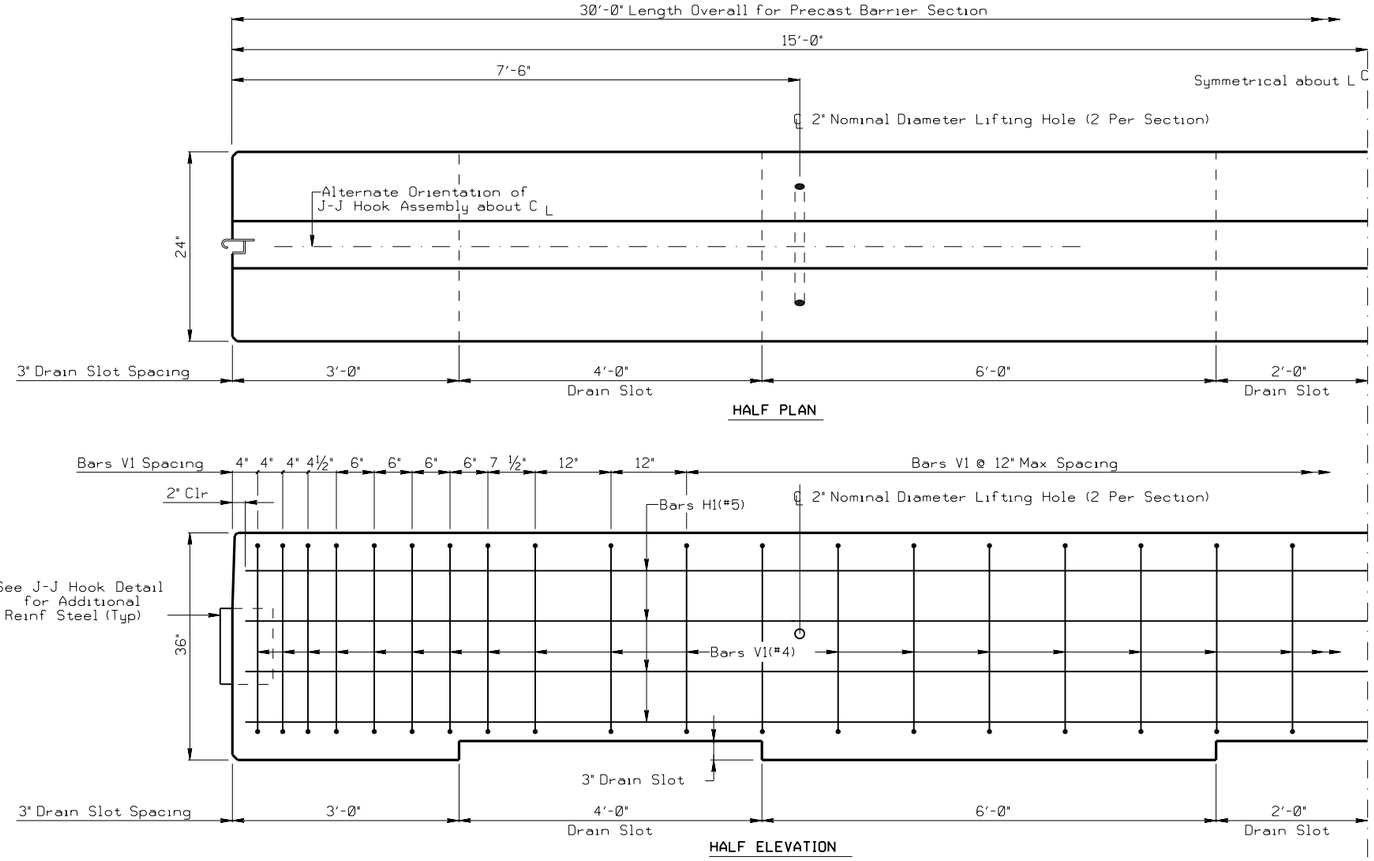
Texas Department of Transportation
Houston District

PRECAST CONCRETE TRAFFIC BARRIER

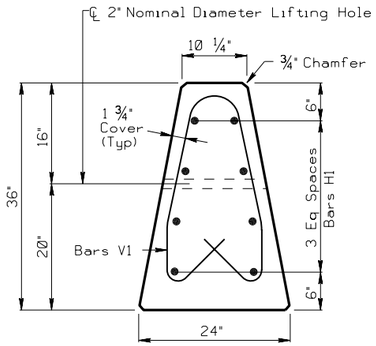
PCTB

FILE: STDC1.DGN	DN: TxDot	CK: TxDot	DW: TxDot	CK: TxDot
©TxDOT November 2011	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS	HOUSTON	6	RMC 6375-52-001	156
	COUNTY		CONTROL SECT JOB	HIGHWAY
	HARRIS/GAL		6375 52 001	IH45

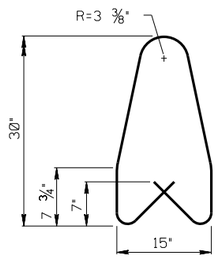
FILE: h:\00*maintenance\south harris maintenance\2020 contracts\6357-02-001*ih45 general maintenance\Standards\Concrete Traffic Barrier 20\stdc1*2.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001



PRECAST SINGLE SLOPE CONCRETE BARRIER

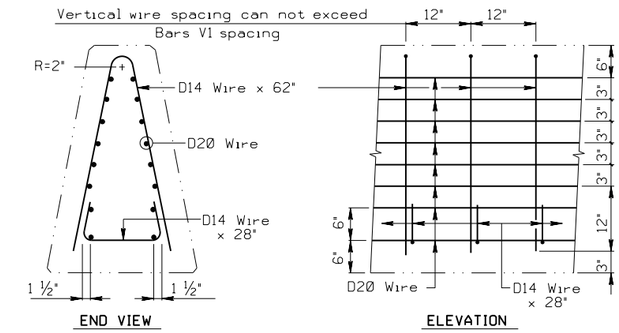


TYPICAL SECTION



BARS V1(#4)

WELDED WIRE FABRIC
36" BARRIER
3x12-D20xD14



WELDED WIRE FABRIC (OPTIONAL REINFORCING)

R = Radius
Dia = Diameter

GENERAL NOTES:

1) Precast barrier length will be 30 feet(1 inch +/-) unless otherwise specified in the plans.

2) All concrete will be Class C.

3) All reinforcing steel will be Grade 60, unless otherwise specified. All welded rebar is ASTM A706.

4) Chamfer all edges ¾inch.

5) The minimum bar splice length is 24 times the bar diameter.

6) Welded wire fabric may be used as an option to conventional reinforcement. All wire is 60 ksi yield strength.

7) Transitions to barrier height,as needed,will be determined by the Engineer. Changes in barrier height should not normally exceed 2 inches per 30 feet. Vertical steel will be uniformly transitioned throughout the variation in barrier height as directed by the Engineer.

8) Installation of barrier anchorage is not paid for directly. Installation is incidental to barrier bid items.

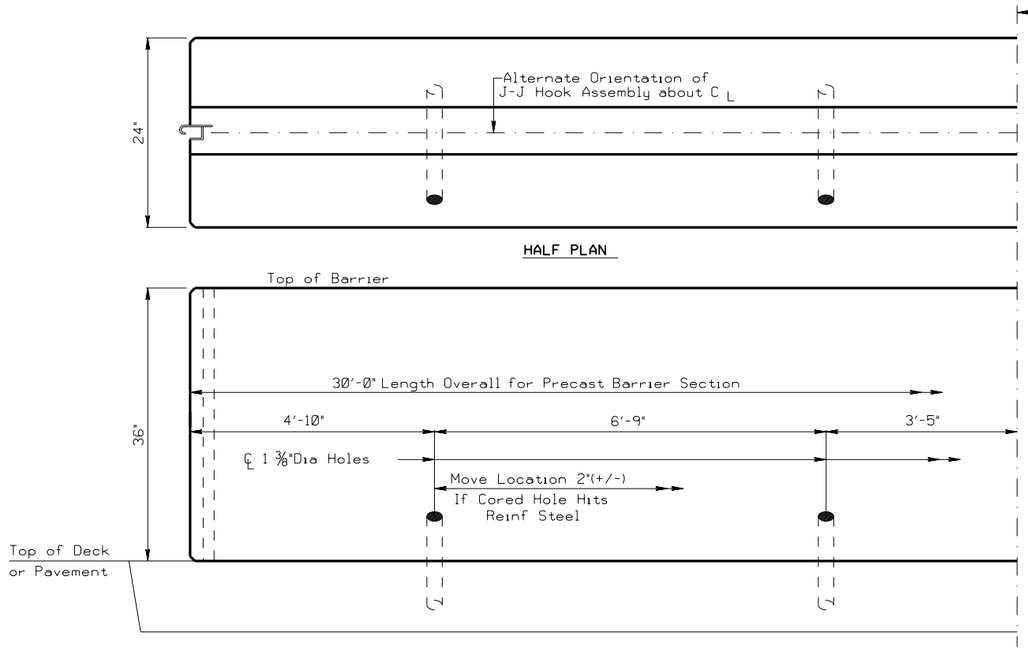
Texas Department of Transportation
Houston District (Roadway)

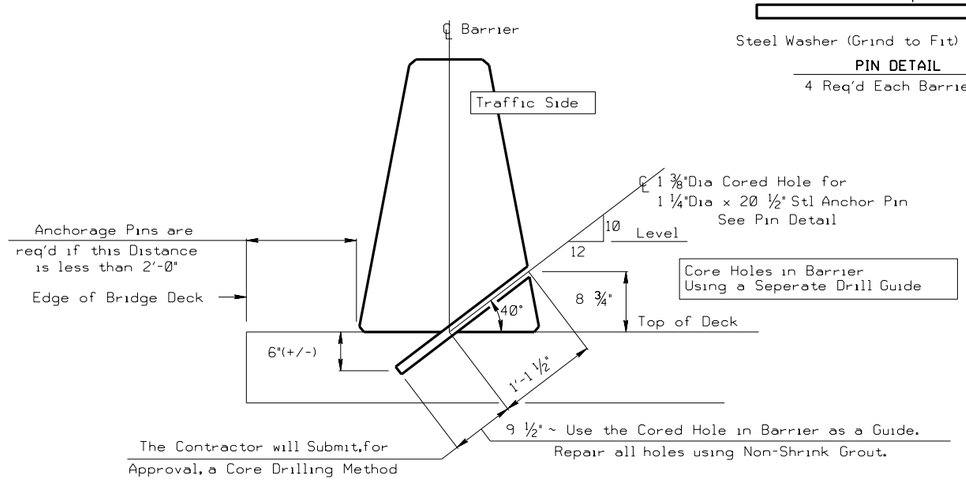
PRECAST SINGLE SLOPE CONCRETE BARRIER (J-J HOOK CONNECTION)

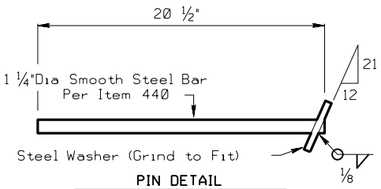
PSSCB-JJ

FILE: STDC3.DGN	DN: TxDot	CK: TxDot	DW: TxDot	CK: TxDot
© TxDOT January 2005	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 12/2004	HOUSTON	6	RMC 6375-52-001	157
	COUNTY		CONTROL SECT JOB	HIGHWAY
	HARRIS/GAL		6375 52 001	IH45

FILE: n:\00*maintenance\south harris maintenance\2020 contracts\6357-02-001*ih45 general maintenance\Standards\Concrete Traffic Barrier 20\stdc3*1.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001

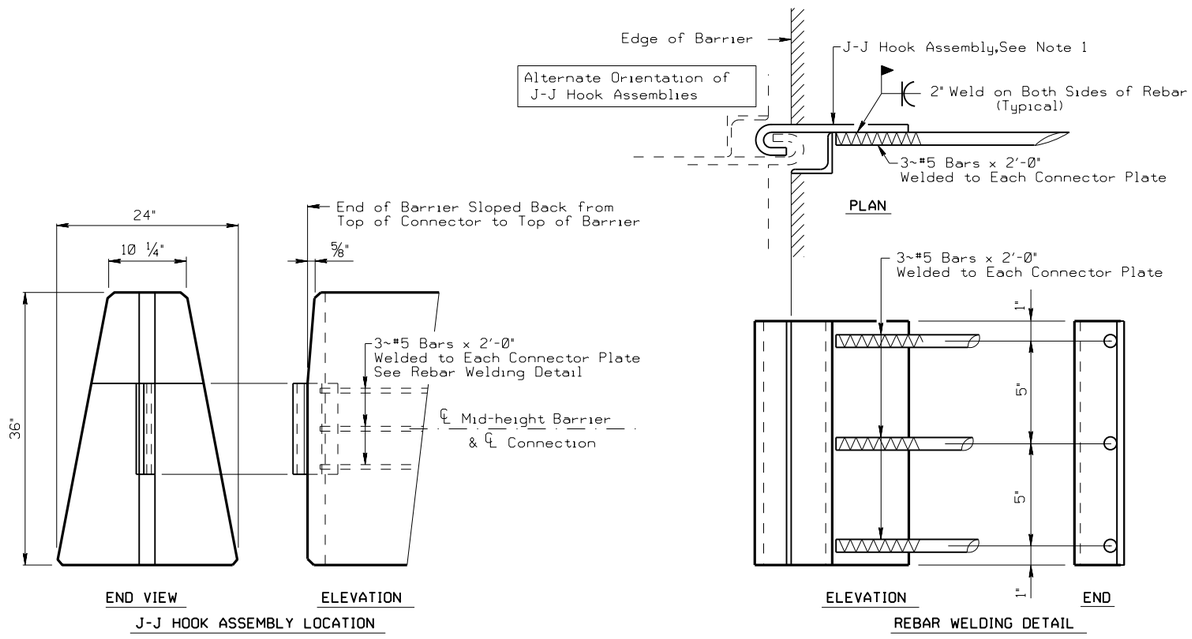






BARRIER ANCHORAGE DETAIL

For Barrier located on Bridge Deck with less than 2' clearance or transition to dissimilar Barrier



J-J HOOK DETAILS

CONNECTOR NOTES AND SPECIFICATIONS

1) J-J Hooks are a patented design as manufactured by EASI-SET Industries, phone 1-800-547-4045. All steel assemblies for joint shall be galvanized after fabrication in accordancewith item 445, "Galvanizing."

2) Reinforcing Steel:
ASTM A-36 (plain).

3) Welding:
All Welding to be in accordance with American Welding Society (AWS) Structural Welding Codes. Use weldable rebar per Item 440.

4) Tolerances:
J-J Hook assembly tolerances as per manufacturer. Installation and fabrication tolerances as follows:
Barrier length + 1/4"
Connector location +/- 1/16"

R = Radius
Dia = Diameter

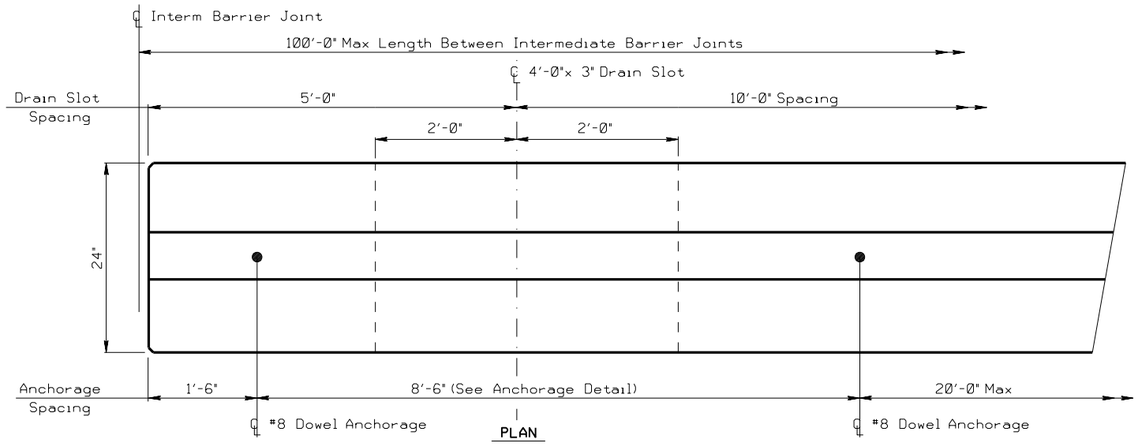
Texas Department of Transportation
Houston District (Roadway)

PRECAST SINGLE SLOPE CONCRETE BARRIER (J-J HOOK CONNECTION)

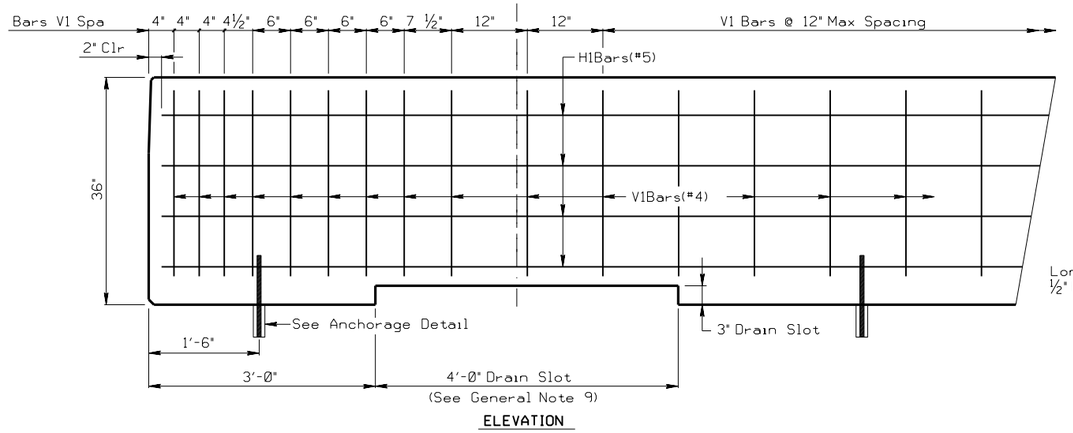
PSSCB-JJ

FILE: STDC3.DGN	DN: TxDot	CK: TxDot	DW: TxDot	CK: TxDot
© TxDOT January 2005	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 12/2004	HOUSTON	6	RMC 6375-52-001	158
	COUNTY		CONTROL SECT JOB	HIGHWAY
	HARRIS/GAL		6375 52 001	IH45

FILE: n:\00*maintenance\south harris maintenance\2020 contracts\6357-02-001*ih45 general maintenance\Standards\Concrete Traffic Barrier 20\stdc3*2.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001



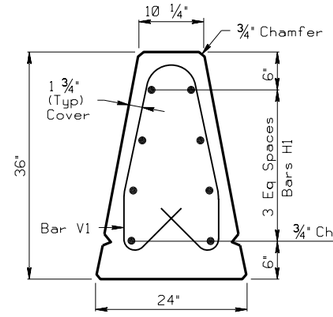
PLAN



ELEVATION

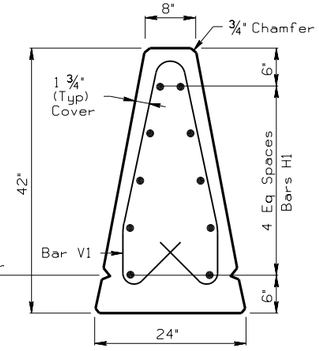
CAST-IN-PLACE SINGLE SLOPE CONCRETE BARRIER

36" Barrier Shown ~ 42" Barrier Similar



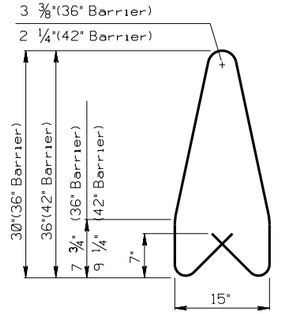
TYPICAL SECTION

36" BARRIER HEIGHT



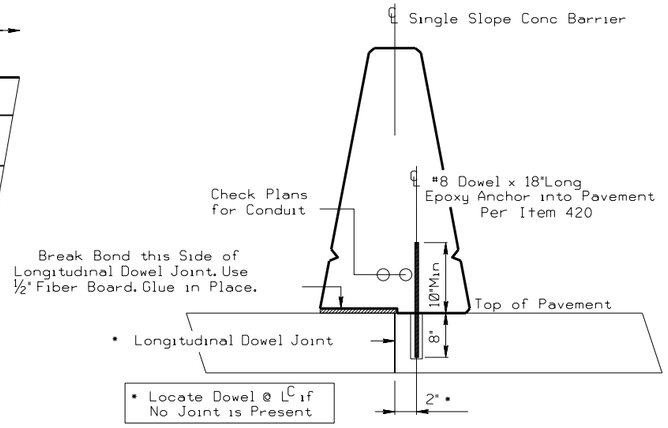
TYPICAL SECTION

42" BARRIER HEIGHT



BARS V1(#4)

REINFORCING DETAIL

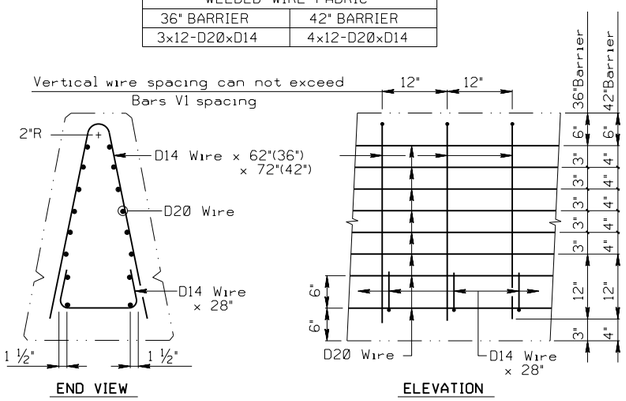


ANCHORAGE AND JOINT DETAIL

GENERAL NOTES:

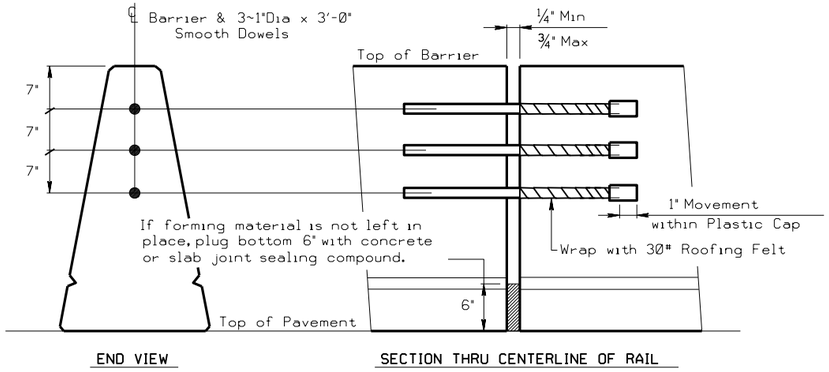
1) Precast barrier is not allowed. Cast-in place barrier may be slip formed. Additional reinforcement may be tack welded to the upper two-thirds of the reinforcing cage to provide bracing.
2) All concrete will be Class C.
3) All reinforcing steel will be Grade 60, unless otherwise specified. All welded rebar is ASTM A706.
4) Chamfer all edges ¾ inch.
5) The minimum bar splice length is 24 times the bar diameter.
6) Welded wire fabric may be used as an option to conventional reinforcement. All wire is 60 ksi yield strength.
7) Transitions to barrier height, as needed, will be determined by the Engineer. Changes in barrier height should not normally exceed 2 inches per 30 feet. Vertical steel will be uniformly transitioned throughout the variation in barrier height as directed by the Engineer.
8) Installation of anchorage dowels are not paid for directly. Installation is incidental to barrier bid items.
9) Drain slots may be used where shown elsewhere on the plans or as directed by the Engineer.

WELDED WIRE FABRIC	
36" BARRIER	42" BARRIER
3x12-D20xD14	4x12-D20xD14



END VIEW ELEVATION

WELDED WIRE FABRIC (OPTIONAL REINFORCING)



END VIEW SECTION THRU CENTERLINE OF RAIL

INTERMEDIATE BARRIER JOINT DETAIL

R = Radius
Dia = Diameter

Texas Department of Transportation
Houston District (Roadway)

SINGLE SLOPE CONCRETE BARRIER

TYPE 2
(CAST-IN-PLACE)

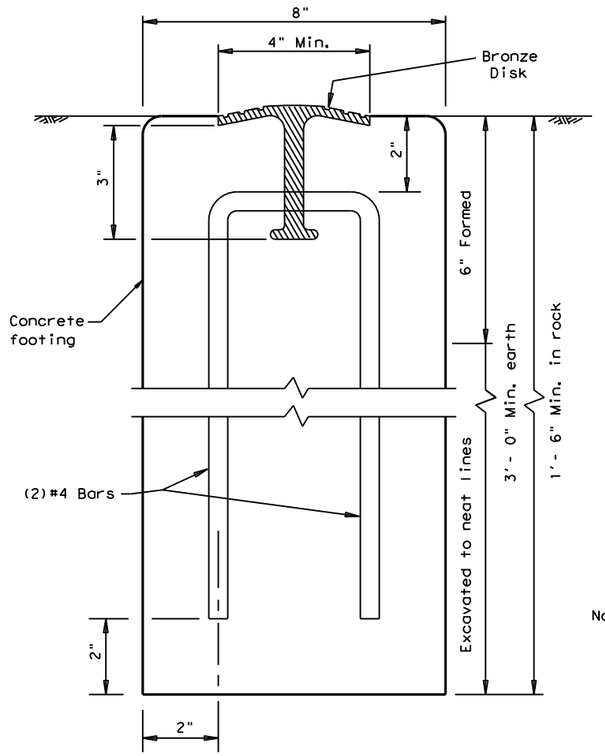
SSCB(2)-HOU

FILE: STDC4.DGN	DN: TxDot	CK: TxDot	DW: TxDot	CK: TxDot
© TxDOT August 2005	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 3/2015 2014 SPECS	HOU	6	RMC 6375-52-001	159
	COUNTY		CONTROL SECT JOB	HIGHWAY
	HARRIS/GAL		6375 52 001	IH45

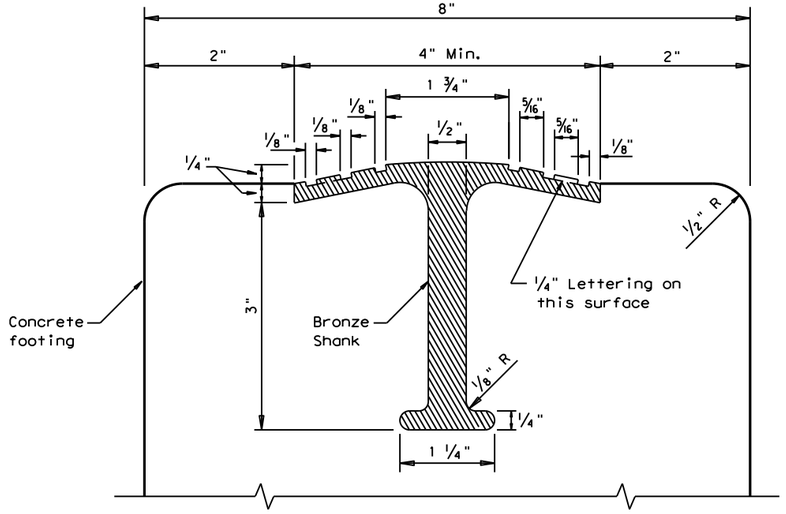
FILE: n:\00*maintenance\south harris maintenance\2020 contracts\6357-02-001*ih45
DATE: 1/4/2021
PROJECT: 6375-52-001

n:\00*maintenance\south harris maintenance\Standards\Concrete Traffic Barrier 20\stdc4.dgn

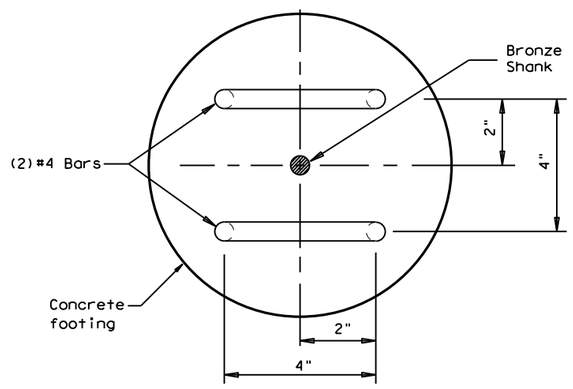
FILE: h:\00maintenance\south harris maintenance\M10.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001



SECTION A-A

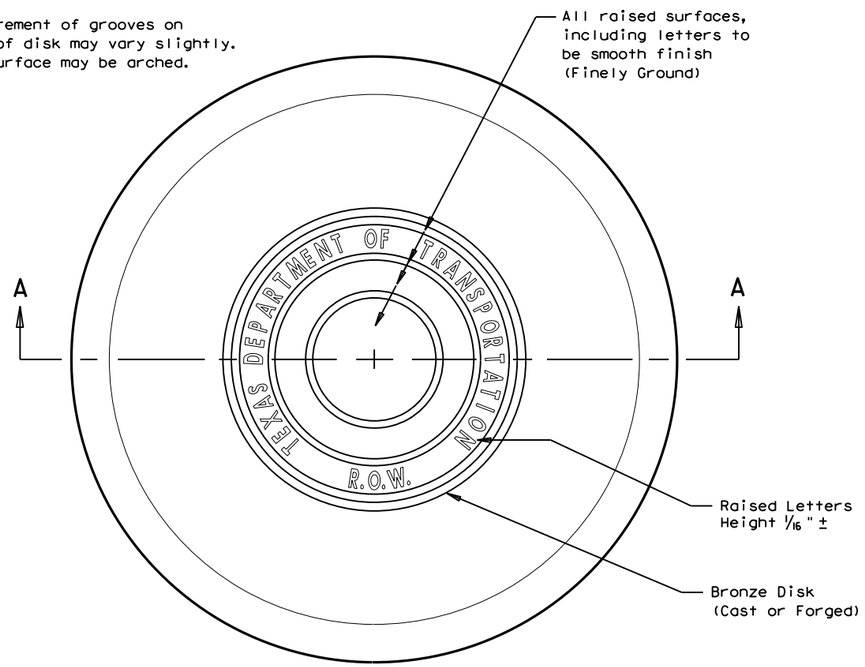


SECTION THRU TOP OF ROW MARKER



CROSS SECTION THRU MARKER

Note:
Measurement of grooves on face of disk may vary slightly. Top surface may be arched.



TOP VIEW OF ROW MARKER

GENERAL NOTES

1. All materials and construction shall be in accordance with Item 538, "Right of way markers."
2. Right-of-Way marker concrete shall be poured in place. The bronze disks shall be set to the correct line and grade, as directed by the Engineer.
3. The bronze disk shall be of architectural bronze with the following composition: Copper 85%, Tin 5%, Lead 5%, Zinc 5%. Excavation of the marker locations shall be made of uniform lines except for the top of 6 inches which shall be formed with removable forms. The top part of the marker around the bronze disk shall receive a trowel finish.
4. Once the concrete has set, the Engineer will stencil the required survey data and, with a chisel or center punch, cut across marker the exact location of the Right-of-Way line in the bronze disk.

Texas Department of Transportation

Design Division Standard

RIGHT-OF-WAY MARKER

M-10

FILE: m10.dgn		DN: TxDOT		CK: AM	DW: BD/VP		CK: VP
© TxDOT February 1992		CONT	SECT	JOB		HIGHWAY	
REVISIONS		6375	52	001		IH45	
		DIST	COUNTY			SHEET NO.	
		12	HARRIS/GAL			160	

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

FILE: h:\00*maintenance\south harris maintenance\2020 contracts\6357-02-001*ih45 gen
DATE: 1/4/2021
PROJECT: 6375-52-001

ZONE 1 NO ICE 100 M.P.H. WIND

TRUSS DETAILS

5/8" Dia. H.S. Bolts — Spans 40' Thru 75'

SPAN	40'	45'	50'	55'	60'	65'	70'	75'
W x D = WIDTH x DEPTH	4.5 x 4.5	4.5 x 4.5	4.5 x 4.5	4.5 x 4.5	4.5 x 4.5	4.5 x 4.5	4.5 x 4.5	4.5 x 4.5
CHORD -②, Unless Otherwise Shown	L 3 x 3 x 3/16 ③ [3]	L 3 x 3 x 1/4 ③ [4]	L 3 x 3 x 1/4 ③ [4]	L 3 x 3 x 1/4 [6]	L 3 1/2 x 3 1/2 x 1/4 [7]	L 3 1/2 x 3 1/2 x 5/16 [9]	L 3 1/2 x 3 1/2 x 5/16 [9]	L 4 x 4 x 5/16 [10]
DEAD LOAD DIAGONAL -③	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]
WIND LOAD DIAGONAL -③	L 3 x 3 x 3/16 [2]	L 3 x 3 x 3/16 [2]	L 3 x 3 x 3/16 [2]	L 3 x 2 1/2 x 1/4 [3]	L 3 x 2 1/2 x 1/4 [3]	L 3 x 2 1/2 x 1/4 [3]	L 3 x 3 x 1/4 [2]	L 3 x 3 x 1/4 [3]
DEAD LOAD VERTICAL -③	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]
WIND LOAD STRUT - ③	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]
TOTAL DEFL. & TRUSS D.L.	DEFL=0.12" L=42 lb/ft	DEFL=0.18" L=42 lb/ft	DEFL=0.21" L=47 lb/ft	DEFL=0.30" L=47 lb/ft	DEFL=0.38" L=53 lb/ft	DEFL=0.44" L=59 lb/ft	DEFL=0.58" L=60 lb/ft	DEFL=0.75" L=64 lb/ft

TOWER DETAILS

COLUMN SIZE & UPLIFT (kips); Tower Height = (HL + HR)/2

S = COLUMN SPACING	6.0'	6.0'	6.0'	6.0'	6.5'	6.5'	6.5'	6.5'
TOWER HEIGHT								
15'	W 10 x 17 (28.0)	W 10 x 17 (31.5)	W 10 x 22 (34.3)	W 10 x 22 (37.8)	W 10 x 22 (36.7)	W 10 x 22 (39.9)	W 10 x 22 (42.9)	W 10 x 26 (45.7)
16'	W 10 x 17 (30.0)	W 10 x 22 (33.7)	W 10 x 22 (36.7)	W 10 x 22 (40.5)	W 10 x 22 (39.3)	W 10 x 22 (42.7)	W 10 x 26 (45.9)	W 10 x 26 (48.9)
17'	W 10 x 22 (33.0)	W 10 x 22 (36.0)	W 10 x 22 (39.0)	W 10 x 22 (43.1)	W 10 x 26 (42.3)	W 10 x 26 (45.5)	W 10 x 26 (48.8)	W 12 x 26 (53.4)
18'	W 10 x 22 (34.0)	W 10 x 22 (38.2)	W 10 x 22 (41.4)	W 10 x 22 (45.8)	W 10 x 26 (44.9)	W 10 x 26 (48.4)	W 10 x 26 (51.9)	W 12 x 26 (56.8)
19'	W 10 x 22 (36.4)	W 10 x 22 (40.5)	W 10 x 26 (43.9)	W 10 x 26 (48.4)	W 10 x 26 (47.6)	W 12 x 26 (51.8)	W 12 x 26 (55.6)	W 12 x 26 (59.3)
20'	W 10 x 22 (38.5)	W 10 x 22 (42.7)	W 10 x 26 (46.4)	W 10 x 26 (51.1)	W 10 x 26 (50.2)	W 12 x 26 (54.7)	W 12 x 26 (58.7)	W 12 x 26 (62.6)
21'	W 10 x 22 (40.6)	W 10 x 26 (45.0)	W 10 x 26 (49.3)	W 12 x 26 (54.4)	W 12 x 26 (53.6)	W 12 x 26 (57.6)	W 12 x 26 (61.8)	W 14 x 30 (66.8)
22'	W 10 x 22 (42.7)	W 10 x 26 (47.4)	W 10 x 26 (51.9)	W 12 x 26 (57.1)	W 12 x 26 (56.4)	W 12 x 26 (60.6)	W 12 x 26 (64.9)	W 14 x 30 (70.3)
23'	W 10 x 26 (44.2)	W 10 x 26 (49.7)	W 12 x 26 (55.1)	W 12 x 26 (60.0)	W 12 x 26 (59.2)	W 14 x 30 (64.6)	W 14 x 30 (69.1)	W 14 x 30 (73.7)
24'	W 10 x 26 (46.3)	W 10 x 26 (52.0)	W 12 x 26 (57.7)	W 12 x 26 (62.8)	W 12 x 26 (62.0)	W 14 x 30 (67.7)	W 14 x 30 (72.4)	W 14 x 30 (77.2)
25'	W 12 x 26 (49.7)	W 12 x 26 (55.0)	W 12 x 26 (60.3)	W 14 x 30 (66.9)	W 14 x 30 (65.9)	W 14 x 30 (70.7)	W 14 x 34 (75.6)	W 14 x 34 (80.5)
26'	W 12 x 26 (51.9)	W 12 x 26 (57.4)	W 12 x 26 (63.0)	W 14 x 30 (69.8)	W 14 x 30 (68.8)	W 14 x 30 (73.8)	W 14 x 34 (78.9)	W 14 x 34 (84.0)
27'	W 12 x 26 (54.1)	W 12 x 26 (59.9)	W 14 x 30 (67.0)	W 14 x 30 (72.8)	W 14 x 30 (71.6)	W 14 x 34 (76.9)	W 14 x 34 (82.2)	W 16 x 36 (87.4)
28'	W 12 x 26 (56.4)	W 12 x 26 (62.4)	W 14 x 30 (69.8)	W 14 x 30 (75.8)	W 14 x 30 (74.7)	W 14 x 34 (80.0)	W 14 x 34 (85.5)	W 16 x 36 (90.9)
29'	W 12 x 26 (58.7)	W 14 x 30 (66.5)	W 14 x 30 (72.6)	W 14 x 34 (78.7)	W 14 x 34 (77.6)	W 14 x 34 (83.1)	W 16 x 36 (90.4)	W 16 x 36 (94.5)
30'	W 12 x 26 (61.0)	W 14 x 30 (69.1)	W 14 x 30 (75.5)	W 14 x 34 (81.7)	W 14 x 34 (80.7)	W 16 x 36 (86.3)	W 16 x 36 (93.9)	W 16 x 36 (98.0)

ZONE 1 NO ICE 100 M.P.H. WIND

TRUSS DETAILS

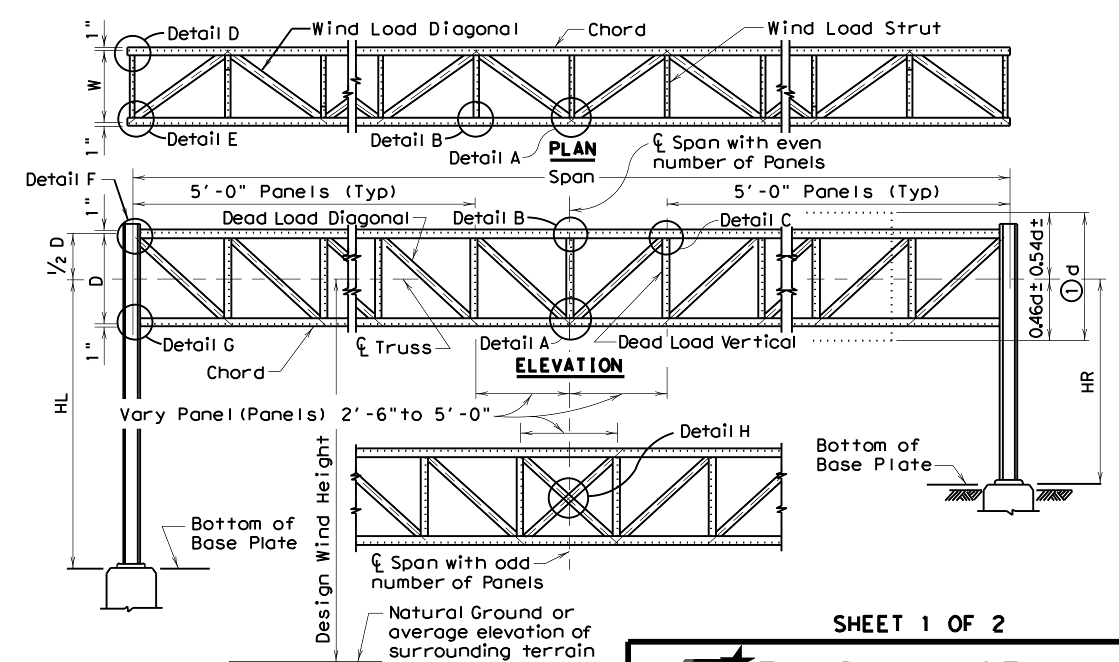
3/4" Dia. H.S. Bolts — Spans 76' Thru 155'

SPAN	80'	85'	90'	95'
W x D = WIDTH x DEPTH	4.5 x 4.5	4.5 x 4.5	4.5 x 4.5	4.5 x 4.5
CHORD -②, Unless Otherwise Shown	L 3 1/2 x 3 1/2 x 3/8 [8]	L 4 x 4 x 3/8 [9]	L 4 x 4 x 3/8 [10]	L 4 x 4 x 7/16 [11]
DEAD LOAD DIAGONAL -③	L 3 x 2 x 3/16 [2]	L 3 x 2 x 3/16 [2]	L 3 x 2 x 3/16 [2]	L 3 x 2 x 3/16 [2]
WIND LOAD DIAGONAL -③	L 3 x 3 x 1/4 [3]	L 3 x 3 x 1/4 [3]	L 3 x 3 x 1/4 [3]	L 3 1/2 x 3 1/2 x 1/4 [3]
DEAD LOAD VERTICAL -③	L 3 x 2 x 3/16 [2]	L 3 x 2 x 3/16 [2]	L 3 x 2 x 3/16 [2]	L 3 x 2 x 3/16 [2]
WIND LOAD STRUT - ③	L 2 1/2 x 2 1/2 x 3/16 [1]	L 2 1/2 x 2 1/2 x 3/16 [1]	L 2 1/2 x 2 1/2 x 3/16 [1]	L 2 1/2 x 2 1/2 x 3/16 [1]
TOTAL DEFL. & TRUSS D.L.	DEFL=0.86" L=70 lb/ft	DEFL=1.08" L=76 lb/ft	DEFL=1.20" L=76 lb/ft	DEFL=1.43" L=86 lb/ft

TOWER DETAILS

COLUMN SIZE & UPLIFT (kips); Tower Height = (HL + HR)/2

S = COLUMN SPACING	7.0'	7.0'	7.0'	7.0'
TOWER HEIGHT				
15'	W 10 x 26 (44.0)	W 10 x 26 (46.8)	W 12 x 26 (50.0)	W 12 x 26 (52.8)
16'	W 10 x 26 (47.2)	W 10 x 26 (50.1)	W 12 x 26 (53.6)	W 12 x 26 (56.5)
17'	W 12 x 26 (51.2)	W 12 x 26 (54.3)	W 12 x 26 (57.2)	W 12 x 26 (60.3)
18'	W 12 x 26 (54.4)	W 12 x 26 (57.7)	W 12 x 26 (60.8)	W 14 x 30 (64.1)
19'	W 12 x 26 (57.7)	W 14 x 30 (61.8)	W 14 x 30 (65.1)	W 14 x 30 (68.6)
20'	W 12 x 26 (60.9)	W 14 x 30 (65.3)	W 14 x 30 (68.8)	W 14 x 30 (72.5)
21'	W 14 x 30 (65.0)	W 14 x 30 (68.8)	W 14 x 30 (72.5)	W 14 x 34 (76.5)
22'	W 14 x 30 (68.3)	W 14 x 30 (72.4)	W 14 x 34 (76.3)	W 14 x 34 (80.4)
23'	W 14 x 30 (71.7)	W 14 x 34 (76.0)	W 14 x 34 (80.0)	W 16 x 36 (85.2)
24'	W 14 x 34 (75.1)	W 14 x 34 (79.5)	W 14 x 34 (83.8)	W 16 x 36 (89.3)
25'	W 14 x 34 (78.6)	W 16 x 36 (83.0)	W 16 x 36 (88.7)	W 16 x 36 (93.4)
26'	W 14 x 34 (82.0)	W 16 x 36 (86.6)	W 16 x 36 (92.5)	W 16 x 40 (97.4)
27'	W 16 x 36 (86.7)	W 16 x 36 (91.6)	W 16 x 40 (96.4)	W 16 x 40 (101.4)
28'	W 16 x 36 (90.2)	W 16 x 36 (95.4)	W 16 x 40 (100.3)	W 16 x 40 (105.6)
29'	W 16 x 40 (93.7)	W 16 x 40 (97.5)	W 16 x 40 (104.2)	W 18 x 46 (111.2)
30'	W 16 x 40 (97.3)	W 16 x 40 (101.2)	W 18 x 46 (108.2)	W 18 x 46 (115.5)



① d = Sign Depth
Where signs of different depths are used, the bottom edges of all signs may be placed in line. Where this is done, all signs should be so positioned that the bottom edges are approximately 0.46 of the depth of the deepest sign below the ℄ of the truss.

② "Low-Alloy Steel" for non-bridge structures per Item 442, "Metal For Structures".

③ "Carbon Steel" for non-bridge structures per Item 442, "Metal For Structures".

SHEET 1 OF 2

Texas Department of Transportation
Traffic Operations Division

OVERHEAD SIGN BRIDGE DETAILS

OSB-Z1

©TxDOT November 2007	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
REVISIONS	CONT	SECT	JOB	HIGHWAY
8/08 # of HS bolts; angle sizes; add missing HS bolt dia (select spans)	6375	52	001	IH45
	DIST		COUNTY	SHEET NO.
	12		HARRIS/GAL	161

32A

ZONE 1 NO ICE 100 M.P.H. WIND

TRUSS DETAILS

3/4" Dia. H.S. Bolts — Spans 76' Thru 155'

SPAN	100'	105'	110'	115'	120'	125'	130'	135'
W x D = WIDTH x DEPTH	5.0 x 5.0	5.0 x 5.0	5.0 x 5.0	5.0 x 5.0	5.0 x 5.0	5.0 x 5.0	5.0 x 5.0	5.0 x 5.0
CHORD -②, Unless Otherwise Shown	L 5 x 5 x 3/8 [11]	L 4 x 4 x 1/2 [12]	L 5 x 5 x 3/8 [14]	L 5 x 5 x 7/16 [15]	L 5 x 5 x 1/2 [16]	L 5 x 5 x 1/2 [18]	L 6 x 6 x 1/2 [20]	L 6 x 6 x 1/2 [21]
DEAD LOAD DIAGONAL -③	L 3 x 2 x 3/16 [2]	L 3 x 2 x 3/16 [2]	L 3 x 2 x 3/16 [2]	L 3 x 2 x 3/16 [2]	L 3 x 2 1/2 x 3/16 [2]	L 3 x 3 x 3/16 [2]	L 3 x 2 x 1/4 [2]	L 3 x 2 1/2 x 1/4 [2]
WIND LOAD DIAGONAL -③	L 3 1/2 x 3 1/2 x 1/4 [3]	L 3 1/2 x 3 1/2 x 1/4 [3]	L 3 1/2 x 3 1/2 x 1/4 [3]	L 3 1/2 x 3 1/2 x 1/4 [4]	L 4 x 4 x 1/4 [4]	L 4 x 4 x 1/4 [4]	L 4 x 4 x 1/4 [4]	L 3 1/2 x 3 1/2 x 5/16 [4]
DEAD LOAD VERTICAL -③	L 3 x 2 x 3/16 [2]	L 3 x 2 x 3/16 [2]	L 3 x 2 x 3/16 [2]	L 3 x 2 x 3/16 [2]	L 3 x 2 1/2 x 3/16 [2]	L 3 x 2 1/2 x 3/16 [2]	L 3 x 2 1/2 x 3/16 [2]	L 3 x 2 1/2 x 3/16 [2]
WIND LOAD STRUT - ③	L 2 1/2 x 2 1/2 x 3/16 [1]	L 2 1/2 x 2 1/2 x 3/16 [1]	L 2 1/2 x 2 1/2 x 3/16 [1]	L 2 1/2 x 2 1/2 x 3/16 [1]	L 2 1/2 x 2 1/2 x 3/16 [1]	L 2 1/2 x 2 1/2 x 3/16 [1]	L 2 1/2 x 2 1/2 x 3/16 [1]	L 2 1/2 x 2 1/2 x 3/16 [1]
TOTAL DEFL. & TRUSS D.L.	DEFL=1.46" L=92 lb/ft	DEFL=1.58" L=95 lb/ft	DEFL=1.88" L=101 lb/ft	DEFL=2.04" L=101 lb/ft	DEFL=2.30" L=113 lb/ft	DEFL=2.61" L=114 lb/ft	DEFL=2.74" L=130 lb/ft	DEFL=3.14" L=133 lb/ft

TOWER DETAILS

COLUMN SIZE & UPLIFT (kips); Tower Height = (HL + HR)/2

S = COLUMN SPACING / TOWER HEIGHT	7.5'	7.5'	7.5'	7.5'	7.5'	7.5'	7.5'	7.5'
15'	W 12 x 26 (54.0)	W 12 x 26 (56.4)	W 14 x 30 (59.5)	W 14 x 30 (62.0)	W 14 x 34 (64.5)	W 14 x 34 (66.9)	W 14 x 34 (69.2)	W 14 x 34 (71.9)
16'	W 12 x 26 (57.8)	W 14 x 30 (60.4)	W 14 x 30 (63.7)	W 14 x 30 (66.4)	W 14 x 34 (69.1)	W 14 x 34 (71.6)	W 14 x 34 (74.2)	W 14 x 34 (77.0)
17'	W 14 x 30 (61.5)	W 14 x 30 (64.4)	W 14 x 30 (68.0)	W 14 x 34 (70.6)	W 14 x 34 (73.7)	W 14 x 34 (76.4)	W 14 x 34 (79.1)	W 16 x 36 (82.7)
18'	W 14 x 30 (65.4)	W 14 x 30 (68.4)	W 14 x 30 (72.2)	W 14 x 34 (75.1)	W 14 x 34 (78.3)	W 14 x 34 (81.2)	W 16 x 36 (84.1)	W 16 x 36 (88.0)
19'	W 14 x 30 (69.2)	W 14 x 34 (73.0)	W 14 x 30 (76.4)	W 14 x 34 (79.6)	W 16 x 36 (83.6)	W 16 x 36 (86.7)	W 16 x 36 (89.9)	W 16 x 40 (93.8)
20'	W 14 x 34 (73.1)	W 14 x 34 (77.1)	W 14 x 34 (80.7)	W 16 x 36 (84.1)	W 16 x 36 (88.3)	W 16 x 36 (91.6)	W 16 x 40 (95.0)	W 16 x 40 (99.1)
21'	W 14 x 34 (77.6)	W 16 x 36 (82.0)	W 16 x 36 (85.8)	W 16 x 36 (88.4)	W 16 x 40 (92.9)	W 16 x 40 (96.4)	W 16 x 40 (99.5)	W 18 x 46 (104.4)
22'	W 14 x 34 (81.6)	W 16 x 36 (86.2)	W 16 x 36 (90.1)	W 16 x 36 (92.9)	W 16 x 40 (97.7)	W 16 x 40 (101.3)	W 16 x 40 (105.1)	W 18 x 46 (109.8)
23'	W 16 x 36 (86.5)	W 16 x 36 (90.4)	W 16 x 40 (94.3)	W 16 x 40 (98.3)	W 16 x 40 (102.4)	W 18 x 46 (107.2)	W 18 x 46 (111.2)	W 18 x 46 (115.2)
24'	W 16 x 36 (90.6)	W 16 x 40 (94.6)	W 16 x 40 (98.7)	W 16 x 40 (102.9)	W 18 x 46 (107.2)	W 18 x 46 (112.2)	W 18 x 46 (116.5)	W 18 x 46 (120.6)
25'	W 16 x 40 (94.5)	W 16 x 40 (98.8)	W 16 x 40 (103.1)	W 18 x 46 (108.8)	W 18 x 46 (113.1)	W 18 x 46 (117.3)	W 18 x 50 (121.6)	W 18 x 50 (126.1)
26'	W 16 x 40 (98.6)	W 16 x 40 (103.1)	W 18 x 46 (107.6)	W 18 x 46 (113.5)	W 18 x 46 (118.0)	W 18 x 46 (122.3)	W 18 x 50 (126.9)	W 18 x 50 (131.6)
27'	W 16 x 40 (100.2)	W 18 x 46 (108.5)	W 18 x 46 (113.4)	W 18 x 46 (118.3)	W 18 x 46 (122.9)	W 18 x 50 (127.5)	W 18 x 50 (132.2)	W 18 x 50 (137.1)
28'	W 16 x 40 (104.2)	W 18 x 46 (112.9)	W 18 x 46 (118.0)	W 18 x 46 (123.0)	W 18 x 50 (127.9)	W 18 x 50 (132.6)	W 18 x 50 (137.5)	W 18 x 55 (142.6)
29'	W 18 x 46 (112.4)	W 18 x 46 (117.3)	W 18 x 46 (122.6)	W 18 x 50 (127.7)	W 18 x 50 (132.9)	W 18 x 55 (137.5)	W 18 x 55 (142.6)	W 18 x 55 (148.1)
30'	W 18 x 46 (116.6)	W 18 x 46 (121.8)	W 18 x 50 (127.2)	W 18 x 50 (132.5)	W 18 x 50 (137.9)	W 18 x 55 (142.6)	W 18 x 55 (147.9)	W 21 x 57 (153.7)

ZONE 1 NO ICE 100 M.P.H. WIND

TRUSS DETAILS

3/4" Dia. H.S. Bolts — Spans 76' Thru 155'

SPAN	140'	145'	150'	155'
W x D = WIDTH x DEPTH	5.5 x 5.5	5.5 x 5.5	5.5 x 5.5	5.5 x 5.5
CHORD -②, Unless Otherwise Shown	L 6 x 6 x 1/2 [21]	L 6 x 6 x 9/16 [23]	L 6 x 6 x 9/16 [24]	L 6 x 6 x 5/8 [26]
DEAD LOAD DIAGONAL -③	L 3 x 2 1/2 x 1/4 [2]	L 3 x 2 1/2 x 1/4 [2]	L 3 x 2 1/2 x 1/4 [2]	L 3 x 3 x 1/4 [3]
WIND LOAD DIAGONAL -③	L 3 1/2 x 3 1/2 x 5/16 [4]	L 3 1/2 x 3 1/2 x 5/16 [4]	L 3 1/2 x 3 1/2 x 5/16 [4]	L 4 x 3 1/2 x 5/16 [4]
DEAD LOAD VERTICAL -③	L 3 x 3 x 3/16 [2]	L 3 x 2 1/2 x 1/4 [2]	L 3 x 2 1/2 x 1/4 [2]	L 3 x 2 1/2 x 1/4 [2]
WIND LOAD STRUT - ③	L 2 1/2 x 2 1/2 x 3/16 [1]	L 2 1/2 x 2 1/2 x 3/16 [1]	L 2 1/2 x 2 1/2 x 3/16 [1]	L 2 1/2 x 2 1/2 x 3/16 [1]
TOTAL DEFL. & TRUSS D.L.	DEFL=3.09" L=137 lb/ft	DEFL=3.36" L=149 lb/ft	DEFL=3.82" L=149 lb/ft	DEFL=4.14" L=162 lb/ft

TOWER DETAILS

COLUMN SIZE & UPLIFT (kips); Tower Height = (HL + HR)/2

S = COLUMN SPACING / TOWER HEIGHT	7.5'	7.5'	7.5'	7.5'
15'	W 14 x 34 (74.8)	W 16 x 36 (77.2)	W 16 x 36 (80.1)	W 16 x 36 (82.6)
16'	W 14 x 34 (80.1)	W 16 x 36 (82.7)	W 16 x 36 (85.8)	W 16 x 36 (88.5)
17'	W 16 x 36 (85.5)	W 16 x 36 (88.3)	W 16 x 40 (91.5)	W 16 x 40 (94.3)
18'	W 16 x 36 (90.8)	W 16 x 40 (93.8)	W 16 x 40 (97.2)	W 16 x 40 (100.3)
19'	W 16 x 40 (96.1)	W 16 x 40 (99.3)	W 18 x 46 (104.5)	W 18 x 46 (107.7)
20'	W 16 x 40 (101.5)	W 16 x 40 (104.9)	W 18 x 46 (110.4)	W 18 x 46 (113.9)
21'	W 18 x 46 (108.6)	W 18 x 46 (112.2)	W 18 x 46 (116.3)	W 18 x 46 (120.0)
22'	W 18 x 46 (114.2)	W 18 x 46 (118.0)	W 18 x 46 (122.3)	W 18 x 50 (126.2)
23'	W 18 x 46 (119.8)	W 18 x 46 (123.8)	W 18 x 50 (128.1)	W 18 x 50 (132.1)
24'	W 18 x 46 (125.4)	W 18 x 50 (129.6)	W 18 x 50 (134.1)	W 18 x 50 (138.3)
25'	W 18 x 50 (130.8)	W 18 x 50 (135.2)	W 18 x 55 (140.0)	W 18 x 55 (144.4)
26'	W 18 x 50 (136.5)	W 18 x 55 (141.1)	W 18 x 55 (146.1)	W 18 x 55 (150.7)
27'	W 18 x 55 (141.9)	W 18 x 55 (146.8)	W 21 x 57 (154.0)	W 21 x 57 (158.9)
28'	W 18 x 55 (147.7)	W 18 x 55 (152.7)	W 21 x 57 (160.2)	W 21 x 57 (165.3)
29'	W 21 x 57 (155.6)	W 21 x 57 (160.8)	W 21 x 62 (166.5)	W 21 x 62 (171.8)
30'	W 21 x 57 (161.5)	W 21 x 57 (166.8)	W 21 x 62 (172.7)	W 21 x 62 (178.3)

KEY TO TRUSS AND TOWER DETAILS

Truss members are all angles.
Truss columns are all wide flange shapes.

W 10 x 26 (44.2) — 44.2 kips Uplift at base plate
— 26 Pounds per foot.
— 10" Nominal size
— Wide Flange

DEFL = 0.12" = inches Deflection due to dead load of truss, walkway, signs and lights.
DL = 42 lb/ft = pounds per foot dead load of truss members only; does not include walkway, signs, and lights.

NOTE: Details on these sheets are for Design Wind Heights up to 30 feet.

GENERAL NOTES

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

For overhead sign bridges with different tower heights, average the height of the two towers and use the tabulated height nearest the calculated average. For average heights falling midway between the two tabulated heights use the larger height.

For truss lengths falling between those shown in the tables use the sizes called for in the next longer span.

Overhead sign bridges are designed for the equivalent area of a 10 foot deep sign panel over 75 percent of the span length, located as necessary to produce maximum stress. Design includes 3 pounds per square foot for sign panel, 20 pounds per linear foot for lights, and 50 pounds per linear foot for walkway, all placed as specified for the design sign panel.

Refer to "Overhead Sign Bridge Truss Details" for details called out in plan and elevation views.

The number of High Strength Bolts required in truss connection or splice are indicated in brackets, e.g. [3], after the member size.

SHEET 2 OF 2

Texas Department of Transportation
Traffic Operations Division

OVERHEAD SIGN BRIDGE DETAILS

OSB-Z1

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

REVISIONS
8/08 add missing HS bolt dia (select spans); applicability note; noted design specifications

CONT	SECT	JOB	HIGHWAY
6375	52	001	IH45

DIST	COUNTY	SHEET NO.
12	HARRIS/GAL	162

32B

FILE: h:\00+maintenance\south harris maintenance\2020 contracts\6357-02-001+ih45 gen...
DATE: 1/4/2021
PROJECT: 6375-52-001

FILE: h:\00*maintenance\south harris maintenance\2020 contracts\6357-02-001*ih45 gen...
DATE: 1/4/2021
PROJECT: 6375-52-001

ZONE 2 WITH ICE 90 M.P.H. WIND

TRUSS DETAILS

5/8" Dia. H.S. Bolts Spans 40' Thru 75'

SPAN	40'	45'	50'	55'	60'	65'	70'	75'
W x D = WIDTH x DEPTH	4.5 x 4.5	4.5 x 4.5	4.5 x 4.5	4.5 x 4.5	4.5 x 4.5	4.5 x 4.5	4.5 x 4.5	4.5 x 4.5
CHORD -②, Unless Otherwise Shown	L 3 x 3 x 3/16 ③ [3]	L 3 x 3 x 3/16 ③ [3]	L 3 x 3 x 1/4 ③ [4]	L 3 x 3 x 1/4 [5]	L 3 x 3 x 1/4 [6]	L 3 1/2 x 3 1/2 x 1/4 [7]	L 3 1/2 x 3 1/2 x 5/16 [9]	L 3 1/2 x 3 1/2 x 5/16 [9]
DEAD LOAD DIAGONAL -③	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 1/2 x 2 1/2 x 3/16 [3]
WIND LOAD DIAGONAL -③	L 3 x 3 x 3/16 [2]	L 3 x 3 x 3/16 [2]	L 3 x 3 x 3/16 [2]	L 3 x 3 x 3/16 [2]	L 3 x 2 1/2 x 1/4 [3]	L 3 x 2 1/2 x 1/4 [3]	L 3 x 2 1/2 x 1/4 [3]	L 3 x 2 1/2 x 1/4 [3]
DEAD LOAD VERTICAL -③	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 1/2 x 2 1/2 x 3/16 [2]	L 2 1/2 x 2 1/2 x 3/16 [2]
WIND LOAD STRUT - ③	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]
TOTAL DEFL. & TRUSS D.L.	DEFL=0.11" L=42 lb/ft	DEFL=0.18" L=42 lb/ft	DEFL=0.22" L=47 lb/ft	DEFL=0.30" L=48 lb/ft	DEFL=0.42" L=49 lb/ft	DEFL=0.50" L=53 lb/ft	DEFL=0.58" L=60 lb/ft	DEFL=0.73" L=61 lb/ft

TOWER DETAILS

Tower Height = (HL + HR)/2

S = COLUMN SPACING	6.0'	6.0'	6.0'	6.0'	6.5'	6.5'	6.5'	6.5'
TOWER HEIGHT	COLUMN SIZE & UPLIFT (kips)							
15'	W 10 x 15 (23.4)	W 10 x 15 (25.6)	W 10 x 17 (28.2)	W 10 x 17 (30.9)	W 10 x 22 (30.7)	W 10 x 22 (33.1)	W 10 x 22 (35.4)	W 10 x 22 (37.8)
16'	W 10 x 15 (24.7)	W 10 x 15 (27.5)	W 10 x 17 (30.2)	W 10 x 22 (33.0)	W 10 x 22 (32.9)	W 10 x 22 (35.4)	W 10 x 22 (37.9)	W 10 x 22 (40.4)
17'	W 10 x 17 (26.4)	W 10 x 17 (29.3)	W 10 x 22 (32.2)	W 10 x 22 (35.2)	W 10 x 22 (35.0)	W 10 x 22 (37.7)	W 10 x 22 (40.4)	W 10 x 26 (43.1)
18'	W 10 x 17 (28.0)	W 10 x 17 (31.2)	W 10 x 22 (34.2)	W 10 x 22 (37.4)	W 10 x 22 (37.2)	W 10 x 22 (40.1)	W 10 x 22 (42.9)	W 10 x 26 (45.7)
19'	W 10 x 17 (29.7)	W 10 x 22 (33.0)	W 10 x 22 (36.3)	W 10 x 22 (39.6)	W 10 x 22 (39.4)	W 10 x 26 (42.4)	W 10 x 26 (45.4)	W 10 x 26 (48.0)
20'	W 10 x 17 (31.4)	W 10 x 22 (34.9)	W 10 x 22 (38.3)	W 10 x 22 (41.8)	W 10 x 22 (41.6)	W 10 x 26 (44.8)	W 10 x 26 (48.0)	W 10 x 26 (50.7)
21'	W 10 x 22 (33.1)	W 10 x 22 (36.8)	W 10 x 22 (40.4)	W 10 x 26 (44.1)	W 10 x 26 (43.8)	W 10 x 26 (47.2)	W 12 x 26 (50.9)	W 12 x 26 (54.2)
22'	W 10 x 22 (34.9)	W 10 x 22 (38.7)	W 10 x 22 (42.5)	W 10 x 26 (46.3)	W 10 x 26 (46.1)	W 10 x 26 (49.6)	W 12 x 26 (53.5)	W 12 x 26 (57.0)
23'	W 10 x 22 (36.6)	W 10 x 22 (40.6)	W 10 x 26 (44.5)	W 10 x 26 (48.6)	W 12 x 26 (48.8)	W 12 x 26 (52.5)	W 12 x 26 (56.1)	W 12 x 26 (59.7)
24'	W 10 x 22 (38.4)	W 10 x 26 (42.5)	W 10 x 26 (46.6)	W 10 x 26 (50.9)	W 12 x 26 (51.1)	W 12 x 26 (54.9)	W 12 x 26 (58.7)	W 12 x 26 (62.5)
25'	W 10 x 26 (40.1)	W 10 x 26 (44.5)	W 12 x 26 (48.8)	W 12 x 26 (52.5)	W 12 x 26 (53.4)	W 12 x 26 (57.4)	W 14 x 30 (62.4)	W 14 x 30 (66.3)
26'	W 10 x 26 (41.9)	W 10 x 26 (46.5)	W 12 x 26 (50.9)	W 12 x 26 (54.8)	W 12 x 26 (55.7)	W 12 x 26 (59.9)	W 14 x 30 (65.1)	W 14 x 30 (69.2)
27'	W 10 x 26 (43.8)	W 12 x 26 (48.4)	W 12 x 26 (53.1)	W 12 x 26 (58.4)	W 12 x 26 (58.0)	W 14 x 30 (63.5)	W 14 x 30 (67.8)	W 14 x 30 (72.1)
28'	W 10 x 26 (45.6)	W 12 x 26 (50.4)	W 12 x 26 (55.2)	W 12 x 26 (60.8)	W 12 x 26 (60.4)	W 14 x 30 (66.1)	W 14 x 30 (70.6)	W 14 x 34 (75.0)
29'	W 12 x 26 (47.4)	W 12 x 26 (52.4)	W 12 x 26 (58.1)	W 14 x 30 (64.6)	W 14 x 30 (64.1)	W 14 x 30 (68.7)	W 14 x 34 (73.4)	W 14 x 34 (77.9)
30'	W 12 x 26 (49.3)	W 12 x 26 (54.5)	W 12 x 26 (60.4)	W 14 x 30 (67.1)	W 14 x 30 (66.6)	W 14 x 30 (71.4)	W 14 x 34 (76.2)	W 14 x 34 (80.9)

ZONE 2 WITH ICE 90 M.P.H. WIND

TRUSS DETAILS

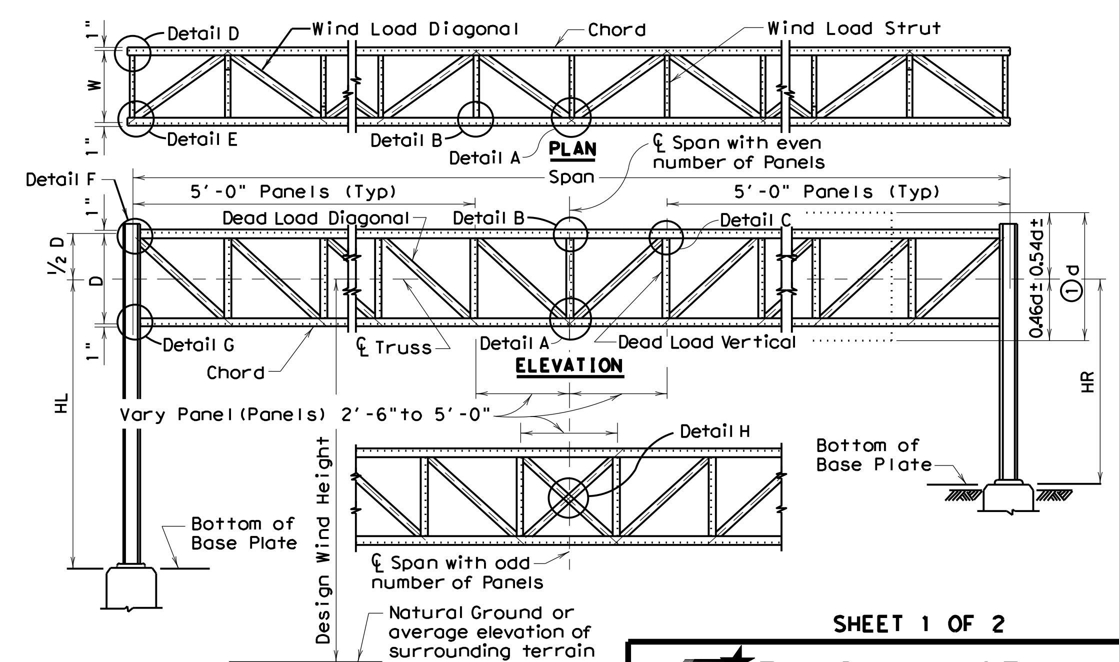
3/4" Dia. H.S. Bolts Spans 76' Thru 155'

SPAN	80'	85'	90'	95'
W x D = WIDTH x DEPTH	4.5 x 4.5	4.5 x 4.5	4.5 x 4.5	4.5 x 4.5
CHORD -②, Unless Otherwise Shown	L 3 1/2 x 3 1/2 x 5/16 [7]	L 3 1/2 x 3 1/2 x 3/8 [8]	L 3 1/2 x 3 1/2 x 7/16 [9]	L 4 x 4 x 3/8 [10]
DEAD LOAD DIAGONAL -③	L 3 x 2 x 3/16 [2]	L 3 x 2 x 3/16 [2]	L 3 x 2 x 3/16 [2]	L 3 x 2 1/2 x 3/16 [2]
WIND LOAD DIAGONAL -③	L 3 x 3 x 1/4 [2]	L 3 x 3 x 1/4 [2]	L 3 x 3 x 1/4 [3]	L 3 x 3 x 1/4 [3]
DEAD LOAD VERTICAL -③	L 3 x 2 x 3/16 [2]	L 3 x 2 x 3/16 [2]	L 3 x 2 x 3/16 [2]	L 3 x 2 x 3/16 [2]
WIND LOAD STRUT - ③	L 2 1/2 x 2 1/2 x 3/16 [1]	L 2 1/2 x 2 1/2 x 3/16 [1]	L 2 1/2 x 2 1/2 x 3/16 [1]	L 2 1/2 x 2 1/2 x 3/16 [1]
TOTAL DEFL. & TRUSS D.L.	DEFL=0.94" L=64 lb/ft	DEFL=1.05" L=70 lb/ft	DEFL=1.18" L=76 lb/ft	DEFL=1.46" L=77 lb/ft

TOWER DETAILS

Tower Height = (HL + HR)/2

S = COLUMN SPACING	7.0'	7.0'	7.0'	7.0'
TOWER HEIGHT	COLUMN SIZE & UPLIFT (kips)			
15'	W 10 x 26 (37.1)	W 10 x 26 (39.3)	W 10 x 26 (41.5)	W 10 x 26 (43.7)
16'	W 10 x 26 (39.7)	W 10 x 26 (42.0)	W 10 x 26 (44.4)	W 10 x 26 (46.8)
17'	W 10 x 26 (42.3)	W 10 x 26 (44.8)	W 12 x 26 (47.6)	W 12 x 26 (50.1)
18'	W 10 x 26 (45.0)	W 10 x 26 (47.6)	W 12 x 26 (50.5)	W 12 x 26 (53.3)
19'	W 12 x 26 (47.9)	W 12 x 26 (50.7)	W 12 x 26 (53.5)	W 12 x 26 (56.4)
20'	W 12 x 26 (50.6)	W 12 x 26 (53.6)	W 12 x 26 (56.5)	W 12 x 26 (59.6)
21'	W 12 x 26 (53.3)	W 12 x 26 (56.4)	W 12 x 26 (59.5)	W 14 x 30 (63.4)
22'	W 12 x 26 (56.0)	W 12 x 26 (59.3)	W 14 x 30 (62.5)	W 14 x 30 (66.7)
23'	W 12 x 26 (58.8)	W 14 x 30 (63.0)	W 14 x 30 (66.4)	W 14 x 30 (69.9)
24'	W 14 x 30 (61.5)	W 14 x 30 (65.9)	W 14 x 30 (69.5)	W 14 x 30 (73.2)
25'	W 14 x 30 (65.2)	W 14 x 30 (68.9)	W 14 x 34 (72.6)	W 14 x 34 (76.5)
26'	W 14 x 30 (68.0)	W 14 x 30 (71.9)	W 14 x 34 (75.7)	W 14 x 34 (79.8)
27'	W 14 x 34 (70.9)	W 14 x 34 (74.9)	W 14 x 34 (78.9)	W 16 x 36 (84.2)
28'	W 14 x 34 (73.7)	W 14 x 34 (77.9)	W 14 x 34 (82.1)	W 16 x 36 (87.6)
29'	W 14 x 34 (76.6)	W 16 x 36 (82.2)	W 16 x 36 (86.6)	W 16 x 36 (91.0)
30'	W 14 x 34 (79.5)	W 16 x 36 (85.3)	W 16 x 36 (89.8)	W 16 x 40 (94.5)



① d = Sign Depth
Where signs of different depths are used, the bottom edges of all signs may be placed in line. Where this is done, all signs should be so positioned that the bottom edges are approximately 0.46 of the depth of the deepest sign below the ℄ of the truss.

② "Low-Alloy Steel" for non-bridge structures per Item 442, "Metal For Structures".

③ "Carbon Steel" for non-bridge structures per Item 442, "Metal For Structures".

SHEET 1 OF 2

Texas Department of Transportation
Traffic Operations Division

OVERHEAD SIGN BRIDGE DETAILS

OSB-Z2I

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
CONT	SECT	JOB	HIGHWAY
6375	52	001	IH45
DIST	COUNTY		SHEET NO.
12	HARRIS/GAL		163

REVISIONS
8/08 add missing HS bolt dia (select spans)

35A

ZONE 2 WITH ICE 90 M.P.H. WIND

TRUSS DETAILS

3/4" Dia. H.S. Bolts — Spans 76' Thru 155'

SPAN	100'	105'	110'	115'	120'	125'	130'	135'
W x D = WIDTH x DEPTH	4.5 x 4.5	4.5 x 4.5	4.5 x 4.5	4.5 x 4.5	5.0 x 5.0	5.0 x 5.0	5.0 x 5.0	5.0 x 5.0
CHORD -②, Unless Otherwise Shown	L 4 x 4 x 7/16 [11]	L 4 x 4 x 7/16 [12]	L 5 x 5 x 3/8 [13]	L 5 x 5 x 7/16 [14]	L 5 x 5 x 7/16 [14]	L 5 x 5 x 7/16 [15]	L 5 x 5 x 1/2 [17]	L 5 x 5 x 1/2 [18]
DEAD LOAD DIAGONAL -③	L 3 x 2 1/2 x 3/16 [3]	L 3 x 3 x 3/16 [3]	L 3 x 2 x 1/4 [3]	L 3 x 2 1/2 x 1/4 [3]	L 3 x 3 x 1/4 [3]	L 3 x 3 x 1/4 [3]	L 3 x 3 x 1/4 [3]	L 3 x 3 x 1/4 [3]
WIND LOAD DIAGONAL -③	L 3 x 3 x 1/4 [3]	L 3 1/2 x 3 1/2 x 1/4 [3]	L 3 1/2 x 3 1/2 x 1/4 [3]	L 3 1/2 x 3 1/2 x 1/4 [3]	L 3 1/2 x 3 1/2 x 1/4 [3]	L 3 1/2 x 3 1/2 x 1/4 [3]	L 3 1/2 x 3 1/2 x 1/4 [3]	L 3 1/2 x 3 1/2 x 1/4 [4]
DEAD LOAD VERTICAL -③	L 3 x 2 x 3/16 [2]	L 3 x 2 x 3/16 [2]	L 3 x 2 x 3/16 [2]	L 3 x 2 1/2 x 3/16 [2]	L 3 x 2 1/2 x 3/16 [2]	L 3 x 2 1/2 x 3/16 [2]	L 3 x 3 x 3/16 [2]	L 3 x 3 x 3/16 [3]
WIND LOAD STRUT - ③	L 2 1/2 x 2 1/2 x 3/16 [1]	L 2 1/2 x 2 1/2 x 3/16 [1]	L 2 1/2 x 2 1/2 x 3/16 [1]	L 2 1/2 x 2 1/2 x 3/16 [1]	L 2 1/2 x 2 1/2 x 3/16 [1]	L 2 1/2 x 2 1/2 x 3/16 [1]	L 2 1/2 x 2 1/2 x 3/16 [1]	L 2 1/2 x 2 1/2 x 3/16 [1]
TOTAL DEFL. & TRUSS D.L.	DEFL=1.61" L=83 lb/ft	DEFL=1.96" L=87 lb/ft	DEFL=2.15" L=92 lb/ft	DEFL=2.41" L=102 lb/ft	DEFL=2.37" L=107 lb/ft	DEFL=2.77" L=107 lb/ft	DEFL=3.01" L=116 lb/ft	DEFL=3.45" L=116 lb/ft

TOWER DETAILS

COLUMN SIZE & UPLIFT (kips); Tower Height = (HL + HR) / 2

S = COLUMN SPACING	7.5'	7.5'	7.5'	7.5'	7.5'	7.5'	7.5'	7.5'
TOWER HEIGHT								
15'	W 12 x 26 (42.8)	W 12 x 26 (45.1)	W 12 x 26 (46.9)	W 12 x 26 (48.9)	W 12 x 26 (50.9)	W 12 x 26 (53.3)	W 14 x 30 (55.2)	W 14 x 30 (57.3)
16'	W 12 x 26 (45.9)	W 12 x 26 (48.4)	W 12 x 26 (50.3)	W 12 x 26 (52.4)	W 12 x 26 (54.5)	W 12 x 26 (57.1)	W 14 x 30 (59.1)	W 14 x 30 (61.5)
17'	W 12 x 26 (48.9)	W 12 x 26 (51.6)	W 12 x 26 (53.6)	W 12 x 26 (55.9)	W 14 x 30 (58.6)	W 14 x 30 (61.1)	W 14 x 30 (63.1)	W 14 x 30 (65.6)
18'	W 12 x 26 (52.0)	W 12 x 26 (54.8)	W 12 x 26 (57.0)	W 14 x 30 (59.4)	W 14 x 30 (62.4)	W 14 x 30 (65.0)	W 14 x 30 (67.1)	W 14 x 34 (69.7)
19'	W 12 x 26 (55.1)	W 14 x 30 (58.6)	W 14 x 30 (60.9)	W 14 x 30 (63.5)	W 14 x 30 (66.1)	W 14 x 34 (68.8)	W 14 x 34 (71.1)	W 14 x 34 (73.9)
20'	W 12 x 26 (58.2)	W 14 x 30 (61.9)	W 14 x 30 (64.3)	W 14 x 30 (67.1)	W 14 x 30 (69.8)	W 14 x 34 (72.7)	W 14 x 34 (75.2)	W 14 x 34 (78.1)
21'	W 14 x 30 (61.9)	W 14 x 30 (65.2)	W 14 x 30 (67.8)	W 14 x 34 (70.7)	W 14 x 34 (73.6)	W 16 x 36 (76.6)	W 16 x 36 (79.9)	W 16 x 36 (82.9)
22'	W 14 x 30 (65.1)	W 14 x 30 (68.6)	W 14 x 34 (71.3)	W 14 x 34 (74.3)	W 14 x 34 (77.3)	W 16 x 36 (81.3)	W 16 x 36 (84.0)	W 16 x 36 (87.2)
23'	W 14 x 34 (68.3)	W 14 x 34 (71.9)	W 14 x 34 (74.7)	W 16 x 36 (78.7)	W 16 x 36 (81.9)	W 16 x 36 (85.3)	W 16 x 36 (88.1)	W 16 x 40 (91.5)
24'	W 14 x 34 (71.5)	W 14 x 34 (75.3)	W 14 x 34 (78.2)	W 16 x 36 (82.5)	W 16 x 36 (85.8)	W 16 x 40 (89.3)	W 16 x 40 (92.3)	W 16 x 40 (95.8)
25'	W 14 x 34 (74.7)	W 16 x 36 (79.6)	W 16 x 36 (82.7)	W 16 x 36 (86.2)	W 16 x 40 (89.6)	W 16 x 40 (93.3)	W 16 x 40 (96.4)	W 18 x 46 (101.0)
26'	W 14 x 34 (78.0)	W 16 x 36 (83.0)	W 16 x 36 (86.3)	W 16 x 36 (89.9)	W 16 x 40 (93.5)	W 16 x 40 (97.3)	W 16 x 40 (100.6)	W 18 x 46 (105.4)
27'	W 16 x 36 (82.2)	W 16 x 36 (85.5)	W 16 x 40 (89.9)	W 16 x 40 (93.7)	W 16 x 40 (97.4)	W 18 x 46 (102.4)	W 18 x 46 (105.9)	W 18 x 46 (109.8)
28'	W 16 x 36 (85.6)	W 16 x 40 (88.9)	W 16 x 40 (93.5)	W 16 x 40 (97.5)	W 18 x 46 (101.3)	W 18 x 46 (106.6)	W 18 x 46 (110.4)	W 18 x 46 (114.3)
29'	W 16 x 40 (88.9)	W 16 x 40 (93.5)	W 16 x 40 (97.1)	W 18 x 46 (102.5)	W 18 x 46 (106.5)	W 18 x 46 (110.7)	W 18 x 46 (114.4)	W 18 x 46 (118.7)
30'	W 16 x 40 (92.3)	W 16 x 40 (97.0)	W 18 x 46 (100.8)	W 18 x 46 (106.4)	W 18 x 46 (110.5)	W 18 x 46 (114.9)	W 18 x 46 (118.8)	W 18 x 50 (123.2)

ZONE 2 WITH ICE 90 M.P.H. WIND

TRUSS DETAILS

3/4" Dia. H.S. Bolts — Spans 76' Thru 155'

SPAN	140'	145'	150'	155'
W x D = WIDTH x DEPTH	5.5 x 5.5	5.5 x 5.5	5.5 x 5.5	5.5 x 5.5
CHORD -②, Unless Otherwise Shown	L 5 x 5 x 1/2 [18]	L 6 x 6 x 1/2 [19]	L 6 x 6 x 1/2 [21]	L 6 x 6 x 9/16 [23]
DEAD LOAD DIAGONAL -③	L 3 x 2 1/2 x 5/16 [3]	L 3 x 2 1/2 x 5/16 [3]	L 3 x 2 1/2 x 5/16 [4]	L 3 1/2 x 3 1/2 x 1/4 [4]
WIND LOAD DIAGONAL -③	L 3 1/2 x 3 x 5/16 [4]	L 4 x 4 x 1/4 [4]	L 4 x 4 x 1/4 [4]	L 4 x 4 x 1/4 [4]
DEAD LOAD VERTICAL -③	L 3 x 3 x 3/16 [3]	L 3 x 2 1/2 x 1/4 [3]	L 3 x 2 1/2 x 1/4 [3]	L 3 x 2 1/2 x 1/4 [3]
WIND LOAD STRUT - ③	L 2 1/2 x 2 1/2 x 3/16 [1]	L 2 1/2 x 2 1/2 x 3/16 [1]	L 2 1/2 x 2 1/2 x 3/16 [1]	L 2 1/2 x 2 1/2 x 3/16 [1]
TOTAL DEFL. & TRUSS D.L.	DEFL=3.43" L=123 lb/ft	DEFL=3.93" L=140 lb/ft	DEFL=4.02" L=140 lb/ft	DEFL=4.29" L=151 lb/ft

TOWER DETAILS

COLUMN SIZE & UPLIFT (kips); Tower Height = (HL + HR) / 2

S = COLUMN SPACING	7.5'	7.5'	7.5'	7.5'
TOWER HEIGHT				
15'	W 14 x 30 (59.5)	W 14 x 34 (61.7)	W 14 x 34 (63.7)	W 14 x 34 (65.6)
16'	W 14 x 30 (63.9)	W 14 x 34 (66.2)	W 14 x 34 (68.3)	W 14 x 34 (70.4)
17'	W 14 x 34 (68.1)	W 14 x 34 (70.6)	W 14 x 34 (72.9)	W 16 x 36 (75.7)
18'	W 14 x 34 (72.4)	W 14 x 34 (75.1)	W 14 x 34 (77.5)	W 16 x 36 (80.5)
19'	W 16 x 36 (77.4)	W 16 x 36 (80.2)	W 16 x 36 (82.8)	W 16 x 36 (85.4)
20'	W 16 x 36 (81.7)	W 16 x 36 (84.7)	W 16 x 36 (87.5)	W 16 x 40 (90.2)
21'	W 16 x 36 (86.1)	W 16 x 40 (89.3)	W 16 x 40 (92.2)	W 16 x 40 (95.1)
22'	W 16 x 40 (90.6)	W 16 x 40 (93.9)	W 16 x 40 (97.0)	W 16 x 40 (100.1)
23'	W 16 x 40 (95.0)	W 16 x 40 (98.5)	W 18 x 46 (102.6)	W 18 x 46 (105.8)
24'	W 16 x 40 (99.5)	W 18 x 46 (103.1)	W 18 x 46 (107.4)	W 18 x 46 (110.8)
25'	W 18 x 46 (104.9)	W 18 x 46 (108.7)	W 18 x 46 (112.3)	W 18 x 46 (115.9)
26'	W 18 x 46 (109.4)	W 18 x 46 (113.4)	W 18 x 46 (117.2)	W 18 x 50 (120.9)
27'	W 18 x 46 (114.0)	W 18 x 46 (118.2)	W 18 x 50 (122.1)	W 18 x 50 (126.0)
28'	W 18 x 46 (118.6)	W 18 x 50 (122.9)	W 18 x 50 (127.0)	W 18 x 50 (131.0)
29'	W 18 x 50 (123.2)	W 18 x 50 (127.7)	W 18 x 55 (131.9)	W 18 x 55 (136.2)
30'	W 18 x 50 (127.8)	W 18 x 50 (132.5)	W 18 x 55 (136.9)	W 18 x 55 (141.3)

KEY TO TRUSS AND TOWER DETAILS

Truss members are all angles.
Truss columns are all wide flange shapes.

W 10 x 26 (44.2) — 44.2 kips Uplift at base plate
- 26 — Pounds per foot.
- 10" — Nominal size
- W — Wide Flange

DEFL = 0.12" = inches Deflection due to dead load of truss, walkway, signs and lights.
DL = 42 lb/ft = pounds per foot dead load of truss members only; does not include walkway, signs, and lights.

NOTE: Details on these sheets are for Design Wind Heights up to 30 feet.

GENERAL NOTES

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

For overhead sign bridges with different tower heights, average the height of the two towers and use the tabulated height nearest the calculated average. For average heights falling midway between the two tabulated heights use the larger height.

For truss lengths falling between those shown in the tables use the sizes called for in the next longer span.

Overhead sign bridges are designed for the equivalent area of a 10 foot deep sign panel over 75 percent of the span length, located as necessary to produce maximum stress. Design includes 3 pounds per square foot for sign panel, 20 pounds per linear foot for lights, and 50 pounds per linear foot for walkway, all placed as specified for the design sign panel.

Refer to "Overhead Sign Bridge Truss Details" for details called out in plan and elevation views.

The number of High Strength Bolts required in truss connection or splice are indicated in brackets, e.g. [3], after the member size.

SHEET 2 OF 2

Texas Department of Transportation
Traffic Operations Division

OVERHEAD SIGN BRIDGE DETAILS

OSB-Z2I

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

REVISIONS
8/08 # of HS bolts; add missing HS bolt dia (select spans); applicability note; noted design specifications

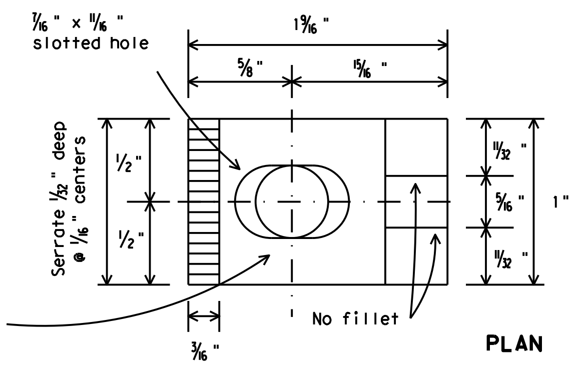
CONT	SECT	JOB	HIGHWAY
6375	52	001	IH45

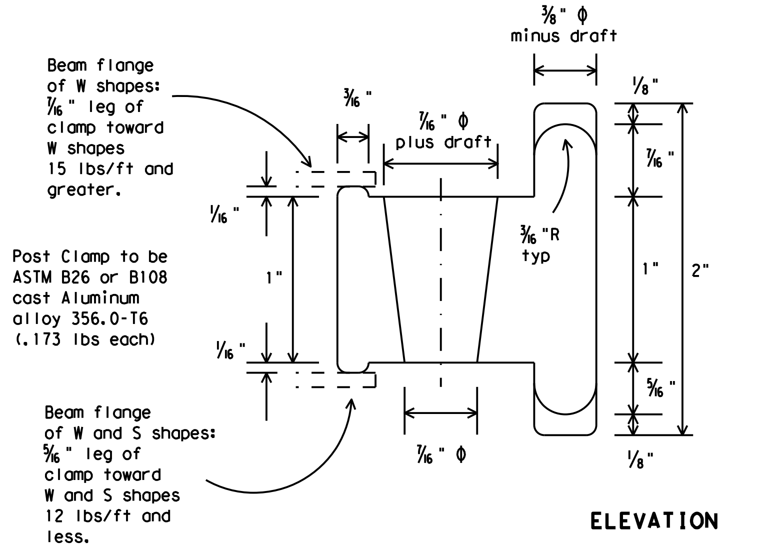
DIST	COUNTY	SHEET NO.
12	HARRIS/GAL	164

35B

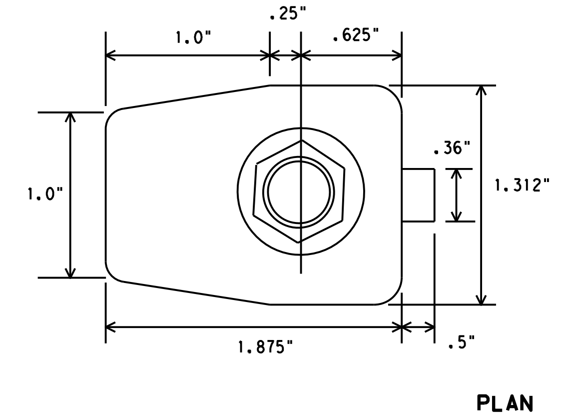
FILE: h:\00*maintenance\south harris maintenance\2020 contracts\6357-02-001*ih45 gen...
DATE: 1/4/2021
PROJECT: 6375-52-001

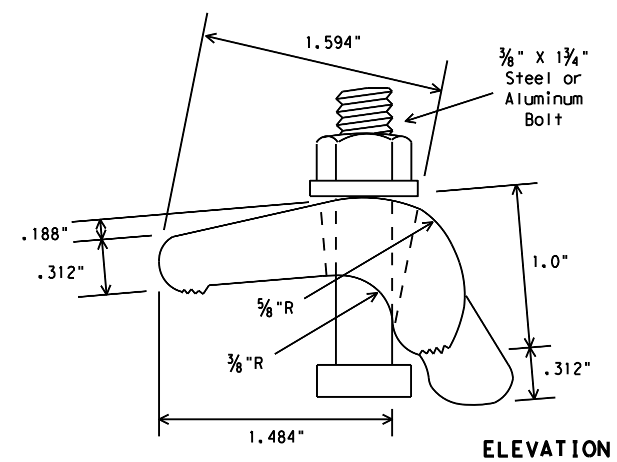
NOTE: centerline of hole for 3/8" diameter squarehead bolt x 2 1/4" long with a flat washer and self-locking nut, or lock washer and hex. nut. Bolt head dimensions shall be in accordance with ANSI B 18.2.1 as referred to in the AISC Manual of steel construction. Bolt assembly shall be galvanized.



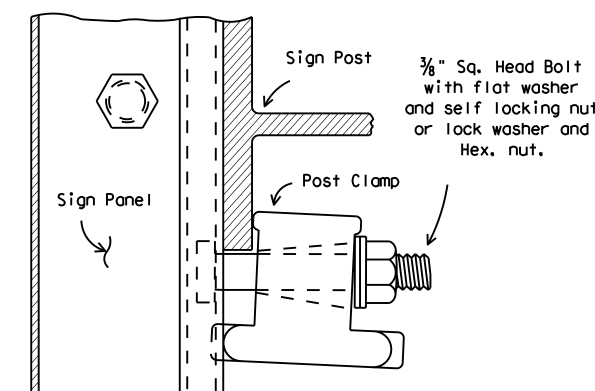


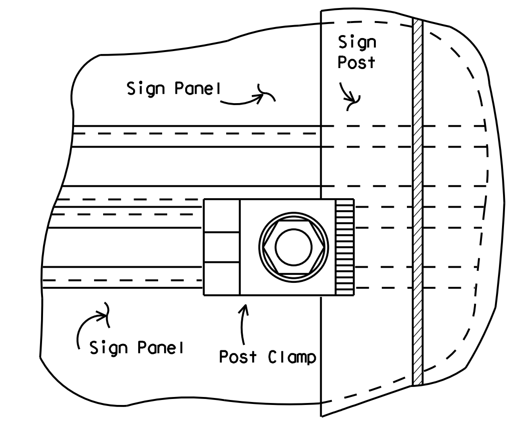
POST CLAMP DETAIL

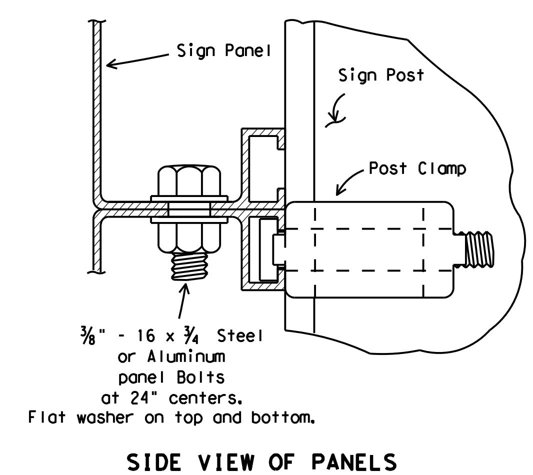




ALTERNATE POST CLAMP DETAIL







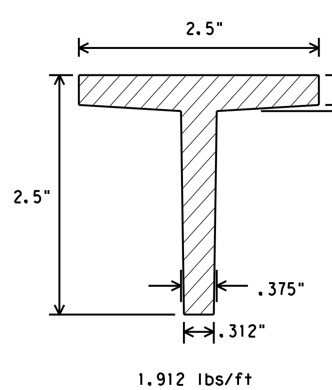
CONNECTION DETAILS

DEPARTMENTAL MATERIAL SPECIFICATIONS

SIGN HARDWARE	DMS-7120

GENERAL NOTES:

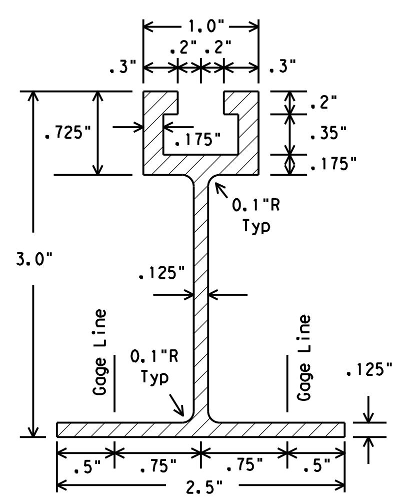
1. Design conforms with AASHTO Specifications for the design and construction of structural supports for highway signs.
2. Materials and fabrication shall conform to the requirements of the Department material specifications.
3. Structural steel shall be "low-alloy steel" for non-bridge structures per Item 442, "Metal For Structures."
4. For fiberglass substrate connection details, see manufacturer's recommendations.

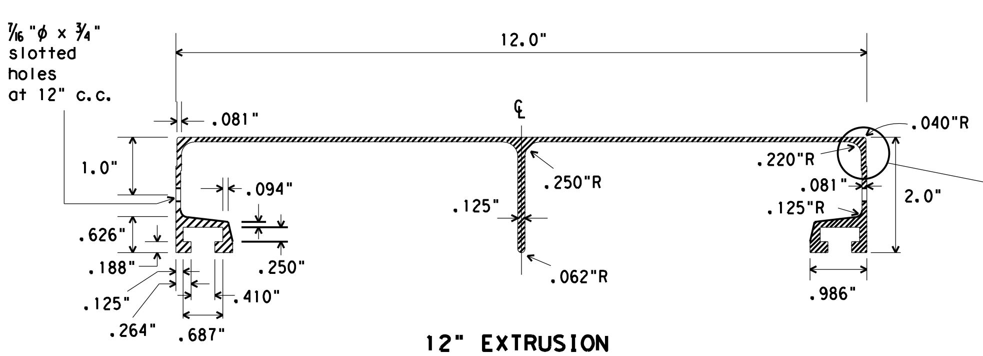


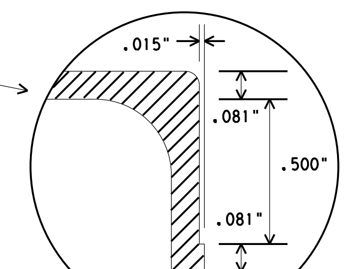
ALUMINUM T SECTION OR APPROVED ALTERNATIVE

WINDBEAM CROSS SECTION

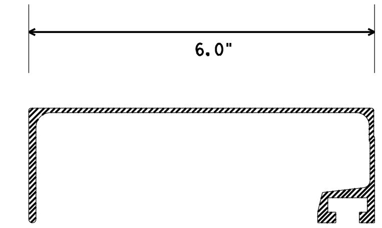
Windbeam to be extruded aluminum (1.175 lbs/ft) or approved alternative

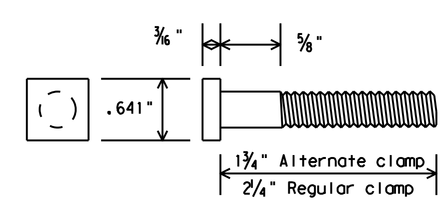






ALUMINUM SIGN PANEL EXTRUSION DETAILS





POST CLAMP BOLT DETAIL

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS- EXTRUDED ALUMINUM SIGN PANELS & HARDWARE

SMD(2-1)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT 6375	SECT 52	JOB 001	HIGHWAY IH45
	DIST 12	COUNTY HARRIS/GAL		SHEET NO. 165

27A

FILE: h:\00¤maintenance\south harris maintenance\2020 contracts\6357-02-001¤ih45
DATE: 1/4/2021
PROJECT: 6375-52-001

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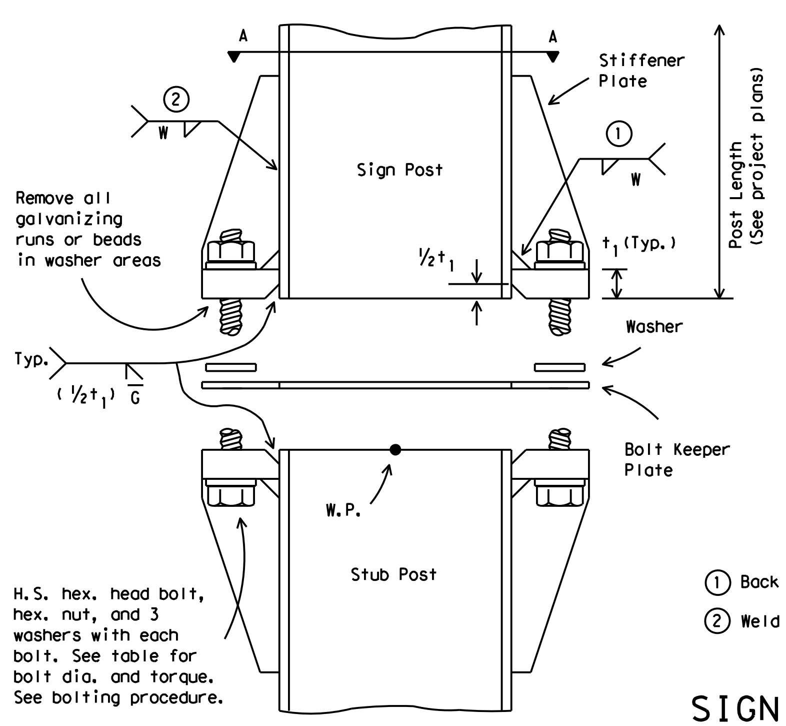
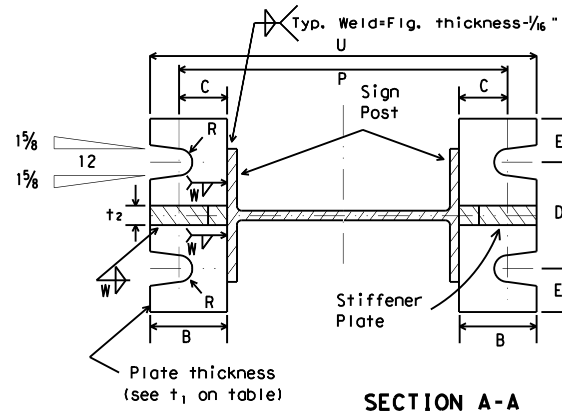
DATE: 1/4/2021
PROJECT: 6375-52-001



ELEVATION



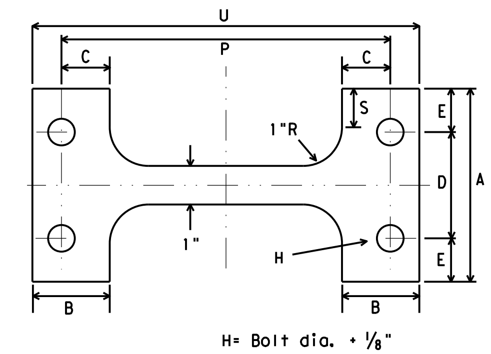
SECTION A-A

① Back up weld to be made before installing stiffener plate

② Weld W may be continued across clips to seal joint

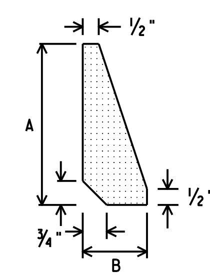
SIGN POST AND STUB POST

(For W Shapes)



BOLT KEEPER PLATE

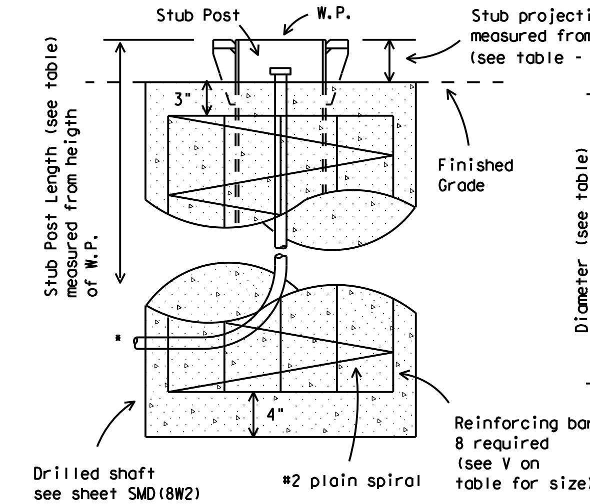
30 Ga galv. sheet steel



STIFFENER PLATE DETAIL

Steel Plate (thickness = t_2)

(See table for dimensions)



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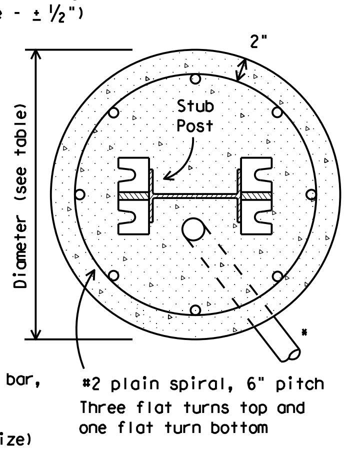
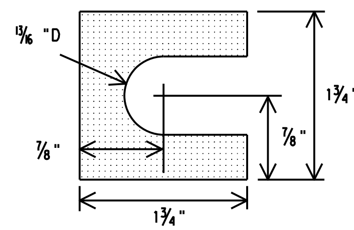


PLAN

FOUNDATION DETAIL

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



SHIM DETAIL

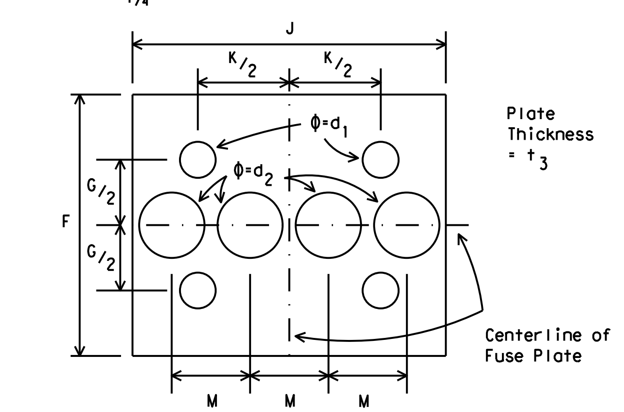
Furnish two .012"+ thick and two .032"+ thick shims per post. Shims shall be fabricated from brass shim stock or strip conforming to ASTM B36.

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 over-tighten.
5. To prevent nut loosening, burr threads of bolt at junction with nut using a center punch.

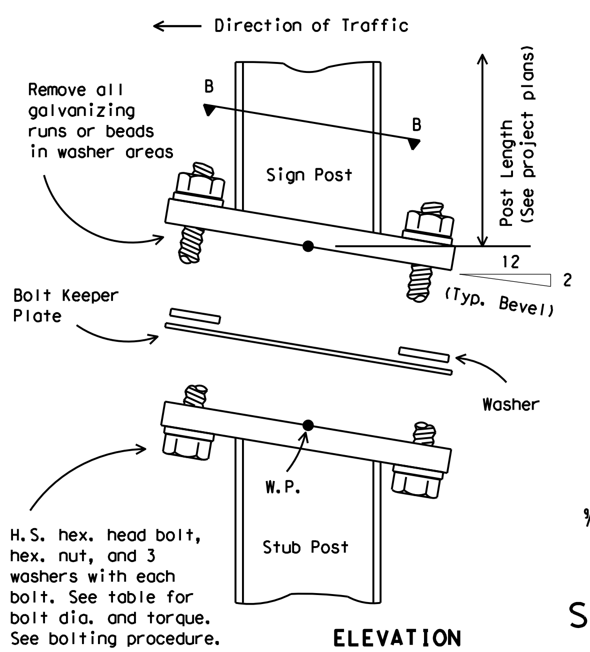
Dimensions / Post Size	Base Connection Data Table: Bolt Size & Torque	A	B	C	D	E	t_1	t_2	W	R	Perforated Fuse Plate Data Table: F	G	J	K	M	d_1	d_2	t_3	Bolt Dia.	Wt. (ea.) (lbs.)	Bolt length	Bolt Keeper Data: P	S	U	Foundation Data: Stub length	Stub projection	Dr. Shaft diameter	Bar V Size
W6x9	5/8"φ x 2 3/4" 440-450 inch pounds 36-38 foot pounds	5"	2"	1 1/4"	2 3/4"	1 1/8"	3/4"	1/2"	1/4"	11/32"	4 1/4"	2"	4"	2 1/4"	1"	9/16"	3/4"	1/4"	1/2"	1.01	1 1/2"	8 3/8"	1"	9 7/8"	2'-0"	3"	24"	#5
W6x12																						8 1/2"		10"	2'-0"	3"		#5
W6x15											5"	2 1/2"	6"	3 1/2"	1 1/2"	11/16"	1 1/4"	3/8"	5/8"	2.51	2 1/4"	8 1/2"		10"	2'-6"	3"		#6
W8x18											5"	2 1/2"	5 1/4"	2 3/4"	1 1/4"	11/16"	1 1/16"	3/8"	5/8"	2.26	2 1/4"	10 5/8"		12 1/8"	2'-6"	3"		#7
W8x21	3/4"φ x 3 1/2" 740-750 inch pounds 62-63 foot pounds	6"	2 1/4"	1 3/8"	3 1/2"	1 1/4"	1"	3/4"	5/16"	13/32"	5 1/2"	2 1/2"	5 1/4"	2 3/4"	1 1/4"	13/16"	1"	1/2"	3/4"	3.35	2 1/4"	11"	1 1/2"	12 3/4"	3'-0"	2 1/2"		#8
W10x22											6"	3"	5 3/4"	2 3/4"	1 3/8"	13/16"	1 1/8"	1/2"	3/4"	4.03	2 1/4"	12 7/8"		14 5/8"	3'-0"	2 1/2"		#9
W10x26																						13 1/8"		14 7/8"	3'-0"	2 1/2"		#10
W12x26											6"	3"	6 1/2"	3 1/2"	1 5/8"	13/16"	1 5/16"	1/2"	3/4"	4.47	2 1/4"	15"		16 3/4"	3'-0"	2 1/2"		#11
S3x5.7	1/2"φ x 2 1/2" 440-450 inch pounds 36-38 foot pounds	See Detail Below									3 3/4"	1 1/2"	2 5/8"	1 1/2"	5/8"	9/16"	3/8"	1/4"	1/2"	0.60	1 1/2"	See Detail Below			3'-3 1/2"	3 1/2"	12"	Non-reinforced ③
S4x7.7																												

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

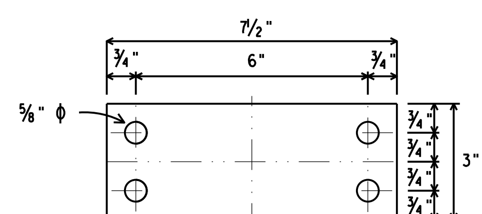


PERFORATED FUSE PLATE DETAIL

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.

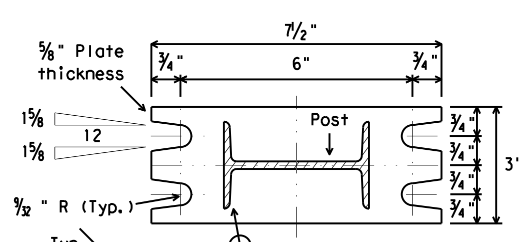


ELEVATION



BOLT KEEPER PLATE

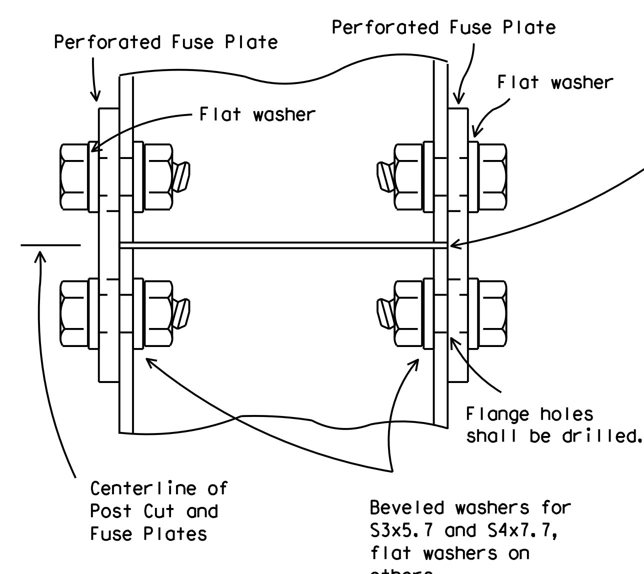
30 Ga galv. sheet steel



SECTION B-B

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 galvanized cut surface repaired per Item 445, "Galvanizing."

Texas Department of Transportation

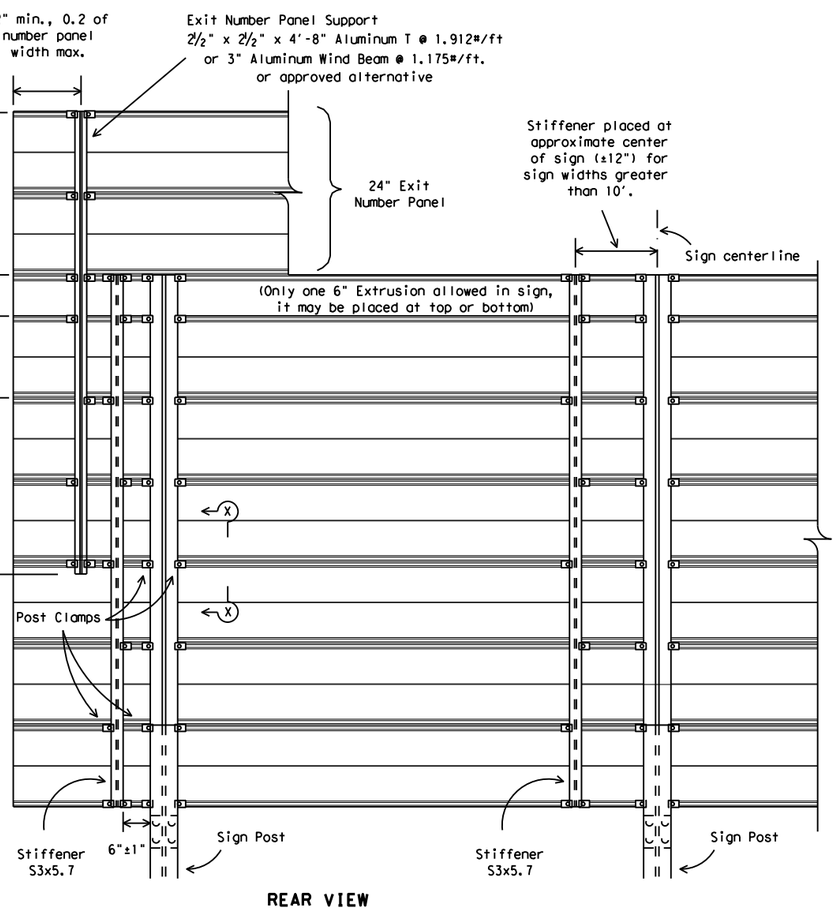
Traffic Operations Division

SIGN MOUNTING DETAILS- LARGE ROADSIDE SIGNS FOUNDATION & STUB

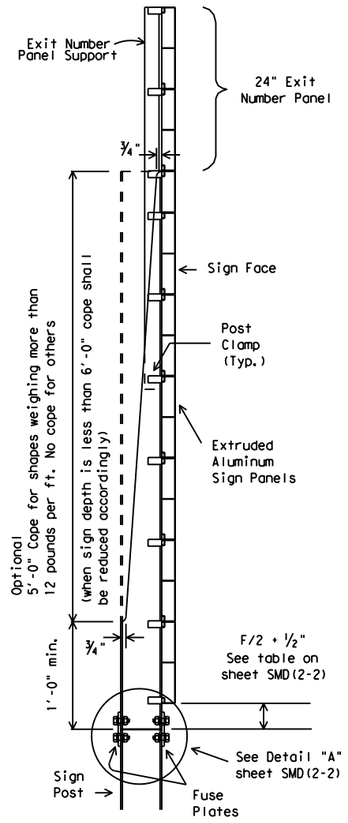
SMD(2-2)-08

© TxDOT August 1995	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
REVISIONS 4-98 9-08	CONT	SECT	JOB	HIGHWAY
	6375	52	001	IH45
	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		166

27B

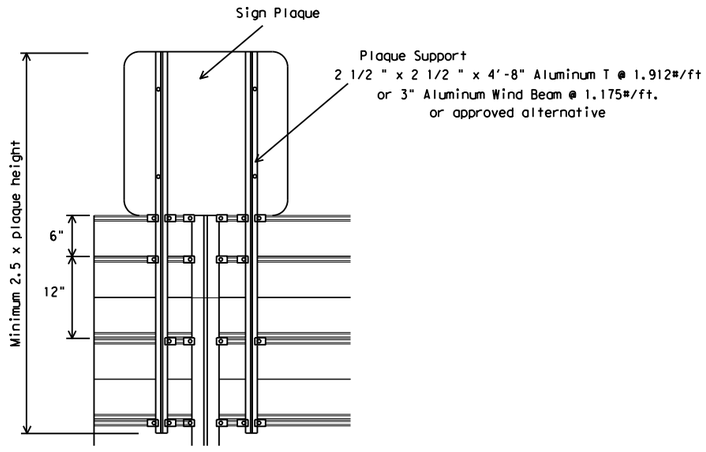


REAR VIEW



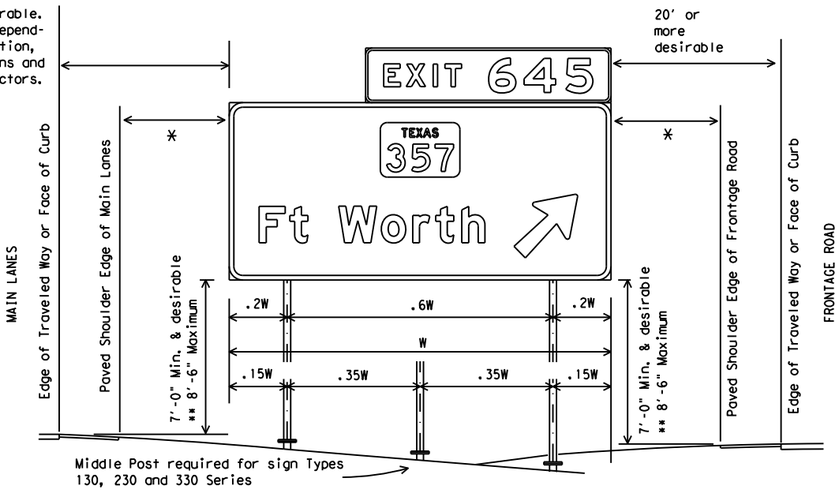
SIDE VIEW

ALUMINUM PARENT SIGN & EXIT NUMBER PANEL MOUNTING DETAILS



SIGN PLAQUE MOUNTING DETAIL TO ALUMINUM PARENT SIGN

30' or more desirable. May be reduced depending on cross section, viewing conditions and other related factors.



TYPICAL SIGN INSTALLATION AND LOCATION

LATERAL CLEARANCE NOTES:

Lateral clearances of signs mounted on median side of main lanes are the same as shown above where space will permit.

Where a sign is to be located behind guardrail, an allowable minimum clearance of five feet may be used, measured from the face of the guardrail to the near edge of sign.

* - 6' minimum and desirable may be used only in areas of limited lateral clearance and when approved by the Engineer.

POST SPACING NOTES:

Post spacing on a two post sign may vary a maximum of plus or minus 10% of total sign width to fit field conditions.

Post spacing on a three post sign may vary a maximum of plus or minus 5% of total sign width to fit field conditions.

SIGN HEIGHT NOTES:

** The 8' 6" maximum may be exceeded when placing signs on extreme slopes. In these conditions, a 7' minimum from natural ground to bottom of sign must be maintained.

DEPARTMENTAL MATERIAL SPECIFICATIONS

ALUMINUM SIGN BLANKS	DMS-7110
SIGN HARDWARE	DMS-7120

GENERAL NOTES:

1. Exit number panel shall be mounted to the right hand side of the parent sign for right exits and to the left hand side for left exits. The number panel shall be mounted with two uprights so its right edge is even with the right edge of the parent sign or vice-versa for left hand exits.
2. Exit number panel support shall be symmetrical about number panel centerline.
3. Exit number panel support shall be ASTM A36 structural steel galvanized after fabrication, or ASTM B221 aluminum alloy 6061-T6 or approved alternative.
4. All bolts, nuts and washers shall be galvanized per ASTM Designation: B695 Class 50, or A153 Class C or D.
5. Posts, parent sign panels, and exit number panels shall comply with notes on sheets SMD(2-1) and SMD(2-2).
6. Signs (such as exit number panels) attached above a parent sign shall be made of the same type material as the parent sign. General Service and Routing signs may be fabricated from flat sheet aluminum.
7. Exit number panel support and other connection hardware required to fasten exit number panel to parent sign shall be subsidiary to "Aluminum Signs" or "Fiberglass Signs."
8. For fiberglass sign installation details, see manufacturer's recommendations.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS-LARGE ROADSIDE SIGNS

SMD(2-3)-08

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

REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
6375	52	001	IH45

DIST	COUNTY	SHEET NO.
12	HARRIS/GAL	167

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DATE: 1/4/2021
PROJECT: 6375-52-001

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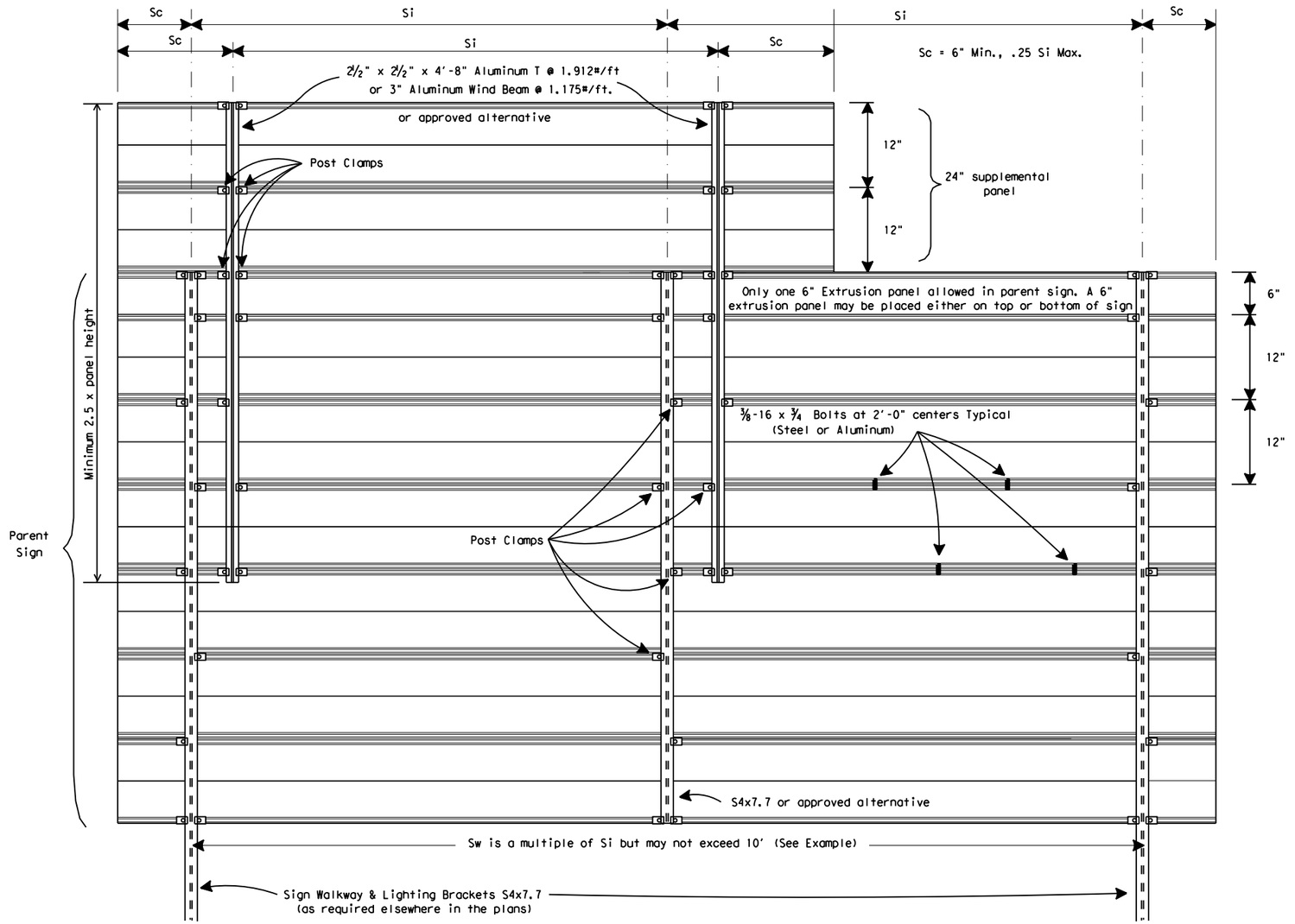
DATE: 1/4/2021
PROJECT: 6375-52-001

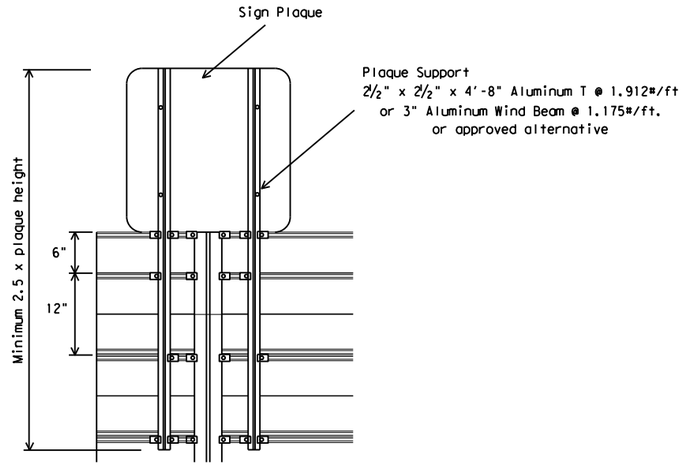


REAR VIEW

EXAMPLES (FOR DETERMINING Si and Sw)

NO.	ZONE	"d"	EXIT PANEL	WALKWAY	Si	Sw	COMMENT
1	1	15.0	YES	YES	4.5	9.0	Sw=2x(Si)
2	2	14.0	YES	NO	7.5	7.5	Sw = Si
3	1	15.0	NO	NO	8.5	8.5	Sw = Si
4	3	14.0	NO	YES	10.0	10.0	Sw = Si

Values shown for Si are maximum values. Si may be varied for different sign lengths and Truss mounting conditions. Sw should not exceed two times Si(Max.) or 10 feet.



SIGN PLAQUE MOUNTING DETAIL

MAXIMUM SIGN SUPPORT SPACING "Si" (FEET)

"d" Deepest Sign in Group (Ft.)	EXTRUDED ALUMINUM SIGN PANELS															
	WITH EXIT NUMBER PANELS								WITHOUT EXIT NUMBER PANELS							
	WITH WALKWAYS				WITHOUT WALKWAYS				WITH WALKWAYS				WITHOUT WALKWAYS			
	WIND ZONE				WIND ZONE				WIND ZONE				WIND ZONE			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
15	4.5	7	8	10	5	7	8	10	7	8	9	10	8.5	10	10	10
14	6	7.5	9.5	10	6	7.5	9.5	10	8	9	10	10	10	10	10	10
13	7.5	9	10	10	7.5	9	10	10	9	10	10	10	10	10	10	10
12	8.5	10	10	10	8.5	10	10	10	10	10	10	10	10	10	10	10
11 or less	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10

For fiberglass sign installations, see manufacturer's recommendations.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS-OVERHEAD SIGNS EXTRUDED ALUMINUM

SMD(2-4)-08

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

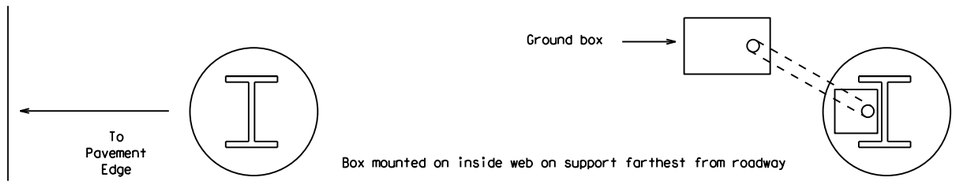
REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
6375	52	001	IH45

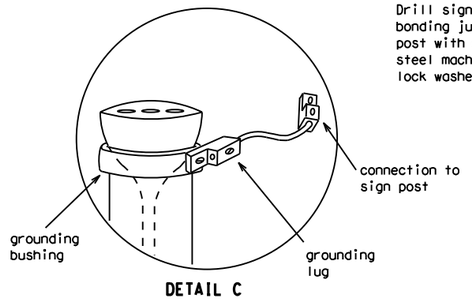
DIST	COUNTY	SHEET NO.
12	HARRIS/GAL	168

27D

FILE: h:\00*maintenance\south harris maintenance\2020 contracts\6357-02-001*in45 generic\standards\sheets\SMD(2-6)-01.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001



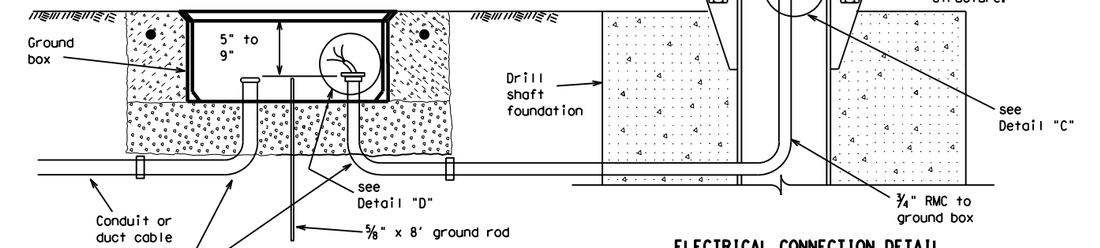
PLAN VIEW



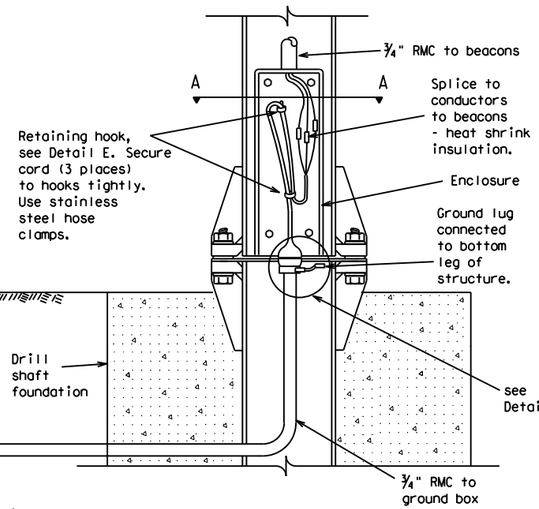
DETAIL C

Drill sign post - structure leg, terminate bonding jumper with listed connector to post with a 10-24 (3/16") min. stainless steel machine screw, nut, flat washer and lock washer made wrench tight.

2 Pull connector down tight against conduit then clamp in ground box. See Detail "D"

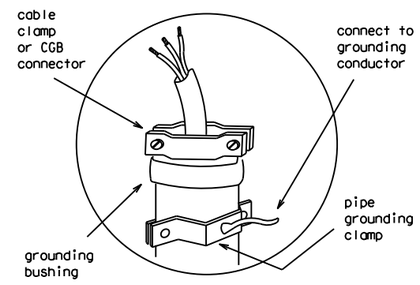


Use RMC Ells, provide grounding bushings. Terminate bonding jumper to ground rod and equipment grounding conductors.



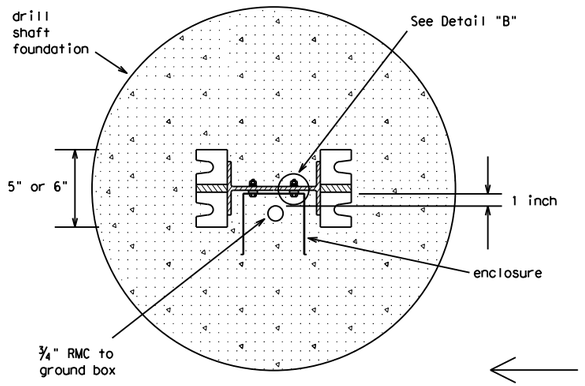
ELECTRICAL CONNECTION DETAIL

Enclosure cover not shown for clarity
Detail shows channel greater than 4 inches.
Less than 4 inches similar, see Detail A.



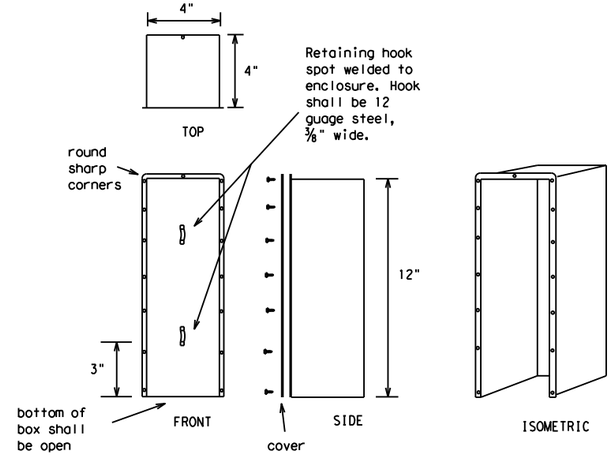
DETAIL D

Pull cable so opposite end connector is tight against conduit end, clamp cable at top of conduit as shown.



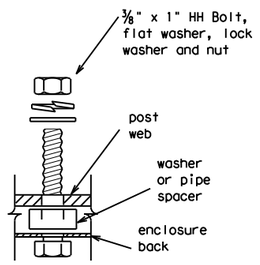
SECTION A-A

Stub-post connection
conduit, bolts and enclosure
(cover not shown)



ENCLOSURE

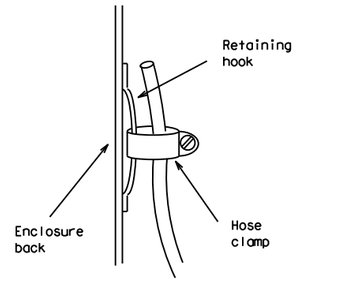
make from 12 gauge
galvanized sheet metal



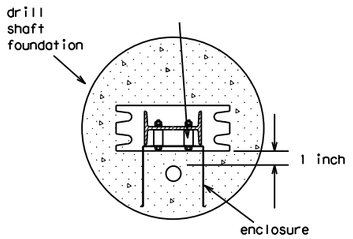
DETAIL B

enclosure connection
(4 places)

(use 2 inch bolt for
3 and 4 inch channels)



DETAIL E



DETAIL A

Stub-post connection
conduit, bolts and enclosure
for 3 and 4 inch channel
(cover not shown)

direction of
traffic

NOTES:

1. Breakaway connector shall be rated for 300 VAC, 30 amps and shall be waterproof. Connector shall be a three pole (two line conductors and neutral) polarized elastomer connector made from thermosetting synthetic polymer which remains fexible over the temperature range of -40 degrees C to 90 degrees C. The pins on the connector shall be overmolded 1 ¼" from the face of the connector toward the tips of the pins with the same material used in the construction of the connector body. This overmolding of the pins shall provide a non-conductive double taper which prevents the intrusion of water into the connection when the connectors are fully engaged. The pin receptors shall have current carrying barrels recessed 1 ½" from the face of the connector and surrounded by beryllium copper spring sleeves. The plug/receptacle combination shall be listed by an approved testing facility (UL or Factory Mutual) as suitable for outdoor use and shall have passed a rain test and a watertight (immersion) test as approved by the Engineer.
2. The female connector shall be integrally molded to a 13' length of type SO cord containing three number 10 or number 8 AWG conductors. The male connector shall be integrally molded to a 20" length of Type SO cord containing three number 10 or number 8 AWG conductors. Cord conductors shall have colored insulation, two black and one white, or shall be taped or painted to be two black and one white. Tape or paint marking shall cover entire exposed length. The contractor shall make a brochure submittal on cord connectors. Breakaway connector and cord shall not be paid for separately, but shall be subsidiary to the various items.
3. The contractor shall install in-line waterproof fuseholders for each line conductor in the ground box. Fuses shall be fast-acting 5 amp (Bussman KTK5, Gould ATM5, Littlefuse KLK5 or equal).
1 4. Conduit shall convert to ¾" liquidtight flexible metalic conduit below the fuse plate or knee joint and shall revert to ¾" RMC above the fuse plate or knee joint. The length of liquidtight flexible metal conduit shall not exceed 6".
5. Ground rod clamp shall be Blackburn GG 5/8H, Weaver W5.8 or equal.
6. Ground rod to be driven to a depth to leave between 2 to 4 inches of rod above the gravel placed under the ground box. See ED(2) standard sheet for ground box details.

11-01 Revision

1 Liquidtight conduit size corrected.
2 Editing of minor notes.

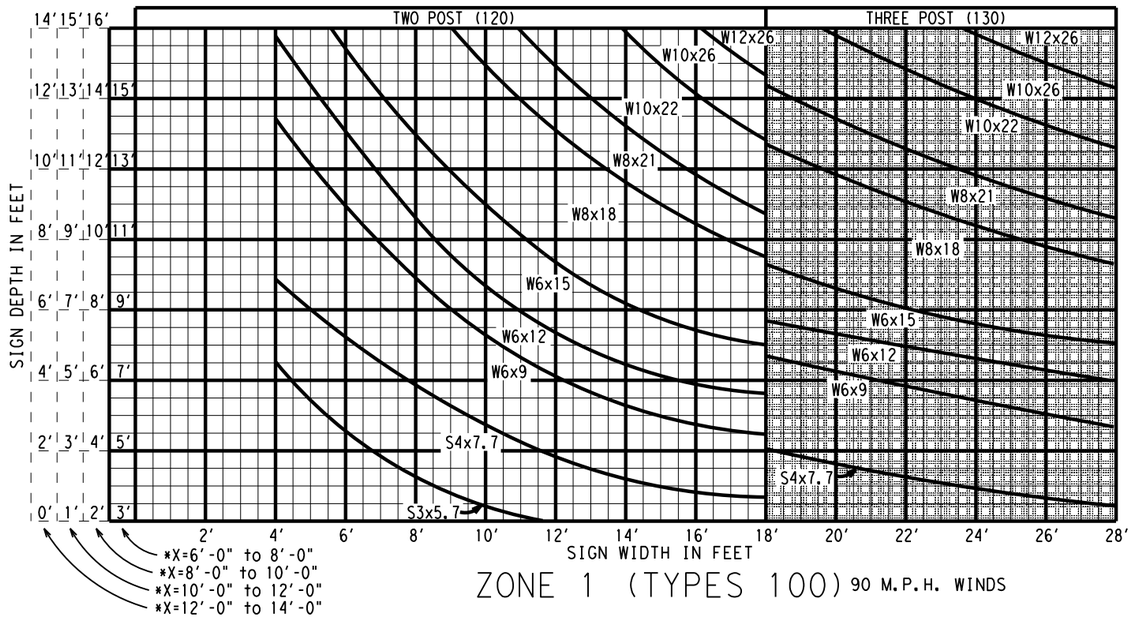
Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS- LARGE ROADSIDE SIGNS ELECTRICAL CONNECTION

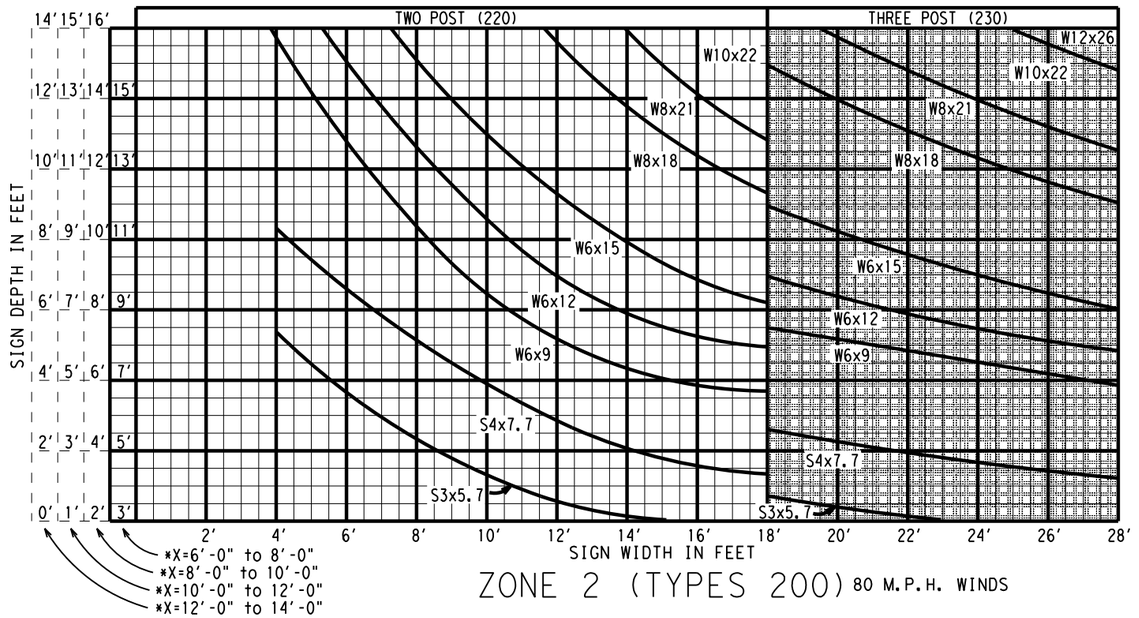
SMD(2-6)-01

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

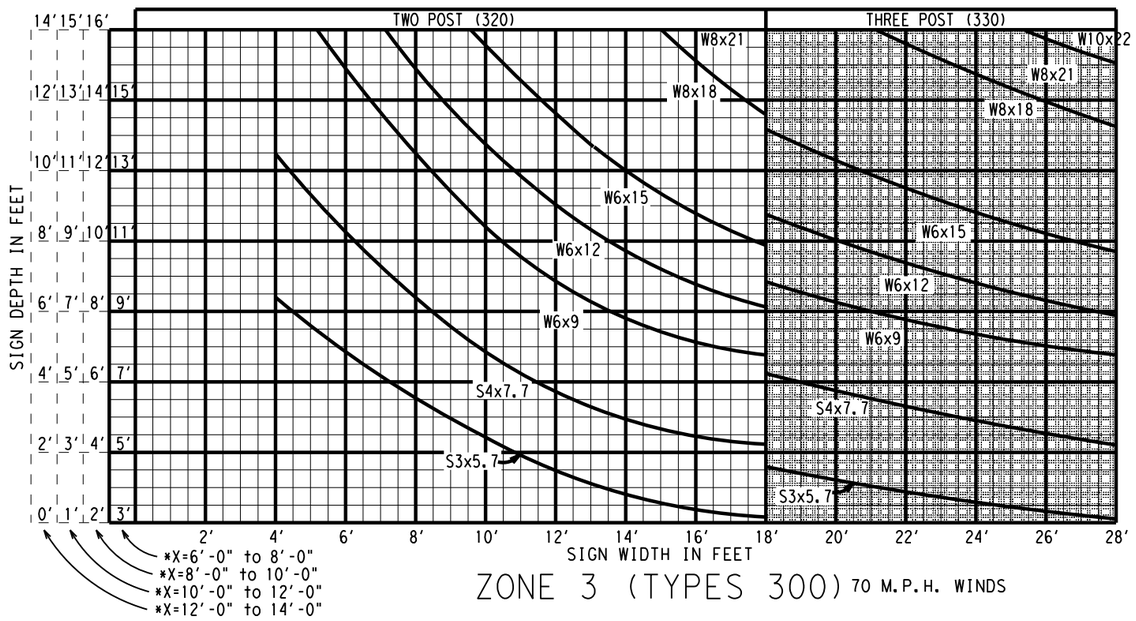
REVISIONS	CONT	SECT	JOB	HIGHWAY
11-98	6375	52	001	IH45
11-01	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		169



ZONE 1 (TYPES 100) 90 M.P.H. WINDS



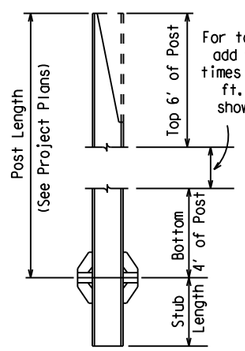
ZONE 2 (TYPES 200) 80 M.P.H. WINDS



ZONE 3 (TYPES 300) 70 M.P.H. WINDS

* NOTE: "X" EQUALS THE AVERAGE HEIGHT FROM THE GROUND LINE TO THE BOTTOM EDGE OF THE SIGN.

SHADED AREA DENOTES 3 POST SUPPORTS



POST WEIGHT DATA

POST SIZE	WEIGHT OF ONE POST (#)	WEIGHT OF TWO POSTS (#)	WEIGHT OF THREE POSTS (#)
W6x9*	123.2	246.4	369.6
W6x12*	160.3	320.6	480.9
W6x15*	167.8	335.6	503.4
W8x18*	201.8	403.6	605.4
W8x21*	254.7	509.4	764.1
W10x22*	266.0	532.0	798.0
W10x26*	308.0	616.0	924.0
W12x26*	308.6	617.2	925.8
S3x5.7*	85.9	171.8	257.7
S4x7.7*	112.2	224.4	336.6

*LAST FIGURES=POST WT. PER FT.

Weight Data is the weight of items shown for one, two or three posts - (includes top 6' of post, bottom 4' of post, post foundation stub, related base connection plates and stiffeners, friction fuse plate and all high strength bolts, nuts and washers).

SIGN TYPE

SIGN TYPE 1 3 0

- 1 — Wind Design Zone
- 3 — Series No.
- 0 — No. of Posts

Series No.: 0 Aluminum/Fiberglass; 1 Aluminum; 2 Fiberglass

Note: Footings for S3x5.7 and S4x7.7 post sizes shall be non-reinforced with Class A concrete, while footing for all other post sizes shall be reinforced with Class C concrete.

Texas Department of Transportation
Traffic Operations Division

LARGE ROADSIDE SIGN SUPPORTS
POST SELECTION
WORKSHEET
SMD(8W1)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
1-82	CONT	SECT	JOB	HIGHWAY
5-01	6375	52	001	IH45
9-08	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		170

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DATE: 1/4/2021
PROJECT: 6375-52-001

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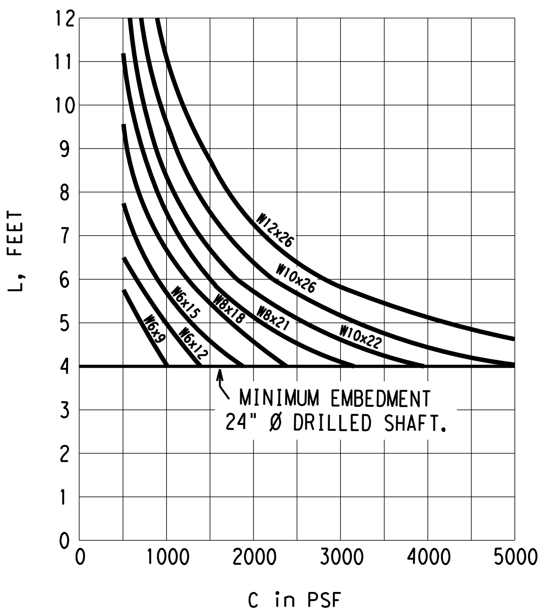
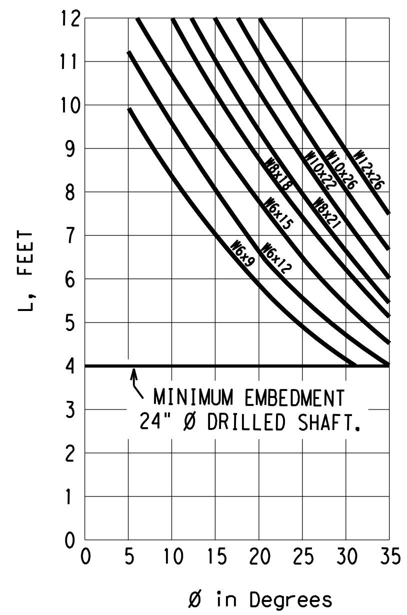
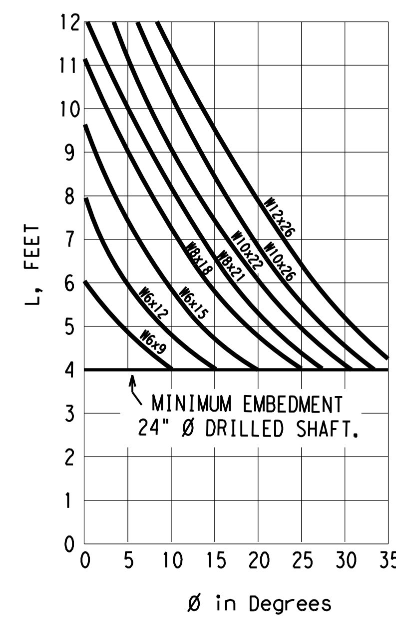
PROJECT: 6375-52-001



Ø = 0 Degrees



C = 0 PSF



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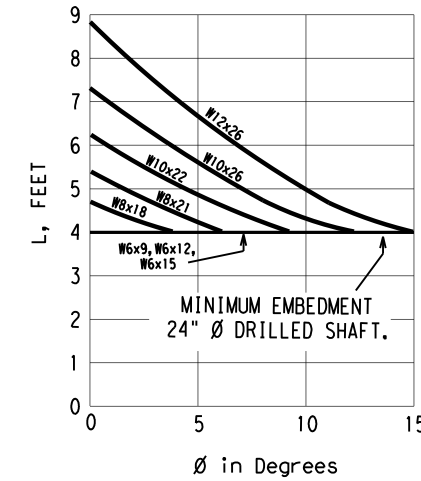

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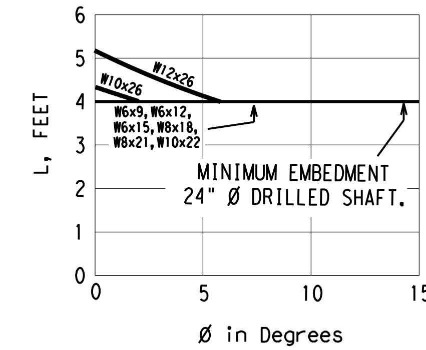


C = 4000 PSF

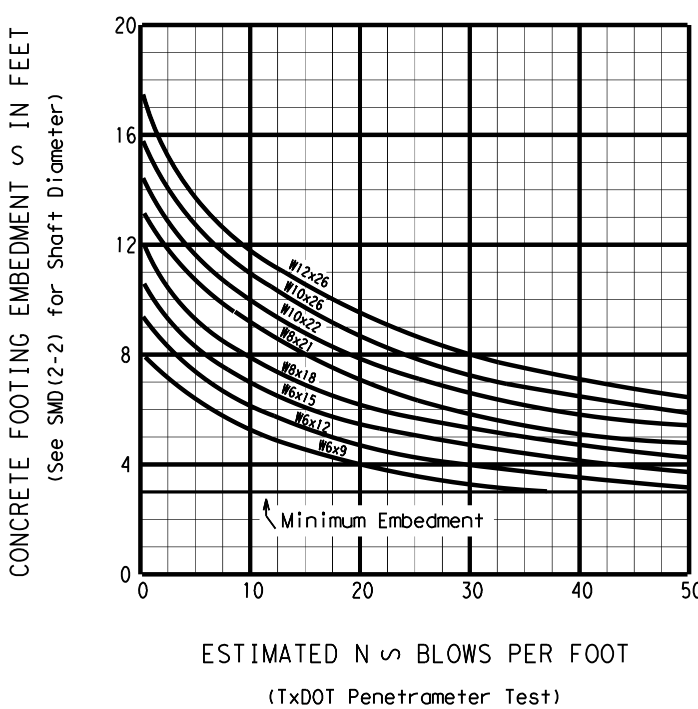
LEGEND:

L = Required embedment of concrete drilled shaft, in feet
C = Cohesive shear strength of soil, in psf
Ø = Angle of internal friction of soil, in degrees

For values of C and Ø which are intermediate to those on the charts, embedments may be determined by straight - line interpolation.

DRILLED CONCRETE FOOTING DEPTH CHART
(COHFRIC DESIGN)

NOTE: THESE CHARTS MAY BE USED AS AN ALTERNATE TO THE CHART BELOW, PROVIDED THAT SOIL COHESION AND INTERNAL FRICTION (COHFRIC) DATA ARE AVAILABLE.



DRILLED CONCRETE FOOTING DEPTH CHART
(TxDOT PENETROMETER DESIGN)

NOTE: ESTIMATED N SHOULD BE BASED AT APPROXIMATELY THE UPPER ONE-THIRD POINT OF THE DRILLED CONCRETE FOOTING BELOW THE GROUND LINE

Note:
1. Curves shown on this sheet are applicable for reinforced concrete footings only.

Texas Department of Transportation
Traffic Operations Division

LARGE ROADSIDE SIGN SUPPORTS FOUNDATION WORKSHEET

SMD(8W2)-08

©TxDOT July 1972	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
REVISIONS	CONT	SECT	JOB	HIGHWAY
5-74	6375	52	001	IH45
4-78	DIST		COUNTY	SHEET NO.
9-08	12		HARRIS/GAL	171

29B

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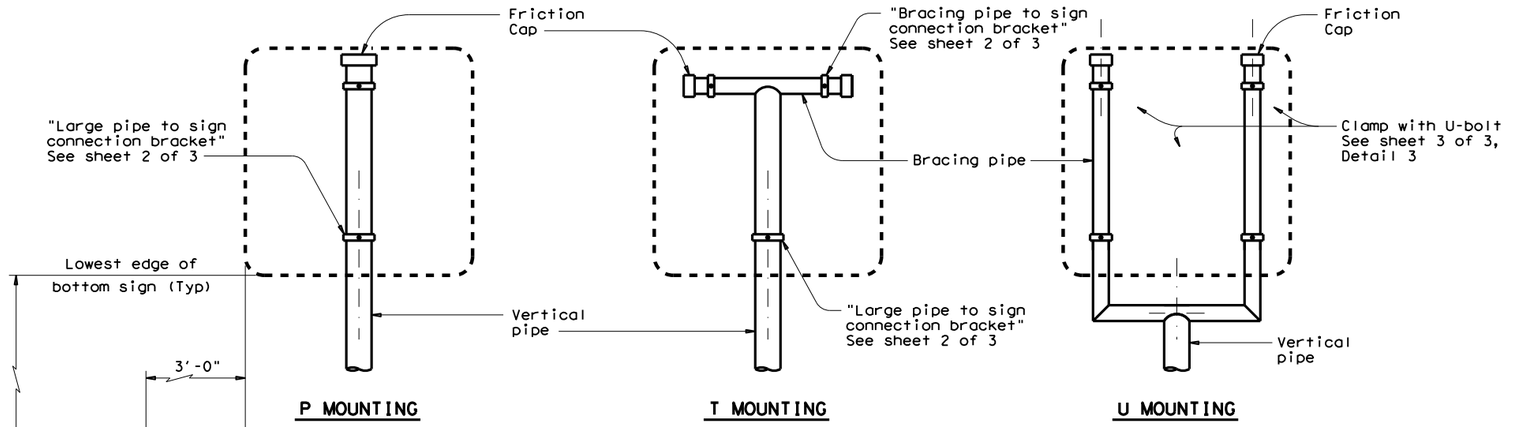
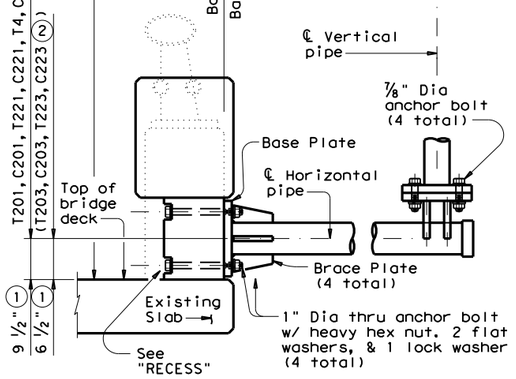
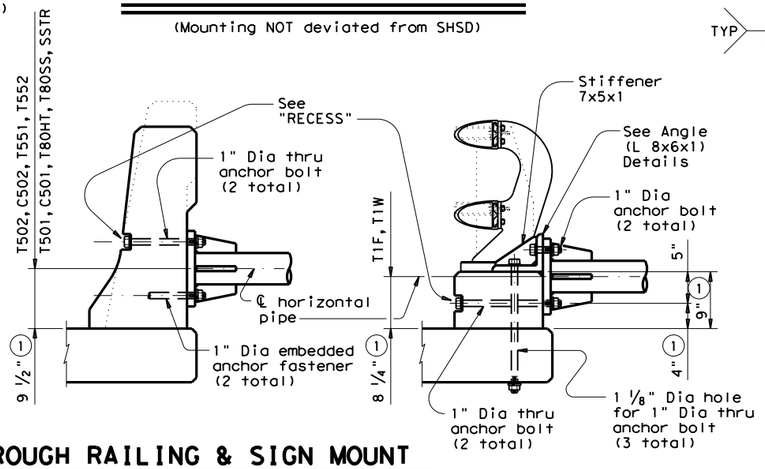
DATE: 1/4/2021
PROJECT: 6375-52-001



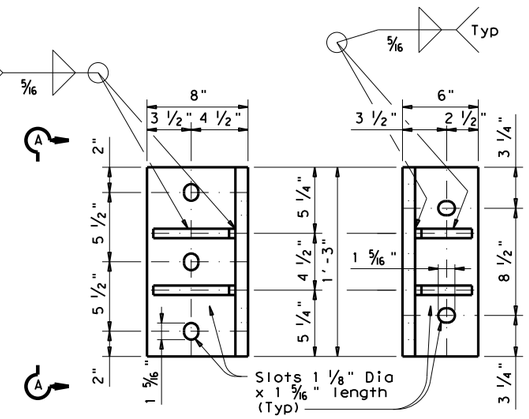
VARIOUS SIGN ATTACHMENTS

(Mounting NOT deviated from SHSD)



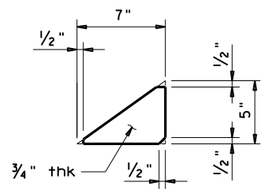


LONGITUDINAL SECTION THROUGH RAILING & SIGN MOUNT



PLAN VIEW

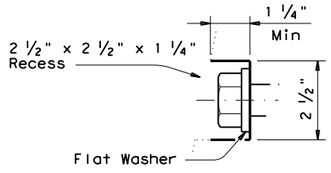
SECTION A-A



STIFFENER

ANGLE (L 8x6x1) DETAILS

① Increase 2" for structure with overlay.
② Attached at ℄ 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 ½" Standard (.203")
130 mph	6" X-Strong (.432")	5" X-Strong (.375")	3" X-Strong (.300")

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.

Texas Department of Transportation

Traffic Operations Division Standard

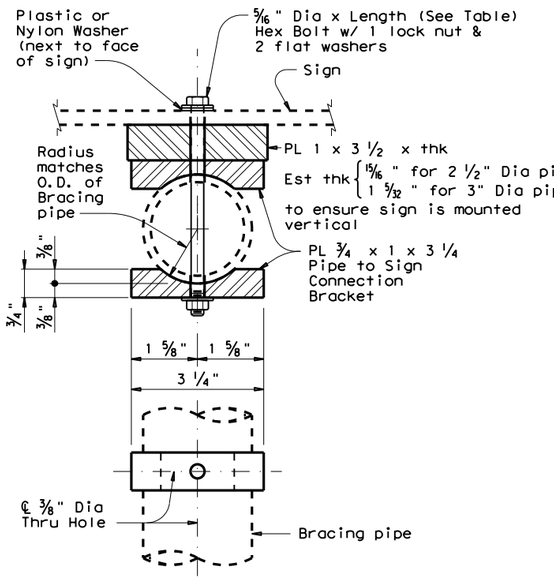
BRIDGE RAILING SIGN MOUNT DETAILS

SMD(BR-1)-14

FILE: smdbr-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		172

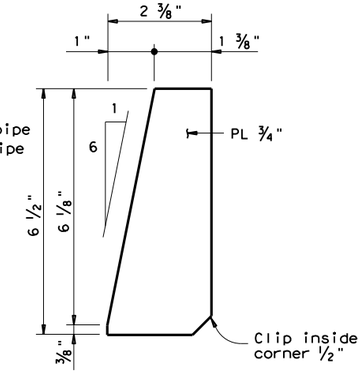
26G

FILE: h:\00xmaintenance\south harris maintenance\2020 contracts\6357-02-001\Mer-Use general mainte
DATE: 1/4/2021
PROJECT: 6375-52-001

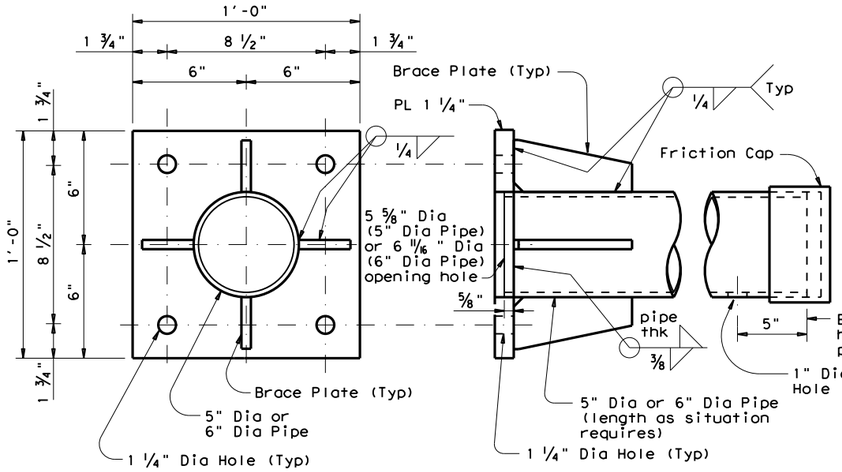


BRACING PIPE TO SIGN CONNECTION BRACKET DETAILS

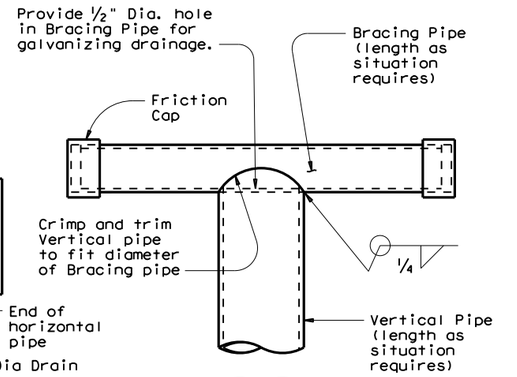
(Showing T Mounting)

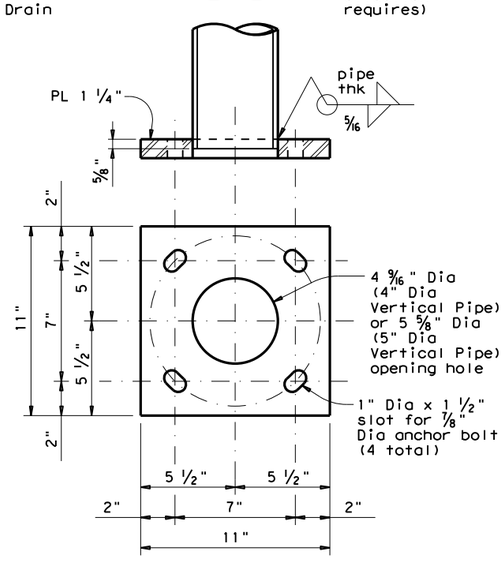


BRACE PLATE DETAILS



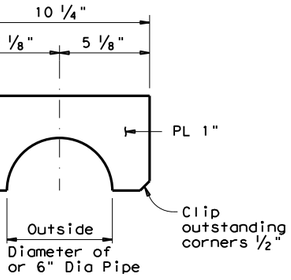
BASE PLATE DETAILS





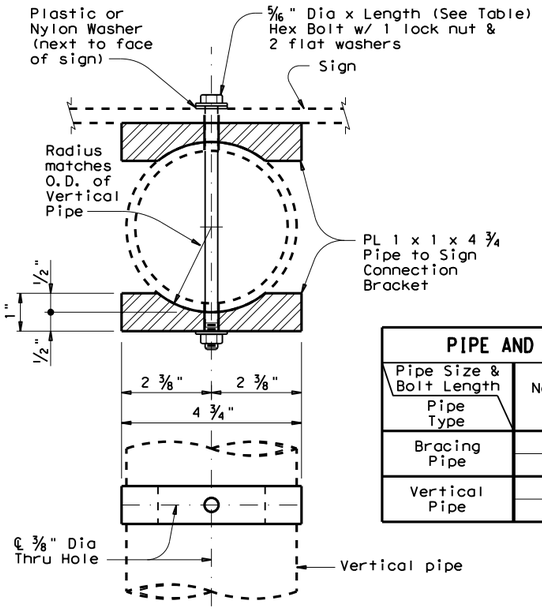
SIGN POLE & POLE BASE PLATE DETAILS

(Showing only T Mounting)



SIGN POLE SUPPORT PLATE BRACKET DETAILS

SIGN POLE SUPPORT PLATE 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

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	6375	52	001	IH45
	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		173

26H

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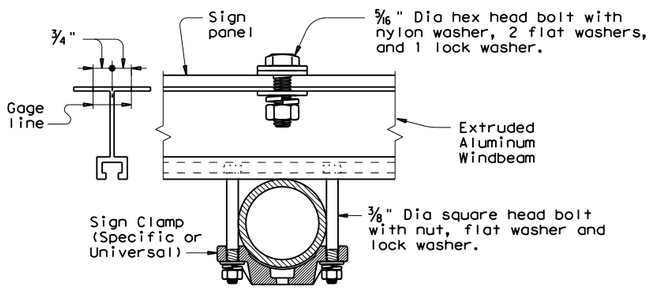
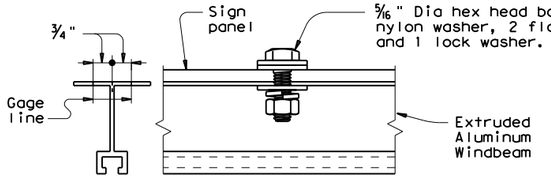
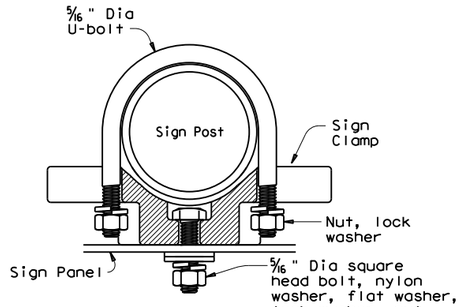
DATE: 1/4/2021
PROJECT: 6375-52-001



DETAIL 1



DETAIL 2

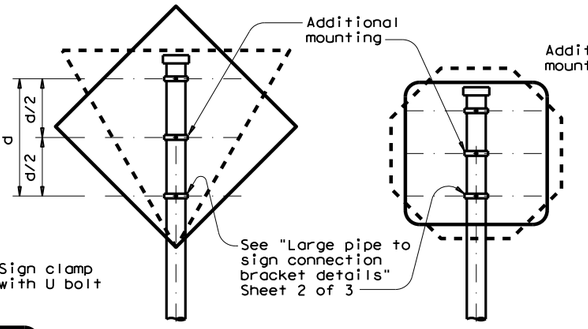


DETAIL 3

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.



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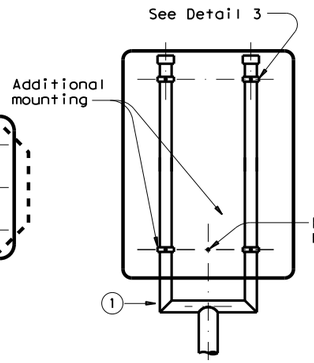

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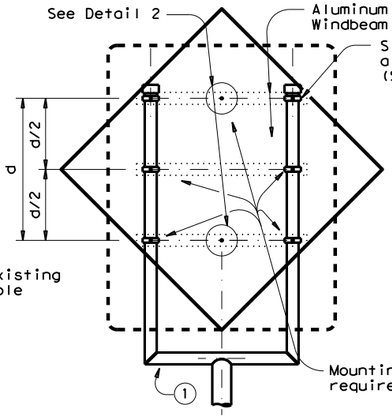

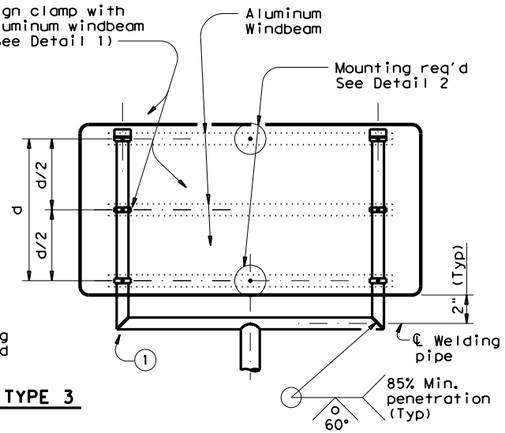

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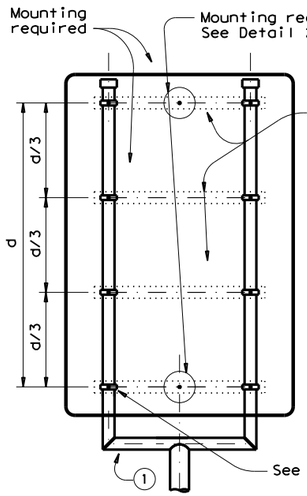
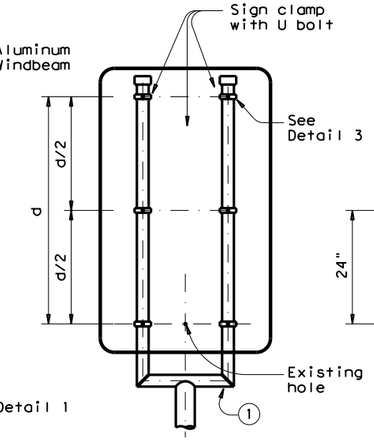


TYPE 4



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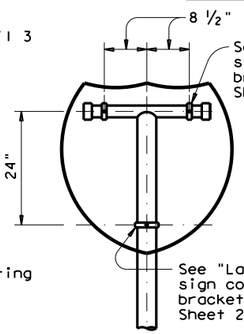
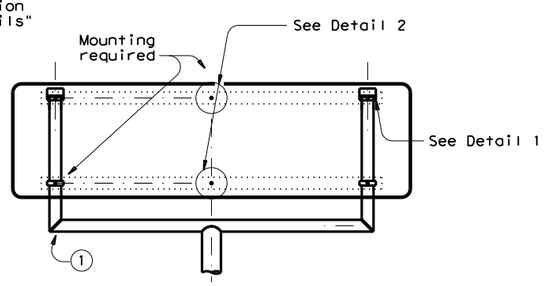


TYPE SPECIAL



TYPE 23

SHEET 3 OF 3

Texas Department of Transportation | Traffic Operations Division Standard

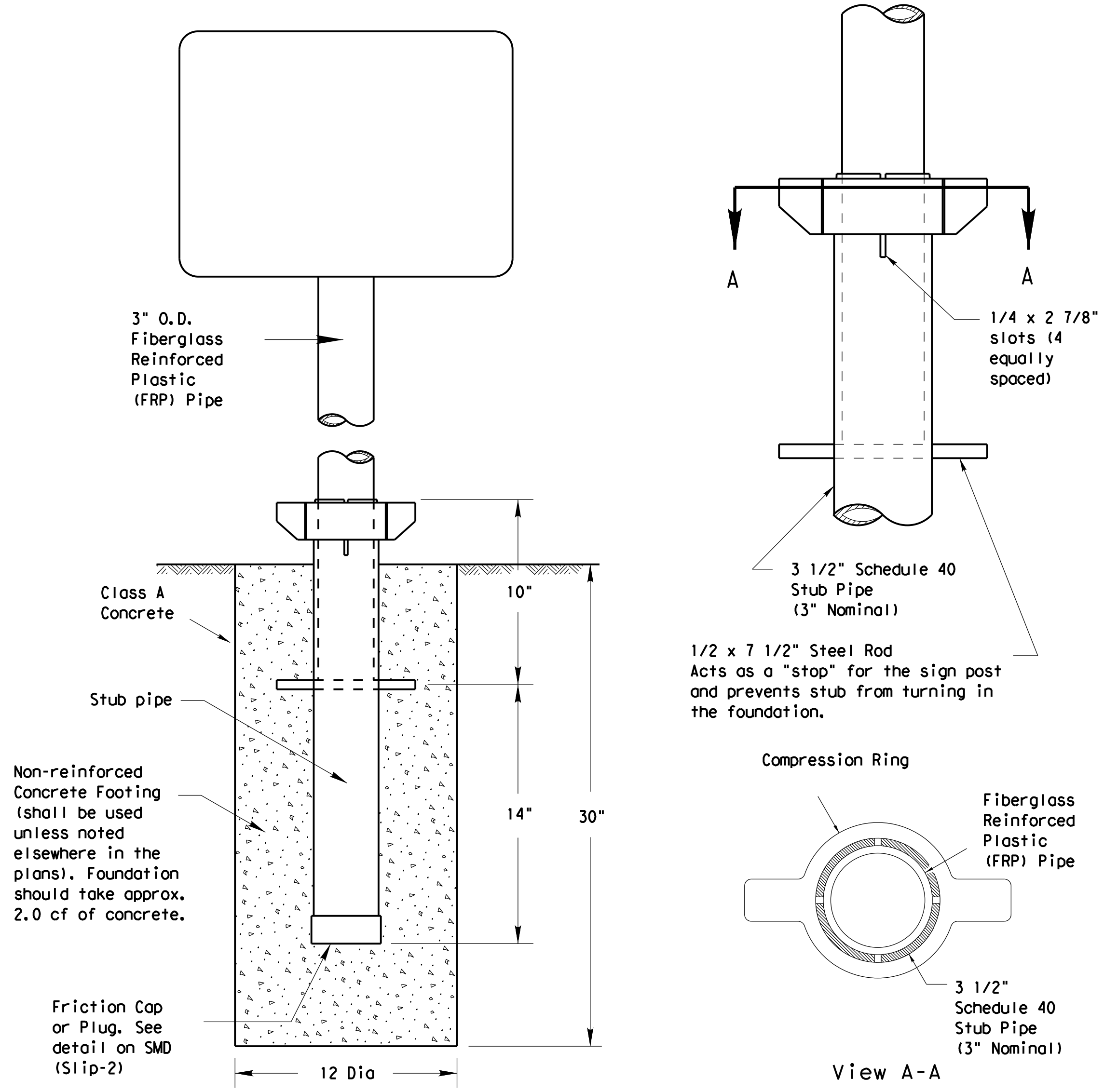
BRIDGE RAILING SIGN MOUNT DETAILS

SMD(BR-3)-14

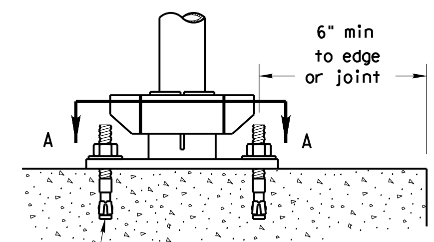
FILE: smdbr-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		174

26J

Universal Anchor System with Fiberglass Reinforced Plastic (FRP) Post



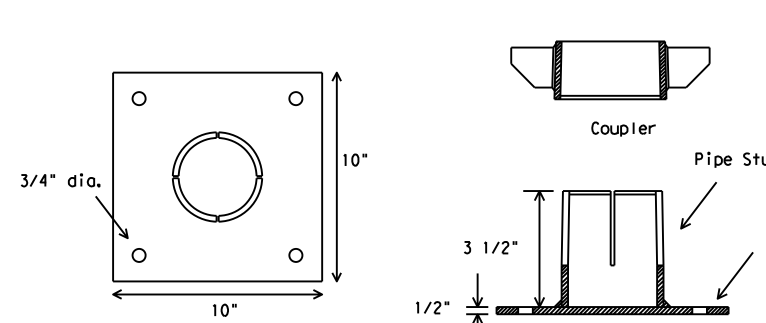
SM RD SGN ASSM TY FRP(X)UA(P)



5/8" diameter Concrete Anchor - 4 places (embed a min. of 3 3/8" and torque to min. of 50 ft-lbs). Anchor may be expansion or adhesive type.

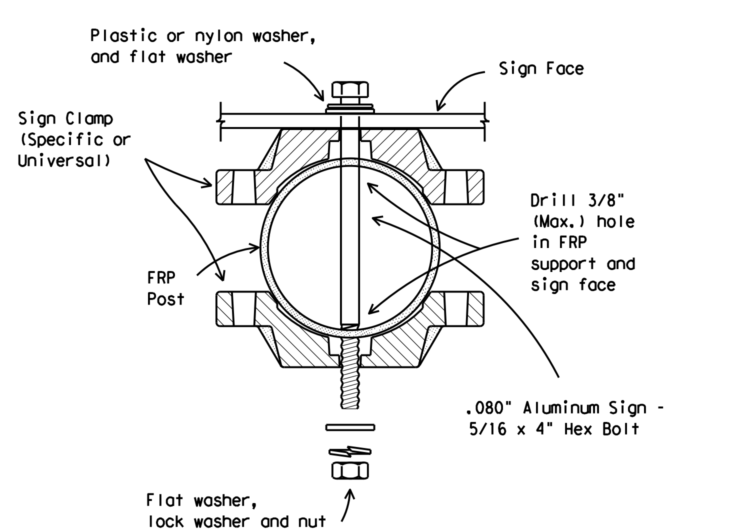
Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Top of bolt shall extend at least flush with top of nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 3 3/8" minimum embedment, shall have a minimum allowable tension and shear of 2450 and 1525 psi, respectively. 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.

BOLT-DOWN DETAILS

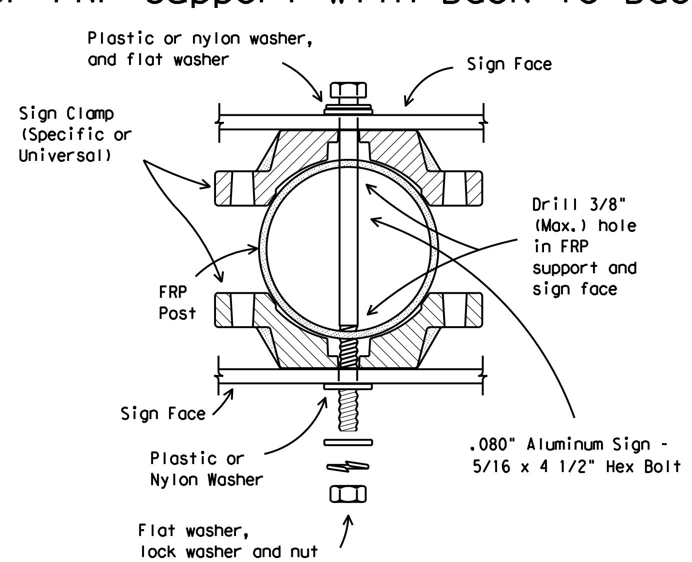


SM RD SGN ASSM TY FRP(X)UB(P)

Typical Sign Mounting Detail for FRP Support with Single Sign



Typical Sign Mounting Detail for FRP Support with Back-to-Back Signs



GENERAL NOTES:

1. FRP sign supports for a single type sign support may be used for signs up to and including 16 square feet. Dual post installation may be used for signs up to and including 32 square feet.
2. All nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing."
3. See the Traffic Operations Division website for detailed drawings of sign clamps. The website address is: http://www.txdot.gov/publications/traffic.htm

FRP POST REQUIREMENTS

1. Materials shall conform to the requirements of Departmental Material Specification DMS-4410 and will be furnished in a yellow or gray color as specified elsewhere in the plans.
2. Thickness of FRP sign support is 0.125" + 0.031", - 0.0".
3. FRP sign supports are prequalified by the Traffic Operations Division. Prequalification procedures are obtained by writing:
   Texas Department of Transportation
   Traffic Operations Division
   125 East 11th Street
   Austin, Texas 78701-2483

UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURES

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
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. Insert base post in foundation hole to depths shown and fill hole with concrete. Cut base post from bottom and ensure a minimum of 18" embedment if installed in solid rock.
4. Level and plumb the base post with coupler using a torpedo level and let concrete set a minimum of 4 days, unless otherwise directed by Engineer. Bottom of base post slots shall be above the concrete footing.
5. Attach sign to FRP post.
6. Insert sign post into base post. Lower until the post comes to rest on the steel rod.
7. Use hammer to ensure the coupler is firmly seated. Top of coupler should be level with top of base post in most instances.
8. Check sign to ensure there is no twist. If loose, increase the tightening of coupler.

BOLT DOWN SIGN SUPPORT

1. Position base plate with coupler on existing concrete.
2. Drill holes into concrete and insert the 5/8" diameter bolts with wedge anchors, and tighten nuts.
3. Attach sign to FRP post.
4. Insert bottom of sign post into pipe stub.
5. Use hammer to ensure the coupler is firmly seated. Top of coupler should be level with top of base post in most instances.
6. Check sign to ensure there is no twist. If loose, increase the tightening of coupler.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS UNIVERSAL ANCHOR SYSTEM WITH FRP POST

SMD(FRP)-08

©TxDOT July 2002	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	6375	52	001	IH45
	DIST		COUNTY	SHEET NO.
	12		HARRIS/GAL	175

26F

FILE: h:\00*maintenance\south harris maintenance\2020 contracts\6357-02-001*ih45 general\...
DATE: 1/4/2021
PROJECT: 6375-52-001

FILE: h:\00maintenance\south harris maintenance\2020 contracts\6357-02-001*IH45 general notes.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001

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)

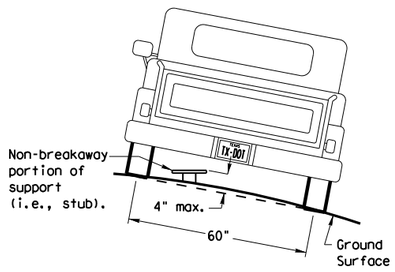
Anchor Type

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))

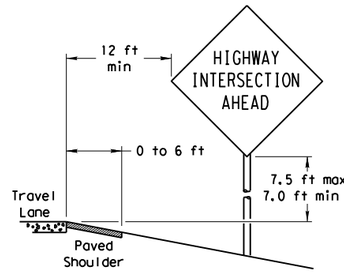
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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).

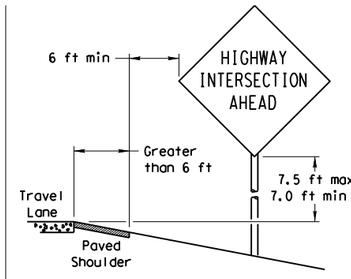
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

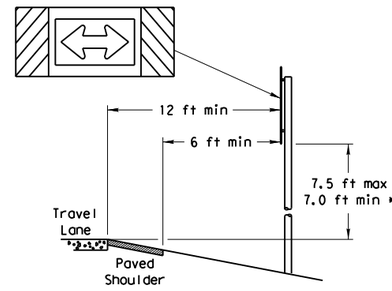
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



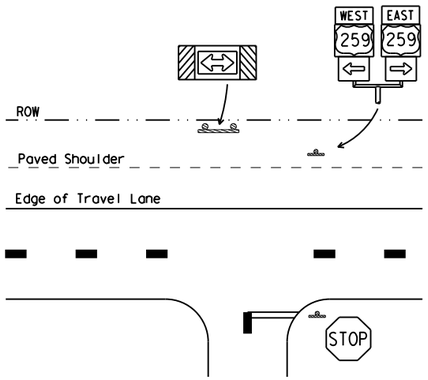
GREATER THAN 6 FT. WIDE

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.

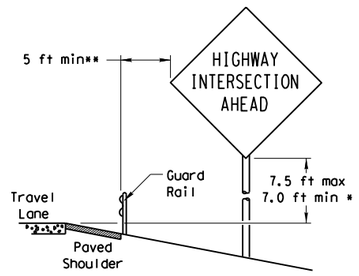
T-INTERSECTION



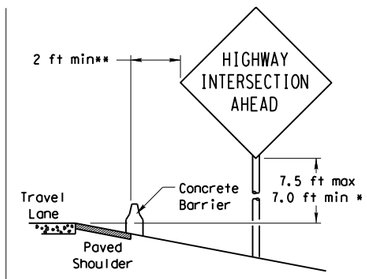
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



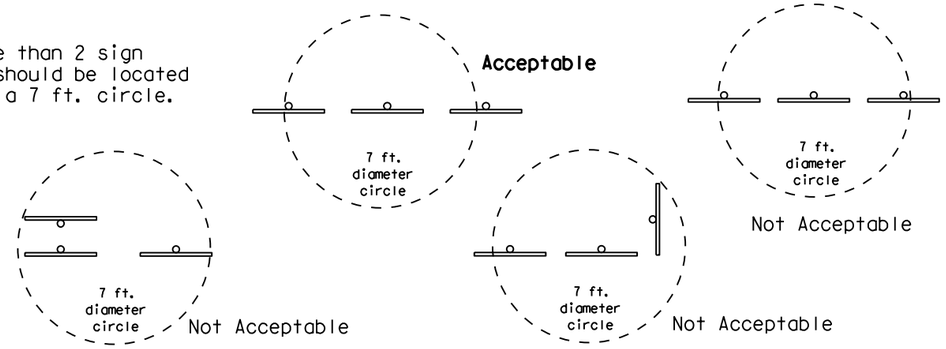
BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

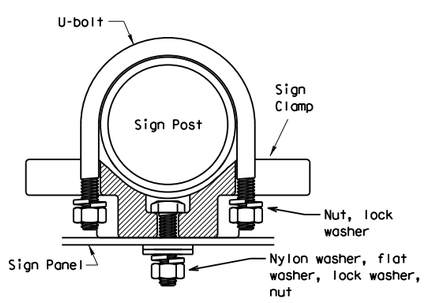
**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

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



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

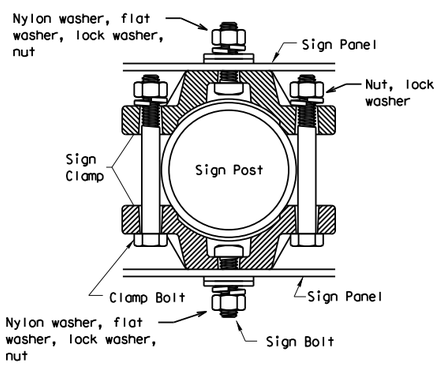


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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.

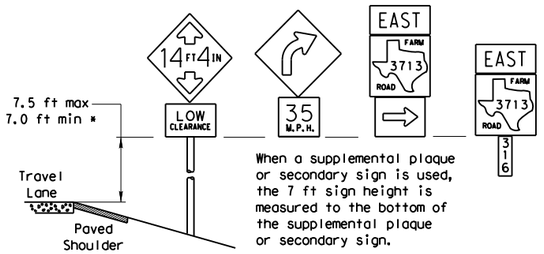
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



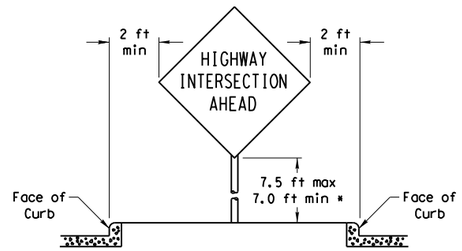
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



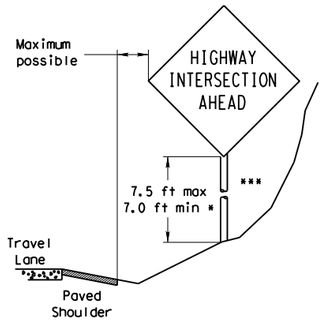
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

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

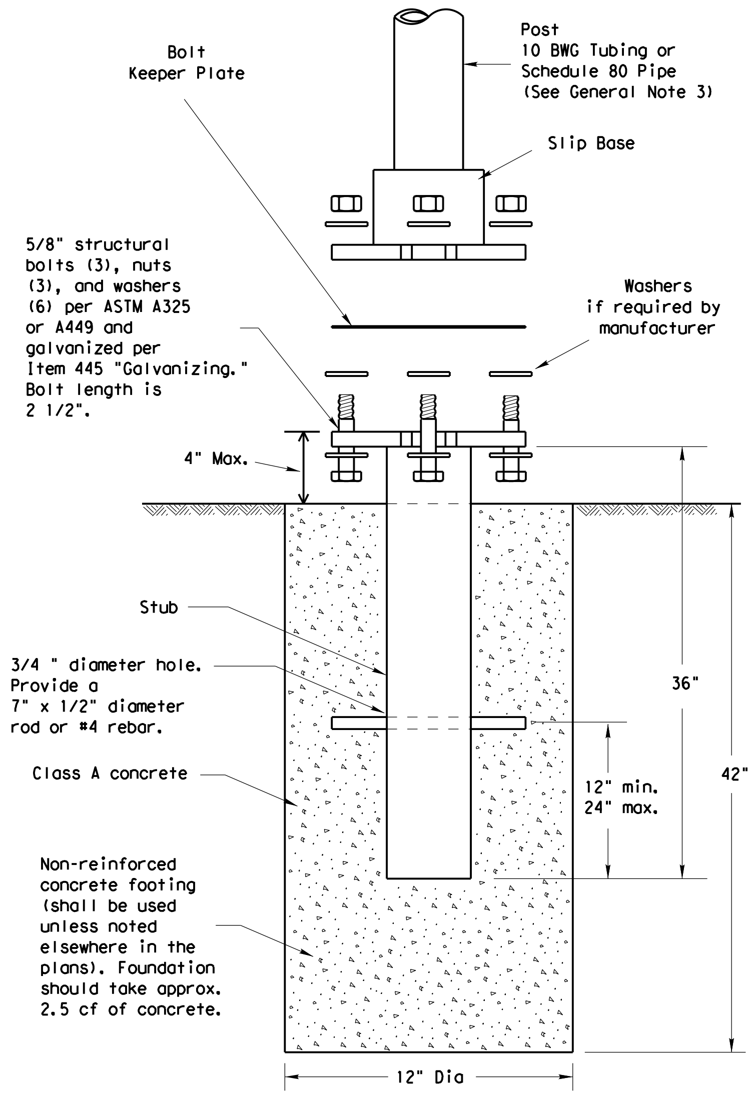
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

9-08 REVISIONS

CONT	SECT	JOB	HIGHWAY
6375	52	001	IH45
DIST	COUNTY		SHEET NO.
12	HARRIS/GAL		176

FILE: h:\00*maintenance\south harris maintenance\2020 contracts\6357-02-001*ih45 general...
DATE: 1/4/2021
PROJECT: 6375-52-001

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

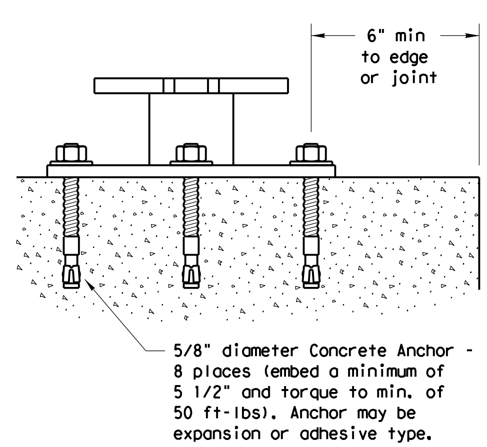
Foundation

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

©TxDOT July 2002	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	6375	52	001	IH45
	DIST		COUNTY	SHEET NO.
	12		HARRIS/GAL	177

26B

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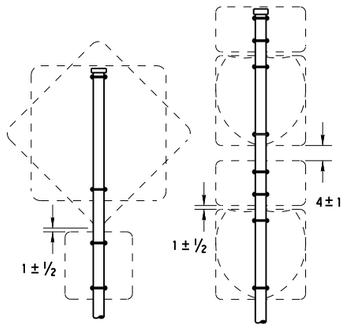
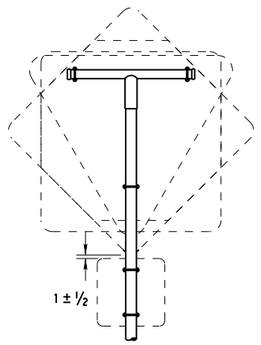
DATE: 1/4/2021
PROJECT: 6375-52-001



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



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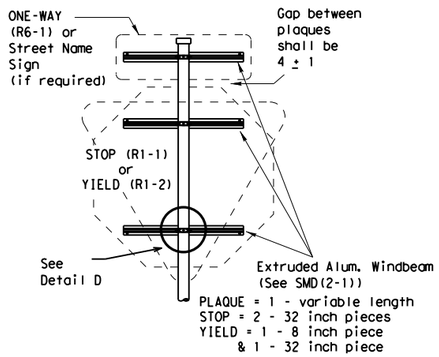

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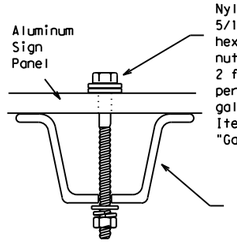
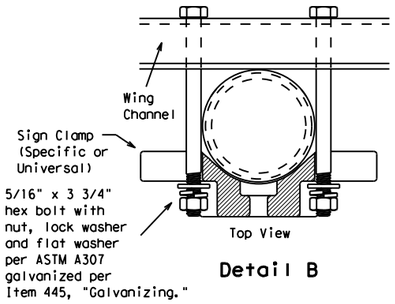
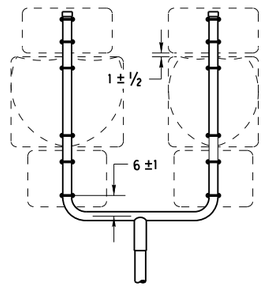


Detail A



Detail B



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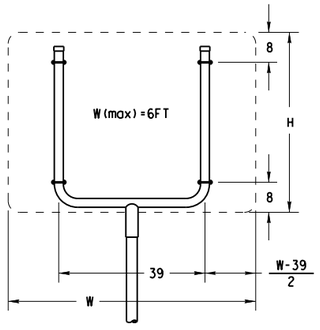

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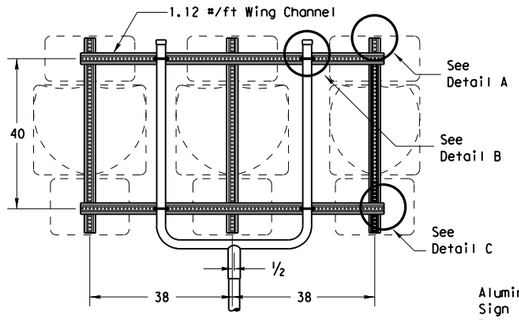
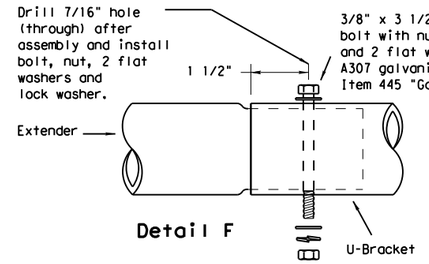
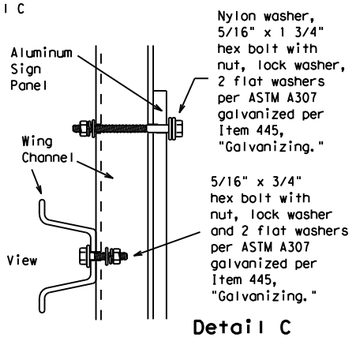


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

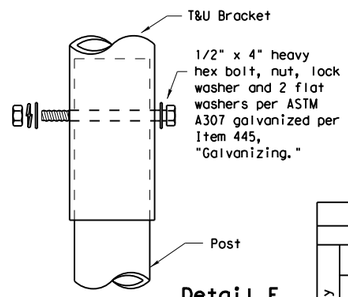


Detail F

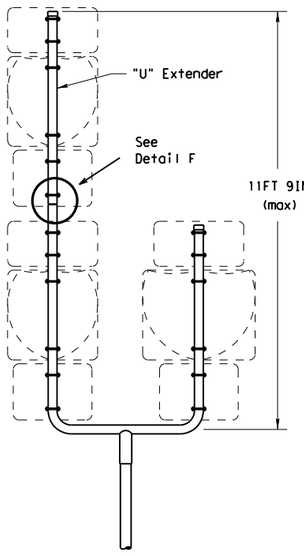
Splices shall only be allowed behind the sign substrate.



Detail C



Detail E



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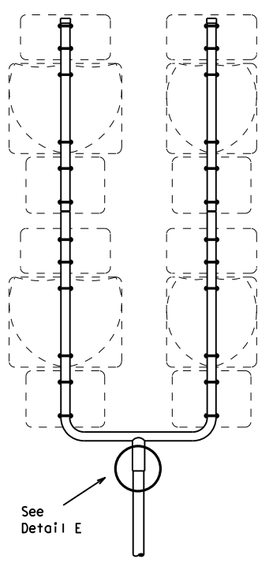

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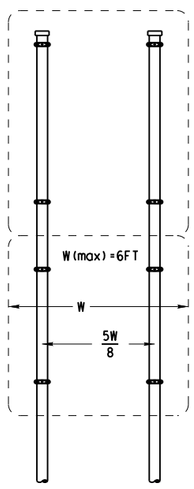
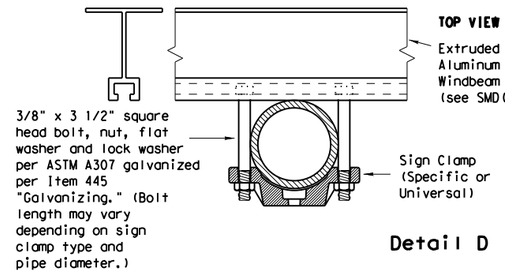
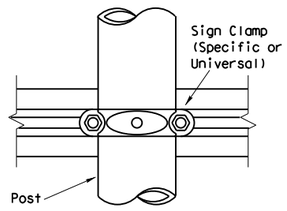


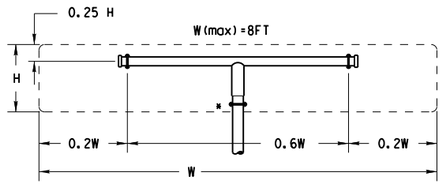
SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW



Detail D

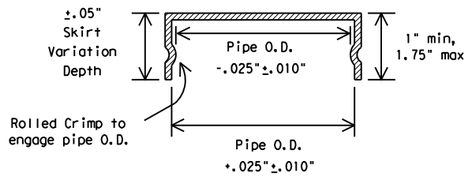




SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

All dimensions are in english unless detailed otherwise.

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

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.

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-2)-08

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

9-08 REVISIONS

CONT	SECT	JOB	HIGHWAY
6375	52	001	IH45

DIST	COUNTY	SHEET NO.
12	HARRIS/GAL	178

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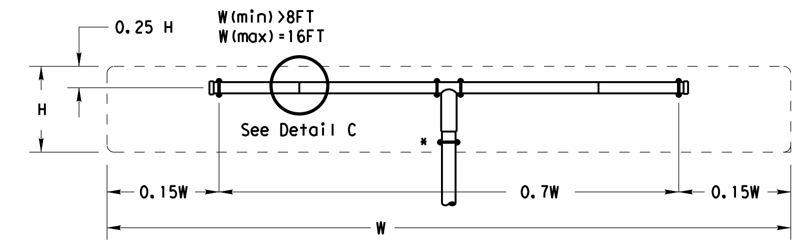

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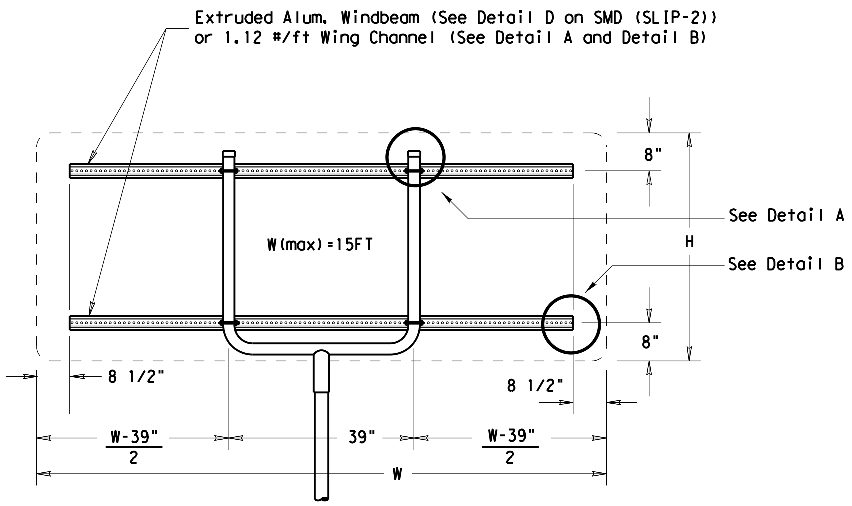
(* - See Note 12)



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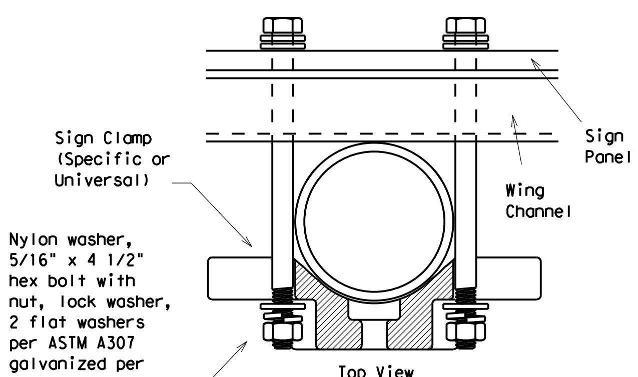
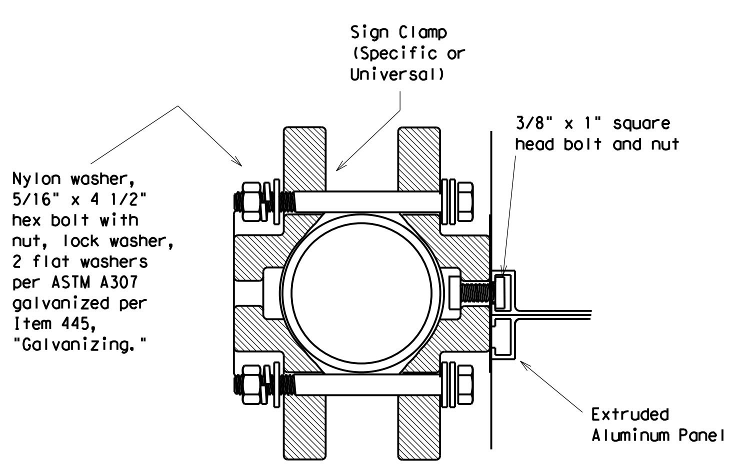
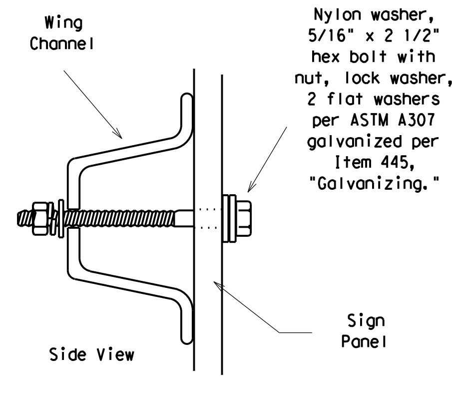


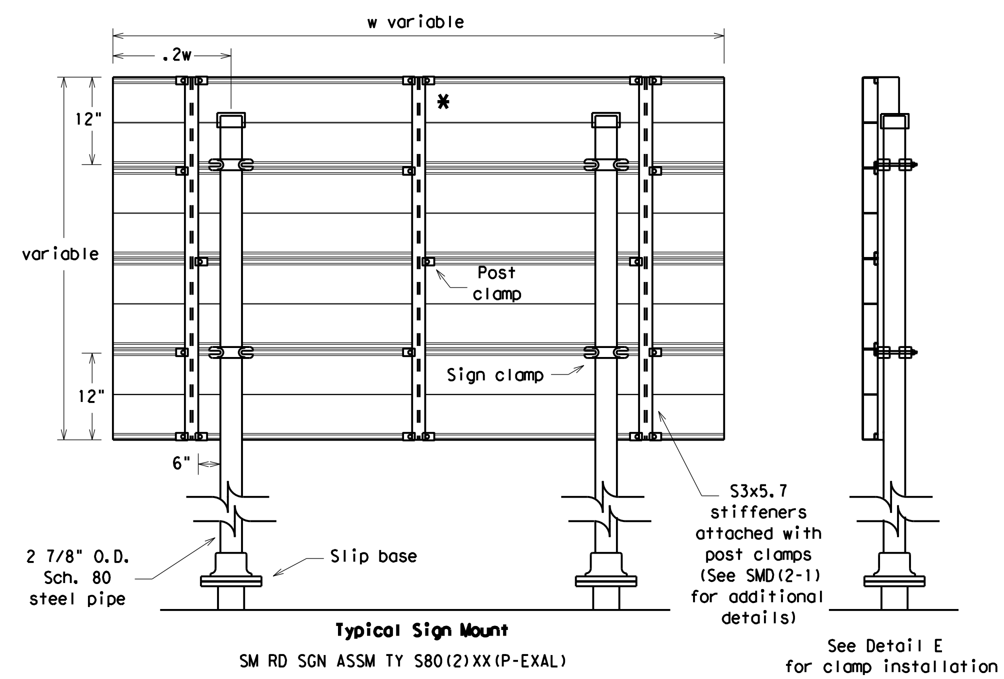
Detail A



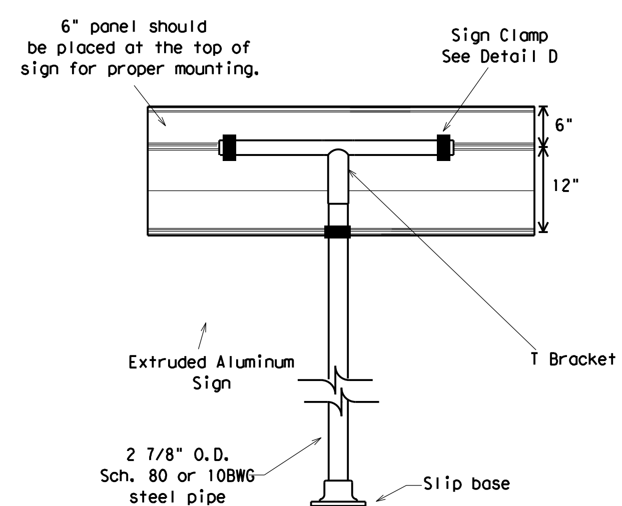
Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET



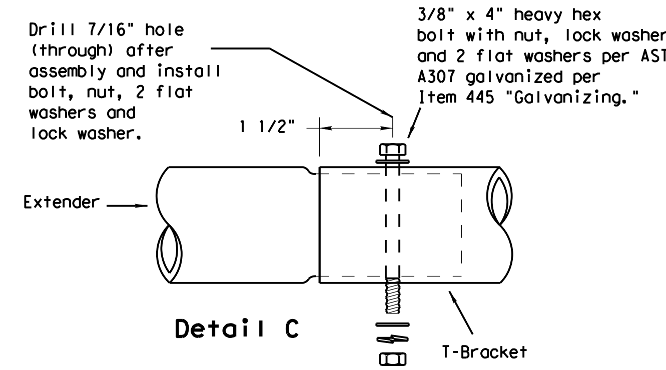
Detail B



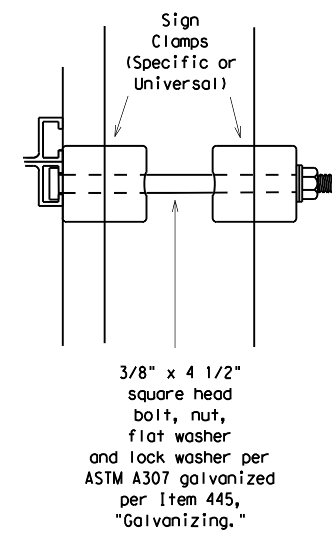
Typical Sign Mount
SM RD SGN ASSM TY S80(2)XX(P-EXAL)
* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.



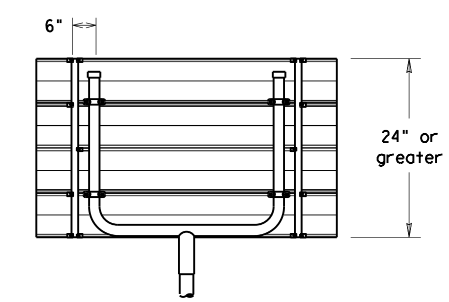
Extruded Aluminum Sign
With T Bracket



Detail C
Splices shall only be allowed behind the sign substrate.



Detail E



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details
See Detail E
for clamp installation

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. Sign blanks shall be the sizes and shapes shown on the plans.
11. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.

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

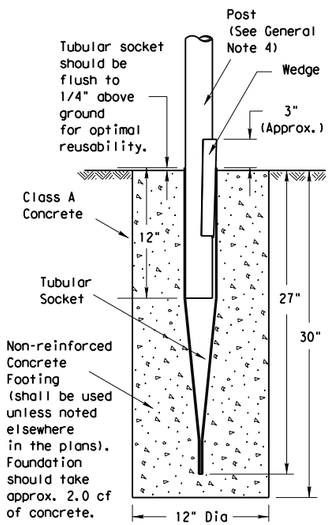
SMD(SLIP-3)-08

©TxDOT July 2002	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	6375	52	001	IH45
	DIST		COUNTY	SHEET NO.
	12		HARRIS/GAL	179

26D

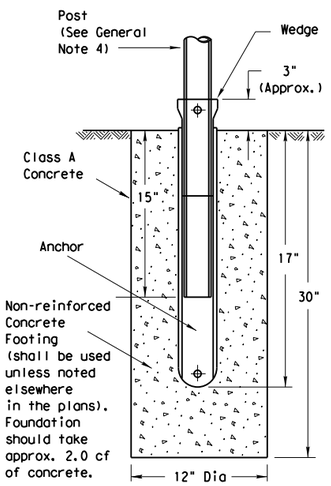
FILE: h:\00*maintenance\south harris maintenance\2020 contracts\6357-02-001*IH45 general\standards\smd(twt)-08.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001

Wedge Anchor Steel System



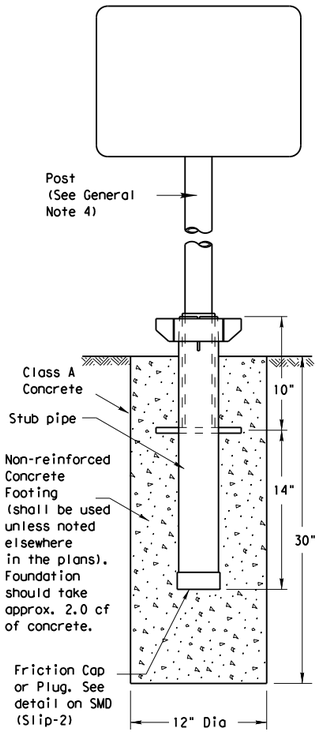
SM RD SGN ASSM TY TWT(X)WS(X)

Wedge Anchor High Density Polyethylene (HDPE) System

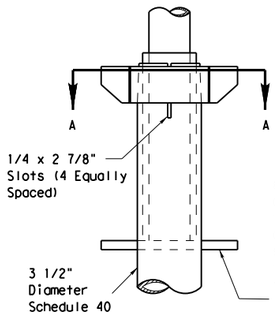


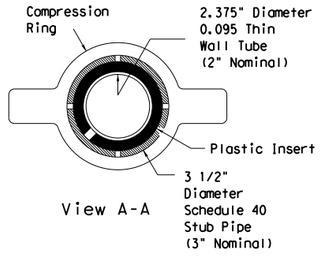
SMD RD SGN ASSM TY TWT(X)WP(X)

Universal Anchor System with Thin-Walled Tubing Post



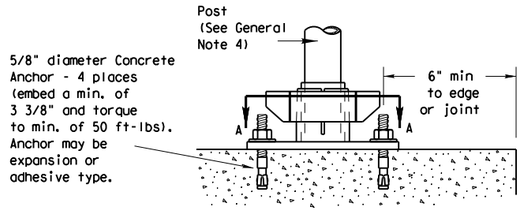
SM RD SGN ASSM TY TWT(X)UA(P)



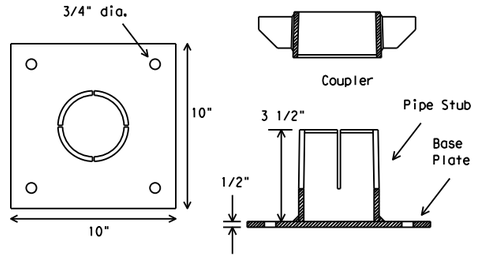


View A-A

Plastic insert must be used when using the TWT with either the Universal Anchor System or the Bolt Down Universal Anchor System. The insert should be approx. 10" long and cover the tubing from just above the top of the stub pipe to the bottom of the sign post when using the Universal Anchor System. The insert should be cut to approx. 4 1/2" when used with the Bolt Down Universal Anchor System.

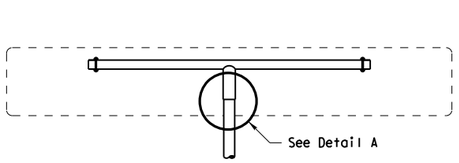


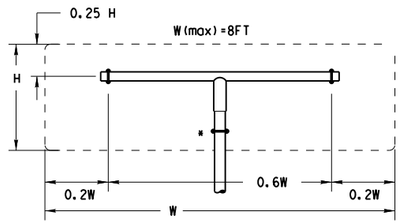
Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Top of bolt shall extend at least flush with top of nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 3 3/8" minimum embedment, shall have a minimum allowable tension and shear of 2450 and 1525 psi, respectively. 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.



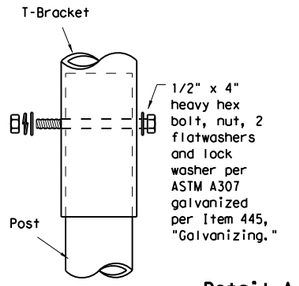
SM RD SGN ASSM TY TWT(X)UB(P)

Sign Installation Using a Prefabricated T-Bracket for Thin-Wall Tubing Post





SM RD SGN ASSM TY TWT(X)XX(T)
(* - See General Note 6)



Detail A

9/16" hole may need to be drilled through post to accommodate bolt.

NOTE

The devices shall be installed per manufacturer's recommendations.
Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. The Wedge Anchor System and the Universal Anchor System with thin wall tubing post may be used to support up to 10 square feet of sign area.
2. The tubular socket, wedge and prefabricated T-bracket shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to the approval of the TxDOT Traffic Standards Engineer.
3. Except for posts (13 BWG Tubing), clamps, nuts and bolts, all components shall be prequalified. A list of prequalified vendors may be obtained from the Material Producer List web page. The website address is: http://www.txdot.gov/business/producer list.htm
4. Material used as post with this system shall conform to the following specifications:
   13 BWG Tubing (2.375" outside diameter) (TWT)
   0.095" nominal wall thickness
   Seamless or electric-resistance welded steel tubing
   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
   18% minimum elongation in 2"
   Wall thickness (uncoated) shall be within the range of .083" to .099"
   Outside diameter (uncoated) shall be within the range of 2.369" to 2.381"
   Galvanization per ASTM 123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.
5. Sign blanks shall be the sizes and shapes shown on the plans.
6. Additional sign clamp required on the "T-bracket" post for 24" high signs. Place clamp at least 3" above bottom of sign when possible.
7. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
8. See the Traffic Operations Division website for detailed drawings of sign clamps and Wedge Anchor System components. The website address is: http://www.txdot.gov/publications/traffic.htm

WEDGE ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
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. Place concrete into hole until it is approximately flush with the ground. Concrete shall be Class A.
3. Insert tubular socket into concrete until top of socket is approximaely 1/4 " above the concrete footing.
4. Plumb the socket. Allow a minimum 4 days for concrete to set, unless otherwise directed by Engineer..
5. Attach the sign to the sign post.
6. Insert the sign post into socket and align sign face with roadway.
7. Drive the wedge into the socket to secure post. This will leave approximately 3 inches of the wedge exposed.

UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. Insert base post in hole to depths shown and backfill hole with concrete.
3. Level and plumb the base post using a torpedo level and allow concrete adequate time to set. The bottom of the slots provided in the stub pipe shall remain above the top of the concrete foundation.
4. Attach the sign to the sign post.
5. Install plastic insert around bottom of post.
6. Insert sign post into base post. Lower until the post comes to rest on steel rod.
7. Seat compression ring using a hammer. Typically, the top of compression ring will be approximately level with top of stub post when optimally installed.
8. Check sign post by hand to ensure it is unable to turn. If loose, increase the tightening of the compression ring.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS WEDGE & UNIVERSAL ANCHOR WITH THIN WALL TUBING POST

SMD(TWT)-08

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

9-08 REVISIONS

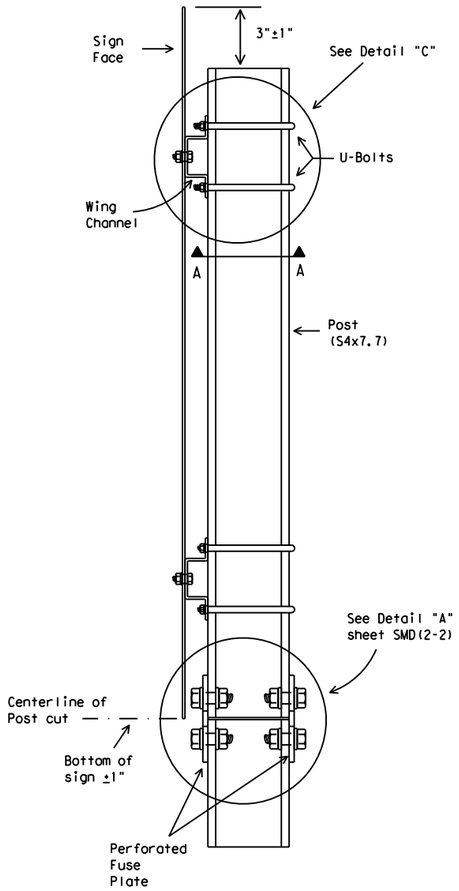
CONT	SECT	JOB	HIGHWAY
6375	52	001	IH45

DIST	COUNTY	SHEET NO.
12	HARRIS/GAL	180

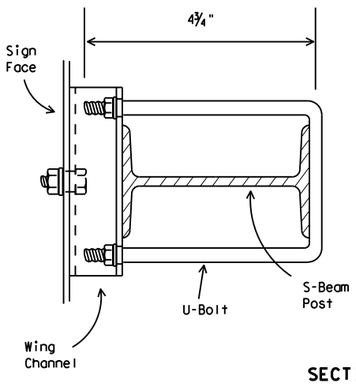
26E

FILE: h:\00maintenance\south harris maintenance\2020 contracts\6357-02-001*ih45 generalmisc\standards\smd(ty g)-08.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001

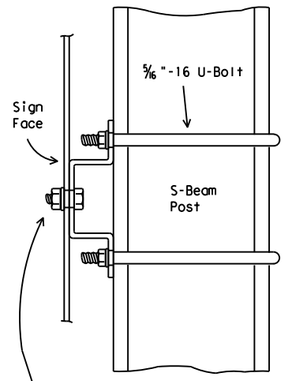
WING CHANNEL CLAMP DETAIL FOR TYPE G MOUNT



SIDE VIEW

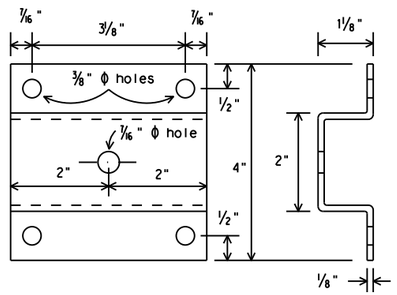


SECTION A-A



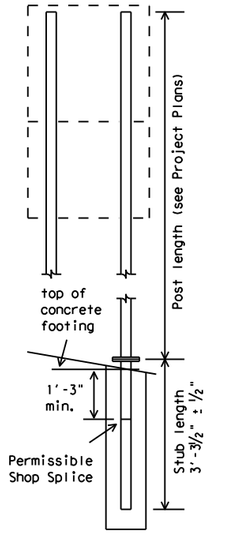
Galvanized steel or aluminum self-locking hex. head nut. 3/8 " - 16 x 3/4 " hex. head bolt for sheet metal. 3/8 " - 16 x 1 1/4 " hex. head bolt for plywood. 3/8 " galvanized medium washer.

DETAIL "C"



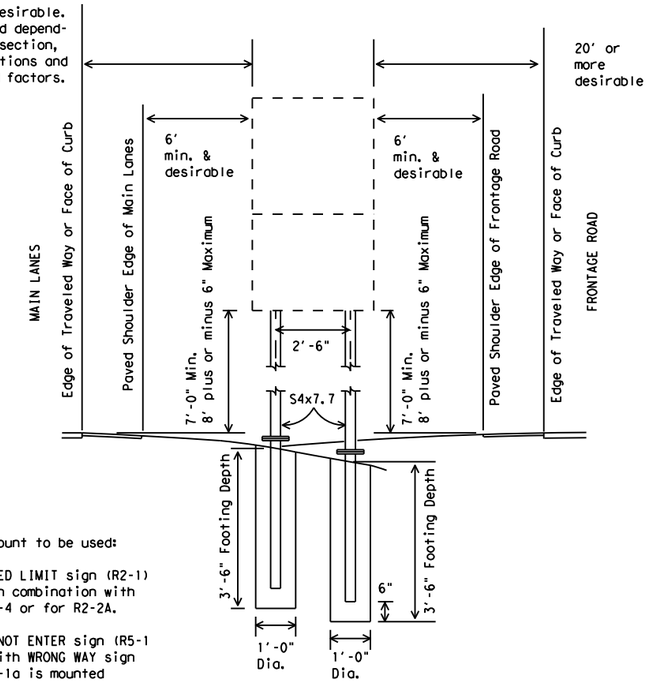
WING CHANNEL

Wing channel, 4" width x 1⅛" depth x ⅛" thickness, shall be aluminum (ASTM B221 6061-T6 or B308 6061-T6), galvanized steel (ASTM A36) or stainless steel (ASTM A167 type 304, No. 2B finish).



The weight of one S4x7.7 post is equal to 112.2 lbs. plus 7.7 lbs./ft x (post length in feet minus 10 ft). The weight of 112.2 lbs. includes 10 feet of post length, post foundation stub, related connection plates, friction fuse plate, and all high strength bolts, nuts and washers.

30' or more desirable. May be reduced depending on cross section, viewing conditions and other related factors.



This type mount to be used:

(1) For SPEED LIMIT sign (R2-1) when used in combination with R2-2 and R2-4 or for R2-2A.

(2) For DO NOT ENTER sign (R5-1 when used with WRONG WAY sign (R5-1a). R5-1a is mounted above R5-1.

DEPARTMENTAL MATERIAL SPECIFICATIONS
SIGN HARDWARE DMS-7120

GENERAL NOTES:

1. Design conforms with AASHTO Specifications for the design and construction of structural supports for highway signs.
2. Materials and fabrication shall conform to the requirements of the Department material specifications.
3. Structural steel shall be "Low-Alloy Steel" for non-bridge structures per Item 442, "Metal For Structures."
4. Parts shall be saw cut either before galvanizing and the galvanized cut cleaned of zinc build-up, or saw cut after galvanizing and the cut surface repaired per Item 445, "Galvanizing." (Cut surface will not be treated until plate is installed and all bolts fully tightened.)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS, TYPE G SUPPORT

SMD(TY G)-08

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

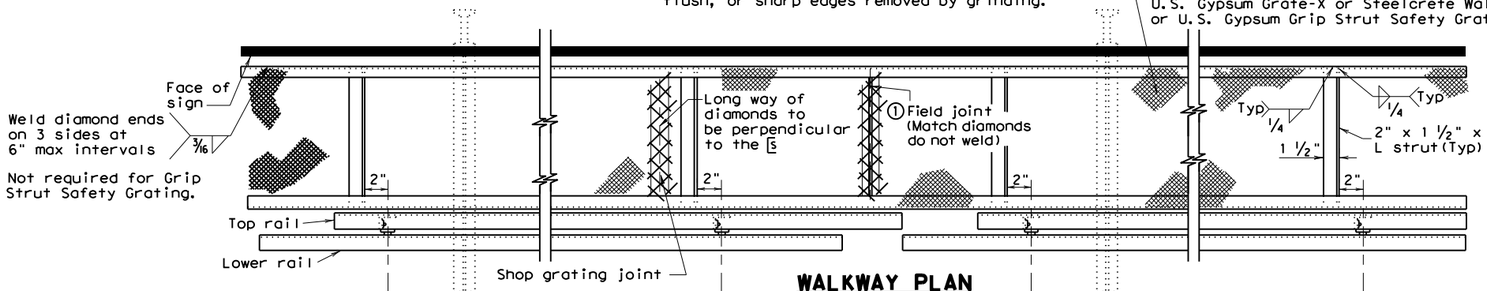
REVISIONS
1-97
9-08

CONT	SECT	JOB	HIGHWAY
6375	52	001	IH45
DIST	COUNTY		SHEET NO.
12	HARRIS/GAL		181

FILE: h:\00maintenance\south harris maintenance\2020 contracts\6357-02-001
DATE: 1/4/2021
PROJECT: 6375-52-001

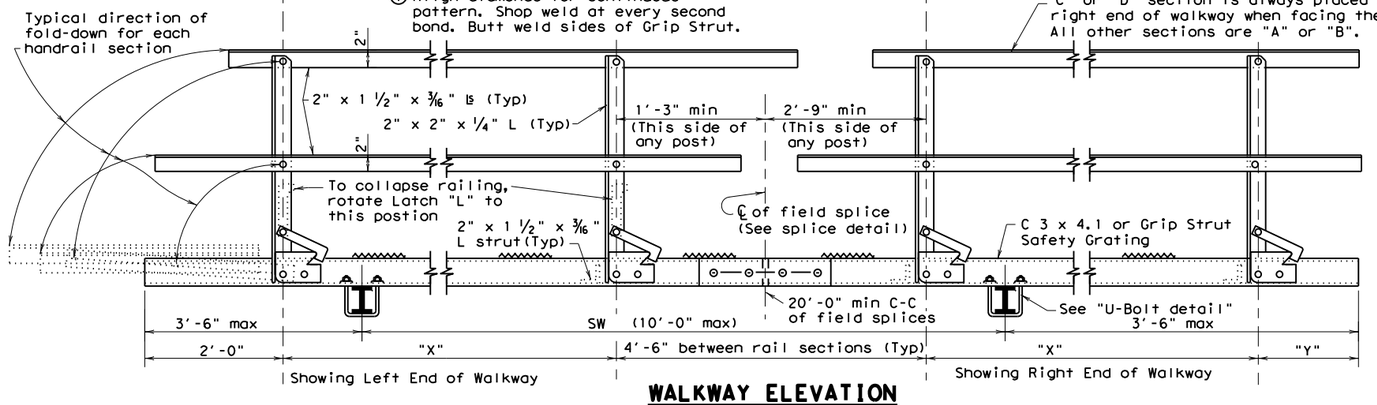
Note: Diamond remnants on cut grating edge of walkway end shall be trimmed flush, or sharp edges removed by grinding.

Steel expanded metal grating. Weight = 4 1/4# (approx) per sq ft ; U.S. Gypsum Grate-X or Steelcrete Walkway Mesh or U.S. Gypsum Grip Strut Safety Grating or approved equal.



WALKWAY PLAN

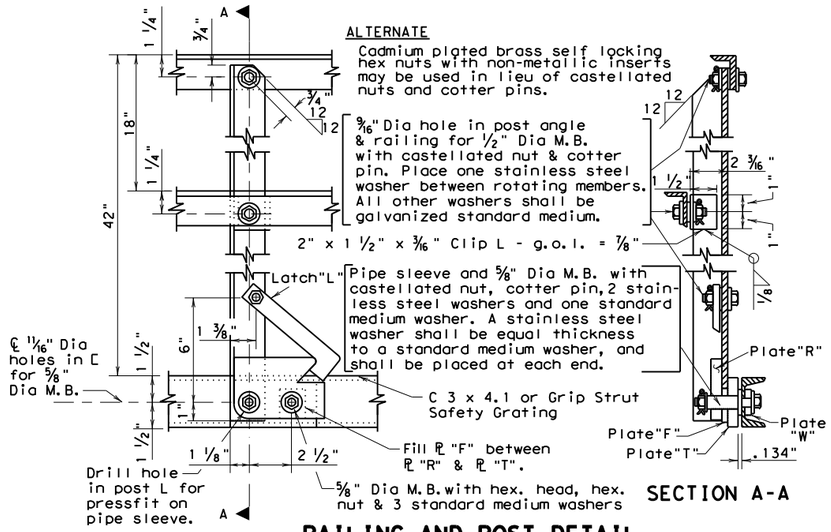
① Align diamonds for continuous pattern. Shop weld at every second bond. Butt weld sides of Grip Strut.



WALKWAY ELEVATION

10'-0" Maximum spacing for Walkway, Lights and Sign Support Bracket spacing, see sheets SL(MV), and SMD(2-4)EXTRUDED ALUMINUM for other limitations to spacing.

Note: Eliminate C 3 x 4.1 when Grip Strut Safety Grating is used. All other details and materials apply unless otherwise noted.



RAILING AND POST DETAIL

After erection, adjust all castellated nuts to remove only excess play in rotation parts then lock in position with cotter pins. Adjust nut on latch "L" for free latch operation.

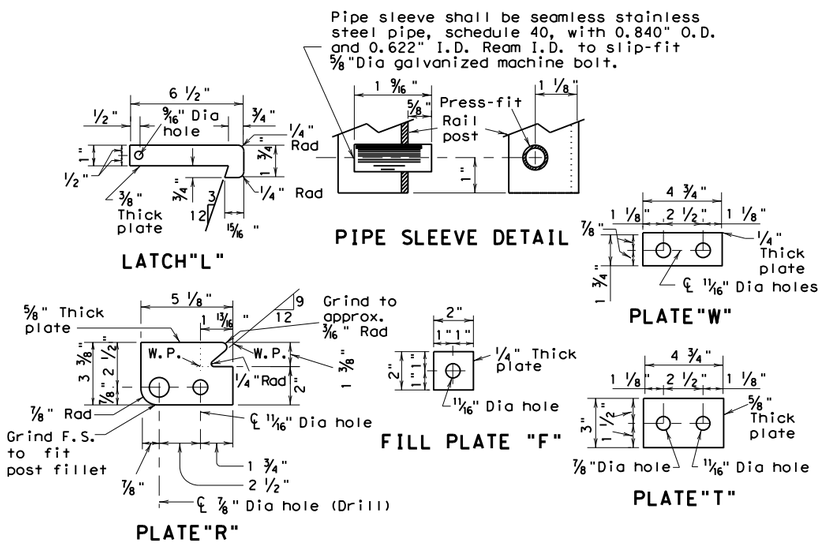


PLATE AND MISCELLANEOUS DETAILS

GENERAL NOTES

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

Materials, fabrication, construction and erection shall conform to Item 654, "Sign Walkways" and with details, dimensions, and weld procedures shown herein.

Structural steel shall conform with ASTM A36. Bolts shall have hexagon heads and nuts and conform with ASTM A307. Stainless steel pipe bushings shall conform with ASTM A312 Grade TP304. Stainless steel washers shall conform with ASTM A167 Type 302B. All parts, except stainless steel shall be galvanized after fabrication per Item 445, "Galvanizing".

The stainless steel bushings shall be pressed in the rail posts after posts are galvanized.

The walkway and railing shall be shop assembled to check fabrication.

SHEET 1 OF 2

Texas Department of Transportation

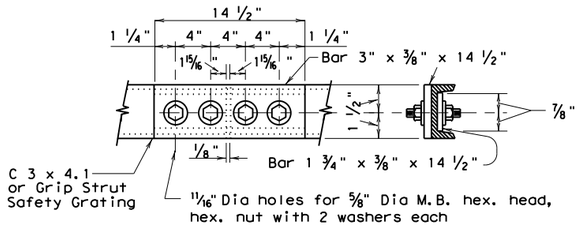
Traffic Operations Division Standard

SIGN WALKWAY AND HANDRAIL

SWW(1)-14

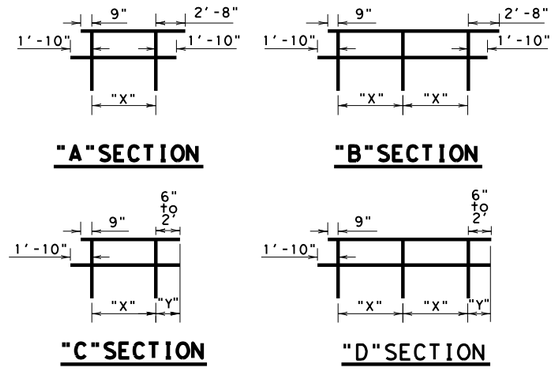
FILE: sww1-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		182

83



FIELD SPLICE DETAIL

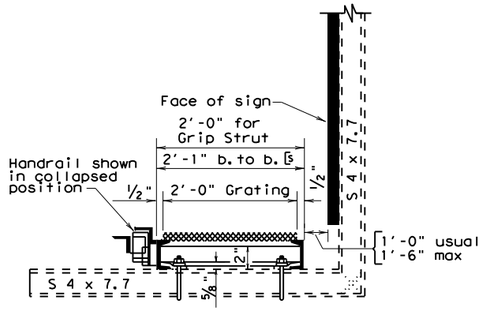
(See WALKWAY ELEVATION for location; sheet 1 of 2)



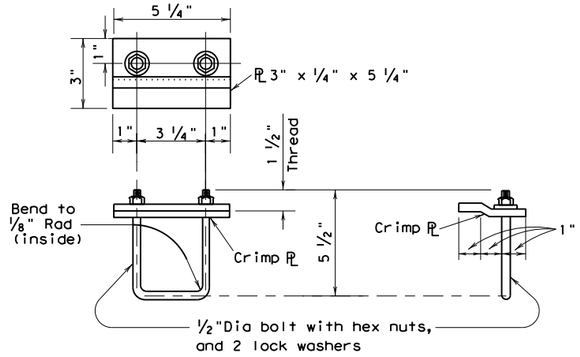
"X"dimension = 8'-0" max. See table for min dimension "X".
"X"shall be the same for all sections in any one walkway.
"Y"dimension = 6" usual,but variable between 6" and
2'-0" to obtain maximum dimension for "X" in even inches.

TYPES OF HANDRAIL SECTION

WALKWAY LENGTH	MINIMUM "X" DIMENSION	REQUIRED NO. OF SECTIONS			
		"A"	"B"	"C"	"D"
7'-6" to 12'-0"	1 at 5'-0"	~	~	1	~
12'-6" to 20'-0"	2 at 5'-0"	~	~	~	1
20'-6" to 24'-6"	2 at 6'-9"	1	~	1	~
25'-0" to 32'-6"	3 at 6'-0"	~	1	1	~
33'-0" to 40'-6"	4 at 6'-6"	~	1	~	1
41'-0" to 45'-0"	4 at 7'-4 ½"	1	1	1	~
45'-6" to 53'-0"	5 at 6'-9"	~	2	1	~
53'-6" to 61'-0"	6 at 7'-0"	~	2	~	1
61'-6" to 73'-6"	7 at 6'-6"	~	3	1	~
74'-0" to 81'-6"	8 at 7'-3"	~	3	~	1
82'-0" to 94'-0"	9 at 6'-10"	~	4	1	~
94'-6" to 102'-0"	10 at 7'-4"	~	4	~	1
102'-6" to 114'-6"	11 at 7'-0"	~	5	1	~
115'-0" to 122'-6"	12 at 7'-6"	~	5	~	1



END VIEW OF WALKWAY



U-BOLT AND CLAMP DETAIL

SHEET 2 OF 2

Texas Department of Transportation

Traffic Operations Division Standard

SIGN WALKWAY AND HANDRAIL

SWW(1)-14

FILE: sww1-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		183

84

FILE: h:\00xmaintenance\south harris maintenance\2020 contracts\6357-02-001\sww1-14.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001

METHOD 1: WOOD EMBEDMENT

STEPS:

Step 1. Determine sign height (Hs), width (Ws), average mounting height from bottom of sign to ground (Hbs), and temporary guide sign wind zone. Temporary guide sign wind zone is determined from Wind Velocity Worksheet. (Page 30A on the Traffic Standards web page) and Table 1.

TABLE 1

Wind Zone on Wind Velocity Worksheet	Temporary Guide Sign Wind Zone
90 mph	70 mph
80 mph	70 mph
70 mph	60 mph

Step 2. Determine number of posts and post size from temporary guide sign wind zone using Hs, Ws, Hbs below (Figure 1: 60 mph and Figure 2: 70 mph). Determine spacing of posts (A) and distance from edge of sign to outside posts (0.5A) from 'Post Spacing and Sign Placement' detail on TLRS(2).

Step 3. Determine minimum post embedment depth from Table 2. For cohesionless soils, another method should be used to determine embedment depth.

TABLE 2

Wooden Post Size	Embedment Depth (ft)
4x6	3
6x8	4
6x10	5

Step 4. Fabricate posts using 'Wood Post' detail on TLRS(2). Attach sign (plywood or extruded aluminum) using a method on TLRS(3). Wooden parts are not required to be painted.

FIGURE 1

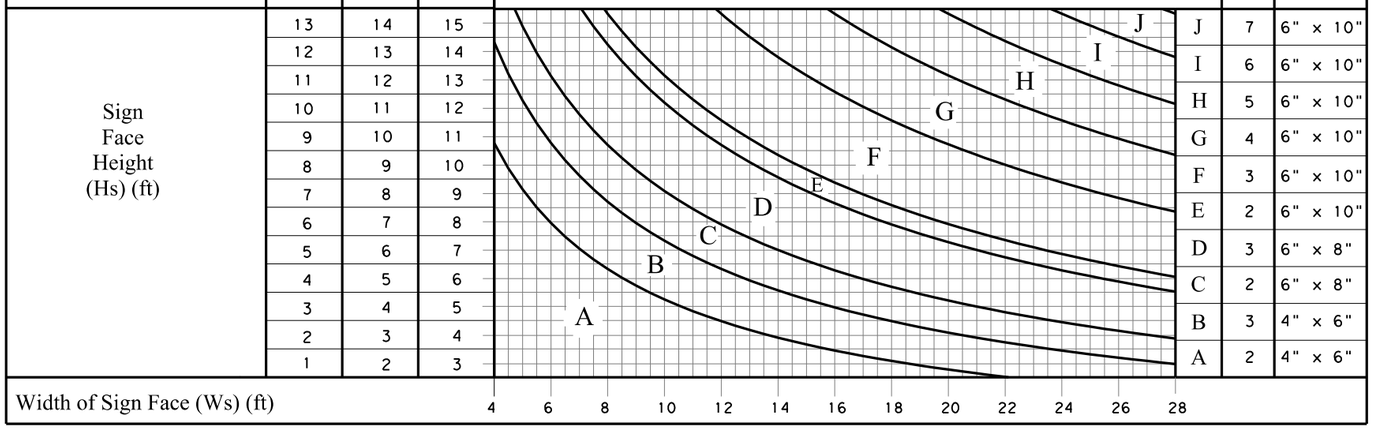
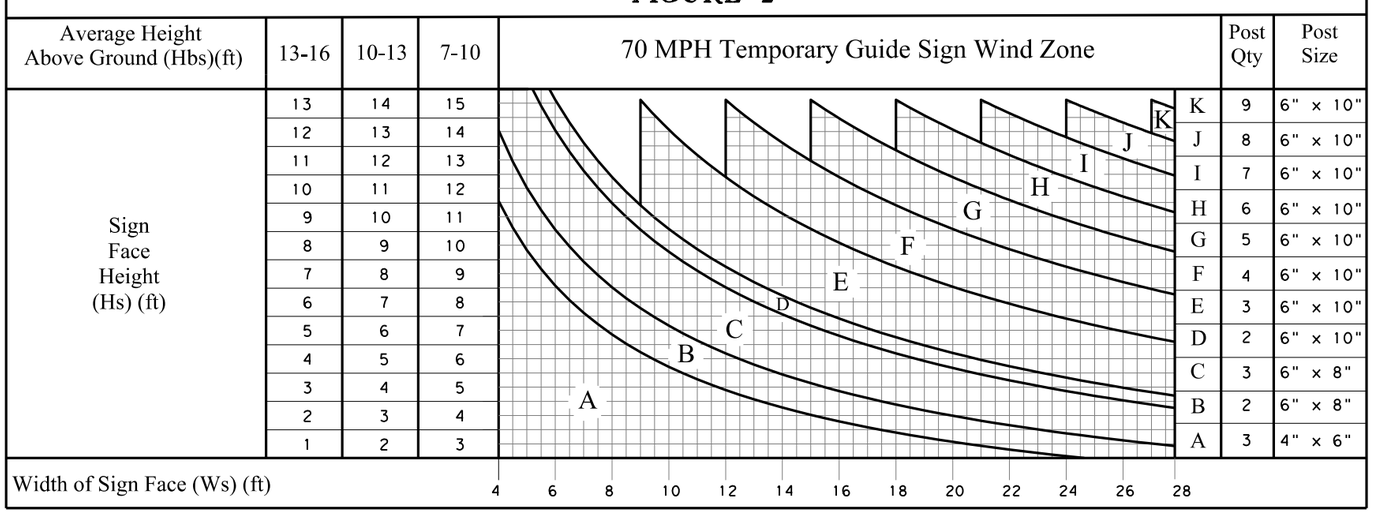


FIGURE 2



GENERAL NOTES

1. See plans for specifications and pay item information. Temporary guide signs required for contractor changes to traffic control plan are subsidiary to item 502.
2. Contractor may use any of the 3 methods (Wood Embedment, Steel Embedment or Wood Skid) as long as sign height requirements are met and approved by the Engineer.
3. See SMD (2-3) for details on attaching panels and plaques to parent signs.
4. Nails are not allowed in temporary sign support structures.

METHOD 2: STEEL EMBEDMENT

STEPS:

Step 1. Determine sign height (Hs), width (Ws), average mounting height from bottom of sign to ground (Hbs), and wind zone from Wind Velocity Worksheet.

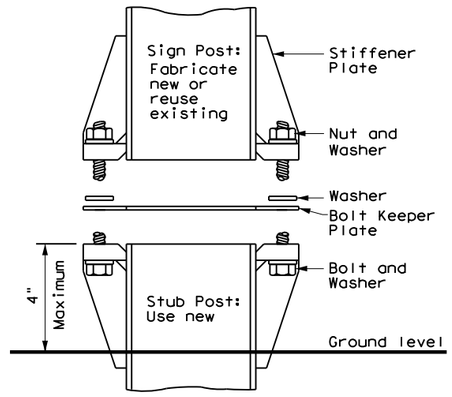
Step 2. Determine number of posts, post size, and post spacing from SMD(2-3) and SMD(8W1). Alternatively, the sign posts from an existing sign may be used if 7' minimum height from pavement to bottom of sign can be maintained at new location. In this case, only a new stub post without concrete foundation is required. See Detail A and SMD(2-2) for more information.

Step 3. Determine minimum stub post embedment depth from Table 3. No concrete foundation is required. For cohesionless soils, another method should be used to determine embedment depth.

TABLE 3

Steel Support Post Size	Embedment Depth (ft)
W6x9	4
W6x12	4.5
W6x15	5
W8x18	6
W8x21	6.5
W10x22	7.5
W10x26	8
W12x26	8.5
S3x5.7	3
S4x7.7	3.5

Step 4. Attach sign using SMD(2-3) for an extruded aluminum sign or using TLRS(3) for a plywood sign.



DETAIL A

SHEET 1 OF 4

Texas Department of Transportation | Traffic Operations Division Standard

TEMPORARY LARGE ROADSIDE SIGNS

TLRS(1)-17

FILE: tlrs-17.dgn	DN:	CK:	DW:	CK:
© TxDOT May 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		184

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FILE: h:\00maintenance\south harris maintenance\2020 contracts\6357-02-001\
DATE: 1/4/2021
PROJECT: 6375-52-001

FILE: h:\00maintenance\south harris maintenance\2020 contracts\6357-02-001\tlrs-17.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001

METHOD 3: WOOD SKID

STEPS:

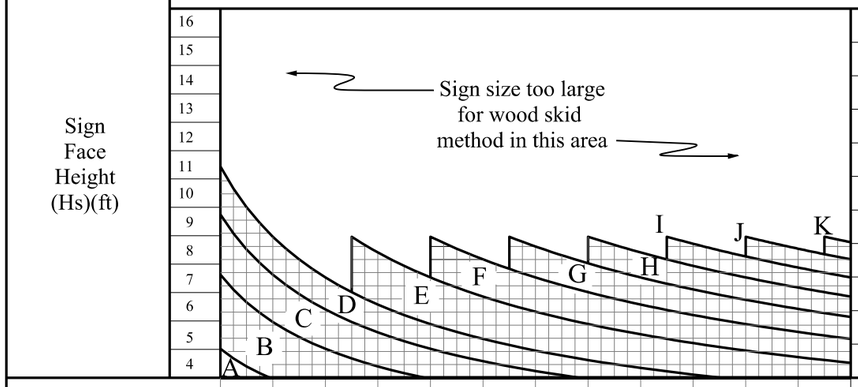
Step 1. Determine sign height (Hs) and width (Ws). Note that the wood skid method is only intended for use on level terrain. The skid height from ground to bottom of sign is 7'6". If this causes the distance from edge of pavement to the bottom of the sign to be less than 7', the wood skid method is not to be used.

Step 2. Determine number of 4"x6" (nominal 3.5"x 5.5") posts from Figure 3 below. Determine spacing of posts (A) and distance from edge of sign to outside posts (0.5A) from 'Post Spacing and Sign Placement' detail.

Step 3. Determine number of 40 pound sandbags from Figure 4.

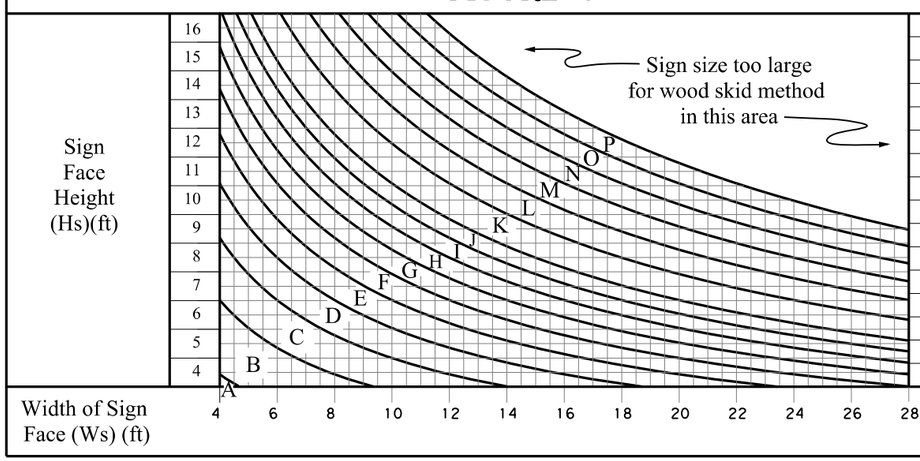
Step 4. Assemble skid as shown on TLRS(4) standard. Attach sign (plywood or extruded aluminum) using a method on TLRS(3). Wooden parts are not required to be painted.

FIGURE 3



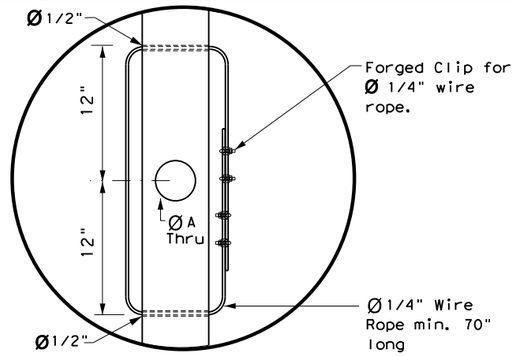
Post Qty	Post Size
K 9	3.5" x 5.5"
J 8	3.5" x 5.5"
I 7	3.5" x 5.5"
H 6	3.5" x 5.5"
G 5	3.5" x 5.5"
F 4	3.5" x 5.5"
E 3	3.5" x 5.5"
D 2	3.5" x 5.5"
C 3	3.5" x 3.5"
B 2	3.5" x 3.5"
A 1	3.5" x 3.5"

FIGURE 4



Bags
P 110
O 100
N 090
M 080
L 070
K 060
J 050
I 045
H 040
G 035
F 030
E 025
D 020
C 015
B 010
A 005

WIRE ROPE BREAKAWAY FEATURE

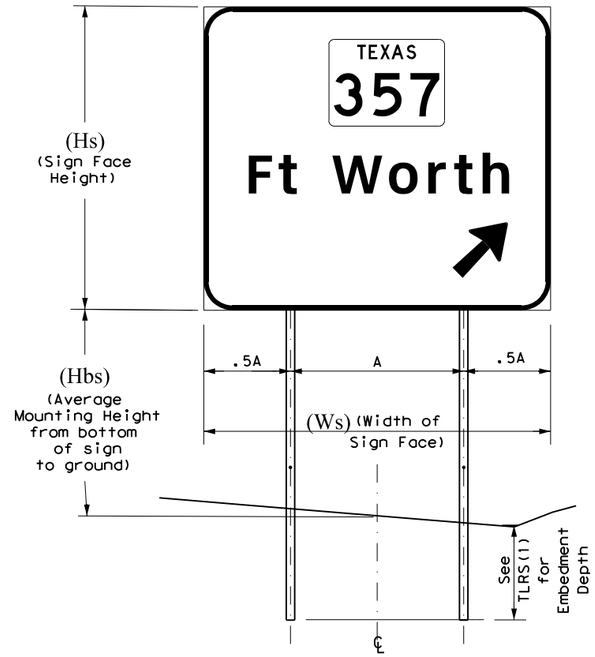


DETAIL B

NOTES:

1. Wire rope breakaway feature required on all wooden posts. This breakaway feature includes the clamped cable with 2 holes to mount the cable, 4 cable clips, and hole A which the cable surrounds.
2. Breakaway feature is designed so wooden post fractures at hole A, with post staying attached to sign structure via the clamped cable.

POST SPACING AND SIGN PLACEMENT



WOODEN POST SPACING NOTES:

1. Spacing between posts: A = Ws / # of posts required
2. Spacing between edge of sign and outside posts: 0.5A

STEEL POST SPACING NOTE:

See SMD(2-3)for post spacing unless reusing existing sign posts.

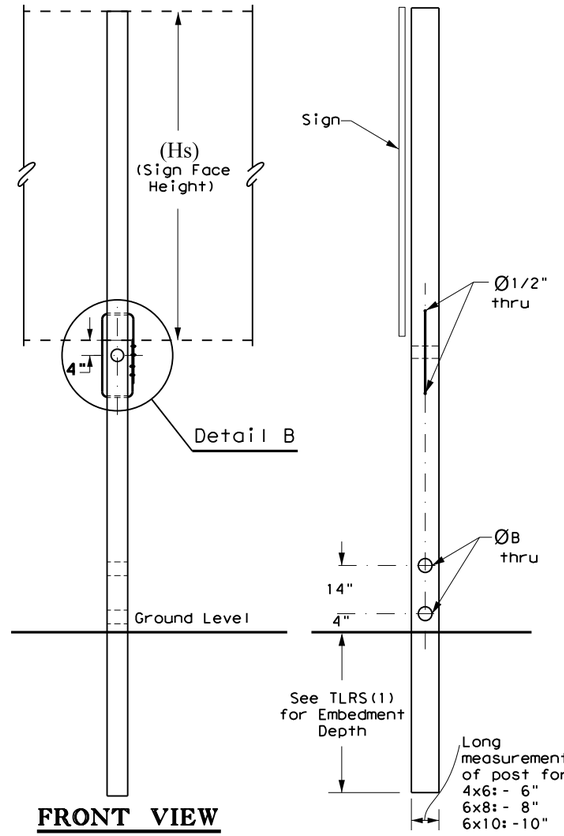
SIGN PLACEMENT NOTE:

See SMD(2-3)for sign placement details.

WOOD POST

TABLE 1

Support Size	ØA	ØB
4x6	1 1/2"	2"
6x8	3 5/8"	4"
6x10	3 5/8"	4"



NOTE:

All holes shown here are required for breakaway features to function properly.

SHEET 2 OF 4

Texas Department of Transportation | Traffic Operations Division Standard

TEMPORARY LARGE ROADSIDE SIGNS

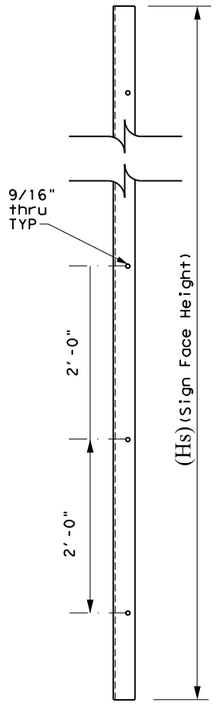
TLRS(2)-17

FILE: tlrs-17.dgn	DN:	CK:	DW:	CK:
©TxDOT May 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		185

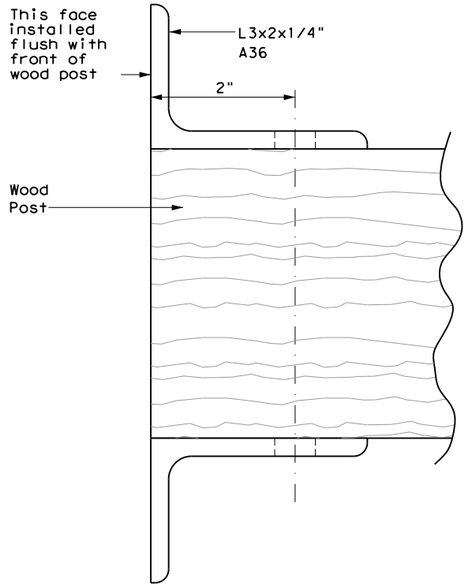
29G

FILE: h:\00maintenance\south harris maintenance\2020 contracts\6357-02-001
DATE: 1/4/2021
PROJECT: 6375-52-001

ANGLE STIFFENER METHOD (WOOD POST)



SIDE VIEW

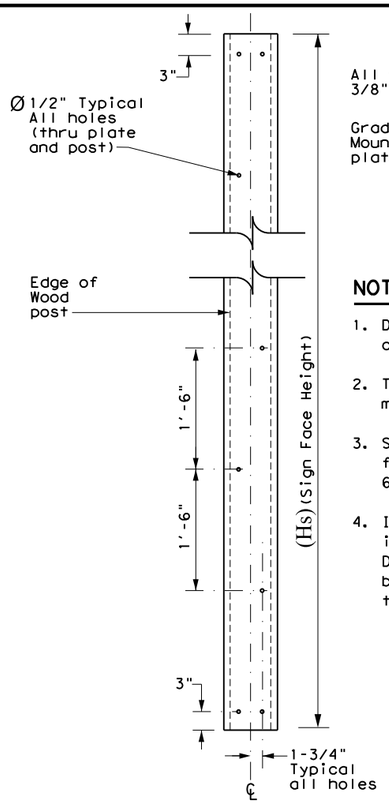


TOP VIEW

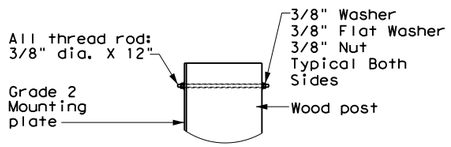
NOTES:

1. Drill holes evenly spaced from each edge of angle stiffener, with 2' between holes.
2. Attach 2 angle stiffeners to each post using A307 1/2" dia. x 2" long lag screws for 4x6 post, or A307 1/2" dia. x 3" long lag screws for 6x8 or 6x10 post.

MOUNTING PLATE METHOD (WOOD POST)



FRONT VIEW

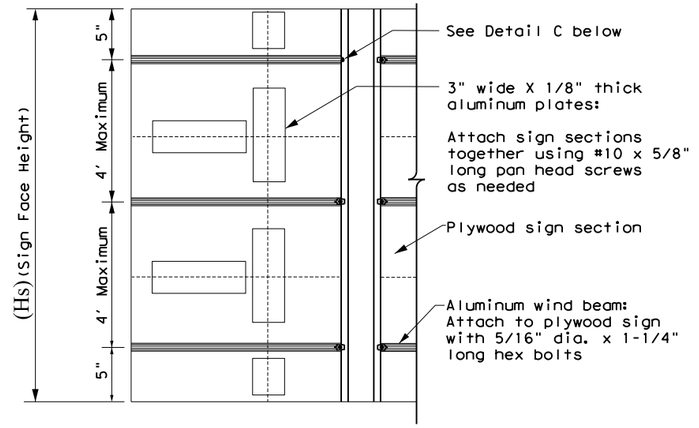


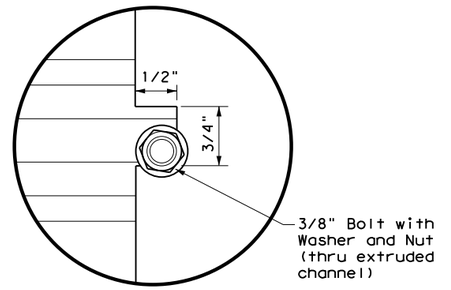
SIDE VIEW

NOTES:

1. Drill holes evenly spaced from each edge of mounting plate, with 1'6" between holes.
2. Two holes drilled 3" from each end of mounting plate.
3. Steel mounting plate 6" wide x 1/4" thick for 4x6 post, or 8" wide x 1/4" thick for 6x8 or 6x10 post.
4. Install mounting plate so plate overhang is the same on both sides of wood post. Drill 1/2" dia. holes thru wood post before attaching mounting plate using 3/8" threaded rod.

MOUNTING A PLYWOOD SIGN



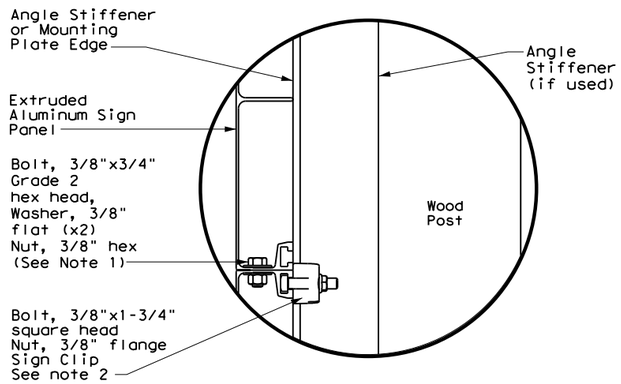


DETAIL C

NOTES:

1. Recommended sign thickness 5/8".
2. Attach an aluminum wind beam approx. 5" from the top and bottom of sign thru the width of the sign and then as needed so there is a maximum 4' spacing between beams.
3. Attach sign sections with aluminum plates as needed.
4. Attach sign to post using bolts with sign clips as shown in 'Mounting Plate and Angle Stiffener Attachment to Extruded Aluminum Sign' detail. On the top bolt, cut out a 1/2" wide x 3/4" tall notch and tighten the bolt in the notch with a nut and washer. A sign clip is not used here. See Detail C.
5. This option works for the angle stiffener or mounting plate methods. Clamp plate method not recommended with aluminum wind beams.
6. Alternatively, contractor may drill holes thru plywood sign and attach to post using angle stiffener, mounting plate, or clamp plate method. Vertical bolt spacing should not be greater than 12" with 3/8" bolts.

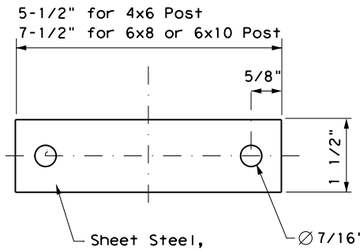
MOUNTING PLATE AND ANGLE STIFFENER ATTACHMENT TO EXTRUDED ALUMINUM SIGN

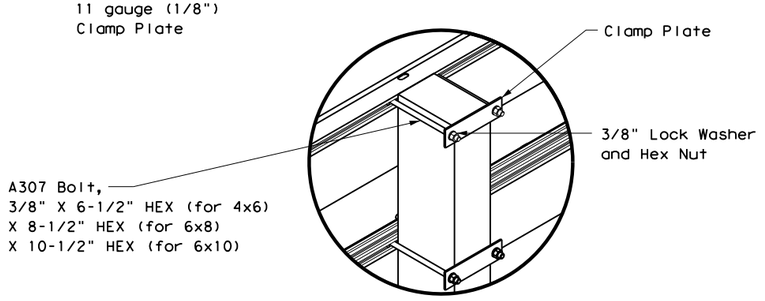


NOTES:

1. Space this hardware at 24" at each joint between panels.
2. Install this hardware on both sides of the wood post for proper attachment.

CLAMP PLATE METHOD (WOOD POST)





SHEET 3 OF 4

Texas Department of Transportation | Traffic Operations Division Standard

TEMPORARY LARGE ROADSIDE SIGNS: MOUNTING DETAILS

TLRS(3)-17

FILE: tlrs-17.dgn	DN:	CK:	DW:	CK:
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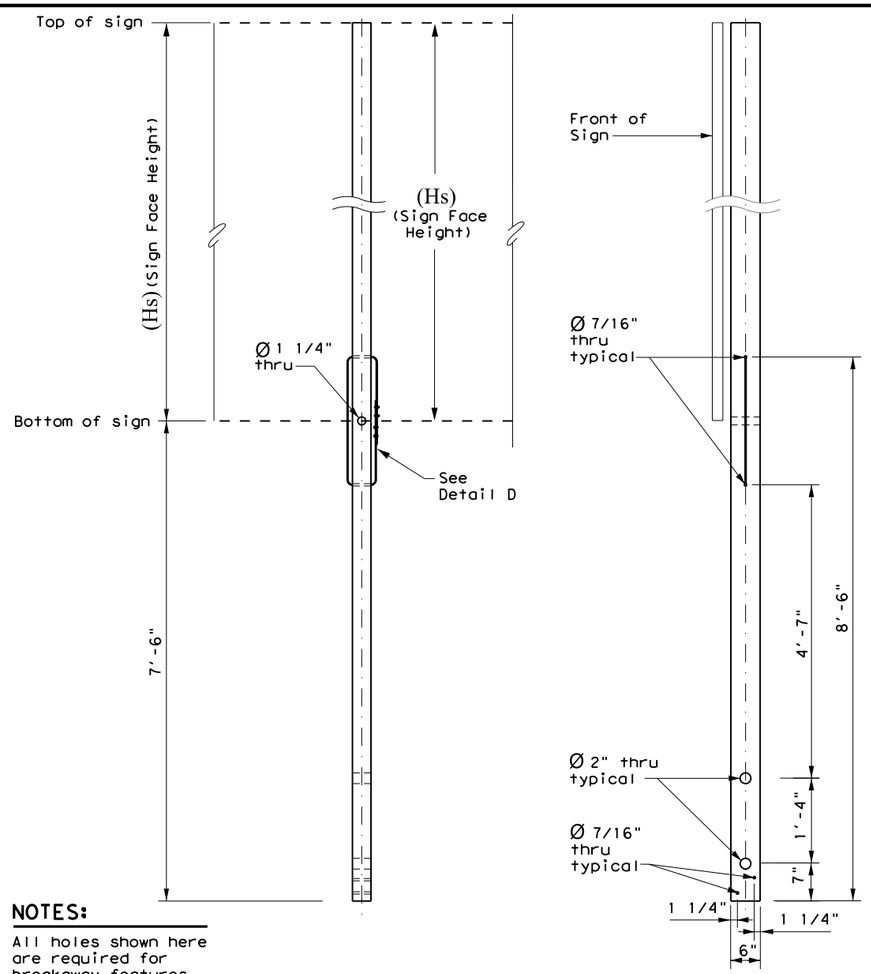
	12	HARRIS/GAL		186

29H

FILE: h:\00maintenance\south harris maintenance\2020 contracts\6357-02-001
DATE: 1/4/2021
PROJECT: 6375-52-001

WOOD POST (4 x 6)



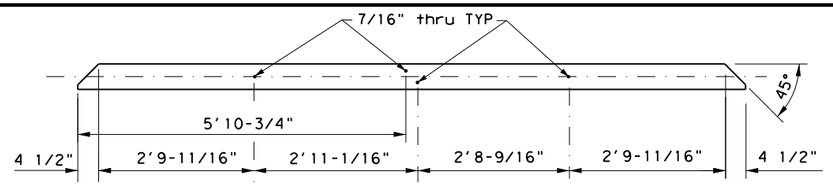
NOTES:

All holes shown here are required for breakaway features to function properly.

FRONT VIEW

SIDE VIEW

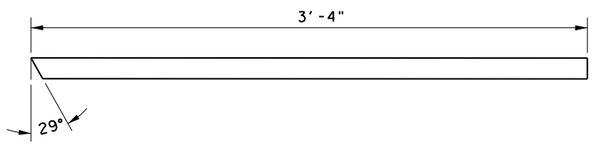
SKID (2 x 6)



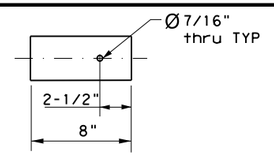
NOTES:

The 2 center holes are drilled 1-1/4" above and below skid centerline for attachment to post.

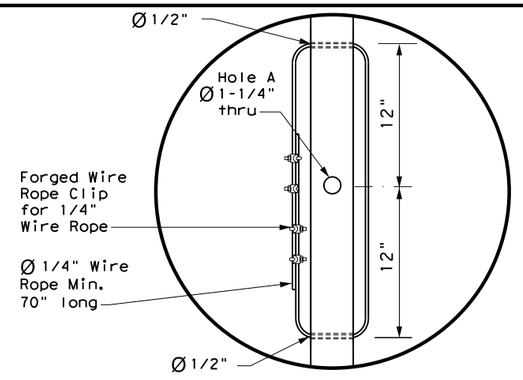
BRACE (2 x 4)



BRACE BLOCK (4 x 4)



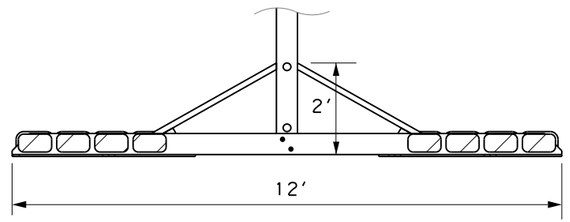
WIRE ROPE BREAKAWAY FEATURE



DETAIL D

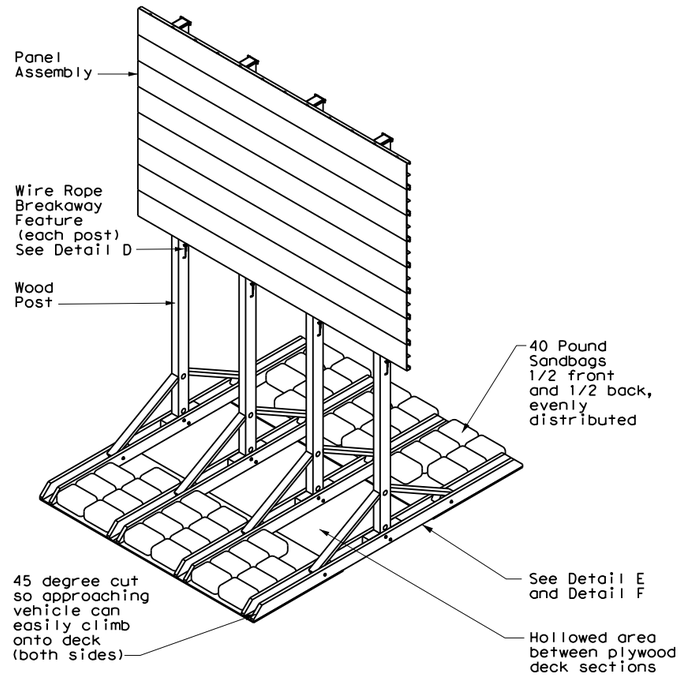
NOTES:

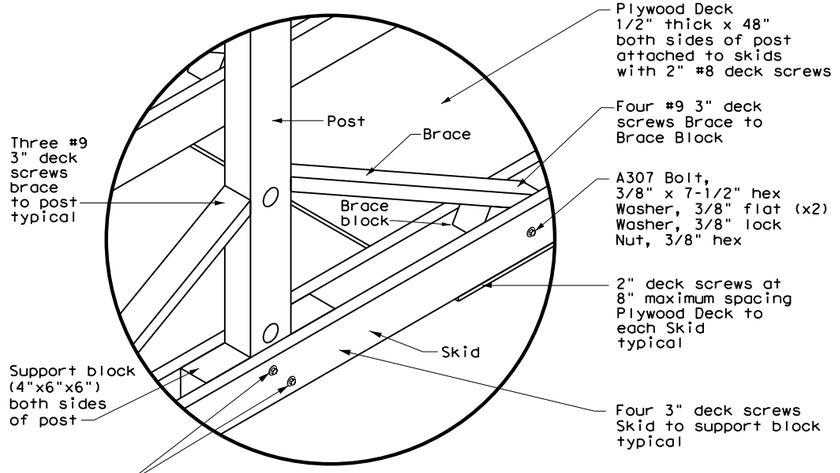
1. Wire rope breakaway feature required on all wooden posts. This breakaway feature includes the clamped cable with 2 holes to mount the cable, 4 cable clips, and hole A which the cable surrounds.
2. Breakaway feature is designed so wood post fractures at hole A, with post staying attached to sign structure via the clamped cable.



DETAIL E

WOOD SKID





DETAIL F

NOTE:

Contractor shall have the option to use another method to support the sandbags, provided the material under the sandbags does not exceed 0.75" in height. Examples include use of marine grade plywood or composite decking. Contractor may drill holes in plywood as needed for drainage.

Texas Department of Transportation

Traffic Operations Division Standard

TEMPORARY LARGE ROADSIDE SIGNS: WOOD SKID

TLRS(4)-17

FILE: tlrs-17.dgn	DN:	CK:	DW:	CK:
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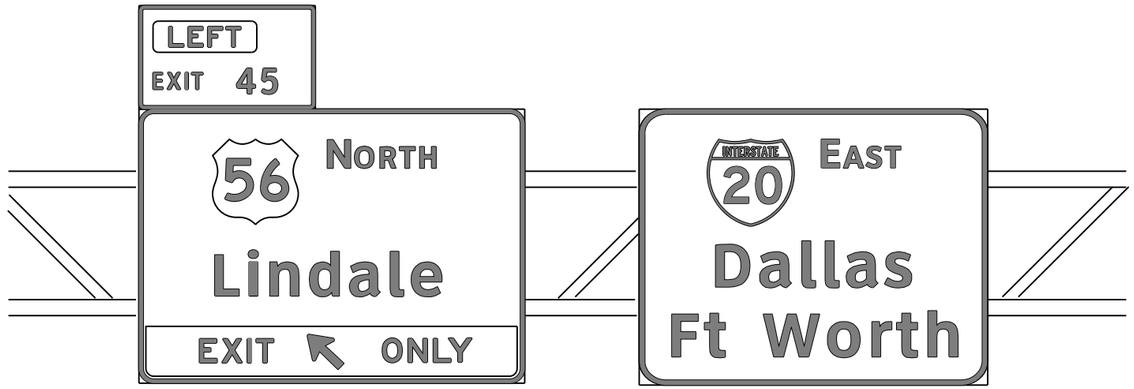
REVISIONS	6375	52	001	IH45
	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		187

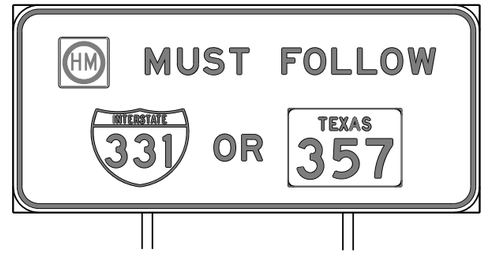
29J

FILE: h:\00rmaintenance\south harris maintenance\2020 contracts\6357-02-001
DATE: 1/4/2021
PROJECT: 6375-52-001

REQUIREMENTS FOR OVERHEAD AND LARGE GROUND-MOUNTED SIGNS

TYPICAL EXAMPLES





GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign summary sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Black legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod, or F).
   White legend shall use the Clearview Alphabet.
   The following Clearview fonts shall be used to replace the existing white FHWA lettering, when not specified in the SHSD or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be cut-out white sheeting applied to colored background sheeting.
6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius need not be trimmed or rounded if fabricated from an extruded material.
7. Sign substrate for ground-mounted signs shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative. Sign substrate for overhead signs shall be any material that meets DMS-7110. Exit Number Panels attached above the parent sign shall be made with the same substrate and sheeting as the parent sign.
8. Mounting details of attachments to parent sign face are shown on Standard Plan Sheet TSR(5). Mounting details of exit number panels above parent sign are shown in the "SMD series" Standard Plan Sheets.
9. Background sheeting shall be applied to the substrate per sheeting manufacturer's recommendations. Sheeting will not be allowed to bridge the horizontal gap between panels.
10. Cut all legend, symbols, borders, and direct applied sign attachments at panel joints.

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

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE B OR C SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

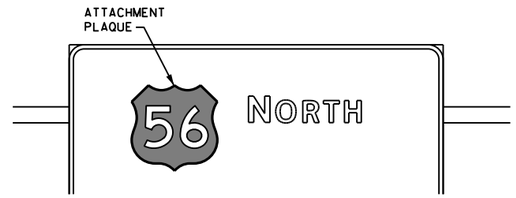
TSR(1)-13

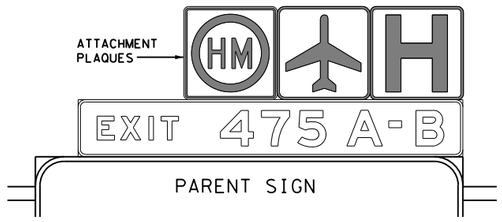
FILE: tsr1-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-03 7-13 9-08	6375	52	001	IH45
	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		188

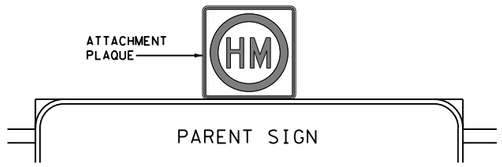
1

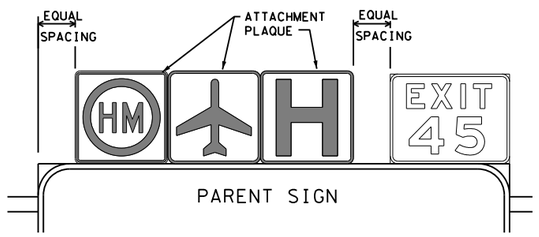
FILE: h:\00maintenance\south harris maintenance\2020 contracts\6357-02-001
DATE: 1/4/2021
PROJECT: 6375-52-001

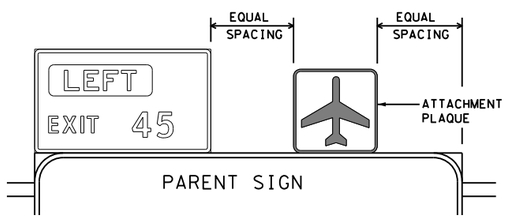
REQUIREMENTS FOR ATTACHMENTS TO OVERHEAD AND LARGE GROUND MOUNTED SIGNS











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

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B OR C SHEETING

GENERAL NOTES

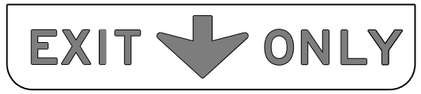
1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Route Marker legends (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod, or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to white background sheeting, or combination thereof.
7. Route markers and other attachments within the parent sign face shall be direct applied unless otherwise specified in the plans. Attachments not direct applied shall use 0.063 inch thick one piece sheet aluminum signs (Type A).
8. General Service Plaques shall be 0.080 inch thick and Routing Plaques shall be 0.100 inch thick.
9. The priority for Routing Plaques shall be (left to right) Hazardous Material, Airport then Hospital. See examples for mounting location.
10. Mounting details of attachments to parent signs face are shown on Standard Plan Sheet TSR(5). Mounting details of sign plaque attachments above and below parent sign are shown in the "SMD series" Standard Plan Sheets.
11. Plaques shall be horizontally centered at the top of the parent sign. If an exit number panel exists, the plaque shall be centered between the edge of the parent sign and the edge of the exit number panel. The plaque may be placed above the exit number panel when there is insufficient space.

TYPICAL EXAMPLES

REQUIREMENTS FOR EXIT ONLY AND LEFT EXIT PANELS

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

SHEETING REQUIREMENTS FOR OVERHEAD EXIT PANELS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLUORESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND	BLACK	ACRYLIC NON-REFLECTIVE FILM



TYPICAL EXAMPLES

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD). Individual panel sizes shown in the plans may be adjusted to fit actual parent sign sizes if necessary.
2. Exit Panel legend shall use the Federal Highway Administration (FHWA)Standard Highway Alphabets E Series.
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend shall be applied by screening process or cut-out acrylic non-reflective black film to yellow background sheeting, or combination thereof.
5. Exit Only and Left Exit panels within the parent sign face shall be direct applied unless otherwise specified in the plans. Panels not direct applied shall use 0.063 inch thick one piece sheet aluminum signs (Type A).
6. Mounting details of Exit Only and Left Exit panel attachments to parent signs face are shown on Standard Plan Sheet TSR(5).

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

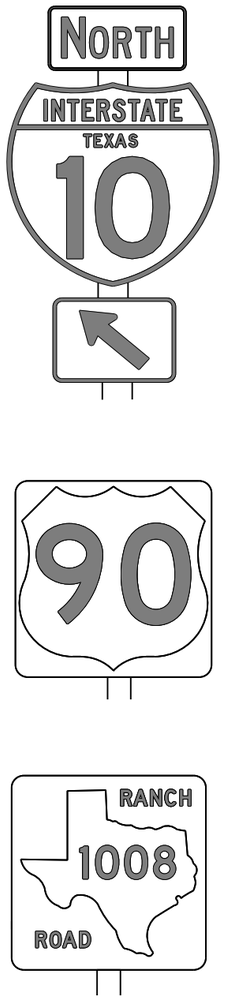
TSR(2)-13

FILE: tsr2-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	12	HARRIS/GAL		189
2				

FILE: h:\00xmaintenance\south harris maintenance\2020 contracts\6357-02-001\tsr3-13.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

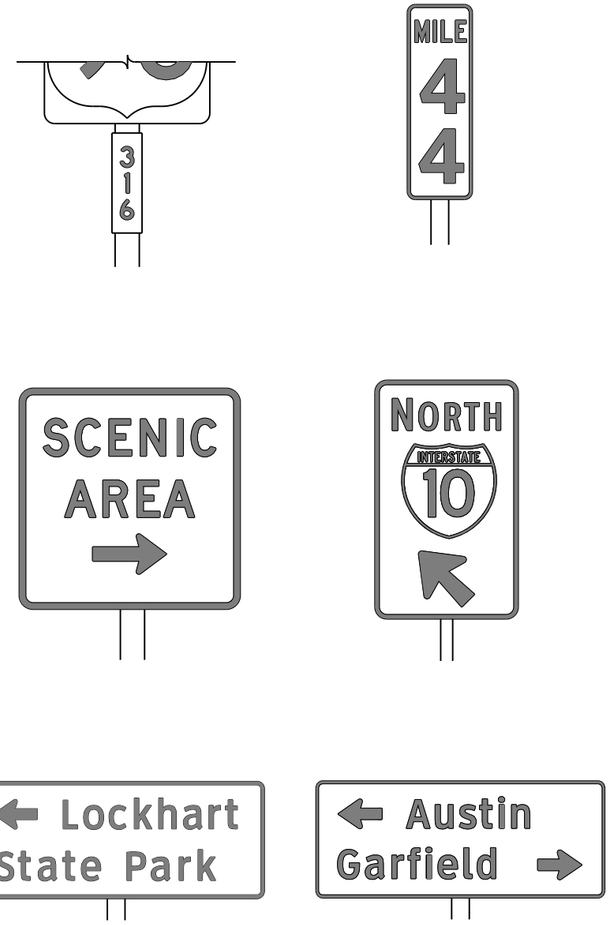
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



TYPICAL EXAMPLES

REQUIREMENTS FOR BLUE, BROWN & GREEN D AND I SERIES GUIDE SIGNS

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND, SYMBOLS & BORDERS	ALL OTHERS	TYPE B OR C SHEETING



TYPICAL EXAMPLES

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).

2. White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white Federal Highway Administration (FHWA) Standard Highway Alphabets, when not specified in the SHSD, or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

3. Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).

4. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.

5. Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.

6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.

7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.

8. Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

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

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

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(3)-13

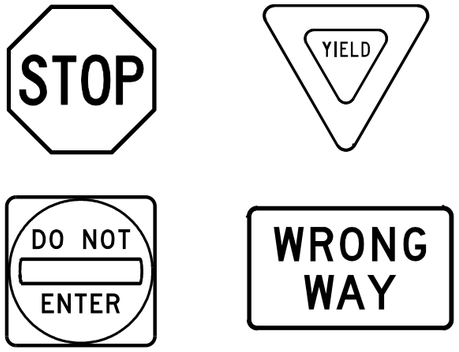
FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	12	HARRIS/GAL		190

3

FILE: h:\00maintenance\south harris maintenance\2020 contracts\6357-02-001\tsr4-13.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

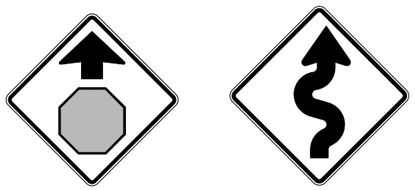
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND, BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

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

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

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

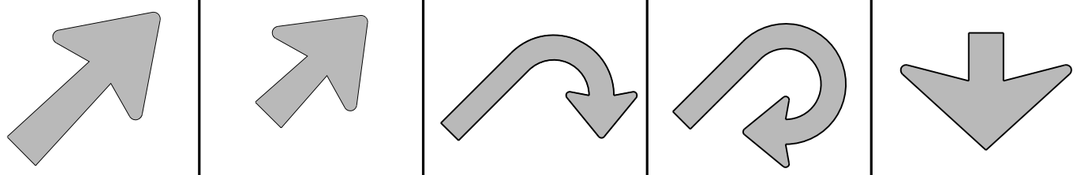
TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	12	HARRIS/GAL		191

4

ARROW DETAILS

for Large Ground-Mounted and Overhead Guide Signs



TYPE	LETTER SIZE	USE
A-1	10.67" U/L and 10" Caps	Single Lane Exits
A-2	13.33" U/L and 12" Caps	
A-3	16" & 20" U/L	
B-1	10.67" U/L and 10" Caps	Multiple Lane Exits
B-2	13.33" U/L and 12" Caps	
B-3	16" & 20" U/L	

CODE	USED ON SIGN NO.
E-3	E5-1aT
E-4	E5-1bT

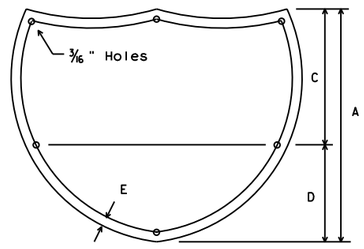
NOTE

Arrow dimensions are shown in the "Standard Highway Sign Designs for Texas" manual.

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

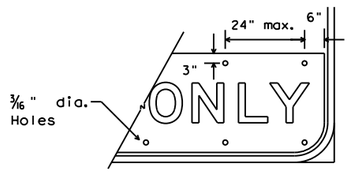
http://www.txdot.gov/

SIGN BLANK PUNCHING DETAILS FOR ATTACHMENTS WHEN SPECIFIED TO BE TYPE A ALUMINUM SIGNS (FOR MOUNTING TO GUIDE SIGN FACE)

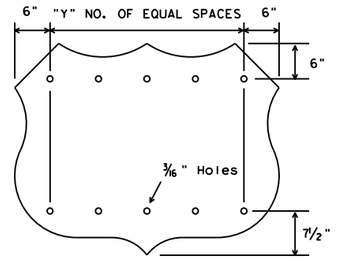


INTERSTATE ROUTE MARKERS

A	C	D	E
36	21	15	1 1/2
48	28	20	1 3/4

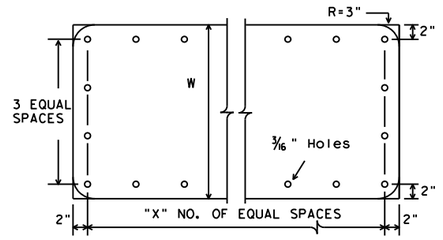


EXIT ONLY PANEL



U.S. ROUTE MARKERS

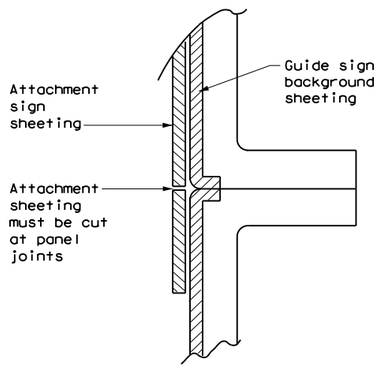
Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



STATE ROUTE MARKERS

No. of Digits	W	X
4	24	4
4	36	5
4	48	6
3	24	3
3	36	4
3	48	5

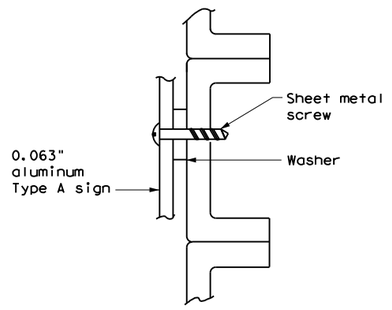
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



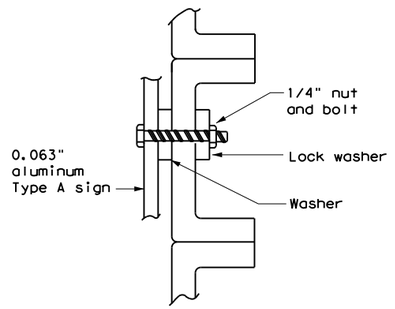
DIRECT APPLIED ATTACHMENT

NOTE:

1. Sheeting for legend, symbols, and borders must be cut at panel joints.
2. Direct applied attachment signs will be subsidiary to "Aluminum Signs" or "Fiberglass Signs".



SCREW ATTACHMENT



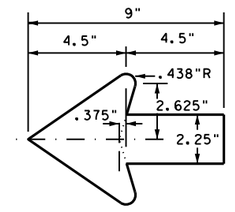
NUT/BOLT ATTACHMENT

NOTE:

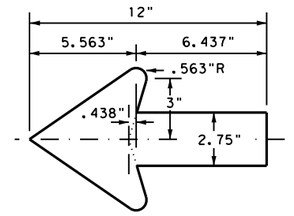
Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

ARROW DETAILS

for Destination Signs (Type D)



Standard arrow to be used with 6 inch letters.



Standard arrow to be used with 8 inch letters.

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

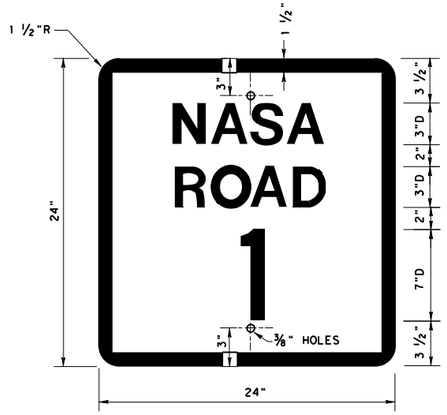
TSR(5)-13

FILE: tsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	12	HARRIS/GAL		192

5

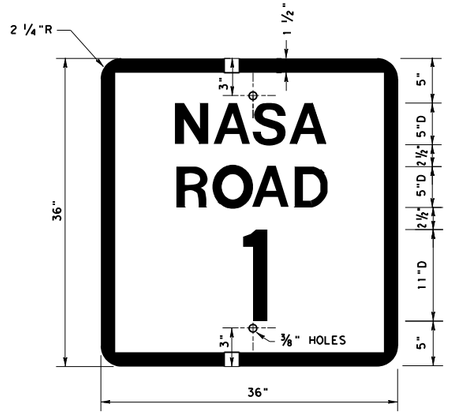
FILE: h:\00maintenance\south harris maintenance\2020 contracts\6357-02-001\
DATE: 1/4/2021
PROJECT: 6375-52-001

FOR INDEPENDENT MOUNTING



M1-6N
24"X24"

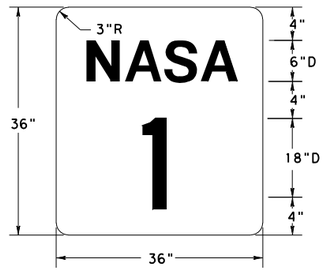
LETTERS - BLACK
NUMERALS - BLACK
BORDER - BLACK
BACKGROUND - WHITE REFLECTIVE



M1-6N
36"X36"

LETTERS - BLACK
NUMERALS - BLACK
BORDER - BLACK
BACKGROUND - WHITE REFLECTIVE

FOR ATTACHMENT TO GUIDE SIGNS



M1-6N(1)
36"X36"

LETTERS - BLACK
NUMERALS - BLACK
BACKGROUND - WHITE REFLECTIVE

For Department Material Specifications and General Notes see "TSR Series" Standard.

Texas Department of Transportation
Houston District

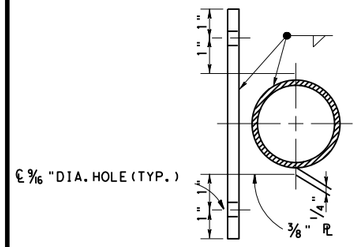
MISCELLANEOUS ROUTE MARKERS

M(MISC)-04

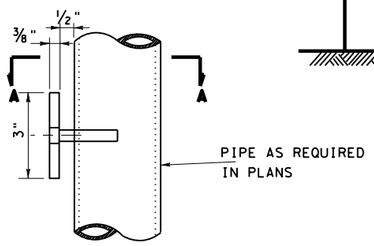
FILE:	DN:	CK:	DW:	CK:
© TxDOT 1998	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS	12	6	RMC 6375-52-001	193
	COUNTY	CONTROL	SECT JOB	HIGHWAY
	HARRIS/GAL	6375	52 001	IH45

STD N-18

FILE: h:\00*maintenance\south harris maintenance\2020 contracts\6357-02-001*in45 general maintenance\Standards\SIGN STANDARDS 20\stdn18.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001

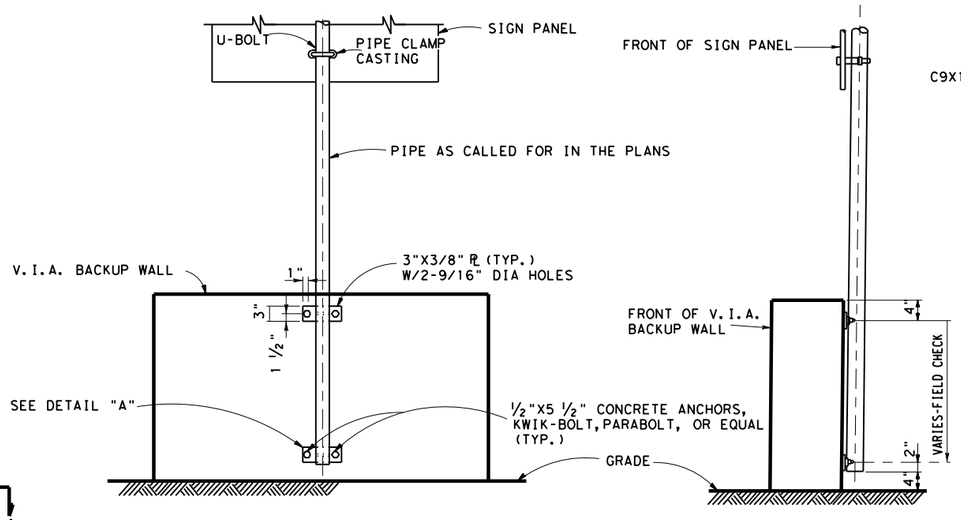


SECTION A-A



ELEVATION

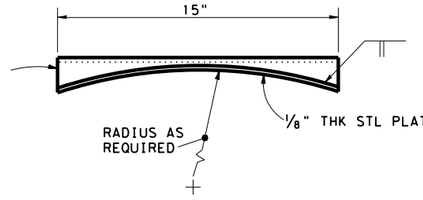
DETAIL "A"



ELEVATION

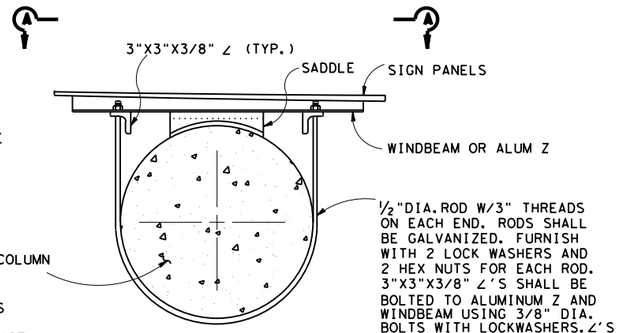
SIDE VIEW

SIGN SUPPORT ATTACHMENT TO V.I.A. BACKUP WALL FOR PIPE POSTS



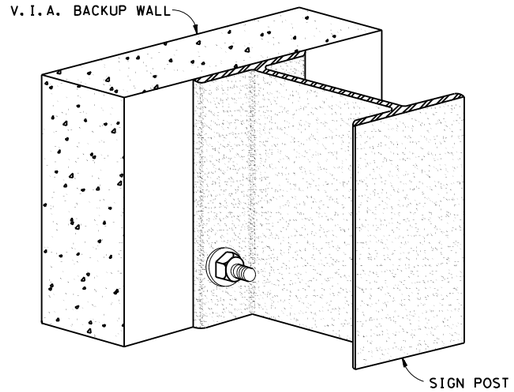
SADDLE DETAIL

SADDLES SHALL BE BOLTED TO ALUMINUM Z WITH 3/8" DIA. BOLTS, AND SHALL BE CLAMPED TO WINDBEAMS USING POST CLAMPS AS DETAILED ON THE SMD (2-11) SHEET. SADDLES SHALL BE GALVANIZED AND COATED WITH ZINC RICH PAINT.

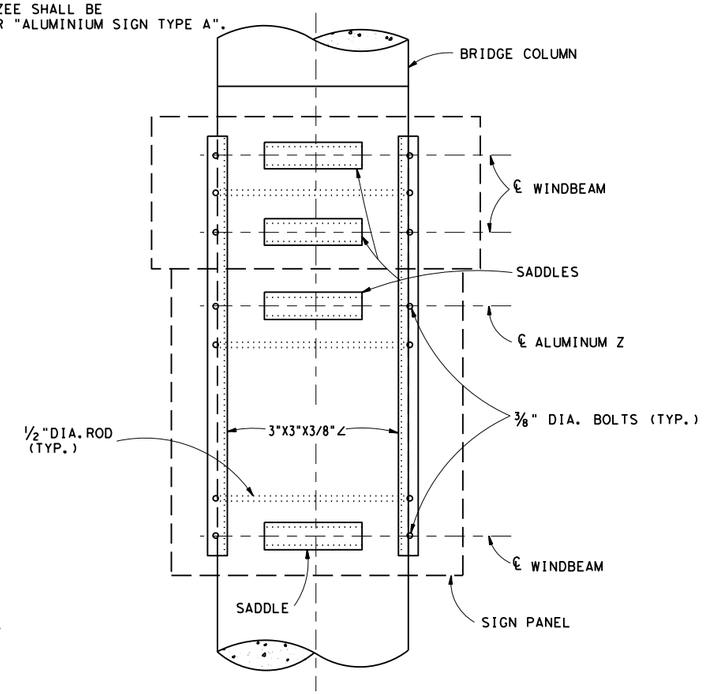


SIGN ATTACHMENT TO BRIDGE COLUMNS

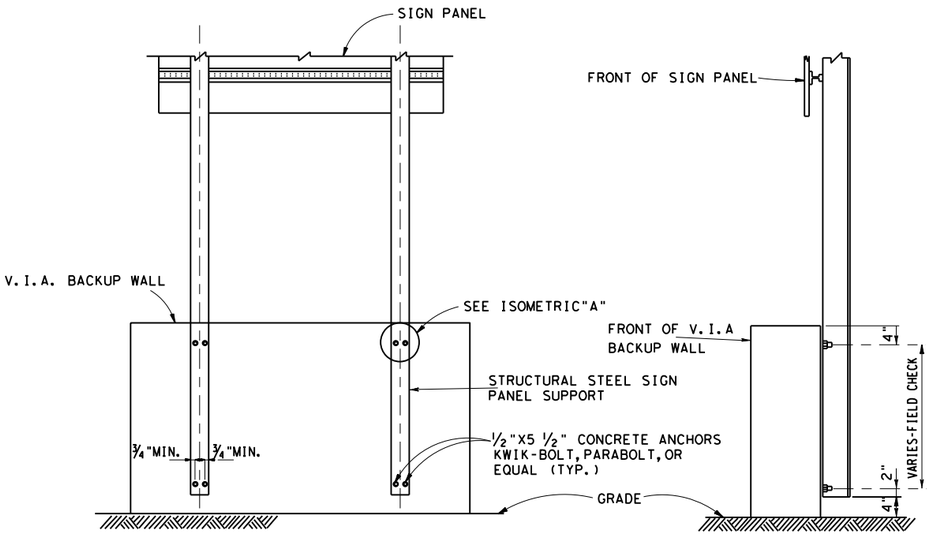
NOTES:
SADDLES, ∠'S, RODS WINDBEAMS AND ZEE SHALL BE INCLUDED IN THE UNIT PRICE BID FOR "ALUMINIUM SIGN TYPE A".



ISOMETRIC "A"



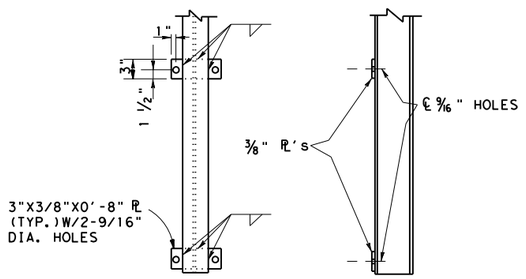
SECTION A-A
(LOOKING THRU PANELS)



ELEVATION

SIDE VIEW

SIGN SUPPORT ATTACHMENT TO V.I.A. BACKUP WALL FOR STRUCTURAL STEEL POSTS



ALTERNATE ATTACHMENT DETAIL

Texas Department of Transportation
Houston District

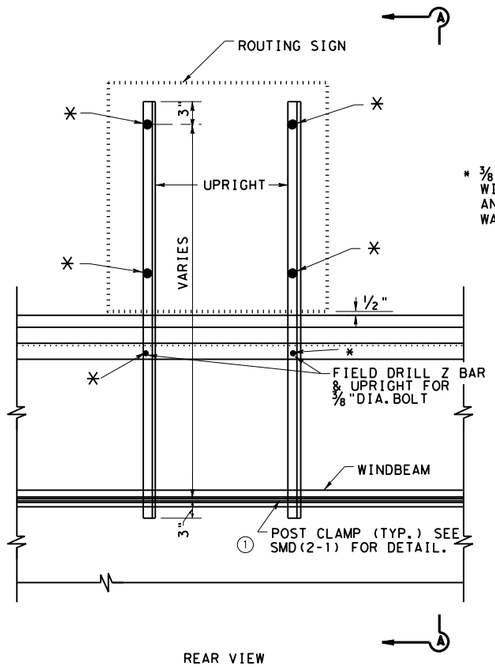
MISCELLANEOUS SIGN MOUNTING DETAILS

SMD (MISC) - 14

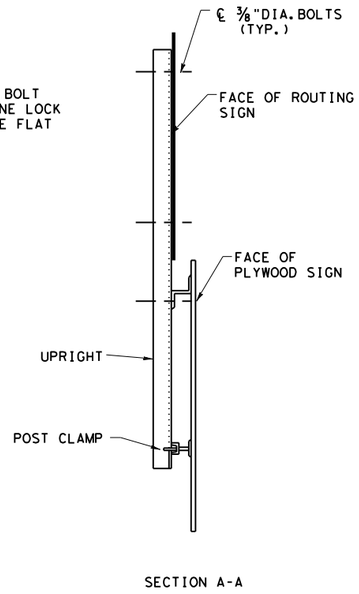
FILE:	DN:	CK:	DW:	CK:
©TxDOT 1998	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 9-14 Saddle detail	12	6	RMC 6375-52-001	194
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	HARRIS/GAL	6375	52	001	IH45

STD N-19

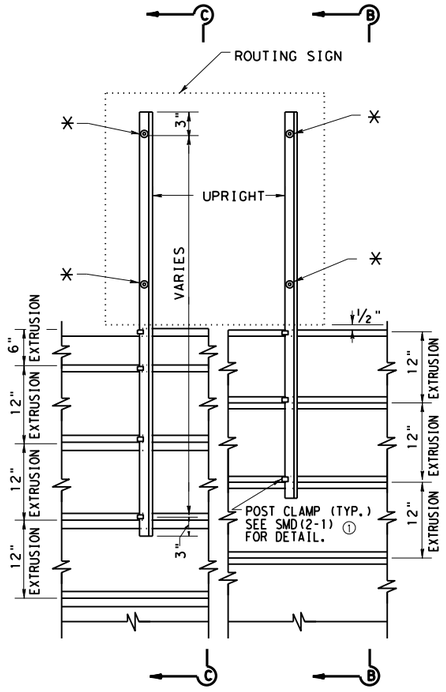
FILE: h:\00*maintenance\south harris maintenance\2020 contracts\6357-02-001*in45 general maintenance\Standards\SIGN STANDARDS 20\stdn19.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001



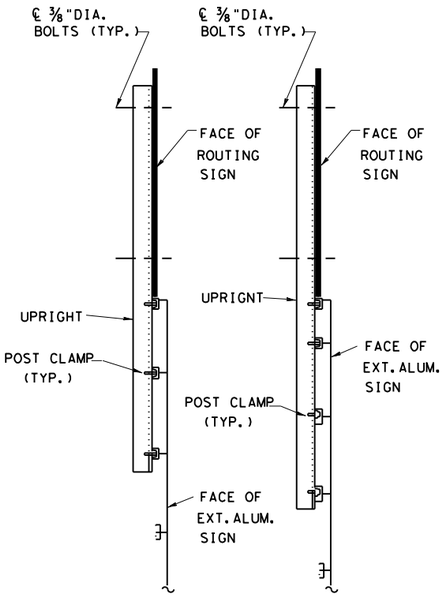
REAR VIEW



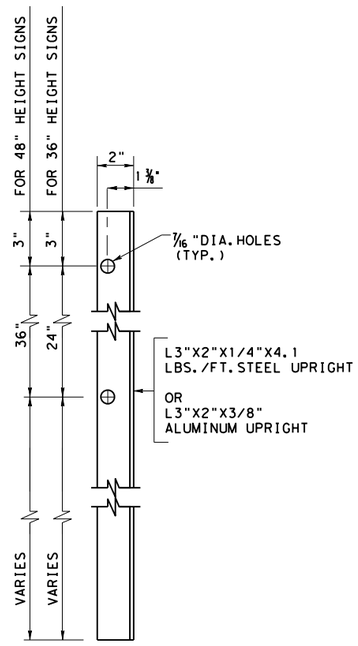
SECTION A-A



REAR VIEW



SECTION B-B SECTION C-C



UPRIGHT SUPPORT DETAIL

ATTACHMENT TO PLYWOOD SIGNS

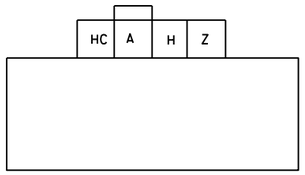
ATTACHMENT TO EXTRUDED ALUMINUM SIGNS

NOTE: UPRIGHT SUPPORT SHALL EXTEND OVER AT LEAST TWO 12" EXTRUSIONS

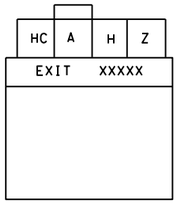
NOTES:

UPRIGHT TO BE OF STRUCTURAL STEEL, ASTM A-36, AND GALVANIZED AFTER FABRICATION OR ALUMINUM 6061-T6.

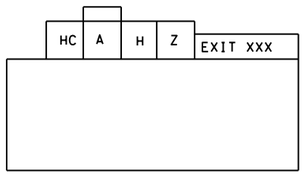
ALL BOLTS, NUTS, AND WASHERS SHALL BE GALVANIZED.



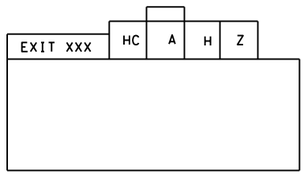
ABOVE GUIDE SIGNS WITHOUT EXIT NUMBER PANELS



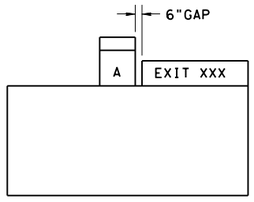
ABOVE EXIT NUMBER PANELS



RIGHT EXITS



LEFT EXITS



GAP FOR AIRPORT SIGN ONLY

NOTES:

WHERE MORE THAN ONE ROUTING SIGN IS REQUIRED ON THE SAME GUIDE SIGN, THE ORDER OF INSTALLATION SHALL BE, FROM LEFT TO RIGHT, HAZARDOUS CARGO - AIRPORT - HOSPITAL - ZOO.

A GAP OF 6"SHALL BE REQUIRED BETWEEN THE AIRPORT SIGN AND THE EXIT NUMBER PANEL. BECAUSE THEY EACH HAVE THE SAME BACKGROUND COLOR.

AT LOCATIONS WHERE THE ROUTING SIGNS CANNOT BE PLACED ADJACENT TO THE EXIT NUMBER PANEL, THEY SHALL BE CENTERED ABOVE IT.

THE ROUTING SIGNS SHALL BE CENTERED ABOVE THOSE GUIDE SIGNS WHICH DO NOT HAVE AN EXIT NUMBER PANEL.

TYPICAL ROUTING SIGN INSTALLATIONS

Texas Department of Transportation
Houston District

ATTACHMENT DETAILS FOR ROUTING SIGNS

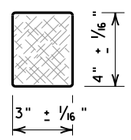
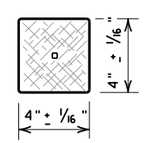
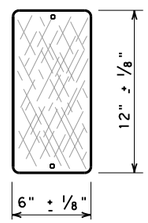
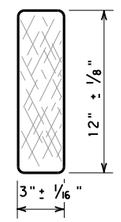
SMD(RSD)-96

FILE:	DN:	CK:	DW:	CK:	
©TxDOT 1998	DIST	FED REG	PROJECT NO.		SHEET
REVISIONS	12	6	RMC 6375-52-001		195
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	HARRIS/GAL		6375	52	001	IH45

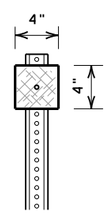
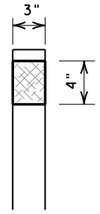
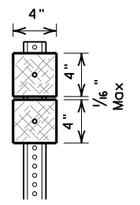
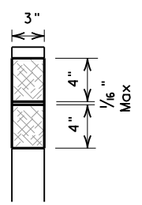
STD N-20

FILE: h:\00*maintenance\south harris maintenance\2020 contracts\6357-02-001*in45 general maintenance\Standards\SIGN STANDARDS 20\stdn20.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			

DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

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

NUMBER OF REFLECTORS
S = Single
D = Double

COLOR OF REFLECTORS
W = White
Y = Yellow
R = Red

REFLECTOR UNIT SIZE
1 or 2

TYPE OF POST OR DELINEATOR
WC = Wing Channel Post
YFLX = Yellow Flexible Post
WFLX = White Flexible Post
BRF = Barrier Reflector

TYPE OF MOUNT
GND = Embedded (drivable or set in concrete)
CTB = Concrete Barrier Mount
GF1 or GF2 = Guard Fence Attachment
SRF = Surface Mount

DIRECTION
If Required
BI = Bi-Directional
BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
1, 2, 3, or 4

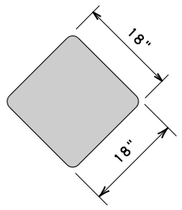
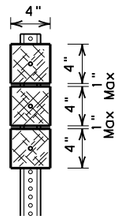
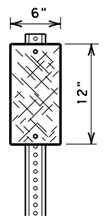
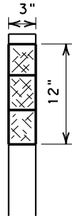
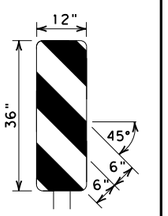
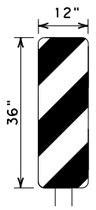
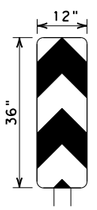
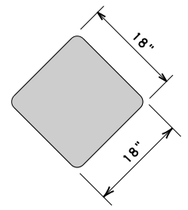
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

TYPE OF POST
WC = Wing Channel Post
WFLX = White Flexible Post
TWT = Thin Walled Tubing

TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

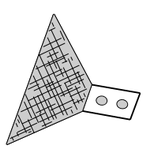
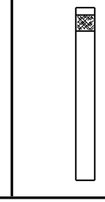
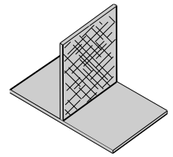
OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

DEPARTMENTAL MATERIAL SPECIFICATIONS

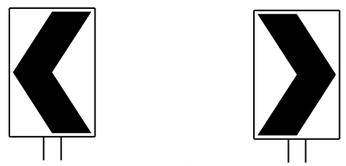
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

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

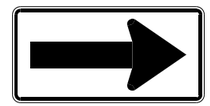


SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	

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



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	6375	52	001	IH45
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	12	HARRIS/GAL		196

20A

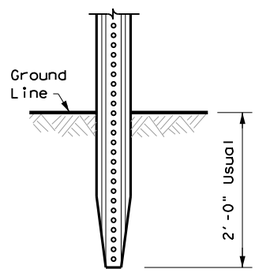
FILE: t:\Ogen-ao\Omaintenance\000*new contracts\ih 45 general maintenance\Standards\DELINEATOR 20\dom1-20.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001

FILE: t:\0*gen-ao\0*maintenance\000*new contracts\in 45 general maintenance\Standards\DELINEATOR 20\dom2-20.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

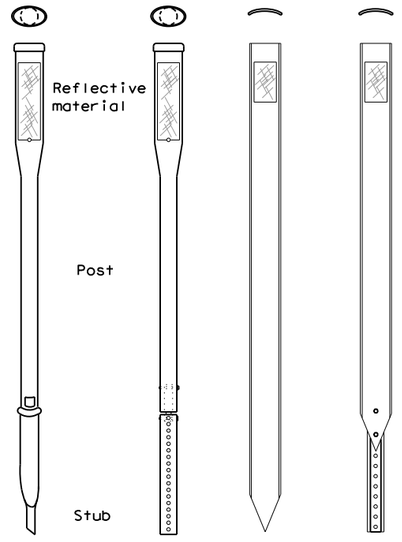


NOTES

1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

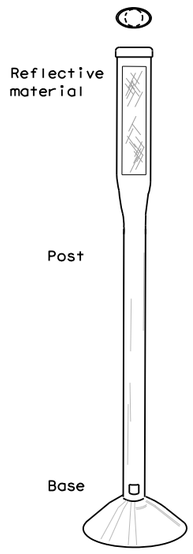
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



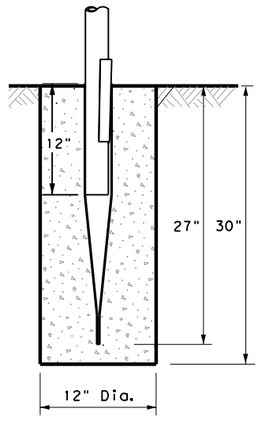
SURFACE MOUNT

NOTES

1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

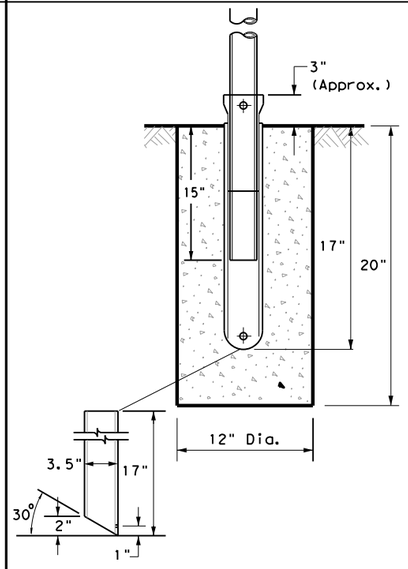
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

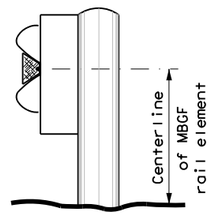
NOTE

1. Install per manufacturer's recommendations.

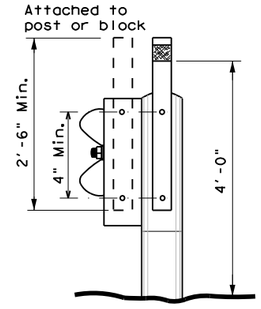
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

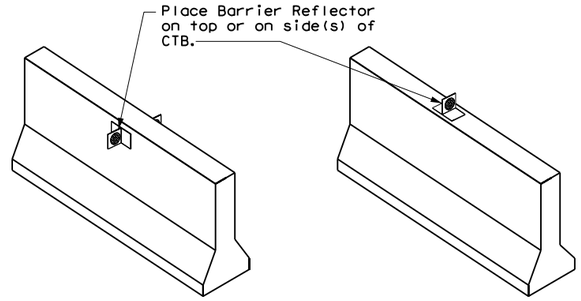
GF1



GF2



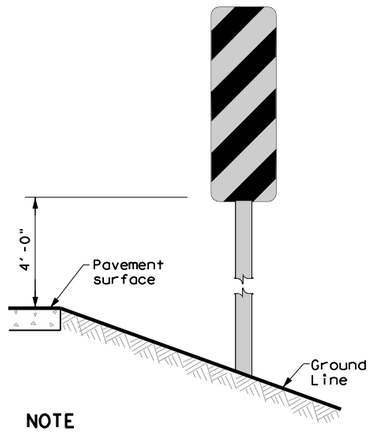
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

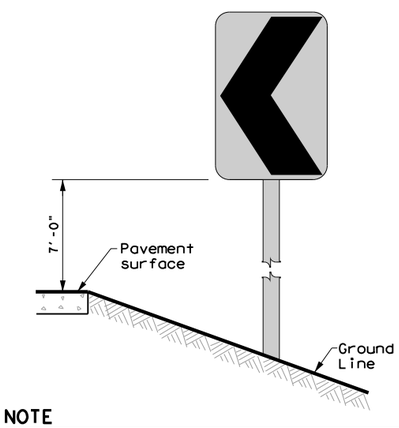
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

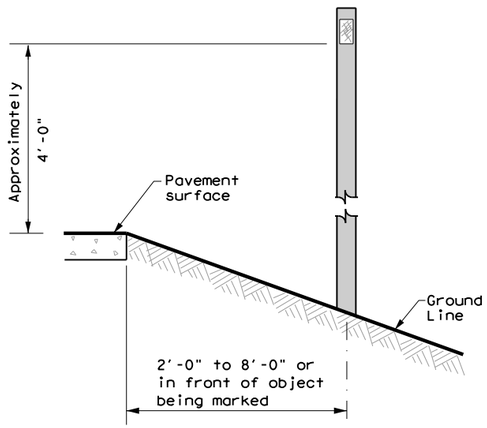
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

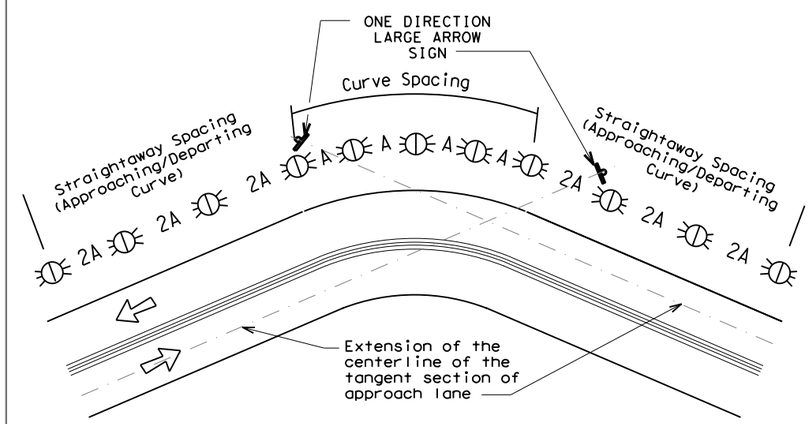
FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	12	HARRIS/GAL		197

20B

MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

Amount by which Advisory Speed is less than Posted Speed	Curve Advisory Speed	
	Turn (30 MPH or less)	Curve (35 MPH or more)
5 MPH & 10 MPH	• RPMs	• RPMs
15 MPH & 20 MPH	• RPMs and One Direction Large Arrow sign	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons.
25 MPH & more	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons	• RPMs and Chevrons

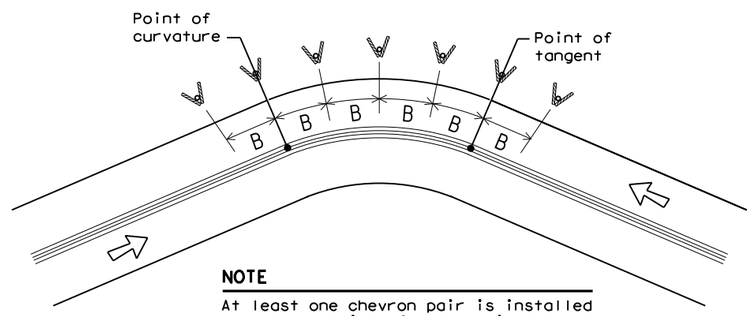
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

ONE DIRECTION LARGE ARROW (W1-6) sign should be located at approximately and perpendicular to the extension of the centerline of the tangent section of approach lane.

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

At least one chevron pair is installed beyond the point of tangent in tangent section.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

Degree of Curve	FEET			
	Radius of Curve	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
		A	2A	B
1	5730	225	450	——
2	2865	160	320	——
3	1910	130	260	200
4	1433	110	220	160
5	1146	100	200	160
6	955	90	180	160
7	819	85	170	160
8	716	75	150	160
9	637	75	150	120
10	573	70	140	120
11	521	65	130	120
12	478	60	120	120
13	441	60	120	120
14	409	55	110	80
15	382	55	110	80
16	358	55	110	80
19	302	50	100	80
23	249	40	80	80
29	198	35	70	40
38	151	30	60	40
57	101	20	40	40

Curve delineator approach and departure spacing should include 3 delineators spaced at 2A. This spacing should be used during design preparation or when the degree of curve is known.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

If the degree of curve is not known, delineator spacing may be determined based on the Advisory Speed of the curve. Use the delineator curve spacing for each Advisory Speed (MPH).

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

CONDITION	REQUIRED TREATMENT	MINIMUM SPACING
Frwy./Exp. Tangent	RPMs	See PM-series and FPM-series standard sheets
Frwy./Exp. Curve	Single delineators on right side	See delineator spacing table
Frwy/Exp.Ramp	Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 3 on D&OM(4))	100 feet on ramp tangents Use delineator spacing table for ramp curves ("straightway spacing" does not apply to ramp curves)
Acceleration/Deceleration Lane	Double delineators (see Detail 3 on D&OM(4))	100 feet (See Detail 3 on D & OM (4))
Truck Escape Ramp	Single red delineators on both sides	50 feet
Bridge Rail (steel or concrete)and Metal Beam Guard Fence	Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction	Equal spacing (100'max) but not less than 3 delineators
Concrete Traffic Barrier (CTB) or Steel Traffic Barrier	Barrier reflectors matching the color of the edge line	Equal spacing 100' max
Cable Barrier	Reflectors matching the color of the edge line	Every 5th cable barrier post (up to 100'max)
Guard Rail Terminus/Impact Head	Divided highway - Object marker on approach end Undivided 2-lane highways - Object marker on approach and departure end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5) and D & OM (6)
Bridges with no Approach Rail	Type 3 Object Marker (OM-3) at end of rail and 3 single delineators approaching rail	See D & OM(5)
Reduced Width Approaches to Bridge Rail	Type 2 and Type 3 Object Markers (OM-3) and 3 single delineators approaching bridge	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5)
Culverts without MBGF	Type 2 Object Markers	See Detail 2 on D & OM(4)
Crossovers	Double yellow delineators and RPMs	See Detail 1 on D & OM (4)
Pavement Narrowing (lane merge) on Freeways/Expressway	Single delineators adjacent to affected lane for full length of transition	100 feet

NOTES

1. Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
2. Barrier reflectors may be used to replace required delineators.
3. Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND	
	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

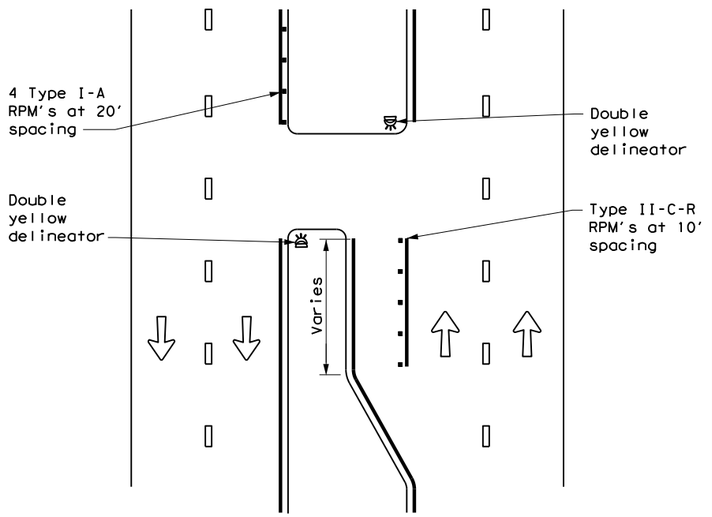
FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	12	HARRIS/GAL		198

20C

FILE: t:\0*gen-ao\0*maintenance\000*new contracts\in 45 general maintenance\Standards\DELINEATOR 20\dom3-20.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001

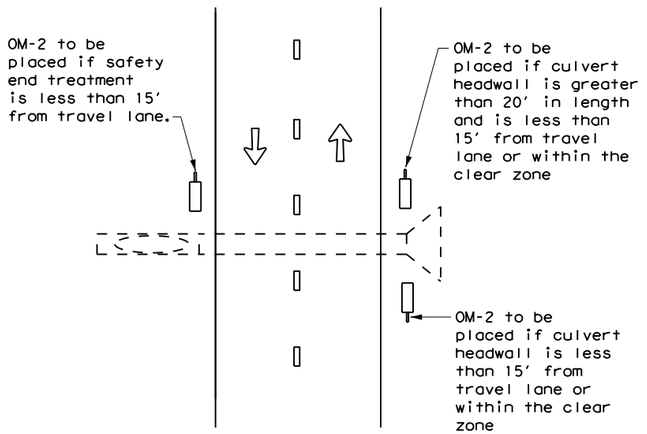
FILE: t:\0*gen-ao\0*maintenance\000*new contracts\ih 45 general maintenance\Standards\DELINEATOR 20\dom4-20.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001

CROSSOVERS



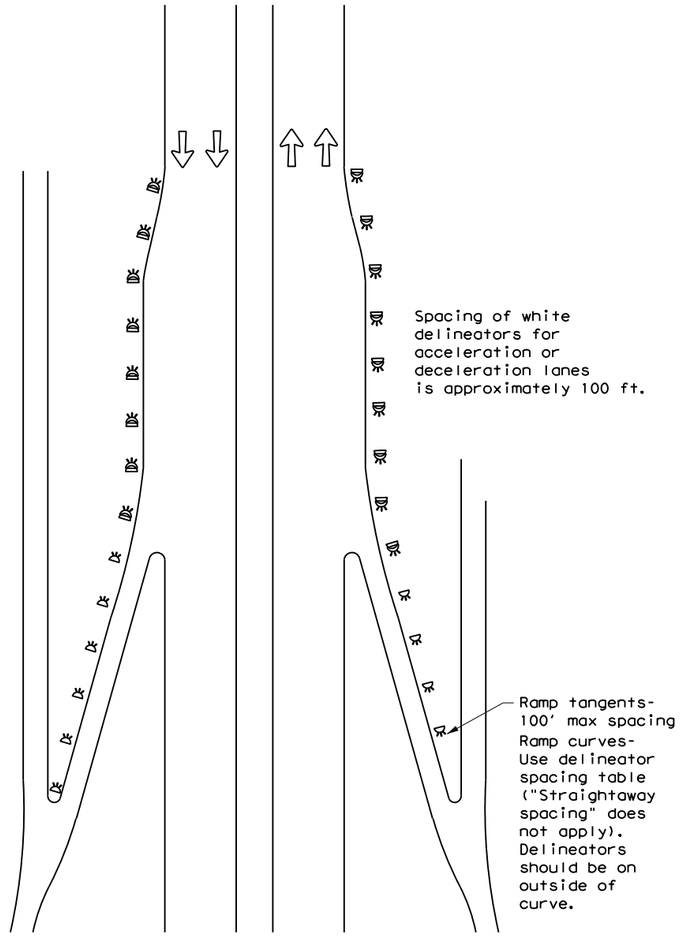
DETAIL 1

FOR CULVERTS WITHOUT MBGF



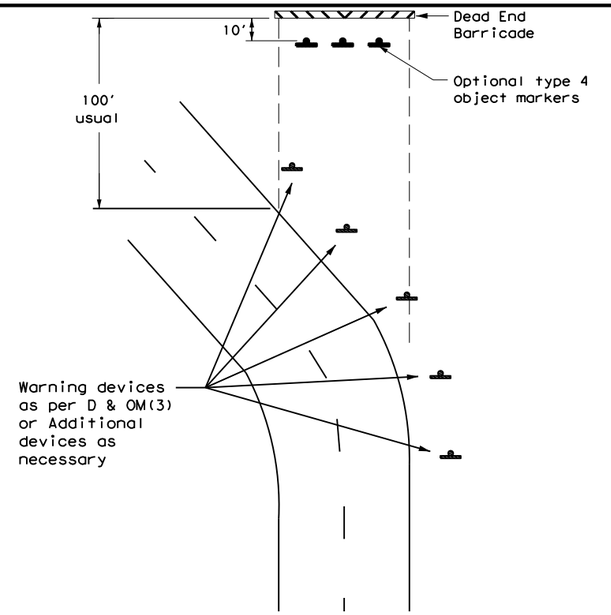
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



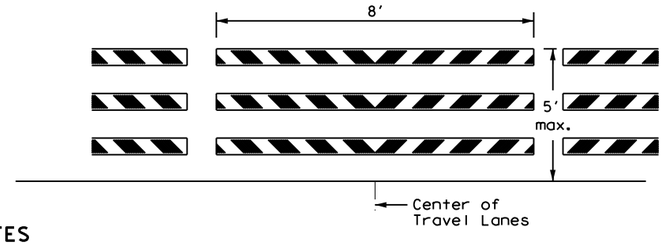
DETAIL 3

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

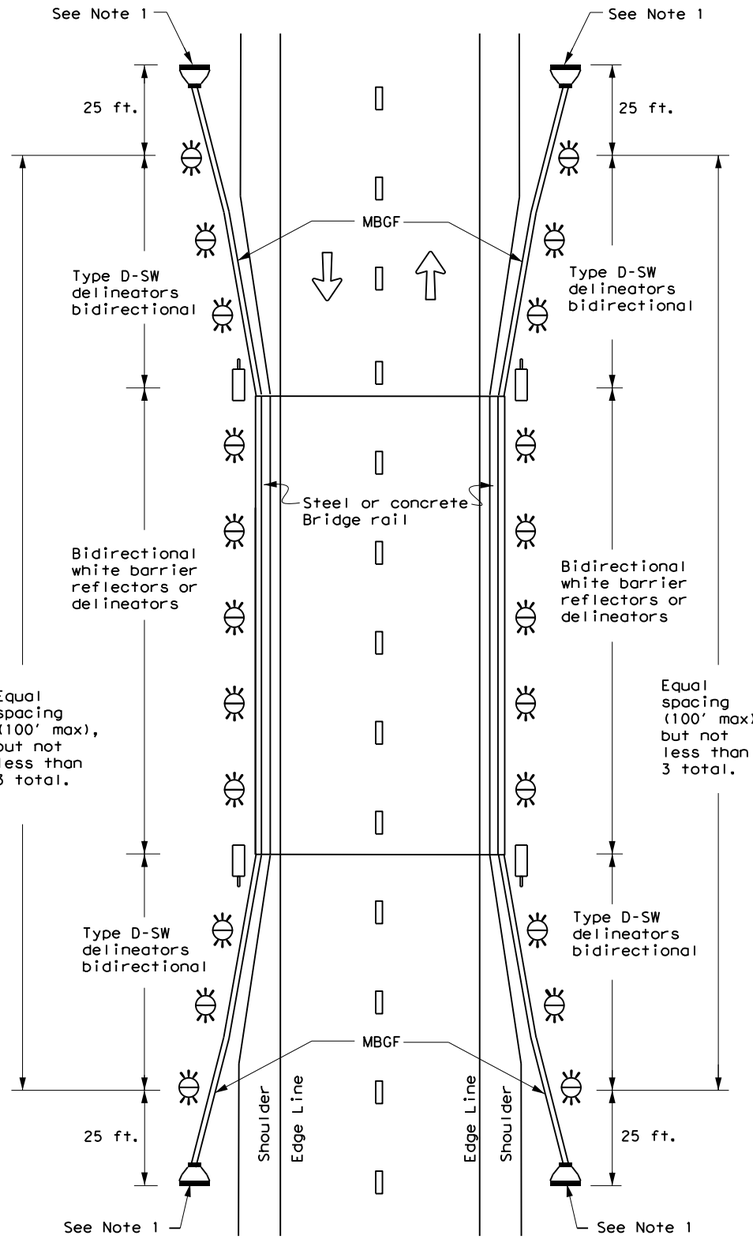
D & OM(4)-20

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
3-15	DIST	COUNTY		SHEET NO.
7-20	12	HARRIS/GAL		199

20D

FILE: t:\0*gen-ao\0*maintenance\000*new contracts\ih 45 general maintenance\Standards\DELINEATOR 20\dom5-20.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001

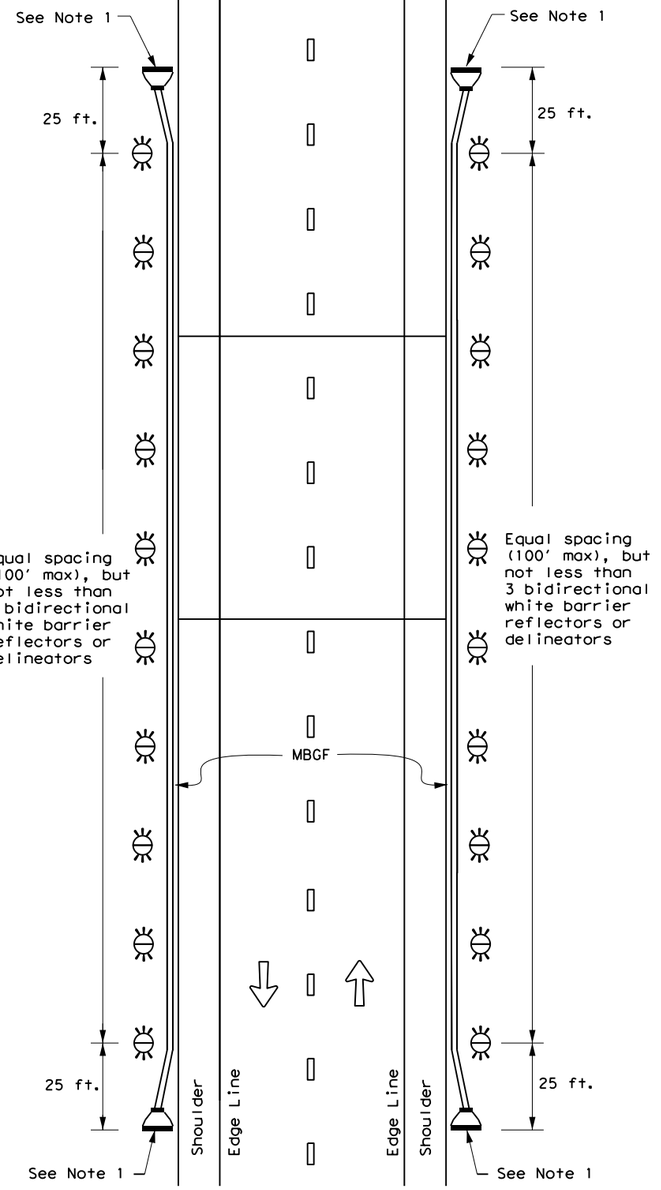
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



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.

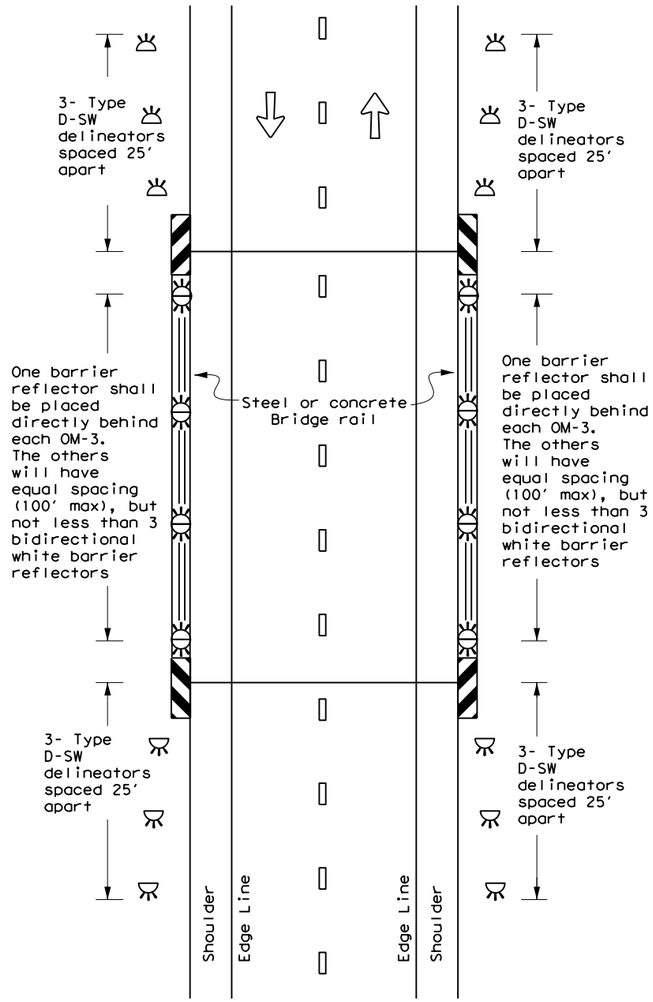
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



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

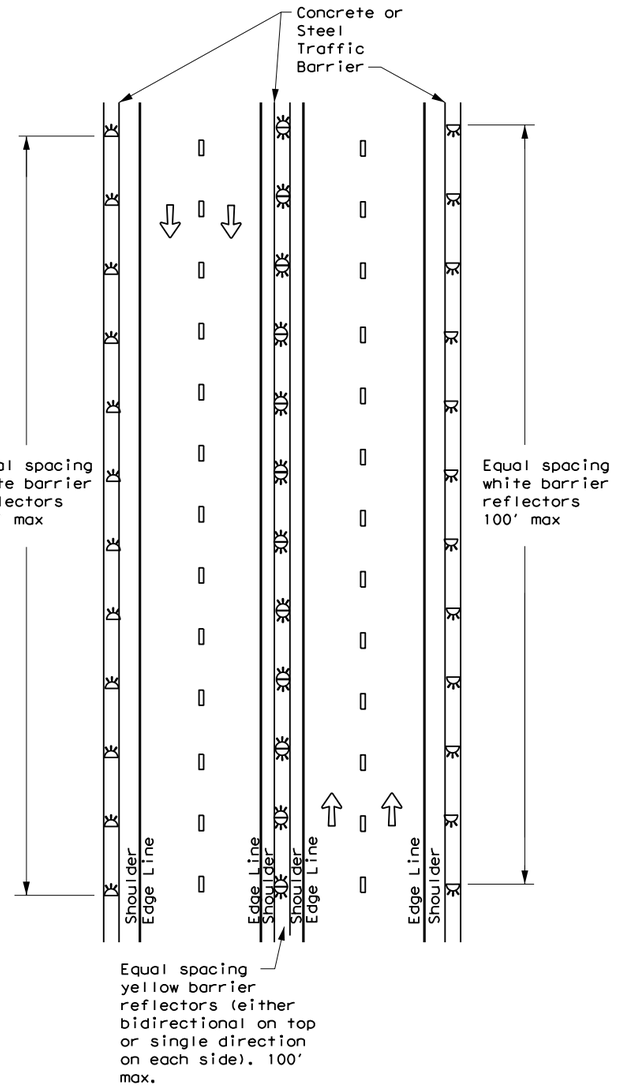
D & OM(5)-20

FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
7-20	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		200

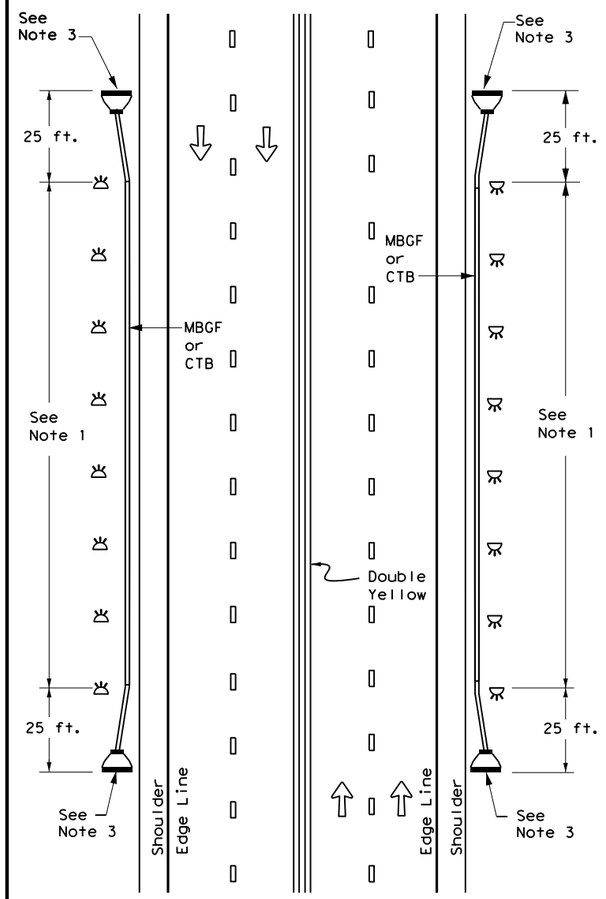
20E

FILE: t:\0*gen-oo\0*maintenance\000*new contracts\ih 45 general maintenance\Standards\DELINEATOR 20\dom6-20.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001

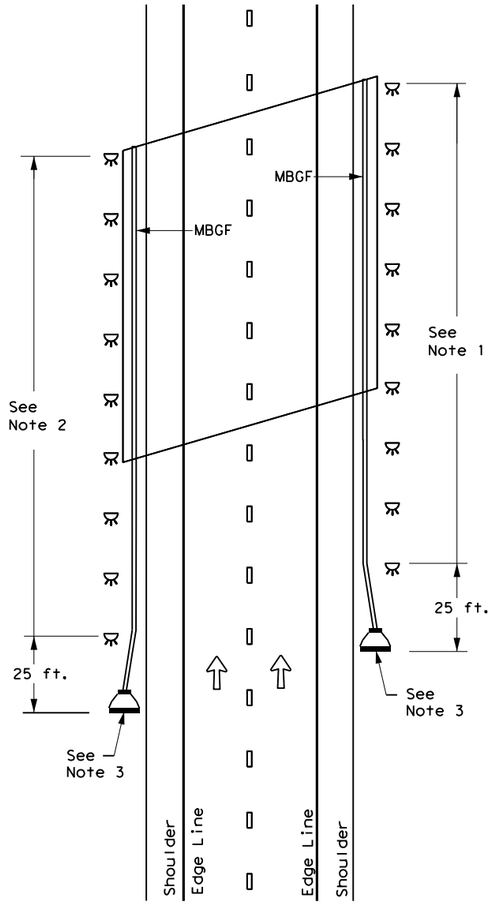
CONTINUOUS CONCRETE OR STEEL BARRIER



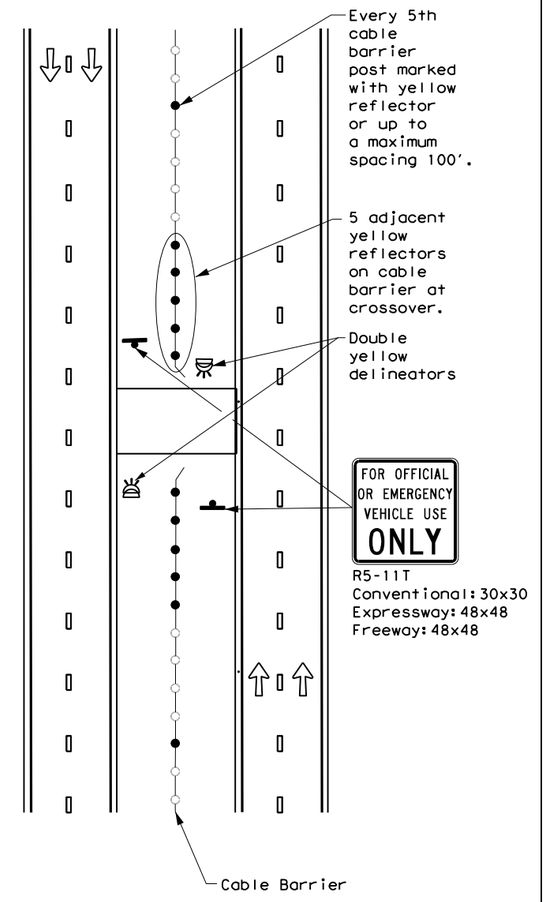
MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



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

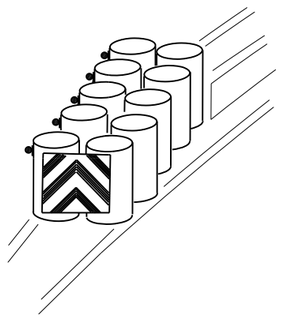
Traffic Safety Division Standard

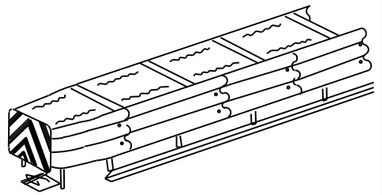
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

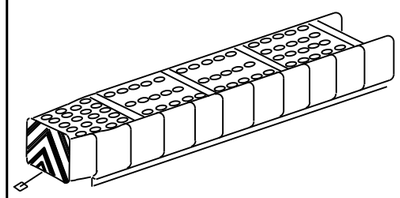
D & OM(6)-20

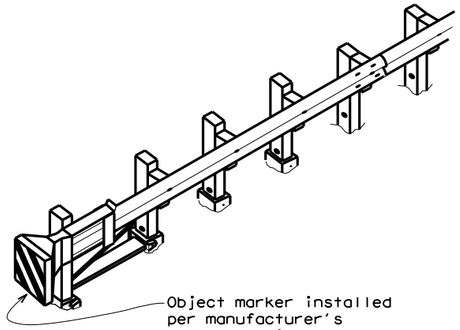
FILE: dom6-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
7-20	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		201

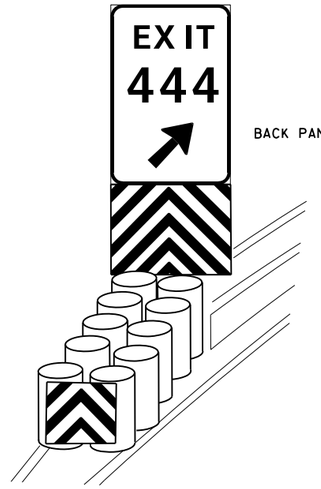
20F

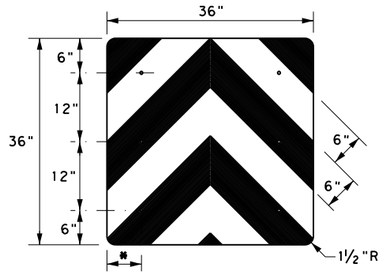


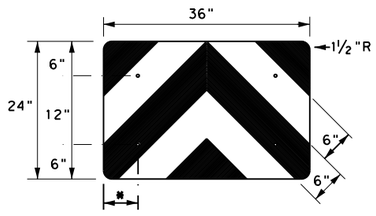




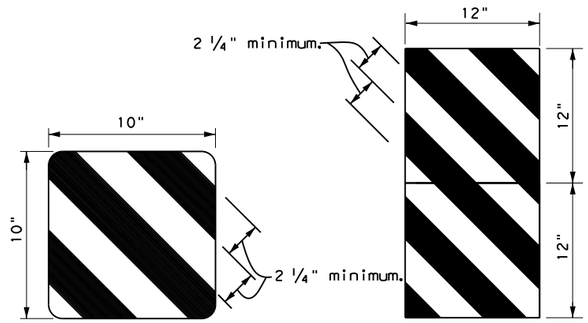




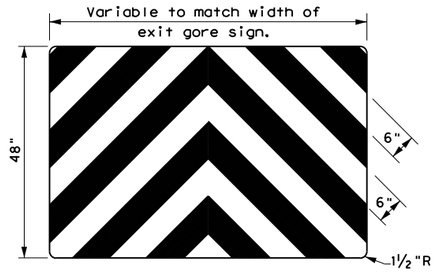


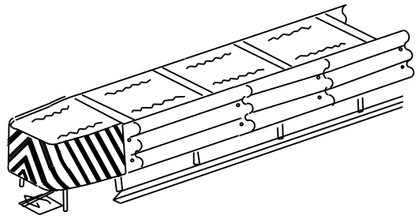


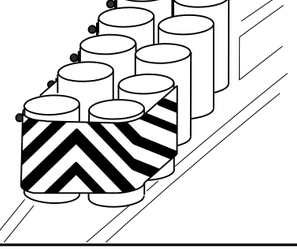
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

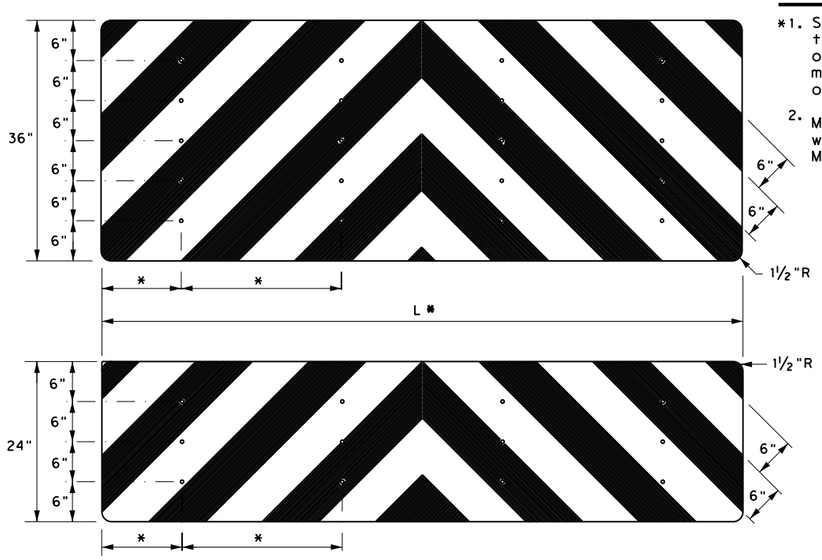


OBJECT MARKERS SMALLER THAN 3 FT^2









NOTES

*1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturers recommendation, or as directed by the Engineer.

2. Mounting should be flush with top of attenuator. Minimum size 96" x 24".

NOTES

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.

2. Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.

3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 ¼".

4. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.

5. Object Marker at nose of attenuator is subsidiary to the attenuator.

6. See D & OM (1-4) for required barrier reflectors.

Texas Department of Transportation

Traffic Safety Division Standard

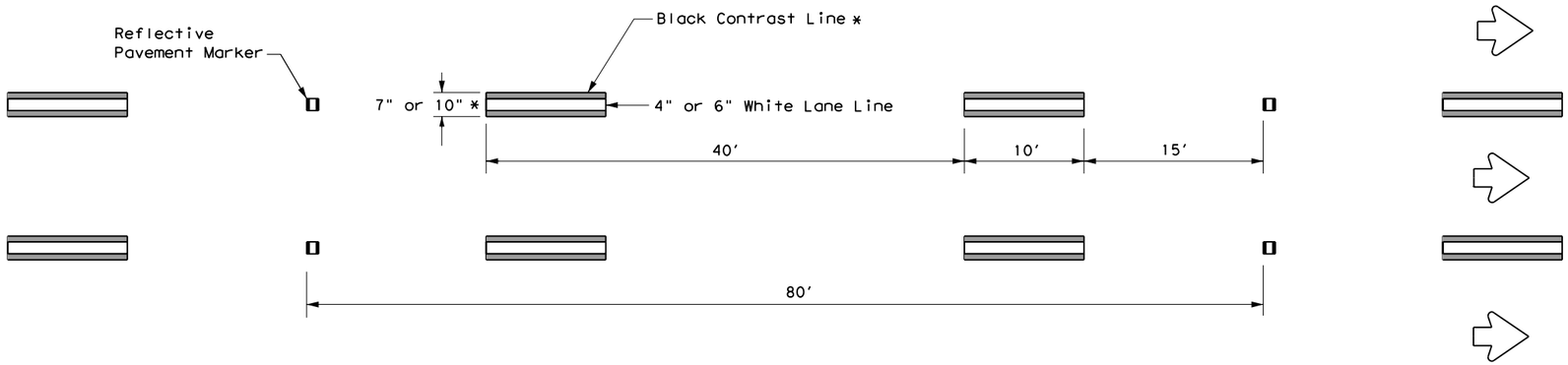
DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-20

FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	12	HARRIS/GAL		202
4-98 7-20				

20G

FILE: t:\0#gen-oo\0#maintenance\000#new contracts\ih 45 general maintenance\Standards\DELINEATOR 20\domvia-20.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001



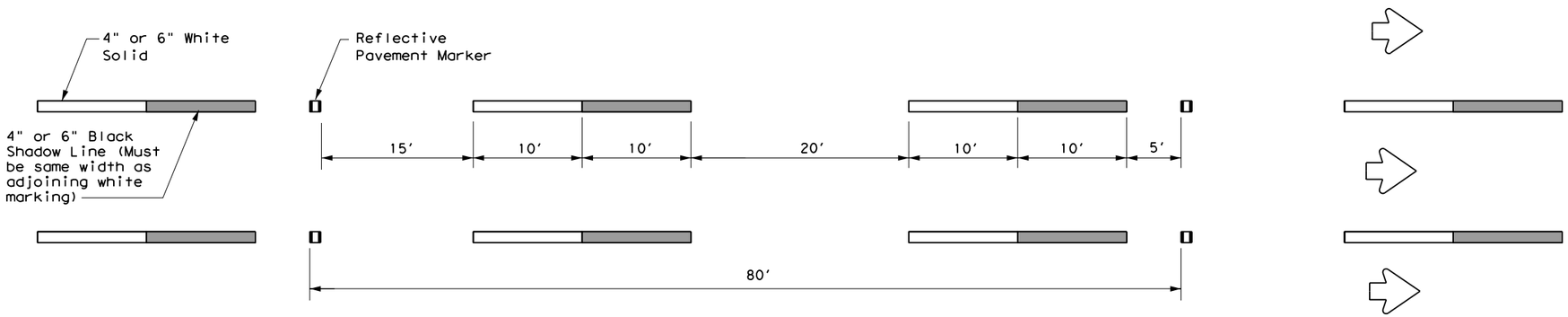
CONTRAST LANE LINE DESIGN

* See contrast line dimensions table for width of black line.

CONTRAST LINE DIMENSIONS		
White	Black (per side)	Total Width
4"	1.5"	7"
6"	2"	10"

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.



SHADOW LANE LINE DESIGN

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

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

Texas Department of Transportation

Traffic Operations Division Standard

CONTRAST AND SHADOW PAVEMENT MARKINGS

CPM(1)-14

FILE: CPM(1)14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		203

22N

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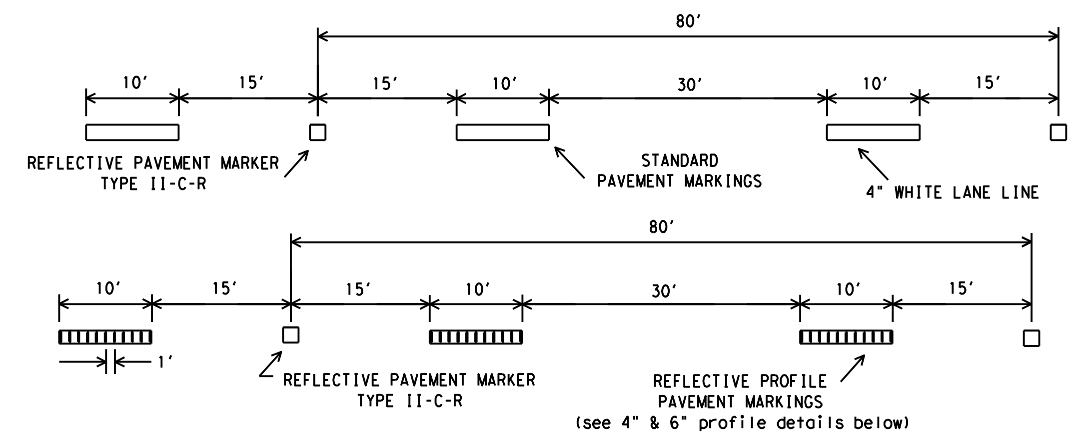
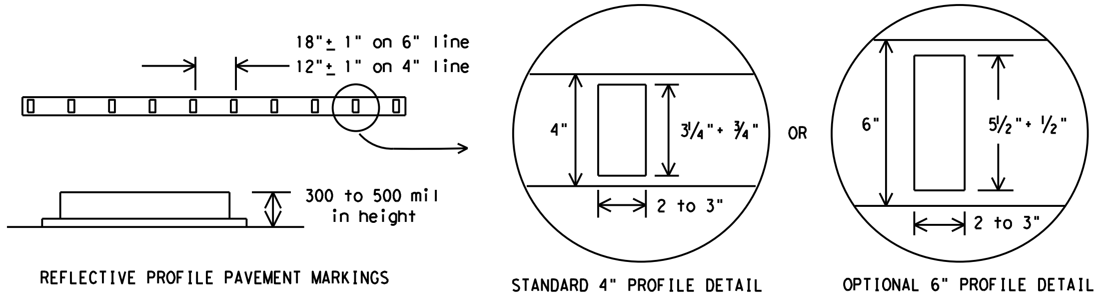
DATE: 1/4/2021
PROJECT: 6375-52-001



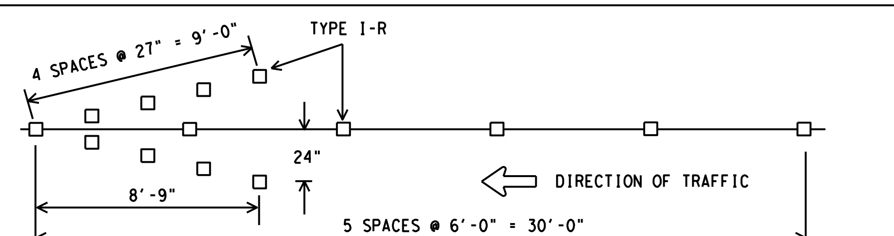
PAVEMENT MARKERS (REFL) TYPE II-C-R SHALL BE SPACED ON 80' CENTERS WITH THE CLEAR FACE TOWARD NORMAL TRAFFIC AND THE RED FACE TOWARD WRONG WAY TRAFFIC.

TRAFFIC LANE LINES PAVEMENT MARKING DETAILS

EDGELINES SHOULD TYPICALLY BE 4" WIDE AND THE MATERIALS SHALL BE AS SPECIFIED IN THE PLANS.
IF RAISED PROFILE PAVEMENT MARKINGS ARE USED SEE DETAILS BELOW.



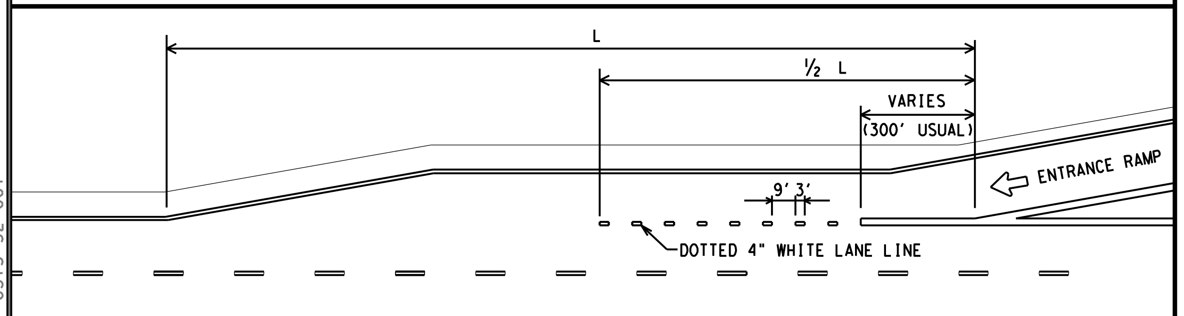
EDGELINE PAVEMENT MARKINGS



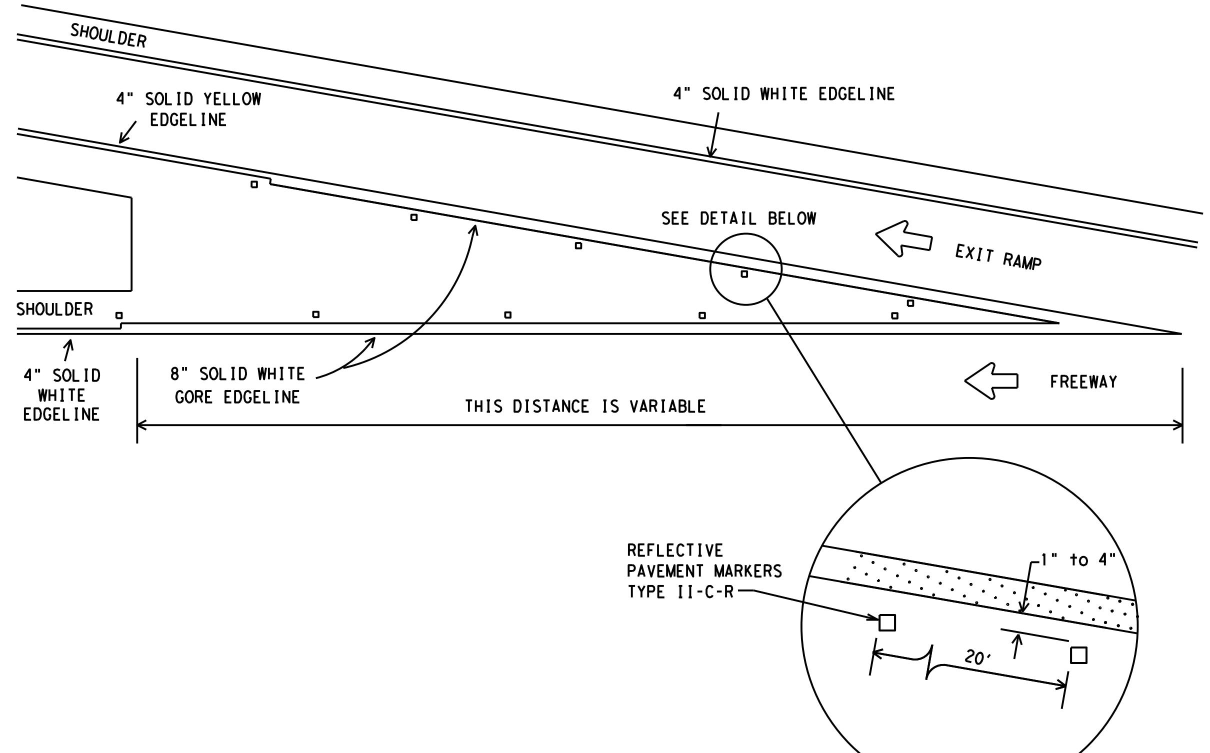
ALL RAISED MARKERS IN THE WRONG WAY ARROW SHALL BE TYPE I-R REFLECTORIZED PAVEMENT MARKERS WITH THE REFLECTORIZED SURFACE FACING THE WRONG WAY TRAFFIC. TYPE II-C-R SHALL NOT BE USED.

REFLECTORIZED WRONG WAY ARROWS, NOT TO EXCEED TWO, MAY BE PLACED ON EXIT RAMPS. LOCATION OF THE ARROWS SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER.

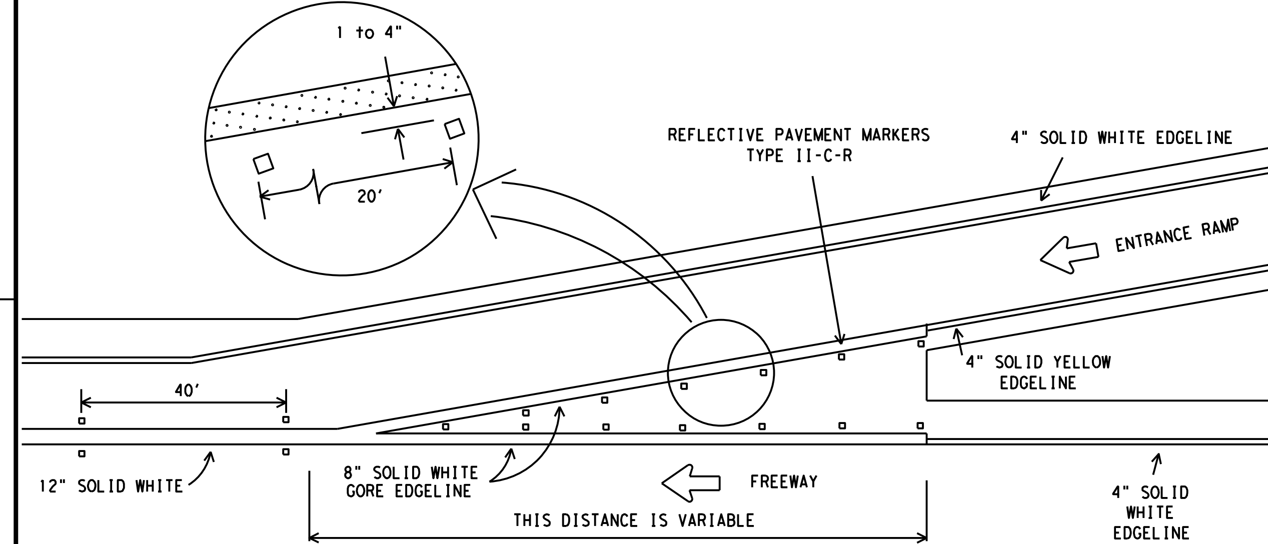
WRONG WAY ARROW DETAIL



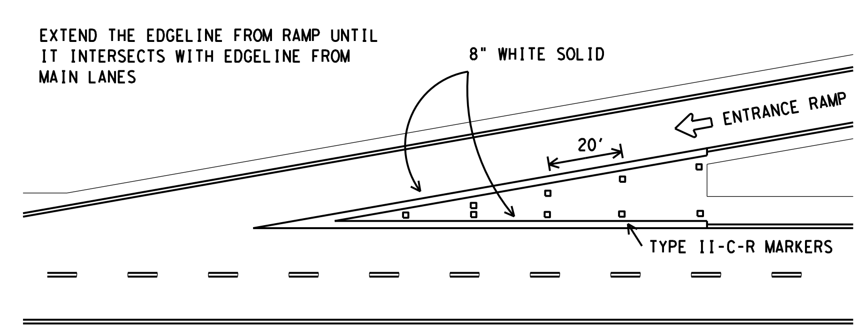
PARALLEL ACCELERATION LANE



TYPICAL EXIT RAMP GORE MARKING



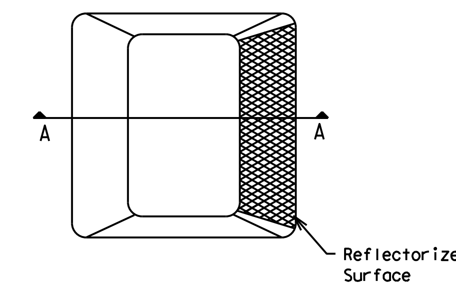
TYPICAL ENTRANCE RAMP GORE MARKING



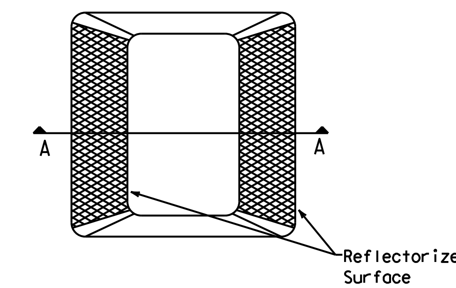
TAPERED ACCELERATION LANE

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

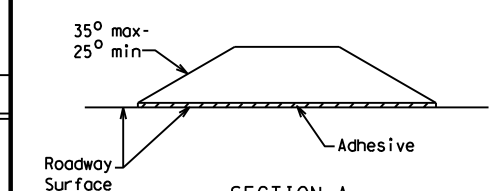
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS

Texas Department of Transportation
Traffic Operations Division

TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS WITH RAISED PAVEMENT MARKERS

FPM(1)-12

©TxDOT May 1974		DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
REVISIONS		CONT	SECT	JOB	HIGHWAY
4-92 2-10		6375	52	001	IH45
5-00 2-12		DIST		COUNTY	SHEET NO.
8-00		12		HARRIS/GAL	204
2-08					

23A

FILE: h:\00=maintenance\south harris maintenance\2020 contracts\6357-02-001=ih45 general...
DATE: 1/4/2021
PROJECT: 6375-52-001

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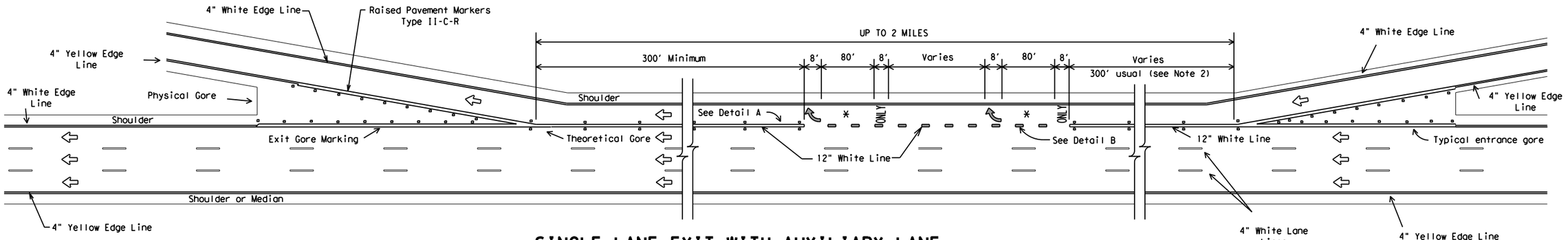
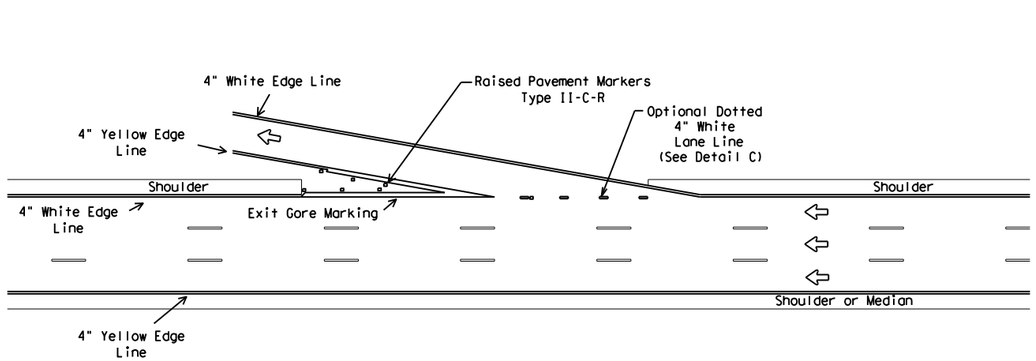
DATE: 1/4/2021
PROJECT: 6375-52-001

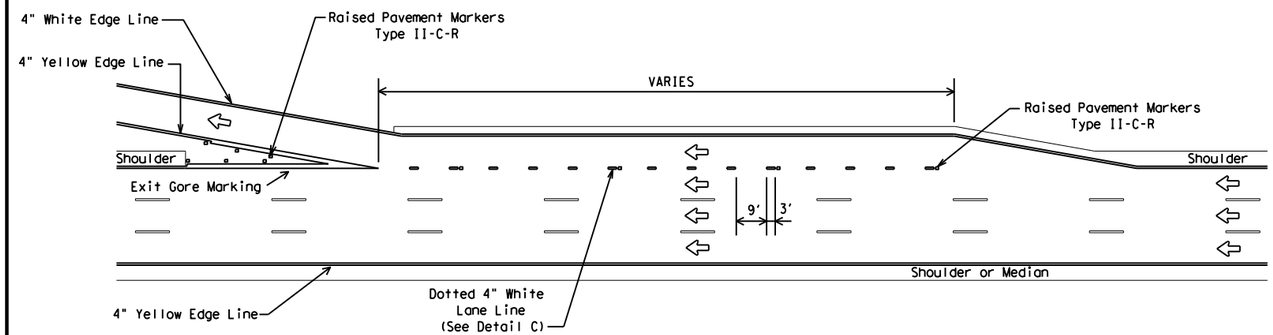


SINGLE LANE EXIT WITH AUXILIARY LANE

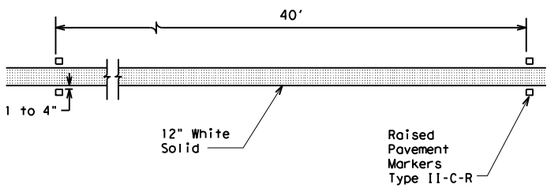
(See Note 2)



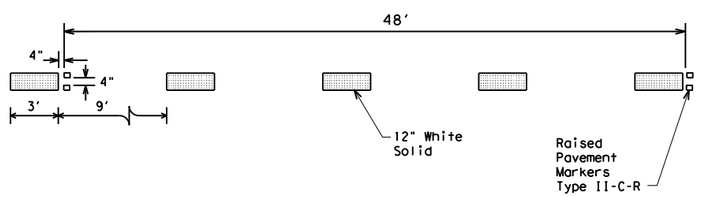
TAPERED DECELERATION LANE



PARALLEL DECELERATION LANE

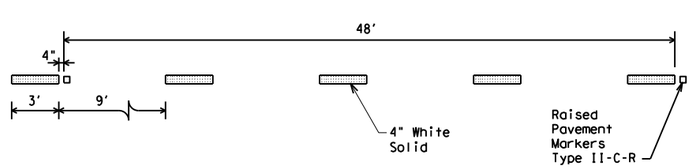


DETAIL A



DETAIL B

Wide (12") Dotted Lane Line (See Note 3)



DETAIL C

Normal (4") Dotted Lane Line (See Note 4)

GENERAL NOTES

1. Pavement markings shall be white except as otherwise noted.
2. Length of 12" white line may vary depending on location.
3. Wide (12") Dotted Lane Line (See Detail B) is used to separate a through lane from a lane drop at normal exit ramp and from an auxiliary lane between an entrance and exit ramp.
4. Normal (4") Dotted Lane Line (See Detail C) is used at parallel acceleration and deceleration lanes.

LEGEND	
⇦	Denotes direction of traffic.
↱	Pavement marking arrows (white)
✳	Arrow markings are optional, however "ONLY" is required if arrow is used

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

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

Texas Department of Transportation
Traffic Operations Division

TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS ENTRANCE AND EXIT RAMPS

FPM(2)-12

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

REVISIONS
4-92 2-10
8-95 2-12
5-00
8-00

CONT	SECT	JOB	HIGHWAY
6375	52	001	IH45
DIST	COUNTY		SHEET NO.
12	HARRIS/GAL		205

23B

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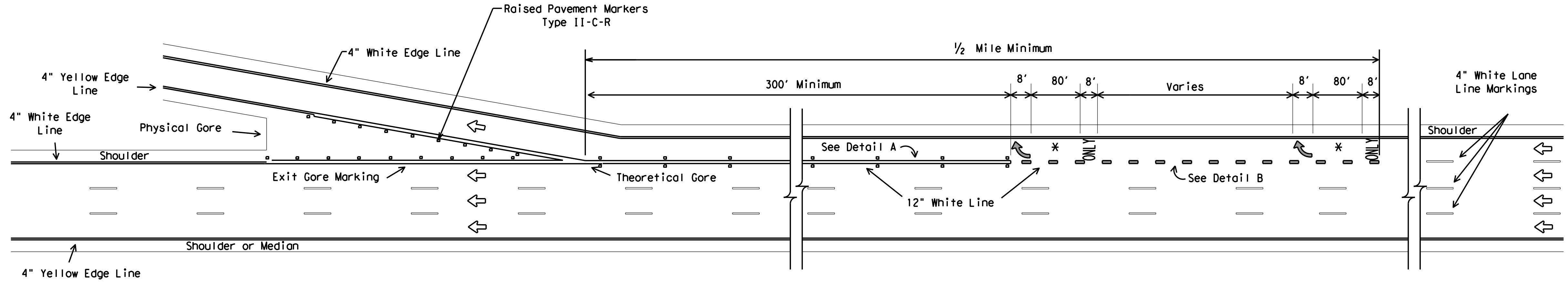
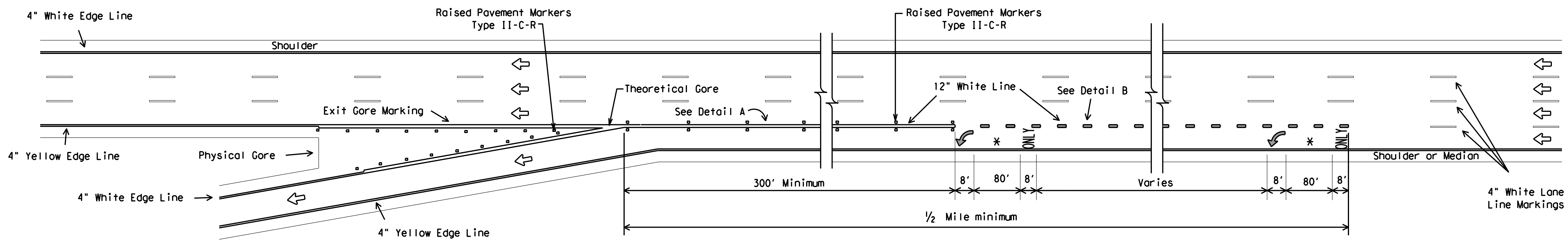
DATE: 1/4/2021
PROJECT: 6375-52-001



SINGLE LANE EXIT - LANE DROP OR EXIT ONLY

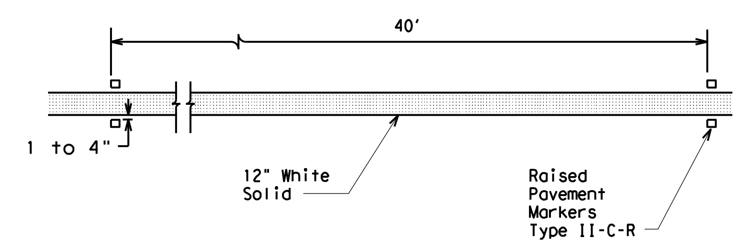


SINGLE LANE EXIT - LANE DROP OR EXIT ONLY (LEFTHAND)

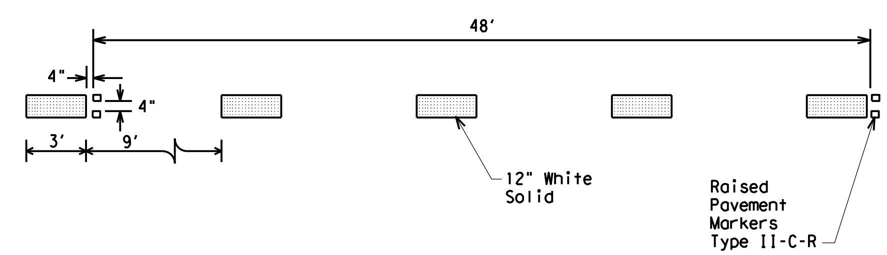
LEGEND	
⇦	Denotes direction of traffic.
↱	Pavement marking arrows (white)
*	Arrow markings are optional, however "ONLY" is required if arrow is used

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 Detail B) is used to separate a through lane from a lane drop at normal exit ramp and from an auxiliary lane between an entrance and exit ramp.



DETAIL A



DETAIL B

Wide (12") Dotted Lane Line (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.

Texas Department of Transportation
Traffic Operations Division

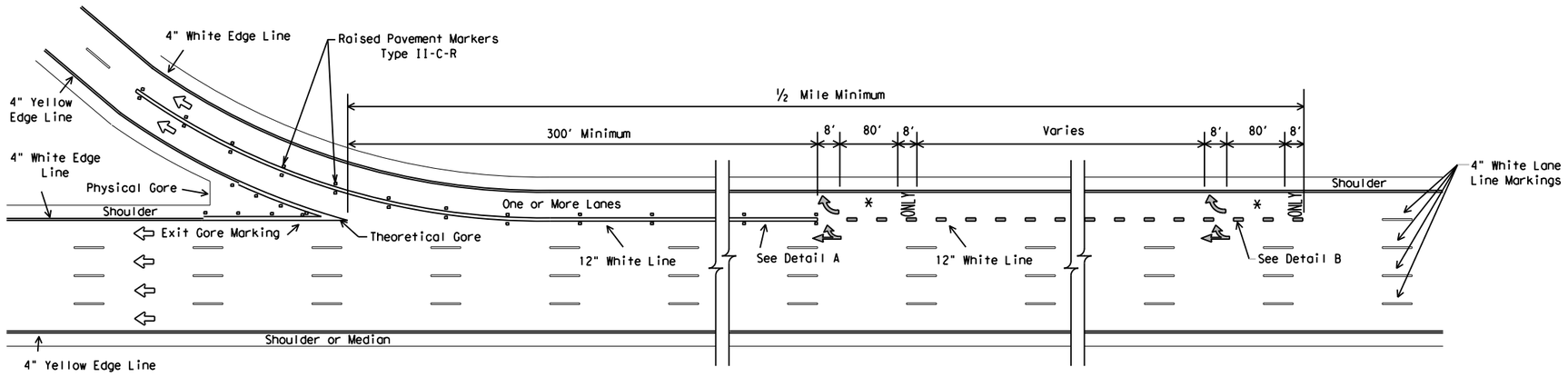
TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS LANE DROP (EXIT ONLY) EXIT RAMPS

FPM(3)-12

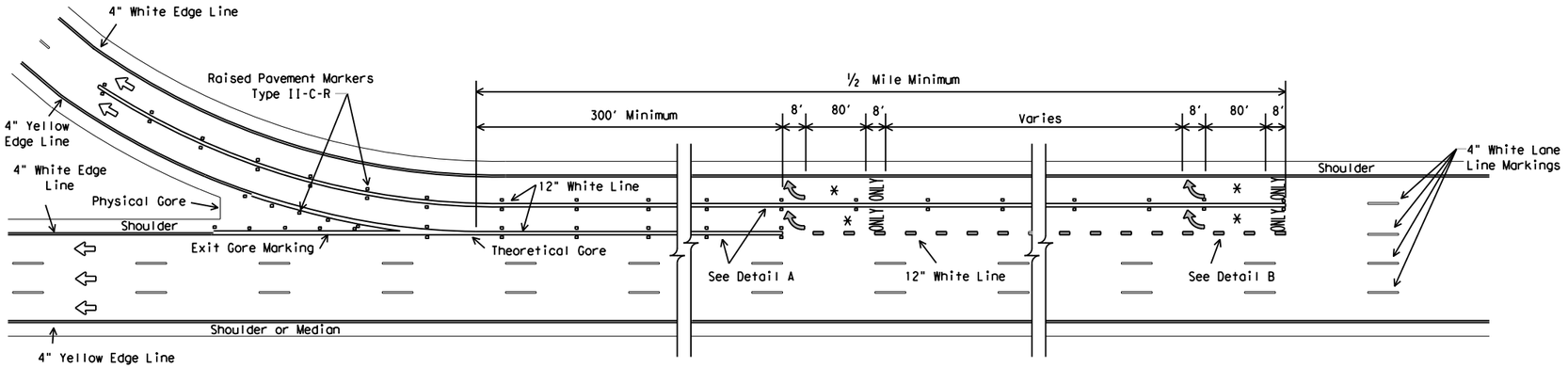
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT	
CONT	SECT	JOB	HIGHWAY	
6375	52	001	IH45	
DIST	COUNTY		SHEET NO.	
12	HARRIS/GAL		206	

REVISIONS
5-00
8-00
2-10
2-12

FILE: h:\00\maintenance\south harris maintenance\2020 contracts\6357-02-001*ih45 general\standards\typical standard freeway pavement markings lane drop (exit only) details.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001



MULTIPLE LANE EXIT - EXIT ONLY WITH OPTION LANE

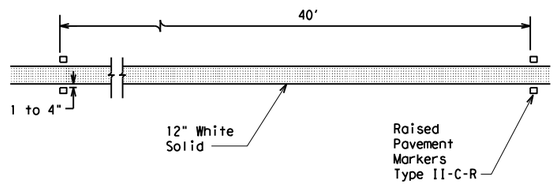


MULTIPLE LANE EXIT ONLY

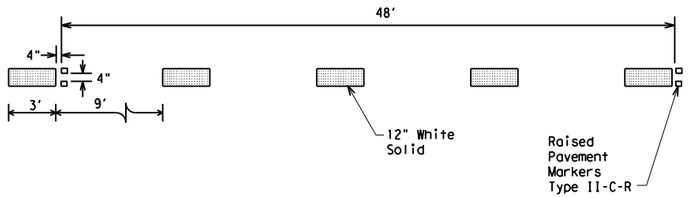
LEGEND	
⇦	Denotes direction of traffic
	Pavement marking arrow (white)
	Optional Pavement Marking Arrows (white)
✳	Arrow markings are optional, however "ONLY" is required if arrow is used

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 Detail B) is used to separate a through lane from a lane drop at normal exit ramp and from an auxiliary lane between an entrance and exit ramp.



DETAIL A



DETAIL B

Wide (12") Dotted Lane Line (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.

Texas Department of Transportation
Traffic Operations Division

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

FPM(4)-12

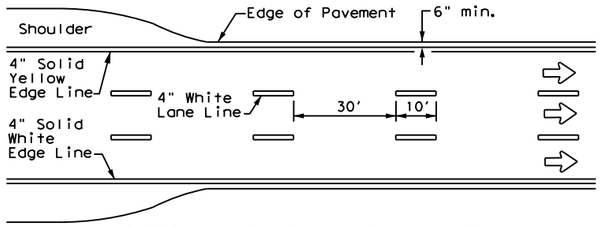
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS
5-00
8-00
2-10
2-12

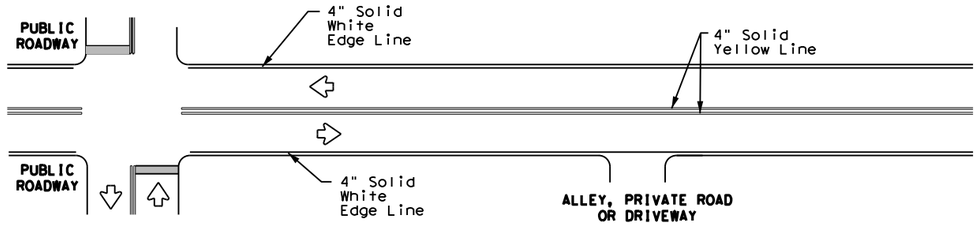
CONT	SECT	JOB	HIGHWAY
6375	52	001	IH45
DIST	COUNTY		SHEET NO.
12	HARRIS/GAL		207

23D

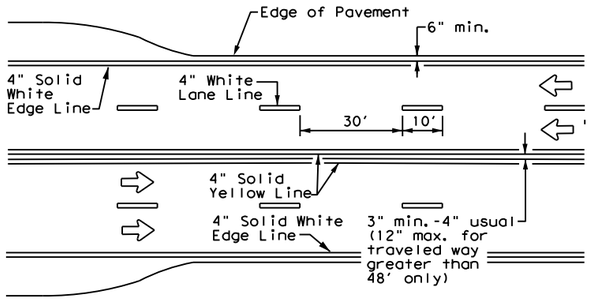
FILE: t:\Orgen-ao\0maintenance\000new contracts\ih 45 general maintenance\Standards\Pavement Markings 20\pm1-20.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001



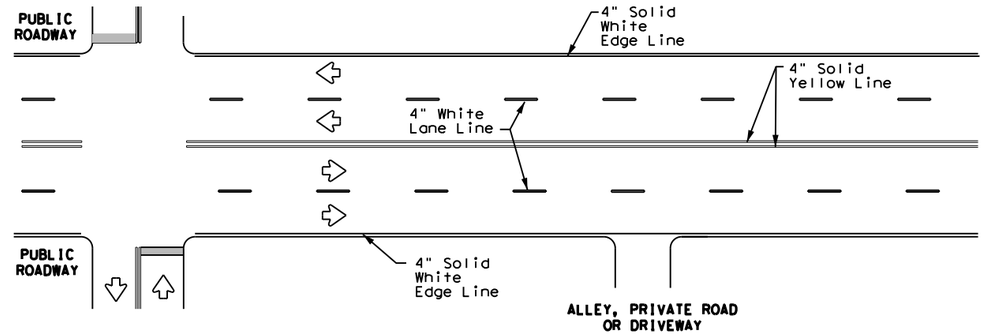
EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



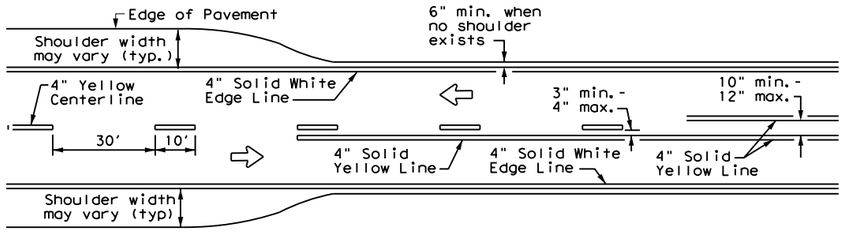
TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



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

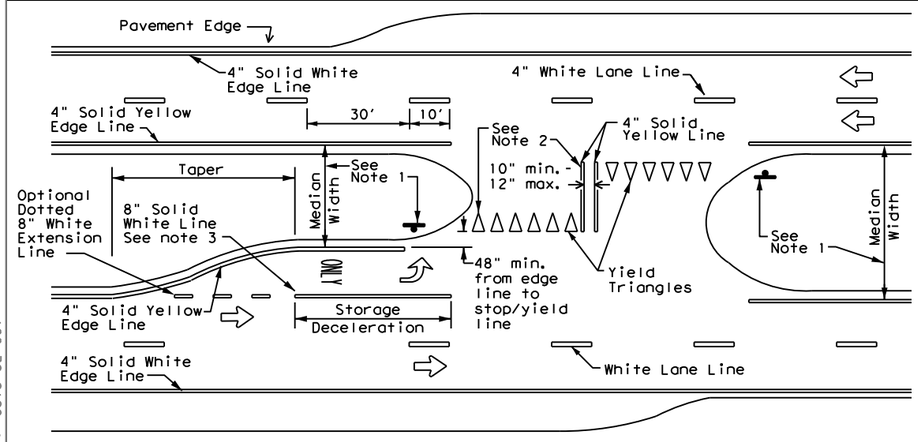


TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

YIELD LINES



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs are optional as determined by the Engineer.

2. Install median striping (double yellow centerlines and stop bars/yield triangles) when a 50' or greater median centerline can be placed. Stop bars shall only be used with stop signs. Yield traingles shall only be used with yield signs.

3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

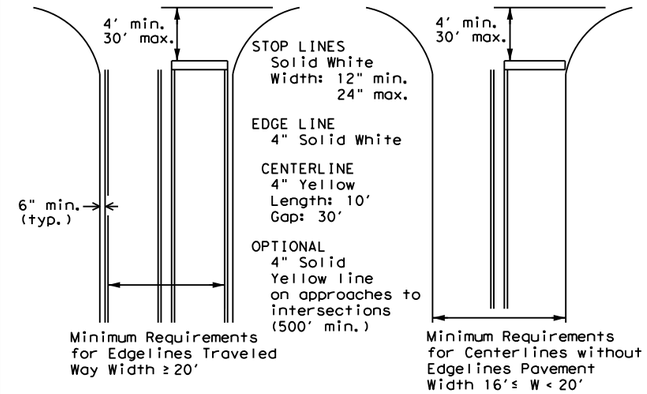
GENERAL NOTES

1. Edgeline striping shall be as shown in the plans or as directed by the Engineer. The edgeline should not be placed less less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edgelines are not required in curb and gutter sections of roadways.

2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the inside of edgeline to the inside of edgeline of a two lane roadway.

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

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



GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Highways

Texas Department of Transportation

Traffic Safety Division Standard

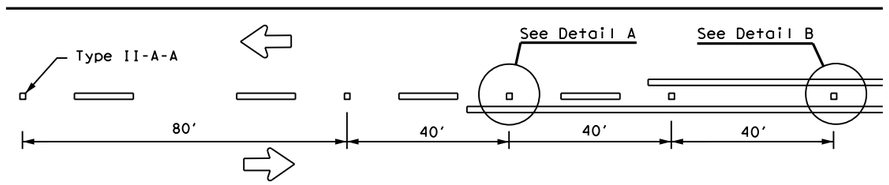
TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-20

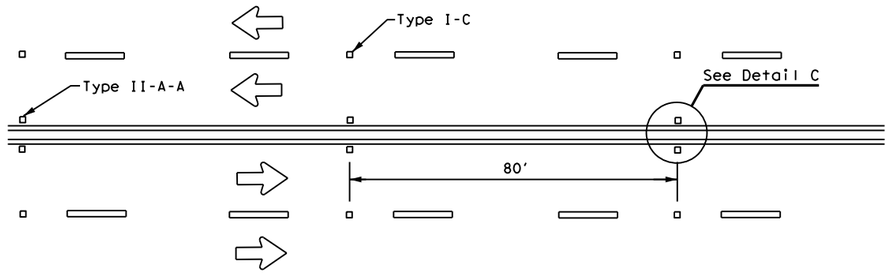
FILE: pm1-20.dgn	DN:	CK:	DW:	CK:
©TxDOT November 1978	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	6375	52	001	IH45
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	12	HARRIS/GAL		208

228

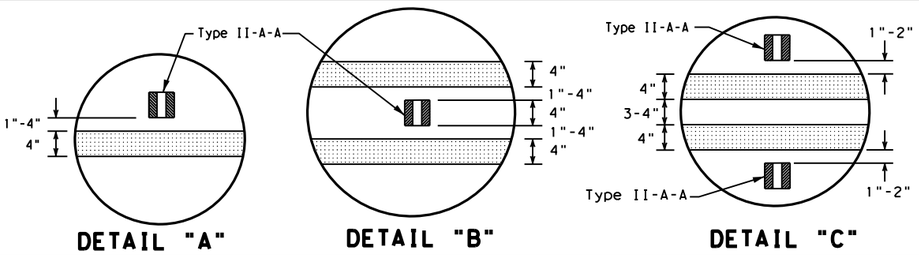
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



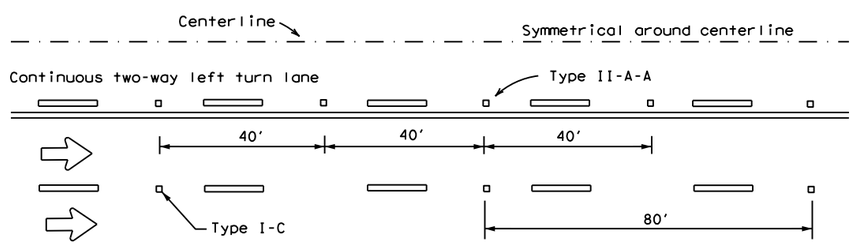
CENTERLINE FOR ALL TWO LANE ROADWAYS



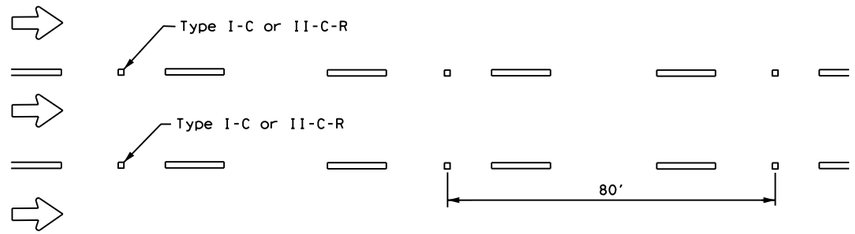
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS



DETAIL "A" **DETAIL "B"** **DETAIL "C"**

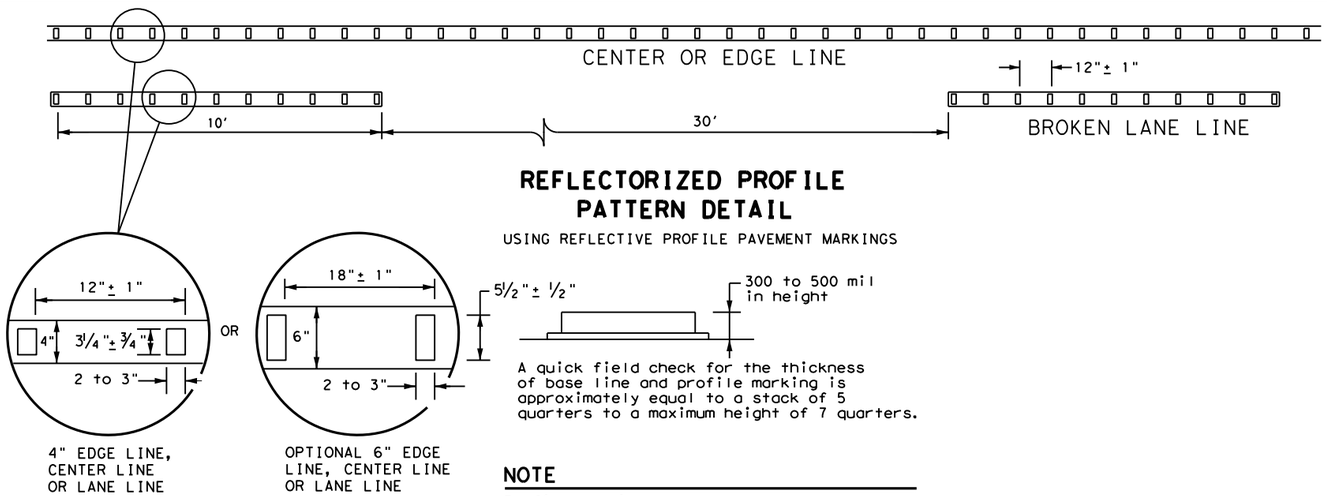


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



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

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



REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

4" EDGE LINE, CENTER LINE OR LANE LINE

OPTIONAL 6" EDGE LINE, CENTER LINE OR LANE LINE

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTE

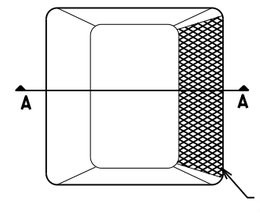
Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

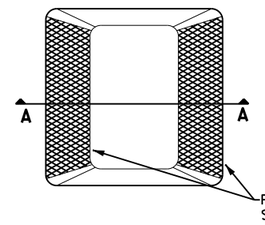
1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

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

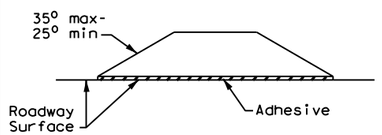
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS

Texas Department of Transportation

Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-20

FILE: pm2-20.dgn	DN:	CK:	DW:	CK:
©TxDOT April 1977	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-92 2-10 5-00 2-12 8-00 6-20	6375	52	001	IH45
	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		209

228

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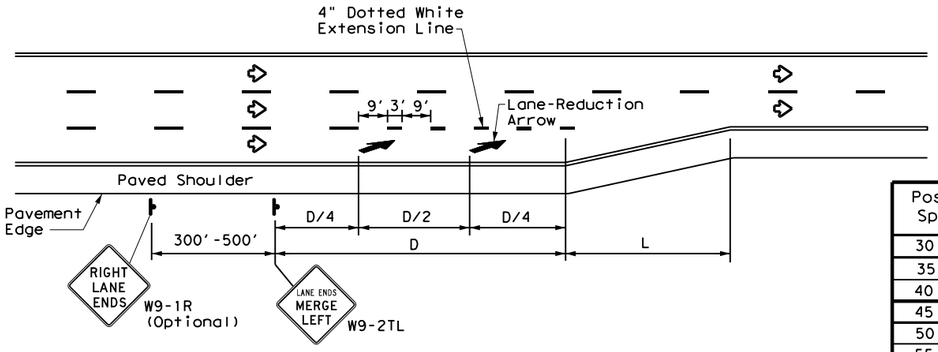
DATE: 1/4/2021
PROJECT: 6375-52-001

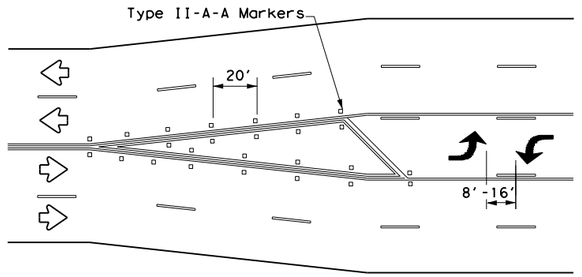


LANE REDUCTION

Posted Speed	D (ft)	L (ft)
30 MPH	460	$L=\frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	

NOTES

1. Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. For Texas Super 2 Passing Lanes, see TS2(PL) standard sheets.
2. On divided highways, an additional W9-1R "RIGHT LANE ENDS" sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
3. Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.



A two-way left-turn (TWLT) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

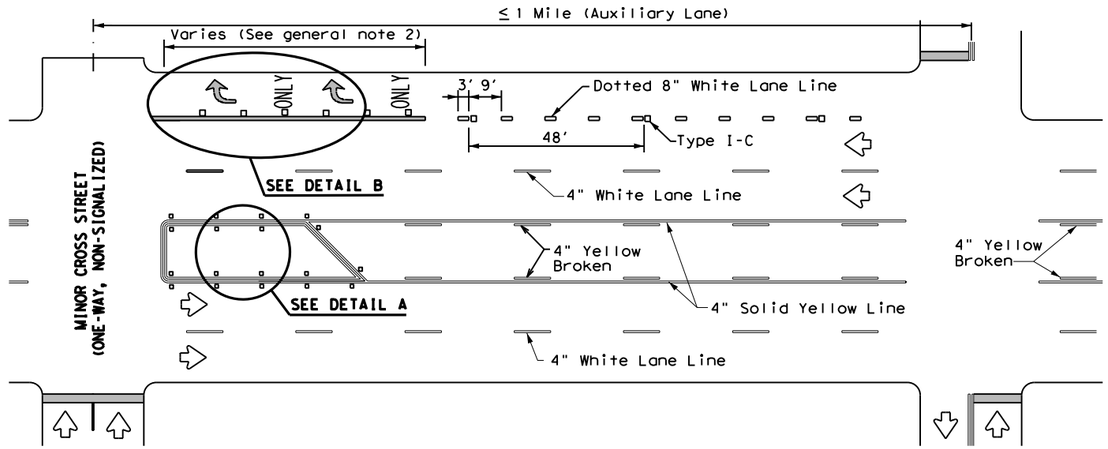
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

GENERAL NOTES

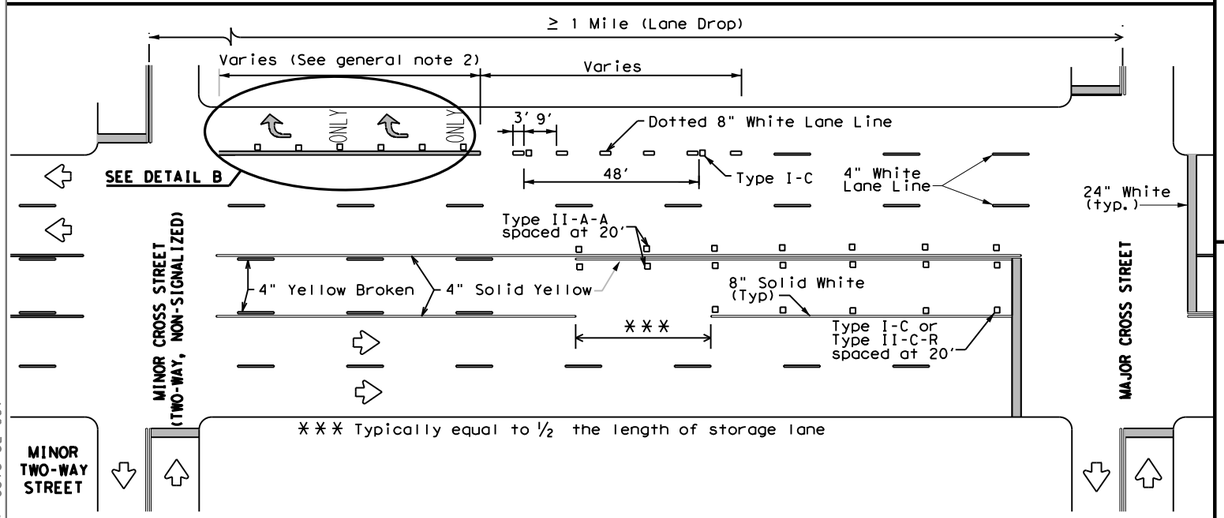
1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
2. When lane-use words and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow or word and arrow marking is used for a short turn lane, it should be located at or near the upstream end of the full-width turn lane.
3. Use raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.
4. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

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

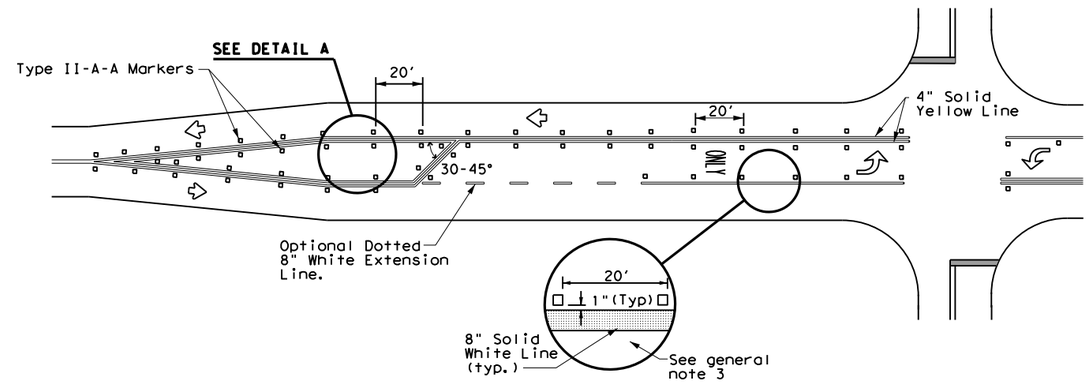
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



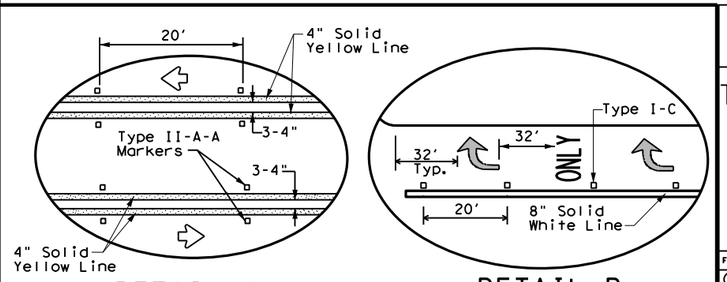
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP



TYPICAL TWO-LANE HIGHWAY INTERSECTION WITH LEFT TURN BAYS



Texas Department of Transportation

Traffic Safety Division Standard

TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS PM(3)-20

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©TxDOT April 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
5-00 2-10	DIST	COUNTY		SHEET NO.
8-00 2-12	12	HARRIS/GAL		210
3-03 6-20				

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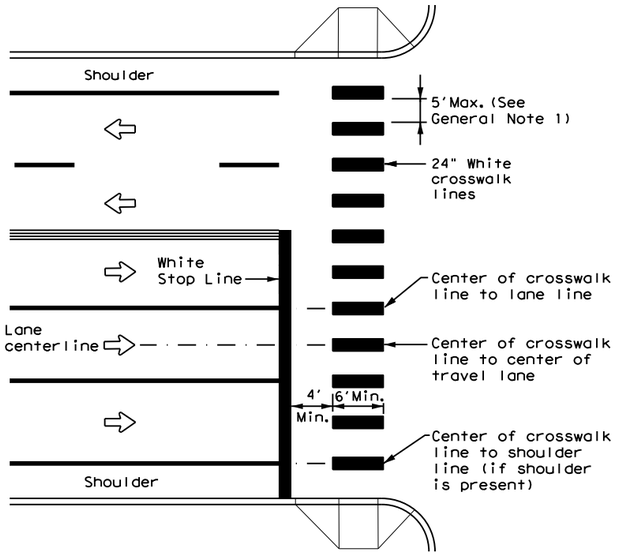


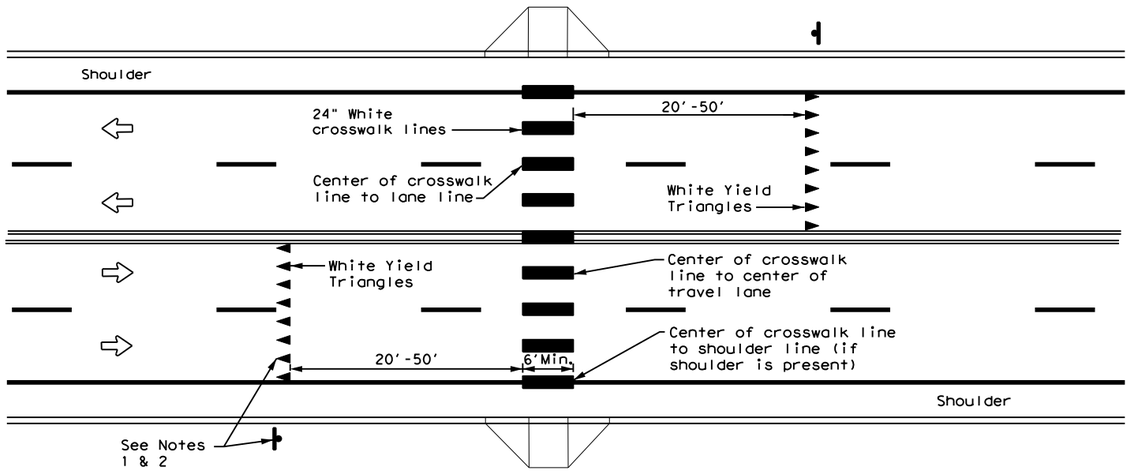
HIGH-VISIBILITY LONGITUDINAL CROSSWALK AT CONTROLLED APPROACH

GENERAL NOTES

1. Longitudinal crosswalk lines should not be placed in the wheel path of vehicles. Center the crosswalk lines on travel lanes, lane lines, and shoulder lines (if present).
2. A minimum 6" clear distance shall be provided to the curb face. If the last crosswalk line falls into this distance it must be omitted.
3. For divided roadways, adjustments in spacing of the crosswalk lines should be made in the median so that the crosswalk lines are maintained in their proper location across the travel portion of the roadway.
4. At skewed crosswalks, the crosswalk lines are to remain parallel to the lane lines.
5. Each crosswalk shall be a minimum of 6' wide.
6. The High-Visibility Longitudinal Crosswalk is the preferred crosswalk pattern on State Highways. Other crosswalk patterns as shown in the "Texas Manual on Uniform Traffic Control Devices" may be used. All crosswalk designs and dimension shall comply with the "Texas Manual on Uniform Traffic Control Devices."
7. Final placement of Stop Bar/Yield Triangles and Crosswalk shall be approved by the Engineer in the field.

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

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



UNSIGNALIZED MID BLOCK HIGH-VISIBILITY LONGITUDINAL CROSSWALK

NOTES

1. Use yield triangles with "Yield Here to Pedestrians" signs at unsignalized mid block crosswalks.
2. Use stop bars with "Stop Here on Red" signs at mid block crosswalks controlled by traffic signals or pedestrian hybrid beacons.

Texas Department of Transportation

Traffic Safety Division Standard

CROSSWALK PAVEMENT MARKINGS

PM(4)-20

FILE: pm4-20.dgn	DN:	CK:	DW:	CK:
©TxDOT June 2020	CONT	SECT	JOB	HIGHWAY
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	12	HARRIS/GAL		211

220

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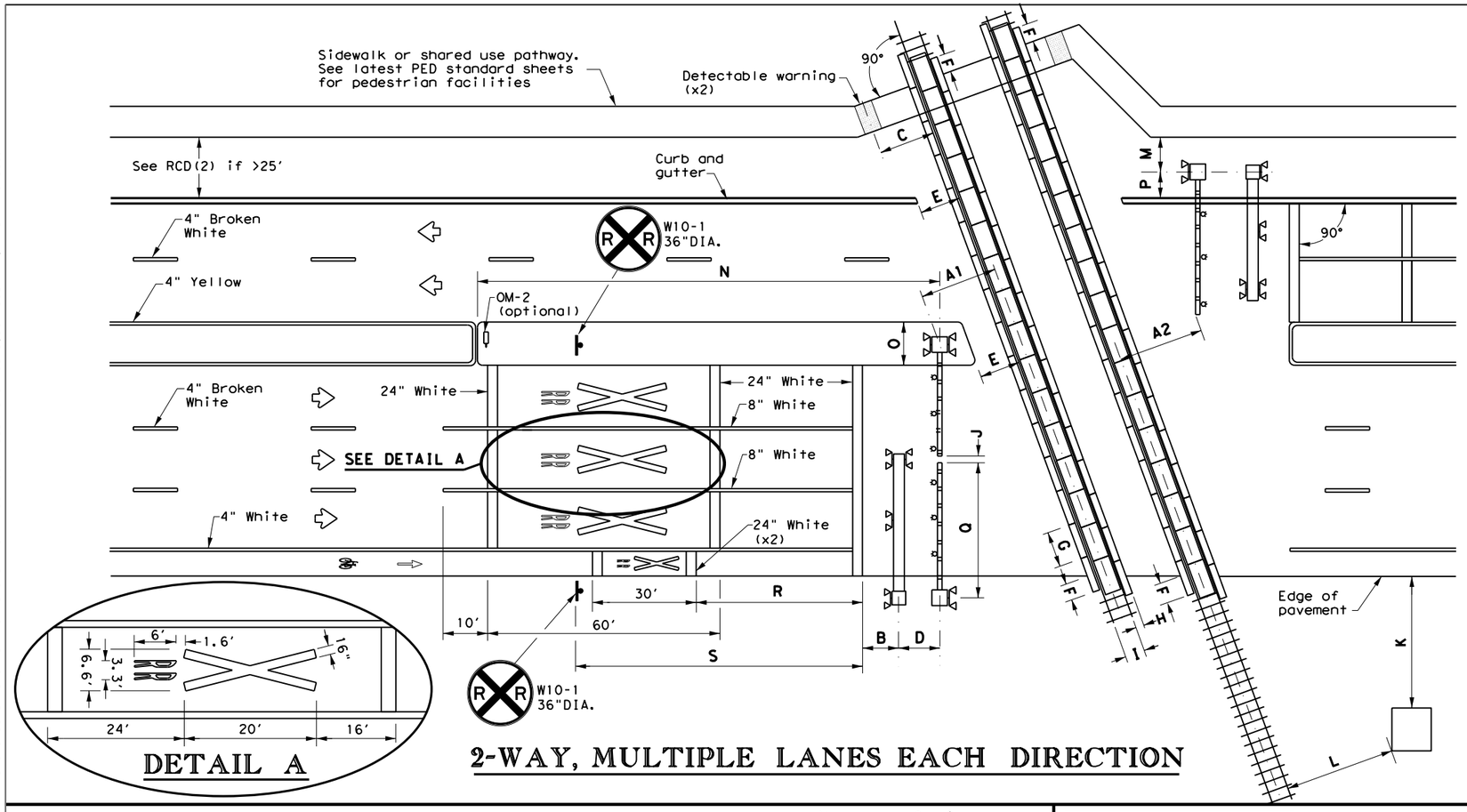
PROJECT: 6375-52-001



DETAIL A

2-WAY, MULTIPLE LANES EACH DIRECTION

NOTES

A1: Center of RR mast to center of rail: 12' minimum, 15' typical.

A2: Tip of gate to center of rail: 12' minimum, 15' typical.

B: Center of mast (cantilever, gate, or mast flasher) of nearest active traffic control device to stop line: 8' (NOTE: Stop line may be moved as needed, but should be at least 8' back from gates, if present).

C: Center of detectable warning device to nearest rail: 6' minimum

D: Center of gate mast to center of cantilever mast: 6' typical.
NOTE: Cantilever may be located in front or behind gates.

E: Edge of median or curb to nearest rail: 10' typical.
NOTE: Design median edge to be parallel with rail.

F: Edge of planking panel from edge of pavement or sidewalk: 3' minimum.
NOTE: Field panels need not be in line with gauge panels.

G: Length of panels along rail: 8' typical.

H: Width of field panel: 2' typical (check with railroad company).

I: Distance between rails: 4'-8.5".

J: Tip of gate to tip of gate: 2' maximum for Quiet Zone SSM or 90% of traveled way covered by gates for all other locations.

K: Nearest edge of RR cabin from edge of pavement: 30' typical.
NOTE: Cabinet not required to be parallel to edge of pavement.

L: Nearest edge of RR cabin from nearest rail: 25' typical.

M: Center of RR mast to edge of sidewalk: 6' minimum.

N: Center of gate mast to leading edge of non-traversable median: 100' minimum to qualify as a Quiet Zone SSM. NOTE: 60'will suffice if there is a street intersection within the 100' and all street intersections within 60' are closed.

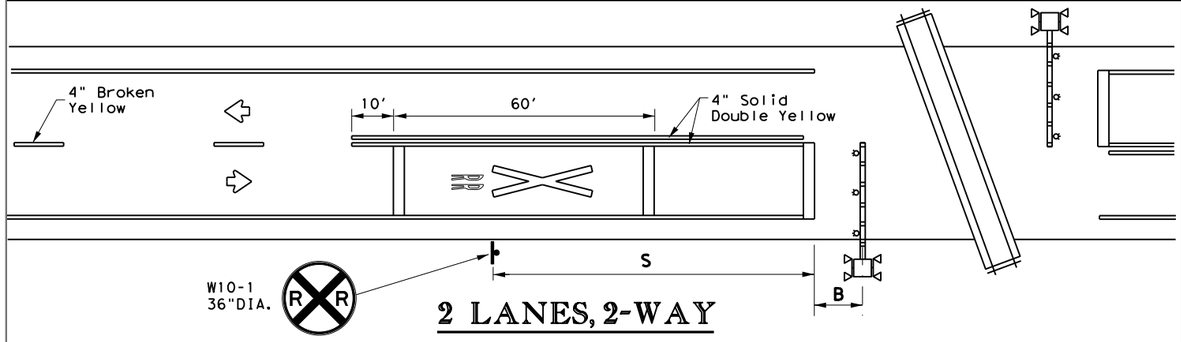
O: Width of median: 8'-6" minimum, 10' typical when using median gates.
NOTE: Center of gate mast minimum 4'-3" from face of curb.

P: Center of RR mast to face of curb: 4'-3" minimum.
Center of RR mast to edge of pavement (with shoulder): 6' minimum
Center of RR mast to edge of pavement (no shoulder): 8'-3" minimum
NOTE: BNSF prefers 5'-3", 7', and 9'-3" minimums, respectively.

Q: Gate length: 28' or less typical, but railroad company may allow up to 32'under special circumstances.

R: Stop line to first RR Crossing transverse line (bike lane): 50' typical.

S: Stop line to GRADE CROSSING ADVANCE WARNING (W10-1) sign and adjacent RR Crossing pavement markings. See Table 1. See RCD(2) for other signs.



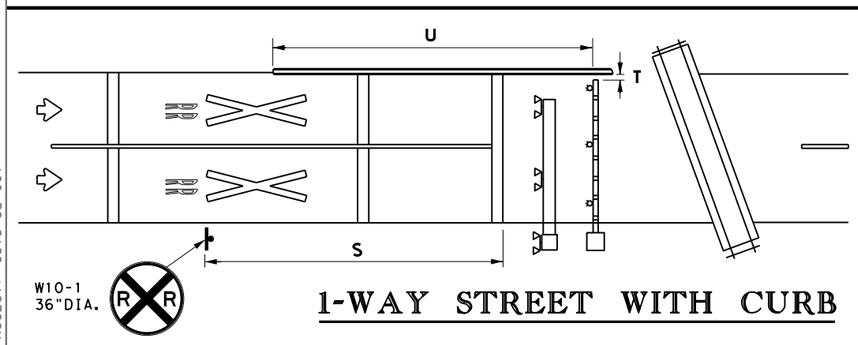
2 LANES, 2-WAY

TABLE 1	
Approach Speed (mph)	Desirable Placement (feet)
20	100
25	100
30	100
35	100
40	125
45	175
50	250
55	325
60	400
65	475
70	550
75	650

LEGEND	
	Sign
	Object Marker
	Traffic Flow
	Cantilever
	Gate Assembly
	Mast Flasher Pair

GENERAL NOTES

1. Medians and curbs must be non-traversable to qualify as a Quiet Zone Supplementary Safety Measure (SSM). Non-traversable curbs in Quiet Zones are 6" tall minimum and used on roadways where speed does not exceed 40 mph.
2. Raised pavement markers may be used to supplement striping. See PM(2) and PM(3) standard sheets.
3. Medians preferred whenever possible to prevent vehicles from driving around gates.
4. Longitudinal edge striping may be continued thru crossing as needed. Illumination may also be considered for nighttime visibility.
5. See SMD standard sheets for sign mounting details.
6. See the Standard Highway Sign Design for Texas (SHSD) manual for sign and pavement marking details.

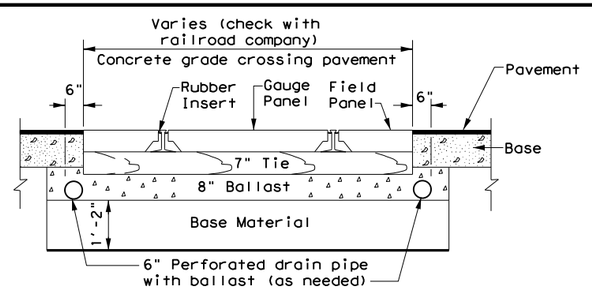


1-WAY STREET WITH CURB

NOTES

T: Tip of gate to edge of curb: 1' max for Quiet Zone SSM, 90% of traveled way covered by gates for all other locations

U: Non-traversable curb length from gate: 100' min. for a Quiet Zone SSM, 10' min for all other locations.



CROSSING SURFACE CROSS SECTION

Texas Department of Transportation

Traffic Operations Division Standard

RAILROAD CROSSING DETAILS SIGNING, STRIPING, AND DEVICE PLACEMENT RCD(1)-16

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©TxDOT February 2016	CONT	SECT	JOB	HIGHWAY
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	12	HARRIS/GAL		212

14

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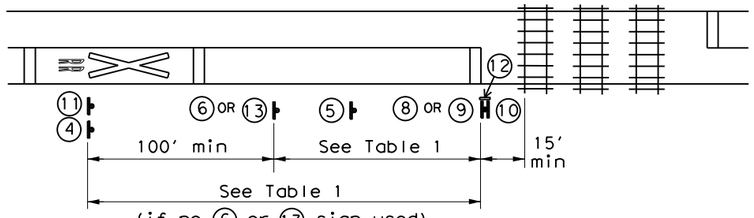
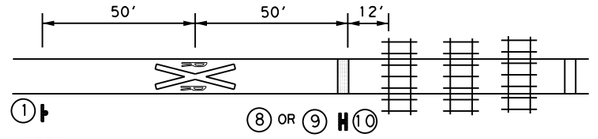
PROJECT: 6375-52-001



PASSIVE CROSSING

NOTES

1. Stop or yield sign may also be installed to the left of the crossbuck sign, rather than below it.
2. A 2" white retroreflective strip shall be installed on front and back of crossbuck sign post.



NOTES

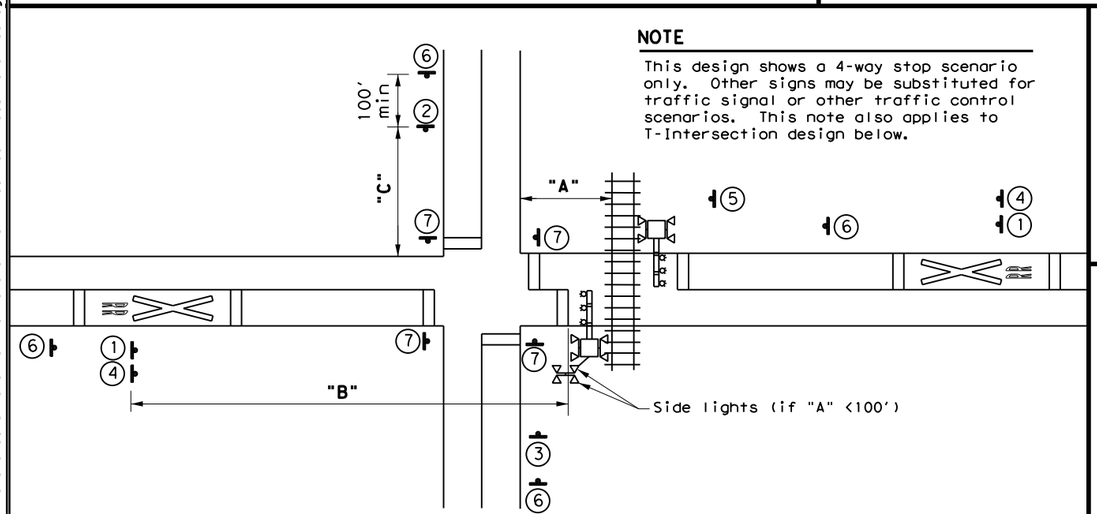
1. A shared use pathway is considered a separate pathway crossing when more than 25' from traveled way of adjacent roadway.
2. Detectable warning used at stop bar.
3. Smaller sign sizes preferred than shown to the right on this sheet.

PATHWAY CROSSING

TABLE 1	
Approach Speed (mph)	Desirable Placement (feet)
20	100
25	100
30	100
35	100
40	125
45	175
50	250
55	325
60	400
65	475
70	550
75	650

GENERAL NOTES

1. Railroad company to provide active traffic control devices, CROSSBUCK (R15-1), NUMBER OF TRACKS Plaque (R15-2P) (if more than 1 track), and EMERGENCY NOTIFICATION (I-13) signs.
2. LOW GROUND CLEARANCE (W10-5) signs may be relocated further upstream of crossing to provide advance warning of alternate route.
3. GRADE CROSSING AND INTERSECTION ADVANCE WARNING (W10-2) signs may be modified as needed to fit roadway geometry.
4. Table 1 placement distances may vary per Sect. 2C.05 of the TMUTCD.
5. See Table 1 to determine placement of STOP AHEAD (W3-1) and YIELD AHEAD (W3-2) signs unless shown otherwise.
6. DO NOT STOP ON TRACKS (R8-8) signs installed when potential for vehicles stopping on tracks is significant as determined by sealing engineer. Install so sign does not block view of RR mast.
7. See the Standard Highway Sign Design for Texas (SHSD) manual for sign and pavement marking details.

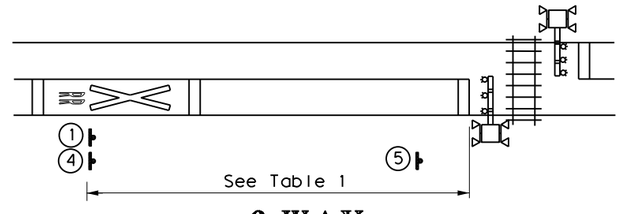


NOTE

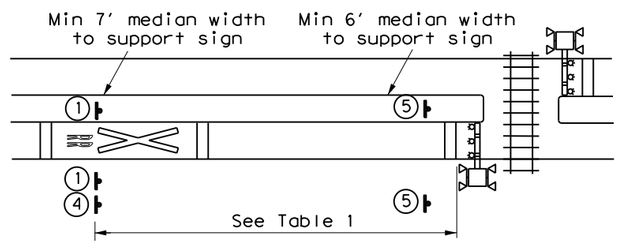
This design shows a 4-way stop scenario only. Other signs may be substituted for traffic signal or other traffic control scenarios. This note also applies to T-Intersection design below.

	"A" <100'	"A" ≥100'
"B"	See Table 1. Place pavement markings and signs on opposite side of intersection from rail if spacing from Table 1 would put markings within intersection.	See Table 1. Place pavement markings and signs between rail and intersection if spacing from Table 1 would put markings within intersection.
"C"	See Table 1.	GRADE CROSSING AND INTERSECTION ADVANCE WARNING (W10-2, W10-3, W10-4) signs should only be installed if W10-1 sign is not between intersection and railroad crossing. If needed, see Table 1.

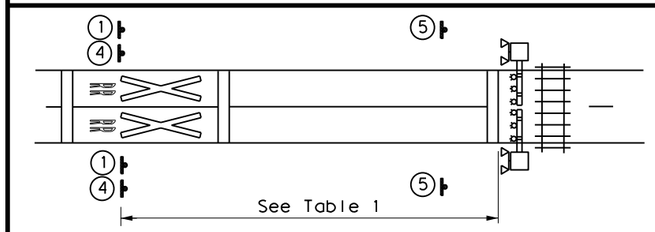
GRADE CROSSING NEAR A PARALLEL STREET



2-WAY



2-WAY WITH MEDIAN



1-WAY

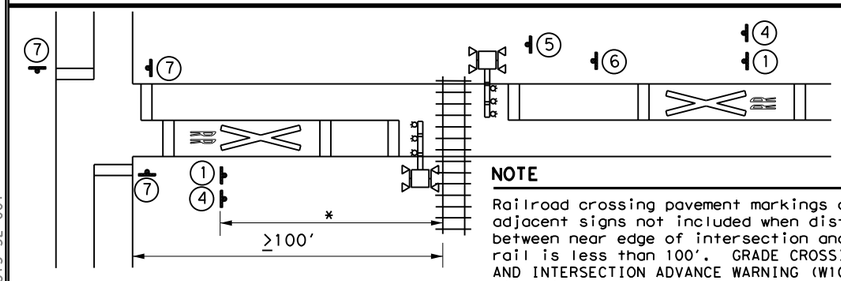
SIGNS

**	**	**	IF NEEDED
1 W10-1 36"DIA.	2 W10-2L 36"X36"	3 W10-2R 36"X36"	4 W10-5 36"X36" / LOW GROUND CLEARANCE W10-5P 30"x24"
IF NEEDED	IF NEEDED		
5 R8-8 24"X30"	6 W3-1 30"X30"	7 STOP R1-1 36"X36" / ALL WAY R1-3P 18"X6"	RAIL CROSSING ROAD 3 TRACKS R15-1 48"X9" / R15-2P 27"X18"; 8 STOP R1-1 36"X36"
RAIL CROSSING ROAD 3 TRACKS R15-1 48"X9" / R15-2P 27"X18"	RAIL CROSSING ROAD 3 TRACKS R15-1 48"X9" / R15-2P 27"X18"	R W10-1 36"DIA.	REPORT EMERGENCY OR PROBLEM 1-800-555-5555 CROSSING 836 597 H
9 YIELD R1-2 48"X48"X48"	10	11 NO GATES OR LIGHTS W10-13P 30"X24" / **	Sign may be placed perpend. to travel lanes. 12 I-13 15"X9"
IF NEEDED			
13 W3-2 30"X30"			

** Includes a NO TRAIN HORN Plaque (W10-9P) if crossing is in a Quiet Zone. LOW GROUND CLEARANCE Plaque (W10-5P) if needed is mounted below W10-2/W10-3/W10-4 signs.

NO TRAIN HORN W10-9P 30"X24"

LOW GROUND CLEARANCE W10-5P 30"X24"

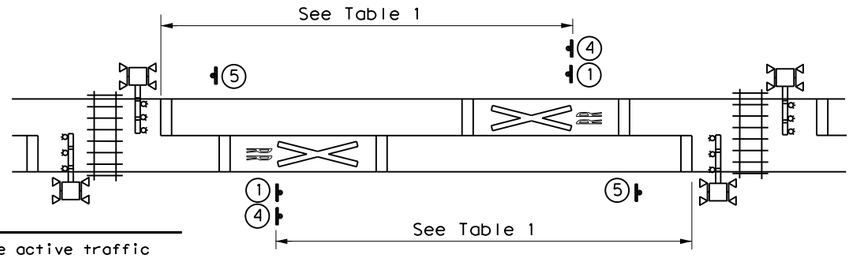


*Use Table 1 if sufficient space exists.

NOTE

Railroad crossing pavement markings and adjacent signs not included when distance between near edge of intersection and near rail is less than 100'. GRADE CROSSING AND INTERSECTION ADVANCE WARNING (W10-3) signs installed on roadway parallel with rail in this case.

T-INTERSECTION



NOTE

Separate active traffic control devices, railroad crossing pavement markings, and adjacent signs required when tracks are more than 100' apart.

2 ADJACENT CROSSINGS

Texas Department of Transportation

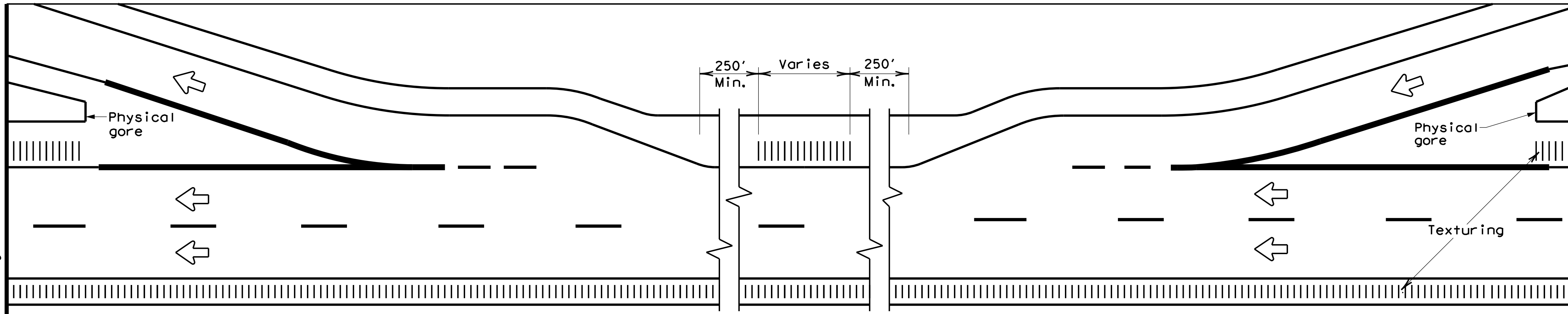
Traffic Operations Division Standard

RAILROAD CROSSING DETAILS SIGNING & STRIPING

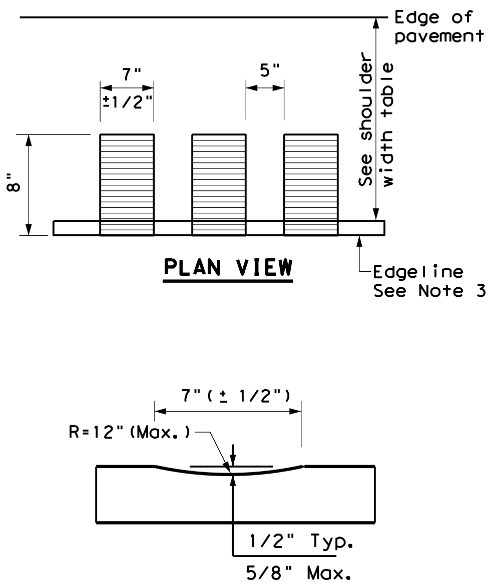
RCD(2)-16

FILE: rcd2-16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT FEBRUARY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		213

FILE: h:\00xmaintenance\south harris maintenance\2020 contracts\6357-02-001
DATE: 1/4/2021
PROJECT: 6375-52-001

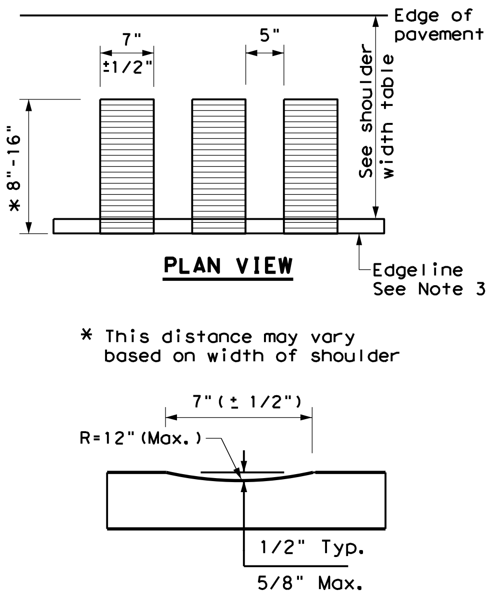


TYPICAL RUMBLE STRIP PLACEMENT AT EXIT AND ENTRANCE RAMPS



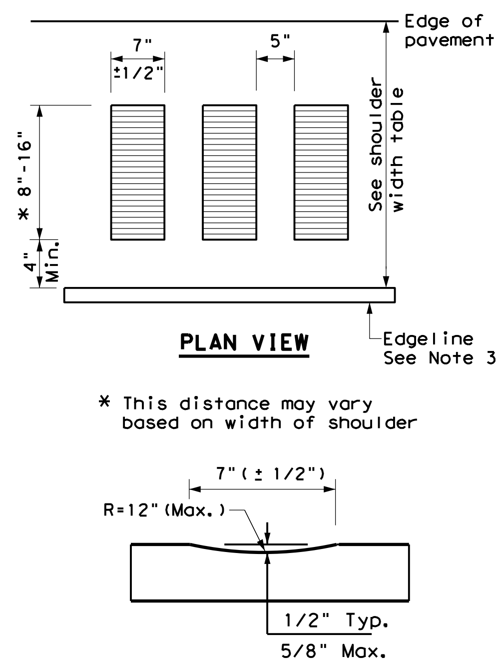
PROFILE VIEW
OPTION 1

CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



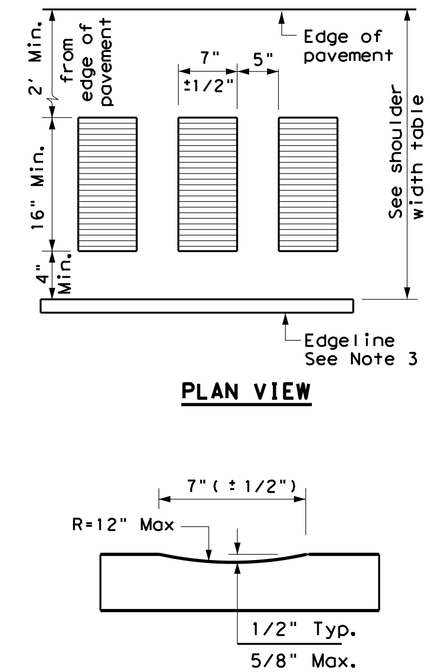
PROFILE VIEW
OPTION 2

CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



PROFILE VIEW
OPTION 3

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



PROFILE VIEW
OPTION 4

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)

GENERAL NOTES

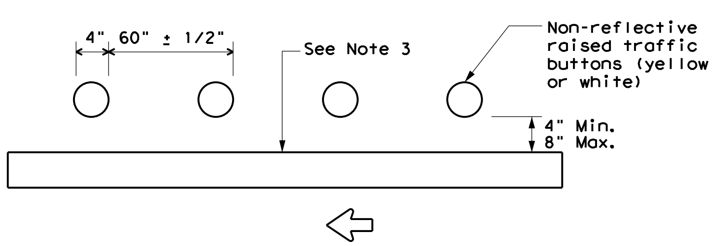
1. Rumble strips and profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
2. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
3. Use Standard Sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings, and profile markings.
4. See the table below for determining what options may be used for edgeline rumble strips.

WHEN INSTALLING MILLED DEPRESSION EDGELINE RUMBLE STRIPS:

5. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Operations Division.
6. Pavement markings can be applied over milled shoulder rumble strips to create an edgeline rumble stripe.
7. Breaks in edgeline rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections and driveways with high usage of large trucks when installed on conventional highways.
8. Rumble strips shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
9. Consideration should be given to noise levels when edgeline rumble strips are installed near residential areas, schools, churches, etc. A minimum of 3/8 inches depth of milled rumble strip may be considered in these areas.
10. On roadways with high bicycle activity, consideration should be given before the installation of edgeline rumble strips. Things to consider include size of rumble strips, rumble strip material and location of rumble strips on the shoulder. If the designer determines that gaps are needed in the rumble strips due to bicycle use of the road, then follow the requirement shown in FHWA Technical Advisory T5040.39, or latest version. A detail of the spacing shall be included in the plans.

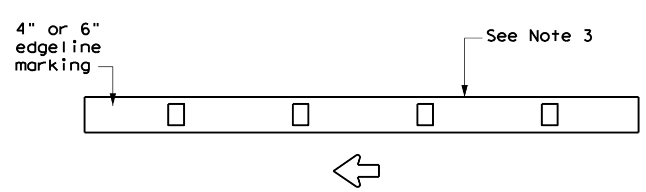
WHEN INSTALLING RAISED OR PROFILE EDGELINE RUMBLE STRIPS:

11. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per the manufacturer's recommendations.
12. Non-reflective traffic buttons shall be placed adjacent to the pavement marking delineating the edgeline when used as a rumble strip. The color of the button should match the color of the adjacent edgeline marking (white or yellow). The buttons will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
13. Non-reflective traffic buttons shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
14. Breaks in edgeline rumble strips using raised traffic buttons shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossing, intersections and driveways with high usage of large trucks when installed on conventional highways.
15. The minimum distance between the edgeline and the buttons should be used if the shoulder is less than 8 feet in width.
16. Raised profile thermoplastic markings used as edgelines may substitute for buttons.



PLAN VIEW
OPTION 5

RAISED EDGELINE RUMBLE STRIPS



PLAN VIEW
OPTION 6

PROFILE EDGELINE MARKINGS

SHOULDER WIDTH TABLE

EQUAL TO OR LESS THAN 2 FEET	GREATER THAN 2 FEET LESS THAN 4 FEET	EQUAL TO OR GREATER THAN 4 FEET
Option 1, 5 OR 6	Option 1, 2, 3, 5 or 6	Option 2, 4, 5 OR 6

Texas Department of Transportation

Traffic Operations Division Standard

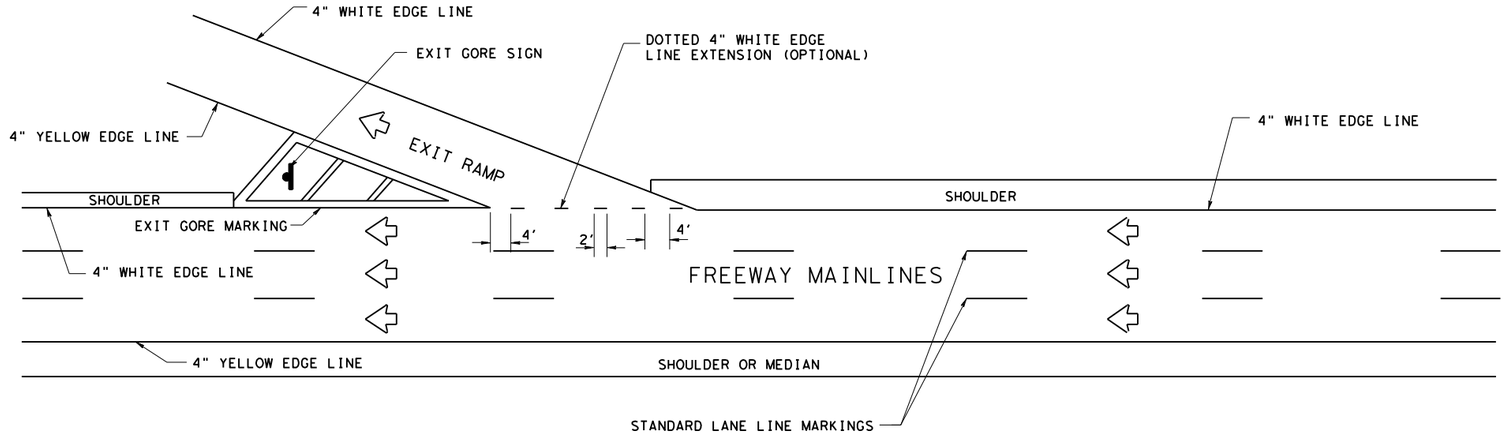
EDGELINE RUMBLE STRIPS ON FREEWAYS AND DIVIDED HIGHWAYS

RS(1)-13

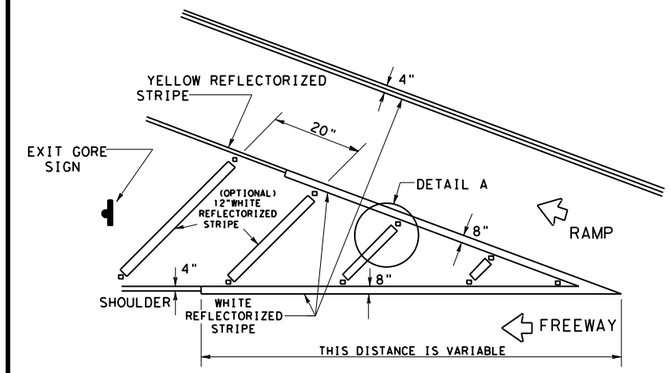
FILE: rs(1)-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
2-10	DIST		COUNTY	SHEET NO.
10-13	12		HARRIS/GAL	214

90

FILE: h:\00*maintenance\south harris maintenance\2020 contracts\6357-02-001\...
DATE: 1/4/2021
PROJECT: 6375-52-001

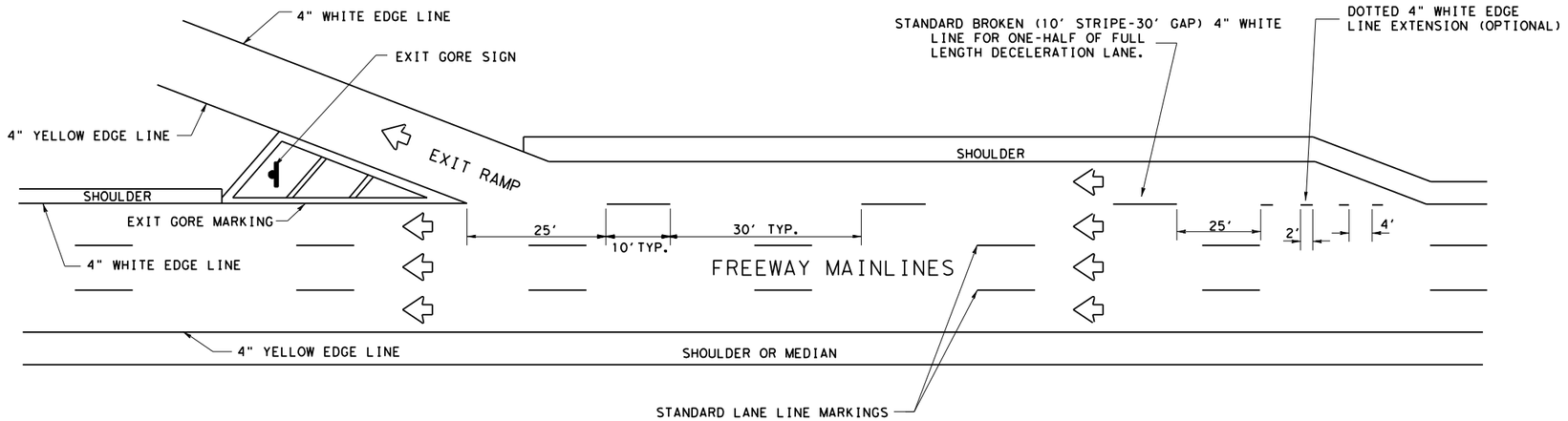


TAPERED DECELERATION LANE

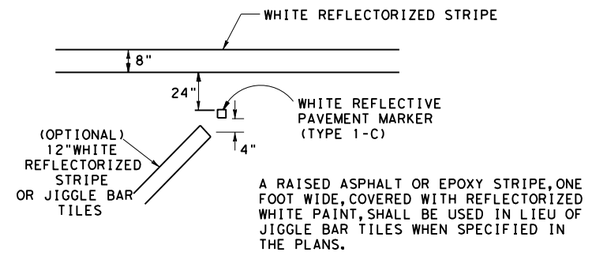


THE SHAPE OF THE GORE MARKING WILL VARY DEPENDING ON THE RAMP DESIGN AND WILL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER.

TYPICAL EXIT RAMP GORE MARKING



PARALLEL DECELERATION LANE



A RAISED ASPHALT OR EPOXY STRIPE, ONE FOOT WIDE, COVERED WITH REFLECTORIZED WHITE PAINT, SHALL BE USED IN LIEU OF JIGGLE BAR TILES WHEN SPECIFIED IN THE PLANS.

DETAIL A

TYPICAL EXIT RAMP MARKINGS

THE ABOVE EXIT RAMP MARKINGS SHALL BE APPLIED ONLY ON ONE LANE EXIT RAMPS TO FRONTAGE ROAD OR TO CROSSING ROADS UNLESS OTHERWISE DIRECTED BY THE PLANS OR BY THE ENGINEER.

Texas Department of Transportation
Houston District

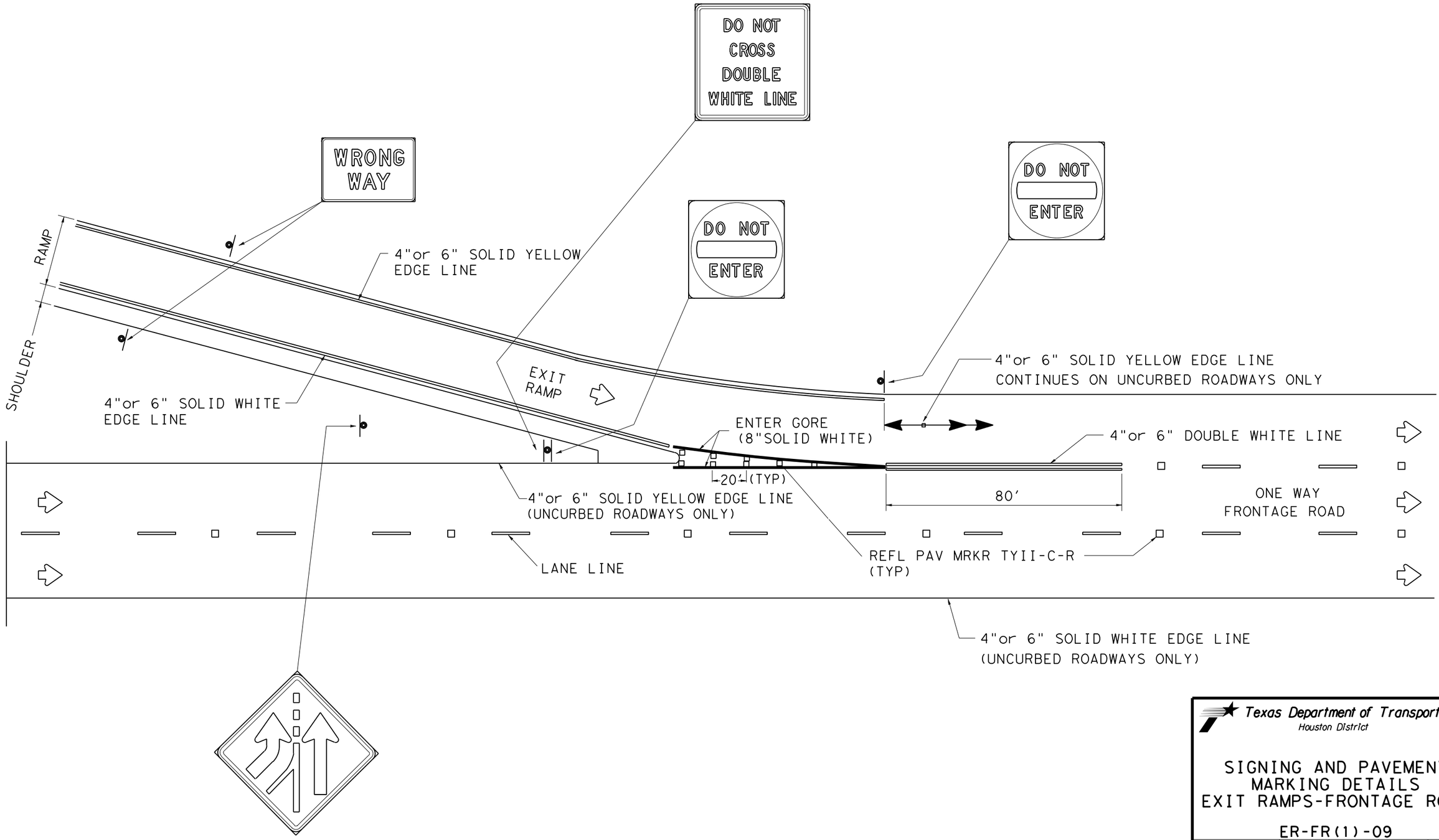
EXIT GORE PAVEMENT MARKINGS

EGPM TC6001-04

FILE:	DN:	CK:	DW:	CK:
©TxDOT	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS	12	6	RMC 6375-52-001	215
	COUNTY	CONTROL	SECT JOB	HIGHWAY
	HARRIS/GAL	6375	52 001	IH45

STD H-25

FILE: h:\00*maintenance\south harris maintenance\2020 contracts\6357-02-001*in45 general maintenance\Standards\Pavement Markings 20\stdh25.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001



DRAWING SCALE: NONE

Texas Department of Transportation
Houston District

SIGNING AND PAVEMENT MARKING DETAILS EXIT RAMPS-FRONTAGE ROAD

ER-FR(1)-09

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©TxDOT 1998	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS FEB., 2008 DEC., 2009	12	6	RMC 6375-52-001	216
	COUNTY	CONTROL	SECT JOB	HIGHWAY
	HARRIS/GAL	6375	52 001	IH45

STD N-25

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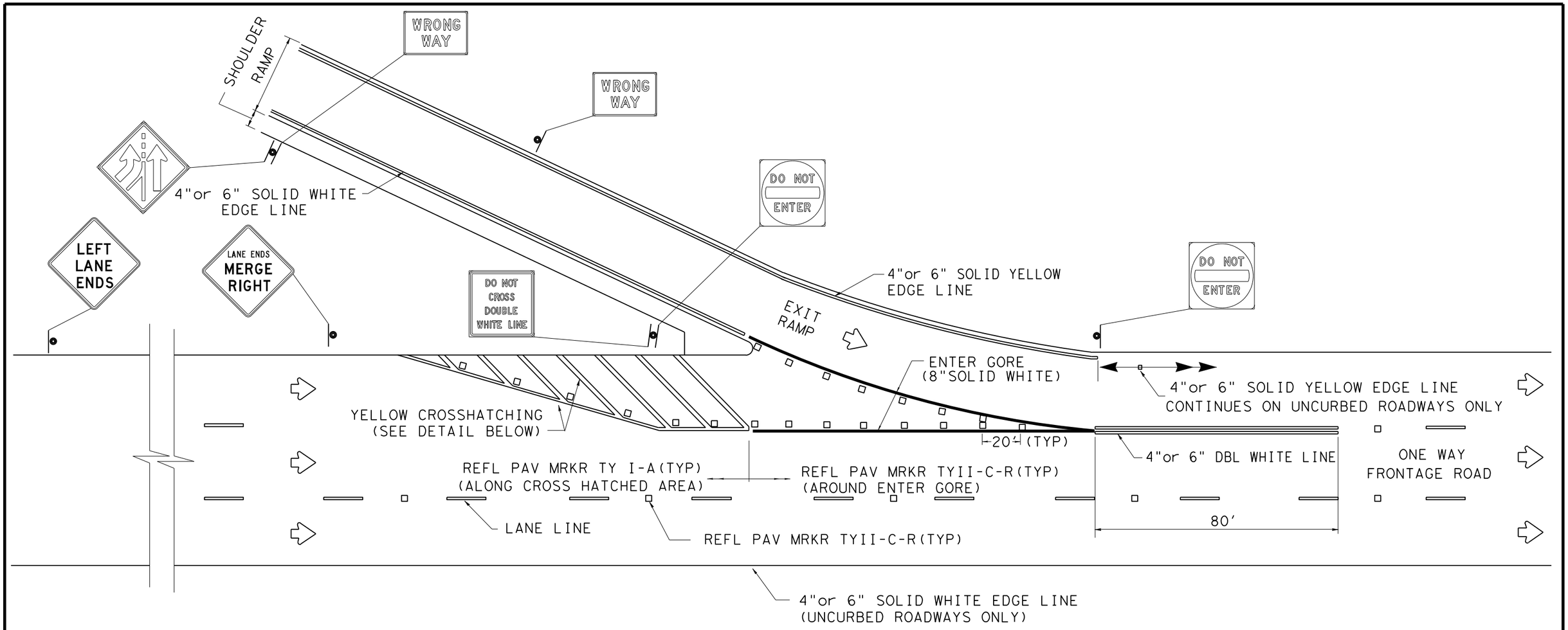
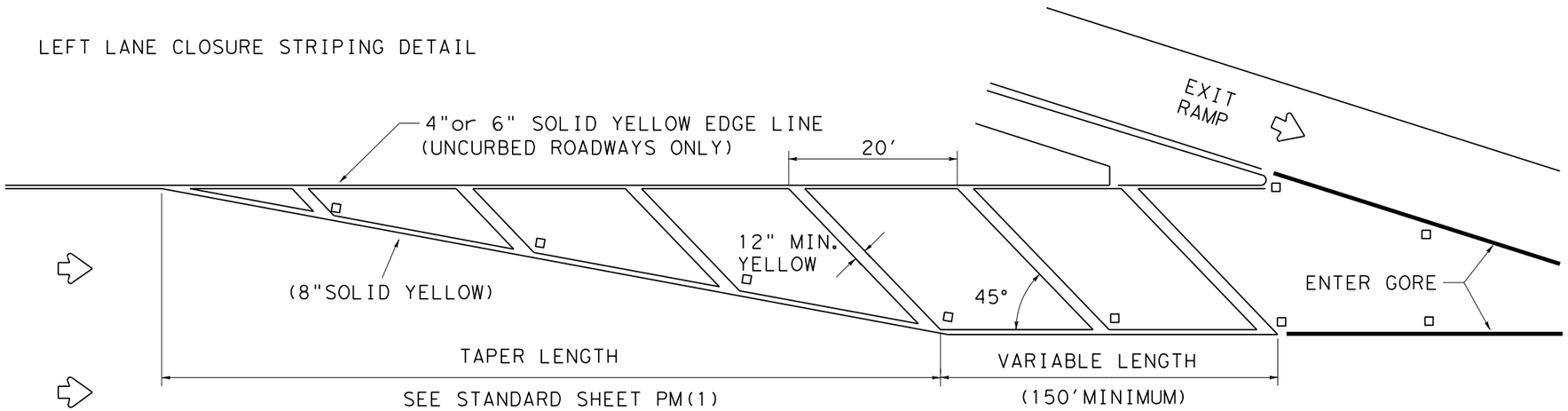
DATE: 1/4/2021
PROJECT: 6375-52-001



LEFT LANE CLOSURE STRIPING DETAIL



DRAWING SCALE: NONE

Texas Department of Transportation
Houston District

SIGNING AND PAVEMENT MARKING DETAILS EXIT RAMPS-FRONTAGE ROAD

ER-FR(2)-09

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© TxDOT 1998	DIST	FED REG	PROJECT NO.	SHEET
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	HARRIS/GAL	6375	52 001	IH45

STD N-26

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DATE: 1/4/2021
PROJECT: 6375-52-001

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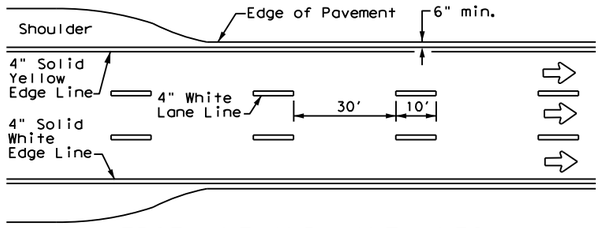
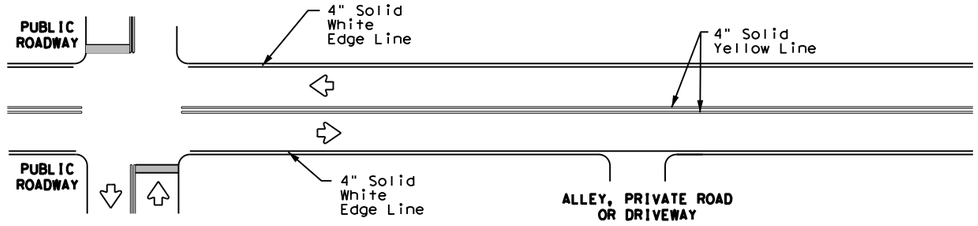
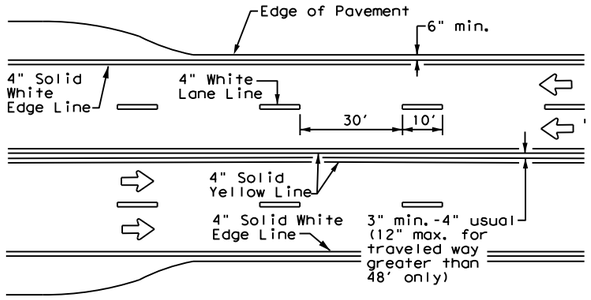
DATE: 1/5/2021
PROJECT: 6375-52-001



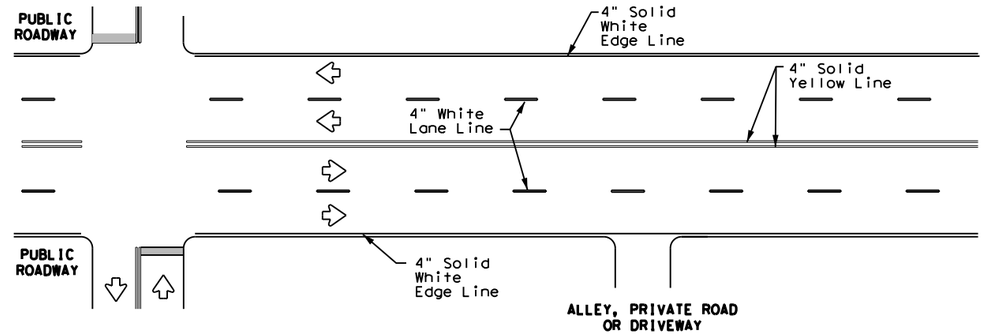
EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



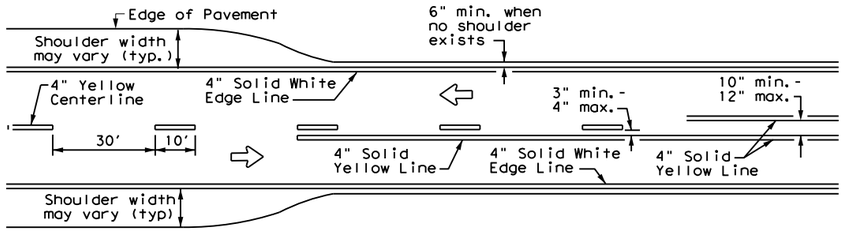
TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



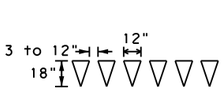
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



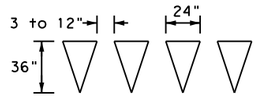
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

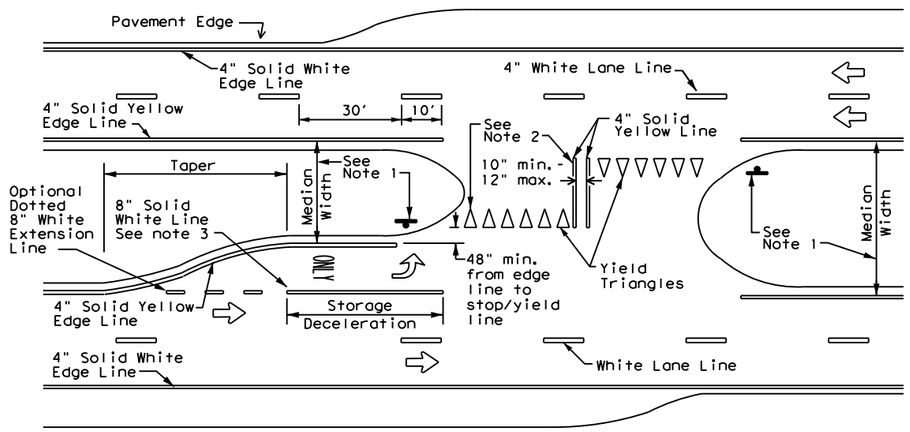


For posted speed on road being marked equal to or less than 40 MPH.



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

YIELD LINES



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTE:

1. Irrespective of shoulder, use 6in width lines (edge lines).
2. Use 4 in. width lines (edge and lane lines) when lane width is 10 ft. or less; and 6 in. width lines when lane width is greater than 10 ft.

NOTES

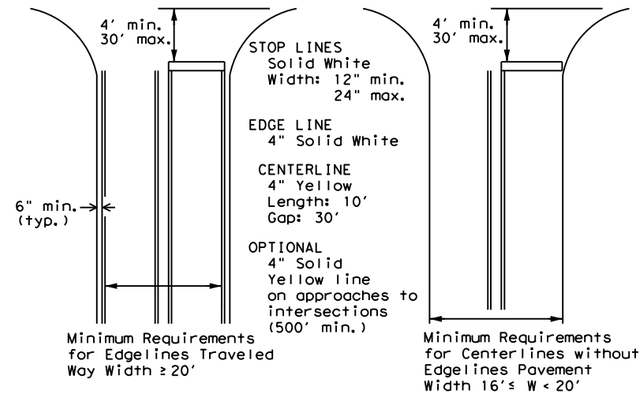
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling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

GENERAL NOTES

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

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

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



GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Highways

Texas Department of Transportation
HOUSTON DISTRICT STANDARD

TYPICAL STANDARD PAVEMENT MARKINGS

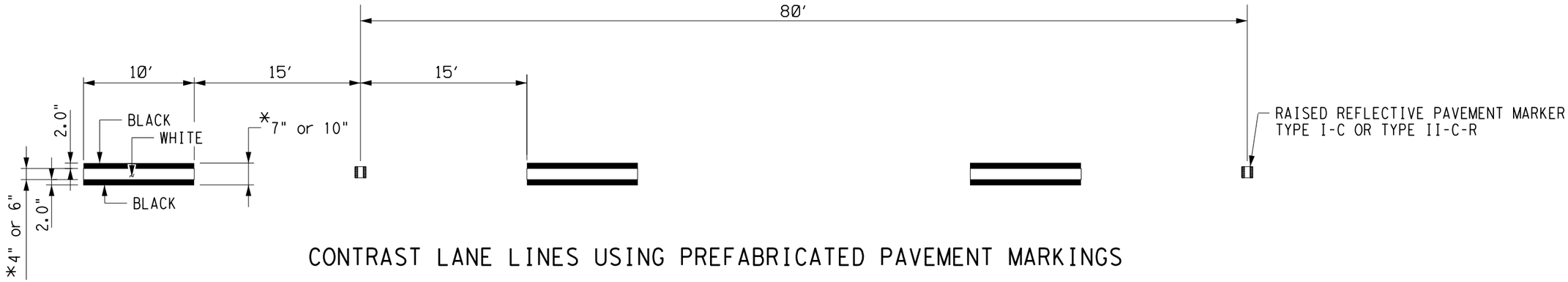
PM-20

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

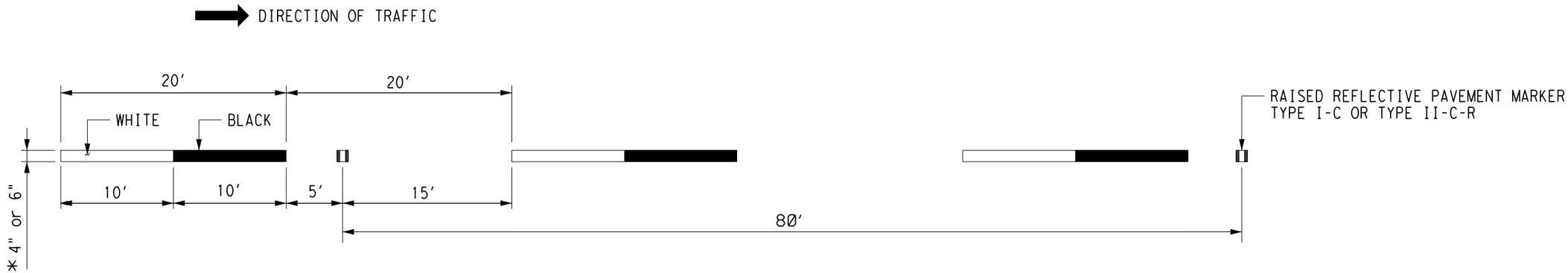
REVISIONS
8-95 2-12
5-00 8-16
8-00 7-20
3-03

CONT	SECT	JOB	HIGHWAY
6375	52	001	IH45
DIST	COUNTY		SHEET NO.
12	HARRIS/GAL		218

STD N-5a



CONTRAST LANE LINES USING PREFABRICATED PAVEMENT MARKINGS



CONTRAST LANE LINES USING LIQUID APPLICATIONS
(MULTIPOLYMER, THERMOPLASTIC, ETC.)

* AS SHOWN ON THE PLANS.

Texas Department of Transportation
Houston District

PAVEMENT MARKINGS
(CONTRAST LANE LINES)

PM(CLL)-14

FILE:	DN:	CK:	DW:	CK:	
© TxDOT 2003	DIST	FED REG	PROJECT NO.		SHEET
REVISIONS 01-10-06 02-12-08 10-2019 9" to 10"	12	6	RMC 6375-52-001		219
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	HARRIS/GAL		6375	52	001	IH45

STD N-30

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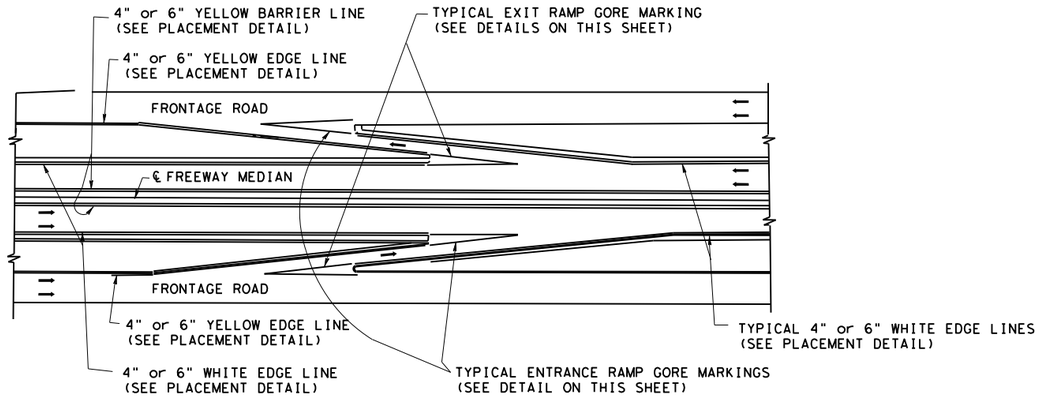
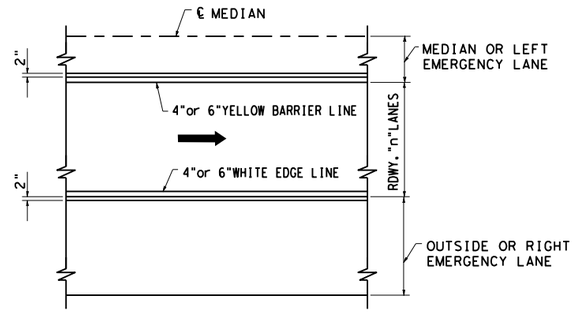
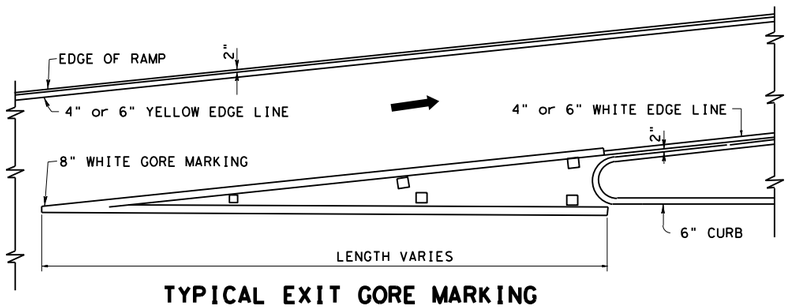
DATE: 1/4/2021
PROJECT: 6375-52-001



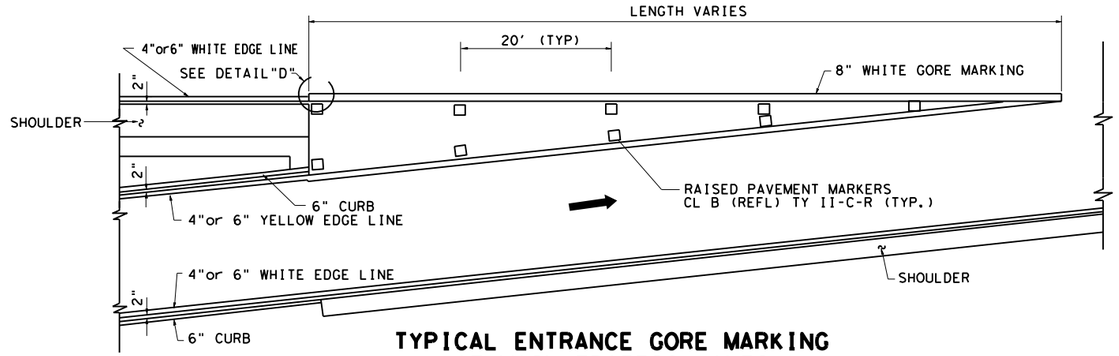
TYPICAL LAYOUT



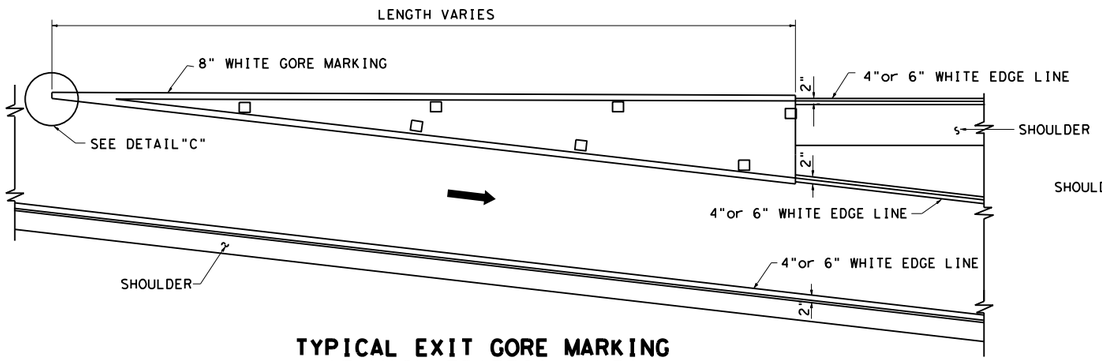
TYPICAL PLACEMENT FOR BARRIER AND EDGE LINES



TYPICAL EXIT GORE MARKING AT FRONTAGE ROAD



TYPICAL ENTRANCE GORE MARKING AT MAIN TRAFFIC LANES



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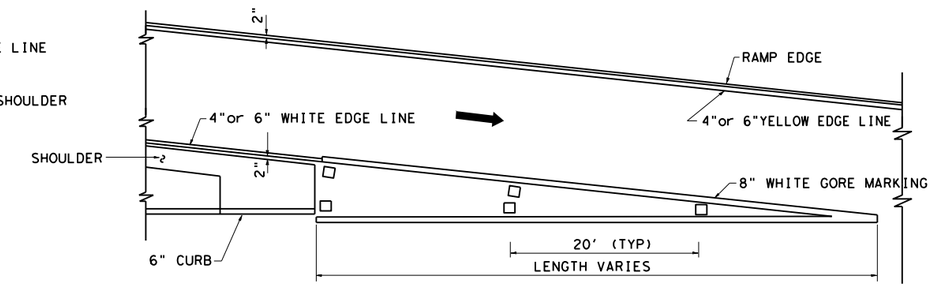

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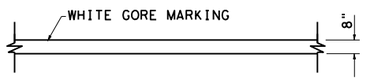
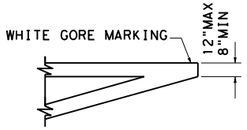


DETAIL "A"



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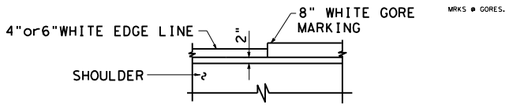


MRKS @ GORES.

DETAIL "D "

Texas Department of Transportation
Houston District

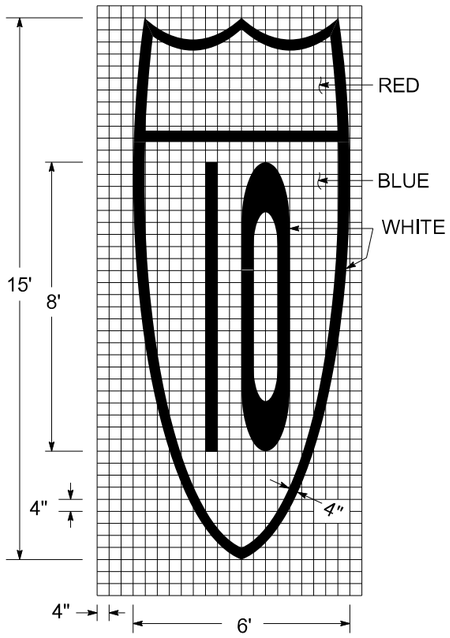
PAVEMENT MARKINGS
(RAMP AND GORE DETAILS)

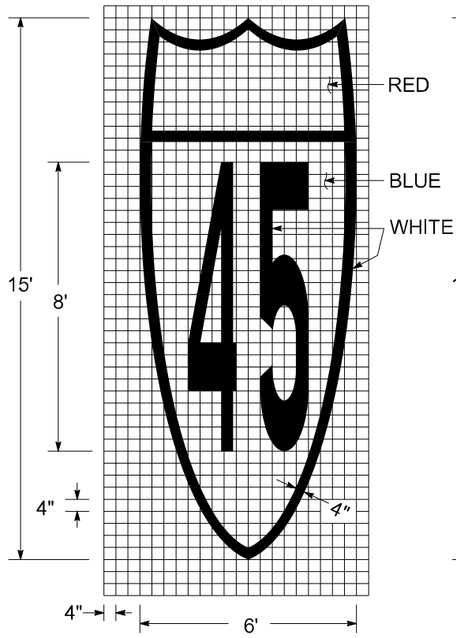
PM(R&G)-10

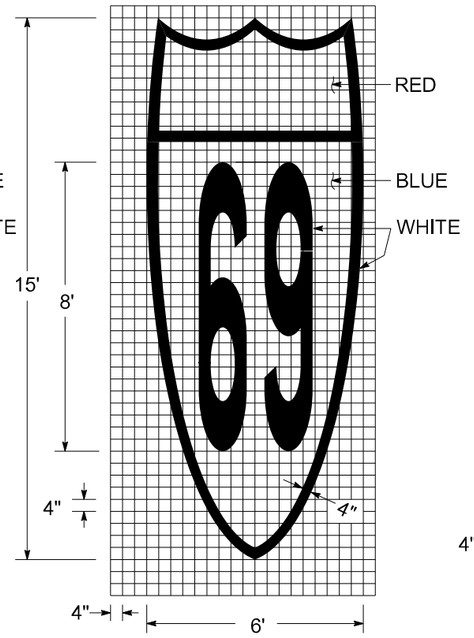
FILE:	DN:	CK:	DW:	CK:
© TxDOT 2010	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 4/2010	HOU	6	RMC 6375-52-001	220
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	HARRIS/GAL	6375	52	001	IH45

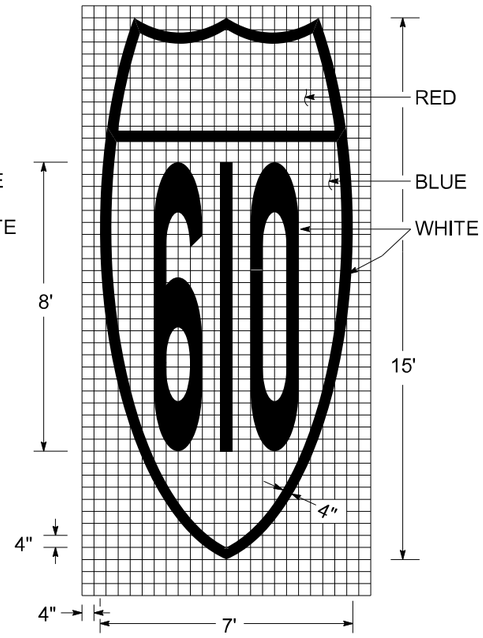
STD N-5

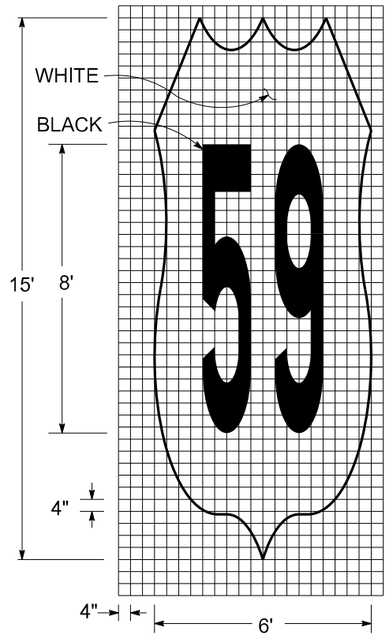
FILE: t:\0*gen-oo\0*maintenance\000*new contracts\ih 45 general maintenance\Standards\Pavement Markings 20\stdn5*10.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001

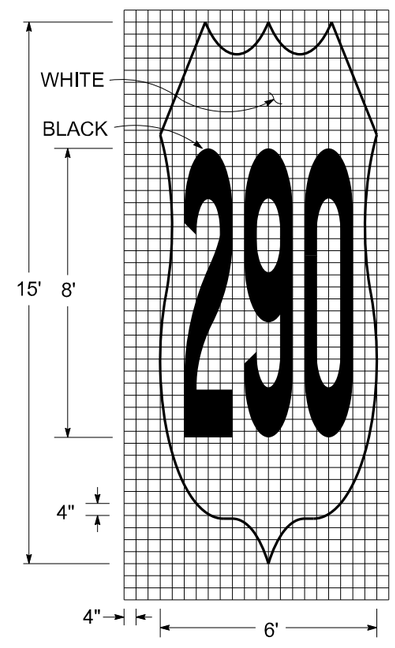


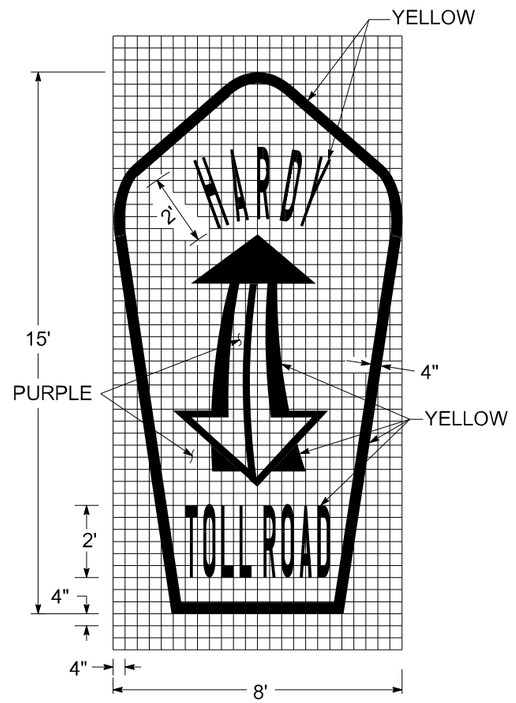


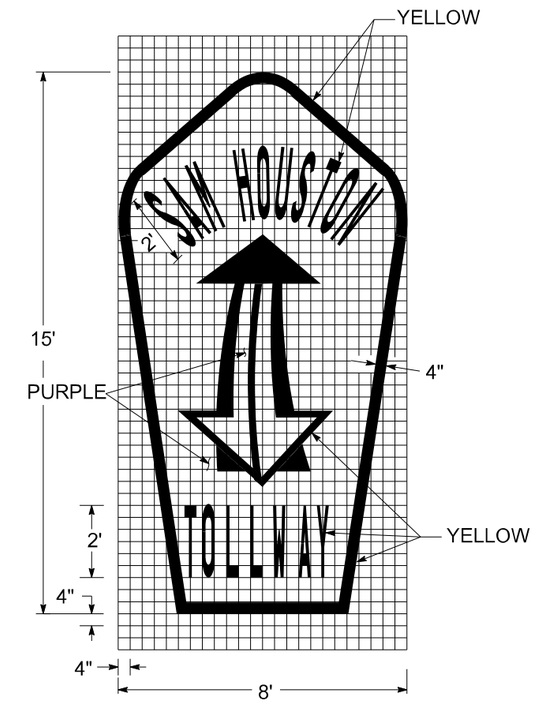


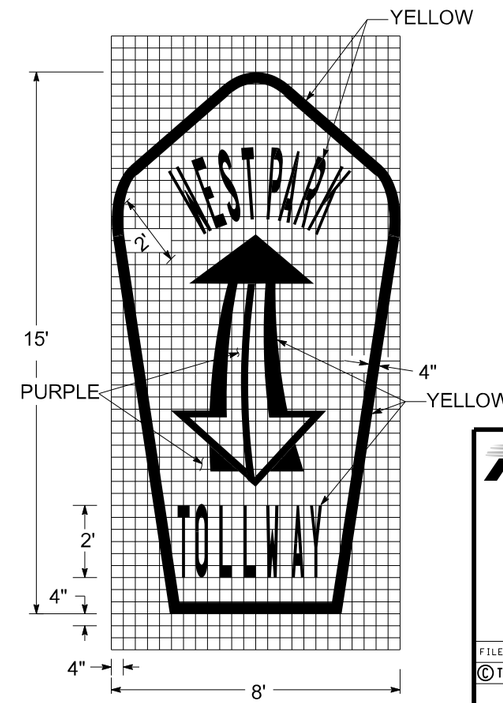












Texas Department of Transportation
Houston District

PAVEMENT MARKING (SHIELD)

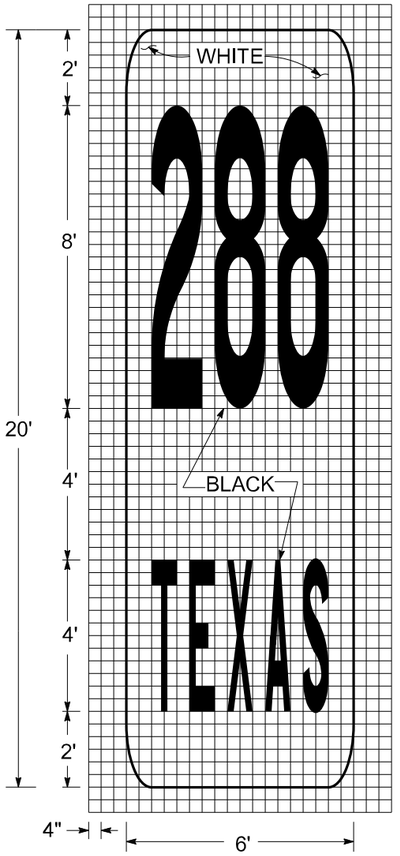
PM(SHIELD-1)-17

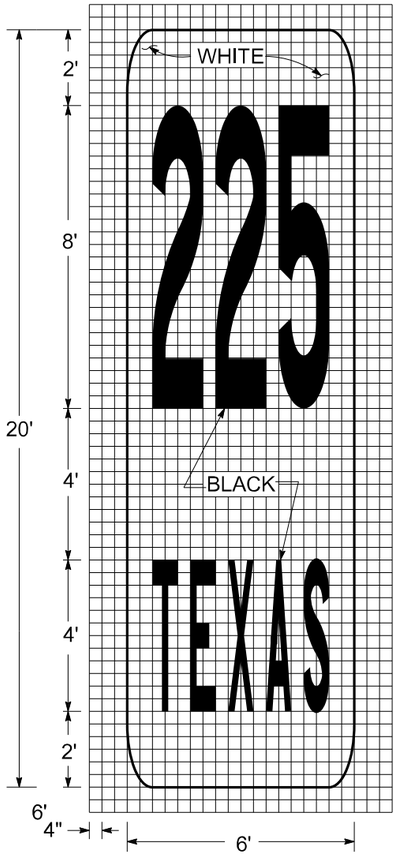
FILE:	DN:	CK:	DW:	CK:
© TxDOT 2004	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 07-12-17 07-30-17	12	6	RMC 6375-52-001	221
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	HARRIS/GAL	6375	52	001	IH45

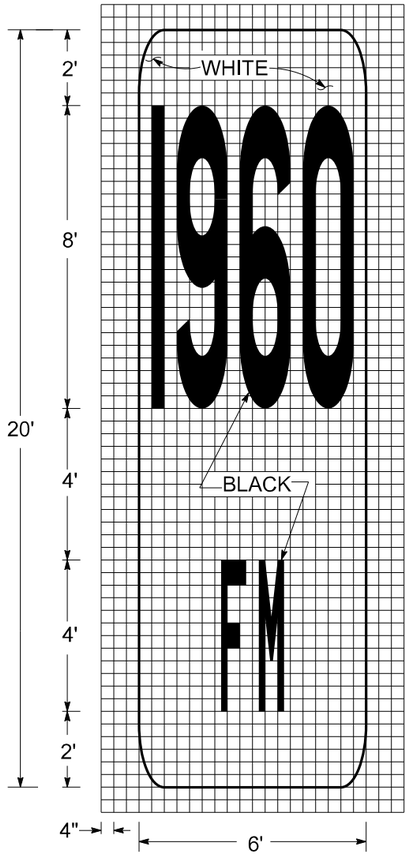
SCALE 1/4" = 1'

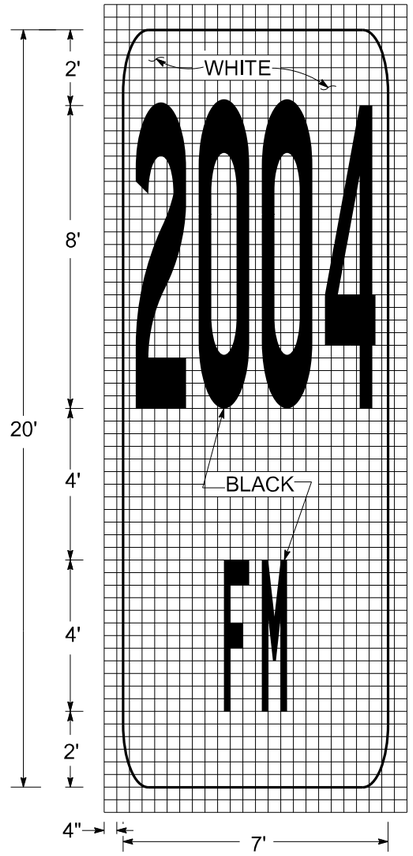
STD-N32

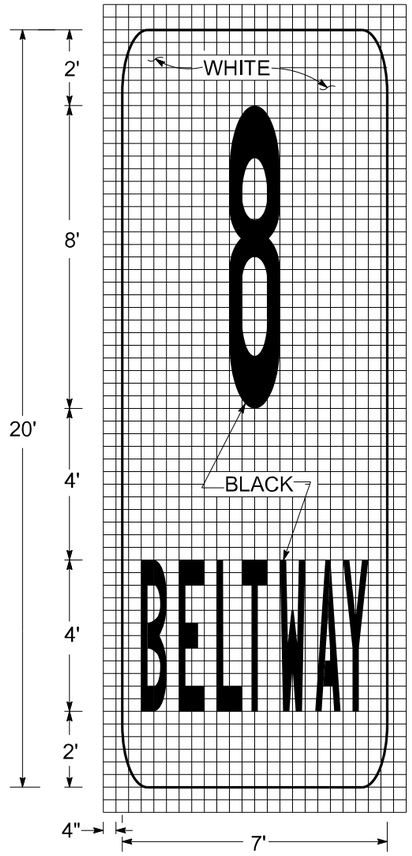
FILE: h:\00*maintenance\south harris maintenance\2020 contracts\6357-02-001*ih45 general maintenance\Standards\Pavement Markings 20\stdn32.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001

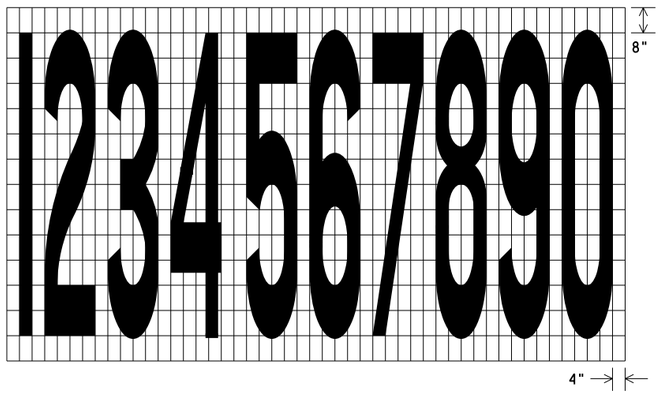


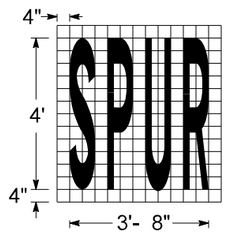


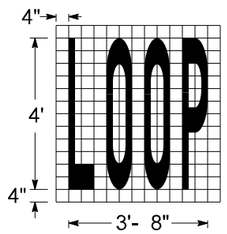


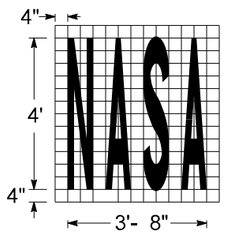












Texas Department of Transportation
Houston District

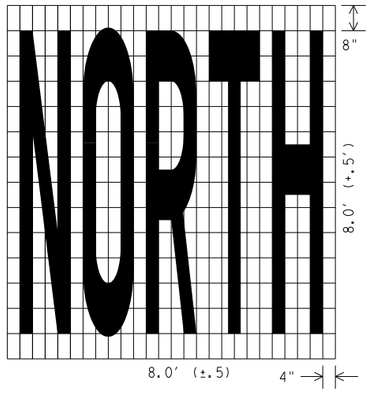
PAVEMENT MARKING (SHIELD)

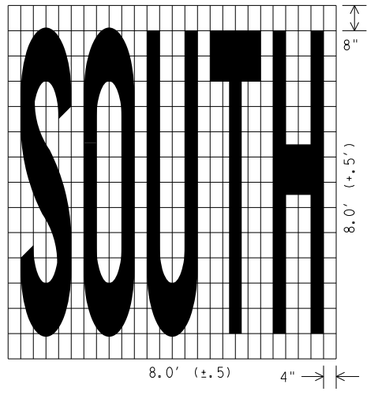
PM(SHIELD-2)-17

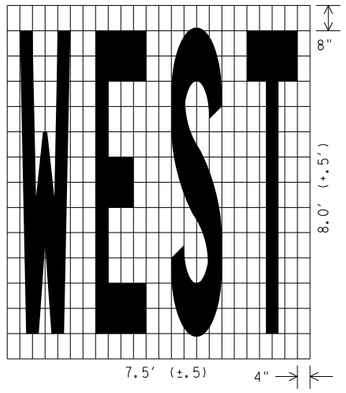
FILE:	DN:	CK:	DW:	CK:	
© TxDOT 2004	DIST	FED REG	PROJECT NO.		SHEET
REVISIONS 07-12-17 07-30-17	12	6	RMC 6375-52-001		222
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	HARRIS/GAL		6375	52	001	IH45

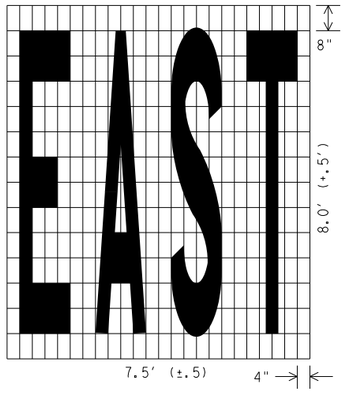
STD-N33

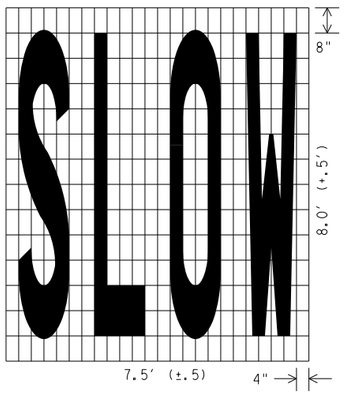
FILE: h:\00*maintenance\south harris maintenance\2020 contracts\6357-02-001*ih45 general maintenance\Standards\Pavement Markings 20\stdn33.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001

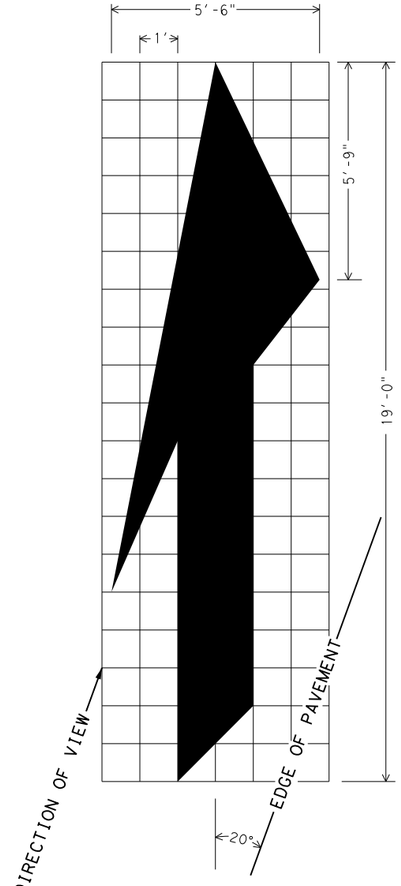






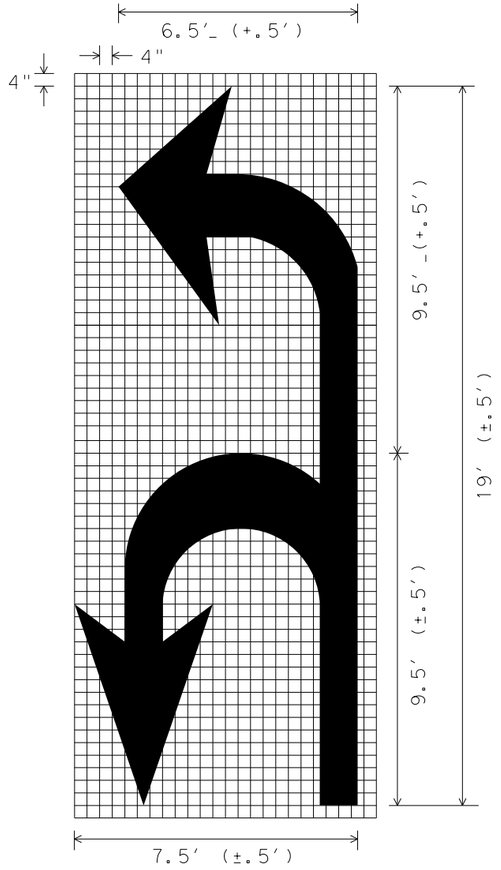




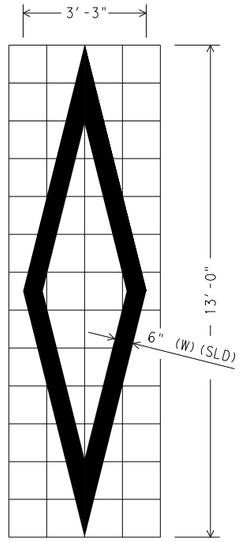


ISOMETRIC ARROW

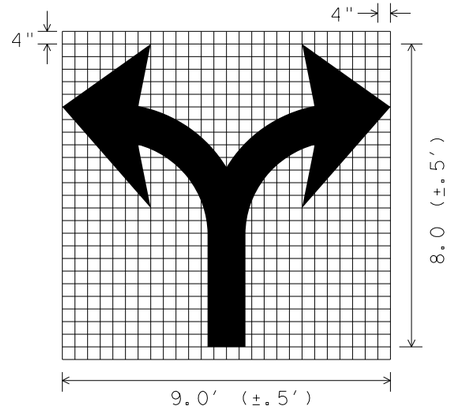
12 INCH GRID
AREA = 42 SQ. FT.
RIGHT LANE DROP ARROW
(FOR LEFT LANE, USE MIRROR IMAGE)



U-L ARROW



DIAMOND SYMBOL



SCALE 1/4" = 1′

Texas Department of Transportation
Houston District

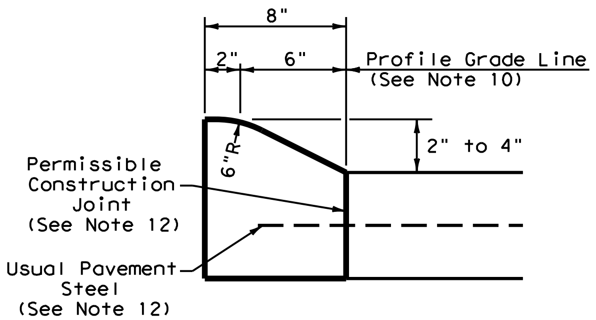
PAVEMENT MARKINGS (WORDS, ARROWS & SYMBOLS)

PM(WAS)-07

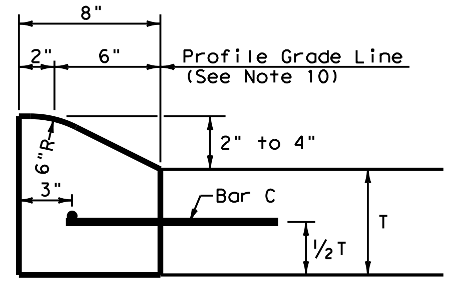
FILE:	DN:	CK:	DW:	CK:	
©TxDOT 2007	DIST	FED REG	PROJECT NO.		SHEET
REVISIONS 03-19-07	12	6	RMC 6375-52-001		223
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	HARRIS/GAL		6375	52	001	IH45

STD-N31

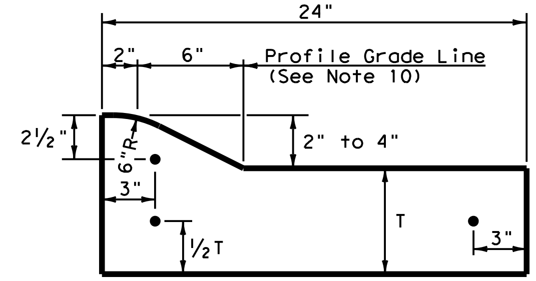
FILE: h:\00*maintenance\south harris maintenance\2020 contracts\6357-02-001*ih45 general maintenance\Standards\Pavement Markings 20\stdn31.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001



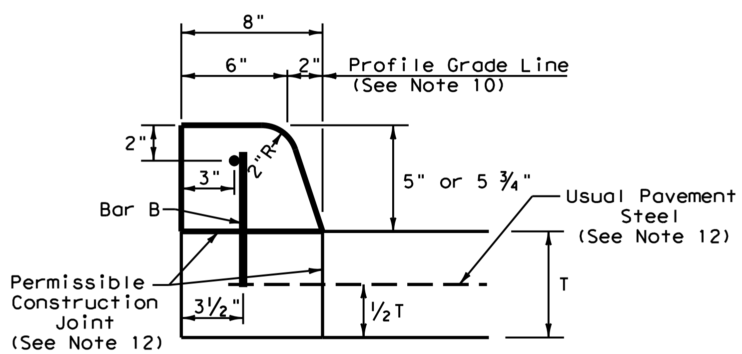
TYPE I CURB (MONOLITHIC)
2" - 4" HEIGHT



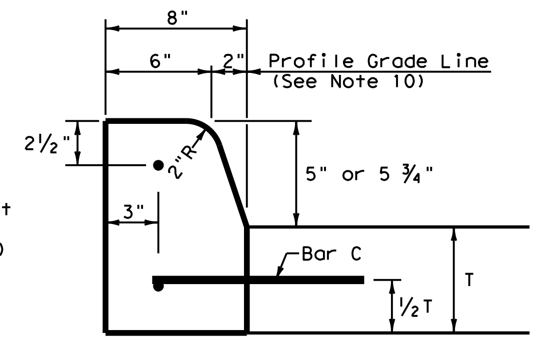
TYPE I CURB
2" - 4" HEIGHT



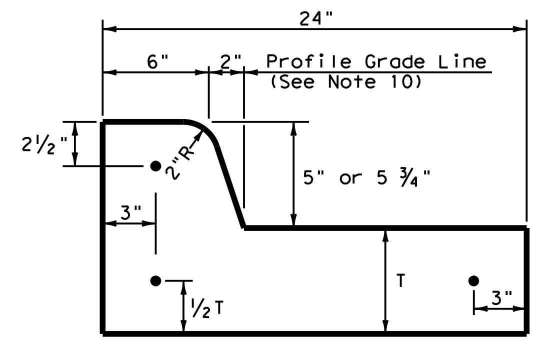
TYPE I CURB AND GUTTER
2" - 4" HEIGHT



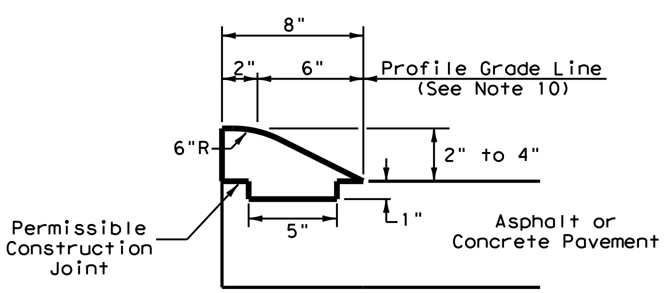
TYPE II CURB (MONOLITHIC)
5" - 5 3/4" HEIGHT



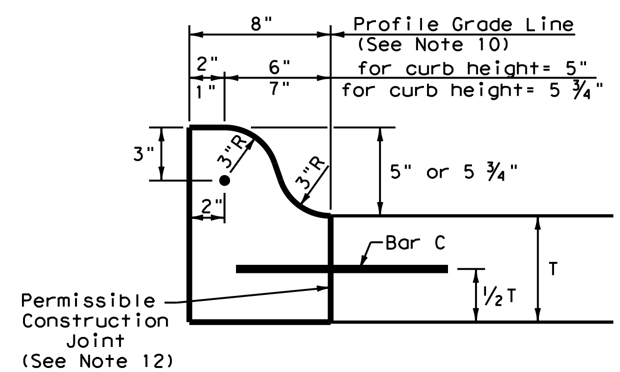
TYPE II CURB
5" - 5 3/4" HEIGHT



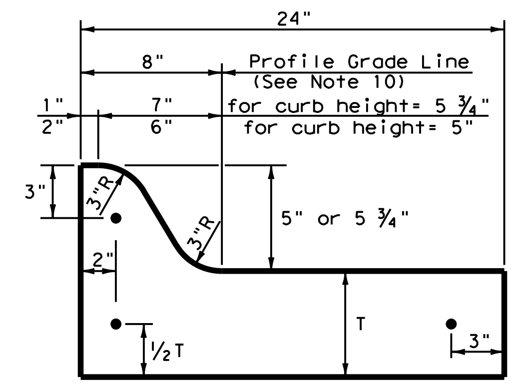
TYPE II CURB AND GUTTER
5" - 5 3/4" HEIGHT



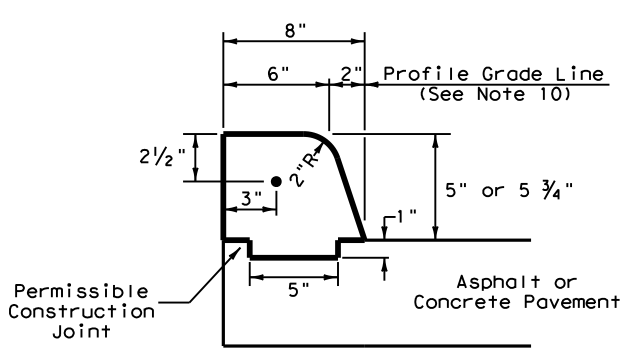
TYPE III CURB (KEYED)
2" - 4" HEIGHT



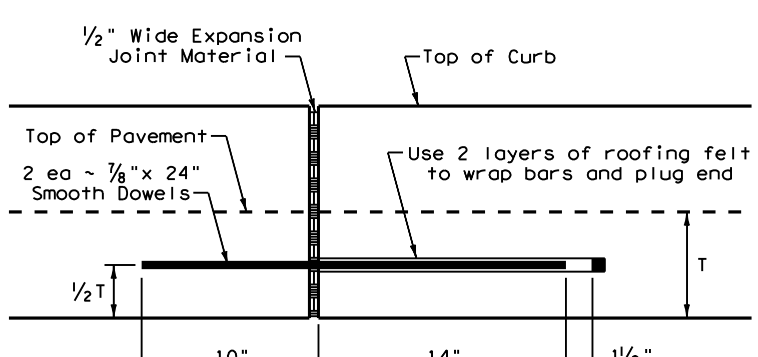
TYPE IIa CURB
5" - 5 3/4" HEIGHT



TYPE IIa CURB AND GUTTER
5" - 5 3/4" HEIGHT

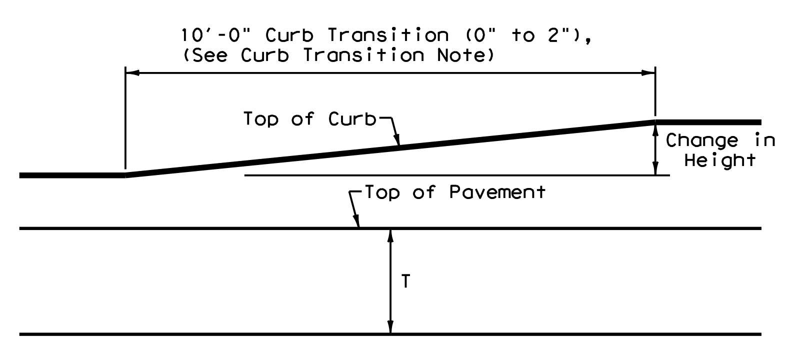


TYPE IV CURB (KEYED)
5" - 5 3/4" HEIGHT



EXPANSION JOINT DETAIL

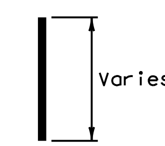
Curb Transition Note:
Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans, or as directed by the Engineer.



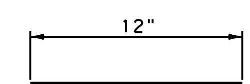
CURB TRANSITION
Note: To be paid for as Highest Curb

General Notes

1. All materials and construction shall be in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."
2. Concrete shall be Class A.
3. When reinforcing bars are used, they shall be No. 4 unless otherwise shown. The use of synthetic fiber in lieu of steel reinforcing is acceptable, provided the fiber producer is on the Department Producer List (MPL), maintained by TxDOT, Construction Division.
4. Round exposed sharp edges with a rounding tool, to a minimum radius of 1/4 inch.
5. All existing curbs and driveways to be removed shall be sawed or removed at existing joints.
6. Where concrete curb is placed on existing concrete pavement, the pavement shall be drilled and the reinforcing bars grouted in place.
7. Expansion and contraction joints shall be constructed to match pavement joints in all curbs and curb and gutter adjacent to jointed concrete pavement. Where placement of curb or curb and gutter is not adjacent to concrete pavement, expansion joints shall be provided at structures, curb returns at streets, and at locations directed by The Engineer.
8. Vertical and horizontal dowel bars and transverse reinforcing bars shall be placed at four feet C~C.
9. Dimension 'T' shown is the thickness of concrete pavement. When curb is installed adjacent to flexible pavement dimension 'T' is 8" maximum.
10. Usual profile grade line. Refer to typical sections and plan-profile sheets for exact locations.
11. One-half inch expansion joint material shall be provided where curb or curb and gutter is adjacent to sidewalk or riprap.
12. When vertical permissible construction joints are used, resulting in a longitudinal construction joint in the pavement, the longitudinal pavement steel shall be placed in accordance with pavement details shown elsewhere in the plans for longitudinal construction joints. Reinforcing steel for curb section shall then conform to that required for concrete curb.



BAR B



BAR C

Texas Department of Transportation

Design Division Standard

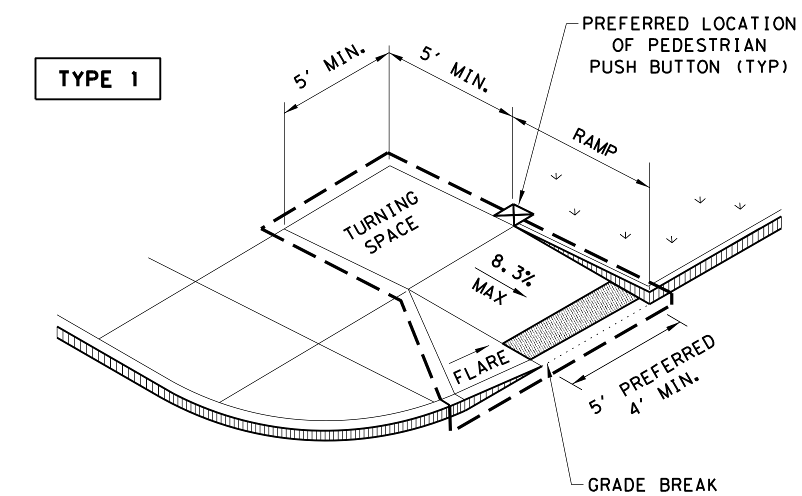
CONCRETE CURB AND CURB AND GUTTER

CCCG-12

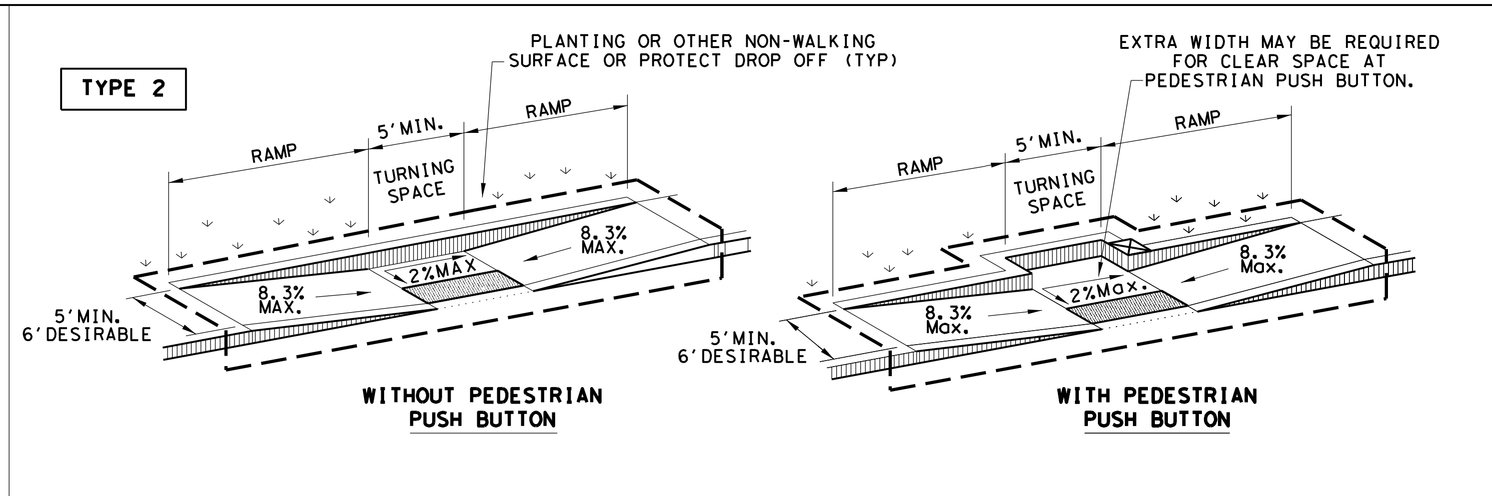
FILE: cccg12.dgn		DN: TxDOT	CK: AM	DW: VP		CK: VP	
© TxDOT: 1995		CONT	SECT	JOB		HIGHWAY	
REVISIONS UPDATED 2012 - VP		6375	52	001		IH45	
		DIST	COUNTY			SHEET NO.	
		12	HARRIS/GAL			224	

FILE: h:\00#maintenance\south harris maintenance\2020 contracts\...
DATE: 1/4/2021
PROJECT: 6375-52-001

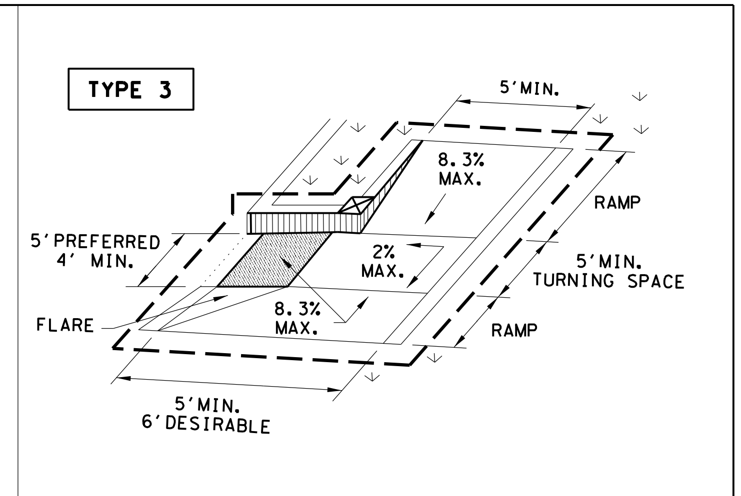
FILE: h:\00+maintenance\south harris maintenance\...
DATE: 1/4/2021
PROJECT: 6375-52-001

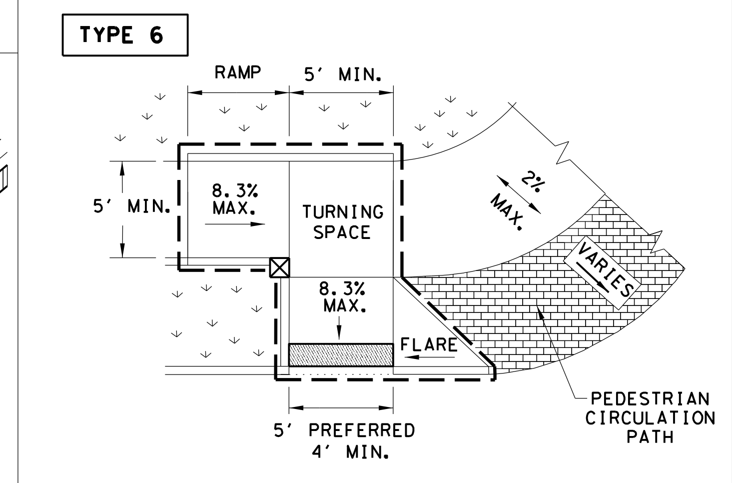


PERPENDICULAR CURB RAMP

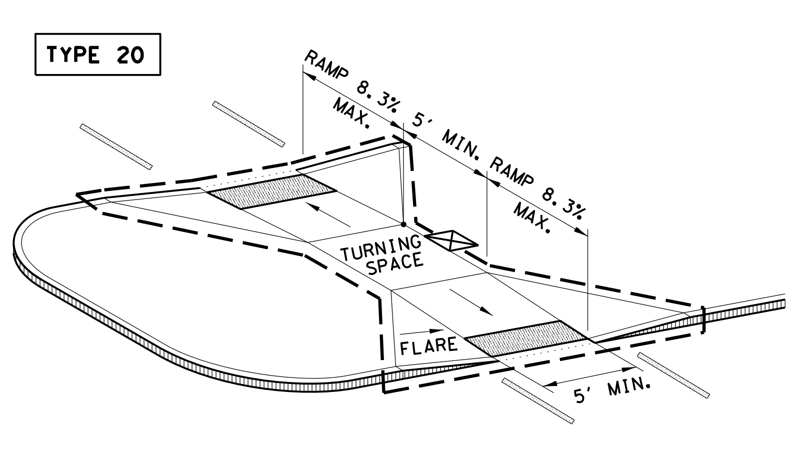


PARALLEL CURB RAMP

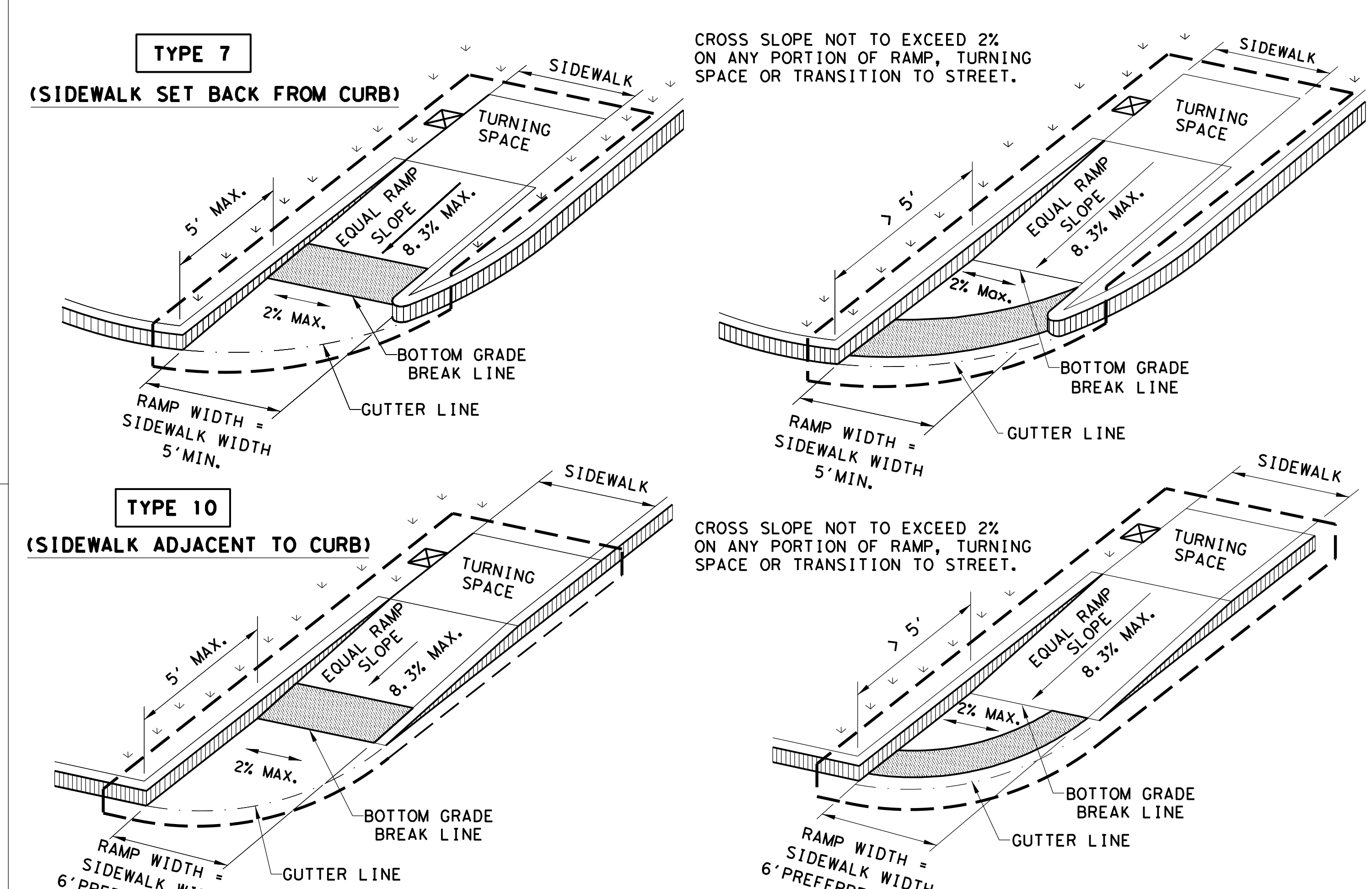




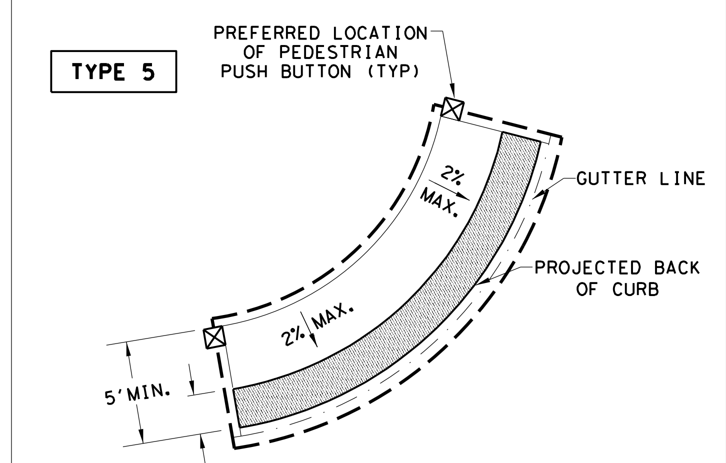
COMBINATION CURB RAMPS



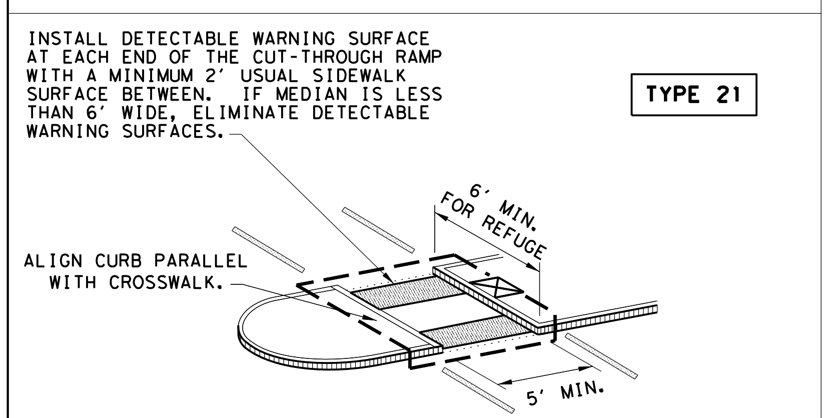
CURB RAMPS AT MEDIAN ISLANDS



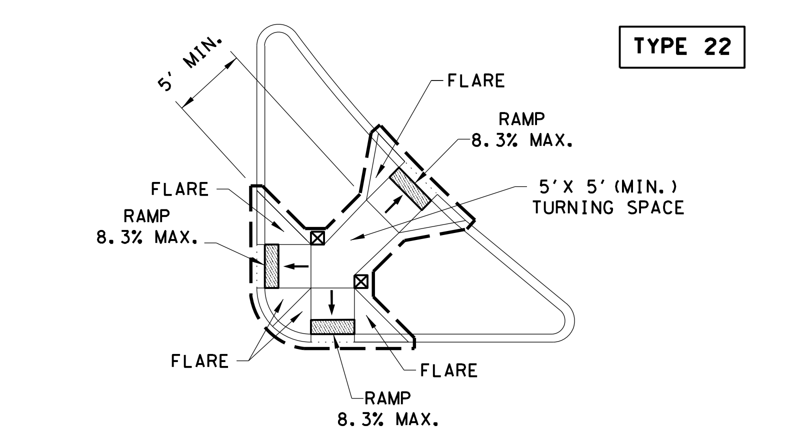
DIRECTIONAL RAMPS WITHIN RADIUS



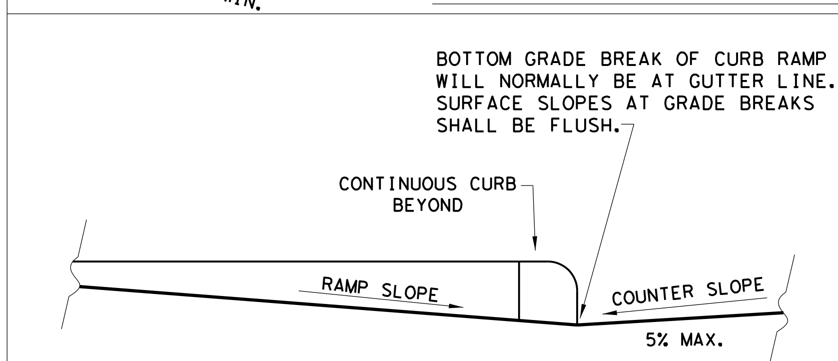
BLENDED TRANSITION (FLUSH LANDING)



NOTE: CURB DETAILS ARE SHOWN ELSEWHERE IN THE PLANS.



COMBINATION ISLAND RAMPS



TYPICAL SECTION OF PERPENDICULAR CURB RAMP AT CONNECTION TO ROADWAY

NOTES / LEGEND:

SEE GENERAL NOTES ON SHEET 2 OF 4 FOR MORE INFORMATION.

DENOTES PLANTING OR NON-WALKING SURFACE NOT PART OF PEDESTRIAN CIRCULATION PATH.	⸙	GUTTER LINE	— · —
DETECTABLE WARNING SURFACE	▨	GRADE BREAK	········
DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON IF APPLICABLE.	☒	RAMP LIMITS OF PAYMENT	— —

SHEET 1 OF 4

Texas Department of Transportation — Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
© TxDOT: March 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		225

GENERAL NOTES

CURB RAMPS

1. Install a curb ramp or blended transition at each pedestrian street crossing.
2. All slopes shown are maximum allowable. Cross slopes of 1.5% and lesser running should be used. Adjust curb ramp length or grade of approach sidewalks as directed.
3. Maximum allowable cross slope on sidewalk and curb ramp surfaces is 2%.
4. The minimum sidewalk width is 5'. Where the sidewalk is adjacent to the back of curb, a 6' sidewalk width is desirable. Where a 5' sidewalk cannot be provided due to site constraints, sidewalk width may be reduced to 4' for short distances. 5'x 5' passing areas at intervals not to exceed 200' are required.
5. Turning Spaces shall be 5'x 5' minimum. Cross slope shall be maximum 2%.
6. Clear space at the bottom of curb ramps shall be a minimum of 4'x 4' wholly contained within the crosswalk and wholly outside the parallel vehicular travel path.
7. Provide flared sides where the pedestrian circulation path crosses the curb ramp. Flared sides shall be sloped at 10% maximum, measured parallel to the curb. Returned curbs may be used only where pedestrians would not normally walk across the ramp, either because the adjacent surface is planted, substantially obstructed, or otherwise protected.
8. Additional information on curb ramp location, design, light reflective value and texture may be found in the latest draft of the Proposed Guidelines for Pedestrian Facilities in the Public Right of Way (PROWAG) as published by the U.S. Architectural and Transportation Barriers Compliance Board (Access Board).
9. To serve as a pedestrian refuge area, the median should be a minimum of 6' wide, measured from back of curbs. Medians should be designed to provide accessible passage over or through them.
10. Small channelization islands, which do not provide a minimum 5'x 5' landing at the top of curb ramps, shall be cut through level with the surface of the street.
11. Crosswalk dimensions, crosswalk markings and stop bar locations shall be as shown elsewhere in the plans. At intersections where crosswalk markings are not required, curb ramps shall align with theoretical crosswalks unless otherwise directed.
12. Provide curb ramps to connect the pedestrian access route at each pedestrian street crossing. Handrails are not required on curb ramps.
13. Curb ramps and landings shall be constructed and paid for in accordance with Item 531 "Sidewalks".
14. Place concrete at a minimum depth of 5" for ramps, flares and landings, unless otherwise directed.
15. Furnish and install No. 3 reinforcing steel bars at 18" o.c. both ways, unless otherwise directed.
16. Provide a smooth transition where the curb ramps connect to the street.
17. Curbs shown on sheet 1 within the limits of payment are considered part of the curb ramp for payment, whether it is concrete curb, gutter, or combined curb and gutter.
18. Existing features that comply with applicalble standards may remain in place unless otherwise shown on the plans.

DETECTABLE WARNING MATERIAL

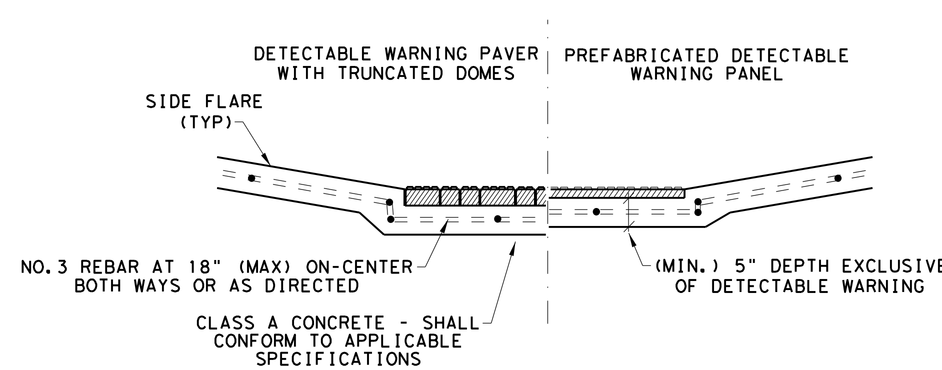
19. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with PROWAG. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material adjacent to uncolored concrete, unless specified elsewhere in the plans.
20. Detectable Warning Materials must meet TxDOT Departmental Materials Specification DMS 4350 and be listed on the Material Producer List. Install products in accordance with manufacturer's specifications.
21. Detectable warning surfaces must be firm, stable and slip resistant.
22. Detectable warning surfaces shall be a minimum of 24 inches in depth in the direction of pedestrian travel, and extend the full width of the curb ramp or landing where the pedestrian access route enters the street.
23. Detectable warning surfaces shall be located so that the edge nearest the curb line is at the back of curb and neither end of that edge is greater than 5 feet from the back of curb. Detectable warning surfaces may be curved along the corner radius.
24. Shaded areas on Sheet 1 of 4 indicate the approximate location for the detectable warning surface for each curb ramp type.

DETECTABLE WARNING PAVERS (IF USED)

25. Furnish detectable warning paver units meeting all requirements of ASTM C-936, C-33. Lay in a two by two unit basket weave pattern or as directed.
26. Lay full-size units first followed by closure units consisting of at least 25 percent (25%) of a full unit. Cut detectable warning paver units using a power saw.

SIDEWALKS

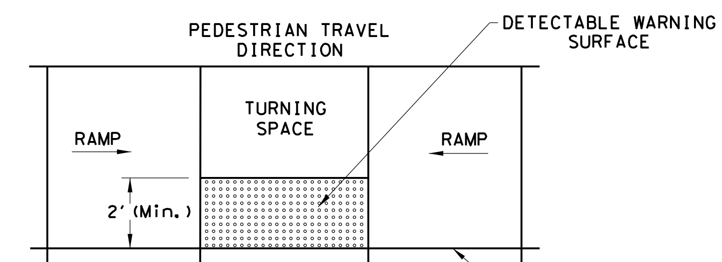
27. Provide clear ground space at operable parts, including pedestrian push buttons. Operable parts shall be placed within unobstructed reach range specified in PROWAG section R406.
28. Place traffic signal or illumination poles, ground boxes, controller boxes, signs, drainage facilities and other items so as not to obstruct the pedestrian access route or clear ground space.
29. Street grades and cross slopes shall be as shown elsewhere in the plans.
30. Changes in level greater than 1/4 inch are not permitted.
31. The least possible grade should be used to maximize accessibility. The running slope of sidewalks and crosswalks within the public right of way may follow the grade of the parallel roadway. Where a continuous grade greater than five percent (5%) must be provided, handrails may be desirable to improve accessibility. Handrails may also be needed to protect pedestrians from potentially hazardous conditions. If provided, handrails shall comply with PROWAG R409.
32. Handrail extensions shall not protrude into the usable landing area or into intersecting pedestrian routes.
33. Driveways and turnouts shall be constructed and paid for in accordance with Item "Intersections, Driveways and Turnouts". Sidewalks shall be constructed and paid for in accordance with Item, "Sidewalks".
34. Sidewalk details are shown elsewhere in the plans.



SECTION VIEW DETAIL

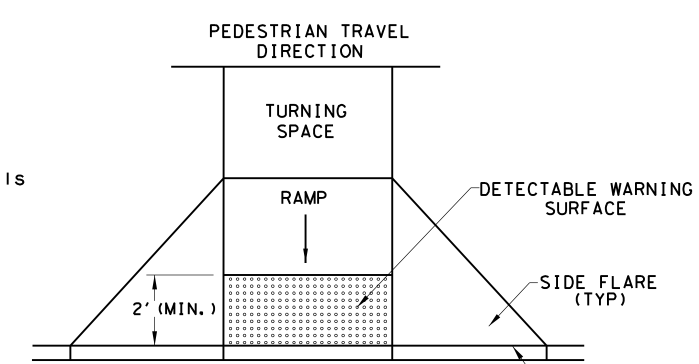
CURB RAMP AT DETECTIBLE WARNINGS

DETECTABLE WARNING SURFACE DETAILS



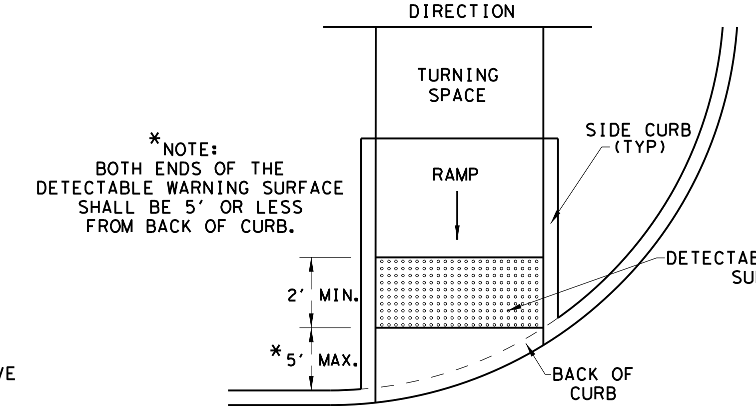
PARALLEL CURB RAMP

TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON LANDING AT STREET EDGE.



PERPENDICULAR CURB RAMP

TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.



DIRECTIONAL CURB RAMP

TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.

SHEET 2 OF 4

Texas Department of Transportation — Design Division Standard

PEDESTRIAN FACILITIES
CURB RAMPS

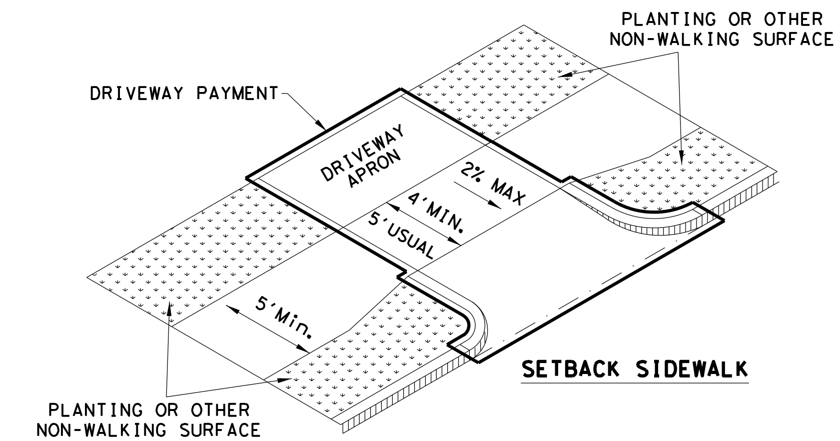
PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
© TxDOT: March 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST		COUNTY	SHEET NO.
	12		HARRIS/GAL	226

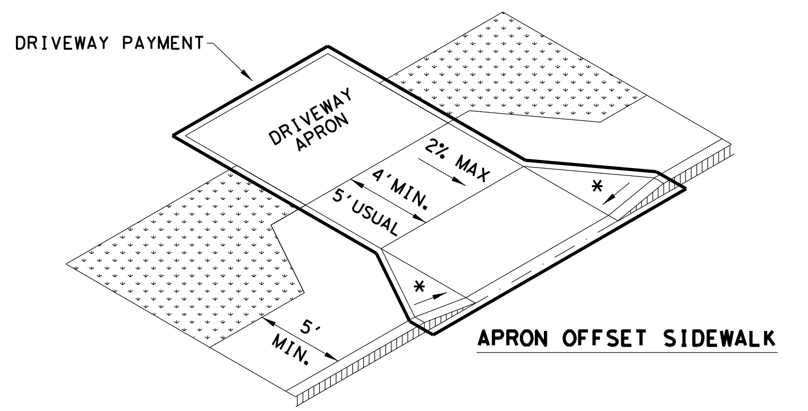
FILE: h:\00maintenance\south harris maintenance\...
DATE: 1/4/2021
PROJECT: 6375-52-001

FILE: h:\00*maintenance\south harris maintenance\2020
DATE: 1/4/2021
PROJECT: 6375-52-001

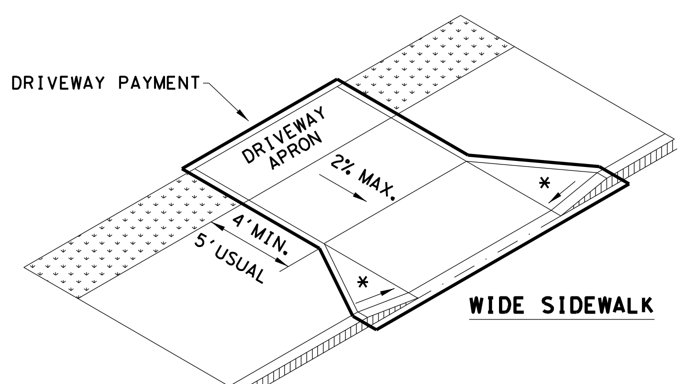
SIDEWALK TREATMENT AT DRIVEWAYS



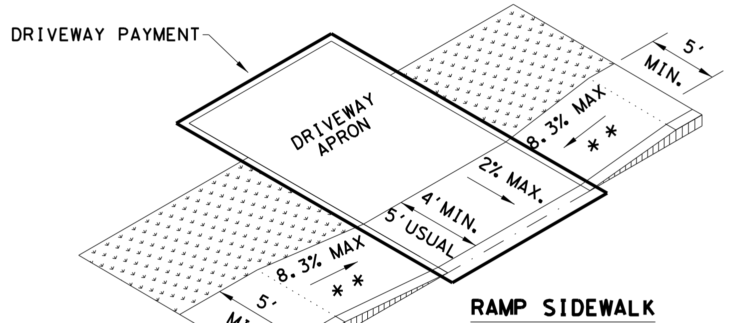
SETBACK SIDEWALK



APRON OFFSET SIDEWALK



WIDE SIDEWALK

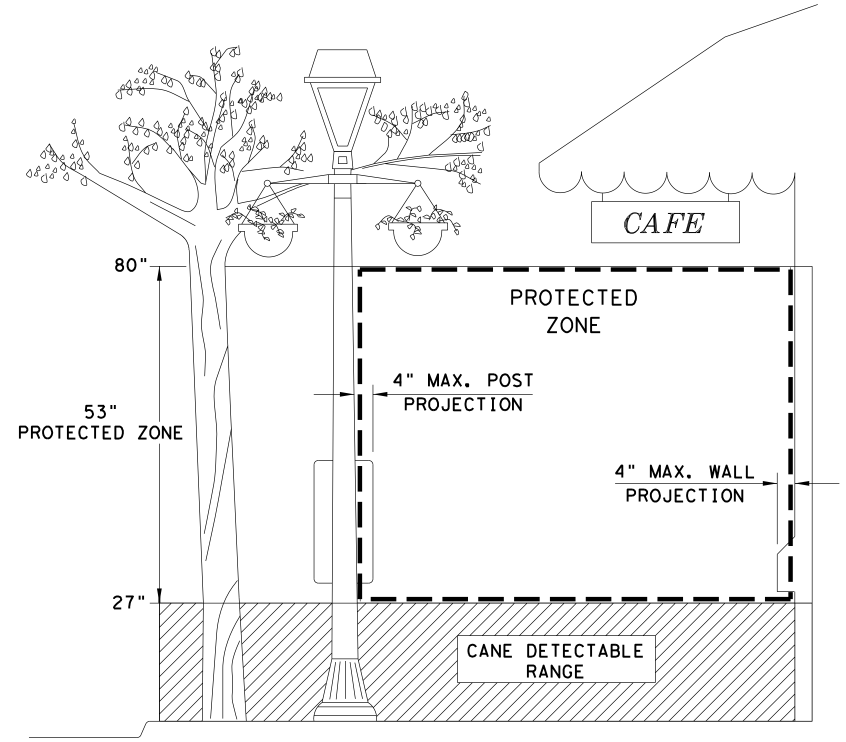


RAMP SIDEWALK

NOTES:

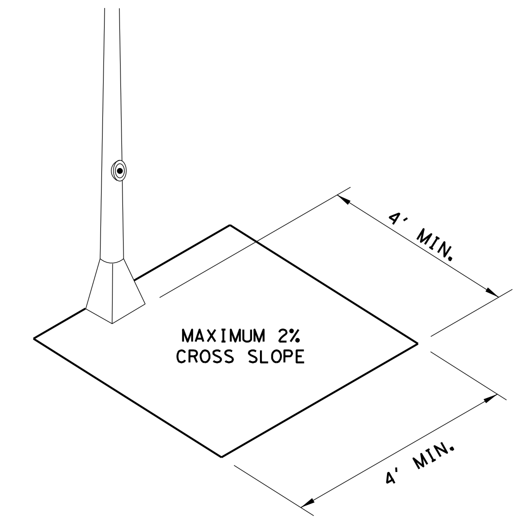
* WHERE DRIVEWAYS CROSS THE PEDESTRIAN ROUTE, SIDES SHALL BE FLARED AT 10% MAX SLOPE.

* * IF CURB HEIGHT IS GREATER THAN 6 INCHES, USE GRADE LESS THAN OR EQUAL TO 5%. HANDRAIL AND DETECTABLE WARNING ARE NOT REQUIRED.

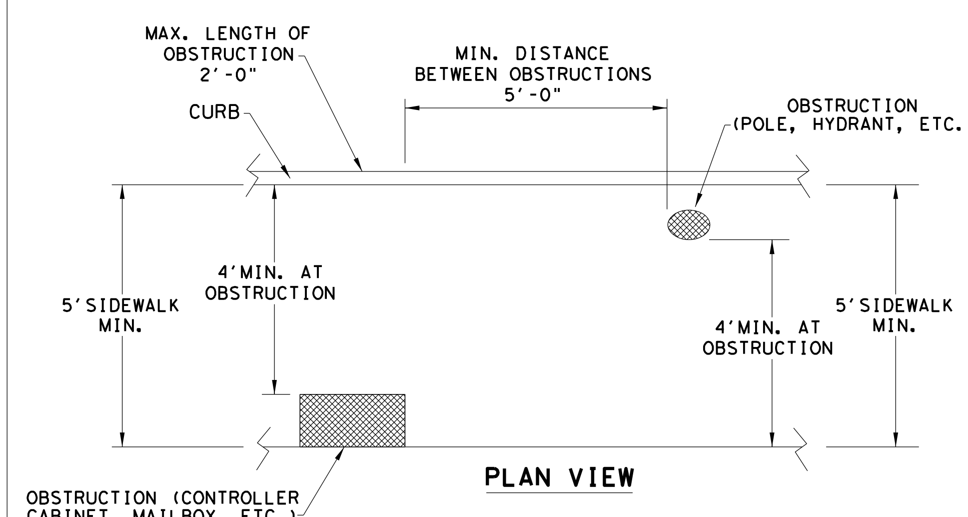


PROTECTED ZONE

NOTE: IN PEDESTRIAN CIRCULATION AREA, MAXIMUM 4" PROJECTION FOR POST OR WALL MOUNTED OBJECTS BETWEEN 27" AND 80" ABOVE THE SURFACE.



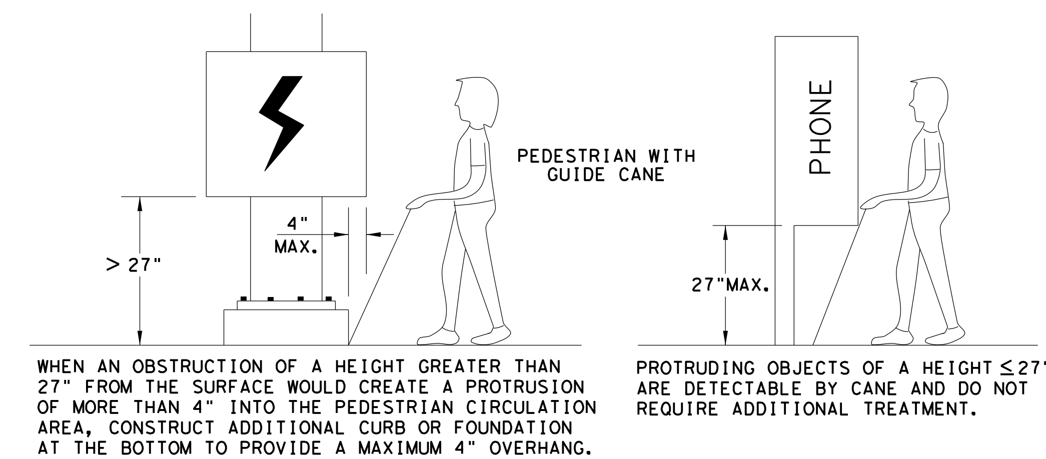
CLEAR SPACE ADJACENT TO PEDESTRIAN PUSH BUTTON



PLAN VIEW

PLACEMENT OF STREET FIXTURES

NOTE: ITEMS NOT INTENDED FOR PUBLIC USE. MINIMUM 4' X 4' CLEAR GROUND SPACE REQUIRED AT PUBLIC USE FIXTURES.



WHEN AN OBSTRUCTION OF A HEIGHT GREATER THAN 27" FROM THE SURFACE WOULD CREATE A PROTRUSION OF MORE THAN 4" INTO THE PEDESTRIAN CIRCULATION AREA, CONSTRUCT ADDITIONAL CURB OR FOUNDATION AT THE BOTTOM TO PROVIDE A MAXIMUM 4" OVERHANG.

PROTRUDING OBJECTS OF A HEIGHT ≤ 27" ARE DETECTABLE BY CANE AND DO NOT REQUIRE ADDITIONAL TREATMENT.

DETECTION BARRIER FOR VERTICAL CLEARANCE < 80"

SHEET 3 OF 4

Texas Department of Transportation — Design Division Standard

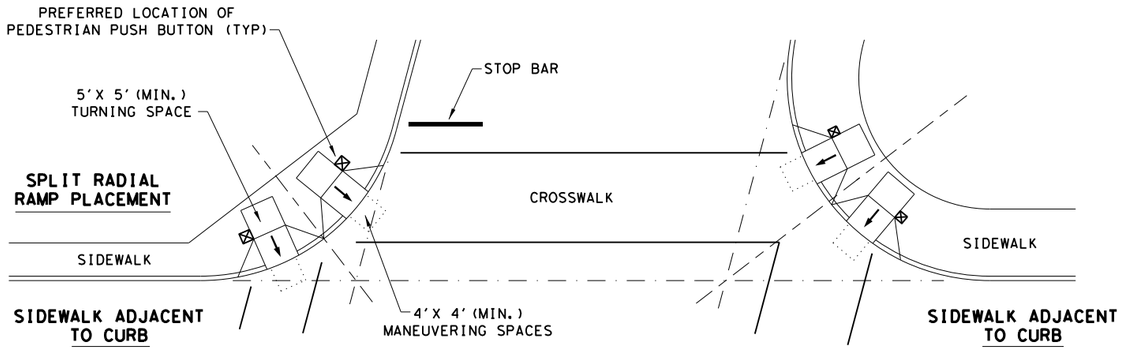
PEDESTRIAN FACILITIES CURB RAMPS

PED-18

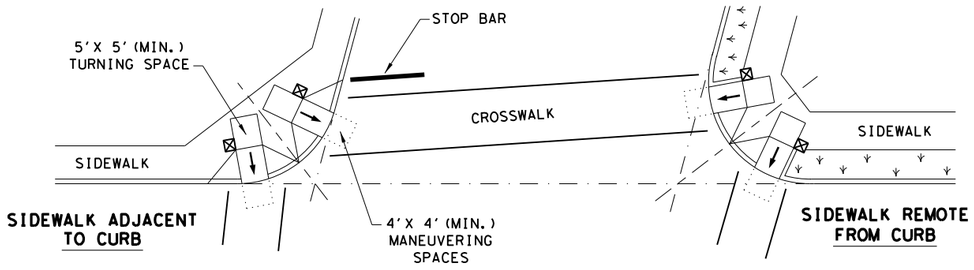
FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
© TxDOT: March 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST		COUNTY	SHEET NO.
	12		HARRIS/GAL	227

FILE: h:\00maintenance\south harris maintenance\2021 standards\ped18.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001

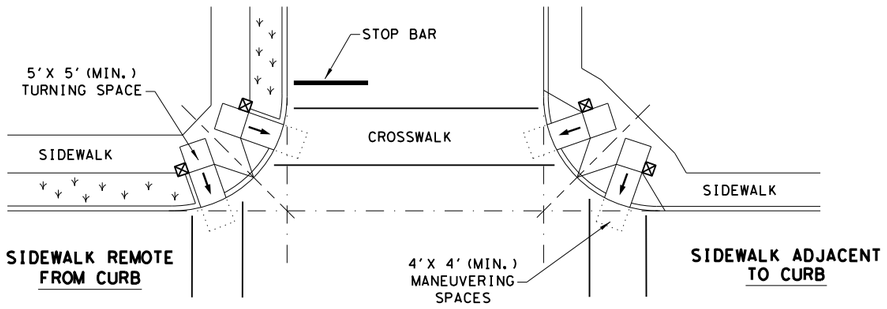
TYPICAL CROSSING LAYOUTS
SEE SHEET 1 OF 4 FOR DETAILS AND DIMENSIONS



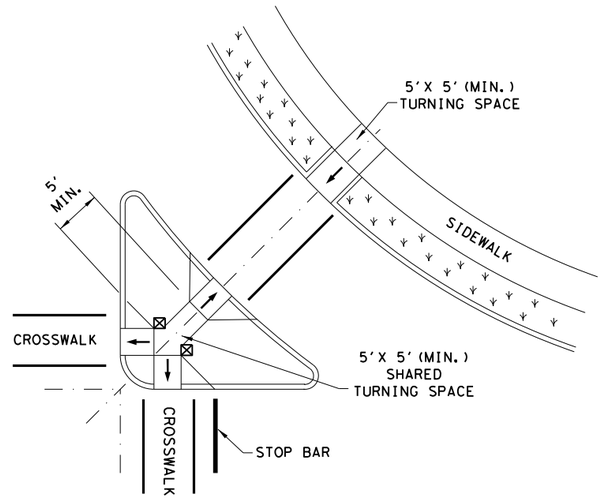
SKEWED INTERSECTION WITH "LARGE" RADIUS



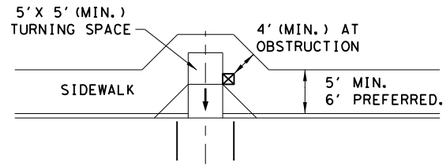
SKEWED INTERSECTION WITH "SMALL" RADIUS

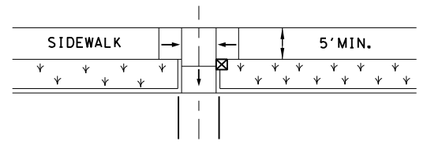


NORMAL INTERSECTION WITH "SMALL" RADIUS



AT INTERSECTION
W/FREE RIGHT TURN & ISLAND





MID-BLOCK PLACEMENT
PERPENDICULAR RAMPS

LEGEND:

SHOWS DOWNWARD SLOPE. →

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON (IF APPLICABLE). ☒

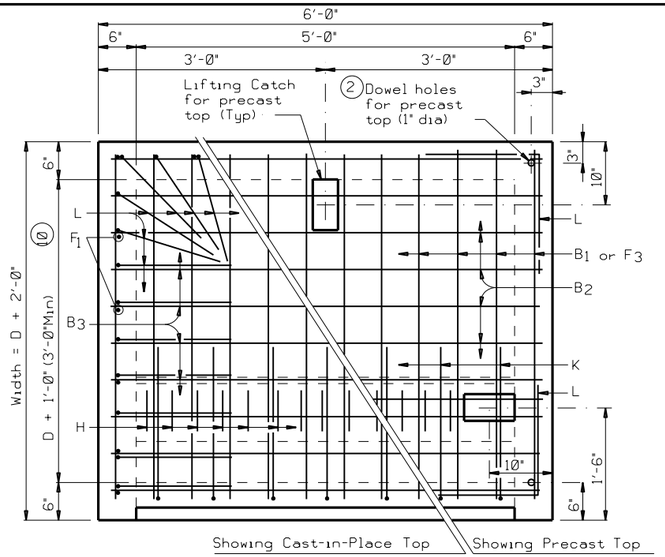
DENOTES PLANTING OR NON-WALKING SURFACE NOT PART OF PEDESTRIAN CIRCULATION PATH.

Texas Department of Transportation | Design Division Standard

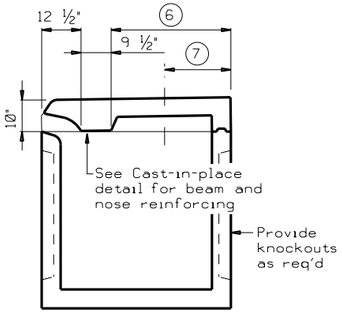
PEDESTRIAN FACILITIES
CURB RAMPS

PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
© TxDOT: March 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		228

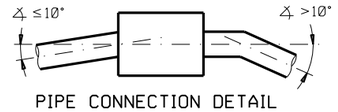


PLAN



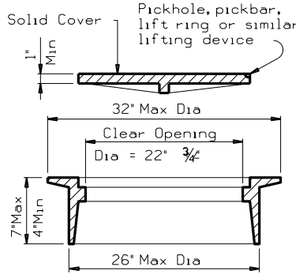
PREFABRICATED INLET

(6) For reinforcing steel and dimensions not shown, see fabricators shop drawings. Structure shall be of the size required to accommodate size of pipe shown elsewhere in the plans. Length of inlet = 6'-0"



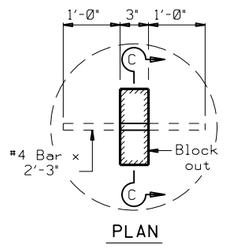
PIPE CONNECTION DETAIL

Connecting pipes should enter within 10° of normal to inlet wall. If necessary, pipe elbow or curved approach alignment should be used to stay within this limit.

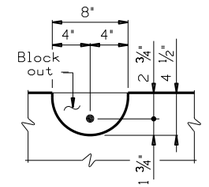


RING AND COVER DETAILS

EJIW No V-1814 or Neenah No R5900-FTX

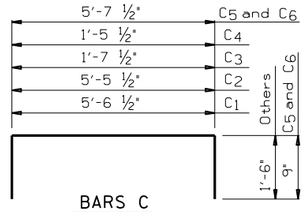


PLAN

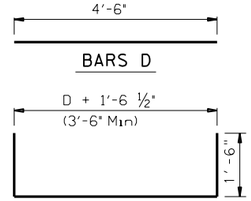


SECTION C-C

LIFTING CATCH



BARS C

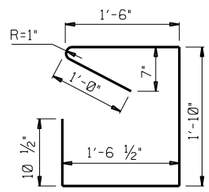


BARS D

BARS E

REINF STEEL		
Bar	Size	Spacing
B1	#4	6"
B2	#5	6"
B3	#4	6"
C1-2	#4	12"
C3-4	#4	(9)
C5	#6	(9)
C6	#4	(9)
D	#4	(9)
E	#4	12"
F1-3	#4	12"
G	#4	6"
H	#3	4"
K	#4	9"
L	#4	6"

(9) As shown



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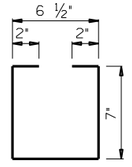

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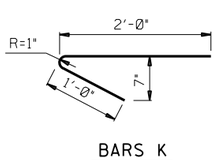

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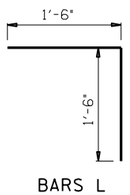


BARS L

GENERAL NOTES:

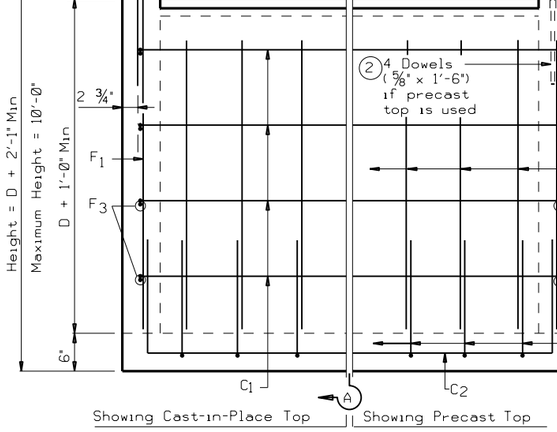
No alternate designs nor alternate details shall be permitted for precast or cast in place inlets.

Quantities shown herein are for Contractor's information only. Unless otherwise shown in the plans, payment will be made for each inlet of the type specified and for each extension. Each five foot curb opening of extension is considered "one extension" regardless of whether placed monolithically or precast. Extension length shall be in multiples of 5 feet.

Engineer has the option of specifying cast-in-place top with ring and cover or removable precast top as specified elsewhere in plans. Shop drawings are required for Precast Inlets.

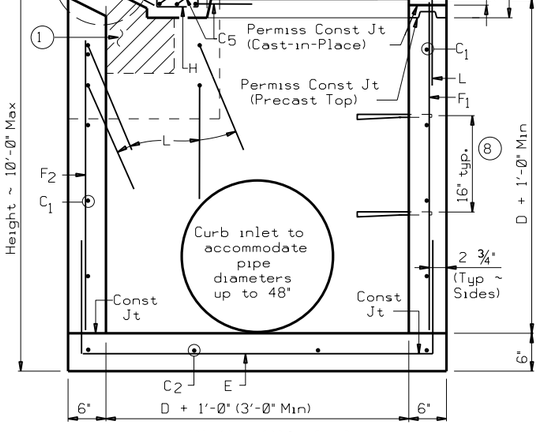
In areas of conflict between reinforcing steel, blockouts, pipes, anchor bolts or other reinforcing steel, the reinforcement shall be bent or adjusted to clear as directed by the Engineer.

Ring and cover shall conform to the requirements of AASHTO M306, "Standard Specification for Drainage Structure Castings". Materials shall conform to ASTM A48, Class 35B for gray iron castings or ASTM A536, Grade 65-45-12 for ductile iron castings. Aluminum alloy castings shall not be permitted.



ELEVATION

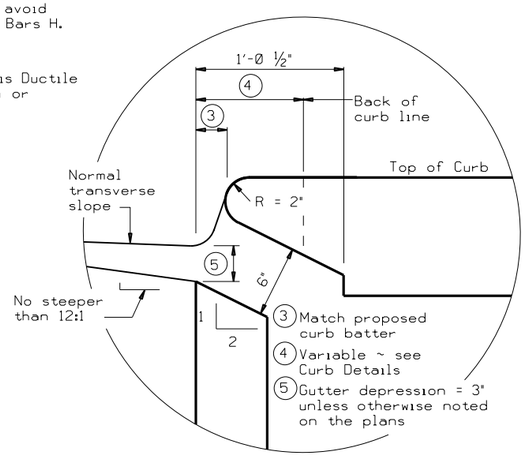
(2) If precast top is used, provide 4 ~ ⅝" dia x 1'-6" smooth bars in inlet walls for 1" dia holes



SECTION A-A

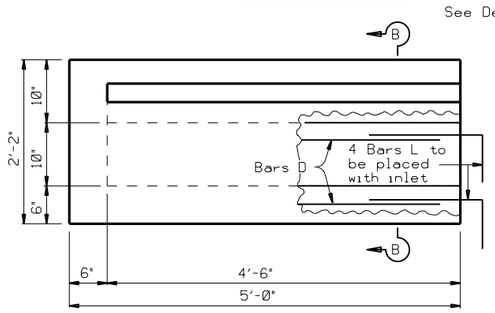
(7) 1'-6" Min, 1'-9" Max Adjust placement of Ring and Cover as necessary to avoid conflict with Bars H.

(8) Ladder rung is Ductile Iron, Aluminum or Cast Iron.

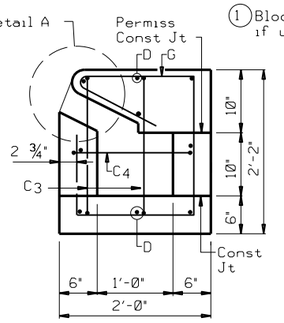


DETAIL A

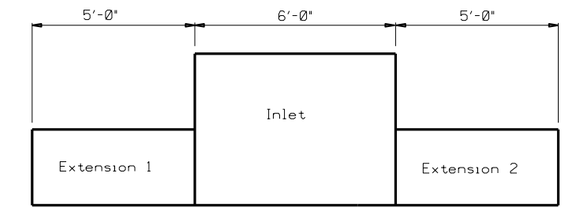
(1) Block out to accommodate extension if used and to place 4 Bars L



EXTENSION ELEVATION



SECTION B-B



Note: If more than one extension is required, they should be located as indicated above. No slope is required in flowline of extension.

EXTENSION PLACEMENT

INSTALL A 3 FT.(HORIZ.) x 6 IN.(VERT.) OPENING ON THE BACK OF THE INLET WHEN SPECIFIED ELSEWHERE ON THE PLANS. MOVE STEPS AS NEEDED. NO REINFORCING ON OPENING/ON 2 IN. ADJACENT TO OPENING.

DESIGNERS: CLARIFY FLOWLINE OF OPENING AND INCLUDE OPENING IN HYDRAULIC CALCULATIONS.

D = Diameter
R = Radius

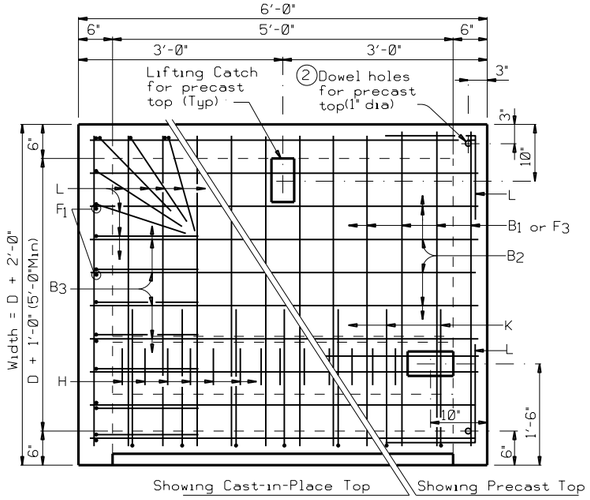
Texas Department of Transportation
Houston District

CURB INLET TYPE C
(WITH OR WITHOUT EXTENSION)

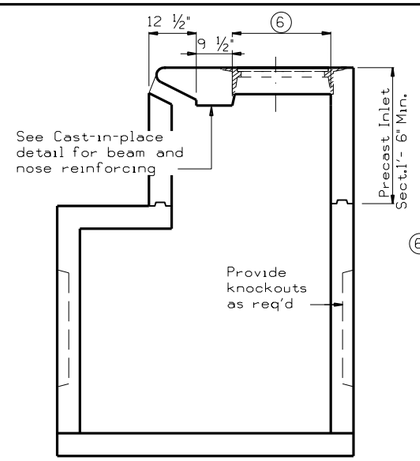
HIL-C

FILE: STDD1.DGN	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT	STD:	
© TxDOT February 2010	DIST	FED REG	PROJECT NO.			SHEET
REVISIONS 2/2010 Added note concerning opening on the back of inlet. 10/2014 Removed Note 10	12	6	RMC 6375-52-001			229
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	HARRIS/GAL		6375	52	001	IH45

FILE: h:\00*maintenance\south harris maintenance\2020 contracts\6357-02-001*IH45 General Maintenance\Standards\Curb Gutter 20\stdd1.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001

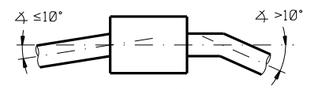


PLAN



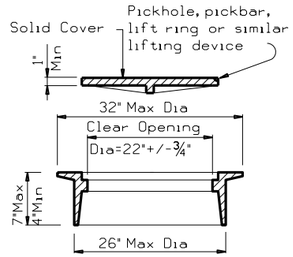
PREFABRICATED INLET

⑥ For reinforcing steel and dimensions not shown, see fabricator's shop drawings. Structure shall be of the size required to accommodate size of pipe shown elsewhere in the plans. Length of inlet = 5'-0"



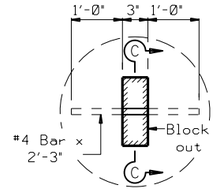
PIPE CONNECTION DETAIL

Connecting pipes should enter within 10° of normal to inlet wall. If necessary, pipe elbow or curved approach alignment should be used to stay within this limit.

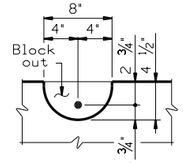


RING AND COVER DETAILS

EJIW No V-1814 or Neenah No R5900 FTX



PLAN

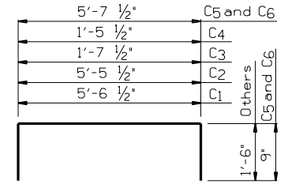


SECTION C-C

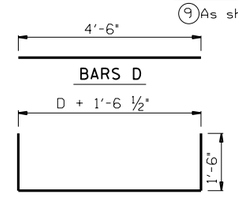
LIFTING CATCH

REINF STEEL		
Bar	Size	Spacing
B_1	#4	6"
B_2	#5	6"
B_3	#4	6"
C_{1-2}	#4	12"
C_{3-4}	#4	⑨
C_5	#6	⑨
C_6	#4	⑨
D	#4	⑨
E	#4	12"
F_{1-5}	#4	12"
G	#4	6"
H	#3	4"
K	#4	9"
L	#4	6"

⑨ As shown

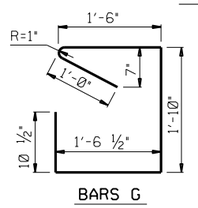


BARS C

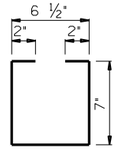


BARS D

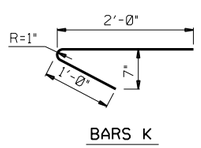
BARS E



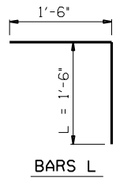
BARS G



BARS H



BARS K



BARS L

GENERAL NOTES:

No alternate designs nor alternate details shall be permitted for precast or cast in place inlets.

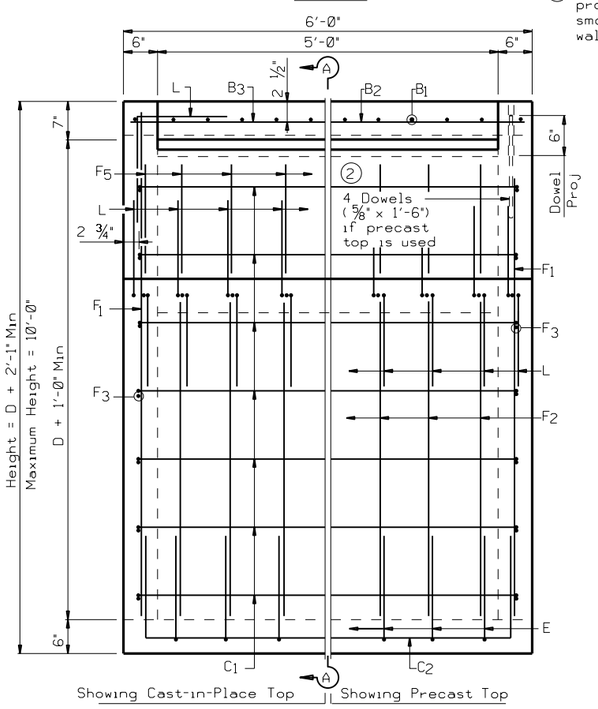
Quantities shown herein are for Contractor's information only. Unless otherwise shown in the plans, payment will be made for each inlet of the type specified and for each extension. Each five foot curb opening of extension is considered "one extension" regardless of whether placed monolithically or precast. Extension length shall be in multiples of 5 feet.

Engineer has the option of specifying cast-in-place top with ring and cover or removable precast top as specified elsewhere in plans.

Shop drawings will be required for precast construction of inlets.

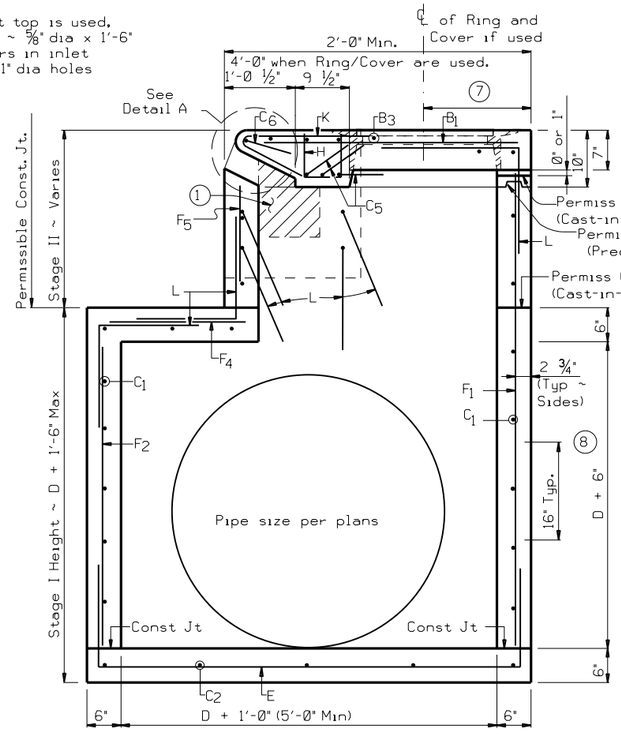
In areas of conflict between reinforcing steel, blockouts, pipes, anchor bolts or other reinforcing steel, the reinforcement shall be bent or adjusted to clear as directed by the Engineer.

Ring and cover shall conform to the requirements of AASHTO M306, "Standard Specification for Drainage Structure Castings". Materials shall conform to ASTM A48, Class 35B for gray iron castings or ASTM A536, Grade 65-45-12 for ductile iron castings. Aluminum alloy castings shall not be permitted.



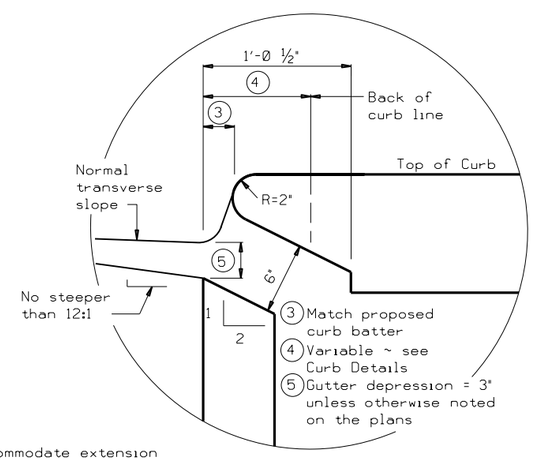
ELEVATION

② If precast top is used, provide 4 ~ ⅝" dia x 1'-6" smooth bars in inlet walls for 1" dia holes

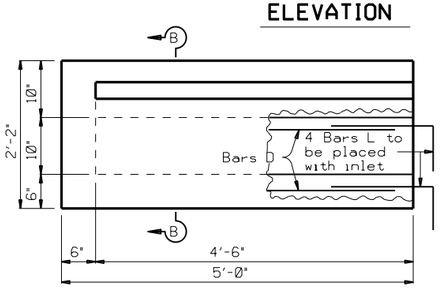


SECTION A-A

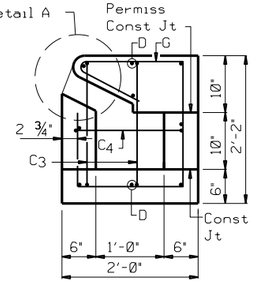
⑦ 1'- 7" Usual. Adjust placement of Ring and Cover as necessary to avoid conflict with Bars H.



DETAIL A

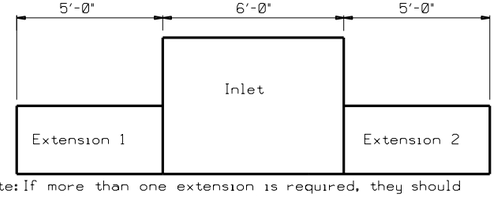


EXTENSION ELEVATION



SECTION B-B

① Block out to accommodate extension if used and to place 4 Bars L



Note: If more than one extension is required, they should be located as indicated above. No slope is required in flowline of extension.

EXTENSION PLACEMENT

INSTALL A 3 FT.(HORIZ.) x 6 IN.(VERT.) OPENING ON THE BACK OF THE INLET WHEN SPECIFIED ELSEWHERE ON THE PLANS. MOVE STEPS AS NEEDED. NO REINFORCING ON OPENING/ON 2 IN. ADJACENT TO OPENING.

DESIGNERS: CLARIFY FLOWLINE OF OPENING AND INCLUDE OPENING IN HYDRAULIC CALCULATIONS.

D = Diameter
R = Radius

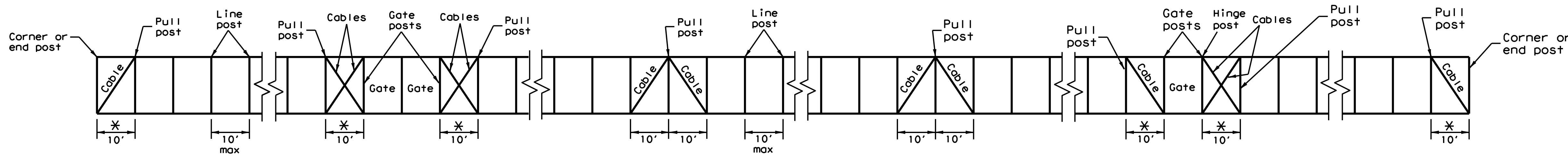
Texas Department of Transportation
Houston District

CURB INLET TYPE C1
(WITH OR WITHOUT EXTENSION)

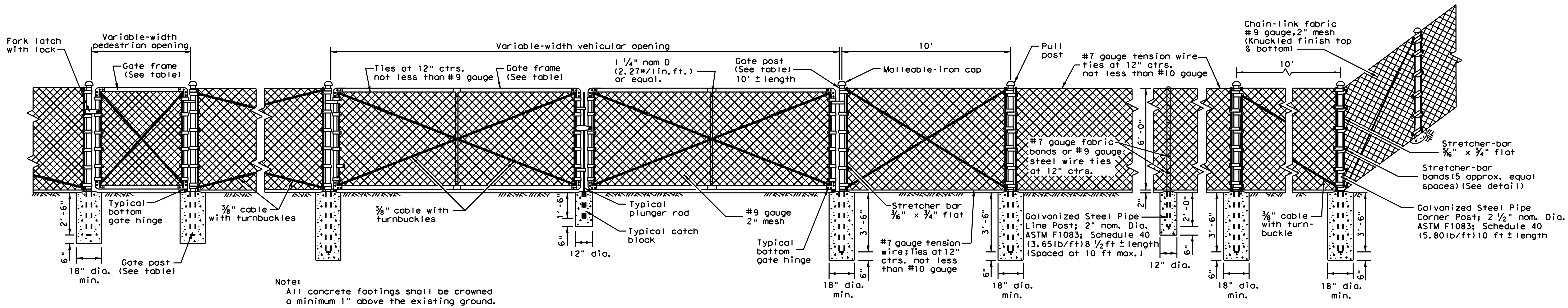
HIL-C1

FILE: STDD2.DGN	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT	STD:	
© TxDOT February 2010	DIST	FED REG	PROJECT NO.			SHEET
REVISIONS 2/2010 Note for alternate design and opening on the back of inlet. 10/2016 Removed ladder rung and wordings.	12	6	RMC 6375-52-001			230
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	HARRIS/GAL		6375	52	001	IH45

FILE: h:\00maintenance\south harris maintenance\2020 contracts\6357-02-001*IH45 General Maintenance\Standards\Curb Gutter 20\stdd2.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001



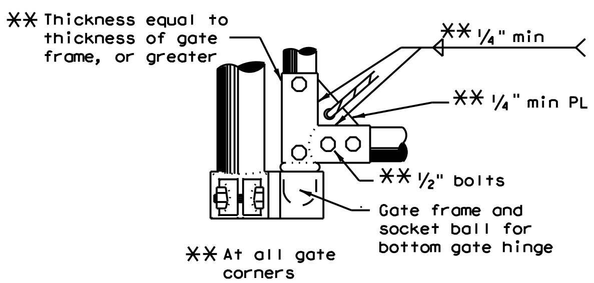
TYPICAL CABLE AND POST ARRANGEMENT



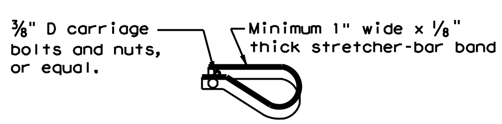
Note:
All concrete footings shall be crowned a minimum 1" above the existing ground.

CHAIN-LINK BARRIER FENCE (6 FT.)

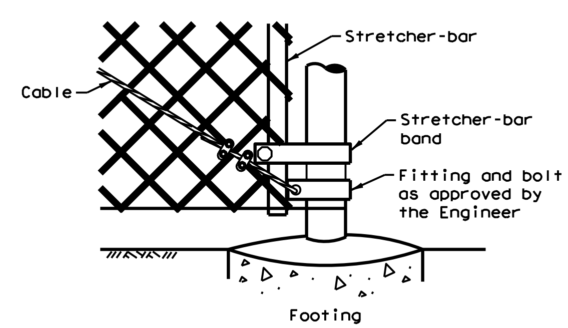
Foundation designs shown are "minimums" for a 6 ft. fence. Taller fences may require larger foundation designs.



TYPICAL BOTTOM GATE HINGE



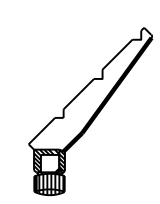
TYPICAL STRETCHER-BAR BAND



TERMINAL POST DETAIL

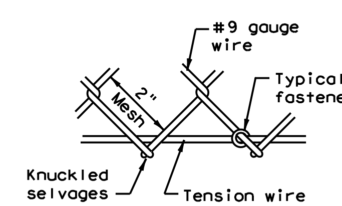
GATE (TYPES AND SIZES)	
Single Inclusive	Double Inclusive
Up to 6' Over 6' to 12' Over 12' to 18' Over 18'	Up to 12' Over 12' to 26' Over 26' to 36' Over 36'

GATE FRAME (WEIGHT)		GATE POST (WEIGHT)	
SIZE	WT./LIN. FT.	SIZE	WT./LIN. FT.
1 1/2" nom dia. or equal	2.72 Lbs.	2 1/2" nom dia. or equal	5.79 Lbs.
		3 1/2" nom dia. or equal	9.11 Lbs.
		6" nom dia.	18.97 Lbs.
		8" nom dia.	24.70 Lbs.



"OPTIONAL" 3 WIRE 45° BARBED WIRE ARM

Barbed wire arm related items shall conform to Item 550, "Chain Link Fence."



FABRIC & TENSION WIRE DETAIL, TOP & BOTTOM

GENERAL NOTES

1. Items hereon shall conform to Item 550, "Chain Link Fence."
2. Typical installation plan may vary as shown elsewhere on the plans or as directed by the Engineer. Location of gates shown elsewhere on plans.
3. Gate-frame members shall be bolted, at frame corners, to joint fittings with four 1/2" bolts per joint.
4. All cable connections are to be made with two 3/8" cable clamps.
5. All pull posts and end posts and their foundations shall have the same respective dimensions as those shown for corner post.
6. All pull post shall be furnished with two stretcher bars.
7. One end of each turnbuckle may be attached directly to fittings with a clevis.
8. Concrete footings are to be crowned at the top to shed water.

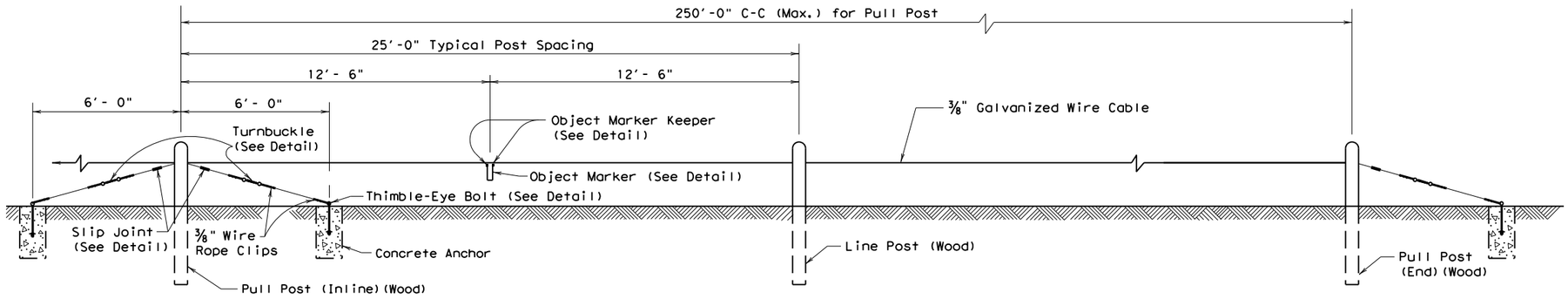
Texas Department of Transportation | Design Division Standard

CHAIN LINK FENCE

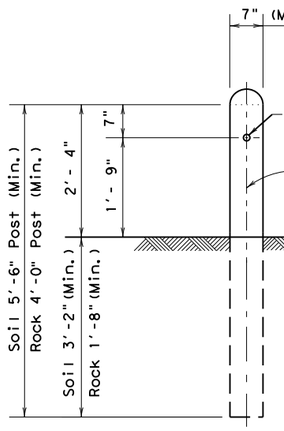
CLF-10

FILE: clf10.dgn	DN: TxDOT	CK: AM	DW: BD	CK: VP
© TxDOT 1996	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
	DIST		COUNTY	SHEET NO.
	12		HARRIS/GAL	231

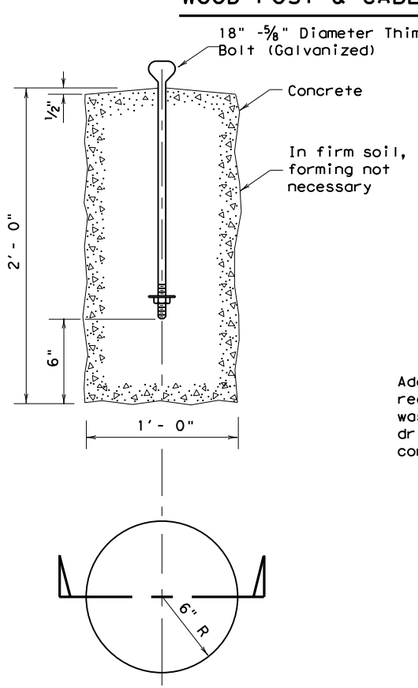
FILE: h:\00#maintenance\south harris maintenance\...
DATE: 1/4/2021
PROJECT: 6375-52-001



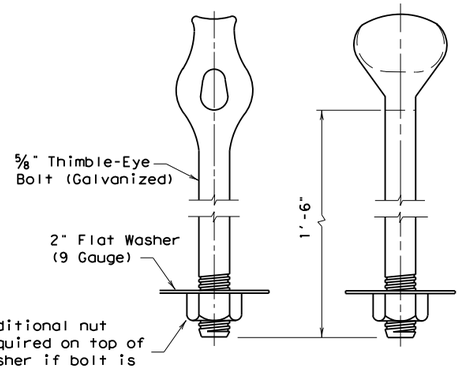
WOOD POST & CABLE UNIT



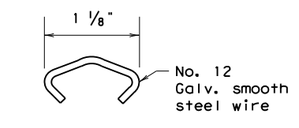
WOOD POST DETAIL



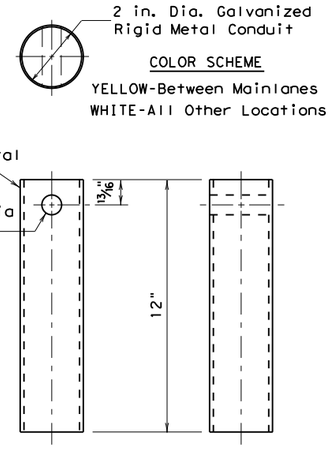
CONCRETE ANCHOR DETAILS



THIMBLE-EYE BOLT DETAILS



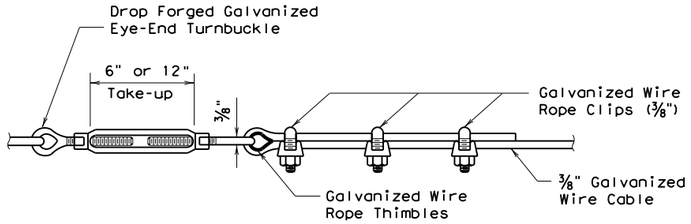
OBJECT MARKER KEEPER DETAIL



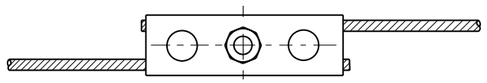
OBJECT MARKER (Reflector Detail)

GENERAL NOTES

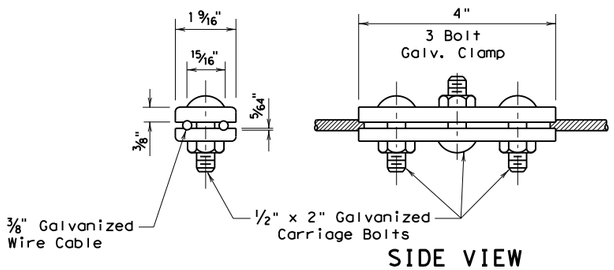
1. Furnish Class "B" or better concrete in accordance with Item 421, "Hydraulic Cement Concrete". Cure concrete anchors at least five (5) days before attaching the cable.
2. Furnish galvanized cable fittings in accordance with the Item 445, Galvanizing.
3. Furnish posts meeting the requirements of DMS 7200, "Timer Posts and Blocks for Metal Beam Guard Fence." Do not use painted timber posts.
4. Cover the entire surface of object marker (reflector) with a reflectorized sheeting material conforming to Departmental Material Specification DMS 8300, "Sign Face Materials", Type C.
5. Furnish cable conforming to ASTM designation A475.



WIRE CABLE CONNECTION (at turnbuckles & eyebolts) DETAIL



TOP VIEW



SIDE VIEW

SLIP JOINT DETAIL

Texas Department of Transportation
Maintenance Division

POST & CABLE FENCE

PCF-05

FILE: pcf05.dgn	DN:	CK:	DW: LJB	CK: JC	NEG:	
©TxDOT Feb. 2005	DIST	FED REG	FEDERAL AID PROJECT #			SHEET
REVISIONS 2/02 Rev.Design Div. PCF-99	12	6	RMC 6375-52-001			232
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	HARRIS/GAL		6375	52	001	IH45

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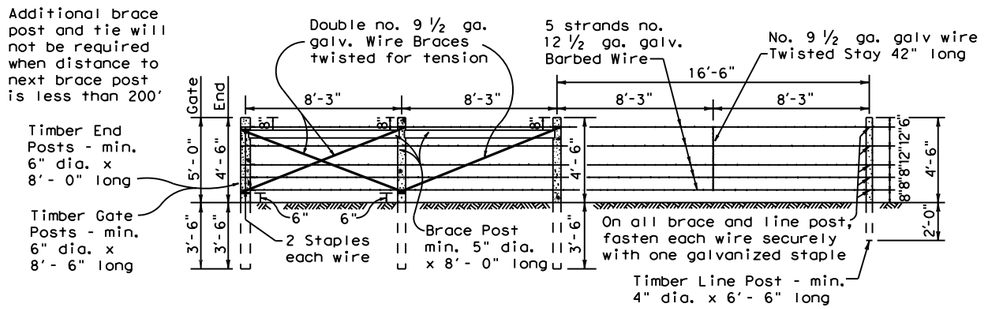
DATE: 1/4/2021
PROJECT: 6375-52-001

FILE: h:\00xmaintenance\south harris maintenance\wf110.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001

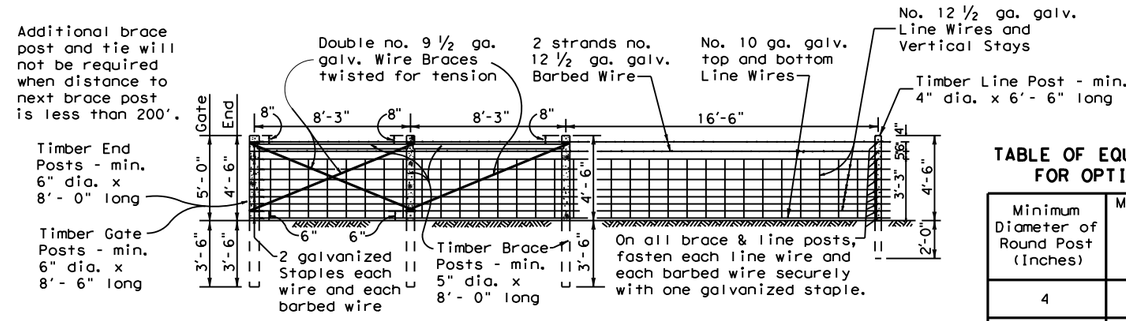


SECTION GALVANIZED BARBED WIRE FENCE WITH WOOD POSTS

Bracing Detail Used at Ends and Gates

TYPE "A" FENCE

(See General Note 6)



SECTION GALVANIZED WOVEN WIRE FENCE WITH WOOD POSTS

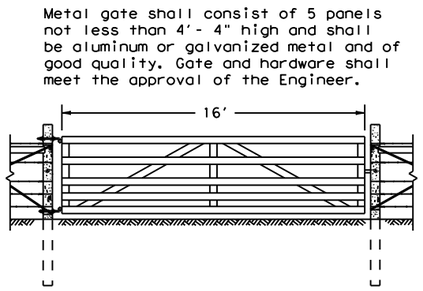
Bracing Detail Used at Ends and Gates

TYPE "B" FENCE

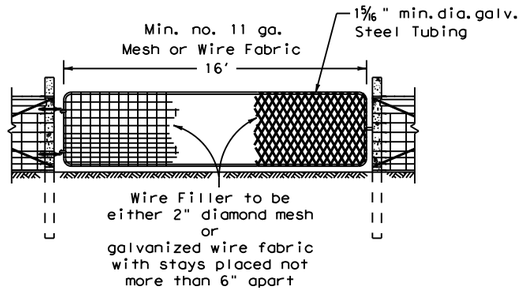
(See General Note 6)

TABLE OF EQUIVALENT SIZES FOR OPTIONAL SHAPE

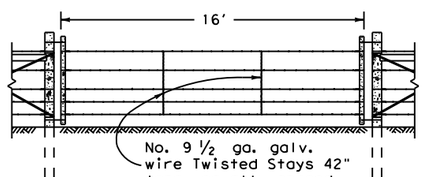
Minimum Diameter of Round Post (Inches)	Minimum Equivalent Dimension for Each Side of Square Post (Inches)
4	3 ½
5	4 ½
6	5 ¼



DETAIL TYPE 1 GATE



DETAIL TYPE 2 GATE

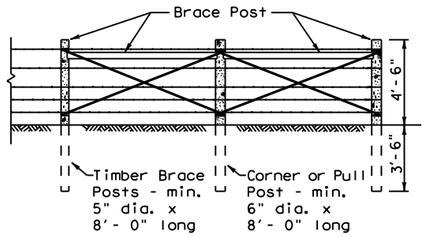


DETAIL TYPE 3 GATE

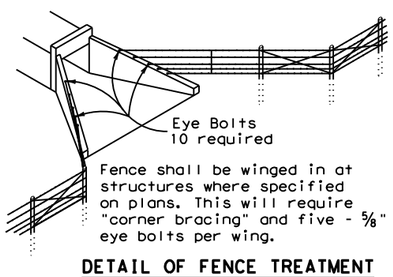
GENERAL NOTES

1. Any high point which interferes with the placing of wire mesh shall be excavated to provide 2" clearance.
2. Latches for Type 1 and Type 2 gates shall be good commercial quality and design latches of the spring, fork or chain type. All latches shall be suitable for the gate and shall be approved by the Engineer.
3. Hinges for Type 2 gates shall be commercial design approved by the Engineer suitable for post and gate.
4. Concrete shall be of the design and consistency approved by the Engineer and shall contain not less than 4 sacks of cement per cubic yard. Concrete footings are to be crowned at the top to shed water.
5. If rock is encountered at a depth less than the embedded depth required, a 15" or larger diameter hole shall be drilled for the post and the post shall be set in concrete. If rock is encountered at a depth of 1' - 6" or more below the ground surface, the hole shall be drilled to the required depth. If rock is encountered at a depth less than 1' - 6" below the ground surface, the holes shall be drilled a minimum of 2' - 0" into the rock or to the depth whichever is the lesser depth.
6. Barbed Wire shall be in accordance with ASTM A 121 (Class 1) Design designation 12-2-4-1 4R or 12-2-5-1 4R, or as approved by the Engineer.

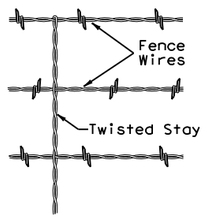
   Woven Wire Fence (Type B) shall be in accordance with ASTM A 116 (Class 1) No. 12-1/2 Grade 60 (See Table 1 ASTM A 116) to the height and design shown on the plans, or as approved by the Engineer.
7. The location of gates and corner posts will be as indicated elsewhere on these plans.
8. Square wood posts may be used in lieu of round posts provided minimum equivalent size requirements, as shown are met. All wood posts shall be in accordance with Item 552, "Wire Fence."



CORNER OR PULL POST ASSEMBLY

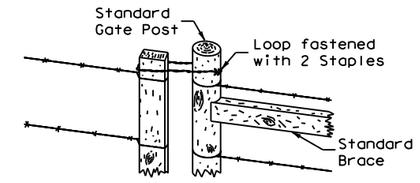


DETAIL OF FENCE TREATMENT AT STRUCTURES



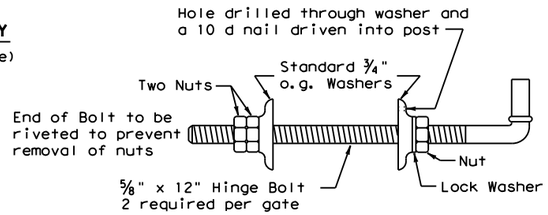
DETAIL OF STAY

(Barbed wire fence)

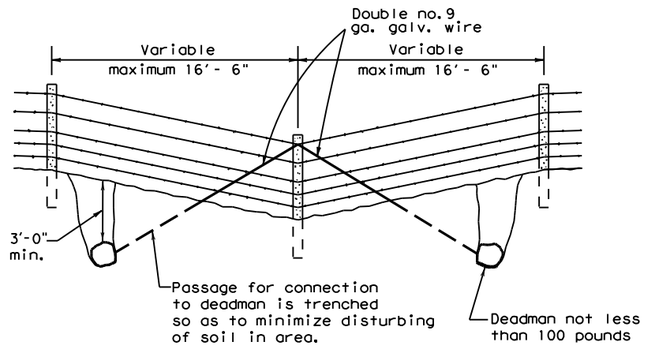


Loop to be made from two strands twisted no. 9 ½ ga. galv. smooth wire, and to be securely fastened to gate post with two galv. staples.

DETAIL FASTENER TYPE 3 GATE

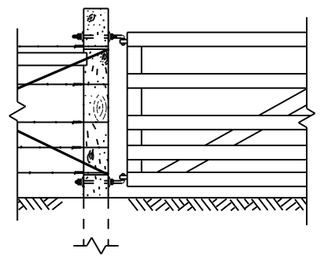


DETAIL OF GATE HINGE BOLT ASSEMBLY

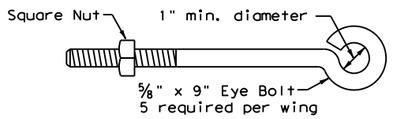


DETAIL OF FENCE SAG

(Single Line Connection)



DETAIL SHOWING INSTALLATION OF HINGES OF TYPE 1 & 2 GATE



DETAIL OF EYE BOLT

Texas Department of Transportation — Design Division Standard

BARBED WIRE AND WOVEN WIRE FENCE

(WOOD POSTS)

WF (1) - 10

FILE: wf110.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
©TxDOT 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		233

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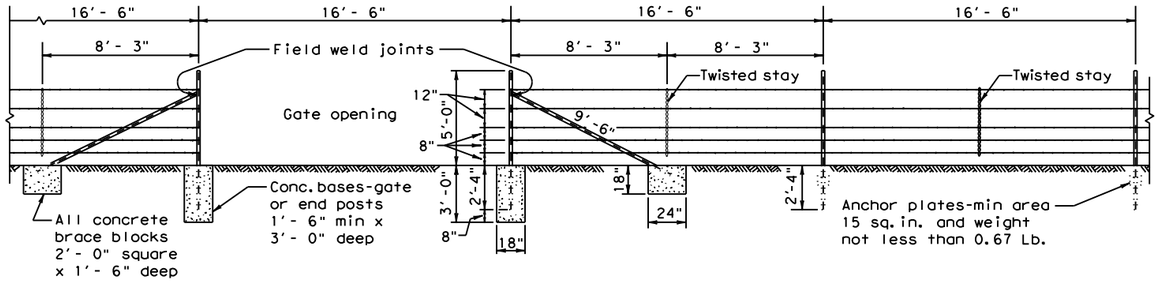
DATE: 1/4/2021
PROJECT: 6375-52-001

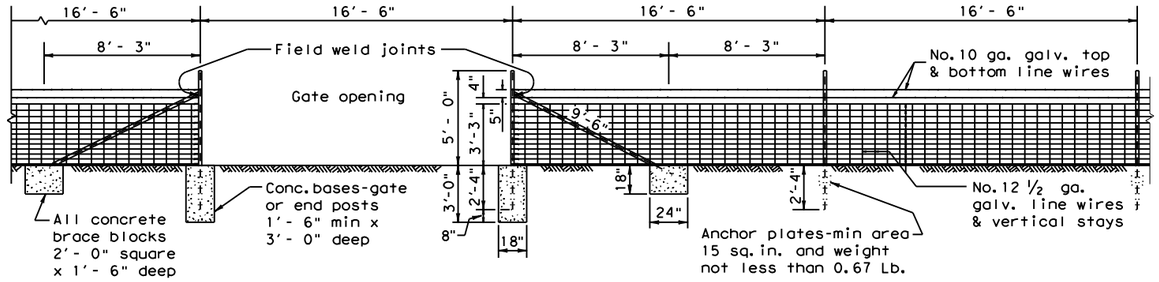


SECTION GALVANIZED BARBED WIRE FENCE WITH METAL POSTS

BRACING DETAIL USED AT ENDS AND GATES

TYPE "C" FENCE

(See General Note 8)



SECTION GALVANIZED WOVEN WIRE FENCE WITH METAL POSTS

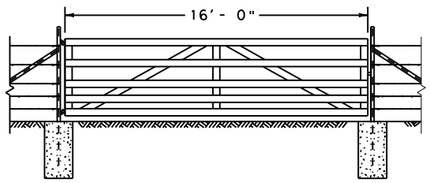
BRACING DETAIL USED AT ENDS AND GATES

TYPE "D" FENCE

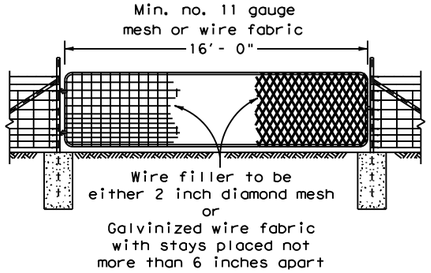
(See General Note 8)

Note:
For Steel pipe and T-Post requirements. (See General Notes 6 & 7)

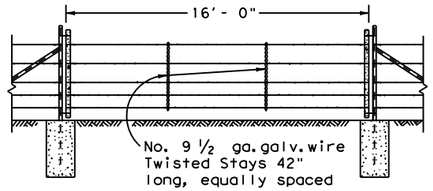
Metal gate shall consist of 5 panels not less than 4'- 4" high and shall be aluminum or galvanized metal and of good quality. Gate and hardware shall meet the approval of the engineer.



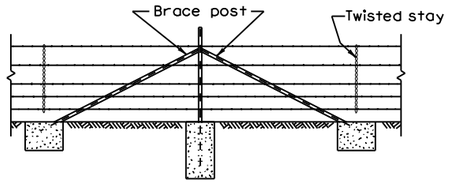
DETAIL TYPE 1 GATE



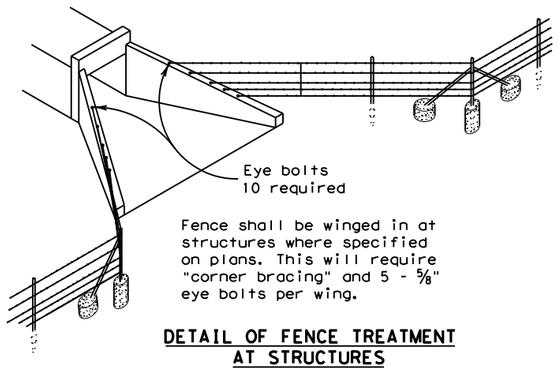
DETAIL TYPE 2 GATE



DETAIL TYPE 3 GATE

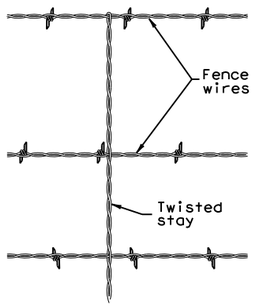


CORNER OR PULL POST ASSEMBLY

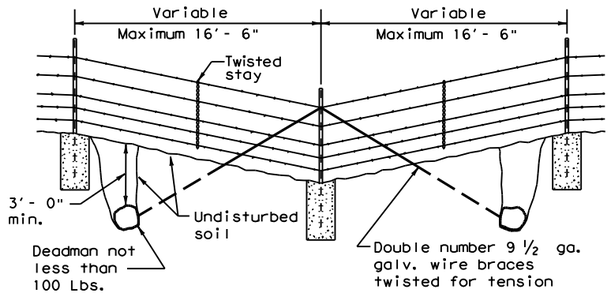


Fence shall be winged in at structures where specified on plans. This will require "corner bracing" and 5 - ⅝" eye bolts per wing.

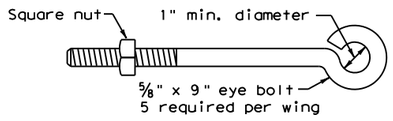
DETAIL OF FENCE TREATMENT AT STRUCTURES



DETAIL OF STAY
(Barbed Wire Fence)



DETAIL OF FENCE SAG



DETAIL OF EYE BOLT

GENERAL NOTES

1. Any high point which interferes with the placing of wire mesh shall be excavated to provide a 2 inch clearance.
2. Latches for Type 1 and Type 2 gates shall be good commercial quality and design latch of the spring, fork or chain type. All latches shall be suitable to the gate and shall be approved by the Engineer.
3. Hinges for Type 2 gates shall be a commercial design approved by the Engineer suitable for post and gate.
4. Concrete shall be of the design and consistency approved by the Engineer and shall contain not less than 4 sacks of cement per cubic yard. Concrete footings are to be crowned at the top to shed water.
5. Steel anchor plates shall be of a design and thickness sufficient to prevent turning of the post in firm soil.
6. Steel pipe end posts, corner and pull posts shall be a minimum of 2" Std. pipe (2.375" O.D., 0.154" wall thickness) with a 1¼" Std. pipe brace (1.660" O.D., 0.140" wall thickness), with a 2"x2"x1/4" angle, or other as approved by the Engineer. Fasteners for securing barbed wire or woven wire fence to metal posts shall be a minimum of 11 gauge galvanized steel wire. Tubular posts shall be fitted with water malleable iron caps.
7. If Steel pipe is used for posts and braces, use standard pipe in accordance with ASTM A 53, Class B or A 501. For T-Posts use steel that meets ASTM A 702. Metal line posts shall be not less than 6'-6" in length and shall weigh not less than (1.33 lbs./lin.ft.). These Items shall be in accordance with Item 552, "Wire Fence."
8. Barbed Wire shall be in accordance with ASTM A 121, Class 1 Design designation 12-2-4-1 4R or 12-2-5-1 4R, or as approved by the Engineer.

   Woven Wire Fence (Type D) shall be in accordance with ASTM A 116, Class 1 No. 12-1/2 Grade 60 (See Table 1 ASTM A 116) to the height and design shown on the plans, or as approved by the Engineer.
9. The location of gates and corner posts will be as indicated elsewhere in these plans.

Texas Department of Transportation

Design Division Standard

BARBED WIRE AND WOVEN WIRE FENCE (STEEL POSTS)

WF(2)-10

FILE: wf210.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
©TxDOT 1996	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		234

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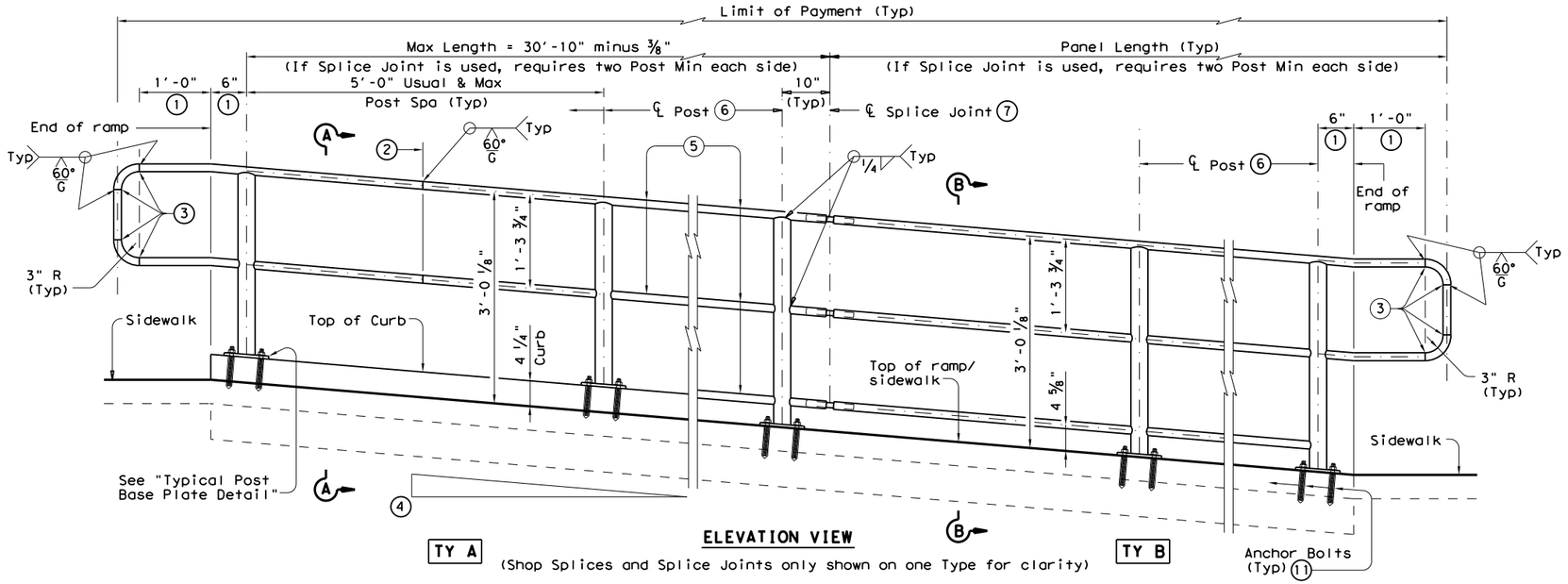
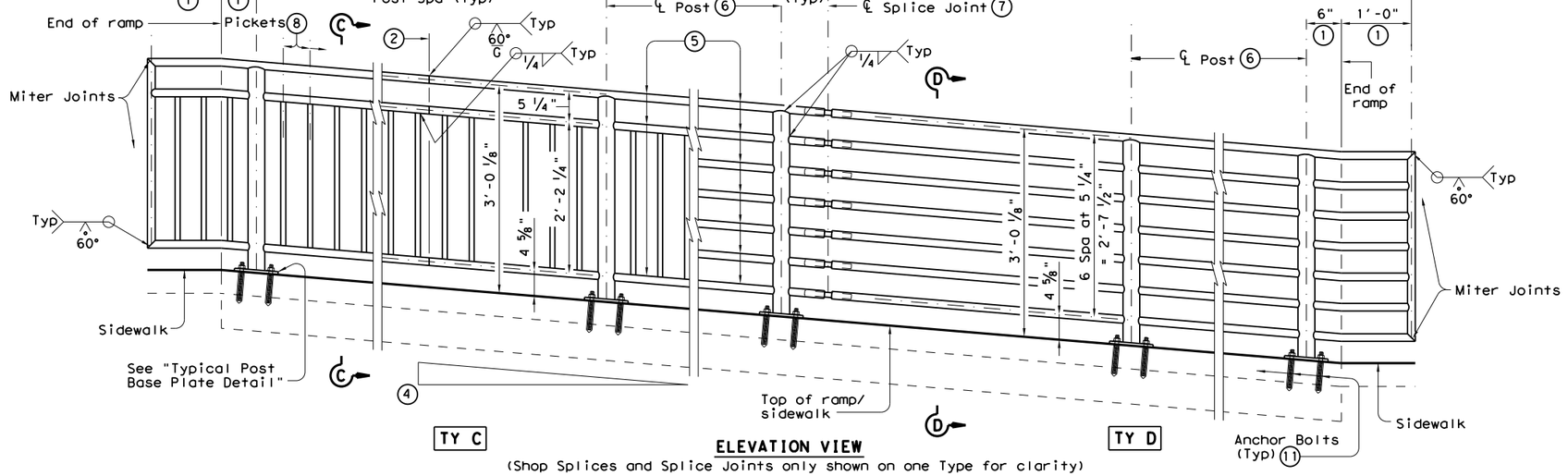
DATE: 1/4/2021
PROJECT: 6375-52-001



ELEVATION VIEW

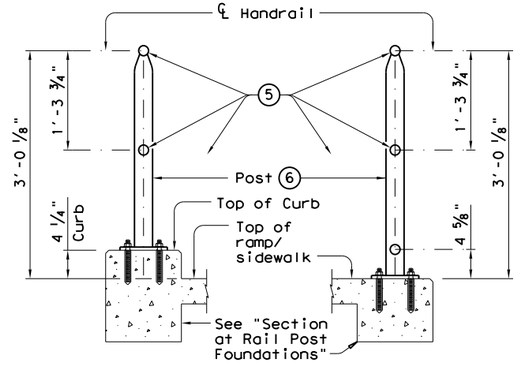
(Shop Splices and Splice Joints only shown on one Type for clarity)



ELEVATION VIEW

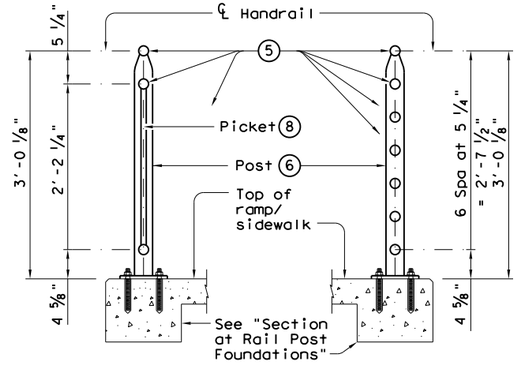
(Shop Splices and Splice Joints only shown on one Type for clarity)

RECOMMENDED USAGE (9) (10)	
Dropoff Height/ Condition	Recommended Rail Options
< 30" dropoff	TY A, TY B, TY C, or TY D
≥ 30" dropoff, or along Bike Path	TY E or TY F



SECTION A-A
(Showing Handrail **TY A**)

SECTION B-B
(Showing Handrail **TY B**)



SECTION C-C
(Showing Handrail **TY C**)

SECTION D-D
(Showing Handrail **TY D**)

(1) Parallel to ground.

(2) One shop splice per panel is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.

(3) Shop splice is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.

(4) See Ramp Details located elsewhere in plans for ramp slope and dimensions. Maximum ramp slope will not exceed 8.3 percent. Level landing required for each 30" rise if grade exceeds 5 percent.

(5) 1 ½" Dia. Standard Pipe (1.900" O.D., 0.145" wall thickness). Parallel to ramp / sidewalk. Provide holes as needed in 1 ½" Dia. pipe for galvanizing drainage and venting.

(6) 2 ½" Dia. Standard Pipe (2.875" O.D., 0.203" wall thickness). See "Post Mount Detail" for crimping and trimming post to fit Dia. of top rail. Provide holes as needed in post for galvanizing drainage and venting. Plumb all posts.

(7) See "Handrail Fabrication Details" for Splice Joints.

(8) ℄ ⅝" Dia. Round Bar equal spacing at 4 ½" Max. Plumb all pickets.

(9) When needed for accessibility (grade > 5 percent) or as needed for pedestrian safety.

(10) Not to be used on bridges.

(11) See "General Notes" for anchor bolt information.

SHEET 1 OF 3

Texas Department of Transportation

Design Division Standard

PEDESTRIAN HANDRAIL DETAILS

PRD-13

FILE: prd13.dgn	DN: TxDOT	CK: AM	DW: JTR	CK: CGL
©TxDOT December 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED MAY, 2013 (VP)	6375	52	001	IH45
	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		235

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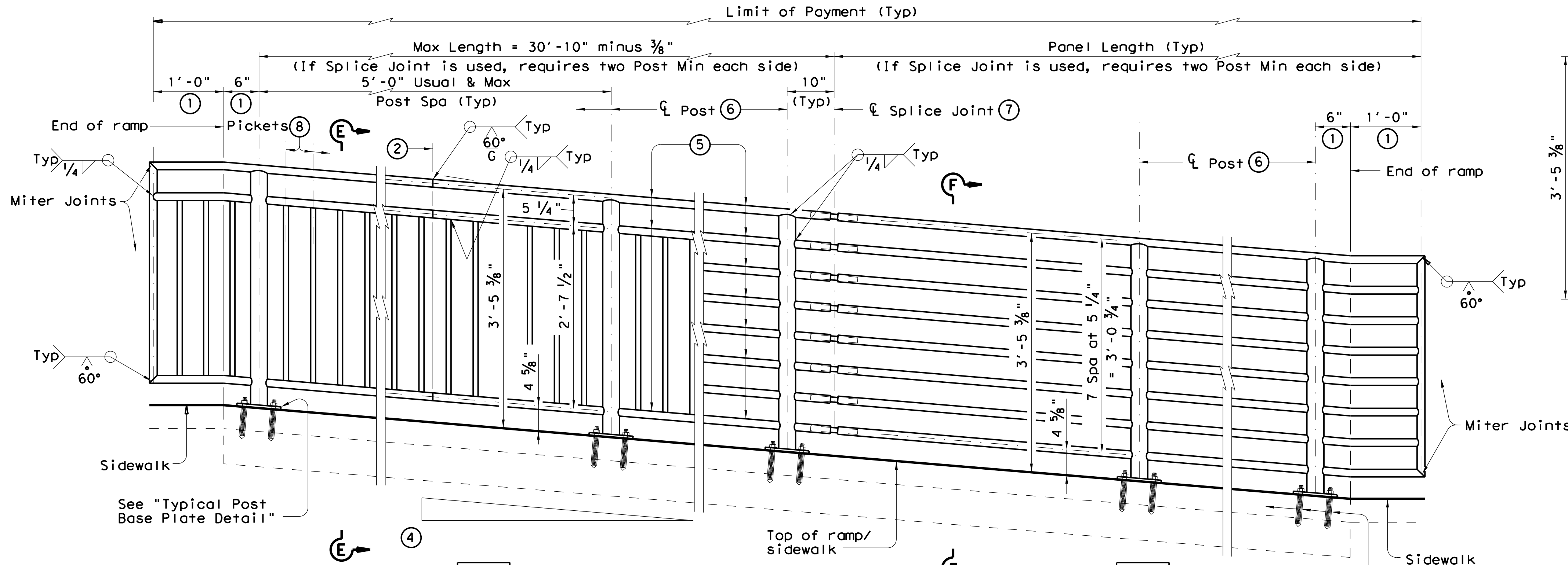
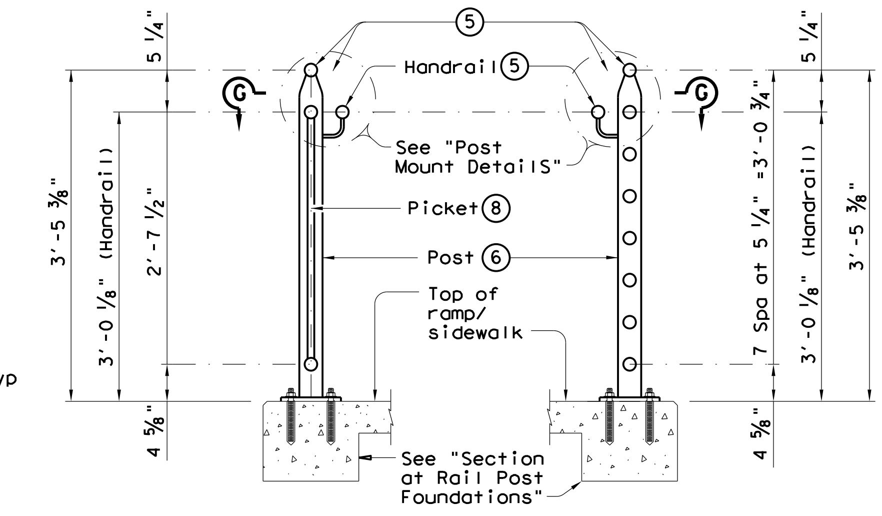
DATE: 1/4/2021
PROJECT: 6375-52-001



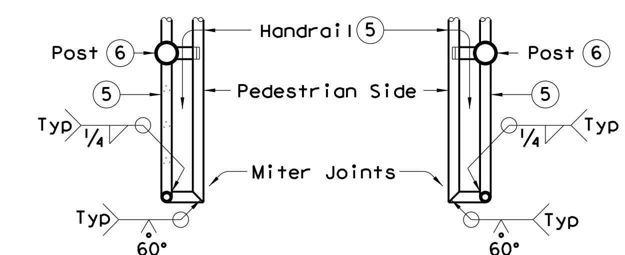
ELEVATION VIEW

(Shop Splices and Splice Joints only shown on one Type for clarity)



SECTION E-E
(Showing Handrail **TY E**)

SECTION F-F
(Showing Handrail **TY F**)



SECTION G-G
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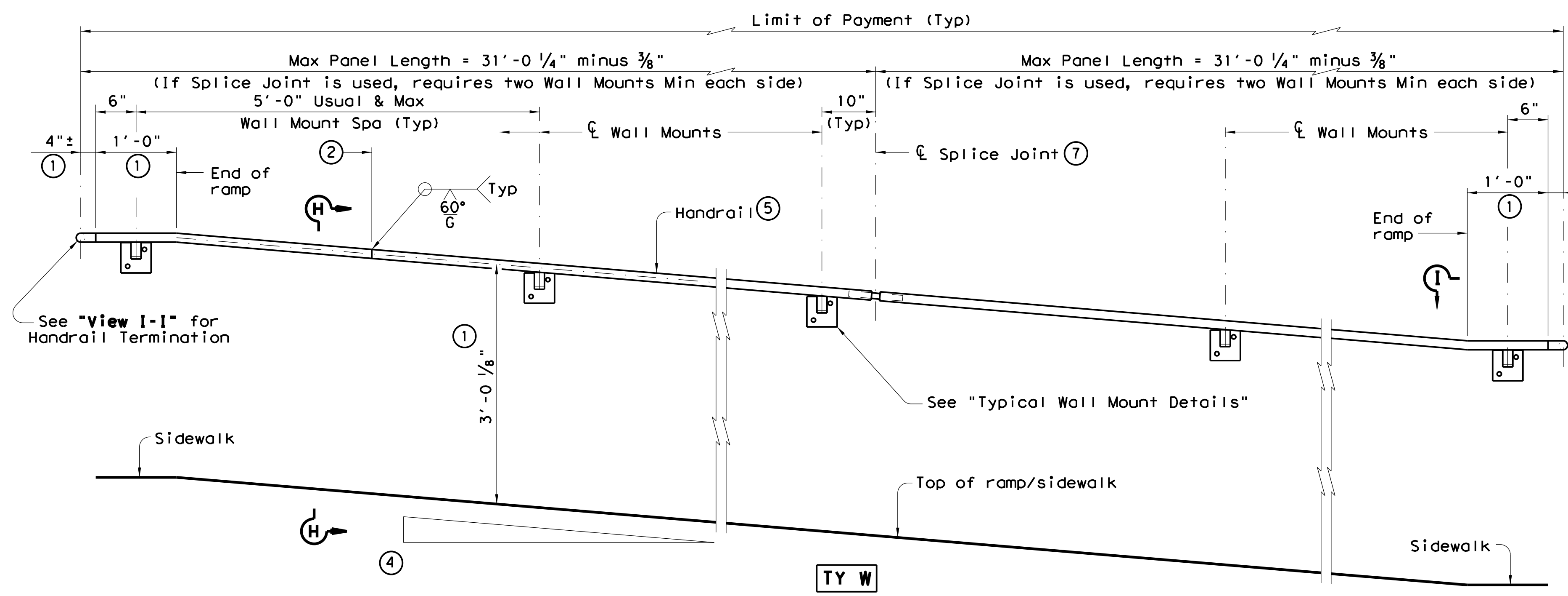
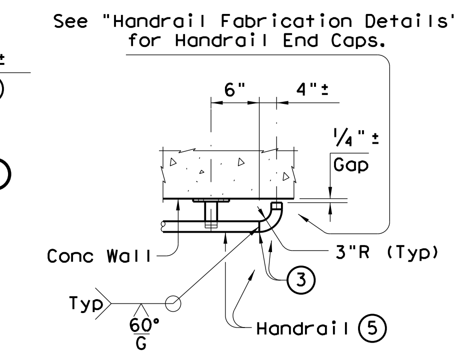
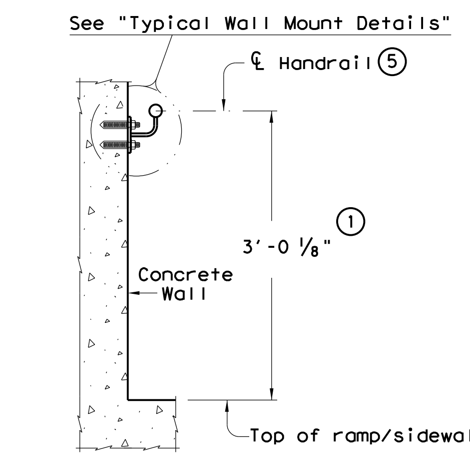


ELEVATION VIEW



VIEW I-I
(Showing Handrail Termination)



SECTION H-H
(Showing Handrail **TY W**)

1. Parallel to ground.
2. One shop splice per panel is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.
3. Shop splice is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.
4. See Ramp Details located elsewhere in plans for ramp slope and dimensions. Maximum ramp slope will not exceed 8.3 percent. Level landing required for each 30" rise if grade exceeds 5 percent.
5. 1 1/2" Dia. Standard Pipe (1.900" O.D., 0.145" wall thickness). Parallel to ramp / sidewalk. Provide holes as needed in 1 1/2" Dia. pipe for galvanizing drainage and venting.
6. 2 1/2" Dia. Standard Pipe (2.875" O.D., 0.203" wall thickness). See "Post Mount Detail" for crimping and trimming post to fit Dia. of top rail. Provide holes as needed in post for galvanizing drainage and venting. Plumb all posts.
7. See "Handrail Fabrication Details" for Splice Joints.
8. ℄ 5/8" Dia. Round Bar equal spacing at 4 1/2" Max. Plumb all pickets.
11. See "General Notes" for anchor bolt information.

SHEET 2 OF 3

Texas Department of Transportation — Design Division Standard

PEDESTRIAN HANDRAIL DETAILS

PRD-13

FILE: prd13.dgn	DN: TxDOT	CK: AM	DW: JTR	CK: CGL
©TxDOT December 2006	CONT	SECT	JOB	HIGHWAY
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REVISED MAY, 2013 (VP)	DIST		COUNTY	SHEET NO.
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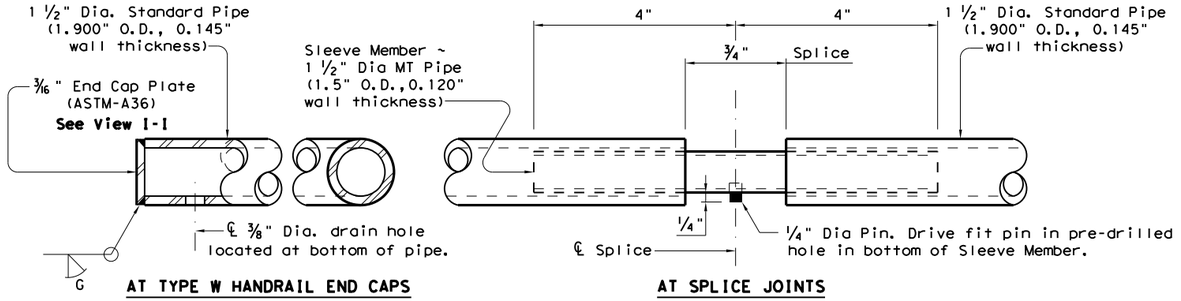
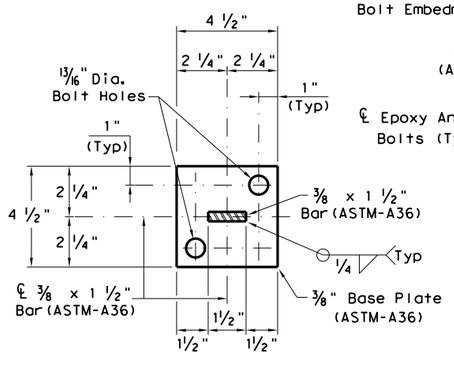
PROJECT: 6375-52-001



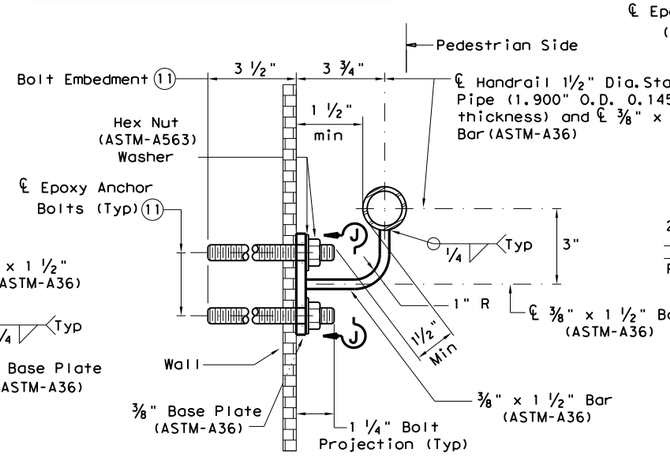
AT TYPE W HANDRAIL END CAPS

AT SPLICE JOINTS

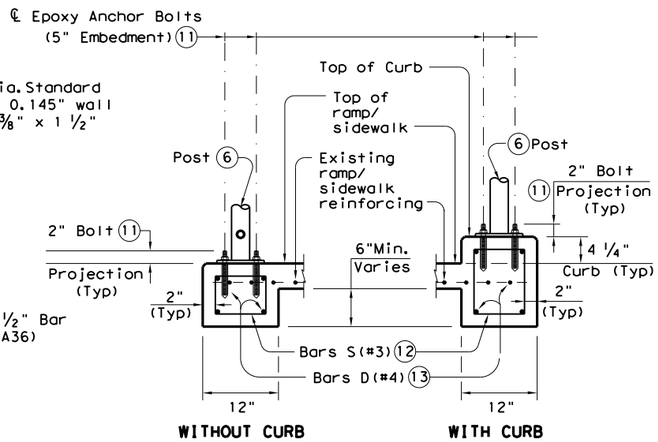
HANDRAIL FABRICATION DETAILS



SECTION J-J
(Anchor Bolts not shown for clarity)



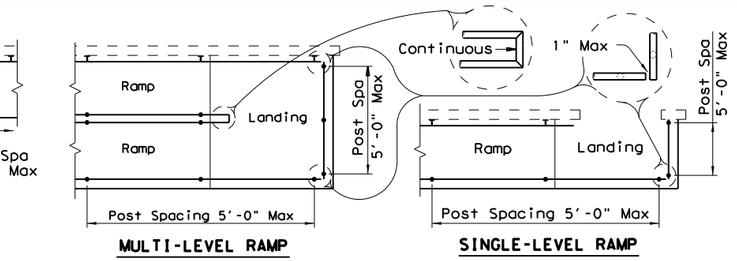
SECTION AT WALL MOUNT



WITHOUT CURB

WITH CURB

SECTION AT RAIL POST FOUNDATIONS



RAMP INTERSECTION

MULTI-LEVEL RAMP

SINGLE-LEVEL RAMP

PLAN SHOWING RAIL AT RAMP CONDITIONS

GENERAL NOTES

Designed according to ADAAG, Texas Accessibility Standards, Uniform Building Code, and AASHTO LRFD Specifications.

Handrail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

Pipe will conform to ASTM-A53 Grade B or A500 Grade B. Steel plates and steel bars will conform to ASTM-A36. Mechanical tubing (MT) will conform to ASTM A513 Grade 1015 or higher. Galvanize all steel components except reinforcing steel unless noted otherwise.

Concrete for foundations will be in accordance with Item 531 "Sidewalks". All reinforcing steel must be Grade 60. Bar laps, where required, will be as follows: Uncoated ~ #4 = 1'-5" Epoxy coated ~ #4 = 2'-1"

When the plans require painted steel, follow the requirements for painting galvanized steel in Item 446, "Cleaning and Painting Steel". Sleeve Members will receive galvanization and only get field painted after installation unless directed otherwise by Engineer.

Epoxy Anchor bolts for wall mount and post base plate will be ⅝" Dia. ASTM A36 threaded rods with one hex nut and one hardened steel washer at each bolt. ⅝" Dia. threaded rod embedment depth for wall mounts is 3 ½" and embedment depth for post base plate is 5".

Embed threaded rods into concrete with a Type III (Class C) epoxy meeting the requirements of DMS-6100, "Epoxies and Adhesives". Mix and dispense adhesive with the manufacturer's static mixing nozzle/dual cartridge system. Core drill holes (percussion drilling not permitted).

At the contractor's option the post base plate anchor bolts may be cast with the Ramp/Sidewalk (See Cast-in-Place Anchor Bolt Options).

Optional cast-in-place anchor bolts will be ⅝" Dia ASTM A307 Grade A bolts (or A36 threaded rods with one tack welded hex nut each) with one hex nut and one hardened steel washer at each bolt. Embedment depth of cast-in-place bolt will be 8" for post base plate.

Handrails and any wall or other surface adjacent to them will be free of any sharp or abrasive elements.

Submit shop drawings to the Engineer unless otherwise noted. For curved handrail applications, fabricate the handrail to the curve if radius is less than 600 ft. Shop drawings are required when rail is fabricated to the curve.

For all handrails, erection drawings will be submitted to the Engineer for approval to ensure proper installation.

Drawings will show handrail mount locations with bolts setting, spacing, ramp slope, and/or splice joint locations, and handrail lengths with identification showing where each handrail goes on the layout.

Payment for concrete sidewalks or curb ramps will be paid for in accordance with Item 531 "Sidewalks".

Payment for all items shown is to be included in unit price bid in accordance with Item 450 "Railing" of the type specified.

All exposed edges will be rounded or chamfered to approximately ⅛" by grinding.

TYPICAL WALL MOUNT DETAILS

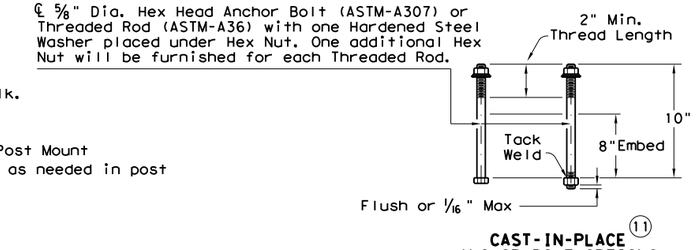
(5) 1 ½" Dia. Standard Pipe (1.900" O.D., 0.145" wall thickness). Parallel to ramp/sidewalk. Provide holes as needed in 1 ½" Dia. pipe for galvanizing drainage and venting.

(6) 2 ½" Dia. Standard Pipe (2.875" O.D., 0.203" wall thickness). Plumb all posts. See "Post Mount Detail" for crimping and trimming post to fit the diamenter of top rail. Provide holes as needed in post for galvanizing drainage and venting.

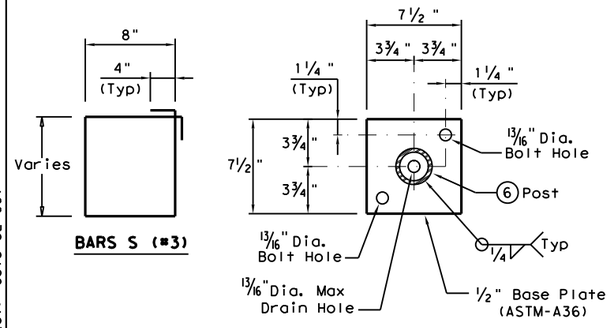
(11) See "General Notes" for anchor bolt information.

(12) Bars S(#3) spaced at 12" Max (Spaced 3" from outside edge of overall length of Ramp/Sidewalk).

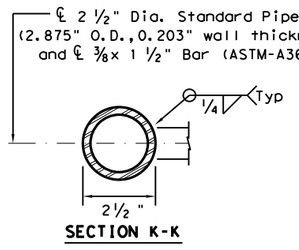
(13) Provide 1 ½" end cover to Bars D(#4) from outside edge of overall length of Ramp/Sidewalk.



CAST-IN-PLACE ANCHOR BOLT OPTIONS
(Used for Post Base Plate only)

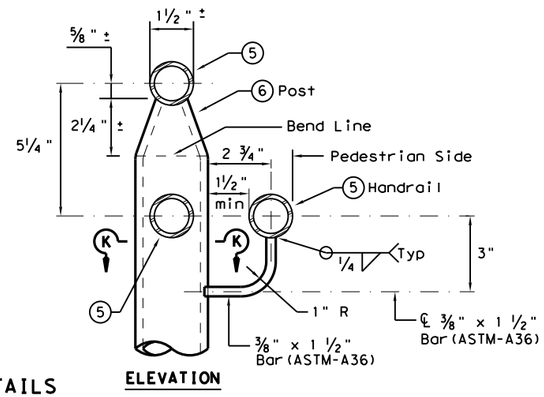


TYPICAL POST BASE PLATE DETAIL



SECTION K-K

POST MOUNT DETAILS



ELEVATION

SHEET 3 OF 3

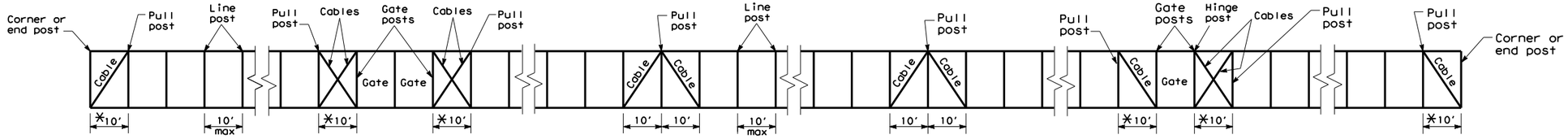
Texas Department of Transportation

Design Division Standard

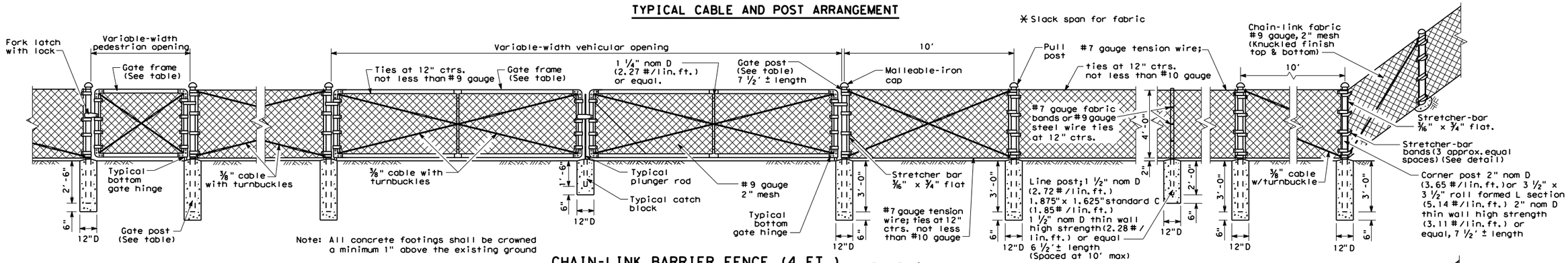
PEDESTRIAN HANDRAIL DETAILS

PRD-13

FILE: prd13.dgn	DN: TxDOT	CK: AM	DW: JTR	CK: CGL
©TxDOT December 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
REVISED MAY, 2013 (VP)	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		237



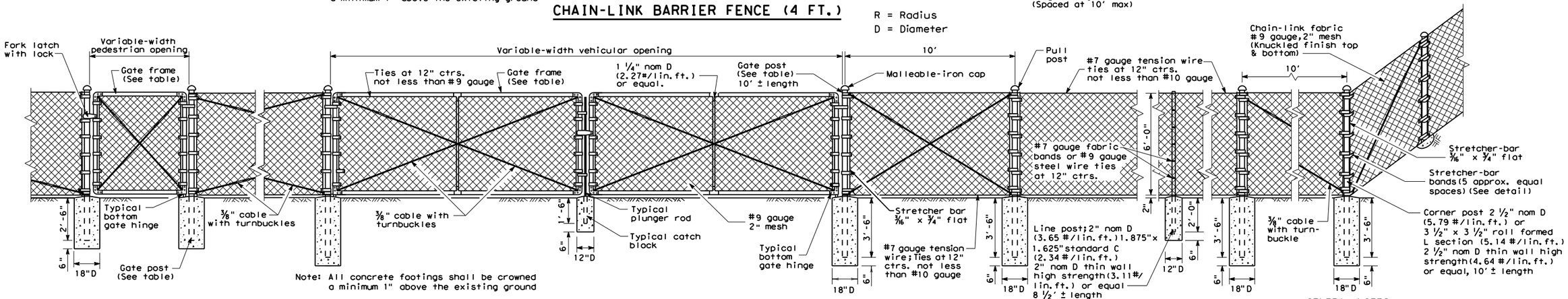
TYPICAL CABLE AND POST ARRANGEMENT



Note: All concrete footings shall be crowned a minimum 1" above the existing ground

CHAIN-LINK BARRIER FENCE (4 FT.)

R = Radius
D = Diameter



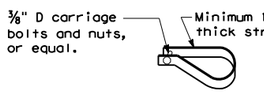
Note: All concrete footings shall be crowned a minimum 1" above the existing ground

CHAIN-LINK BARRIER FENCE (6 FT.)

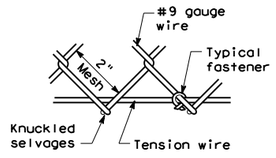
TABLE OF MINIMUM SIZES & WEIGHTS

GATE OPENING TYPE	
Single Inclusive	Double Inclusive
Up to 6'	Up to 12'
Over 6' to 12'	Over 12' to 26'
Over 12' to 18'	Over 26' to 36'
Over 18'	Over 36'

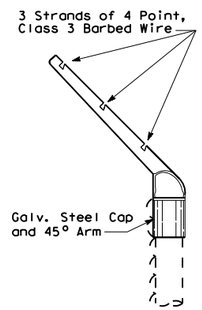
GATE FRAME		GATE POST	
SIZE	WT./LIN.FT.	SIZE	WT./LIN.FT.
1½" nom D or equal	2.72 LBS.	2½" nom D or equal	5.79 LBS.
	2.72 LBS.	3½" nom D or equal	9.11 LBS.
	2.72 LBS.	6" nom D	18.97 LBS.
	2.72 LBS.	8" nom D	24.70 LBS.



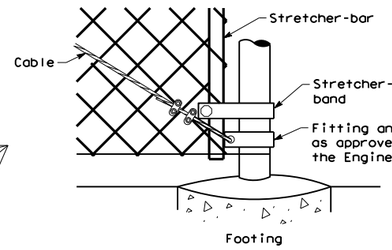
TYPICAL STRETCHER-BAR BAND



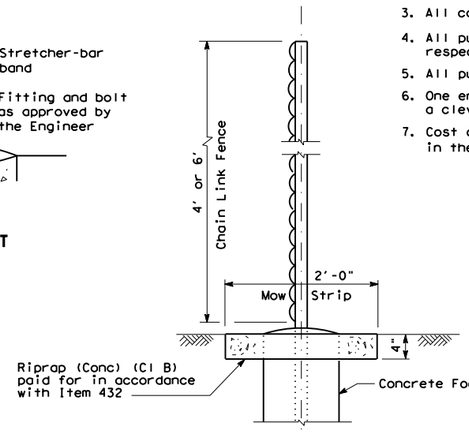
FABRIC & TENSION WIRE DETAIL TOP & BOTTOM



3 WIRE 45° BARBED WIRE ARM FOR CHAIN LINK SECURITY FENCE ⚠



TERMINAL POST DETAIL



MOWING STRIP DETAIL ⚠

GENERAL NOTES

1. Typical installation plan may vary as shown elsewhere on the plans or as directed by the Engineer. Location of gates shown elsewhere on plans.
2. Gate-frame members shall be bolted, at frame corners, to joint fittings with four ½" bolts per joint.
3. All cable connections are to be made with two ⅜" cable clamps.
4. All pull posts and end posts and their foundations shall have the same respective dimensions as those shown for corner post.
5. All pull post shall be furnished with two stretcher bars.
6. One end of each turnbuckle may be attached directly to fittings with a clevis.
7. Cost of furnishing and installing 45°Arm and Barbed Wire to be included in the unit price bid for "Chain Link Security Fence."

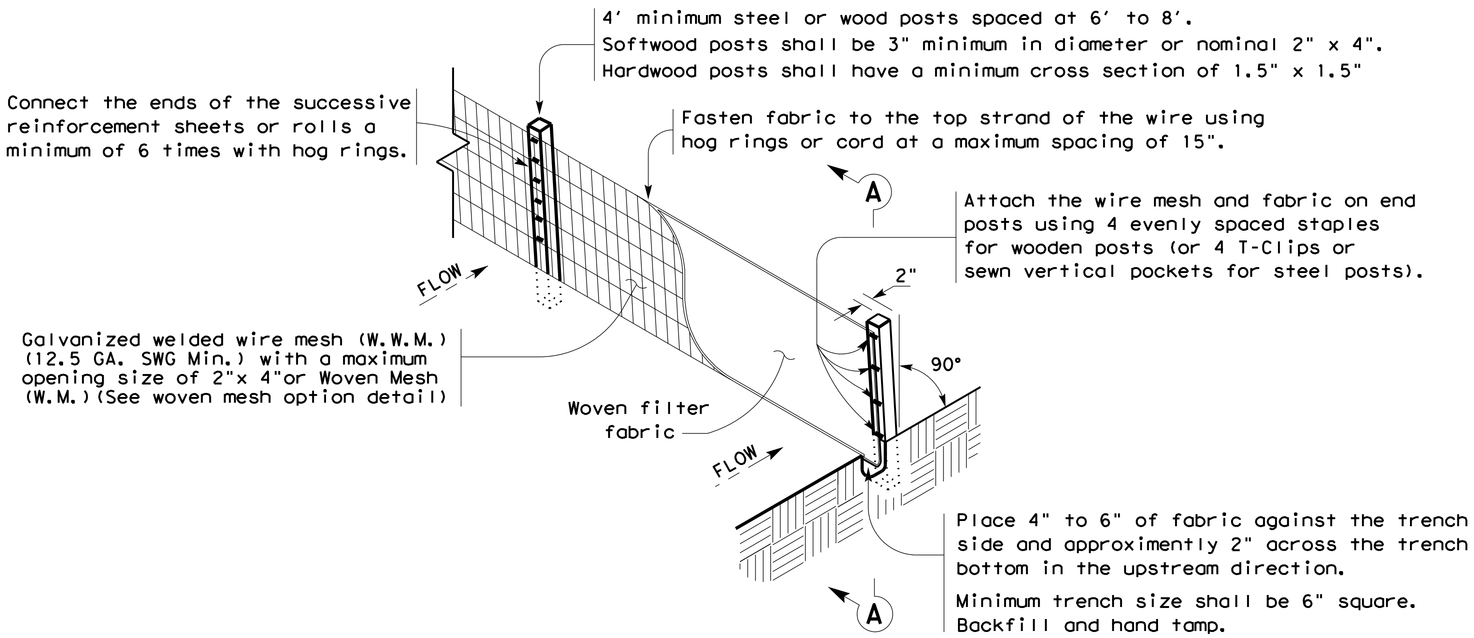
Texas Department of Transportation
Houston District

CHAIN-LINK BARRIER FENCE (4 AND 6 FOOT HEIGHT) CLF

FILE: STDG-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2006	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 3/15 2014 SPECS	12	6	RMC 6375-52-001	238
	COUNTY		CONTROL SECT JOB	HIGHWAY
	HARRIS/GAL		6375 52 001	IH45

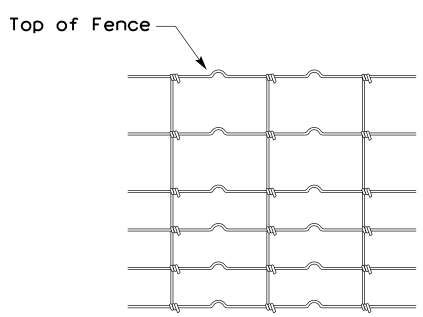
STD G3

FILE: h:\00maintenance\south harris maintenance\2020 contracts\6357-02-001*ih45 general maintenance\Standards\Fence Hand Rail 20\stdg3.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001



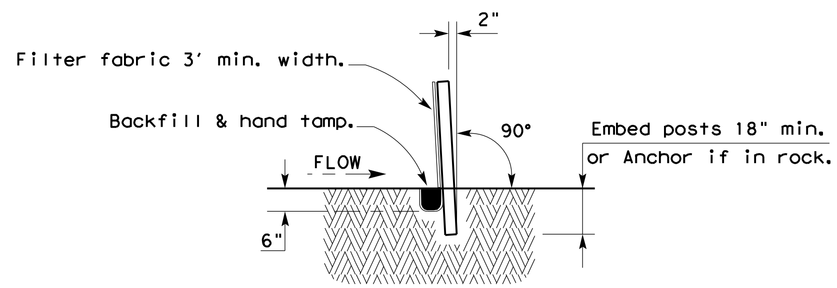
TEMPORARY SEDIMENT CONTROL FENCE

SCF



HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.



SECTION A-A

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

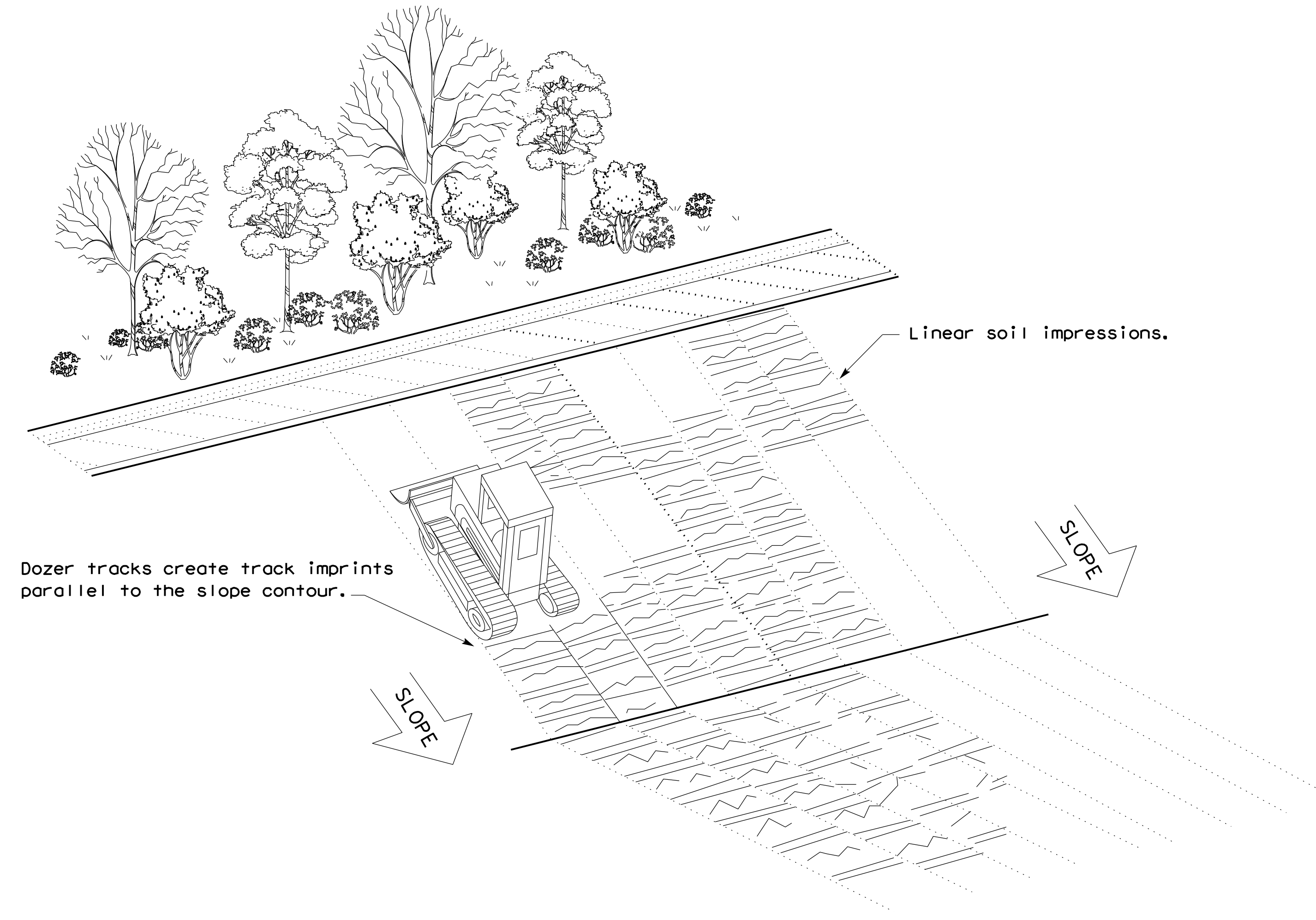
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation — Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: July 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
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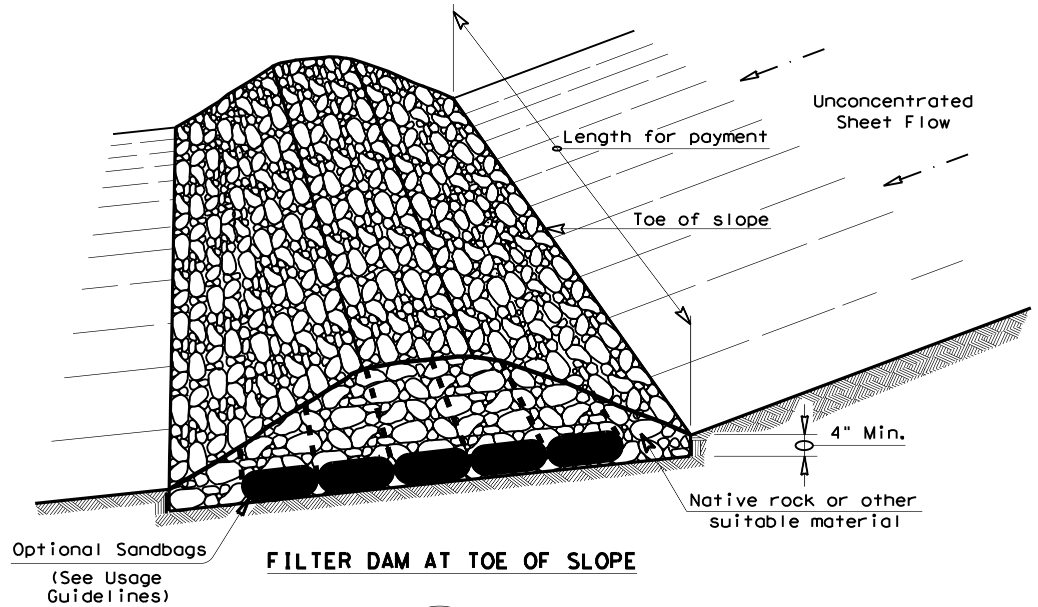
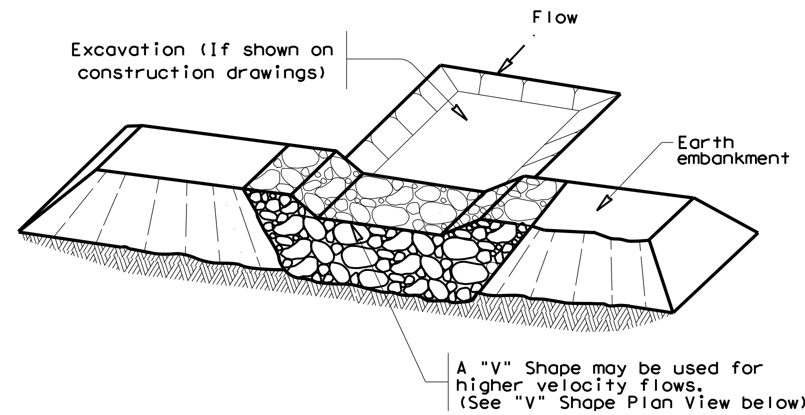
	12		HARRIS/GAL	239

FILE: h:\00maintenance\south harris maintenance\...
DATE: 1/4/2021
PROJECT: 6375-52-001



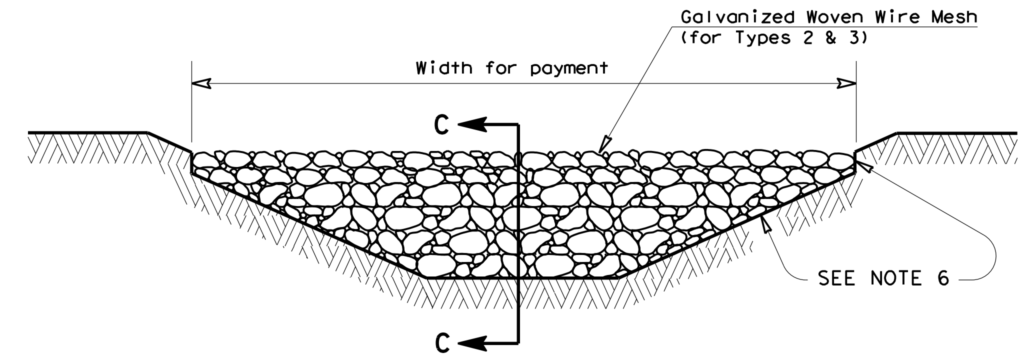
FILTER DAM AT TOE OF SLOPE

RFD1



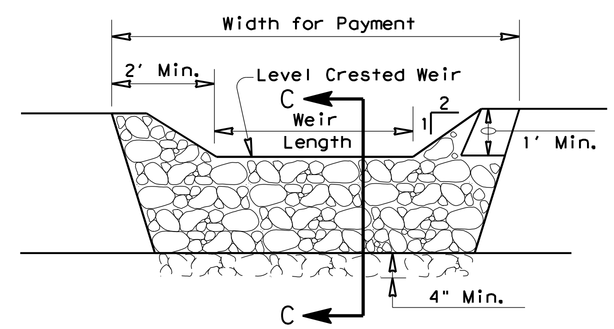
FILTER DAM AT SEDIMENT TRAP

RFD1 OR RFD2

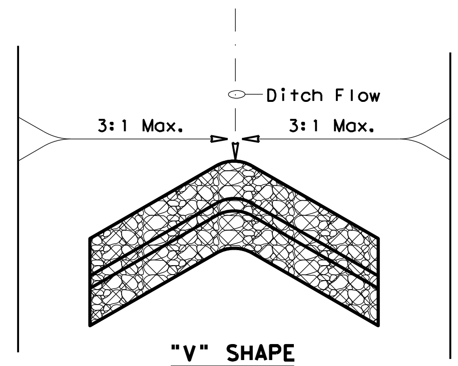


FILTER DAM AT CHANNEL SECTIONS

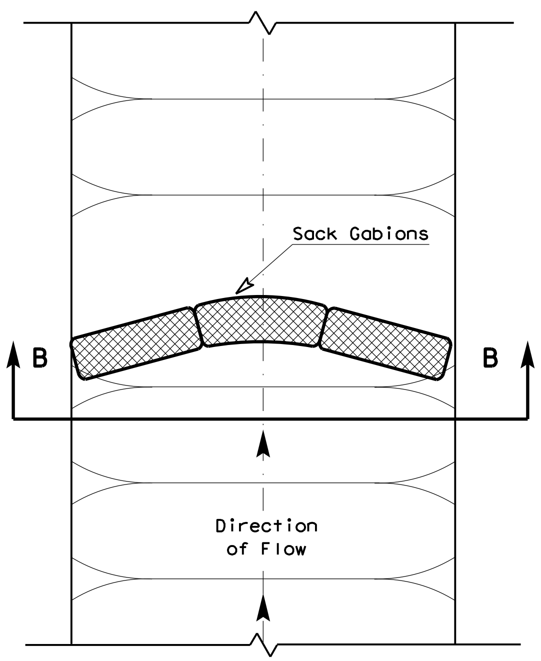
RFD1 OR RFD2 OR RFD3



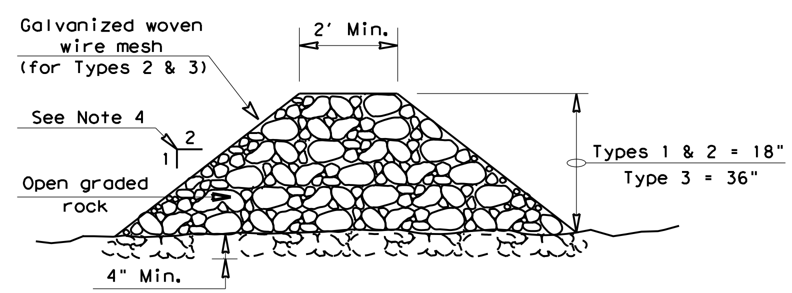
PROFILE



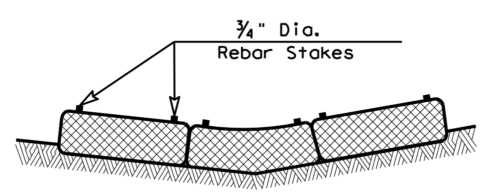
"V" SHAPE
PLAN VIEW



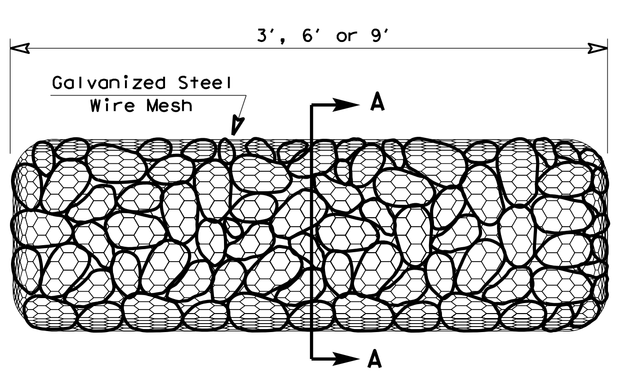
PLAN VIEW



SECTION C-C

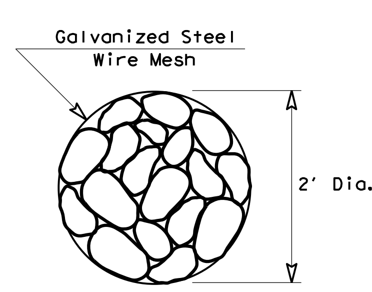


SECTION B-B



TYPE 4 (SACK GABIONS)

RFD4



SECTION A-A

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼".
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam	RFD1
Type 2 Rock Filter Dam	RFD2
Type 3 Rock Filter Dam	RFD3
Type 4 Rock Filter Dam	RFD4

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.

Texas Department of Transportation — Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: July 2016	CONT	SECT	JOB	HIGHWAY
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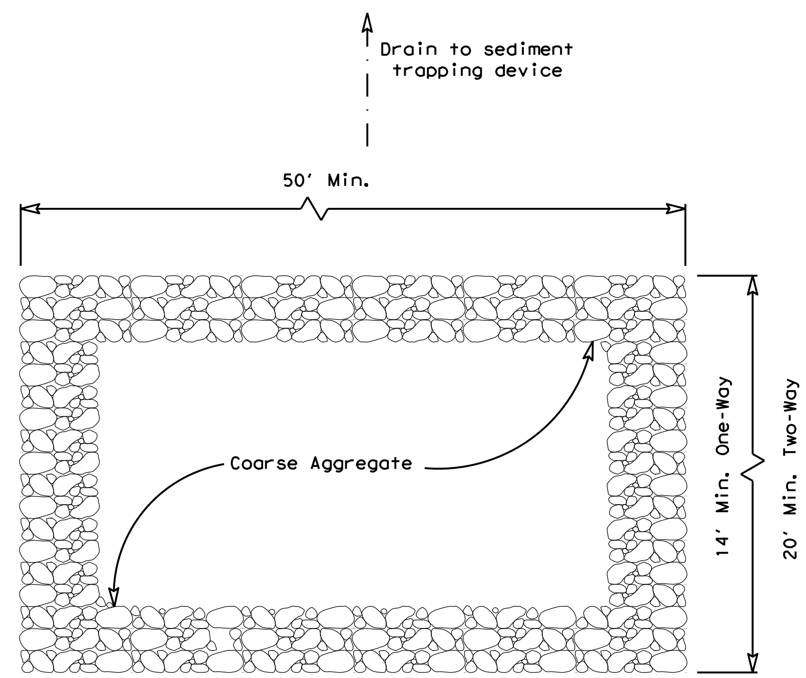
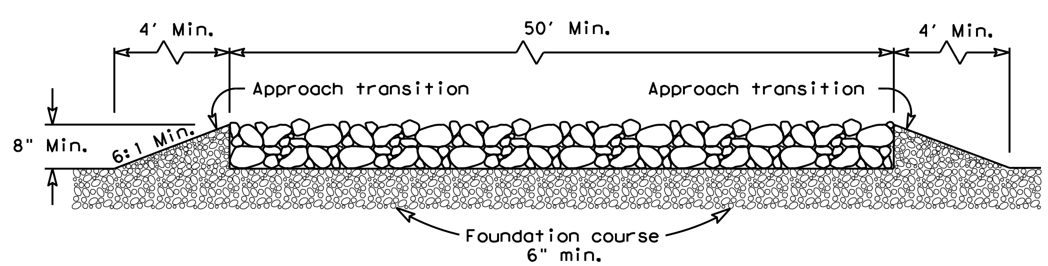


PLAN VIEW



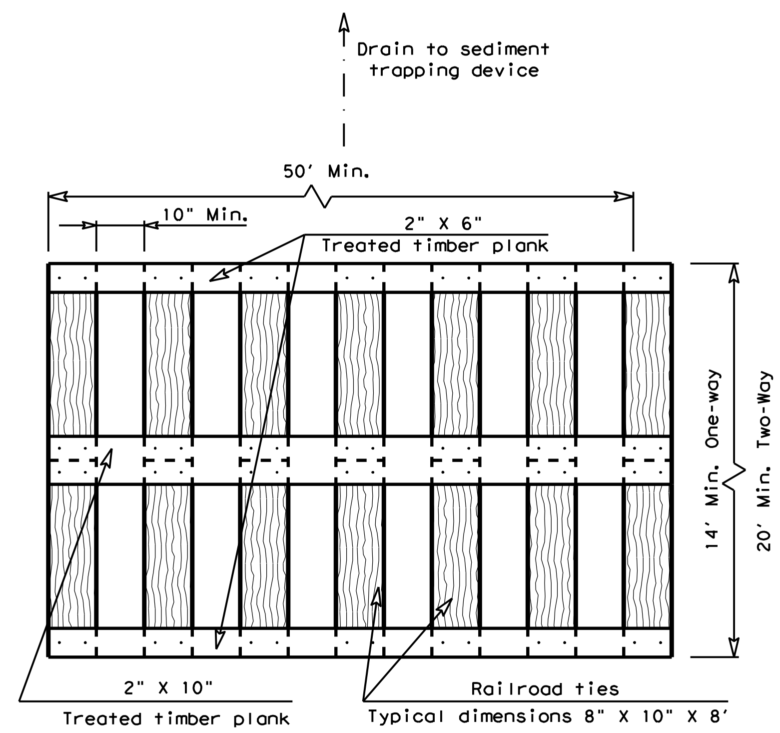
ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

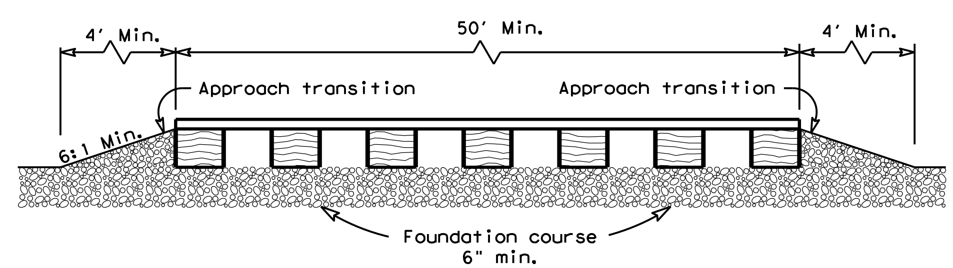
ROCK CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50'.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.



PLAN VIEW



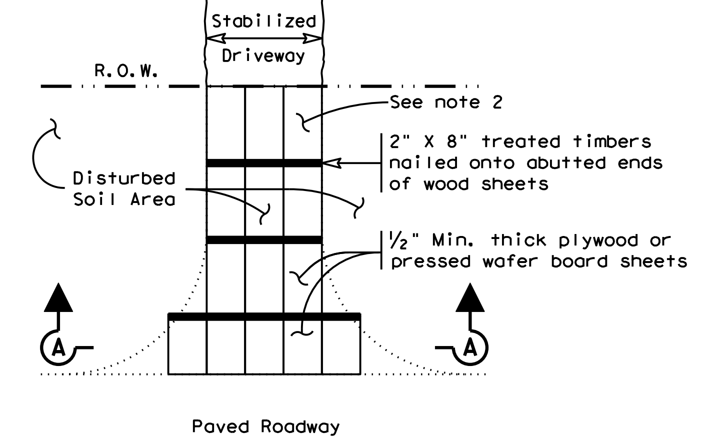
ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

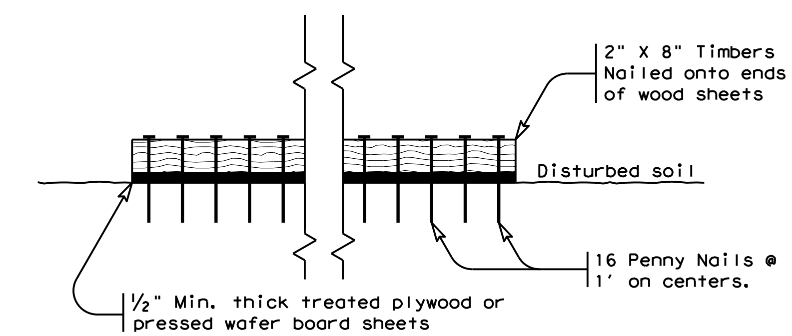
TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
2. The treated timber planks shall be attached to the railroad ties with $\frac{1}{2}$"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.



PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

SHORT TERM

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation — Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

EC(3)-16

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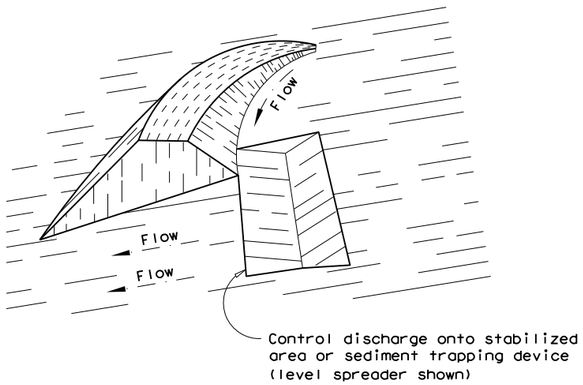
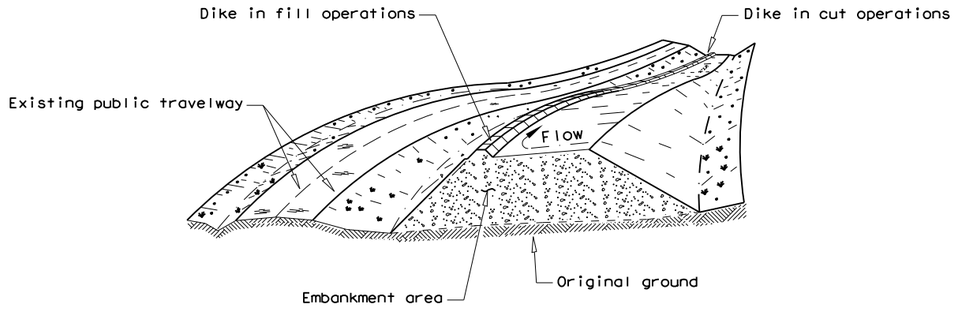
PROJECT: 6375-52-001



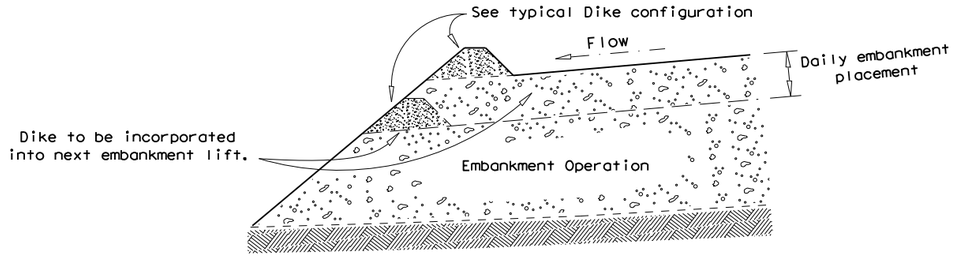
PERIMETER DIKE

→(D)→



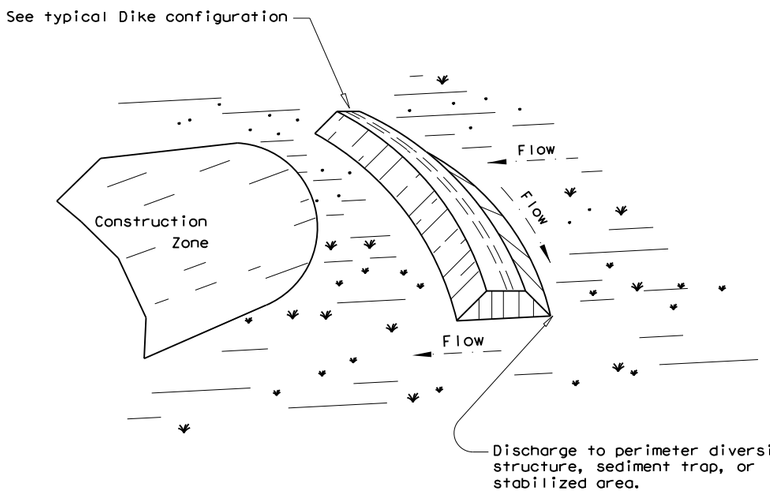
DIVERSION DIKE

→(D)→



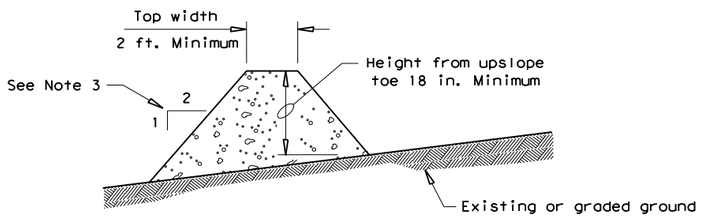
EMBANKMENT SECTION - DIVERSION DIKE

→(D)→



INTERCEPTOR DIKE

→(D)→



TYPICAL DIKE CONFIGURATION

→(D)→

GENERAL NOTE

1. Soil used in dike construction shall be machine compacted.
2. Top width and height of dike may be modified with prior approval of the Engineer.
3. Side slopes within the safety clear zone of a roadway shall be 6:1 or flatter.
4. Grading shall be shown elsewhere in the plans or as directed by the Engineer.
5. The Engineer reserves the right to modify the dimensions shown for the dike dependent on runoff volume characteristics.
6. Dikes that are in place for more than 14 calendar days should be stabilized to prevent sediment runoff.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Remove sediment and debris when accumulation affects the performance of the devices, after a rain and when directed by the engineer.

DIKE USAGE GUIDELINES

A Dike may be used to intercept runoff and divert it around unstabilized areas or to divert sediment laden runoff to an erosion control device (sediment basin or trap, rock filter dam, etc.).

The drainage area contributing runoff to a dike should not exceed 5 acres. The spacing of dikes should be as follows:

Slope of disturbed areas above dike	greater than 10%	5 - 10%	less than 5%
Maximum distance between dikes	100′	200′	300′

Intercepted runoff flowing along a dike should outlet to a stabilized area (vegetation, rock, etc.).

PLANS SHEET LEGEND

DIKE →(D)→

Texas Department of Transportation — Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES DIKES (EARTHWORK FOR EROSION CONTROL)

EC(4)-16

FILE: ec416	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: July 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
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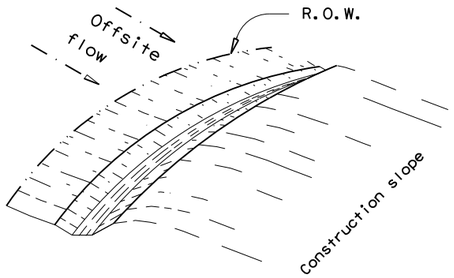
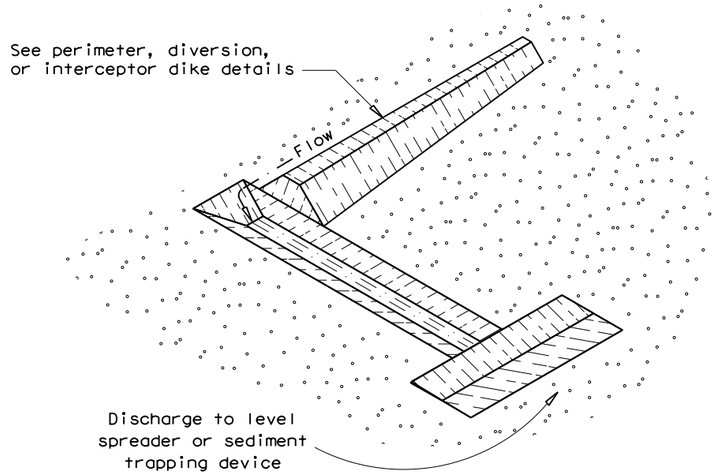
FILE: h:\00maintenance\south harris maintenance\standards\erosion 20\ec516.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001



PERIMETER SWALE

→(S)→



DIVERSION SWALE

→(S)→

GENERAL NOTE

1. Dimensions of swale may be modified with prior approval of the Engineer.
2. Side slopes within the safety clear zone of a roadway shall be 6:1 or flatter.
3. Grading shall be shown elsewhere on the plans or as directed by the Engineer.
4. The Engineer reserves the right to modify the dimensions shown for the swale dependent on runoff volume characteristics.
5. Swales that are in place for more than 14 calender days should be stabilized through seeding or other measures to control sediment runoff.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Remove sediment and debris when accumulation affects the performance of the devices, after a rain and when directed by the Engineer.

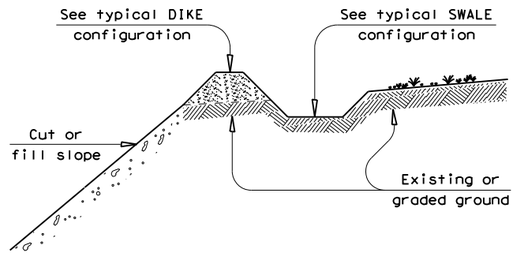
SWALE AND DIKE/SWALE USAGE GUIDELINES

A swale or dike/swale may be used to intercept runoff and divert it around unstabilized areas or to divert sediment laden runoff to an erosion control device (sediment basin or trap, rock filter dam, etc.).

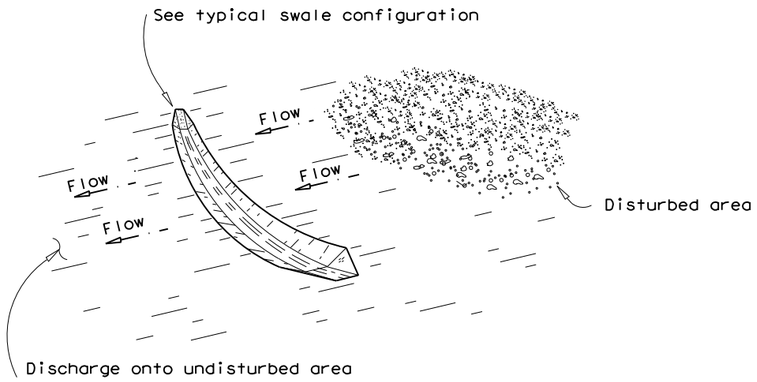
The drainage area contributing runoff to a swale or dike/swale should not exceed 5 acres. The spacing of swales and dike/swales should be as follows:

Slope of disturbed areas above dike	greater than 10%	5 - 10%	less than 5%
Maximum distance between dikes	100′	200′	300′

Intercepted runoff flowing in a swale or dike/swale should outlet to a stabilized area (vegetation, rock, etc.).

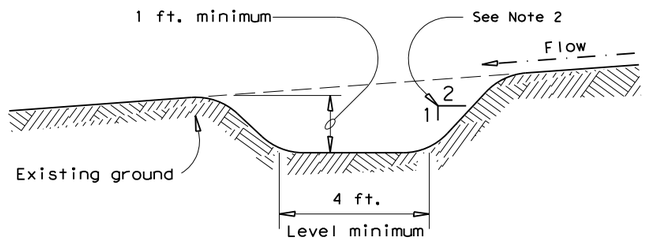


DIVERSION DIKE WITH SWALE



INTERCEPTOR SWALE

→(S)→



TYPICAL SWALE CONFIGURATION

PLAN SHEET LEGEND

SWALE →(S)→

DIKE →(D)→

Texas Department of Transportation — Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
SWALES
(EARTHWORK FOR EROSION CONTROL)

EC(5)-16

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© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
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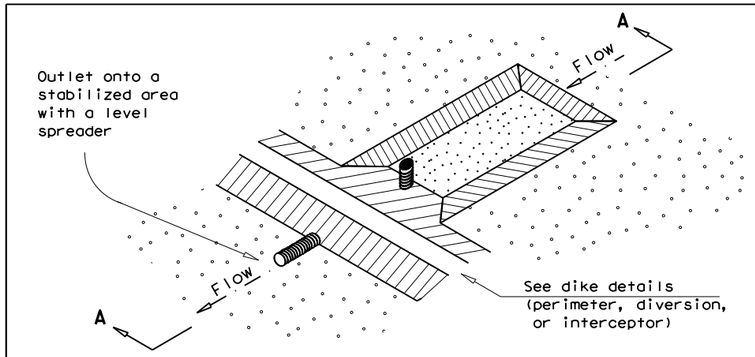
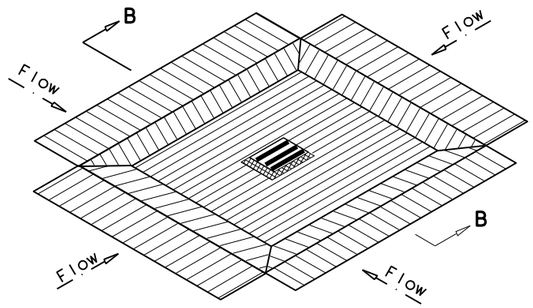
DATE: 1/4/2021
PROJECT: 6375-52-001



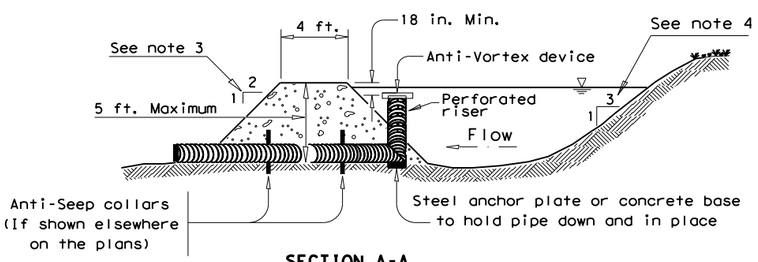
SEDIMENT BASIN AND/OR TRAP WITH PIPE OUTLET

ST/PO

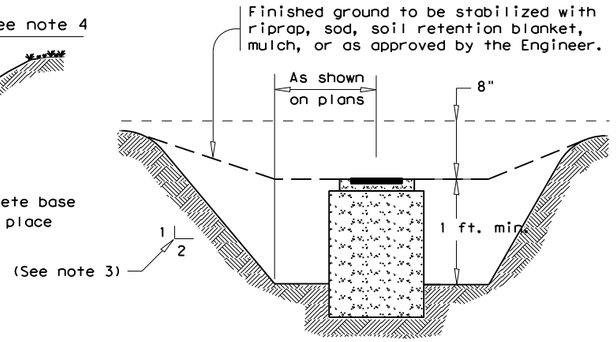


DROP INLET SEDIMENT TRAP

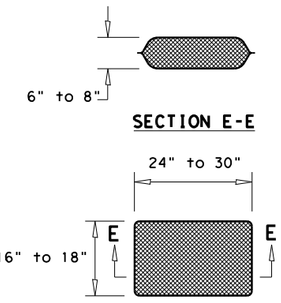
ST-DI



SECTION A-A

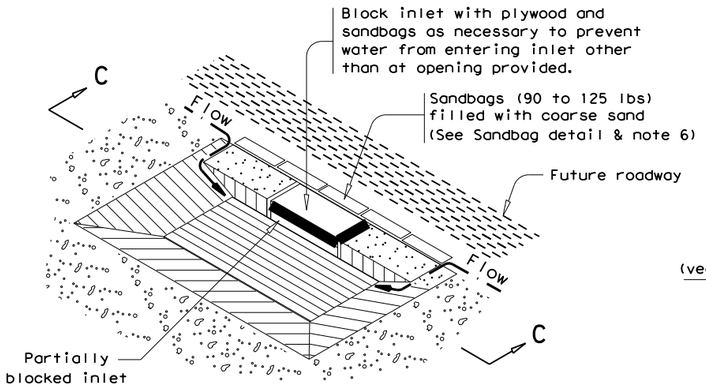


SECTION B-B



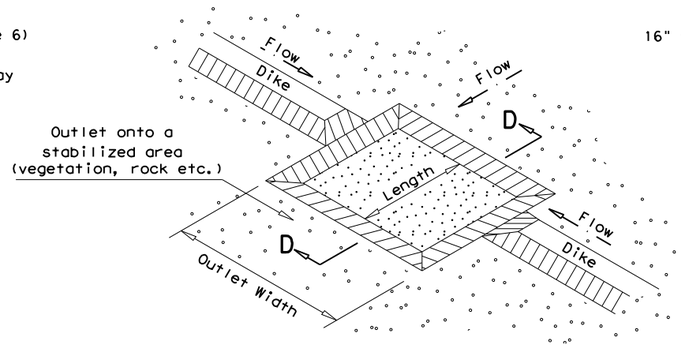
SECTION E-E

SANDBAG DETAIL



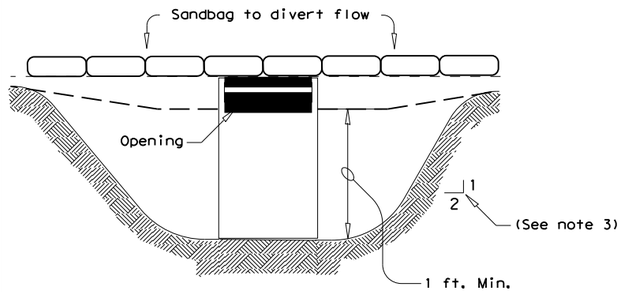
CURB INLET SEDIMENT TRAP

ST-CI

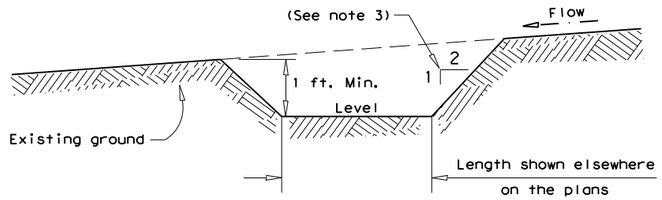


SEDIMENT TRAP WITH LEVEL STABILIZED OUTLET

ST



SECTION C-C



SECTION D-D

GENERAL NOTES

1. Pipe outlet material shall conform to the Item "Pipe Underdrains" or as accepted by the Engineer.
2. All pipe connections shall be watertight.
3. Side slopes within the safety clear zone of a roadway shall be 6:1 or flatter. Protect the traveling public from inlet stacks within the clear zone.
4. Sediment basins shall have side slopes of 3:1 or flatter.
5. The dimensions and limits of excavation for sediment basins and traps will be as shown elsewhere on the plans.
6. The sandbag material shall be made of polypropylene, polyethylene or polyamide woven fabric, min. unit weight 4 ounces /SY, Mullen burst strength exeeding 300 psi and ultraviolet stability exeeding 70%.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

SEDIMENT BASIN & TRAP USAGE GUIDELINES

A sediment basin and/or trap may be used to precipitate sediment out of runoff draining from an unstabilized area.

Basins: The drainage area for a sediment basin should not exceed 100 acres. The basin capacity shall be at least 1800 CF/Acre of drainage area (0.5" over the drainage area). If the disturbed area draining to the basin is larger than 10 acres, the basin capacity should be 3600 CF/Acre (1.0" over the drainage area).

The basin should have a 40 hour draw-down time with an emergency spillway. The spillway may be designed to pass the peak rate of runoff from a 25 year frequency storm. The 100 year storm should be investigated to consider possible flooding impacts.

The entrance into the basin should be protected from erosion. The basin should be cleaned when the capacity has been reduced by 1/3.

Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Sediment traps should be placed in the following locations:
1. Within drainage ditches spaced @ 500'± on center
2. Immediately preceding ditch inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way

The trap outlet may either be through a perforated riser and pipe assembly designed to achieve a 40 hour draw-down time or over a level stabilized area (vegetation, rock, etc.).

The trap should be cleaned when the capacity has been reduced by ½ or the sediment has accumulated to a depth of 1', whichever is less.

PLANS SHEET LEGEND

ST/PO — Sediment Basin and / or Trap with Pipe Outlet

ST-DI — Drop Inlet Sediment Trap

ST-CI — Curb Inlet Sediment Trap

ST — Sediment Trap with Level Stabilized Outlet

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

SEDIMENT BASINS AND TRAPS (EARTHWORK FOR EROSION CONTROL)

EC(6)-16

FILE: ec616	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: July 2016	CONT	SECT	JOB	HIGHWAY
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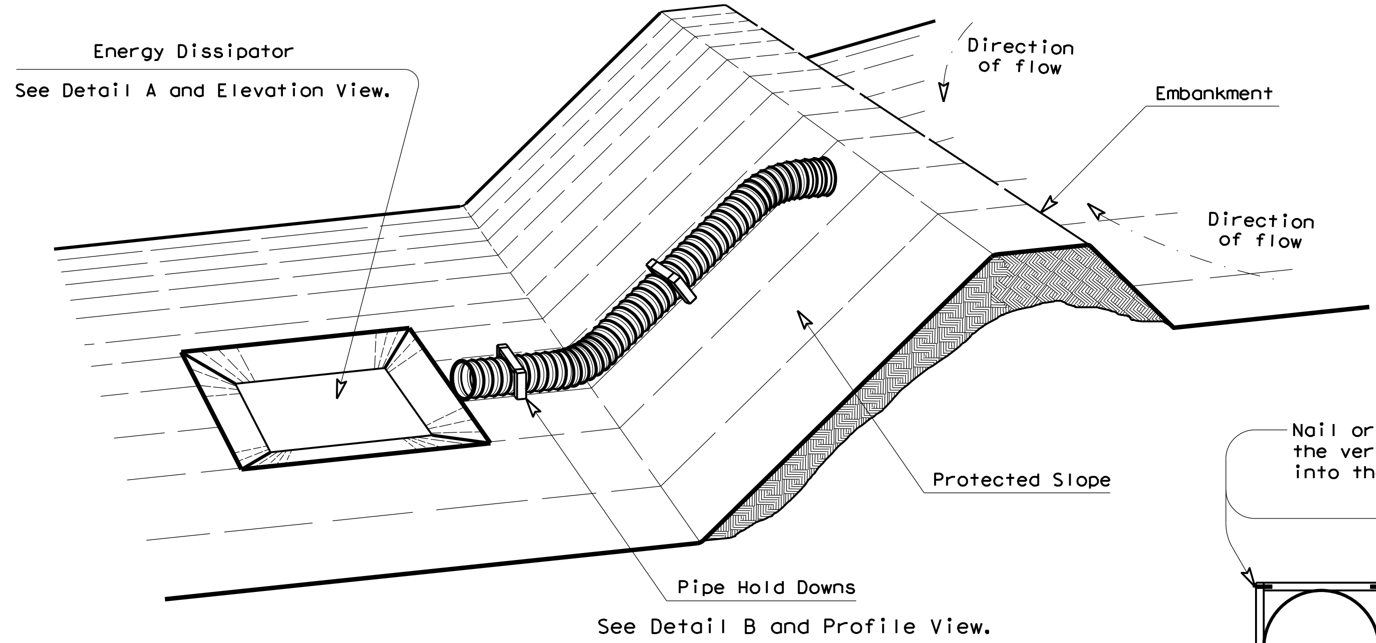
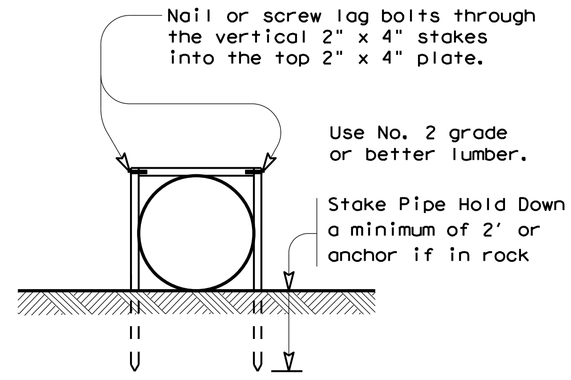
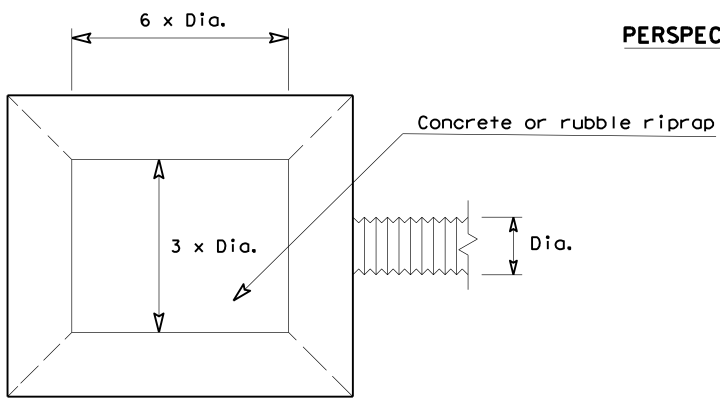
PROJECT: 6375-52-001



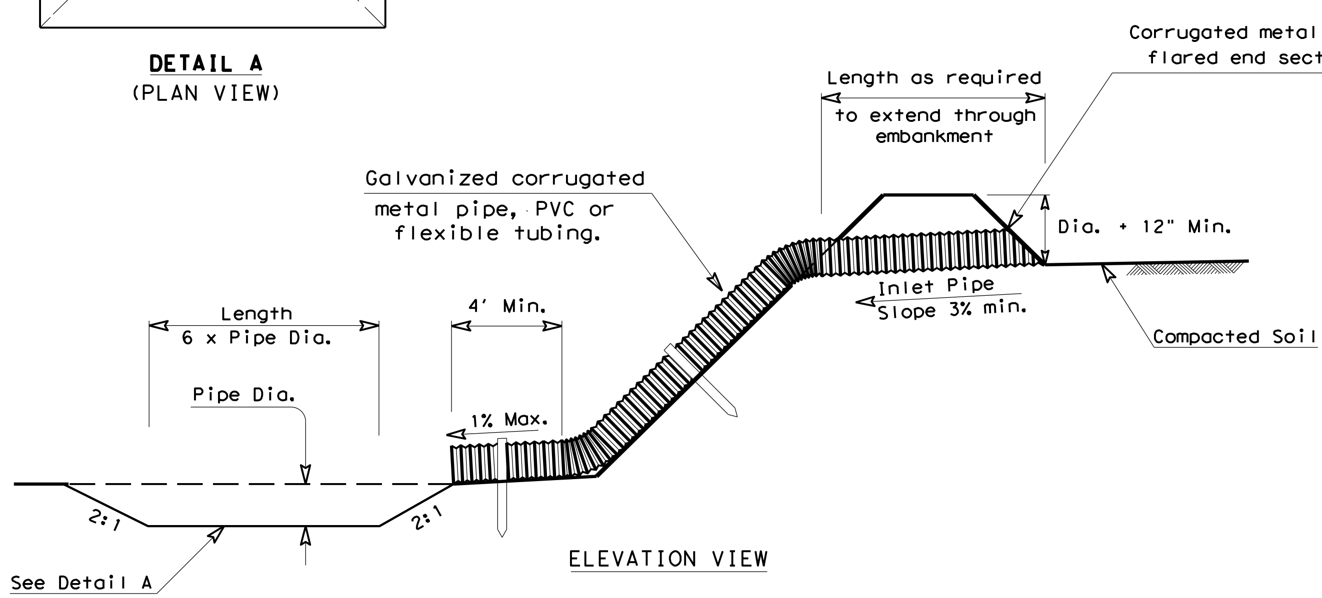
PERSPECTIVE VIEW



DETAIL B
(ELEVATION VIEW)



DETAIL A
(PLAN VIEW)



ELEVATION VIEW

PIPE SLOPE DRAIN WITH ENERGY DISSIPATOR

PSD

GENERAL NOTES

1. The inlet pipe shall have a slope of 3 percent or greater. Pipe diameter shall be as indicated on the construction drawings.
2. The top of embankment shall be at least 12" higher than the top of the inlet pipe at all points.
3. The pipe shall be galvanized corrugated metal pipe, PVC, or flexible tubing with watertight connection bands.
4. Pipe shall be secured with hold-down grommets spaced a maximum of 10' on centers or with pipe hold downs as shown in Detail B.
5. Construct embankment for the drainage system in 8" lifts to the required elevations. Hand tamp the soil around and under the entrance section to the top of the embankment as shown on the plans or as directed by the engineer.
6. The sediment trap shall be constructed to the dimensions as shown and in accordance with Special Specification, "Earthwork for Erosion Control". As otherwise detailed on the plans, the sediment trap may be stabilized using concrete or rubble riprap as per Item, "Riprap".
7. A standard corrugated metal pipe flared end section shall be used at the entrance of the pipe slope drain.
8. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PIPE SLOPE DRAIN
DESIGN CRITERIA

PIPE/TUBING SIZE	DIAMETER	MAXIMUM DRAINAGE AREA
PSD 12	12"	0.5 Acre
PSD 18	18"	1.5 Acres
PSD 21	21"	2.5 Acres
PSD 24	24"	3.5 Acres
PSD 30	30"	5.0 Acres

PIPE SLOPE DRAIN USAGE GUIDELINES

A Pipe Slope Drain (PSD) should be constructed to drain concentrated surface runoff safely down slopes without causing erosion. The drainage area contributing runoff to a PSD should not exceed 5 acres. The PSD should be sized to drain the peak rate of runoff without over-topping at the earth dike entrance. A 25 year storm frequency may be used to calculate the flow rate.

PLAN SHEET LEGEND

Pipe Slope Drain —(PSD)—

Texas Department of Transportation
Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
TEMPORARY PIPE SLOPE DRAINS

EC(7)-16

FILE: ec716.dgn	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS	
© TxDOT: July 2016	CONT	SECT	JOB	HIGHWAY	
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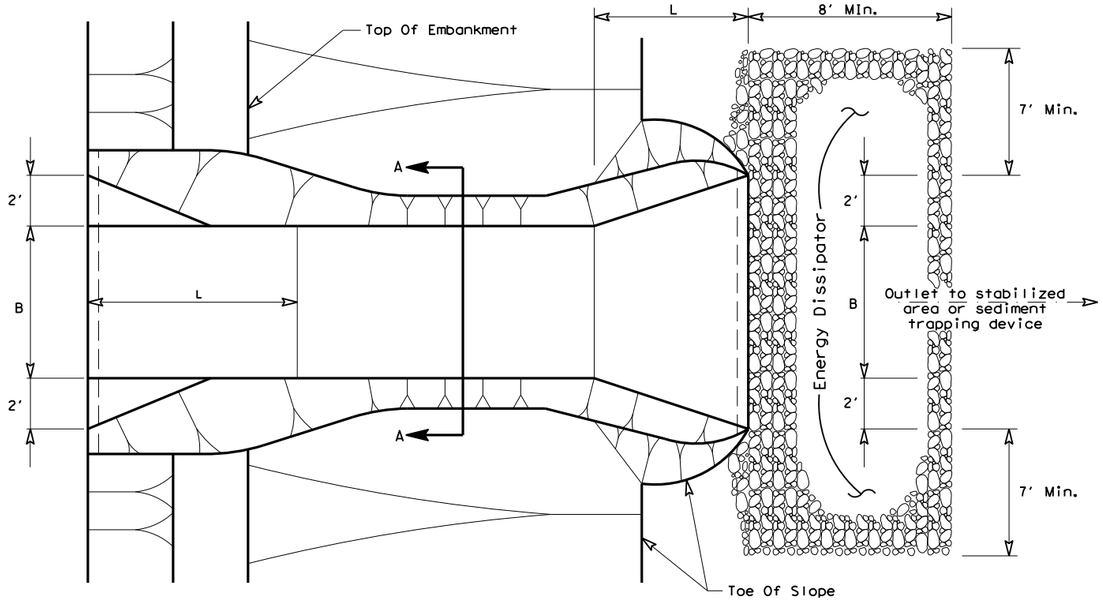
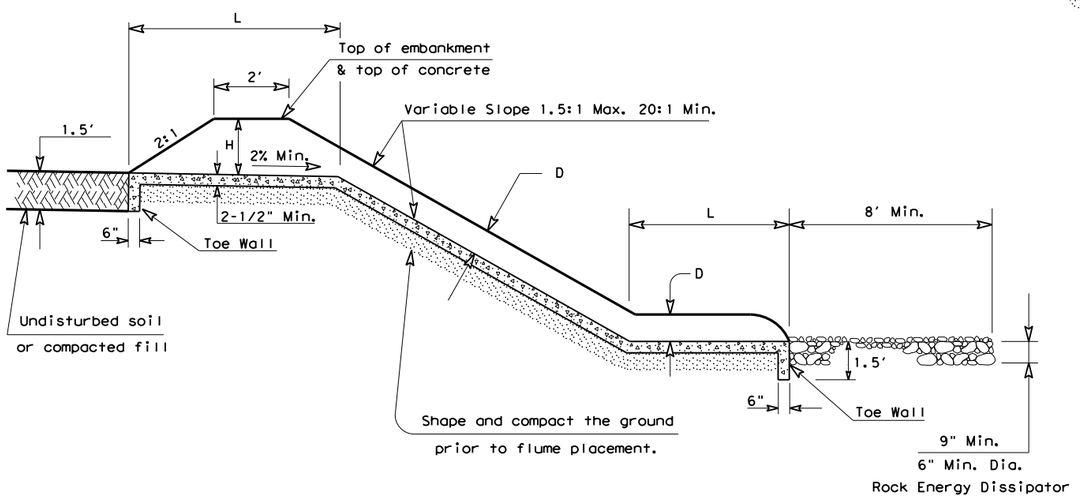


PLAN VIEW

SECTION A-A



ELEVATION VIEW

PAVED FLUME

PF

GENERAL NOTES

1. The group / size is a designator for the dimensions of the paved flume. The group / size is designated by a letter (A or B) and the bottom (B) dimension. The appropriate size shall be indicated on the construction plans.
2. Provide rock or rubble with a minimum diameter of 6" and a maximum volume of 1/2 cubic feet for construction of energy dissipaters.
3. For high velocity flows, the aggregate of the energy dissipator should be secured with 20-gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggegrate should be placed on the mesh to the dimensions specified. The mesh shall be folded at the upstream side over the aggegrate and tightly secured to itself on the downstream side using wire ties or hog rings.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PAVED FLUME USAGE GUIDELINES

A Paved Flume should be constructed to drain concentrated surface runoff safely down slopes without causing erosion. The drainage area contributing runoff to a paved flume should not exceed that given in the Design Criteria above. The paved flume should be sized to drain the peak rate of runoff without overtopping the embankment at the earth dike entrance. A 25 year storm frequency may be used to calculate the flow rate.

DESIGN CRITERIA					
Group/Size	B Bottom Width	H Min.	D Min.	L Min.	Maximum Drainage Area
A-2	2'	1.5'	8"	5'	5 Acres
A-4	4'	1.5'	8"	5'	8 Acres
A-6	6'	1.5'	8"	5'	11 Acres
A-8	8'	1.5'	8"	5'	14 Acres
A-10	10'	1.5'	8"	5'	18 Acres
B-4	4'	2'	10"	6'	14 Acres
B-6	6'	2'	10"	6'	20 Acres
B-8	8'	2'	10"	6'	25 Acres
B-10	10'	2'	10"	6'	31 Acres
B-12	12'	2'	10"	6'	36 Acres

PLANS SHEET LEGEND

Paved Flume — PF

Texas Department of Transportation | Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

TEMPORARY PAVED FLUMES

EC(8)-16

FILE: ec816	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: July 2016	CONT	SECT	JOB	HIGHWAY
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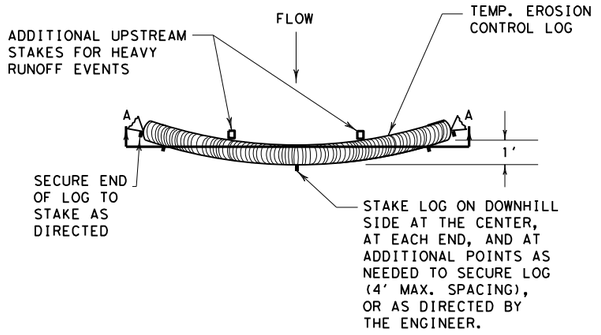
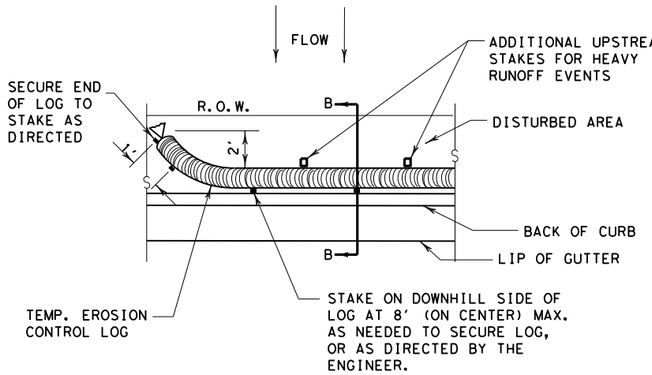


PLAN VIEW



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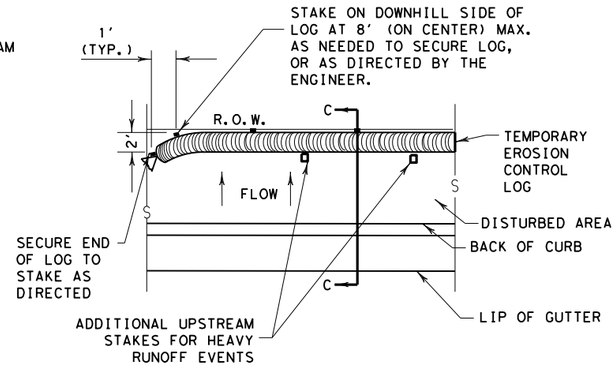

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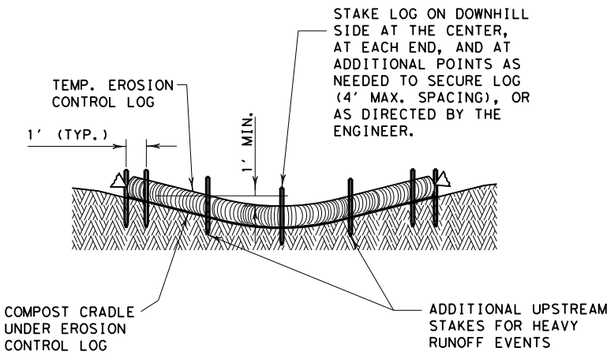
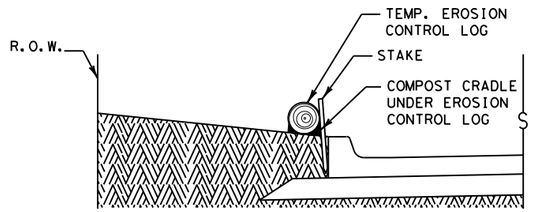


SECTION A-A

EROSION CONTROL LOG DAM

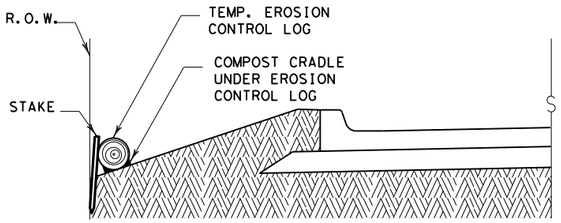
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

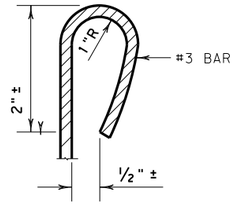
CL-BOC



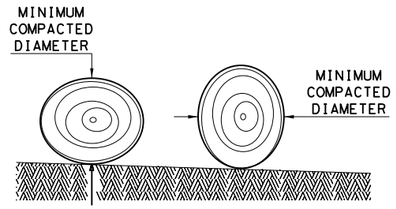
SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



REBAR STAKE DETAIL



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

GENERAL NOTES:

1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.

LEGEND

- CL-D — EROSION CONTROL LOG DAM
- CL-BOC — EROSION CONTROL LOG AT BACK OF CURB
- CL-ROW — EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
- CL-SST — EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
- CL-SSL — EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
- CL-DI — EROSION CONTROL LOG AT DROP INLET
- CL-CI — EROSION CONTROL LOG AT CURB INLET
- CL-GI — EROSION CONTROL LOG AT CURB & GRATE INLET

SEDIMENT BASIN & TRAP USAGE GUIDELINES

An erosion control log sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.

SHEET 1 OF 3

Texas Department of Transportation — Design Division Standard

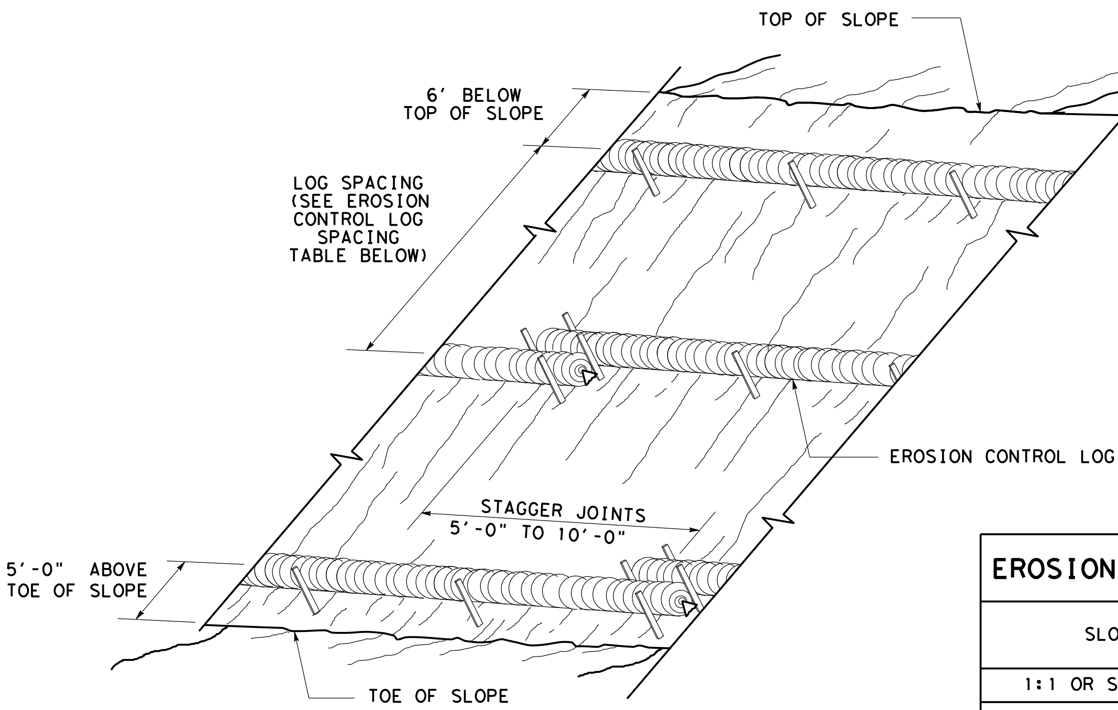
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

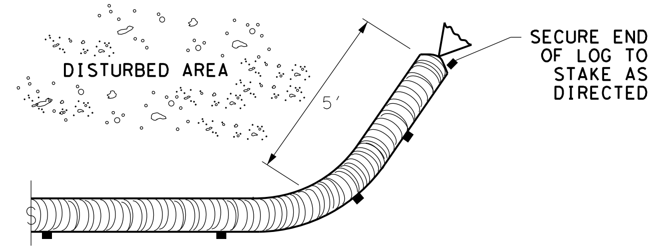
FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: APRIL 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
	DIST	COUNTY		SHEET NO.
	12	HARRIS/GAL		247

FILE: h:\00maintenance\south harris maintenance\...
DATE: 1/4/2021
PROJECT: 6375-52-001



EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

(CL-SST)



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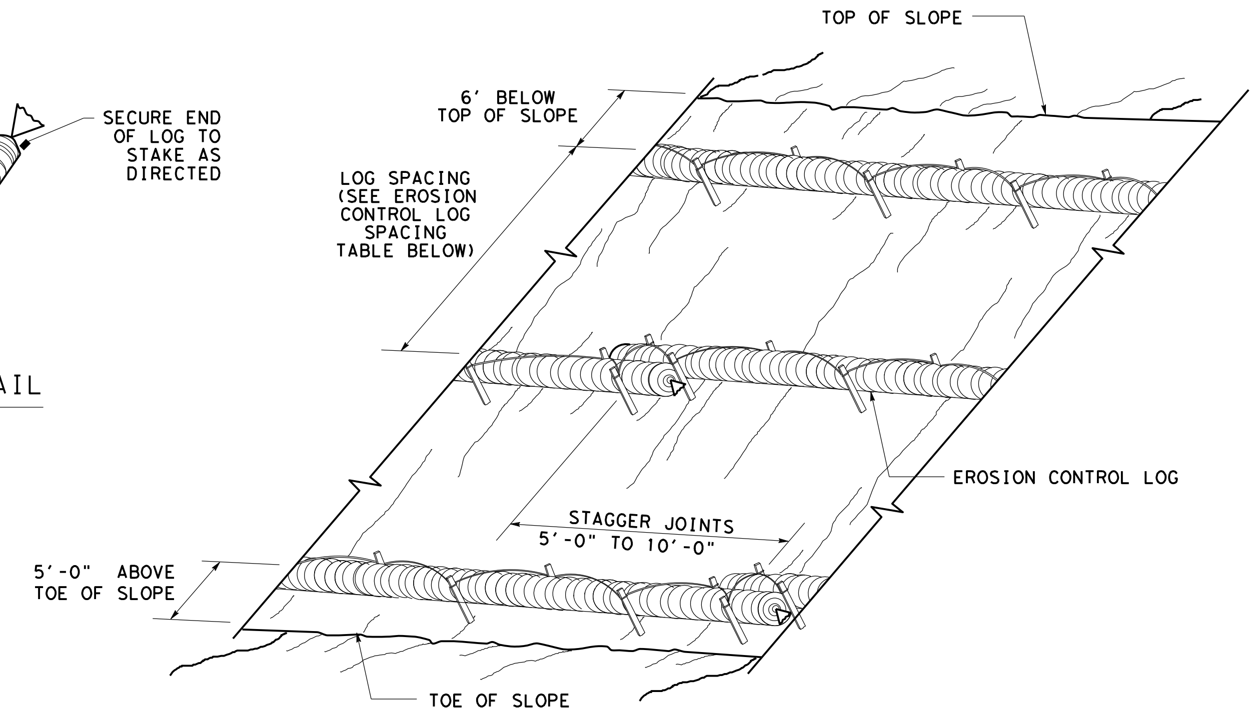


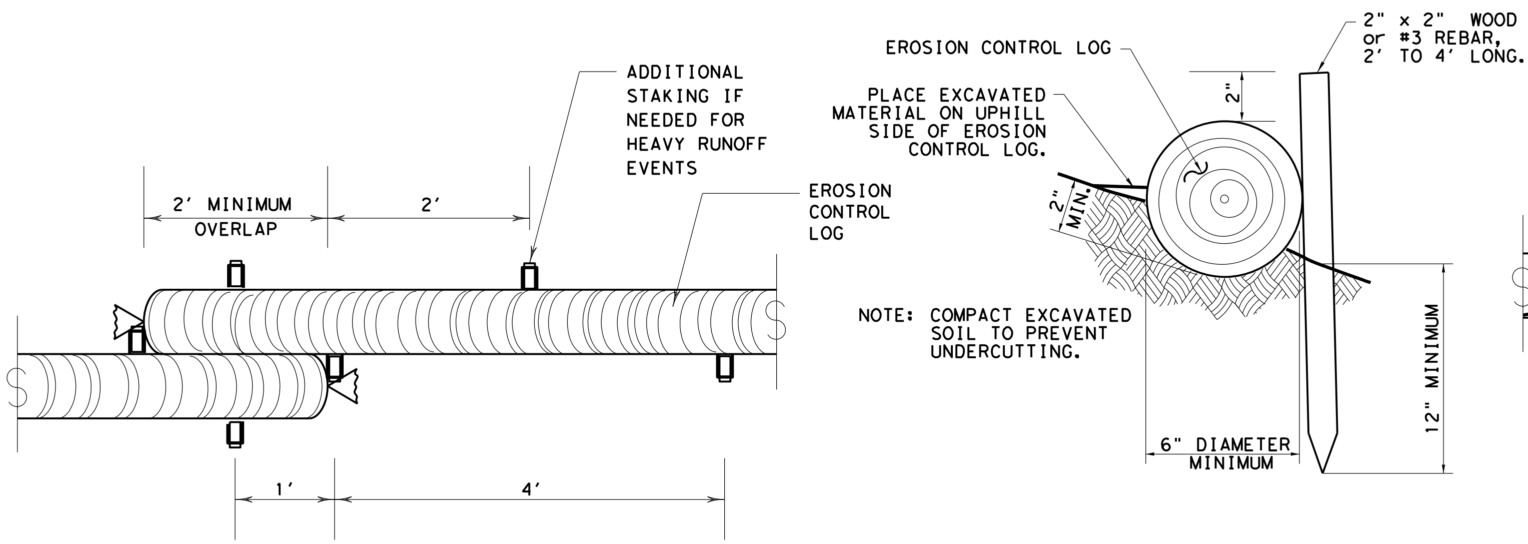
EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

(CL-SSL)

EROSION CONTROL LOG SPACING TABLE

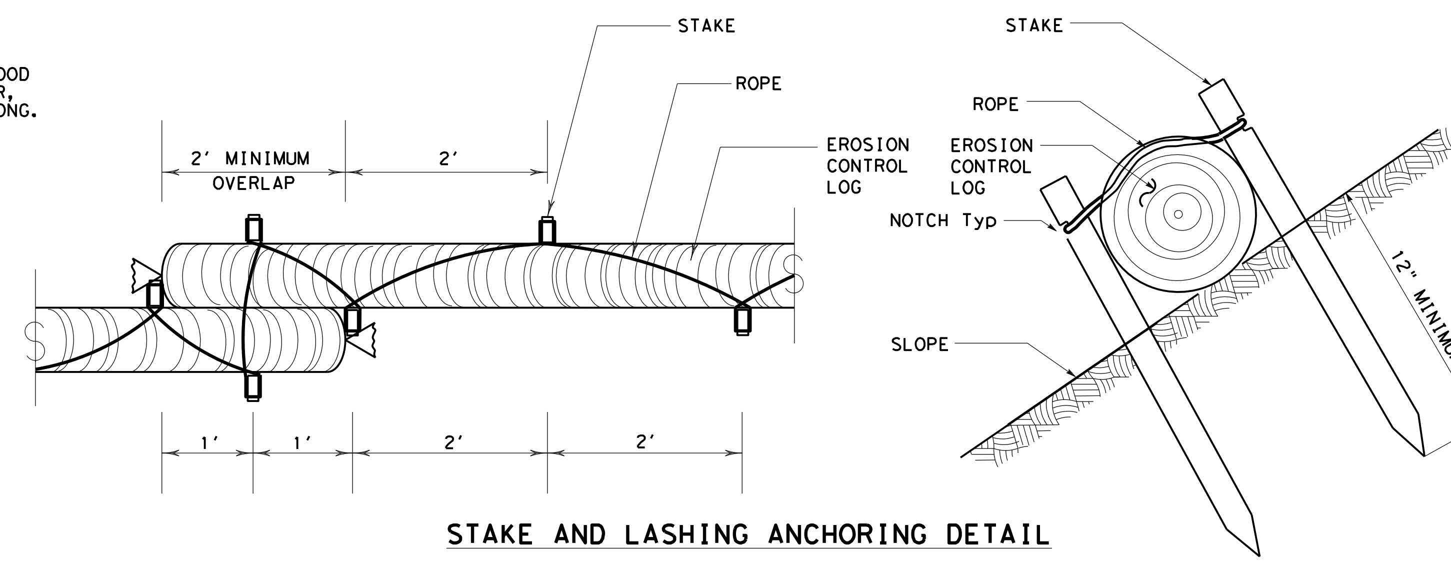
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



STAKE AND TRENCHING ANCHORING DETAIL

(CL-SST)

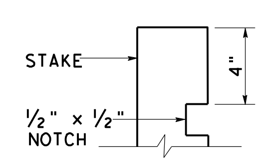


STAKE AND LASHING ANCHORING DETAIL

(CL-SSL)

TRENCH DEPTH TABLE

LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"



STAKE NOTCH DETAIL

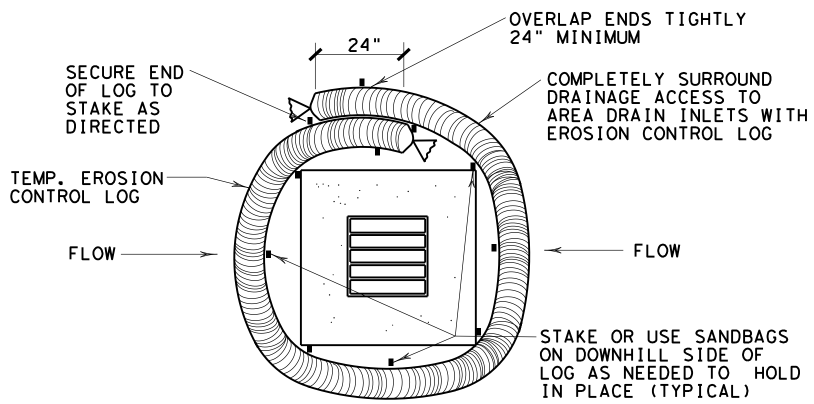
SHEET 2 OF 3

Texas Department of Transportation — Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG

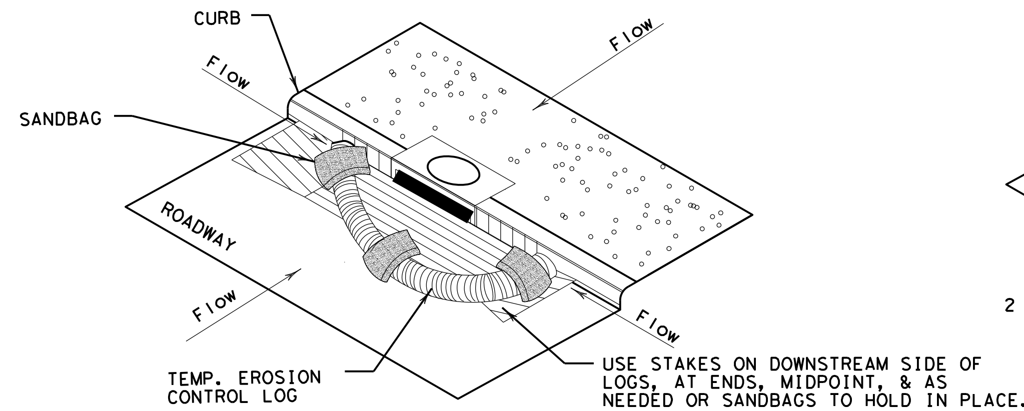
EC(9)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: July 2016	CONT 6375	SECT 52	JOB 001	HIGHWAY IH45
REVISIONS	DIST 12	COUNTY HARRIS/GAL		SHEET NO. 248



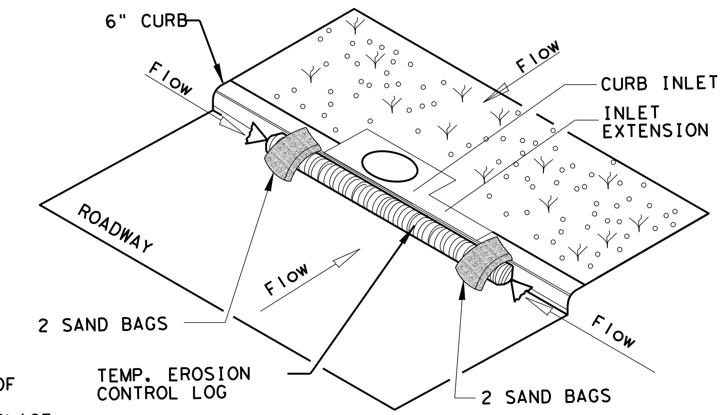
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

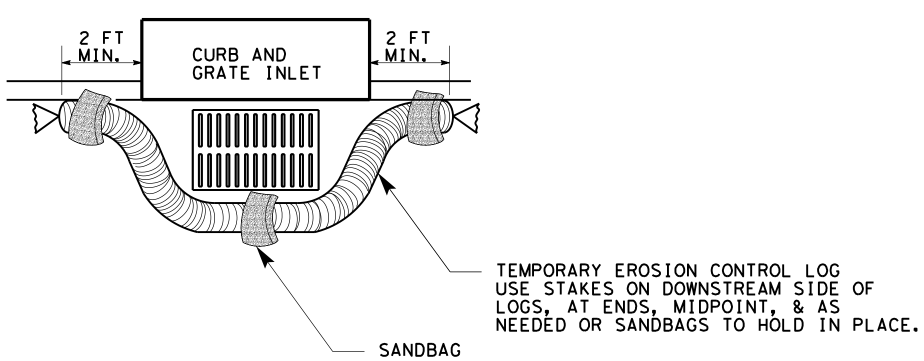
CL-CI



EROSION CONTROL LOG AT CURB INLET

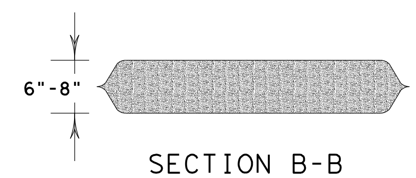
CL-CI

NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.

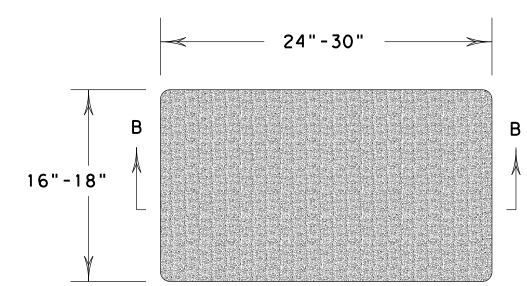


EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI



SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

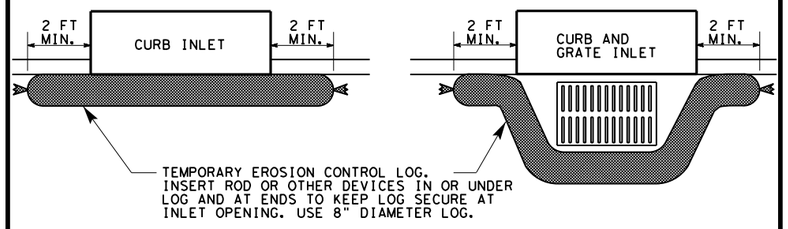
EC(9)-16

FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: July 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	6375	52	001	IH45
	DIST		COUNTY	SHEET NO.
	12		HARRIS/GAL	249

FILE: h:\00#maintenance\south harris maintenance\...
DATE: 1/4/2021
PROJECT: 6375-52-001

CURB INLETS
8" DIAMETER LOGS

ITEM 506-6040 BIODEG EROSN CONT LOGS (INSTL) (8")



MATERIAL REQUIREMENTS

FILL:

Use 100% shredded mulch or other non-compost biodegradable material as fill for logs. No compost or fines.

DO NOT USE MATERIAL WHICH PROHIBITS WATER INFILTRATION.

LOG MESH:
Use mesh with 1/4" openings or larger. Mesh must allow water infiltration but also hold fill material in place.

SEDIMENT BASIN & TRAP USAGE GUIDELINES

A sediment trap (erosion control log) may be used to filter sediment out of runoff draining from an unstabilized area.

Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Sediment traps should be placed in the following locations:
1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way

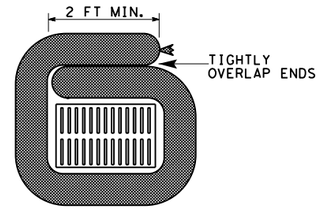
The trap should be cleaned when the capacity has been reduced by 1/2 or the sediment has accumulated to a depth of 1', whichever is less.

REQUIRED ITEMS:

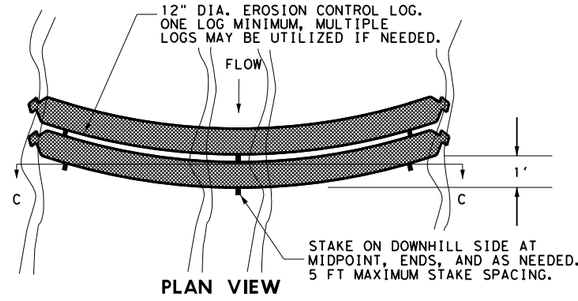
- ITEM 506-6040 BIODEG EROSN CONT LOGS (INSTL) (8") LF
- ITEM 506-6041 BIODEG EROSN CONT LOGS (INSTL) (12") LF
- ITEM 506-6043 BIODEG EROSN CONT LOGS (REMOVE) LF

DROP INLETS AND OTHER LOCATIONS
12" DIAMETER LOGS

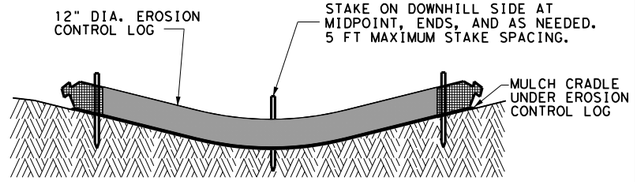
ITEM 506-6041 BIODEG EROSN CONT LOGS (INSTL)(12")



DROP INLETS

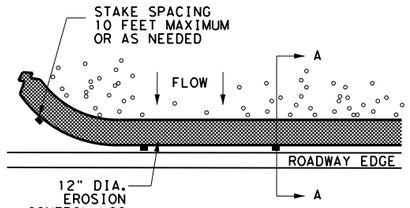


PLAN VIEW

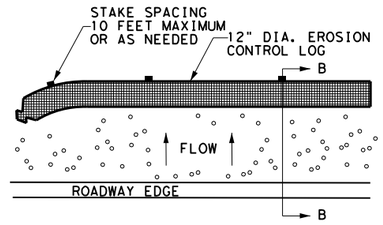


SECTION C-C

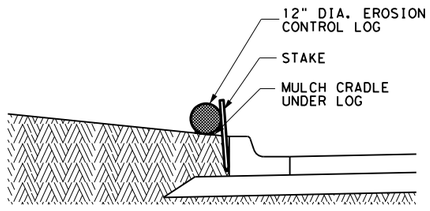
DRAINAGE SWALE OR DITCH



PLAN VIEW

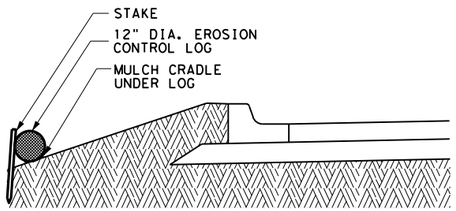


PLAN VIEW



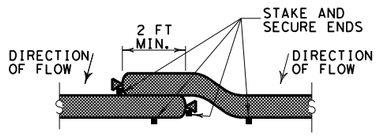
SECTION A-A

SLOPE TO ROADWAY EDGE

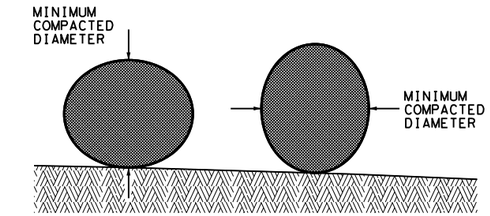


SECTION B-B

SLOPE AWAY FROM ROADWAY EDGE



END OF LOG OVERLAP



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

Texas Department of Transportation
Houston District

EROSION CONTROL LOG

ECL-12

FILE: STDG4a.DGN	DN: TxDot	CK: TxDot	DW: TxDot	CK: TxDot
© TxDOT 2014	DISTRICT	FED REG	PROJECT NUMBER	SHEET
REVISIONS 3/15 MINOR CORRECTIONS	12	6	RMC 6375-52-001	250
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	HARRIS/GAL	6375	52	001	IH45

STD G-4A

FILE: h:\00maintenance\south harris maintenance\2020 contracts\6357-02-001*ih45 general maintenance\Standards\Erosion 20\stdg4a.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001

TYPE OF WORK — ITEMS AND REQUIREMENTS FOR EACH TYPE OF WORK

SODDING	PERMANENT SEEDING	TEMPORARY SEEDING	Reference Item 161, 162, 164, 166, 168 of the Texas Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges 2014 for specifications, dimensions, volumes and measurements that are not shown. Use latest Houston District, Special Provisions for those items indicated.		
	✓		**161-6017 COMPOST MANUF TOPSOIL (BIP)(4") SY**	APPLICATION RATE Item 161.2.1. Compost Manufactured Topsoil (CMT)	Item 161.2. Materials. Submit quality control (QC) documentation to the Engineer. Compost producer's STA certification must be dated to meet STA requirements (certification must be within 30 or 90 days per STA requirements). Lab analysis performed by an STA-certified lab must be dated within 30 days before delivery of the compost.
✓			**162-6002 BLOCK SODDING SY**	GRASS SPECIES Item 162.2. Materials. Common Bermuda (Cynodon Dactylon)	Item 162.2.1. Block Sod. Use block palletized or roll type sod. **REMOVE PLASTIC BACKING FROM ROLL TYPE SOD.** Place sod within 48 hours of delivery to site. No exceptions. Place sod with joints alternating on each row to prevent continuous joint lines. Peg sod as needed with wood pegs to hold sod in place. Pegging sod is subsidiary to Item 162.
	✓		**164-6066 DRILL SEEDING(PERM)(WARM OR COOL) SY** Item 164.1. Description Provide and install seeding as shown on District Standard	PLANTING MONTH / SEED MIX March, April, May, June, July, August, September, October: Hulled - Bermudagrass (Cynodon dactylon) - 40.0 lbs PLS/acre Foxtail Millet (Setaria italica) - 34.0 lbs PLS/acre Green Sprangletop (Leptochloa dubia) - 4.0 lbs PLS/acre Sideoats Grama (Bouteloua curtipendula) - 3.2 lbs PLS/acre Little Bluestem (Schizachyrium scoparium) - 1.4 lbs PLS/acre November, December, January, February, Unhulled - Bermudagrass (Cynodon dactylon) - 40.0 lbs PLS/acre Oats (Avena sativa) - 72.0 lbs PLS/acre Green Sprangletop (Leptochloa dubia) - 4.0 lbs PLS/acre Sideoats Grama (Bouteloua curtipendula) - 3.2 lbs PLS/acre Little Bluestem (Schizachyrium scoparium) - 1.4 lbs PLS/acre	PLS (Pure Live Seed) Provide documentation of PLS requirements per Item 164.2.1. CONSTRUCTION. Cultivate the area to a depth of 4 inches before placing the seed unless otherwise directed. When performing permanent seeding after an established temporary seeding, cultivate the seedbed to a depth of 4 inches or mow the area before placement of the permanent seed. Plant the seed and place the straw or hay mulch after the area has been completed to lines and grades as shown on the plans. Drill Seeding. Plant seed or seed mixture uniformly over the area shown on the plans at a depth of 1/4 to 1/3 inch using a cultipacker(turfgrass) type seeder. Plant seed along the contour of the slopes. Use broadcast seeding method where site conditions prevent drill seeding method. Broadcast Seeding. Distribute the dry seed or dry seed mixture uniformly over the areas shown on the plans using hand or mechanical distribution on top of soil.
	✓		**164-6052 BROADCAST SEED(PERM)(SPECIAL MIX) SY** Item 164.1. Description Provide and install seeding as shown on District Standard		
		✓	**164-6051 DRILL SEED(TEMP)(WARM OR COOL) SY** Item 164.1. Description Provide and install seeding as shown on District Standard	PLANTING MONTH / SEED MIX March, April, May, June, July, August, September, October: Foxtail Millet (Setaria italica) - 34.0 lbs PLS/acre November, December, January, February, Oats (Avena sativa - 72.0 lbs PLS/acre	
		✓	**164-6009 BROADCAST SEED(TEMP)(WARM) SY** Item 164.1. Description Provide and install seeding as shown on District Standard		
	✓	✓	**162-6003 STRAW OR HAY MULCH SY**	APPLICATION RATE Immediately after planting the seed or seed mixture, apply straw or hay mulch uniformly over the seeded area. Apply straw or hay mulch at 2 tons per acre. Use tacking agent with straw or hay mulch as described on this sheet.	Use straw or hay mulch in conformance with Article 162.2.5, "Mulch." Use biodegradable tacking agents only applied at a rate in accordance with manufacturer's recommendations. Use the following products or an approved equal(see note this sheet): Conweb/Contac Guar Gum, Profile Products Corporation, (307) 655-9565, Ramtec/Procol/Viscol Guar Gum, Ramtec Corporation, (800) 366-1180
✓	✓	✓	**166-6001 FERTILIZER AC** Item 166.2. Materials Use fertilizer as shown on District Standard	APPLICATION RATE Deliver and evenly distribute fertilizer at a rate of 4000 lbs/acre.	Use a **NON-CHEMICAL** fertilizer which meets all the following criteria: (1) BRAND NAME must be registered with the Texas State Chemist as a commercial fertilizer. (2) Meets USEPA guidelines for unrestricted use. (3) Derived from biological sources such as, but not limited to: sewage sludge, manures, vegetation, etc. (4) In granular form and essentially dust free. Submit proof of registration and nutrient source to Engineer. Use the following products or an approved equal(see note this sheet): Sigma, SIGMA AgriScience, 281-851-6749 Sustanite-standard grade, Automation Nation, Inc., 713-675-4999 Milorganite, MMSD, 800-287-9645 Agricultural Organic P/L, Ag Org, INC., 713-523-4396
✓	✓	✓	**168-6001 VEGETATIVE WATERING MG**	APPLICATION RATE Item 168.3 Construction. 6000 gallons/acre per working day x 20 consecutive working days = 120,000 gallons total/acre	Begin watering immediately after installation of seed or sod. Replace, fertilize, and water any seed or sod in poor condition due to the failure to apply the specified amount of water within the time allowed at no expense to the Department.

SEQUENCE OF WORK

BLOCK SOD	PERMANENT SEEDING	TEMPORARY SEEDING
1. FERTILIZER 2. CULTIVATE SOIL (ITEM 162.3) 3. SOD 4. VEGETATIVE WATERING	1. FERTILIZER 2. COMPOST MANUFACTURED TOPSOIL 3. CULTIVATE SOIL (ITEMS 164.3 AND 161.3.1) 4. PERMANENT SEEDING 5. STRAW OR HAY MULCH 6. VEGETATIVE WATERING	1. FERTILIZER 2. CULTIVATE SOIL (PER ITEM 164.3) 3. TEMPORARY SEEDING 4. STRAW OR HAY MULCH 5. VEGETATIVE WATERING

FILE: h:\00*maintenance\south harris maintenance\2020 contracts\6357-02-001*in45 general mainteance\Standards\Erosion 20\std*k-1.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001

Texas Department of Transportation

HOUSTON DISTRICT

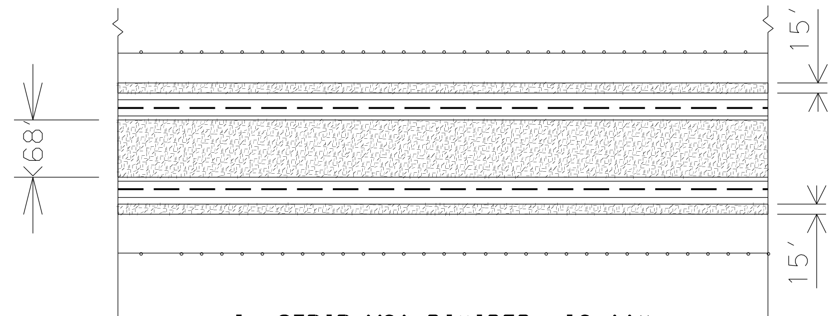
FERTILIZER, SEED, SOD, STRAW, COMPOST, AND WATER

SHEET 1 OF 1

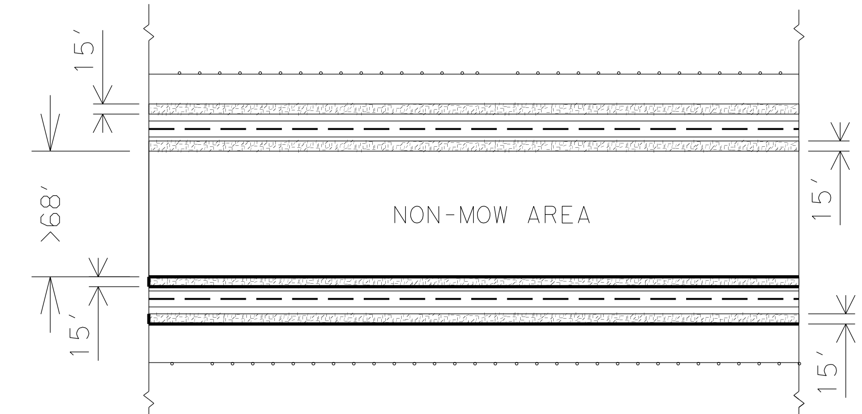
REVISIONS	FILE:	FED DIV	STATE	PROJECT NUMBER			SHEET
10/2014 UPDATED TO 2014 SPECS 3/2015 MINOR CORRECTIONS	OCT 2014	6	TEXAS	RMC 6375-52-001			251
	ORIGINAL:	DIST	COUNTY	CONTROL	SECT	JOB	HIGHWAY
		12	HARRIS/GAL	6375	52	001	IH45

STD K-1

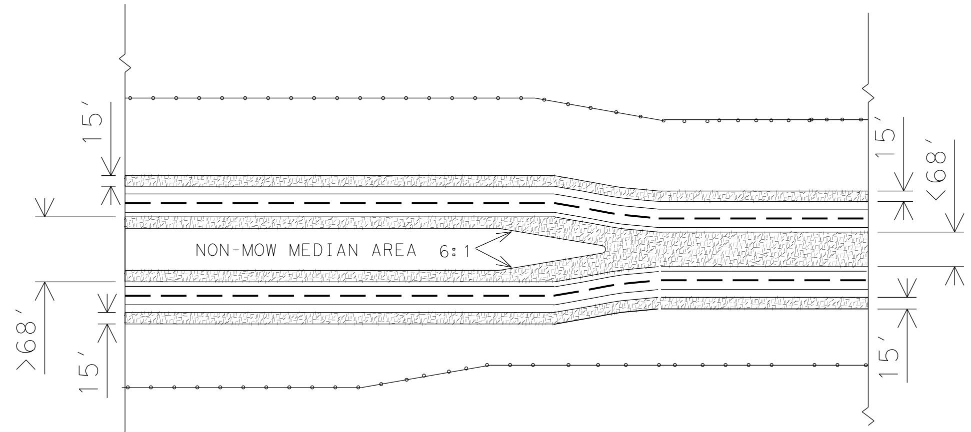
FILE: h:\00*maintenance\south hdn\maintenance\2020\contracts\6375-52-001\ihs\general\standards\Misc 20
DATE: 1/4/2021
PROJECT: 6375-52-001



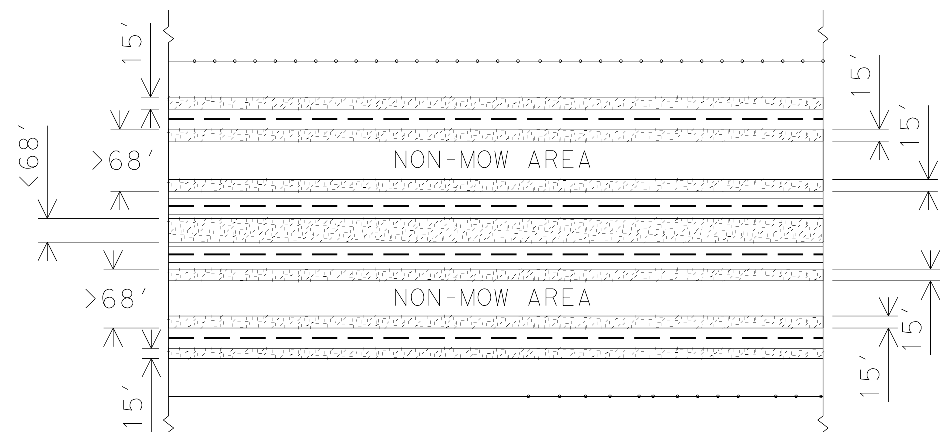
I. STRIP MOW DIVIDED HIGHWAY WITHOUT FRONTAGE ROADS (MEDIAN <68')



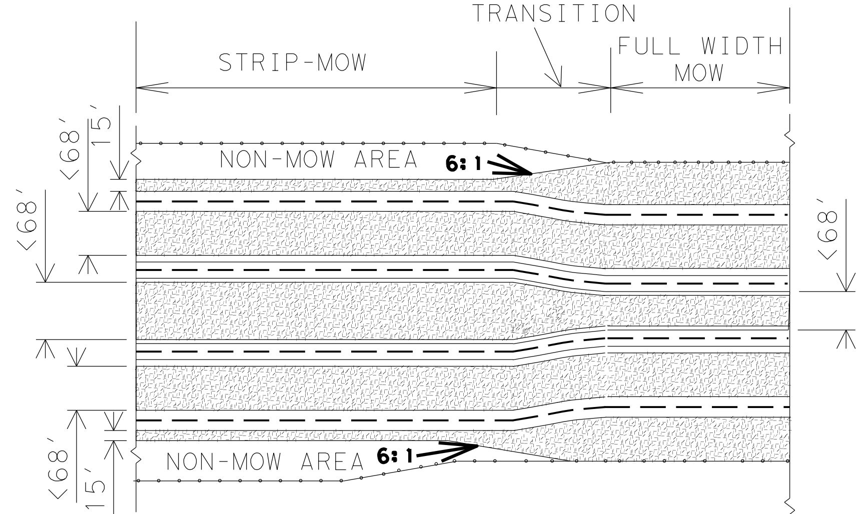
II. STRIP MOW DIVIDED HIGHWAY WITHOUT FRONTAGE ROADS (MEDIAN >68')



III. DIVIDED HIGHWAY WITHOUT FRONTAGE ROADS MEDIAN CHANGES FOR > 68' TO < 68' WIDE



IV. STRIP MOW WHEN SEPARATION BETWEEN MAIN LANE AND FRONTAGE ROADS IS WIDER THAN 68'



V. TRANSITION FROM FULL WIDTH TO STRIP MOWING DIVIDED HIGHWAY WITH FRONTAGE ROADS (MEDIAN <68' WIDE)

GENERAL NOTES:

1. MOW THE ENTIRE WIDTH OF MEDIANS AND OUTER SEPARATIONS (AREAS BETWEEN MAIN LANES, RAMPS, AND FRONTAGE ROAD) EXCEPT FOR NON-MOW AREAS.
2. MOW FULL-WIDTH ALL MEDIANS AND OUTER SEPARATIONS 68' OR LESS FROM PAVEMENT EDGE TO PAVEMENT EDGE.
3. FOR MEDIANS AND OUTER SEPARATIONS GREATER THAN 68' MOW A 15' ALONG EACH PAVEMENT EDGE.
4. NON-MOW AREAS IN MEDIANS & OUTER SEPARATIONS WILL BE CONSIDERED THE AREA IN MEDIANS AND OUTER SEPARATIONS GREATER THAN 68' BETWEEN THE 15' STRIP MOW AREAS.
5. OTHER NON-MOW AREA'S WILL BE SHOWN ELSEWHERE ON PLANS OR MARKED ON THE RIGHT OF WAY.

KEY

MOW AREA
PAVED ROADWAY
RIGHT-OF-WAY LINE

Texas Department of Transportation
Maintenance Division
Standard Plans

STRIP MOWING (DIVIDED HIGHWAYS)

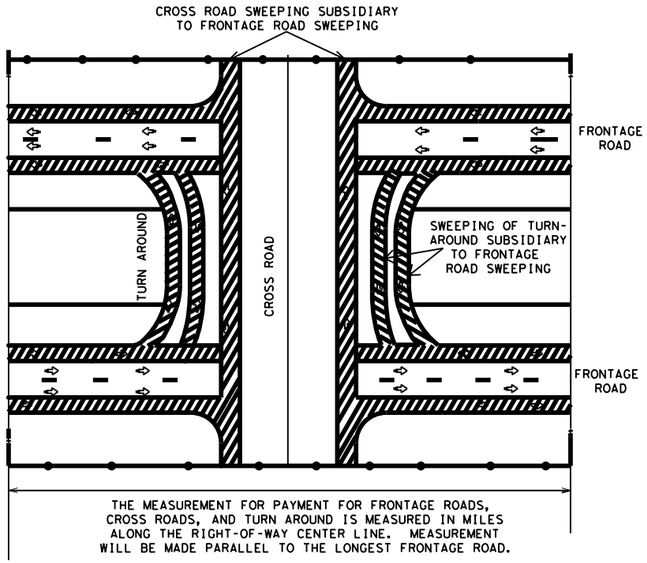
STRIP-MOW-D-04

SHEET 1 OF 1 — NOT TO SCALE

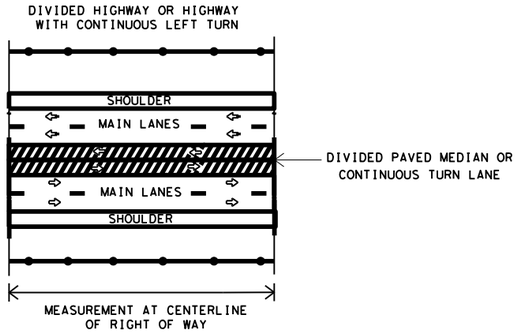
FILE: SMOWD04.DGN	DN: LJB	CK: JG	DW: -	CK: -	NEG NO.:
©TxDOT June 2004	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT		SHEET
REVISED: 6/03/2004	12	6	RMC 6375-52-001		252
REVISED:	COUNTY		CONTROL / SECTION / JOB		HIGHWAY
REVISED:	HARRIS/GAL		6375 / 52 / 001		IH45

FILE: h:\00*maintenance\southern\2021\standards\sweep04.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001

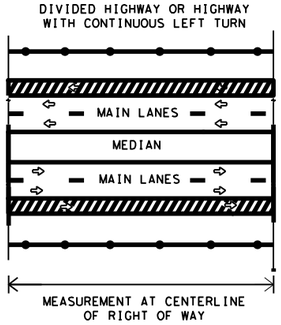
FRONTAGE ROAD SWEEPING



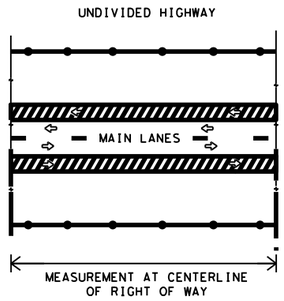
CENTER MEDIAN SWEEPING

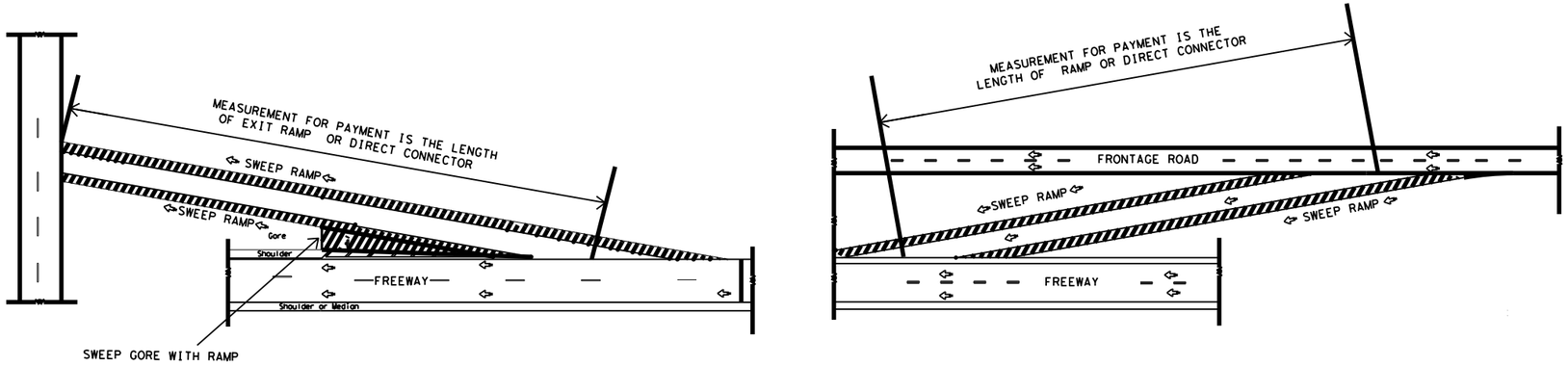


OUTSIDE MAIN LANE SWEEPING



OUTSIDE MAIN LANE SWEEPING





RAMPS OR DIRECT CONNECTORS

PAYMENT ITEM	NORMAL NUMBER OF PASSES OF THE SWEEPER	MEASUREMENT OF CENTER LINE MILES	OTHER AREAS SUBSIDIARY TO PAYMENT ITEM
SWEEPING (CENTER MEDIAN)	2	OF RIGHT OF WAY	NONE
SWEEPING (OUTSIDE MAIN LANE)	2	OF RIGHT OF WAY	NONE
SWEEPING (ONE FRONTAGE ROAD)	2	OF RIGHT OF WAY	CROSS ROADS & TURN AROUNDS
SWEEPING (TWO FRONTAGE ROADS)	4	OF RIGHT OF WAY	CROSS ROADS & TURN AROUNDS
SWEEPING (RAMP)	2	OF RAMP	GORE AREA
SWEEPING (DIRECT CONNECTOR)	2	OF CONNECTOR	GORE AREA

KEY

- PATH OF SWEEPER
- DIRECTION OF TRAFFIC & SWEEPER
- LANE DIVIDER STRIPE
- RIGHT-OF-WAY LINE

Texas Department of Transportation
Maintenance Division
Standard Plans

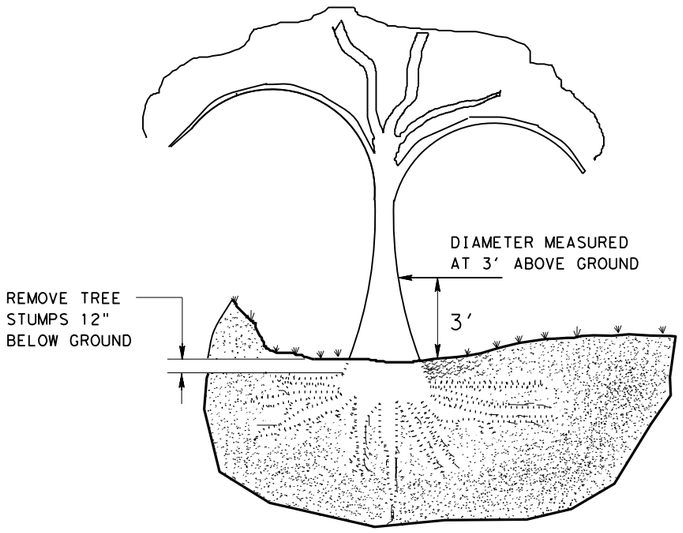
SWEEPING HIGHWAYS

SHEET 1 OF 1

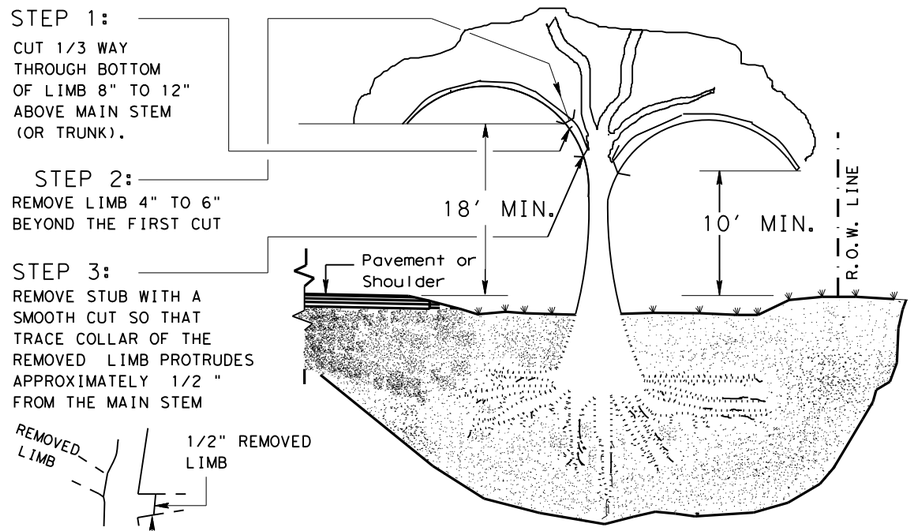
SWEEP - 04

NOT TO SCALE

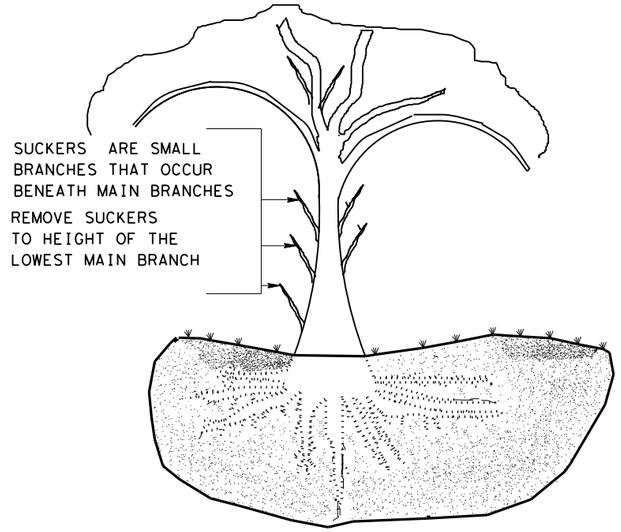
FILE: SWEEP04.DGN	DN: LJB	CK: JG	DW: -	CK: -	NEG NO.:
©TxDOT May 2004	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT		SHEET
REVISED:	12	6	RMC 6375-52-001		253
REVISED:	COUNTY		CONTROL	SECTION	JOB	HIGHWAY
REVISED:	HARRIS/GAL		6375	52	001	IH45



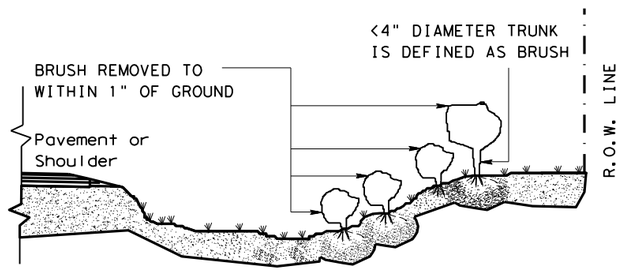
TREE REMOVAL



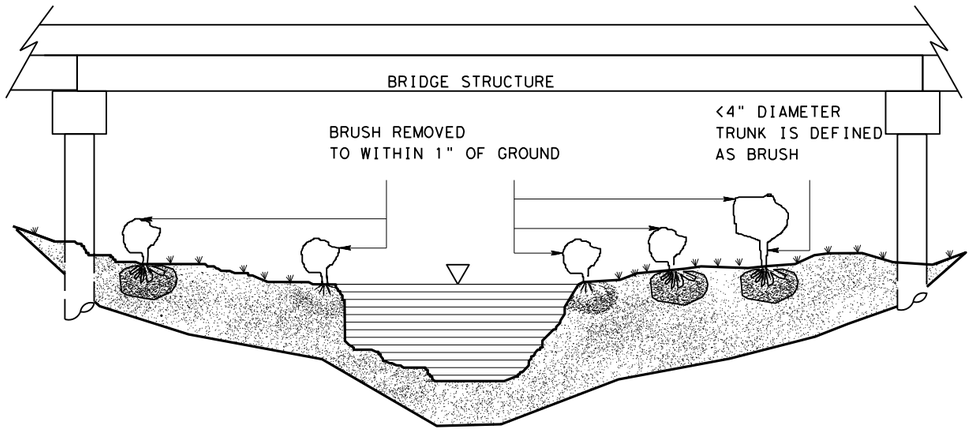
TREE TRIMMING



STEPS 1, 2 AND 3 APPLY WHEN REMOVING LIMBS 2" IN DIAMETER OR LARGER.



BRUSH REMOVAL



BRUSH REMOVAL UNDER BRIDGE AND IN CHANNEL

GENERAL NOTES:

TREE TRIMMING

1. TRIM AND REMOVE ALL TREE LIMBS ON THE PAVEMENT SIDE OF THE TRUNK 18' ABOVE THE PAVEMENT OR BRIDGE DECK ELEVATION, UNLESS OTHERWISE SHOWN ON THE PLANS.

2. TRIM AND REMOVE ALL TREE LIMBS BETWEEN THE TRUNK AND R.O.W. LINE 10' ABOVE NATURAL GROUND, TERRAIN OR OTHER STRUCTURE ELEVATION, UNLESS OTHERWISE SHOWN ON THE PLANS.

TREE REMOVAL

3. FOR TREES MARKED FOR REMOVAL, THE DIAMETER OF TREES ARE DETERMINED BY MEASUREMENT OF THE TRUNK CIRCUMFERENCE 3' ABOVE THE GROUND. TREES WITH TRUNKS OF LESS THAN 4" DIAMETER ARE CONSIDERED TO BE BRUSH. TREES WITH MULTIPLE TRUNKS AT THE POINT OF MEASUREMENT ARE MEASURED AND PAID FOR SEPARATELY.

4. MEASUREMENTS FOR PAYMENT OF TREE DIAMETERS ARE DIVIDED INTO THE RANGES SHOWN IN TABLE 1.

TABLE 1
TREE TRUNK SIZE FOR TREE REMOVAL PAYMENT

PAY ITEM	RANGE FOR PAY ITEMS			
	TRUNK DIAMETER *		TRUNK CIRCUMFERENCE	
	LOWER LIMIT IS GREATER THAN	UPPER LIMIT IS LESS THAN OR EQUAL TO	LOWER LIMIT IS GREATER THAN	UPPER LIMIT IS LESS THAN OR EQUAL TO
752 6005	4	12	12 1/2	37 1/2
752 6006	12	18	37 1/2	56 1/2
752 6007	18	24	56 1/2	75 1/2
752 6008	24	30	75 1/2	94
752 6009	30	36	94	113
752 6010	36	42	113	132
752 6011	42	48	132	151
752 6012	48	60	151	188 1/2
752 6013	60	72	188 1/2	226
752 6019	72	84	226	264
	84	GREATER THAN 84	264	NOT APPLICABLE

***SEE GENERAL NOTE #3.**

Texas Department of Transportation — Maintenance Division Standard

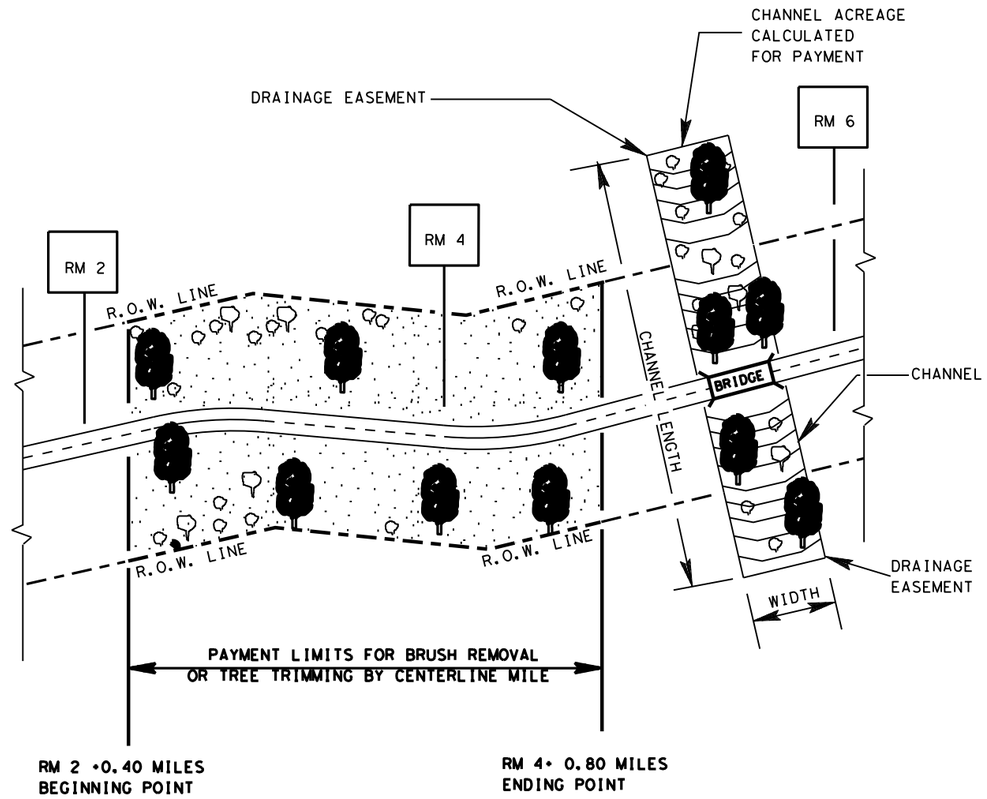
TREE AND BRUSH REMOVAL

TRB-15(1)

FILE:	DN: JEO		CK: LJB	DW: JEO	CK:
© TxDOT March 2015	CONT	SECT	JOB		HIGHWAY
REVISIONS	6375	52	001		IH45
Revised table 1 to 2014 Specification	DIST	COUNTY			SHEET NO.
	12	HARRIS/GAL			254

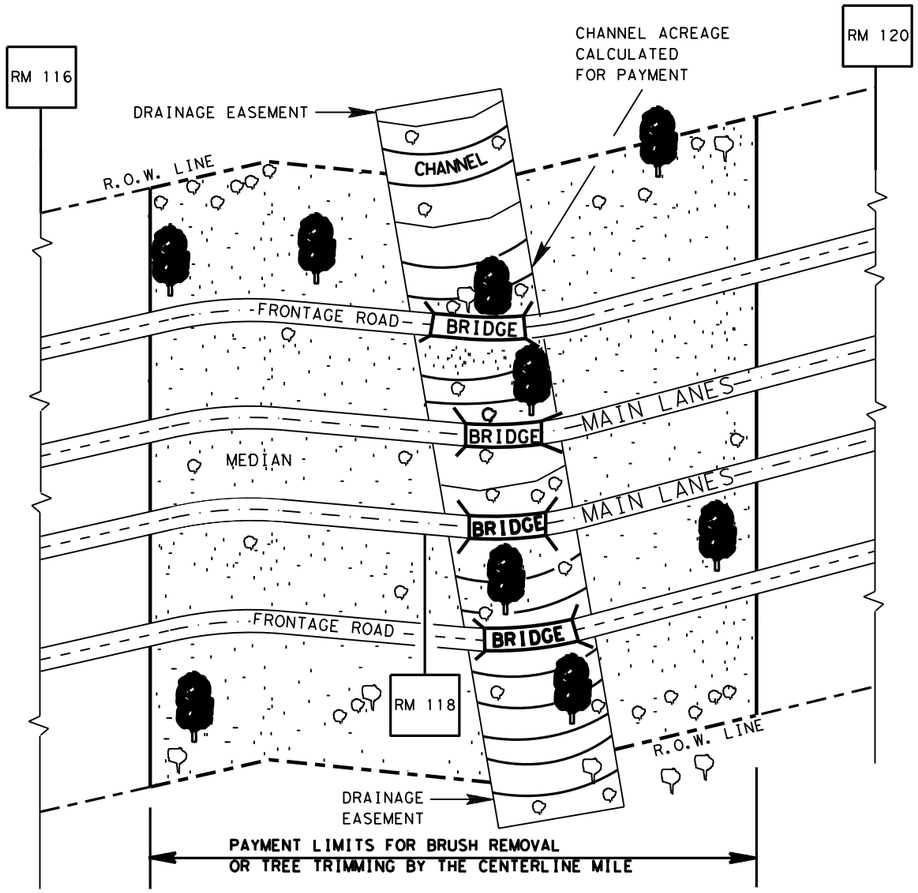
FILE: h:\00maintenance\south harris maintenance\2020 contracts\6357-02-001\trb15gen.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001

FILE: h:\00*maintenance\south harris maintenance\2021\trb15*2.dgn
DATE: 1/4/2021
PROJECT: 6375-52-001



BRUSH REMOVED TO
WITHIN 1" OF GROUND
<4" DIAMETER TRUNK
IS DEFINED AS BRUSH
UNLESS OTHERWISE DIRECTED

EXAMPLE: UNDIVIDED HIGHWAY



BRUSH REMOVED TO
WITHIN 1" OF GROUND
<4" DIAMETER TRUNK
IS DEFINED AS BRUSH
UNLESS OTHERWISE DIRECTED

EXAMPLE: DIVIDED HIGHWAY WITH FRONTAGE ROADS

GENERAL NOTES:

TREE TRIMMING AND BRUSH REMOVAL

1. PAYMENT BY THE CENTERLINE MILE IS MADE TO THE NEAREST 1/100 (0.01) MILE.

2. LIMITS OF WORK ARE SHOWN AS DISTANCES FROM REFERENCE MARKERS (RM).

3. PAY ITEMS BY THE CENTERLINE MILE INCLUDE ALL TREE TRIMMING OR BRUSH REMOVAL IN THE RIGHT OF WAY ON BOTH SIDES OF THE HIGHWAY. FOR DIVIDED HIGHWAYS, THE MEDIAN IS INCLUDED. FOR HIGHWAYS WITH FRONTAGE ROADS, THE AREAS BETWEEN THE FRONTAGE ROADS AND MAIN LANES, AND THE AREAS OUTSIDE OF THE FRONTAGE ROADS ARE INCLUDED.

4. BRUSH REMOVAL AND TREE TRIMMING UNDER BRIDGES, IN AND ALONG CHANNELS AND EASEMENTS ARE PAID FOR BY THE ACRE FOR AREAS DESIGNATED ON THE PLANS.

Texas Department of Transportation
Maintenance Division
Standard Plans

TREE AND BRUSH REMOVAL

TRB-15(2)

NOT TO SCALE — SHEET 2 OF 2

FILE: TRB-15(2).DGN	DRAWN: JEO		CHECKED: DM&LJB	DW: -	CK: -	NEG NO.:		
	MODIFIED:							
		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT #				SHEET
REVISED: 5/13/2004	LJB	12	6	RMC 6375-52-001				255
REVISED: 9/24/2004	LJB	COUNTY			CONTROL	SECTION	JOB	HIGHWAY
REVISED: APRIL 2015	JEO	HARRIS/GAL			6375	52	001	IH45