INDEX OF SHEETS
SEE SHEET NO. 2

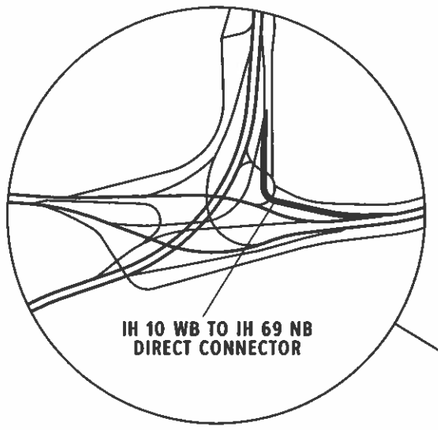
FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY
6	TEXAS	F 2024(482)			IH 10
STATE DISTRICT	COUNTY	CONTROL	SECTION	JOB	SHEET NO.
HOU	HARRIS	0508	01	387	1
LETTING DATE: DECEMBER 05, 2023					

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

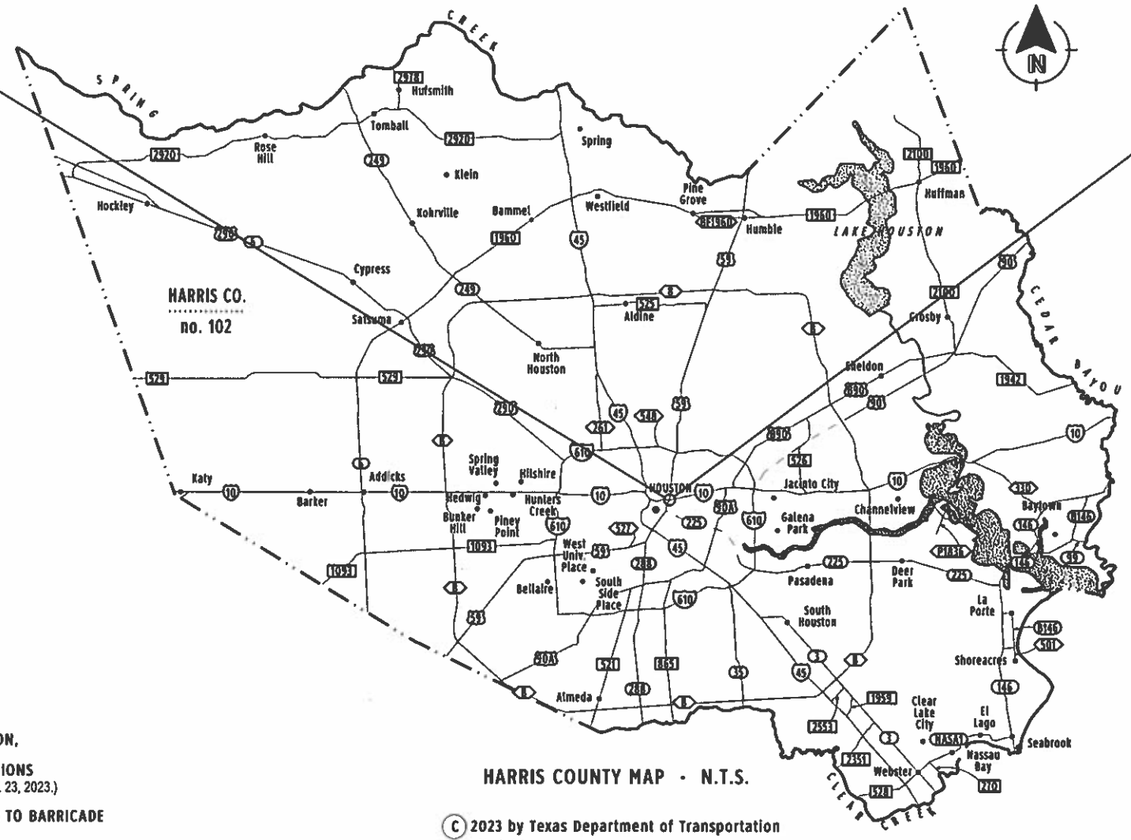
PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT
PROJECT NO. F 2024(482)

CONTROL CSJ: 0508-01-387
COUNTY: HARRIS
HIGHWAY: IH 10
LIMITS: FROM IH 10 WB TO IH 69 NB
PROJECT DESCRIPTION: HAZARD ELIMINATION & SAFETY
- INSTALL LED FLASHING CHEVRONS ON DIRECT CONNECTOR CURVE
- INSTALL REFLECTIVE ULTRA GUARD STRIPING ON CTB/RAIL ON IH 610 DIRECT CONNECTORS

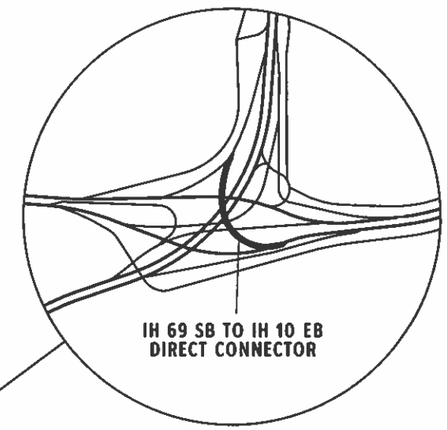
NO.	CSJ	HWY	LIMITS	DESIGN SPEED	FUNCTIONAL CLASS	2023 ADT	2043 ADT
1	0508-01-387	IH 10	IH 10 WB TO IH 69 NB	N/A	INTERSTATE	37,200	51,800
2	0177-11-160	IH 69	IH 69 SB TO IH 10 EB	N/A	INTERSTATE	22,100	30,800
3	0912-72-744	VARIOUS	VARIOUS LOCATIONS ON IH 610	N/A	INTERSTATE	N/A	N/A



PROJECT LOCATION
NO. 1



HARRIS COUNTY MAP · N.T.S.



PROJECT LOCATION
NO. 2

REGISTERED ACCESSIBILITY SPECIALIST
(RAS) INSPECTION NOT REQUIRED

NO EXCEPTIONS
NO RAILROAD CROSSINGS
NO EQUATIONS

NOTES:

1. SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014, AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, OCT. 23, 2023.)
2. FOR BARRICADE AND SIGNING AT INDIVIDUAL HIGHWAY SECTIONS, REFER TO BARRICADE AND CONSTRUCTION STANDARD SHEETS: BC(1)-21 THRU BC(12)-21.
3. FOR TRAFFIC CONTROL AT INDIVIDUAL HIGHWAY SECTIONS, REFER TO TRAFFIC CONTROL PLAN STANDARD SHEETS: TCP(5-1)-18, TCP(6-1)-12 THRU TCP(6-4)-12, TCP(6-8)-14, AND TCP(6-9)-14.

TEXAS DEPARTMENT OF TRANSPORTATION

SUBMITTED FOR LETTING 09/29/2023

P.E.
For DISTRICT TRAFFIC ENGINEER

APPROVED FOR LETTING

P.E.
FOR DISTRICT ENGINEER

INDEX OF SHEETS

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED PROFESSIONAL ENGINEER
P.E.

09/29/2023

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

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0508	01	387	IH 10
DIST	COUNTY		SHEET NO.
HOU	HARRIS		2

INDEX OF SHEETS

DATE: 9/29/2023 11:34:54 AM
FILE: H:\Trf\Signals\Hoi Tran\Harris\0508-01-387 Main.dgn

General Notes:

General:

Area Engineer contact information for this project follows:

Dock S. Gee, P.E. Dock.Gee@txdot.gov
Yannick F Dwatie, P.E. Yannick.Dwatie@txdot.gov

Submit any questions about this project via the Letting Pre-Bid Q&A web page, located at:

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

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

Large files with relevant project documentation, such as Geotech reports, As-Built plans, and cross-sections will continue to be provided on the following FTP site:

Index of /pub/txdot-info/Pre-Letting Responses/Houston District (state.tx.us) or

https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting%20Responses/Houston%20District/

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.

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.

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 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.

Furnish aluminum Type A signs instead of plywood signs for signs shown on the Summary of Small Signs sheet.

Clearly mark or highlight on the shop drawings, the items being furnished for this project. Submit required shop drawings in accordance with the shop drawing distribution list shown in the note for Item 5 for review and distribution.

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

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

General: Roadway Illumination and Electrical

For roadway illumination and electrical items, use materials from pre-qualified producers as shown on the Construction Division (CST) of the Department's material producers list. Check the latest link on the Department's website for this list. The category/item is "Roadway Illumination and Electrical Supplies." No substitutions will be allowed for materials found on this list.

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

General: Traffic Signals

For traffic signal items, use materials from the Pre-Qualified Producers List (located at http://www.dot.state.tx.us/GSD/purchasing/supps.htm) and the materials pre-qualified for illumination and electrical items (located at http://ftp.dot.state.tx.us/pub/txdot-info/cmd/mpl/riaes.pdf) as shown on the Department's Material Producers List and the Roadway Illumination and Electrical Supplies List. Check the latest links on the Department's website for these lists. No substitutions will be allowed for materials found on these lists.

General: Site Management

Mark stations every 100 ft. and maintain the markings for the project duration. Remove the station markings at the completion of the project. This work is subsidiary to the various bid items.

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

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.

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

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

General: Utilities

Consider the locations of underground utilities depicted in the plans as approximate and employ responsible care to avoid damaging utility facilities. Depending upon scope and magnitude of planned construction activities, advanced field confirmation by the utility owner or operator may be prudent. Where possible, protect and preserve permanent signs, markers, and designations of underground facilities.

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

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, or by e-mailing the Department's Houston District Traffic Signal Operations Office at: HOU-LocateRequest@txdot.gov, 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's 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 or Table 2 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 requested)	Y	Y	Y	A	SD
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
Brazoria Area Office	HOU-BRZAShpDrwgs@txdot.gov
Fort Bend Area Office	HOU-FBAShpDrwgs@txdot.gov
Galveston Area Office	HOU-GALVAShpDrwgs@txdot.gov
Montgomery Area Office	HOU-MONTAShpDrwgs@txdot.gov
North Harris Area Office	HOU-NHAShpDrwgs@txdot.gov
Southeast Area Office	HOU-SEHAShpDrwgs@txdot.gov
Traffic Systems Construction Office	HOU-TSCShpDrwgs@txdot.gov
West/Central Harris Area Office	HOU-WWCHAOShpDrwgs@txdot.gov

B - Houston Bridge Engineer

Bridge Design (Houston TxDOT)	HOU-BrgShpDrwgs@txdot.gov

BRG - Austin Bridge Division

Bridge Design (Austin TxDOT)	BRG_ShopPlanReview@txdot.gov

C - Construction Office

Construction	HOU-ConstrShpDrwgs@txdot.gov
Laboratory	HOU-LabShpDrwgs@txdot.gov

T - Traffic Engineer

Traffic Operations	HOU-TrfShpDrwgs@txdot.gov

TMS – Traffic Management System

Computerized Traffic Management Systems (CTMS)	HOU-CTMSShpDrwgs@txdot.gov

Item 6: Control of Materials

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

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

The Buy America Material Classification Sheet is located at the below link.

https://www.txdot.gov/business/resources/materials/buy-america-material-classification-sheet.html for clarification on material categorization.

Item 7: Legal Relations and Responsibilities

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.

Document and coordinate with the USACE, if required, before hauling any excavation from or hauling any embankment to a USACE permit area by either 1 or 2 below:

1. **Restricted Use of Materials for the Previously Evaluated Permit Areas.** Document both the Project Specific Locations (PSL) and their authorization. Maintain copies for review by the Department or any regulatory agency. When an area within the project limits has been evaluated by the USACE as part of the permit process for this project:
   a. Suitable excavation of required material in the areas shown on the plans and cross sections as specified in the Item, “Excavation” is used for permanent or temporary fill (under the Item, “Embankment”) within a USACE permit area.
   b. Suitable embankment (under the Item, “Embankment”) from within the USACE permit area is used as fill within a USACE evaluated area.
   c. Unsuitable excavation or excess excavation, “Waste” (under the Item, “Excavation”), that is disposed of at a location approved within a USACE evaluated area.

2. **Contractor Materials from Areas Other than Previously Evaluated Areas.** Provide the Department with a copy of USACE coordination or approvals before initiating any activities for an area within the project limits that has not been evaluated by the USACE or for any off right of way locations used for the following, but not limited to, haul roads, equipment staging areas, borrow and disposal sites:
   a. The Item, “Embankment” used for temporary or permanent fill within a USACE permit area.
   b. Unsuitable excavation or excess excavation, “Waste” (under the Item, “Excavation”), that is disposed of outside a USACE evaluated area.

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.

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 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 as specified below in accordance with Article 8.3.1.6.

A working day will be charged Monday through Friday, excluding national holidays, if weather or other conditions permit the performance of the principal unit of work underway, as determined by the Engineer, for a continuous period of at least 7 hr. between 10:00 P.M. and 5:00 A.M., unless otherwise shown in the contract. Nighttime work that extends past midnight will be charged to the following day. Work on national holidays will not be permitted without written permission of the Engineer. If work requiring an Inspector to be present is performed on a national holiday, and weather and other conditions permit the performance of work for 7 hours between 10:00 p.m. and 5:00 a.m., a working day will be charged.

Allowable work times are as follows:

Sunday 10:00 P.M. – Monday 5:00 AM
Monday 10:00 P.M. – Tuesday 5:00 AM
Tuesday 10:00 P.M. – Wednesday 5:00 AM
Wednesday 10:00 P.M. – Thursday 5:00 AM
Thursday 10:00 P.M. – Friday 5:00 AM

The Lane Closure Assessment Fee is shown in the following table. 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.” The time increment for the Lane Closure Assessment fee for this project is one hour.

Lane Closure Assessment Fee Table

Interchange	Lane Assessment Fee
IH10 WB to IH69 NB Direct Connector	$6,800.00
IH 69 SB to IH10 EB Direct Connector	$1,900.00
IH10W - IH610 (W Loop Fwy)	$8,400.00
IH69 - IH610 (W Loop Fwy)	$8,300.00
IH610 - S Post Oak Rd	$1,200.00
IH610 (S Loop Fwy) - SH288	$4,800.00
IH610 (S Loop Fwy) - IH45	$1,500.00
IH610 (S Loop Fwy) - SH225	$2,400.00
IH10E - IH610 (E Loop Fwy)	$4,600.00
IH69 - IH610 (N Loop Fwy)	$4,000.00
IH45 - IH610 (N Loop Fwy)	$6,300.00
US290 - IH610(W/N Loop Fwy)	$6,400.00
IH45 - IH69	$5,300.00
IH10 - IH69	$6,400.00

Item 502: Barricades, Signs, and Traffic Handling

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.

Before detouring traffic onto the mainlane shoulders, remove dirt, debris, vegetation, and other deleterious material from the surface of the shoulders. 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 or remove 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, Two and Full Lane Closures (Roadway/Ramp/Direct Connector)

Day	Daytime Closure Hours	Nighttime Closure Hours	Restricted Hours Subject to Lane Assessment Fee
Monday	N/A	12:00 AM – 5:00 AM 10:00 PM-11:59 PM	5:00 AM-10:00 PM
Tuesday	N/A	12:00 AM – 5:00 AM 10:00 PM-11:59 PM	5:00 AM-10:00 PM
Wednesday	N/A	12.00 AM – 5:00 AM 10:00 PM-11:59 PM	5:00 AM-10:00 PM
Thursday	N/A	12.00 AM – 5:00 AM 10:00 PM-11:59 PM	5:00 AM-10:00 PM
Friday	N/A	12:00 AM – 5:00 AM	5:00 AM-11:59 PM
Saturday	N/A	N/A	N/A
Sunday	N/A	10:00 PM – 11:59 PM	12:00 AM-10:00 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.

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.

During construction, remove, cover, adjust, or replace overhead sign panels to correspond with each current traffic control phase. The desirable size of letters for freeways is 10 in., the minimum is 8 in. This work is subsidiary to Item 502.

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.

Item 506: Temporary Erosion, Sedimentation and Environmental Controls

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

Due to the nature of the work involved, a Storm Water Pollution Prevention Plan (SWP3) is not required. However, if a SWP3 becomes necessary, it will be paid as extra work.

Item 618: Conduit

When backfilling bore pits, ensure that the conduit is not damaged during installation or due to settling backfill material. Compact select backfill in 3 equal lifts to the bottom of the conduit; or if using sand, place it 2 in. above the conduit. Ensure backfill density is equal to that of the existing soil. Prevent material from entering the conduit.

Construct bore pits a minimum of 5 ft. from the edge of the base or pavement. Close the bore pit holes overnight.

Unless otherwise shown on the plans, install underground conduit a minimum of 24 in. deep. Install the conduit in accordance with the latest National Electrical Code (NEC) and applicable Department standard sheets. Place conduit under driveways or roadways a minimum of 24 in. below the pavement surface.

If using casing to place bored conduit, the casing is subsidiary to the conduit.

Item 620: Electrical Conductors

Test each wire of each cable or conductor after installation. Incomplete circuits or damage to the wire or the cable are cause for immediate rejection of the entire cable being tested. Remove and replace the entire cable at no expense to the Department. Also test the replacement cable after installation.

When pulling cables or conductors through the conduit, do not exceed the manufacturer's recommended pulling tensions. Lubricate the cables or conductors with a lubricant recommended by the cable manufacturer.

For both transformer and shoe-base type illumination poles, provide double-pole breakaway fuse holders as shown on the Department's Construction Division (CST) material producers list. Check the latest link on the Department's website for this list. The category is "Roadway Illumination and Electrical Supplies." The fuse holder is shown on the list under Items 610 and 620. Provide 10 Amp time delay fuses.

Ensure that circuits test clear of faults, grounds, and open circuits.

Split bolt connectors are allowed only for splices on the grounding conductors.

For Roadside Flashing Beacon Assemblies (Item 685) and Pedestal Pole Assemblies (Item 687) within the project, provide single-pole breakaway disconnects as shown on the Construction Division (CST) material producers list. Check the latest link on the Department's website for this list. The category is "Roadway Illumination and Electrical Supplies." The fuse holder is shown on the list under Item 685. For underground (hot) conductors, install a breakaway connector with a dummy fuse (slug). Provide dummy fuse (slug). For grounded (neutral) conductors, install a breakaway connector with a white colored marking and a permanently installed dummy fuse (slug).

For electrical licensing and electrical certification requirements for this project, see Item 7 of the Standard Specifications and any applicable special provisions to Item 7.

Item 624: Ground Boxes

The ground box locations are approximate. Alternate ground box locations may be used as directed, to avoid placing in sidewalks or driveways.

Ground metal ground box covers. Bond the ground box cover and ground conductors to a ground rod located in the ground box and to the system ground.

Ground the existing metal ground box covers as shown on the latest standard sheet ED (4)-14.

During construction and until project completion, provide personnel and equipment necessary to remove ground box lids for inspection. Provide this assistance within 24 hours of notification.

Construct concrete aprons in accordance with the latest standard sheet ED (4)-14. Make the depth of the concrete apron the same as the depth of the ground box, except for Type 1 and Type 2 ground boxes. For Type 1 or Type 2 ground boxes, construct the concrete apron in accordance with details shown on the "Ground Box Details Installations" standard.

Item 636: Signs

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

Furnish and install signs shown on the traffic signal "Summary of Traffic Signal Materials" sheet. Ensure that the legend on these sign panels is in accordance with the latest "Standard Highway Sign Designs for Texas" manual.

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

Item 644: Small Roadside Sign Assemblies

Sign locations shown on the plans are approximate. Before placing them, obtain approval of and then stake the exact locations for these signs.

Use the Texas Universal Triangular Slip Base with the concrete foundation for small ground mounted signs, unless otherwise shown in the plans.

Remove existing street name signs from existing stop signs and re-install them above the new stop signs. Removing and re-installing existing street name signs is subsidiary to the Item, "Small Roadside Sign Assemblies."

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

Use Type E Super High Specific Intensity (Fluorescent Prismatic) yellow green reflective sheeting background to fabricate school signs (S1-1, S3-1, S4-3, S5-1, W16-2, SW16-9p, and SW16-7pL(R)).

Assume ownership of the removed existing signposts. Store removed sign panels at the Contractor's field office, to be picked up by the maintenance office. This work is subsidiary to this item.

Locations of the relocated signs are approximate. Before placing them, obtain approval of and then stake the exact locations for these signs.

Replace existing signs that become damaged during relocation at no expense to the Department.

Item 6508: Safety Barrier Line Markings

Ensure the surface to be coated is free of any contaminant that will prevent the material from adhering to the surface per manufacturer's recommendation. Surface preparation for the application of Safety Barrier Line Markings will not be paid directly but will be subsidiary to the relevant bid items.

Apply Anti-rust coat on the bridge pipe rails before placing Barrier Safety Line Markings. This work will not be paid directly but will be incidental to the relevant bid items.

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

Stripe all roadways before opening them to traffic.

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

Remove all safety barrier line markings that fail to meet the requirements of the Specification and replace at the Contractor's expense unless otherwise directed. Replace all failing markings within 30 days of notification.

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.

In addition to the shadow vehicles with TMAs/TAs that are specified as being required on the TCP layout sheets for this project, provide additional shadow vehicles with TMAs/TAs as shown on the TCP Standard sheets. 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.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0508-01-387 **DISTRICT** Houston **COUNTY** Harris
HIGHWAY IH 10, IH 69, Various

			CONTROL SECTION JOB	**0177-11-160**		**0508-01-387**		**0912-72-744**		TOTAL EST.	TOTAL FINAL
			PROJECT ID	**A00180740**		**A00180735**		**A00197614**			
			COUNTY	**Harris**		**Harris**		**Harris**			
			HIGHWAY	**IH 69**		**IH 10**		**Various**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	500-6001	MOBILIZATION	LS			1.000				1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	1.000		1.000		6.000		8.000	
	618-6046	CONDT (PVC) (SCH 80) (2")	LF	35.000						35.000	
	618-6070	CONDT (RM) (2")	LF	295.000						295.000	
	620-6003	ELEC CONDR (NO.12) BARE	LF	330.000						330.000	
	620-6004	ELEC CONDR (NO.12) INSULATED	LF	340.000						340.000	
	624-6010	GROUND BOX TY D (162922)W/APRON	EA	1.000						1.000	
	636-6001	ALUMINUM SIGNS (TY A)	SF	44.500		12.500				57.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	7.000						7.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	4.000		1.000				5.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	12.000		1.000				13.000	
	644-6087	IN SRSS & AM (RAIL)(130 MPH)(P MOUNT)	EA	9.000		6.000				15.000	
	644-6089	IN SRSS & AM (RAIL)(130 MPH)(T MOUNT)	EA			1.000				1.000	
	658-6013	INSTL DEL ASSM (D-SW)SZ (BRF)CTB	EA					2,444.000		2,444.000	
	658-6014	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	EA					96.000		96.000	
	658-6026	INSTL DEL ASSM (D-SY)SZ (BRF)CTB	EA					2,410.000		2,410.000	
	658-6060	REMOVE DELIN & OBJECT MARKER ASSMS	EA					5,321.000		5,321.000	
	658-6061	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	EA					187.000		187.000	
	658-6064	INSTL DEL ASSM (D-SY)SZ 1(BRF)GF2	EA					184.000		184.000	
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	21.000		13.000		79.000		113.000	
	6185-6002	TMA (STATIONARY)	DAY	21.000		13.000		79.000		113.000	
	6185-6003	TMA (MOBILE OPERATION)	HR	25.000		15.000		90.000		130.000	
	6227-6002	SOLAR POWERED LED ROADSIDE SIGN	EA	1.000		1.000				2.000	
	6354-6001	LEAD LED CURVE SIGN	EA	1.000		1.000				2.000	
	6354-6002	LED CHEVRON	EA	12.000		6.000				18.000	
	6508-6001	SAFETY BARRIER MRK (CONC)(Y)(10")	LF					144,160.000		144,160.000	
	6508-6002	SAFETY BARRIER MRK (CONC)(W)(10")	LF					152,020.000		152,020.000	
	6508-6003	SAFETY BARRIER MRK(GUARDRAIL)(Y)(8")	LF					10,670.000		10,670.000	
	6508-6004	SAFETY BARRIER MRK(GUARDRAIL)(W)(8")	LF					10,980.000		10,980.000	
	6508-6005	SAFETY BARRIER MRK (PIPE RAIL)(Y)	LF					3,080.000		3,080.000	
	6508-6006	SAFETY BARRIER MRK (PIPE RAIL)(W)	LF					3,210.000		3,210.000	
	12	RAILROAD FORCE ACCOUNT WORK (PARTICIPATING)	LS			1.000				1.000	
	18	LAW ENFORCEMENT: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS			1.000				1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS			1.000				1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS			1.000				1.000	

MATERIALS FOR HIGHWAY TRAFFIC SIGNAL				0508-01-387 IH 10 WB TO IH 69 NB	0177-11-160 IH 69 SB TO IH 10 EB	
ITEM	DESC CODE	DESCRIPTION	UNIT	QUANTITY	QUANTITY	TOTAL
618	6046	CONDT (PVC) (SCH 80) (2")	LF	-	35	35
618	6070	CONDT (RM) (2")	LF	-	295	295
	****	JUNCTION BOX	EA	-	1	1
620	6003	ELEC CONDR (NO.12) BARE	LF	-	330	330
620	6004	ELEC CONDR (NO.12) INSULATED	LF	-	340	340
624	6010	GROUND BOX TY D (162922)W/APRON	EA	-	1	1
636	6001	ALUMINUM SIGNS (TY A)	SF	12.5	44.5	57
	****	ADVISORY SPEED PLAQUE (W13-1P) (30"X30") [6.25 SF]	EA	2	2	4
	****	TRUCK ROLLOVER SIGN (W1-13L) (48"X48") [16 SF]	EA	-	1	1
	****	"BRIDGE MAY ICE IN COLD WEATHER" SIGN (W8-13aT) (48"X48") [16 SF]	EA	-	1	1
644	6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	-	7	7
644	6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	1	4	5
644	6076	REMOVE SM RD SN SUP&AM	EA	1	12	13
644	6087	IN SRSS & AM (RAIL)(130 MPH)(P MOUNT)	EA	6	9	15
644	6089	IN SRSS & AM (RAIL)(130 MPH)(T MOUNT)	EA	1	-	1
6227	6002	SOLAR POWERED LED ROADSIDE SIGN	EA	1	1	2
	****	TURN (RIGHT) SIGN (W1-1R) (48"X48") [16 SF]	EA	1	-	1
	****	TURN (LEFT) SIGN (W1-1L) (48"X48") [16 SF]	EA	-	1	1
6354	6001	LEAD LED CURVE SIGN	EA	1	1	2
	****	TURN (RIGHT) SIGN (W1-1R) (48"X48") [16 SF]	EA	1	-	1
	****	TURN (LEFT) SIGN (W1-1L) (48"X48") [16 SF]	EA	-	1	1
6354	6002	LED CHEVRON	EA	6	12	18
	****	CHEVRON (RIGHT) SIGN (W1-8R) (30"X36") [7.5 SF]	EA	6	-	6
	****	CHEVRON (LEFT) SIGN (W1-8L) (30"X36") [7.5 SF]	EA	-	12	12

**** MATERIALS SUBSIDIARY TO PERTINENT ITEM

SUMMARY OF LED CHEVRON QUANTITIES

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0508	01	387	IH 10
DIST	COUNTY		SHEET NO.
HOU	HARRIS		5

DATE: 9/29/2023 11:34:54 AM
FILE: H:\TrfSignals\Hai Tran\Harris\0508-01-387 Main.dgn

SUMMARY OF PAVEMENT MARKING ITEMS

LOCATION	INTERCHANGE	658 6013	658 6014	658 6026	658 6060	658 6061	658 6064	6508 6001	6508 6002	6508 6003	6508 6004	6508 6005	6508 6006
		INSTL DEL ASSM (D-SW)SZ (BRF)CTB	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	INSTL DEL ASSM (D-SY)SZ (BRF)CTB	REMOVE DELIN & OBJECT MARKER ASSMS	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	INSTL DEL ASSM (D-SY)SZ 1(BRF)GF2	SAFETY BARRIER MRK (CONC)(Y)(10")	SAFETY BARRIER MRK (CONC)(W)(10")	SAFETY BARRIER MRK (GUARDRAIL)(Y)(8"	SAFETY BARRIER MRK (GUARDRAIL)(W)(8")	SAFETY BARRIER MRK (PIPE RAIL)(Y)	SAFETY BARRIER MRK (PIPE RAIL)(W)
		EA	EA	EA	EA	EA	EA	LF	LF	LF	LF	LF	LF
Sheet 1	IH10W-610 (W Loop FWY)	190	0	188	378	0	0	11250	11370	0	0	0	0
Sheet 2	IH69-IH610 (W Loop FWY)	345	0	338	688	0	5	20260	20660	240	0	0	0
Sheet 3	IH610-S Post Oak Rd	115	0	126	250	6	3	7530	6860	160	340	0	0
Sheet 4	IH610(SLoop)-SH288	230	0	223	453	0	0	13320	13780	0	0	0	0
Sheet 5	IH610(SLoop)-IH45	226	0	220	497	30	21	13190	13550	1220	1760	0	0
Sheet 6	IH610(SLoop)-SH225	133	0	124	345	34	54	7390	7950	3190	1990	0	0
Sheet 7	IH10E-610 (E Loop FWY)	147	0	161	380	30	42	9620	8770	2460	1780	3080	3210
Sheet 8	IH69-610 (N Loop FWY)	223	0	223	496	32	18	13350	13360	1050	1890	0	0
Sheet 9	IH45-610 (N Loop FWY)	68	0	36	184	51	29	2110	4030	1690	3010	0	0
Sheet 10 & 11	US290-IH610	296	96	296	688	0	0	17710	23470	0	0	0	0
Sheet 12	IH45-IH69	201	0	201	402	0	0	12030	12030	0	0	0	0
Sheet 13	IH10 - IH69	270	0	274	560	4	12	16400	16190	660	210	0	0
PROJECT TOTALS		**2444**	**96**	**2410**	**5321**	**187**	**184**	**144160**	**152020**	**10670**	**10980**	**3080**	**3210**

DATE:
FILE:

TEXAS DEPARTMENT OF TRANSPORTATION

SUMMARY OF PERMANENT PAVEMENT MARKING QUANTITIES

SCALE: N.T.S. SHEET 1 OF 1

ORIGINAL DRAWING DATE: JUNE, 2023	STATE DISTRICT	FEDERAL REGION	PROJECT NO	SHEET
DN.T.: REVISIONS	HOU	6		6
CK.T.:	COUNTY		CONTROL SECTION JOB	HIGHWAY
DN.T.:	HARRIS		0508 01 387	IH 10
CK.T.:				

DATE: 9/6/2023 8:20:42 AM
FILE: H:\Trf\Signals\Hal Iran\Harris\0508-01-387 Main.dgn

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

SHEET 1 OF 12

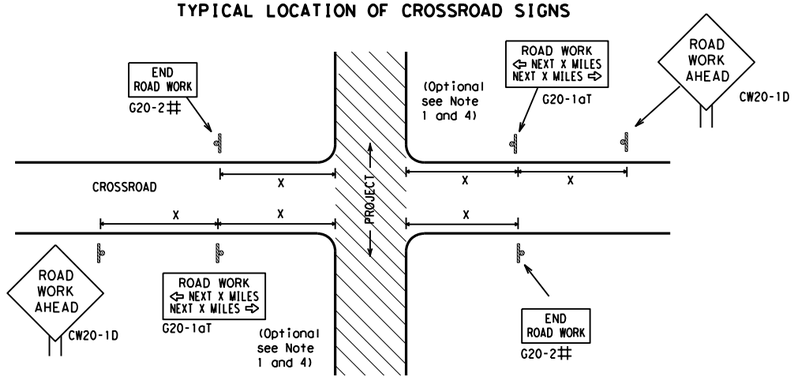
Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13 9-07 8-14 5-10 5-21	0508	01	387	IH 10
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		7

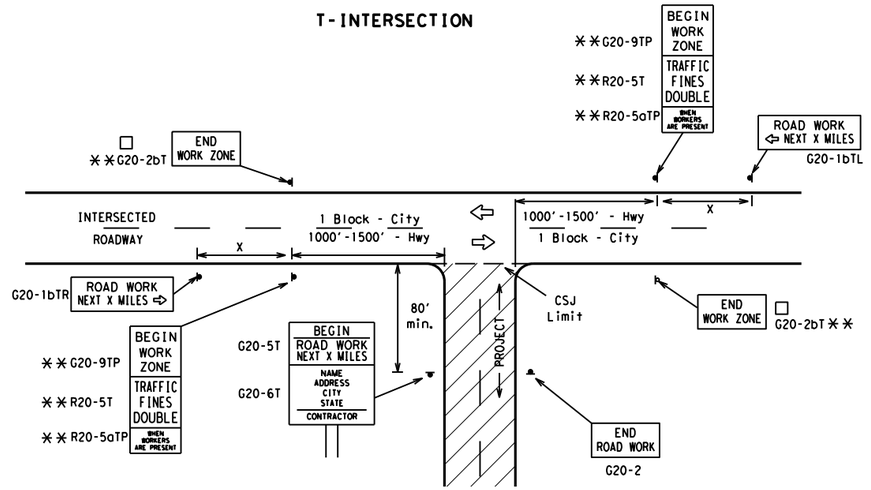
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

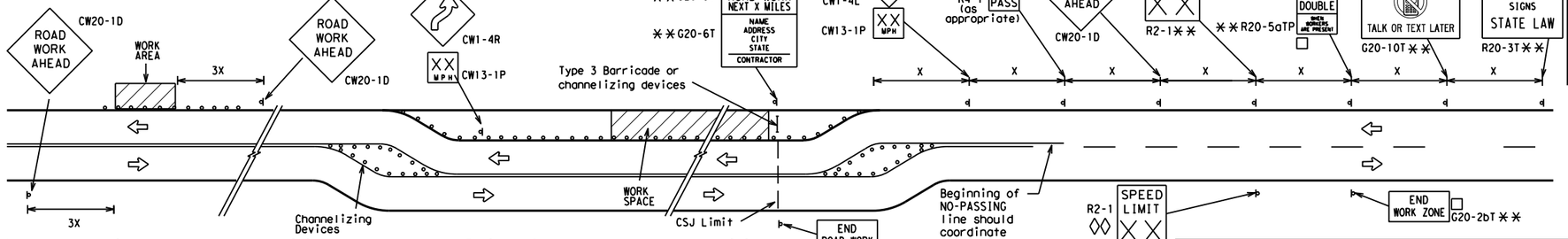
✱ For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

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

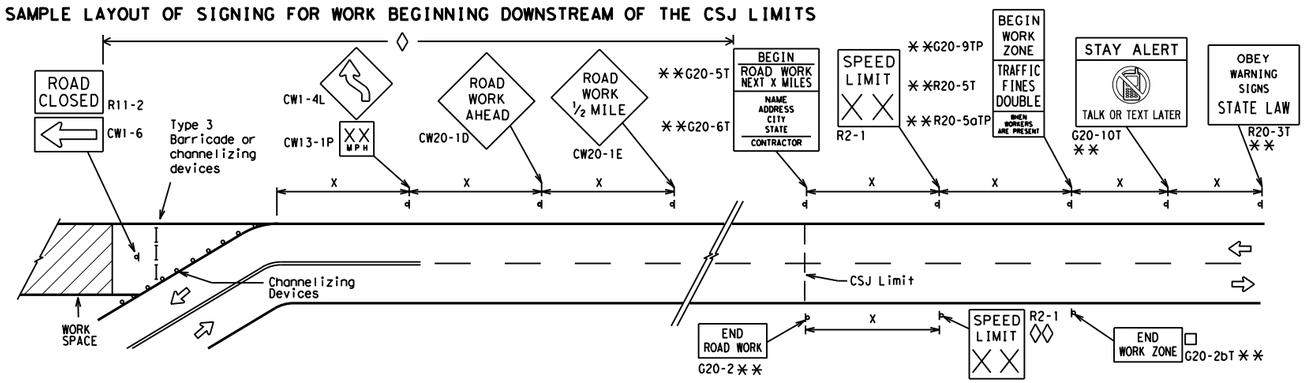
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

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



NOTES

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

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

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

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

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

LEGEND

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

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Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

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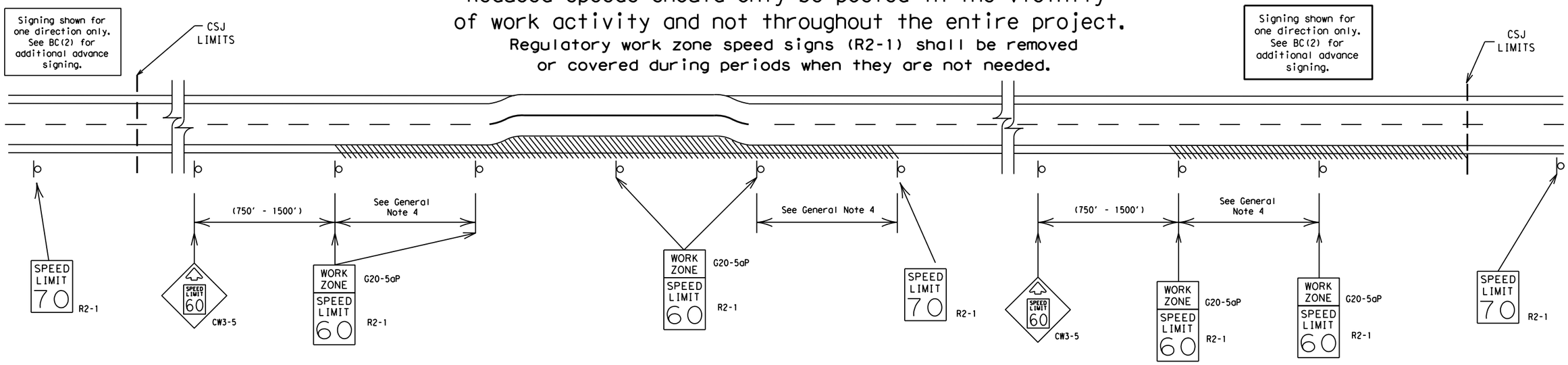
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

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Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

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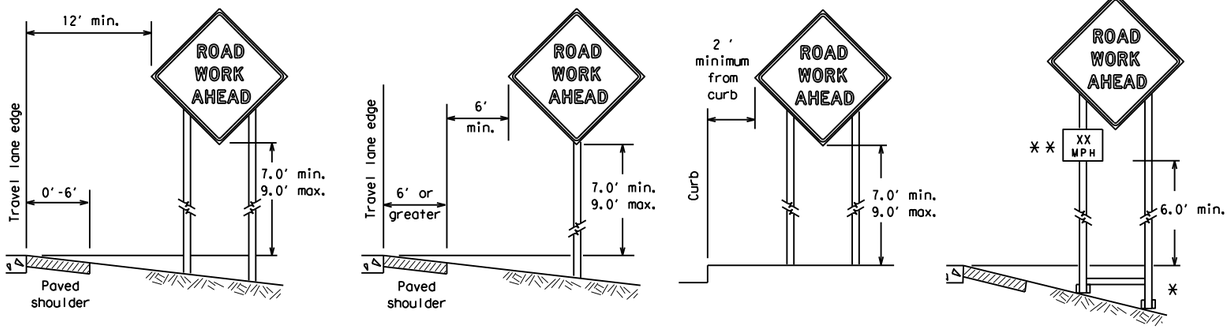
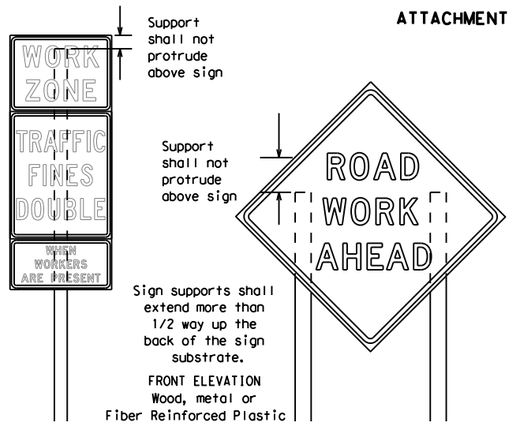
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



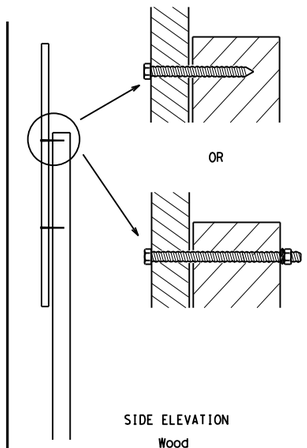
* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS



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

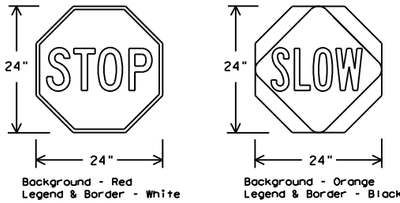


Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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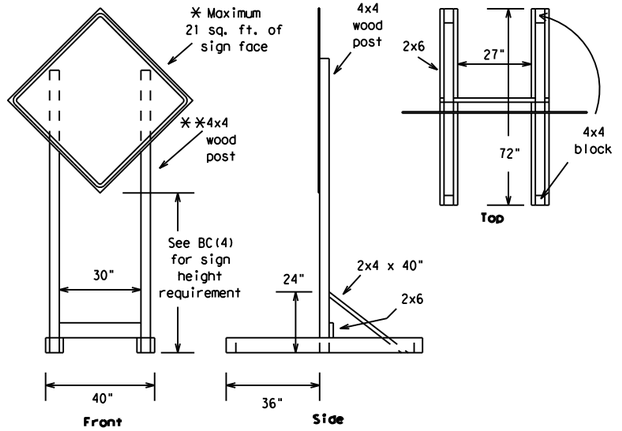
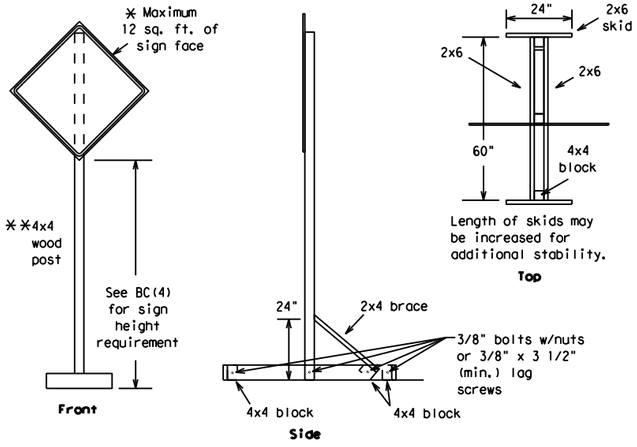
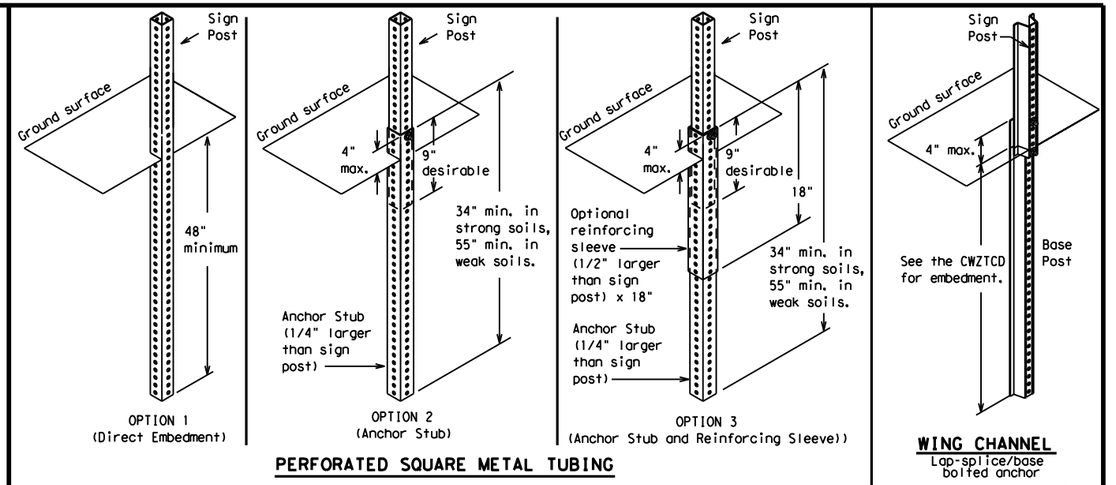




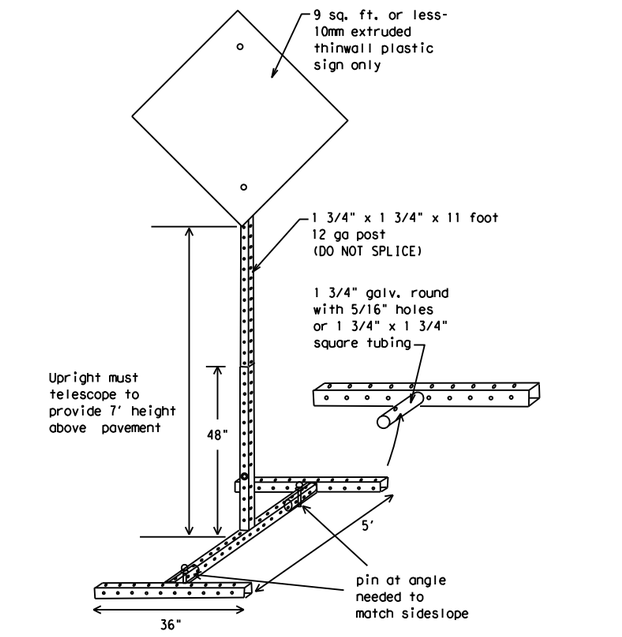
SKID MOUNTED WOOD SIGN SUPPORTS

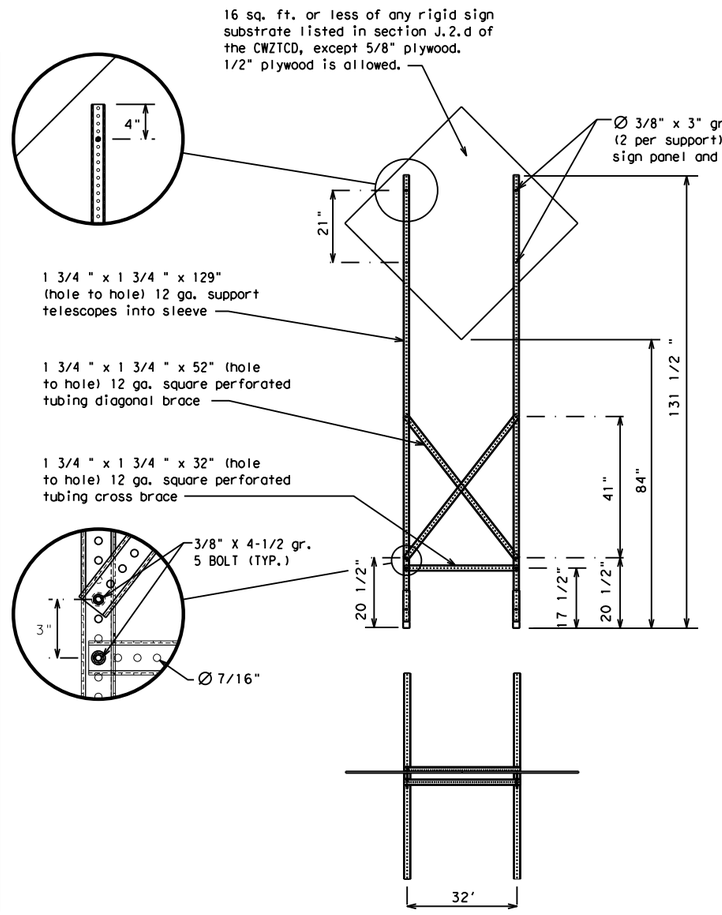
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

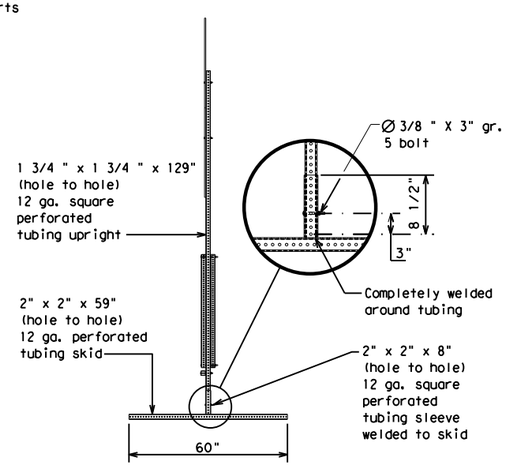


GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

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Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

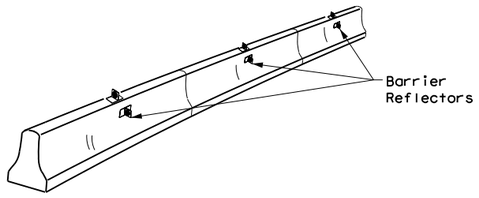
BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE:	bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS		0508	01	387	IH 10
9-07 8-14		DIST	COUNTY		SHEET NO.
7-13 5-21		HOU	HARRIS		12

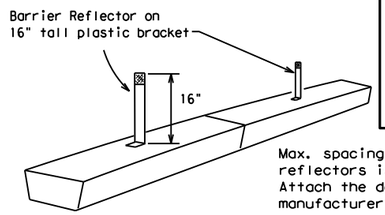
100

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.



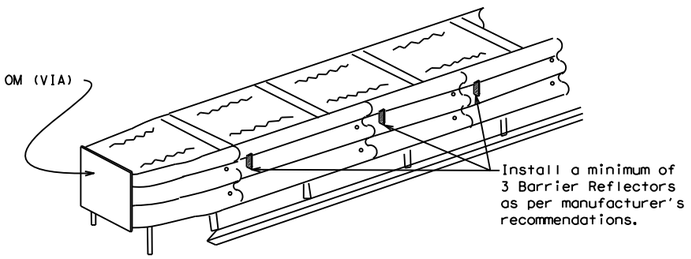
CONCRETE TRAFFIC BARRIER (CTB)

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.



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

LOW PROFILE CONCRETE BARRIER (LPCB)



DELINEATION OF END TREATMENTS

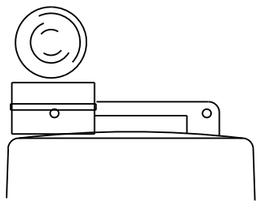
LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

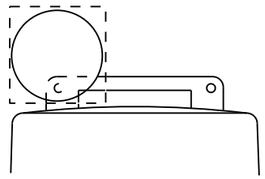
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

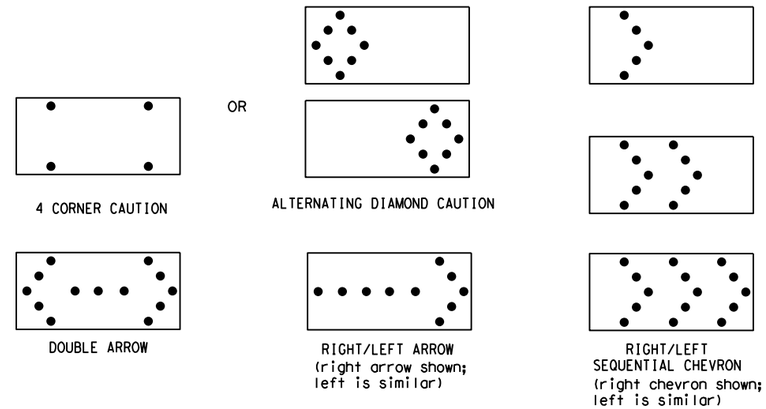
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0508	01	387	IH 10
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	HOU	HARRIS		13

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

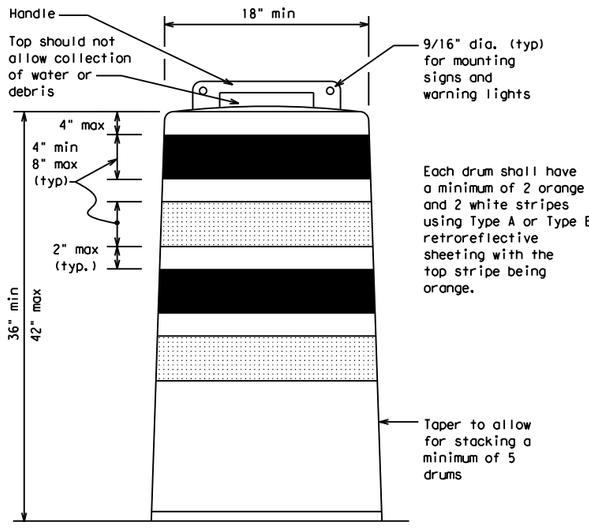
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

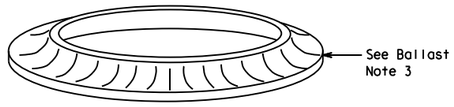
RETROREFLECTIVE SHEETING

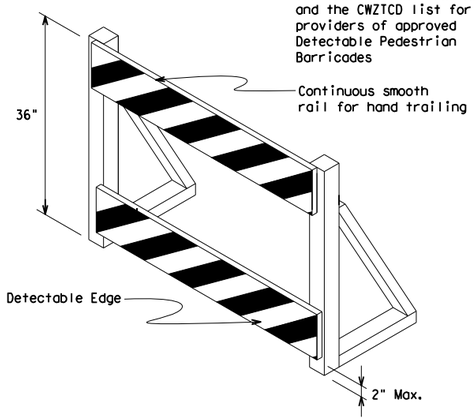
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

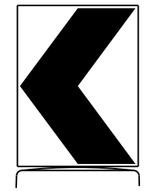




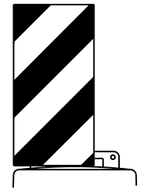


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

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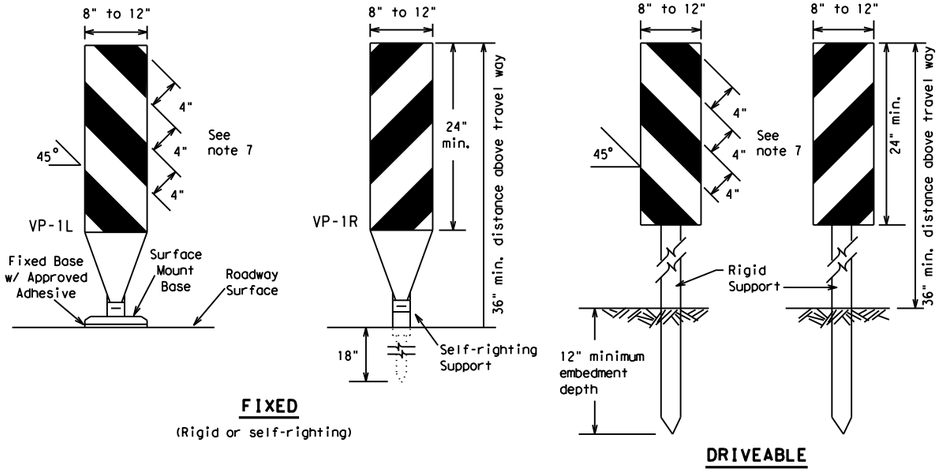


FIXED
(Rigid or self-righting)

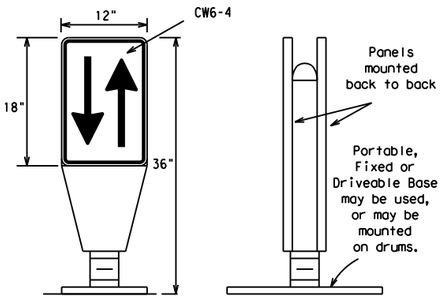
DRIVEABLE

(Rigid or self-righting)

PORTABLE

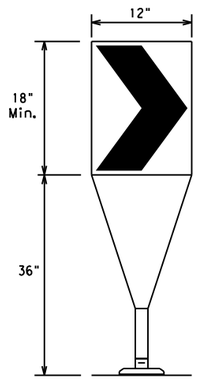
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



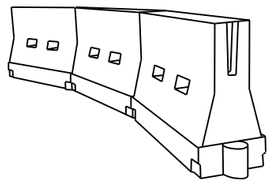
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

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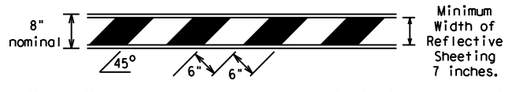
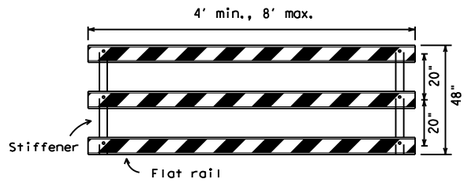
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



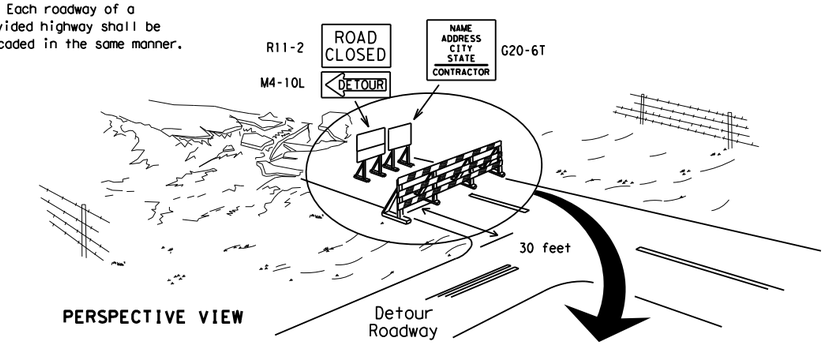
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

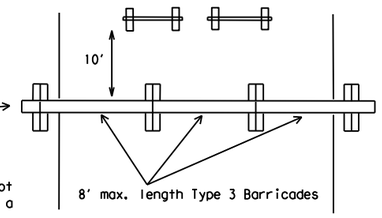
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

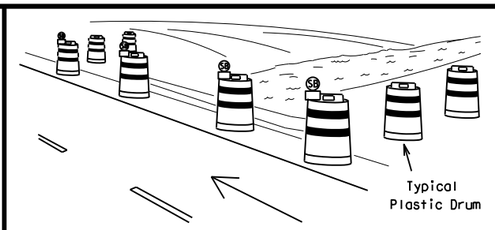
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

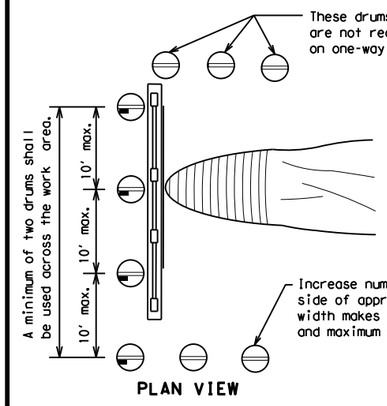
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

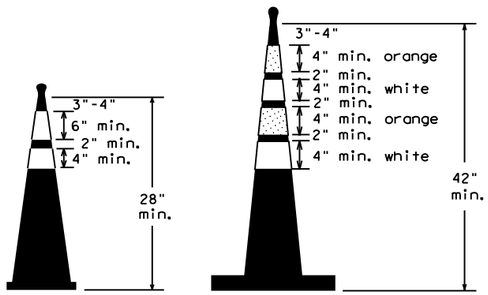
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



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

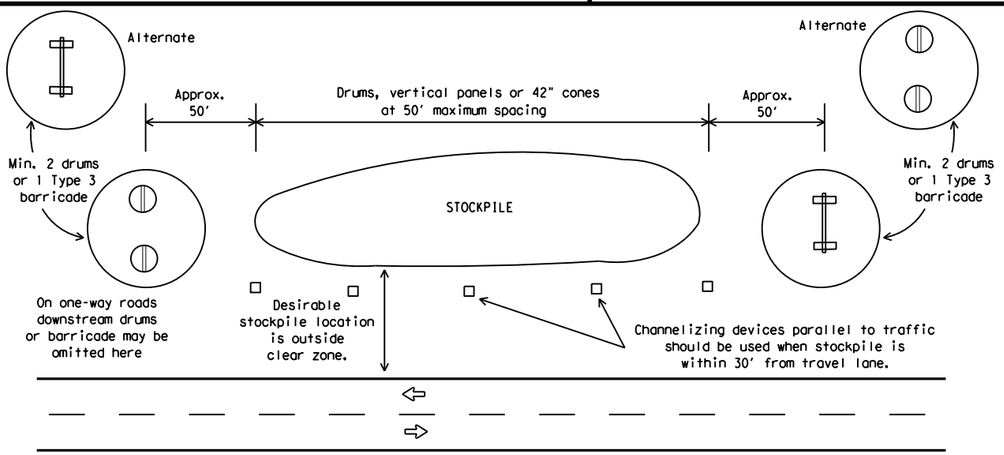
PLAN VIEW

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 shall have white or white and orange reflective bands as shown above. The reflective bands shall have a smooth, sealed outer surface and meet the requirements of Departmental Material Specification DMS-8300 Type A or Type B.
5. 28" cones and tubular markers are generally suitable for short duration and short-term stationary work as defined on BC(4). These should not be used for intermediate-term or long-term stationary work unless personnel is on-site to maintain them in their proper upright position.
6. 42" two-piece cones, vertical panels or drums are suitable for all work zone durations.
7. Cones or tubular markers used on each project should be of the same size and shape.



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

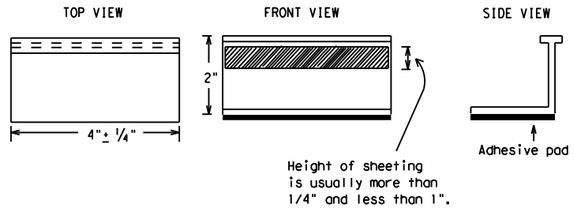
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

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BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

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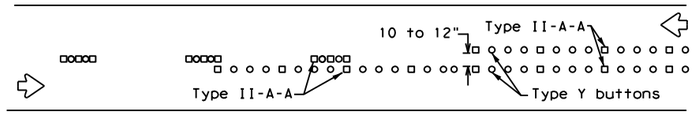
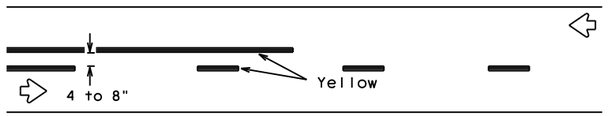
PAVEMENT MARKING PATTERNS

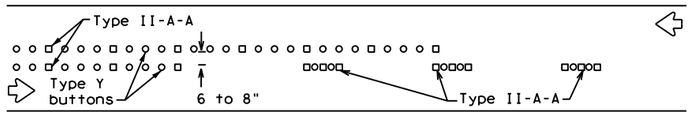
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



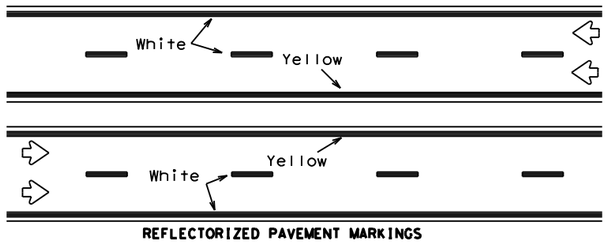
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



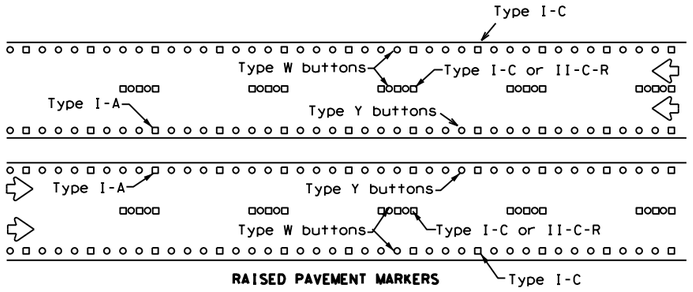
RAISED PAVEMENT MARKERS - PATTERN B

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

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



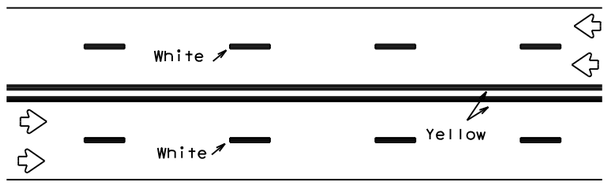
REFLECTORIZED PAVEMENT MARKINGS



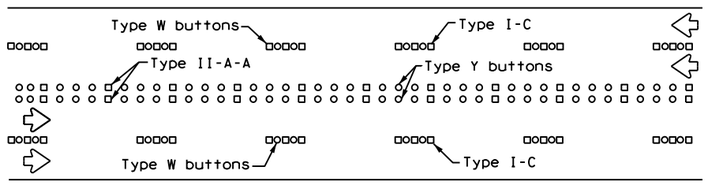
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



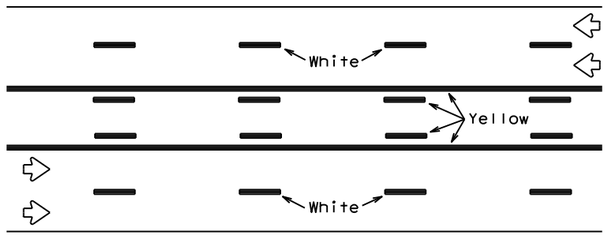
REFLECTORIZED PAVEMENT MARKINGS



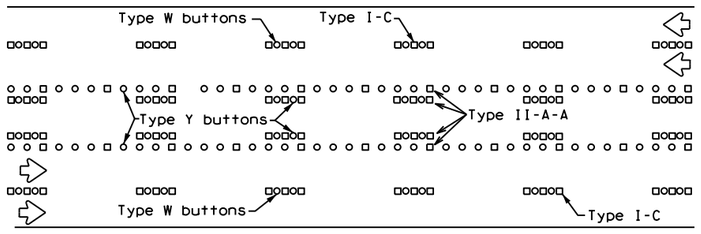
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

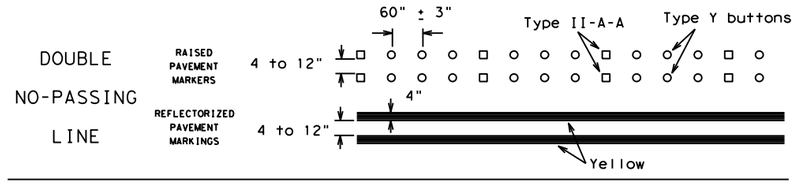
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

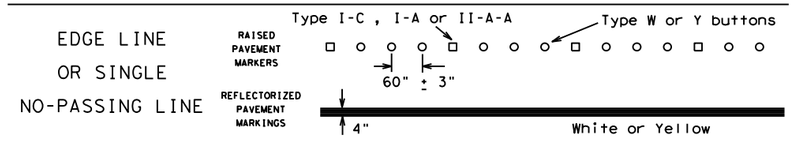
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

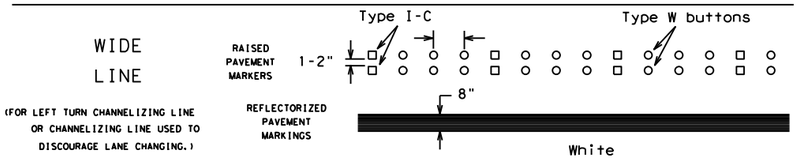


EDGE LINE OR SINGLE NO-PASSING LINE



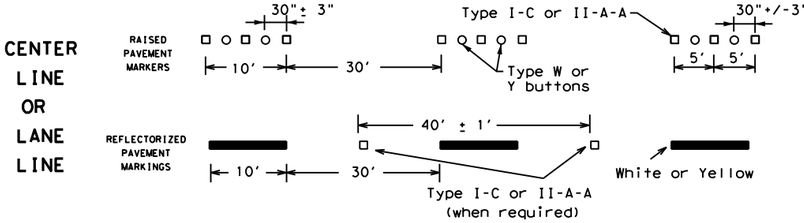
WIDE LINE

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

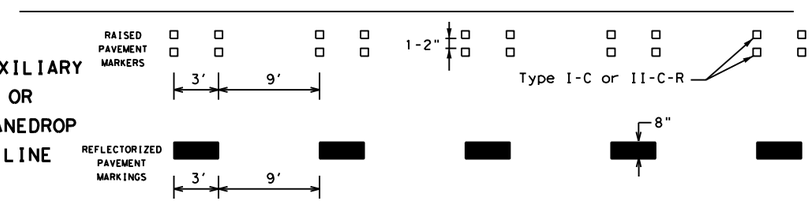


BROKEN LINES

CENTER LINE OR LANE LINE

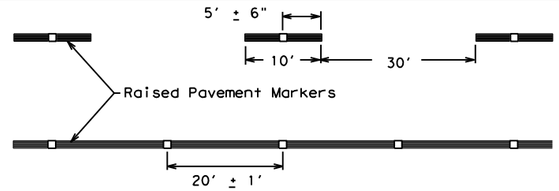


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

SHEET 12 OF 12

Texas Department of Transportation

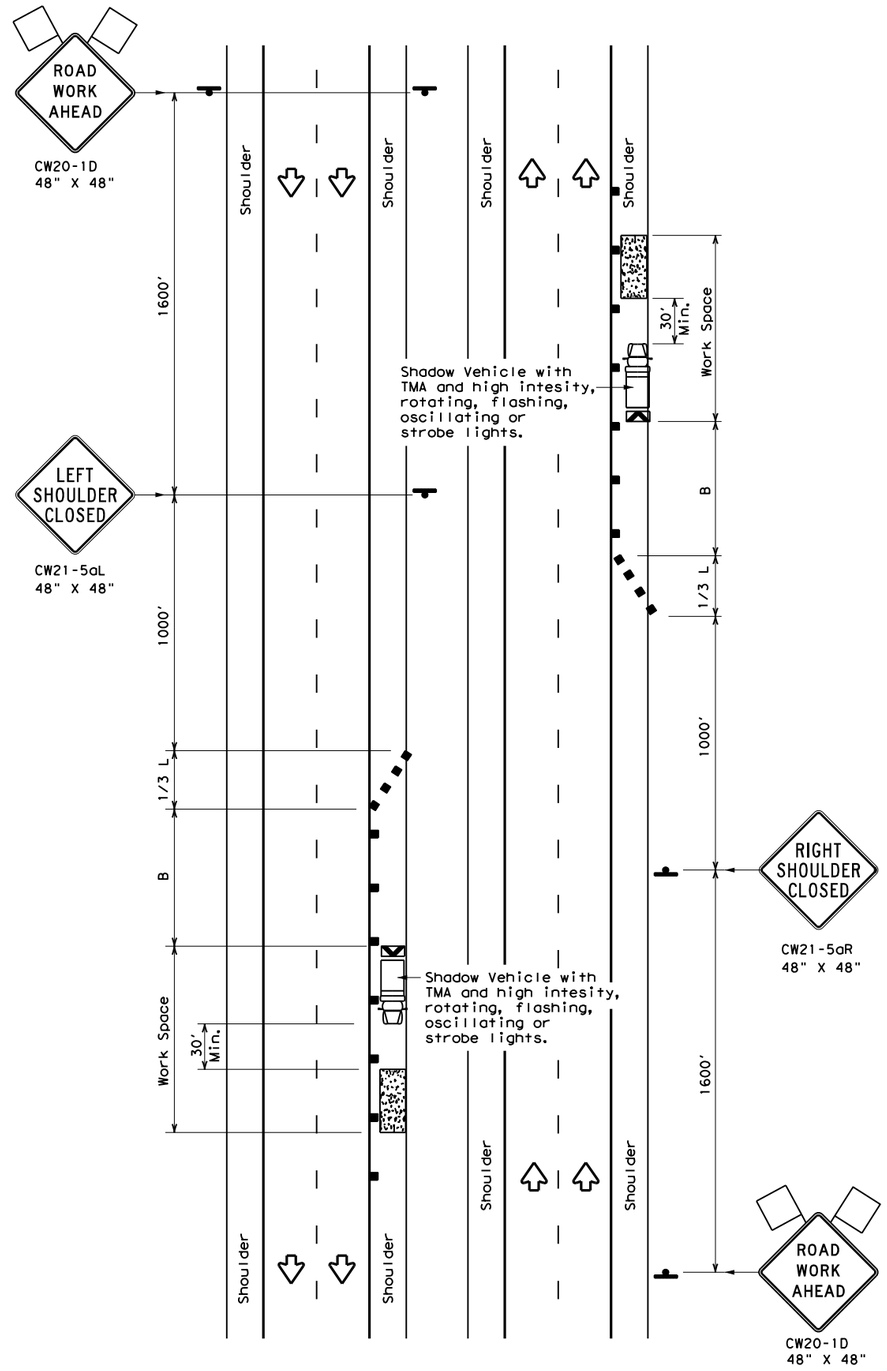
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

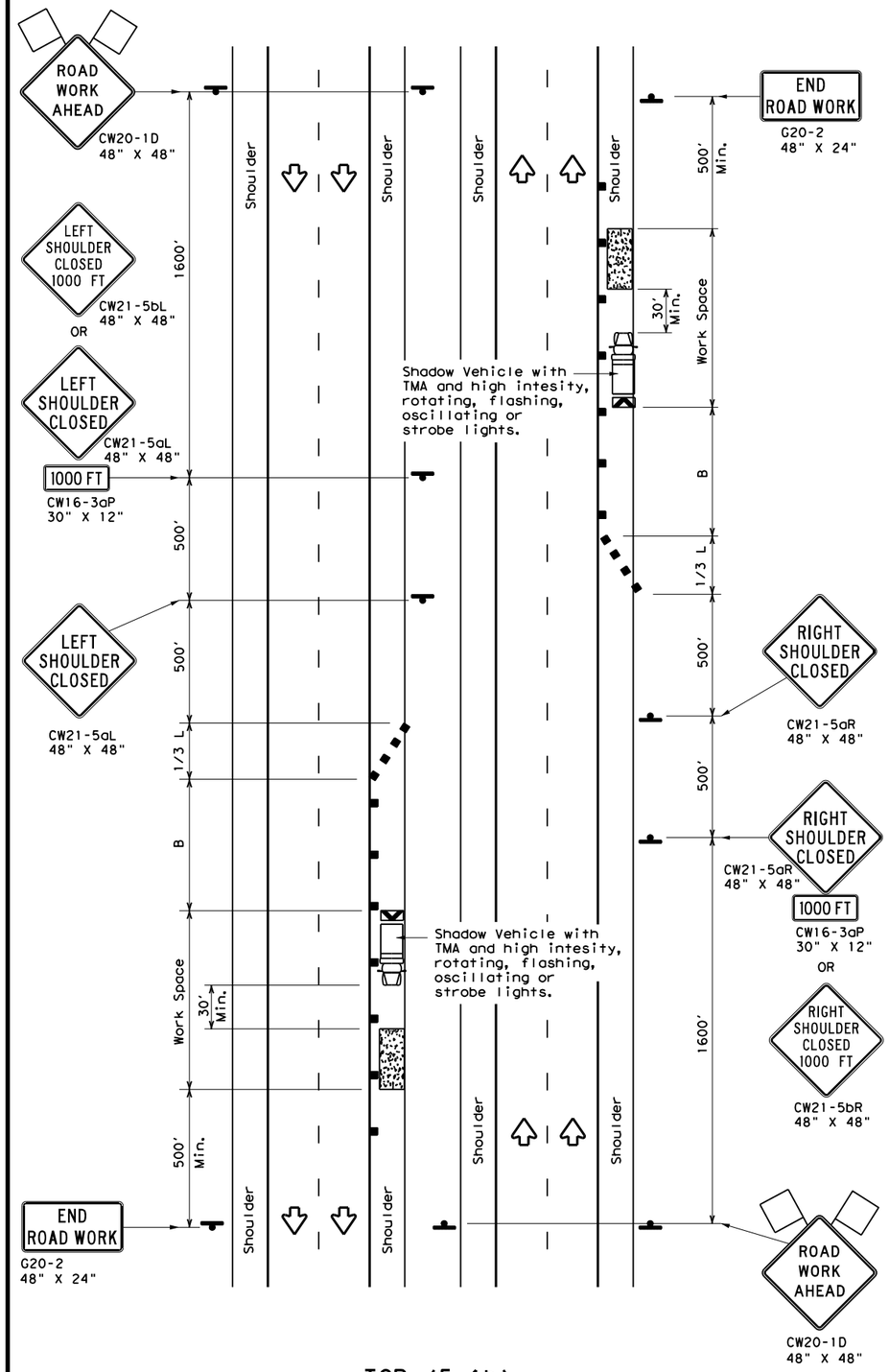
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	0508	01	387	IH 10
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		18

106



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

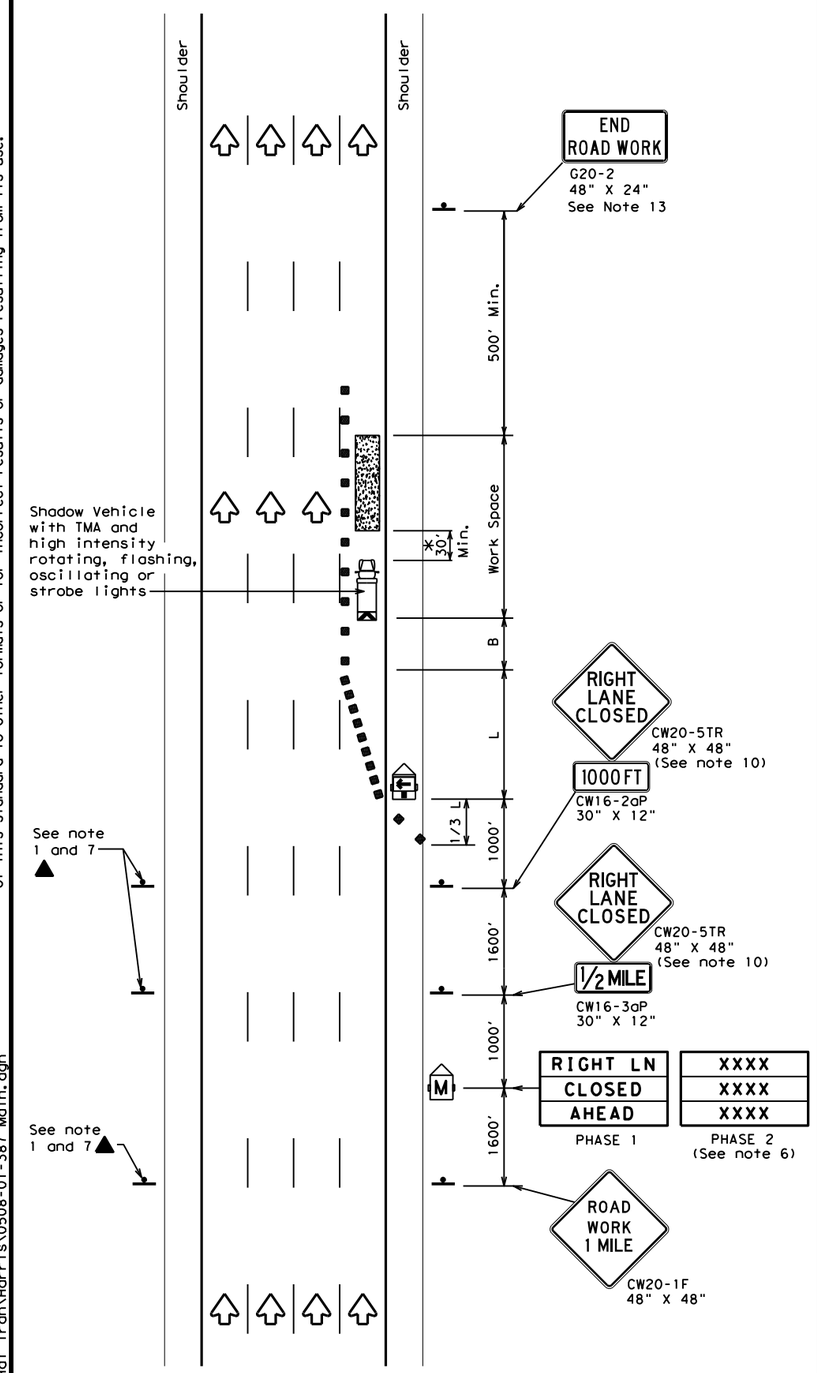
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN SHOULDER WORK FOR FREEWAYS / EXPRESSWAYS

TCP(5-1)-18

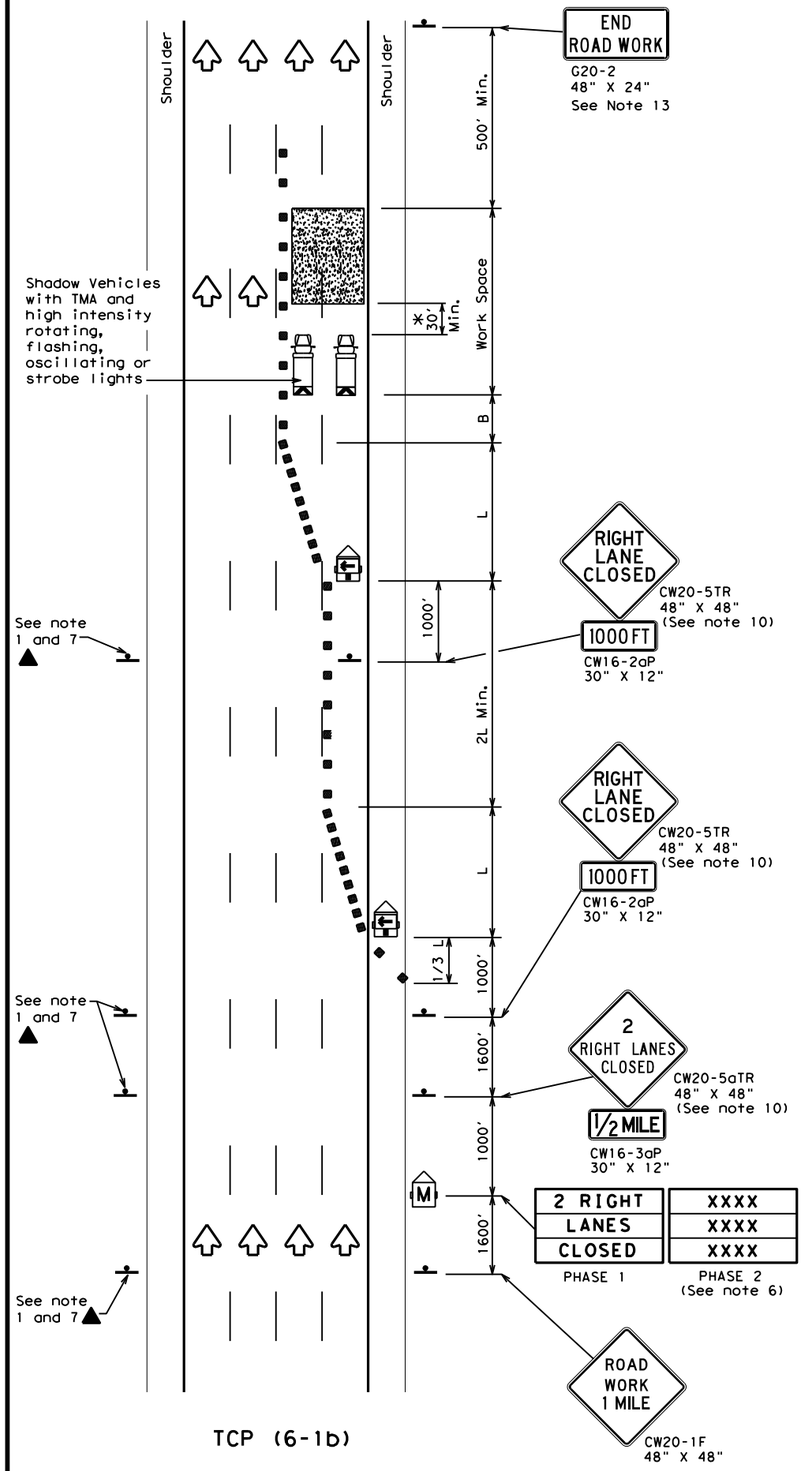
FILE: tcp5-1-18.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-18	0508	01	387	IH 10
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		19

DATE: 9/6/2023 8:20:46 AM
FILE: H:\TrfSignals\Hai Tran\Harris\0508-01-387 Main.dgn



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

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

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

GENERAL NOTES

1. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
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	0508	01	387	IH 10
8-12	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		20

DATE: 9/6/2023 8:20:46 AM
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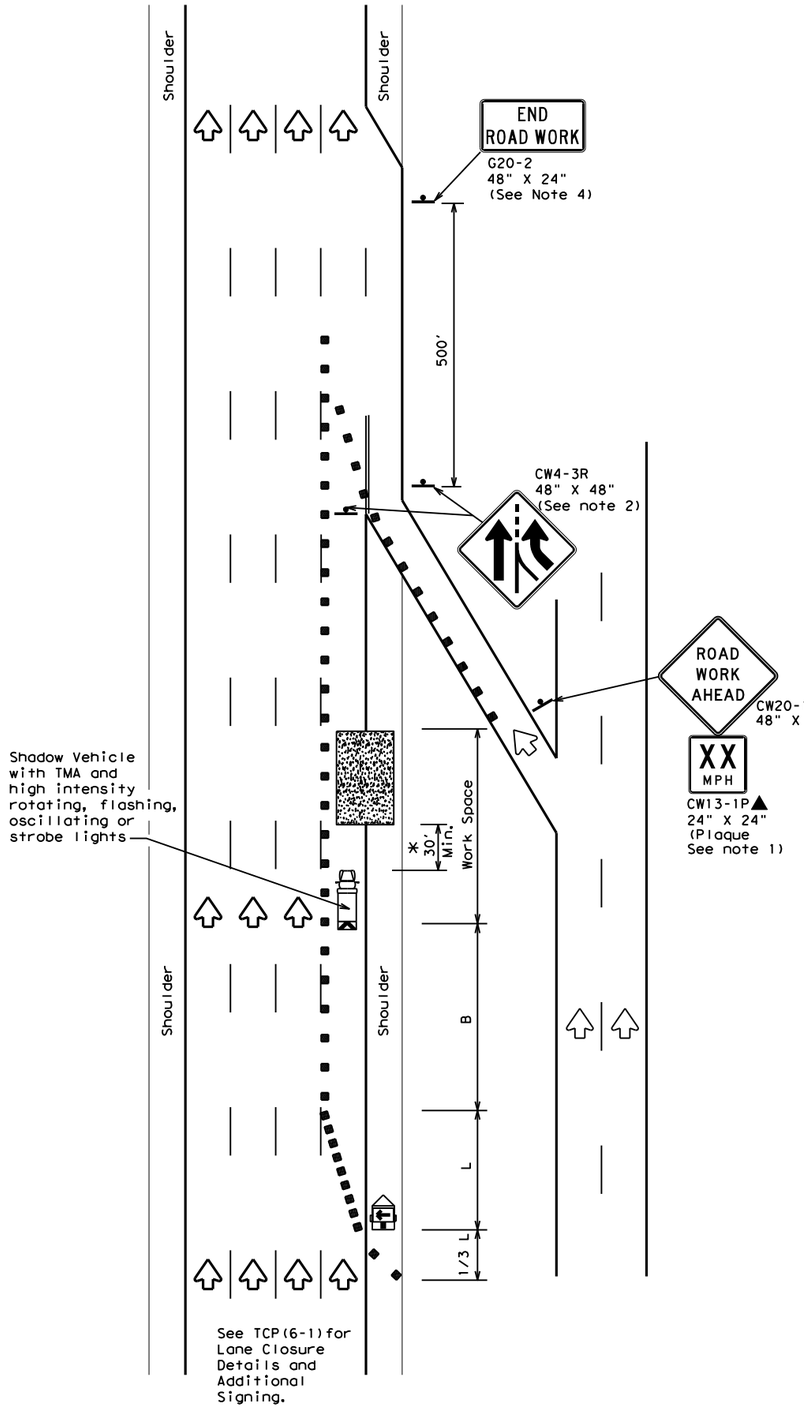
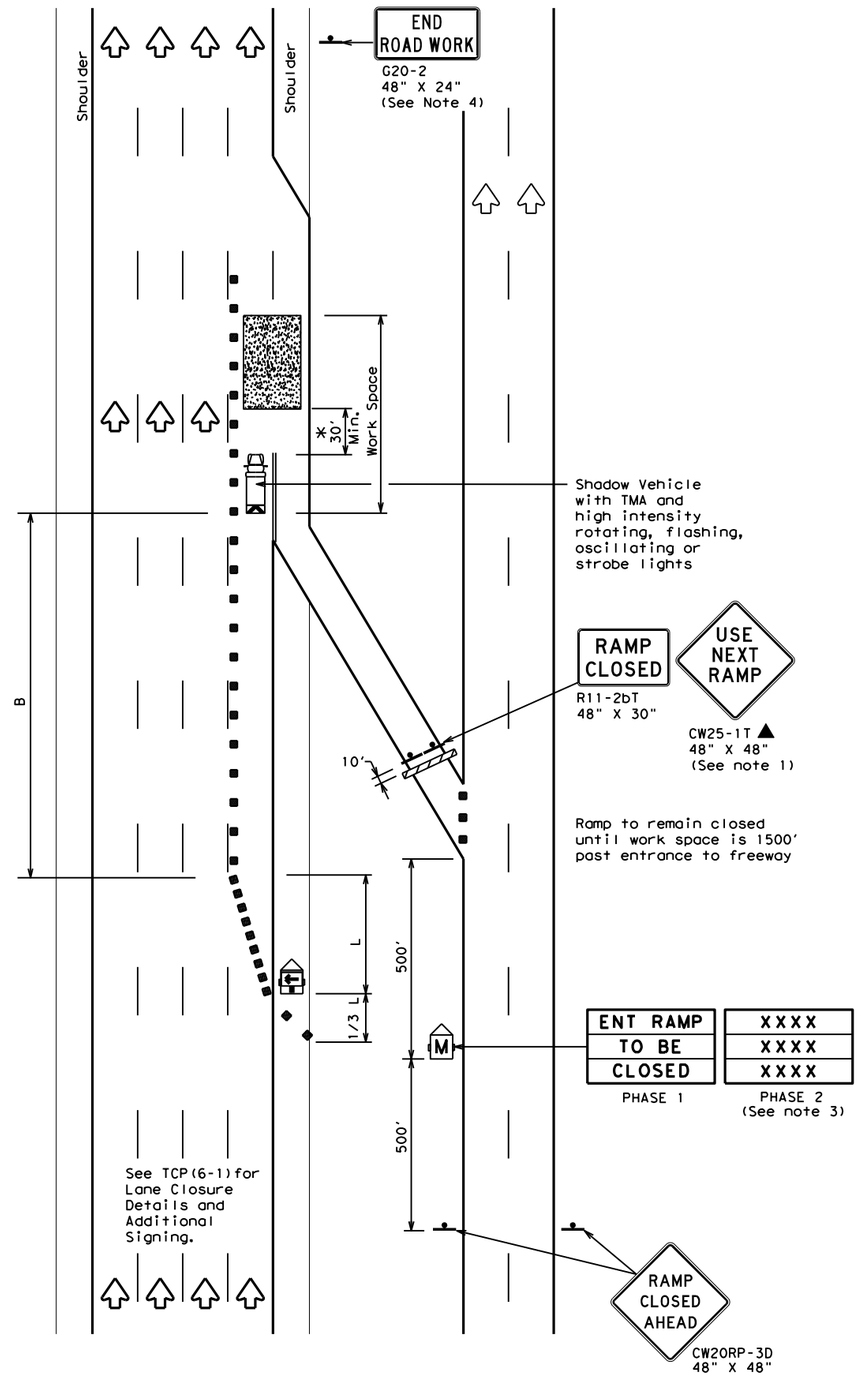


TCP (6-2a)

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	0508	01	387	IH 10
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	HOU	HARRIS		21

DATE: 9/6/2023 8:20:47 AM
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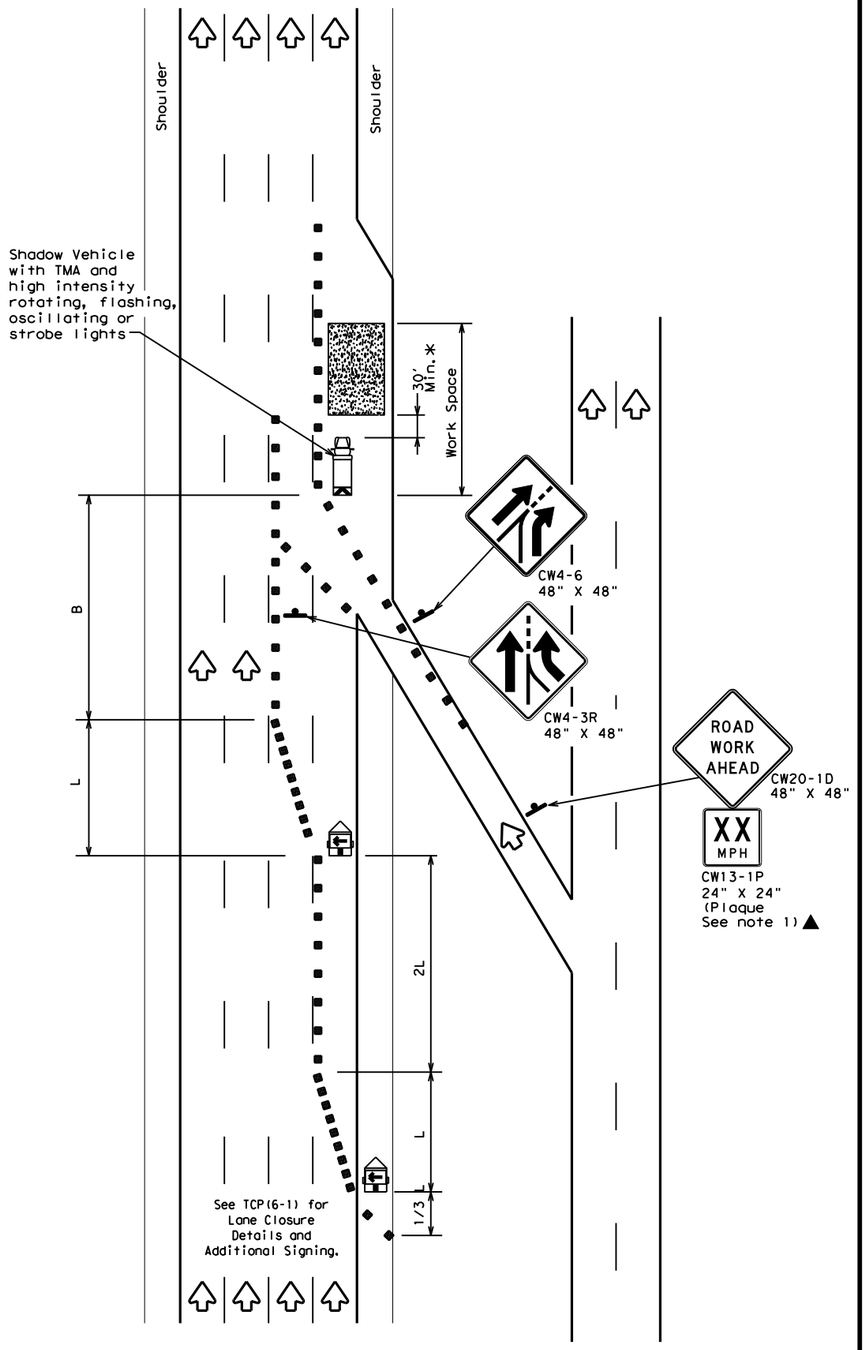
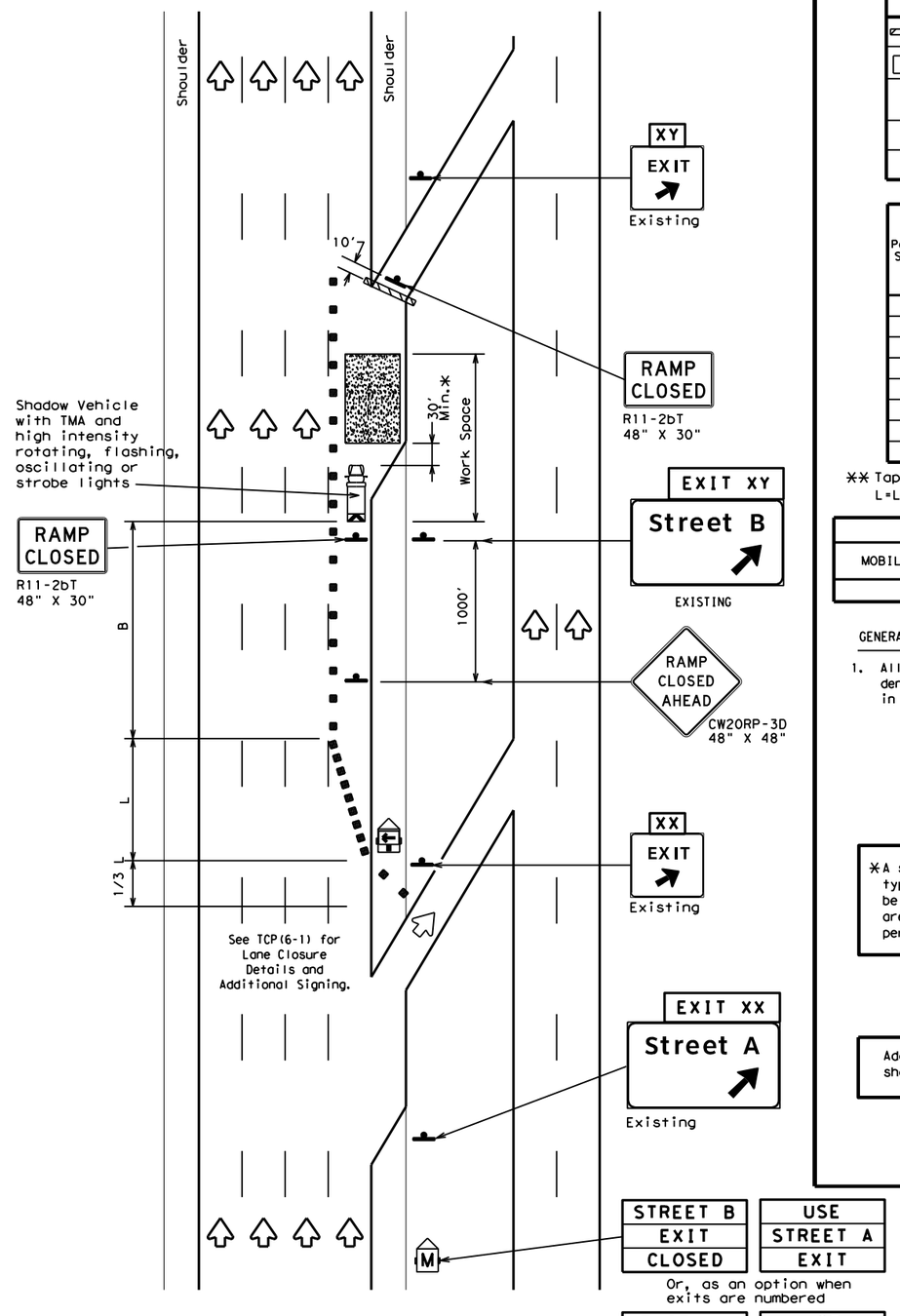


TCP (6-3a)

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.

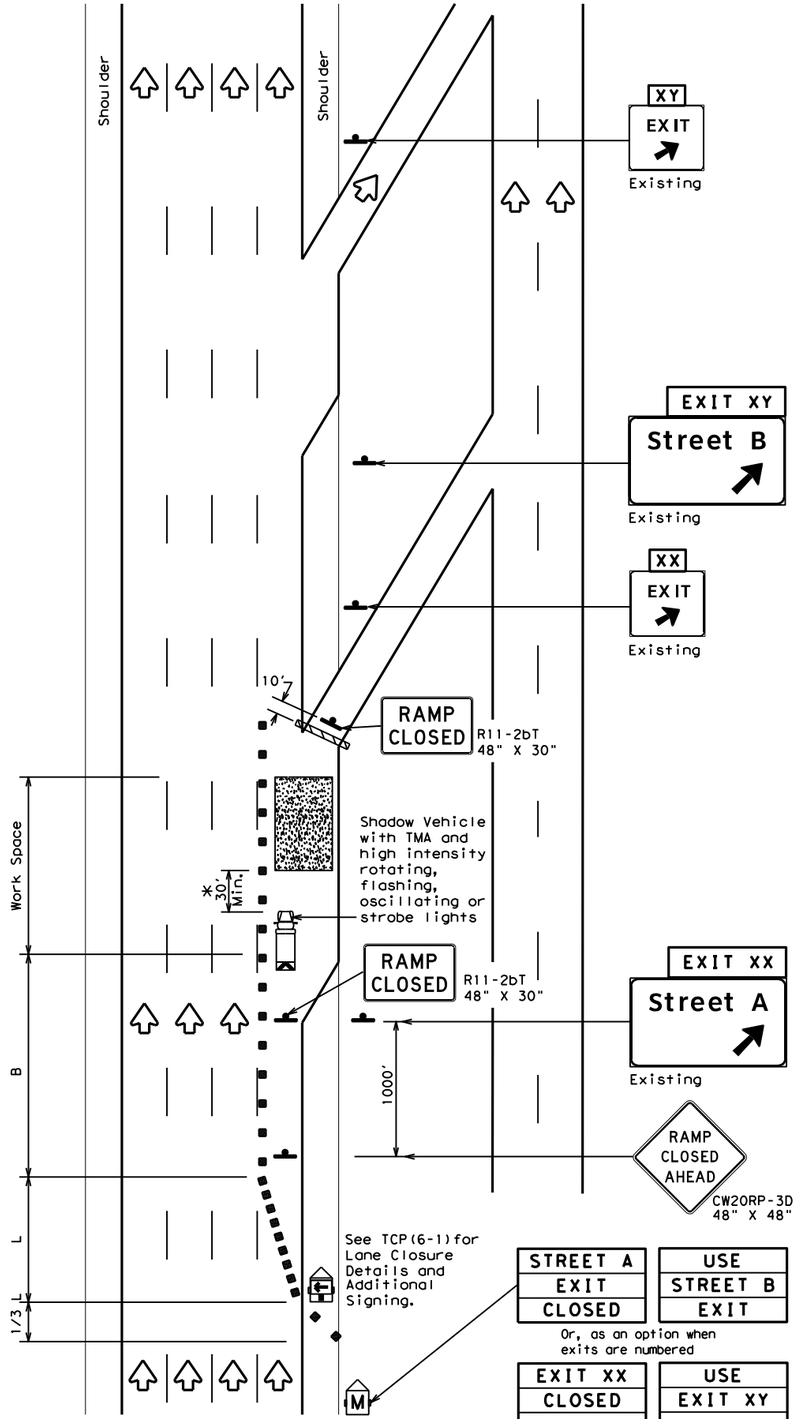
Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA BEYOND RAMP

TCP(6-3)-12

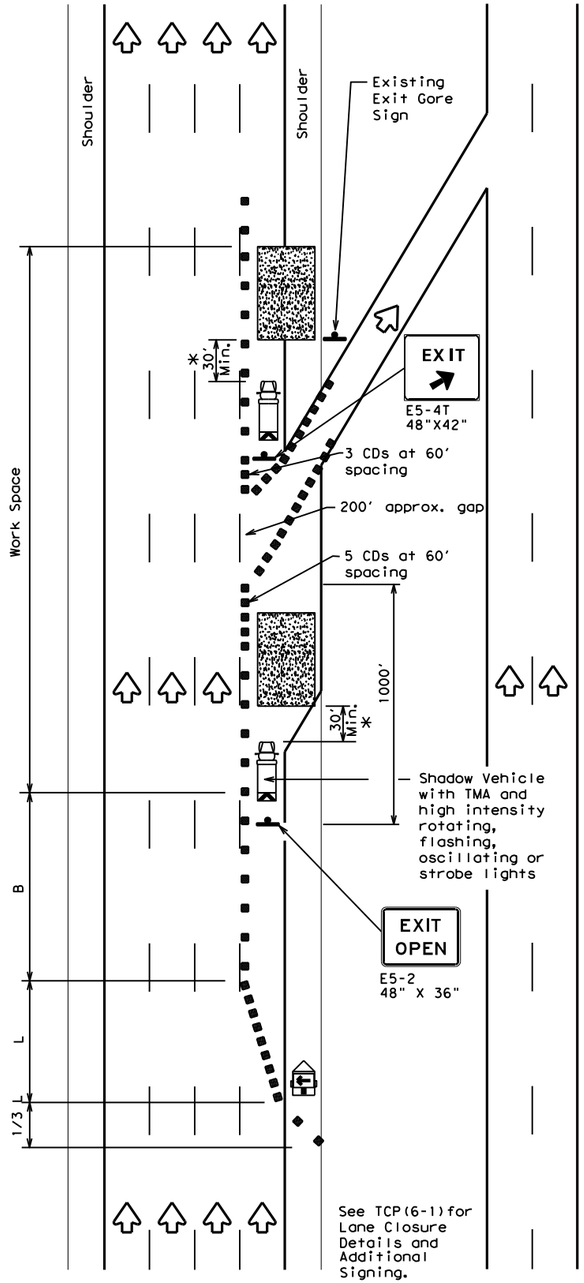
FILE: tcp6-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0508	01	387	IH 10
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	HOU	HARRIS		22

DATE: 9/6/2023 8:20:47 AM
FILE: H:\TrfSignals\Hai Tran\Harris\0508-01-387 Main.dgn



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.

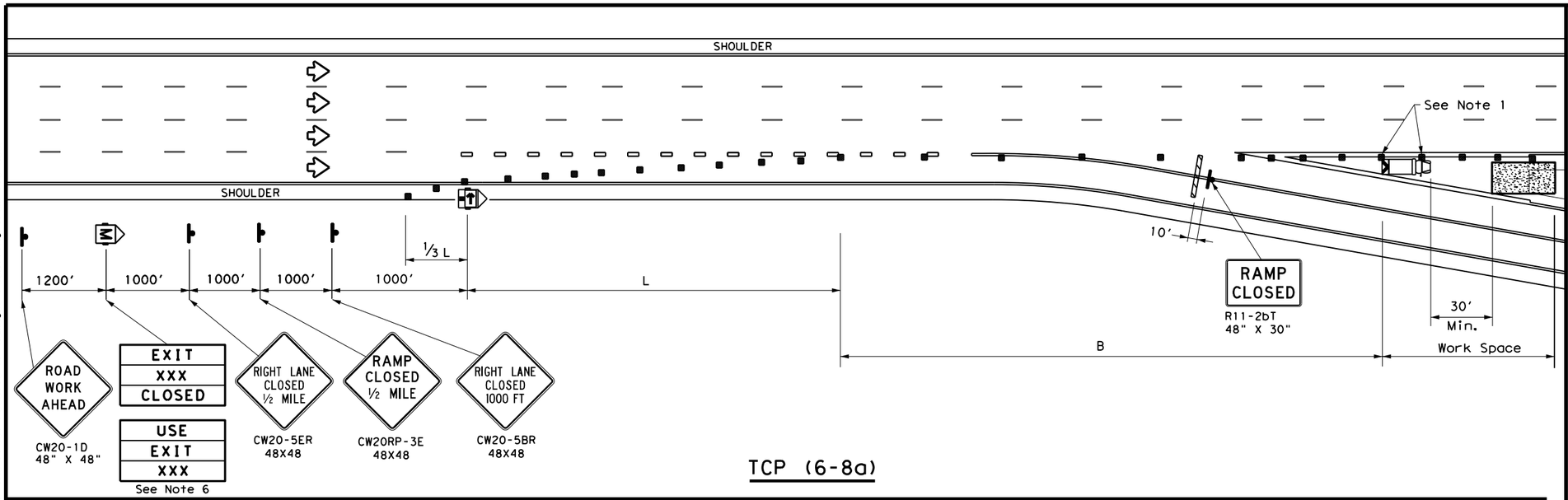
Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA AT EXIT RAMP

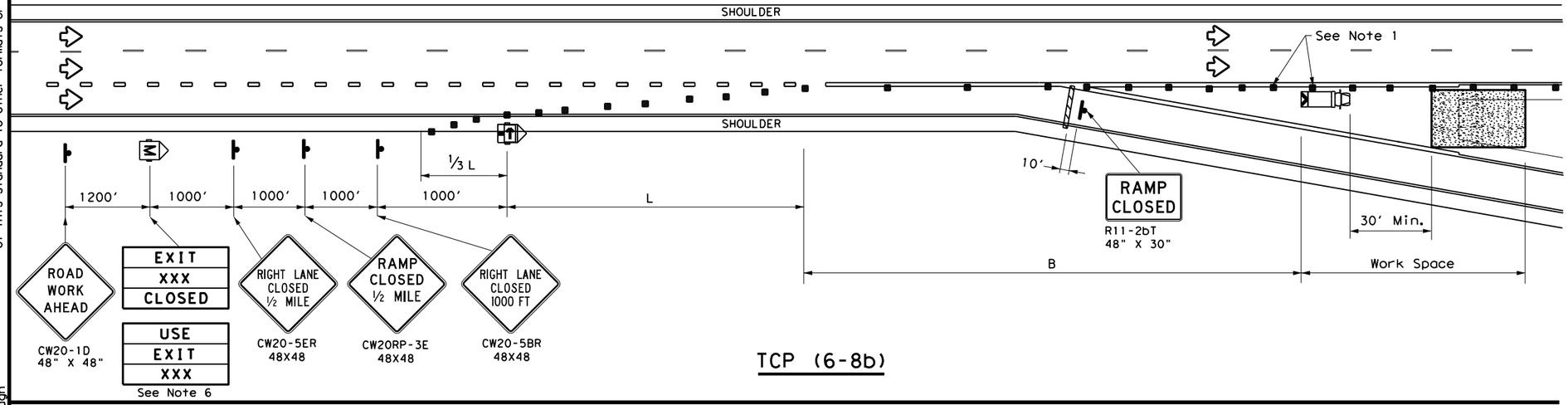
TCP(6-4)-12

FILE: tcp6-4.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT Feburary 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0508	01	387	IH 10
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	HOU	HARRIS		23

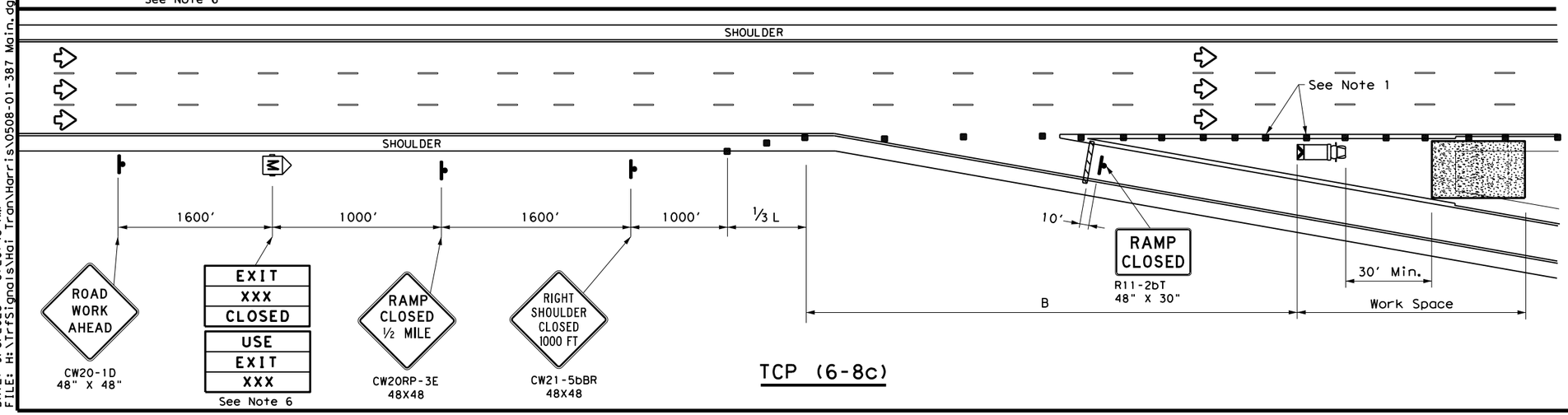
DATE: 9/6/2023 8:20:47 AM
FILE: H:\TrfSignals\Hai Tran\Harris\0508-01-387 Main.dgn



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		Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

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

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

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

GENERAL NOTES

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

Texas Department of Transportation

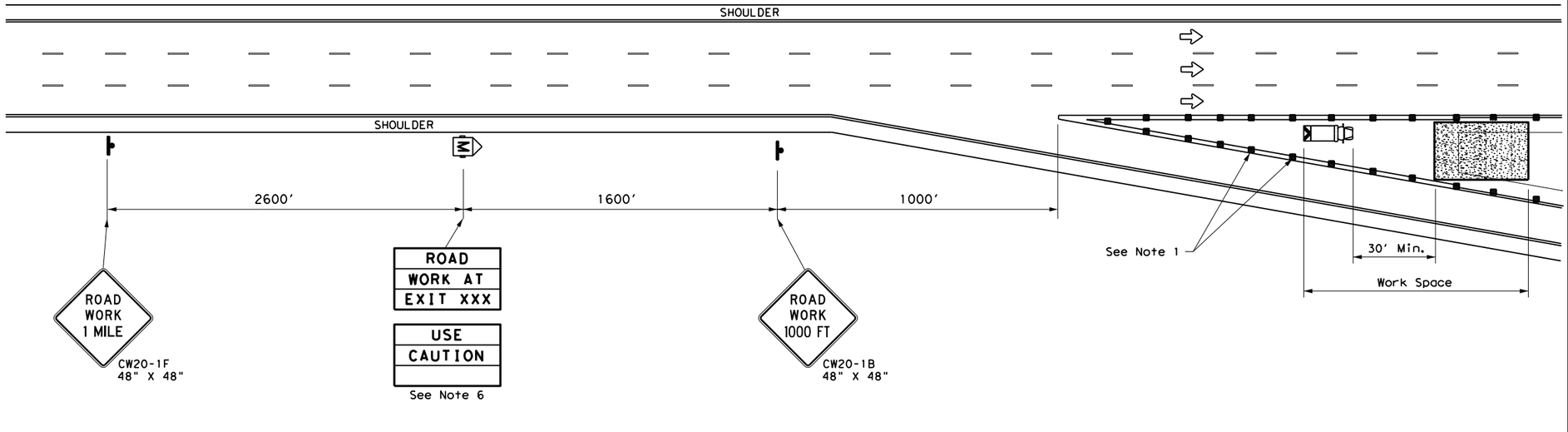
Traffic Operations Division Standard

WORK IN EXIT GORE FOR ADT GREATER THAN 10,000

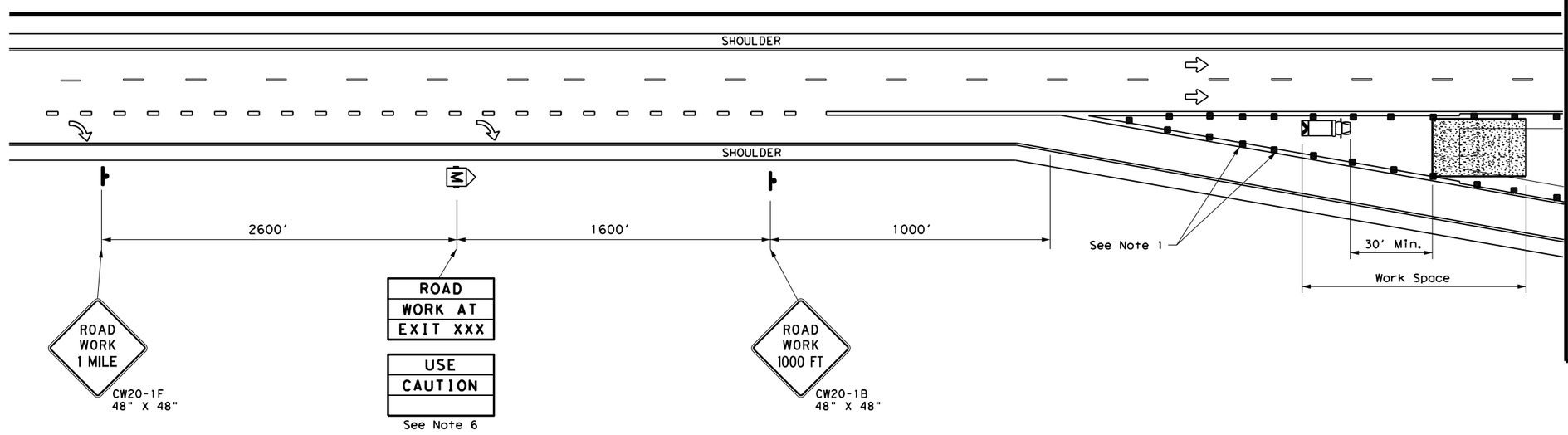
TCP(6-8)-14

FILE: tcp6-8.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0508	01	387	IH 10
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		24

DATE: 9/6/2023 8:20:48 AM
FILE: H:\TrfSignals\Hoi Tran\Harris\0508-01-387 Main.dgn



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

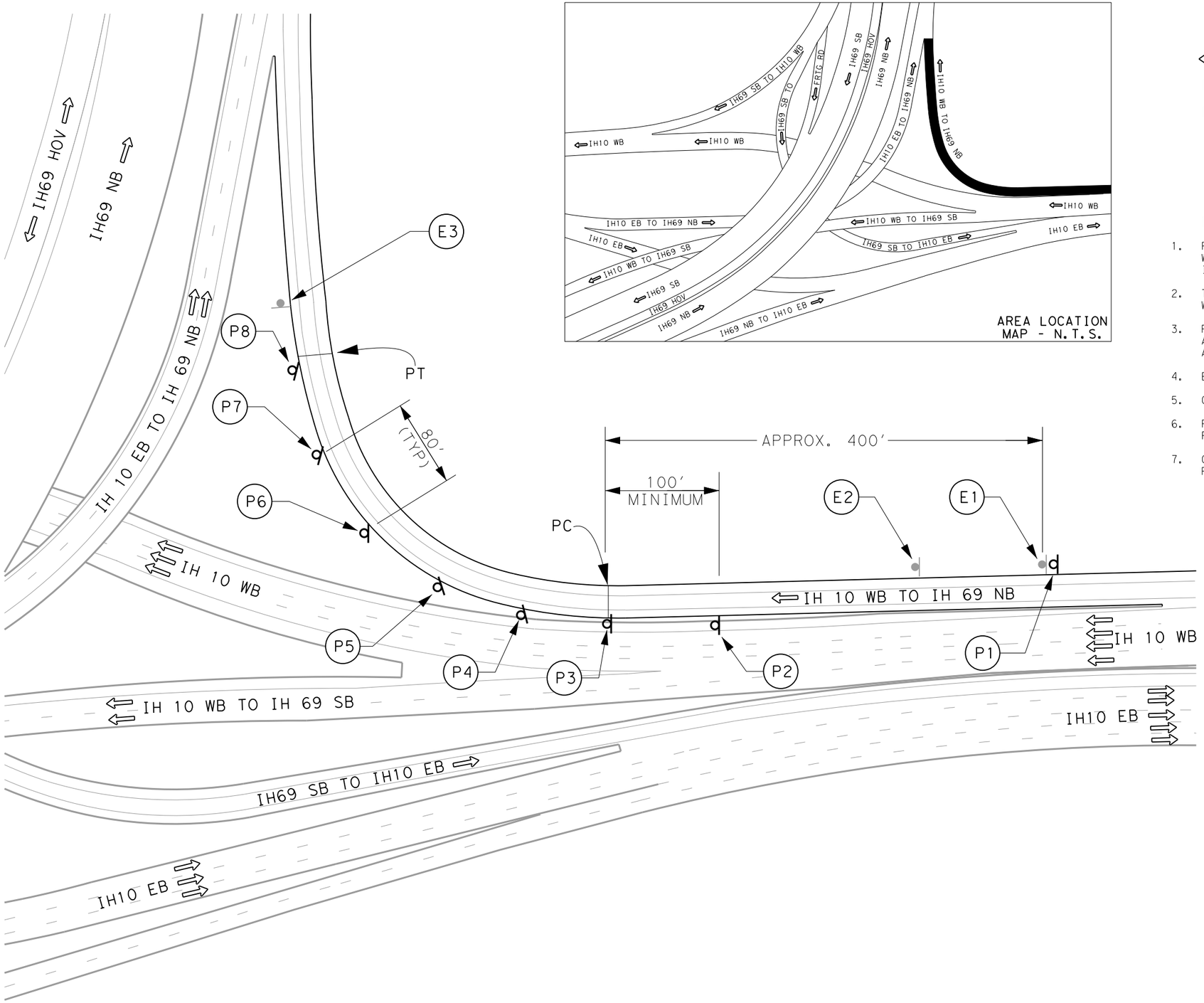
Traffic Operations Division Standard

WORK IN EXIT GORE FOR ADT LESS THAN 10,000

TCP(6-9)-14

FILE: tcp6-9.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0508	01	387	IH 10
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		25

DATE: 9/6/2023 8:20:48 AM
FILE: H:\TrfSignals\Hal Iran\Harris\0508-01-387 Main.dgn



LEGEND

- ⇦ DIRECTION OF TRAFFIC FLOW
- PC POINT OF CURVE
- PT POINT OF TANGENT
- ● EXISTING SIGN ASSEMBLY
- ⊳ PROPOSED SIGN ASSEMBLY

NOTES:

1. REFER TO SPECIAL SPECIFICATION 6354: DYNAMIC LED CURVE WARNING SYSTEM w/LED ADVANCE CURVE WARNING SIGN FOR MORE INFORMATION.
2. THE LOCATION OF SIGNS ARE APPROXIMATE. THE EXACT LOCATION WILL BE DETERMINED BY THE ENGINEER IN THE FIELD.
3. PLACEMENT LOCATION FOR SOLAR PANEL REQUIRES DIRECT SUNLIGHT AND MUST INSTALL AS PER MANUFACTURER'S RECOMMENDATION AND BE APPROVED BY THE ENGINEER IN THE FIELD.
4. EXIT RAMP SPEED LIMIT IS 25 MPH.
5. CURVE ADVISORY SPEED IS 25 MPH.
6. REPAIR OR REPLACE ANY DAMAGES MADE BY THE CONTRACTOR'S FORCES DURING CONSTRUCTION AT NO COST TO THE DEPARTMENT.
7. CONTRACTOR TO UTILIZE TXDOT TCP STANDARDS FOR RAMP CLOSURE PRIOR TO STARTING CONSTRUCTION.

IH 10 WB TO IH 69 NB DIRECT CONNECTOR LED CHEVRONS PROPOSED LAYOUT

0 50 100
SCALE IN FEET
1" = 100'

SHEET 1 OF 2

Texas Department of Transportation

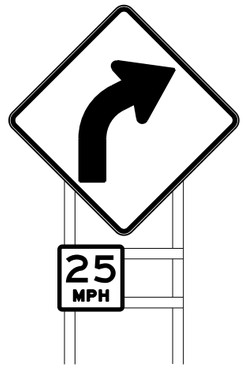
CONT	SECT	JOB	HIGHWAY
0508	01	387	IH 10
DIST	COUNTY		SHEET NO.
HOU	HARRIS		26

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED PROFESSIONAL ENGINEER
P.E.

09/29/2023

DATE: 9/29/2023 8:54:20 AM
FILE: H:\Traffic Signals\Hai Tran\Harris\0508-01-387 Main.dgn

EXISTING
SIGN ASSEMBLY
(TO BE REMOVED)

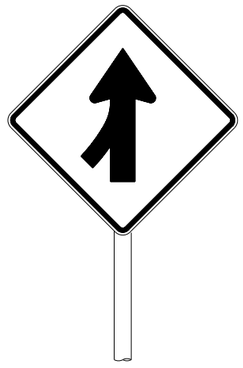


E1

EXISTING
SIGN ASSEMBLY
(TO REMAIN)

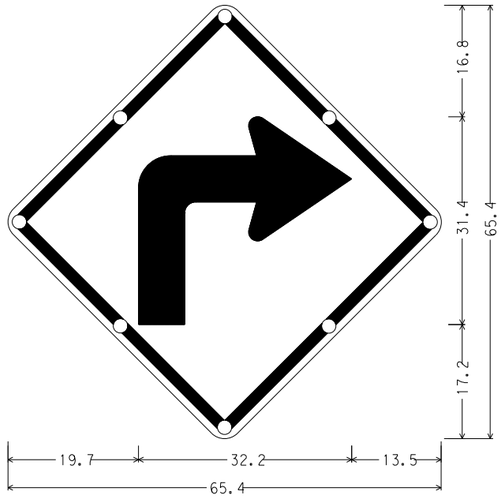
E2

EXISTING
SIGN ASSEMBLY
(TO REMAIN)



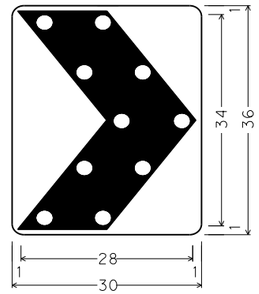
E3

PROPOSED
TURN (RIGHT) SIGN
w/EMBEDDED LED



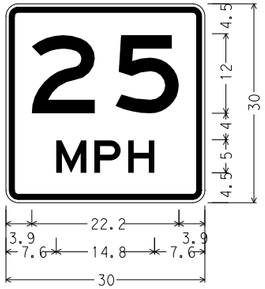
W1-1R (48"x48");
48.0" across sides 3.0" Radius, 1.3" Border,
0.8" Indent, Black on, Yellow;
Arrow CW1-1;

PROPOSED
CHEVRON (RIGHT) SIGN
w/EMBEDDED LED



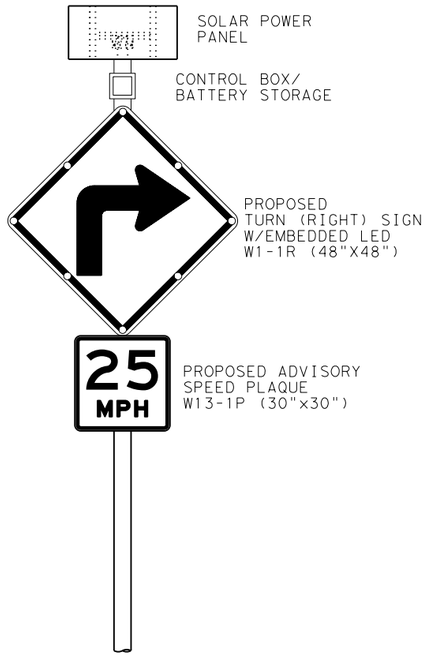
W1-8R (30"x36");
1.9" Radius, No border,
Yellow;

PROPOSED
ADVISORY SPEED
PLAQUE



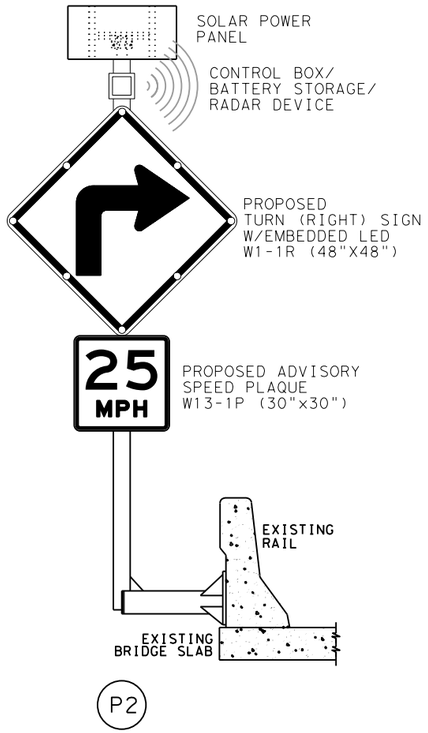
W13-1P (30"x30");
1.9" Radius, 0.8" Border,
0.5" Indent, Black on, Yellow;
"25", E;
"MPH", E 87% spacing;

PROPOSED
SOLAR-POWERED
LED ROADSIDE
SIGN ASSEMBLY



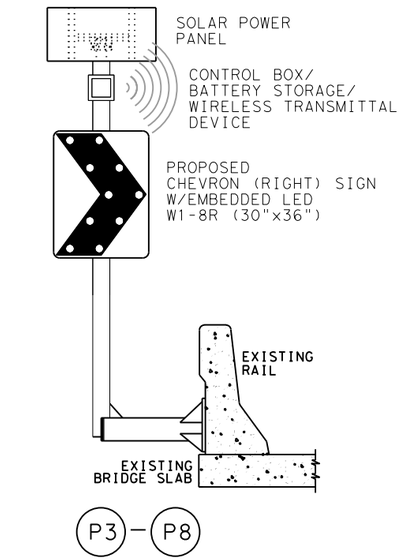
P1

PROPOSED
SOLAR-POWERED
LED LEAD CURVE
WARNING SIGN ASSEMBLY



P2

PROPOSED
SOLAR-POWERED
LED CHEVRON
SIGN ASSEMBLY



P3 – P8

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER

09/29/2023

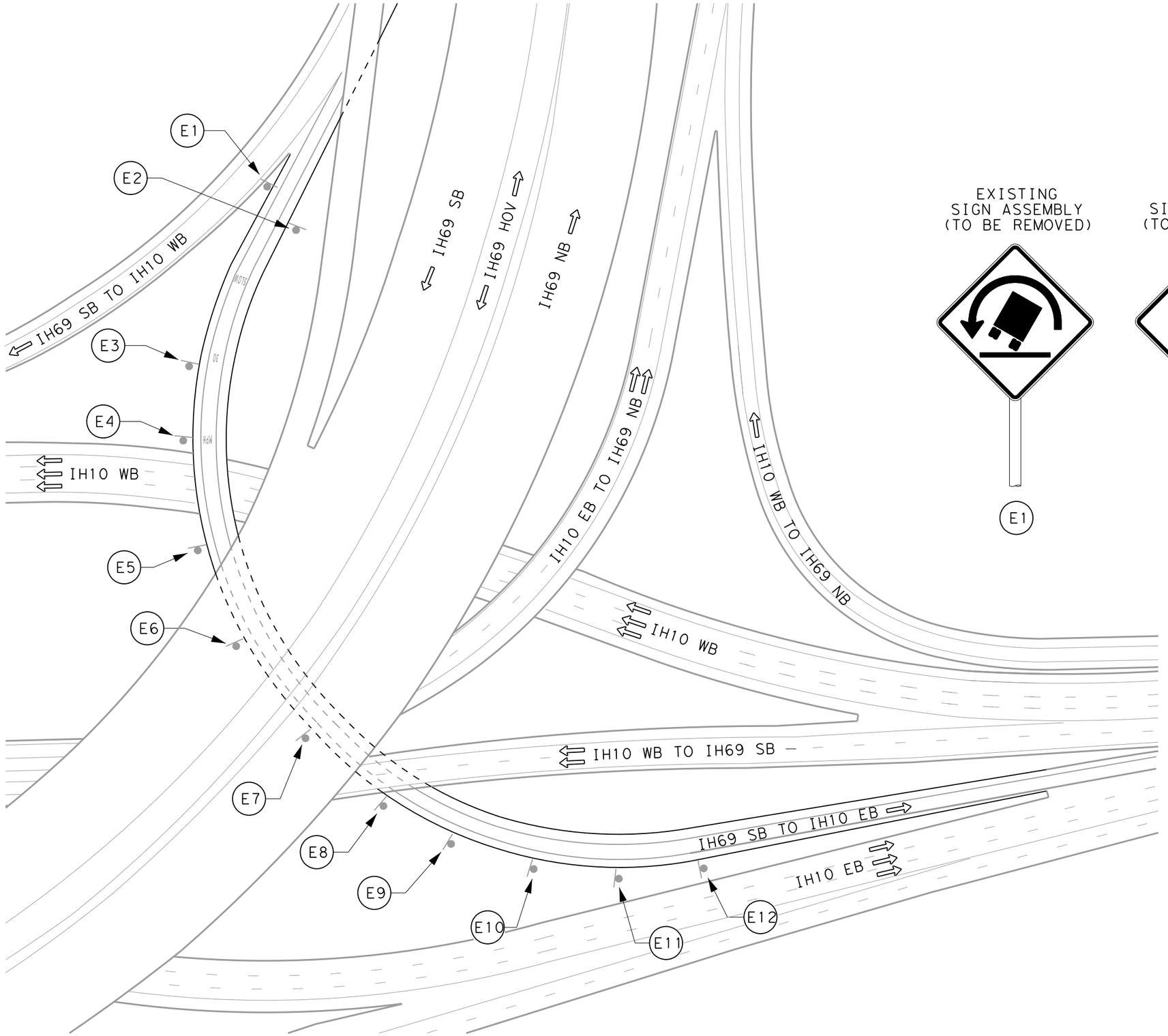
IH 10 WB
TO IH 69 NB
DIRECT CONNECTOR
LED CHEVRONS
PROPOSED LAYOUT

SHEET 2 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0508	01	387	IH 10
DIST	COUNTY		SHEET NO.
HOU	HARRIS		27

DATE: 9/29/2023 8:54:23 AM
FILE: H:\Trf\Signals\Hai Tran\Harris\0508-01-387 Main.dgn



LEGEND

⇦ DIRECTION OF TRAFFIC FLOW

● EXISTING SIGN ASSEMBLY

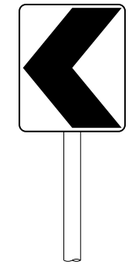
EXISTING SIGN ASSEMBLY (TO BE REMOVED)

E1

EXISTING SIGN ASSEMBLY (TO BE REMOVED)

E2

EXISTING SIGN ASSEMBLIES (TO BE REMOVED)



E3 - E12

IH 69 SB
TO IH 10 EB
DIRECT CONNECTOR
LED CHEVRONS
EXISTING LAYOUT

0 50 100
SCALE IN FEET
1" = 100'

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER

P.E.

09/29/2023

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0508	01	387	IH 10
DIST	COUNTY		SHEET NO.
HOU	HARRIS		28

DATE: 9/29/2023 8:54:23 AM
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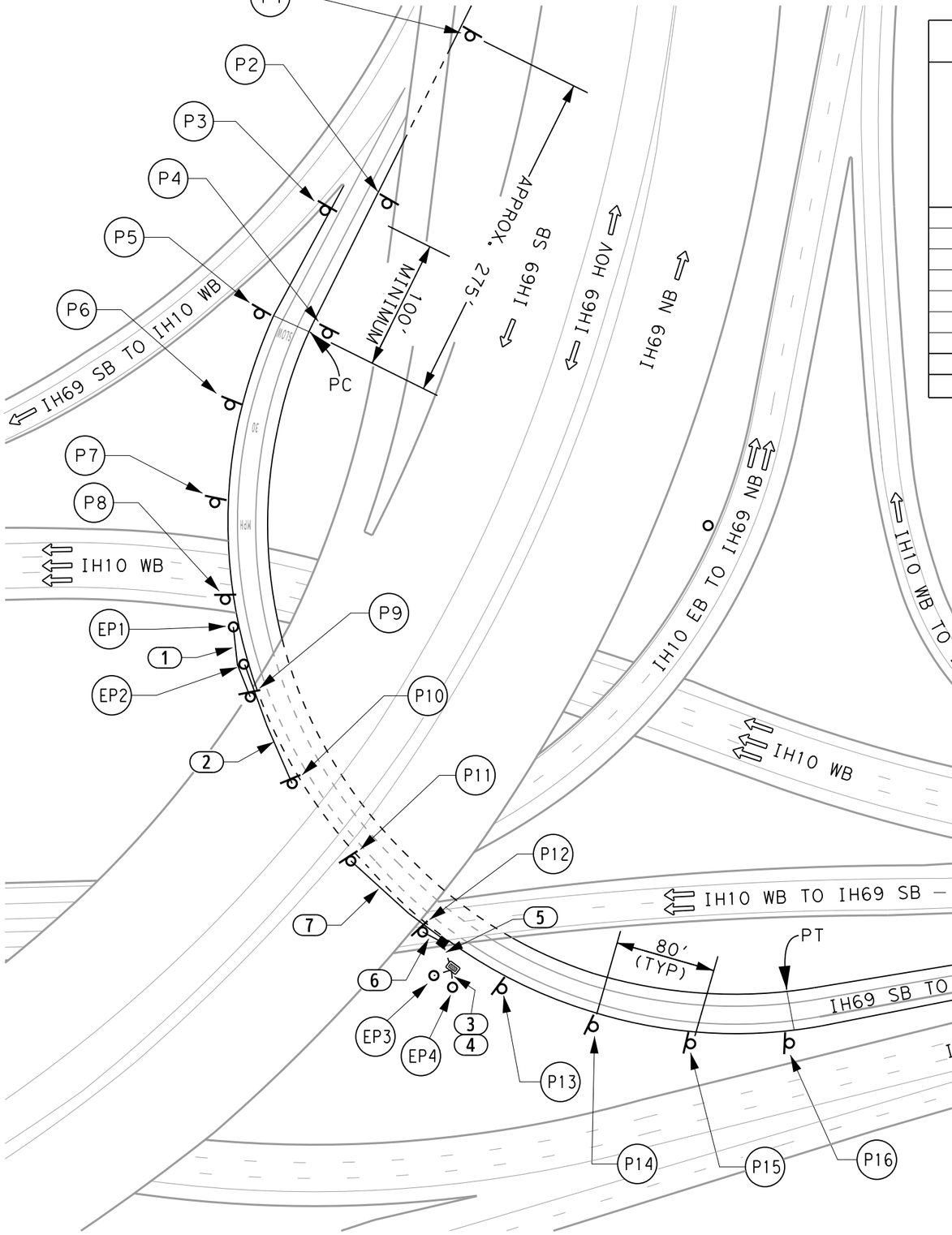


CONDUIT AND CONDUCTOR RUNS								
RUN NO.	CONDUIT (618)				CONDUCTORS (620)			
	PVC		RM		POWER		GROUND	
	2" (SCHD 80) (6046)		2" (6070)		#12 INSULATED (6004)		#12 BARE (6003)	
	NO. EA	TRENCH LF	NO. EA	LENGTH LF	NO. EA	LENGTH LF	NO. EA	LENGTH LF
1			1	60	1	60	1	60
2			1	100	1	100	1	100
3	1	10			1	10	1	10
4	1	10			1	10	1	10
5	1	10			2	10	1	10
6			1	20	1	20	1	20
7			1	100	1	100	1	100
TOTAL (LF)		30		280		320		310
EST. TOTAL		35		295		340		330

LEGEND

- DIRECTION OF TRAFFIC FLOW
- PC POINT OF CURVE
- PT POINT OF TANGENT
- PROPOSED SIGN ASSEMBLY
- PROPOSED ELECTRICAL POLE WITH BATTERY
- PROPOSED GROUND BOX
- PROPOSED JUNCTION BOX
- PROPOSED CONDUIT (TRENCH)
- PROPOSED CONDUIT (RIGID METAL)

NOTES:

1. REFER TO SPECIAL SPECIFICATION 6354: DYNAMIC LED CURVE WARNING SYSTEM w/LED ADVANCE CURVE WARNING SIGN FOR MORE INFORMATION.
2. BEFORE PURCHASING MATERIALS, VERIFY IF THE POLE HEIGHT OF EP1 AND EP2 NEEDS TO BE INCREASED TO ENSURE CLEAR LINE OF SIGHT AND NO OBSTRUCTION TO THE LED CHEVRONS.
3. ENSURE SOLAR PANELS AND BATTERY BOXES OF EP1 AND EP2 ARE INSTALLED TO NOT OBSTRUCT THE SIGHT OF THE LED CHEVRONS OF P9 AND P10.
4. THE LOCATION OF SIGNS ARE APPROXIMATE. THE EXACT LOCATION WILL BE DETERMINED BY THE ENGINEER IN THE FIELD.
5. PLACEMENT LOCATION FOR SOLAR PANEL REQUIRES DIRECT SUNLIGHT AND MUST INSTALL AS PER MANUFACTURER'S RECOMMENDATION AND BE APPROVED BY THE ENGINEER IN THE FIELD.
6. POSTED SPEED LIMIT ON IH 69 SOUTHBOUND IS 60 MPH. CURVE ADVISORY SPEED IS 30 MPH.
7. REPAIR OR REPLACE ANY DAMAGES MADE BY THE CONTRACTOR'S FORCES DURING CONSTRUCTION AT NO COST TO THE DEPARTMENT.
8. CONTRACTOR TO UTILIZE TXDOT TCP STANDARDS FOR RAMP CLOSURE PRIOR TO STARTING CONSTRUCTION.

IH 69 SB TO IH 10 EB DIRECT CONNECTOR LED CHEVRONS PROPOSED LAYOUT

0 50 100
SCALE IN FEET
1" = 100'

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED PROFESSIONAL ENGINEER
P.E.

09/29/2023

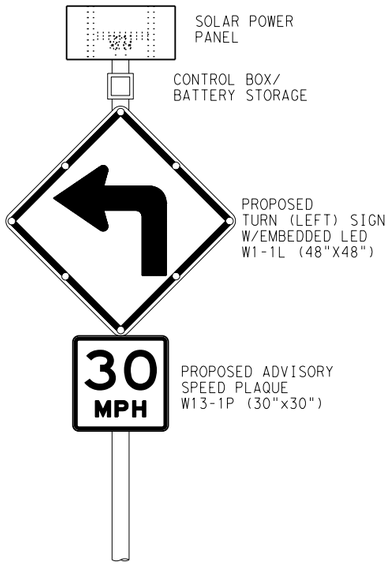
SHEET 1 OF 3

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0508	01	387	IH 10
DIST	COUNTY		SHEET NO.
HOU	HARRIS		29

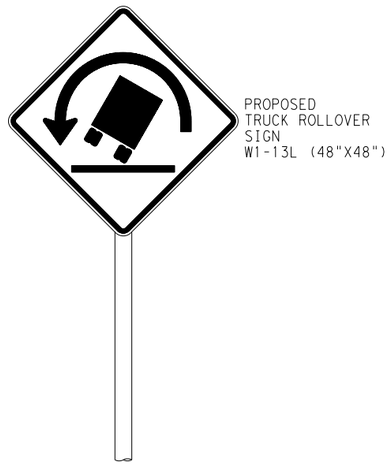
DATE: 9/29/2023 8:55:23 AM
FILE: H:\TrfSignals\Hal Tran\Harris\0508-01-387 Main.dgn

PROPOSED
SOLAR-POWERED
LED ROADSIDE
SIGN ASSEMBLY



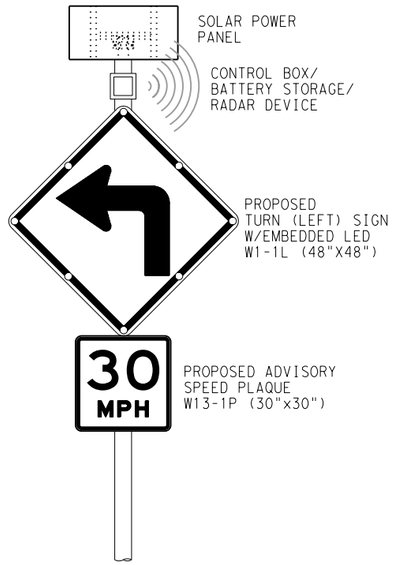
P1

PROPOSED
SIGN ASSEMBLY



P2

PROPOSED
SOLAR-POWERED
LED LEAD CURVE
WARNING SIGN ASSEMBLY

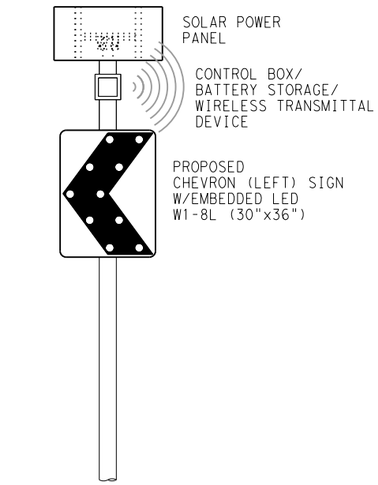


P3

PROPOSED
SIGN ASSEMBLY

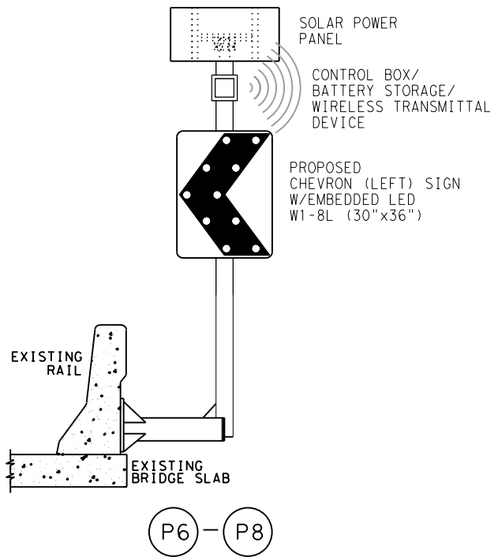
P4

PROPOSED
SOLAR-POWERED
LED CHEVRON
SIGN ASSEMBLIES



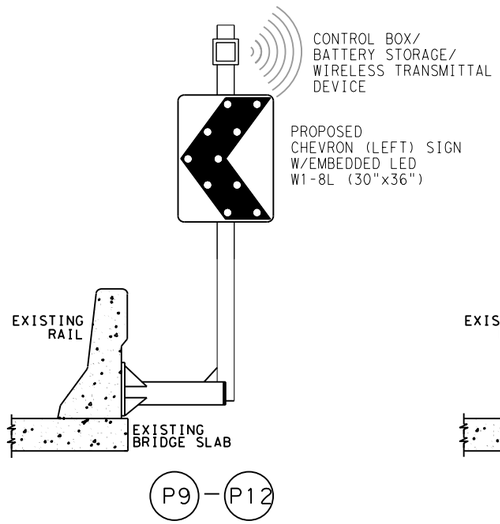
P5, P13 – P16

PROPOSED
SOLAR-POWERED
LED CHEVRON
SIGN ASSEMBLIES



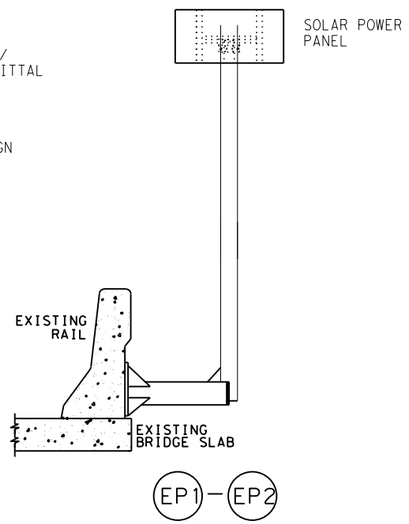
P6 – P8

PROPOSED
SOLAR-POWERED
LED CHEVRON
SIGN ASSEMBLY
WITHOUT SOLAR PANEL



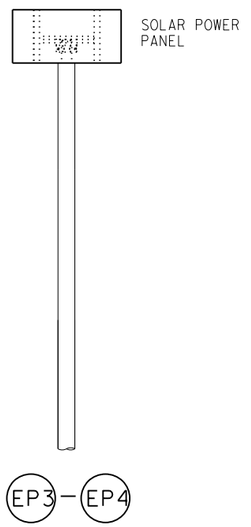
P9 – P12

PROPOSED
ELECTRICAL POLE
WITH
SOLAR PANEL



EP1 – EP2

PROPOSED
ELECTRICAL POLE
WITH
SOLAR PANEL



EP3 – EP4

IH 69 SB
TO IH 10 EB
DIRECT CONNECTOR
LED CHEVRONS
PROPOSED LAYOUT

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER

09/29/2023

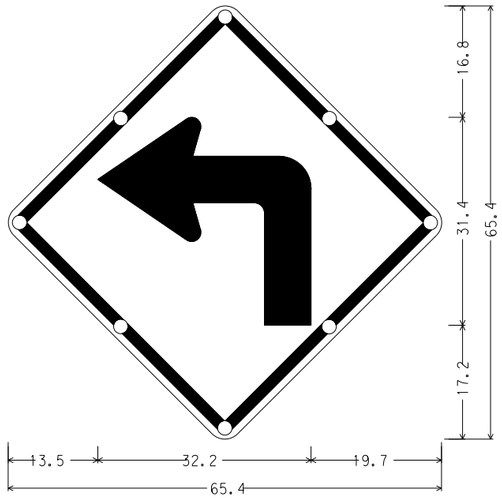
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0508	01	387	IH 10
DIST	COUNTY		SHEET NO.
HOU	HARRIS		30

DATE: 9/29/2023 8:55:52 AM
FILE: H:\Traffic Signals\Hai Tran\Harris\0508-01-387 Main.dgn

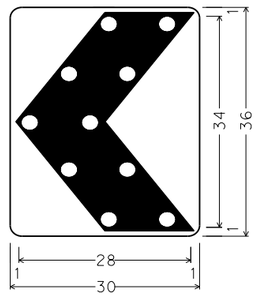
CK:
DW:
CK:
DN:

PROPOSED TURN (LEFT) SIGN w/EMBEDDED LED



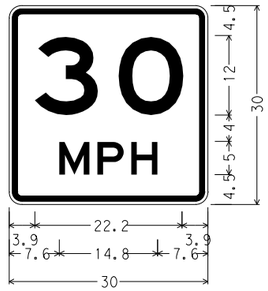
W1-1L (48"x48");
48.0" across sides 3.0" Radius, 1.3" Border,
0.8" Indent, Black on, Yellow;

PROPOSED CHEVRON (LEFT) SIGN w/EMBEDDED LED



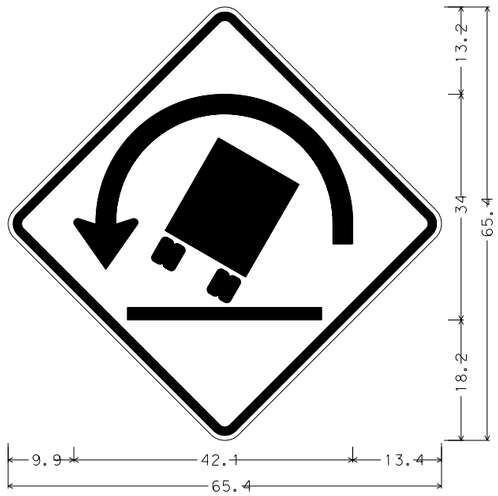
W1-8L (30"x36");
1.9" Radius, No border, Yellow;

PROPOSED ADVISORY SPEED PLAQUE



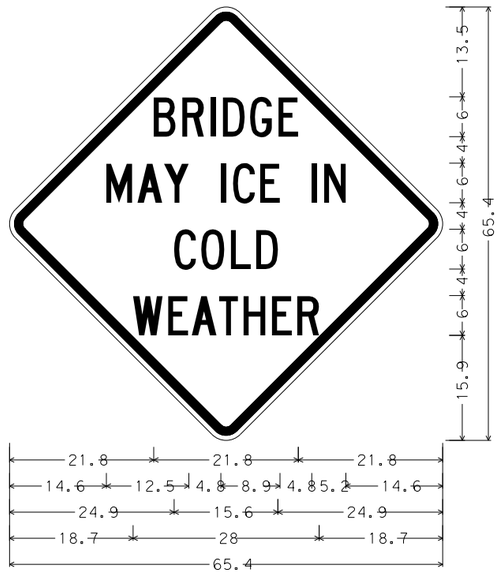
W13-1P (30"x30");
1.9" Radius, 0.8" Border,
0.5" Indent, Black on, Yellow;
"30", E;
"MPH", E 87% spacing;

PROPOSED TRUCK ROLLOVER SIGN



W1-13L (48"X48");
48.0" across sides 3.0" Radius, 1.3" Border,
0.8" Indent, Black on, Yellow;

PROPOSED "BRIDGE MAY ICE IN COLD WEATHER" SIGN



W8-13aT (48"X48")
48.0" across sides 3.0" Radius, 1.3" Border,
0.8" Indent, Black on, Yellow;

DATE: 9/29/2023 8:55:53 AM
FILE: H:\Trf\Signals\Hai Tran\Harris\0508-01-387 Main.dgn

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER
P.E.

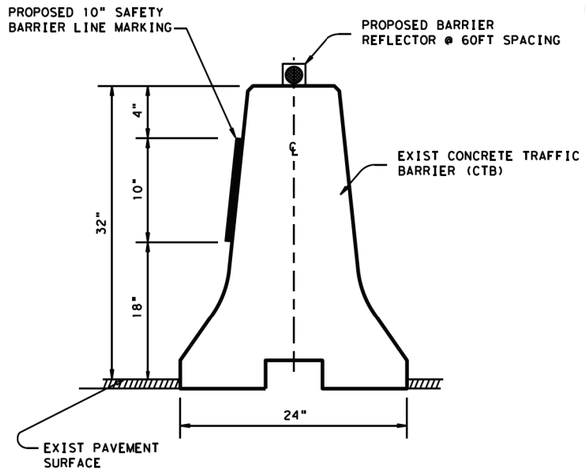
09/29/2023

IH 69 SB TO IH 10 EB DIRECT CONNECTOR LED CHEVRONS PROPOSED LAYOUT

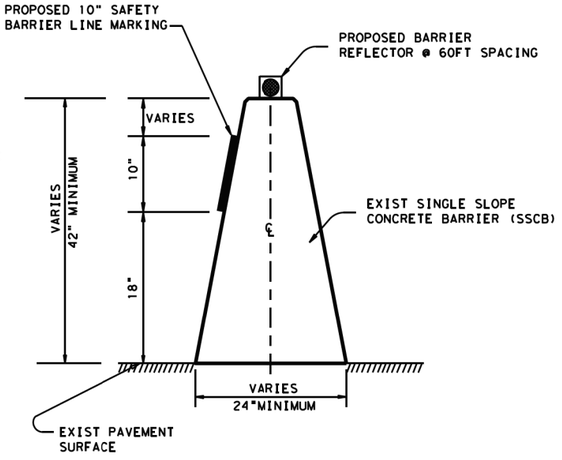
SHEET 3 OF 3

Texas Department of Transportation

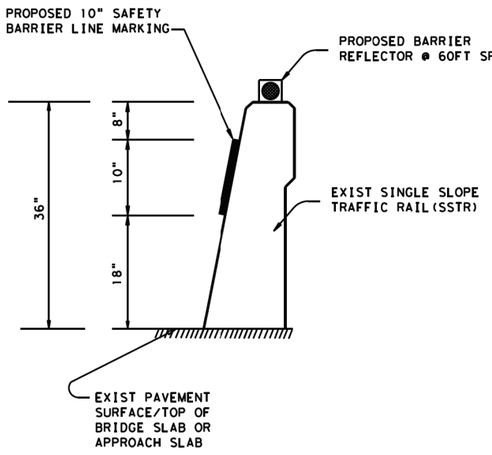
CONT	SECT	JOB	HIGHWAY
0508	01	387	IH 10
DIST	COUNTY		SHEET NO.
HOU	HARRIS		31



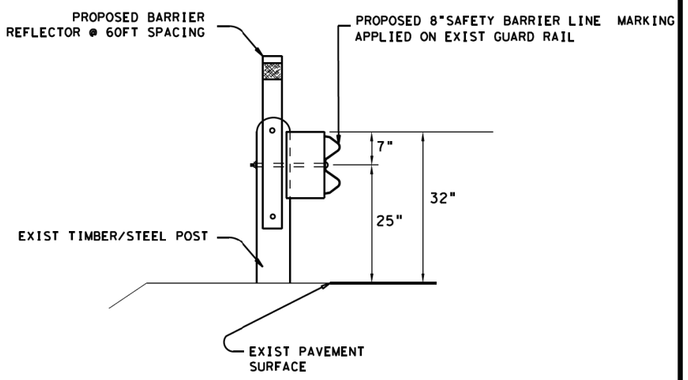
CONCRETE TRAFFIC BARRIER (CTB)



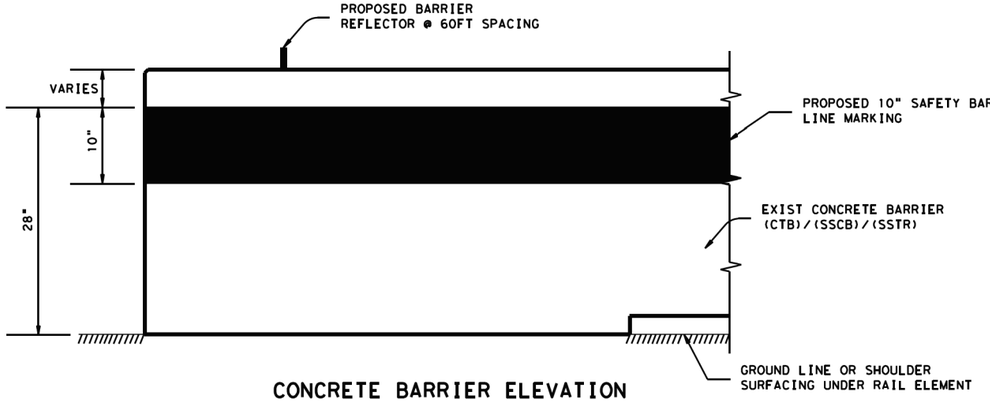
SINGLE SLOPE CONCRETE BARRIER (SSCB)



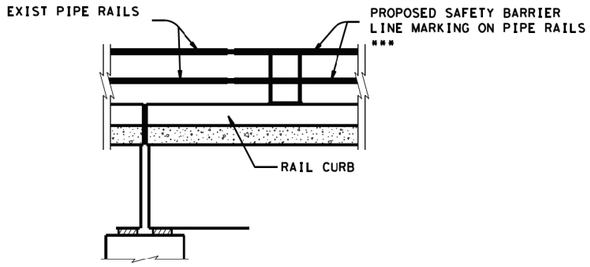
SINGLE SLOPE TRAFFIC RAIL (SSTR)



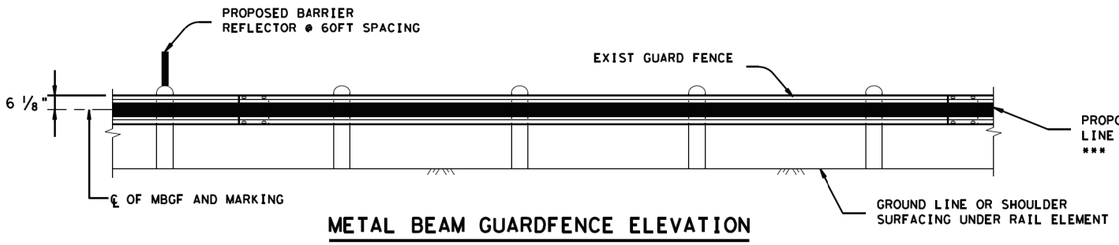
TIMBER/STEEL POST GUARDFENCE



CONCRETE BARRIER ELEVATION (CTB)/(SSCB)/(SSTR)



PIPE RAIL ELEVATION



METAL BEAM GUARDFENCE ELEVATION

NOTE:

1. SAFETY BARRIER LINE MARKING TO BE APPLIED ON THE INSIDE FACE OF BARRIER ON BOTH SIDES OF THE DIRECT CONNECTOR.
2. APPLY WHITE SAFETY BARRIER LINE MARKING AND BARRIER REFLECTORS ON THE RIGHT SIDE AND YELLOW SAFETY BARRIER LINE MARKING AND BARRIER REFLECTORS ON THE LEFT SIDE BARRIER TO THE DIRECTION OF TRAVEL UNLESS OTHERWISE SHOWN IN THE PLAN.
3. FOR COORDINATES OF BEGINNING AND ENDING POINTS OF SAFETY BARRIER LINE MARKINGS, REFER SUMMARY OF LOCATIONS SHEETS.
4. APPLY BARIER SAFETY LINE MARKINGS ON CIRCUMFERENCE OF PIPE RAILS. THE UNIT PRICE FOR BARRIER SAFETY MARKING FOR LINEAR FOOT OF RAIL INCLUDES PAINITING OF ALL PIPE RAILS FOR THE RAIL SEGMENT.

*** APPLY ANTI-RUST COAT ON PIPE RAILS AND METAL BEAM GUARDFENCE BEFORE PLACING BARRIER SAFETY MARKINGS. THIS WORK IS INCIDENTAL TO RELEVANT BID ITEMS.

STATE OF TEXAS
ZENA S. HAILU
123451
LICENSED PROFESSIONAL ENGINEER

9/28/2023

TEXAS DEPARTMENT OF TRANSPORTATION

TYPICAL SAFETY BARRIER REFLECTIVE LINE MARKING APPLICATION

SCALE: NTS

SHEET 1 OF 1

ORIGINAL DRAWING DATE: JUNE, 2023	STATE DISTRICT	FEDERAL REGION	PROJECT NO	SHEET
REVISIONS	HOU	6		32
	COUNTY	CONTROL	SECTION	JOB	HIGHWAY
	HARRIS	0508	01	387	IH 10

DATE:
FILE:

S. No.	Approximate Interchange Location	Interchange	Connectror Identification	Direction from	Direction to	Total Leftt Barrier(ft)	Total Right Barrier(ft)	CB L	CB R	FB L	FB R	P L	P R	Limits			
														START		END	
1	29°46'51.19"N 95°27'13.83"W	IH10W - 610 (W Loop FWY)	C-1	IH10 EB	IH610 NB	**2240**	**2320**	2240	2320	0	0	0	0	**29°46'56.50"**	**95°27'26.40"**	**29°46'58.00"**	**95°27'6.00"W**
			C-2	IH10 EB	IH610 SB	**1370**	**1330**	1370	1330	0	0	0	0	**29°46'56.50"**	**95°27'26.40"**	**29°46'45.00"**	**95°27'20.40"W**
			C-3	IH10 WB	IH610 NB	**1100**	**1060**	1100	1060	0	0	0	0	**29°46'47.80"**	**95°27'3.80"W**	**29°46'58.00"**	**95°27'6.00"W**
			C-4	IH10 WB	IH610 SB	**1670**	**1750**	1670	1750	0	0	0	0	**29°46'47.80"**	**95°27'3.80"W**	**29°46'45.00"**	**95°27'20.40"W**
			C-5	IH610 NB	IH10 EB	**910**	**880**	910	880	0	0	0	0	**29°46'42.00"**	**95°27'17.40"**	**29°46'43.80"**	**95°27'8.00"W**
			C-6	IH610 NB	IH10 WB	**1590**	**1660**	1590	1660	0	0	0	0	**29°46'42.00"**	**95°27'17.40"**	**29°46'56.00"**	**95°27'18.50"W**
			C-7	IH610 SB	IH10 EB	**1630**	**1700**	1630	1700	0	0	0	0	**29°46'58.00"**	**95°27'11.00"**	**29°46'43.80"**	**95°27'8.00"W**
			C-8	IH610 SB	IH10 WB	**740**	**670**	740	670	0	0	0	0	**29°46'58.00"**	**95°27'11.00"**	**29°46'56.00"**	**95°27'18.50"W**
2	29°43'42.89"N 95°27'37.85"W	IH69- IH610 (W Loop FWY)	C-1	IH69NB	IH610SB	**1640**	**1590**	1640	1590	0	0	0	0	**29°43'37.90"**	**95°27'47.60"**	**29°43'26.00"**	**95°27'38.00"W**
			C-2	IH69NB	IH610NB	**1950**	**2020**	1950	2020	0	0	0	0	**29°43'37.90"**	**95°27'47.60"**	**29°43'52.10"**	**95°27'34.70"W**
			C-3	IH69SB	IH610NB	**1000**	**950**	1000	950	0	0	0	0	**29°43'48.60"**	**95°27'25.50"**	**29°43'52.10"**	**95°27'34.70"W**
			C-4	IH69SB	IH610SB	**2320**	**2370**	2320	2370	0	0	0	0	**29°43'48.60"**	**95°27'25.50"**	**29°43'32.50"**	**95°27'38.20"W**
			C-5	IH610SB	IH69NB	**3610**	**3680**	3610	3680	0	0	0	0	**29°43'59.80"**	**95°27'36.00"**	**29°43'47.30"**	**95°27'7.60"W**
			C-6	IH610SB	IH69SB	**2470**	**2410**	2470	2410	0	0	0	0	**29°43'60.00"**	**95°27'36.70"**	**29°43'40.20"**	**95°27'50.00"W**
			C-7	IH610SB	IH69SB	**600**	**590**	600	590	0	0	0	0	**29°43'57.50"**	**95°27'36.40"**	**29°43'51.20"**	**95°27'39.00"W**
			C-8	IH610NB	IH69NB	**2420**	**2500**	2180	2500	240	0	0	0	**29°43'28.20"**	**95°27'36.20"**	**29°43'47.00"**	**95°27'22.00"W**
			C-9	IH610NB	IH69SB	**4490**	**4550**	4490	4550	0	0	0	0	**29°43'18.80"**	**95°27'35.80"**	**29°43'35.30"**	**95°28'9.30"W**
3	29°40'46.08"N 95°27'29.73"W	IH610-S Post Oak Rd	C-1	S Post Oak NB	IH610(Wloop)NB	**2340**	**1850**	2340	1670	0	180	0	0	**29°40'35.10"**	**95°27'33.60"**	**29°40'59.70"**	**95°27'31.90"W**
			C-2	IH610(WLoop)SB	S Post Oak SB	**1970**	**1960**	1970	1960	0	0	0	0	**29°40'55.90"**	**95°27'32.60"**	**29°40'36.80"**	**95°27'34.00"W**
			C-3	S Post Oak NB	IH610(SLoop)EB	**1650**	**1630**	1490	1470	160	160	0	0	**29°40'35.10"**	**95°27'33.60"**	**29°40'44.40"**	**95°27'17.10"W**
			C-4	IH610(SLoop)WB	S Post Oak SB	**1730**	**1760**	1730	1760	0	0	0	0	**29°40'45.30"**	**95°27'19.30"**	**29°40'36.80"**	**95°27'34.00"W**
4	29°40'51.61"N 95°22'51.36"W	IH610(SLoop)-SH288	C-1	IH610(SLoop)EB	SH288NB	**2010**	**2230**	2010	2230	0	0	0	0	**29°40'49.00"**	**95°23'4.00"W**	**29°41'1.00"N**	**95°22'46.40"W**
			C-2	IH610(SLoop)EB	SH288SB	**1070**	**1020**	1070	1020	0	0	0	0	**29°40'49.00"**	**95°23'4.00"W**	**29°40'42.20"**	**95°22'55.60"W**
			C-3	IH610(SLoop)WB	SH288SB	**2280**	**2330**	2280	2330	0	0	0	0	**29°40'52.30"**	**95°22'35.80"**	**29°40'42.20"**	**95°22'55.60"W**
			C-4	IH610(SLoop)WB	SH288NB	**1440**	**1400**	1440	1400	0	0	0	0	**29°40'52.30"**	**95°22'35.80"**	**29°41'1.00"N**	**95°22'46.40"W**
			C-5	SH288NB	IH610(SLoop)EB	**1740**	**1690**	1740	1690	0	0	0	0	**29°40'41.80"**	**95°22'52.00"**	**29°40'49.50"**	**95°22'36.20"W**
			C-6	SH288NB	IH610(SLoop)WB	**1530**	**1610**	1530	1610	0	0	0	0	**29°40'41.80"**	**95°22'52.00"**	**29°40'52.30"**	**95°23'2.30"W**
			C-7	SH288SB	IH610(SLoop)WB	**1360**	**1310**	1360	1310	0	0	0	0	**29°41'0.80"N**	**95°22'51.60"**	**29°40'52.30"**	**95°23'2.30"W**
			C-8	SH288SB	IH610(SLoop)EB	**1890**	**2190**	1890	2190	0	0	0	0	**29°41'0.80"N**	**95°22'51.60"**	**29°40'49.50"**	**95°22'36.20"W**
5	29°41'50.27"N 95°17'19.97"W	IH610(SLoop)-IH45	C-1	IH610(SLoop) EB	IH45NB	**4840**	**4930**	4840	4930	0	0	0	0	**29°41'44.50"**	**95°18'5.90"W**	**29°42'2.30"N**	**95°17'34.10"W**
			C-2	IH610(SLoop) EB	IH45SB	**950**	**920**	890	860	60	60	0	0	**29°41'47.40"**	**95°17'25.60"**	**29°41'44.10"**	**95°17'16.00"W**
			C-3	IH610(SLoop) WB	IH45NB	**720**	**930**	0	0	720	930	0	0	**29°41'54.60"**	**95°17'6.90"W**	**29°41'55.00"**	**95°17'23.50"W**
			C-4	IH610(SLoop) WB	IH45SB	**2010**	**2000**	1750	2000	260	0	0	0	**29°41'56.90"**	**95°17'2.10"W**	**29°41'38.80"**	**95°17'9.50"W**
			C-5	IH45NB	IH610(SLoop) EB	**520**	**830**	340	220	180	610	0	0	**29°41'40.60"**	**95°17'8.20"W**	**29°41'52.50"**	**95°17'5.70"W**
			C-6	IH45NB	IH610(SLoop) WB	**1000**	**1030**	1000	1030	0	0	0	0	**29°41'44.70"**	**95°17'13.30"**	**29°41'49.30"**	**95°17'23.00"W**
			C-7	IH45SB	IH610(SLoop) WB	**3200**	**3680**	3200	3680	0	0	0	0	**29°42'3.50"N**	**95°17'39.30"**	**29°41'45.00"**	**95°17'54.80"W**
			C-8	IH45SB	IH610(SLoop) EB	**1170**	**990**	1170	830	0	160	0	0	**29°41'48.20"**	**95°17'21.60"**	**29°41'50.70"**	**95°17'9.50"W**
6	29°42'34.73"N 95°16'3.82"W	IH610(SLoop)-SH225	C-1	IH610(SLoop) EB	SH225EB	**470**	**220**	350	130	120	90	0	0	**29°42'30.40"**	**95°16'6.70"W**	**29°42'30.20"**	**95°15'44.60"W**
			C-2	IH610(SLoop) EB	SH225WB	**2440**	**2520**	2100	2150	340	370	0	0	**29°42'26.20"**	**95°16'14.60"**	**29°42'39.90"**	**95°16'16.60"W**
			C-3	IH610(Eloop) SB	SH225WB	**1110**	**200**	60	70	1050	130	0	0	**29°42'42.40"**	**95°15'59.50"**	**29°42'40.00"**	**95°16'13.40"W**
			C-4	IH610(Eloop) SB	SH225EB	**1860**	**1920**	1860	1920	0	0	0	0	**29°42'49.20"**	**95°15'59.40"**	**29°42'32.90"**	**95°15'54.70"W**
			C-5	SH225EB	IH610(ELoop) NB	**1340**	**1290**	610	640	730	650	0	0	**29°42'36.70"**	**95°16'15.00"**	**29°42'41.50"**	**95°15'57.30"W**
			C-6	SH225EB	IH610(SLoop) SB	**1220**	**1300**	490	550	730	750	0	0	**29°42'39.50"**	**95°16'21.20"**	**29°42'27.60"**	**95°16'16.30"W**
			C-7	SH225WB	IH610(ELoop) NB	**980**	**1420**	760	1420	220	0	0	0	**29°42'32.30"**	**95°15'46.10"**	**29°42'41.50"**	**95°15'57.30"W**
			C-8	SH225WB	IH610(SLoop) SB	**1160**	**1070**	1160	1070	0	0	0	0	**29°42'33.90"**	**95°15'57.20"**	**29°42'31.00"**	**95°16'9.60"W**

CBL- Concrete Barrier on Left Side
CBR- Concrete Barrier on Right Side
FBL- Flexible Barrier on Left Side
FBR- Flexible Barrier on Right Side
PL- Pipe Rail on Left Side

TEXAS DEPARTMENT OF TRANSPORTATION

SUMMARY OF LOCATIONS FOR DIRECT CONNECTORS

SCALE: N. T. S. SHEET 1 OF 2

ORIGINAL DRAWING DATE: JUNE, 2023	STATE DISTRICT	FEDERAL REGION	PROJECT NO	SHEET
REVISIONS	HOU	6		33
	COUNTY	CONTROL	SECTION	JOB	HIGHWAY
	HARRIS	0508	01	387	IH 10

DATE:
FILE:

S. No.	Approximate Interchange Location	Interchange	Connectror Identification	Direction from	Direction to	Total Lefft Barrier(ft)	Total Right Barrier(ft)	CB L	CB R	FB L	FB R	P L	P R	Limits START		Limits END	
7	29°46'31.46"N 95 °15'50.04"W	IH10E - 610 (E Loop FWY)	C-1	IH10 EB	IH610 NB	**1340**	**1270**	700	720	640	550	0	0	**29°46'31.90"**	**95°16'0.20"W**	**29°46'44.70"**	**95°15'45.20"W**
			C-2	IH10 EB	IH610 SB	**0**	**0**	0	0	0	0	0	0	**29°46'31.90"**	**95°16'0.20"W**	**29°46'25.20"**	**95°15'54.90"W**
			C-3	IH10 WB	IH610 NB	**990**	**160**	0	0	990	160	0	0	**29°46'28.70"**	**95°15'23.40"**	**29°46'44.70"**	**95°15'45.20"W**
			C-4	IH10 WB	IH610 SB	**840**	**880**	0	160	190	40	650	680	**29°46'32.90"**	**95°15'35.90"**	**29°46'25.20"**	**95°15'54.90"W**
			C-5	IH610 NB	IH10 EB	**0**	**210**	0	0	0	210	0	0	**29°46'24.80"**	**95°15'41.50"**	**29°46'26.40"**	**95°15'19.50"W**
			C-6	IH610 NB	IH10 WB	**1340**	**1310**	0	0	240	190	1100	1120	**29°46'21.60"**	**95°15'49.60"**	**29°46'36.00"**	**95°16'1.00"W**
			C-7	IH610 SB	IH10 EB	**1510**	**1910**	0	200	180	300	1330	1410	**29°46'43.30"**	**95°15'51.00"**	**29°46'28.60"**	**95°15'33.60"W**
			C-8	IH610 SB	IH10 WB	**0**	**0**	0	0	0	0	0	0	**29°46'43.30"**	**95°15'51.00"**	**29°46'36.00"**	**95°16'1.00"W**
			C-9	IH10 EB	US90 EB	**4790**	**4870**	4790	4870	0	0	0	0	**29°46'33.60"**	**95°16'3.90"W**	**29°46'38.30"**	**95°15'16.00"W**
			C-10	IH610NB	US90 EB	**220**	**750**	0	510	220	240	0	0	**29°46'21.60"**	**95°15'49.60"**	**29°46'26.10"**	**95°15'34.90"W**
			C-11	US90WB	IH610SB	**2150**	**860**	2150	770	0	90	0	0	**29°46'36.90"**	**95°15'18.50"**	**29°46'34.20"**	**95°15'45.70"W**
			C-12	US90WB	IH10W	**1980**	**1540**	1980	1540	0	0	0	0	**29°46'36.90"**	**95°15'18.50"**	**29°46'31.00"**	**95°15'37.80"W**
8	29°48'29.94"N 95 °20'9.34"W	IH69 - 610 (N Loop FWY)	C-1	IH69 NB	IH610 EB	**850**	**750**	510	500	340	250	0	0	**29°48'23.40"**	**95°20'12.20"**	**29°48'28.50"**	**95°19'59.40"W**
			C-2	IH69NB	IH610 WB	**3530**	**3630**	3530	3630	0	0	0	0	**29°48'10.80"**	**95°20'21.40"**	**29°48'34.50"**	**95°20'24.70"W**
			C-3	IH69SB	IH610 EB	**1730**	**2290**	1640	1950	90	340	0	0	**29°48'43.10"**	**95°20'8.00"W**	**29°48'28.70"**	**95°19'51.30"W**
			C-4	IH69SB	IH610 WB	**290**	**280**	130	0	160	280	0	0	**29°48'35.40"**	**95°20'8.20"W**	**29°48'31.70"**	**95°20'14.70"W**
			C-5	IH610 EB	IH69NB	**2400**	**2510**	2400	2230	0	280	0	0	**29°48'31.20"**	**95°20'22.60"**	**29°48'41.20"**	**95°20'5.50"W**
			C-6	IH610 EB	IH69SB	**2600**	**2510**	2600	2500	0	0	0	0	**29°48'33.00"**	**95°20'26.30"**	**29°48'11.40"**	**95°20'24.00"W**
			C-7	IH610 WB	IH69NB	**610**	**730**	380	350	230	380	0	0	**29°48'30.30"**	**95°20'1.40"W**	**29°48'35.50"**	**95°20'6.40"W**
			C-8	IH610 WB	IH69SB	**2390**	**2560**	2160	2200	230	360	0	0	**29°48'30.60"**	**95°19'51.80"**	**29°48'22.50"**	**95°20'18.60"W**
9	29°48'50.21"N 95 °22'31.77"W	IH45 - 610 (N Loop FWY)	C-1	IH45 NB	IH610 EB	**0**	**370**	0	270	0	100	0	0	**29°48'44.00"**	**95°22'26.00"**	**29°48'49.00"**	**95°22'18.30"W**
			C-2	IH45NB	IH610 WB	**830**	**710**	200	0	630	710	0	0	**29°48'39.40"**	**95°22'26.50"**	**29°48'51.50"**	**95°22'44.40"W**
			C-3	IH45SB	IH610 EB	**450**	**540**	0	0	450	540	0	0	**29°48'57.90"**	**95°22'37.20"**	**29°48'49.00"**	**95°22'18.30"W**
			C-4	IH45SB	IH610 WB	**160**	**750**	0	480	160	270	0	0	**29°49'1.00"N**	**95°22'37.20"**	**29°48'51.50"**	**95°22'44.40"W**
			C-5	IH610 EB	IH45NB	**1400**	**1110**	1070	930	330	180	0	0	**29°48'50.40"**	**95°22'44.40"**	**29°48'57.50"**	**95°22'31.50"W**
			C-6	IH610 EB	IH45SB	**0**	**1120**	0	770	0	350	0	0	**29°48'50.40"**	**95°22'44.40"**	**29°48'39.90"**	**95°22'28.60"W**
			C-7	IH610 WB	IH45NB	**0**	**1150**	0	800	0	350	0	0	**29°48'50.60"**	**95°22'18.30"**	**29°49'2.80"N**	**95°22'36.10"W**
			C-8	IH610 WB	IH45SB	**960**	**1290**	840	780	120	510	0	0	**29°48'52.00"**	**95°22'26.90"**	**29°48'42.50"**	**95°22'30.20"W**
10	29°48'6.39"N 95 °27'0.03"W	US290-IH610	C-1	US290EB	IH610 NB	**2160**	**2240**	2160	2240	0	0	0	0	**29°48'16.60"**	**95°27'11.00"**	**29°48'14.30"**	**95°26'50.80"W**
			C-2	US290EB	IH610 SB	**3250**	**3250**	3250	3250	0	0	0	0	**29°48'16.60"**	**95°27'11.00"**	**29°47'47.20"**	**95°27'3.20"W**
			C-3	US290EB	IH10	**2400**	**2380**	2400	2380	0	0	0	0	**29°48'16.60"**	**95°27'11.00"**	**29°47'54.00"**	**95°27'3.70"W**
			C-4	IH610 (N Loop) W	IH10	**1450**	**1470**	1450	1470	0	0	0	0	**29°48'7.50"N**	**95°26'59.30"**	**29°47'54.00"**	**95°27'3.70"W**
			C-5	IH610WB	US290WB	**1170**	**1120**	1170	1120	0	0	0	0	**29°48'14.30"**	**95°26'55.80"**	**29°48'15.60"**	**95°27'7.60"W**
			C-6	IH610 (N Loop) W	W Loop FWY/IH10	**2800**	**2810**	2800	2810	0	0	0	0	**29°47'49.70"**	**95°27'5.30"W**	**29°48'14.20"**	**95°26'54.20"W**
			C-7	IH10	US290WB	**2340**	**2380**	2340	2380	0	0	0	0	**29°47'55.20"**	**95°26'58.50"**	**29°48'16.40"**	**95°27'7.80"W**
			C-8	IH10	IH610(N Loop FWY)	**2140**	**2100**	2140	2100	0	0	0	0	**29°47'55.20"**	**95°26'58.50"**	**29°48'14.30"**	**95°26'50.80"W**
		white on both sides	C-9	US290HOV EB	NW Transit Center	**2860**	**2860**	2860	2860	0	0	0	0	29°48'18.10"N	95°27'11.40"W	29°47'51.30"N	95°27'5.30"W
11	29°44'39.83"N 95 °21'45.90"W	IH45 - IH69	C-1	IH45NB	IH69NB	**1800**	**1760**	1800	1760	0	0	0	0	**29°44'34.00"**	**95°21'29.50"**	**29°44'46.20"**	**95°21'41.20"W**
			C-2	IH45NB	IH69SB	**2220**	**2280**	2220	2280	0	0	0	0	**29°44'34.00"**	**95°21'29.50"**	**29°44'34.00"**	**95°21'50.90"W**
			C-3	IH45SB	IH69NB	**1210**	**1250**	1210	1250	0	0	0	0	**29°44'42.90"**	**95°21'52.40"**	**29°44'46.20"**	**95°21'41.20"W**
			C-4	IH45SB	IH69SB	**1010**	**960**	1010	960	0	0	0	0	**29°44'42.90"**	**95°21'52.40"**	**29°44'34.00"**	**95°21'50.90"W**
			C-5	IH69NB	IH45NB	**1230**	**1290**	1230	1290	0	0	0	0	**29°44'33.20"**	**95°21'50.50"**	**29°44'44.20"**	**95°21'53.10"W**
			C-6	IH69NB	IH45SB	**1420**	**1370**	1420	1370	0	0	0	0	**29°44'33.20"**	**95°21'50.50"**	**29°44'35.70"**	**95°21'35.70"W**
			C-7	IH69SB	IH45NB	**1560**	**1500**	1560	1500	0	0	0	0	**29°44'49.30"**	**95°21'40.00"**	**29°44'44.20"**	**95°21'53.10"W**
			C-8	IH69SB	IH45SB	**1580**	**1620**	1580	1620	0	0	0	0	**29°44'49.30"**	**95°21'40.00"**	**29°44'35.70"**	**95°21'35.70"W**
12	29°46'7.68"N 95 °20'31.82"W	IH10 - IH69	C-1	IH10EB	IH69NB	**1450**	**1520**	1450	1520	0	0	0	0	**29°46'8.50"N**	**95°20'37.00"**	**29°46'14.50"**	**95°20'23.80"W**
			C-2	IH10EB	IH69SB	**1530**	**1460**	1530	1460	0	0	0	0	**29°46'11.60"**	**95°20'56.10"**	**29°46'1.90"N**	**95°20'49.90"W**
			C-3	IH10WB	IH69NB	**1220**	**1170**	1220	1170	0	0	0	0	**29°46'9.40"N**	**95°20'14.70"**	**29°46'14.50"**	**95°20'23.80"W**
			C-4	IH10WB	IH69SB	**2430**	**2460**	2240	2250	190	210	0	0	**29°46'8.70"N**	**95°20'22.00"**	**29°46'1.90"N**	**95°20'49.90"W**
			C-5	IH69NB	IH10WB	**3470**	**3550**	3470	3550	0	0	0	0	**29°45'50.80"**	**95°20'56.40"**	**29°46'13.20"**	**95°20'52.20"W**
			C-6	IH69NB	IH10EB	**2530**	**2470**	2530	2470	0	0	0	0	**29°45'54.90"**	**95°20'52.30"**	**29°46'6.00"N**	**95°20'27.50"W**
			C-7	IH69SB	IH10WB	**1350**	**760**	880	760	470	0	0	0	**29°46'20.70"**	**95°20'26.40"**	**29°46'11.80"**	**95°20'34.60"W**
			C-8	IH69SB	IH10EB	**1310**	**1270**	1310	1270	0	0	0	0	**29°46'14.30"**	**95°20'28.30"**	**29°46'8.10"N**	**95°20'20.40"W**
			C-9	IH69NB	IH10EB	**1770**	**1740**	1770	1740	0	0	0	0	**29°45'50.80"**	**95°20'56.40"**	**29°46'1.80"N**	**95°20'41.50"W**

CBL- Concrete Barrier on Left Side
CBR- Concrete Barrier on Right Side
FBL- Flexible Barrier on Left Side
FBR- Flexible Barrier on Right Side
PL- Pipe Rail on Left Side
PR- Pipe Rail on Right Side

DATE:
FILE:

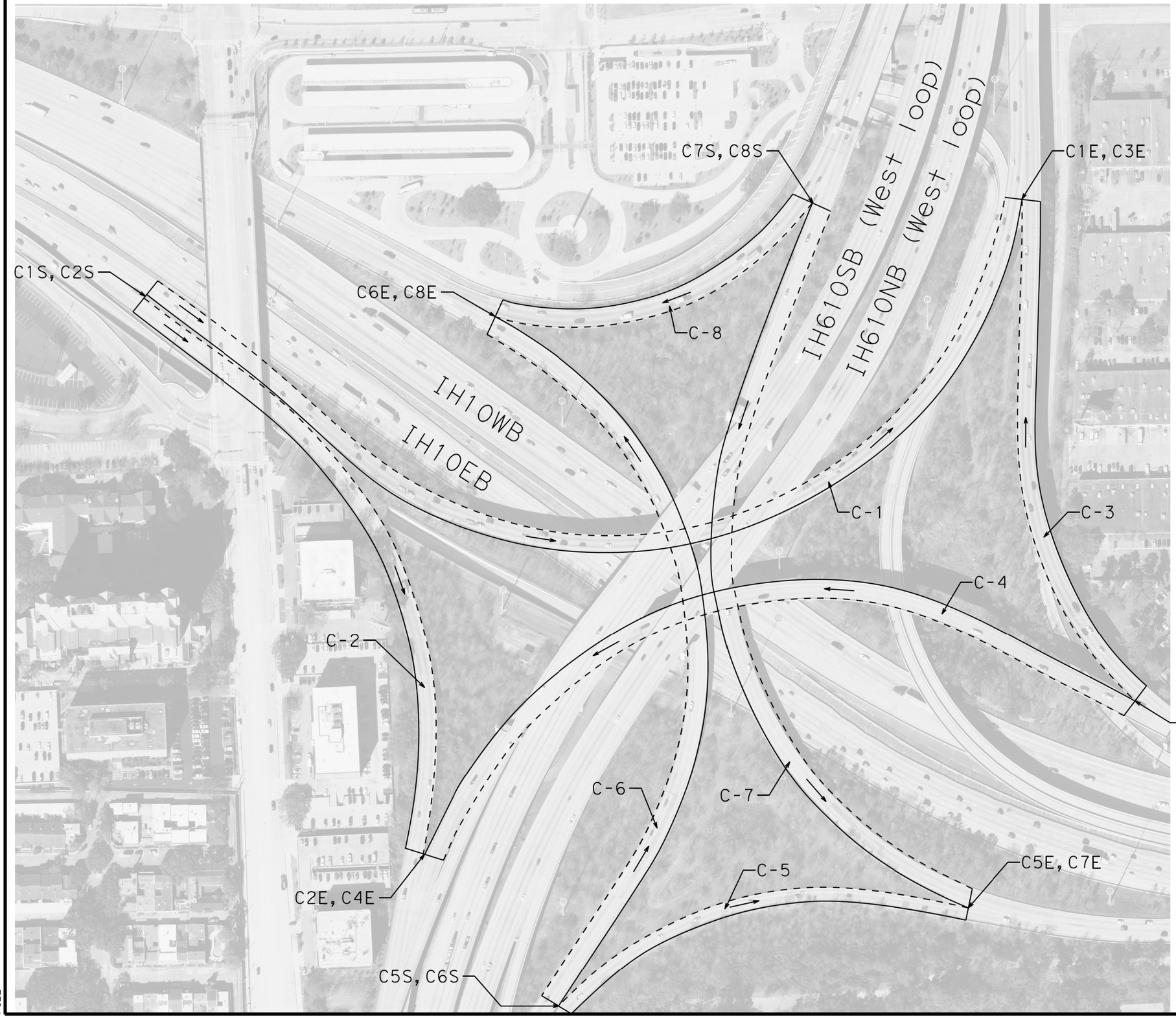
TEXAS DEPARTMENT OF TRANSPORTATION

SUMMARY OF LOCATIONS FOR DIRECT CONNECTORS

SCALE: N. T. S.

SHEET 2 OF 2

ORIGINAL DRAWING DATE	STATE DISTRICT	FEDERAL REGION	PROJECT NO	SHEET
JUNE, 2023	HOU	6		34
REVISIONS	COUNTY	CONTROL	SECTION	JOB	HIGHWAY
	HARRIS	0508	01	387	IH 10



NOTES :

-APPLY BARRIER SAFETY LINE MARKING ON RIGHT AND LEFT SIDE BARRIERS ON DIRECT CONNECTORS.

-BEGIN AND END ULTRAGUARD MARKINGS AT THE PHYSICAL GORE AREAS. IN PLACES WHERE PHYSICAL GORE DOES NOT EXIST, BEGIN ULTRAGUARD MARKING AT A POINT WHERE DIRECT CONNECTOR BEGINS AND END MARKING AT A POINT WHERE DIRECT CONNECTOR ENDS. FOR THE STARTING AND ENDING COORDINATE POINTS SEE BELOW:

C-1 : CONNECTOR FROM IH10 EB TO IH610 NB
29° 46' 56.50"N 95° 27' 26.40"W (START)
29° 46' 58.00"N 95° 27' 6.00"W (END)
C-2 : CONNECTOR FROM IH10 EB TO IH610 SB
29° 46' 56.50"N 95° 27' 26.40"W (START)
29° 46' 45.00"N 95° 27' 20.40"W (END)
C-3 : CONNECTOR FROM IH10 WB TO IH610 NB
29° 46' 47.80"N 95° 27' 3.80"W (START)
29° 46' 58.00"N 95° 27' 6.00"W (END)
C-4 : CONNECTOR FROM IH10 WB TO IH610 SB
29° 46' 47.80"N 95° 27' 3.80"W (START)
29° 46' 45.00"N 95° 27' 20.40"W (END)
C-5 : CONNECTOR FROM IH610 NBTO IH10 EB
29° 46' 42.00"N 95° 27' 17.40"W (START)
29° 46' 43.80"N 95° 27' 8.00"W (END)
C-6 : CONNECTOR FROM IH610 NBTO IH10 WB
29° 46' 42.00"N 95° 27' 17.40"W (START)
29° 46' 56.00"N 95° 27' 18.50"W (END)
C-7 : CONNECTOR FROM IH610 SBTO IH10 EB
29° 46' 58.00"N 95° 27' 11.00"W (START)
29° 46' 43.80"N 95° 27' 8.00"W (END)
C-8 : CONNECTOR FROM IH610 SBTO IH10 WB
29° 46' 58.00"N 95° 27' 11.00"W (START)
29° 46' 56.00"N 95° 27' 18.50"W (END)

LEGEND:

C-X : DENOTED CONNECTOR NUMBER

CXS : DENOTED CONNECTOR START

CXE : DENOTED CONNECTOR END

--->: TRAVELING DIRECTION

N

STATE OF TEXAS
HUMAM K. YASEEN
146352
LICENSED PROFESSIONAL ENGINEER

8/31/2023

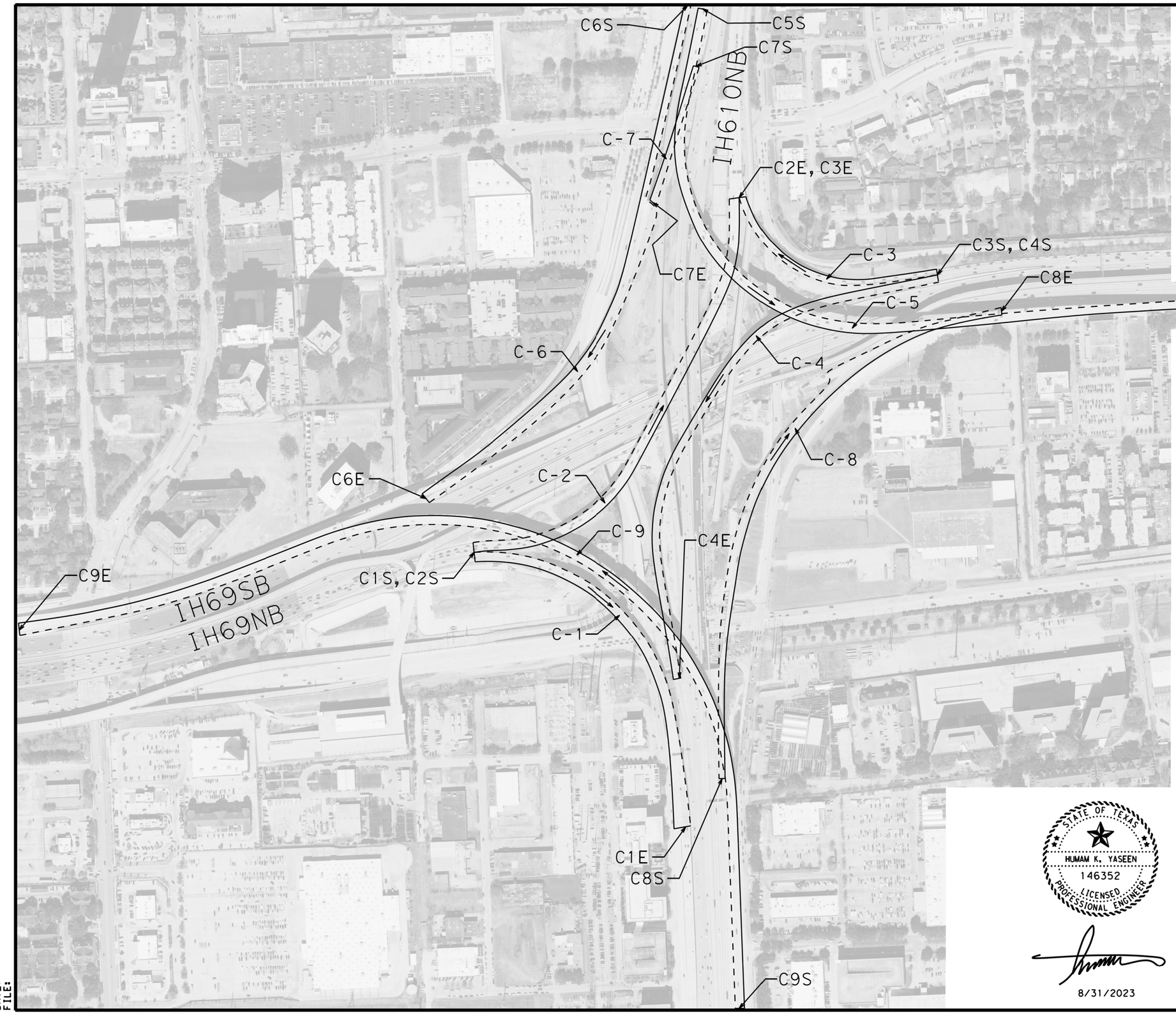
TEXAS DEPARTMENT OF TRANSPORTATION

IH10W-610 (W LOOP FWY) INTERCHANGE LAYOUT

SCALE: N. T. S. SHEET 1 OF 13

ORIGINAL DRAWING DATE: JUNE, 2023	STATE DISTRICT	FEDERAL REGION	PROJECT NO				SHEET
REVISIONS	HOU	6					35
DN.1:	COUNTY		CONTROL	SECTION	JOB		HIGHWAY
CK.1:	HARRIS		0508	01	387		IH 10
DN.1:							
CK.1:							

DATE:
FILE:



NOTES :

-APPLY BARRIER SAFETY LINE MARKING ON RIGHT AND LEFT SIDE BARRIERS ON DIRECT CONNECTORS.

-BEGIN AND END ULTRAGUARD MARKINGS AT THE PHYSICAL GORE AREAS. IN PLACES WHERE PHYSICAL GORE DOES NOT EXIST, BEGIN ULTRAGUARD MARKING AT A POINT WHERE DIRECT CONNECTOR BEGINS AND END MARKING AT A POINT WHERE DIRECT CONNECTOR ENDS. FOR THE STARTING AND ENDING COORDINATE POINTS SEE BELOW:

C-1 : CONNECTOR FROM IH69NB TO IH610SB
29°43'37.90"N 95°27'47.60"W (START)
29°43'26.00"N 95°27'38.00"W (END)
C-2 : CONNECTOR FROM IH69NB TO IH610NB
29°43'37.90"N 95°27'47.60"W (START)
29°43'52.10"N 95°27'34.70"W (END)
C-3 : CONNECTOR FROM IH69SB TO IH610NB
29°43'48.60"N 95°27'25.50"W (START)
29°43'52.10"N 95°27'34.70"W (END)
C-4 : CONNECTOR FROM IH69SB TO IH610SB
29°43'48.60"N 95°27'25.50"W (START)
29°43'32.50"N 95°27'38.20"W (END)
C-5 : CONNECTOR FROM IH610SB TO IH69NB
29°43'59.80"N 95°27'36.00"W (START)
29°43'47.30"N 95°27'7.60"W (END)
C-6 : CONNECTOR FROM IH610SB TO IH69SB
29°43'60.00"N 95°27'36.70"W (START)
29°43'40.20"N 95°27'50.00"W (END)
C-7 : CONNECTOR FROM IH610SB TO IH69SB
29°43'57.50"N 95°27'36.40"W (START)
29°43'51.20"N 95°27'39.00"W (END)
C-8 : CONNECTOR FROM IH610NB TO IH69NB
29°43'28.20"N 95°27'36.20"W (START)
29°43'47.00"N 95°27'22.00"W (END)
C-9 : CONNECTOR FROM IH610NB TO IH69SB
29°43'18.80"N 95°27'35.80"W (START)
29°43'35.30"N 95°28'9.30"W (END)

LEGEND:

C-X : DENOTED CONNECTOR NUMBER

CXS : DENOTED CONNECTOR START

CXE : DENOTED CONNECTOR END

--->: TRAVELING DIRECTION

STATE OF TEXAS
HUMAM K. YASEEN
146352
LICENSED
PROFESSIONAL ENGINEER

8/31/2023

TEXAS DEPARTMENT OF TRANSPORTATION

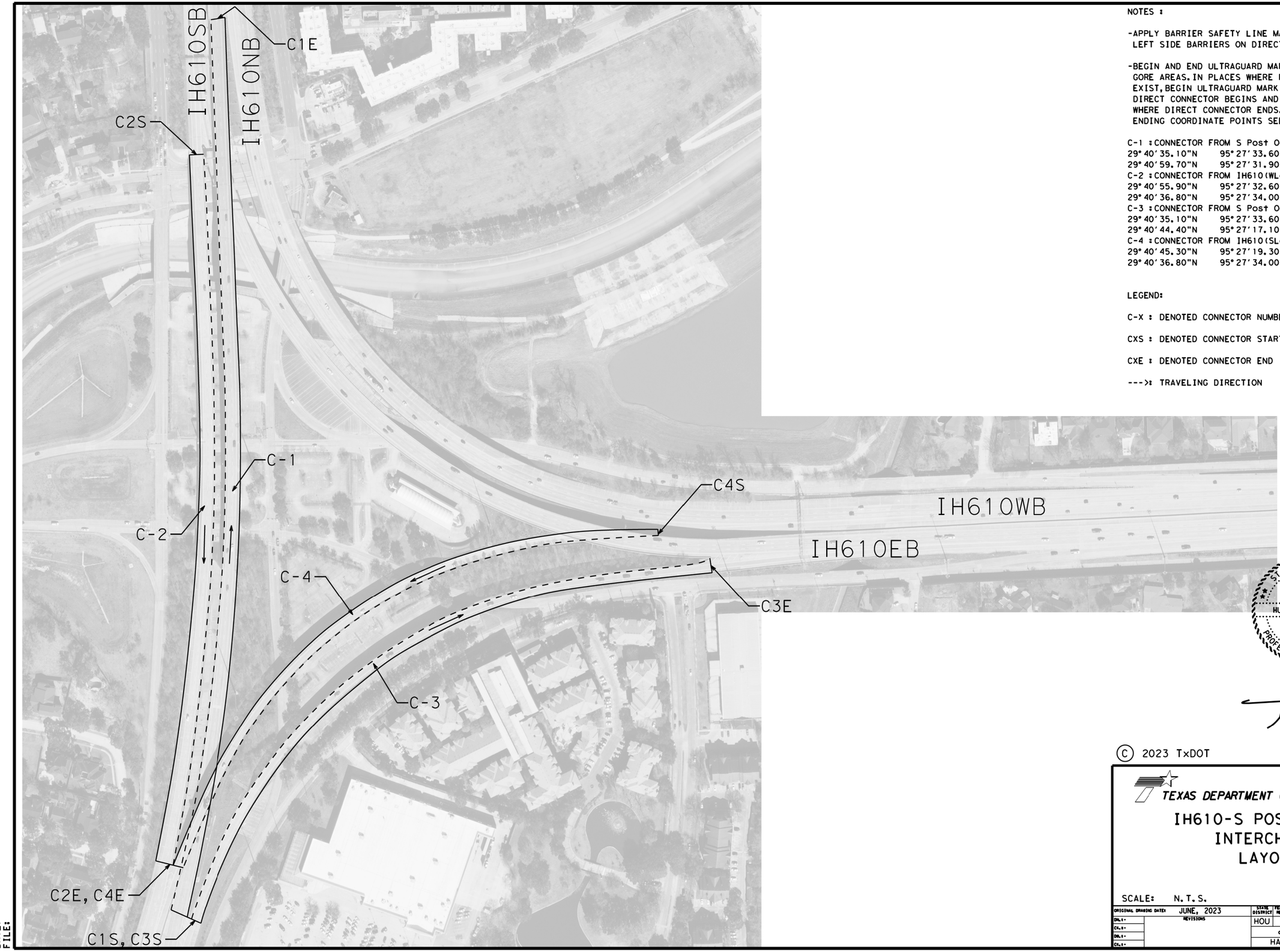
IH69-IH610 (W LOOP FWY) INTERCHANGE LAYOUT

SCALE: N.T.S.

SHEET 2 OF 13

ORIGINAL DRAWING DATE: JUNE, 2023	STATE DISTRICT	FEDERAL REGION	PROJECT NO	SHEET
DN, I= REVISIONS	HOU	6		36
CK, I=	COUNTY		CONTROL SECTION JOB	HIGHWAY
DW, I=	HARRIS		0508 01 387	IH 10
CK, I=				

DATE:
FILE:



NOTES :

-APPLY BARRIER SAFETY LINE MARKING ON RIGHT AND LEFT SIDE BARRIERS ON DIRECT CONNECTORS.

-BEGIN AND END ULTRAGUARD MARKINGS AT THE PHYSICAL GORE AREAS. IN PLACES WHERE PHYSICAL GORE DOES NOT EXIST, BEGIN ULTRAGUARD MARKING AT A POINT WHERE DIRECT CONNECTOR BEGINS AND END MARKING AT A POINT WHERE DIRECT CONNECTOR ENDS. FOR THE STARTING AND ENDING COORDINATE POINTS SEE BELOW:

C-1 :CONNECTOR FROM S Post Oak NB TO IH610(WIoop)NB
29°40'35.10"N 95°27'33.60"W (START)
29°40'59.70"N 95°27'31.90"W (END)
C-2 :CONNECTOR FROM IH610(WLoop)SB TO S Post Oak SB
29°40'55.90"N 95°27'32.60"W (START)
29°40'36.80"N 95°27'34.00"W (END)
C-3 :CONNECTOR FROM S Post Oak NB TO IH610(SLoop)EB
29°40'35.10"N 95°27'33.60"W (START)
29°40'44.40"N 95°27'17.10"W (END)
C-4 :CONNECTOR FROM IH610(SLoop)WB TO S Post Oak SB
29°40'45.30"N 95°27'19.30"W (START)
29°40'36.80"N 95°27'34.00"W (END)

LEGEND:

C-X : DENOTED CONNECTOR NUMBER

CXS : DENOTED CONNECTOR START

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--->: TRAVELING DIRECTION

STATE OF TEXAS
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146352
LICENSED PROFESSIONAL ENGINEER

8/31/2023

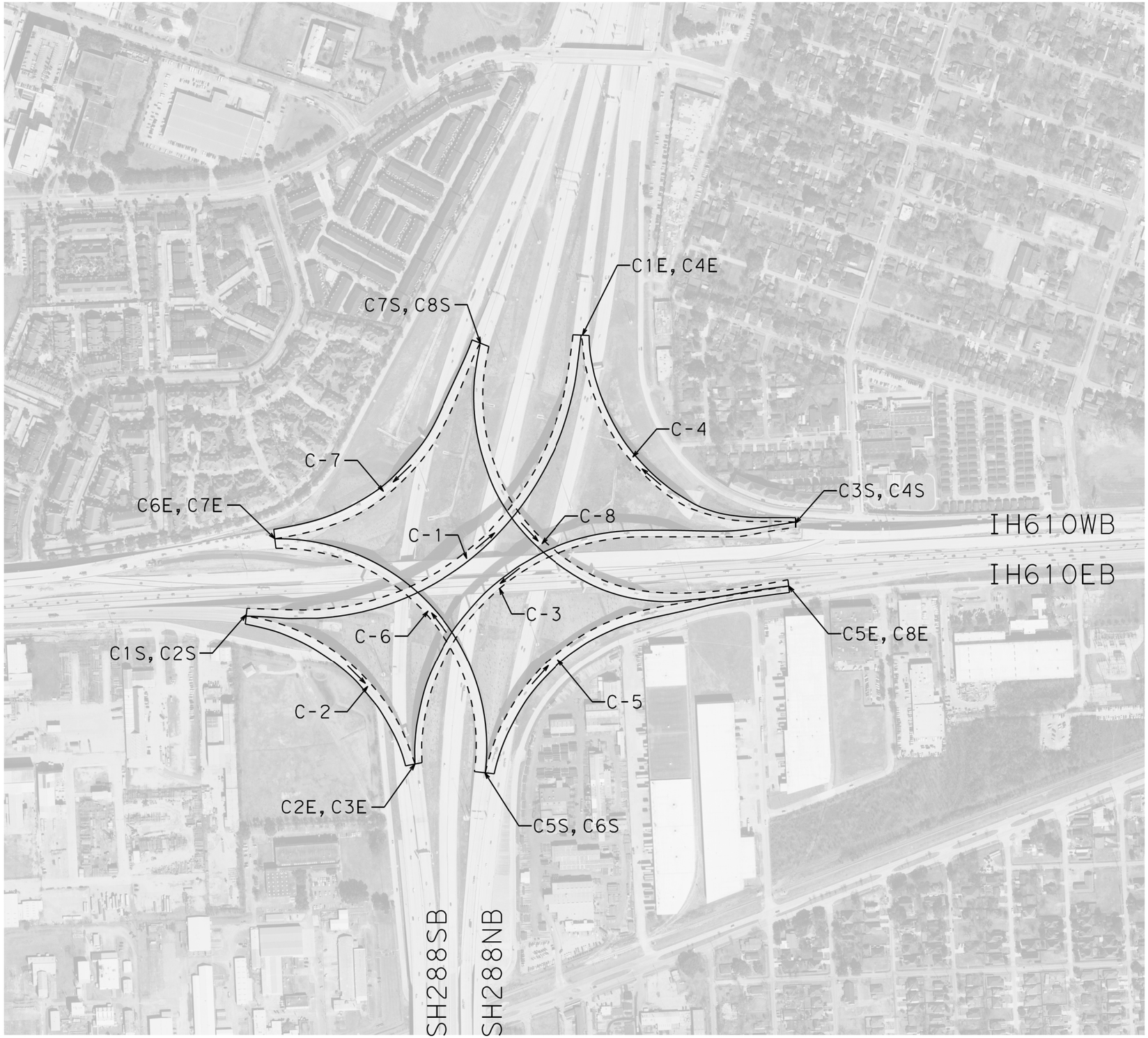
TEXAS DEPARTMENT OF TRANSPORTATION

IH610-S POST OAK RD INTERCHANGE LAYOUT

SCALE: N.T.S. SHEET 3 OF 13

ORIGINAL DRAWING DATE: JUNE, 2023	STATE DISTRICT	FEDERAL REGION	PROJECT NO		SHEET
DN,E= REVISIONS	HOU	6			37
CK,E=	COUNTY		CONTROL	SECTION	JOB	HIGHWAY
DN,E=	HARRIS		0508	01	387	IH 10
CK,E=						

DATE:
FILE:



NOTES :

-APPLY BARRIER SAFETY LINE MARKING ON RIGHT AND LEFT SIDE BARRIERS ON DIRECT CONNECTORS.

-BEGIN AND END ULTRAGUARD MARKINGS AT THE PHYSICAL GORE AREAS. IN PLACES WHERE PHYSICAL GORE DOES NOT EXIST, BEGIN ULTRAGUARD MARKING AT A POINT WHERE DIRECT CONNECTOR BEGINS AND END MARKING AT A POINT WHERE DIRECT CONNECTOR ENDS. FOR THE STARTING AND ENDING COORDINATE POINTS SEE BELOW:

C-1 : CONNECTOR FROM IH610(SLoop)EB TO SH288NB
29°40'49.00"N 95°23'4.00"W (START)
29°41'1.00"N 95°22'46.40"W (END)
C-2 : CONNECTOR FROM IH610(SLoop)EB TO SH288SB
29°40'49.00"N 95°23'4.00"W (START)
29°40'42.20"N 95°22'55.60"W (END)
C-3 : CONNECTOR FROM IH610(SLoop)WB TO SH288SB
29°40'52.30"N 95°22'35.80"W (START)
29°40'42.20"N 95°22'55.60"W (END)
C-4 : CONNECTOR FROM IH610(SLoop)WB TO SH288NB
29°40'52.30"N 95°22'35.80"W (START)
29°41'1.00"N 95°22'46.40"W (END)
C-5 : CONNECTOR FROM SH288NB TO IH610(SLoop)EB
29°40'41.80"N 95°22'52.00"W (START)
29°40'49.50"N 95°22'36.20"W (END)
C-6 : CONNECTOR FROM SH288NB TO IH610(SLoop)WB
29°40'41.80"N 95°22'52.00"W (START)
29°40'52.30"N 95°23'2.30"W (END)
C-7 : CONNECTOR FROM SH288SB TO IH610(SLoop)WB
29°41'0.80"N 95°22'51.60"W (START)
29°40'52.30"N 95°23'2.30"W (END)
C-8 : CONNECTOR FROM SH288SB TO IH610(SLoop)EB
29°41'0.80"N 95°22'51.60"W (START)
29°40'49.50"N 95°22'36.20"W (END)

LEGEND:

C-X : DENOTED CONNECTOR NUMBER

CXS : DENOTED CONNECTOR START

CXE : DENOTED CONNECTOR END

--->: TRAVELING DIRECTION

STATE OF TEXAS
HUMAM K. YASEEN
146352
LICENSED PROFESSIONAL ENGINEER

8/31/2023

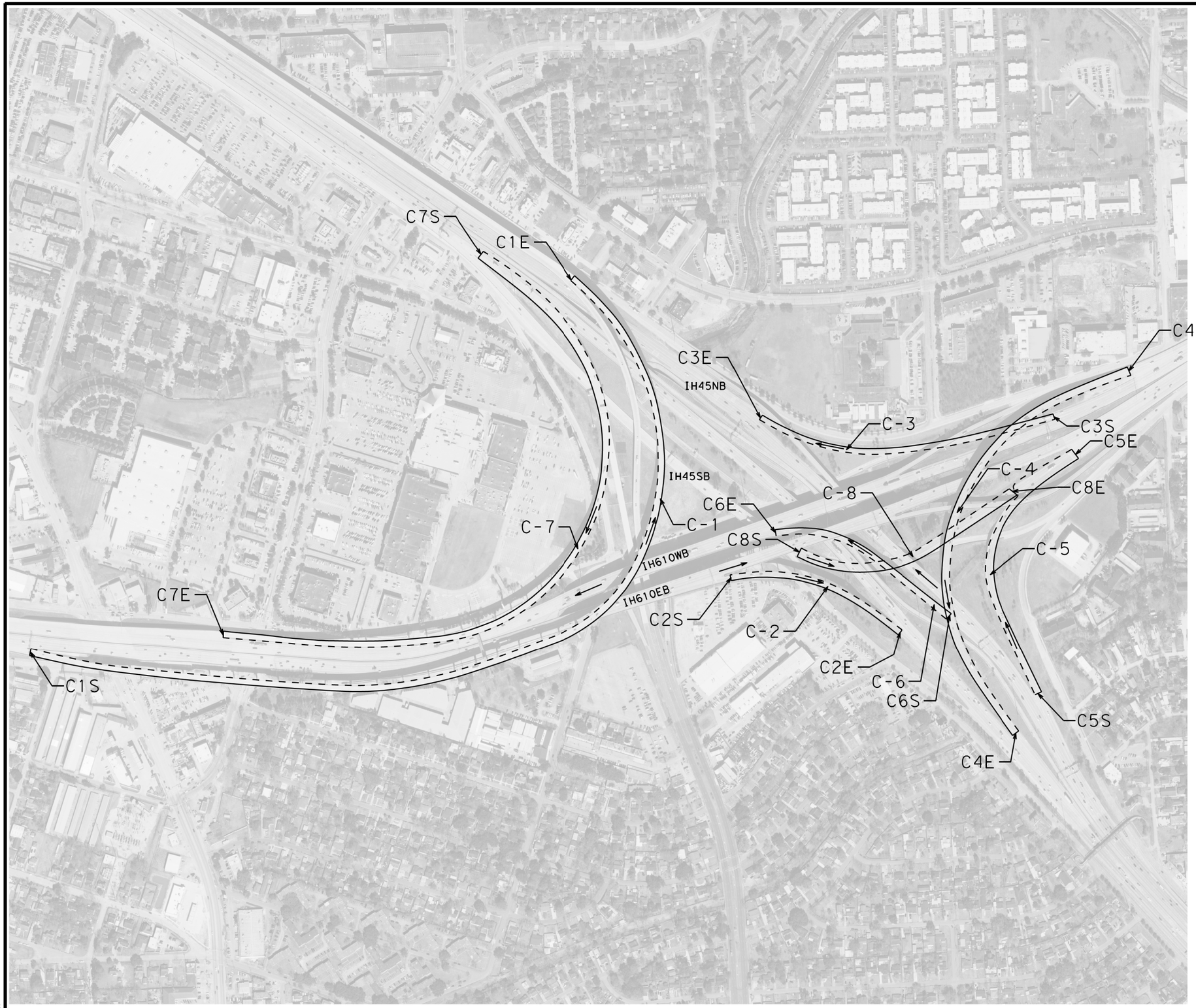
TEXAS DEPARTMENT OF TRANSPORTATION

IH610(S LOOP)-SH288 INTERCHANGE LAYOUT

SCALE: N.T.S. SHEET 4 OF 13

ORIGINAL DRAWING DATE: JUNE, 2023		STATE DISTRICT	FEDERAL REGION	PROJECT NO				SHEET
DN.E:	REVISIONS	HOU	6					38
CK.E:		COUNTY		CONTROL	SECTION	JOB		HIGHWAY
DN.E:		HARRIS		0508	01	387		IH 10
CK.E:								

DATE:
FILE:



NOTES :

-APPLY BARRIER SAFETY LINE MARKING ON RIGHT AND LEFT SIDE BARRIERS ON DIRECT CONNECTORS.

-BEGIN AND END ULTRAGUARD MARKINGS AT THE PHYSICAL GORE AREAS. IN PLACES WHERE PHYSICAL GORE DOES NOT EXIST, BEGIN ULTRAGUARD MARKING AT A POINT WHERE DIRECT CONNECTOR BEGINS AND END MARKING AT A POINT WHERE DIRECT CONNECTOR ENDS. FOR THE STARTING AND ENDING COORDINATE POINTS SEE BELOW:

C-1 : CONNECTOR FROM IH610(SLoop) EB TO IH45NB
29°41'44.50"N 95°18'5.90"W (START)
29°42'2.30"N 95°17'34.10"W (END)
C-2 : CONNECTOR FROM IH610(SLoop) EB TO IH45SB
29°41'47.40"N 95°17'25.60"W (START)
29°41'44.10"N 95°17'16.00"W (END)
C-3 : CONNECTOR FROM IH610(SLoop) WB TO IH45NB
29°41'54.60"N 95°17'6.90"W (START)
29°41'55.00"N 95°17'23.50"W (END)
C-4 : CONNECTOR FROM IH610(SLoop) WB TO IH45SB
29°41'56.90"N 95°17'2.10"W (START)
29°41'38.80"N 95°17'9.50"W (END)
C-5 : CONNECTOR FROM IH45NB TO IH610(SLoop) EB
29°41'40.60"N 95°17'8.20"W (START)
29°41'52.50"N 95°17'5.70"W (END)
C-6 : CONNECTOR FROM IH45NB TO IH610(SLoop) WB
29°41'44.70"N 95°17'13.30"W (START)
29°41'49.30"N 95°17'23.00"W (END)
C-7 : CONNECTOR FROM IH45SB TO IH610(SLoop) WB
29°42'3.50"N 95°17'39.30"W (START)
29°41'45.00"N 95°17'54.80"W (END)
C-8 : CONNECTOR FROM IH45SB TO IH610(SLoop) EB
29°41'48.20"N 95°17'21.60"W (START)
29°41'50.70"N 95°17'9.50"W (END)

LEGEND:

C-X : DENOTED CONNECTOR NUMBER

CXS : DENOTED CONNECTOR START

CXE : DENOTED CONNECTOR END

--->: TRAVELING DIRECTION

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STATE OF TEXAS
HUMAM K. YASEEN
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LICENSED PROFESSIONAL ENGINEER

8/31/2023

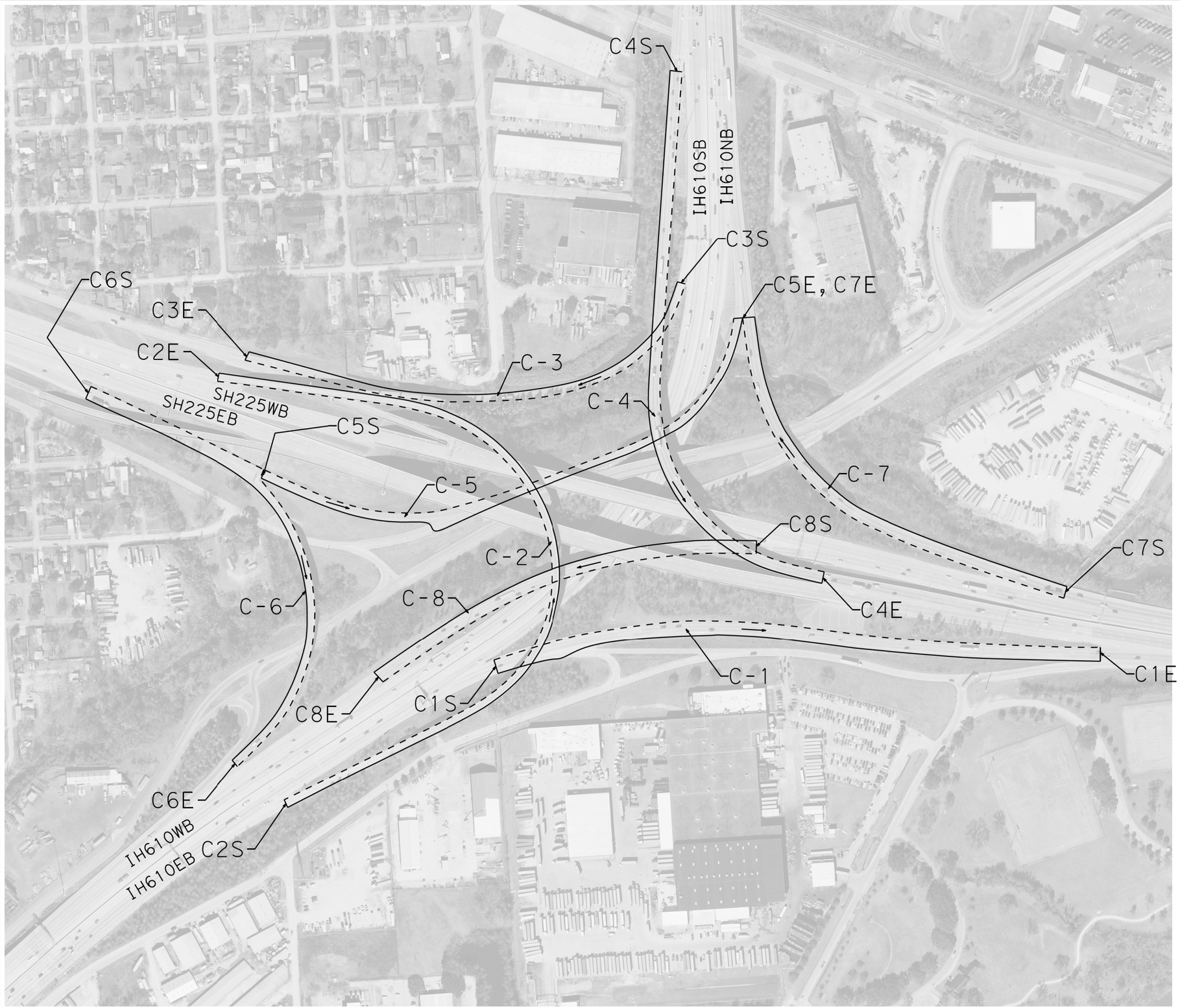
TEXAS DEPARTMENT OF TRANSPORTATION

IH610(S LOOP)-IH45 INTERCHANGE LAYOUT

SCALE: N.T.S. SHEET 5 OF 13

ORIGINAL DRAWING DATE: JUNE, 2023	STATE DISTRICT	FEDERAL REGION	PROJECT NO	SHEET
REVISIONS	HOU	6		39
	COUNTY		CONTROL SECTION JOB	HIGHWAY
	HARRIS		0508 01 387	IH 10

DATE:
FILE:



NOTES :

-APPLY BARRIER SAFETY LINE MARKING ON RIGHT AND LEFT SIDE BARRIERS ON DIRECT CONNECTORS.

-BEGIN AND END ULTRAGUARD MARKINGS AT THE PHYSICAL GORE AREAS. IN PLACES WHERE PHYSICAL GORE DOES NOT EXIST, BEGIN ULTRAGUARD MARKING AT A POINT WHERE DIRECT CONNECTOR BEGINS AND END MARKING AT A POINT WHERE DIRECT CONNECTOR ENDS. FOR THE STARTING AND ENDING COORDINATE POINTS SEE BELOW:

C-1 : CONNECTOR FROM IH610(SLoop) EB TO SH225EB
29°42'30.40"N 95°16'6.70"W (START)
29°42'30.20"N 95°15'44.60"W (END)
C-2 : CONNECTOR FROM IH610(SLoop) EB TO SH225WB
29°42'26.20"N 95°16'14.60"W (START)
29°42'39.90"N 95°16'16.60"W (END)
C-3 : CONNECTOR FROM IH610(Eloop) SB TO SH225WB
29°42'42.40"N 95°15'59.50"W (START)
29°42'40.00"N 95°16'13.40"W (END)
C-4 : CONNECTOR FROM IH610(Eloop) SB TO SH225EB
29°42'49.20"N 95°15'59.40"W (START)
29°42'32.90"N 95°15'54.70"W (END)
C-5 : CONNECTOR FROM SH225EB TO IH610(ELoop) NB
29°42'36.70"N 95°16'15.00"W (START)
29°42'41.50"N 95°15'57.30"W (END)
C-6 : CONNECTOR FROM SH225EB TO IH610(SLoop) SB
29°42'39.50"N 95°16'21.20"W (START)
29°42'27.60"N 95°16'16.30"W (END)
C-7 : CONNECTOR FROM SH225WB TO IH610(ELoop) NB
29°42'32.30"N 95°15'46.10"W (START)
29°42'41.50"N 95°15'57.30"W (END)
C-8 : CONNECTOR FROM SH225WB TO IH610(SLoop) SB
29°42'33.90"N 95°15'57.20"W (START)
29°42'31.00"N 95°16'9.60"W (END)

LEGEND:

C-X : DENOTED CONNECTOR NUMBER

CXS : DENOTED CONNECTOR START

CXE : DENOTED CONNECTOR END

--->: TRAVELING DIRECTION

STATE OF TEXAS
HUMAM K. YASEEN
146352
LICENSED PROFESSIONAL ENGINEER

8/31/2023

TEXAS DEPARTMENT OF TRANSPORTATION

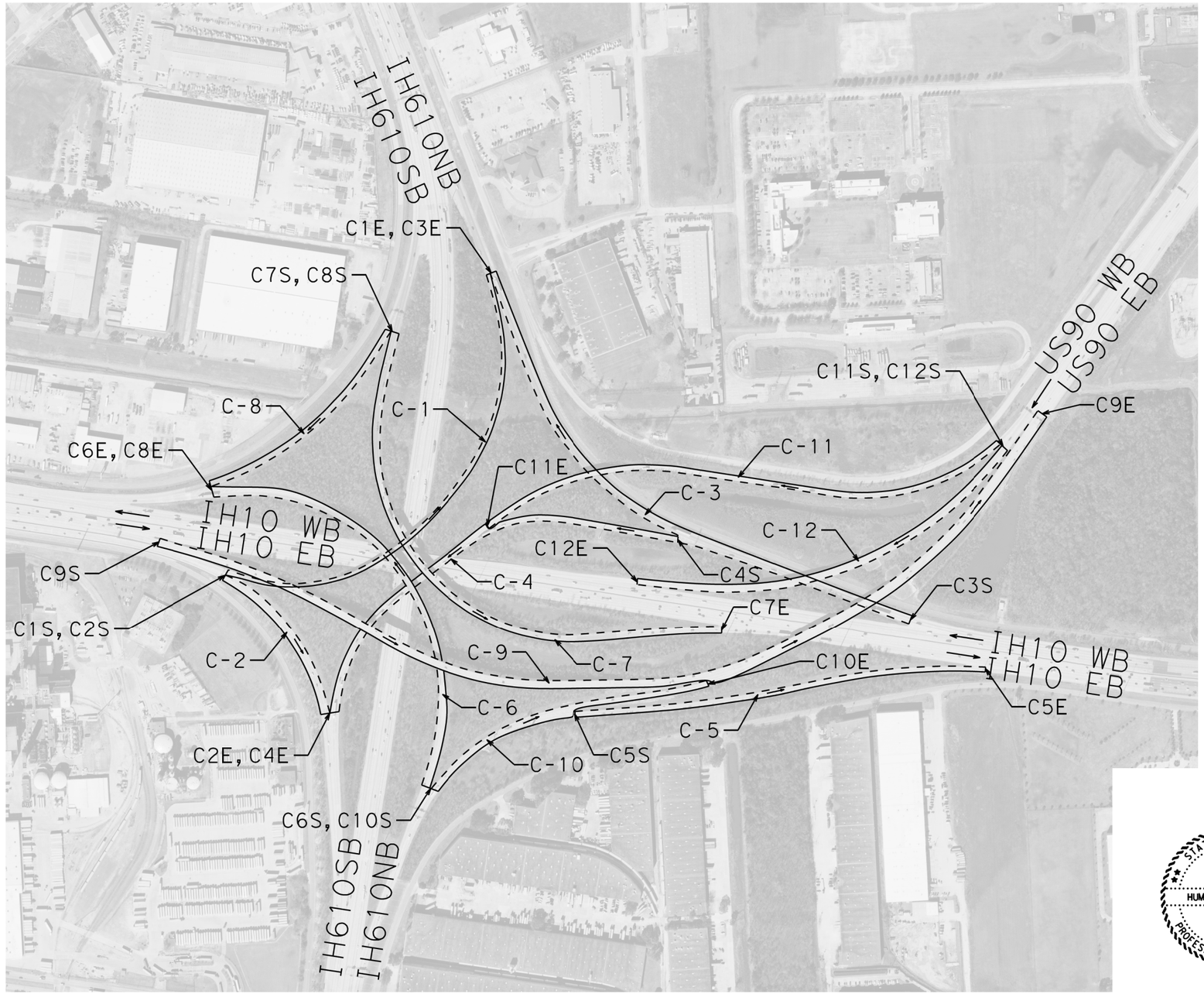
IH610(S LOOP)-SH225 INTERCHANGE LAYOUT

SCALE: N.T.S.

SHEET 6 OF 13

ORIGINAL DRAWING DATE: JUNE, 2023	STATE DISTRICT	FEDERAL REGION	PROJECT NO	SHEET
REVISIONS	HOU	6		40
	COUNTY		CONTROL SECTION JOB	HIGHWAY
	HARRIS		0508 01 387	IH 10

DATE:
FILE:



NOTES :

-APPLY BARRIER SAFETY LINE MARKING ON RIGHT AND LEFT SIDE BARRIERS ON DIRECT CONNECTORS.

-BEGIN AND END ULTRAGUARD MARKINGS AT THE PHYSICAL GORE AREAS. IN PLACES WHERE PHYSICAL GORE DOES NOT EXIST, BEGIN ULTRAGUARD MARKING AT A POINT WHERE DIRECT CONNECTOR BEGINS AND END MARKING AT A POINT WHERE DIRECT CONNECTOR ENDS. FOR THE STARTING AND ENDING COORDINATE POINTS SEE BELOW:

C-1 : CONNECTOR FROM IH10 EB TO IH610 NB
29°46'31.90"N 95°16'0.20"W (START)
29°46'44.70"N 95°15'45.20"W (END)
C-2 : CONNECTOR FROM IH10 EB TO IH610 SB
29°46'31.90"N 95°16'0.20"W (START)
29°46'25.20"N 95°15'54.90"W (END)
C-3 : CONNECTOR FROM IH10 WB TO IH610 NB
29°46'28.70"N 95°15'23.40"W (START)
29°46'44.70"N 95°15'45.20"W (END)
C-4 : CONNECTOR FROM IH10 WB TO IH610 SB
29°46'32.90"N 95°15'35.90"W (START)
29°46'25.20"N 95°15'54.90"W (END)
C-5 : CONNECTOR FROM IH610 NBTO IH10 EB
29°46'24.80"N 95°15'41.50"W (START)
29°46'26.40"N 95°15'19.50"W (END)
C-6 : CONNECTOR FROM IH610 NBTO IH10 WB
29°46'21.60"N 95°15'49.60"W (START)
29°46'36.00"N 95°16'1.00"W (END)
C-7 : CONNECTOR FROM IH610 SBTO IH10 EB
29°46'43.30"N 95°15'51.00"W (START)
29°46'28.60"N 95°15'33.60"W (END)
C-8 : CONNECTOR FROM IH610 SBTO IH10 WB
29°46'43.30"N 95°15'51.00"W (START)
29°46'36.00"N 95°16'1.00"W (END)
C-9 : CONNECTOR FROM IH10 EB TO US90 EB
29°46'33.60"N 95°16'3.90"W (START)
29°46'38.30"N 95°15'16.00"W (END)
C-10: CONNECTOR FROM IH610NB TO US90 EB
29°46'21.60"N 95°15'49.60"W (START)
29°46'26.10"N 95°15'34.90"W (END)
C-11: CONNECTOR FROM US90WB TO IH610SB
29°46'36.90"N 95°15'18.50"W (START)
29°46'34.20"N 95°15'45.70"W (END)
C-12: CONNECTOR FROM US90WB TO IH10W
29°46'36.90"N 95°15'18.50"W (START)
29°46'31.00"N 95°15'37.80"W (END)

LEGEND:

C-X : DENOTED CONNECTOR NUMBER

CXS : DENOTED CONNECTOR START

CXE : DENOTED CONNECTOR END

--->: TRAVELING DIRECTION

STATE OF TEXAS
HUMAM K. YASEEN
146352
LICENSED PROFESSIONAL ENGINEER

8/31/2023

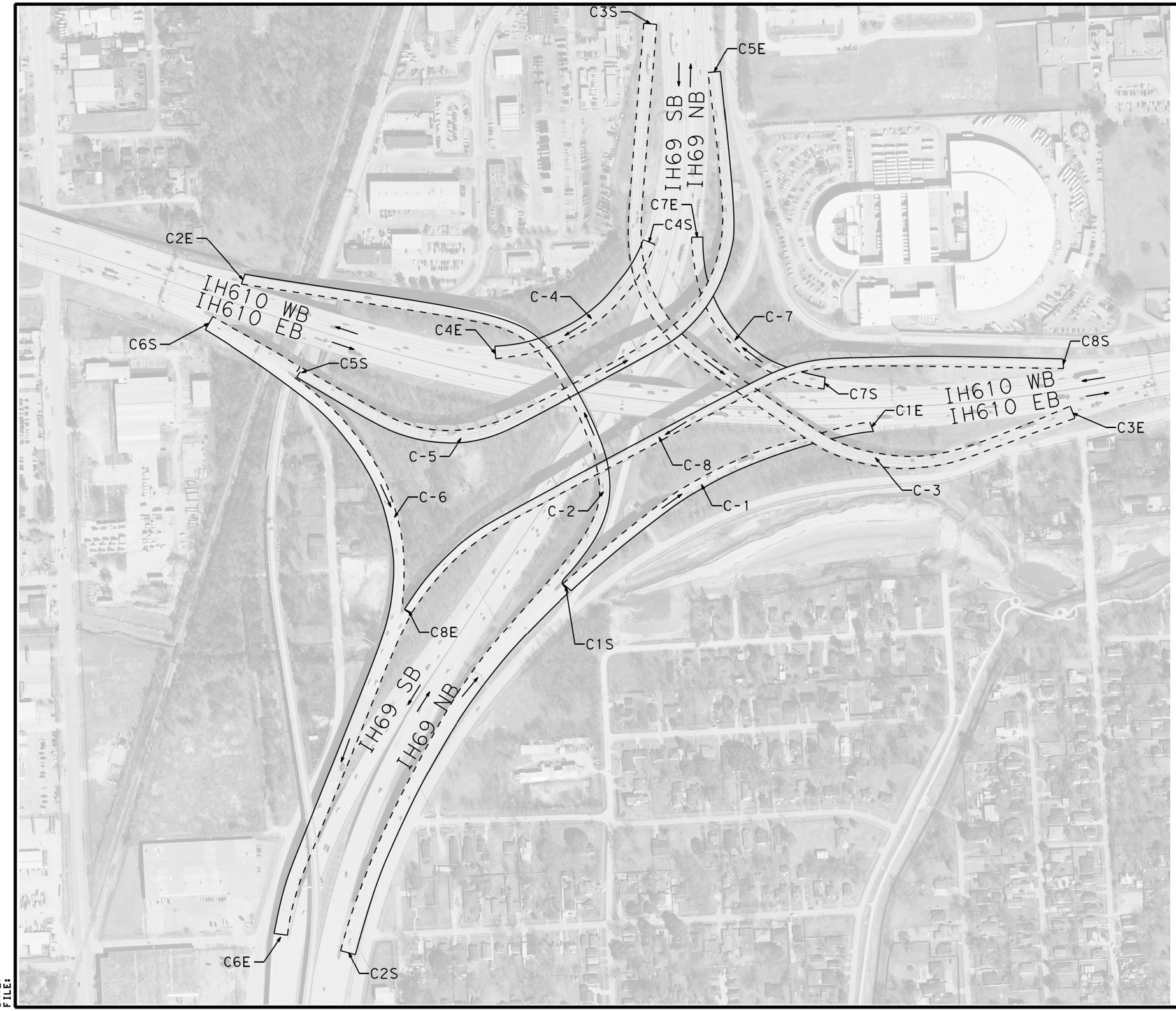
TEXAS DEPARTMENT OF TRANSPORTATION

IH10E-610 (E LOOP FWY) INTERCHANGE LAYOUT

SCALE: N.T.S. SHEET 7 OF 13

ORIGINAL DRAWING DATE: JUNE, 2023		STATE DISTRICT	FEDERAL REGION	PROJECT NO		SHEET
DN:	REVISIONS	HOU	6			41
CK:		COUNTY		CONTROL	SECTION	JOB	HIGHWAY
DN:		HARRIS		0508	01	387	IH 10
CK:							

DATE:
FILE:



NOTES :

-APPLY BARRIER SAFETY LINE MARKING ON RIGHT AND LEFT SIDE BARRIERS ON DIRECT CONNECTORS.

-BEGIN AND END ULTRAGUARD MARKINGS AT THE PHYSICAL GORE AREAS. IN PLACES WHERE PHYSICAL GORE DOES NOT EXIST, BEGIN ULTRAGUARD MARKING AT A POINT WHERE DIRECT CONNECTOR BEGINS AND END MARKING AT A POINT WHERE DIRECT CONNECTOR ENDS. FOR THE STARTING AND ENDING COORDINATE POINTS SEE BELOW:

C-1 : CONNECTOR FROM IH69 NB	TO	IH610 EB
29°48'23.40"N	95°20'12.20"W	(START)
29°48'28.50"N	95°19'59.40"W	(END)
C-2 : CONNECTOR FROM IH69NB	TO	IH610 WB
29°48'10.80"N	95°20'21.40"W	(START)
29°48'34.50"N	95°20'24.70"W	(END)
C-3 : CONNECTOR FROM IH69SB	TO	IH610 EB
29°48'43.10"N	95°20'8.00"W	(START)
29°48'28.70"N	95°19'51.30"W	(END)
C-4 : CONNECTOR FROM IH69SB	TO	IH610 WB
29°48'35.40"N	95°20'8.20"W	(START)
29°48'31.70"N	95°20'14.70"W	(END)
C-5 : CONNECTOR FROM IH610 EB	TO	IH69NB
29°48'31.20"N	95°20'22.60"W	(START)
29°48'41.20"N	95°20'5.50"W	(END)
C-6 : CONNECTOR FROM IH610 EB	TO	IH69SB
29°48'33.00"N	95°20'26.30"W	(START)
29°48'11.40"N	95°20'24.00"W	(END)
C-7 : CONNECTOR FROM IH610 WB	TO	IH69NB
29°48'30.30"N	95°20'1.40"W	(START)
29°48'35.50"N	95°20'6.40"W	(END)
C-8 : CONNECTOR FROM IH610 WB	TO	IH69SB
29°48'30.60"N	95°19'51.80"W	(START)
29°48'22.50"N	95°20'18.60"W	(END)

LEGEND:

C-X : DENOTED CONNECTOR NUMBER

CXS : DENOTED CONNECTOR START

CXE : DENOTED CONNECTOR END

--->: TRAVELING DIRECTION

STATE OF TEXAS
HUMAM K. YASEEN
146352
LICENSED PROFESSIONAL ENGINEER

8/31/2023

TEXAS DEPARTMENT OF TRANSPORTATION

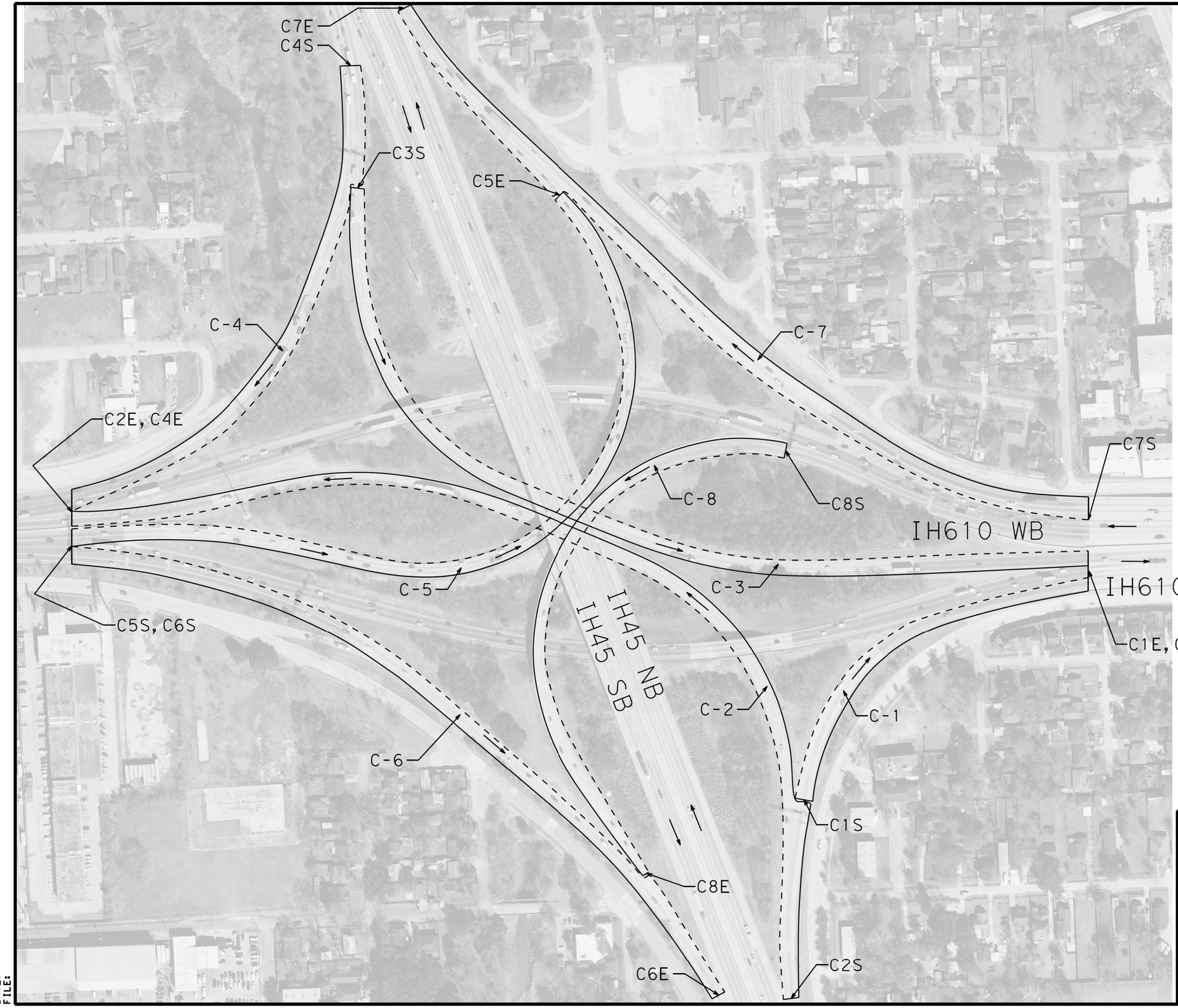
IH69-610 (N LOOP FWY) INTERCHANGE LAYOUT

SCALE: N.T.S.

SHEET 8 OF 13

ORIGINAL DRAWING DATE: JUNE, 2023	STATE DISTRICT	FEDERAL REGION	PROJECT NO	SHEET
DN.E: REVISIONS	HOU	6		42
CK.E:	COUNTY	CONTROL	SECTION	JOB	HIGHWAY
DN.E:	HARRIS	0508	01	387	IH 10
CK.E:					

DATE:
FILE:



NOTES :

-APPLY BARRIER SAFETY LINE MARKING ON RIGHT AND LEFT SIDE BARRIERS ON DIRECT CONNECTORS.

-BEGIN AND END ULTRAGUARD MARKINGS AT THE PHYSICAL GORE AREAS. IN PLACES WHERE PHYSICAL GORE DOES NOT EXIST, BEGIN ULTRAGUARD MARKING AT A POINT WHERE DIRECT CONNECTOR BEGINS AND END MARKING AT A POINT WHERE DIRECT CONNECTOR ENDS. FOR THE STARTING AND ENDING COORDINATE POINTS SEE BELOW:

C-1 : CONNECTOR FROM IH45 NB TO IH610 EB
29°48'44.00"N 95°22'26.00"W (START)
29°48'49.00"N 95°22'18.30"W (END)
C-2 : CONNECTOR FROM IH45NB TO IH610 WB
29°48'39.40"N 95°22'26.50"W (START)
29°48'51.50"N 95°22'44.40"W (END)
C-3 : CONNECTOR FROM IH45SB TO IH610 EB
29°48'57.90"N 95°22'37.20"W (START)
29°48'49.00"N 95°22'18.30"W (END)
C-4 : CONNECTOR FROM IH45SB TO IH610 WB
29°49'1.00"N 95°22'37.20"W (START)
29°48'51.50"N 95°22'44.40"W (END)
C-5 : CONNECTOR FROM IH610 EBTO IH45NB
29°48'50.40"N 95°22'44.40"W (START)
29°48'57.50"N 95°22'31.50"W (END)
C-6 : CONNECTOR FROM IH610 EBTO IH45SB
29°48'50.40"N 95°22'44.40"W (START)
29°48'39.90"N 95°22'28.60"W (END)
C-7 : CONNECTOR FROM IH610 WBTO IH45NB
29°48'50.60"N 95°22'18.30"W (START)
29°49'2.80"N 95°22'36.10"W (END)
C-8 : CONNECTOR FROM IH610 WBTO IH45SB
29°48'52.00"N 95°22'26.90"W (START)
29°48'42.50"N 95°22'30.20"W (END)

LEGEND:

C-X : DENOTED CONNECTOR NUMBER

CXS : DENOTED CONNECTOR START

CXE : DENOTED CONNECTOR END

--->: TRAVELING DIRECTION

STATE OF TEXAS
HUMAM K. YASEEN
146352
LICENSED PROFESSIONAL ENGINEER

8/31/2023

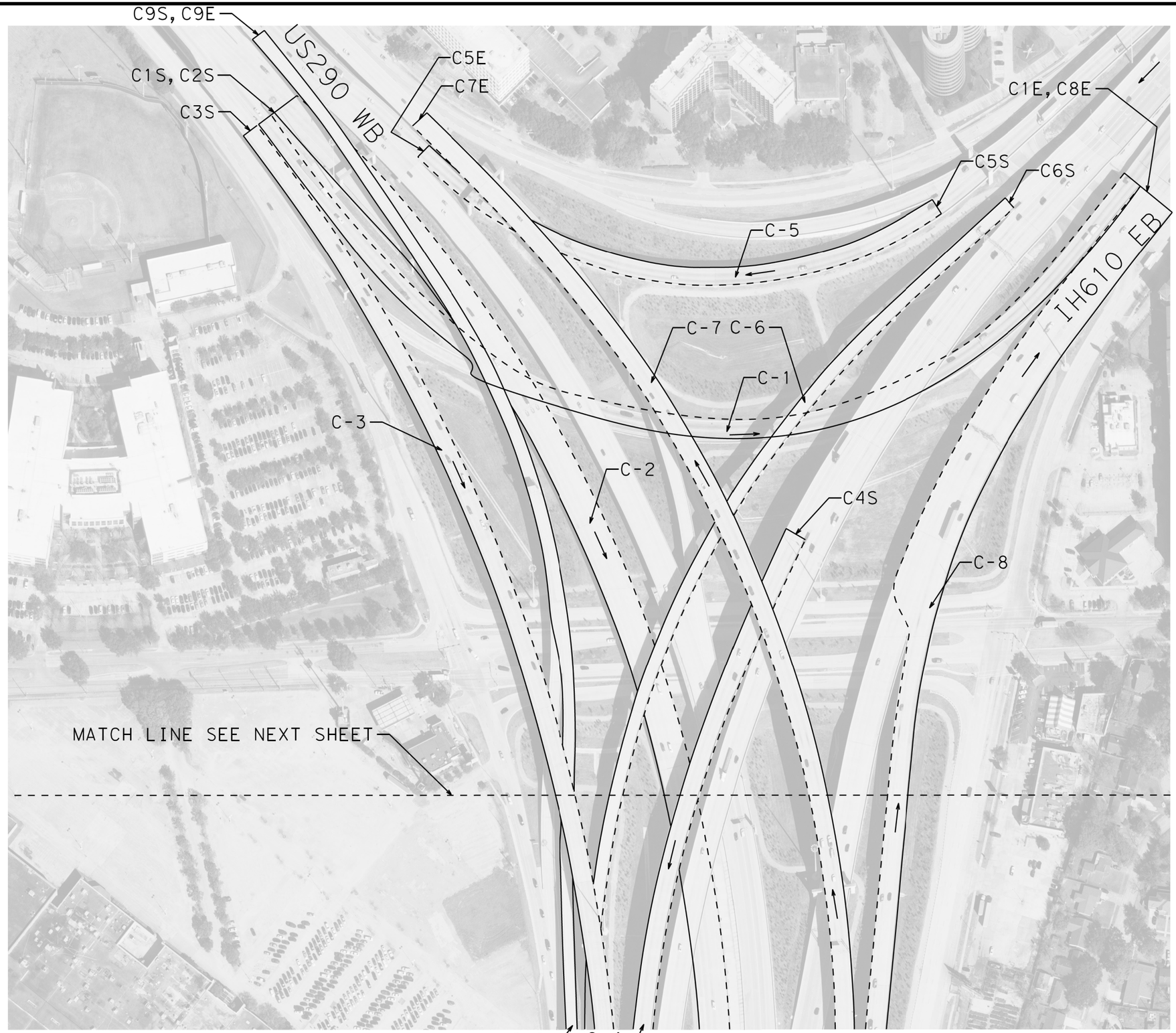
TEXAS DEPARTMENT OF TRANSPORTATION

IH45-610 (N LOOP FWY) INTERCHANGE LAYOUT

SCALE: N.T.S. SHEET 9 OF 13

ORIGINAL DRAWING DATE: JUNE, 2023	STATE DISTRICT	FEDERAL REGION	PROJECT NO	SHEET
REVISIONS	HOU	6		43
DN.I= CK.I= DN.I= CK.I=	COUNTY	CONTROL	SECTION	JOB	HIGHWAY
	HARRIS	0508	01	387	IH 10

DATE:
FILE:



NOTES :

-APPLY BARRIER SAFETY LINE MARKING ON RIGHT AND LEFT SIDE BARRIERS ON DIRECT CONNECTORS.

-BEGIN AND END ULTRAGUARD MARKINGS AT THE PHYSICAL GORE AREAS. IN PLACES WHERE PHYSICAL GORE DOES NOT EXIST, BEGIN ULTRAGUARD MARKING AT A POINT WHERE DIRECT CONNECTOR BEGINS AND END MARKING AT A POINT WHERE DIRECT CONNECTOR ENDS. FOR THE STARTING AND ENDING COORDINATE POINTS SEE BELOW:

C-1: CONNECTOR FROMUS290EBTOIH610 NB
29°48'16.60"N 95°27'11.00"W(START)
29°48'14.30"N 95°26'50.80"W(END)
C-2: CONNECTOR FROMUS290EBTOIH610 SB
29°48'16.60"N 95°27'11.00"W(START)
29°47'47.20"N 95°27'3.20"W(END)
C-3: CONNECTOR FROMUS290EBTOIH10
29°48'16.60"N 95°27'11.00"W(START)
29°47'54.00"N 95°27'3.70"W(END)
C-4: CONNECTOR FROMIH610 (N Loop) WBTOIH10
29°48'7.50"N 95°26'59.30"W(START)
29°47'54.00"N 95°27'3.70"W(END)
C-5: CONNECTOR FROMIH610WBTOUS290WB
29°48'14.30"N 95°26'55.80"W(START)
29°48'15.60"N 95°27'7.60"W(END)
C-6: CONNECTOR FROM IH610 (N Loop) WB TO W Loop FWY/IH10
29°47'49.70"N 95°27'5.30"W(START)
29°48'14.20"N 95°26'54.20"W(END)
C-7: CONNECTOR FROMIH10TOUS290WB
29°47'55.20"N 95°26'58.50"W(START)
29°48'16.40"N 95°27'7.80"W(END)
C-8: CONNECTOR FROMIH10TOIH610(N Loop FWY) EB
29°47'55.20"N 95°26'58.50"W(START)
29°48'14.30"N 95°26'50.80"W(END)
C-9: CONNECTOR FROMUS290HOV EBTONW Transit Center
29°48'18.10"N 95°27'11.40"W(START/END)
29°47'51.30"N 95°27'5.30"W(START/END)

LEGEND:

C-X : DENOTED CONNECTOR NUMBER

CXS : DENOTED CONNECTOR START

CXE : DENOTED CONNECTOR END

--->: TRAVELING DIRECTION

STATE OF TEXAS
HUMAM K. YASEEN
146352
LICENSED PROFESSIONAL ENGINEER

8/31/2023

TEXAS DEPARTMENT OF TRANSPORTATION

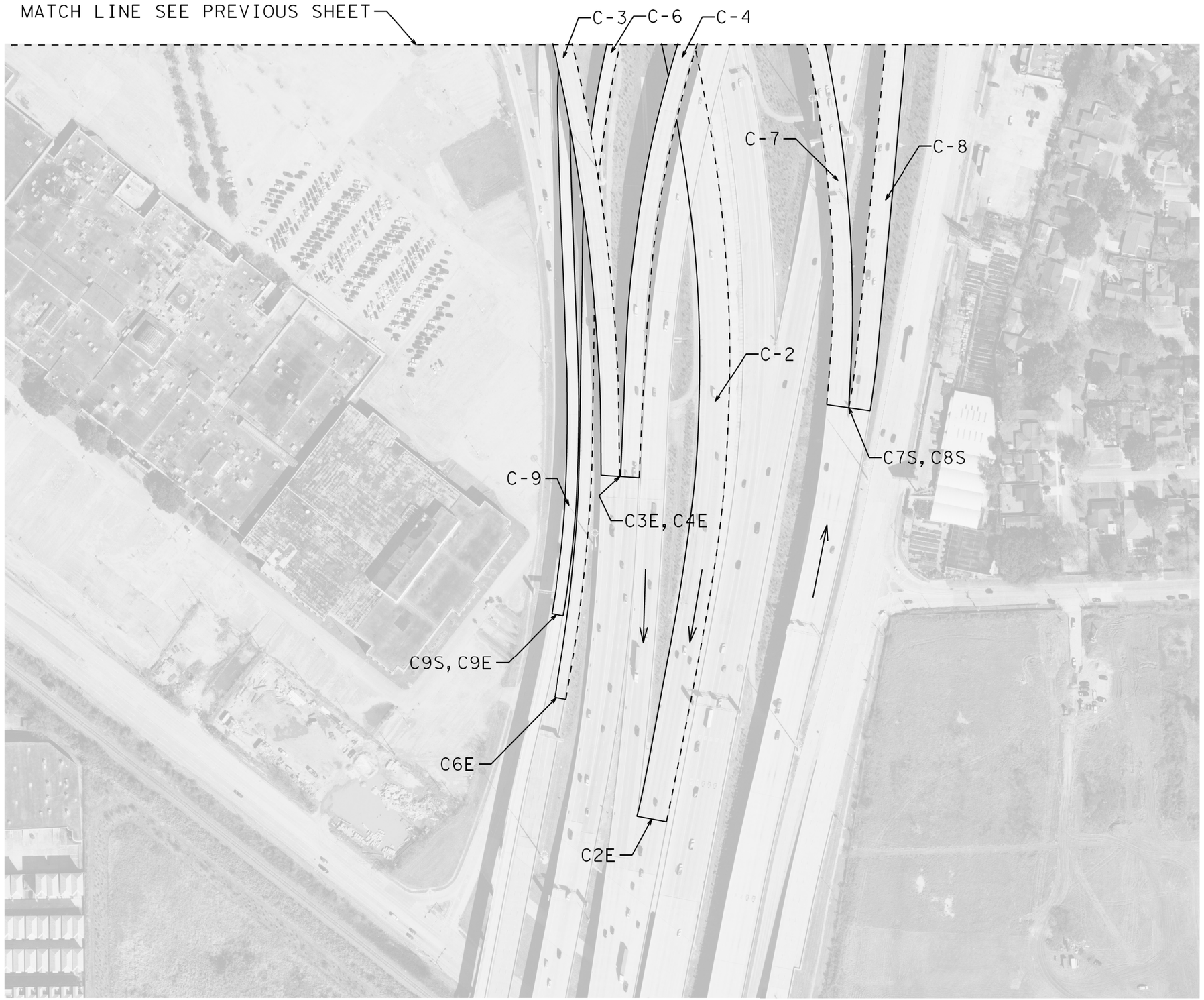
US290-IH610 INTERCHANGE LAYOUT PART I

SCALE: N.T.S.

SHEET 10 OF 13

ORIGINAL DRAWING DATE: JUNE, 2023	STATE DISTRICT	FEDERAL REGION	PROJECT NO	SHEET
DN,E= REVISIONS	HOU	6		44
CK,E=	COUNTY		CONTROL SECTION JOB	HIGHWAY
DN,E=	HARRIS		0508 01 387	IH 10
CK,E=				

DATE:
FILE:



NOTES :

-APPLY BARRIER SAFETY LINE MARKING ON RIGHT AND LEFT SIDE BARRIERS ON DIRECT CONNECTORS.

-BEGIN AND END ULTRAGUARD MARKINGS AT THE PHYSICAL GORE AREAS. IN PLACES WHERE PHYSICAL GORE DOES NOT EXIST, BEGIN ULTRAGUARD MARKING AT A POINT WHERE DIRECT CONNECTOR BEGINS AND END MARKING AT A POINT WHERE DIRECT CONNECTOR ENDS. FOR THE STARTING AND ENDING COORDINATE POINTS SEE BELOW:

C-1 : CONNECTOR FROM US290EB TO IH610 NB
29°48'16.60"N 95°27'11.00"W (START)
29°48'14.30"N 95°26'50.80"W (END)
C-2 : CONNECTOR FROM US290EB TO IH610 SB
29°48'16.60"N 95°27'11.00"W (START)
29°47'47.20"N 95°27'3.20"W (END)
C-3 : CONNECTOR FROM US290EB TO IH10
29°48'16.60"N 95°27'11.00"W (START)
29°47'54.00"N 95°27'3.70"W (END)
C-4 : CONNECTOR FROM IH610 (N Loop) WB TO IH10
29°48'7.50"N 95°26'59.30"W (START)
29°47'54.00"N 95°27'3.70"W (END)
C-5 : CONNECTOR FROM IH610WB TO US290WB
29°48'14.30"N 95°26'55.80"W (START)
29°48'15.60"N 95°27'7.60"W (END)
C-6 : CONNECTOR FROM IH610 (N Loop) WB TO W Loop FWY/IH10
29°47'49.70"N 95°27'5.30"W (START)
29°48'14.20"N 95°26'54.20"W (END)
C-7 : CONNECTOR FROM IH10TO US290WB
29°47'55.20"N 95°26'58.50"W (START)
29°48'16.40"N 95°27'7.80"W (END)
C-8 : CONNECTOR FROM IH10TO IH610(N Loop FWY) EB
29°47'55.20"N 95°26'58.50"W (START)
29°48'14.30"N 95°26'50.80"W (END)
C-9 : CONNECTOR FROM US290HOV EB TO NW Transit Center
29°48'18.10"N 95°27'11.40"W (START/END)
29°47'51.30"N 95°27'5.30"W (START/END)

LEGEND:

C-X : DENOTED CONNECTOR NUMBER

CXS : DENOTED CONNECTOR START

CXE : DENOTED CONNECTOR END

--->: TRAVELING DIRECTION

STATE OF TEXAS
HUMAM K. YASEEN
146352
LICENSED PROFESSIONAL ENGINEER

8/31/2023

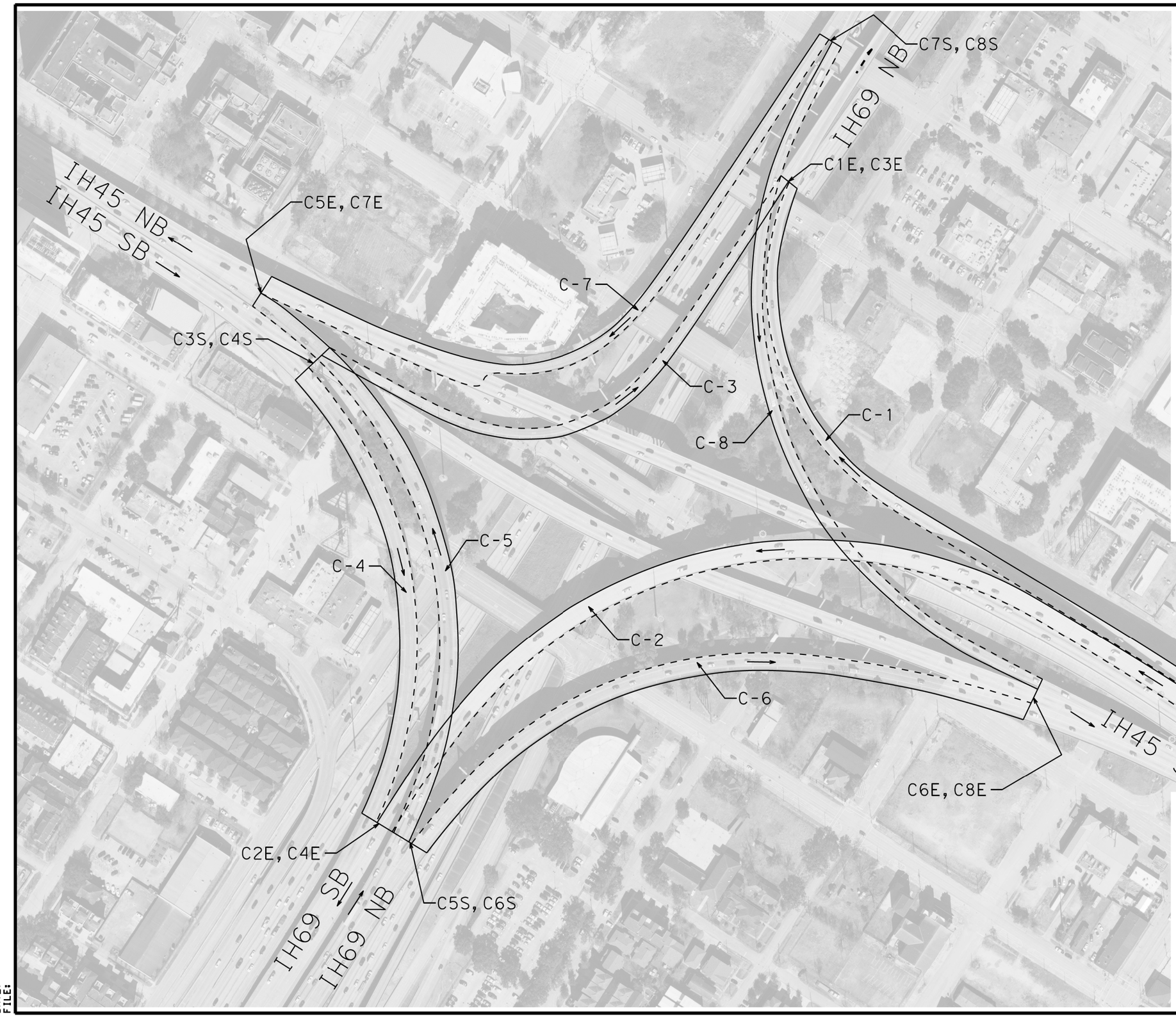
TEXAS DEPARTMENT OF TRANSPORTATION

US290-IH610 INTERCHANGE LAYOUT PART II

SCALE: N.T.S. SHEET 11 OF 13

ORIGINAL DRAWING DATE: JUNE, 2023	STATE DISTRICT	FEDERAL REGION	PROJECT NO	SHEET
DN.E: CK.E: DR.E: CK.E: REVISIONS	HOU	6		45
	COUNTY	CONTROL	SECTION	JOB	HIGHWAY
	HARRIS	0508	01	387	IH 10

DATE:
FILE:



NOTES :

-APPLY BARRIER SAFETY LINE MARKING ON RIGHT AND LEFT SIDE BARRIERS ON DIRECT CONNECTORS.

-BEGIN AND END ULTRAGUARD MARKINGS AT THE PHYSICAL GORE AREAS. IN PLACES WHERE PHYSICAL GORE DOES NOT EXIST, BEGIN ULTRAGUARD MARKING AT A POINT WHERE DIRECT CONNECTOR BEGINS AND END MARKING AT A POINT WHERE DIRECT CONNECTOR ENDS. FOR THE STARTING AND ENDING COORDINATE POINTS SEE BELOW:

C-1 : CONNECTOR FROM IH45NB TO IH69NB
29°44'34.00"N 95°21'29.50"W (START)
29°44'46.20"N 95°21'41.20"W (END)
C-2 : CONNECTOR FROM IH45NB TO IH69SB
29°44'34.00"N 95°21'29.50"W (START)
29°44'34.00"N 95°21'50.90"W (END)
C-3 : CONNECTOR FROM IH45SB TO IH69NB
29°44'42.90"N 95°21'52.40"W (START)
29°44'46.20"N 95°21'41.20"W (END)
C-4 : CONNECTOR FROM IH45SB TO IH69SB
29°44'42.90"N 95°21'52.40"W (START)
29°44'34.00"N 95°21'50.90"W (END)
C-5 : CONNECTOR FROM IH69NB TO IH45NB
29°44'33.20"N 95°21'50.50"W (START)
29°44'44.20"N 95°21'53.10"W (END)
C-6 : CONNECTOR FROM IH69NB TO IH45SB
29°44'33.20"N 95°21'50.50"W (START)
29°44'35.70"N 95°21'35.70"W (END)
C-7 : CONNECTOR FROM IH69SB TO IH45NB
29°44'49.30"N 95°21'40.00"W (START)
29°44'44.20"N 95°21'53.10"W (END)
C-8 : CONNECTOR FROM IH69SB TO IH45SB
29°44'49.30"N 95°21'40.00"W (START)
29°44'35.70"N 95°21'35.70"W (END)

LEGEND:

C-X : DENOTED CONNECTOR NUMBER

CXS : DENOTED CONNECTOR START

CXE : DENOTED CONNECTOR END

--->: TRAVELING DIRECTION

N

STATE OF TEXAS
HUMAM K. YASEEN
146352
LICENSED PROFESSIONAL ENGINEER

8/31/2023

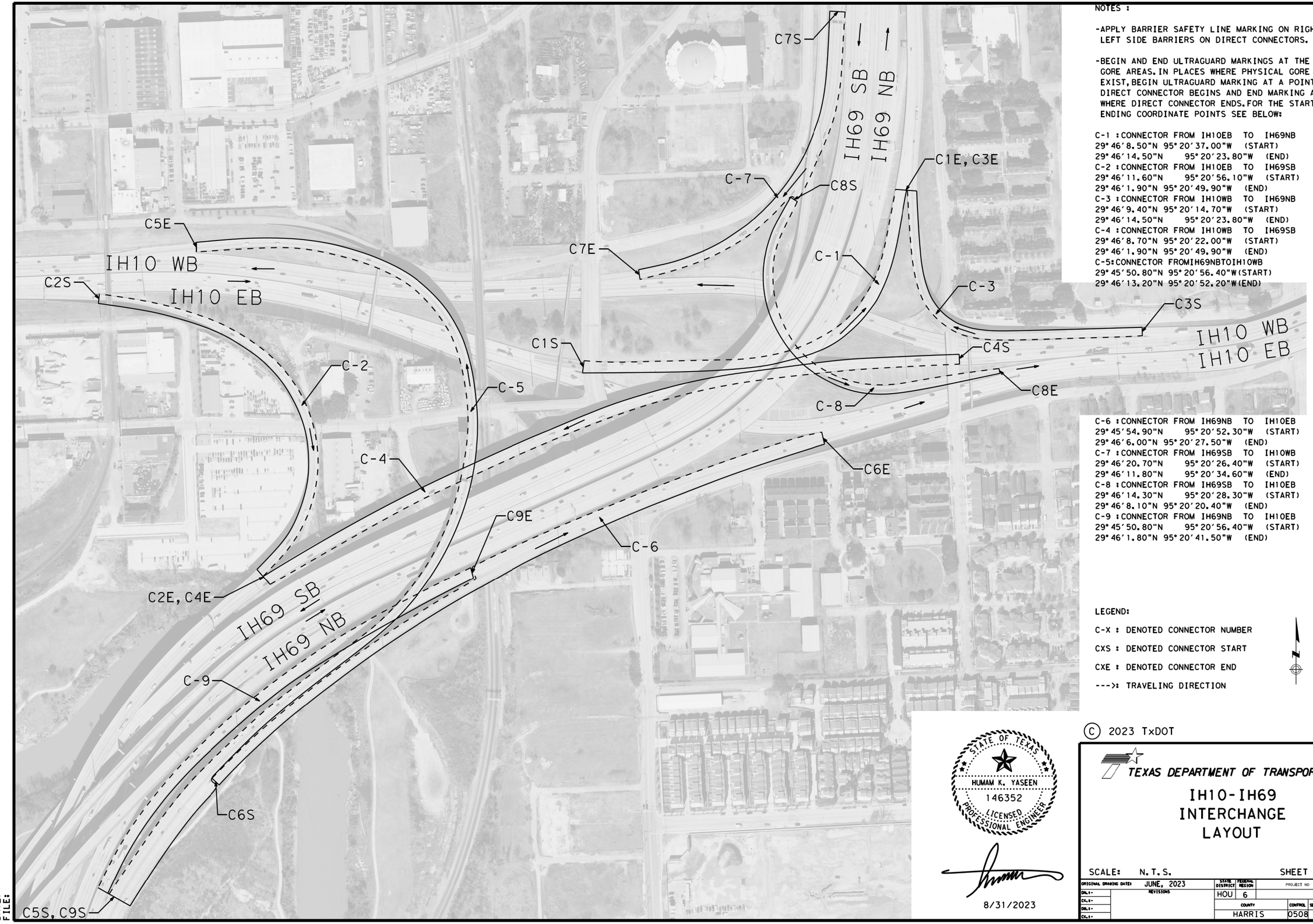
TEXAS DEPARTMENT OF TRANSPORTATION

IH45-IH69 INTERCHANGE LAYOUT

SCALE: N.T.S. SHEET 12 OF 13

ORIGINAL DRAWING DATE: JUNE, 2023	STATE DISTRICT	FEDERAL REGION	PROJECT NO	SHEET
REVISIONS	HOU	6		46
DN.E:	COUNTY	CONTROL	SECTION	JOB	HIGHWAY
CK.E:	HARRIS	0508	01	387	IH 10
DN.E:					
CK.E:					

DATE:
FILE:



NOTES :

-APPLY BARRIER SAFETY LINE MARKING ON RIGHT AND LEFT SIDE BARRIERS ON DIRECT CONNECTORS.

-BEGIN AND END ULTRAGUARD MARKINGS AT THE PHYSICAL GORE AREAS. IN PLACES WHERE PHYSICAL GORE DOES NOT EXIST, BEGIN ULTRAGUARD MARKING AT A POINT WHERE DIRECT CONNECTOR BEGINS AND END MARKING AT A POINT WHERE DIRECT CONNECTOR ENDS. FOR THE STARTING AND ENDING COORDINATE POINTS SEE BELOW:

C-1 : CONNECTOR FROM IH10EB TO IH69NB
29°46'8.50"N 95°20'37.00"W (START)
29°46'14.50"N 95°20'23.80"W (END)
C-2 : CONNECTOR FROM IH10EB TO IH69SB
29°46'11.60"N 95°20'56.10"W (START)
29°46'1.90"N 95°20'49.90"W (END)
C-3 : CONNECTOR FROM IH10WB TO IH69NB
29°46'9.40"N 95°20'14.70"W (START)
29°46'14.50"N 95°20'23.80"W (END)
C-4 : CONNECTOR FROM IH10WB TO IH69SB
29°46'8.70"N 95°20'22.00"W (START)
29°46'1.90"N 95°20'49.90"W (END)
C-5: CONNECTOR FROMIH69NBTOIH10WB
29°45'50.80"N 95°20'56.40"W(START)
29°46'13.20"N 95°20'52.20"W(END)

C-6 : CONNECTOR FROM IH69NB TO IH10EB
29°45'54.90"N 95°20'52.30"W (START)
29°46'6.00"N 95°20'27.50"W (END)
C-7 : CONNECTOR FROM IH69SB TO IH10WB
29°46'20.70"N 95°20'26.40"W (START)
29°46'11.80"N 95°20'34.60"W (END)
C-8 : CONNECTOR FROM IH69SB TO IH10EB
29°46'14.30"N 95°20'28.30"W (START)
29°46'8.10"N 95°20'20.40"W (END)
C-9 : CONNECTOR FROM IH69NB TO IH10EB
29°45'50.80"N 95°20'56.40"W (START)
29°46'1.80"N 95°20'41.50"W (END)

LEGEND:

C-X : DENOTED CONNECTOR NUMBER

CXS : DENOTED CONNECTOR START

CXE : DENOTED CONNECTOR END

--->: TRAVELING DIRECTION

N

STATE OF TEXAS
HUMAM K. YASEEN
146352
LICENSED PROFESSIONAL ENGINEER

8/31/2023

TEXAS DEPARTMENT OF TRANSPORTATION

IH10-IH69 INTERCHANGE LAYOUT

SCALE: N.T.S.

SHEET 13 OF 13

ORIGINAL DRAWING DATE: JUNE, 2023		STATE DISTRICT	FEDERAL REGION	PROJECT NO				SHEET
DN,E=	REVISIONS	HOU	6					47
CK,E=		COUNTY		CONTROL	SECTION	JOB	HIGHWAY	
DN,E=		HARRIS		0508	01	387	IH 10	
CK,E=								

DATE:
FILE:

GENERAL NOTES FOR ALL ELECTRICAL WORK

1. The location of all conduits, junction boxes, ground boxes, and electrical services is diagrammatic and may be shifted to accommodate field conditions.

2. Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC), TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA), and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association (CSA), Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Where reference is made to NEMA listed devices, International Electrotechnical Commission (IEC) listed devices will not be considered an acceptable equal to a NEMA listed device. Acceptable devices may have both a NEMA and IEC listing. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection. Replace or reinstall rejected material or equipment at no additional cost to the Department.

3. Miscellaneous nuts, bolts and hardware, except for high strength bolts, may be stainless steel when plans specify galvanized, provided the bolt size is ½ in. or less in diameter.

4. Provide the following test equipment as required by the Engineer to confirm compliance with the contract and the NEC: voltmeter, ammeter, megohm meter (1000 volt DC), ground resistance tester, torque wrenches, and torque screwdrivers. Ensure all equipment has been properly calibrated within the last year. Provide calibration certification to the Engineer upon request. Operate test equipment during inspection as requested by the Engineer.

5. Install grounding as shown on the plans and in accordance with the NEC. Ensure all metallic conduits; metal poles; luminaires; and metal enclosures are bonded to the equipment grounding conductor. Provide stranded bare copper or green insulated grounding conductors. Ground rods, connectors, and bonding jumpers are subsidiary to the various bid items.

6. When required by the Engineer, notify the Department in writing of materials from the Material Producers List (MPL) intended for use on each project. Prequalified materials are listed on the MPL on TxDOT's website under "Roadway Illumination and Electrical Supplies." No substitutions will be allowed for materials on this list.

CONDUIT

A. MATERIALS

1. Provide conduit, junction boxes, fittings, and hardware as per TxDOT Departmental Material Specification (DMS) 11030 "Conduit" and Item 618 "Conduit" of TxDOT's "Standard Specifications For Construction And Maintenance Of Highways, Streets, And Bridges," latest edition. Provide conduits listed under Item 618 on the MPL under "Roadway Illumination and Electrical Supplies." Provide conduit types according to the descriptive code or as shown on the plans. Do not substitute other types of conduits for those shown. Provide liquidtight flexible metal conduit (LFMC) when flexible conduit is called for on galvanized steel rigid metallic conduit (RMC) systems. Provide liquidtight flexible nonmetallic conduit (LFNC) when flexible conduit is called for on polyvinyl chloride (PVC) systems.

2. Provide galvanized steel RMC for all exposed conduits, unless otherwise shown on the plans. Properly bond all metal conduits.

3. Unless otherwise shown on the plans, provide junction boxes with a minimum size as shown in the following table, which applies to the greatest number of conductors entering the box through one conduit with no more than four conduits per box. When a mixture of conductor sizes is present, count the conductors as if all are of the larger size. For situations not applicable to the table, size junction boxes in accordance with NEC.

AWG	3 CONDUCTORS	5 CONDUCTORS	7 CONDUCTORS
#1	10" x 10" x 4"	12" x 12" x 4"	16" x 16" x 4"
#2	8" x 8" x 4"	10" x 10" x 4"	12" x 12" x 4"
#4	8" x 8" x 4"	10" x 10" x 4"	10" x 10" x 4"
#6	8" x 8" x 4"	8" x 8" x 4"	10" x 10" x 4"
#8	8" x 8" x 4"	8" x 8" x 4"	8" x 8" x 4"

4. Junction boxes with an internal volume of less than 100 cu. in. and supported by entering raceways must have threaded entries or hubs identified for the intended purpose and supported by connection of two or more rigid metal conduits. Secure conduit within 3 ft. of the enclosure or within 18 in. of the enclosure if all conduit entries are on the same side. Mechanically secure all junction boxes with an internal volume greater than 100 cu. inches.

5. Provide hot dipped galvanized cast iron or sand cast aluminum outlet boxes for junction boxes containing only 10 AWG or 12 AWG conductors. Do not use die cast aluminum boxes. Size outlet boxes according to the NEC.

6. Do not use intermediate metal conduit (IMC) or electrical metallic tubing (EMT) unless specifically required by the plan sheets. When EMT is called for, provide junction boxes made from galvanized steel sheeting, listed and approved for outdoor use, unless otherwise noted on the plans. Size all galvanized steel junction boxes in accordance with the NEC. Provide junction boxes for IMC conduit systems that meet the same requirements for junction boxes used with RMC systems.

7. Provide PVC junction boxes intended for outdoor use on PVC conduit systems, unless otherwise noted on the plans.

8. Provide PVC elbows in PVC conduit systems, unless otherwise shown on the plans. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the PVC conduit system. When galvanized steel RMC elbows are specifically called for in the plans and any portion of the RMC elbow is buried less than 18 in., ground the RMC elbow by means of a grounding bushing on a rigid metal extension. Grounding of the rigid metal elbow is not required if the entire RMC elbow is encased in a minimum of 2 in. of concrete. PVC extensions are allowed on these concrete encased rigid metal elbows. RMC or PVC elbows are subsidiary to various bid items.

9. When required, provide High-Density Polyethylene (HDPE) conduit with factory installed internal conductors according to Item 622 "Duct Cable." At the Contractor's request and with approval by the Engineer, substitute HDPE conduit with no conductors for bored schedule 40 or schedule 80 PVC conduit bid under Item 618. Ensure bored HDPE substituted for PVC is schedule 40 and of the same size PVC called for in the plans. Ensure the substituted HDPE meets the requirements of Item 622, except that the conduit is supplied without factory-installed conductors. Make the transition of the HDPE conduit to PVC (or RMC elbow when required) at the bore pit. Provide conduit of the size and schedule as shown on the plans. Do not extend substituted conduit into ground boxes or foundations. Provide PVC or galvanized steel RMC elbows as called for at all ground boxes and foundations.

10. Use two-hole straps when supporting 2 in. and larger conduits. On electrical service poles, properly sized stainless steel or hot dipped galvanized one-hole standoff straps are allowed on the service riser conduit.

B. CONSTRUCTION METHODS

1. Provide and install expansion joint conduit fittings on all structure-mounted conduits at the structure's expansion joints to allow for movement of the conduit. In addition, provide and install expansion joint fittings on all continuous runs of galvanized steel RMC conduit externally exposed on structures such as bridges at maximum intervals of 150 ft. When requested by the project Engineer, supply manufacturer's specification sheet for expansion joint conduit fittings. Repair or replace expansion joint fittings that do not allow for movement at no additional cost to the Department. Provide the method of determining the amount of expansion to the Engineer upon request. Do not use LFMC or LFNC as a substitute for the required expansion conduit fittings.

2. Space all conduit supports at maximum intervals of 5 ft. Install conduit spacers when attaching metal conduit to surface of concrete structures. See "Conduit Mounting Options" on ED(2). Install conduit support within 3 ft. of all enclosures and conduit terminations.

3. Do not attach conduit supports directly to pre-stressed concrete beams except as shown specifically in the plans or as approved by the Engineer.

4. Unless otherwise shown on the plans, jack or bore conduit placed beneath existing roadways, driveways, sidewalks, or after the base or surfacing operation has begun. Backfill and compact the bore pits below the conduit per Item 476 "Jacking, Boring, or Tunneling Pipe or Box" prior to installing conduit or duct cable to prevent bending of the connections.

5. When placing conduit in the sub-grade of new roadways, backfill all trenches with excavated material unless otherwise noted on the plans. When placing conduit in the sub-base of new roadways, backfill all trenches with cement-stabilized base as per requirements of Items 110 "Excavation", 400 "Excavation and Backfill for Structures", 401 "Flowable Backfill", 402 "Trench Excavation Protection", and 403 "Temporary Special Shoring."

6. Provide and place warning tape approximately 10 in. above all trenched conduit as per Item 618.

7. During construction, temporarily cap or plug open ends of all conduit and raceways immediately after installation to prevent entry of dirt, debris and animals. Temporary caps constructed of durable duct tape are allowed. Tightly fix the tape to the conduit opening. Clean out the conduit and prove it clear in accordance with Item 618 prior to installing any conductors.

8. Ensure conduit entry into the top of any enclosure is waterproof by installing conduit sealing hubs or using boxes with threaded bosses. This includes surface mounted safety switches, meter cans, service enclosures, auxiliary enclosures and junction boxes. Grounding bushings on water tight sealing hubs are not required.

9. Fit the ends of all PVC conduit terminations with bushings or bell end fittings. Provide and install a grounding type bushing on all metal conduit terminations.

10. Install a bonding jumper from each grounding bushing to the nearest ground rod, grounding lug, or equipment grounding conductor. Ensure all bonding jumpers are the same size as the equipment grounding conductor. Bonding of conduit used as a casing under roadways for duct cable is not required, if the duct extends the full length through the casing.

11. At all electrical services, install a 6 AWG solid copper grounding electrode conductor.

12. Place conduits entering ground boxes so that the conduit openings are between 3 in. and 6 in. from the bottom of the box. See the ground box detail on sheet ED(4).

13. Seal ends of all conduits with duct seal, expandable foam, or by other methods approved by the Engineer. Seal conduit immediately after completion of conductor installation and pull tests. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a conduit sealant.

14. File smooth the cut ends of all mounting strut and conduit. Before installing, paint the field cut ends of all mounting strut and RMC (threaded or non-threaded) with zinc rich paint (94% or more zinc content) to alleviate overspray. Use zinc rich paint to touch up galvanized material as allowed under Item 445 "Galvanizing." Do not paint non-galvanized material with a zinc rich paint as an alternative for materials required to be galvanized.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUITS & NOTES

ED(1)-14

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		DIST	COUNTY		SHEET NO.
		HOU	HARRIS		48

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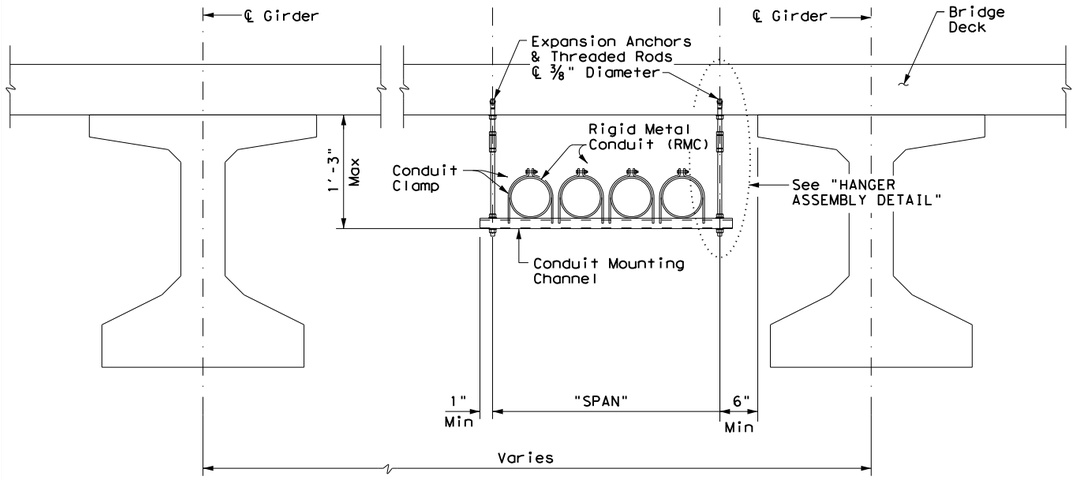
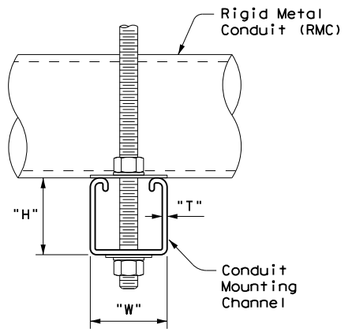
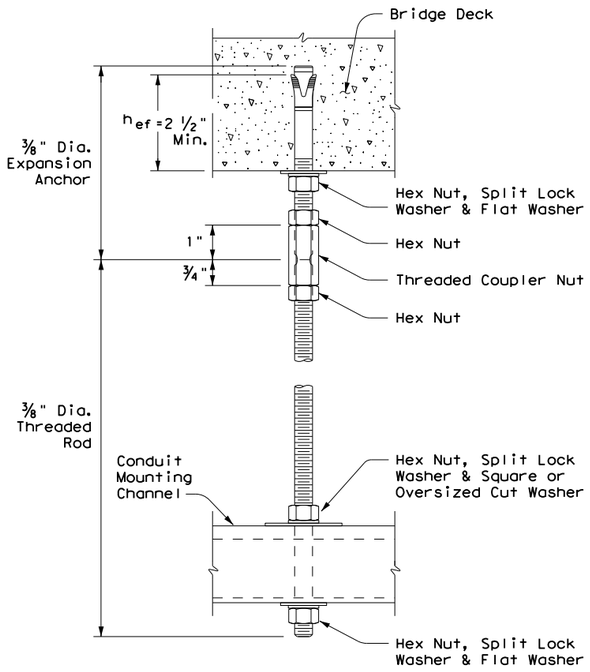


CONDUIT HANGING DETAIL

CONDUIT MOUNTING CHANNEL		
"SPAN"	"W" x "H"	"T"
less than 2'	1 5/8" x 1 3/8"	12 Ga.
2'-0" to 2'-6"	1 5/8" x 1 5/8"	12 Ga.
>2'-6" to 3'-0"	1 5/8" x 2 7/16"	12 Ga.

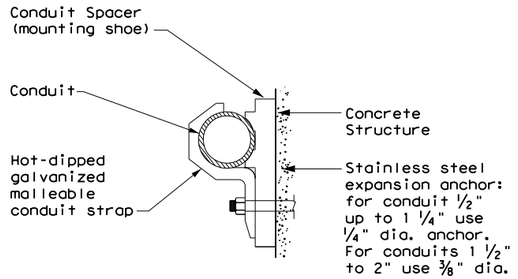
Channels with round or short slotted hole patterns are allowed, if the load carrying capacity is not reduced by more than 15%.

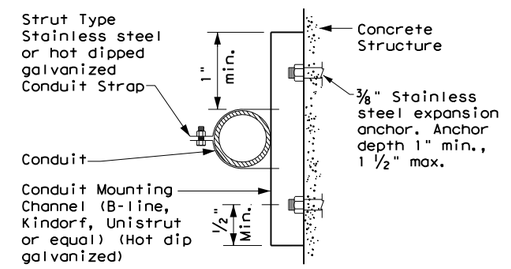




HANGER ASSEMBLY DETAIL

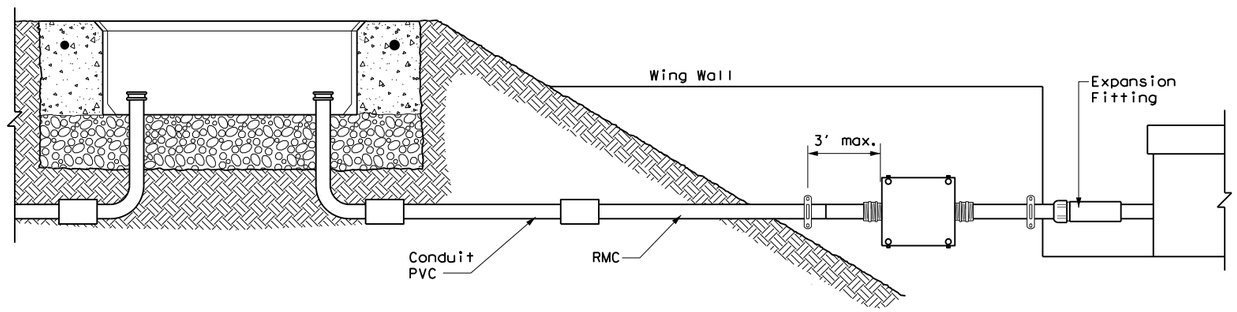
ELECTRIC CONDUIT TO BRIDGE DECK ATTACHMENT





CONDUIT MOUNTING OPTIONS

Attachment to concrete surfaces
See ED(1)B.2



TYPICAL CONDUIT ENTRY TO BRIDGE STRUCTURE DETAIL

EXPANSION ANCHOR NOTES FOR BRIDGE DECK ATTACHMENT

1. Use torque controlled mechanical expansion anchors that are approved for use in cracked concrete by the International Code Council, Evaluation Service (ICC-ES). The chosen anchor product shall have a designated ICC-ES Evaluation Report number, and its approval status shall be maintained on the ICC-ES website under Division 031600 for Concrete Anchors.
2. Unless otherwise approved by the Engineer: do not use adhesive anchors; do not use expansion anchors that are not included in the ICC-ES approval list; and do not use expansion anchors that are only approved for use in uncracked concrete.
3. Use anchors manufactured with stainless steel expansion wedges. Anchors manufactured with carbon steel expansion wedges are not allowed. Anchor bodies can be either zinc-plated carbon steel or stainless steel. For application in marine environment, both the anchor body and expansion wedge shall be stainless steel.
4. Install anchors as shown on the plans and in accordance with the anchor manufacturer's published installation instructions. Arrange a field demonstration test to evaluate the procedures and tools. The test shall be witnessed and approved by the Engineer prior to furnishing anchors on the structure.
5. Prior to hole drilling, use rebar locator to ensure clearing of existing deck strands or reinforcement. Install anchors to ensure a minimum effective embedment depth, (h_{ef}), as shown. Increase (h_{ef})as needed to ensure sufficient thread length for proper torqueing and tightening of anchors.
6. Use anchors of minimum 1600 Lbs tensile capacity (minimum of steel, concrete breakout, and concrete pullout strengths as determined by ACI 318 Appendix D) at the required minimum embedment depth (h_{ef}). No lateral loads shall be introduced after conduit installation.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUIT SUPPORTS

ED(2)-14

FILE: ed2-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0508	01	387	IH 10
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	HOU	HARRIS		49

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ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

1. Provide Type XHHW insulated conductors in accordance with Departmental Material Specification (DMS)11040 "Conductors" and Item 620 "Electrical Conductors." Provide conductors as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies" Item 620. Color code insulated conductors in conformance with the NEC. Identify grounded (neutral) conductors with white insulation. Identify grounding conductors (ground wires) with green insulation or bare conductors. Identify ungrounded (hot) conductors with any color insulation except green, white, or gray. Keep color scheme consistent throughout the wiring system. Identify conductors 6 American Wire Gauge (AWG) and smaller by continuous color jacket. Identify electrical conductors 4 AWG and larger by continuous color jacket or by colored tape. When identifying conductors with colored tape, mark at least 6 in. of the conductor's insulation with half laps of tape.

2. Provide a solid copper 6 AWG grounding electrode conductor to bond the electrical service equipment to the concrete encased grounding electrode or the ground rod at the service location. Connect the grounding electrode conductor to the ground rod with a UL listed connector in accordance with DMS 11040. Connect the grounding electrode conductor to the concrete encased grounding electrode as shown in the plans.

3. Where two or more circuits are present in one conduit or enclosure, permanently identify the conductors of each branch circuit by attaching a non-metallic tag around both circuit conductors at each accessible location. Provide tags with two straps, large enough to indicate circuit number, letter, or other identification as shown in the plans. Print circuit identification on the tag with a permanent marker.

4. Use listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors for splicing as specified in DMS 11040. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Provide UL listed gel-filled insulating splice covers. Splicing materials, insulating materials, breakaway disconnects, splice covers, and fuse holders are subsidiary to various bid items.

B. CONSTRUCTION METHODS

1. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the conduit system. After installing conductors in conduit, perform conductor pull test. If a conductor cannot be freely pulled, make any needed alterations or repairs at no additional cost to the department. Perform insulation resistance tests in accordance with Item 620. Coordinate with the Engineer to witness the tests.

2. Leave 2 ft. minimum, 3 ft. maximum length for each conductor up to the splice in ground boxes. Leave 3 ft. minimum, 4 ft. maximum length of conductor in ground boxes when pulled through with no splice. Leave 1 ft. minimum, 1.5 ft. maximum length of conductor at enclosures, weatherheads and pole bases.

3. Make splices only in junction boxes, ground boxes, pole bases, or electrical enclosures and use only listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors. Insulate splices with heavy wall heat shrink tubing or gel-filled insulating splice covers to provide a watertight splice. Overlap conductor insulation with heat shrink tubing a minimum of 2 in. past both sides of the splice. Where heat shrink tubing may not shrink sufficiently to provide a watertight seal around the individual conductors, prior to heating the tubing, increase the diameter of the conductor insulation using hot melt adhesive tape to provide a watertight seal between the individual conductors and the heat shrink tubing. Ensure the tape extends past the heat shrink tubing. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Heat shrink tubing that appears to have been burned, or overheated, is considered defective and must be replaced.

4. Size and install gel-filled insulating splice covers according to manufacturer's specifications when used in place of heat shrink tubing.

5. Wire nuts with factory applied waterproof sealant may be used for 8 AWG or smaller conductors in above ground junction boxes, but not in pole bases or ground boxes. Install wire nuts in an upright position to prevent the accumulation of water.

6. Support conductors in illumination poles with a J-hook at the top of the pole.

7. When terminating conductors, remove the insulation and jacketing material without nicking the individual strands of the conductor. Conductors with nicked individual conductor strands or removed strands will be considered damaged.

8. Replace conductors and cables that are damaged beyond repair or that fail an insulation resistance test at no additional cost to the department.

9. Do not repair damaged conductors with duct tape, electrical tape, or wire nuts. Use only approved splicing methods.

10. Do not terminate more than one conductor under a single connector, unless the connector is rated for multiple conductors. Do not exceed the pressure connector's listing for maximum number and size of conductors allowed.

11. Install breakaway connectors on conductors bid under Item 620 whenever those conductors pass through a breakaway support device. Follow manufacturer's instructions when terminating conductors to breakaway connectors. Properly torque threaded connections. Proper terminations are critical to the safe operation of breakaway devices. Trim waterproofing boots on breakaway connectors to fit snugly around the conductor to ensure waterproof connection. Only one conductor may enter a single opening in a boot. Provide waterproof boots with the correct number of openings. Leave unused openings factory sealed. Use prequalified breakaway connectors as shown on the MPL.

12. Provide and install a separate stranded equipment grounding conductor (EGC) in all conduits that contain circuit wiring of 50 volts or more. Unless shown elsewhere, size the EGC to be the same size as the largest current carrying conductor contained in the conduit. Ensure all EGCs are bonded together at every accessible location. For traffic signal installations, provide a minimum size 8 AWG EGC. The EGC is paid for under Item 620.

C. TEMPORARY WIRING

1. Install temporary conductors and electrical equipment in accordance with the NEC article "Temporary Installations" and Department standard sheets.

2. Provide a ground fault circuit interrupter (GFCI) for power outlets for portable electrical equipment, power tools, ice machines, ice storage bins and refrigerators located outdoors at grade. GFCI may be any one of the following: molded cord and plug set, receptacle, or circuit breaker type.

3. Use listed wire nuts with factory applied sealant for temporary wiring where approved.

4. Enclose conductor splices within a listed enclosure or ground box, or ensure the splices are more than 10 ft. above grade vertically and more than 5 ft. horizontally from any metal structure. Where installing temporary conductors in areas subject to vehicle traffic or mobile construction equipment, ensure the vertical clearance to ground is at least 18 ft. when measured at the lowest point. Ground messenger wires that support power conductors in conformance with the NEC.

5. Protect and when necessary repair any existing electrical conduits uncovered during the construction process in a timely manner and in conformance with the NEC.

GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

1. Provide and install a grounding electrode at electrical services. Provide ground rods according to DMS 11040 and the plans. Larger diameter or longer length rods may be called for in some specific locations, see the individual plans sheets. Concrete encased grounding electrodes may be called for in specific locations including electrical service, see individual plan sheets.

B. CONSTRUCTION METHODS

1. Furnish auxiliary ground rods for lightning protection and install in soil, concrete, or both, as called for in the plans. For ground rods installed in concrete, ensure the connection of the conductor to the ground rod is readily accessible for inspection or repairs. For ground rods installed in soil, ensure that the upper end is between 2 to 4 in. below finished grade.

2. Do not place ground rods in the same drilled hole as a timber pole.

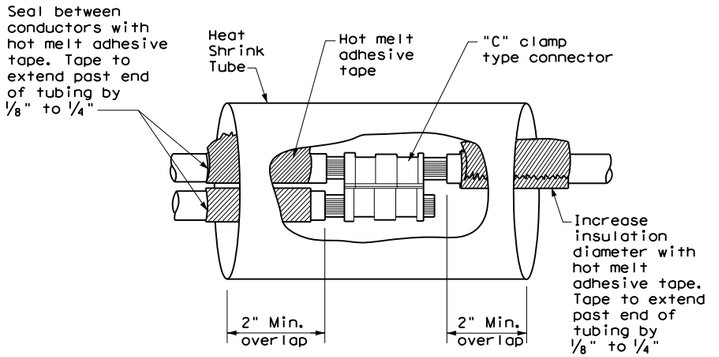
3. Install ground rods so the imprinted part number is at the upper end of the rod.

4. Remove all non-conductive coatings such as concrete splatter from the rod at the clamp location.

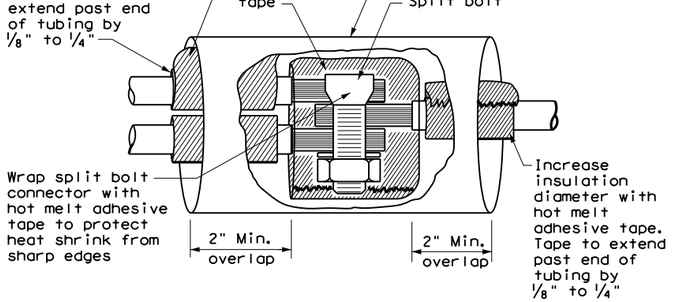
5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.

6. Unless otherwise called for in the plans, protect grounding electrode conductors with non-metallic conduit. When protecting grounding electrode conductors with metal conduit, provide and install a grounding type bushing and properly sized bonding jumper on each end of the metal conduit.

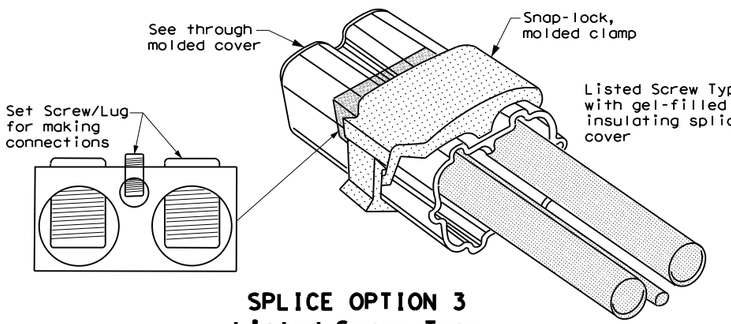
7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.



SPLICE OPTION 1
Compression Type



SPLICE OPTION 2
Split Bolt Type



SPLICE OPTION 3
Listed Screw Type

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUCTORS

ED(3)-14

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		HOU	HARRIS		50

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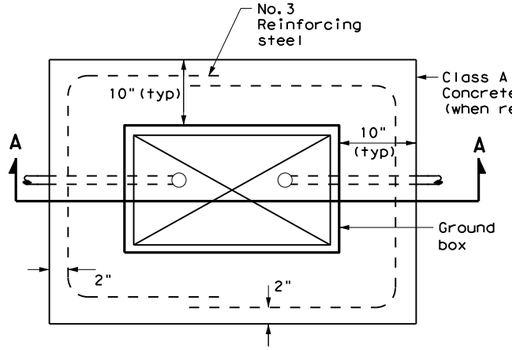
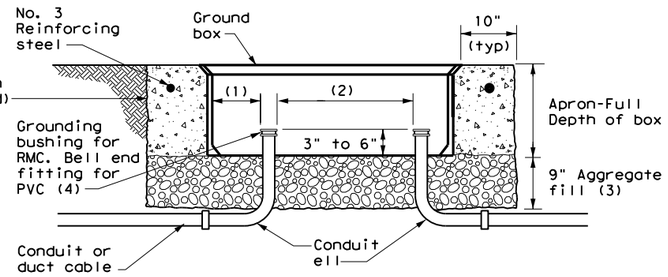


PLAN VIEW



SECTION A - A

APRON FOR GROUND BOX

(1) Uniformly space ends of conduits within the ground box. Position ends of conduits so that ground box walls do not interfere with the installation of grounding bushings or bell end fittings.

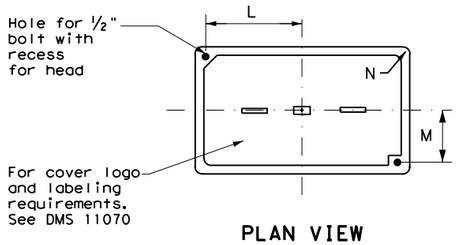
(2) Maintain sufficient space between conduits to allow for proper installation of bushing.

(3) Place aggregate under the box, not in the box. Aggregate should not encroach on the interior volume of the box.

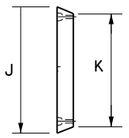
(4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

GROUND BOX DIMENSIONS	
TYPE	OUTSIDE DIMENSIONS (INCHES) (Width x Length X Depth)
A	12 X 23 X 11
B	12 X 23 X 22
C	16 X 29 X 11
D	16 X 29 X 22
E	12 X 23 X 17

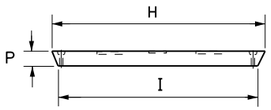
GROUND BOX COVER DIMENSIONS								
TYPE	DIMENSIONS (INCHES)							
	H	I	J	K	L	M	N	P
A, B & E	23 1/4	23	13 3/4	13 1/2	9 7/8	5 1/8	1 3/8	2
C & D	30 1/2	30 1/4	17 1/2	17 1/4	13 1/4	6 3/4	1 3/8	2



PLAN VIEW



END



SIDE

GROUND BOX COVER

GROUND BOXES

A. MATERIALS

1. Provide polymer concrete ground boxes measuring 16x30x24 in. (WxLxD) or smaller in accordance with Departmental Material Specification (DMS) 11070 "Ground Boxes" and Item 624 "Ground Boxes."

2. Provide Type A, B, C, D, and E ground boxes as shown in the plans, and as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 624.

3. Ensure ground box cover is correctly labeled in accordance with DMS 11070.

4. Provide larger ground boxes in accordance with Item 624 and as shown in the plans.

B. CONSTRUCTION METHODS

1. Remove all gravel and dirt from conduit. Cap all conduits prior to placing aggregate and setting ground box. Provide Grade 3 or 4 coarse aggregate as shown on Table 2 of Item 302 "Aggregates for Surface Treatments." Ensure aggregate bed is in place and at least 9 inches deep, prior to setting the ground box. Install ground box on top of aggregate.

2. Cast ground box aprons in place. Reinforcing steel may be field bent. Ensure the depth of concrete for the apron extends from finished grade to the top of the aggregate bed under the box. Ground box aprons, including concrete and reinforcing steel, are subsidiary to ground boxes when called for by descriptive code.

3. Keep bolt holes in the box clear of dirt. Bolt covers down when not working in ground boxes.

4. Install all conduits and ells in a neat and workmanlike manner. Uniformly space conduits so grounding bushings and bell end fittings can easily be installed.

5. Temporarily seal all conduits in the ground box until conductors are installed.

6. Permanently seal conduits immediately after the completion of conductor installation and pull tests. Permanently seal the ends of all conduits with duct seal, expandable foam, or other method as approved. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a sealant.

7. When a ground rod is present in a ground box, bond all equipment grounding conductors together and to the ground rod with listed connectors.

8. When a type B or D ground box is stacked to meet volume requirements, it is allowable to cut an appropriately sized hole for conduit entry in the side wall at least 18 inches below grade.

9. If an existing ground box in the contract has a metal cover, bond the cover to the equipment grounding conductor with a 3 ft. long stranded bonding jumper the same size as the grounding conductor. The bonding jumper is subsidiary to various bid items. Verify existing ground boxes with metal covers are shown on the plans, with notes fully describing the work required.

10. If other ground boxes with metal covers are within the project limits but are not part of the contract, the Engineer may direct the Contractor to bond the metal covers, identifying the specific boxes in writing. This work will be paid for separately.

11. Bond metal ground box covers to the grounding conductor with a tank ground type lug.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS GROUND BOXES

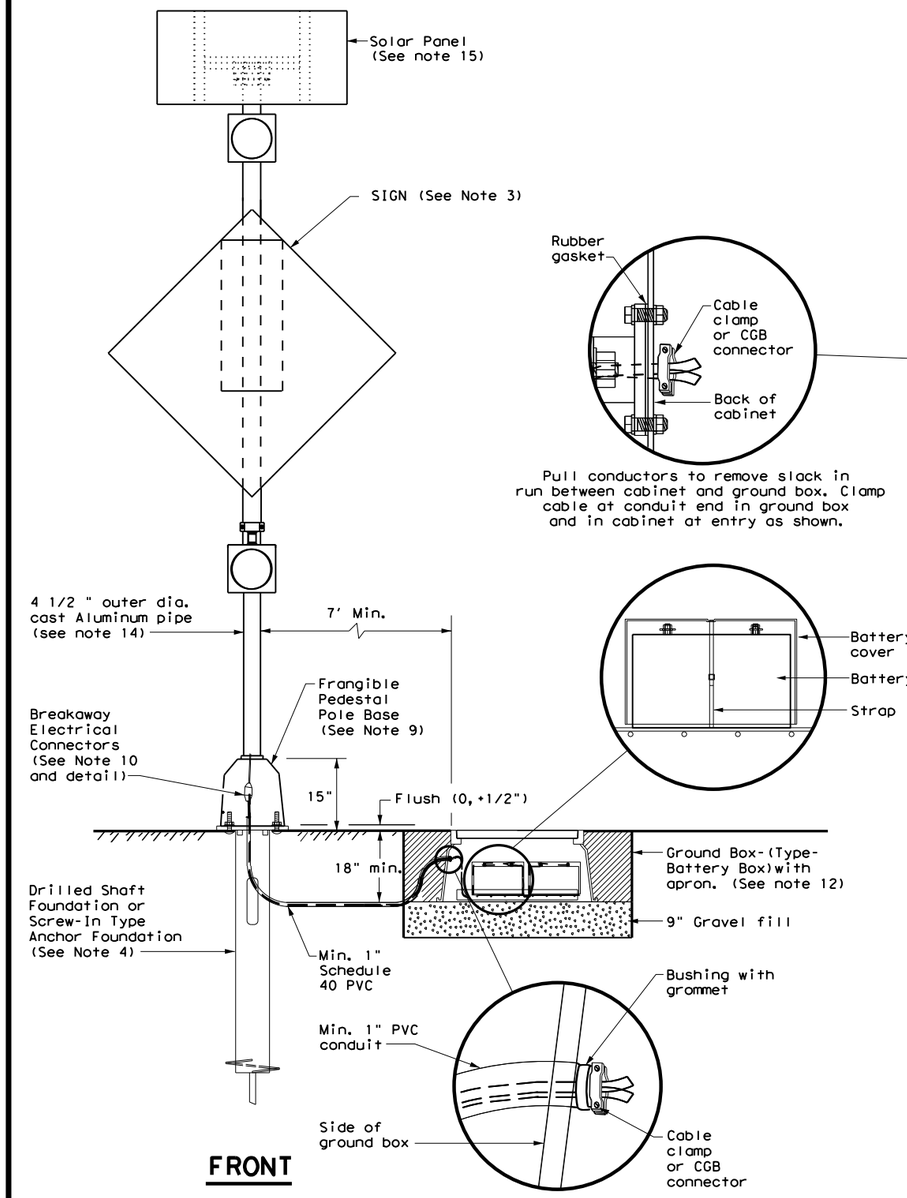
ED(4)-14

FILE: ed4-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
	CONT	SECT	JOB	HIGHWAY
REVISIONS	0508	01	387	IH 10
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		51

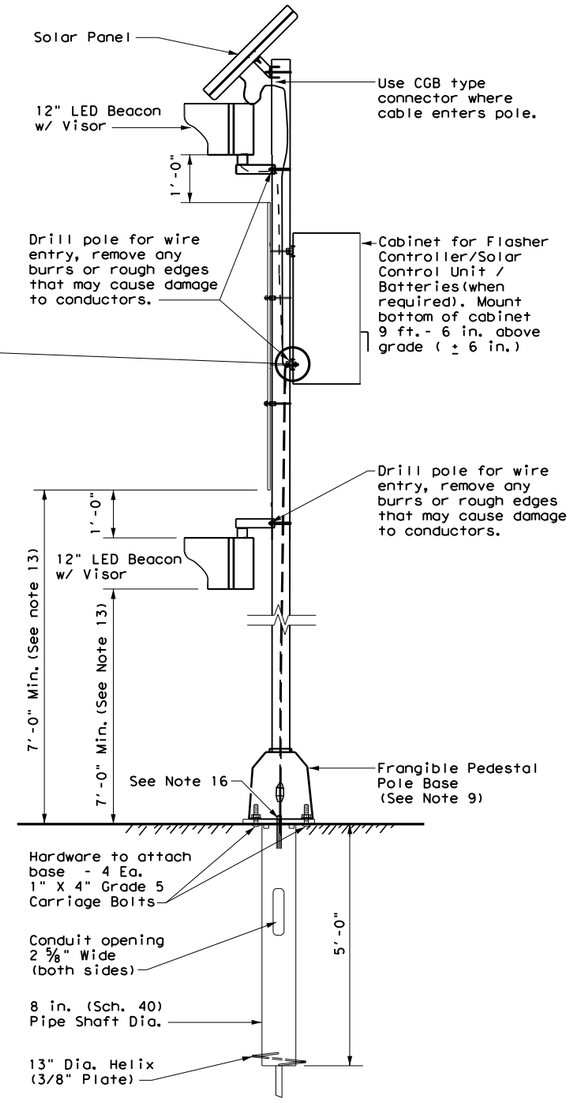
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

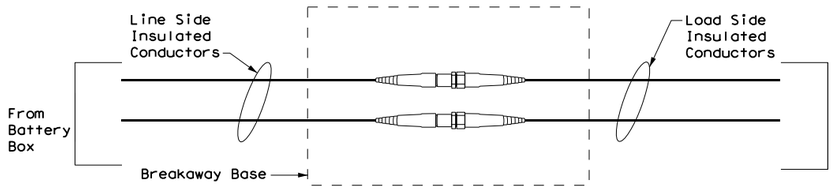
GENERAL NOTES:

1. Details show a typical warning sign with two flashing beacon heads, other arrangements are possible. When only one beacon is required, install the upper beacon.
2. See Item 685, "Roadside Flashing Beacon Assemblies" for further requirements.
3. See SMD standard sheets for lateral and vertical clearances and sign mounting details. Install signs as shown on the sign layout sheets.
4. Use either a Screw-In Type Anchor Foundation or a Drilled Shaft Foundation as shown elsewhere in the plans. When plans require a Drilled Shaft Foundation, see standard sheet TS-FD. Install the Screw-In Type Anchor Foundation as per manufacturer's recommendations. On a slope, install one edge at ground level. Screw-In/Drilled Shaft Foundation is subsidiary to Item 685. Installation of a ground rod is not required for solar powered flashing beacon assemblies.
5. When used, provide Screw-In Type Anchor Foundations as shown on TxDOT's Material Producer List (MPL) in the file "Highway Traffic Signals".
6. Use materials specifically designed for attaching cabinets, beacon heads, solar panels, etc., to poles.
7. Install beacon heads as shown here, as shown elsewhere on the plans, or as directed. Use hardware specifically designed for mounting beacon heads on poles.
8. Conduit in foundation and within 6 in. of foundation is subsidiary to the Item 685, "Roadside Flashing Beacon Assemblies."
9. Per manufacturer's recommendations, engage all threads on the pedestal pole base and pipe unless the pipe is fully seated into base. In high winds, use a pole and base collar assembly to add strength and prevent loosening on connection.
10. Provide single pole non-fused watertight breakaway electrical connectors for frangible pedestal pole bases, as shown on TxDOT's MPL in the file "Roadway Illumination and Electrical Supplies." Approved models are listed under Item 685. For ungrounded (hot) conductors, install a breakaway connector with a dummy fuse slug). For grounded (neutral) conductors, install a breakaway connector with a white colored marking and a permanently installed dummy fuse (slug).
11. Install the batteries in a battery box. Place the batteries on a 3/16" thick plastic sheet and connect together. Place a plastic cover (battery bell jar) over the top of each battery and secure the battery bell jar to the battery with a strap. The batteries, bell jars, straps and 3/16" plastic sheet are subsidiary to the Item 685, "Roadside Flashing Beacon Assemblies." When required, install batteries in the flasher cabinet. Wire batteries according to manufacturers recommendations. Provide the number of batteries as required by the manufacturer.
12. See standard sheet Electrical Details (ED) for additional requirements regarding the installation of ground boxes/battery boxes, conduit, and cabinets.
13. Provide clearance as shown above the sidewalk or pavement grade at the edge of the road. When a bottom beacon is not used, mount the bottom of the sign at least 7 ft. above the sidewalk or pavement grade at the edge of the road.
14. Unless otherwise shown on the plans, pole shaft shall be one piece, Schedule 40 Aluminum pipe, ASTM B429 or B221 (Alloy 6061-T6 only). Aluminum conduit will not develop the necessary strength and will not be allowed.
15. Orient solar panel for optimum exposure to sunlight (face to the south). Prior to installation, check the location to ensure there is no overhead obstruction that would block the solar panel from receiving full sunlight. Unless specified elsewhere, mount a minimum of 14' above grade.
16. Ensure height of conduit is below top of anchor bolts.

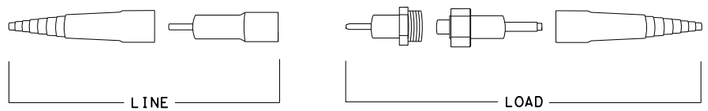


Pull conductors to remove slack in run between cabinet and ground box. Clamp cable at conduit end in ground box and in cabinet at entry as shown.





NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS



NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS EXPLODED VIEW

Texas Department of Transportation

Traffic Operations Division Standard

SOLAR POWERED ROADSIDE FLASHING BEACON ASSEMBLY DETAILS

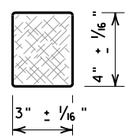
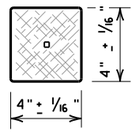
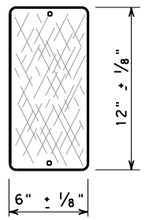
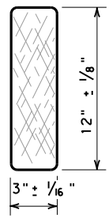
SPRFBA(1)-13

FILE: spb1-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0508	01	387	IH 10
12-04 3-13	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		52

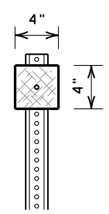
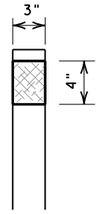
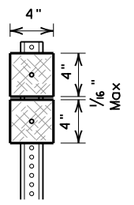
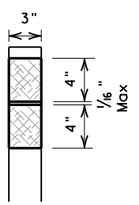
75A

DATE: 9/6/2023 8:25:04 AM
FILE: H:\TrfSignals\Hai Tran\Harris\0508-01-387 Main.dgn

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			

DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

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

NUMBER OF REFLECTORS
S = Single
D = Double

COLOR OF REFLECTORS
W = White
Y = Yellow
R = Red

REFLECTOR UNIT SIZE
1 or 2

TYPE OF POST OR DELINEATOR
WC = Wing Channel Post
YFLX = Yellow Flexible Post
WFLX = White Flexible Post
BRF = Barrier Reflector

TYPE OF MOUNT
GND = Embedded (drivable or set in concrete)
CTB = Concrete Barrier Mount
GF1 or GF2 = Guard Fence Attachment
SRF = Surface Mount

DIRECTION
If Required
BI = Bi-Directional
BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
1, 2, 3, or 4

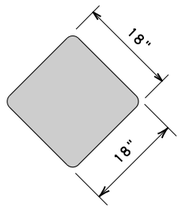
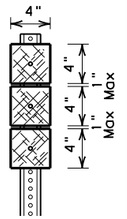
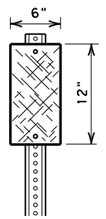
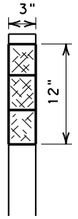
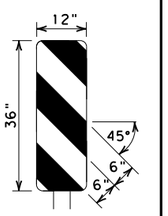
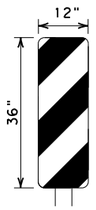
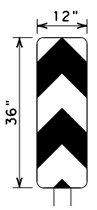
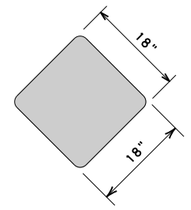
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

TYPE OF POST
WC = Wing Channel Post
WFLX = White Flexible Post
TWT = Thin Walled Tubing

TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

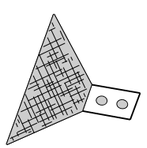
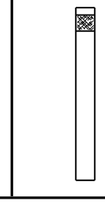
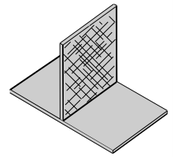
OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

DEPARTMENTAL MATERIAL SPECIFICATIONS

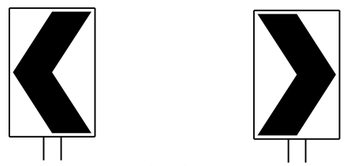
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE			
	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.		
SHEETING	Yellow, White, Red		
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.		

CHEVRONS

DEVICE



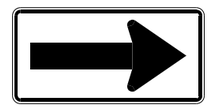
W1-8

SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	

NOTE
1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies).
2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).

ONE DIRECTION LARGE ARROW

DEVICE



W1-6

SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

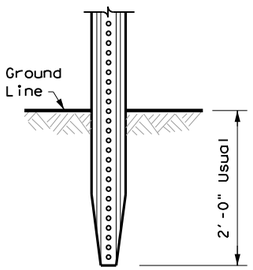
FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0508	01	387	IH 10
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	HOU	HARRIS		53

20A

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

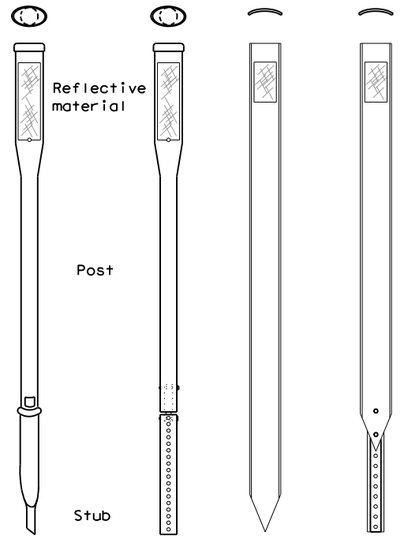


NOTES

1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

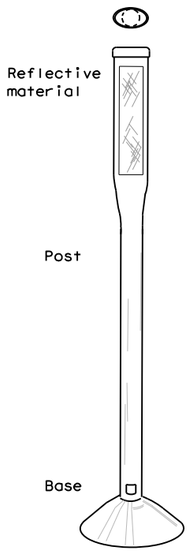
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



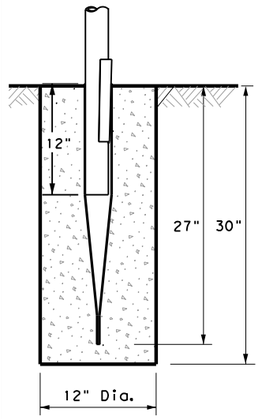
SURFACE MOUNT

NOTES

1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

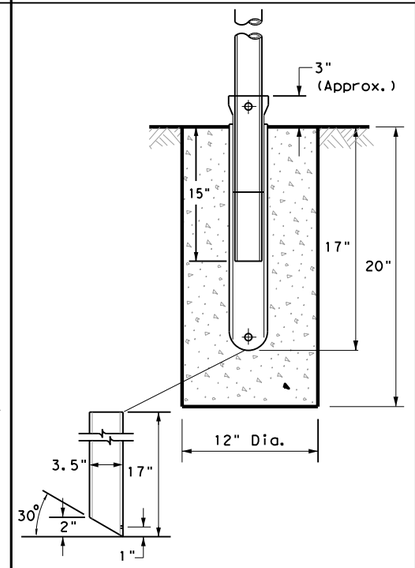
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

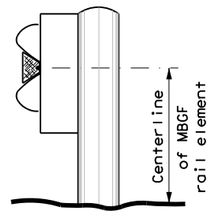
NOTE

1. Install per manufacturer's recommendations.

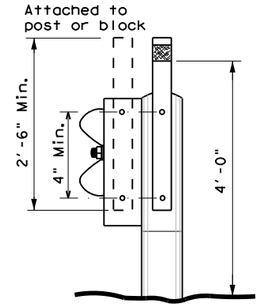
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

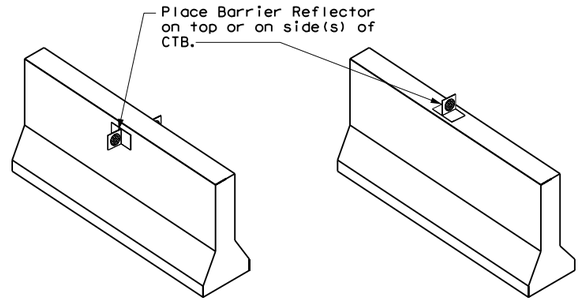
GF1



GF2



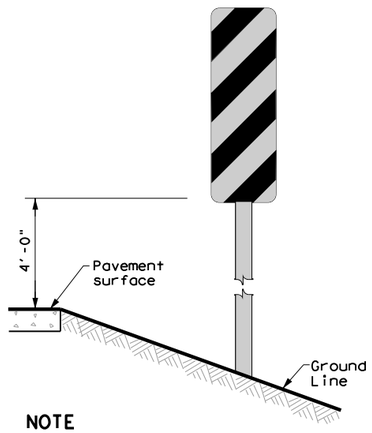
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

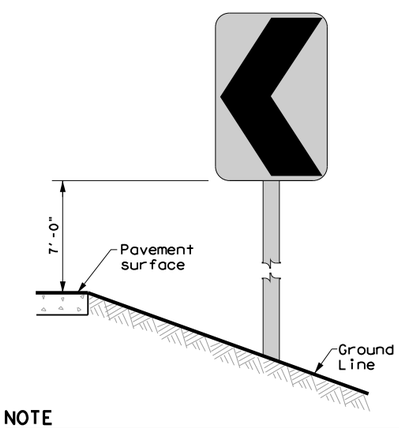
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

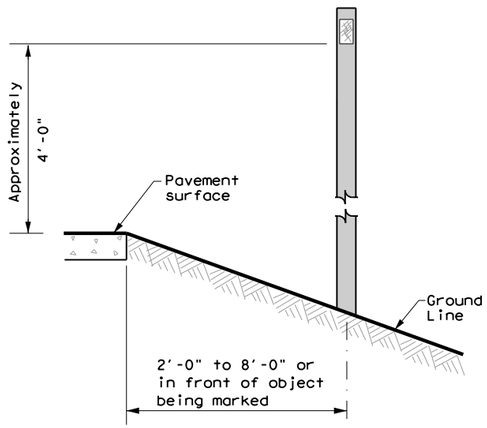
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
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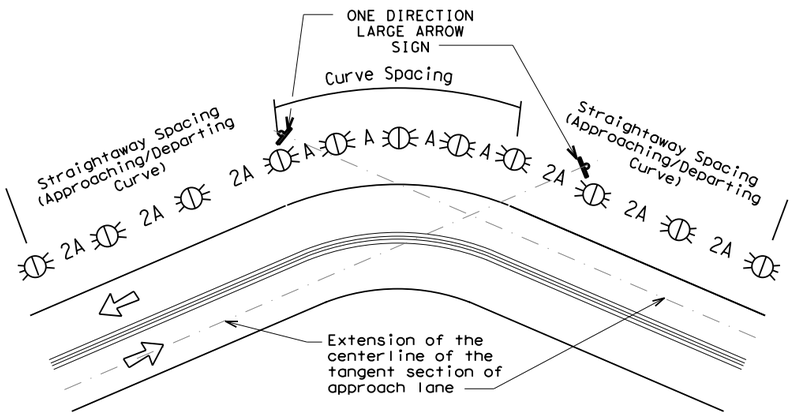
REVISIONS	0508	01	387	IH 10
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	HOU	HARRIS		54

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

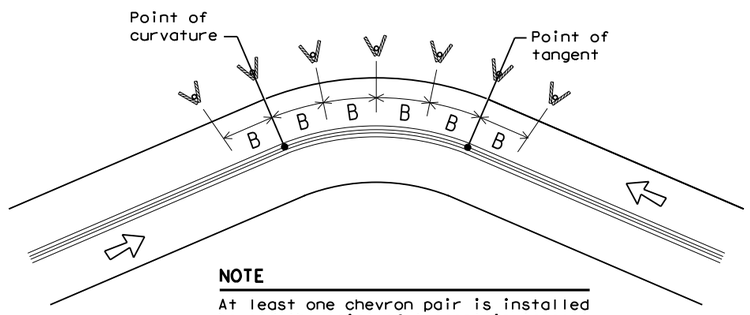
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



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
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REVISIONS	0508	01	387	IH 10
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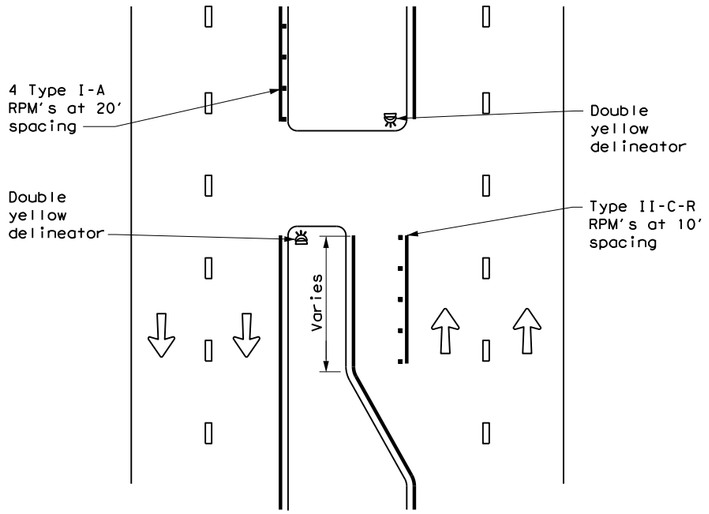
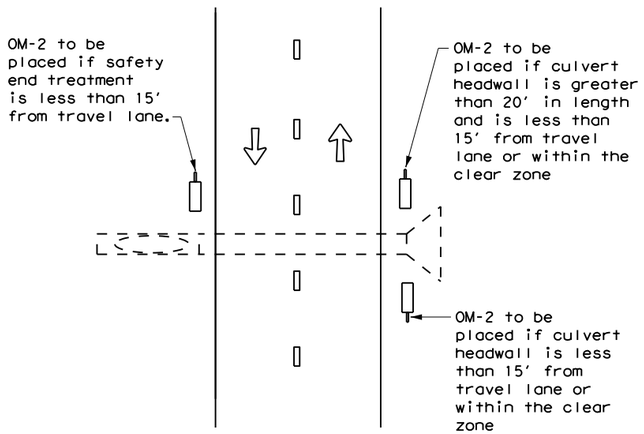
CROSSOVERS



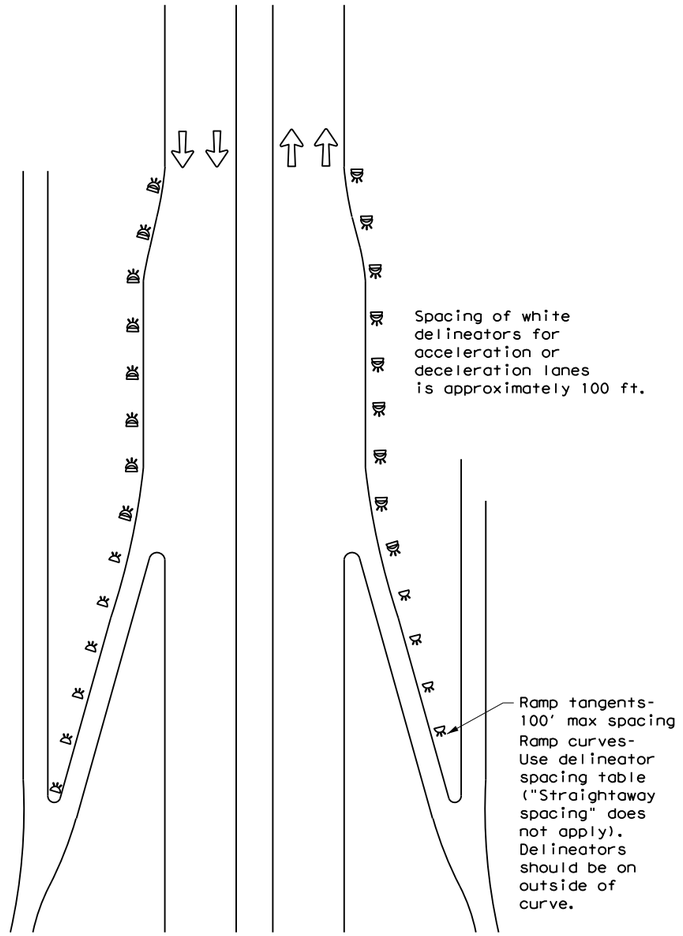
DETAIL 1

FOR CULVERTS WITHOUT MBGF



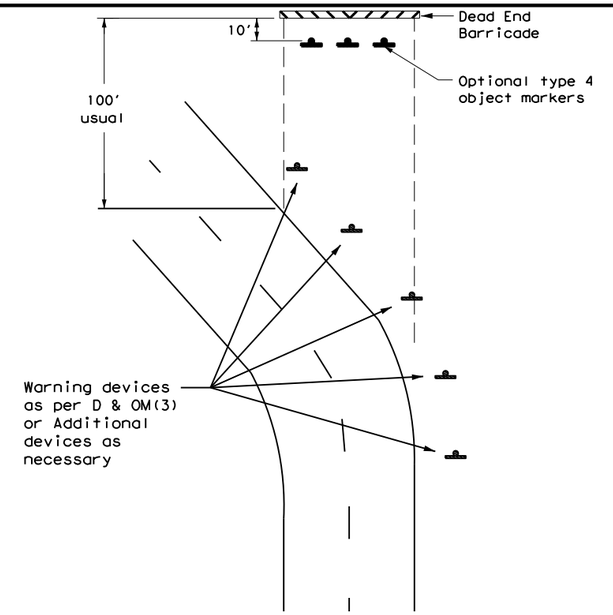
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



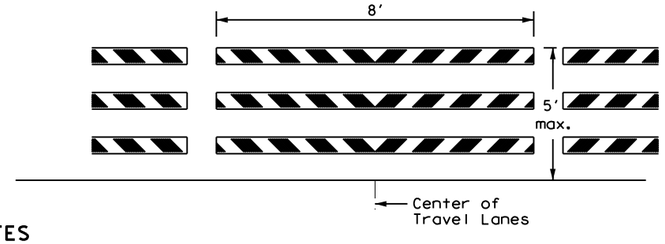
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

DETAIL 5

LEGEND	
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator

Texas Department of Transportation

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
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REVISIONS	0508	01	387	IH 10
3-15	DIST	COUNTY		SHEET NO.
7-20	HOU	HARRIS		56

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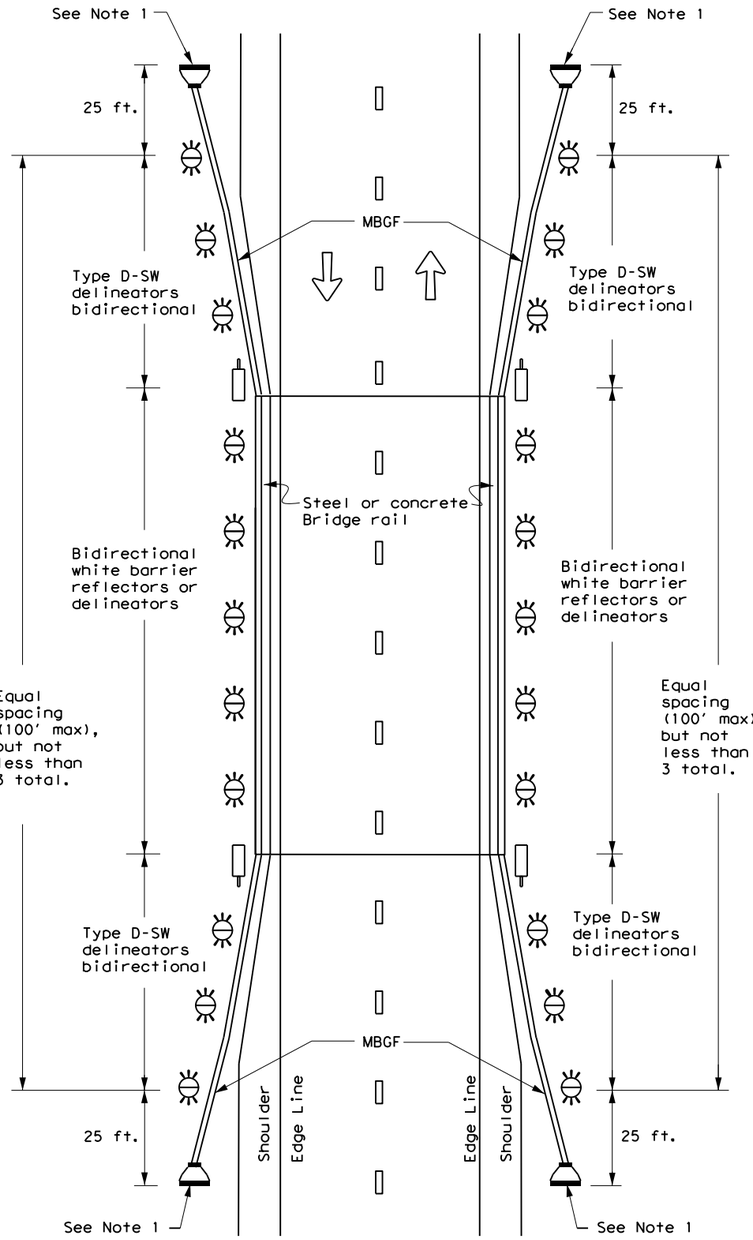
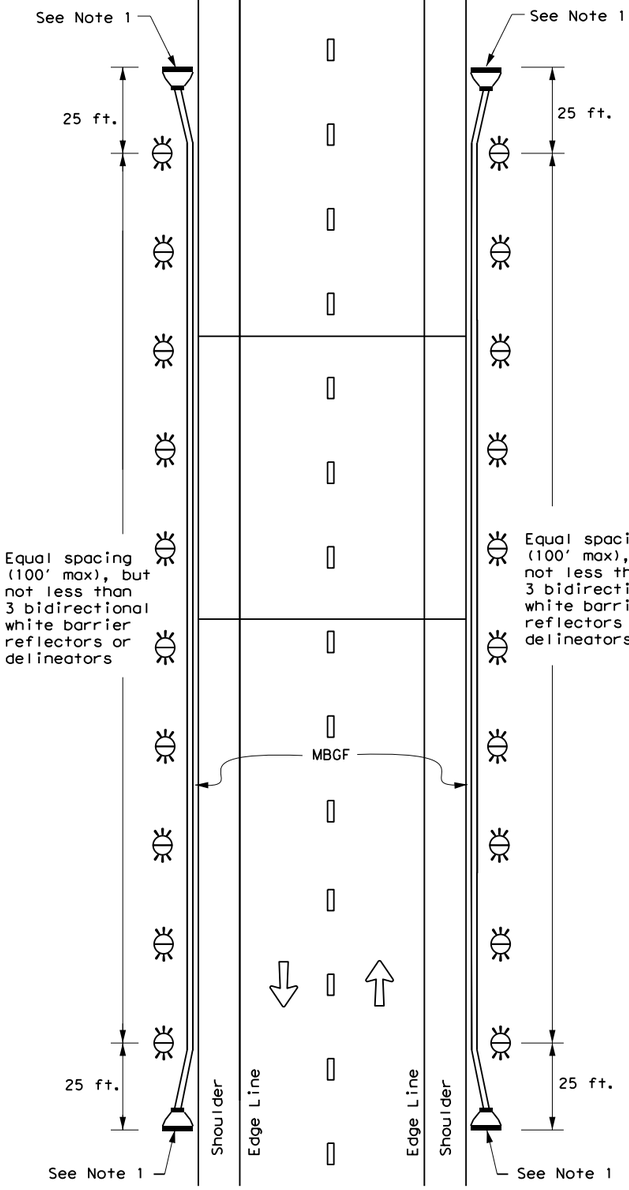
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



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.

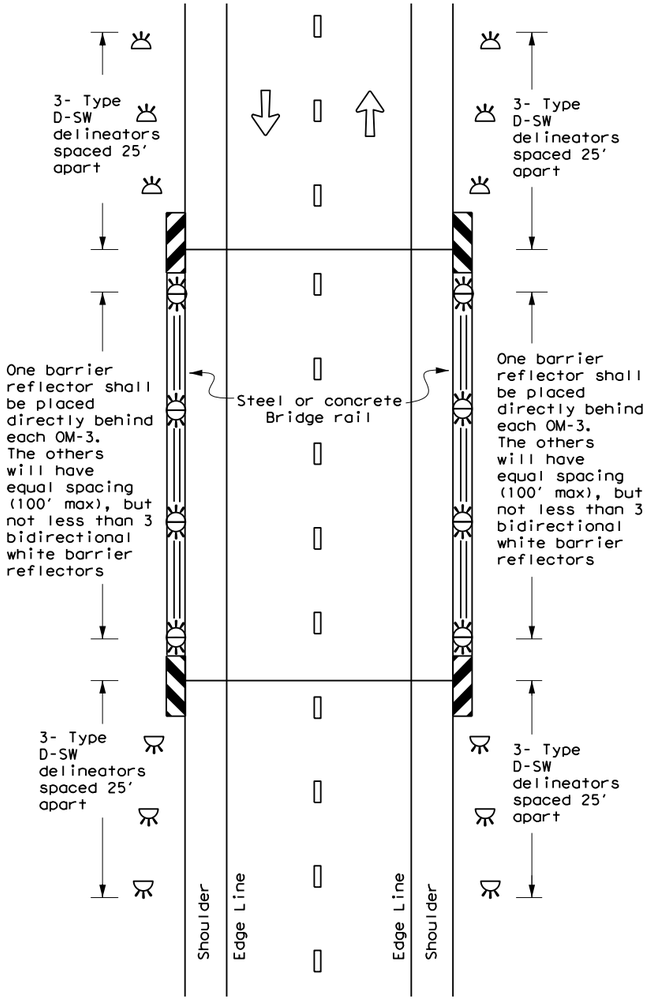
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



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

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	HOU	HARRIS		57

20E

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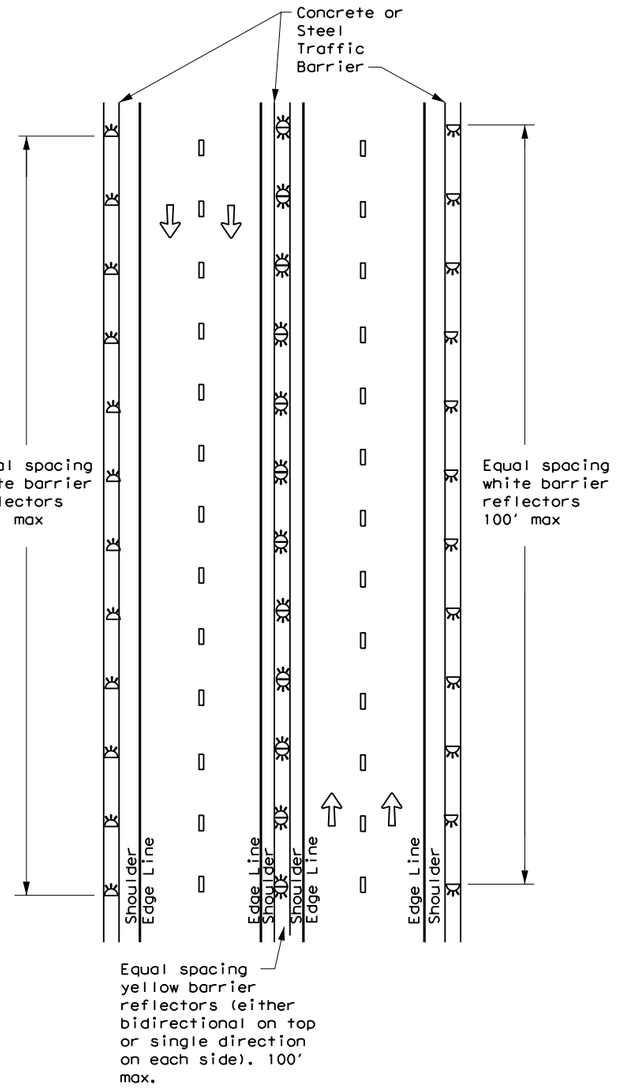
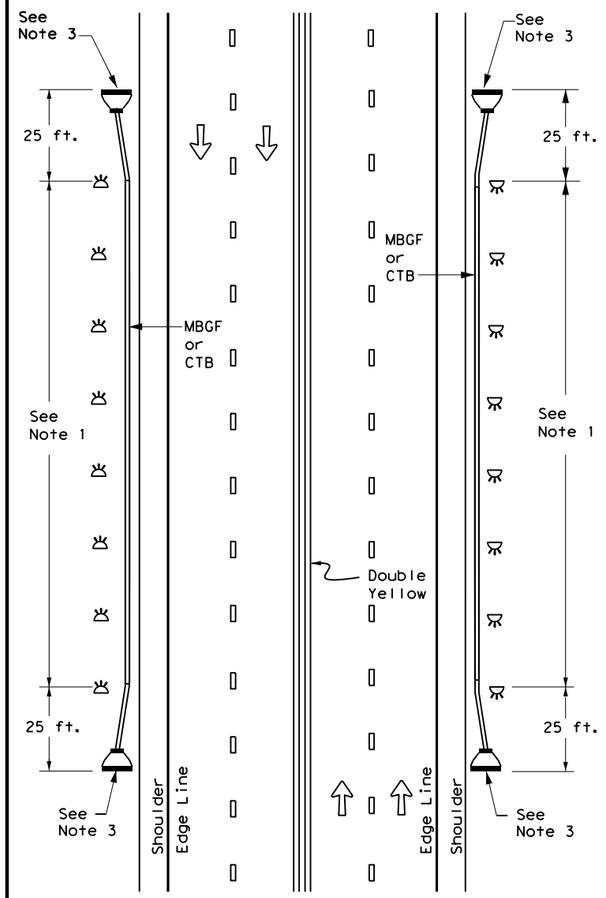
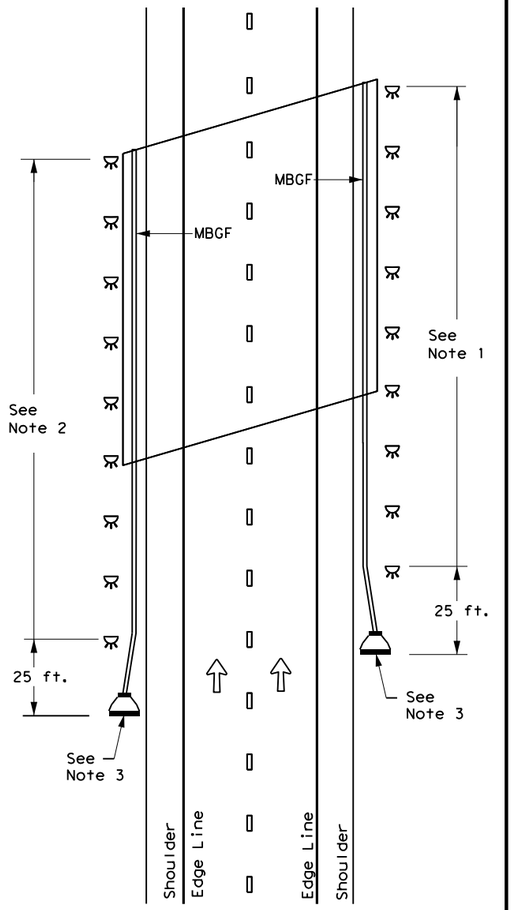
CONTINUOUS CONCRETE OR STEEL BARRIER



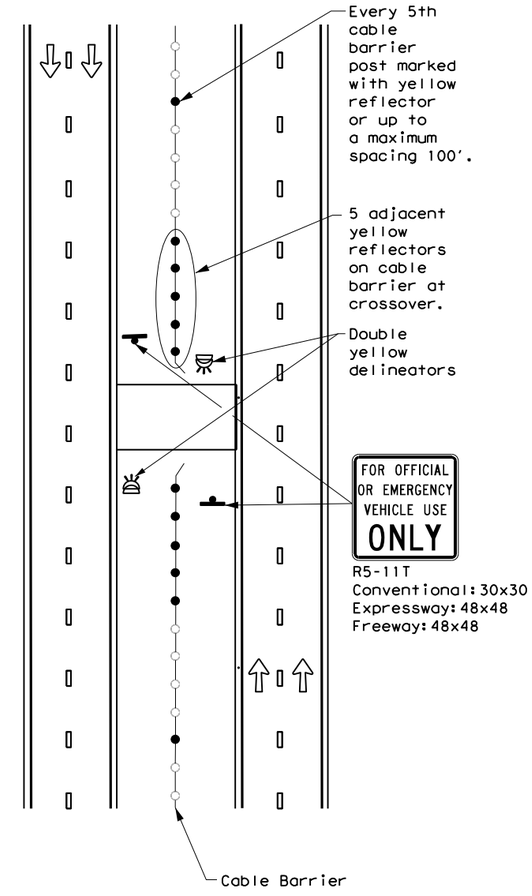
MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



DIVIDED ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



EMERGENCY CROSSOVER



NOTES

1. Equal spacing (100' max), but not less than 3 single directional white barrier reflectors or delineators. On Continuos Barrier, equal spacing (100' max.)
2. Equal spacing (100' max), but not less than 3 single directional yellow barrier reflectors or delineators.
3. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3)in front of the terminal end.

LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(6)-20

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	HOU	HARRIS		58

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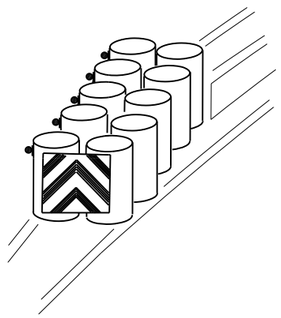
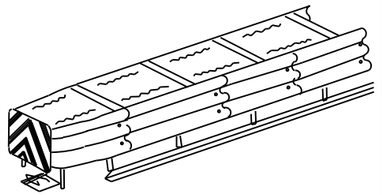
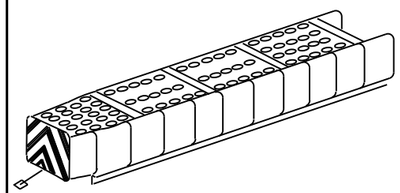
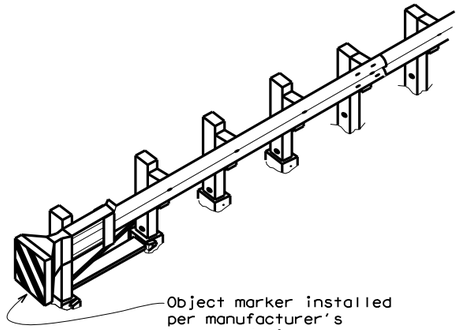
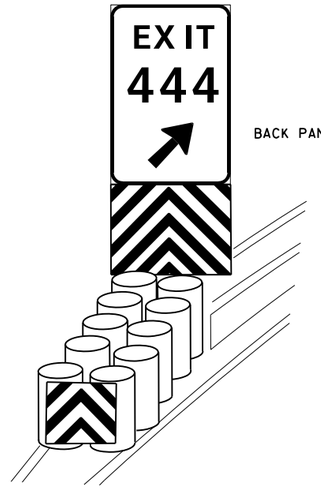




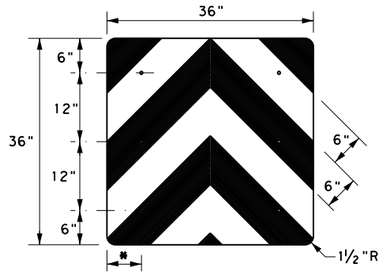


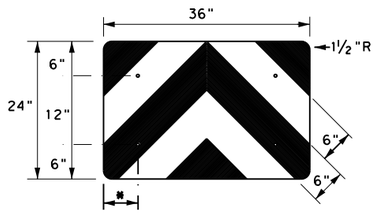


Object marker installed per manufacturer's recommendations.

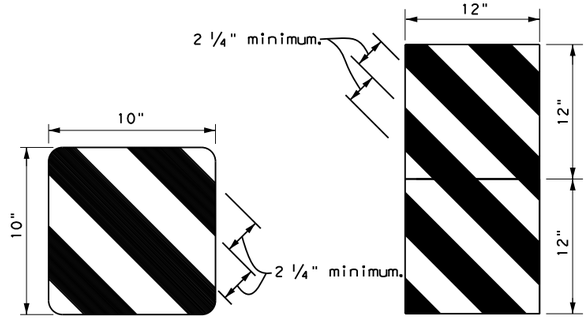


BACK PANEL (OPTIONAL)

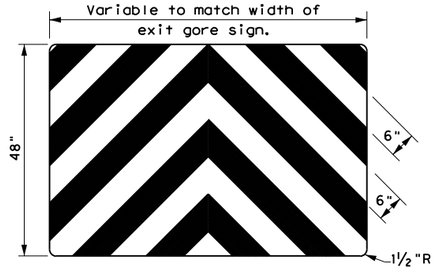


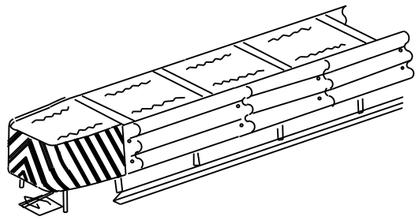


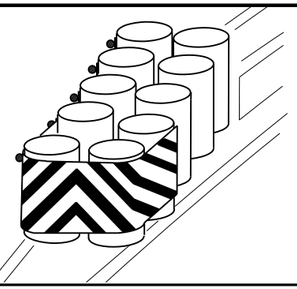
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

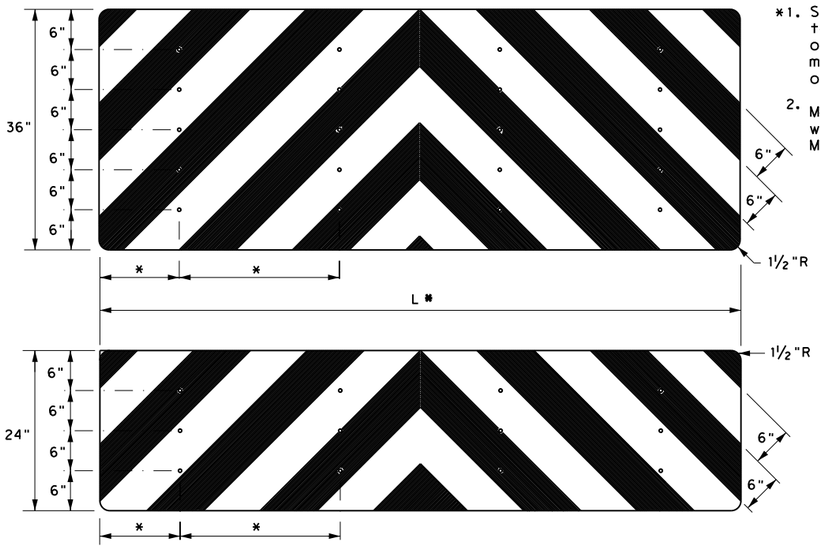


OBJECT MARKERS SMALLER THAN 3 FT^2









NOTES

*1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturers recommendation, or as directed by the Engineer.

2. Mounting should be flush with top of attenuator. Minimum size 96" x 24".

NOTES

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.

2. Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.

3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 ¼".

4. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.

5. Object Marker at nose of attenuator is subsidiary to the attenuator.

6. See D & OM (1-4) for required barrier reflectors.

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	0508	01	387	IH 10
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	HOU	HARRIS		59
4-98 7-20				

20G

DATE: 9/6/2023 8:25:06 AM
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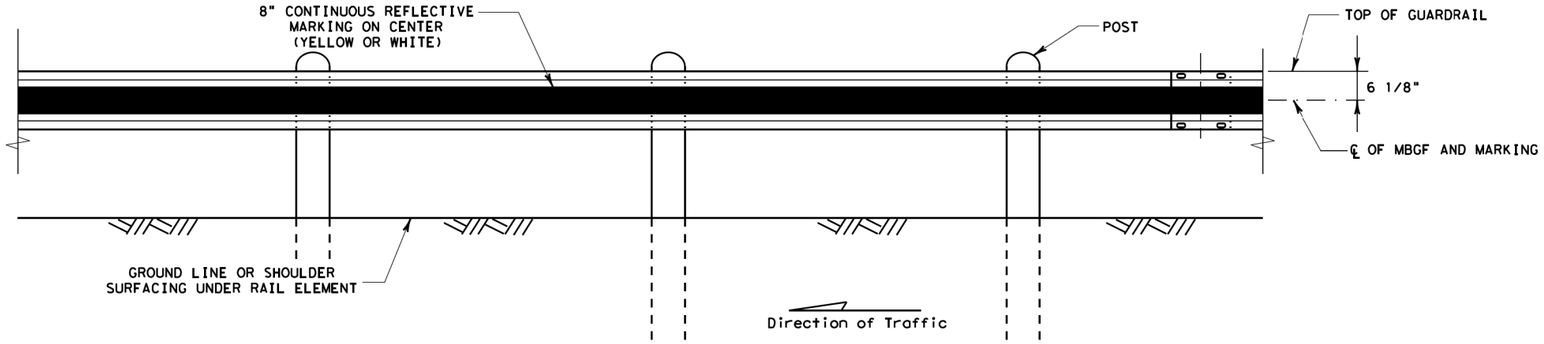
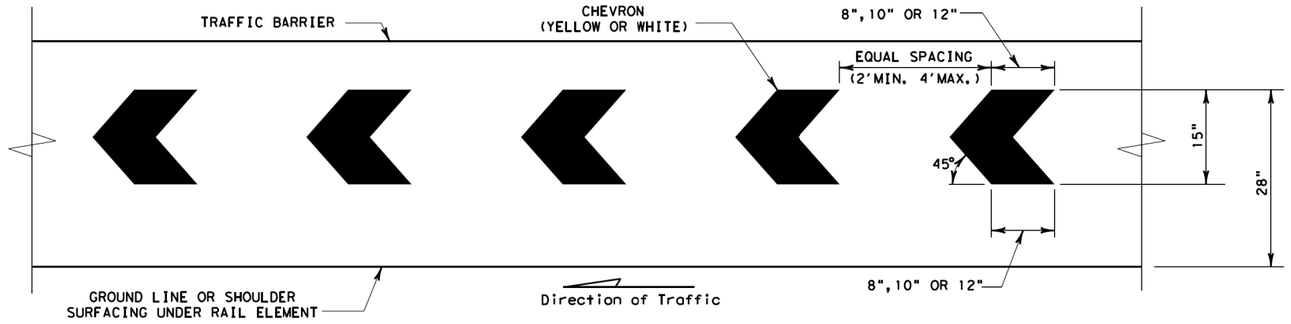
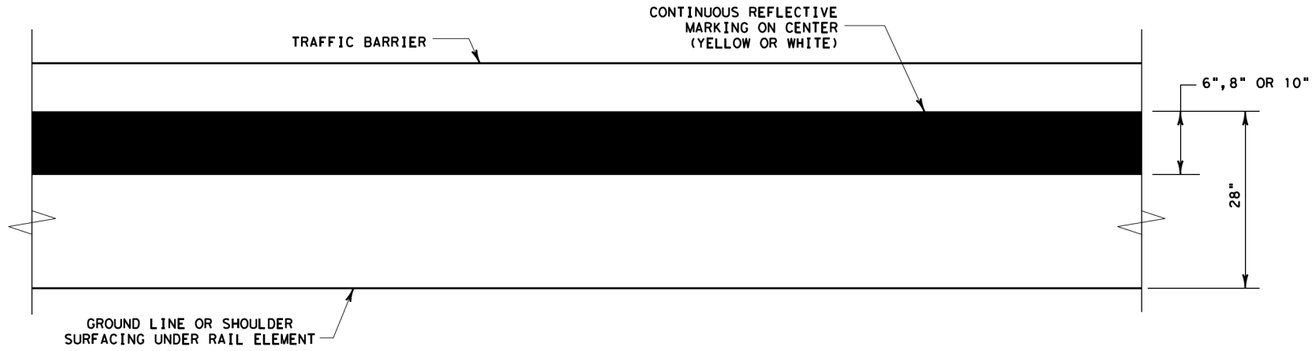


ELEVATION
GUARDRAIL SYSTEM CONTINUOUS REFLECTIVE MARKING



ELEVATION
TRAFFIC BARRIER REFLECTIVE MARKING (CHEVRON)

QUANTITIES = 1.536 LF FOR EACH CHEVORN



ELEVATION
CONCRETE BARRIER CONTINUOUS REFLECTIVE MARKING

Texas Department of Transportation

Design Division Standard

BARRIER REFLECTIVE MARKING

BRM-17

FILE: brm17.dgn		DN: TxDOT	CK: KA	DW: FD		CK: GC	
©TxDOT: JUNE 2017		CONT	SECT	JOB		HIGHWAY	
REVISIONS		0508	01	387		IH 10	
		DIST	COUNTY			SHEET NO.	
		HOU	HARRIS			60	

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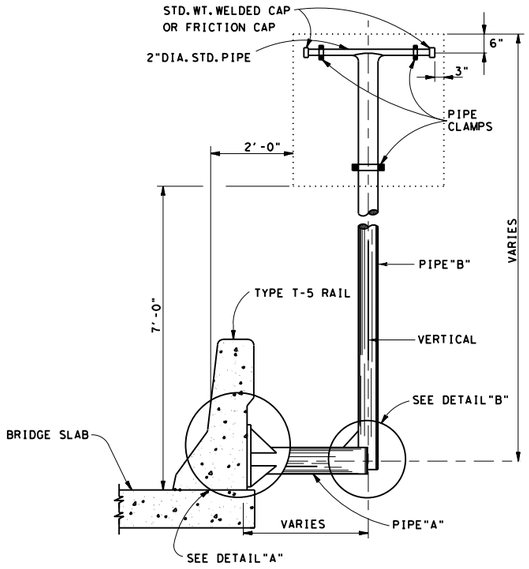
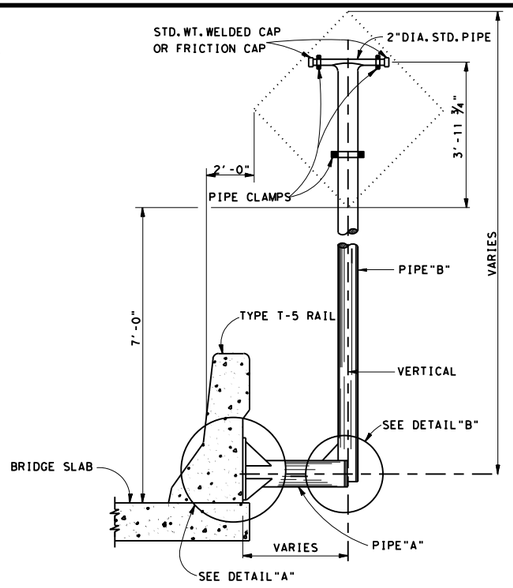
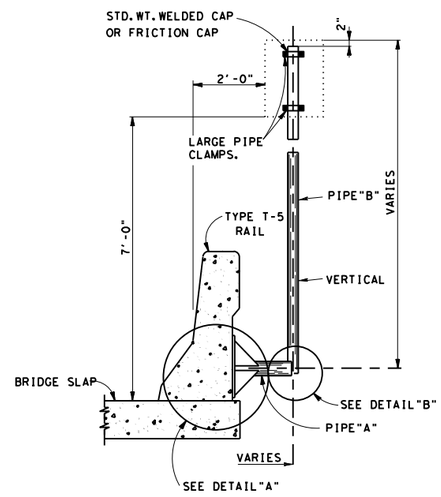
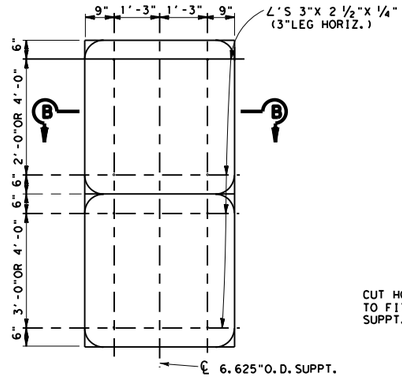




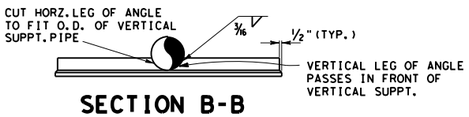
BRIDGE MOUNTED SIGNS





R2-1(48x60) & R2-4(48x60)
R5-1a(48x36) & R5-1(48x48)

TABLE OF PIPE SIZES			
SIGN AREA S.F.	PIPE A SIZE	PIPE B SIZE	CORRESPONDING TYPE GROUND MOUNT
1-10	4.500"O.D.X 0.337"W.T.	3.500"O.D.X 0.300"W.T.	10 BWG(1)SA(P)
10-16	8.625"O.D.X 0.332"W.T.	4.500"O.D.X 0.337"W.T.	10 BWG(1)SA(T)
16-32	8.625"O.D.X 0.332"W.T.	6.625"O.D.X 0.280"W.T.	S80(1)SA(T) S80(1)SA(U) S80(1)SA(U-1EXT)
32-40	8.625"O.D.X 0.332"W.T.	6.625"O.D.X 0.432"W.T.	S80(2)SA(P) S80(1)SA(U-2EXT)

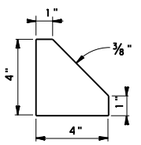


SECTION B-B

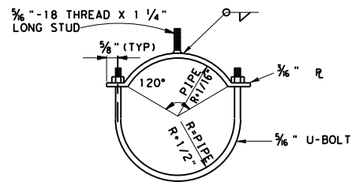
FRICTION CAP

NOTES:

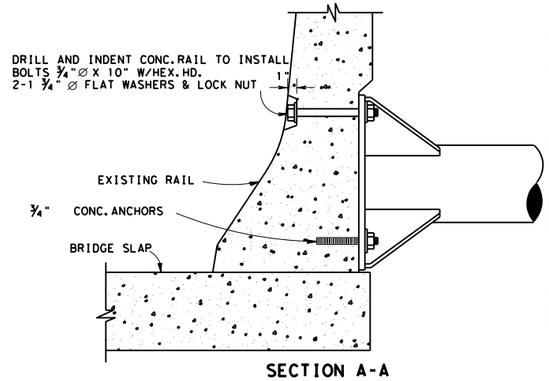
FRICTION CAPS-MANUFACTURED FROM HOT OR COLD ROLLED STEEL SHEETS, SIZED FOR DRIVE FRICTION FIT, AND SO FORMED AS TO HAVE NO TENDENCY TO ROCK WHEN SEATED. THEY SHALL BE FREE OF SHARP INDENTATIONS AND EVIDENCE OF METAL FRACTURE, WITH RIMS REASONABLY STRAIGHT AND SMOOTH.



⅜"℄ STIFFENER



PLAN



SECTION A-A
(SHOWING EXISTING RAILING)

NOTES:

CONTRACTOR SHALL CHECK CROSS SLOPE ON BRIDGES AND THEN FABRICATE SIGN MOUNTS SO SIGN SUPPORT PIPE IS VERTICAL.

ADDITIONAL "U" OR "T" EXTENSION PIPE OF THE SIZE AND LENGTHS SHOWN ON STANDARD PLAN SHEETS SHALL BE PROVIDED AND ATTACHED (WELDED OR AS DIRECTED BY THE ENGINEER) TO PIPE "B" AS REQUIRED.

SIGN PANELS SHALL BE ATTACHED TO THE 3" DIA. OR SMALLER PIPE ARMS AS SHOWN IN THE STANDARD PLAN SHEETS. ATTACHMENT TO 4" OR 6" PIPES SHALL BE AS SHOWN ON THIS SHEET OR AS SHOWN IN STANDARD PLAN SHEETS EXCEPT FOR R2-1 AND R2-4 OR R5-1A AND R5-1 SIGN COMBINATIONS WHICH SHALL BE MOUNTED AS SHOWN ON THIS SHEET.

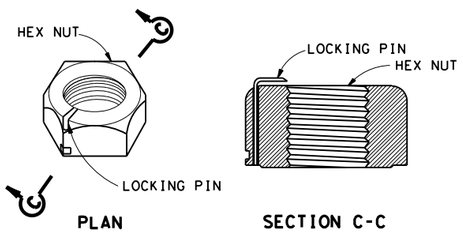
LOCK NUTS WITH NONREVERSIBLE HIGH TENSILE STRENGTH STAINLESS STEEL LOCKING PINS SHALL BE USED ON BOLTS.

CONCRETE ANCHORS SHALL BE STANDARD 3 UNIT CONCRETE ANCHORS. RAWL, PARABOLT, KWIKBOLT OR EQUAL, WITH LOCK NUT, FLAT WASHER & LOCK WASHER. ANCHORS SHALL NOT BE LESS THAN 4 ½" IN LENGTH.

SIGN SUPPORTS SHALL BE GALVANIZED AFTER FABRICATION.

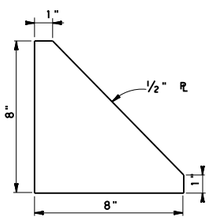
SIGN SUPPORT BRACKETS AS DETAILED ON THIS SHEET ARE FOR SIGNS MOUNTED ON RIGHT SIDE OF ROADWAY. LEFT HAND BRACKETS SHALL BE OPPOSITE TO THOSE SHOWN. SEE SIGN LAYOUT SHEETS TO DETERMINE WHETHER RIGHT OR LEFT HAND BRACKET IS REQUIRED.

ANY CHIPPING, GOUGING, OR OTHER WORK, TOOLS OR ANY OTHER INCIDENTALS NECESSARY TO EFFECT THE INSTALLATION OF BRIDGE MOUNTED SIGN BRACKETS ON CURBS, PARAPET WALLS, COPINGS OR OTHER LOCATIONS AS CALLED FOR IN PLANS WILL NOT BE PAID FOR DIRECTLY BUT SHALL BE CONSIDERED SUBSIDIARY TO THE ITEM "SMALL ROADSIDE SIGN SUPPORTS AND ASSEMBLIES".

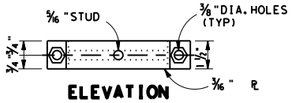


PLAN SECTION C-C

LOCK NUT DETAIL

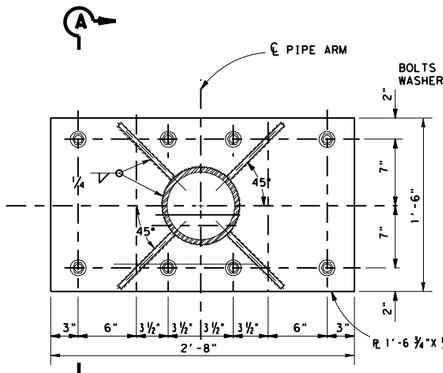


½"℄ STIFFENER

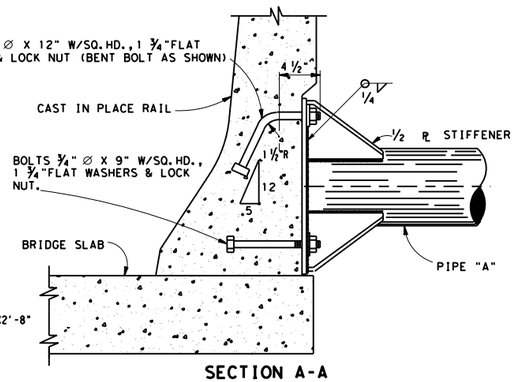


ELEVATION

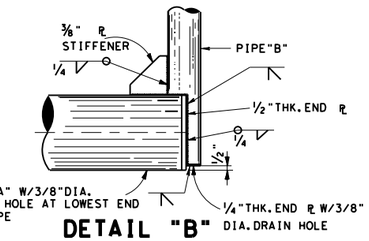
LARGE PIPE CLAMP



DETAIL "A"



SECTION A-A
(SHOWING CAST IN PLACE RAIL)



DETAIL "B"

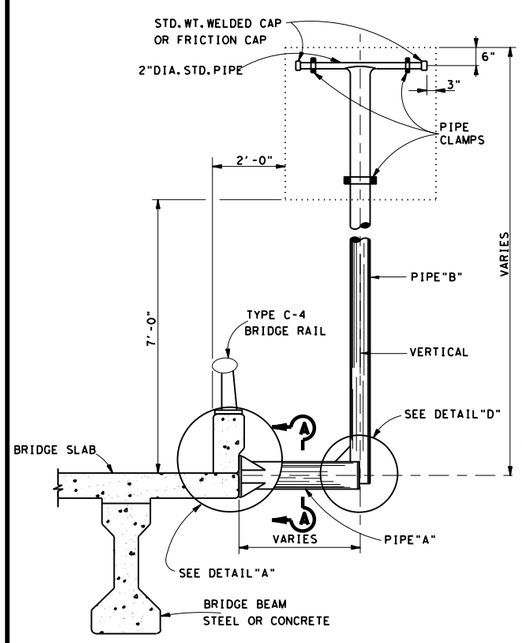
Texas Department of Transportation
Houston District

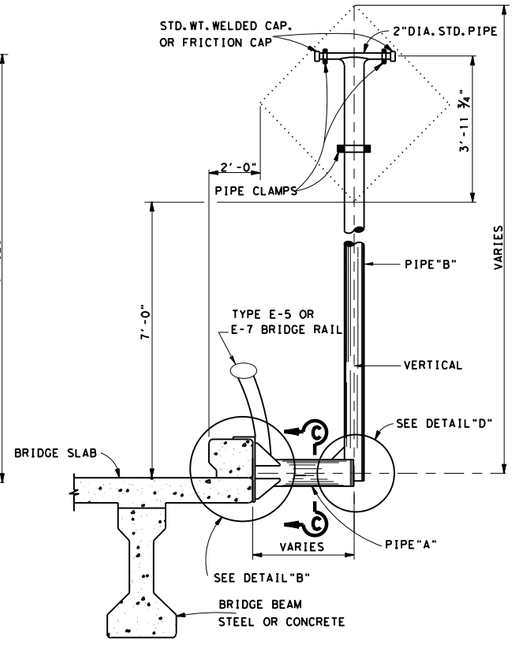
BRIDGE MOUNTING DETAILS
(FOR SMALL ROADSIDE SIGNS)

SMD(BM-1)-04

FILE:	DN:	CK:	DW:	CK:
©TxDOT 1998	CONTROL	SECT	JOB	HIGHWAY
REVISIONS	0508	01	387	IH 10
	DIST	COUNTY		SHEET
	HOU	HARRIS		61

STD N-7





BRIDGE MOUNTED SIGNS

NOTES:

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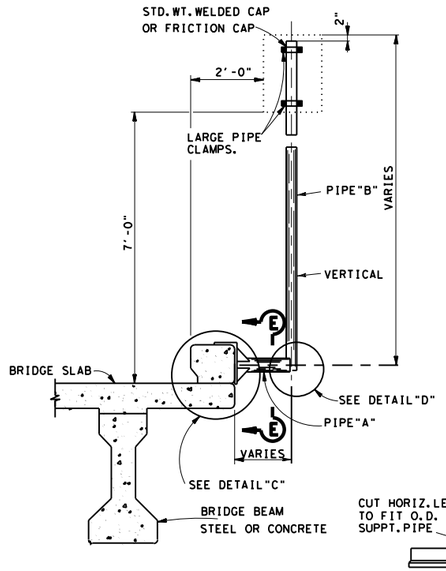
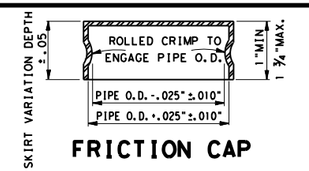
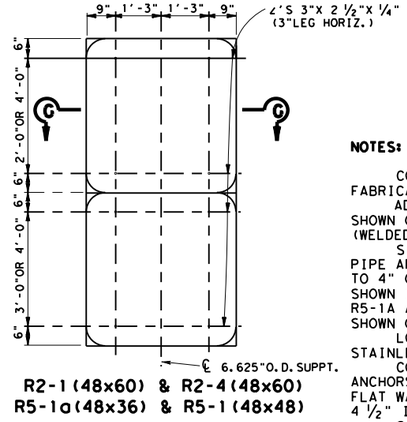
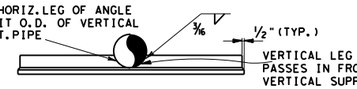




FRICTION CAP



R2-1(48x60) & R2-4(48x60)
R5-1a(48x36) & R5-1(48x48)



SECTION G-G

TABLE OF PIPE SIZES			
SIGN AREA S.F.	PIPE A SIZE	PIPE B SIZE	CORRESPONDING TYPE GROUND MOUNT
1-10	4.500"O.D.X 0.337"W.T.	3.500"O.D.X 0.300"W.T.	10 BWG(1)SA(P)
10-16	8.625"O.D.X 0.332"W.T.	4.500"O.D.X 0.337"W.T.	10 BWG(1)SA(T)
16-32	8.625"O.D.X 0.332"W.T.	6.625"O.D.X 0.280"W.T.	S80(1)SA(T) S80(1)SA(U) S80(1)SA(U-1EXT)
32-40	8.625"O.D.X 0.332"W.T.	6.625"O.D.X 0.432"W.T.	S80(2)SA(P) S80(1)SA(U-2EXT)

NOTES:

CONTRACTOR SHALL CHECK CROSS SLOPE ON BRIDGES AND THEN FABRICATE SIGN MOUNTS SO SIGN SUPPORT PIPE IS VERTICAL.

ADDITIONAL "U" OR "T" EXTENSION PIPE OF THE SIZE AND LENGTHS SHOWN ON STANDARD PLAN SHEETS SHALL BE PROVIDED AND ATTACHED (WELDED OR AS DIRECTED BY THE ENGINEER) TO PIPE "B" AS REQUIRED.

SIGN PANELS SHALL BE ATTACHED TO THE 3" DIA. OR SMALLER PIPE ARMS AS SHOWN IN THE STANDARD PLAN SHEETS. ATTACHMENT TO 4" OR 6" PIPES SHALL BE AS SHOWN ON THIS SHEET OR AS SHOWN IN STANDARD PLAN SHEETS EXCEPT FOR R2-1 AND R2-4 OR R5-1A AND R5-1 SIGN COMBINATIONS WHICH SHALL BE MOUNTED AS SHOWN ON THIS SHEET.

LOCK NUTS WITH NONREVERSIBLE HIGH TENSILE STRENGTH STAINLESS STEEL LOCKING PINS SHALL BE USED ON BOLTS.

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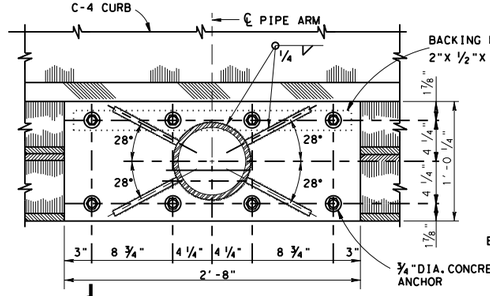
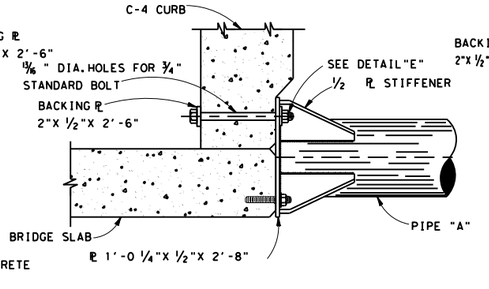
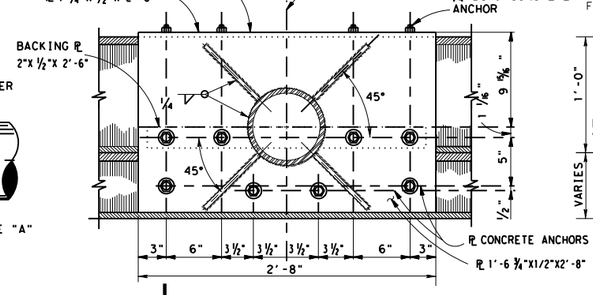
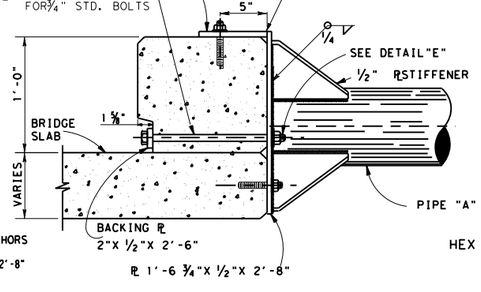
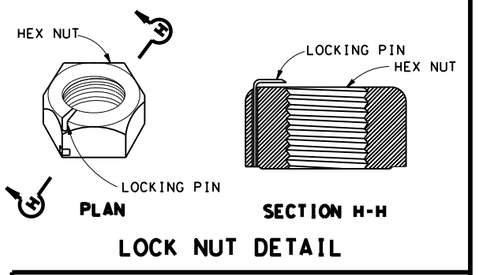


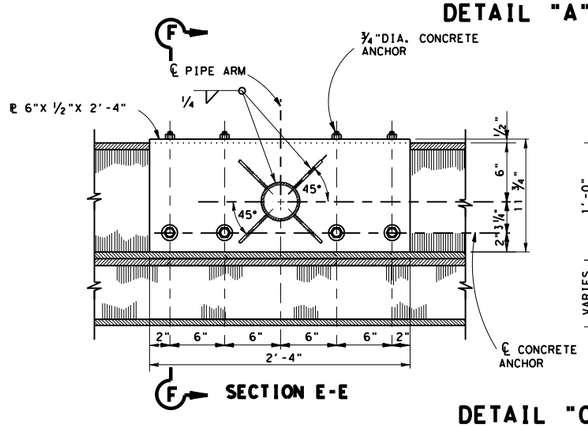




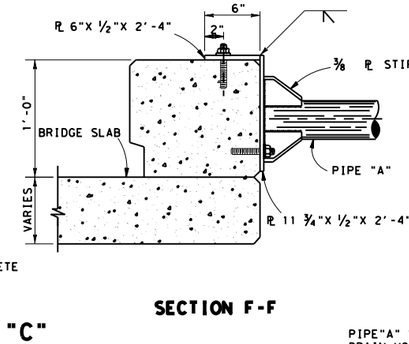


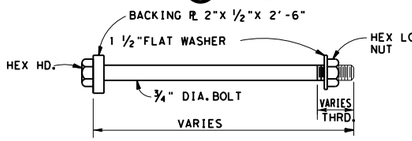


LOCK NUT DETAIL



DETAIL "C"





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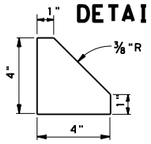
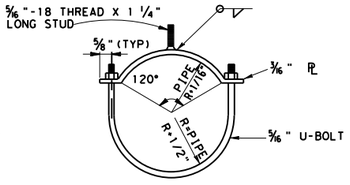
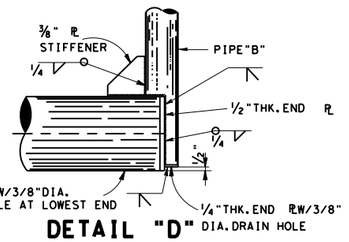


⅜"PL STIFFENER





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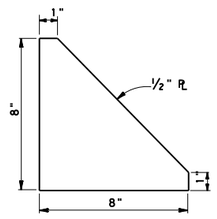
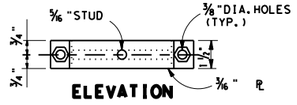


½"PL STIFFENER



ELEVATION

LARGE PIPE CLAMP

Texas Department of Transportation
Houston District

BRIDGE MOUNTING DETAILS
(FOR SMALL ROADSIDE SIGNS)

SMD(BM-2)-04

FILE:	DN:	CK:	DW:	CK:
©TxDOT 1998	CONTROL	SECT	JOB	HIGHWAY
REVISIONS	0508	01	387	IH 10
	DIST	COUNTY		SHEET
	HOU	HARRIS		62

STD N-8

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
TWT = Thin-Walled Tubing (see SMD(TWT))
10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

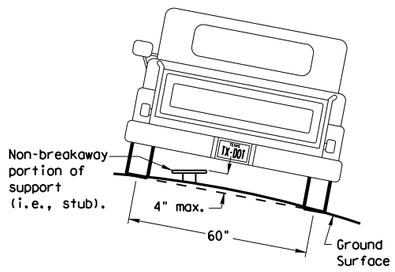
Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
WS = Wedge Anchor Steel - (see SMD(TWT))
WP = Wedge Anchor Plastic (see SMD(TWT))
SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-1))

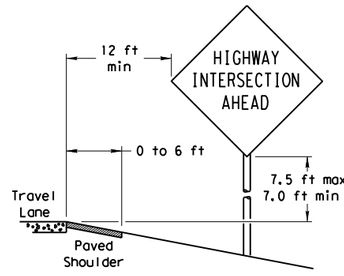
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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

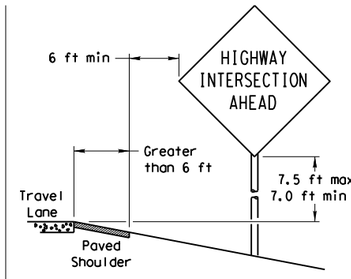
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

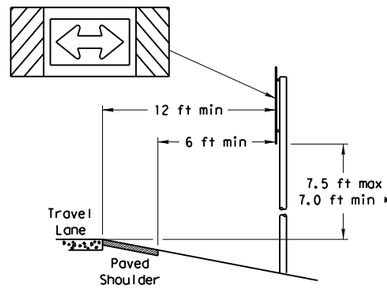
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



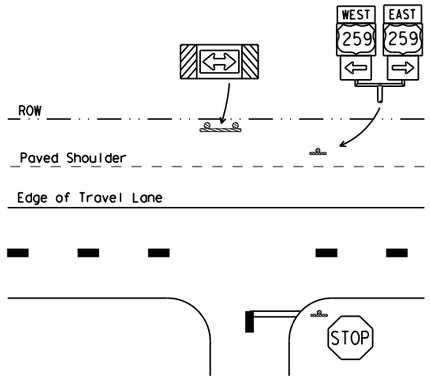
GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

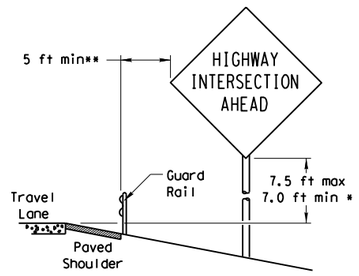
T-INTERSECTION



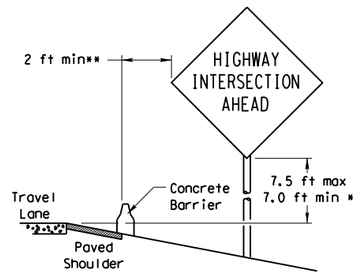
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

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

* 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

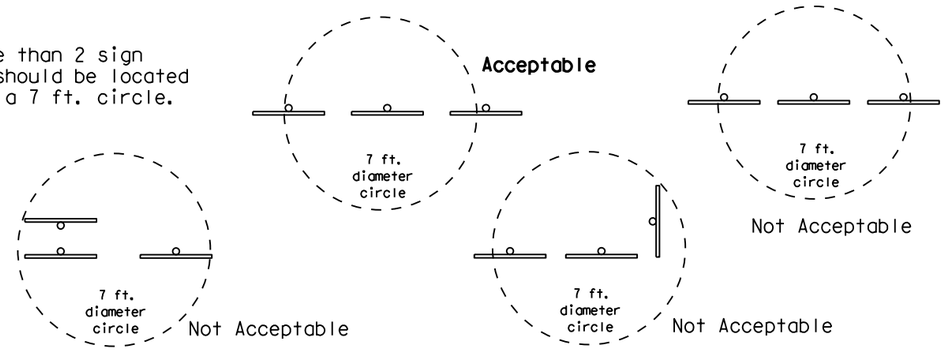
(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

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.

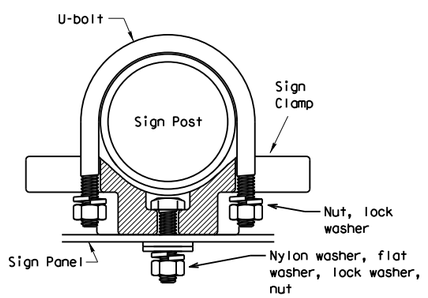
The website address is:
http://www.txdot.gov/publications/traffic.htm

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



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

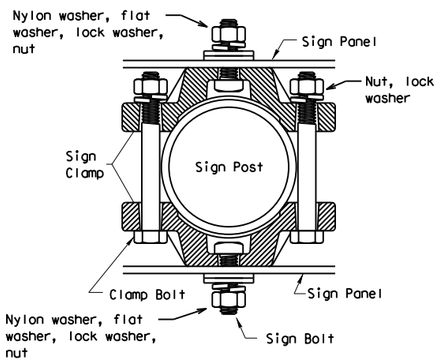


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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.

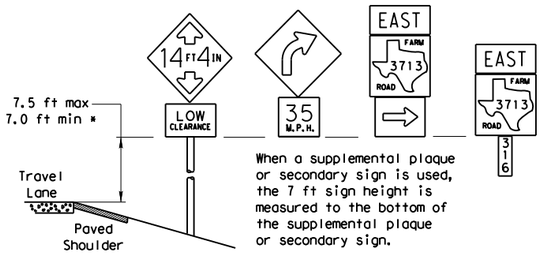
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



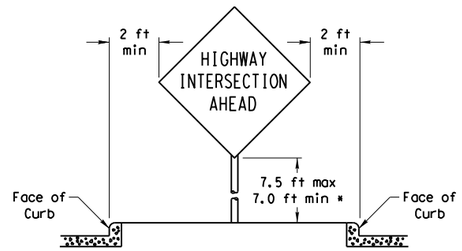
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



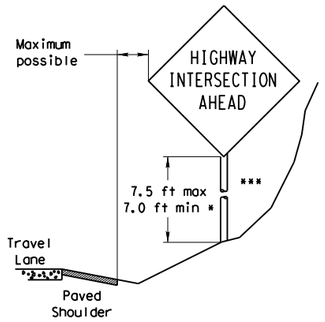
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

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.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

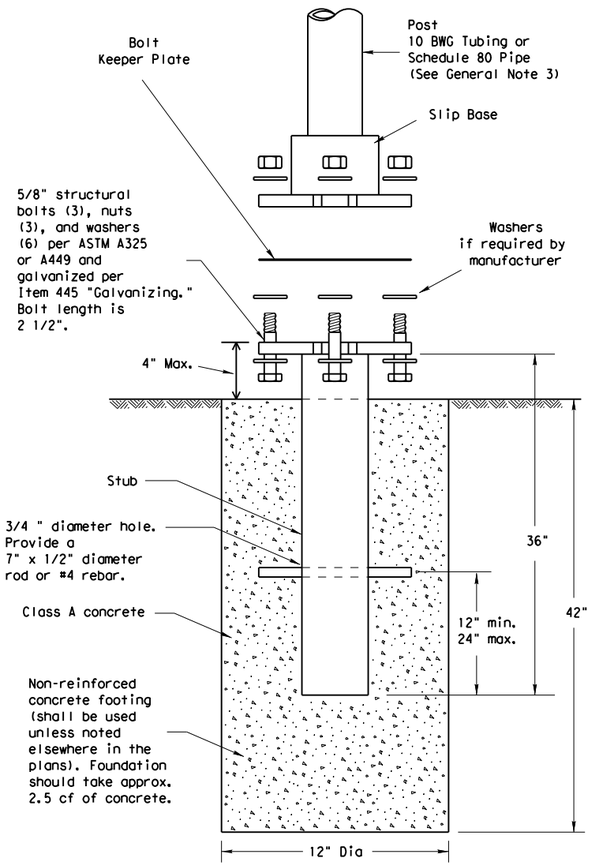
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	0508	01	387	IH 10
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		63

26A

DATE: 9/6/2023 8:25:17 AM
FILE: H:\Traffic\Signals\Hai Tran\Harris\0508-01-387 Main.dgn

TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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

NOTE

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

GENERAL NOTES:

1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   - 0.134" nominal wall thickness
   - Seamless or electric-resistance welded steel tubing or pipe
   - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   - Other steels may be used if they meet the following:
     - 55,000 PSI minimum yield strength
     - 70,000 PSI minimum tensile strength
     - 20% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
   - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
   - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.

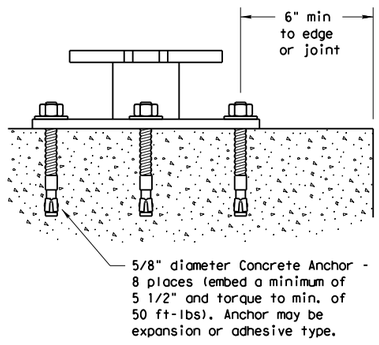
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum yield strength
     - 62,000 PSI minimum tensile strength
     - 21% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
   - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
   - Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

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

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

CONCRETE ANCHOR



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

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

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

REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	0508	01	387	IH 10
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		64

DATE: 9/6/2023 8:25:18 AM
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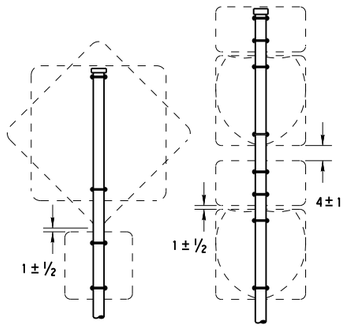
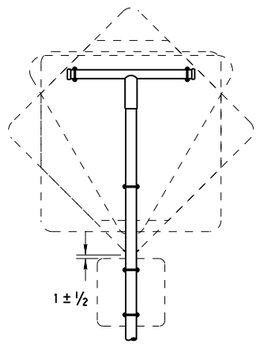
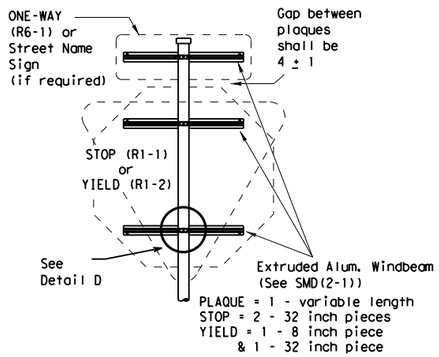


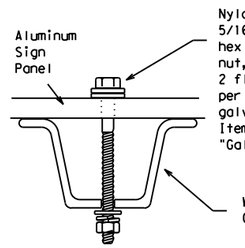
SM RD SGN ASSM TY XXXXX(1)XX(P)



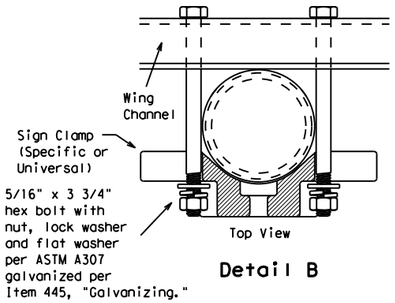
SM RD SGN ASSM TY XXXXX(1)XX(T)



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



Detail A



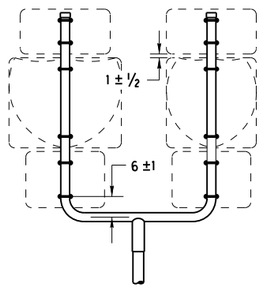
Detail B

GENERAL NOTES:

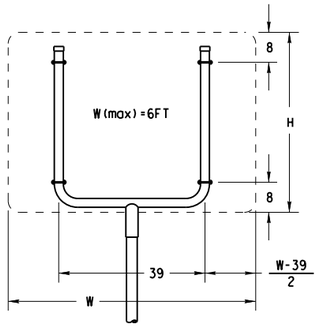
1.

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

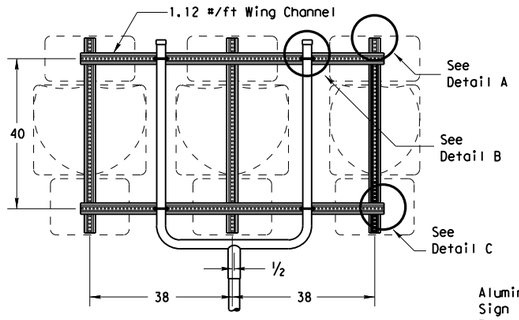
2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.



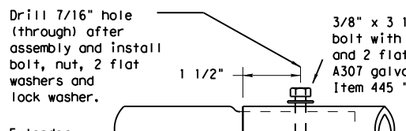
SM RD SGN ASSM TY XXXXX(1)XX(U)



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

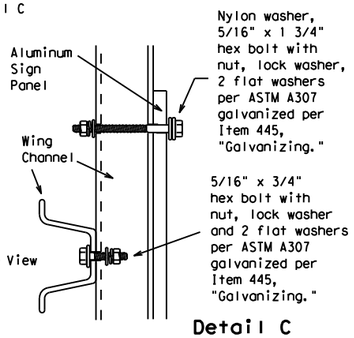


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)



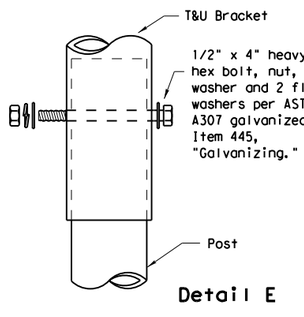
Detail F

Splices shall only be allowed behind the sign substrate.

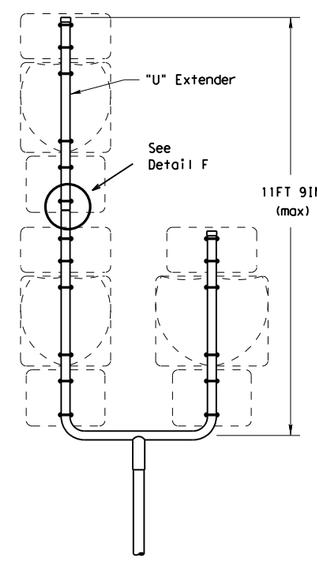


SIDE VIEW

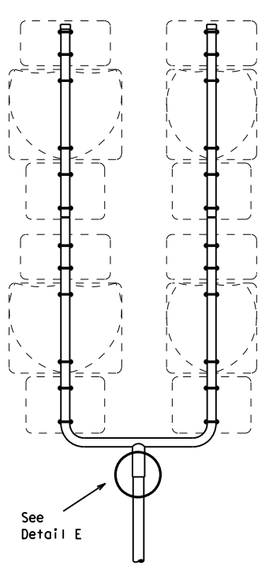
Detail C



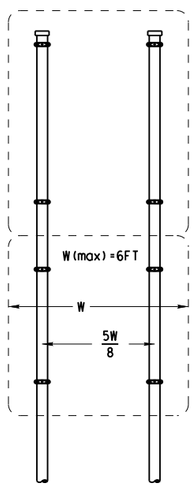
Detail E



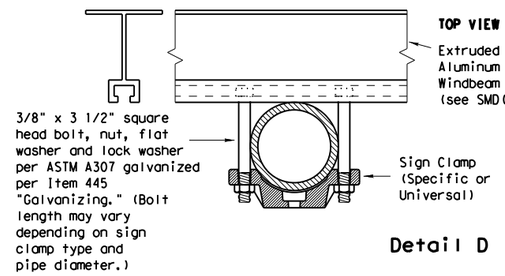
SM RD SGN ASSM TY S80(1)XX(U-1EXT)



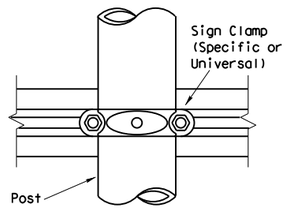
SM RD SGN ASSM TY S80(1)XX(U-2EXT)



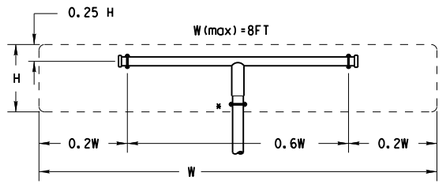
SM RD SGN ASSYM TY XXXXX(2)XX(P)



Detail D



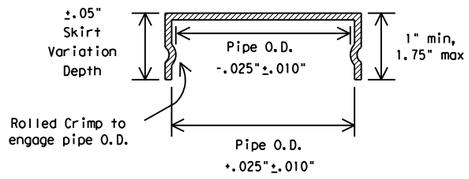
REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)



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

All dimensions are in english unless detailed otherwise.

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

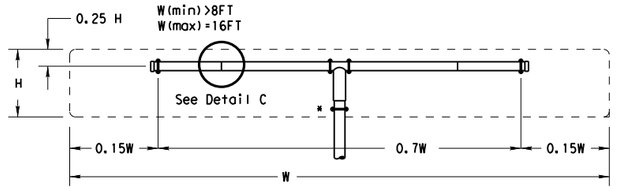
Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

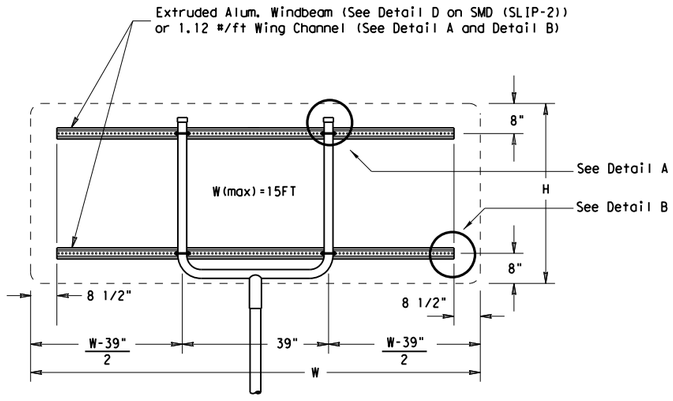
SMD(SLIP-2)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0508	01	387	IH 10
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		65

DATE: 9/6/2023 8:25:18 AM
FILE: H:\TrfSignals\Hai Tran\Harris\0508-01-387 Main.dgn



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



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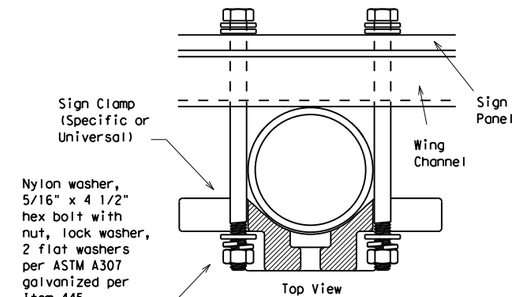
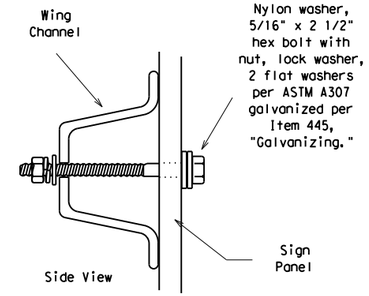
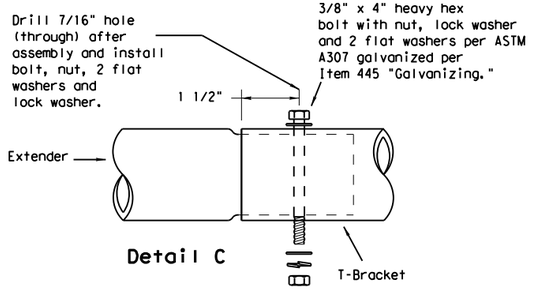


Top View

Detail A



Detail B



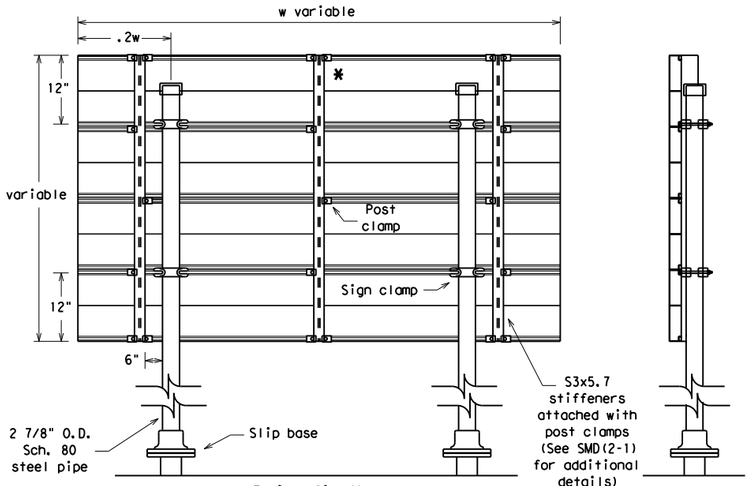
Detail C

Splices shall only be allowed behind the sign substrate.

GENERAL NOTES:

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

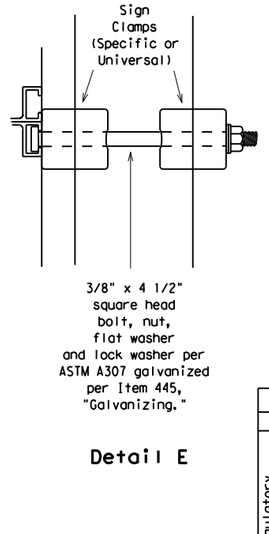
1. See table above.
2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to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



Typical Sign Mount

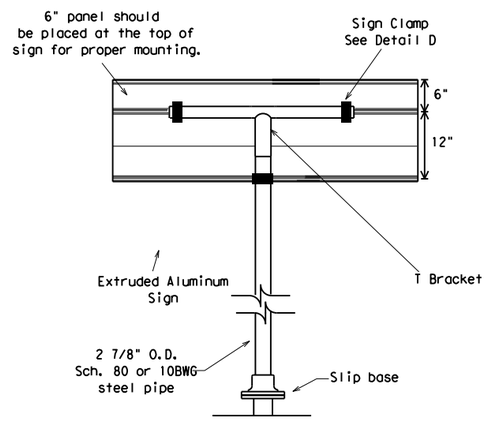
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

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

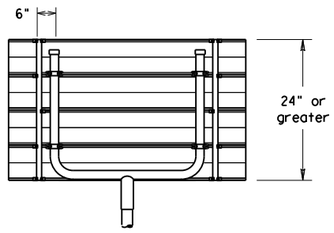


Detail E

See Detail E
for clamp installation



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET

REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0508	01	387	IH 10
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		66

DATE: 9/6/2023 8:25:18 AM
FILE: H:\Traffic Signals\Hai Tran\Harris\0508-01-387 Main.dgn

I. WORK AT CROSSING LOCATIONS (AT GRADE, HIGHWAY OVERPASS, HIGHWAY UNDERPASS, PEDESTRIAN, OR CLOSED/ABANDONED)

☐ This project is adjacent or parallel work, not within RR ROW:

DOT No.: 758741H
Crossing Type: Highway Overpass
RR Company Operating Track at Crossing: Union Pacific Railroad Company (UPRR)
RR Company Owning Track at Crossing: UPRR
RR MP: 3.360
RR Subdivision: Lufkin
City: Houston
County: Harris
CSJ at this Crossing: 0912-72-744

Scope of Work, including any TCP, to be performed by State Contractor:

Applying Safety barrier line markings and replacing barrier reflectors for rigid and flexible barriers on Direct Connectors.

Scope of Work to be performed by Railroad Company:

N/A

II. FLAGGING & INSPECTION

No. of Days of Railroad Flagging Expected: N/A

On this project, night or weekend flagging is:

☐ Expected
☐ Not Expected

Flagging services will be provided by:

☐ Railroad Company: TxDOT will pay flagging invoices. Flagging Agreement with Railroad will be needed
☐ Outside Party: Contractor will pay flagging invoices to be reimbursed by TxDOT

Contractor must incorporate flaggers into anticipated construction schedule. The Railroad requires a 30-day notice if their flaggers are to be utilized. If Contractor falls behind schedule due to their own negligence and is not ready for scheduled flaggers, any flagging charges will be paid by Contractor.

Contact Information for Flagging:

☐ **UPRR** UP.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
UP.request@nrssinc.net
Call Center 877-984-677

☐ **BNSF** BNSFinfo@railprosfs.com
Call Center 877-315-0513, Select #1 for flagging

☐ **KCS** KCS.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
Bottom Line On-Track Safety Services
bottomline076@aol.com, 903-767-7630

☐ OTHERS:

Contractor must incorporate Construction Inspection into anticipated construction schedule.

☐ Not Required
☐ Required. Contact Information for Construction Inspection:

III. CONSTRUCTION WORK TO BE PERFORMED BY THE RAILROAD

☐ Required. Railroad Point of Contact: _____
☑ Not Required

Coordinate with TxDOT for any work to be performed by the Railroad Company. TxDOT must issue a work order for any work done by the Railroad Company prior to the work being performed.

IV. RAILROAD INSURANCE REQUIREMENTS

The Contractor shall confirm the insurance requirements with the Railroad as the insurance limits are subject to change without notice.

Insurance policies and corresponding certificates of insurance must be issued by the contractor on behalf of the Railroad. Separate insurance policies and certificates are required when more than one Railroad Company is operating on the same right of way, or when several Railroad Companies are involved and operate on their own separate right of ways.

No direct compensation will be made to the Contractor for providing the insurance coverages shown below or any deductibles. These costs are incidental to the various bid items.

Escalated Limits

Type of Insurance	Amount of Coverage (Minimum)
Workers Compensation	$500,000 / $500,000 / $500,000
Commercial General Liability	$2,000,000 / $4,000,000
Business Automobile	$2,000,000

Railroad Protective Liability Limits

☐ Not Required	
☑ Non - Bridge/Typical Maintenance Projects. Includes repairs to overpass/underpass and culvert structures	$2,000,000 / $6,000,000
☐ Bridge Structure Projects. Includes new construction or replacement of overpass/ underpass structures	$5,000,000 / $10,000,000
☐ Other: _____	

V. CONTRACTOR'S RIGHT OF ENTRY (CROE)

☐ Not Required
☑ Required: UPRR Maintenance Consent Letter. TxDOT to assist
☐ Required: TxDOT to assist in obtaining the UPRR CROE
☐ Required: Contractor to obtain
- ☐ BNSF: _____
https://bnsf.railpermitting.com
- ☐ KCS
https://jllrpg.360works.com/fmi/webd/rpo_web_kcs.fmp12
- ☐ Other Railroads: _____

To view previously approved CROE templates agreed upon between the State and Railroad, see: https://www.txdot.gov/business/resources/railroad-highway-crossing/sample-right-of-entry-agreements.html

Approved CROE templates are not to be modified by the Contractor.

Contractor shall not operate within Railroad Right of Way without an executed Construction & Maintenance Agreement between the State and the Railroad and an executed CROE between the Contractor and the Railroad if required on project.

VI. RAILROAD COORDINATION MEETING

A Railroad Coordination Meeting is required. See item 5, Article 8.1, of the Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges Manual for more details.

VII. RAILROAD SAFETY ORIENTATION

A. Complete the Railroad's course "Orientation for Contractor's Safety," and maintain registration prior to working on the Railroad's property. This course is required to be completed annually by Contractor and Subcontractor personnel working on site.

UPRR, BNSF, KCS/TEXMEX will not accept on-track safety training certificates from other Railroads. Refer to each Railroad's specific contractor right of entry for training information.

Know and follow the Contractor's Right of Entry Agreement EXHIBIT D, MINIMUM SAFETY REQUIREMENTS regarding clothing, personal protective equipment, and general safety requirements.

VIII. SUBCONTRACTORS

Contractor shall not subcontract work without written consent of TxDOT. Subcontractors are subject to the same insurance requirements as the Prime Contractor.

IX. EMERGENCY NOTIFICATION

In Case of Railroad Emergency
Call: UPRR
Railroad Emergency Line at: 1-800-848-8715
Location: DOT 758741H
RR Milepost: 3.360
Subdivision: Lufkin

RRD Review Only
Initials: AC
Date: 07/22/2023

Texas Department of Transportation — Rail Division

RAILROAD SCOPE OF WORK
PROJECT SPECIFIC DETAILS

FILE: rr-scope-of-work.pdf	DN: TxDOT	CK:	DW:	CK:	
© TxDOT June 2014	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0508	01	387	IH 10	
3/2023	DIST	COUNTY		SHEET NO.	
	HOU	HARRIS		67	

I. WORK AT CROSSING LOCATIONS (AT GRADE, HIGHWAY OVERPASS, HIGHWAY UNDERPASS, PEDESTRIAN, OR CLOSED/ABANDONED)

☐ This project is adjacent or parallel work, not within RR ROW:

DOT No.: 758627H
Crossing Type: Highway Overpass
RR Company Operating Track at Crossing: Union Pacific Railroad Company (UPRR)
RR Company Owning Track at Crossing: UPRR
RR MP: 8.210
RR Subdivision: Harrisburg
City: Houston
County: Harris
CSJ at this Crossing: 0912-72-744

Scope of Work, including any TCP, to be performed by State Contractor:

Applying Safety barrier line markings and replacing barrier reflectors for rigid and flexible barriers on Direct Connectors.

Scope of Work to be performed by Railroad Company:

N/A

II. FLAGGING & INSPECTION

No. of Days of Railroad Flagging Expected: N/A

On this project, night or weekend flagging is:

☐ Expected
☐ Not Expected

Flagging services will be provided by:

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Contact Information for Flagging:

☐ **UPRR** UP.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
UP.request@nrssinc.net
Call Center 877-984-677

☐ **BNSF** BNSFinfo@railprosfs.com
Call Center 877-315-0513, Select #1 for flagging

☐ **KCS** KCS.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
Bottom Line On-Track Safety Services
bottomline076@aol.com, 903-767-7630

☐ OTHERS:

Contractor must incorporate Construction Inspection into anticipated construction schedule.

☐ Not Required
☐ Required. Contact Information for Construction Inspection:

III. CONSTRUCTION WORK TO BE PERFORMED BY THE RAILROAD

☐ Required. Railroad Point of Contact: _____
☑ Not Required

Coordinate with TxDOT for any work to be performed by the Railroad Company. TxDOT must issue a work order for any work done by the Railroad Company prior to the work being performed.

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Escalated Limits	
Type of Insurance	Amount of Coverage (Minimum)
Workers Compensation	$500,000 / $500,000 / $500,000
Commercial General Liability	$2,000,000 / $4,000,000
Business Automobile	$2,000,000

Railroad Protective Liability Limits

☐ Not Required	
☑ Non - Bridge/Typical Maintenance Projects. Includes repairs to overpass/underpass and culvert structures	$2,000,000 / $6,000,000
☐ Bridge Structure Projects. Includes new construction or replacement of overpass/ underpass structures	$5,000,000 / $10,000,000
☐ Other: _____	

V. CONTRACTOR'S RIGHT OF ENTRY (CROE)

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☑ Required: UPRR Maintenance Consent Letter. TxDOT to assist
☐ Required: TxDOT to assist in obtaining the UPRR CROE
☐ Required: Contractor to obtain
- ☐ BNSF: _____
https://bnsf.railpermitting.com
- ☐ KCS
https://jllrpg.360works.com/fmi/webd/rpo_web_kcs.fmp12
- ☐ Other Railroads: _____

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IX. EMERGENCY NOTIFICATION

In Case of Railroad Emergency
Call: UPRR
Railroad Emergency Line at: 1-800-848-8715
Location: DOT 758627H
RR Milepost: 8.210
Subdivision: Harrisburg

RRD Review Only
Initials: AC
Date: 07/22/2023

Texas Department of Transportation — Rail Division

RAILROAD SCOPE OF WORK
PROJECT SPECIFIC DETAILS

FILE: rr-scope-of-work.pdf		DN: TxDOT	CK:	DW:		CK:
© TxDOT June 2014		CONT	SECT	JOB	HIGHWAY	
REVISIONS		0508	01	387	IH 10	
3/2023		DIST	COUNTY		SHEET NO.	
		HOU	HARRIS		68	

I. WORK AT CROSSING LOCATIONS (AT GRADE, HIGHWAY OVERPASS, HIGHWAY UNDERPASS, PEDESTRIAN, OR CLOSED/ABANDONED)

☐ This project is adjacent or parallel work, not within RR ROW:

DOT No.: 758476V
Crossing Type: Highway Overpass
RR Company Operating Track at Crossing: Union Pacific Railroad Company (UPRR)
RR Company Owning Track at Crossing: UPRR
RR MP: 360.970
RR Subdivision: Houston
City: Houston
County: Harris
CSJ at this Crossing: 0912-72-744

Scope of Work, including any TCP, to be performed by State Contractor:

Applying Safety barrier line markings and replacing barrier reflectors for rigid and flexible barriers on Direct Connectors.

Scope of Work to be performed by Railroad Company:

N/A

II. FLAGGING & INSPECTION

No. of Days of Railroad Flagging Expected: N/A

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☐ Not Expected

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Contact Information for Flagging:

☐ **UPRR** UP.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
UP.request@nrssinc.net
Call Center 877-984-677

☐ **BNSF** BNSFinfo@railprosfs.com
Call Center 877-315-0513, Select #1 for flagging

☐ **KCS** KCS.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
Bottom Line On-Track Safety Services
bottomline076@aol.com, 903-767-7630

☐ OTHERS:

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☐ Not Required
☐ Required. Contact Information for Construction Inspection:

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☐ Other: _____

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☑ Required: UPRR Maintenance Consent Letter. TxDOT to assist
☐ Required: TxDOT to assist in obtaining the UPRR CROE
☐ Required: Contractor to obtain
  ☐ BNSF: _____
  https://bnsf.railpermitting.com
  ☐ KCS
  https://jllrpg.360works.com/fmi/webd/rpo_web_kcs.fmp12
  ☐ Other Railroads: _____

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Railroad Emergency Line at: 1-800-848-8715
Location: DOT 758476V
RR Milepost: 360.970
Subdivision: Houston

RRD Review Only
Initials: AC
Date: 07/22/2023

Texas Department of Transportation — Rail Division

RAILROAD SCOPE OF WORK
PROJECT SPECIFIC DETAILS

FILE: rr-scope-of-work.pdf		DN: TxDOT	CK:	DW:		CK:
© TxDOT June 2014		CONT	SECT	JOB	HIGHWAY	
REVISIONS		0508	01	387	IH 10	
3/2023		DIST	COUNTY		SHEET NO.	
		HOU	HARRIS		69	

I. WORK AT CROSSING LOCATIONS (AT GRADE, HIGHWAY OVERPASS, HIGHWAY UNDERPASS, PEDESTRIAN, OR CLOSED/ABANDONED)

☐ This project is adjacent or parallel work, not within RR ROW:

DOT No.: Near 755378U

Crossing Type: Highway Overpass

RR Company Operating Track at Crossing: Union Pacific Railroad Company (UPRR)

RR Company Owning Track at Crossing: UPRR

RR MP: 6.910

RR Subdivision: Strang

City: Houston

County: Harris

CSJ at this Crossing: 0912-72-744

Scope of Work, including any TCP, to be performed by State Contractor:

Applying Safety barrier line markings and replacing barrier reflectors for rigid and flexible barriers on Direct Connectors.

Scope of Work to be performed by Railroad Company:

N/A

II. FLAGGING & INSPECTION

No. of Days of Railroad Flagging Expected: N/A

On this project, night or weekend flagging is:

☐ Expected

☐ Not Expected

Flagging services will be provided by:

☐ Railroad Company: TxDOT will pay flagging invoices. Flagging Agreement with Railroad will be needed

☐ Outside Party: Contractor will pay flagging invoices to be reimbursed by TxDOT

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Call Center 877-315-0513, Select #1 for flagging
UP.request@nrssinc.net
Call Center 877-984-677

☐ **BNSF** BNSFinfo@railprosfs.com
Call Center 877-315-0513, Select #1 for flagging

☐ **KCS** KCS.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
Bottom Line On-Track Safety Services
bottomline076@aol.com, 903-767-7630

☐ OTHERS:

Contractor must incorporate Construction Inspection into anticipated construction schedule.

☐ Not Required

☐ Required. Contact Information for Construction Inspection:

III. CONSTRUCTION WORK TO BE PERFORMED BY THE RAILROAD

☐ Required. Railroad Point of Contact: _____

☑ Not Required

Coordinate with TxDOT for any work to be performed by the Railroad Company. TxDOT must issue a work order for any work done by the Railroad Company prior to the work being performed.

IV. RAILROAD INSURANCE REQUIREMENTS

The Contractor shall confirm the insurance requirements with the Railroad as the insurance limits are subject to change without notice.

Insurance policies and corresponding certificates of insurance must be issued by the contractor on behalf of the Railroad. Separate insurance policies and certificates are required when more than one Railroad Company is operating on the same right of way, or when several Railroad Companies are involved and operate on their own separate right of ways.

No direct compensation will be made to the Contractor for providing the insurance coverages shown below or any deductibles. These costs are incidental to the various bid items.

Escalated Limits

Type of Insurance	Amount of Coverage (Minimum)
Workers Compensation	$500,000 / $500,000 / $500,000
Commercial General Liability	$2,000,000 / $4,000,000
Business Automobile	$2,000,000

Railroad Protective Liability Limits

☐ Not Required	
☑ Non - Bridge/Typical Maintenance Projects. Includes repairs to overpass/underpass and culvert structures	$2,000,000 / $6,000,000
☐ Bridge Structure Projects. Includes new construction or replacement of overpass/ underpass structures	$5,000,000 / $10,000,000
☐ Other: _____	

V. CONTRACTOR'S RIGHT OF ENTRY (CROE)

☐ Not Required

☑ Required: UPRR Maintenance Consent Letter. TxDOT to assist

☐ Required: TxDOT to assist in obtaining the UPRR CROE

☐ Required: Contractor to obtain

- ☐ BNSF: _____
  https://bnsf.railpermitting.com
- ☐ KCS
  https://jllrpg.360works.com/fmi/webd/rpo_web_kcs.fmp12
- ☐ Other Railroads: _____

To view previously approved CROE templates agreed upon between the State and Railroad, see: https://www.txdot.gov/business/resources/railroad-highway-crossing/sample-right-of-entry-agreements.html

Approved CROE templates are not to be modified by the Contractor.

Contractor shall not operate within Railroad Right of Way without an executed Construction & Maintenance Agreement between the State and the Railroad and an executed CROE between the Contractor and the Railroad if required on project.

VI. RAILROAD COORDINATION MEETING

A Railroad Coordination Meeting is required. See item 5, Article 8.1, of the Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges Manual for more details.

VII. RAILROAD SAFETY ORIENTATION

A. Complete the Railroad's course "Orientation for Contractor's Safety," and maintain registration prior to working on the Railroad's property. This course is required to be completed annually by Contractor and Subcontractor personnel working on site.

UPRR, BNSF, KCS/TEXMEX will not accept on-track safety training certificates from other Railroads. Refer to each Railroad's specific contractor right of entry for training information.

Know and follow the Contractor's Right of Entry Agreement EXHIBIT D, MINIMUM SAFETY REQUIREMENTS regarding clothing, personal protective equipment, and general safety requirements.

VIII. SUBCONTRACTORS

Contractor shall not subcontract work without written consent of TxDOT. Subcontractors are subject to the same insurance requirements as the Prime Contractor.

IX. EMERGENCY NOTIFICATION

In Case of Railroad Emergency

Call: UPRR

Railroad Emergency Line at: 1-800-848-8715

Location: DOT Near 755378U

RR Milepost: 6.910

Subdivision: Strang

RRD Review Only

Initials: AC

Date: 07/22/2023

Texas Department of Transportation | Rail Division

RAILROAD SCOPE OF WORK
PROJECT SPECIFIC DETAILS

FILE: rr-scope-of-work.pdf		DN: TxDOT	CK:	DW:		CK:
© TxDOT June 2014		CONT	SECT	JOB	HIGHWAY	
REVISIONS		0508	01	387	IH 10	
3/2023		DIST	COUNTY		SHEET NO.	
		HOU	HARRIS		70	

I. WORK AT CROSSING LOCATIONS (AT GRADE, HIGHWAY OVERPASS, HIGHWAY UNDERPASS, PEDESTRIAN, OR CLOSED/ABANDONED)

☐ This project is adjacent or parallel work, not within RR ROW:

DOT No.: 743674W

Crossing Type: Highway Overpass

RR Company Operating Track at Crossing: Union Pacific Railroad Company (UPRR)

RR Company Owning Track at Crossing: UPRR

RR MP: 1.244

RR Subdivision: Eureka

City: Houston

County: Harris

CSJ at this Crossing: 0912-72-744

Scope of Work, including any TCP, to be performed by State Contractor:

Applying Safety barrier line markings and replacing barrier reflectors for rigid and flexible barriers on Direct Connectors.

Scope of Work to be performed by Railroad Company:

N/A

II. FLAGGING & INSPECTION

No. of Days of Railroad Flagging Expected: N/A

On this project, night or weekend flagging is:

☐ Expected

☐ Not Expected

Flagging services will be provided by:

☐ Railroad Company: TxDOT will pay flagging invoices. Flagging Agreement with Railroad will be needed

☐ Outside Party: Contractor will pay flagging invoices to be reimbursed by TxDOT

Contractor must incorporate flaggers into anticipated construction schedule. The Railroad requires a 30-day notice if their flaggers are to be utilized. If Contractor falls behind schedule due to their own negligence and is not ready for scheduled flaggers, any flagging charges will be paid by Contractor.

Contact Information for Flagging:

☐ **UPRR** UP.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
UP.request@nrssinc.net
Call Center 877-984-677

☐ **BNSF** BNSFinfo@railprosfs.com
Call Center 877-315-0513, Select #1 for flagging

☐ **KCS** KCS.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
Bottom Line On-Track Safety Services
bottomline076@aol.com, 903-767-7630

☐ OTHERS:

Contractor must incorporate Construction Inspection into anticipated construction schedule.

☐ Not Required

☐ Required. Contact Information for Construction Inspection:

III. CONSTRUCTION WORK TO BE PERFORMED BY THE RAILROAD

☐ Required. Railroad Point of Contact: _____

☑ Not Required

Coordinate with TxDOT for any work to be performed by the Railroad Company. TxDOT must issue a work order for any work done by the Railroad Company prior to the work being performed.

IV. RAILROAD INSURANCE REQUIREMENTS

The Contractor shall confirm the insurance requirements with the Railroad as the insurance limits are subject to change without notice.

Insurance policies and corresponding certificates of insurance must be issued by the contractor on behalf of the Railroad. Separate insurance policies and certificates are required when more than one Railroad Company is operating on the same right of way, or when several Railroad Companies are involved and operate on their own separate right of ways.

No direct compensation will be made to the Contractor for providing the insurance coverages shown below or any deductibles. These costs are incidental to the various bid items.

Escalated Limits	
Type of Insurance	Amount of Coverage (Minimum)
Workers Compensation	$500,000 / $500,000 / $500,000
Commercial General Liability	$2,000,000 / $4,000,000
Business Automobile	$2,000,000

Railroad Protective Liability Limits	
☐ Not Required	
☑ Non - Bridge/Typical Maintenance Projects. Includes repairs to overpass/underpass and culvert structures	$2,000,000 / $6,000,000
☐ Bridge Structure Projects. Includes new construction or replacement of overpass/ underpass structures	$5,000,000 / $10,000,000
☐ Other: _____	

V. CONTRACTOR'S RIGHT OF ENTRY (CROE)

☐ Not Required

☑ Required: UPRR Maintenance Consent Letter. TxDOT to assist

☐ Required: TxDOT to assist in obtaining the UPRR CROE

☐ Required: Contractor to obtain

- ☐ BNSF: _____
  https://bnsf.railpermitting.com
- ☐ KCS
  https://jllrpg.360works.com/fmi/webd/rpo_web_kcs.fmp12
- ☐ Other Railroads: _____

To view previously approved CROE templates agreed upon between the State and Railroad, see: https://www.txdot.gov/business/resources/railroad-highway-crossing/sample-right-of-entry-agreements.html

Approved CROE templates are not to be modified by the Contractor.

Contractor shall not operate within Railroad Right of Way without an executed Construction & Maintenance Agreement between the State and the Railroad and an executed CROE between the Contractor and the Railroad if required on project.

VI. RAILROAD COORDINATION MEETING

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VII. RAILROAD SAFETY ORIENTATION

A. Complete the Railroad's course "Orientation for Contractor's Safety," and maintain registration prior to working on the Railroad's property. This course is required to be completed annually by Contractor and Subcontractor personnel working on site.

UPRR, BNSF, KCS/TEXMEX will not accept on-track safety training certificates from other Railroads. Refer to each Railroad's specific contractor right of entry for training information.

Know and follow the Contractor's Right of Entry Agreement EXHIBIT D, MINIMUM SAFETY REQUIREMENTS regarding clothing, personal protective equipment, and general safety requirements.

VIII. SUBCONTRACTORS

Contractor shall not subcontract work without written consent of TxDOT. Subcontractors are subject to the same insurance requirements as the Prime Contractor.

IX. EMERGENCY NOTIFICATION

In Case of Railroad Emergency

Call: UPRR

Railroad Emergency Line at: 1-800-848-8715

Location: DOT 743674W

RR Milepost: 1.244

Subdivision: Eureka

RRD Review Only

Initials: AC

Date: 07/22/2023

Texas Department of Transportation — Rail Division

RAILROAD SCOPE OF WORK
PROJECT SPECIFIC DETAILS

FILE: rr-scope-of-work.pdf		DN: TxDOT	CK:	DW:	CK:
© TxDOT June 2014		CONT	SECT	JOB	HIGHWAY
REVISIONS		0508	01	387	IH 10
3/2023		DIST	COUNTY		SHEET NO.
		HOU	HARRIS		71

I. WORK AT CROSSING LOCATIONS (AT GRADE, HIGHWAY OVERPASS, HIGHWAY UNDERPASS, PEDESTRIAN, OR CLOSED/ABANDONED)

☐ This project is adjacent or parallel work, not within RR ROW:

DOT No.: 288097W

Crossing Type: Highway Overpass

RR Company Operating Track at Crossing: Union Pacific Railroad Company (UPRR)

RR Company Owning Track at Crossing: UPRR

RR MP: 232.590

RR Subdivision: Houston West B

City: Houston

County: Harris

CSJ at this Crossing: 0912-72-744

Scope of Work, including any TCP, to be performed by State Contractor:

Applying Safety barrier line markings and replacing barrier reflectors for rigid and flexible barriers on Direct Connectors.

Scope of Work to be performed by Railroad Company:

N/A

II. FLAGGING & INSPECTION

No. of Days of Railroad Flagging Expected: N/A

On this project, night or weekend flagging is:

☐ Expected

☐ Not Expected

Flagging services will be provided by:

☐ Railroad Company: TxDOT will pay flagging invoices. Flagging Agreement with Railroad will be needed

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Contractor must incorporate flaggers into anticipated construction schedule. The Railroad requires a 30-day notice if their flaggers are to be utilized. If Contractor falls behind schedule due to their own negligence and is not ready for scheduled flaggers, any flagging charges will be paid by Contractor.

Contact Information for Flagging:

☐ **UPRR** UP.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
UP.request@nrssinc.net
Call Center 877-984-677

☐ **BNSF** BNSFinfo@railprosfs.com
Call Center 877-315-0513, Select #1 for flagging

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Bottom Line On-Track Safety Services
bottomline076@aol.com, 903-767-7630

☐ OTHERS:

Contractor must incorporate Construction Inspection into anticipated construction schedule.

☐ Not Required

☐ Required. Contact Information for Construction Inspection:

III. CONSTRUCTION WORK TO BE PERFORMED BY THE RAILROAD

☐ Required. Railroad Point of Contact: _____

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Type of Insurance	Amount of Coverage (Minimum)
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Railroad Protective Liability Limits	
☐ Not Required	
☑ Non - Bridge/Typical Maintenance Projects. Includes repairs to overpass/underpass and culvert structures	$2,000,000 / $6,000,000
☐ Bridge Structure Projects. Includes new construction or replacement of overpass/ underpass structures	$5,000,000 / $10,000,000
☐ Other: _____	

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☐ Not Required

☑ Required: UPRR Maintenance Consent Letter. TxDOT to assist

☐ Required: TxDOT to assist in obtaining the UPRR CROE

☐ Required: Contractor to obtain

- ☐ BNSF: _____
  https://bnsf.railpermitting.com
- ☐ KCS
  https://jllrpg.360works.com/fmi/webd/rpo_web_kcs.fmp12
- ☐ Other Railroads: _____

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VIII. SUBCONTRACTORS

Contractor shall not subcontract work without written consent of TxDOT. Subcontractors are subject to the same insurance requirements as the Prime Contractor.

IX. EMERGENCY NOTIFICATION

In Case of Railroad Emergency

Call: UPRR

Railroad Emergency Line at: 1-800-848-8715

Location: DOT 288097W

RR Milepost: 232.590

Subdivision: Houston West B

RRD Review Only

Initials: AC

Date: 07/22/2023

Texas Department of Transportation — Rail Division

RAILROAD SCOPE OF WORK
PROJECT SPECIFIC DETAILS

FILE: rr-scope-of-work.pdf		DN: TxDOT	CK:	DW:		CK:
© TxDOT June 2014		CONT	SECT	JOB	HIGHWAY	
REVISIONS		0508	01	387	IH 10	
3/2023		DIST	COUNTY		SHEET NO.	
		HOU	HARRIS		72	

PART 1 - GENERAL

1.01 DESCRIPTION

This project includes construction work within the right of way and/or properties of the Railroad and adjacent to its tracks, wire lines and other facilities. These sheets describe the minimum special requirements for coordination with the Railroad when working upon, over or under Railroad Right of Way or when impacting current or future Railroad operations. Coordinate with the Railroad while performing the work outlined herein, and afford the same cooperation with the Railroad as with TxDOT. Complete all submittals and work in accordance with TxDOT Standard Specifications, Railroad Guidelines and AREMA recommendations as modified by these minimum special requirements or as directed in writing by the Railroad Designated Representative.

For purposes of this project, the Railroad Designated Representative is the person or persons designated by the Railroad Manager of Industry and Public Projects to handle specific tasks related to the project.

1.02 REQUEST FOR INFORMATION / CLARIFICATION

Submit Requests for Information ("RFI") involving work within any Railroad Right of Way to the TxDOT Engineer. The TxDOT Engineer will submit the RFI to the Railroad Designated Representative for review and approval for RFI's corresponding to work within Railroad Right of Way. Allow six (6) weeks total time for review and approval, which includes four (4) weeks for review and approval by the Railroad.

1.03 PLANS / SPECIFICATIONS

TxDOT has received written Railroad approval of the plans and specifications for this project. Any revisions or changes in the plans after award of the Contract must have the approval of TxDOT and the Railroad.

PART 2 - UTILITIES AND FIBER OPTIC

Construct all utility installations in accordance with current AREMA recommendations, Railroad, TxDOT and owning utility specifications and requirements. Railroad general guidelines can be found on the Railroad website or by contacting the Railroad Designated Representative.

PART 3 - CONSTRUCTION

3.01 GENERAL

A. Perform all work in compliance with all applicable Railroad, Federal Railroad Administration (FRA), and TxDOT rules and regulations. Arrange and conduct work in a manner that does not endanger or interfere with the safe operation of the tracks and property of the Railroad and the traffic moving on such tracks, or the wires, signals and other property of the Railroad, its tenants or licensees, at or in the vicinity of the Work. The safe operation of railroad train movements takes precedence over any work to be performed by the Contractor. The Contractor is responsible for train delay cost and lost revenue claims due to any delays or interruption of train operations resulting from Contractor's construction or other activities.

B. Construction activities within 15 feet of the operational tracks will only be allowed if absolutely necessary and the Railroad's Designated Representative grants approval. Construction activities within 15 feet of the operational track(s) preferably allow the tracks to stay operational. In such cases, coordination and approval by the Railroad Track Manager is required with regard to schedule, flagging, and slow orders. See Sections 3.07 and 3.08 for additional information.

C. Provide track protection for all work equipment (including rubber tired equipment) operating within 25 feet from nearest rail. When not in use, keep Contractor machinery and materials at least 50 feet from the Railroad's nearest track.

D. Vehicular crossings of railroad track are allowed only at existing crossings, or haul road crossings developed with Railroad approval.

E. The Contractor is also advised that new railroad facilities within the project may be built by the Railroad. If applicable, these facilities are delineated in the plans. Be aware of the limits of responsibilities and coordinate efforts with the Railroad and TxDOT.

F. Railroad requirements do not allow work within 50 feet of track centers when a train passes the work site and all personnel must clear the area within 50 feet of the track centerline and secure all equipment. Additional allowances may be pursued as outlined in 3.02 and 3.03.

G. All permanent clearances shall be verified before project closing.

3.02 RAILROAD OPERATIONS

A. Trains and/or equipment are expected on any track, at any time, in either direction. Become familiar with the train schedules in this location and structure bid assuming intermittent track windows in this period, as defined in Paragraph B that follows.

B. All railroad tracks within and adjacent to the contract site are active, and rail traffic over these facilities shall be maintained throughout the Project. Activities may include both through moves and switching moves to local customers. railroad traffic and operations will occur continuously throughout the day and night on these tracks and shall be maintained at all times as defined herein. Coordinate and schedule the work so that construction activities do not interfere with railroad operations.

C. Coordinate work windows with TxDOT and the Railroad's Designated Representative. Types of work windows include Conditional Work Windows and Absolute Work Windows, as defined below:

1. Conditional Work Window: A Conditional Work Window is a period of time that railroad operations have priority over construction activities. When construction activities may occur on and/or adjacent to the railroad tracks within 25 feet of the nearest track, a railroad flag person will be required. At the direction of the railroad flag person, upon approach of a train, and when trains are present on the tracks, the tracks must be cleared (i.e., no construction equipment, materials or personnel within 25 feet, or as directed by the Railroad Designated Representative, from the tracks). Conditional Work Windows are available for the Project.

2. Absolute Work Window: An Absolute Work Window is a period of time that construction activities are given priority over railroad operations. During this time frame, the designated railroad track(s) will be inactive for train movements and may be fouled by the Contractor. At the end of an Absolute Work Window, the railroad tracks and/or signals must be completely operational for train operations and all Railroad, Public Utilities Commission (PUC) and FRA requirements, codes and regulations for operational tracks must be satisfied. In the situation where the operating tracks and/or signals have been affected, the Railroad will perform inspections of the work prior to placing that track back into service. Railroad flag persons will be required for construction activities requiring an Absolute Work Window. Absolute Work Windows will not generally be granted. Any request will require a detailed explanation for Railroad review.

3.03 RIGHT OF ENTRY, ADVANCE NOTICE AND WORK STOPPAGES

A. Do not perform any work within Railroad Right of Way without a valid executed Right of Entry Agreement if required on this project.

B. Give advance notice to the Railroad as required in the "Contractor's Right of Entry Agreement" before commencing work in connection with construction upon or over Railroad Right of Way and observe the Railroad's rules and regulations with respect thereto.

C. Perform all work upon Railroad Right of Way in a manner to avoid interference with or endanger the operations of the Railroad. Whenever work may affect the operations or safety of trains, submit the work method to the Railroad Designated Representative for approval. Approval does not relieve the Contractor from liability. Do not commence any work which requires flagging service or inspection service until the flagging protection required by the Railroad is available at the job site. See Section 3.15 for railroad flagging requirements.

D. Make requests in writing for both Absolute and Conditional Work Windows, at least 30 days in advance of any work. Include in the written request:
1. Exactly what the work entails.
2. The days and hours that work will be performed.
3. The exact location of work, and proximity to the tracks.
4. The type of window requested and the amount of time requested.
5. The designated contact person.

Provide a written confirmation notice to the Railroad at least 48 hours before commencing work in connection with approved work windows when work is within 25 feet of nearest rail. Perform all work in accordance with previously approved work plans.

E. Make provisions to protect operations and property of the Railroad should a condition arising from, or in connection with the work, require immediate and unusual action. If in the judgment of the Railroad Designated Representative such provisions are insufficient, the Railroad Designated Representative may require or provide such provisions as deemed necessary. In any event, such provisions shall be at the Contractor's expense and without cost to the Railroad or TxDOT. The Railroad or TxDOT shall have the right to order the Contractor to temporarily cease operations in the event of an emergency or, if in the opinion of the Railroad Designated Representative, the Contractor's operations could endanger railroad operations. In the event of such an order, immediately notify TxDOT of the order.

3.04 INSURANCE

Do not begin work upon or over Railroad Right of Way until furnishing the Railroad with the insurance policies, binders, certificates and endorsements required by the "Contractor's Right of Entry Agreement", and until the Railroad Designated Representative has advised TxDOT that such insurance is in accordance with the Agreement.

3.05 RAILROAD SAFETY ORIENTATION

A. Complete the railroad course "Orientation for Contractor's Safety", and maintain current registration prior to working on railroad property. This course is required to be completed annually by Contractor and Subcontractor personnel working on site.

"UPRR, BNSF, KCS/TEXMEX will not accept on-track safety training certificates from other railroads. Refer to Railroad specific contractor right of entry for training information."

B. Know and follow the "Contractor's Right of Entry Agreement" EXHIBIT D, MINIMUM SAFETY REQUIREMENTS regarding clothing, personal protective equipment, and general safety requirements.

3.06 COOPERATION

The Railroad will cooperate with Contractor so that work may be conducted in an efficient manner, and will cooperate with Contractor in enabling use of Railroad Right of Way in performing the work.

3.07 MINIMUM CONSTRUCTION CLEARANCES FOR FALSEWORK AND OTHER TEMPORARY STRUCTURES

Abide by the following minimum temporary clearances during the course of construction:
A. 15' - 0" (BNSF)(UPRR)and 14'-0" (KCS) horizontal from centerline of track
B. 22' (KCS) and 21' - 6" (UPRR & BNSF) vertically above top of rail.

For construction clearance less than listed above, obtain local Railroad Operating Unit review and approval.

3.08 APPROVAL OF REDUCED CLEARANCES

A. Maintain minimum track clearances during construction as specified in Section 3.07.

B. Submit any proposed infringement on the specified minimum clearances to the Railroad Designated Representative through TxDOT at least 30 days in advance of the work. Do not proceed with such infringement without written approval by the Railroad Designated Representative.

C. Do not commence work involving an approved infringement without receiving written assurance from the Railroad Designated Representative that arrangements have been made for any necessary flagging service.

Texas Department of Transportation | Rail Division

RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS March 2020	0508	01	387	IH 10
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		73

DATE: 9/6/2023 8:26:21 AM
FILE: H:\TrfSignals\Hoi Tran\Harris\0508-01-387 Main.dgn

3.09 MAINTENANCE OF RAILROAD FACILITIES

A. Maintain all ditches and drainage structures free of silt or other obstructions resulting from Contractor's operations. Repair eroded areas and any other damage within Railroad Right of Way and repair any other damage to the property of the Railroad, or its tenants.

B. Perform all such maintenance and repair of damages due to the Contractors's operations at Contractor's expense.

C. Submit a proposed method of erosion control for review by the Railroad prior to beginning any grading on the project site. Comply with all applicable local, state and federal regulations when developing and implementing such erosion control.

3.10 SITE INSPECTIONS BY RAILROAD's DESIGNATED REPRESENTATIVE

A. In addition to the office reviews of construction submittals, site inspections may be performed by the Railroad Designated Representative at significant points during construction, including the following if applicable:
   1. Pre-construction meetings.
   2. Pile driving/drilling of caissons or drilled shafts.
   3. Reinforcement and concrete placement for railroad bridge substructure and/or superstructure.
   4. Erection of precast concrete or steel bridge superstructure.
   5. Placement of waterproofing (prior to placing ballast on bridge deck).
   6. Completion of the bridge structure.

B. Site inspection is not limited to the milestone events listed above. Site visits to check progress of the work may be performed at any time throughout the construction as deemed necessary by the Railroad.

C. Provide a detailed construction schedule, including the proposed temporary horizontal and vertical clearances and construction sequence for all work to TxDOT for submittal to the Railroad Designated Representative for review prior to commencement of work. Include the anticipated dates when the above listed events will occur. Update this schedule for the above listed events as necessary and each month at a minimum to allow the Railroad to schedule site inspections.

3.11 RAILROAD REPRESENTATIVES

Railroad representatives, conductors, flag person or watch person will be provided by the Railroad at expense of TxDOT to protect Railroad facilities, property and movements of its trains or engines. In general, the Railroad will furnish such personnel or other protective services as follows:

A. When any part of any equipment is standing or being operated within 25 feet, measured horizontally, from nearest rail of any track on which trains may operate, or when any object is off the ground and any dimension thereof could extend inside the 25 foot limit, or when any erection or construction activities are in progress within such limits, regardless of elevation above or below track.

B. For any excavation below elevation of track subgrade if, in the opinion of the Railroad Designated Representative, track or other railroad facilities may be subject to settlement or movement.

C. During any clearing, grubbing, excavation or grading in proximity to railroad facilities, which, in the opinion of the Railroad Designated Representative, may endanger railroad facilities or operations.

D. During any Contractor's operations when, in the opinion of the Railroad Designated Representative, railroad facilities, including, but not limited to, tracks, buildings, signals, wire lines, or pipe lines, may be endangered.

E. Arrange with the Railroad Designated Representative to provide the adequate number of flag persons to accomplish the work.

3.12 COMMUNICATIONS AND SIGNAL LINES

If required, the Railroad will rearrange its communications and signal lines, its grade crossing warning devices, train signals and tracks, and facilities that are in use and maintained by the Railroad's forces in connection with its operation at expense of TxDOT. This work by the Railroad will be done by its own forces and it is not a part of the Work under this Contract.

3.13 TRAFFIC CONTROL

Coordinate any operations that control traffic across or around railroad facilities with the Railroad Designated Representative.

3.14 CONSTRUCTION EXCAVATIONS AND BORING ACTIVITIES UNDER TRACK

A. Take special precaution and care in connection with excavating and shoring. Excavations for construction of footings, piers, columns, walls or other facilities that require shoring shall comply with requirements of TxDOT, OSHA, AREMA and Railroad "Guidelines for Temporary Shoring".

B. The project plans indicate whether there are fiber optic lines or other such telecommunications systems that require consideration. Regardless, contact the necessary call center to determine if such cable systems are present:

   UPRR 1-800-336-9193
   7:00 AM to 9:00 PM CST Monday-Friday except holidays,
   staffed 24 hrs/day for emergencies
   48 hrs notice required

   BNSF 1-800-533-2891
   24 hour number
   5 working days notice required

   KCS 1-800-344-8377
   Texas One Call, a 24 hour number
   48 hrs notice required, excluding weekends and holidays

   If a telecommunications system is buried anywhere on or near railroad property, coordinate with TxDOT, the Railroad and the Telecommunication Company(ies) to arrange for relocation or protective measures prior to beginning work on or near railroad property. Refer to the project General Notes for additional information.

C. Projects involving a boring or jack and bore operation under track such as drainage pipes or culverts and utilities require an installation plan reviewed and approved by the Railroad and TxDOT prior to proceeding with such construction. A railroad inspector and contractor assisted monitoring of ground and track movement is required to maintain safe passage of rail traffic. Stop installation and do not allow passage of trains if movements in excess of 1/4 inch vertical or horizontal is detected in the tracks. Immediately repair the damage to the satisfaction of TxDOT and the Railroad before proceeding.

3.15 RAILROAD FLAGGING

Per the Right of Entry Agreement for flagging, notify the Railroad Representative at least 10 working days in advance of Contractor's work and at least 30 working days in advance of any Contractor's work in which any person or equipment will be within 25 feet of nearest rail or as specified in the Contractor Right of Entry (CROE).

3.16 CLEANING OF RIGHT-OF-WAY

When work is complete, remove all tools, implements, and other materials brought into Railroad Right of Way and leave the right of Way in a clean and presentable condition to the satisfaction of TxDOT and the Railroad.

Texas Department of Transportation | Rail Division

RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS

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© TxDOT October 2018	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		74

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I. STORMWATER POLLUTION PREVENTION

Texas Pollutant Discharge Elimination System (TPDES) TXR 150000: Stormwater Discharge Permit or Construction General Permit is required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506. Refer to the TxDOT SWP3 Summary Sheets, SWP3 Binder Template, and Form 2118.

No Additional Comments

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS

United States Army Corps of Engineers (USACE) Permit is required for filling, dredging, excavating or other work in water bodies, rivers, creeks, streams, wetlands or wet areas. The Contractor must adhere to all of the terms and general conditions associated with the following permit(s). If additional work not represented in the plans is required, contact the Engineer immediately.

☒ No United States Army Corps (USACE) Permit Required

☐ Work is authorized by the United States Army Corps of Engineers (USACE) under a Nationwide Permit (NWP) without a Pre-Construction Notification (PCN). Project specific permit was not issued by USACE, therefore is not in the plan set. The USACE general conditions are in the "General Notes."

☐ Work is authorized by the United States Army Corps of Engineers (USACE) under a Nationwide Permit (NWP) with a Pre-Construction Notification (PCN). The project specific permit issued by the United States Army Corps of Engineers (USACE) is included in the plan set. The USACE general conditions are in the "General Notes."

☐ Work is authorized by the United States Army Corps of Engineers (USACE) under a Individual Permit (IP). The project specific permit issued by the United States Army Corps of Engineers (USACE) is included in the plan set.

☐ Work would be authorized by the United States Army Corps of Engineers (USACE) permit. The project specific permit issued by the USACE will be provided to the contractor.

United States Coast Guard (USCG) Permit is required for projects that involve the construction or modification (including changes to lighting) of a bridge or causeway across a water body determined to be navigable by the United States Coast Guard (USCG) under Section 9 of the Rivers and Harbors Act. If additional work not represented in the plans is required, contact the Engineer immediately.

☒ No United States Coast Guard (USCG) Coordination Required

☐ United States Coast Guard (USCG) Permit

☐ United States Coast Guard (USCG) Exemption

No Additional Comments

III. CULTURAL RESOURCES

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

No Additional Comments

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical. Refer to TxDOT Standard Specifications in order to comply with requirements for invasive species, beneficial landscaping and tree/brush removal.

No Additional Comments

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

If any of the listed species below are observed, cease work in the area, do not disturb species or habitat and contact the Engineer immediately.

The work may not remove active nests (from bridges, structures, or vegetation adjacent to the roadway, etc.) during nesting season (February 15 to October 1). If removal of structures or vegetation is necessary during the nesting season, the Contractor shall conduct a bird survey no more than 3 days in advance of the clearing/demolish start date. All bird surveys shall be conducted by a Field Biologist and adhere to the guidance document "Avoiding Migratory Birds and Handling Potential Violations" found in the TxDOT Environmental Compliance Toolkits at the time of the survey. (See below for Field Biologist and Ornithologist qualifications)

No Additional Comments

Field Biologist, Ornithologist – a field biologist is defined as an individual qualified to perform field investigations, presence/absence surveys and habitat surveys for protected avian species or species of concern. A mandatory bachelor's degree in biology or a related science is required. At a minimum, the Field Biologist, Ornithologist, shall have completed and reported a minimum of three presence/absence and habitat surveys for protected avian species in the past five years. A minimum of three projects must have been conducted in Texas. Surveys shall have been performed for documentation of species in accordance with a protocol approved by USFWS or TPWD, or following generally accepted methodologies.

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

Refer to TxDOT Standard Specifications in the event potentially contaminated materials are observed, such as dead or distressed vegetation, trash disposal areas, drums, canisters, barrels, leaching or seepage of substances, unusual smells or odors, or stained soil, cease work in the area and contact the Engineer immediately.

No Additional Comments

VII. OTHER ENVIRONMENTAL ISSUES

Comments:

DATE: Apr 24, 2023
FILE:

Version 2.2

Texas Department of Transportation

TxDOT Houston District

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: EPIC Sheet.dgn	DN:	CK:	DW:	CK:
© TxDOT: March 2017	CONT	SECT	JOB	HIGHWAY
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UPDATED section V. text and added definition (10/17) ADDED USCG and USACE notes in Section VII (04/18)	DIST	COUNTY		SHEET NO.
	HOU	Harris		75