STATE DISTRICT	FEDERAL REGION	PROJECT NO.			SHEET
HOU	6	STP 2B24(241)TP			1
COUNTY		CONTROL	SECTION	JOB	HIGHWAY
HARRIS		0271	14	240	IH-610

INDEX OF SHEETS

- SEE SHEET 2 FOR INDEX OF SHEETS

STATE OF TEXAS

DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED

STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT NO. STP 2B24(241)TP
IH-610 SB FRONTAGE RD (SUP)
HARRIS COUNTY
CONTROL NO. 0271-14-240

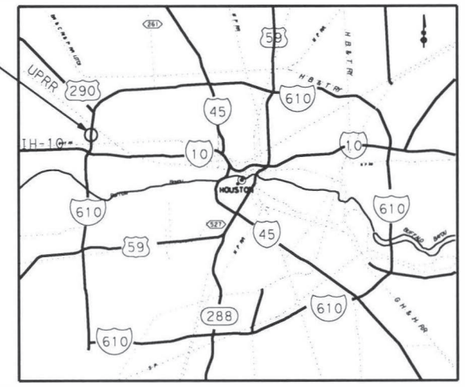
LENGTH OF PROJECT = ROADWAY = 2,625.33 FT = 0.497 MILES
BRIDGE = 0.00 FT = 0.000 MILES
TOTAL LENGTH OF PROJECT = 2,625.33 FT = 0.497 MILES

LIMITS: FROM OLD KATY ROAD TO WEST 12TH STREET

FOR THE CONSTRUCTION OF BICYCLE AND PEDESTRIAN SHARED USE PATH (SUP) IMPROVEMENTS, SIGNAGE AND PAVEMENT MARKINGS, SIGNAL, PEDESTRIAN ACTUATION, PEDESTRIAN CURB RAMPS, FENCING, AND DRIVEWAYS.

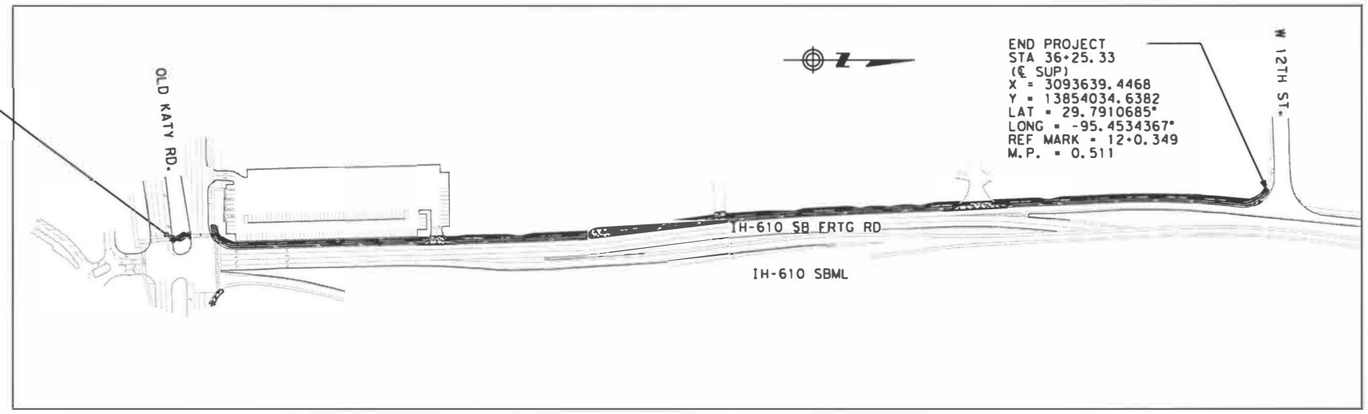
REGISTERED ACCESSIBILITY SPECIALIST(RAS) INSPECTION REQUIRED
TDLR NO. TABS2024020338

PROJECT LOCATION



VICINITY MAP
SCALE = NTS

DESIGN SPEED = 45 MPH (IH-610 SB FRTG RD)
FUNCTIONAL CLASS: URBAN MAJOR COLLECTOR
ADT = 2,495 (YR 2024)
ADT = 3,493 (YR 2044)



PROJECT LOCATION MAP
NOT TO SCALE

EXCEPTIONS: NONE
EQUATIONS: NONE
RR CROSSINGS: NONE

PUBLIC WORKS PLANS ACCEPTED
77805
CITY DRAWING

NOTE: CITY SIGNATURE VALID FOR ONE YEAR ONLY, AFTER DATE OF SIGNATURE.

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

05/15/24
Director of Houston Public Works — Date:

Texas Department of Transportation

SUBMITTED FOR LETTING: 6/14/2024
DocuSigned by: Hamoon Bahrami 192FCD8CB4B444D...
NEER

APPROVED FOR LETTING: 7/3/2024
DocuSigned by: Brett McLeod FE9C2D7C24E543D...
, P.E.
NEER

ALL CURVES BASED ON ARC DEFINITION.
COORDINATES AND DISTANCES ARE REFERENCED TO THE TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTERAL ZONE, NAD 83, 2011 ADJUSTMENT. GRID VALUES ARE OBTAINED BY DIVIDING SURFACE VALUE BY SCALE FACTOR OF 1.00013.

HORIZONTAL DATUM ARE REFERENCED TO NAVD 83, 1993 ADJUSTMENT.
VERTICAL DATUM ARE REFERENCED TO NAVD 88, 1991 ADJUSTMENT.

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, SEPTEMBER 1, 2024, AND THE CONTRACT PROVISIONS LISTED AND DATED AS FOLLOWS SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, OCTOBER 23, 2023).

COUNTY HARRIS PROJ. NO. STP 2B24(241)TP
HWY. NO. IH-610 LETTING DATE SEPTEMBER 2024
DATE ACCEPTED

DATE: 4/1/2024 3:32:09 PM
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THE STANDARD SHEETS SPECIFICALLY (#) IDENTIFIED ON THIS SHEET HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

STATE OF TEXAS
STEVE VAN
137551
LICENSED PROFESSIONAL ENGINEER

Steve Van, P.E.

06/21/2024

IH-610
SB FRONTAGE RD (SUP)
INDEX OF SHEET

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610
DIST	COUNTY		SHEET NO.
12	HARRIS		2

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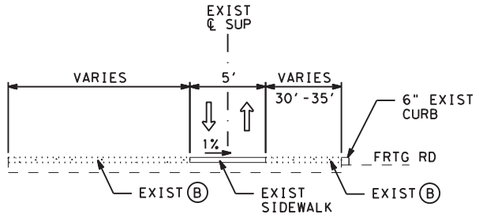
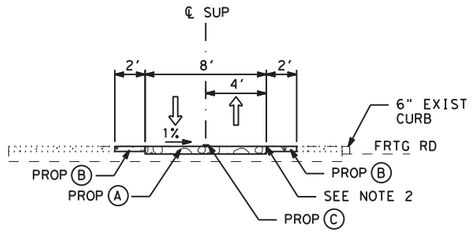


EXISTING TYPICAL SECTION

STA 10+14.00 TO STA 10+30.73



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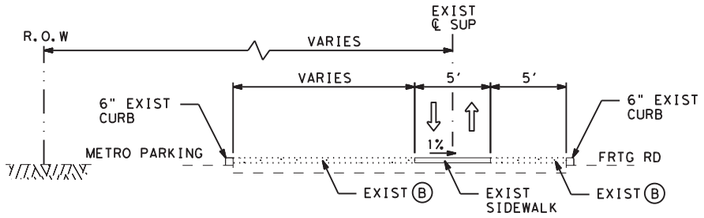

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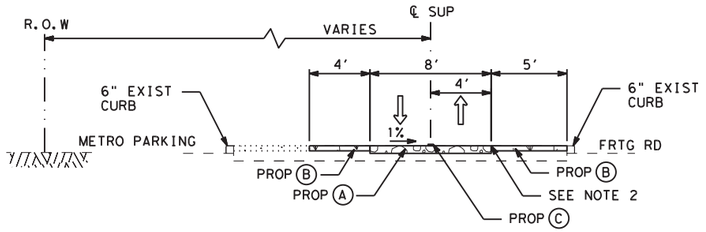

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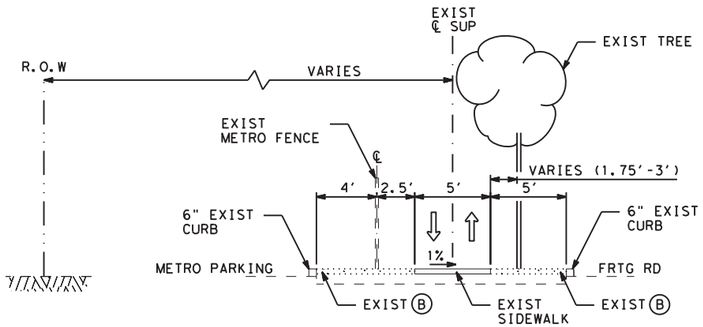

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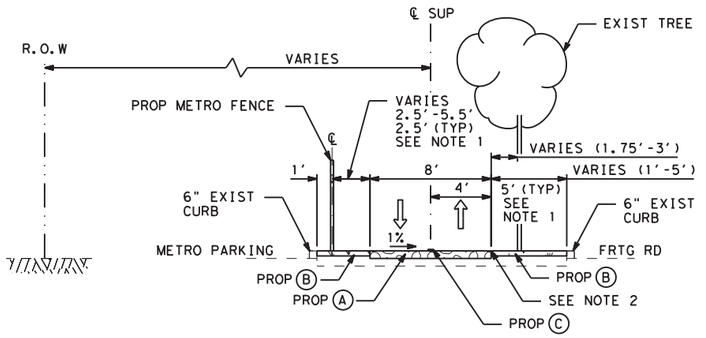

PROPOSED TYPICAL SECTION

STA 11+58.57 TO STA 16+14.56

NOTE:

1. SEE SUP LAYOUT SHEETS FOR MORE SUP INFORMATION.
2. ELEVATION TO MATCH FRONTAGE RD TOP OF CURB.

LEGEND:

(A) 6" CONC SIDEWALK

(B) BLOCK SOD

(C) PAV MRK (Y)(4")

STATE OF TEXAS
STEVE VAN
137551
LICENSED
PROFESSIONAL ENGINEER

Steve Van, P.E.

06.27.24

IH-610
SB FRTG RD (SUP)
TYPICAL SECTIONS

SHEET 1 OF 2

TEXAS DEPARTMENT OF TRANSPORTATION

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610
DIST	COUNTY		SHEET NO.
12	HARRIS		3

SCALE: N.T.S

DATE: 6/27/2024 9:43:57 AM
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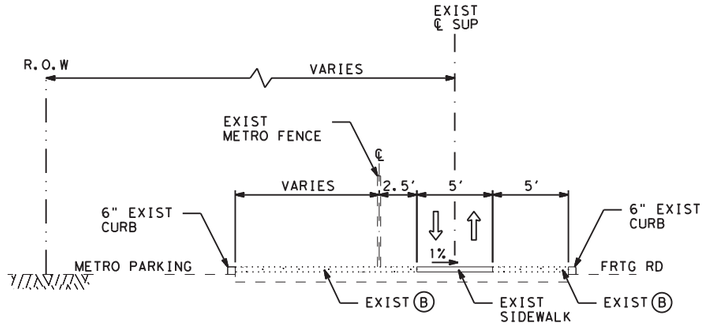

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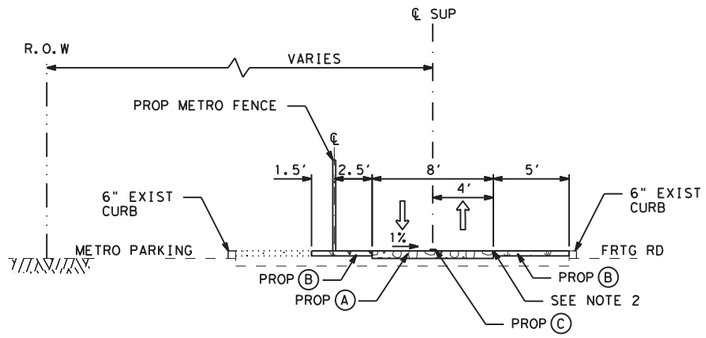

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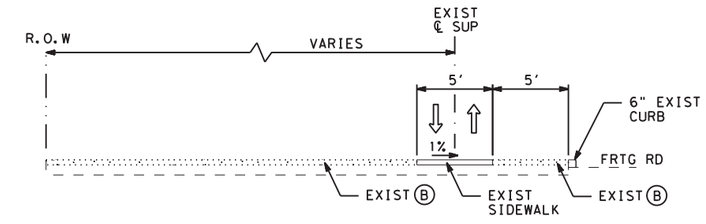

EXISTING TYPICAL SECTION

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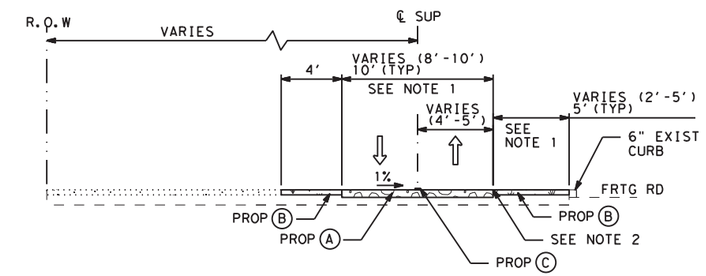
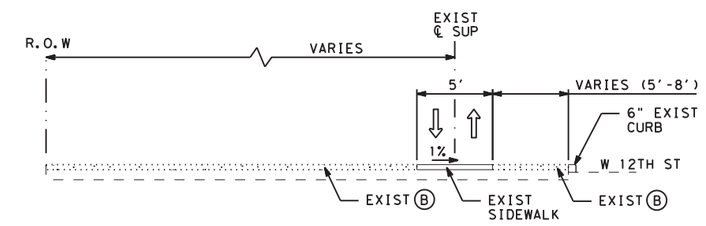
STA 20+51.41 TO STA 22+97.59
STA 23+30.64 TO STA 28+79.89
STA 29+71.59 TO STA 35+81.51



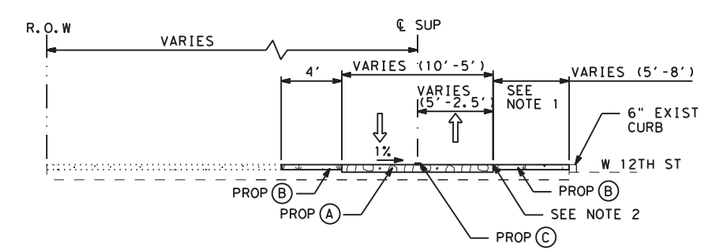
PROPOSED TYPICAL SECTION

STA 16+82.42 TO STA 20+00.14
STA 20+51.41 TO STA 22+97.59
STA 23+30.64 TO STA 28+79.89
STA 29+71.59 TO STA 35+81.51



EXISTING TYPICAL SECTION

STA 35+81.51 TO STA 36+25.33



PROPOSED TYPICAL SECTION

STA 35+81.51 TO STA 36+25.33

LEGEND:

(A) 6" CONC SIDEWALK

(B) BLOCK SOD

(C) PAV MRK (Y)(4")

NOTE:

1. SEE SUP LAYOUT SHEETS FOR MORE SUP INFORMATION.
2. ELEVATION TO MATCH FRONTAGE RD TOP OF CURB.

STATE OF TEXAS
STEVE VAN
137551
LICENSED
PROFESSIONAL ENGINEER

Steve Van, P.E.

06.27.24

IH-610
SB FRTG RD (SUP)
TYPICAL SECTIONS

SHEET 2 OF 2

TEXAS DEPARTMENT OF TRANSPORTATION

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610
DIST	COUNTY		SHEET NO.
12	HARRIS		4

SCALE: N.T.S

General Notes:

General:

Area Engineer contact information for this project follows:

Hamoon Bahrami, P.E. at Hamoon.Bahrami@txdot.gov.
William Burch, P.E. at William.Burch@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.

All relevant project documentation, including Contract Time Determinations 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/

Unless otherwise shown on the plans, RAP generated by this project will become the property of the Contractor for use in the current construction project or in future projects.

If fixed features require, the governing slopes shown may vary between the limits shown and to the extent determined by the Engineer.

Superelevate the curves to match the existing surface.

Notify the Engineer immediately if discrepancies are discovered in the horizontal control or the benchmark data.

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.

Grade street intersections and median openings for surface drainage.

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.

Stencil the National Bridge Inventory (NBI) number on each existing bridge shown on these plans. The NBI number is shown above the title block for each bridge layout.

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.

Unless otherwise shown on the plans or otherwise directed, commence work after sunrise and ensure construction equipment is off the road by sunset.

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 https://ftp.dot.state.tx.us/pub/txdot-info/cmd/mpl/archive/) 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

Mow the grass and weeds within the project limits a maximum of 3 times a year as directed. This work is subsidiary to the various bid items.

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.

This project requires extensive grading operations in an environmentally sensitive area.

If relocating mailboxes, place them with the post firmly in the ground at nearby locations. Upon completing the project, the Engineer will locate the final mailbox placement. Perform this work

in accordance with the requirements of the Item, "Mailbox Assemblies," except for measurement and payment. This work is subsidiary to the various bid items.

If fences cross construction easements shown on the plans and work is required beyond the fences, remove and replace the fences as directed. This work and the materials are subsidiary to the various bid items.

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 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, https://ftp.txdot.gov/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
420	Formwork/Falsework	Y	N	Y	A	WD
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
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
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
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
SS	Camera Poles	Y	Y	Y	TMS	SD
SS	Fiber Optic/Communication Cable	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
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

When a precast or cast-in-place concrete element is included in the plans, a precast concrete alternate may be submitted in accordance with "Standard Operating Procedure for Alternate Precast Proposal Submission" found online at https://www.txdot.gov/inside-txdot/forms-publications/consultants-contractors/publications/bridge.html#design. Acceptance or denial of an alternate is at the sole discretion of the Engineer. Impacts to the project schedule and any additional costs resulting from the use of alternates are the sole responsibility of the Contractor.

Item 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 an 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.

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 based on a five-day standard workweek in accordance with Section 8.3.1.4.

The Lane Closure Assessment Fee is $ *500*. 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.

Item 100: Preparing Right of Way

Obtain a City of Houston plumbing permit and a demolishing permit or removing permit before demolishing or removing existing houses or commercial buildings.

Clean existing ditches under fill sections of undesirable materials including grass, muck, and trash. Perform this work in accordance with the Construction section of the Item, “Preparing Right of Way.” This work is subsidiary to this bid Item.

The Item, “Preparing Right of Way” will be measured for payment only in those designated areas shown on the plans. Preparing right of way necessary to perform construction that is outside designated areas is subsidiary to this bid Item.

Remove abandoned utilities that are in conflict with the new utilities, at no expense to the Department.

Reestablish and maintain right of way stakes after completing the right of way preparation activities and until the new utilities are in place.

Remove and assume ownership of the existing ground mounted signs within the limits of roadway construction unless otherwise noted or directed. This work is subsidiary to the Item, "Preparing Right of Way."

Item 104: Removing Concrete

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

Item 105: Removing Treated and Untreated Base and Asphalt Pavement

Removing curb on cement-treated and untreated base or on cement treatment being removed at the same time is subsidiary to this bid Item.

Item 110: Excavation

If manipulating the excavated material requires moving the same material more than once to accomplish the desired results, the excavation is measured and paid for only once regardless of the manipulation required.

Transition the ditch grades and channel bottom widths at structure locations. Use only approved channel excavation in the embankment.

The total excavation quantity shown on the plans includes the quantity for excavating to 2 ft. behind the back of the proposed curb.

Item 132: Embankment

If salvaged base is used for the embankment material, break it into small pieces to achieve the required density and to facilitate placing in the embankment. Obtain approval of the material before placing in the embankment.

Furnish Type C material with a maximum Liquid Limit (LL) of 65, a minimum Plasticity Index (PI) of 5, and composed of suitable earth material such as loam, clay, or other materials that form a suitable embankment.

The embankment material used on the project which has a Liquid Limit exceeding 45 will be tested for Liquid Limits at the rate of one test per 20,000 cu. yd. or per total quantity less than 20,000 cu. yd., unless otherwise directed. Only use material that passes the above tests.

Item 168: Vegetative Watering

Refer to the "Fertilizer, Seed, Sod, Straw, Compost, and Water" plan sheet for material specifications, application rates, and for watering requirements.

Item 360: Concrete Pavement

Where the pavement curb is left off for a later tie, provide the dowels or the tie bars as indicated on the paving detail sheets. The dowel bars and tie bars are subsidiary to the various bid items.

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

On pavement widening, hand finishing in place of the longitudinal float will be permitted.

Where existing pavement is widened with new pavement, place the new pavement a minimum of 2 ft. wide.

Equip the batching plants to proportion by weight, aggregates and bulk cement, using approved proportioning devices and approved automatic scales.

For mono curb, the curb height transitions will be paid at the contract unit price of the larger curb height in the transition. The 2.5-in. laydown curbs for driveways will be paid at the unit price bid for the Item, "Conc Curb (Mono) (Ty II)."

High-early strength cement may be used for frontage road and city street intersection construction.

Do not use limestone dust of fracture as fine aggregate.

If the concrete design requires greater than 5.5 sacks of cementitious material per cubic yard, obtain written approval. If placing concrete pavement mixes from April 1 to October 31, inclusive, use Mix Design Option 1 as specified in Section 421.4.2.6.1.

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

Unless otherwise directed in writing, provide High Early Strength (Class HES) concrete with a minimum average flexural strength of 425 psi or a minimum average compressive strength of 3,000 psi in 16 hours.

When directed in writing, open the pavement to traffic before the minimum requirements have been attained.

When needed, place and remove forms in accordance with Section 360.4.5, except do not remove forms until at least 6 hours after concrete has been placed. The time for the form removal

may be extended with the direction of the Engineer if weather or other conditions make it advisable.

Sprinkling and rolling, required for the compaction of the rough subgrade in advance of fine grading are subsidiary to this Item. Maintenance of a moist condition of the subgrade in advance of fine-grading and concrete is subsidiary work, as provided above.

Item 421: Hydraulic Cement Concrete

Entrained air is required in all slip formed concrete (bridge rail, concrete traffic barrier, pavement, etc.), but is not required for other structural concrete. Adjust the dosage of air entraining agent for low air content as directed or allowed by the Engineer. If entrained air is provided where not required, do not exceed the manufacturer's recommended dosage.

Item 427: Surface Finishes for Concrete

Provide a Surface Area I finish for structures. Use concrete paint for the surface finish.

Item 465: Junction Boxes, Manholes, and Inlets

If required on the plans, build manholes and inlets to stage 1 construction, cover with temporary pavement, and complete in a later phase of construction. This temporary covering and pavement are subsidiary to the various bid items.

Construct manholes and inlets in graded areas, first to an elevation at least 4 in. above the top of the highest entering pipe and cover with a wooden cover. Complete the construction of such manholes and inlets to the finished elevation as shown on the plans when completing the grading work for such manholes and inlets. Adjust the final elevation, if required, since this elevation is approximate.

Construct manholes and inlets in paved areas to an elevation so their temporary wooden covers are flush with the surface of the base material.

Do not leave excavations or trenches open overnight.

Items 496: Removing Structures

Do not permit debris resulting from the structure removal or construction activities to enter a natural or manmade waterway such as drainage channels, rivers, streams, bays, etc. Remove debris which falls into such waterways. This work is subsidiary to the Item, "Removing Structures."

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."

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

Before detouring traffic onto the 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 Lane Closure (IH-610 SB FRTG and Old Katy Rd)

Day	Daytime Closure Hours	Nighttime Closure Hours	Restricted Hours Subject to Lane Assessment Fee
Monday	9:00 AM – 3:00 PM	N/A	5:00 AM – 9:00 AM AND 3:00 PM-9:00 PM
Tuesday	9:00 AM – 3:00 PM	N/A	5:00 AM – 9:00 AM AND 3:00 PM-9:00 PM
Wednesday	9:00 AM – 3:00 PM	N/A	5:00 AM – 9:00 AM AND 3:00 PM-9:00 PM
Thursday	9:00 AM – 3:00 PM	N/A	5:00 AM – 9:00 AM AND 3:00 PM-9:00 PM
Friday	9:00 AM – 3:00 PM	N/A	5:00 AM – 9:00 AM AND 3:00 PM-9:00 PM
Saturday	N/A	N/A	N/A
Sunday	N/A	N/A	N/A

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.

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

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 the enhancement.

Item 505: 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, except 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.

A total of three (3) shadow vehicles with a TMA/TA are required for Pavement Marking Operations. The Contractor is responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMAs/TAs needed on the project.

Item 506: Temporary Erosion, Sedimentation and Environmental Controls

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

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

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

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

Schedule the seeding or sodding work as soon as possible. The project schedule provides for a vegetation management plan.

After completing earthwork operations, restore and reseed the disturbed areas in accordance with the Department's specifications for permanent or temporary erosion control.

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

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

Immediately address chemical and hydrocarbon spills caused by the Contractor. Keep a spill kit onsite.

Item 531: Sidewalks

An air-entraining admixture is not required.

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

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

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

Item 618: Conduit
Item 620: Electrical Conductors
Item 628: Electrical Services

If the specifications for electrical items require UL-listed products, this means UL-listed or CSA-listed.

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.

Use materials from pre-qualified producers as shown on the Department's Construction Division (CST) material producers list. Check the latest links on the Department's website for the list.

The category is "Roadway Illumination and Electrical Supplies." The polymer concrete barrier box is subsidiary to Item 618, "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

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 666: Retroreflectorized Pavement Markings
Item 668: Prefabricated Pavement Markings and Rumble Strips

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

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

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

For roadways with asphalt surfaces to be striped with work zone or permanent thermoplastic markings, the Contractor has the option to apply paint and beads markings for a maximum 30-day period until placing the thermoplastic markings, or until starting the succeeding phase of work on the striped area. Maintain the paint and beads markings, at no expense to the Department, until placing the thermoplastic markings or starting the succeeding phase of work on the striped area. The work zone markings, whether paint and beads or thermoplastic, are paid under the Item, "Work Zone Pavement Markings" and the markings are paid for only once for the given phase of construction.

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

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

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

Stripe all roadways before opening them to traffic.

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

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

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

Item 677: Eliminating Existing Pavement Markings and Markers

Remove existing pavement markings on concrete or asphalt surfaces by flail milling or as directed. Do not use flail milling on grooved concrete or porous asphalt.

Item 678: Pavement Surface Preparation for Markings

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

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

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

Do not clean concrete pavement by grinding.

Item 682: Vehicle and Pedestrian Signal Heads

Install two set screws on vehicle signal head mounting hardware fittings.

Item 687: Pedestal Pole Assemblies

Furnish and install screw-in anchor foundations in accordance with Special Specification Item “Screw-In Anchor Type Foundations.” The work performed and materials furnished in accordance with this Item are subsidiary to the Item, “Pedestal Pole Assemblies.”

Item 688: Pedestrian Detectors and Vehicle Loop Detectors

Provide pedestrian push buttons a minimum of 2 in. diameter in the smallest dimension.

Install a rubber grommet or bushing between the push button assembly and the signal pole to protect the conductors.

Provide a black tube loop detector wire as specified in the “International Municipal Signal Association, Inc.” (IMSA) Specifications.

At intersections where a minimum of 10 ft. spacing between adjacent accessible pedestrian signal units is not possible, provide each accessible pedestrian pushbutton with the following features: a pushbutton locator tone, a tactile arrow, a speech walk message for the walking person indication and a speech pushbutton information message.

Provide pedestrian push buttons a minimum of 2 in. diameter in the smallest dimension.

Install a rubber grommet or bushing between the push button assembly and the signal pole to protect the conductors.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0271-14-240 **DISTRICT** Houston **COUNTY** Harris
HIGHWAY IH 610

			CONTROL SECTION JOB		**0271-14-240**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00129706**		
			COUNTY		**Harris**		
			HIGHWAY		**IH 610**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	100-7001	PREPARING ROW	AC	0.750		0.750	
	104-7011	REMOV CONC (DRIVEWAYS)	SY	396.000		396.000	
	104-7013	REMOV CONC (SIDEWALK, RAMP OR SUP)	SY	1,549.000		1,549.000	
	104-7016	REMOV CONC (CURB)	LF	7.000		7.000	
	105-7026	RMV (6") TRT/UNTRT BASE & ASPH PAV	SY	137.000		137.000	
	110-7001	EXCAV (ROADWAY)	CY	219.000		219.000	
	110-7003	EXCAV (SPECIAL)	CY	14.000		14.000	
	132-7005	EMBANK (FNL)(OC)(TY C)	CY	15.000		15.000	
	162-7002	BLOCK SODDING	SY	2,141.000		2,141.000	
	166-7001	FERTILIZER	AC	0.460		0.460	
	168-7001	VEGETATIVE WATERING	TGL	55.200		55.200	
	194-7007	RDSIDE AMENITY (WHEEL STOP)	EA	36.000		36.000	
	465-7333	INLET (STAGE II)(CURB)(TY C)(LEFT)(HOU)	EA	1.000		1.000	
	465-7334	INLET (STAGE II)(CURB)(TY C)(NONE)(HOU)	EA	2.000		2.000	
	471-7005	RING & COVER	EA	1.000		1.000	
	481-7010	PIPE (PVC) (SCH 40) (3 IN)	LF	40.000		40.000	
	496-7002	REMOV STR (INLET)	EA	3.000		3.000	
	500-7001	MOBILIZATION	LS	1.000		1.000	
	502-7001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	4.000		4.000	
	503-7001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	100.000		100.000	
	505-7001	TMA (STATIONARY)	DAY	10.000		10.000	
	512-7033	PORT CTB (MOVE)(LOW PROF)(TY 1)	LF	40.000		40.000	
	529-7007	CONC CURB (MONO) (TY II)	LF	122.000		122.000	
	529-7012	CONC CURB (DOWELED)	LF	23.000		23.000	
	530-7007	DRIVEWAYS (CONC) (HES)	SY	544.000		544.000	
	531-7003	CONC SIDEWALKS (6")	SY	2,334.000		2,334.000	
	531-7005	CURB RAMPS (TY 1)	EA	2.000		2.000	
	531-7006	CURB RAMPS (TY 2)	EA	1.000		1.000	
	531-7010	CURB RAMPS (TY 7)	EA	3.000		3.000	
	550-7001	CHAIN LINK FENCE (INSTALL) (6')	LF	472.000		472.000	
	550-7007	CHAIN LINK FENCE (REMOVE)	LF	476.000		476.000	
	550-7012	GATE (INSTALL)(6'X4')	EA	1.000		1.000	
	550-7017	REMOVE AND INSTALL EXISTING GATE	EA	2.000		2.000	
	618-7054	CONDT (PVC) (SCH 80) (2")	LF	20.000		20.000	
	618-7055	CONDT (PVC) (SCH 80) (2") (BORE)	LF	280.000		280.000	
	620-7007	ELEC CONDR (NO.8) BARE	LF	295.000		295.000	
	624-7008	GROUND BOX TY D (162922)W/APRON	EA	2.000		2.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0271-14-240 **DISTRICT** Houston **COUNTY** Harris
HIGHWAY IH 610

			CONTROL SECTION JOB		**0271-14-240**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00129706**		
			COUNTY		**Harris**		
			HIGHWAY		**IH 610**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	636-7001	ALUMINUM SIGNS (TY A)	SF	5.000		5.000	
	644-7001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	5.000		5.000	
	644-7065	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	1.000		1.000	
	644-7073	REMOVE SM RD SN SUP&AM	EA	1.000		1.000	
	644-7096	REPLACE SRS & S TY10BWG(1) (P)	EA	1.000		1.000	
	644-7106	REMOVE SM RD SN (FOUNDATION ONLY)	EA	1.000		1.000	
	666-7036	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	15.000		15.000	
	666-7171	RE PM TY II (W) 4" (SLD)	LF	1,254.000		1,254.000	
	666-7184	RE PM TY II (W) 24" (SLD)	LF	15.000		15.000	
	666-7210	RE PM TY II (Y) 4" (SLD)	LF	44.000		44.000	
	666-7244	RE PM TY III (W)(24")(SLD)	LF	419.000		419.000	
	666-7245	RE PM TY III (Y)(4")(SLD)	LF	340.000		340.000	
	666-7246	RE PM TY III (Y)(4")(BRK)	LF	534.000		534.000	
	666-7347	PAVEMENT SLER 6"	LF	800.000		800.000	
	666-7352	PAVEMENT SLER 24"	LF	400.000		400.000	
	666-7353	PAVEMENT SLER (ARROW)	EA	6.000		6.000	
	666-7405	REFL PAV MRK TY I (W)4"(SLD)(100MIL)	LF	1,254.000		1,254.000	
	666-7417	REFL PAV MRK TY I (Y)4"(SLD)(100MIL)	LF	44.000		44.000	
	668-7090	PREFAB PM TY C (W)(24")(SLD)CONTRAST	LF	400.000		400.000	
	668-7091	PREFAB PM TY C (W)(ARROW)	EA	6.000		6.000	
	677-7001	ELIM EXT PM & MRKS (4")	LF	796.000		796.000	
	677-7004	ELIM EXT PM & MRKS (8")	LF	8.000		8.000	
	677-7006	ELIM EXT PM & MRKS (12")	LF	538.000		538.000	
	677-7008	ELIM EXT PM & MRKS (24")	LF	693.000		693.000	
	677-7009	ELIM EXT PM & MRKS (ARROW)	EA	2.000		2.000	
	678-7001	PAV SURF PREP FOR MRK (4")	LF	2,172.000		2,172.000	
	678-7002	PAV SURF PREP FOR MRK (6")	LF	800.000		800.000	
	678-7008	PAV SURF PREP FOR MRK (24")	LF	834.000		834.000	
	678-7009	PAV SURF PREP FOR MRK (ARROW)	EA	6.000		6.000	
	682-7002	VEH SIG SEC (12")LED(GRN ARW)	EA	1.000		1.000	
	682-7004	VEH SIG SEC (12")LED(YEL ARW)	EA	1.000		1.000	
	682-7006	VEH SIG SEC (12")LED(RED ARW)	EA	1.000		1.000	
	682-7018	PED SIG SEC (LED)(COUNTDOWN)	EA	3.000		3.000	
	682-7054	BACKPLATE W/REFL BRDR(3 SEC)	EA	1.000		1.000	
	684-7029	TRF SIG CBL (TY A)(14 AWG)(3 CONDR)	LF	375.000		375.000	
	684-7031	TRF SIG CBL (TY A)(14 AWG)(5 CONDR)	LF	375.000		375.000	
	684-7033	TRF SIG CBL (TY A)(14 AWG)(7 CONDR)	LF	70.000		70.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0271-14-240 **DISTRICT** Houston **COUNTY** Harris
HIGHWAY IH 610

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0271-14-240**			
		PROJECT ID		**A00129706**			
		COUNTY		**Harris**			
		HIGHWAY		**IH 610**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	687-7001	PED POLE ASSEMBLY	EA	3.000		3.000	
	687-7005	REMOVE PED POLE ASSEMBLY	EA	3.000		3.000	
	688-7001	PED DETECT PUSH BUTTON (APS)	EA	3.000		3.000	
	688-7003	PED DETECTOR CONTROLLER UNIT	EA	1.000		1.000	
	690-7127	REMOVE LUMINAIRE POLE	EA	1.000		1.000	
	5005-7001	REMOVABLE BOLLARD	EA	2.000		2.000	
	6013-7008	GROUND BOX W/ APRON (ADJUST)	EA	4.000		4.000	
	18	SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	
		LAW ENFORCEMENT: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	

SUMMARY OF ROADWAY QUANTITIES

LOCATION	100 7001 PREPARING ROW	110 7001 EXCAV (ROADWAY)	110 7003 EXCAV (SPECIAL)	132 7005 EMBANK (FNL)(OC)(TY C)	162 7002 BLOCK SODDING	166 7001 FERTILIZER	168 7001 VEGETATIVE WATERING	194 7007 ROADSIDE AMENITY (WHEEL STOP)	465 7333 INLET (STAGE II)(CURB)(TY C)(LEFT)(HOU)	465 7334 INLET (STAGE II)(CURB)(TY C)(NONE)(HOU)	471 7005 RING & COVER	481 7010 PIPE (PVC) (SCH 40) (3 IN)	512 7033 PORT CTB (MOVE)(LOW PROF)(TY 1)
	AC	CY	CY	CY	SY	AC	TGL	EA	EA	EA	EA	LF	LF
SHEET 1 OF 4	0.03	17	7	1	320	0.07	8.4	20				20	
SHEET 2 OF 4	0.28	70	7	6	623	0.13	15.6	16				20	40
SHEET 3 OF 4	0.31	68		7	596	0.13	15.6				1		
SHEET 4 OF 4	0.13	64		1	602	0.13	15.6		1	2			
PROJECT TOTALS	**0.75**	**219**	**14**	**15**	**2141**	**0.46**	**55.2**	**36**	**1**	**2**	**1**	**40**	**40**

LOCATION	529 7007 CONC CURB (MONO) (TY II)	529 7012 CONC CURB (DOWELED)	530 7007 DRIVEWAYS (CONC) (HES)	531 7003 CONC SIDEWALKS (6")	531 7005 CURB RAMPS (TY 1)	531 7006 CURB RAMPS (TY 2)	531 7010 CURB RAMPS (TY 7)	550 7001 CHAIN LINK FENCE (INSTALL) (6')	550 7012 GATE (INSTALL)(6'X4')	550 7017 REMOVE AND INSTALL EXISTING GATE	5005 7001 REMOVABLE BOLLARD	6013 7008 GROUND BOX W/ APRON (ADJUST)
	LF	LF	SY	SY	EA	EA	EA	LF	EA	EA	EA	EA
SHEET 1 OF 4		16		278	2	1	2	241	1		1	2
SHEET 2 OF 4	52		249	706				231		2		1
SHEET 3 OF 4	70		295	695								1
SHEET 4 OF 4		7		655			1				1	
PROJECT TOTALS	**122**	**23**	**544**	**2334**	**2**	**1**	**3**	**472**	**1**	**2**	**2**	**4**

SUMMARY OF ROADWAY QUANTITIES

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610
DIST	COUNTY		SHEET NO.
12	HARRIS		9

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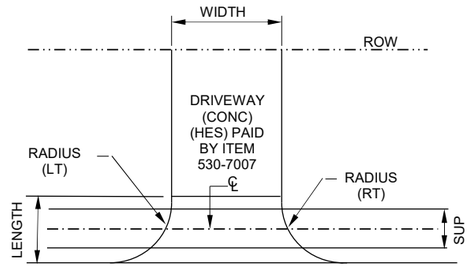
SUMMARY OF DRIVEWAYS QUANTITIES

IH-610 SOUTH BOUND FRONTAGE ROAD PLAN SHEET NUMBER	DRIVEWAY NUMBER	EXISTING DRIVEWAY		PROPOSED DRIVEWAY					NOTES
		SUP STATION AT CENTER OF DRIVEWAY	SURFACE TYPE	LT RADIUS	RT RADIUS	WIDTH	LENGTH	ITEM 530 7007 DRIVEWAY (CONC) (HES)	REFER TO LAYOUT
				FT	FT	FT	FT	SY	
SHT 2 OF 4	01	16+37.63	CONCRETE	35.0	35.0	32.2	20.0	112	SUP LAYOUT
SHT 2 OF 4	02	20+25.74	ASPHALT	27.5	29.0	39.5	22.0	137	SUP LAYOUT
SHT 3 OF 4	03	23+14.05	CONCRETE	27.5	25.0	25.0	25.0	102	SUP LAYOUT
SHT 3 OF 4	04	29+26.08	CONCRETE	72.0	74.0	77.8	16.5	193	SUP LAYOUT
TOTAL								544	



TYPICAL DRIVEWAY DETAIL
NTS
SEE SUP LAYOUT SHEETS FOR PROPOSED DRIVEWAY GEOMETRY

NOTE:
DIMENSIONS SHOWN ARE FOR CONTRACTORS' INFORMATION ONLY.
PRIOR TO THE REMOVAL OF EXISTING DRIVEWAYS, VERIFY DIMENSIONS OF EXISTING DRIVEWAYS AND ALERT THE ENGINEER IMMEDIATELY IF THERE IS A DISCREPANCY BETWEEN THE EXISTING AND PROPOSED DRIVEWAY WIDTHS. MATCH EXISTING DRIVEWAY WIDTH UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

IH-610
SB FRTG RD (SUP)
SUMMARY OF DRIVEWAYS

SHEET 1 OF 1

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			10
STATE	STATE DIST. NO.	COUNTY	
TEXAS	HOU	HARRIS	
CONT.	SECT.	JOB	HIGHWAY NO.
0271	14	240	IH-610

SUMMARY OF DEMOLITION QUANTITIES

LOCATION	104 7011	104 7013	104 7016	105 7026	496 7002	550 7007	644 7106	690 7127
	REMOV CONC (DRIVEWAYS)	REMOV CONC (SIDEWALK, RAMP OR SUP)	REMOV CONC (CURB)	RMV (6") TRT/UNTRT BASE & ASPH PAV	REMOV STR (INLET)	CHAIN LINK FENCE (REMOVE)	REMOVE SM RD SN (FOUNDATION ONLY)	REMOVE LUMINAIRE POLE
	SY	SY	LF	SY	EA	LF	EA	EA
SHEET 1 OF 4		270				245	1	
SHEET 2 OF 4	112	433		137		231		
SHEET 3 OF 4	284	436						1
SHEET 4 OF 4		410	7		3			
PROJECT TOTALS	**396**	**1549**	**7**	**137**	**3**	**476**	**1**	**1**

SUMMARY OF DEMOLITION QUANTITIES

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610
DIST	COUNTY		SHEET NO.
12	HARRIS		11

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IH 610 at Old Katy Rd				
ITEM	DESC CODE	DESCRIPTION	UNIT	TOTAL QUANTITY
618	7054	CONDT (PVC) (SCH 80)(2")	LF	20
618	7055	CONDT (PVC) (SCH 80) (2") (BORE)	LF	280
620	7007	ELEC CONDR (NO.8) BARE	LF	295
624	7008	GROUND BOX TY D (162922)W/APRON	EA	2
636	7001	ALUMINUM SIGN (TY A)	SF	5
		(R10-5L) LEFT TURN ON GREEN ARROW ONLY (24"x30")	EA	1
682	7002	VEH SIG SEC (12")LED(GRN ARW)	EA	1
682	7004	VEH SIG SEC (12")LED(YEL ARW)	EA	1
682	7006	VEH SIG SEC (12")LED(RED ARW)	EA	1
682	7018	PED SIG SEC (LED)(COUNTDOWN)	EA	3
682	7054	BACKPLATE W/REFL BRDR(3 SEC)	EA	1
684	7029	TRF SIG CBL (TY A)(14 AWG)(3 CONDR)	LF	375
684	7031	TRF SIG CBL (TY A)(14 AWG)(5 CONDR)	LF	375
684	7033	TRF SIG CBL (TY A)(14 AWG)(7 CONDR)	LF	70
687	7001	PED POLE ASSEMBLY	EA	3
		* SCREW-IN TYPE ANCHOR FOUNDATION		
687	7005	REMOVE PED POLE ASSEMBLY	EA	3
688	7001	PED DETECT PUSH BUTTON (APS)	EA	3
688	7003	PED DETECTOR CONTROLLER UNIT	EA	1

* MATERIALS SUBSIDIARY TO PERTINENT ITEMS

IH-610 AT
OLD KATY RD

TRAFFIC SIGNAL
SUMMARY OF
QUANTITIES

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH 610
DIST	COUNTY		SHEET NO.
HOU	HARRIS		12

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SUMMARY OF SMALL SIGN QUANTITIES

LOCATION	644 7001	644 7065	644 7073	644 7096
	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	RELOCATE SM RD SN SUP&AM TY 10BWG	REMOVE SM RD SN SUP&AM	REPLACE SRS & S TY10BWG(1) (P)
	EA	EA	EA	EA
SHEET 1 OF 2	1	1		
SHEET 2 OF 2	4		1	1
PROJECT TOTALS	**5**	**1**	**1**	**1**

SUMMARY OF
SMALL SIGNS
QUANTITIES

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610
DIST	COUNTY		SHEET NO.
12	HARRIS		13

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SUMMARY OF PAVEMENT MARKING QUANTITIES

LOCATION	666 7036	666 7171	666 7184	666 7210	666 7244	666 7245	666 7246	666 7347	666 7352	666 7353	666 7405	666 7417	668 7090
	REFL PAV MRK TY I (W)24"(SLD)(100 MIL)	RE PM TY II (W) 4" (SLD)	RE PM TY II (W) 24" (SLD)	RE PM TY II (Y) 4" (SLD)	RE PM TY III (W)(24")(SLD)	RE PM TY III (Y)(4")(SLD)	RE PM TY III (Y)(4")(BRK)	PAVEMENT SLER 6"	PAVEMENT SLER 24"	PAVEMENT SLER (ARROW)	REFL PAV MRK TY I (W)4"(SLD)(100MIL)	REFL PAV MRK TY I (Y)4"(SLD)(100MIL)	PREFAB PM TY C (W)(24")(SLD)CONTRAST
	LF	LF	LF	LF	LF	LF	LF	LF	LF	EA	LF	LF	LF
SHEET 1 OF 4		722	0	0	192	100	57	800	400	2	722		400
SHEET 2 OF 4	15	532	15	44			177	0	0	4	532	44	
SHEET 3 OF 4		0	0	0			171	0	0	0			
SHEET 4 OF 4		0	0	0	227	240	129	0	0	0			
								0	0	0			
PROJECT TOTALS	**15**	**1254**	**15**	**44**	**419**	**340**	**534**	**800**	**400**	**6**	**1254**	**44**	**400**

LOCATION	668 7091	677 7001	677 7004	677 7006	677 7008	677 7009	678 7001	678 7002	678 7008	678 7009
	PREFAB PM TY C (W)(ARROW)	ELIM EXT PM & MRKS (4")	ELIM EXT PM & MRKS (8")	ELIM EXT PM & MRKS (12")	ELIM EXT PM & MRKS (24")	ELIM EXT PM & MRKS (ARROW)	PAV SURF PREP FOR MRK (4")	PAV SURF PREP FOR MRK (6")	PAV SURF PREP FOR MRK (24")	PAV SURF PREP FOR MRK (ARROW)
	EA	LF	LF	LF	LF	EA	LF	LF	LF	EA
SHEET 1 OF 4	2	416	8	538	678		879	800	592	2
SHEET 2 OF 4	4	380			15	2	753	0	15	4
SHEET 3 OF 4							171	0	0	0
SHEET 4 OF 4							369	0	227	0
PROJECT TOTALS	**6**	**796**	**8**	**538**	**693**	**2**	**2172**	**800**	**834**	**6**

SUMMARY OF PAVEMENT MARKING QUANTITIES

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610
DIST	COUNTY		SHEET NO.
12	HARRIS		14

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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

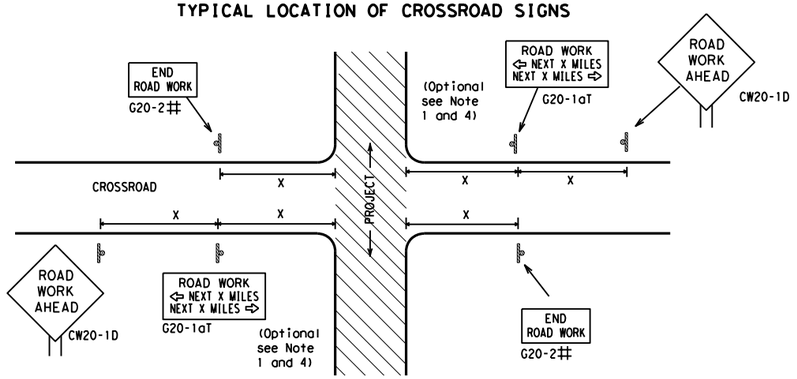
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	14	240	IH-610
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	12	HARRIS		15
5-10 5-21				

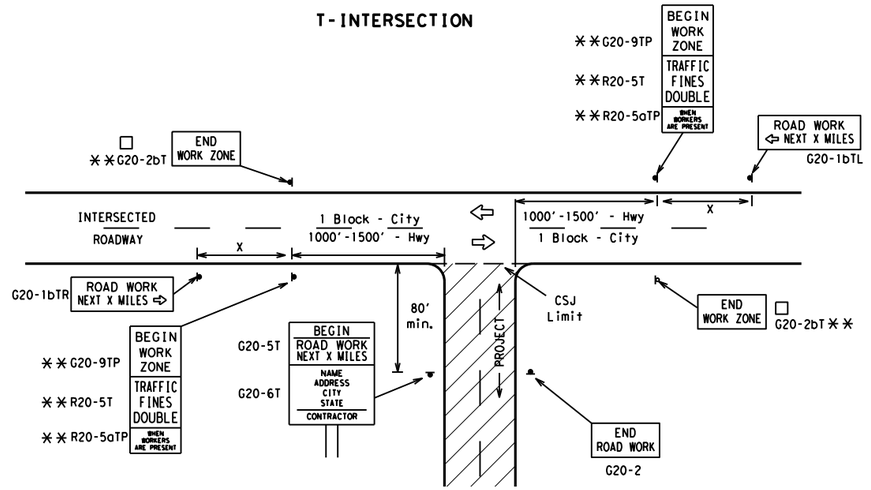
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

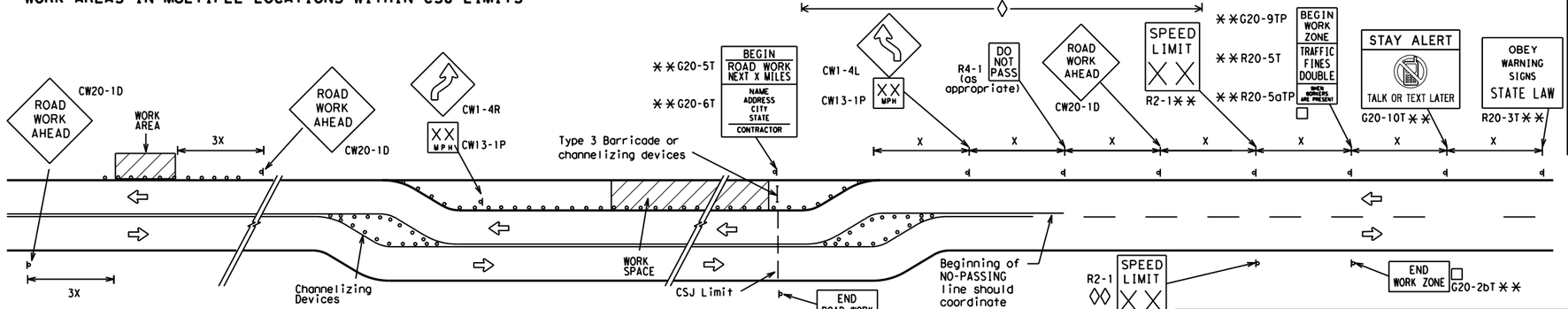
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

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

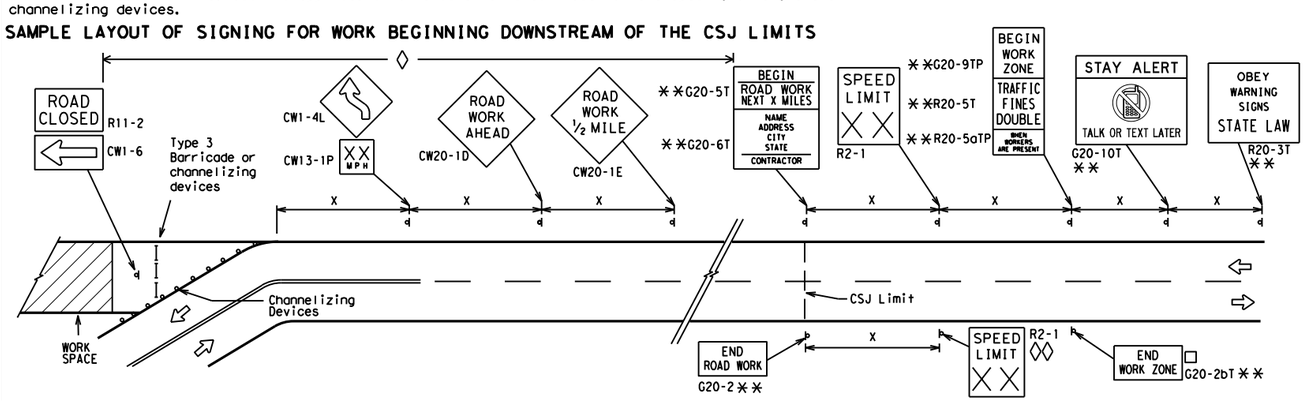
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING 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.

SHEET 2 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0271	14	240	IH-610
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	12	HARRIS		16

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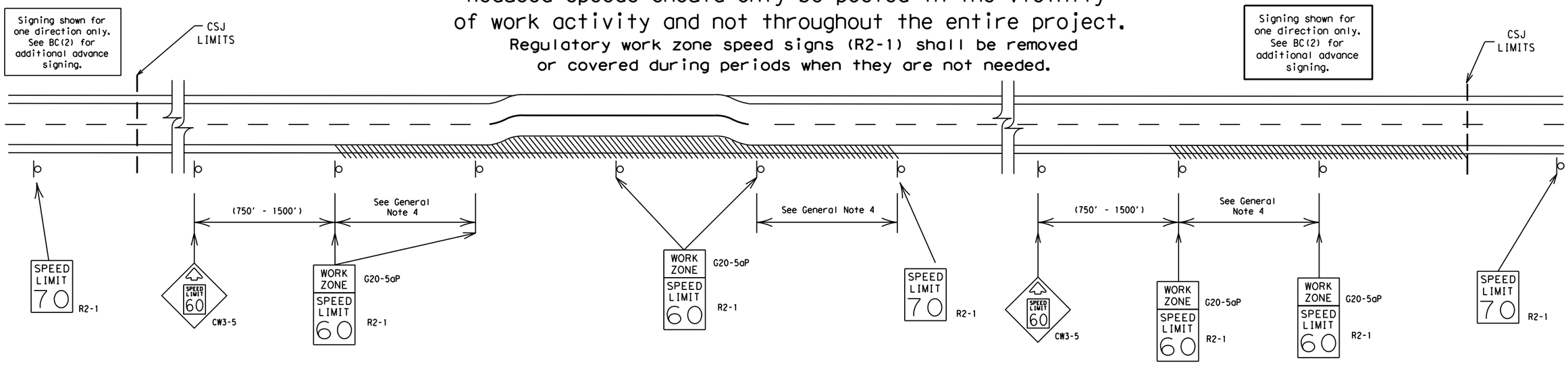
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

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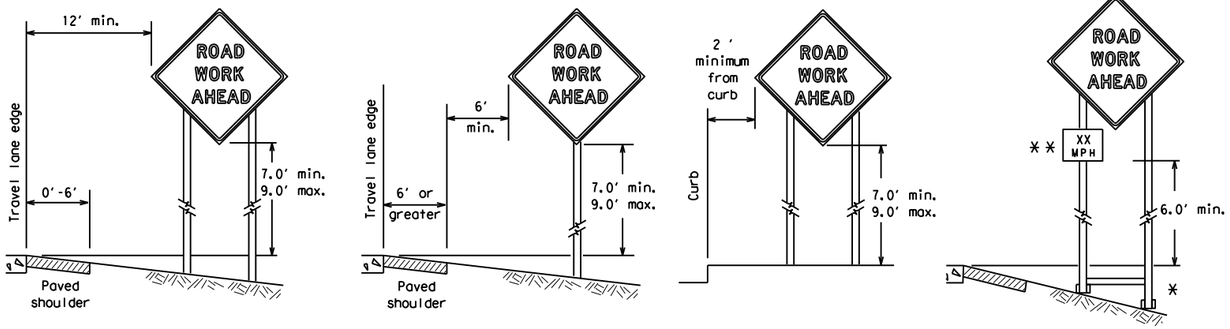
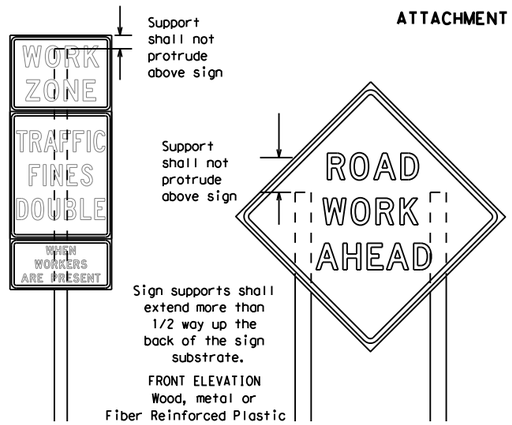
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

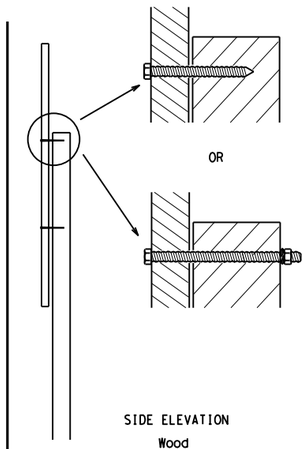


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





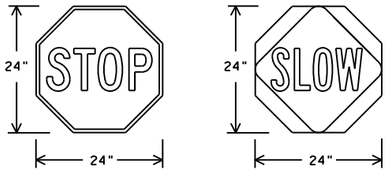
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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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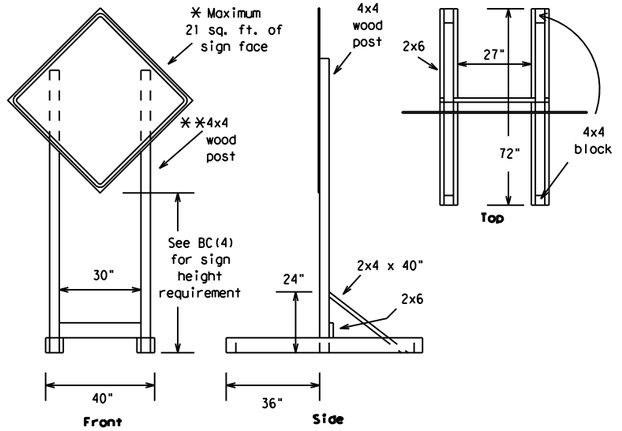
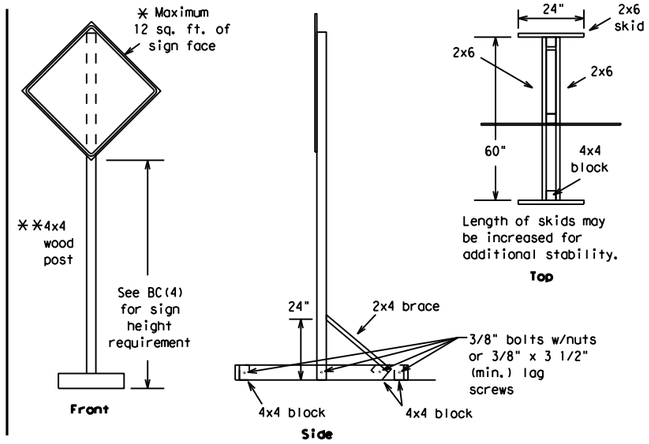
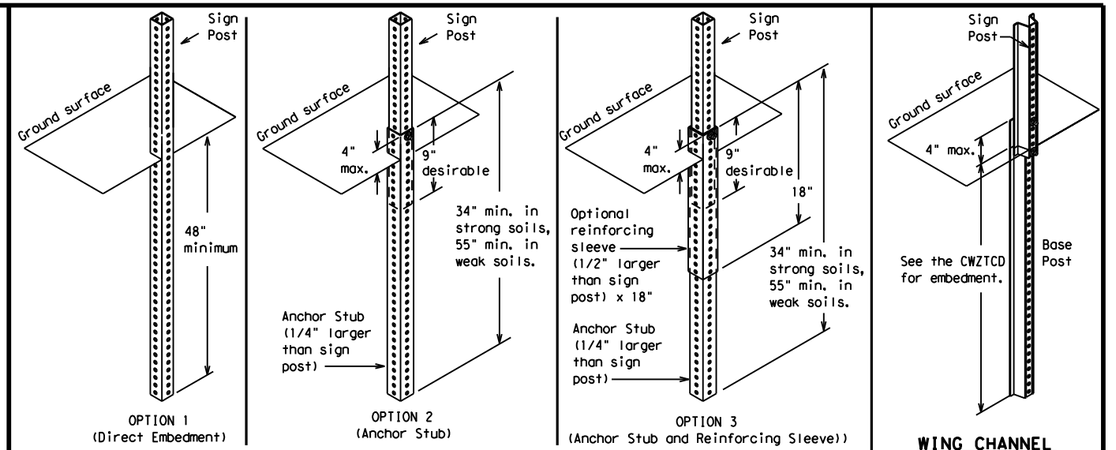




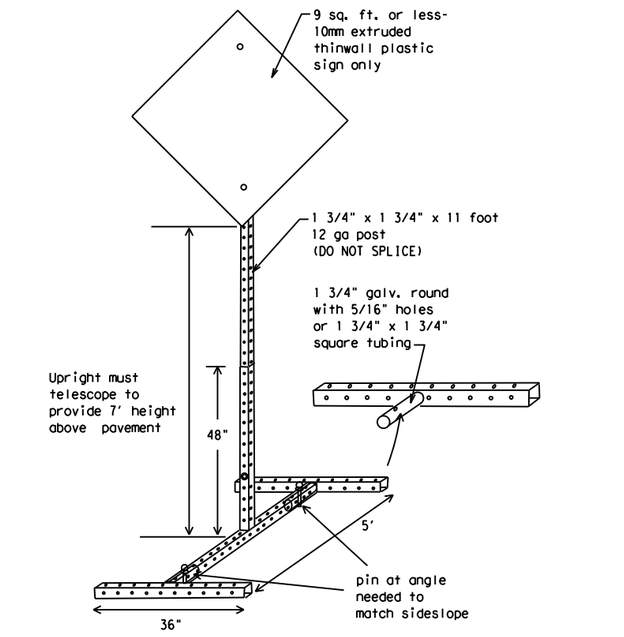
SKID MOUNTED WOOD SIGN SUPPORTS

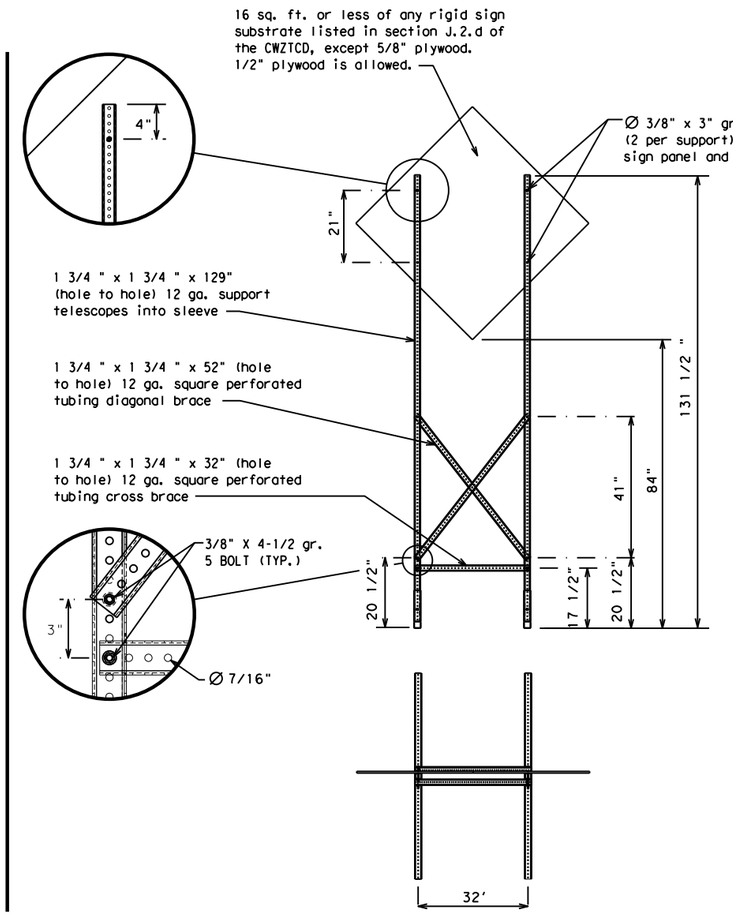
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

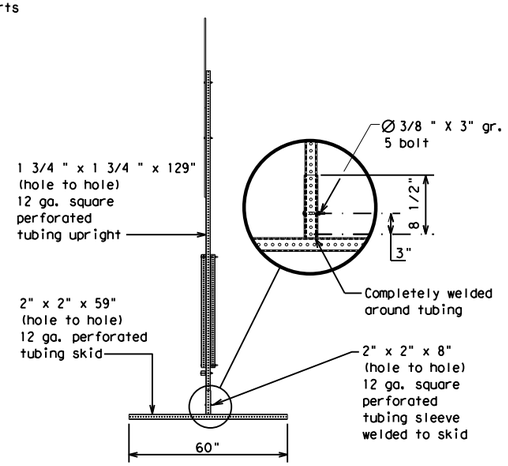


GROUND MOUNTED SIGN SUPPORTS

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.

SHEET 5 OF 12

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

** 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

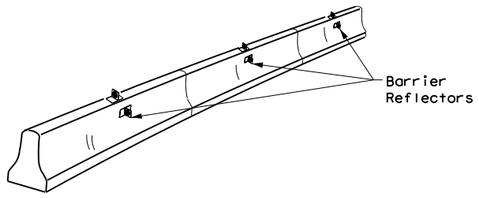
BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	14	240	IH-610
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	12	HARRIS		20

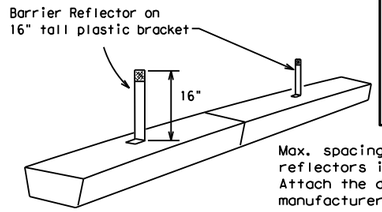
100

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.

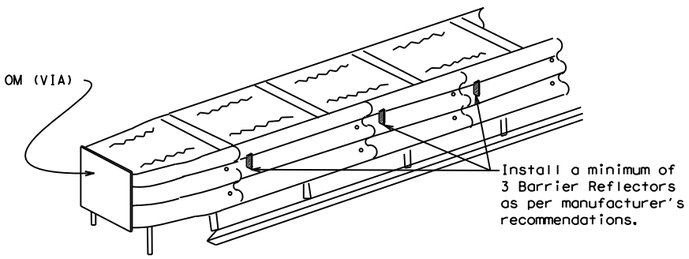


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

LOW PROFILE CONCRETE BARRIER (LPCB)

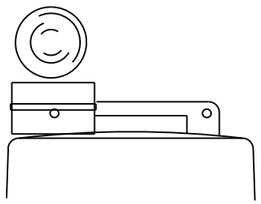


DELINEATION OF END TREATMENTS

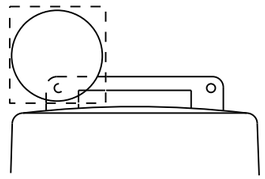
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

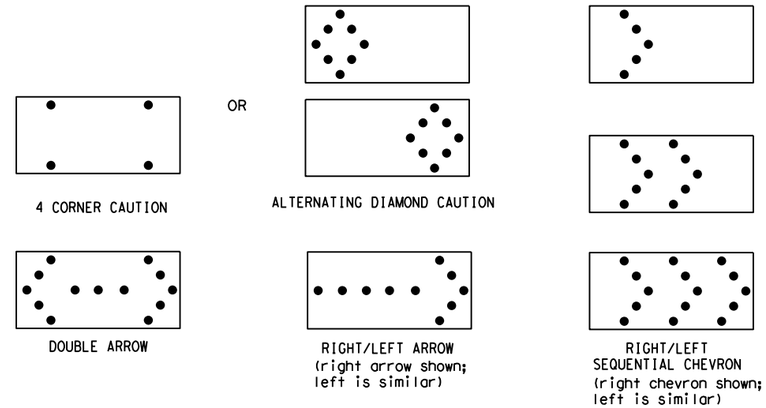
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

SHEET 7 OF 12

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	0271	14	240	IH-610
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	12	HARRIS		21

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

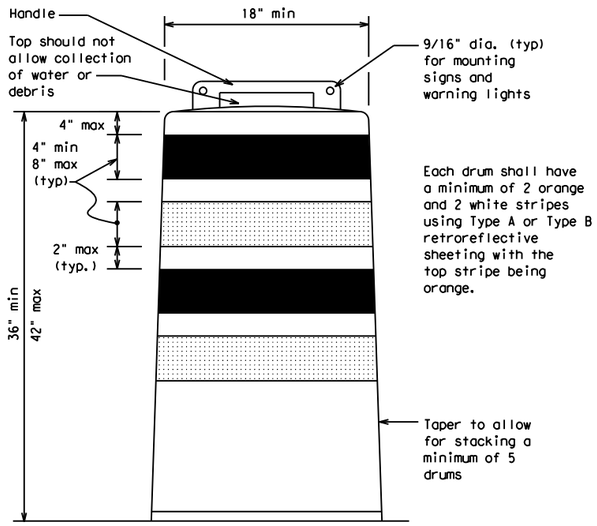
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

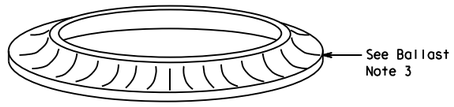
RETROREFLECTIVE SHEETING

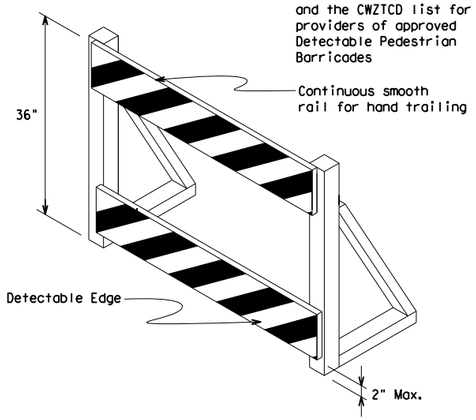
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

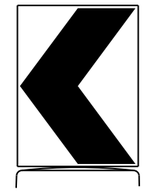




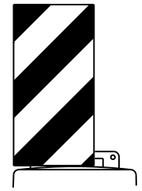


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

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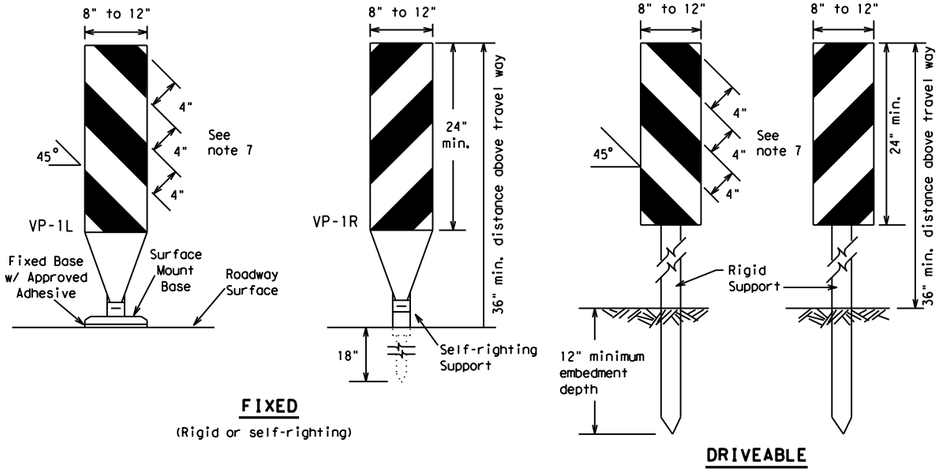
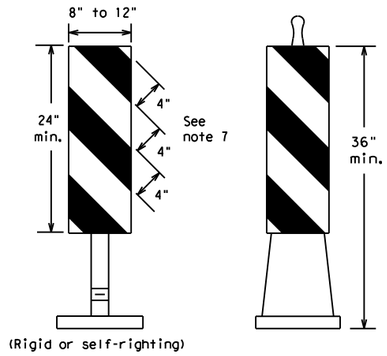


FIXED
(Rigid or self-righting)

DRIVEABLE

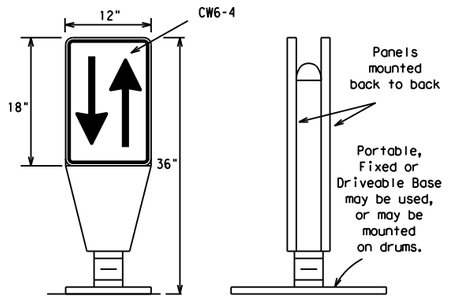


(Rigid or self-righting)

PORTABLE

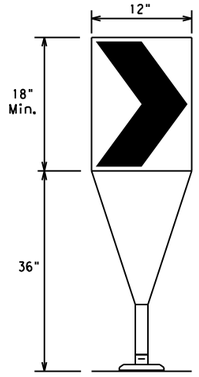
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



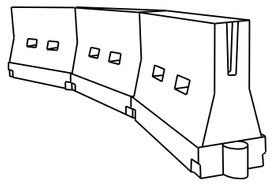
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

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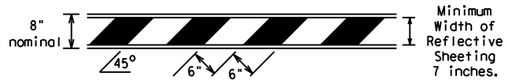
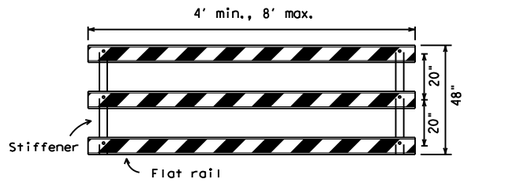
TYPE 3 BARRICADES

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.



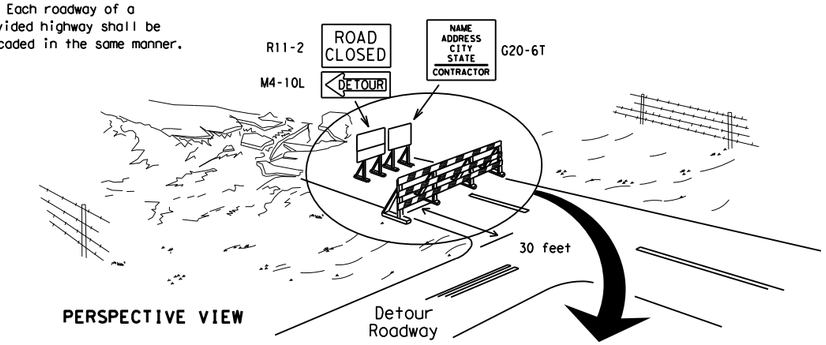
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

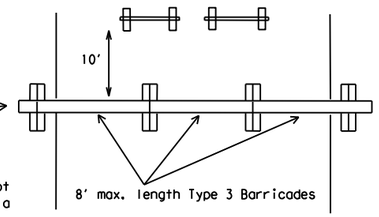
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

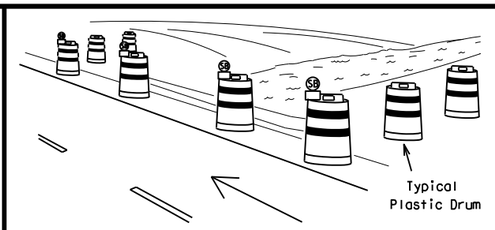
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

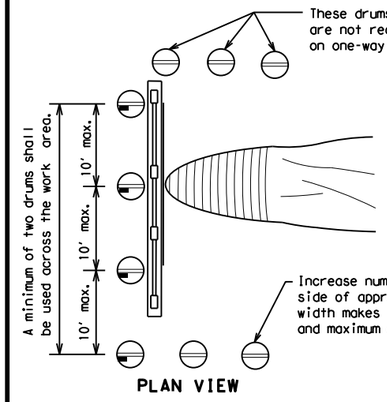
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

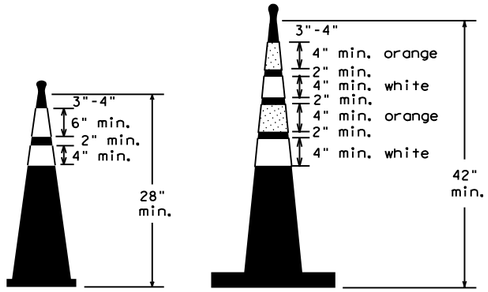
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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

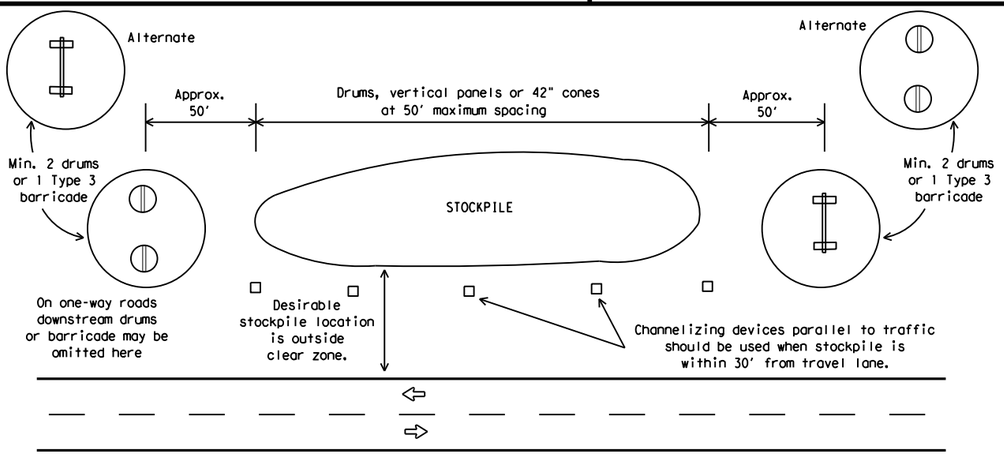
PLAN VIEW

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

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

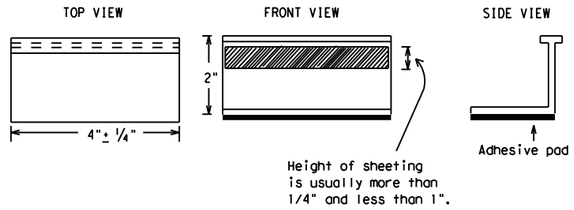
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

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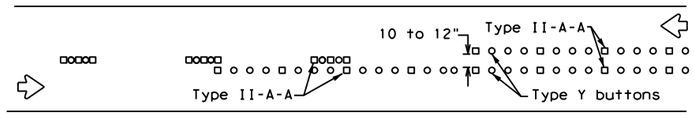
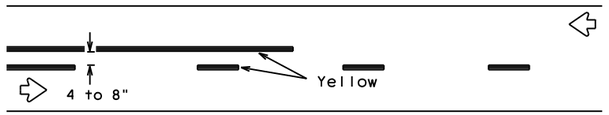
PAVEMENT MARKING PATTERNS

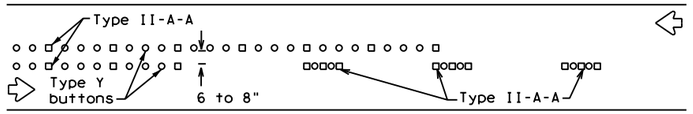
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



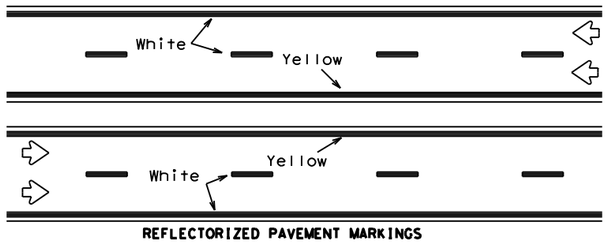
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



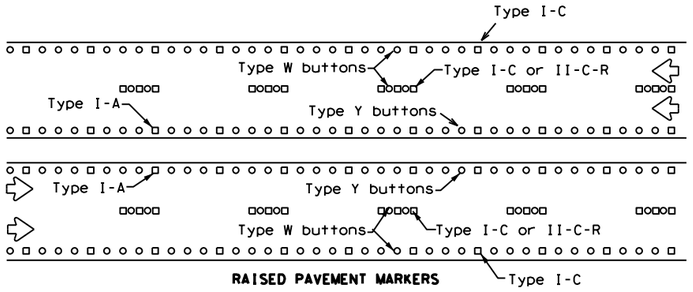
RAISED PAVEMENT MARKERS - PATTERN B

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



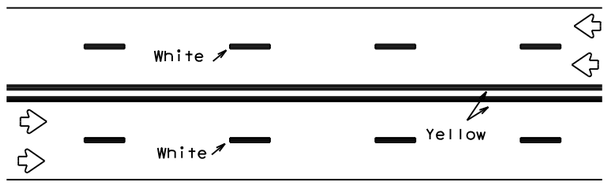
REFLECTORIZED PAVEMENT MARKINGS



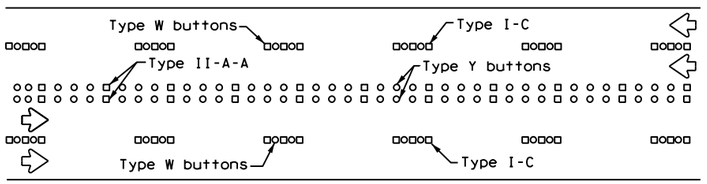
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



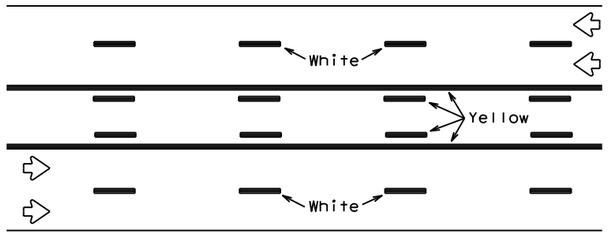
REFLECTORIZED PAVEMENT MARKINGS



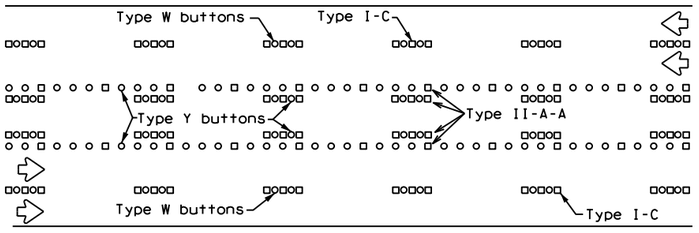
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS

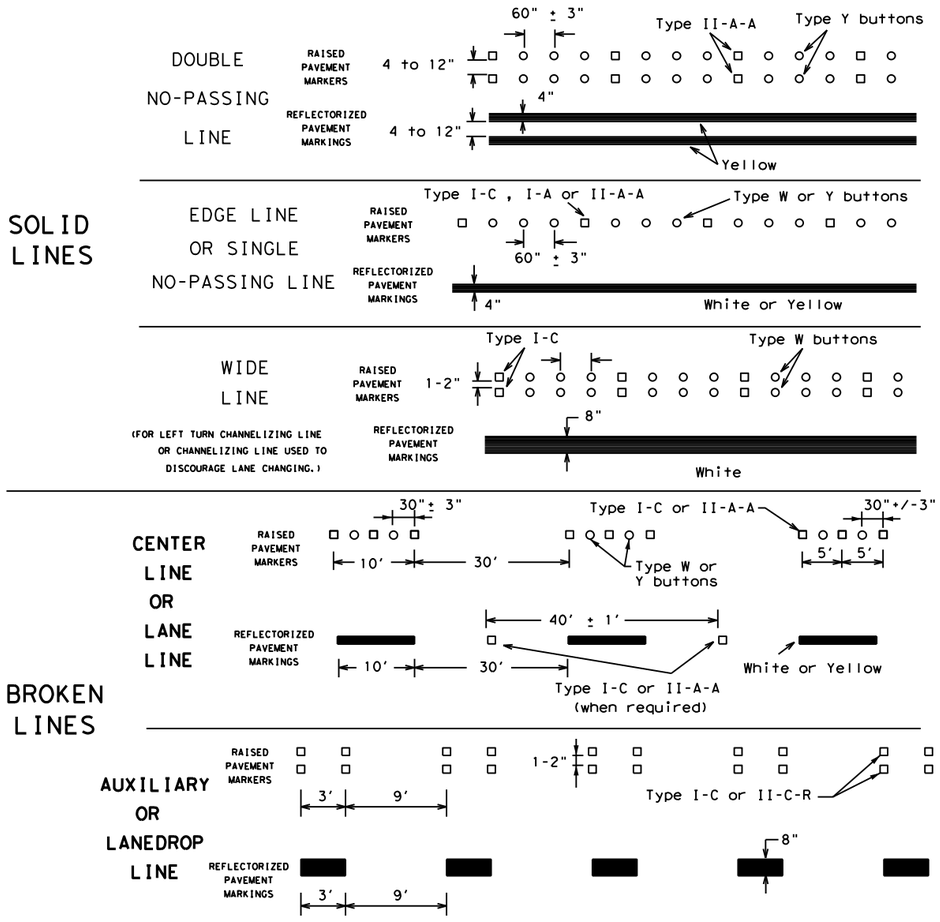


RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

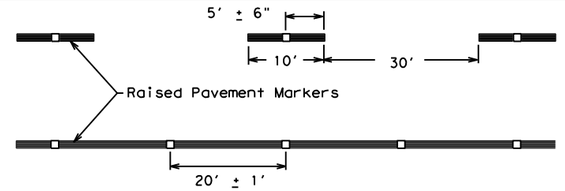
TWO-WAY LEFT TURN LANE

STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

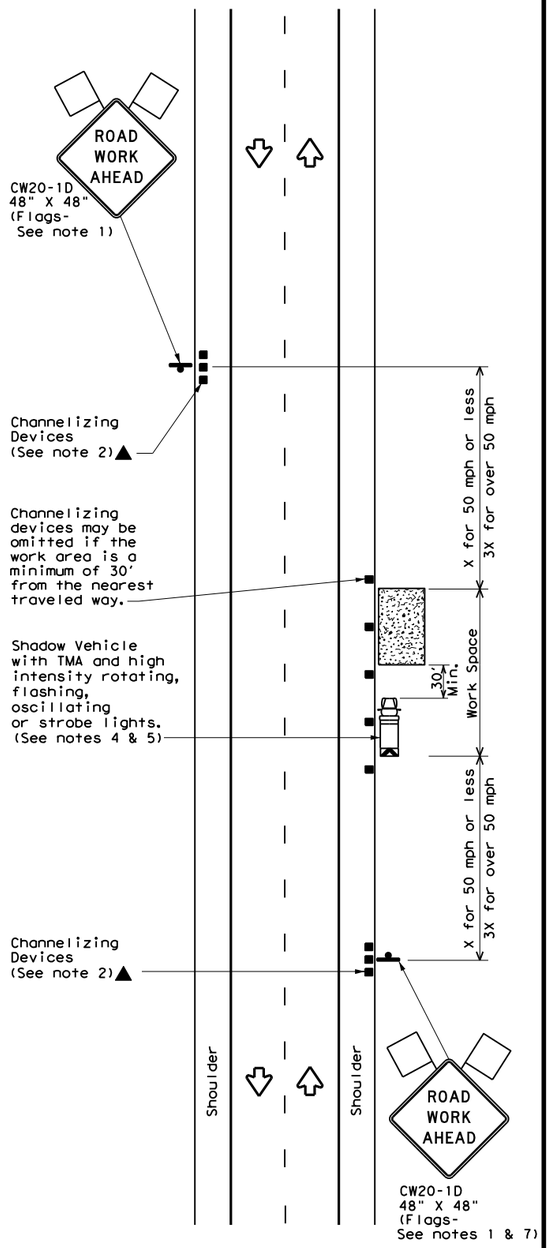
Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

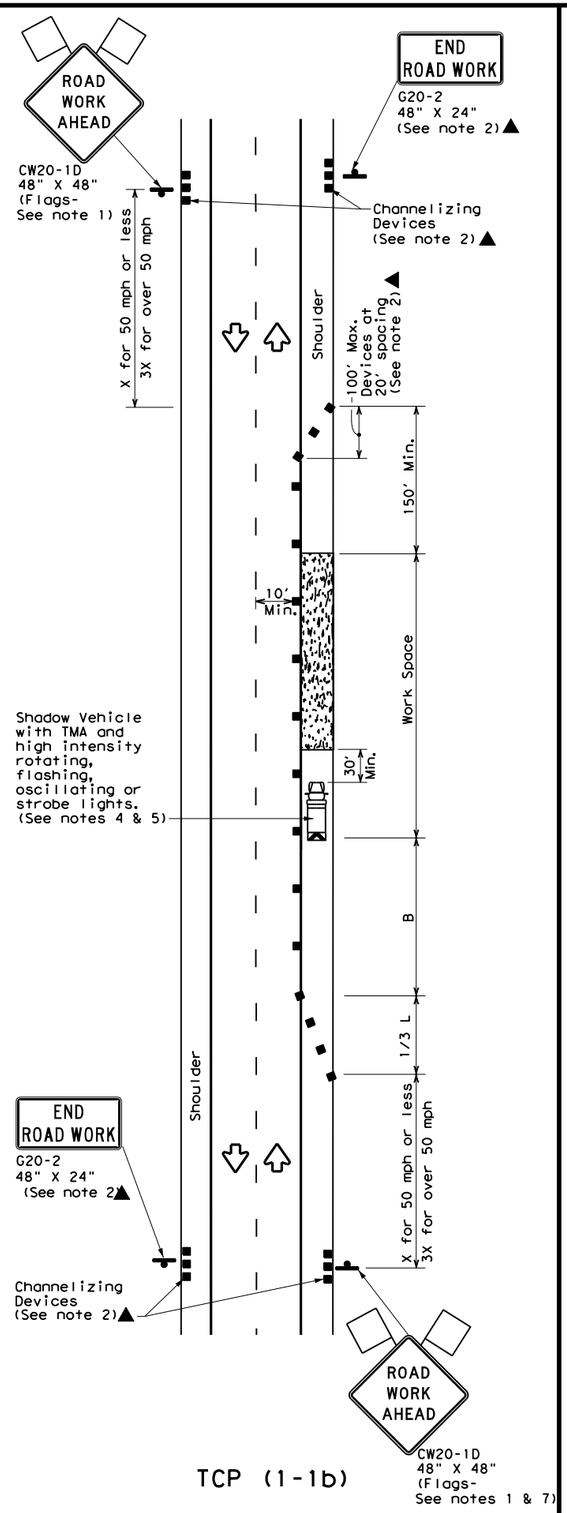
BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	0271	14	240	IH-610
	DIST	COUNTY		SHEET NO.
	12	HARRIS		26



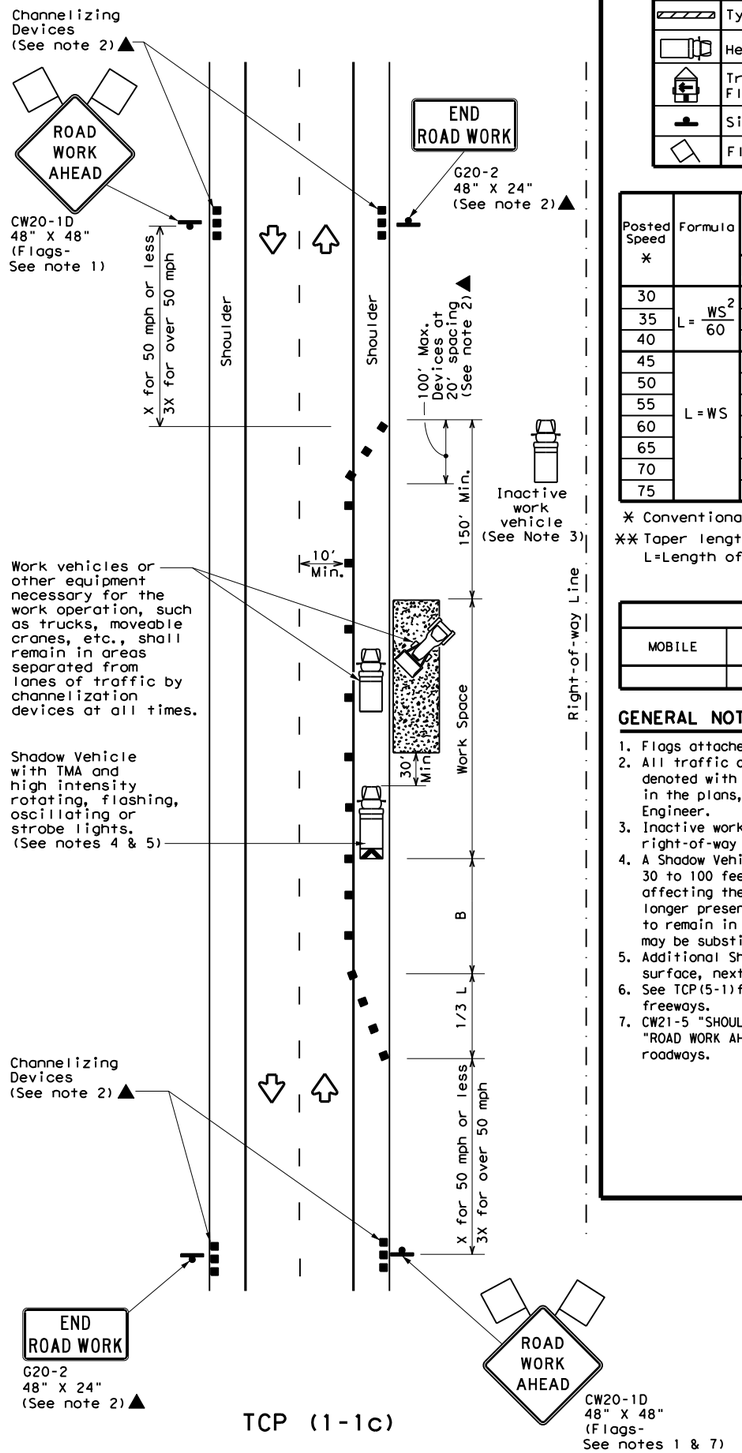
TCP (1-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (1-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (1-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(1-1)-18

FILE: tcp1-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	14	240	IH-610
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	12	HARRIS		27
1-97 2-18				

DATE: 3/11/2024 11:12:54 AM
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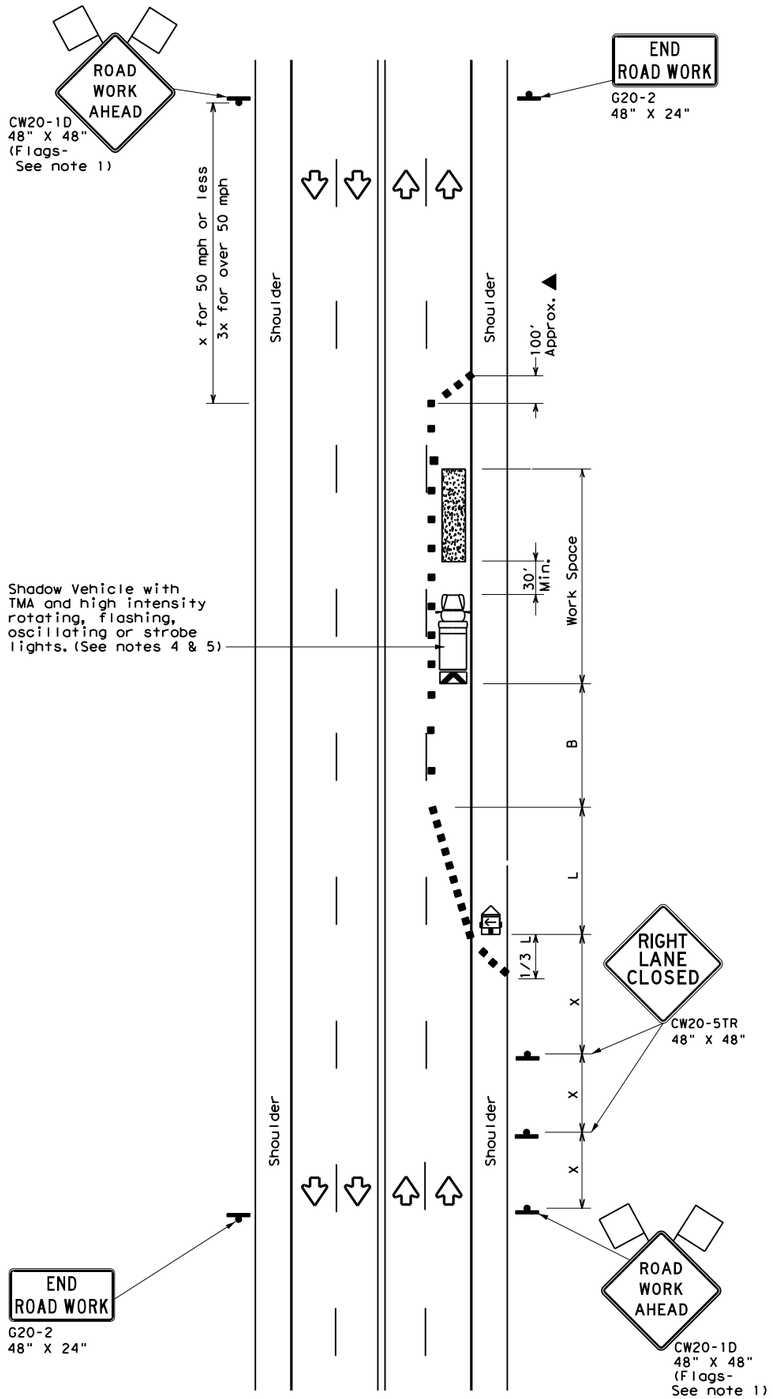
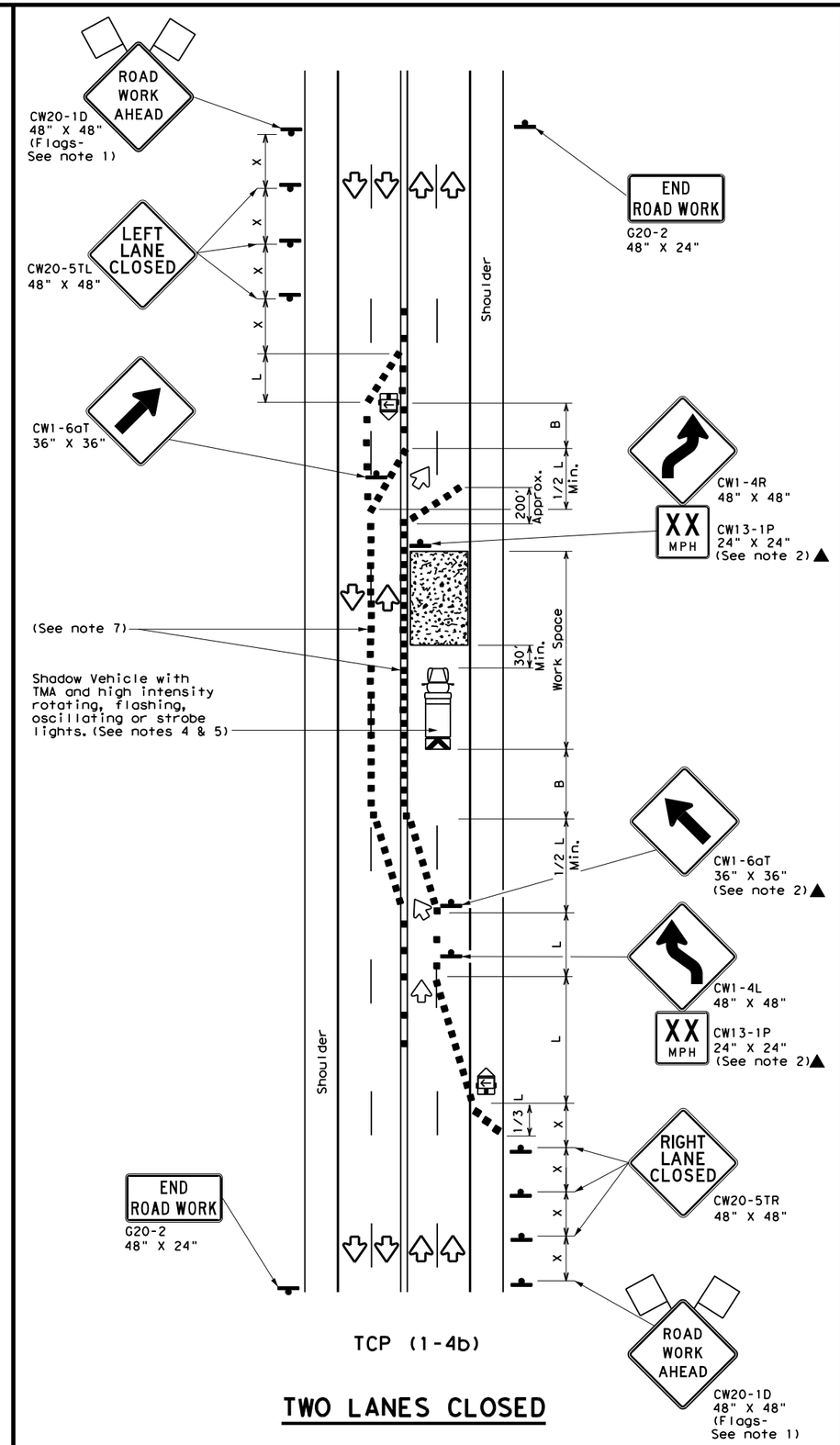
DATE: 3/11/2024 11:12:55 AM
FILE: C:\Engdata\output\plot\SUP\Standards\TCP\tcp1-4-18.dgn



TCP (1-4a)

ONE LANE CLOSED



TCP (1-4b)

TWO LANES CLOSED

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

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

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

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

GENERAL NOTES

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

TCP (1-4a)

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

TCP (1-4b)

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

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(1-4)-18

FILE: tcp1-4-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 2-12 1-97 2-18	0271	14	240	IH-610
	DIST	COUNTY		SHEET NO.
	12	HARRIS		28

DATE: 3/11/2024 11:12:56 AM
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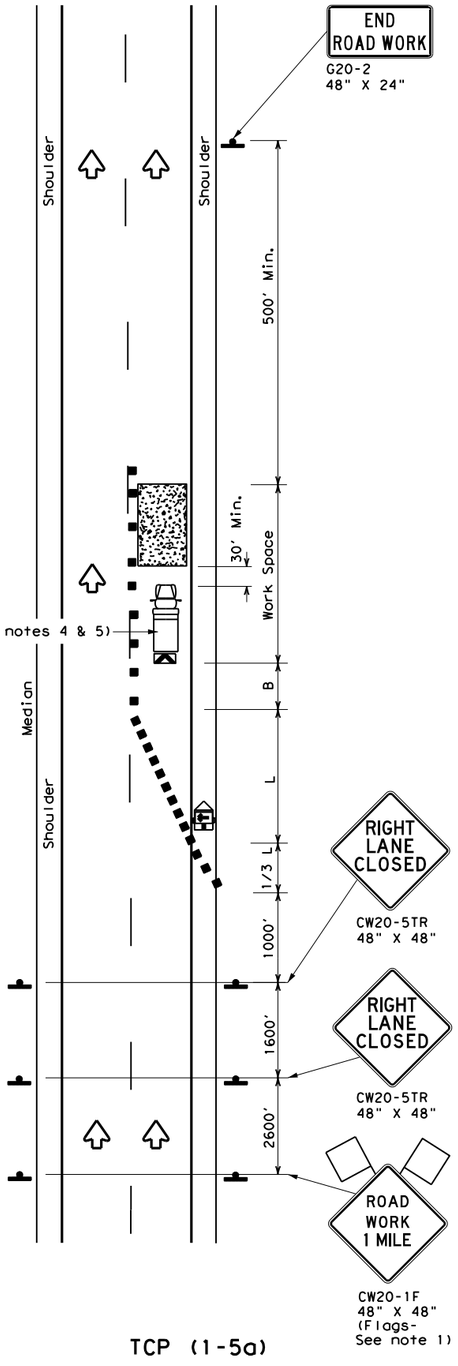
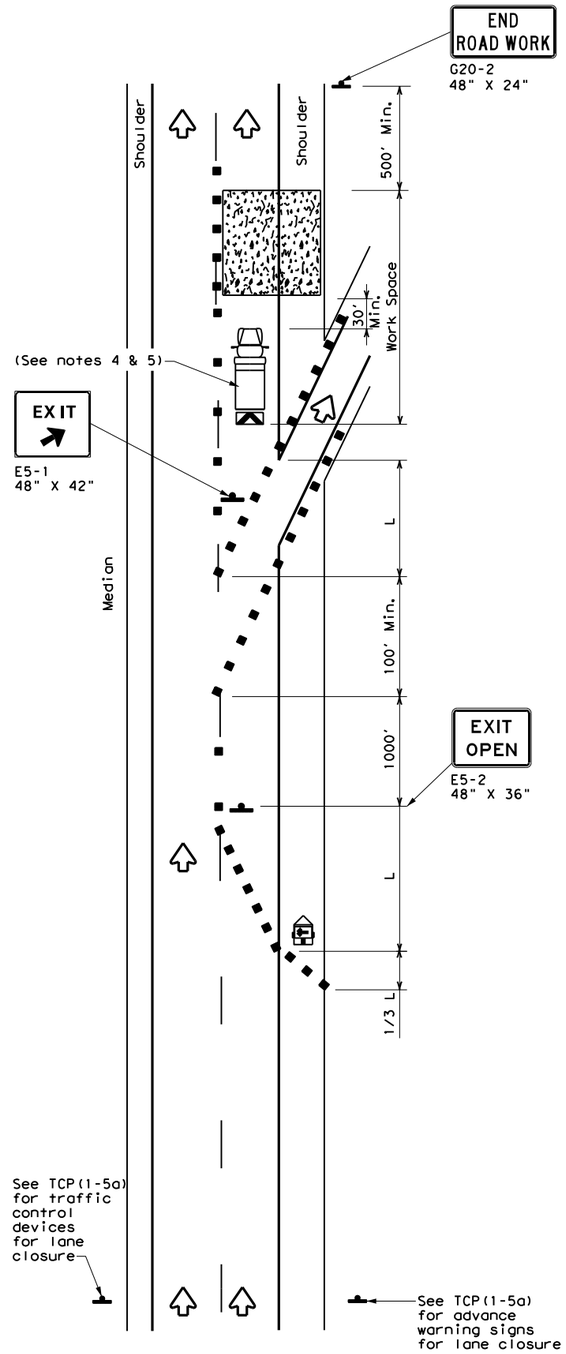


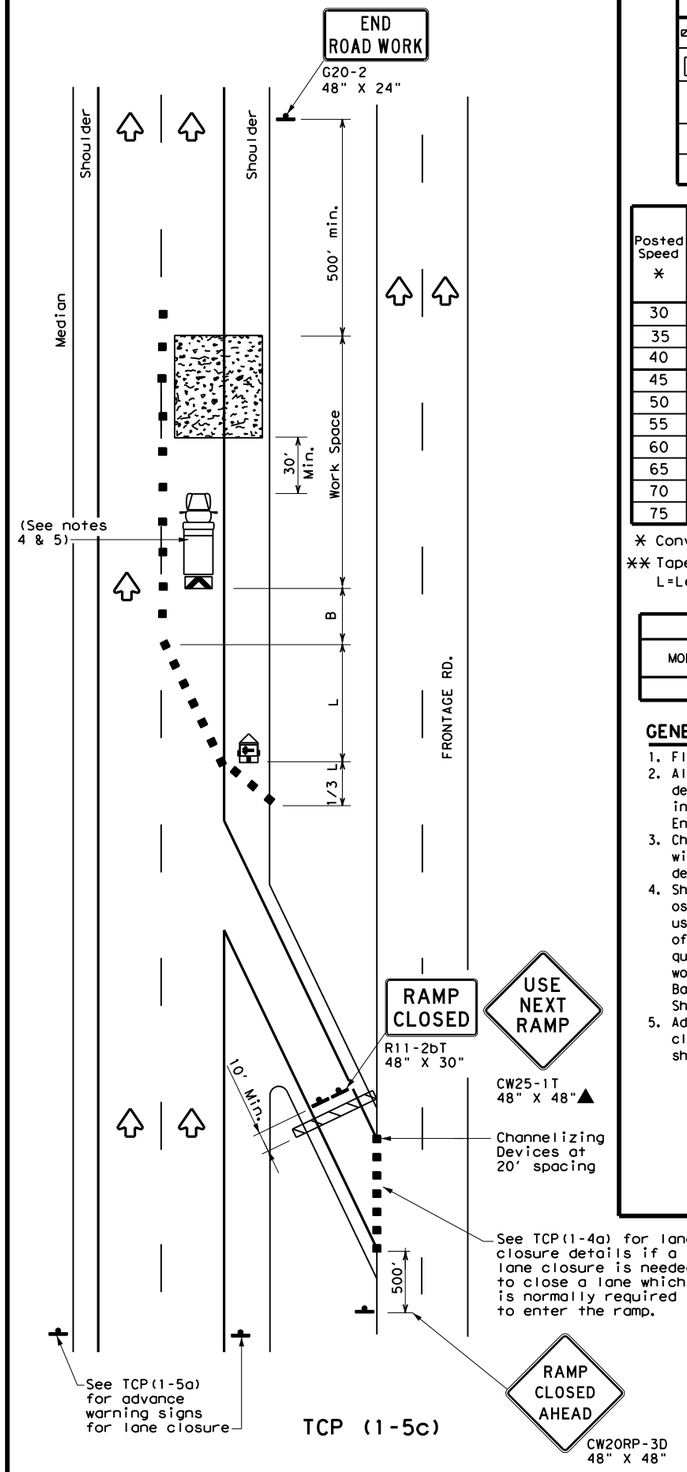
TCP (1-5a)

ONE LANE CLOSURE



TCP (1-5b)

LANE CLOSURE NEAR EXIT RAMPS



TCP (1-5c)

LANE CLOSURE NEAR ENTRANCE RAMPS

LEGEND

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

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

* Conventional Roads Only

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

TYPICAL USAGE

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES FOR DIVIDED HIGHWAYS

TCP(1-5)-18

FILE: tcp1-5-18.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-18	0271	14	240	IH-610
	DIST	COUNTY		SHEET NO.
	12	HARRIS		29

DATE: 3/11/2024 11:16:30 AM
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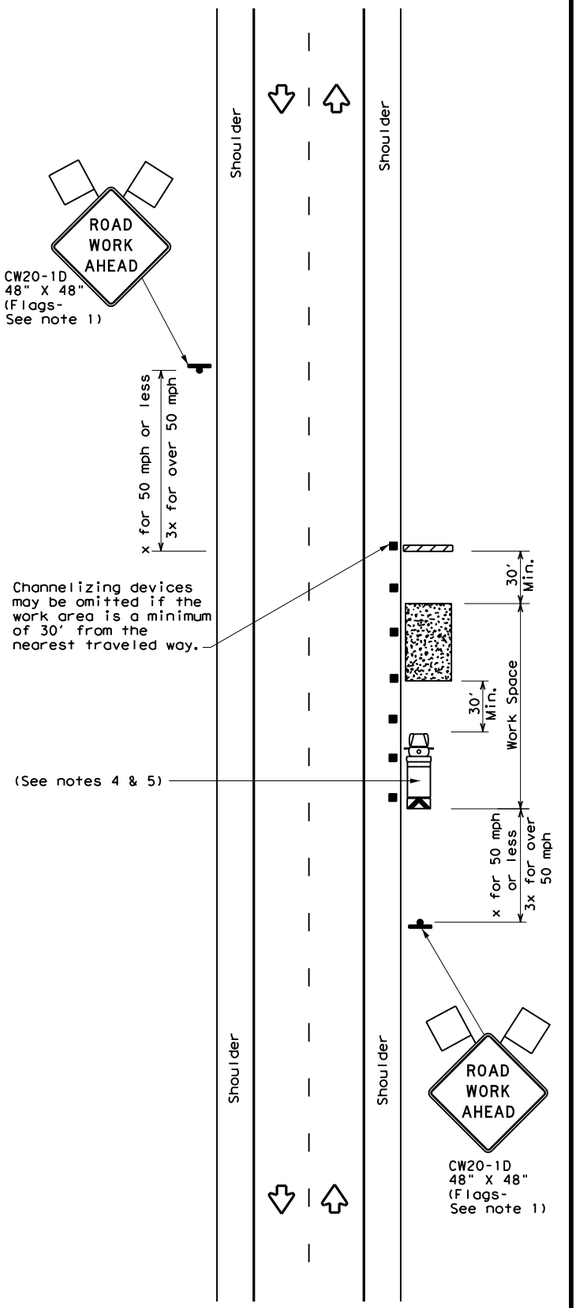
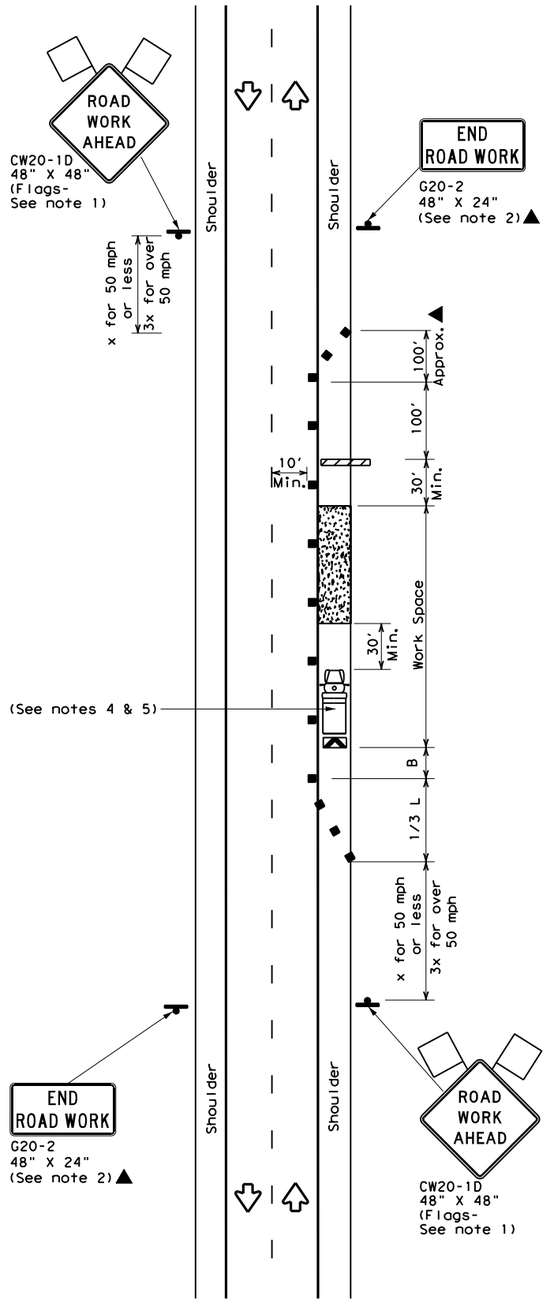


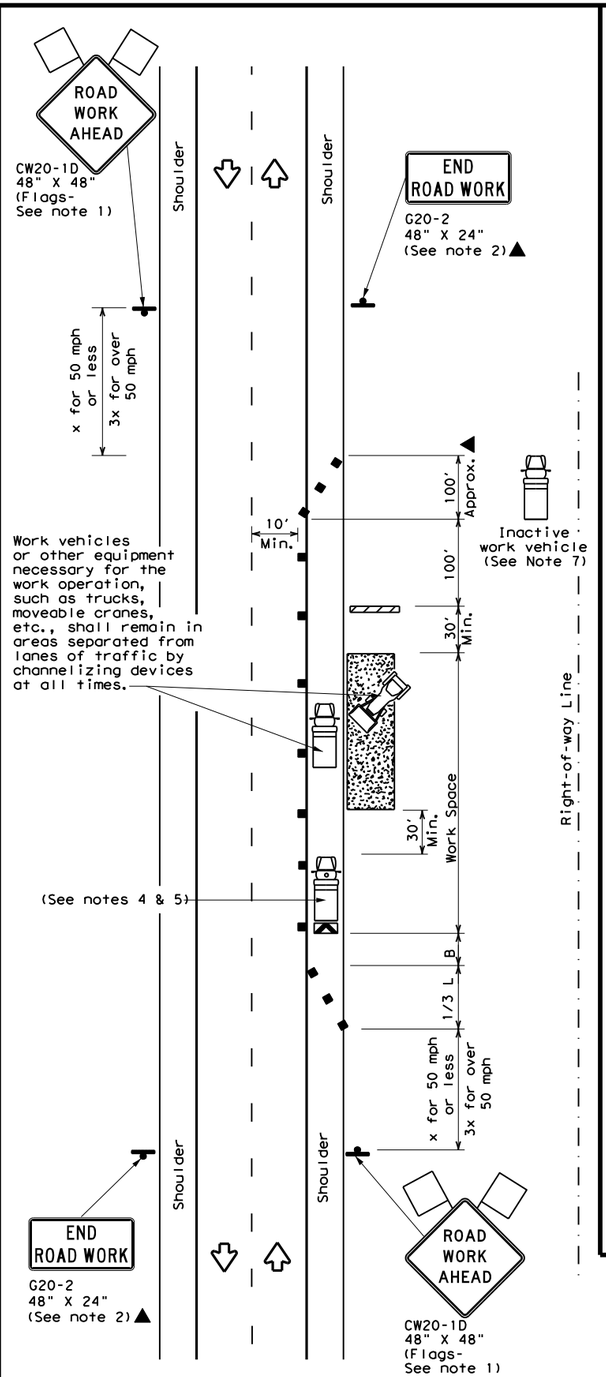
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

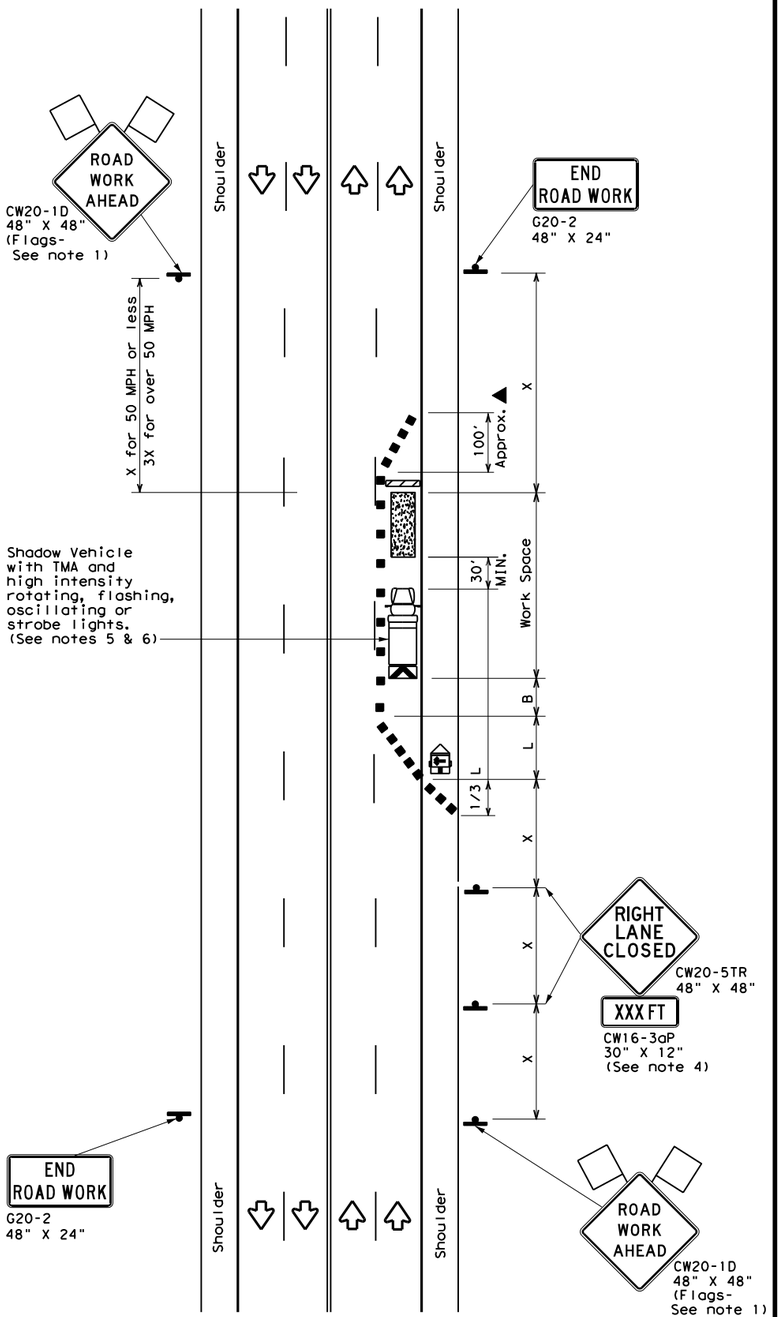
Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

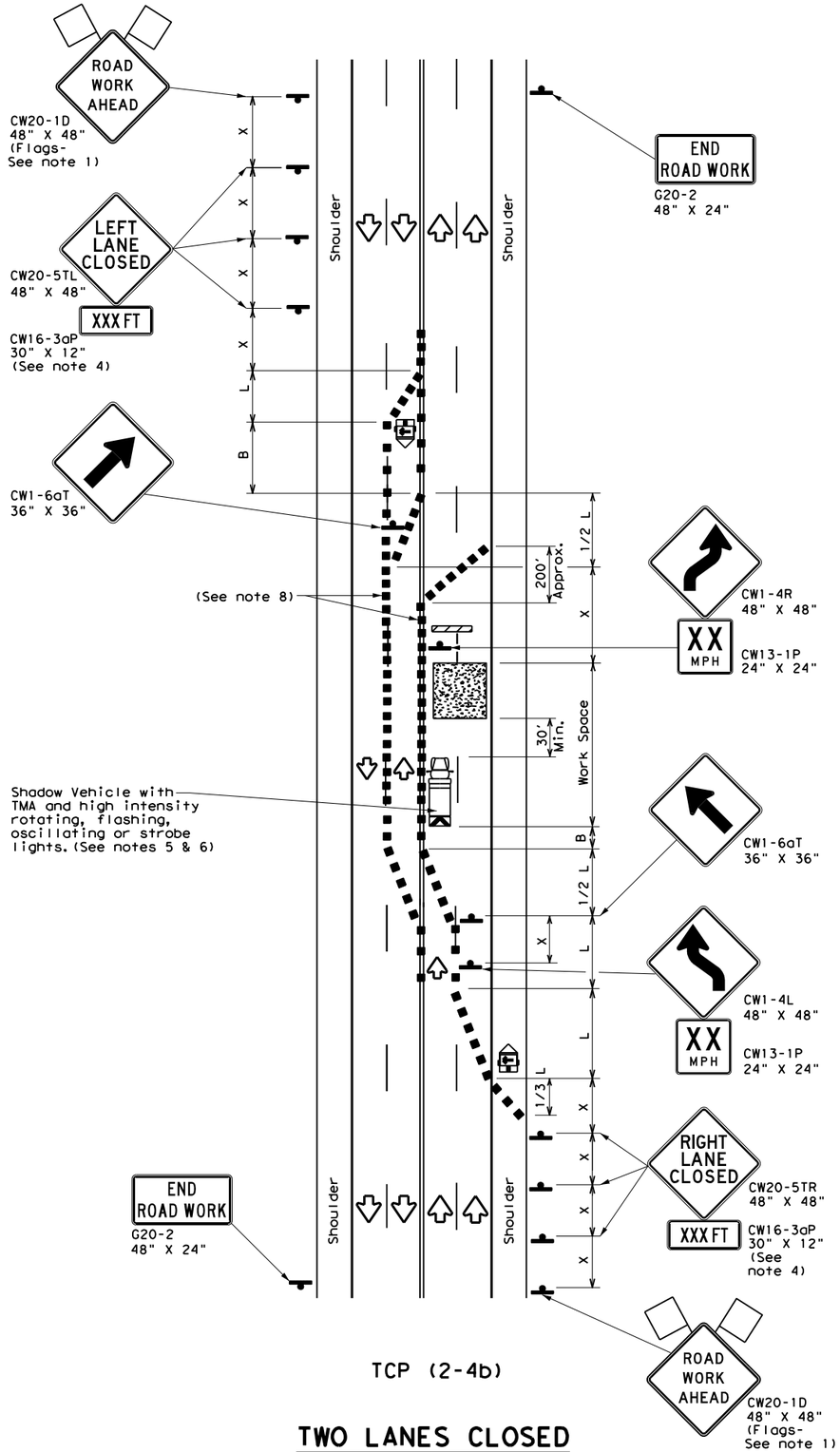
TCP(2-1)-18

FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	14	240	IH-610
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	12	HARRIS		30
1-97 2-18				



TCP (2-4a)

ONE LANE CLOSED



TCP (2-4b)

TWO LANES CLOSED

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

TCP (2-4a)

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

TCP (2-4b)

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

Texas Department of Transportation | *Traffic Operations Division Standard*

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(2-4)-18

FILE: tcp2-4-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	14	240	IH-610
8-95 3-03	DIST	COUNTY		SHEET NO.
1-97 2-12	12	HARRIS		31
4-98 2-18				

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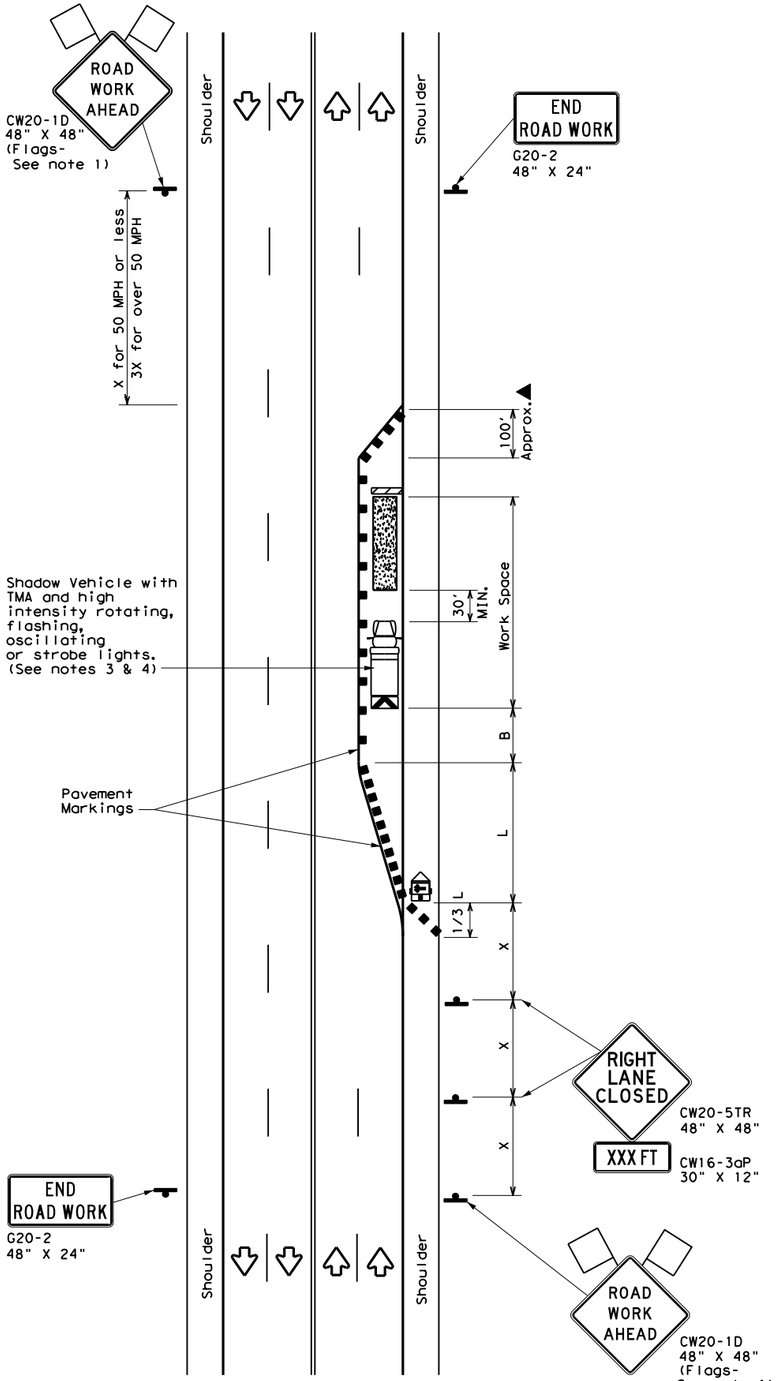
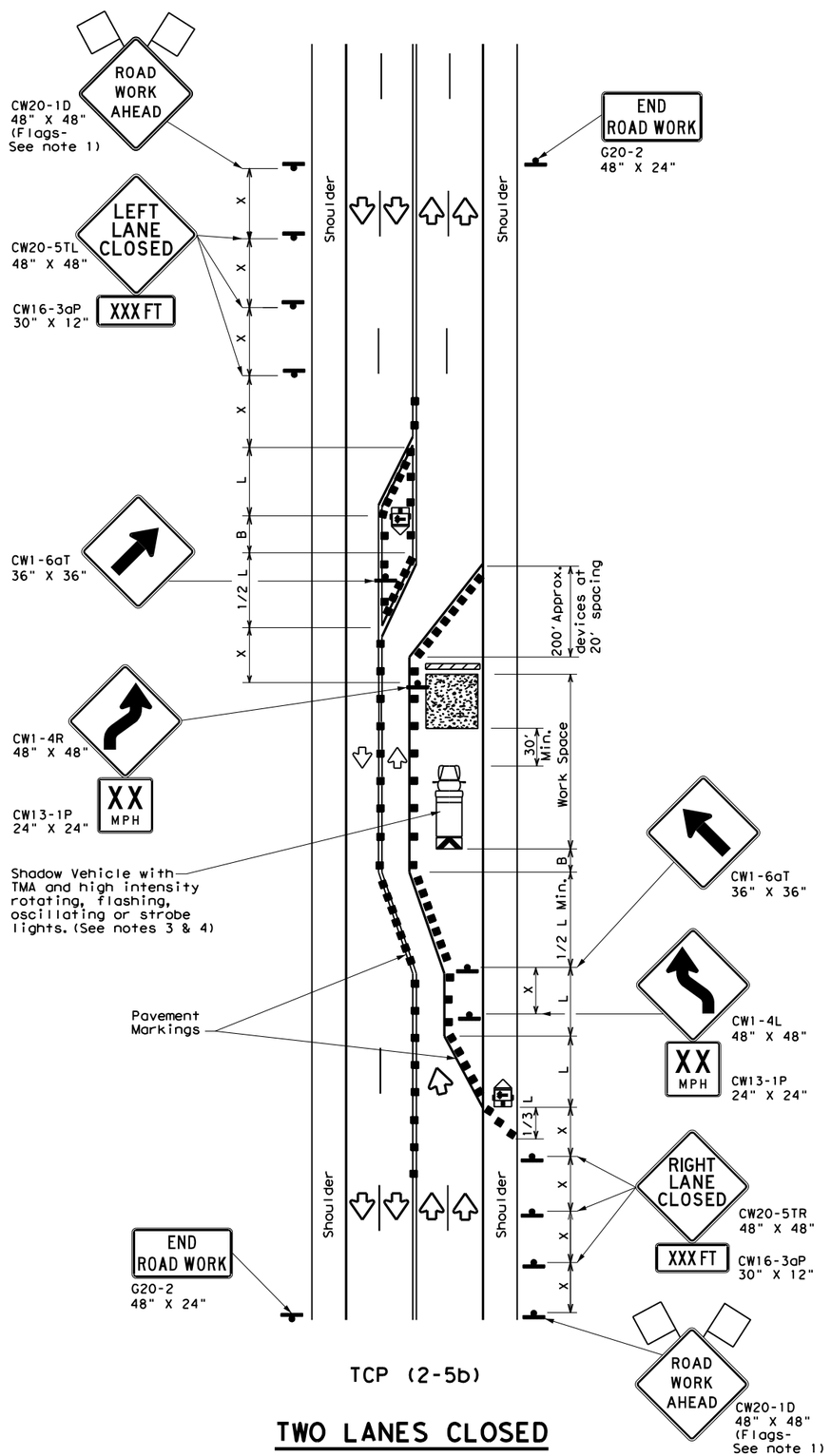


TCP (2-5a)

ONE LANE CLOSED



TCP (2-5b)

TWO LANES CLOSED

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

TCP (2-5a)

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

TCP (2-5b)

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LONG TERM LANE CLOSURES MULTILANE CONVENTIONAL RDS.

TCP(2-5)-18

FILE: tcp2-5-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 2-12	0271	14	240	IH-610
1-97 3-03	DIST	COUNTY		SHEET NO.
4-98 2-18	12	HARRIS		32

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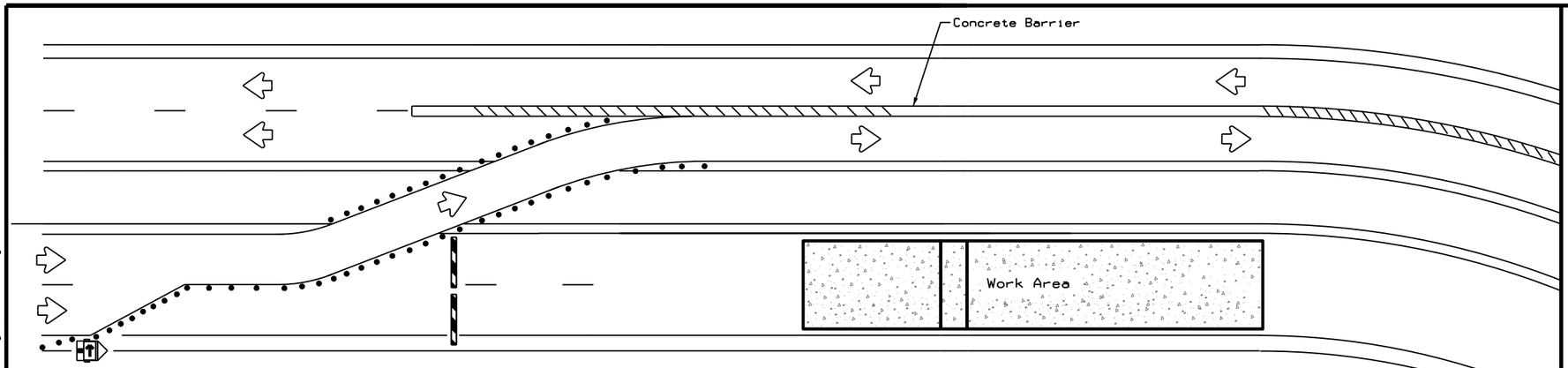


NOTES:

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

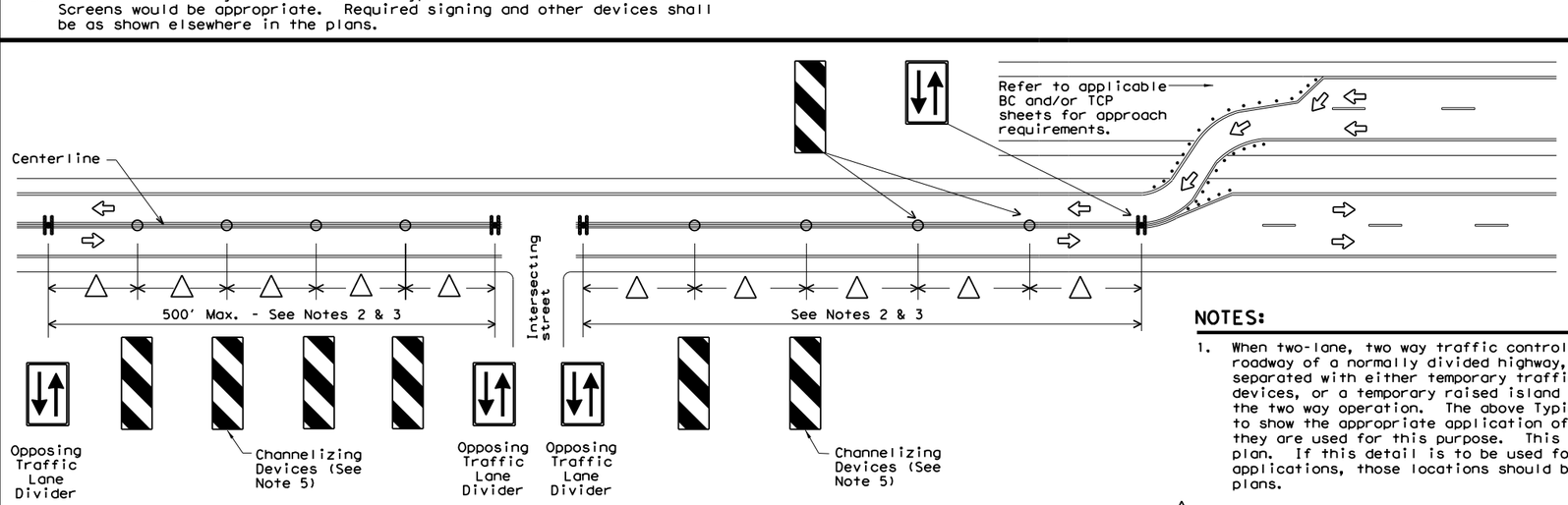
BARRIER DELINEATION WITH MODULAR GLARE SCREENS

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

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

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

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



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

NOTES:

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN TYPICAL DETAILS

WZ(TD)-17

FILE: wztd-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-98 2-17 3-03 7-13	0271	14	240	IH-610
	DIST	COUNTY		SHEET NO.
	12	HARRIS		33

110

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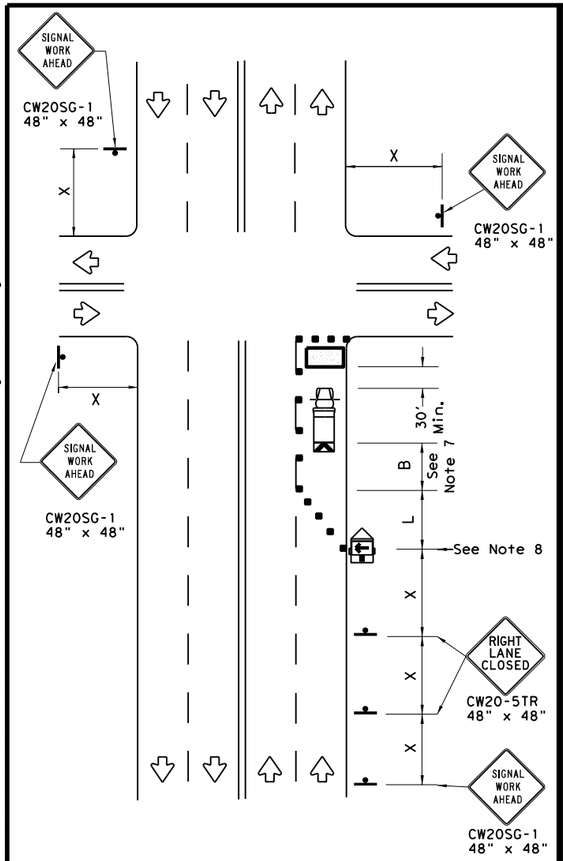
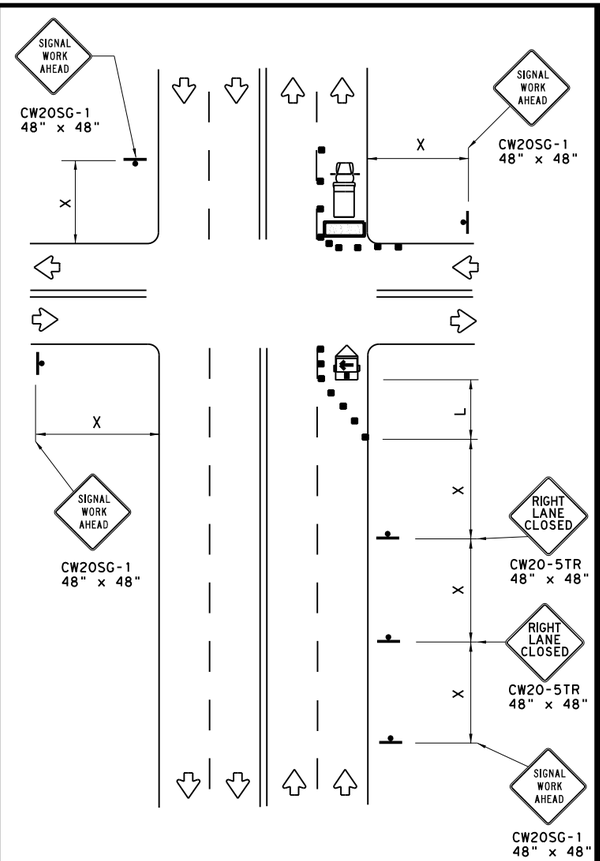


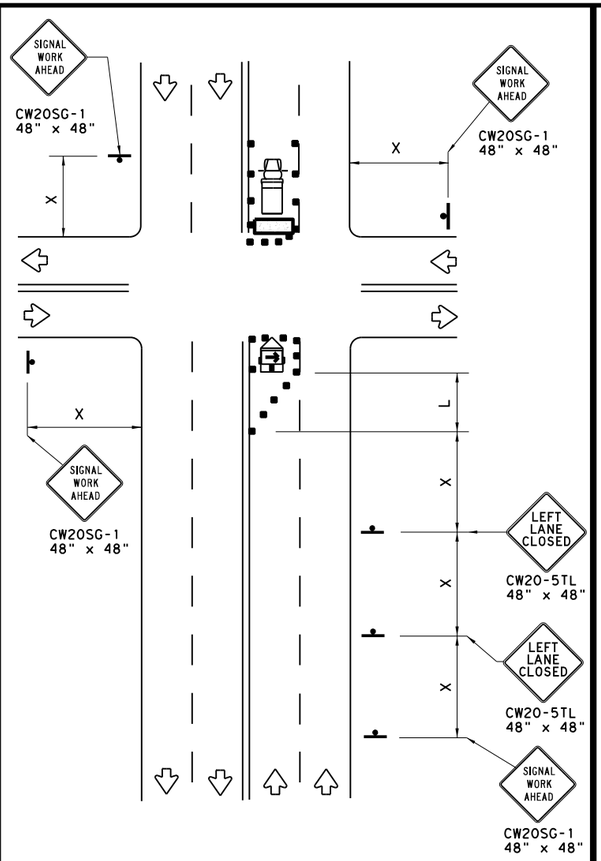
NEAR SIDE LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY



FAR SIDE RIGHT LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY



FAR SIDE LEFT LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY

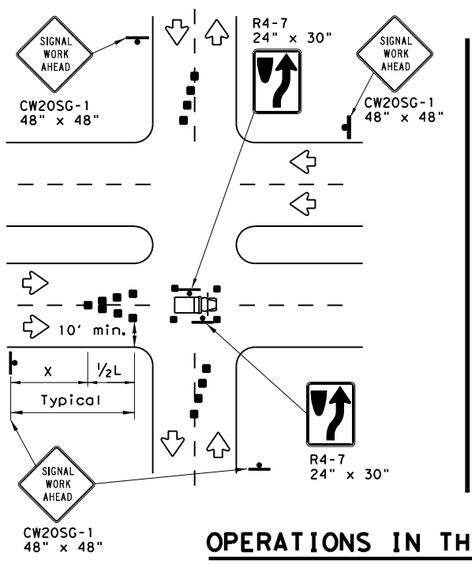
LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

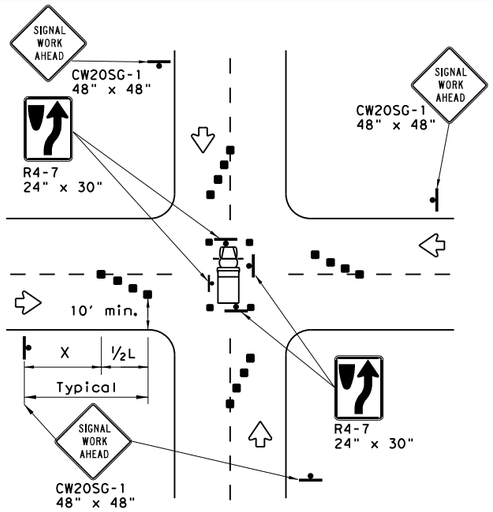
Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35	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

* Conventional Roads Only

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

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





OPERATIONS IN THE INTERSECTION

SHORT DURATION

GENERAL NOTES

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

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC SIGNAL WORK TYPICAL DETAILS

WZ(BTS-1)-13

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©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
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2-98 10-99 7-13	DIST	COUNTY		SHEET NO.
4-98 3-03	12	HARRIS		34

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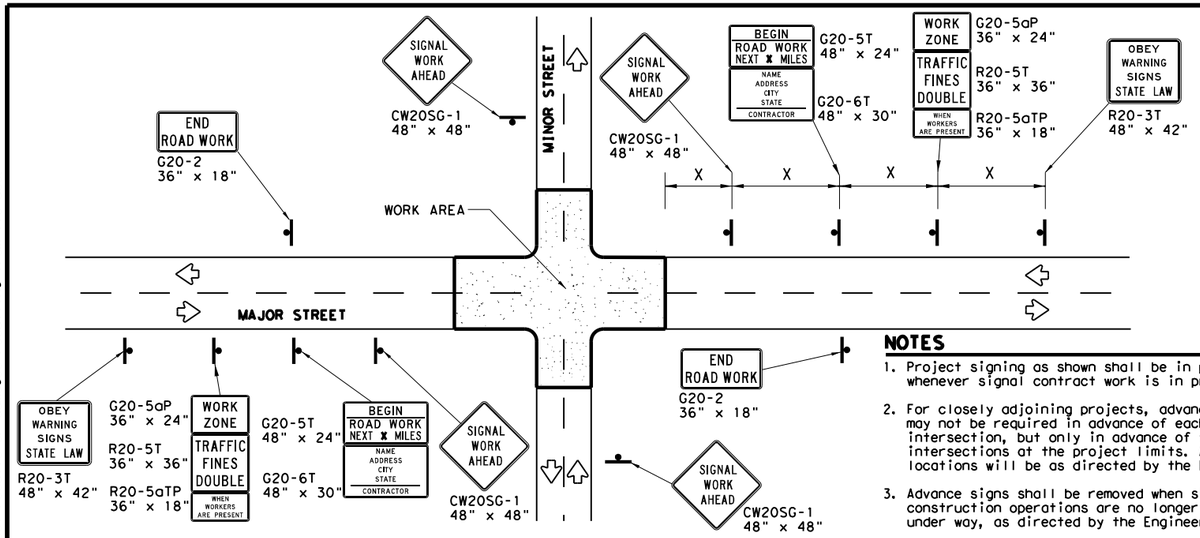


TYPICAL ADVANCE SIGNAL PROJECT SIGNING

FOR LONG TERM and INTERMEDIATE-TERM STATIONARY WORK OPERATIONS

NOTES

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

DURATION OF WORK

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

SIGN MOUNTING HEIGHT

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

REMOVING OR COVERING

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

REFLECTIVE SHEETING

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

SIGN SUPPORT WEIGHTS

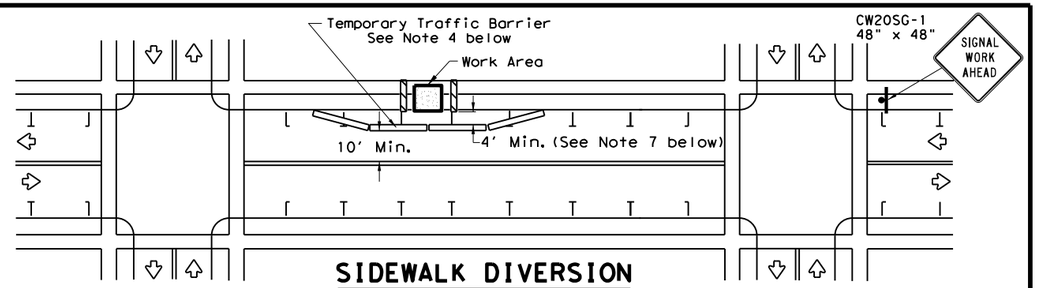
1. Weights used to keep signs from turning over should be sandbags filled with dry, cohesionless material.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects will not be permitted for use as sign support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

LEGEND	
	Sign
	Channelizing Devices
	Type 3 Barricade

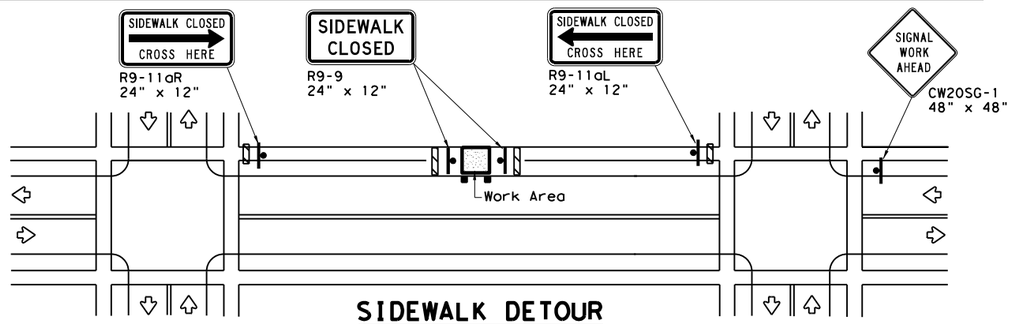
DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN FACE MATERIALS	DMS-8300
FLEXIBLE ROLL-UP REFLECTIVE SIGNS	DMS-8310

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

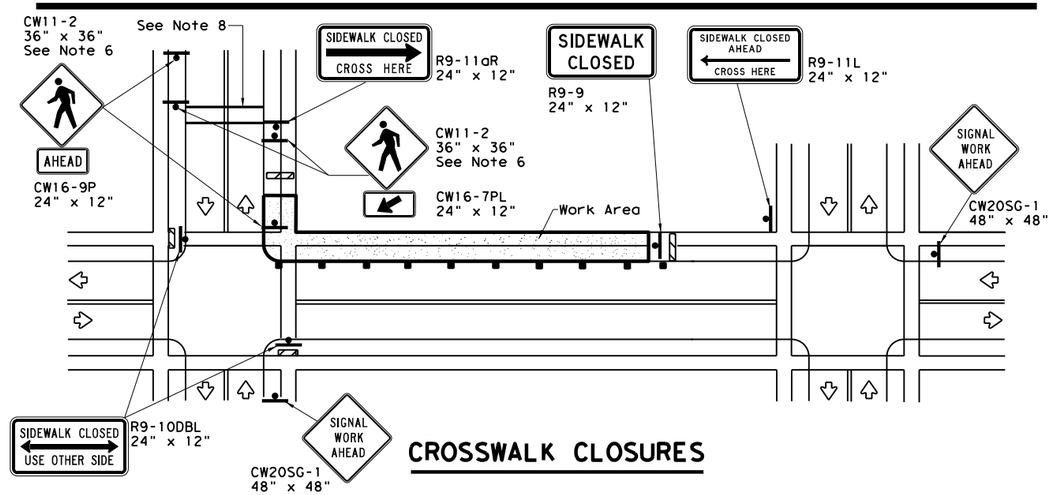
Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found at the following web address:
http://www.txdot.gov/txdot_library/publications/construction.htm



SIDEWALK DIVERSION



SIDEWALK DETOUR



CROSSWALK CLOSURES

PEDESTRIAN CONTROL

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

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC SIGNAL WORK BARRICADES AND SIGNS

WZ(BTS-2)-13

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© TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
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2-98 10-99 7-13	DIST	COUNTY		SHEET NO.
4-98 3-03	12	HARRIS		35

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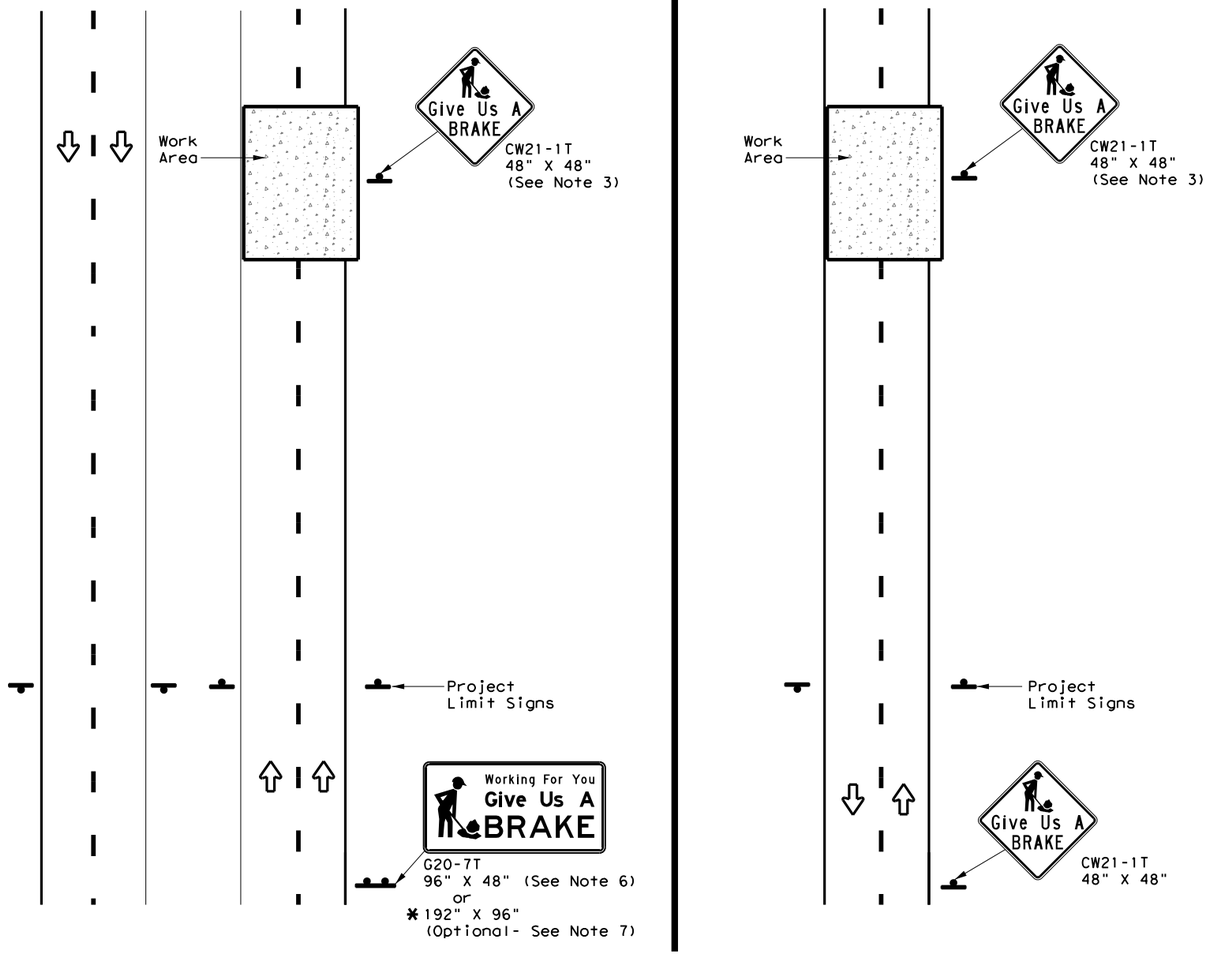


DIVIDED HIGHWAY

UNDIVIDED HIGHWAY

SIGNS ARE SHOWN FOR ONE DIRECTION OF TRAVEL

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

SUMMARY OF LARGE SIGNS

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

▲ See Note 6 Below

LEGEND	
	Sign
	Large Sign
	Traffic Flow

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

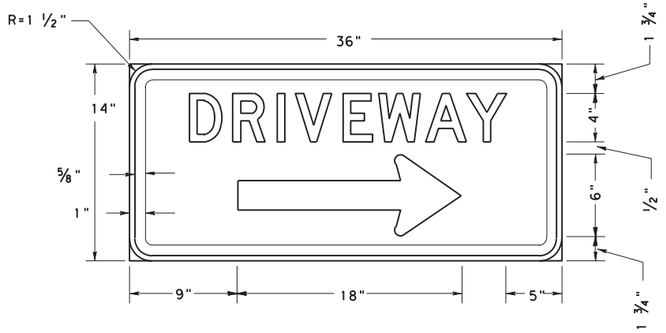
WORK ZONE "GIVE US A BRAKE" SIGNS

WZ(BRK)-13

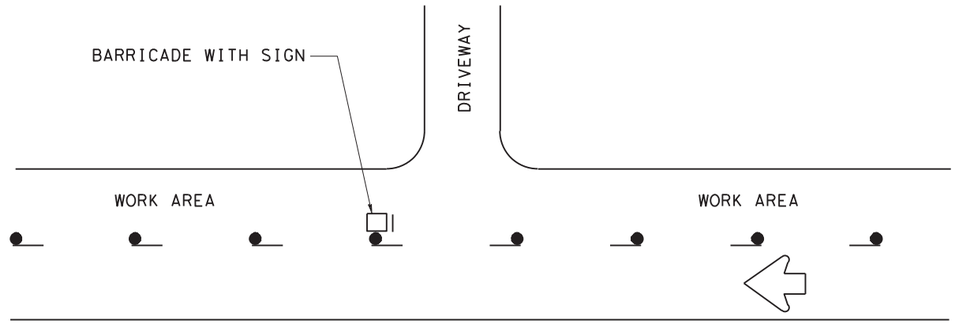
FILE: wzbrk-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	14	240	IH-610
6-96 5-98 7-13	DIST	COUNTY		SHEET NO.
8-96 3-03	12	HARRIS		36

116

DATE: 3/11/2024 11:13:01 AM
FILE: C:\Engdata\output\plot\SUP\Standards\TCP\wzbrk-13.dgn



LETTERS: WHITE
BORDER: WHITE
BACKGROUND: BLUE



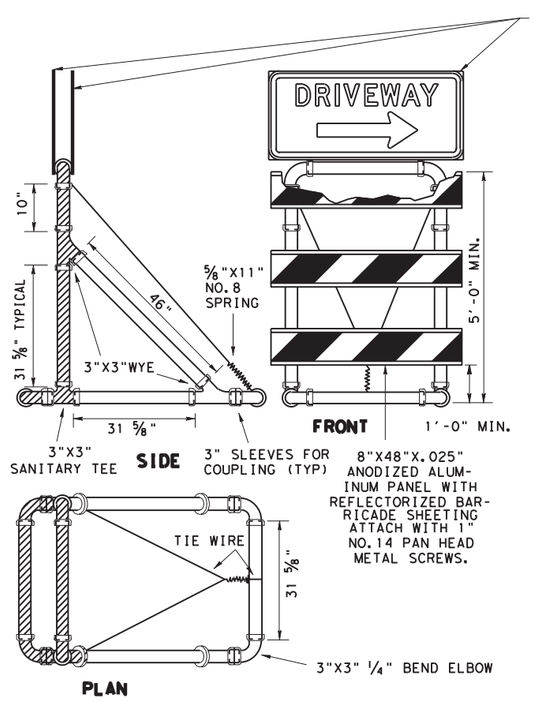
TYPICAL LOCATION OF DRIVEWAY SIGN

TYPE III PVC BARRICADES TYPICAL DESIGN DETAILS

MAY BE USED AT THE OPTION OF THE CONTRACTOR.

NOTES:

1. ALL PIPE SHALL BE POLYVINYL CHLORIDE (PVC) PRESSURE RATED PIPE SDR 21 OR SDR 26 ASTM D2241.
2. JOINT FITTINGS MAY BE PVC-ASTM D2665 OR ACRYLONITRILE BUTADIENE STYRENE (ABS) ASTM D2661 (DRAINAGE WASTE AND VENT).
3. ALL PIPE AND FITTINGS SHALL BE WHITE.
4. ALL JOINTS SHALL BE FREE TO SEPARATE UPON VEHICLE IMPACT.
5. CROSS HATCHED CONDUIT TO BE TIED TOGETHER WITH ROPE THREADED INTO PIPE INTERIOR. USE ⅜" NO. 6 SOLID BRAIDED NYLON OR EQUIVALENT.
6. A FIXED FRANGIBLE PAVEMENT CONNECTION IS PREFERRED. SAND BAGS MAY BE SUBSTITUTED.



CONSTRUCTION SIGN NOTES

MATERIALS

CONSTRUCTION SIGNS SHALL BE MADE FROM APPROVED FIBERGLASS OR HIGH IMPACT PLASTIC AS PRIMARY MATERIALS.

SIGN SHEETING

REFLECTORIZED SIGN SHALL BE CONSTRUCTED OF RETRO REFLECTIVE SHEETING MEETING THE COLOR AND REFLECTIVITY REQUIREMENTS OF MATERIAL SPECIFICATIONS, DMS-8300.

TYPE C SHEETING SHALL BE USED FOR THIS APPLICATION.

SIGN LETTERS

ALL SIGNS LETTERING SHALL BE CLEAR, OPEN ROUNDED TYPE CAPITAL LETTERS AS APPROVED BY AND AS PUBLISHED BY THE FEDERAL HIGHWAY ADMINISTRATION. SIGNS AND LETTERING SHALL BE OF FIRST CLASS WORKMANSHIP EQUIVALENT TO THAT OF THE DEPARTMENT'S STANDARD SIGNS.

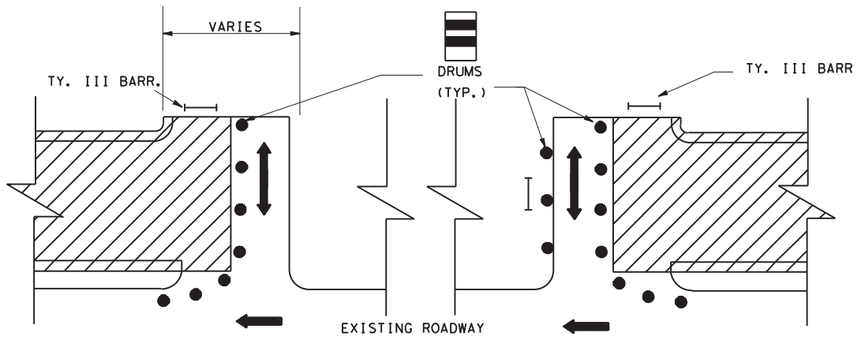
Texas Department of Transportation
Houston District

DRIVEWAY SIGNING

DS TC8020-04

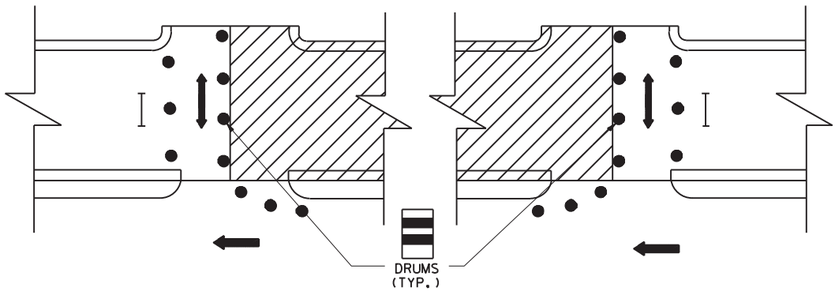
FILE:	DN:	CK:	DW:	CK:
© TxDOT 2004 REVISIONS	DIST	FED REG	PROJECT NO.	SHEET
	HOU	6		37
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	HARRIS	0271	14	240	IH-610

STD H-30

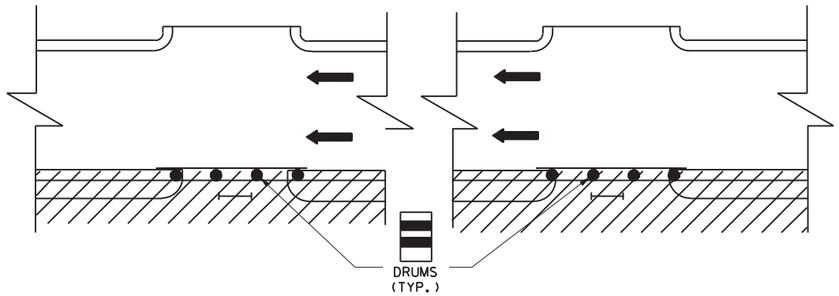


1) WITH TRAFFIC ON EXISTING
BUILD ONE-HALF OF DRIVE.

2) BUILD OTHER HALF OF DRIVE



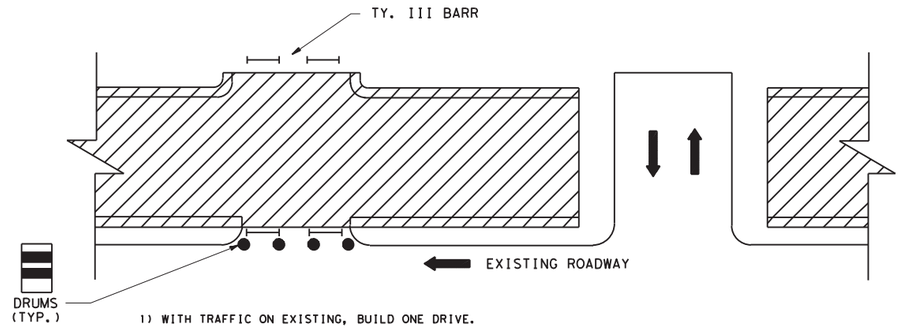
2) BUILD OTHER HALF OF DRIVE



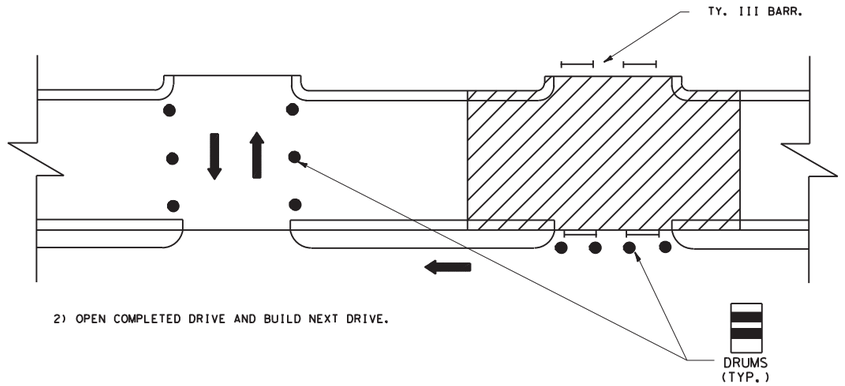
3) OPEN DRIVE

4) AFTER TRAFFIC MOVES TO NEW ROADWAY,
BUILD REMAINING CURB.

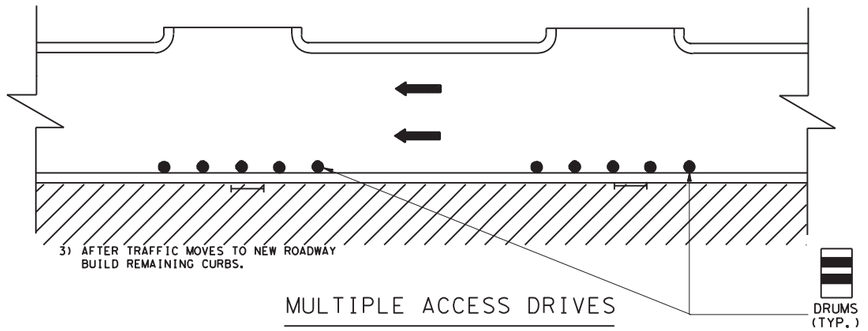
SINGLE ACCESS DRIVES



1) WITH TRAFFIC ON EXISTING, BUILD ONE DRIVE.



2) OPEN COMPLETED DRIVE AND BUILD NEXT DRIVE.



3) AFTER TRAFFIC MOVES TO NEW ROADWAY
BUILD REMAINING CURBS.

MULTIPLE ACCESS DRIVES

Texas Department of Transportation
Houston District

CONSTRUCTION SEQUENCE FOR MISCELLANEOUS DRIVES

CSMD TC8010-2020

FILE:	DN:	CK:	DW:	CK:
© TxDOT 2020	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS	HOU	6		38
	COUNTY	CONTROL	SECT JOB	HIGHWAY
	HARRIS	0271	14 240	IH-610

STD H-29

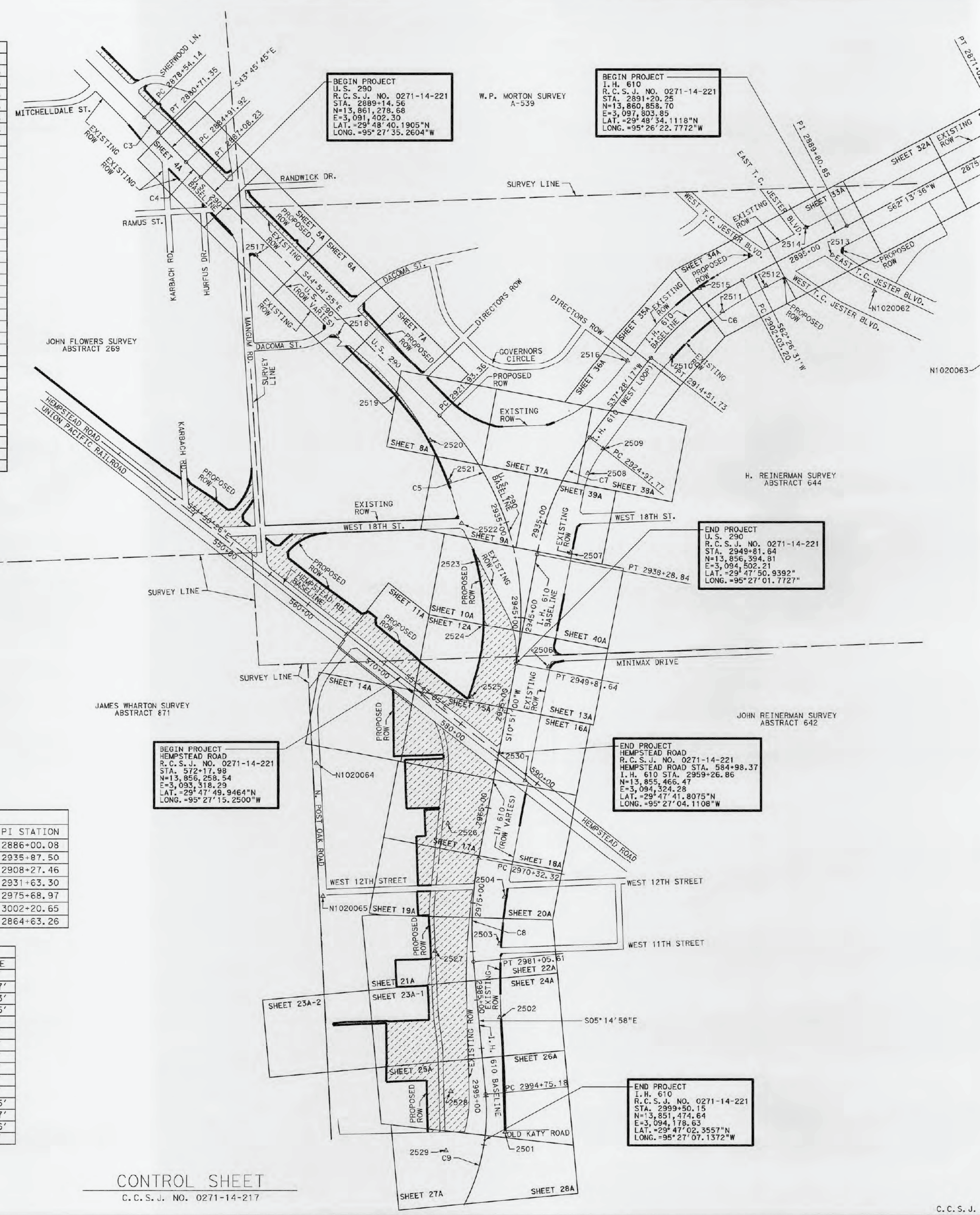
CONTROL INFORMATION 2019				
NAME	N	E	ELEV.	DESCRIPTION
N1020062	13,860,249.37	3,098,211.21	57.07	SET 5/8"I.R. W/TxDOT ALUM. DISK IN CONC.
N1020063	13,859,531.99	3,099,380.62	58.20	SET 5/8"I.R. W/TxDOT ALUM. DISK IN CONC.
N1020064	13,855,363.56	3,092,445.74	66.82	SET 5/8"I.R. W/TxDOT ALUM. DISK IN CONC.
N1020065	13,853,987.76	3,092,513.57	66.00	SET 5/8"I.R. W/TxDOT ALUM. DISK IN CONC.
N1020080	13,864,248.20	3,089,175.24	71.38	SET 5/8"I.R. W/TxDOT ALUM. DISK IN CONC.
N1020081	13,864,306.47	3,090,529.03	71.35	SET 5/8"I.R. W/TxDOT ALUM. DISK IN CONC.
2501	13,851,560.13	3,094,389.45	64.74	SET 5/8" I.R. W/TxDOT ALUM. DISK
2502	13,852,740.15	3,094,334.67	63.75	SET 5/8" I.R. W/TxDOT ALUM. DISK
2503	13,853,495.88	3,094,332.98	64.37	SET 5/8" I.R. W/TxDOT ALUM. DISK
2504	13,853,979.54	3,094,383.46	64.79	SET 5/8" I.R. W/TxDOT ALUM. DISK
2506	13,856,363.70	3,094,839.63	66.36	SET 5/8" I.R. W/TxDOT ALUM. DISK
2507	13,857,544.13	3,095,064.40	65.99	SET 5/8" I.R. W/TxDOT ALUM. DISK
2508	13,858,364.34	3,095,242.12	66.24	SET 5/8" I.R. W/TxDOT ALUM. DISK
2509	13,858,618.05	3,095,398.53	67.21	SET 5/8" I.R. W/TxDOT ALUM. DISK
2510	13,859,573.24	3,096,116.65	67.79	SET 5/8" I.R. W/TxDOT ALUM. DISK
2511	13,860,041.01	3,096,637.43	66.47	SET 5/8" I.R. W/TxDOT ALUM. DISK
2512	13,860,303.02	3,097,092.31	60.90	SET 5/8" I.R. W/TxDOT ALUM. DISK
2513	13,860,619.32	3,097,778.27	56.88	SET 5/8" I.R. W/TxDOT ALUM. DISK
2514	13,860,908.00	3,097,503.08	56.69	SET 5/8" I.R. W/TxDOT ALUM. DISK
2515	13,860,279.35	3,096,400.20	64.94	SET 5/8" I.R. W/TxDOT ALUM. DISK
2516	13,859,530.14	3,095,651.15	67.44	SET 5/8" I.R. W/TxDOT ALUM. DISK
2517	13,860,618.91	3,091,823.20	64.22	SET 5/8" I.R. W/TxDOT ALUM. DISK
2518	13,859,781.41	3,092,657.51	64.17	SET 5/8" I.R. W/TxDOT ALUM. DISK
2519	13,859,172.54	3,093,271.39	66.84	SET 5/8" I.R. W/TxDOT ALUM. DISK
2520	13,858,702.90	3,093,618.94	67.83	SET 5/8" I.R. W/TxDOT ALUM. DISK
2521	13,858,288.24	3,093,815.71	66.10	SET 5/8" I.R. W/TxDOT ALUM. DISK
2522	13,857,847.71	3,093,941.12	68.14	SET 5/8" I.R. W/TxDOT ALUM. DISK
2523	13,857,464.50	3,094,109.37	67.59	SET 5/8" I.R. W/TxDOT ALUM. DISK
2524	13,856,806.44	3,094,182.61	66.93	SET 5/8" I.R. W/TxDOT ALUM. DISK
2525	13,856,049.40	3,094,043.46	71.21	SET 5/8" I.R. W/TxDOT ALUM. DISK
2526	13,854,744.72	3,093,802.48	65.46	SET 5/8" I.R. W/TxDOT ALUM. DISK
2527	13,853,423.80	3,093,667.79	64.30	SET 5/8" I.R. W/TxDOT ALUM. DISK
2528	13,851,979.11	3,093,830.83	63.81	SET 5/8" I.R. W/TxDOT ALUM. DISK
2529	13,851,361.40	3,093,781.69	64.16	SET 5/8" I.R. W/TxDOT ALUM. DISK
2530	13,855,187.09	3,094,598.08	67.88	SET 5/8" I.R. W/TxDOT ALUM. DISK

SIDE STREETS			
NAME	STATION	N	E
U.S. 290 BASELINE			
KARBACH DRIVE	2881+55.14	13,861,822.72	3,090,872.50
RANDWICK DRIVE	2888+75.73	13,861,306.18	3,091,374.88
RAMUS STREET	2892+65.58	13,861,100.92	3,091,579.53
MANGUM ROAD	2892+98.50	13,861,006.79	3,091,673.38
DACOMA STREET	2907+64.61	13,859,968.56	3,092,708.55
DIRECTORS ROW	2917+93.67	13,859,239.84	3,093,435.13
WEST 18TH STREET	2934+91.96	13,857,864.09	3,094,398.26
I.H. 610			
EAST T.C. JESTER BLVD.	2893+40.99	13,860,756.58	3,097,608.16
WEST T.C. JESTER BLVD.	2898+26.45	13,860,531.98	3,097,177.79
DIRECTORS ROW	2915+92.37	13,859,449.14	3,095,809.94
WEST 18TH STREET	2934+64.93	13,857,879.09	3,094,810.20
MINIMAX DRIVE	2949+34.80	13,856,440.80	3,094,511.03
HEMPSTEAD ROAD	2949+81.64	13,856,394.81	3,094,502.21
WEST 12TH STREET	2973+29.05	13,854,087.47	3,094,071.71
WEST 11TH STREET	2980+00.50	13,853,417.09	3,094,055.75
HEMPSTEAD ROAD			
NORTH POST OAK ROAD	565+87.03	13,856,648.84	3,092,822.54

CURVE TABLE								
#	DELTA	RADIUS	LENGTH	CHORD	DIST.	PI N	PI E	PI STATION
C4	01°09'10"	10,750.00'	216.31'	S44°20'20"E	216.31'	13,861,501.38	3,091,180.25	2886+00.08
C5	55°45'56"	2,864.79'	2,788.27'	S17°01'58"E	2,679.51'	13,857,883.43	3,094,787.53	2935+87.50
C6	24°58'14"	2,864.79'	1,248.53'	S49°57'24"W	1,238.67'	13,860,064.21	3,096,281.41	2908+27.46
C7	26°37'20"	2,864.79'	1,331.07'	S24°09'39"W	1,319.13'	13,858,192.65	3,094,846.80	2931+63.30
C8	16°05'58"	3,819.72'	1,073.29'	S02°48'01"W	1,069.77'	13,853,850.23	3,094,014.50	2975+68.97
C9	41°00'04"	2,083.48'	1,490.94'	S15°15'04"W	1,459.34'	13,851,172.74	3,094,260.50	3002+20.65
C10	25°33'36"	2,864.79'	1,278.00'	S75°00'24"W	1,267.43'	13,862,101.37	3,100,164.58	2864+63.26

CONTROL TRAVERSE INFORMATION 2019			
FROM	TO	BEARING	DISTANCE
N1020062	N1020063	S58°28'22"E	1,371.92'
N1020064	N1020065	S02°49'21"E	1,377.47'
N1020080	N1020081	N87°32'07"E	1,355.04'
2501	2502	N02°39'29"W	1,181.29'
2502	2503	N00°07'41"W	755.73'
2503	2504	N05°57'30"E	486.29'
2504	2530	N10°04'41"E	1,226.47'
2530	2506	N11°36'04"E	1,201.15'
2506	2507	N10°46'51"E	1,201.64'
2507	2508	N12°13'32"E	839.24'
2508	2509	N31°39'12"E	298.05'
2509	2510	N36°56'10"E	1,195.02'
2510	2511	N48°04'10"E	700.01'
2511	2512	N60°03'29"E	524.94'
2512	2513	N65°14'43"E	755.37'

CONTROL TRAVERSE INFORMATION 2019			
FROM	TO	BEARING	DISTANCE
2513	2514	N43°37'46"W	398.83'
2514	2515	S60°19'00"W	1,269.47'
2515	2516	S44°59'38"W	1,059.43'
2517	2518	S44°53'26"E	1,182.15'
2518	2519	S45°14'05"E	864.62'
2519	2520	S36°30'10"E	584.25'
2520	2521	S25°23'09"E	458.98'
2521	2522	S15°53'26"E	458.03'
2522	2523	S23°42'15"E	418.52'
2523	2524	S06°21'03"E	662.12'
2524	2525	S10°24'55"W	769.72'
2525	2526	S10°27'53"W	1,326.75'
2526	2527	S05°49'20"W	1,327.77'
2527	2528	S06°26'20"E	1,453.86'
2528	2529	S04°32'54"W	619.66'



CONTROL SHEET
C.C.S.J. NO. 0271-14-217

0 600 1200 2400

SCALE: 1"= 600' FOR 22"x34" SHEET
SCALE: 1"=1200' FOR 11"x17" SHEET

NOTES:

1. ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NORTH AMERICAN DATUM OF 1983 (NAD 83), 1993 ADJUSTMENT. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY DIVIDING BY A COMBINED ADJUSTMENT FACTOR OF 1.00013.
2. ALL COORDINATES AND DISTANCES ARE IN U.S. SURVEY FEET.
3. VERTICAL PROJECT CONTROL IS REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88), HOLDING THE PUBLISHED ELEVATIONS OF TXDOT CONTROL MONUMENTS L1020202 (62.10') AND N1020248 (79.93') FIXED. ELEVATION VALUES WERE DETERMINED UTILIZING DIGITAL LEVELS.
4. HORIZONTAL PROJECT CONTROL WAS TIED UTILIZING THE TXDOT VRS NETWORK OF CONTINUOUSLY OPERATING REFERENCE STATIONS (CORS).
5. DRAWINGS ARE BASED ON ABSTRACTING PERFORMED JUNE, 2007 & SEPTEMBER, 2010.
6. DRAWINGS ARE BASED ON FIELD SURVEYS PERFORMED JUNE 2007 THROUGH OCTOBER 2010.
7. THIS RIGHT-OF-WAY MAP WAS COMPLETED OCTOBER, 2010.

STATE OF TEXAS REGISTERED DAVID H. SPRADLEY 6035 PROFESSIONAL LAND SURVEYOR

David Spradley 10-11-2019

SURVEYOR CERTIFICATION

THE CONTROL POINTS SHOWN HEREON WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.

REVISIONS		
No.	DATE	DESCRIPTION
3	08/2019	UPDATED MONUMENTATION & CONVEYANCE DEED INFO. & REMOVED PARCEL 214RR (McKIM & CREED-TBPLS FIRM REGISTRATION NO. 101776-00)
2	06/2015	INCREASED TAKING ON PARCEL 214RR. (McKIM & CREED)
1	03/2015	INCREASED TAKING ON PARCEL 224 TO WHOLE TAKE. (McKIM & CREED)

U.S. 290 & I.H. 610
(W. LOOP N. & N. LOOP W.)
SEGMENT 2
SURVEY CONTROL
INDEX SHEET

Texas Department of Transportation

SURVCON INC.
PROFESSIONAL SURVEYORS
5757 WOODWAY
HOUSTON, TEXAS 77057
PH. (713) 780-4123

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					3A-1
STATE DIST. NO.	COUNTY		CONTROL NO.	SECTION NO.	JOB NO.	HIGHWAY NO.
12	HARRIS		0271	14	221	IH 610

C.C.S.J. NO. 0271-14-217

10/10/2019 1:42:39 PM
...\Segment 2\217*Row03A-1.dgn

THIS SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED IN THIS PS&E.

STATE OF TEXAS
STEVE VAN
137551
LICENSED PROFESSIONAL ENGINEER

Steve Van, P.E.
06.14.24

IH-610
SB FRTG RD (SUP)

SURVEY CONTROL INDEX SHEET

SHEET 1 OF 1

TEXAS DEPARTMENT OF TRANSPORTATION

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610
DIST	COUNTY		SHEET NO.
12	HARRIS		39

DATE: 6/14/2024 4:02:06 PM
PEN TABLE: ...0271-14-240 IH 610 FROM OLD KATY RD TO W. 12TH ST\Miscellaneous\Borders\PenTable 0271-14-240.tbl
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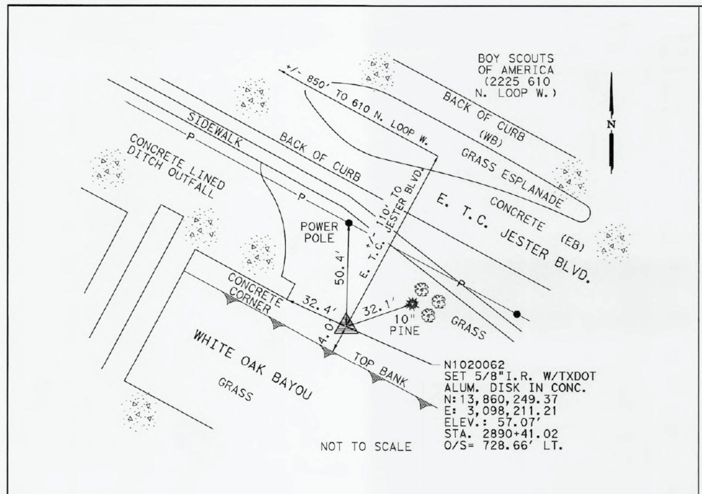
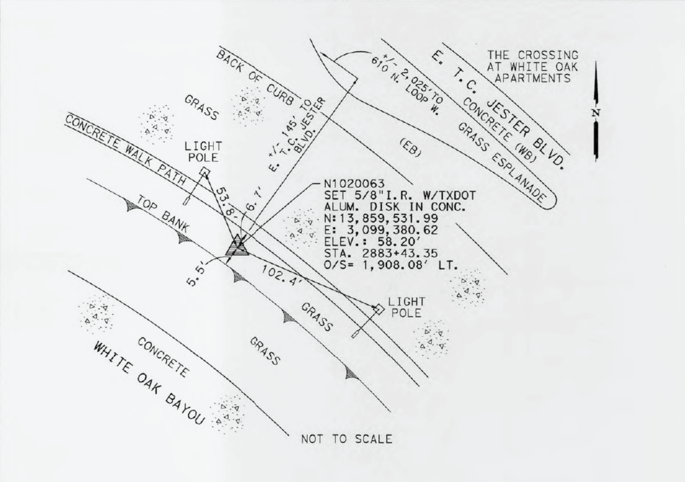
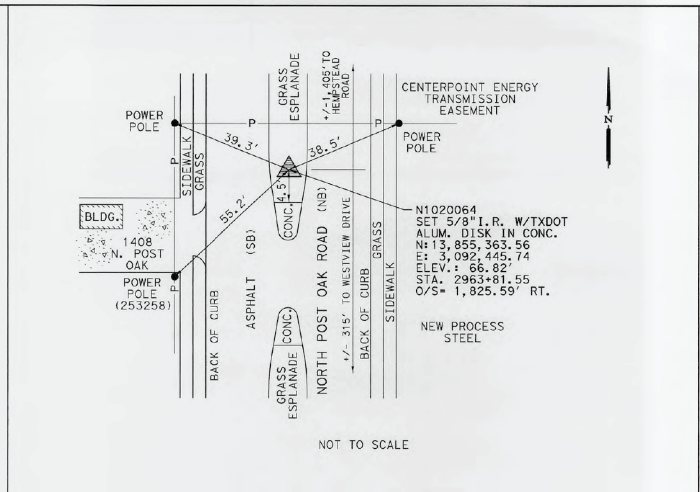


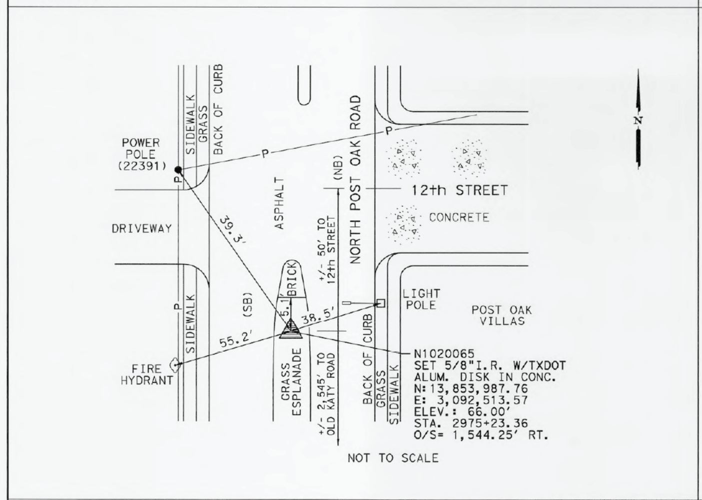
LOCATED ON THE NORTH SIDE OF WHITE OAK BAYOU APPROXIMATELY 850 FEET EAST FROM THE CENTERLINE OF 610 NORTH LOOP WEST AND 110 FEET SOUTH FROM THE CENTERLINE OF E. T.C. JESTER BLVD.



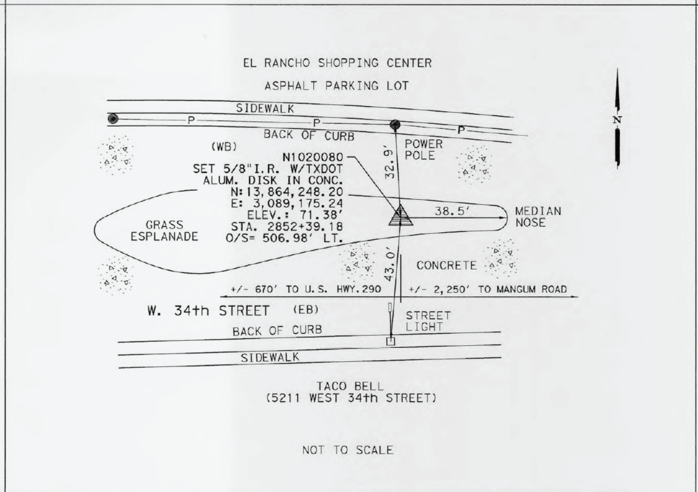
LOCATED ON THE NORTH SIDE OF WHITE OAK BAYOU APPROXIMATELY 2,025 FEET EAST FROM THE CENTERLINE OF 610 NORTH LOOP WEST AND 145 FEET SOUTH FROM THE CENTERLINE OF E. T.C. JESTER BLVD.



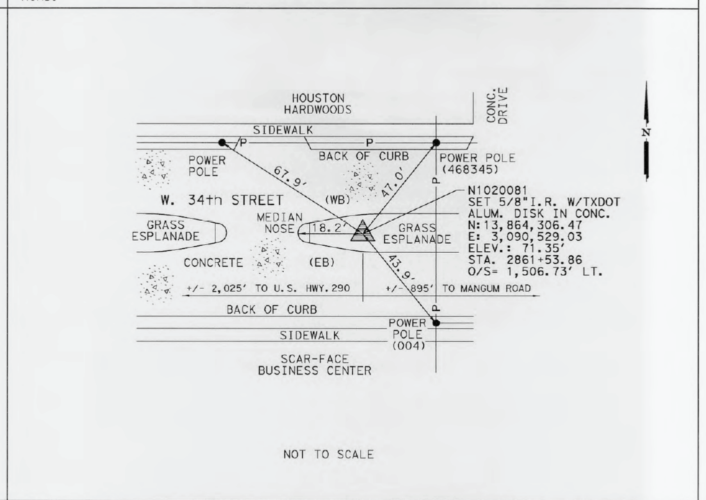
LOCATED IN THE MEDIAN OF NORTH POST OAK ROAD APPROXIMATELY 315 FEET NORTH FROM THE CENTERLINE OF WESTVIEW DRIVE AND 1,405 FEET SOUTH FROM THE CENTERLINE OF HEMPSTEAD ROAD.



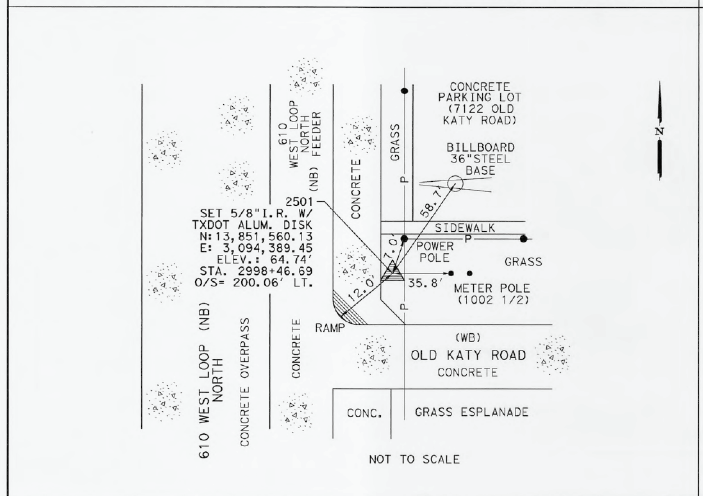
LOCATED IN THE MEDIAN OF NORTH POST OAK ROAD APPROXIMATELY 2,545 FEET NORTH FROM THE CENTERLINE OF OLD KATY ROAD AND 2,775 FEET SOUTH FROM THE CENTERLINE OF HEMPSTEAD ROAD.



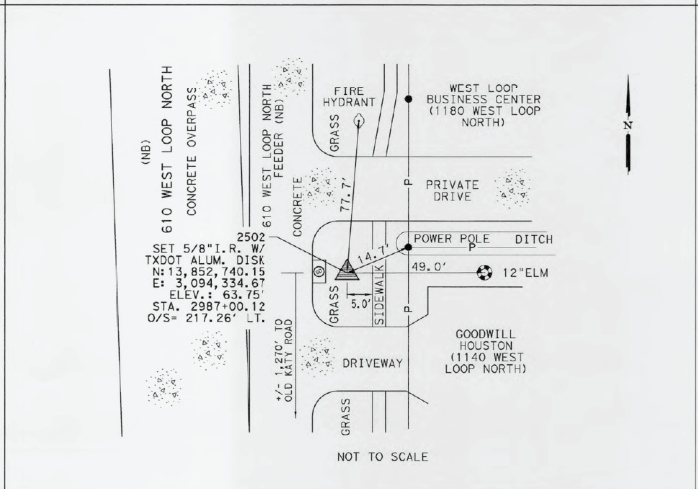
LOCATED IN THE MEDIAN OF WEST 34th STREET APPROXIMATELY 670 FEET EAST FROM THE CENTERLINE OF U.S. 290 AND 2,250 FEET WEST FROM THE CENTERLINE OF MANGUM ROAD.



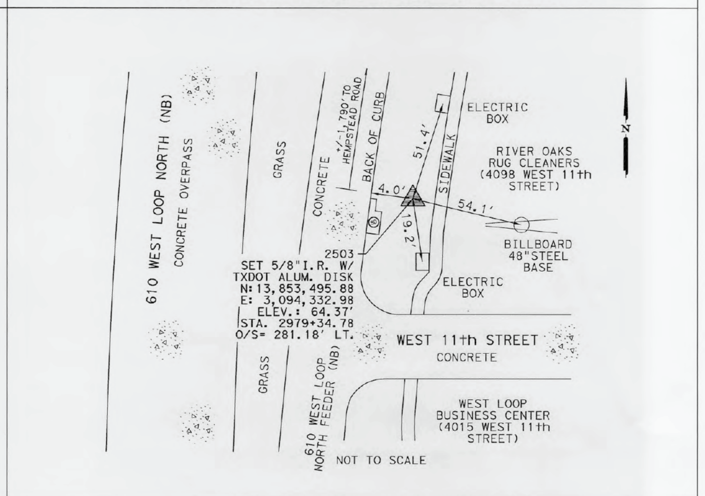
LOCATED IN THE MEDIAN OF WEST 34th STREET APPROXIMATELY 2,025 FEET EAST FROM THE CENTERLINE OF U.S. 290 AND 895 FEET WEST FROM THE CENTERLINE OF MANGUM ROAD.



LOCATED NEAR THE NORTHEAST INTERSECTION OF THE NORTHBOUND FEEDER OF 610 WEST LOOP NORTH AND OLD KATY ROAD.



LOCATED ON THE EAST SIDE OF THE NORTHBOUND FEEDER OF 610 WEST LOOP NORTH APPROXIMATELY 1,270 FEET NORTH FROM THE CENTERLINE OF OLD KATY ROAD.



LOCATED NEAR THE NORTHEAST INTERSECTION OF THE NORTHBOUND FEEDER OF 610 WEST LOOP NORTH AND WEST 11th STREET.

NOTES:

1. ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NORTH AMERICAN DATUM OF 1983 (NAD 83), 1993 ADJUSTMENT. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY DIVIDING BY A COMBINED ADJUSTMENT FACTOR OF 1.00013.
2. ALL COORDINATES AND DISTANCES ARE IN U.S. SURVEY FEET.
3. VERTICAL PROJECT CONTROL IS REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88), HOLDING THE PUBLISHED ELEVATIONS OF TXDOT CONTROL MONUMENTS L1020202 (62.10') AND N1020248 (79.93') FIXED. ELEVATION VALUES WERE DETERMINED UTILIZING DIGITAL LEVELS.
4. HORIZONTAL PROJECT CONTROL WAS TIED UTILIZING THE TXDOT VRS NETWORK OF CONTINUOUSLY OPERATING REFERENCE STATIONS (CORS).
5. BASELINE STATIONS AND OFFSETS SHOWN HEREON ARE REFERENCED TO THE PROPOSED RIGHT-OF-WAY BASELINE WHICH MAY NOT MATCH THE PROPOSED CONSTRUCTION BASELINE OR AS-BUILT BASELINE DUE TO DESIGN CHANGES.

STATE OF TEXAS REGISTERED PROFESSIONAL LAND SURVEYOR DAVID H. SPRADLEY 6035

David Spradley 10/2/2019

SURVEYOR CERTIFICATION

THE CONTROL POINTS SHOWN HEREON WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.

REVISIONS		
No.	DATE	DESCRIPTION

U.S. 290 & I.H. 610 (W. LOOP N. & N. LOOP W.)
SEGMENT 2
HORIZONTAL AND VERTICAL CONTROL DATA SHEET

Texas Department of Transportation

McKIM&CREED
ENGINEERS, SURVEYORS, PLANNERS
9960 West Sam Houston Parkway South, Suite 200 Houston, TX 77099, 713.559.0021
www.mckimcreed.com
TBPLS Firm Registration No. 101776-00

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				3A-2
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	HIGHWAY NO.
12	HARRIS	0271	14	221	IH 610

THIS SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED IN THIS PS&E.

STATE OF TEXAS
STEVE VAN
137551
LICENSED PROFESSIONAL ENGINEER

Steve Van, P.E.
06.14.24

IH-610
SB FRTG RD (SUP)

HORIZONTAL & VERTICAL CONTROL DATA SHEET

SHEET 1 OF 4

TEXAS DEPARTMENT OF TRANSPORTATION

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610
DIST		COUNTY	SHEET NO.
12		HARRIS	40

DATE: 6/14/2024 4:07:12 PM
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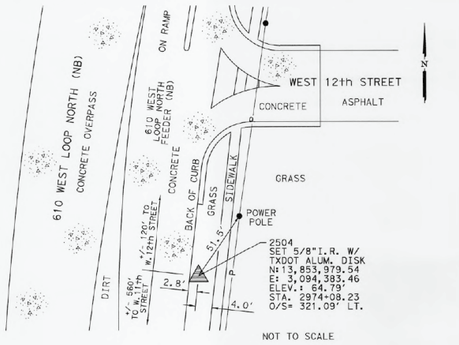
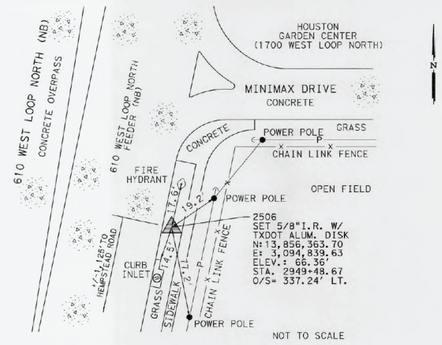
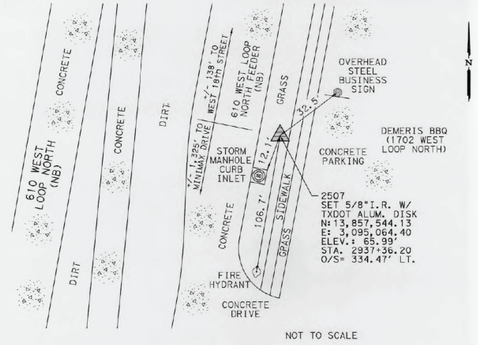


LOCATED ON THE EAST SIDE OF THE NORTHBOUND FEEDER OF 610 WEST LOOP NORTH APPROXIMATELY 560 FEET NORTH FROM THE CENTERLINE OF WEST 11th STREET AND 120 FEET SOUTH FROM THE CENTERLINE OF WEST 12th STREET.



LOCATED ON THE EAST SIDE OF THE NORTHBOUND FEEDER OF 610 WEST LOOP NORTH APPROXIMATELY 1,125 FEET NORTH FROM THE CENTERLINE OF HEMPSTEAD ROAD.



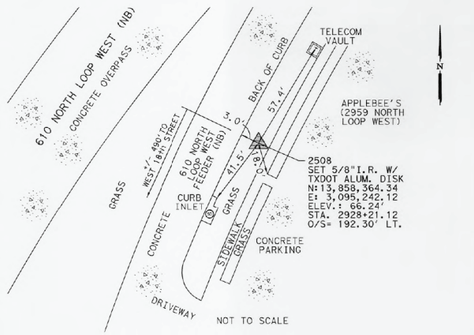
LOCATED ON THE EAST SIDE OF THE NORTHBOUND FEEDER OF 610 WEST LOOP NORTH APPROXIMATELY 1,325 FEET NORTH FROM THE CENTERLINE OF MINIMAX DRIVE AND 138 FEET SOUTH FROM THE CENTERLINE OF WEST 18th STREET.

NOTES:

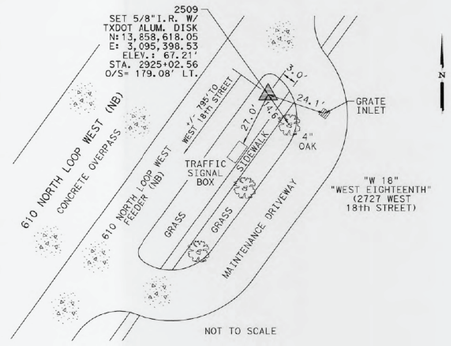
1. ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NORTH AMERICAN DATUM OF 1983 (NAD 83), 1993 ADJUSTMENT. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY DIVIDING BY A COMBINED ADJUSTMENT FACTOR OF 1.00013.
2. ALL COORDINATES AND DISTANCES ARE IN U.S. SURVEY FEET.
3. VERTICAL PROJECT CONTROL IS REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88), HOLDING THE PUBLISHED ELEVATIONS OF TXDOT CONTROL MONUMENTS L1020202 (62.10') AND N1020248 (79.93') FIXED. ELEVATION VALUES WERE DETERMINED UTILIZING DIGITAL LEVELS.
4. HORIZONTAL PROJECT CONTROL WAS TIED UTILIZING THE TXDOT VRS NETWORK OF CONTINUOUSLY OPERATING REFERENCE STATIONS (CORS).
5. BASELINE STATIONS AND OFFSETS SHOWN HEREON ARE REFERENCED TO THE PROPOSED RIGHT-OF-WAY BASELINE WHICH MAY NOT MATCH THE PROPOSED CONSTRUCTION BASELINE OR AS-BUILT BASELINE DUE TO DESIGN CHANGES.

SURVEYOR CERTIFICATION

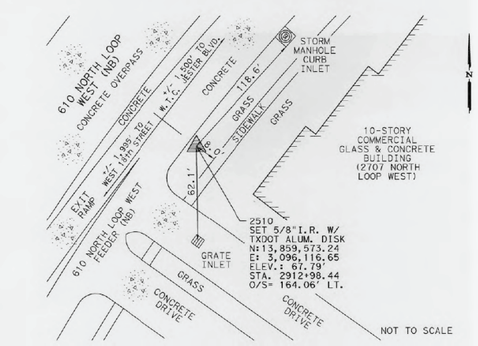
THE CONTROL POINTS SHOWN HEREON WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.



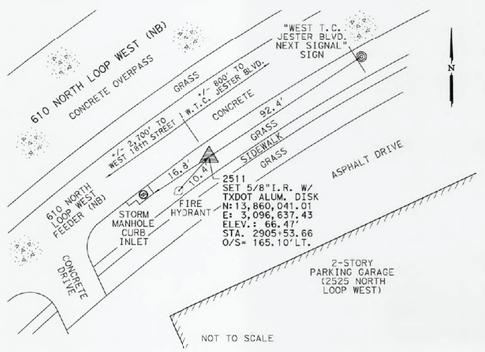
LOCATED ON THE EAST SIDE OF THE NORTHBOUND FEEDER OF 610 NORTH LOOP WEST APPROXIMATELY 490 FEET NORTH FROM THE CENTERLINE OF WEST 18th STREET.



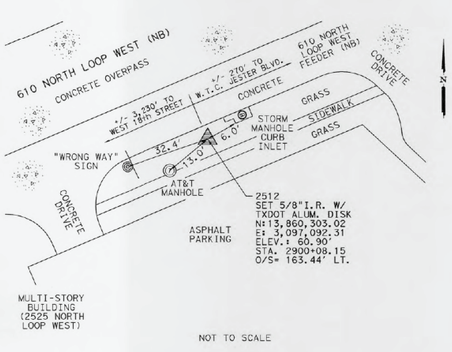
LOCATED ON THE EAST SIDE OF THE NORTHBOUND FEEDER OF 610 NORTH LOOP WEST APPROXIMATELY 795 FEET NORTH FROM THE CENTERLINE OF WEST 18th STREET.



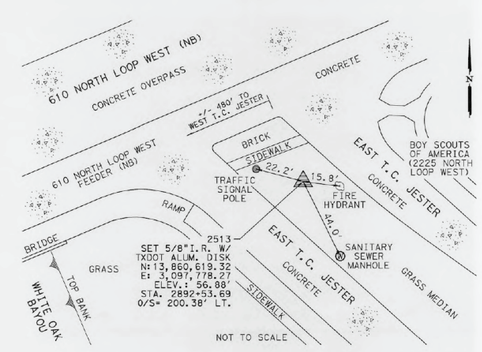
LOCATED ON THE EAST SIDE OF THE NORTHBOUND FEEDER OF 610 NORTH LOOP WEST APPROXIMATELY 1,995 FEET NORTH FROM THE CENTERLINE OF WEST 18th STREET AND 1,500 FEET SOUTH FROM THE CENTERLINE OF WEST T.C. JESTER BOULEVARD.



LOCATED ON THE EAST SIDE OF THE NORTHBOUND FEEDER OF 610 NORTH LOOP WEST APPROXIMATELY 2,700 FEET NORTH FROM THE CENTERLINE OF WEST 18th STREET AND 800 FEET SOUTH FROM THE CENTERLINE OF WEST T.C. JESTER BOULEVARD.



LOCATED ON THE EAST SIDE OF THE NORTHBOUND FEEDER OF 610 NORTH LOOP WEST APPROXIMATELY 3,230 FEET NORTH FROM THE CENTERLINE OF WEST 18th STREET AND 270 FEET SOUTH FROM THE CENTERLINE OF WEST T.C. JESTER BOULEVARD.



LOCATED IN THE MEDIAN ON THE EAST SIDE OF THE NORTHBOUND FEEDER OF 610 NORTH LOOP WEST WITH THE INTERSECTION OF EAST T.C. JESTER BOULEVARD APPROXIMATELY 480 FEET NORTH FROM THE CENTERLINE OF WEST T.C. JESTER BOULEVARD.

REVISIONS		
No.	DATE	DESCRIPTION

U.S. 290 & I.H. 610
(W. LOOP N. & N. LOOP W.)
SEGMENT 2
HORIZONTAL AND VERTICAL CONTROL DATA SHEET

Texas Department of Transportation

McKIM&CREED
ENGINEERS, SURVEYORS, PLANNERS
9960 West Sam Houston Parkway South, Suite 200
Houston, TX 77099, 713.659.0021
www.mckimcreed.com
TBPLS Firm Registration No. 10077600

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					3A-3
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	HIGHWAY NO.	
12	HARRIS	0271	14	221	IH 610	

06.14.24

IH-610
SB FRTG RD (SUP)

HORIZONTAL & VERTICAL CONTROL DATA SHEET

SHEET 2 OF 4

TEXAS DEPARTMENT OF TRANSPORTATION

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610
DIST	COUNTY		SHEET NO.
12	HARRIS		41

THIS SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED IN THIS PS&E.

DATE: 6/14/2024 4:07:29 PM
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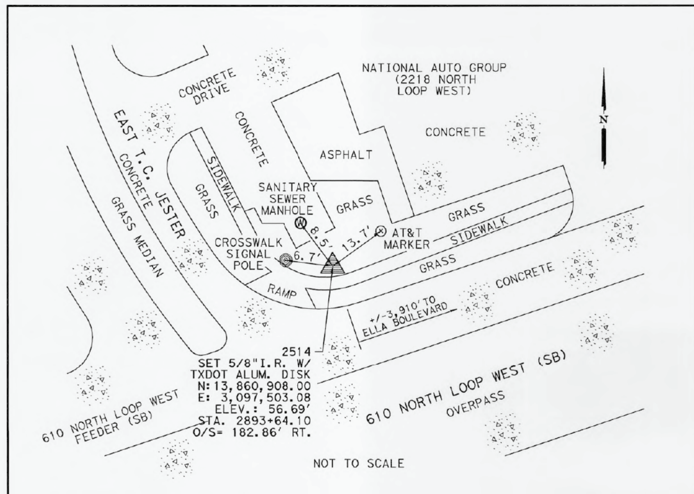
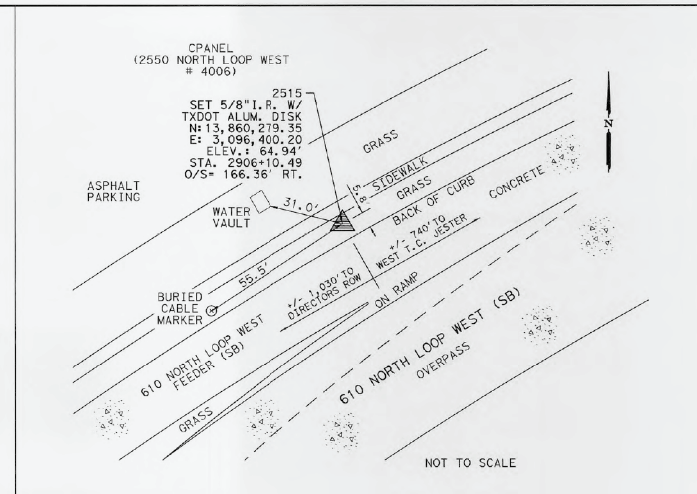
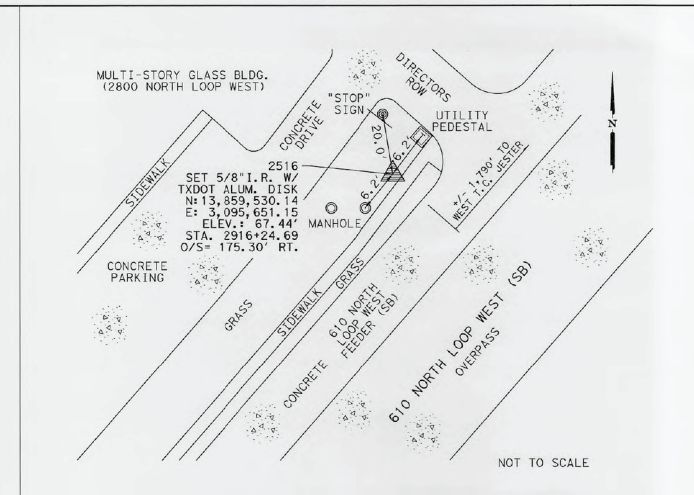


LOCATED NEAR THE NORTHWEST INTERSECTION OF THE SOUTHBOUND FEEDER OF 610 NORTH LOOP WEST AND EAST T.C. JESTER BOULEVARD APPROXIMATELY 3,910 FEET SOUTH FROM THE CENTERLINE OF ELLA BOULEVARD.



LOCATED ON THE WEST SIDE OF THE SOUTHBOUND FEEDER OF 610 NORTH LOOP WEST APPROXIMATELY 1,030 FEET NORTH FROM THE CENTERLINE OF DIRECTORS ROW AND 740 FEET SOUTH FROM THE CENTERLINE OF WEST T.C. JESTER BOULEVARD.



LOCATED NEAR THE SOUTHWEST INTERSECTION OF THE SOUTHBOUND FEEDER OF 610 NORTH LOOP WEST AND DIRECTORS ROW APPROXIMATELY 1,790 FEET SOUTH FROM THE CENTERLINE OF WEST T.C. JESTER BOULEVARD.

NOTES:

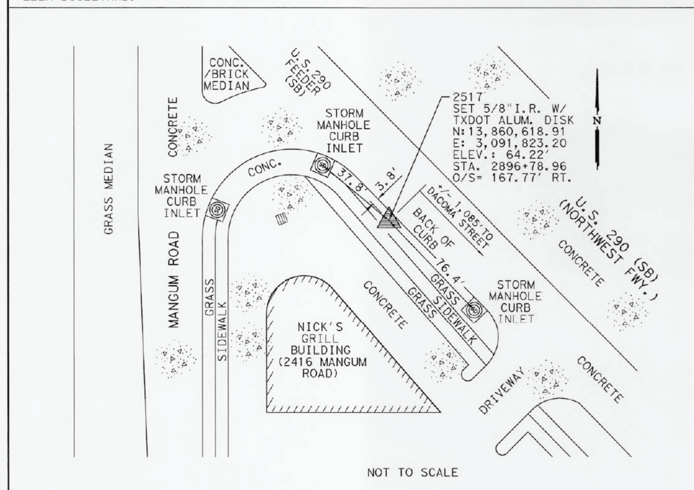
1. ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NORTH AMERICAN DATUM OF 1983 (NAD 83), 1993 ADJUSTMENT. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY DIVIDING BY A COMBINED ADJUSTMENT FACTOR OF 1.00013.
2. ALL COORDINATES AND DISTANCES ARE IN U.S. SURVEY FEET.
3. VERTICAL PROJECT CONTROL IS REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88), HOLDING THE PUBLISHED ELEVATIONS OF TXDOT CONTROL MONUMENTS L1020202 (62.10') AND N1020248 (79.93') FIXED. ELEVATION VALUES WERE DETERMINED UTILIZING DIGITAL LEVELS.
4. HORIZONTAL PROJECT CONTROL WAS TIED UTILIZING THE TXDOT VRS NETWORK OF CONTINUOUSLY OPERATING REFERENCE STATIONS (CORS).
5. BASELINE STATIONS AND OFFSETS SHOWN HEREON ARE REFERENCED TO THE PROPOSED RIGHT-OF-WAY BASELINE WHICH MAY NOT MATCH THE PROPOSED CONSTRUCTION BASELINE OR AS-BUILT BASELINE DUE TO DESIGN CHANGES.

STATE OF TEXAS — DAVID H. SPRADLEY — 6035 — PROFESSIONAL LAND SURVEYOR

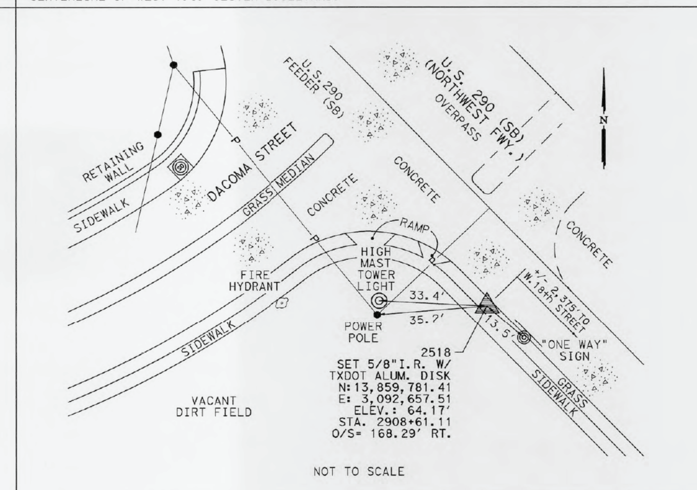
David Spradley 10/2/2019

SURVEYOR CERTIFICATION

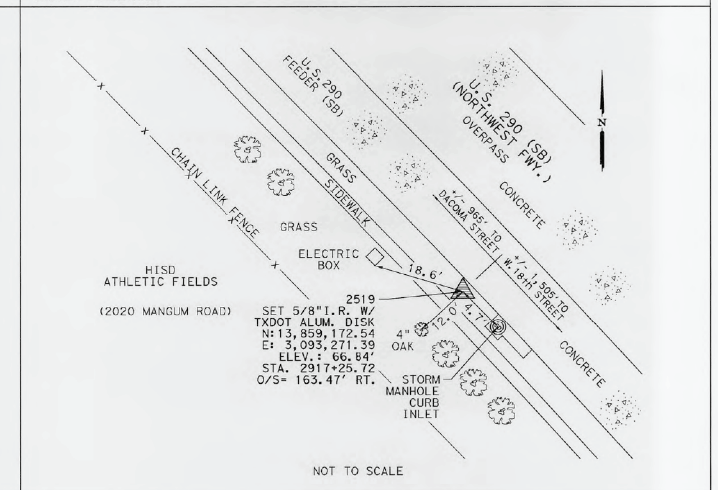
THE CONTROL POINTS SHOWN HEREON WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.



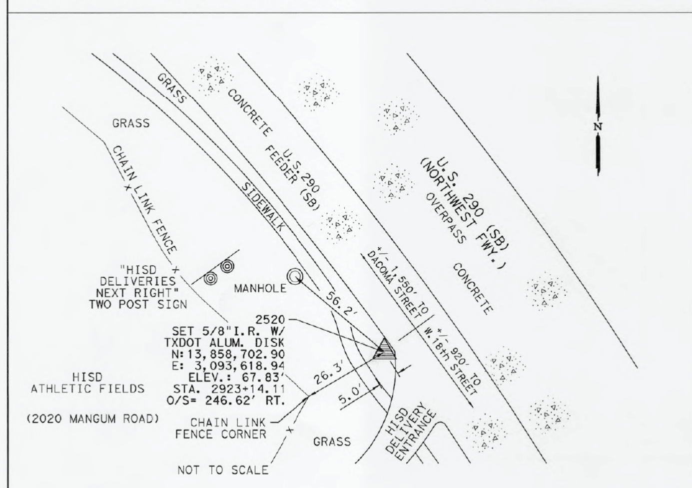
LOCATED NEAR THE SOUTHWEST INTERSECTION OF THE SOUTHBOUND FEEDER OF U.S. 290 AND MANGUM ROAD APPROXIMATELY 1,085 FEET NORTH FROM THE CENTERLINE OF DACOMA STREET.



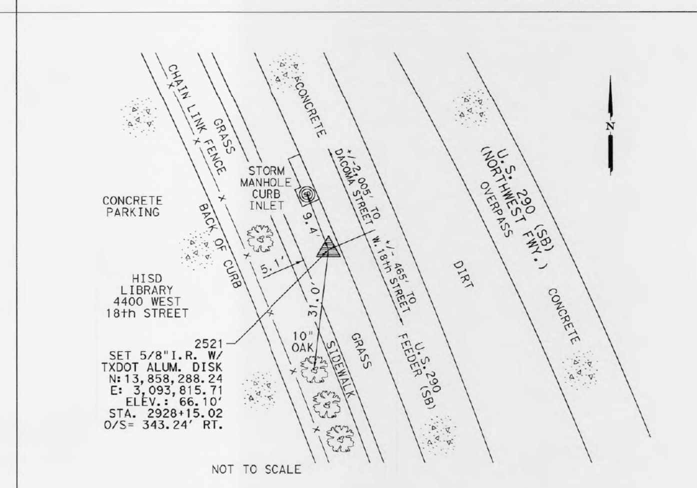
LOCATED NEAR THE SOUTHWEST INTERSECTION OF THE SOUTHBOUND FEEDER OF U.S. 290 AND DACOMA STREET APPROXIMATELY 2,375 FEET NORTH FROM THE CENTERLINE OF WEST 18TH STREET.



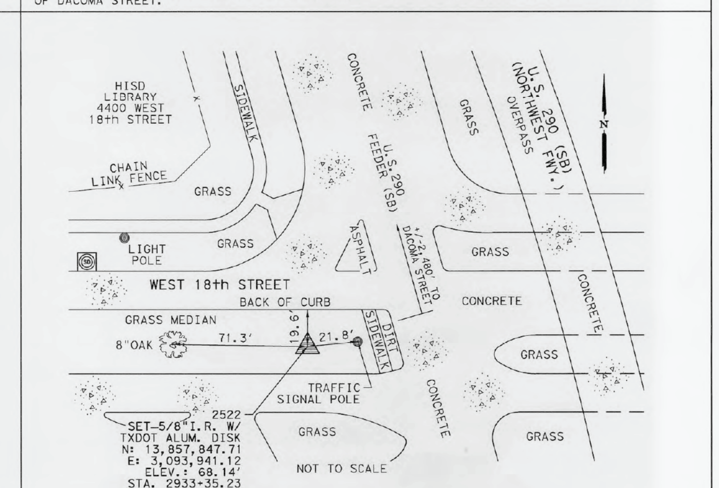
LOCATED ON THE WEST SIDE OF THE SOUTHBOUND FEEDER OF U.S. 290 APPROXIMATELY 1,505 FEET NORTH FROM THE CENTERLINE OF WEST 18th STREET AND 965 FEET SOUTH FROM THE CENTERLINE OF DACOMA STREET.



LOCATED ON THE WEST SIDE OF THE SOUTHBOUND FEEDER OF U.S. 290 APPROXIMATELY 920 FEET NORTH FROM THE CENTERLINE OF WEST 18th STREET AND 1,550 FEET SOUTH FROM THE CENTERLINE OF DACOMA STREET.



LOCATED ON THE WEST SIDE OF THE SOUTHBOUND FEEDER OF U.S. 290 APPROXIMATELY 465 FEET NORTH FROM THE CENTERLINE OF WEST 18th STREET AND 2,005 FEET SOUTH FROM THE CENTERLINE OF DACOMA STREET.



LOCATED IN THE MEDIAN ON THE WEST SIDE OF THE SOUTHBOUND FEEDER OF U.S. 290 WITH THE INTERSECTION OF WEST 18th STREET APPROXIMATELY 2,480 FEET SOUTH FROM THE CENTERLINE OF DACOMA STREET.

REVISIONS		
No.	DATE	DESCRIPTION

U.S. 290 & I.H. 610 (W. LOOP N. & N. LOOP W.)
SEGMENT 2
HORIZONTAL AND VERTICAL CONTROL DATA SHEET

Texas Department of Transportation

McKIM&CREED
ENGINEERS, SURVEYORS, PLANNERS
9960 West Sam Houston Parkway South, Suite 200
Houston, TX 77099, 713.659.0021
www.mckimcreed.com
TBPLS Firm Registration No. 101776-00

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.		SHEET NO.
6	TEXAS			3A-4
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO. / HIGHWAY NO.
12	HARRIS	0271	14	221 / IH 610

THIS SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED IN THIS PS&E.

STATE OF TEXAS — STEVE VAN — 137551 — LICENSED PROFESSIONAL ENGINEER

Steve Van, P.E.
06.14.24

IH-610
SB FRTG RD (SUP)

HORIZONTAL & VERTICAL CONTROL DATA SHEET

SHEET 3 OF 4

TEXAS DEPARTMENT OF TRANSPORTATION

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610
DIST		COUNTY	SHEET NO.
12		HARRIS	42

DATE: 6/14/2024 4:07:44 PM
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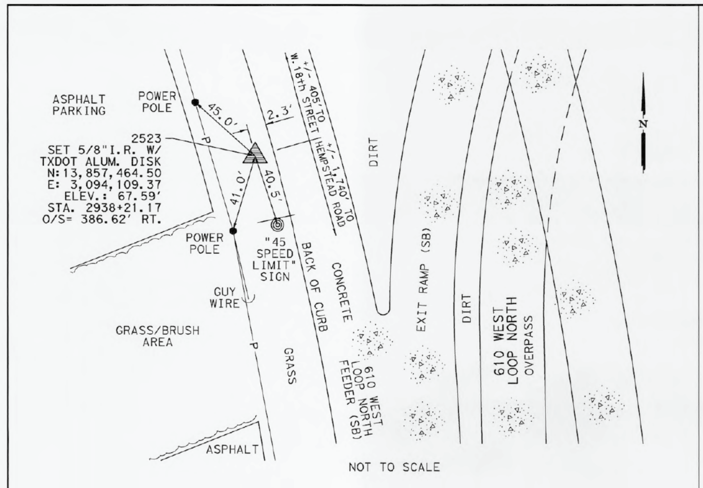
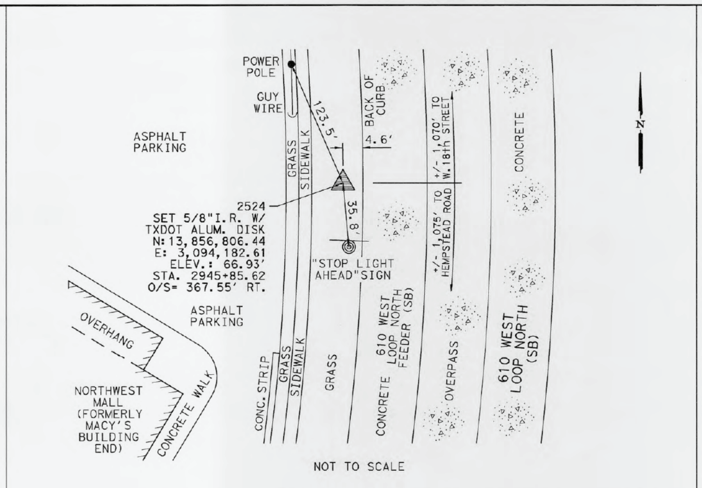
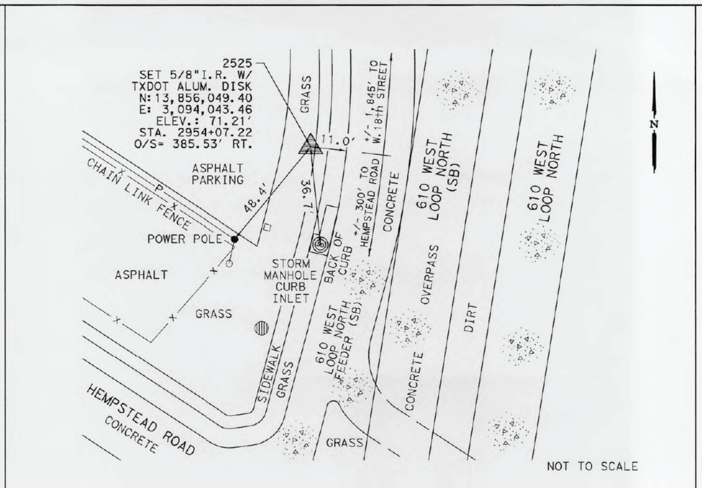


LOCATED ON THE WEST SIDE OF THE SOUTHBOUND FEEDER OF 610 WEST LOOP NORTH APPROXIMATELY 1,740 FEET NORTH FROM THE CENTERLINE OF HEMPSTEAD ROAD AND 405 FEET SOUTH FROM THE CENTERLINE OF WEST 18th STREET.



LOCATED ON THE WEST SIDE OF THE SOUTHBOUND FEEDER OF 610 WEST LOOP NORTH APPROXIMATELY 1,075 FEET NORTH FROM THE CENTERLINE OF HEMPSTEAD ROAD AND 1,070 FEET SOUTH FROM THE CENTERLINE OF WEST 18th STREET.



LOCATED ON THE WEST SIDE OF THE SOUTHBOUND FEEDER OF 610 WEST LOOP NORTH APPROXIMATELY 300 FEET NORTH FROM THE CENTERLINE OF HEMPSTEAD ROAD AND 1,845 FEET SOUTH FROM THE CENTERLINE OF WEST 18th STREET.

NOTES:

1. ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NORTH AMERICAN DATUM OF 1983 (NAD 83), 1993 ADJUSTMENT. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY DIVIDING BY A COMBINED ADJUSTMENT FACTOR OF 1.00013.
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4. HORIZONTAL PROJECT CONTROL WAS TIED UTILIZING THE TXDOT VRS NETWORK OF CONTINUOUSLY OPERATING REFERENCE STATIONS (CORS).
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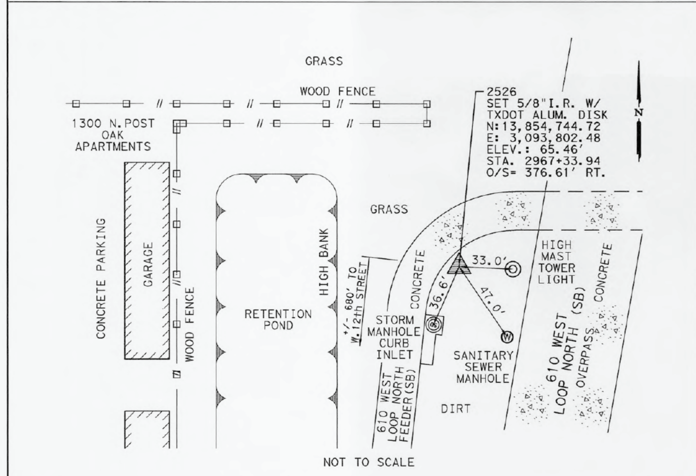
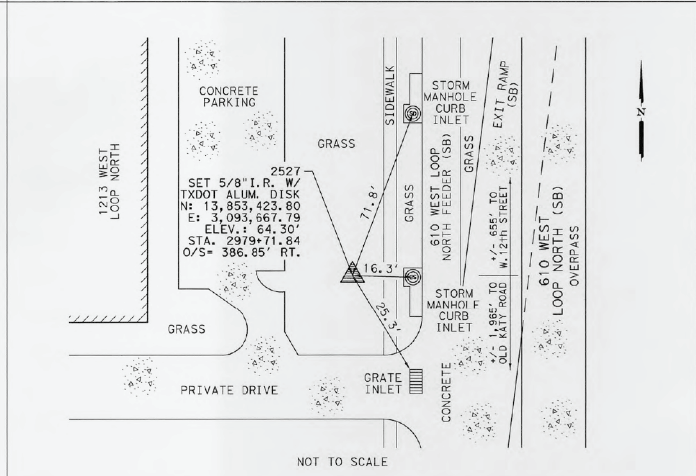
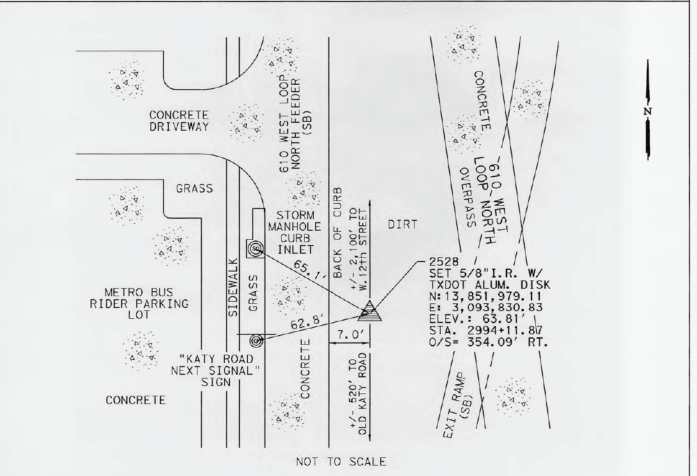


LOCATED ON THE EAST SIDE OF THE SOUTHBOUND FEEDER OF 610 WEST LOOP NORTH APPROXIMATELY 680 FEET NORTH FROM THE CENTERLINE OF WEST 12th STREET.



LOCATED ON THE WEST SIDE OF THE SOUTHBOUND FEEDER OF 610 WEST LOOP NORTH APPROXIMATELY 1,965 FEET NORTH FROM THE CENTERLINE OF OLD KATY ROAD AND 655 FEET SOUTH FROM THE CENTERLINE OF WEST 12th STREET.



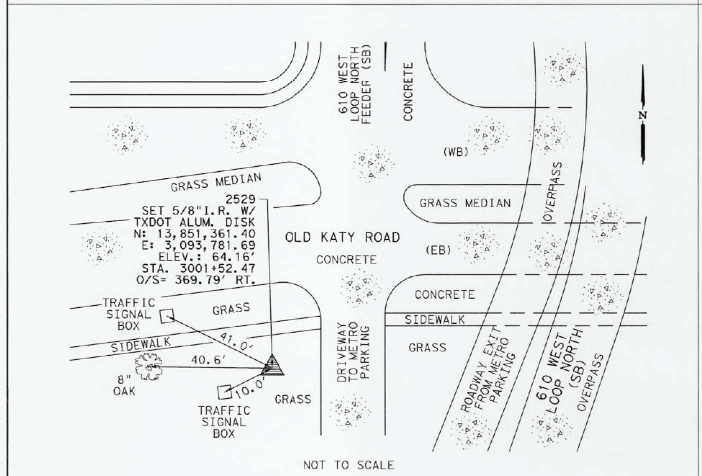
LOCATED ON THE EAST SIDE OF THE SOUTHBOUND FEEDER OF 610 WEST LOOP NORTH APPROXIMATELY 520 FEET NORTH FROM THE CENTERLINE OF OLD KATY ROAD AND 2,100 FEET SOUTH FROM THE CENTERLINE OF WEST 12th STREET.

SURVEYOR CERTIFICATION

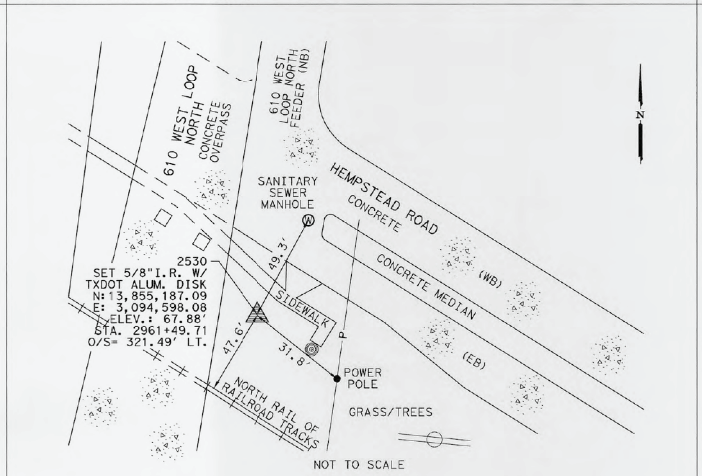
THE CONTROL POINTS SHOWN HEREON WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.

STATE OF TEXAS — DAVID H. SPRADLEY — 6035 — PROFESSIONAL LAND SURVEYOR

David Spradley 10/2/2019



LOCATED NEAR THE SOUTHWEST INTERSECTION OF 610 WEST LOOP NORTH AND OLD KATY ROAD.



LOCATED NEAR THE SOUTHEAST INTERSECTION OF 610 WEST LOOP NORTH AND HEMPSTEAD ROAD.

REVISIONS		
No.	DATE	DESCRIPTION

U.S. 290 & I.H. 610 (W. LOOP N. & N. LOOP W.)
SEGMENT 2
HORIZONTAL AND VERTICAL CONTROL DATA SHEET

Texas Department of Transportation

McKIM&CREED
ENGINEERS, SURVEYORS, PLANNERS
9960 West Sam Houston Parkway South, Suite 200 Houston, TX 77099, 713.659.0021
www.mckimcreed.com
TBPLS Firm Registration No. 101776-00

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				3A-5
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	HIGHWAY NO.
12	HARRIS	0271	14	221	IH 610

STATE OF TEXAS — STEVE VAN — 137551 — LICENSED PROFESSIONAL ENGINEER

Steve Van, P.E.
06.14.24

IH-610 SB FRTG RD (SUP)

HORIZONTAL & VERTICAL CONTROL DATA SHEET

SHEET 4 OF 4

TEXAS DEPARTMENT OF TRANSPORTATION

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610
DIST		COUNTY	SHEET NO.
12		HARRIS	43

THIS SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED IN THIS PS&E.

DATE: 6/14/2024 4:08:01 PM
PEN TABLE: ...0271-14-240 IH 610 FROM OLD KATY RD TO W. 12TH ST\Miscellaneous\Borders\PenTable 0271-14-240.tbl
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℄ SUP

Beginning chain SUP description

Point P031 N 13,851,440.1956 E 3,093,755.5640 Sta 10+00.00

Course from P031 to PC SUP1 N 5° 14′ 44.57" W Dist 14.2107

Curve Data

Curve SUP1					
P.I. Station	10+18.12	N	13,851,458.2375	E	3,093,753.9075
Delta =	33° 27′ 20.69"	(LT)			
Degree =	440° 44′ 12.36"				
Tangent =	3.9071				
Length =	7.5909				
Radius =	13.0000				
External =	0.5744				
Long Chord =	7.4835				
Mid. Ord. =	0.5501				
P.C. Station	10+14.21	N	13,851,454.3468	E	3,093,754.2647
P.T. Station	10+21.80	N	13,851,461.2866	E	3,093,751.4646
C.C.		N	13,851,453.1582	E	3,093,741.3192
Back = N	5° 14′ 44.57" W				
Ahead = N	38° 42′ 05.25" W				
Chord Bear = N	21° 58′ 24.91" W				

Course from PT SUP1 to PC SUP2 N 38° 42′ 05.26" W Dist 5.4104

Curve Data

Curve SUP2					
P.I. Station	10+28.90	N	13,851,466.8251	E	3,093,747.0272
Delta =	37° 16′ 38.77"	(RT)			
Degree =	1145° 54′ 56.12"				
Tangent =	1.6864				
Length =	3.2531				
Radius =	5.0000				
External =	0.2768				
Long Chord =	3.1960				
Mid. Ord. =	0.2622				
P.C. Station	10+27.21	N	13,851,465.5090	E	3,093,748.0817
P.T. Station	10+30.47	N	13,851,468.5111	E	3,093,746.9853
C.C.		N	13,851,468.6353	E	3,093,751.9837
Back = N	38° 42′ 05.25" W				
Ahead = N	1° 25′ 26.48" W				
Chord Bear = N	20° 03′ 45.87" W				

Course from PT SUP2 to P032 N 1° 25′ 26.48" W Dist 14.3118

Point P032 N 13,851,482.8184 E 3,093,746.6296 Sta 10+44.78

Course from P032 to P033 N 1° 52′ 48.52" W Dist 48.6540

Point P033 N 13,851,531.4462 E 3,093,745.0333 Sta 10+93.43

Course from P033 to PC SUP3 N 0° 22′ 02.02" W Dist 12.9317

Curve Data

Curve SUP3					
P.I. Station	11+13.45	N	13,851,548.1782	E	3,093,750.9328
Delta =	16° 47′ 55.54"	(LT)			
Degree =	119° 21′ 58.35"				
Tangent =	7.0875				
Length =	14.0733				
Radius =	48.0000				
External =	0.5204				
Long Chord =	14.0229				
Mid. Ord. =	0.5149				
P.C. Station	11+06.36	N	13,851,544.3777	E	3,093,744.9504
P.T. Station	11+20.44	N	13,851,553.5454	E	3,093,755.5615
C.C.		N	13,851,584.8933	E	3,093,719.2117
Back = N	57° 34′ 22.88" E				
Ahead = N	40° 46′ 27.34" E				
Chord Bear = N	49° 10′ 25.11" E				

Curve Data

Curve SUP4					
P.I. Station	11+28.47	N	13,851,559.6298	E	3,093,760.8086
Delta =	19° 00′ 16.41"	(LT)			
Degree =	119° 21′ 58.34"				
Tangent =	8.0344				
Length =	15.9212				
Radius =	48.0000				
External =	0.6678				
Long Chord =	15.8483				
Mid. Ord. =	0.6586				
P.C. Station	11+20.44	N	13,851,553.5454	E	3,093,755.5615
P.T. Station	11+36.36	N	13,851,567.0912	E	3,093,763.7884
C.C.		N	13,851,584.8933	E	3,093,719.2117
Back = N	40° 46′ 27.34" E				
Ahead = N	21° 46′ 10.93" E				
Chord Bear = N	31° 16′ 19.14" E				

Course from PT SUP4 to PC SUP5 N 21° 46′ 10.93" E Dist 10.0162

Curve Data

Curve SUP5					
P.I. Station	11+52.71	N	13,851,582.2736	E	3,093,769.8516
Delta =	22° 23′ 09.25"	(LT)			
Degree =	179° 02′ 57.52"				
Tangent =	6.3321				
Length =	12.5026				
Radius =	32.0000				
External =	0.6205				
Long Chord =	12.4233				
Mid. Ord. =	0.6087				
P.C. Station	11+46.37	N	13,851,576.3931	E	3,093,767.5032
P.T. Station	11+58.88	N	13,851,588.6053	E	3,093,769.7835
C.C.		N	13,851,588.2612	E	3,093,737.7854
Back = N	21° 46′ 10.93" E				
Ahead = N	0° 36′ 58.32" W				
Chord Bear = N	10° 34′ 36.31" E				

Course from PT SUP5 to P034 N 0° 36′ 58.31" W Dist 13.2552

Point P034 N 13,851,601.8597 E 3,093,769.6410 Sta 11+72.13

Course from P034 to PC SUP6 N 1° 43′ 59.56" W Dist 211.0551

Curve Data

Curve SUP6					
P.I. Station	13+87.48	N	13,851,817.1143	E	3,093,763.1275
Delta =	16° 51′ 37.70"	(RT)			
Degree =	197° 34′ 17.95"				
Tangent =	4.2980				
Length =	8.5339				
Radius =	29.0000				
External =	0.3168				
Long Chord =	8.5031				
Mid. Ord. =	0.3133				
P.C. Station	13+83.19	N	13,851,812.8183	E	3,093,763.2575
P.T. Station	13+91.72	N	13,851,821.2633	E	3,093,764.2491
C.C.		N	13,851,813.6954	E	3,093,792.2442
Back = N	1° 43′ 59.56" W				
Ahead = N	15° 07′ 38.13" E				
Chord Bear = N	6° 41′ 49.29" E				

Course from PT SUP6 to PC SUP7 N 15° 07′ 38.13" E Dist 2.9957

℄ SUP CONTINUED

Curve Data

Curve SUP7					
P.I. Station	13+97.82	N	13,851,827.1477	E	3,093,765.8398
Delta =	16° 47′ 38.10"	(LT)			
Degree =	272° 50′ 13.36"				
Tangent =	3.0999				
Length =	6.1553				
Radius =	21.0000				
External =	0.2276				
Long Chord =	6.1333				
Mid. Ord. =	0.2251				
P.C. Station	13+94.72	N	13,851,824.1552	E	3,093,765.0309
P.T. Station	14+00.87	N	13,851,830.2462	E	3,093,765.7497
C.C.		N	13,851,829.6355	E	3,093,744.7585
Back = N	15° 07′ 38.13" E				
Ahead = N	1° 39′ 59.97" W				
Chord Bear = N	6° 43′ 49.08" E				

Course from PT SUP7 to PC SUP8 N 1° 39′ 59.97" W Dist 1.2535

Curve Data

Curve SUP8					
P.I. Station	14+05.53	N	13,851,834.9050	E	3,093,765.6141
Delta =	18° 25′ 53.98"	(LT)			
Degree =	272° 50′ 13.36"				
Tangent =	3.4072				
Length =	6.7556				
Radius =	21.0000				
External =	0.2746				
Long Chord =	6.7265				
Mid. Ord. =	0.2711				
P.C. Station	14+02.12	N	13,851,831.4992	E	3,093,765.7132
P.T. Station	14+08.88	N	13,851,838.1047	E	3,093,764.4433
C.C.		N	13,851,830.8884	E	3,093,744.7221
Back = N	1° 39′ 59.97" W				
Ahead = N	20° 05′ 53.95" W				
Chord Bear = N	10° 52′ 56.96" W				

Course from PT SUP8 to PC SUP9 N 20° 05′ 53.93" W Dist 1.3536

Curve Data

Curve SUP9					
P.I. Station	14+14.97	N	13,851,843.8244	E	3,093,762.3503
Delta =	18° 33′ 15.58"	(RT)			
Degree =	197° 34′ 17.95"				
Tangent =	4.7371				
Length =	9.3912				
Radius =	29.0000				
External =	0.3843				
Long Chord =	9.3502				
Mid. Ord. =	0.3793				
P.C. Station	14+10.23	N	13,851,839.3758	E	3,093,763.9781
P.T. Station	14+19.62	N	13,851,848.5598	E	3,093,762.2227
C.C.		N	13,851,849.3412	E	3,093,791.2122
Back = N	20° 05′ 53.95" W				
Ahead = N	1° 32′ 38.37" W				
Chord Bear = N	10° 49′ 16.16" W				

Course from PT SUP9 to PC SUP10 N 1° 32′ 38.37" W Dist 68.7206

Curve Data

Curve SUP10					
P.I. Station	14+92.24	N	13,851,921.1487	E	3,093,760.2661
Delta =	18° 26′ 05.72"	(RT)			
Degree =	238° 43′ 56.69"				
Tangent =	3.8947				
Length =	7.7220				
Radius =	24.0000				
External =	0.3140				
Long Chord =	7.6887				
Mid. Ord. =	0.3099				
P.C. Station	14+88.35	N	13,851,917.2554	E	3,093,760.3711
P.T. Station	14+96.07	N	13,851,924.8753	E	3,093,761.3977
C.C.		N	13,851,917.9021	E	3,093,784.3624
Back = N	1° 32′ 38.37" W				
Ahead = N	16° 53′ 27.35" E				
Chord Bear = N	7° 40′ 24.49" E				

Course from PT SUP10 to PC SUP11 N 16° 53′ 27.36" E Dist 5.8991

Curve Data

Curve SUP11					
P.I. Station	15+07.30	N	13,851,935.6231	E	3,093,764.6613
Delta =	36° 52′ 11.63"	(LT)			
Degree =	358° 05′ 55.04"				
Tangent =	5.3333				
Length =	10.2960				
Radius =	16.0000				
External =	0.8655				
Long Chord =	10.1193				
Mid. Ord. =	0.8211				
P.C. Station	15+01.97	N	13,851,930.5199	E	3,093,763.1117
P.T. Station	15+12.26	N	13,851,940.6355	E	3,093,762.8390
C.C.		N	13,851,935.1687	E	3,093,747.8019
Back = N	16° 53′ 27.35" E				
Ahead = N	19° 58′ 44.28" W				
Chord Bear = N	1° 32′ 38.46" W				

Course from PT SUP11 to PC SUP12 N 19° 58′ 44.27" W Dist 5.8992

Curve Data

Curve SUP12					
P.I. Station	15+22.06	N	13,851,949.8399	E	3,093,759.4927
Delta =	18° 26′ 05.80"	(RT)			
Degree =	238° 43′ 56.69"				
Tangent =	3.8947				
Length =	7.7220				
Radius =	24.0000				
External =	0.3140				
Long Chord =	7.6887				
Mid. Ord. =	0.3099				
P.C. Station	15+18.16	N	13,851,946.1796	E	3,093,760.8234
P.T. Station	15+25.88	N	13,851,953.7332	E	3,093,759.3878
C.C.		N	13,851,954.3798	E	3,093,783.3791
Back = N	19° 58′ 44.28" W				
Ahead = N	1° 32′ 38.48" W				
Chord Bear = N	10° 45′ 41.38" W				

Course from PT SUP12 to P035 N 1° 32′ 38.48" W Dist 88.6773

Point P035 N 13,852,042.3782 E 3,093,756.9984 Sta 16+14.56

Course from P035 to P036 N 0° 48′ 26.73" W Dist 46.3937

Point P036 N 13,852,088.7673 E 3,093,756.3446 Sta 16+60.95

Course from P036 to PC SUP13 N 1° 22′ 19.20" W Dist 21.4665

STATE OF TEXAS
STEVE VAN
137551
LICENSED PROFESSIONAL ENGINEER
Steve Van, P.E.
06.14.24

IH-610
SB FRTG RD (SUP)
HORIZONTAL ALIGNMENT DATA

SHEET 1 OF 3

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610
DIST	COUNTY		SHEET NO.
12	HARRIS		44

DN: CK: DW: CK:

DATE: 6/14/2024 11:49:20 AM
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Curve Data

Curve SUP13
P.I. Station = 16+83.42 N 13,852,111.2273 E 3,093,755.8067
Delta = 1° 54′ 34.38" (LT)
Degree = 95° 29′ 34.68"
Tangent = 0.9999
Length = 1.9997
Radius = 60.0000
External = 0.0083
Long Chord = 1.9996
Mid. Ord. = 0.0083
P.C. Station = 16+82.42 N 13,852,110.2277 E 3,093,755.8306
P.T. Station = 16+84.42 N 13,852,112.2256 E 3,093,755.7494
C.C. N 13,852,108.7911 E 3,093,695.8478
Back = N 1° 22′ 19.20" W
Ahead = N 3° 16′ 53.58" W
Chord Bear = N 2° 19′ 36.39" W

Course from PT SUP13 to PC SUP14 N 3° 16′ 53.58" W Dist 28.0443

Curve Data

Curve SUP14
P.I. Station = 17+13.43 N 13,852,141.1884 E 3,093,754.0888
Delta = 1° 50′ 41.23" (RT)
Degree = 95° 29′ 34.68"
Tangent = 0.9660
Length = 1.9319
Radius = 60.0000
External = 0.0078
Long Chord = 1.9318
Mid. Ord. = 0.0078
P.C. Station = 17+12.47 N 13,852,140.2240 E 3,093,754.1441
P.T. Station = 17+14.40 N 13,852,142.1541 E 3,093,754.0646
C.C. N 13,852,143.6585 E 3,093,814.0457
Back = N 3° 16′ 53.58" W
Ahead = N 1° 26′ 12.34" W
Chord Bear = N 2° 21′ 32.96" W

Course from PT SUP14 to PC SUP15 N 1° 26′ 12.34" W Dist 86.1209

Curve Data

Curve SUP15
P.I. Station = 18+04.23 N 13,852,231.9606 E 3,093,751.8121
Delta = 8° 29′ 45.03" (RT)
Degree = 114° 35′ 29.61"
Tangent = 3.7138
Length = 7.4140
Radius = 50.0000
External = 0.1377
Long Chord = 7.4072
Mid. Ord. = 0.1374
P.C. Station = 18+00.52 N 13,852,228.2479 E 3,093,751.9052
P.T. Station = 18+07.93 N 13,852,235.6463 E 3,093,752.2685
C.C. N 13,852,229.5016 E 3,093,801.8895
Back = N 1° 26′ 12.34" W
Ahead = N 7° 03′ 32.68" E
Chord Bear = N 2° 48′ 40.17" E

Course from PT SUP15 to PC SUP16 N 7° 03′ 32.68" E Dist 18.3075

Curve Data

Curve SUP16
P.I. Station = 18+34.58 N 13,852,262.0915 E 3,093,755.5433
Delta = 17° 33′ 31.62" (LT)
Degree = 106° 06′ 11.86"
Tangent = 8.3398
Length = 16.5488
Radius = 54.0000
External = 0.6402
Long Chord = 16.4841
Mid. Ord. = 0.6327
P.C. Station = 18+26.24 N 13,852,253.8150 E 3,093,754.5184
P.T. Station = 18+42.79 N 13,852,270.2916 E 3,093,754.0235
C.C. N 13,852,260.4512 E 3,093,700.9277
Back = N 7° 03′ 32.68" E
Ahead = N 10° 29′ 58.94" W
Chord Bear = N 1° 43′ 13.13" W

Course from PT SUP16 to PC SUP17 N 10° 29′ 58.94" W Dist 18.5628

Curve Data

Curve SUP17
P.I. Station = 18+64.80 N 13,852,291.9343 E 3,093,750.0124
Delta = 7° 53′ 26.45" (RT)
Degree = 114° 35′ 29.61"
Tangent = 3.4484
Length = 6.8859
Radius = 50.0000
External = 0.1188
Long Chord = 6.8805
Mid. Ord. = 0.1185
P.C. Station = 18+61.35 N 13,852,288.5436 E 3,093,750.6408
P.T. Station = 18+68.24 N 13,852,295.3791 E 3,093,749.8554
C.C. N 13,852,297.6551 E 3,093,799.8036
Back = N 10° 29′ 58.94" W
Ahead = N 2° 36′ 32.49" W
Chord Bear = N 6° 33′ 15.71" W

Course from PT SUP17 to P037 N 2° 36′ 32.49" W Dist 128.3568

Point P037 N 13,852,423.6028 E 3,093,744.0126 Sta 19+96.59

Course from P037 to P038 N 5° 42′ 07.07" W Dist 55.7767

Point P038 N 13,852,479.1035 E 3,093,738.4710 Sta 20+52.37

Course from P038 to P039 N 5° 39′ 16.54" W Dist 19.2540

Point P039 N 13,852,498.2638 E 3,093,736.5738 Sta 20+71.62

Course from P039 to PC SUP18 N 7° 57′ 25.02" W Dist 37.8334

Curve Data

Curve SUP18
P.I. Station = 21+13.30 N 13,852,539.5417 E 3,093,730.8042
Delta = 8° 47′ 47.57" (RT)
Degree = 114° 35′ 29.61"
Tangent = 3.8458
Length = 7.6764
Radius = 50.0000
External = 0.1477
Long Chord = 7.6689
Mid. Ord. = 0.1472
P.C. Station = 21+09.46 N 13,852,535.7330 E 3,093,731.3366
P.T. Station = 21+17.13 N 13,852,543.3871 E 3,093,730.8606
C.C. N 13,852,542.6544 E 3,093,780.8552
Back = N 7° 57′ 25.02" W
Ahead = N 0° 50′ 22.55" E
Chord Bear = N 3° 33′ 31.23" W

Course from PT SUP18 to PC SUP19 N 0° 50′ 22.55" E Dist 18.2230

℄ SUP CONTINUED

Curve Data

Curve SUP19
P.I. Station = 21+43.72 N 13,852,569.9678 E 3,093,731.2501
Delta = 17° 36′ 06.85" (LT)
Degree = 106° 06′ 11.86"
Tangent = 8.3606
Length = 16.5894
Radius = 54.0000
External = 0.6434
Long Chord = 16.5242
Mid. Ord. = 0.6358
P.C. Station = 21+35.36 N 13,852,561.6081 E 3,093,731.1276
P.T. Station = 21+51.95 N 13,852,577.9731 E 3,093,728.8389
C.C. N 13,852,562.3994 E 3,093,677.1334
Back = N 0° 50′ 22.55" E
Ahead = N 16° 45′ 44.30" W
Chord Bear = N 7° 57′ 40.87" W

Course from PT SUP19 to PC SUP20 N 16° 45′ 44.30" W Dist 17.8385

Curve Data

Curve SUP20
P.I. Station = 21+73.87 N 13,852,598.9665 E 3,093,722.5157
Delta = 9° 20′ 41.16" (RT)
Degree = 114° 35′ 29.61"
Tangent = 4.0865
Length = 8.1548
Radius = 50.0000
External = 0.1667
Long Chord = 8.1458
Mid. Ord. = 0.1662
P.C. Station = 21+69.79 N 13,852,595.0536 E 3,093,723.6942
P.T. Station = 21+77.94 N 13,852,603.0188 E 3,093,721.9881
C.C. N 13,852,609.4737 E 3,093,771.5697
Back = N 16° 45′ 44.30" W
Ahead = N 7° 25′ 03.14" W
Chord Bear = N 12° 05′ 23.72" W

Course from PT SUP20 to P040 N 7° 25′ 03.14" W Dist 119.6472

Point P040 N 13,852,721.6648 E 3,093,706.5418 Sta 22+97.59

Course from P040 to P041 N 6° 41′ 17.58" W Dist 33.0539

Point P041 N 13,852,754.4937 E 3,093,702.6921 Sta 23+30.64

Course from P041 to PC SUP21 N 3° 40′ 06.39" W Dist 96.2314

Curve Data

Curve SUP21
P.I. Station = 24+27.36 N 13,852,851.0192 E 3,093,696.5035
Delta = 1° 52′ 49.73" (RT)
Degree = 190° 59′ 09.35"
Tangent = 0.4924
Length = 0.9846
Radius = 30.0000
External = 0.0040
Long Chord = 0.9846
Mid. Ord. = 0.0040
P.C. Station = 24+26.87 N 13,852,850.5279 E 3,093,696.5350
P.T. Station = 24+27.86 N 13,852,851.5114 E 3,093,696.4881
C.C. N 13,852,852.4474 E 3,093,726.4735
Back = N 3° 40′ 06.39" W
Ahead = N 1° 47′ 16.65" W
Chord Bear = N 2° 43′ 41.52" W

Course from PT SUP21 to PC SUP22 N 1° 47′ 16.65" W Dist 27.7512

Curve Data

Curve SUP22
P.I. Station = 24+57.40 N 13,852,881.0385 E 3,093,695.5664
Delta = 4° 06′ 04.96" (RT)
Degree = 114° 35′ 29.61"
Tangent = 1.7903
Length = 3.5791
Radius = 50.0000
External = 0.0320
Long Chord = 3.5784
Mid. Ord. = 0.0320
P.C. Station = 24+55.61 N 13,852,879.2490 E 3,093,695.6222
P.T. Station = 24+59.19 N 13,852,882.8274 E 3,093,695.6387
C.C. N 13,852,880.8091 E 3,093,745.5979
Back = N 1° 47′ 16.65" W
Ahead = N 2° 18′ 48.30" E
Chord Bear = N 0° 15′ 45.82" E

Course from PT SUP22 to PC SUP23 N 2° 18′ 48.30" E Dist 25.6475

Curve Data

Curve SUP23
P.I. Station = 24+88.04 N 13,852,911.6605 E 3,093,696.8035
Delta = 14° 04′ 21.45" (LT)
Degree = 220° 22′ 06.18"
Tangent = 3.2091
Length = 6.3860
Radius = 26.0000
External = 0.1973
Long Chord = 6.3699
Mid. Ord. = 0.1958
P.C. Station = 24+84.83 N 13,852,908.4540 E 3,093,696.6739
P.T. Station = 24+91.22 N 13,852,914.8023 E 3,093,696.1495
C.C. N 13,852,909.5035 E 3,093,670.6951
Back = N 2° 18′ 48.30" E
Ahead = N 11° 45′ 33.15" W
Chord Bear = N 4° 43′ 22.42" W

Course from PT SUP23 to PC SUP24 N 11° 45′ 33.15" W Dist 22.5725

Curve Data

Curve SUP24
P.I. Station = 25+17.83 N 13,852,940.8513 E 3,093,690.7269
Delta = 9° 13′ 38.57" (RT)
Degree = 114° 35′ 29.61"
Tangent = 4.0349
Length = 8.0522
Radius = 50.0000
External = 0.1625
Long Chord = 8.0437
Mid. Ord. = 0.1620
P.C. Station = 25+13.79 N 13,852,936.9011 E 3,093,691.5492
P.T. Station = 25+21.85 N 13,852,944.8823 E 3,093,690.5486
C.C. N 13,852,947.0910 E 3,093,740.4998
Back = N 11° 45′ 33.15" W
Ahead = N 2° 31′ 54.58" W
Chord Bear = N 7° 08′ 43.87" W

Course from PT SUP24 to PC SUP25 N 2° 31′ 54.58" W Dist 95.0896

STATE OF TEXAS
STEVE VAN
137551
LICENSED
PROFESSIONAL ENGINEER

Steve Van, P.E.

06.14.24

IH-610
SB FRTG RD (SUP)
HORIZONTAL ALIGNMENT DATA

SHEET 2 OF 3

TEXAS DEPARTMENT OF TRANSPORTATION

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610
DIST	COUNTY		SHEET NO.
12	HARRIS		45

DATE: 6/14/2024 11:49:21 AM
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DSN: CKS: DWN: CKS:

Curve Data							
Curve SUP25							
P.I. Station	26+22.02	N	13,853,044.9560	E	3,093,686.1236		
Delta =	11° 36′ 25.20"	(RT)					
Degree =	114° 35′ 29.61"						
Tangent =	5.0819						
Length =	10.1290						
Radius =	50.0000						
External =	0.2576						
Long Chord =	10.1117						
Mid. Ord. =	0.2563						
P.C. Station	26+16.94	N	13,853,039.8791	E	3,093,686.3481		
P.T. Station	26+27.06	N	13,853,049.9743	E	3,093,686.9252		
C.C.		N	13,853,042.0878	E	3,093,736.2993		
Back = N	2° 31′ 54.58" W						
Ahead = N	9° 04′ 30.61" E						
Chord Bear = N	3° 16′ 18.02" E						

Course from PT SUP25 to PC SUP26 N 9° 04′ 30.61" E Dist 12.9027

Curve Data							
Curve SUP26							
P.I. Station	26+42.17	N	13,853,064.8878	E	3,093,689.3073		
Delta =	11° 25′ 14.35"	(LT)					
Degree =	260° 26′ 07.30"						
Tangent =	2.1999						
Length =	4.3852						
Radius =	22.0000						
External =	0.1097						
Long Chord =	4.3780						
Mid. Ord. =	0.1092						
P.C. Station	26+39.97	N	13,853,062.7155	E	3,093,688.9603		
P.T. Station	26+44.35	N	13,853,067.0859	E	3,093,689.2173		
C.C.		N	13,853,066.1855	E	3,093,667.2357		
Back = N	9° 04′ 30.61" E						
Ahead = N	2° 20′ 43.73" W						
Chord Bear = N	3° 21′ 53.44" E						

Course from PT SUP26 to PC SUP27 N 2° 20′ 43.73" W Dist 5.5578

Curve Data							
Curve SUP27							
P.I. Station	26+51.84	N	13,853,074.5716	E	3,093,688.9107		
Delta =	8° 30′ 33.94"	(LT)					
Degree =	220° 22′ 06.18"						
Tangent =	1.9343						
Length =	3.8615						
Radius =	26.0000						
External =	0.0719						
Long Chord =	3.8579						
Mid. Ord. =	0.0717						
P.C. Station	26+49.91	N	13,853,072.6390	E	3,093,688.9899		
P.T. Station	26+53.77	N	13,853,076.4713	E	3,093,688.5464		
C.C.		N	13,853,071.5749	E	3,093,663.0116		
Back = N	2° 20′ 43.73" W						
Ahead = N	10° 51′ 17.68" W						
Chord Bear = N	6° 36′ 00.70" W						

Course from PT SUP27 to PC SUP28 N 10° 51′ 17.68" W Dist 14.2340

Curve Data							
Curve SUP28							
P.I. Station	26+72.06	N	13,853,094.4353	E	3,093,685.1018		
Delta =	8° 35′ 37.27"	(RT)					
Degree =	106° 06′ 11.86"						
Tangent =	4.0573						
Length =	8.0994						
Radius =	54.0000						
External =	0.1522						
Long Chord =	8.0918						
Mid. Ord. =	0.1518						
P.C. Station	26+68.01	N	13,853,090.4506	E	3,093,685.8658		
P.T. Station	26+76.10	N	13,853,098.4894	E	3,093,684.9417		
C.C.		N	13,853,100.6200	E	3,093,738.8996		
Back = N	10° 51′ 17.68" W						
Ahead = N	2° 15′ 40.41" W						
Chord Bear = N	6° 33′ 29.04" W						

Course from PT SUP28 to PC SUP29 N 2° 15′ 40.41" W Dist 12.1367

Curve Data							
Curve SUP29							
P.I. Station	26+92.27	N	13,853,114.6410	E	3,093,684.3039		
Delta =	8° 31′ 50.76"	(RT)					
Degree =	106° 06′ 11.86"						
Tangent =	4.0275						
Length =	8.0401						
Radius =	54.0000						
External =	0.1500						
Long Chord =	8.0326						
Mid. Ord. =	0.1496						
P.C. Station	26+88.24	N	13,853,110.6167	E	3,093,684.4628		
P.T. Station	26+96.28	N	13,853,118.6444	E	3,093,684.1437		
C.C.		N	13,853,112.7473	E	3,093,738.4208		
Back = N	2° 15′ 40.41" W						
Ahead = N	6° 16′ 10.35" E						
Chord Bear = N	2° 00′ 14.97" E						

Course from PT SUP29 to PC SUP30 N 6° 16′ 10.35" E Dist 14.2571

Curve Data							
Curve SUP30							
P.I. Station	27+12.48	N	13,853,134.7438	E	3,093,686.5125		
Delta =	8° 31′ 50.76"	(LT)					
Degree =	220° 22′ 06.18"						
Tangent =	1.9392						
Length =	3.8711						
Radius =	26.0000						
External =	0.0722						
Long Chord =	3.8676						
Mid. Ord. =	0.0720						
P.C. Station	27+10.54	N	13,853,132.8162	E	3,093,686.3007		
P.T. Station	27+14.41	N	13,853,136.6814	E	3,093,686.4360		
C.C.		N	13,853,135.6556	E	3,093,660.4562		
Back = N	6° 16′ 10.35" E						
Ahead = N	2° 15′ 40.41" W						
Chord Bear = N	2° 00′ 14.97" E						

Course from PT SUP30 to PC SUP31 N 2° 15′ 40.41" W Dist 5.5253

Curve Data							
Curve SUP31							
P.I. Station	27+21.87	N	13,853,144.1399	E	3,093,686.1415		
Delta =	8° 31′ 46.85"	(LT)					
Degree =	220° 22′ 06.18"						
Tangent =	1.9389						
Length =	3.8706						
Radius =	26.0000						
External =	0.0722						
Long Chord =	3.8671						
Mid. Ord. =	0.0720						
P.C. Station	27+19.94	N	13,853,142.2025	E	3,093,686.2180		
P.T. Station	27+23.81	N	13,853,146.0445	E	3,093,685.7784		
C.C.		N	13,853,141.1766	E	3,093,660.2382		
Back = N	2° 15′ 40.41" W						
Ahead = N	10° 47′ 27.25" W						
Chord Bear = N	6° 31′ 33.83" W						

Course from PT SUP31 to PC SUP32 N 10° 47′ 27.25" W Dist 14.2645

Curve Data							
Curve SUP32							
P.I. Station	27+42.09	N	13,853,164.0054	E	3,093,682.3552		
Delta =	8° 30′ 52.20"	(RT)					
Degree =	106° 06′ 11.86"						
Tangent =	4.0198						
Length =	8.0247						
Radius =	54.0000						
External =	0.1494						
Long Chord =	8.0173						
Mid. Ord. =	0.1490						
P.C. Station	27+38.07	N	13,853,160.0567	E	3,093,683.1078		
P.T. Station	27+46.10	N	13,853,168.0220	E	3,093,682.1955		
C.C.		N	13,853,170.1669	E	3,093,736.1529		
Back = N	10° 47′ 27.25" W						
Ahead = N	2° 16′ 35.06" W						
Chord Bear = N	6° 32′ 01.16" W						

Course from PT SUP32 to PC SUP33 N 2° 16′ 35.06" W Dist 11.4742

Curve Data							
Curve SUP33							
P.I. Station	27+60.60	N	13,853,182.5136	E	3,093,681.6194		
Delta =	6° 25′ 14.35"	(RT)					
Degree =	106° 06′ 11.86"						
Tangent =	3.0288						
Length =	6.0513						
Radius =	54.0000						
External =	0.0849						
Long Chord =	6.0482						
Mid. Ord. =	0.0847						
P.C. Station	27+57.57	N	13,853,179.4871	E	3,093,681.7397		
P.T. Station	27+63.62	N	13,853,185.5345	E	3,093,681.8383		
C.C.		N	13,853,181.6320	E	3,093,735.6971		
Back = N	2° 16′ 35.06" W						
Ahead = N	4° 08′ 39.29" E						
Chord Bear = N	0° 56′ 02.12" E						

Course from PT SUP33 to PC SUP34 N 4° 08′ 39.29" E Dist 20.8576

Curve Data							
Curve SUP34							
P.I. Station	27+91.68	N	13,853,213.5250	E	3,093,683.8664		
Delta =	15° 12′ 08.31"	(LT)					
Degree =	106° 06′ 11.86"						
Tangent =	7.2062						
Length =	14.3278						
Radius =	54.0000						
External =	0.4781						
Long Chord =	14.2858						
Mid. Ord. =	0.4745						
P.C. Station	27+84.48	N	13,853,206.3376	E	3,093,683.3457		
P.T. Station	27+98.81	N	13,853,220.5974	E	3,093,682.4842		
C.C.		N	13,853,210.2400	E	3,093,629.4868		
Back = N	4° 08′ 39.29" E						
Ahead = N	11° 03′ 29.02" W						
Chord Bear = N	3° 27′ 24.86" W						

Course from PT SUP34 to PC SUP35 N 11° 03′ 29.02" W Dist 17.0472

Curve Data							
Curve SUP35							
P.I. Station	28+20.27	N	13,853,241.6422	E	3,093,678.2682		
Delta =	10° 05′ 46.25"	(RT)					
Degree =	114° 35′ 29.61"						
Tangent =	4.4167						
Length =	8.8106						
Radius =	50.0000						
External =	0.1947						
Long Chord =	8.7992						
Mid. Ord. =	0.1939						
P.C. Station	28+15.85	N	13,853,237.3281	E	3,093,679.2145		
P.T. Station	28+24.66	N	13,853,246.0555	E	3,093,678.0927		
C.C.		N	13,853,248.0415	E	3,093,728.0533		
Back = N	12° 22′ 21.31" W						
Ahead = N	2° 16′ 35.06" W						
Chord Bear = N	7° 19′ 28.18" W						

Course from PT SUP35 to P042 N 2° 16′ 35.06" W Dist 55.2265

Point P042 N 13,853,301.2384 E 3,093,675.8991 Sta 28+79.89

Course from P042 to P043 N 2° 47′ 44.33" W Dist 91.6978

Point P043 N 13,853,392.8271 E 3,093,671.4267 Sta 29+71.59

Course from P043 to PC SUP36 N 2° 30′ 14.29" W Dist 90.4512

Curve Data							
Curve SUP36							
P.I. Station	30+65.87	N	13,853,487.0168	E	3,093,667.3077		
Delta =	8° 45′ 26.48"	(RT)					
Degree =	114° 35′ 29.61"						
Tangent =	3.8286						
Length =	7.6422						
Radius =	50.0000						
External =	0.1464						
Long Chord =	7.6348						
Mid. Ord. =	0.1459						
P.C. Station	30+62.04	N	13,853,483.1919	E	3,093,667.4750		
P.T. Station	30+69.68	N	13,853,490.8226	E	3,093,667.7248		
C.C.		N	13,853,485.3763	E	3,093,717.4272		
Back = N	2° 30′ 14.29" W						
Ahead = N	6° 15′ 12.19" E						
Chord Bear = N	1° 52′ 28.95" E						

Course from PT SUP36 to PC SUP37 N 6° 15′ 12.19" E Dist 18.3159

Curve Data							
Curve SUP37							
P.I. Station	30+96.19	N	13,853,517.1778	E	3,093,670.6127		
Delta =	17° 15′ 46.79"	(LT)					
Degree =	106° 06′ 11.86"						
Tangent =	8.1971						
Length =	16.2700						
Radius =	54.0000						
External =	0.6186						
Long Chord =	16.2085						
Mid. Ord. =	0.6116						
P.C. Station	30+88.00	N	13,853,509.0295	E	3,093,669.7198		
P.T. Station	31+04.27	N	13,853,525.2241	E	3,093,669.0473		
C.C.		N	13,853,514.9115	E	3,093,616.0411		
Back = N	6° 15′ 12.19" E						
Ahead = N	11° 00′ 34.60" W						
Chord Bear = N	2° 22′ 41.21" W						

Course from PT SUP37 to PC SUP38 N 11° 00′ 34.60" W Dist 18.4480

Curve Data							
Curve SUP38							
P.I. Station	31+26.42	N	13,853,546.9652	E	3,093,664.8174		
Delta =	8° 27′ 58.11"	(RT)					
Degree =	114° 35′ 29.61"						
Tangent =	3.7008						
Length =	7.3881						
Radius =	50.0000						
External =	0.1368						
Long Chord =	7.3814						
Mid. Ord. =	0.1364						
P.C. Station	31+22.72	N	13,853,543.3325	E	3,093,665.5242		
P.T. Station	31+30.10	N	13,853,550.6623	E	3,093,664.6532		
C.C.		N	13,853,552.8812	E	3,093,714.6039		
Back = N	11° 00′ 34.60" W						
Ahead = N	2° 32′ 36.50" W						
Chord Bear = N	6° 46′ 35.55" W						

Course from PT SUP38 to PC SUP39 N 2° 32′ 36.50" W Dist 110.8049

Curve Data							
Curve SUP39							
P.I. Station	33+17.42	N	13,853,737.7915	E	3,093,656.3407		
Delta =	4° 09′ 11.82"	(RT)					
Degree =	2° 42′ 55.58"						
Tangent =	76.5089						
Length =	152.9607						
Radius =	2,110.0000						
External =	1.3867						
Long Chord =	152.9172						
Mid. Ord. =	1.3857						
P.C. Station	32+40.91	N	13,853,661.3580	E	3,093,659.7360		
P.T. Station	33+93.86	N	13,853,814.2702	E	3,093,658.4901		
C.C.		N	13,853,754.9943	E	3,095,767.6573		
Back = N	2° 32′ 36.50" W						
Ahead = N	1° 36′ 35.33" E						
Chord Bear = N	0° 28′ 00.59" W						

Course from PT SUP39 to P044 N 1° 26′ 07.70" E Dist 37.0057

Point P044 N 13,853,851.2642 E 3,093,659.4171 Sta 34+30.86

Course from P044 to P045 N 2° 09′ 04.19" E Dist 21.3990

Point P045 N 13,853,872.6482 E 3,093,660.2203 Sta 34+52.26

Course from P045 to P046 N 3° 47′ 49.80" E Dist 44.2177

Point P046 N 13,853,916.7689 E 3,093,663.1486 Sta 34+96.48

Course from P046 to P047 N 4° 58′ 37.20" E Dist 74.6956

Point P047 N 13,853,991.1829 E 3,093,669.6289 Sta 35+71.18

Course from P047 to PC SUP40 N 23° 10′ 53.72" W Dist 20.1432

Curve Data							
Curve SUP40							
P.I. Station	36+08.95	N	13,854,025.9051	E	3,093,654.7602		
Delta =	37° 07′ 20.67"	(LT)					
Degree =	109° 08′ 05.35"						
Tangent =	17.6286						
Length =	34.0152						
Radius =	52.5000						
External =	2.8807						
Long Chord =	33.4233						
Mid. Ord. =	2.7308						
P.C. Station	35+91.32	N	13,854,009.6997	E	3,093,661.6996		
P.T. Station	36+25.33	N	13,853,994.0382	E	3,093,639.4468		
C.C.		N	13,853,989.0333	E	3,093,613.4384		
Back = N	23° 10′ 53.72" W						
Ahead = N	60° 18′ 14.39" W						
Chord Bear = N	41° 44′ 34.06" W						

Ending chain SUP description

Steve Van, P.E.

06.14.24

IH-610
SB FRTG RD (SUP)
HORIZONTAL ALIGNMENT DATA

SHEET 3 OF 3

TEXAS DEPARTMENT OF TRANSPORTATION

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610
DIST	COUNTY		SHEET NO.
12	HARRIS		46

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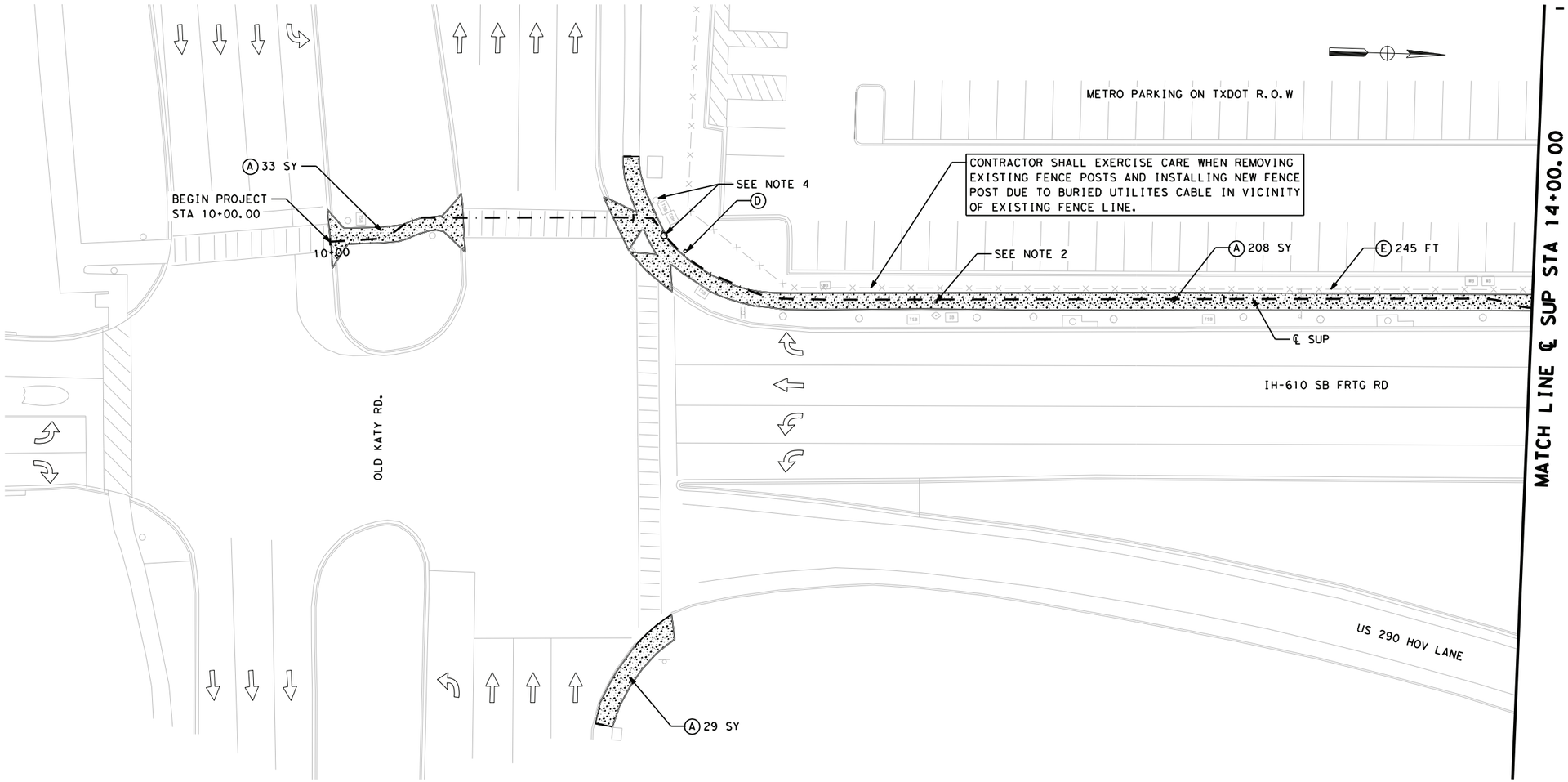

NOTES:

1. CALL 811 TO DETERMINE THE PROPER LOCATIONS OF UNDERGROUND UTILITIES PRIOR TO EXCAVATE.
2. SEE SUP LAYOUTS FOR MORE INFORMATION.
3. SAW CUT WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO ITEM 104.
4. SEE TRAFFIC SIGNAL LAYOUTS FOR RELOCATING PEDESTRIAN POLES.

STATE OF TEXAS
STEVE VAN
137551
LICENSED
PROFESSIONAL ENGINEER

Steve Van, P.E.

06.14.24

IH-610
SB FRTG RD (SUP)
DEMOLITION LAYOUT

SCALE: 1":40' HORZ

SHEET 1 OF 4

TEXAS DEPARTMENT OF TRANSPORTATION

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610
DIST	COUNTY		SHEET NO.
12	HARRIS		47

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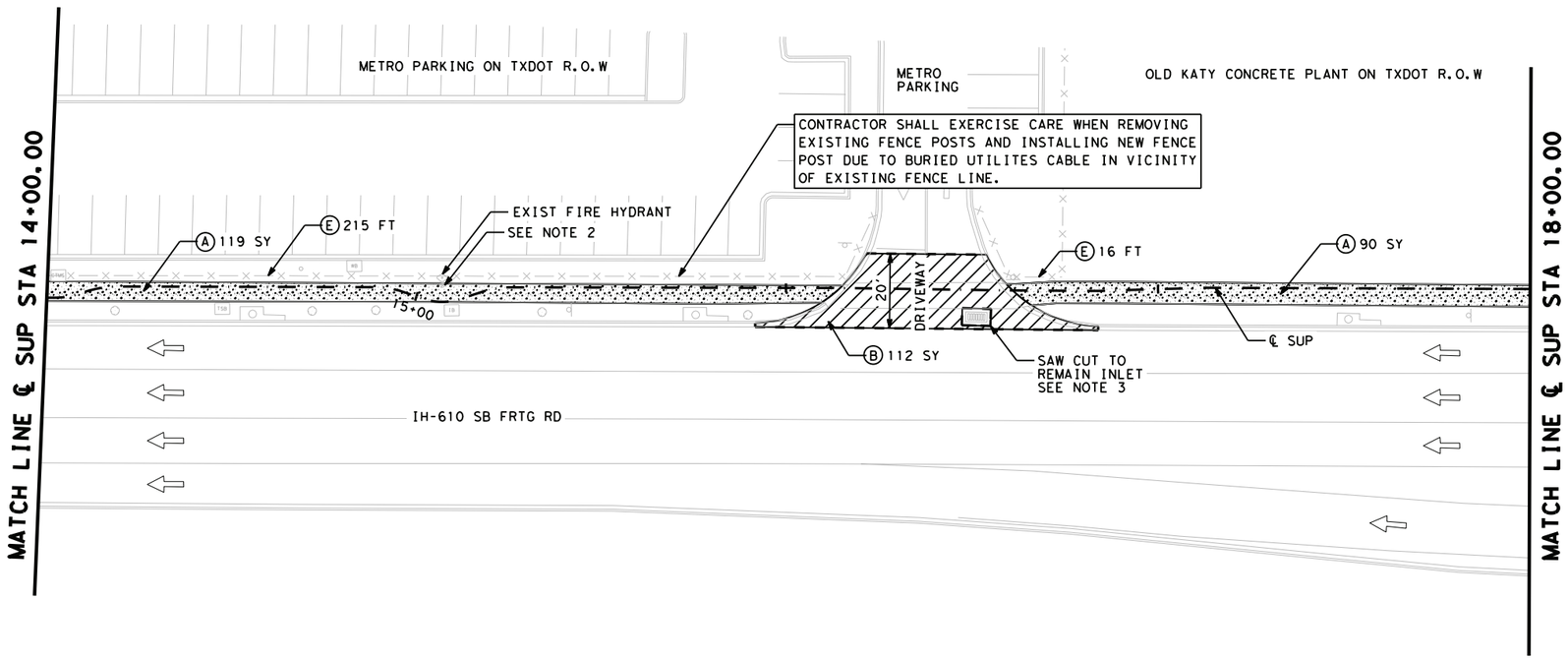

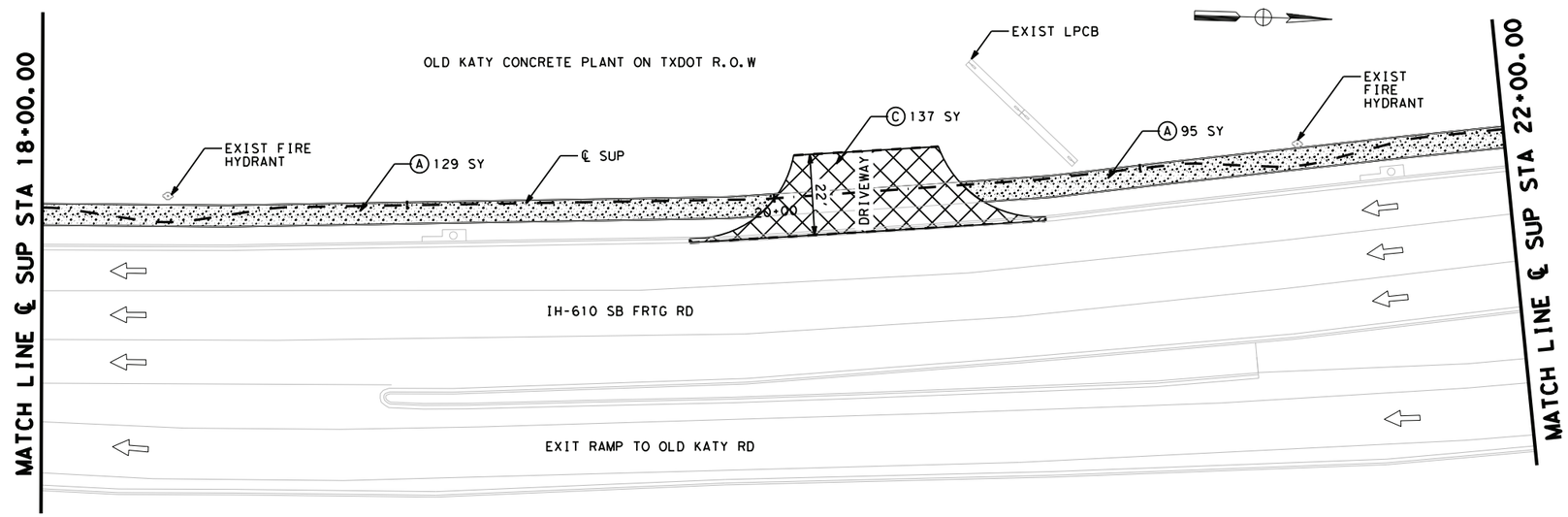

LEGEND:

- (A) REMOVE CONC SIDEWALK
- (B) REMOVE CONC DRIVEWAY
- (C) REMOVE STAB BASE AND ASPH PAV (6")
- (D) REMOVE SM RD SN (FOUNDATION ONLY)
- (E) REMOVE CHAIN LINK FENCE
- (F) REMOVE 6" CONC CURB
- (G) REMOVE UTILITY POLE
- (H) REMOVE TOP STR INLET TYPE C (STAGE 2)
- SAW CUT
- EXISTING UTILITY GROUND BOX

NOTES:

1. CALL 811 TO DETERMINE THE PROPER LOCATIONS OF UNDERGROUND UTILITIES PRIOR TO EXCAVATE.
2. SEE SUP LAYOUTS FOR MORE INFORMATION.
3. SAW CUT WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO ITEM 104.
4. REMOVAL OF DRIVEWAY CURB WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO ITEM 104-7011.

STATE OF TEXAS
STEVE VAN
137551
LICENSED PROFESSIONAL ENGINEER

Steve Van, P.E.

06.14.24

IH-610
SB FRTG RD (SUP)
DEMOLITION LAYOUT

SCALE: 1":40' HORZ

SHEET 2 OF 4

TEXAS DEPARTMENT OF TRANSPORTATION

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610
DIST	COUNTY		SHEET NO.
12	HARRIS		48

DATE: 6/14/2024 11:49:38 AM
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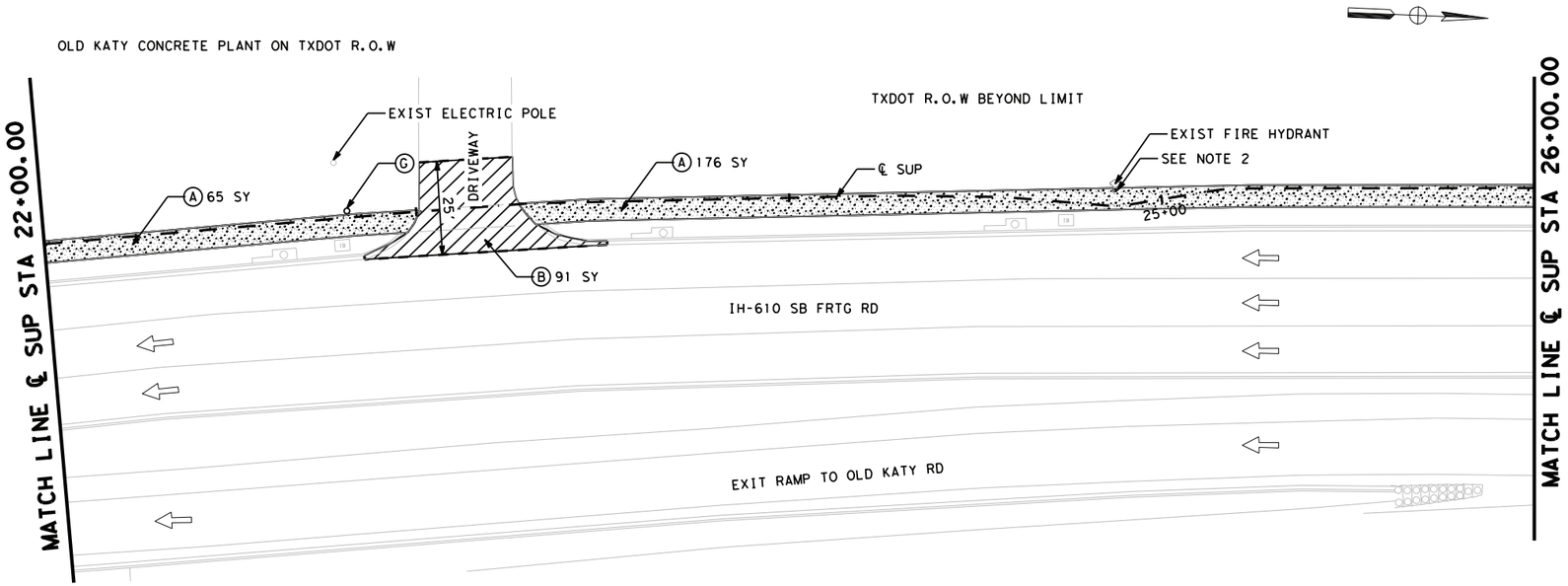

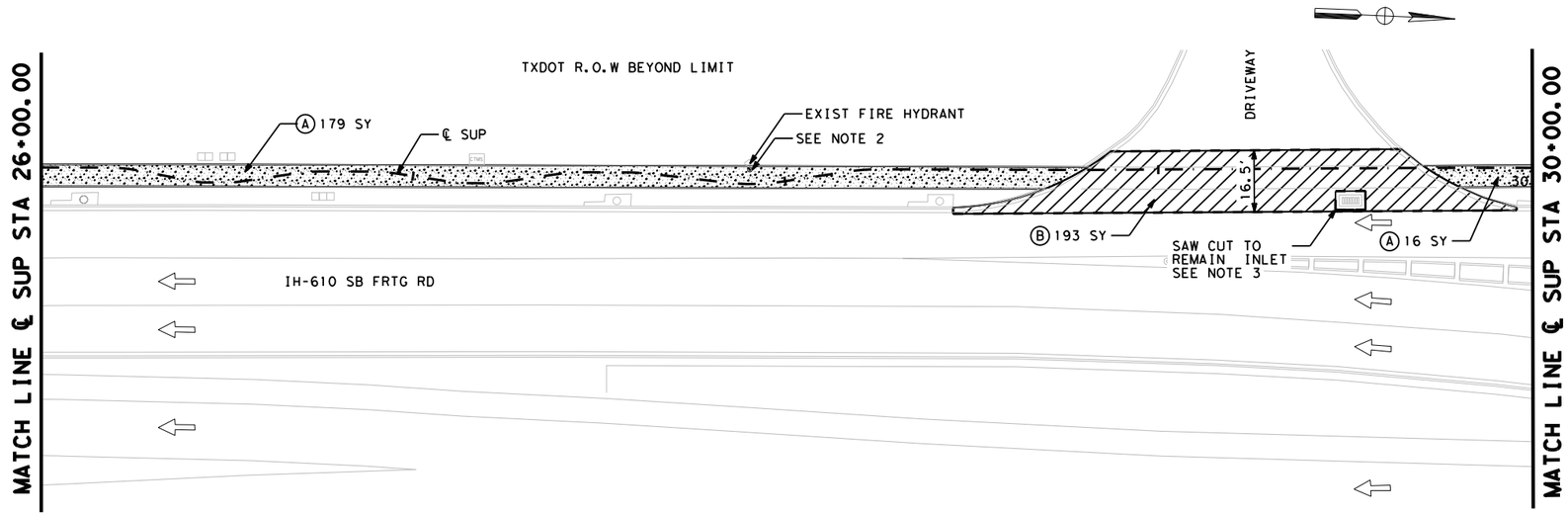

LEGEND:

- (A) REMOVE CONC SIDEWALK
- (B) REMOVE CONC DRIVEWAY
- (C) REMOVE STAB BASE AND ASPH PAV (6")
- (D) REMOVE SM RD SN (FOUNDATION ONLY)
- (E) REMOVE CHAIN LINK FENCE
- (F) REMOVE 6" CONC CURB
- (G) REMOVE UTILITY POLE
- (H) REMOVE TOP STR INLET TYPE C (STAGE 2)
- SAW CUT
- EXISTING UTILITY GROUND BOX

NOTES:

1. CALL 811 TO DETERMINE THE PROPER LOCATIONS OF UNDERGROUND UTILITIES PRIOR TO EXCAVATE.
2. SEE SUP LAYOUTS FOR MORE INFORMATION.
3. SAW CUT WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO ITEM 104.
4. REMOVAL OF DRIVEWAY CURB WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO ITEM 104-7011.

STATE OF TEXAS
STEVE VAN
137551
LICENSED PROFESSIONAL ENGINEER

Steve Van, P.E.
06.14.24

IH-610
SB FRTG RD (SUP)
DEMOLITION LAYOUT

SCALE: 1":40' HORZ

SHEET 3 OF 4

TEXAS DEPARTMENT OF TRANSPORTATION

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610
DIST	COUNTY		SHEET NO.
12	HARRIS		49

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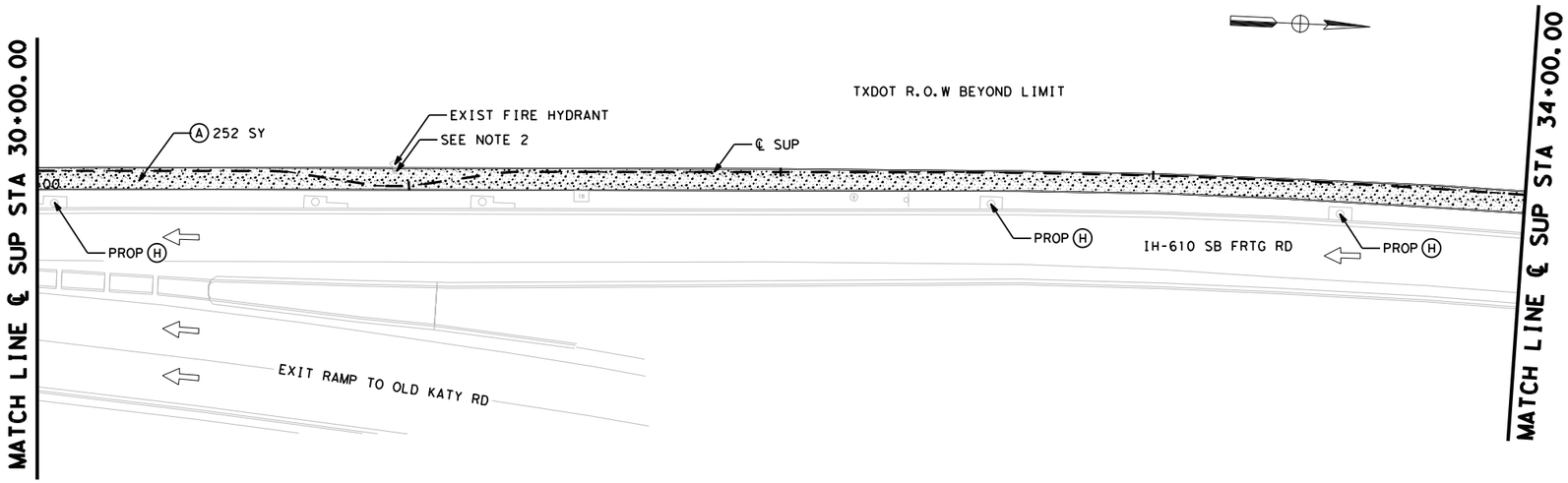

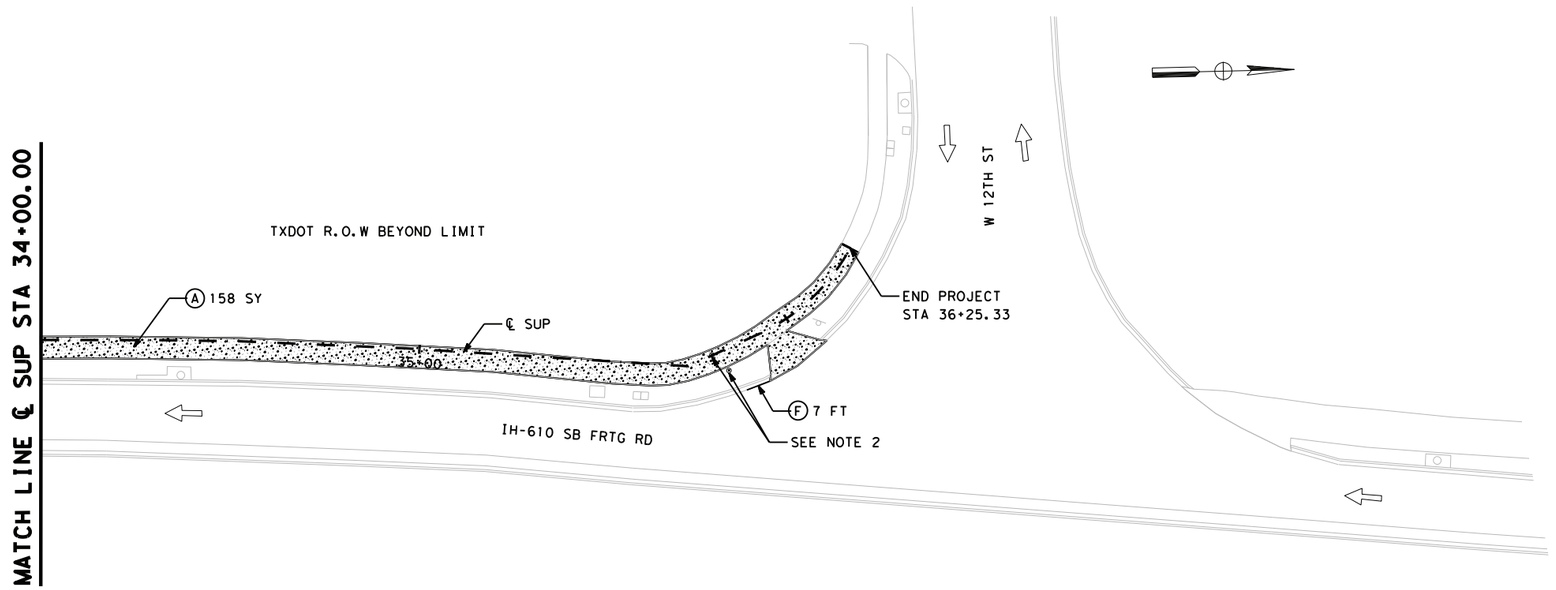

LEGEND:

- (A) REMOVE CONC SIDEWALK
- (B) REMOVE CONC DRIVEWAY
- (C) REMOVE STAB BASE AND ASPH PAV (6")
- (D) REMOVE SM RD SN (FOUNDATION ONLY)
- (E) REMOVE CHAIN LINK FENCE
- (F) REMOVE 6" CONC CURB
- (G) REMOVE UTILITY POLE
- (H) REMOVE TOP STR INLET TYPE C (STAGE 2)
- SAW CUT
- EXISTING UTILITY GROUND BOX

NOTES:

1. CALL 811 TO DETERMINE THE PROPER LOCATIONS OF UNDERGROUND UTILITIES PRIOR TO EXCAVATE.
2. SEE SUP LAYOUTS FOR MORE INFORMATION.
3. SAW CUT WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO ITEM 104.
4. REMOVE TOP STRUCTURE INLET TY C (STAGE 2) WILL BE PAID TO ITEM 496-7002.

STATE OF TEXAS
STEVE VAN
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LICENSED
PROFESSIONAL ENGINEER

Steve Van, P.E.

06.14.24

IH-610
SB FRTG RD (SUP)
DEMOLITION LAYOUT

SCALE: 1":40' HORZ

SHEET 4 OF 4

TEXAS DEPARTMENT OF TRANSPORTATION

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610
DIST	COUNTY		SHEET NO.
12	HARRIS		50

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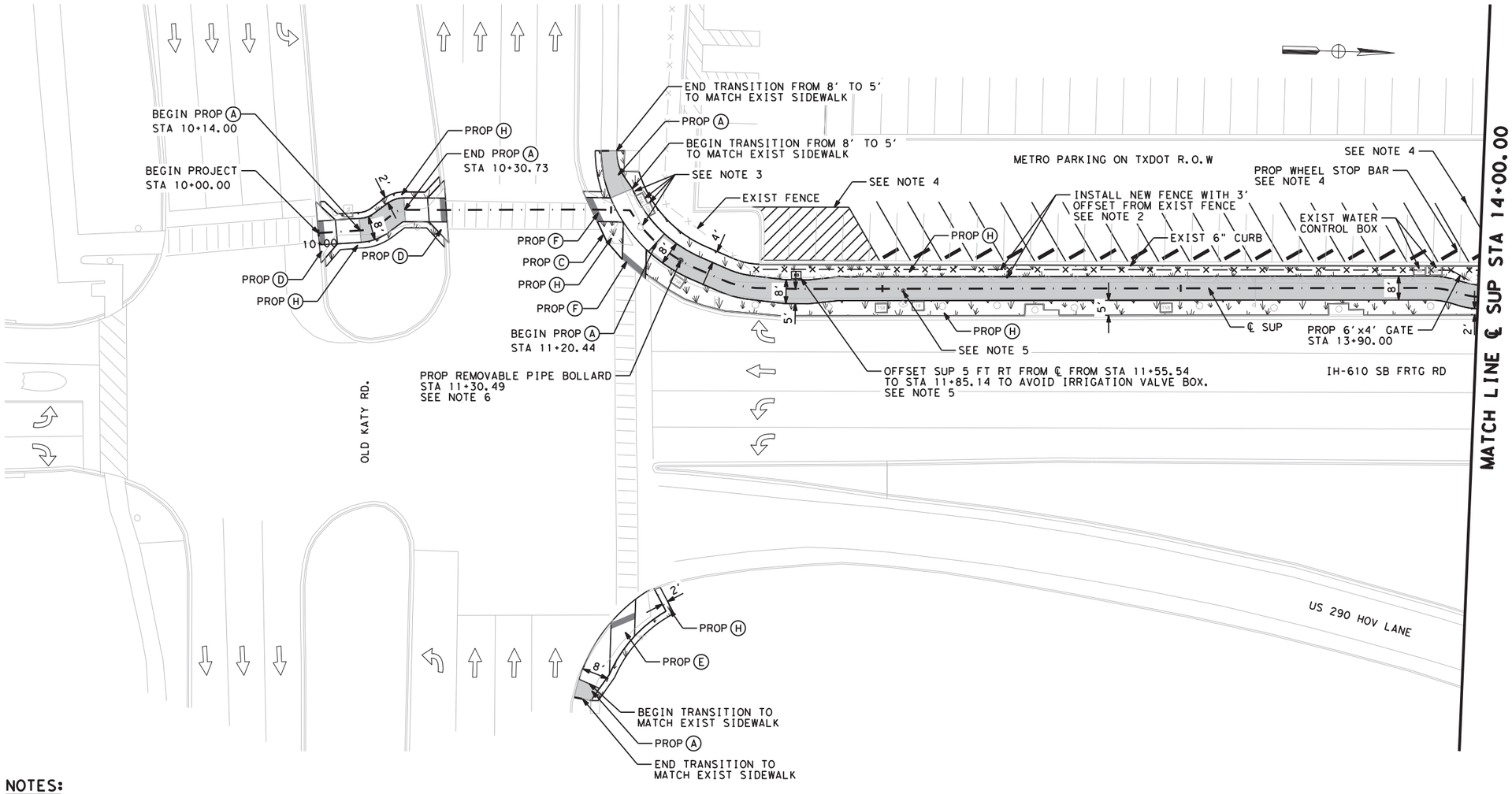

LEGEND:

- (A) 6" CONC SIDEWALK
- (B) 6" CONC DRIVEWAY
- (C) 6" CONC CURB (DOWEL)
- (D) CURB RAMPS (TY 1)
- (E) CURB RAMPS (TY 2)
- (F) CURB RAMPS (TY 7)
- (H) BLOCK SOD
- (G) TOP STR INLET TYPE C (STAGE 2)
- (I) 6" CONC CURB (MONO) (TY II)
- NEW CHAIN LINK FENCE
- EXISTING CHAIN LINK FENCE
- EXISTING UTILITY GROUND BOX
- (X) DRIVEWAY NO.
- SAW CUT

NOTES:

1. CALL 811 TO DETERMINE THE PROPER LOCATIONS OF UNDERGROUND UTILITIES PRIOR TO EXCAVATE.
2. PROPOSED CHAIN LINK FENCE AND SINGLE 6'X4' GATE ARE FABRIC CLASS 2A, EXTRUDED 2X8 BLACK VINYL ALL PIPE AND FITTINGS TO BE POWDER COATED BLACK. EXACT DIMENSION OF CHAIN LINK FENCE WILL BE VERIFIED BY THE CONTRACTOR IN THE FIELD PRIOR TO REPLACE.

   ANY EXIST METRO SIGNS ATTACHING ON EXIST CHAIN LINK FENCE WILL BE REMOVED AND RELOCATED BACK TO NEW CHAIN LINK FENCE. THE WORK WILL BE CONSIDERED SUBSIDIARY TO ITEM 550.

   VACUUM EXCAVATION WILL BE USED FOR INSTALLING NEW FOUNDATION FOR THE CHAIN LINK FENCE AND GATES TO AVOID DAMAGING THE BURIED IRRIGATION PIPE AND UTILITIES. UPON DISCOVERY OF UTILITIES, ADD A PROTECTIVE SLEEVE OR FELT PAPER AROUND THE UTILITIES BEFORE POURING THE CONCRETE TO HAVE A POTENTIAL BONDING BETWEEN CONCRETE AND UTILITIES. ALL WORKS WILL BE PAID UNDER ITEM 110-7003.

   IF CONTRACTOR DAMAGES THE SPRINKLING HEADS DURING EXCAVATION. THE REPLACEMENT WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO ITEM 550.

   IF CONTRACTOR DAMAGES THE IRRIGATION PIPES DURING EXCAVATION. THE REPLACEMENT WILL BE PAID UNDER ITEM 481.
3. SEE TRAFFIC SIGNAL SHEETS FOR RELOCATING PEDESTRIAN POLES. ADJUST TWO UTILITY GROUND BOXES IF NEED.
4. SEE PRECAST CONCRETE WHEEL STOP DETAIL AND PAVEMENT MARKING SHEETS FOR MORE INFORMATION.
5. ADJUST EXISTING WATER VALVE COVER IF NEED. ADJUST IRRIGATION VALVE BOX TO GROUND LEVEL & INSTALL MISSING COVER. THE WORK WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO ITEM 531.
6. SEE REMOVABLE PIPE BOLLARD DETAIL SHEET FOR MORE INFORMATION.

STATE OF TEXAS
STEVE VAN
137551
LICENSED
PROFESSIONAL ENGINEER

Steve Van, P.E.

08.09.24

IH-610
SB FRTG RD (SUP)
SUP LAYOUT

SCALE: 1":40' HORZ

SHEET 1 OF 4

TEXAS DEPARTMENT OF TRANSPORTATION

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610
DIST	COUNTY		SHEET NO.
12	HARRIS		51

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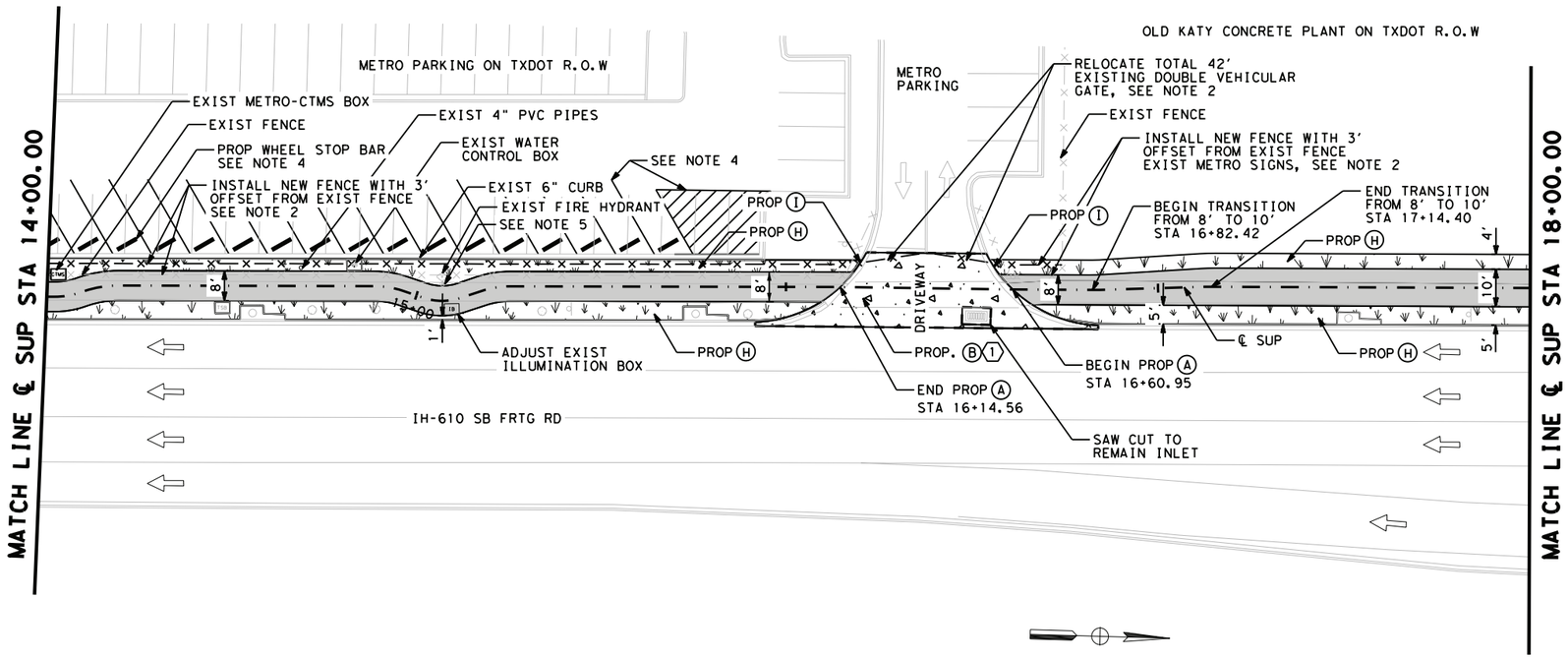

LEGEND:

- (A) 6" CONC SIDEWALK
- (B) 6" CONC DRIVEWAY
- (C) 6" CONC CURB (DOWEL)
- (D) CURB RAMPS (TY 1)
- (E) CURB RAMPS (TY 2)
- (F) CURB RAMPS (TY 7)
- (H) BLOCK SOD
- (G) TOP STR INLET TYPE C (STAGE 2)
- (I) 6" CONC CURB (MONO) (TY II)
- NEW CHAIN LINK FENCE
- EXISTING CHAIN LINK FENCE
- EXISTING UTILITY GROUND BOX
- (X) DRIVEWAY NO.
- SAW CUT

NOTES:

1. CALL 811 TO DETERMINE THE PROPER LOCATIONS OF UNDERGROUND UTILITIES PRIOR TO EXCAVATE.
2. PROPOSED CHAIN LINK FENCE AND SINGLE 6'X4' GATE ARE FABRIC CLASS 2A, EXTRUDED 2X8 BLACK VINYL ALL PIPE AND FITTINGS TO BE POWDER COATED BLACK. EXACT DIMENSION OF CHAIN LINK FENCE WILL BE VERIFIED BY THE CONTRACTOR IN THE FIELD PRIOR TO REPLACE.

   ANY EXIST METRO SIGNS ATTACHING ON EXIST CHAIN LINK FENCE WILL BE REMOVED AND RELOCATED BACK TO NEW CHAIN LINK FENCE. THE WORK WILL BE CONSIDERED SUBSIDIARY TO ITEM 550.

   VACUUM EXCAVATION WILL BE USED FOR INSTALLING NEW FOUNDATION FOR THE CHAIN LINK FENCE AND GATES TO AVOID DAMAGING THE BURIED IRRIGATION PIPE AND UTILITIES. UPON DISCOVERY OF UTILITIES, ADD A PROTECTIVE SLEEVE OR FELT PAPER AROUND THE UTILITIES BEFORE POURING THE CONCRETE TO HAVE A POTENTIAL BONDING BETWEEN CONCRETE AND UTILITIES. ALL WORKS WILL BE PAID UNDER ITEM 110-7003.

   IF CONTRACTOR DAMAGES THE SPRINKLING HEADS DURING EXCAVATION. THE REPLACEMENT WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO ITEM 550.

   IF CONTRACTOR DAMAGES THE IRRIGATION PIPES DURING EXCAVATION. THE REPLACEMENT WILL BE PAID UNDER ITEM 481.
3. SEE TRAFFIC SIGNAL SHEETS FOR RELOCATING PEDESTRIAN POLES. ADJUST TWO UTILITY GROUND BOXES IF NEED.
4. SEE PRECAST CONCRETE WHEEL STOP DETAIL AND PAVEMENT MARKING SHEETS FOR MORE INFORMATION.
5. ADJUST EXISTING WATER VALVE COVER IF NEED. THE WORK WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO ITEM 531.
6. SEE REMOVABLE PIPE BOLLARD DETAIL SHEET FOR MORE INFORMATION.

STATE OF TEXAS
STEVE VAN
137551
LICENSED PROFESSIONAL ENGINEER

Steve Van, P.E.

06.14.24

IH-610
SB FRTG RD (SUP)
SUP LAYOUT

SCALE: 1":40' HORZ

SHEET 2 OF 4

TEXAS DEPARTMENT OF TRANSPORTATION

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610
DIST	COUNTY		SHEET NO.
12	HARRIS		52

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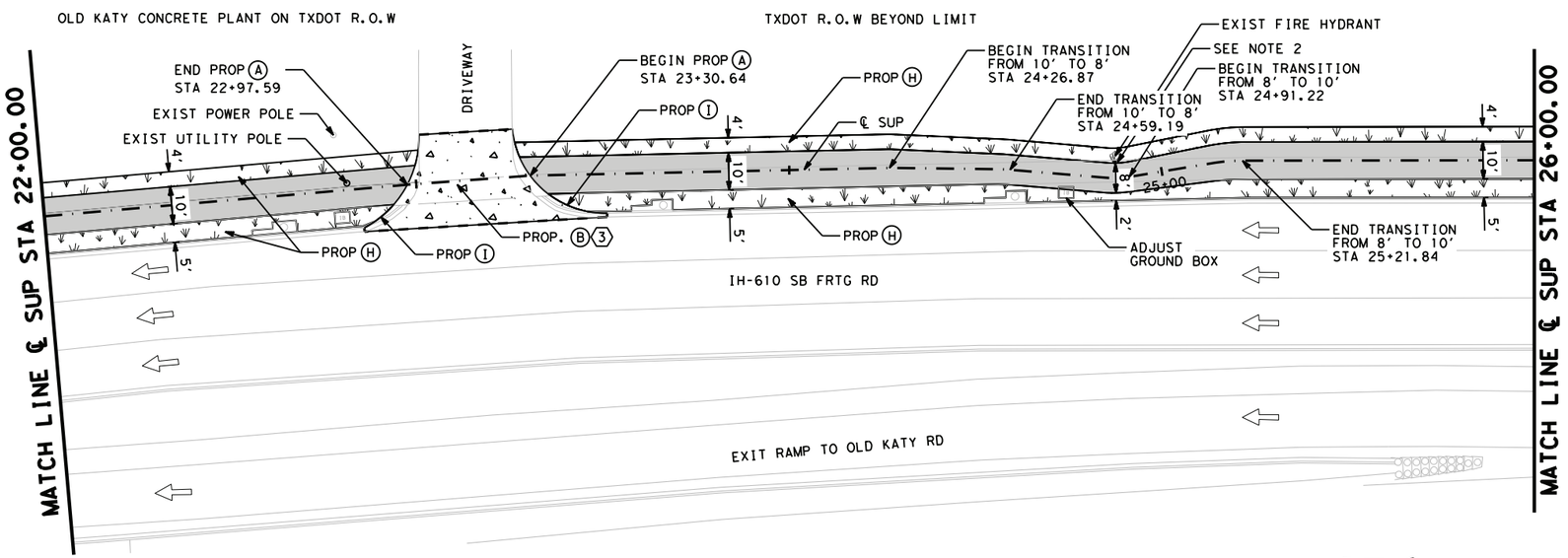

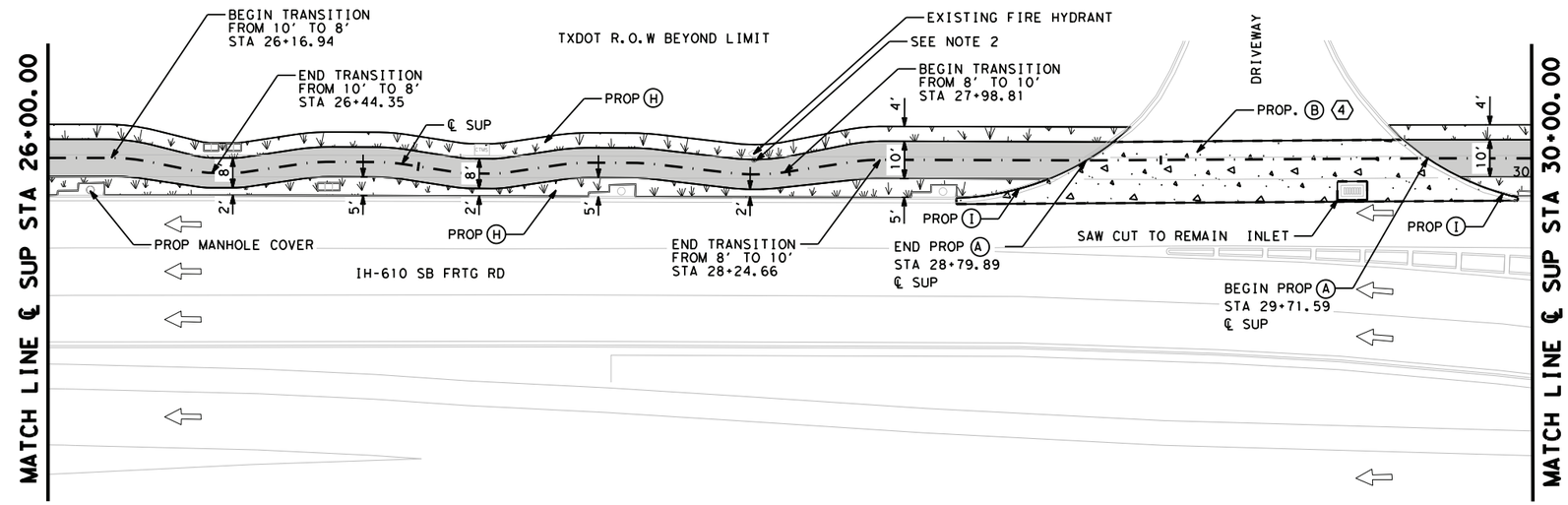

LEGEND:

- (A) 6" CONC SIDEWALK
- (B) 6" CONC DRIVEWAY
- (C) 6" CONC CURB (DOWEL)
- (D) CURB RAMPS (TY 1)
- (E) CURB RAMPS (TY 2)
- (F) CURB RAMPS (TY 7)
- (H) BLOCK SOD
- (G) TOP STR INLET TYPE C (STAGE 2)
- (I) 6" CONC CURB (MONO) (TY II)
- NEW CHAIN LINK FENCE
- EXISTING CHAIN LINK FENCE
- EXISTING UTILITY GROUND BOX
- (X) DRIVEWAY NO.
- SAW CUT

NOTES:

1. CALL 811 TO DETERMINE THE PROPER LOCATIONS OF UNDERGROUND UTILITIES PRIOR TO EXCAVATE.
2. ADJUST EXISTING WATER VALVE COVER IF NEED. THE WORK WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO ITEM 531.

STATE OF TEXAS
STEVE VAN
137551
LICENSED PROFESSIONAL ENGINEER

Steve Van, P.E.

06.14.24

IH-610
SB FRTG RD (SUP)
SUP LAYOUT

SCALE: 1":40' HORZ

SHEET 3 OF 4

TEXAS DEPARTMENT OF TRANSPORTATION

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610
DIST	COUNTY		SHEET NO.
12	HARRIS		53

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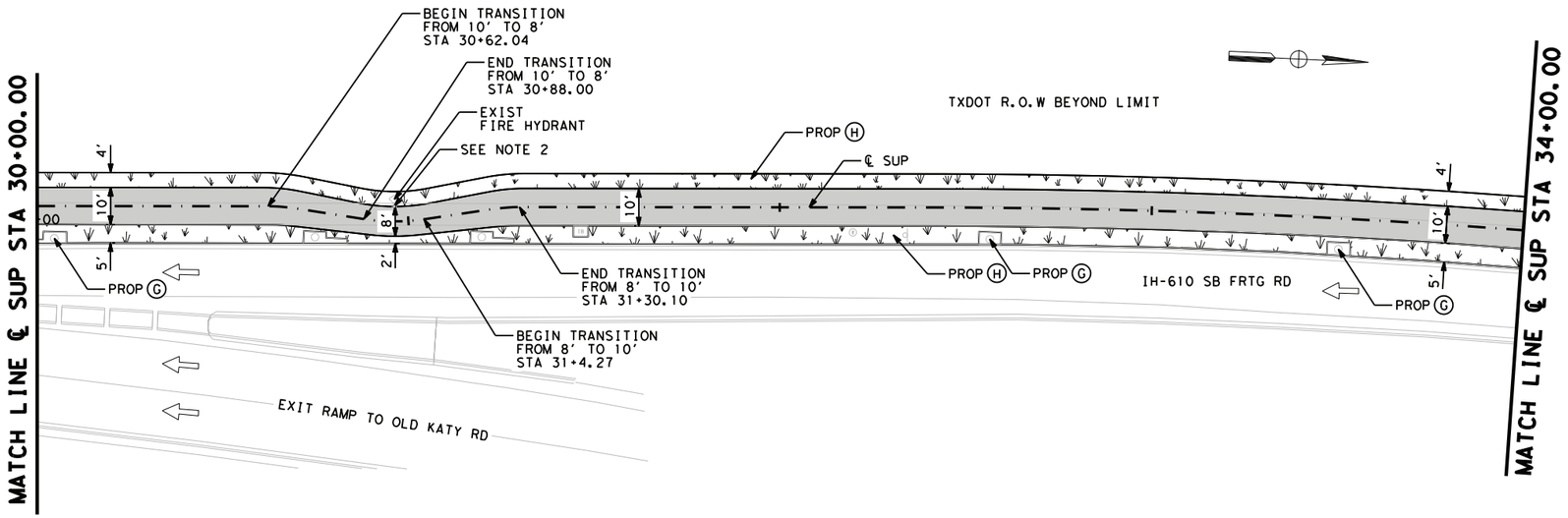

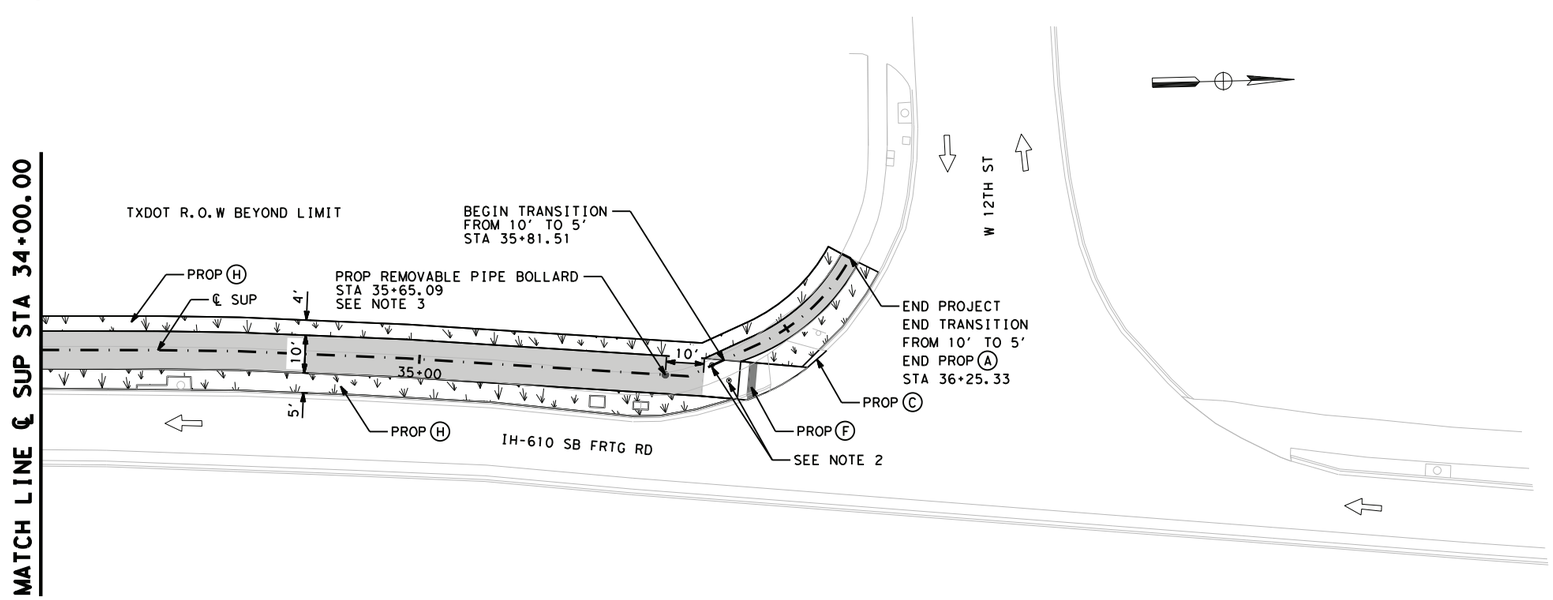

LEGEND:

- (A) 6" CONC SIDEWALK
- (B) 6" CONC DRIVEWAY
- (C) 6" CONC CURB (DOWEL)
- (D) CURB RAMPS (TY 1)
- (E) CURB RAMPS (TY 2)
- (F) CURB RAMPS (TY 7)
- (H) BLOCK SOD
- (G) TOP STR INLET TYPE C (STAGE 2)
- (I) 6" CONC CURB (MONO) (TY II)
- NEW CHAIN LINK FENCE
- EXISTING CHAIN LINK FENCE
- EXISTING UTILITY GROUND BOX
- (X) DRIVEWAY NO.
- SAW CUT

NOTES:

1. CALL 811 TO DETERMINE THE PROPER LOCATIONS OF UNDERGROUND UTILITIES PRIOR TO EXCAVATE.
2. ADJUST EXISTING WATER VALVE COVER IF NEED. THE WORK WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO ITEM 531.
3. SEE REMOVABLE PIPE BOLLARD DETAIL SHEET FOR MORE INFORMATION.
4. INSTALL TOP STRUCTURE INLET TY C (STAGE 2) WILL BE PAID TO ITEM 465.

STATE OF TEXAS
STEVE VAN
137551
LICENSED PROFESSIONAL ENGINEER

Steve Van, P.E.

06.14.24

IH-610
SB FRTG RD (SUP)
SUP LAYOUT

SCALE: 1":40' HORZ

SHEET 4 OF 4

TEXAS DEPARTMENT OF TRANSPORTATION

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610
DIST	COUNTY		SHEET NO.
12	HARRIS		54

DATE: 6/14/2024 11:49:53 AM
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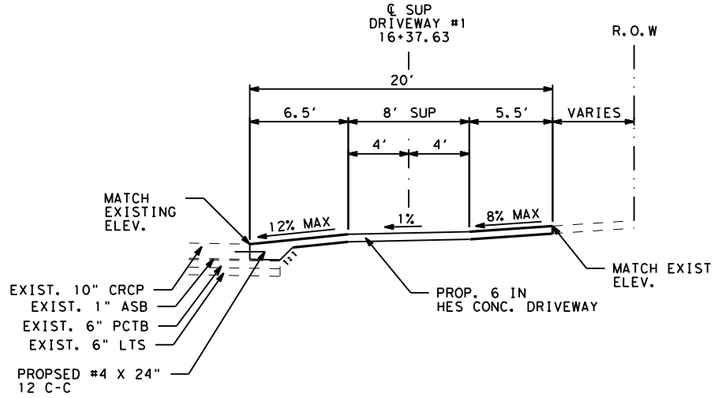

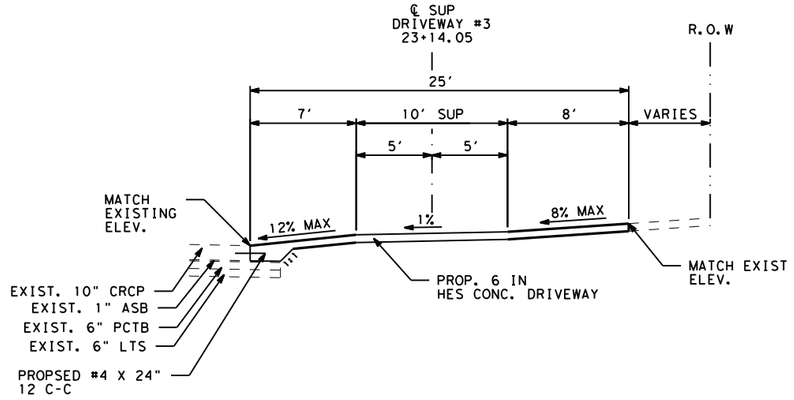

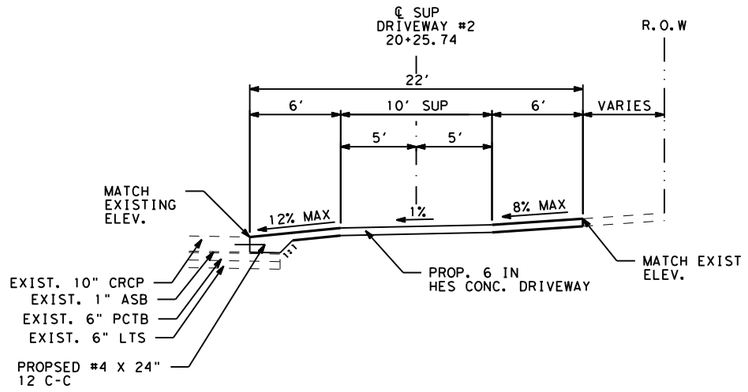

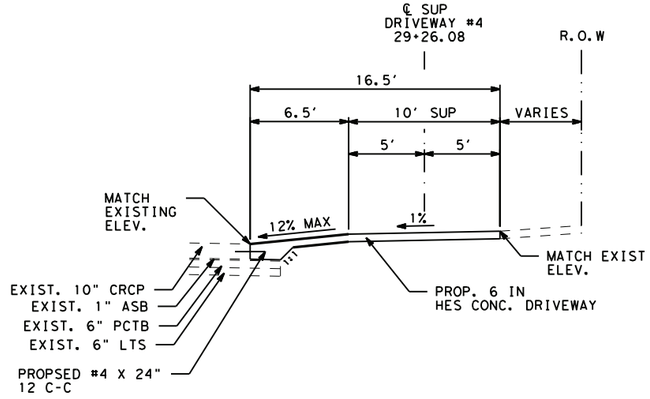

NOTE:

1. SEE DRIVEWAY DETAILS STANDARD FOR DRIVEWAY REINFORCEMENT.

STATE OF TEXAS
STEVE VAN
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PROFESSIONAL ENGINEER

Steve Van, P.E.

06.14.24

IH-610
SB FRTG RD (SUP)
DRIVEWAY DETAIL CROSS SECTION SHEET

SHEET 1 OF 1

TEXAS DEPARTMENT OF TRANSPORTATION

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610
DIST	COUNTY		SHEET NO.
12	HARRIS		55

SCALE: N.T.S

DATE: 6/14/2024 12:03:23 PM
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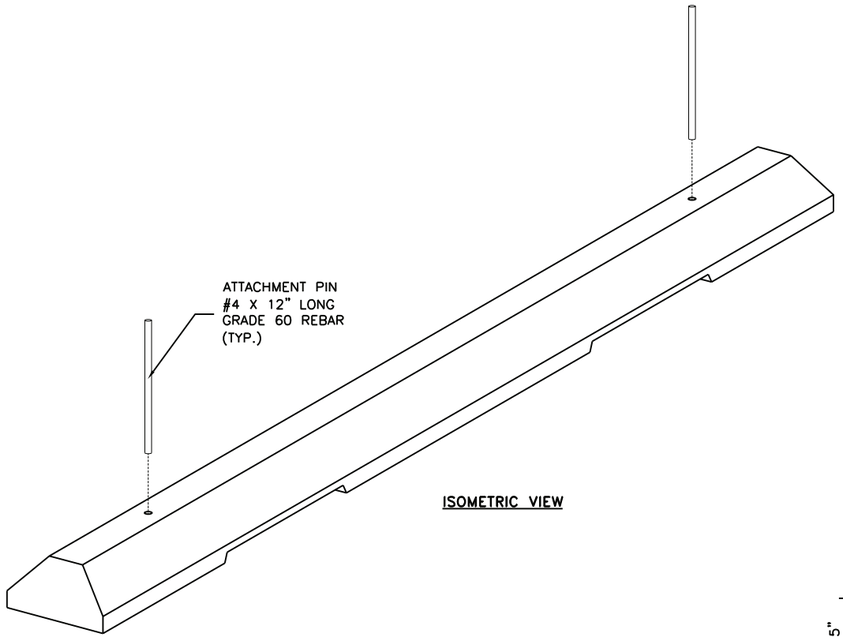
CK: | DW: | CK: | CK:



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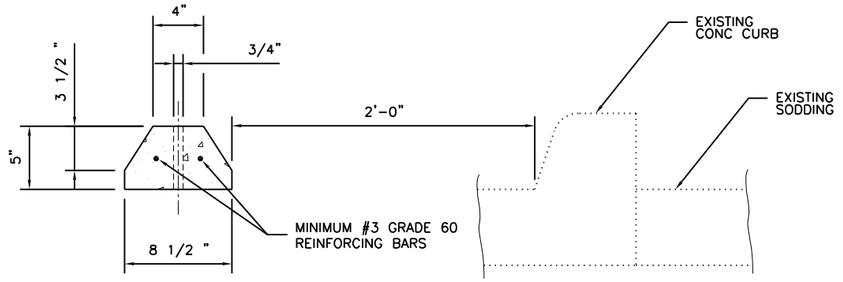

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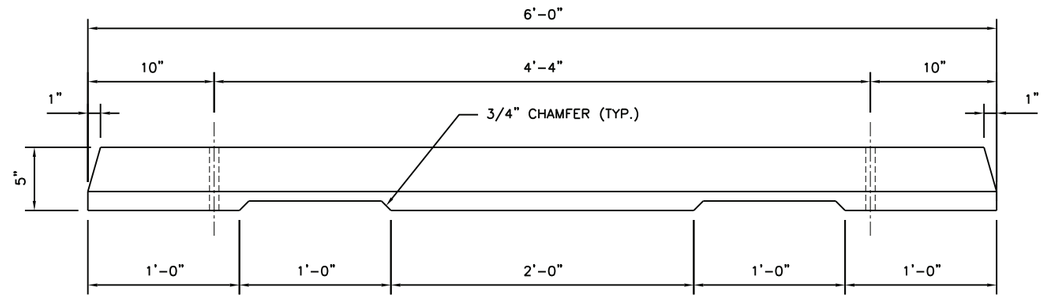

ELEVATION

NOTES:

1. THE WORK WILL BE PAID UNDER ITEM 194-7007.
2. CONCRETE FOR WHEEL STOP: MINIMUM 3,000 PSI IN 28 DAYS.
3. REINFORCING STEEL: PER ASTM A615, GRADE 60.
4. ATTACHMENT PINS SHALL HAVE 7 INCH EMBEDMENT.
5. SEE PAVEMENT MARKING LAYOUT SHEET FOR ANGLED CONCRETE WHEEL STOP INFORMATION.

SCALE: N.T.S

STATE OF TEXAS
STEVE VAN
137551
LICENSED
PROFESSIONAL ENGINEER

Steve Van, P.E.
06.14.24

IH-610
SB FRTG RD (SUP)
PRECAST CONCRETE WHEEL STOP DETAIL

SHEET 1 OF 1

TEXAS DEPARTMENT OF TRANSPORTATION

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610
DIST	COUNTY		SHEET NO.
12	HARRIS		56

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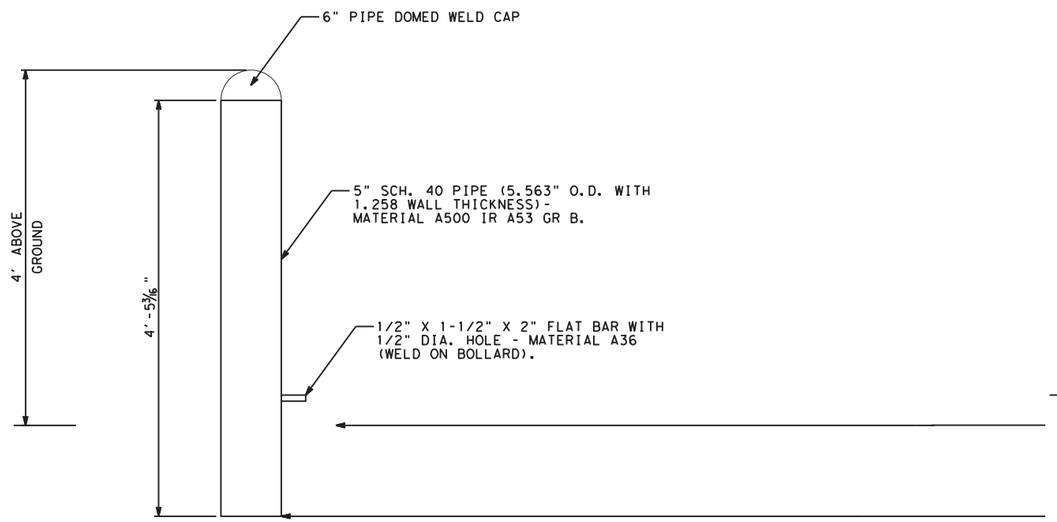
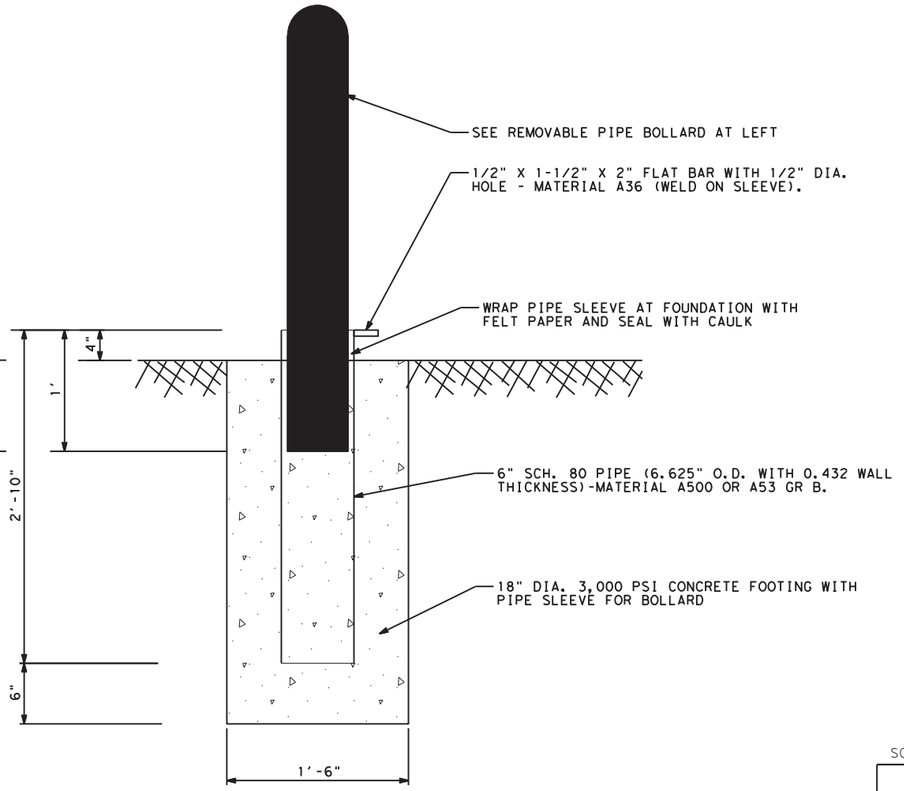


REMOVABLE PIPE BOLLARD



REMOVABLE PIPE SLEEVE
AND FOUNDATION

REMOVABLE PIPE BOLLARD NOTES:

1. CONTRACTOR TO PAINT ALL ABOVE-GRADE PORTIONS OF REMOVABLE BOLLARD AND BOLLARD SLEEVE RAL-1016 (SULFUR YELLOW).
2. CONTRACTOR TO PROVIDE MASTER COMBINATION LOCK MODEL NO. 175 D FOR EACH INSTALLED REMOVABLE PIPE BOLLARD
3. INSTALLING REMOVABLE PIPE BOLLARD WILL BE PAID UNDER ITEM 5005.

SCALE: N.T.S

STATE OF TEXAS
STEVE VAN
137551
LICENSED PROFESSIONAL ENGINEER

Steve Van, P.E.
06.21.24

IH-610
SB FRTG RD (SUP)
REMOVABLE PIPE BOLLARD DETAIL

SHEET 1 OF 1

TEXAS DEPARTMENT OF TRANSPORTATION

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610
DIST	COUNTY		SHEET NO.
12	HARRIS		57

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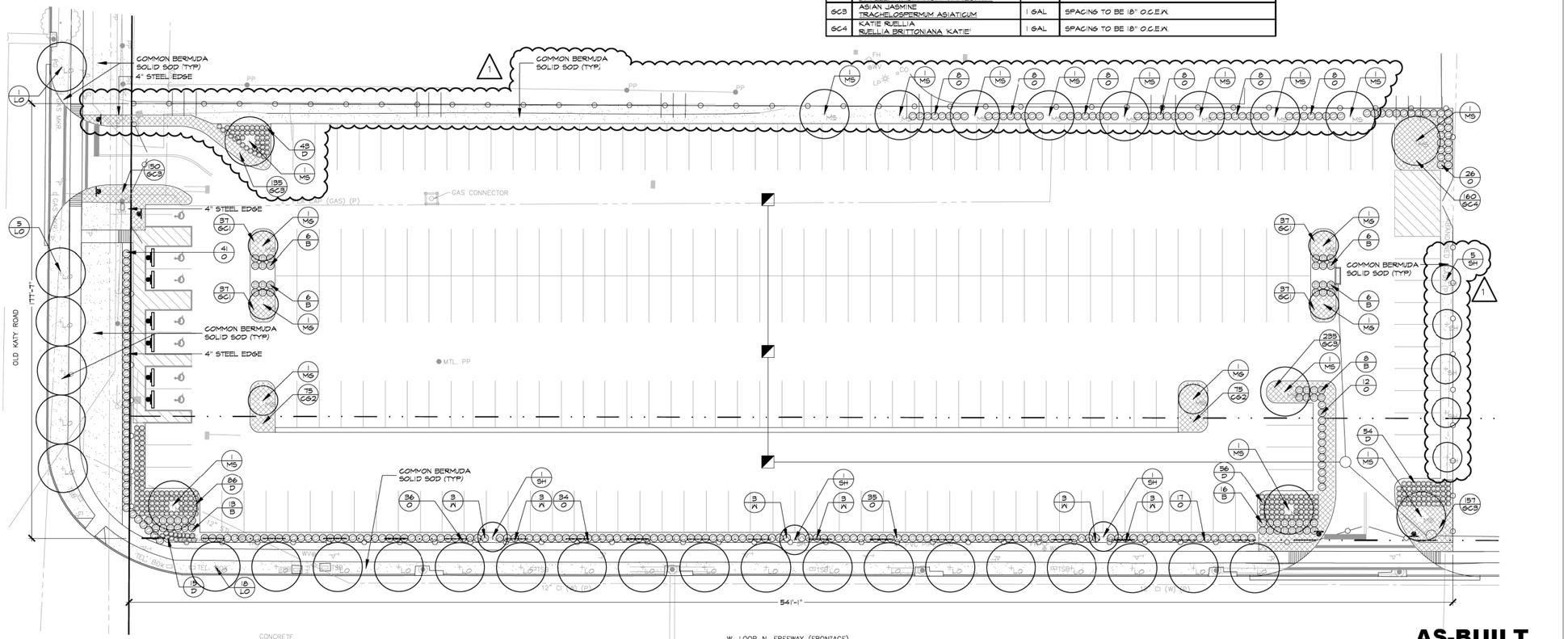
DGN: | CK: | DW: | CK:

CITY OF HOUSTON - LANDSCAPE ORDINANCE				
STREET TREES : Section 33-126 (A) - Length of property line in linear feet as measured along each street separately.				
STREET NAME	LINEAR FT/30	TREE PLANTING REQUIRED	CREDITS USED	TOTAL TREES PLANTED
West Loop (Frontage Road)	541'	18		18
Old Katy Road	177'	6		6

PARKING LOT TREES : Section 33-127 (A) - 50% of Parking lot trees must be large trees. Each parking space must be within 120' of a tree.						
TOTAL # OF SPACES	TOTAL / 10	TREE PLANTING REQUIREMENT	CREDITS USED	LARGE TREES	SMALL TREES	TOTAL TREES PLANTED
263	26	26		13	13	26

SHRUBS : Section 33-127 (B) - 75% of all shrubs must be planted along the perimeter of the parking lot. Shrubs are required for new and/or expanded portions of parking lots			
STREET TREE PLANTING REQUIREMENT	REQUIREMENT * 10	TOTAL REQUIRED	TOTAL SHRUBS PLANTED
24	240	240	267

PLANTING SCHEDULE			
SYM.	SPECIES	SIZE	NOTE
TREES			
MS	MEXICAN SYCAMORE PLATANUS MEXICANA	45 GAL	STRONG CENTRAL LEADER, 14' HT, 6' ND.
LO	LIVE OAK QUERCUS VIRGINIANA ' Cathedral'	45 GAL	FULL CANOPY, 12' HT, 6' ND.
MG	MAGNOLIA 'LITTLE GEM' MAGNOLIA VIRGINIANA 'LITTLE GEM'	30 GAL	FULL TO GROUND, 8' HT, 4' ND.
SH	SAVANNAH HOLLY ILEX X ATTENUATA 'SAVANNAH'	30 GAL	TREE FORM, 8' HT, 4' ND.
SHRUBS & ORNAMENTAL GRASSES			
W	DWARF WAX MYRTLE MYRICA CERIFERA 'DON'S DWARF'	3 GAL	SPACING TO BE 36" O.C.
O	DWARF OLEANDER NERIUM OLEANDER 'DONS DWARF'	3 GAL	SPACING TO BE 36" O.C.E.W.
B	BI-COLOR IRIS DIETES BICOLOR'	3 GAL	SPACING TO BE 36" O.C.E.W.
D	DWARF FOUNTAIN GRASS PENNISETUM ALOPECUROIDES 'HAMELN'	3 GAL	SPACING TO BE 24" O.C.E.W.
GROUNDCOVERS			
GC1	MEXICAN FEATHERGRASS NASELLA TENUISSIMA	1 GAL	SPACING TO BE 18" O.C.E.W.
GC2	VARIEGATED FLAX LILY DANELLA TASMANICA 'VARIEGATA'	1 GAL	SPACING TO BE 18" O.C.E.W.
GC3	ASIAN JASMINE TRACHELOSPERMUM ASIATICUM	1 GAL	SPACING TO BE 18" O.C.E.W.
GC4	KATIE RUELLIA RUELLIA BRITTONIANA 'KATIE'	1 GAL	SPACING TO BE 18" O.C.E.W.



SCALE (IN FEET)
HORIZ. 0 10 20 40

AS-BUILT

CONTRACT SHEET NO 20 OF 43

REV	DATE	DESCRIPTION	ADD	AMD	CCR	BY	ENG	CHK	APP
1	07/13/16	LANDSCAPE REVISIONS DUE TO SWALE GRADING							

Knudson
8388 KATY FREEWAY | SUITE 441
HOUSTON, TX 77024 | 713.681.8000

Midtown Engineers, LLC
5225 Katy Freeway, Suite 400 Houston, Texas 77007
Office (713) 862-8848 TBPE No. F-8934

New METRO Going Places

B.JANHSEN DRN BY	6/08/2015 DATE	NW TRANSIT CENTER—TEMPORARY PARKING EXPANSION
B.JANHSEN DRN CKD BY	6/08/2015 DATE	
B.JANHSEN DES BY	6/08/2015 DATE	LANDSCAPE PLANTING PLAN
B.JANHSEN DES CKD BY	6/08/2015 DATE	
B.JANHSEN APPROVED BY	6/08/2015 DATE	

SCALE: 1:20 | CONTRACT NO. XXX | DRAWING NO. LCI-0001 | REV.

FOR CONTRACTORS INFORMATION ONLY

IH-610
SB FRTG RD (SUP)

AS-BUILT

SHEET 1 OF 2

TEXAS DEPARTMENT OF TRANSPORTATION

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610
DIST	COUNTY		SHEET NO.
12	HARRIS		58

DN: CK: DW: CK:

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DN: | CK: | DW: | CK:

HUNTER INST. 4" POP-UP
TOTAL 4" POP-UPS (241)

- (A) PRO-SPRAY NOZZLE 15' QUARTER CIRCLE
- (B) PRO-SPRAY NOZZLE 15' HALF CIRCLE
- (E) PRO-SPRAY NOZZLE 15' END STRIP
- (F) PRO-SPRAY NOZZLE 15' SIDE STRIP
- (G) PRO-SPRAY NOZZLE 15' LEFT/RIGHT STRIP
- (L) PRO-SPRAY NOZZLE 10' QUARTER CIRCLE
- (M) PRO-SPRAY NOZZLE 10' HALF CIRCLE
- (N) PRO-SPRAY NOZZLE 10' ADJUSTABLE ARCH
- (O) PRO-SPRAY NOZZLE 10' FULL CIRCLE
- (S) PRO-SPRAY NOZZLE 8' ADJUSTABLE ARCH
- (U) PRO-SPRAY NOZZLE 5' QUARTER CIRCLE
- (Z) PRO-SPRAY NOZZLE 17' ADJUSTABLE ARCH

HUNTER INST. 12" POP-UP
TOTAL 12" POP-UPS (106)

- (G) PRO-SPRAY NOZZLE 15' LEFT/RIGHT STRIP
- (L) PRO-SPRAY NOZZLE 10' QUARTER CIRCLE
- (M) PRO-SPRAY NOZZLE 10' HALF CIRCLE
- (N) PRO-SPRAY NOZZLE 10' ADJUSTABLE ARCH
- (O) PRO-SPRAY NOZZLE 10' FULL CIRCLE
- (Q) PRO-SPRAY NOZZLE 8' QUARTER CIRCLE
- (R) PRO-SPRAY NOZZLE 8' HALF CIRCLE
- (S) PRO-SPRAY NOZZLE 8' ADJUSTABLE ARCH
- (U) PRO-SPRAY NOZZLE 5' QUARTER CIRCLE
- (V) PRO-SPRAY NOZZLE 5' HALF CIRCLE

PIPE LEGEND

- .75 = 3/4" CLASS 200 PVC
- 1.0 = 1" CLASS 200 PVC
- 1.25 = 1 1/4" CLASS 200 PVC
- 1.5 = 1 1/2" CLASS 200 PVC
- 2.0 = 2" CLASS 200 PVC
- 2.5 = 2 1/2" SCH. 40 PVC

ALL UNMARKED PIPE IS 1/2" CLASS 315 PVC

NOTE:

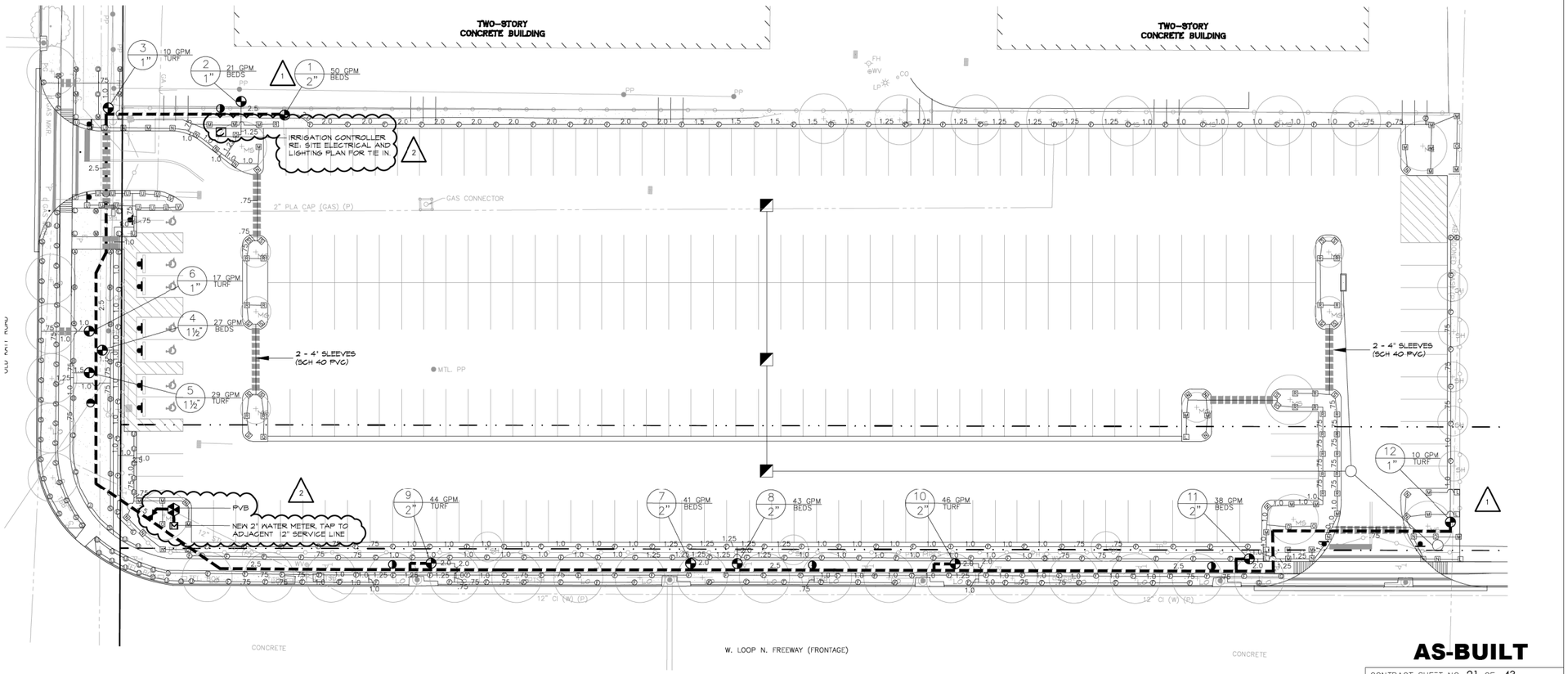
IT IS THE INTENT OF THESE IRRIGATION PLANS TO PROVIDE LOCATION OF VALVES, HEADS, VALVE BOXES AND QUICK COUPLERS AS ACCURATELY AS POSSIBLE. AT TIMES EQUIPMENT WILL BE SHOWN IN PAVED AREAS. MAINLINE AND LATERAL PIPING WILL AT TIMES BE SHOWN TRAVELING THROUGH NEW AND EXISTIG TREES. THIS IS DONE FOR CLARITY ONLY AND SHOULD BE VIEWED AS DIAGRAMMATIC.
HAND TRENCHING IS TO BE USED BY THE IRRIGATION CONTRACTOR IN AREAS WHERE THE ROOT SYSTEM OF EXISTING TREES MAY BE DAMAGED BY A TRENCHING MACHINE.

NOTE:

THE TEXAS COMMISSION ON ENVIROMENTAL QUALITY REQUIRES THE PRESENTS OF A LICENSED IRRIGATOR OR A LICENSED IRRIGATION TECHNICIAN AT ALL TIMES DURING THE CONSTRUCTION PERIOD.

HORIZ. SCALE (IN FEET) 0 10 20 40

DESIGN PRESSURE
50 PSI



AS-BUILT

CONTRACT SHEET NO 21 OF 43

REV	DATE	DESCRIPTION	ADD	AMD	CCR	BY	ENG	CHK	APP
1	07/13/16	IRRIGATION REVISIONS DUE TO LANDSCAPE RELOCATION							
2	10/27/16	IRRIGATION METER P.O.C. CHANGE TO 12" SERVICE							

Designed By CPI
IRRIGATION DESIGN & CONSULTING SINCE 1980
Chuck Puccio , Inc.
TEXAS IRRIGATION LIC. #947
Office: 713-962-3371
Fax: 281-516-0085
puccichuck@gmail.com

Knudson
8588 KATY FREEWAY | SUITE 444
HOUSTON, TX 77024 | 713.465.8200

Midtown Engineers, LLC
5225 Katy Freeway, Suite 400 Houston, Texas 77007
Office (713) 862-8848 TBPE No. F-8934

New METRO Going Places

DRN BY	C. PUCCIO	6/8/2015 DATE
DRN CKD BY	C. PUCCIO	6/8/2015 DATE
DES BY	C. PUCCIO	6/8/2015 DATE
DES CKD BY	C. PUCCIO	6/8/2015 DATE
APPROVED BY	B.JANHSEN	6/8/2015 DATE

SCALE: 1:20

NW TRANSIT CENTER-TEMPORARY PARKING EXPANSION

LANDSCAPE IRRIGATION PLAN

CONTRACT NO. XXX DRAWING NO. LC3-0001 REV.

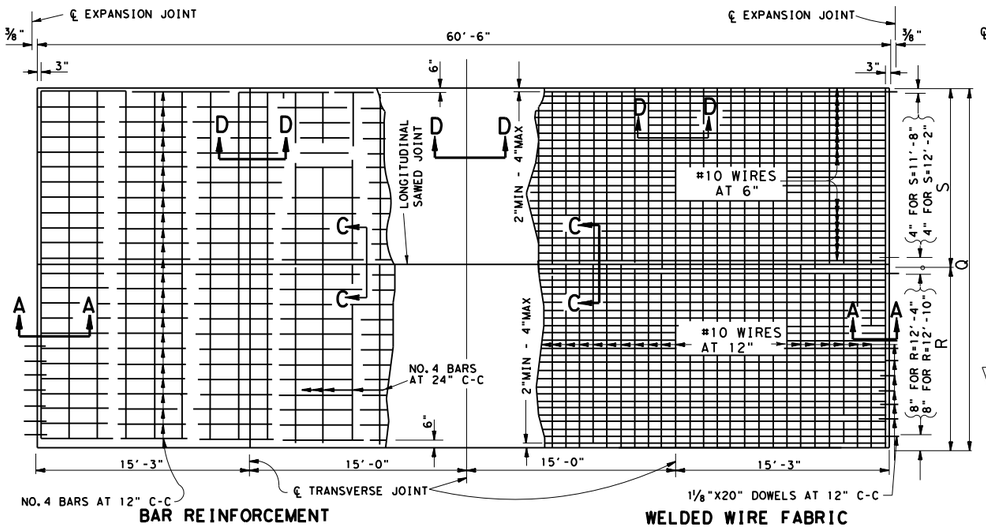
FOR CONTRACTORS INFORMATION ONLY

IH-610
SB FRTG RD (SUP)

AS-BUILT

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610
DIST	COUNTY		SHEET NO.
12	HARRIS		59

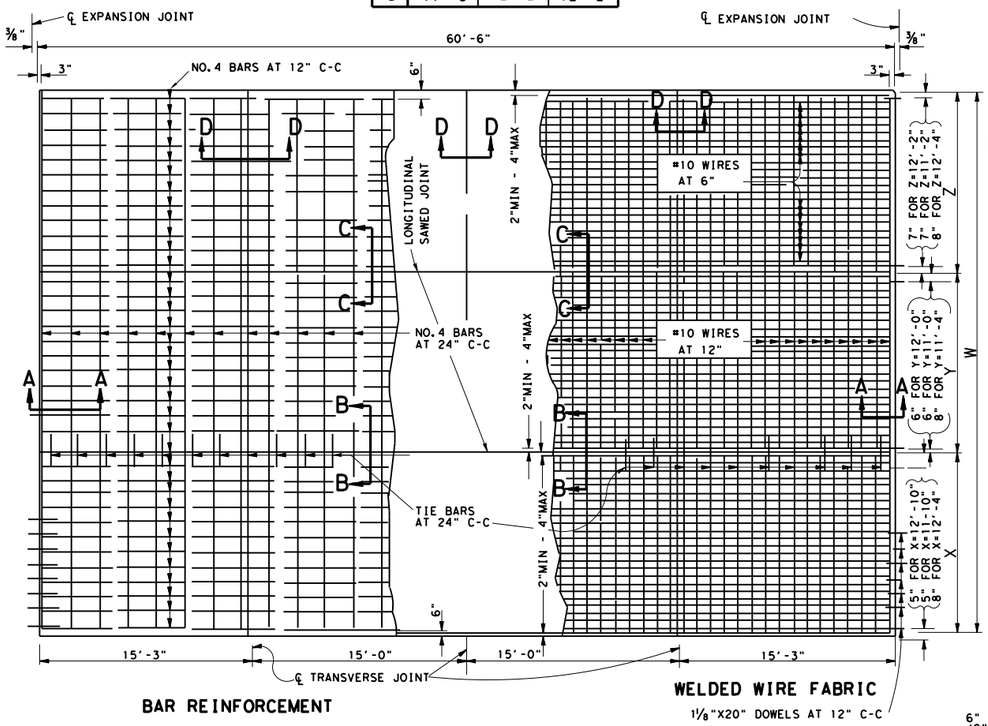


BAR REINFORCEMENT

WELDED WIRE FABRIC

TWO LANE PAVEMENT PLAN

	WIDTH - Q		
	24'-0"	24'-6"	25'-0"
R	12'-4"	12'-4"	12'-10"
S	11'-8"	12'-2"	12'-2"



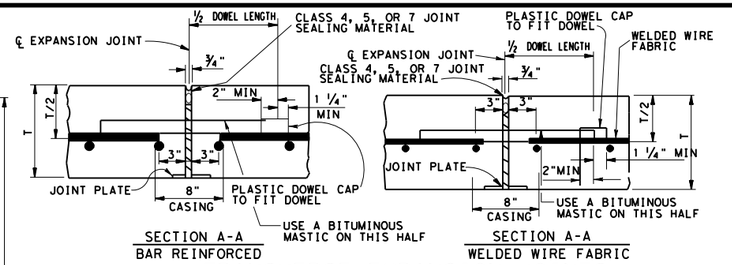
BAR REINFORCEMENT

WELDED WIRE FABRIC

THREE LANE PAVEMENT PLAN

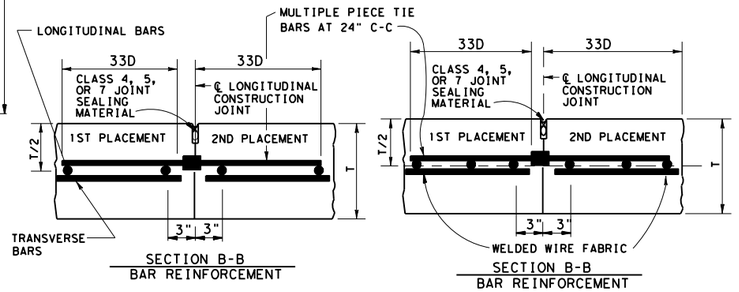
	WIDTH - W		
	37'-0"	36'-0"	34-0"
X	12'-10"	12'-4"	11'-10"
Y	12'-0"	11'-4"	11'-0"
Z	12'-2"	12'-4"	11'-2"

D = DIAMETER
R = RADIUS
T = THICKNESS

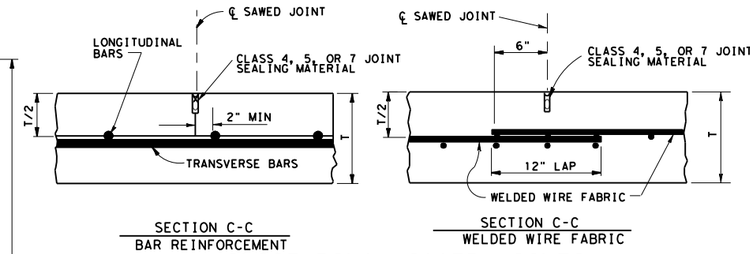


TRANSVERSE EXPANSION JOINTS

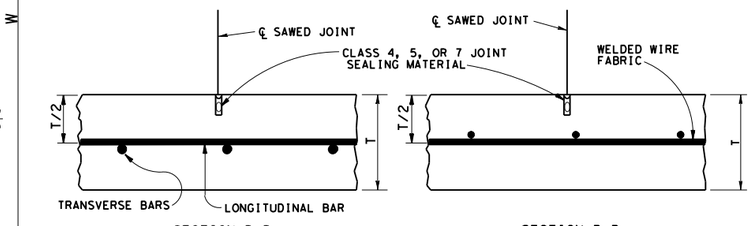
NOTE: DOWEL BARS CONFORMING TO ASTM A615 OR A616 GRADE 60 ARE ACCEPTABLE



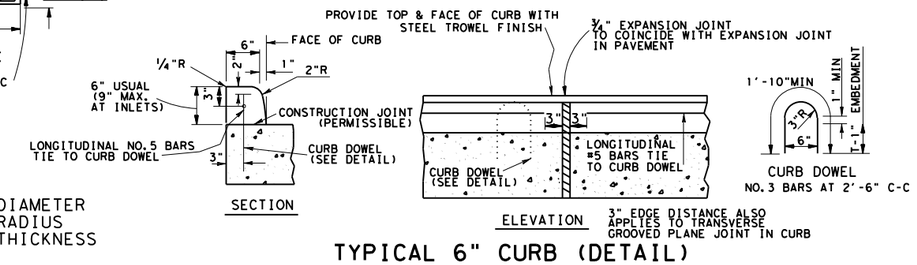
LONGITUDINAL CONSTRUCTION JOINTS



LONGITUDINAL SAWED JOINTS



TRANSVERSE SAWED JOINTS



3" EDGE DISTANCE ALSO APPLIES TO TRANSVERSE GROOVED PLANE JOINT IN CURB

TYPICAL 6" CURB (DETAIL)

GENERAL NOTES

1. MULTIPLE PIECE TIE BARS ARE REQUIRED AT LONGITUDINAL CONSTRUCTION JOINTS. USE MULTIPLE PIECE TIE BAR ASSEMBLIES WITH STOP TYPE COUPLINGS AND WITH THREADS ON THE BARS. ENSURE THE MULTIPLE PIECE TIE BAR ASSEMBLIES DEVELOP A MINIMUM ULTIMATE TENSILE STRENGTH EQUAL TO 1.25 TIMES THE YIELD STRENGTH OF THE TRANSVERSE BARS BEING JOINED. USE DEFORMED REINFORCING BARS FOR TIE BARS. TIE BAR ASSEMBLIES MADE FROM STEELS OTHER THAN ASTM GRADE 60 AND WITH DEFORMATIONS OTHER THAN ASTM STANDARD MAY BE USED IF IT CAN BE PROVEN TO THE ENGINEER THAT THEY ARE IN EVERY RESPECT THE EQUAL OF THE ASSEMBLIES SPECIFIED. LABORATORY TESTING OF THE PROPOSED ASSEMBLIES, AT THE CONTRACTOR'S EXPENSE, MAY BE REQUIRED.
2. FORM CONSTRUCTION JOINTS WITH METAL OR WOOD FORMS EQUAL IN DEPTH TO THE NOMINAL DEPTH OF THE PAVEMENT OR BY OTHER MEANS APPROVED PRIOR TO THEIR USE.
3. SAW LONGITUDINAL AND TRANSVERSE JOINTS AS SOON AS SAWING CAN BE ACCOMPLISHED WITHOUT DAMAGE TO THE PAVEMENT AND BEFORE 24 HOURS AFTER PLACING THE CONCRETE, THE EXACT TIME WILL BE APPROVED BY THE ENGINEER. PREFORMED JOINT WITH ASPHALT STRIP IS NOT ACCEPTABLE.
4. LONGITUDINAL JOINTS ARE SHOWN OFFSET FOUR INCHES FROM THE THEORETICAL LANE LINE AND MAY BE OFFSET TO EITHER SIDE IF THE WIDTH OF THE WIRE FABRIC IS PROPERLY ADJUSTED.
5. ONE OF THE LONGITUDINAL JOINTS OF PAVEMENT SLABS WIDER THAN TWO LANES MAY BE A CONSTRUCTION JOINT. FOR PAVEMENT SLABS WIDER THAN 15 FT. PROVIDE A LOGITUDINAL SAWED JOINT UNLESS OTHERWISE DIRECTED.
6. FORM THE JOINT SEAL SPACE AT TRANSVERSE EXPANSION JOINTS BY USING A STRAIGHT FORM PLACED BEHIND THE LONGITUDINAL FLOAT. LOOSEN THE FORM AS SOON AS THE CONCRETE WILL RETAIN ITS SHAPE AND EDGE WITH AN APPROVED EDGING TOOL. TOOL BOTH EDGES OF LONGITUDINAL CONSTRUCTION JOINTS TO A ⅛ IN. RADIUS AT THE PAVEMENT SURFACE.
7. DO NOT DISCHARGE CONCRETE FROM THE MIXER DIRECTLY ON TOP OF OR ON THE SIDES OF THE EXPANSION JOINT ASSEMBLIES.
8. LAP TRANSVERSE EDGES OF SHEETS OF WELDED WIRE FABRIC 12 INCHES EXCEPT AT TRANSVERSE EXPANSION JOINTS. LAP LONGITUDINAL EDGES 6 INCHES EXCEPT AT LONGITUDINAL CONSTRUCTION JOINTS.
9. DOWEL BARS MAY BE COATED WITH STAINLESS STEEL, MONEL METAL, OR IN ACCORDANCE WITH THE ITEM "REINFORCING STEEL" SECTION ON EPOXY COATING; WITH A WELDED DOWEL ASSEMBLY SUPPORT, AS APPROVED. ENSURE THE CASING CONFORMS TO THE REQUIREMENTS OF ONE OF THE GRADES OF ASTM A167-70 OR A176-71 AND IS NOT LESS THAN 0.010 INCH THICK. PROVIDE A CASING AT LEAST 8 INCHES LONG AND THAT COVERS THE MIDDLE 8 INCHES OF THE DOWEL.
10. SECURE DOWELS PARALLEL TO THE PAVEMENT SURFACE AND PERPENDICULAR TO THE JOINT WITH THE AID OF APPROVED WELDED WIRE BASKET ARRANGEMENTS. ENSURE WELDED WIRE BASKET ARRANGEMENTS DO NOT CROSS THE EXPANSION JOINT. UNIFORMLY COAT DOWELS WITH A BITUMINOUS MASTIC ON THE END WITH THE DOWEL CAP.
11. DO NOT BEND TIE BARS AND DOWEL BARS. TO PREVENT DISPLACEMENT OF WIRE FABRIC BY CONCRETE PLACEMENT, TIE THE FABRIC PANEL TOGETHER AND TIE THE INITIAL FABRIC PANELS OF EACH SLAB TO THE DOWEL BASKET OR AS DIRECTED.
12. TOOL PAVEMENT EDGES TO A RADIUS OF ⅛ IN. WITH AN APPROVED EDGING TOOL.
13. DETAILS FOR PAVEMENT WIDTH, PAVEMENT THICKNESS, AND CROWN-SLOPE ARE ELSEWHERE SHOWN ON THE PLANS.
14. THE CONTRACTOR HAS THE OPTION OF USING WELDED WIRE FABRIC OR BAR REINFORCEMENT. LOCATE THE LONGITUDINAL STEEL AT THE CENTER OF THE SLAB. TAKE NECESSARY PRECAUTIONS TO INSURE THAT THE FINAL POSITION OF STEEL IS WITHIN ½ IN. OF THE SLAB CENTER. ENSURE THE LONGITUDINAL AND TRANSVERSE STEEL SPACING DOES NOT VARY MORE THAN ONE-TWELFTH OF SPACING SHOWN.
15. LONGITUDINAL STEEL MAY BE SPLICED WITH 33 TIMES BAR DIAMETER LAPS.
16. FOR LANE WIDTHS NOT SHOWN OR FOR VARIABLE PANEL LENGTHS AND WIDTHS, SPACE REINFORCING STEEL AND DOWELS AS DIRECTED.
17. USE APPROVED BAR MAT CHAIRS. DO NOT EXCEED CHAIR SPACING OF 30 IN. C-C (TRANSVERSE) AND 48 IN. C-C (LONGITUDINAL). GALVANIZING THE CHAIRS IS NOT REQUIRED.
18. OBTAIN BOARDS FOR EXPANSION JOINT FILLER FROM REDWOOD TIMBER.
19. PROVIDE AND CONSTRUCT THE JOINT PLATE AS APPROVED.
20. WHEN CURB IS PLACED SEPARATELY FROM THE CONCRETE PAVEMENT, PROVIDE THE REINFORCING STEEL AS SHOWN IN THE CURB DETAIL. THE CURB REINFORCING STEEL MAY BE OMITTED WHEN THE CURB IS PLACED MONOLITHICALLY.

(GENERAL NOTES CONTINUED ON SHEET 2 OF 2)

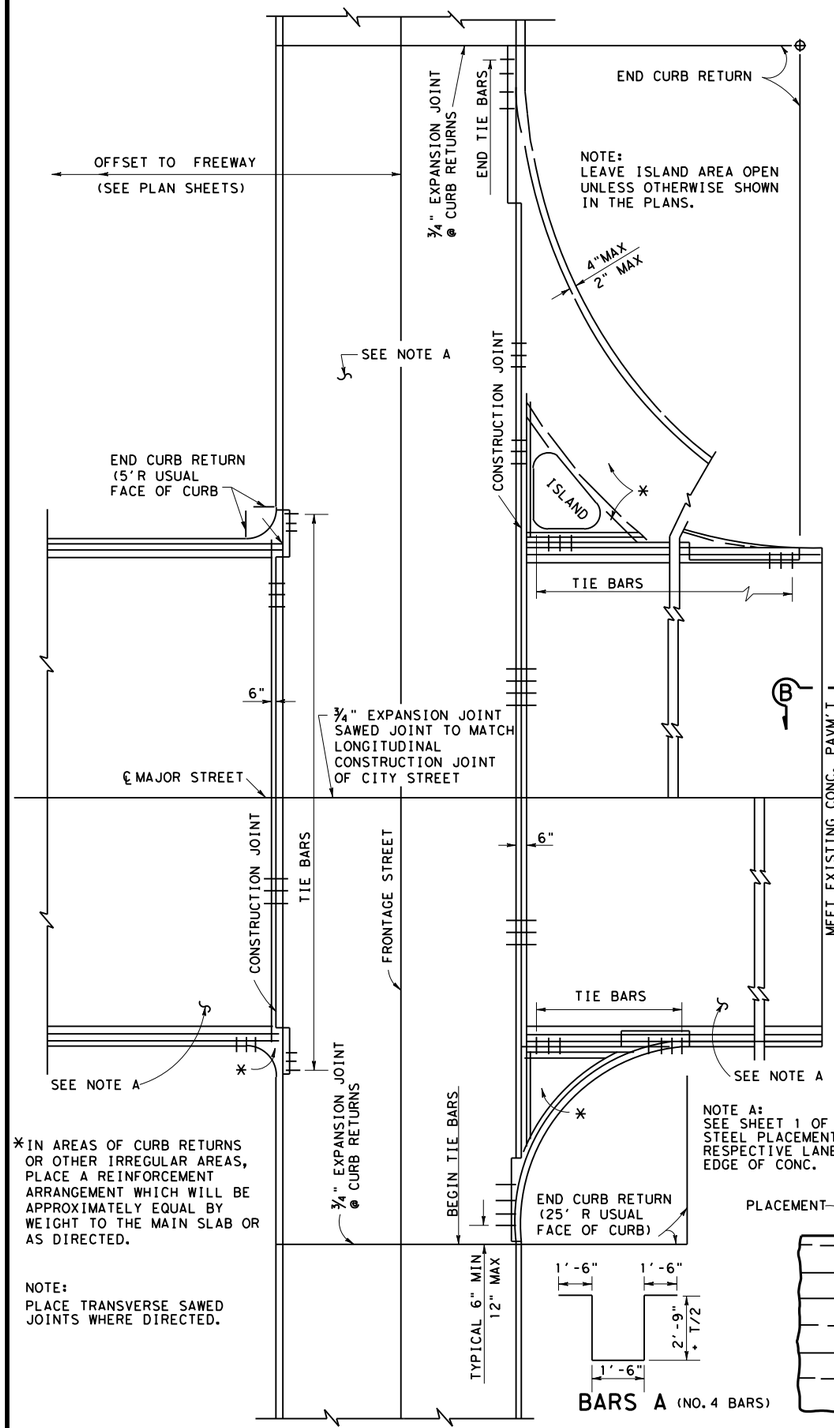
Texas Department of Transportation
Houston District

JOINTED REINFORCED CONCRETE PAVEMENT DETAILS

(FOR PAVEMENT THICKNESS 10 INCHES OR LESS)

JRCP

FILE: STDB-2.dgn	DN:	CK:	DW:	CK:	
©TxDOT MAR. 2004	DIST	FED REG	PROJECT NO.		SHEET
REVISIONS 5/05 2004 SPECS 7/2010 ADDED NOTE 8/2015 MODIFIED NOTES	HOU	6			60
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	HARRIS	0271	14	240	IH-610

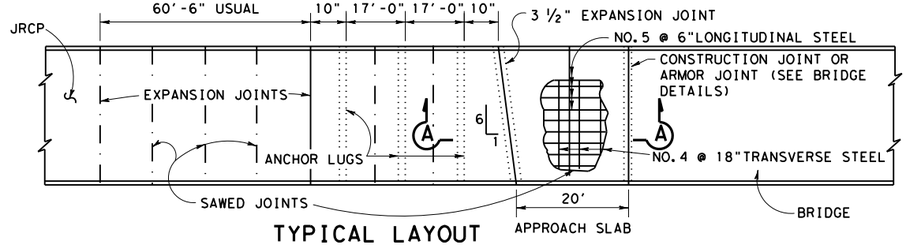


*IN AREAS OF CURB RETURNS OR OTHER IRREGULAR AREAS, PLACE A REINFORCEMENT ARRANGEMENT WHICH WILL BE APPROXIMATELY EQUAL BY WEIGHT TO THE MAIN SLAB OR AS DIRECTED.

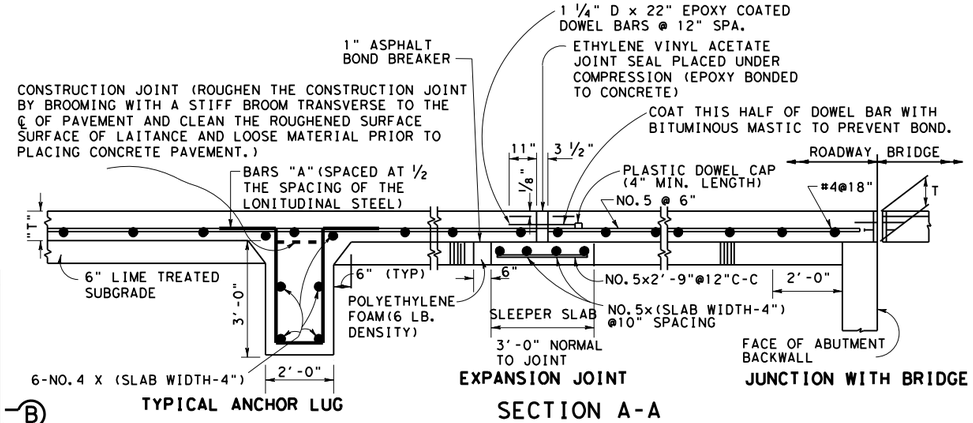
NOTE:
PLACE TRANSVERSE SAWED JOINTS WHERE DIRECTED.

NOTE A:
SEE SHEET 1 OF 2 FOR STEEL PLACEMENT FOR THE RESPECTIVE LANE WIDTHS. EDGE OF CONC.

INTERSECTION OF MAJOR STREET WITH FRONTAGE STREET TYPICAL REINFORCING PLAN

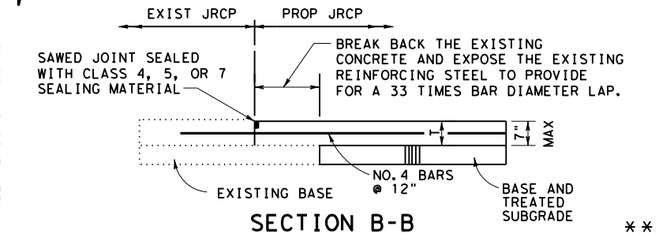


TYPICAL LAYOUT
(TERMINAL ANCHORAGE AT BRIDGES)



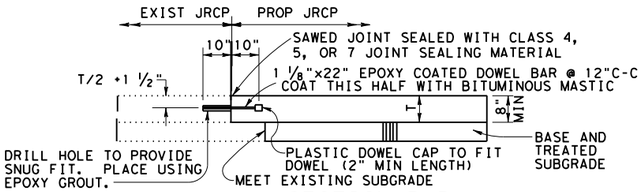
TYPICAL ANCHOR LUG | **EXPANSION JOINT** | **JUNCTION WITH BRIDGE**

SECTION A-A

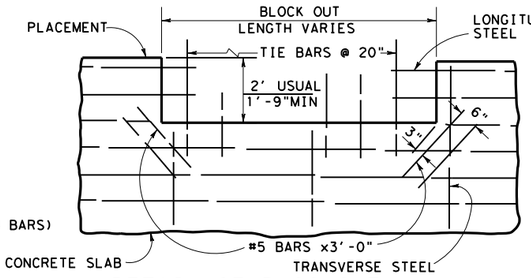


SECTION B-B
(FOR PROPOSED PAVEMENT DEPTHS OF 7" MAX)

REPLACE ANY BENT LONGITUDNIAL REINFORCING. IF THERE IS NOT SUFFICIENT EXPOSED REINFORCING TO PROVIDE A MINIMUM OF A 33 TIMES BAR DIAMETER LAP, REMOVE THE EXISTING PAVEMENT AND SUFFICIENTLY EXPOSE THE EXISTING REINFORCING TO PROVIDE A 33 TIMES BAR DIAMETER LAP. REPLACE ANY SHEAR BARS THAT ARE DISTURBED, BY DRILLING AND GROUTING AS REQUIRED BY NOTE #29. PERFORM THIS CORRECTIVE ACTION AT NO EXPENSE TO THE DEPARTMENT.

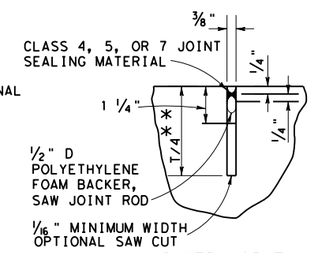


SECTION B-B
(FOR PROPOSED PAVEMENT DEPTHS OF 8" MIN)

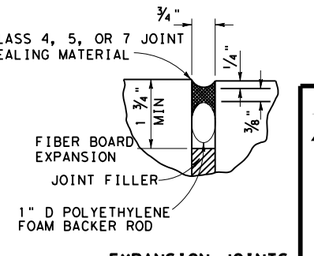


DETAIL OF BLOCKOUT

*OMIT TIE BARS @ INLET BLOCK-OUT



SAWED JOINT



EXPANSION JOINTS

** IF SILICEOUS RIVER GRAVEL IS USED AS THE COARSE AGGREGATE, THIS DEPTH IS T/3.

JOINT SEALING DETAILS

GENERAL NOTES (CONTINUED FROM SHEET 1 OF 2)

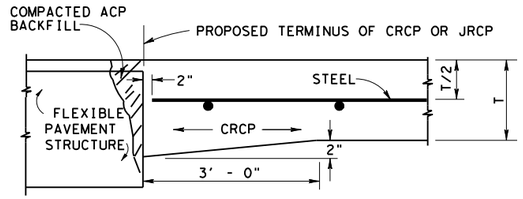
21. CONSTRUCT ANCHOR LUGS, EXPANSION JOINTS, AND SLEEPER SLABS AS DETAILED IN SECTION A-A. THESE WILL BE PAID FOR IN ACCORDANCE WITH ITEM, "CONCRETE PAVEMENT TERMINALS."
22. REINFORCING STEEL FOR TERMINAL ANCHOR SYSTEMS MAY BE GRADE 40 OR GRADE 60.
23. PLACE CONCRETE FOR ANCHOR LUGS AS SOON AS POSSIBLE AFTER COMPLETING EXCAVATION, TO PRESERVE THE INHERENT SOIL CHARACTERISTICS. EXCAVATING FOR AND PLACING CONCRETE FOR ANCHOR SYSTEM MAY BE IN PREFORMED SECTIONS CORRESPONDING TO THE WIDTH OF PAVING PLACEMENT.
24. APPLY A STEEL TROWEL FINISH TO SLEEPER SLABS AND AND COAT WITH AN ASPHALT BOND BREAKER.
25. THE DETAILS FOR ANCHORS, LUGS, EXPANSION JOINTS, AND SLEEPER SLABS ARE NOT APPLICABLE UNLESS SHOWN ELSEWHERE IN THE PLANS.
26. APPROACH SLAB WILL BE PAID FOR IN ACCORDANCE WITH THE ITEM "CONCRETE STRUCTURES."
27. WITHIN 5 MINUTES OF SAWING, COMPLETELY REMOVE THE RESULTING SLURRY FROM THE JOINT BY FLUSHING WITH HIGH PRESSURE WATER. THEN ALLOW THE JOINT TO DRY FOR A MINIMUM OF 48 HOURS BEFORE SANDBLASTING THE JOINT.
28. DO NOT SHEAR CUT DOWEL BARS.
29. SIZE ADDITIONAL SHEAR BARS AS LONGITUDIAL BARS AND SPACE THEM MIDWAY BETWEEN ALTERNATE LONGITUDINAL BARS ALONG THE TRANSVERSE CONSTRUCTION JOINT FORMED AT THE LEAVE-OUT.
30. IF THE CONCRETE DESIGN REQUIRES GREATER THAN 5.5 SACKS OF CEMENTITIOUS MATERIAL PER CUBIC YARD, WRITTEN APPROVAL BY THE AREA ENGINEER WILL BE REQUIRED. ENSURE CONCRETE PAVEMENT MIXES PLACED FROM APRIL 1 TO OCTOBER 31 CONTAIN A MINIMUM OF 25 PERCENT BY WEIGHT OF CLASS "F" FLY ASH.
31. IN LOCATIONS WHERE THE PLANS CALL FOR FAST TRACK CONCRETE PAVEMENT IN LIEU OF JRCP (LAID ON COMPACTED OR STABILIZED SUBGRADE), USE DETAILS IN THIS STANDARD IN CONJUNCTION WITH THE APPROPRIATE FAST TRACK CONCRETE SPECIFICATION. IF THE JRCP IS LAID UPON A BASE STRUCTURE, ADD 3" TO THE FAST TRACK PAVEMENT THICKNESS TO COMPENSATE FOR THE BASE.

Texas Department of Transportation
Houston District

JOINTED REINFORCED CONCRETE PAVEMENT DETAILS
EXPANSION JOINT DESIGN
(FOR PAVEMENT THICKNESS 10 INCHES OR LESS)

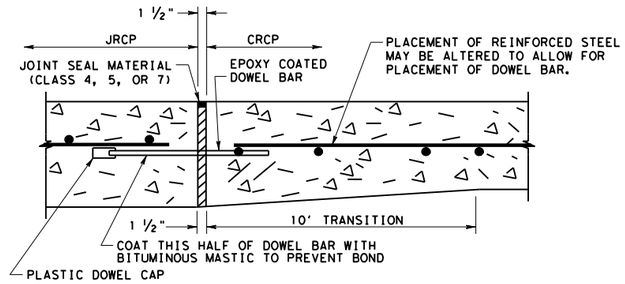
JRCP SHEET 2 OF 2

FILE: STDB-2.dgn	DN:	CK:	DW:	CK:
© TxDOT MAR. 2004	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 5/05 2004 SPECS 7/2010 ADDED NOTE 9/2013 ADDED NOTE 8/2015 MODIFIED NOTES	HOU	6		61
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	HARRIS	0271	14	240	IH-610



NOTE:
ADDITIONAL CONCRETE FOR THICKENED EDGE IS SUBSIDIARY TO VARIOUS BID ITEMS. BACKFILL DISTURBED MATERIAL IN THE FLEXIBLE PAVEMENT WITH ACP. THIS ACP IS SUBSIDIARY TO VARIOUS BID ITEMS.

JUNCTURE A & B - CRCP OR JRCP WITH FLEXIBLE TYPE PAVEMENT STRUCTURE

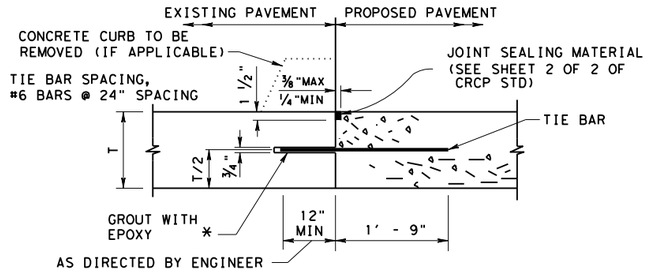


FOR DETAILS NOT SHOWN, SEE TRANSVERSE EXPANSION JOINT DETAILS ELSEWHERE IN PLANS.

DETAIL "B" - DOWEL ASSEMBLY AT EXPANSION JOINT

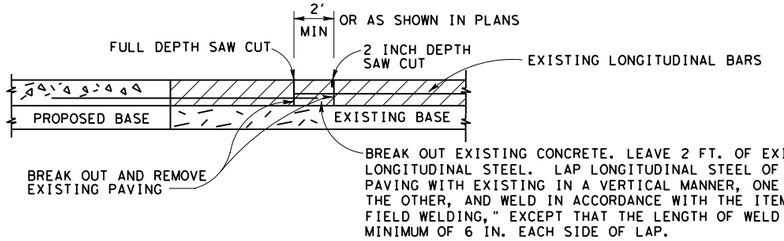
DOWEL BAR DATA			
SLAB THICKNESS(T)	6"-7.5"	8"-10"	10.5"-15"
DOWEL SIZE	1"	1 ¼"	1 ½"
DOWEL LENGTH	18"	20"	22"
DOWEL BAR SPACING	12"	12"	12"

TABLE A - DOWEL BAR DATA



JUNCTURE D - TYPICAL CONNECTION TO EXISTING CONCRETE

*FOR EPOXY TYPE SEE ITEM 361.



JUNCTURE F - "BREAK BACK" CONCRETE CRCP WITH CRCP OR JRCP WITH JRCP

GENERAL NOTES

1. FOR FURTHER INFORMATION REGARDING PLACING CONCRETE AND REINFORCEMENT, REFER TO THE GOVERNING SPECIFICATION FOR CONCRETE PAVEMENT.
2. THE DESIGN REQUIREMENTS FOR THE PAVEMENT STRUCTURE, I.E. BAR SPACING, BAR SIZE LAP REQUIREMENTS, ETC., ARE SHOWN ON THE APPROPRIATE PAVEMENT DESIGN DETAIL.
3. SLEEPER SLAB AND ADDITIONAL REINFORCING REQUIRED ON THIS DRAWING ARE INCIDENTAL TO THE VARIOUS BID ITEMS.
4. USE THE SIZE, SPACING, AND LENGTH OF DOWEL BARS SHOWN IN TABLE "A".
5. WHERE THERE WILL BE A JUNCTURE AND ADDITIONAL JRCP PAVING WILL BE PLACED AT A FUTURE DATE, MULTIPLE PIECE DOWEL BARS WILL BE PERMITTED AT THE JUNCTURE. PROVIDE MULTIPLE PIECE DOWEL BAR ASSEMBLIES WITH A MINIMUM ULTIMATE TENSILE STRENGTH OF 60.0 KIPS AND THAT HAVE SMOOTH EPOXY COATED BARS. ENSURE THE MULTIPLE PIECE DOWEL BAR ASSEMBLIES HAVE STOP TYPE COUPLINGS AND HAVE HAVE ROLLED THREADS ON THE BARS. DISMANTLE THE BAR AND FIT THE COUPLING PORTION USED IN CONSTRUCTION, WITH A PLASTIC CAP. FURNISH THE REMAINING PORTION OF THE BAR TO THE ENGINEER.
6. WHERE THE PAVING IS CRCP AND A RAMP COMPOSED OF A FLEXIBLE PAVEMENT WILL BE USED AT THE JUNCTURE UNTIL FUTURE PAVING IS CONSTRUCTED, MULTIPLE PIECE TIE BARS MAY BE USED IF PERMITTED BY THE ENGINEER. IF USED, ENSURE THE MULTIPLE PIECE TIE BAR ASSEMBLIES HAVE STOP TYPE COUPLINGS AND ROLLED THREADS ON THE BARS. FURNISH MULTIPLE PIECE TIE BAR ASSEMBLIES THAT DEVELOP A MINIMUM ULTIMATE TENSILE STRENGTH EQUAL TO 1.25 TIMES THE YIELD STRENGTH OF THE TRANSVERSE BARS BEING JOINED. FOR TIE BARS, USE DEFORMED REINFORCING BARS. TIE BAR ASSEMBLIES MADE FROM STEELS OTHER THAN ASTM GRADE 60 AND WITH DEFORMATIONS OTHER THAN ASTM STD. MAY BE USED PROVIDED THEY PROVE SATISFACTORY TO THE ENGINEER AND ARE IN EVERY RESPECT THE EQUAL TO THE ASSEMBLIES SPECIFIED. LABORATORY TESTING OF THE PROPOSED ASSEMBLIES, AT THE CONTRACTOR'S EXPENSE, MAY BE REQUIRED. LAP AND WELD ONE PORTION OF THE TIE BAR ASSEMBLY TO EACH LONGITUDINAL BAR IN ACCORDANCE WITH THE ITEM "STRUCTURAL FIELD WELDING "AND THE OTHER PORTION INTO THE COUPLING PRIOR TO PAVING. ENSURE MULTIPLE PIECE TIE BAR LENGTHS CONFORM TO THE TIE BAR LENGTHS SHOWN ELSEWHERE IN THE PLANS. ADDITIONAL "SHEAR STEEL" WILL ALSO BE REQUIRED AND MAY BE USED WITH MULTIPLE PIECE ASSEMBLIES AS PREVIOUSLY DESCRIBED. USE ADDITIONAL STEEL BARS OF EQUAL DIAMETER AT A SPACING DOUBLE THAT OF THE LONGITUDINAL STEEL AND ENSURE THE LENGTH IS 66 TIMES THE TIE BAR DIAMETER.
7. DO NOT SHEAR CUT DOWEL BARS.
8. ENSURE DOWEL BAR EPOXY COATING CONFORMS TO ARTICLE 440.2.7., "EPOXY COATING".
9. REPLACE ANY BENT LONGITUDINAL REINFORCING. IF THERE IS NOT SUFFICIENT EXPOSED REINFORCING TO PROVIDE A MINIMUM OF A 33 TIMES BAR DIAMETER LAP, REMOVE THE EXISTING PAVEMENT AND SUFFICIENTLY EXPOSE THE EXISTING REINFORCING TO PROVIDE A 33 TIMES BAR DIAMETER LAP. REPLACE ANY SHEAR BARS THAT ARE DISTURBED, BY DRILLING AND GROUTING AS REQUIRED BY NOTE 12 BELOW. PERFORM THIS CORRECTIVE ACTION AT NO EXPENSE TO THE DEPARTMENT.
10. TIE BARS AND DOWEL BARS OMITTED, LOST, OR DAMAGED SHALL BE REPAIRED BY DRILLING AND EPOXY GROUTING AT NO EXPENSE TO THE DEPARTMENT.
11. JUNCTURES A & B ARE ONLY SUITABLE FOR MINOR STREETS WITH LOW TRAFFIC VOLUMES.
12. FURNISH ADDITIONAL SHEAR BARS (DIAMETER "D") OF THE SAME SIZE AS LONGITUDINAL BARS AND SPACE THEM MIDWAY BETWEEN ALTERNATE LONGITUDINAL BARS ALONG THE TRANSVERSE CONSTRUCTION JOINT FORMED AT THE LEAVE-OUT.

LEGEND

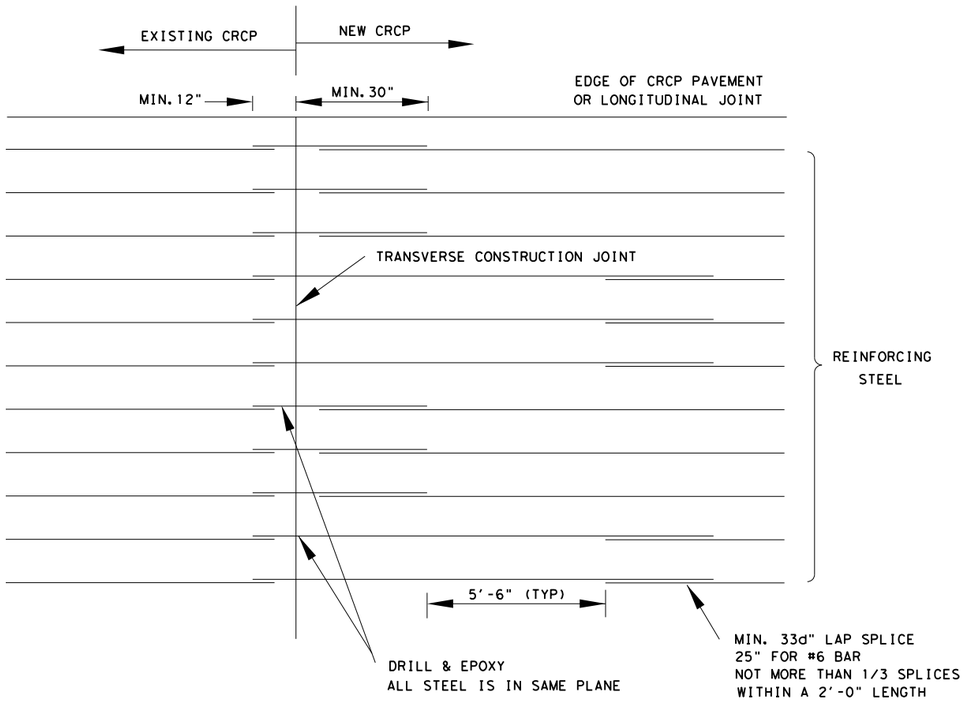
ACP - ASPHALT CONCRETE PAVEMENT
CRCP - CONTINUOUSLY REINFORCED CONCRETE PAVEMENT
JRCP - JOINTED REINFORCED CONCRETE PAVEMENT
T - THICKNESS

Texas Department of Transportation
Houston District

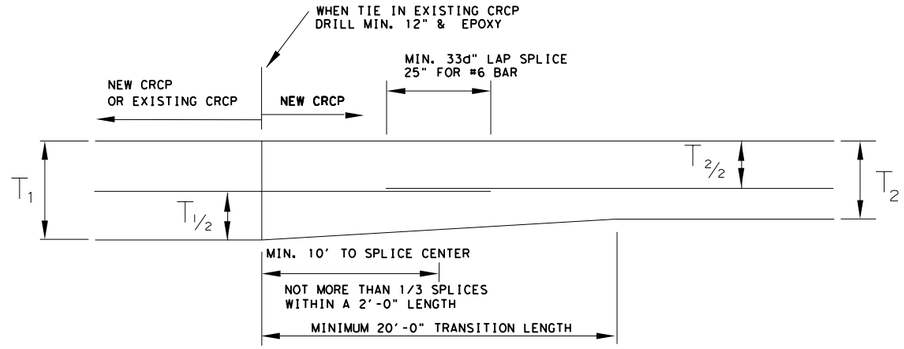
CONCRETE PAVEMENT JUNCTURES

CPJ

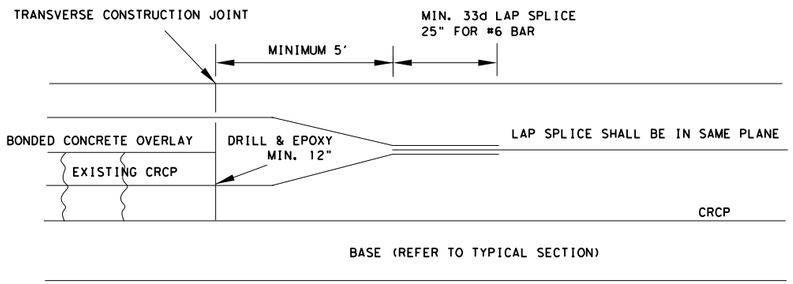
FILE: STDB-5.dgn	DN:	CK:	DW:	CK:	
© TxDOT DEC. 2009	DIST	FED REG	PROJECT NO.		SHEET
REVISIONS 5/05 2004 SPECS REVISED 4/2008 2/15 2014 SPECS	HOU	6			62
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	HARRIS		0271	14	240	IH-610



EXISTING CRCP TO NEW CRCP

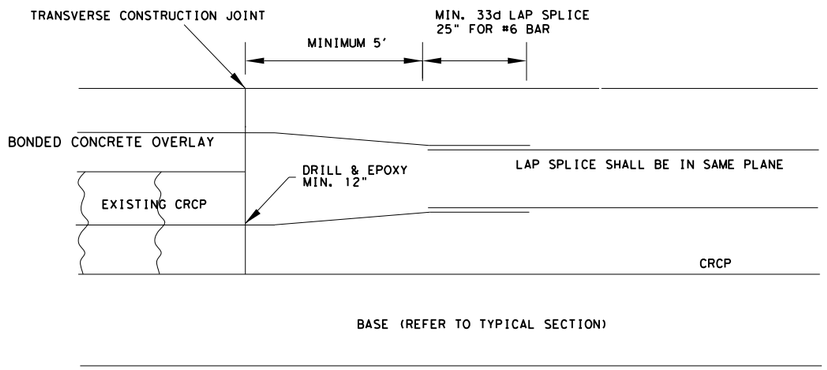


CRCP THICKNESS TRANSITION



CRCP BONDED OVERLAY TO CRCP TRANSITION

(ONE LAYER STEEL)



CRCP BONDED OVERLAY TO CRCP TRANSITION

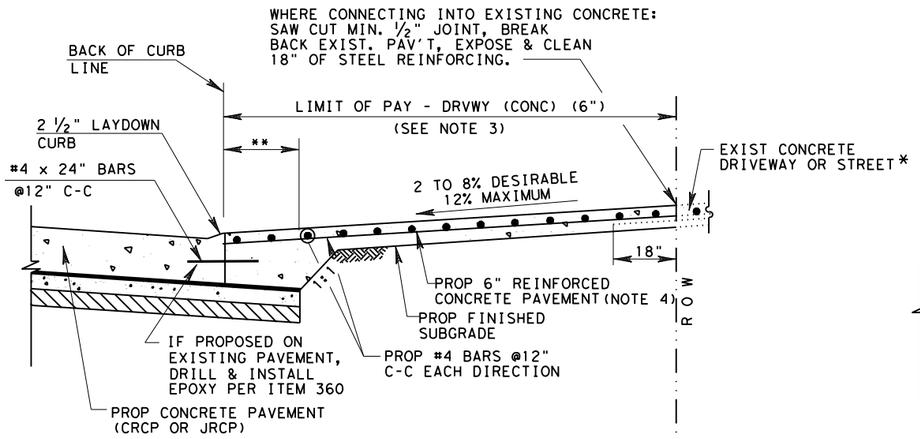
(TWO LAYER STEEL)

Texas Department of Transportation
Houston District

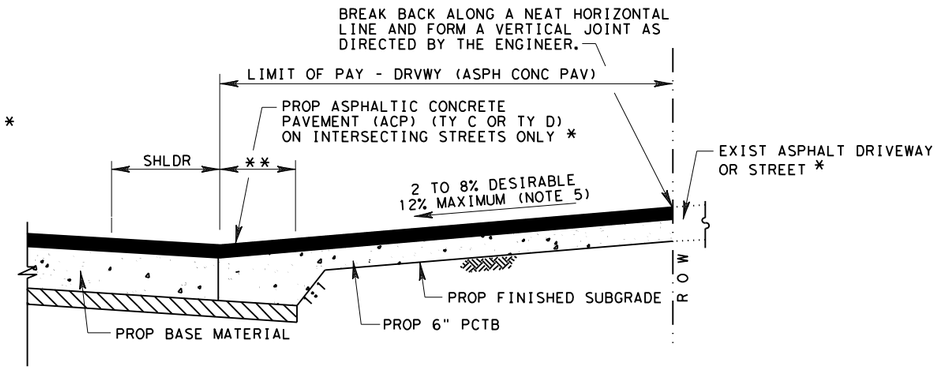
CONCRETE PAVEMENT JUNCTURES

CPJ

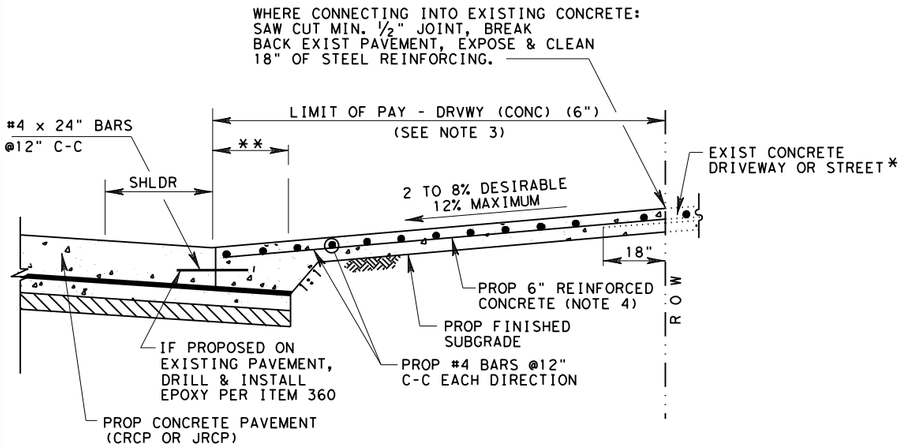
FILE: STDB-5.dgn	DN:	CK:	DW:	CK:		
© TxDOT DEC. 2009	DIST	FED REG	PROJECT NO.			SHEET
REVISIONS 5/05 2004 SPECS REVISED 4/2008 2/15 2014 SPECS	HOU	6				63
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	HARRIS		0271	14	240	IH-610



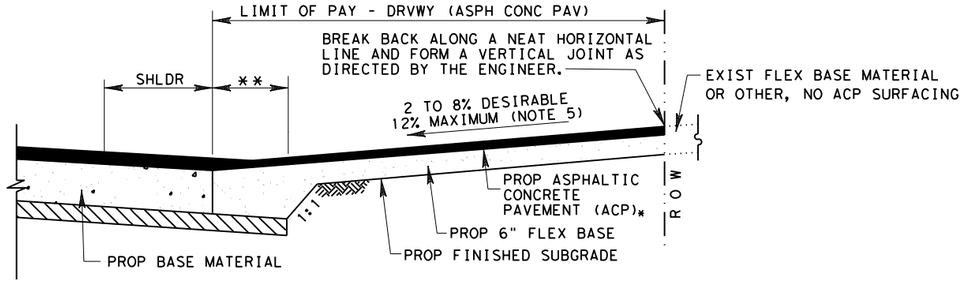
PROPOSED DRIVEWAY DETAIL
REINFORCED CONCRETE AT CONCRETE
CURB AND GUTTER ROADWAY



PROPOSED DRIVEWAY DETAIL
ASPHALT W/ PCTB AT ASPHALT ROADWAY



PROPOSED DRIVEWAY DETAIL
REINFORCED CONCRETE AT CONCRETE ROADWAY



PROPOSED DRIVEWAY DETAIL
ASPHALT W/ FLEX BASE AT ASPHALT ROADWAY

NOTES:

1. ALSO SEE SHEET 2 OF 2 FOR DRIVEWAY SLOPES WITH PROPOSED SIDEWALKS.
2. FOR INTERSECTIONS BUILT WITH CRCP PAVEMENT SEE CRCP DETAIL.
3. FAST TRACK CONCRETE IS PAID AS DRVWY (CONC) (FAST TRACK).
4. THICKNESS OF DRIVEWAY IS 6 INCHES FOR REGULAR AND FAST TRACK CONCRETE.
5. MAXIMUM SLOPE IS: 12% RESIDENTIAL
   8% OTHERS

LEGEND:

PCTB- PORTLAND CEMENT TREATED BASE

JRCP- JOINTED REINFORCED CONCRETE PAVEMENT

CRCP- CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

ACP- ASPHALTIC CONCRETE PAVEMENT

* FOR STREET INTERSECTIONS REFER TO PAVING DETAILS AND INTERSECTION DETAILS FOR REINFORCING STEEL AND SECTION REQUIREMENTS.

** PROPOSED LIMIT OF ROADWAY BASE AND/OR SUBGRADE

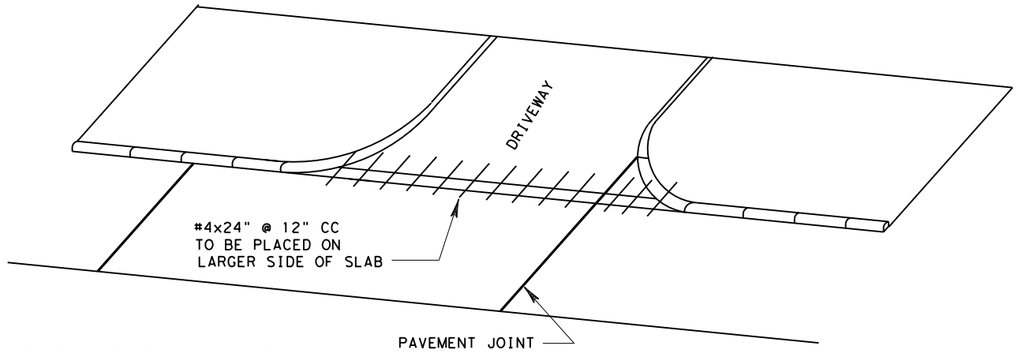
Texas Department of Transportation
Houston District

DRIVEWAY DETAILS

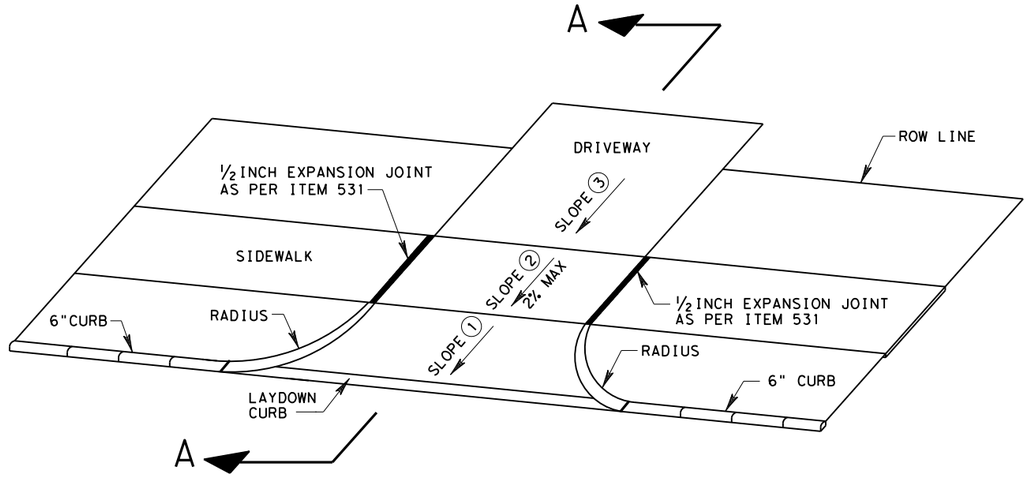
DD

FILE: STDB-8a.dgn	DN:	CK:	DW:	CK:		
© TxDOT SEPT. 2004	DIST	FED REG	PROJECT NO.			SHEET
REVISIONS 11/15 ADDED NOTE FOR PCTB 3/17 MODIFIED PAVEMENT SLOPES	HOU	6				64
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	HARRIS		0271	14	240	IH-610

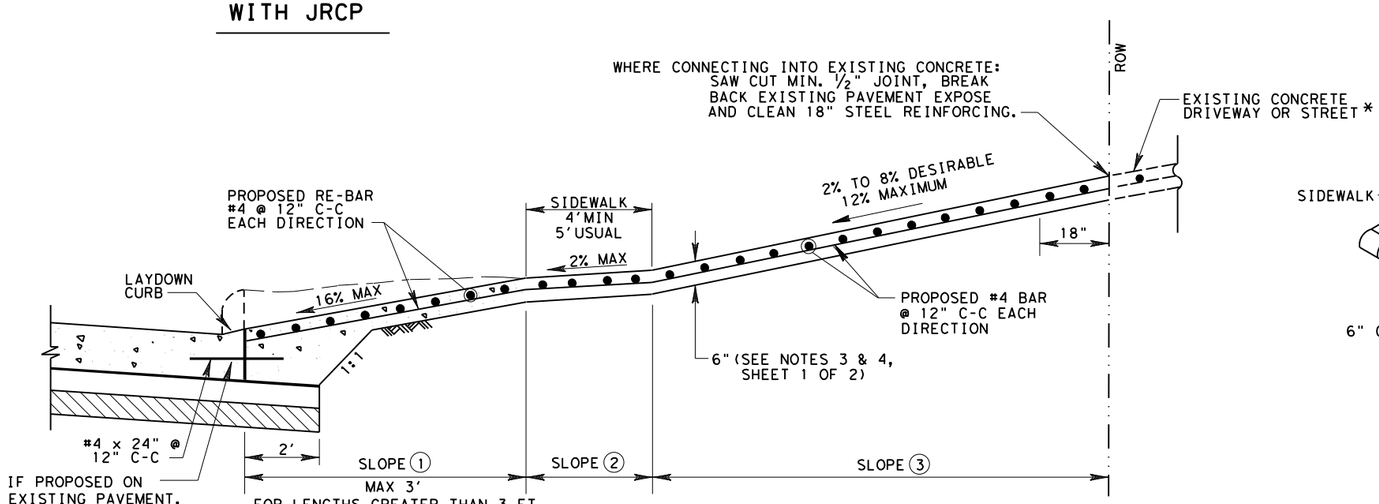
STDB8A



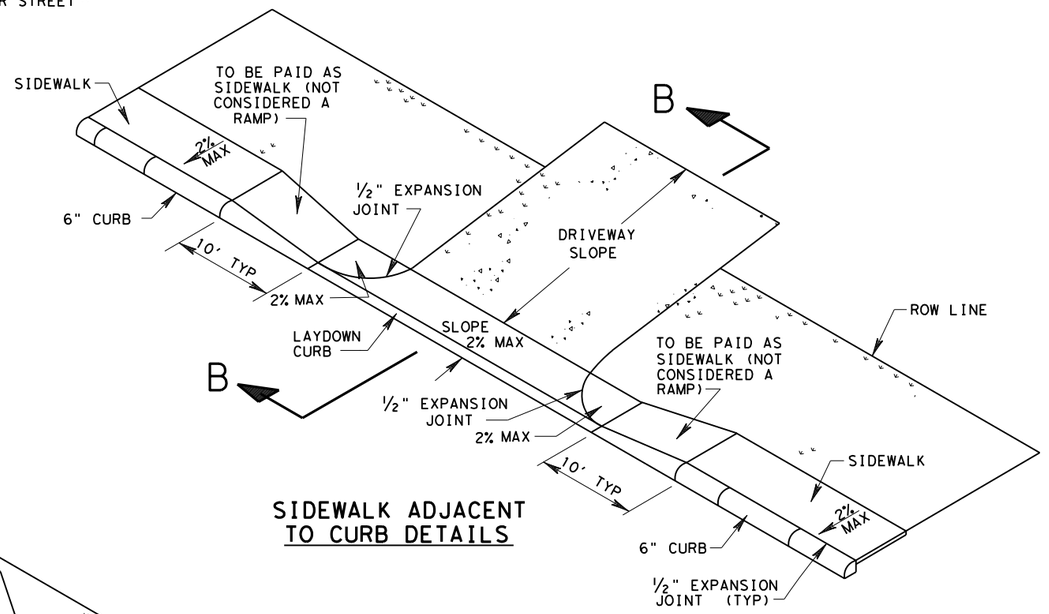
TIE BAR PLACEMENT WITH JRCP



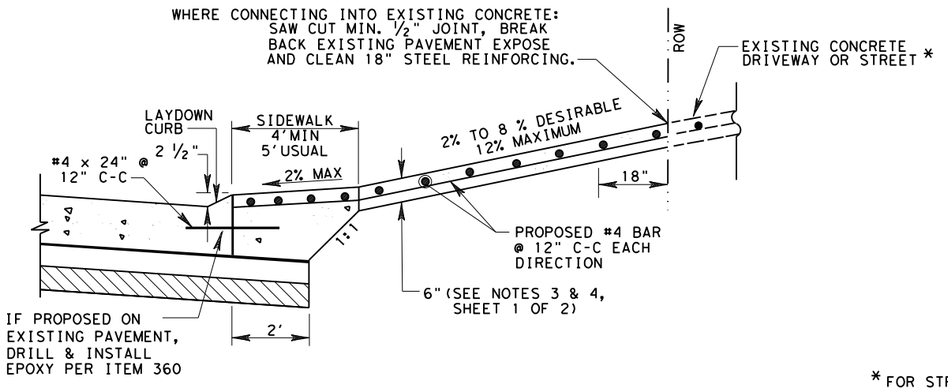
SIDEWALK OFFSET FROM CURB DETAILS



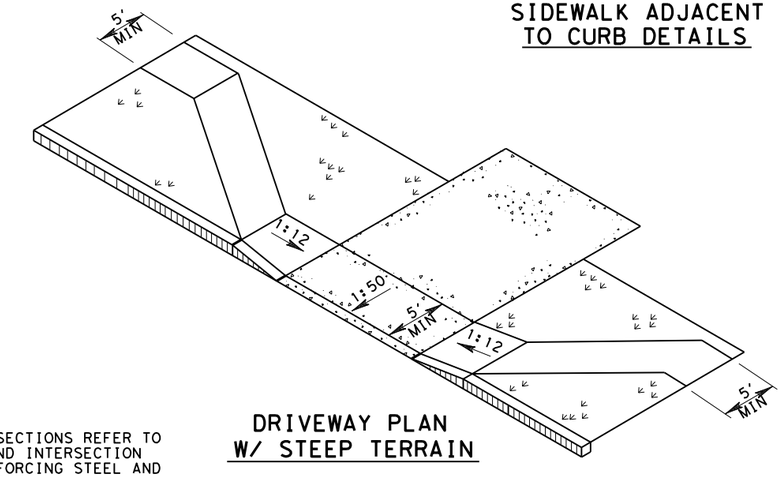
SLOPES W/ SIDEWALKS OFFSET FROM CURB (SECTION A-A)



SIDEWALK ADJACENT TO CURB DETAILS



DRIVEWAY SLOPES W/ SIDEWALKS ADJACENT TO CURB (SECTION B-B)



DRIVEWAY PLAN W/ STEEP TERRAIN

* FOR STREET INTERSECTIONS REFER TO PAVING DETAILS AND INTERSECTION DETAILS FOR REINFORCING STEEL AND SECTION REQUIREMENTS.

SHEET 2 OF 3

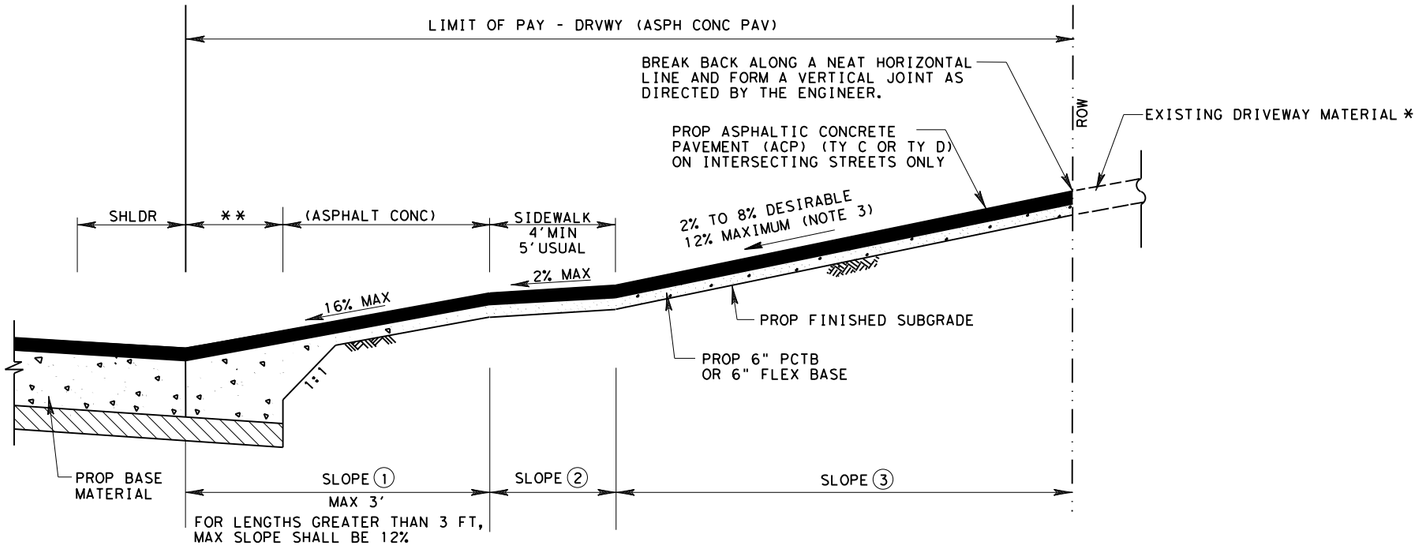
Texas Department of Transportation
Houston District

DRIVEWAY DETAILS

DD

FILE: STDB-8b.dgn	DN:	CK:	DW:	CK:		
©TxDOT SEPT. 2004	DIST	FED REG	PROJECT NO.			SHEET
REVISIONS 9/09 ADDED NOTE FOR ITEM 360. 11/15 ADDED NOTE FOR PCTB	HOU	6				65
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	HARRIS		0271	14	240	IH-610

STDB8B



PROPOSED DRIVEWAY SLOPES
WITH SIDEWALKS OFFSET

NOTES:

1. ALSO SEE SHEET 2 OF 3 FOR DRIVEWAY SLOPES WITH PROPOSED SIDEWALKS.
2. FOR INTERSECTIONS BUILT WITH CRCP PAVEMENT SEE CRCP DETAIL.
3. MAXIMUM SLOPE IS: 12% RESIDENTIAL 8% OTHERS

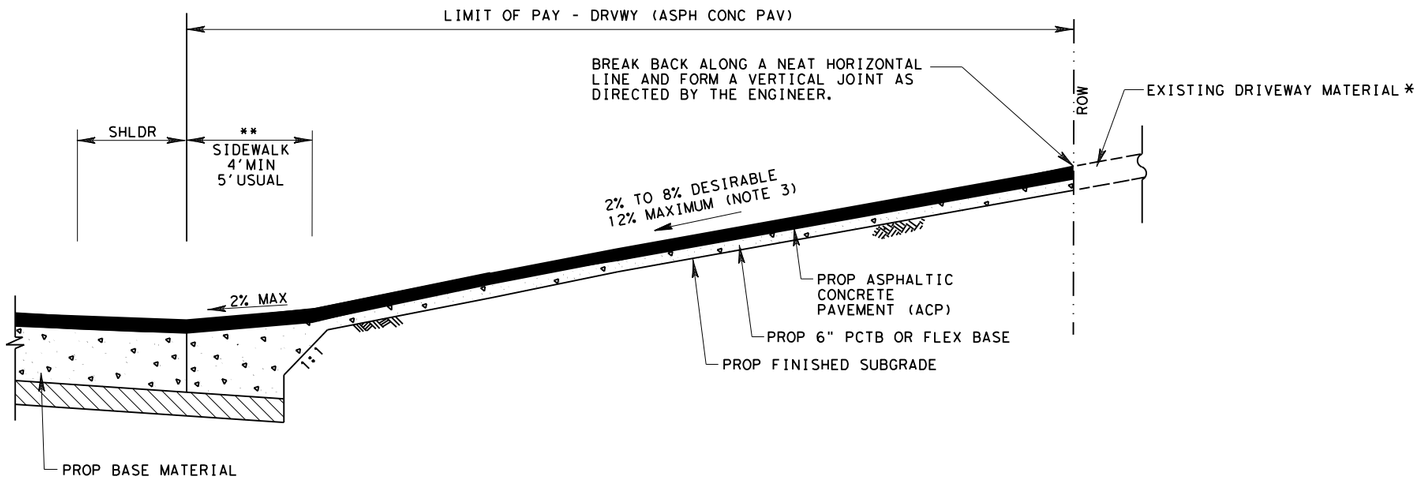
LEGEND:

PCTB- PORTLAND CEMENT TREATED BASE

ACP- ASPHALTIC CONCRETE PAVEMENT

* FOR STREET INTERSECTIONS REFER TO PAVING DETAILS AND INTERSECTION DETAILS.

** PROPOSED LIMIT OF ROADWAY BASE AND/OR SUBGRADE



PROPOSED DRIVEWAY SLOPES
WITH SIDEWALKS ADJACENT

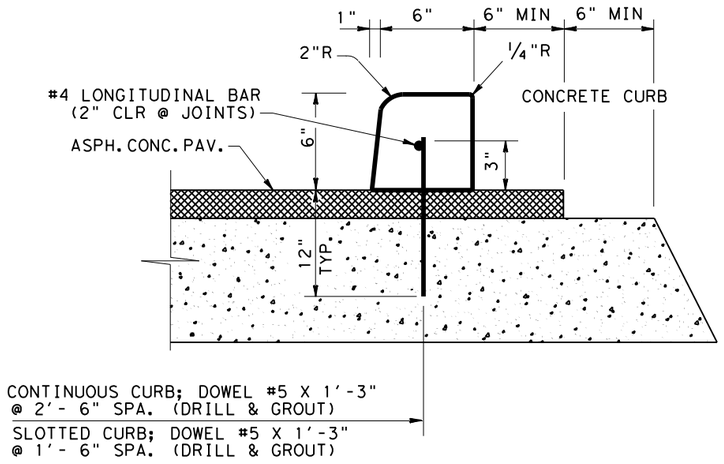
Texas Department of Transportation
Houston District

DRIVEWAY DETAILS

DD

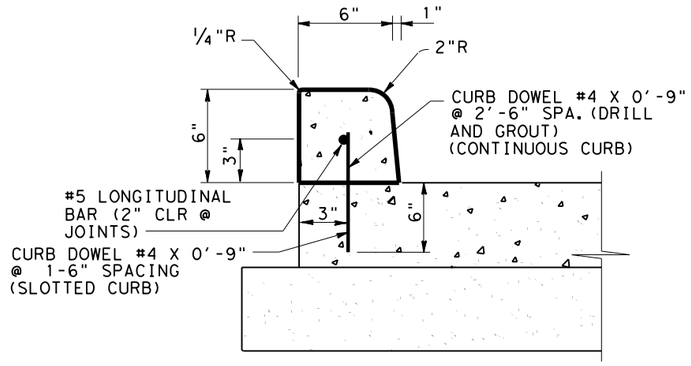
FILE: STDB-8c.dgn	DN:	CK:	DW:	CK:		
© TxDOT SEPT. 2004	DIST	FED REG	PROJECT NO.			SHEET
REVISIONS 11/15 ADDED NOTE FOR PCTB 3/17 MODIFIED PAVEMENT SLOPES	HOU	6				66
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	HARRIS		0271	14	240	IH-610

STDB8C



SHOWN ON EXISTING OR PROPOSED ACP PAVEMENT

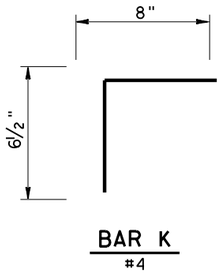
(PAY ITEM 529-6011) - FOR CONTINUOUS



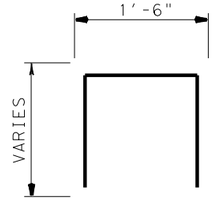
SHOWN ON EXISTING OR PROPOSED CONCRETE PAVEMENT

(PAY ITEM 529-6011) - FOR CONTINUOUS

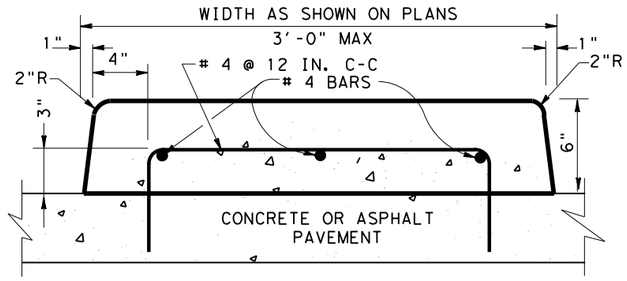
CONCRETE CURB (DOWEL) (6 IN.)



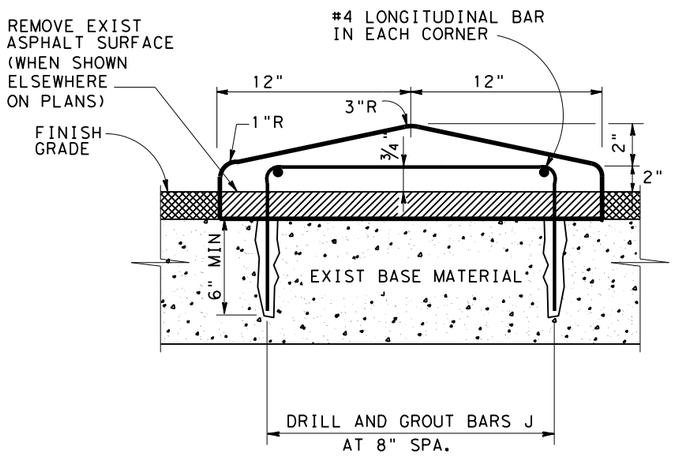
BAR K
#4



BAR J
#4

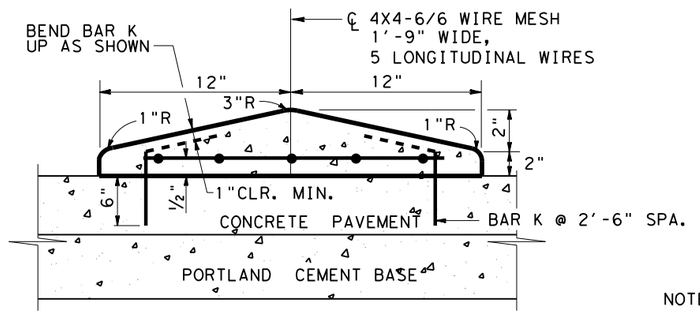


ITEM 536-6001 CONCRETE MEDIAN
SEE NOTE 2



SHOWN ON EXISTING ACP PAVEMENT

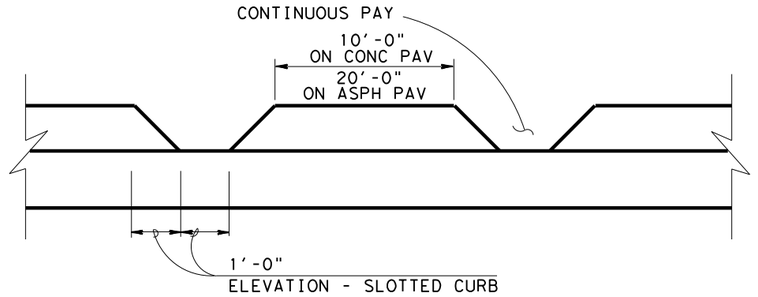
SEE NOTE 2 - ITEM 536-6003 CONC DIRECTIONAL ISLAND



SHOWN ON EXISTING OR PROPOSED CONCRETE PAVEMENT

SEE NOTE 2 - ITEM 536-6003 CONC DIRECTIONAL ISLAND

CONCRETE DIRECTIONAL ISLAND



ELEVATION - SLOTTED CURB

ITEM 529-6012 CONCRETE CURB (SLOTTED) - ON CONC.
ITEM 529-6009 CONC CURB (DOWEL)(SLOTTED) - ON ASPH.

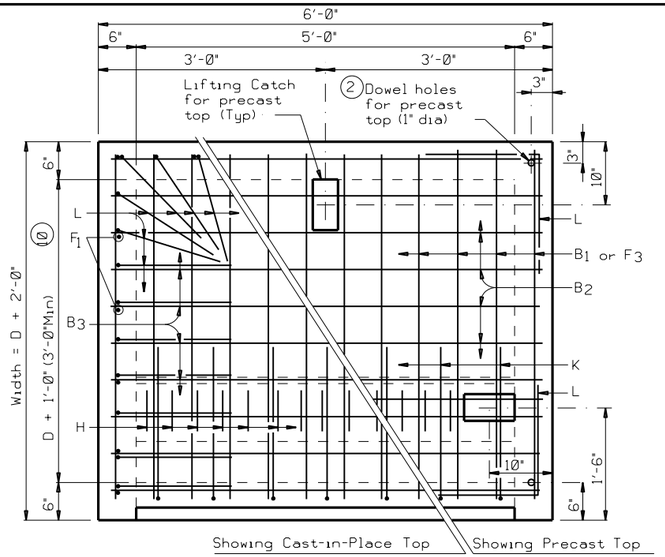
NOTES:

1. DRILL AND GROUT BARS SHOWN AS PER ITEM 420.4.7.10, 6" EMBEDMENT, MINIMUM ON CONC.
2. INSTALL A 2 INCH DRAINAGE OPENING AT 10 FT C-C WHEN CURB/ISLAND IS NOT ON TOP OF CROSS SECTION. (LOCATED ON A 2 OR 3 PERCENT TRANSVERSE GRADE, OR SUPERELEVATION.)

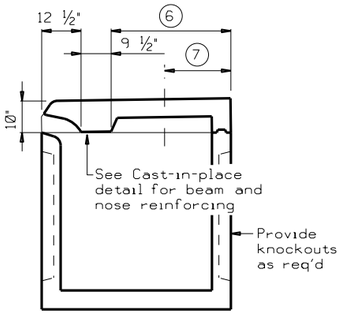
Texas Department of Transportation
Houston District

CONCRETE CURB AND DIRECTIONAL ISLAND DETAILS
CC & DID

FILE: STDB-9.dgn	DN:	CK:	DW:	CK:
©TxDOT 2014	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS	HOU	6		67
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	HARRIS	0271	14	240	IH-610

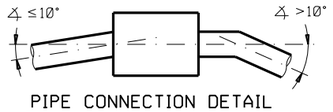


PLAN



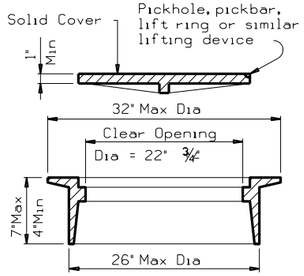
PREFABRICATED INLET

(6) For reinforcing steel and dimensions not shown, see fabricators shop drawings. Structure shall be of the size required to accommodate size of pipe shown elsewhere in the plans. Length of inlet = 6'-0"



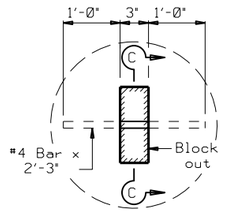
PIPE CONNECTION DETAIL

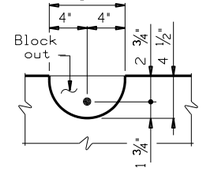
Connecting pipes should enter within 10° of normal to inlet wall. If necessary, pipe elbow or curved approach alignment should be used to stay within this limit.



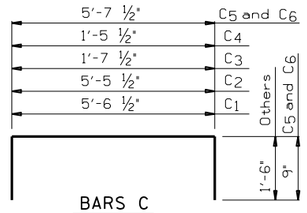
RING AND COVER DETAILS

EJIW No V-1418 or Neenah No R5900-FTX

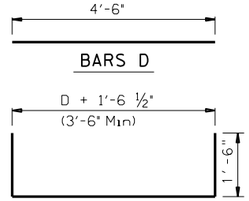




LIFTING CATCH



BARS C

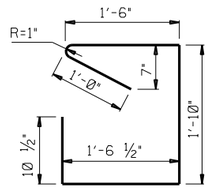


BARS D

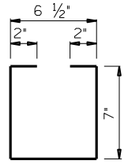
BARS E

REINF STEEL		
Bar	Size	Spacing
B1	#4	6"
B2	#5	6"
B3	#4	6"
C1-2	#4	12"
C3-4	#4	(9)
C5	#6	(9)
C6	#4	(9)
D	#4	(9)
E	#4	12"
F1-3	#4	12"
G	#4	6"
H	#3	4"
K	#4	9"
L	#4	6"

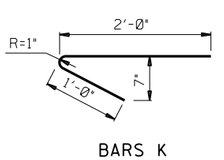
(9) As shown



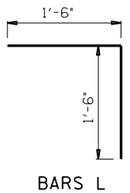
BARS G



BARS H



BARS K



BARS L

GENERAL NOTES:

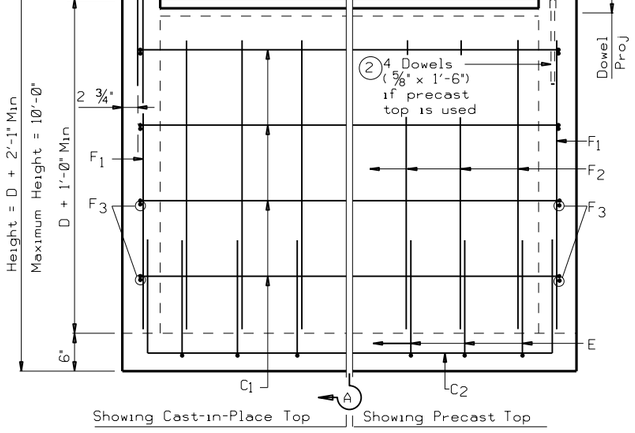
No alternate designs nor alternate details shall be permitted for precast or cast in place inlets.

Quantities shown herein are for Contractor's information only. Unless otherwise shown in the plans, payment will be made for each inlet of the type specified and for each extension. Each five foot curb opening of extension is considered "one extension" regardless of whether placed monolithically or precast. Extension length shall be in multiples of 5 feet.

Engineer has the option of specifying cast-in-place top with ring and cover or removable precast top as specified elsewhere in plans. Shop drawings are required for Precast Inlets.

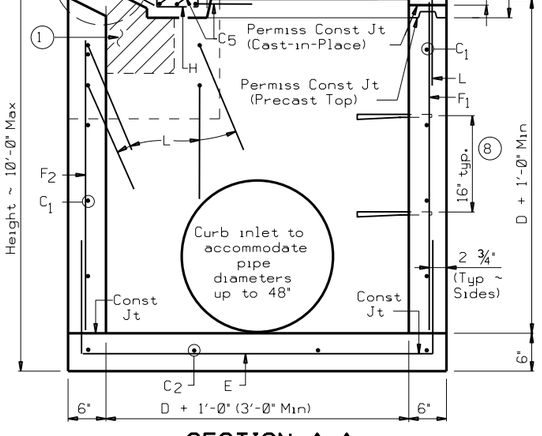
In areas of conflict between reinforcing steel, blockouts, pipes, anchor bolts or other reinforcing steel, the reinforcement shall be bent or adjusted to clear as directed by the Engineer.

Ring and cover shall conform to the requirements of AASHTO M306, "Standard Specification for Drainage Structure Castings". Materials shall conform to ASTM A48, Class 35B for gray iron castings or ASTM A536, Grade 65-45-12 for ductile iron castings. Aluminum alloy castings shall not be permitted.



ELEVATION

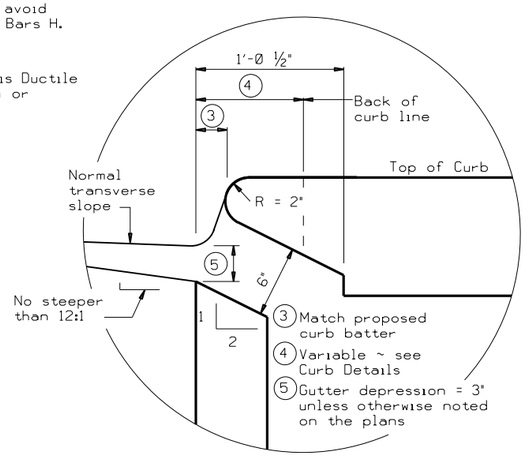
(2) If precast top is used, provide 4 ~ ⅝" dia x 1'-6" smooth bars in inlet walls for 1" dia holes



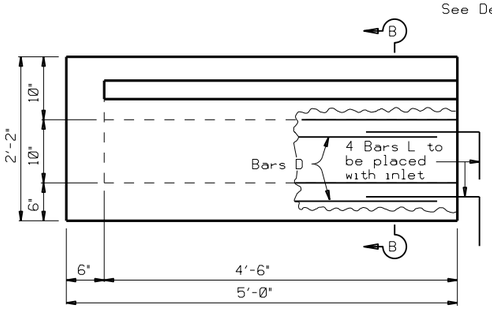
SECTION A-A

(7) 1'-6" Min, 1'-9" Max Adjust placement of Ring and Cover as necessary to avoid conflict with Bars H.

(8) Ladder rung is Ductile Iron, Aluminum or Cast Iron.

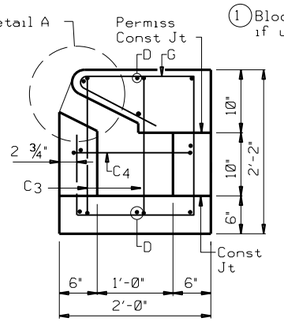


DETAIL A

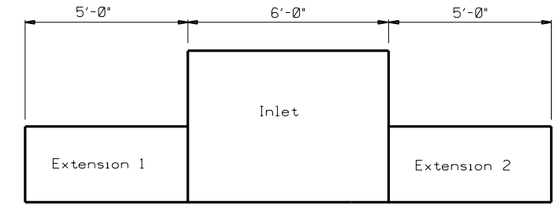


EXTENSION ELEVATION

(1) Block out to accommodate extension if used and to place 4 Bars L



SECTION B-B



Note: If more than one extension is required, they should be located as indicated above. No slope is required in flowline of extension.

EXTENSION PLACEMENT

INSTALL A 3 FT.(HORIZ.) x 6 IN.(VERT.) OPENING ON THE BACK OF THE INLET WHEN SPECIFIED ELSEWHERE ON THE PLANS. MOVE STEPS AS NEEDED. NO REINFORCING ON OPENING/ON 2 IN. ADJACENT TO OPENING.

DESIGNERS: CLARIFY FLOWLINE OF OPENING AND INCLUDE OPENING IN HYDRAULIC CALCULATIONS.

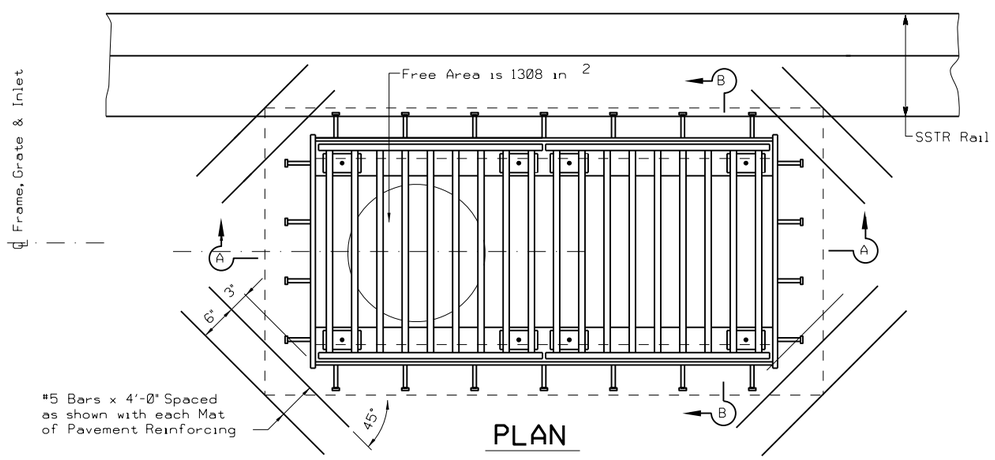
D = Diameter
R = Radius

Texas Department of Transportation
Houston District

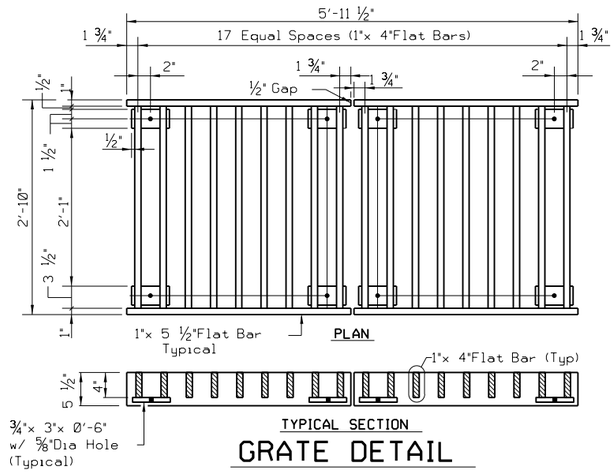
CURB INLET TYPE C
(WITH OR WITHOUT EXTENSION)

HIL-C

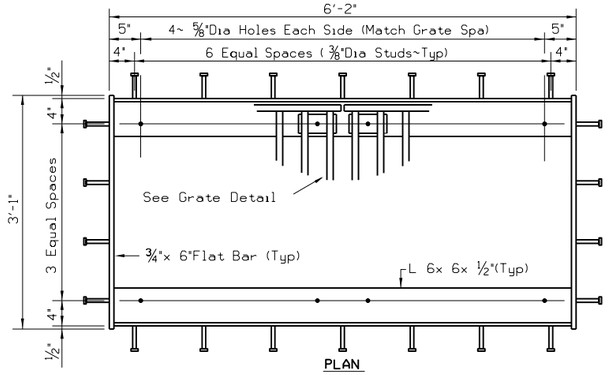
FILE: STDD1.DGN	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT	STD:	
© TxDOT Feb 2010	DIST	FED REG	PROJECT NO.			SHEET
REVISIONS 2/2010 Added note concerning opening on the back of inlet. 10/2014 Removed Note 10	HOUS	6				68
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	HARRIS		0271	14	240	IH-610



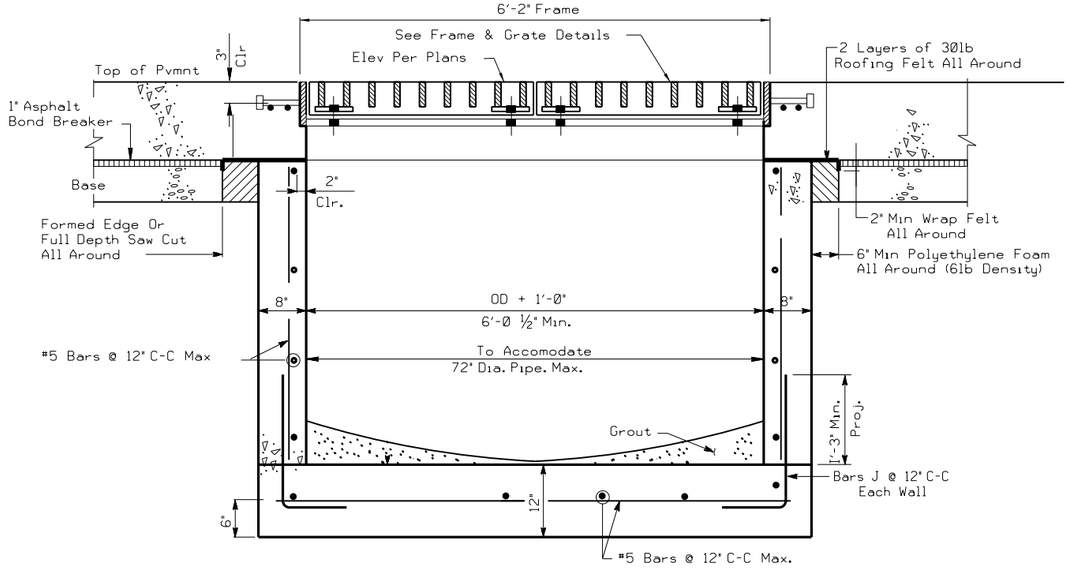
PLAN

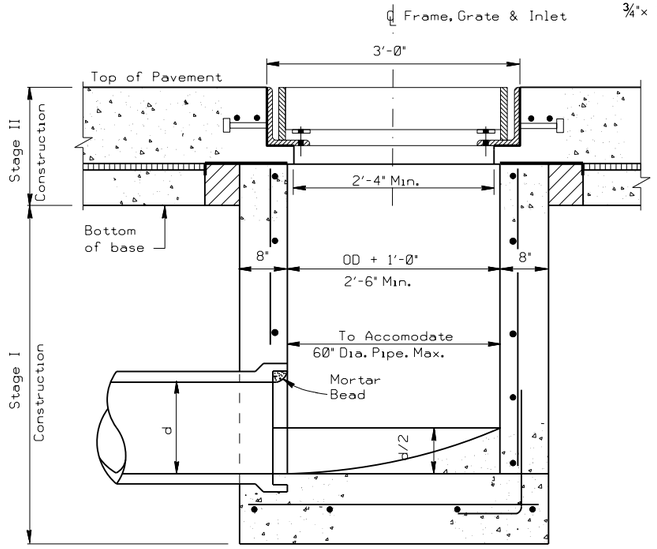


GRATE DETAIL

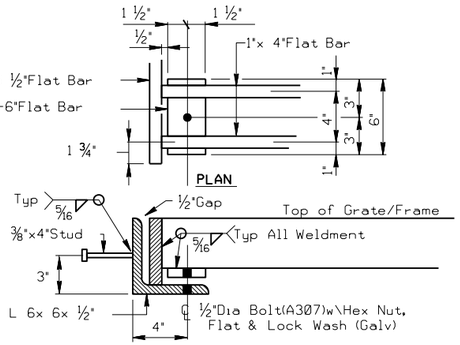


FRAME DETAIL





SECTION B-B



WELDMENT DETAIL

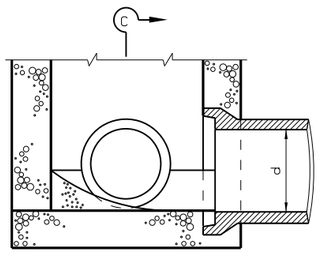
GENERAL NOTES:

All steel is ASTM-A36 and shall be galvanized after fabrication.

Cost Of Furnishing And Installing Frames, Grates, Additional Pavement Reinforcing, Roofing Felt And Polyethylene Foam Shall Be Included In The Unit Price Bid For The Type Of Inlet Selected.

All Concrete Shall Be Class C.

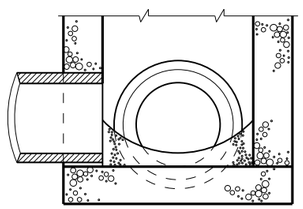
Shop Drawings Will Be Required For Precast Construction Of Inlets.



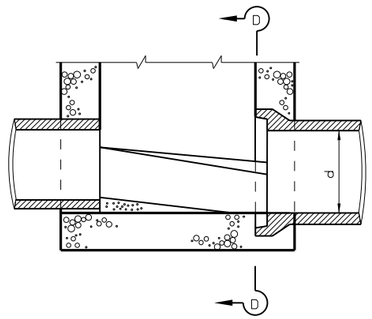
PART SECTION AT INVERT

Showing Shaping Of Invert, Pipe Entering From Adjacent Sides

SECTION A-A

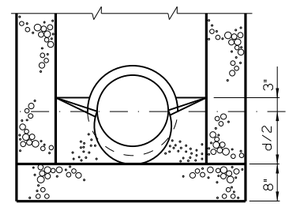


SECTION C-C

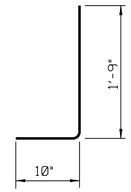


PART SECTION AT INVERT

Showing Shaping Of Invert, Pipe Entering From Opposite Sides



SECTION D-D



BARS J (#5)

d = Diameter

FOR TRAFFIC LOADS

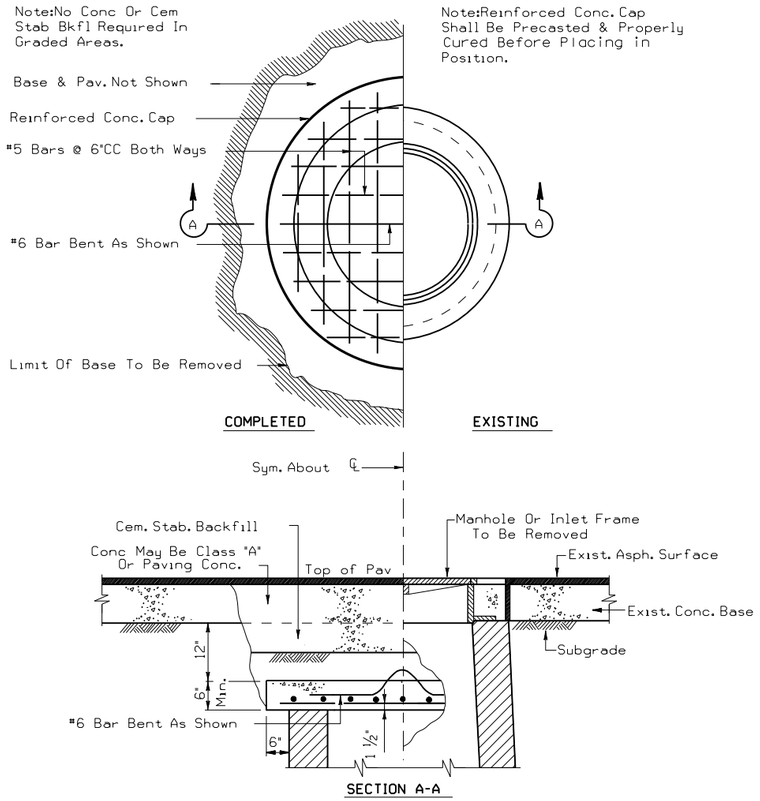
Texas Department of Transportation
Houston District

INLET TYPE AZ2G

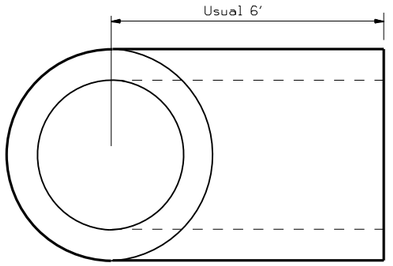
HIL-AZ2G

FILE: STDD7.DGN	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT	STD:	
©TxDOT Feb 2010	DIST	FED REG	PROJECT NO.			SHEET
REVISIONS	HOUS	6				69
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	HARRIS		0271	14	240	IH-610

STDD7.DGN

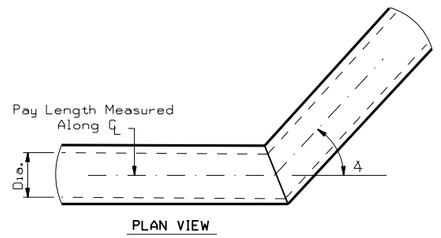


DETAIL SHOWING METHOD OF CAPPING ABANDONED MANHOLES OR INLETS (GRADED OR PAVED AREAS)



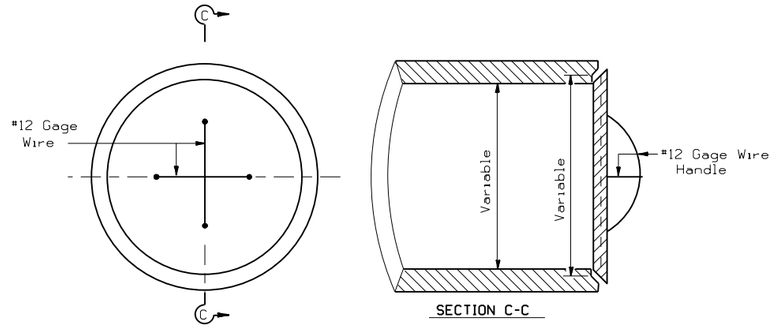
Note: Jointing Material Shall Conform To Requirements Of Item "Reinforced Concrete Pipe." Material For Tees Shall Conform To Requirements Of Item "Reinforced Concrete Pipe." Payment For Tee To Be In Accordance With Item "Reinforced Concrete Pipe."

PRECAST STORM SEWER TEE



BENDING DETAIL

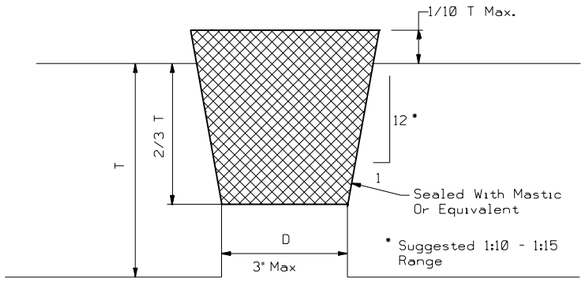
Note: Bending Of Proposed Pipe Sewer Or RCP In A Vertical & /Or Horizontal Plane Shall Be Accomplished By The Use Of A "Pipe Collar" Or A "Precast Elbow", As Approved By The Engineer.
Price Of "Pipe Collar" Or "Precast Elbow" Shall Be Subsidiary To The Unit Prices Bid For Item Reinforced Concrete Pipe.
Pay Length Measurement To Be Along Horizontal ℄ & Horizontal Plane Of Pipes.



Note: The Price Of Plug Shall Be Subsidiary To The Unit Bid Price For Pipe Sewer Or RCP. Mortar Joints To Be Used As Directed By The Engineer. Removal Of The Existing Plugs For Storm Sewer Or RCP Conns. Shall Be Considered Incidental To Item "Excavation And Backfill For Structures."

Concrete Plug For End Of Pipe Culvert Or Sewer

CONCRETE PLUG FOR PIPE

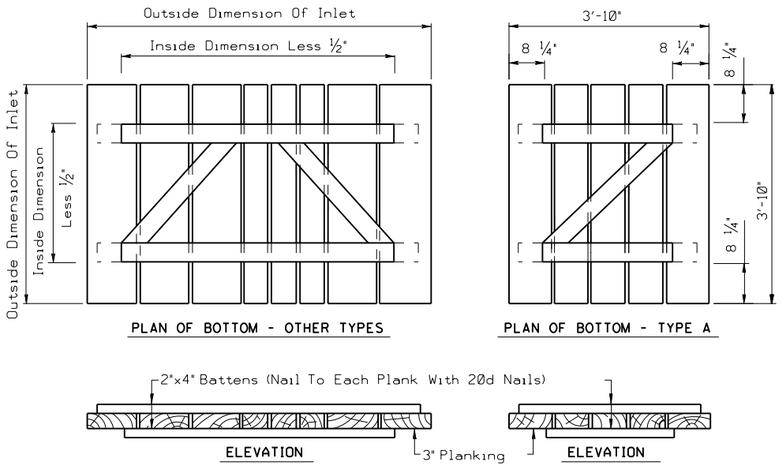


T = Wall Thickness On Top Of Box Or Pipe
D = Diameter Of Lifting Hole

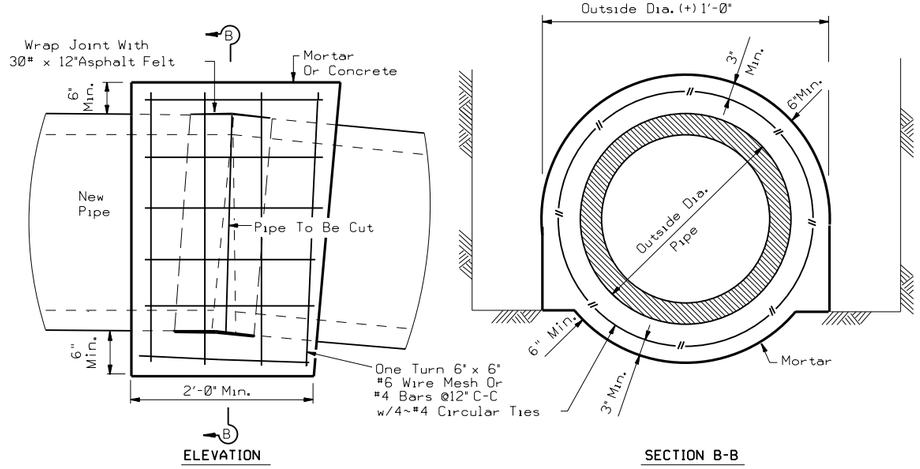
Minimum Length Of Plug Is 2/3 T +/-
Minimum Diameter At Bottom Of Plug = D - ⅛"
Maximum 1/10 T Of Plug Not Seated In Lifting Hole

Note: The Plug Shall Be Cast With The Same Taper As The Lifting Hole.

DETAIL OF PLUG FOR LIFTING HOLES IN RCB AND RCP



TEMPORARY COVERS FOR ALL TYPES OF INLETS



PIPE COLLAR DETAIL

For Horizontal Or Vertical Placement

d = Diameter
R = Radius

Texas Department of Transportation
Houston District (Bridge)

MISCELLANEOUS SEWER DETAILS

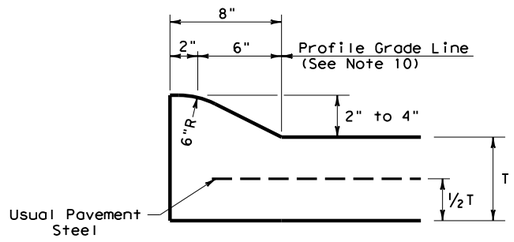
MSD

FILE: STDD11.DGN	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK:
© TxDOT Mar 2004	DISTRICT	FED REG	PROJECT NO.	SHEET
REVISIONS 3/2015 2014 Specs	HOU	6		70

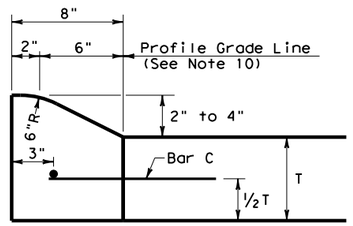
COUNTY	CONTROL	SECT	JOB	HIGHWAY
HARRIS	0271	14	240	IH-610

STDD11.DGN

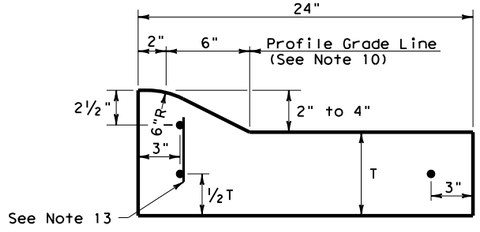
DATE:
FILE:



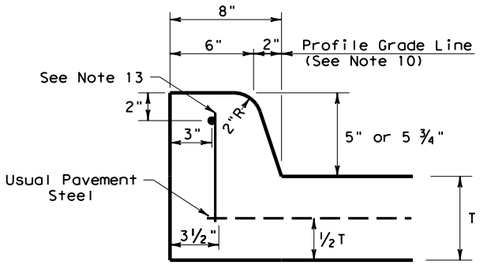
TYPE I CURB (MONOLITHIC)
2" - 4" HEIGHT



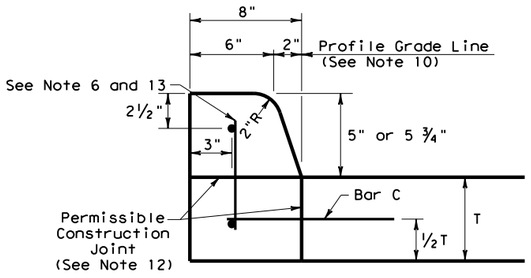
TYPE I CURB
2" - 4" HEIGHT



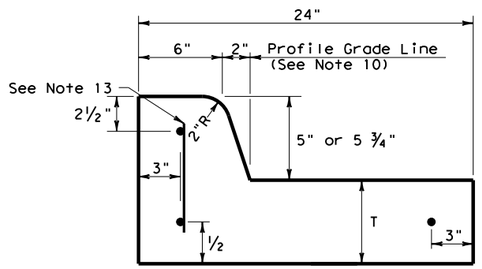
TYPE I CURB AND GUTTER
2" - 4" HEIGHT



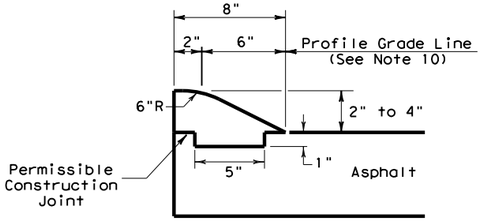
TYPE II CURB (MONOLITHIC)
5" - 5 ¾" HEIGHT



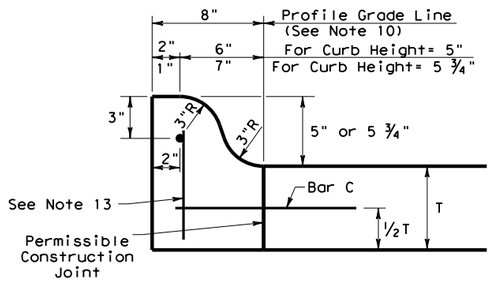
TYPE II CURB
5" - 5 ¾" HEIGHT



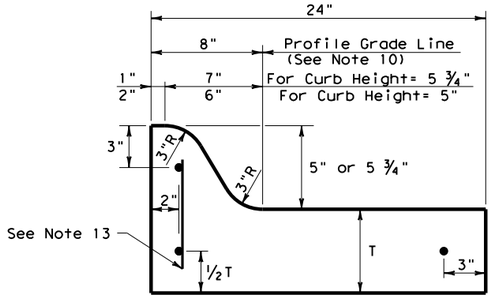
TYPE II CURB AND GUTTER
5" - 5 ¾" HEIGHT



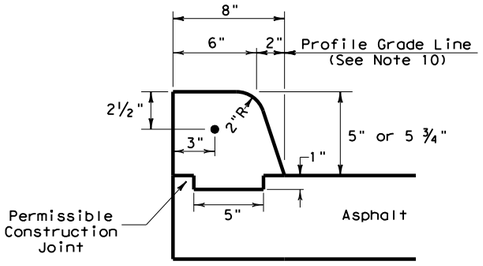
TYPE III CURB (KEYED)
2" - 4" HEIGHT



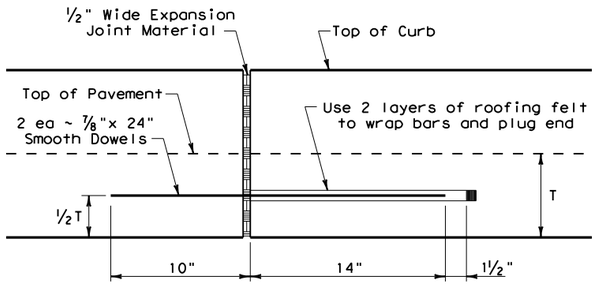
TYPE IIa CURB
5" - 5 ¾" HEIGHT



TYPE IIa CURB AND GUTTER
5" - 5 ¾" HEIGHT

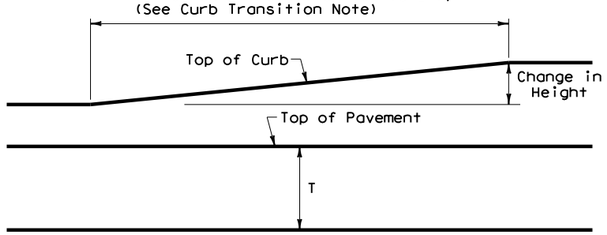


TYPE IV CURB (KEYED)
5" - 5 ¾" HEIGHT



EXPANSION JOINT DETAIL

CURB TRANSITION NOTE:
Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans, or as directed by the Engineer.

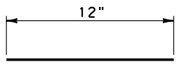


CURB TRANSITION
Note: To be paid for as Highest Curb

GENERAL NOTES

1. All materials and construction shall be in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."
2. Concrete shall be Class A.
3. When reinforcing bars are used, they shall be No.4 unless otherwise shown. The use of fiber reinforced concrete in lieu of reinforcing steel is acceptable. Use fibers meeting the requirements of DMS 4550, "Fibers for Concrete," and dose fibers in accordance with Material Producers List (MPL) "Fibers for Class A and B Concrete Applications."
4. Round exposed sharp edges with a rounding tool, to a minimum radius of ¼ inch.
5. All existing curbs and driveways to be removed shall be sawed or removed at existing joints.
6. Where concrete curb is to be placed on existing concrete pavement, Bar B may be drilled and grouted in place, or may be inserted into fresh concrete.
7. Expansion and contraction joints shall be constructed to match pavement joints in all curbs and curb and gutter adjacent to jointed concrete pavement. Where placement of curb or curb and gutter is not adjacent to concrete pavement, expansion joints shall be provided at structures, curb returns at streets, and at locations directed by The Engineer.
8. Vertical and horizontal dowel bars and transverse reinforcing bars shall be placed at four feet C~C.
9. Dimension 'T' shown is the thickness of concrete pavement. When curb is installed adjacent to flexible pavement dimension 'T' is 8" maximum.
10. Usual profile grade line. Refer to typical sections and plan-profile sheets for exact locations.
11. One-half inch expansion joint material shall be provided where curb or curb and gutter is adjacent to sidewalk or riprap.
12. When horizontal permissible construction joints are used, the longitudinal pavement steel shall be placed in accordance with pavement details shown elsewhere in the plans. Reinforcing steel for curb section shall then conform to that required for concrete curb.
13. Bar B placement as needed (typically at four ft. C-C) to support curb reinforcing steel during concrete placement.

BAR B



BAR C

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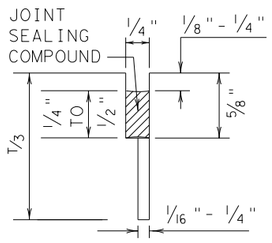
CONCRETE CURB AND CURB AND GUTTER

CCCG-22

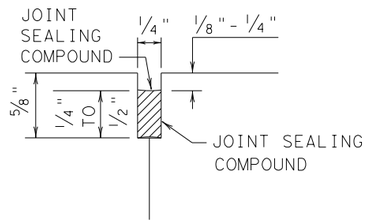
FILE: cccg21.dgn	DN: TXDOT	CK: AN	DW: CS	CK: KM
© TxDOT: JUNE 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	14	240	IH-610
	DIST	COUNTY		SHEET NO.
	12	HARRIS		71

DATE: 3/11/2024
FILE: \\FS-HOUHQ.dot.state.tx.us\Data4\data\engdata\WCHAO\Design\Construction Projects\0271-14-240 IH 610 FROM OLD KATY RD TO W. 12TH ST\Plan Review\5. 90_95 Percent\07 ROADWAY STA

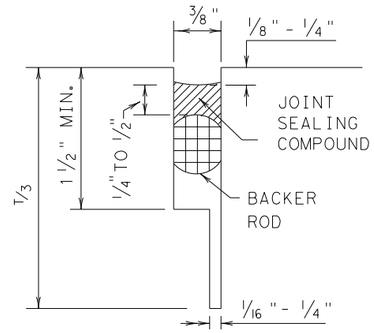
METHOD B: JOINT SEALING COMPOUND



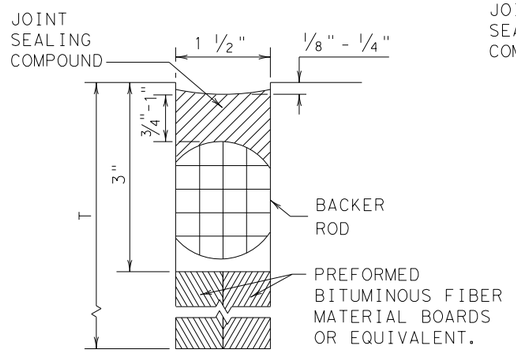
LONGITUDINAL SAWED CONTRACTION JOINT



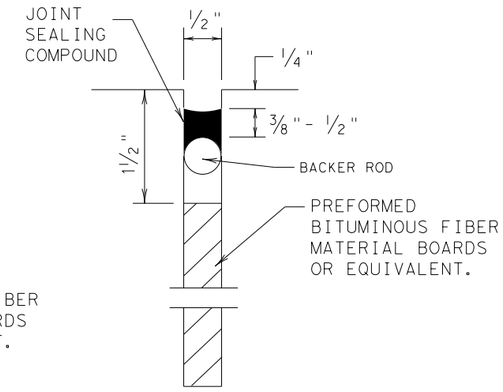
LONGITUDINAL OR TRANSVERSE CONSTRUCTION JOINT



TRANSVERSE SAWED CONTRACTION JOINT

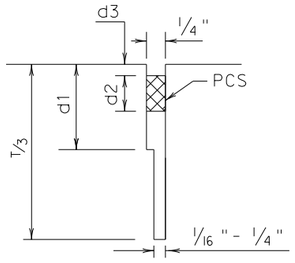


TRANSVERSE FORMED EXPANSION JOINT

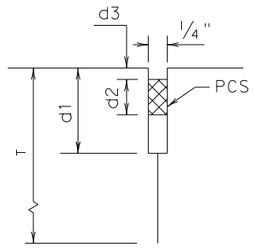


FORMED ISOLATION JOINT

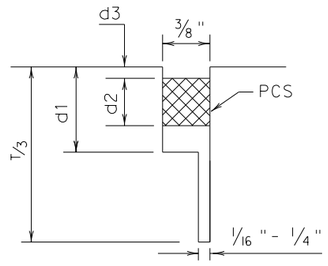
METHOD A: PREFORMED COMPRESSION SEALS (PCS)(DMS-6310 CLASS 6)



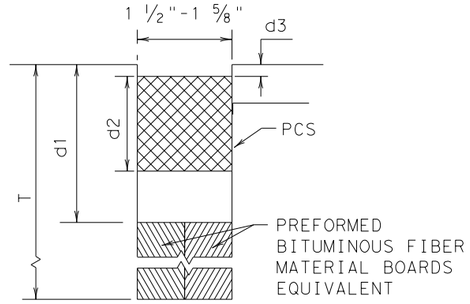
LONGITUDINAL SAWED CONTRACTION JOINT



LONGITUDINAL CONSTRUCTION JOINT



TRANSVERSE SAWED CONTRACTION JOINT



TRANSVERSE FORMED EXPANSION JOINT

GENERAL NOTES

1. UNLESS OTHERWISE SHOWN IN THE PLANS, EITHER METHOD "A" OR METHOD "B" MAY BE USED.
2. THE LOCATION OF JOINTS SHALL BE AS SHOWN ELSEWHERE IN THE PLANS.
3. THE JOINT RESERVOIR FOR SEALANT OR PCS SHALL BE SAWED UNLESS OTHERWISE SHOWN ON THE PLANS FOR THE LONGITUDINAL AND TRANSVERSE CONSTRUCTION JOINTS AND THE SAWED JOINTS.
4. DIMENSIONS d1, d2, AND d3 SHOWN IN METHOD A SHALL BE IN ACCORDANCE WITH THE PREFORMED COMPRESSION SEAL MANUFACTURER'S RECOMMENDATION.
5. REFER TO DMS-6310 "JOINT SEALANTS AND FILLERS" FOR THE CLASSIFICATIONS.
6. FOR SAWED LONGITUDINAL JOINT, LONGITUDINAL OR TRANSVERSE CONSTRUCTION JOINT, USE JOINT SEALANT CLASS 5 OR 8 UNLESS OTHERWISE SHOWN ON THE PLAN OR APPROVED.
7. FOR TRANSVERSE SAWED CONTRACTION, TRANSVERSE FORMED EXPANSION JOINT, AND ISOLATION JOINT USE JOINT SEALANT CLASS 5 OR 8 AT NEW JOINTS. USE JOINT SEALANT CLASS 4,5,7,OR 8 FOR MAINTAINING EXISTING JOINTS.
8. THE JOINTS SHALL BE CLEANED IN ACCORDANCE WITH THE ITEM 438 "CLEANING AND SEALING JOINTS" OR ITEM 713 "CLEANING AND SEALING JOINTS AND CRACKS (CONCRETE PAVEMENT)".
9. ISOLATION JOINTS ACCOMMODATE HORIZONTAL AND VERTICAL MOVEMENTS THAT OCCUR BETWEEN A PAVEMENT AND A STRUCTURE. ISOLATION JOINTS MAY BE USED FOR BRIDGE ABUTMENTS, INTERSECTIONS, CURB AND GUTTER, OLD AND NEW PAVEMENTS, OR AROUND DRAINAGE INLETS, MANHOLES, FOOTINGS AND LIGHTING STRUCTURES.

Texas Department of Transportation

Design Division Standard

CONCRETE PAVING DETAILS

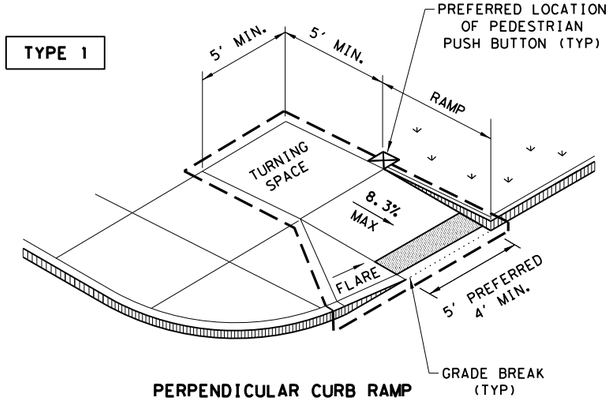
JOINT SEALS

JS-14

FILE: js14.dgn	DN: TxDOT	DN: HC	DW: HC	CK: AN
© TxDOT: DECEMBER 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	14	240	IH-610
	DIST	COUNTY		SHEET NO.
	12	HARRIS		72

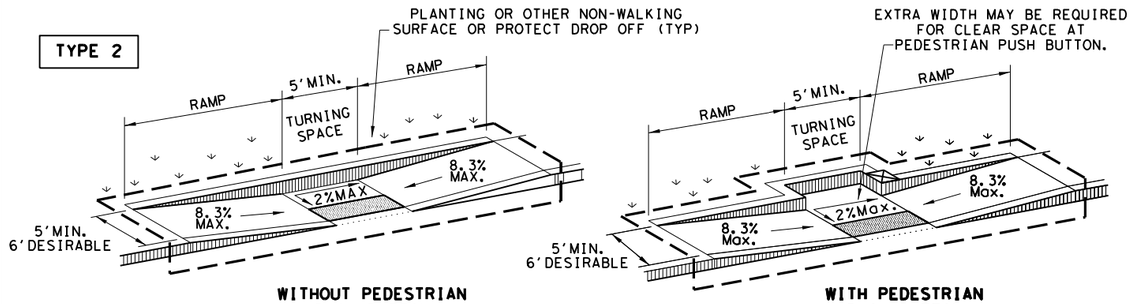
DATE: 3/11/2024
FILE: \\FS-HOUHQ.dot.state.tx.us\Data4\data\engdata\WCHAO\Design\Construction Projects\0271-14-240 IH 610 FROM OLD KATY RD TO W. 12TH ST\Plan Review\5. 90_95 Percent\07 ROADWAY STA

TYPE 1



PERPENDICULAR CURB RAMP

TYPE 2

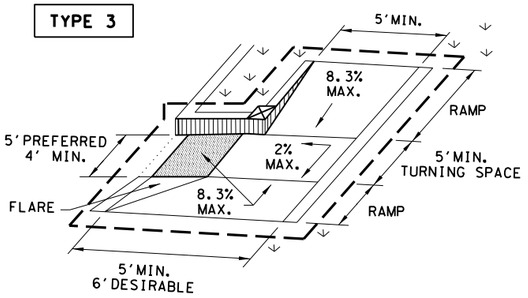


WITHOUT PEDESTRIAN PUSH BUTTON

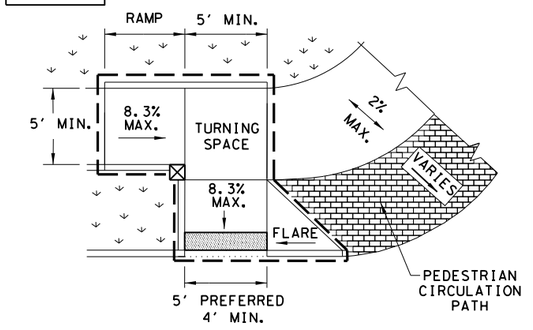
WITH PEDESTRIAN PUSH BUTTON

PARALLEL CURB RAMP

TYPE 3

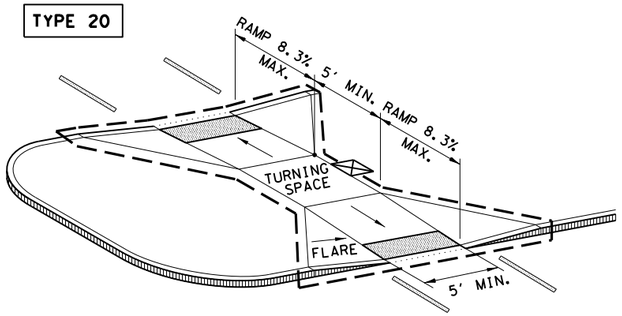


TYPE 6



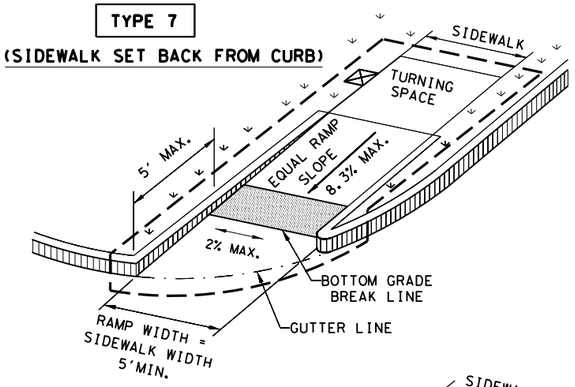
COMBINATION CURB RAMPS

TYPE 20

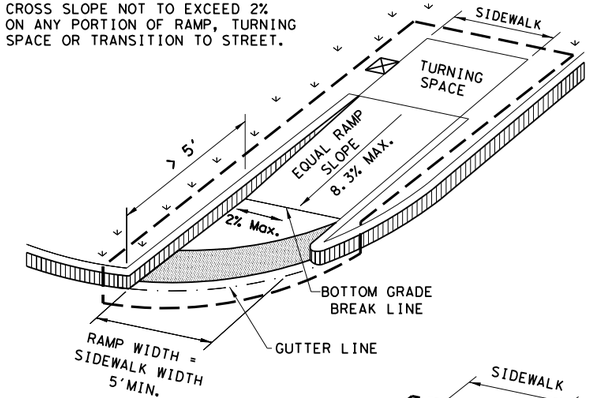


CURB RAMPS AT MEDIAN ISLANDS

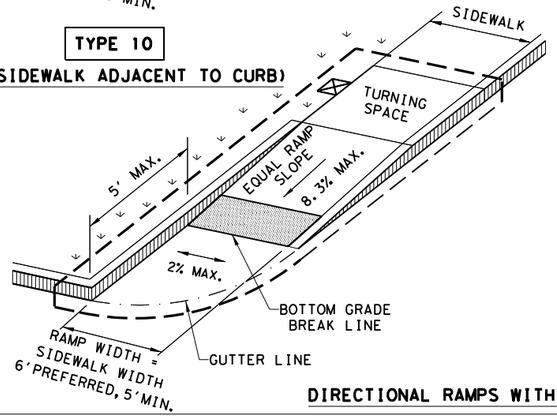
TYPE 7
(SIDEWALK SET BACK FROM CURB)



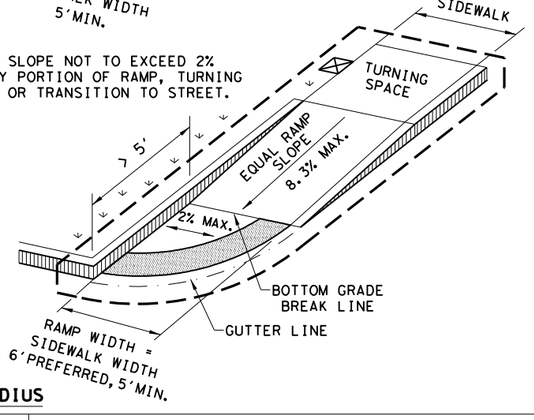
CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.



TYPE 10
(SIDEWALK ADJACENT TO CURB)

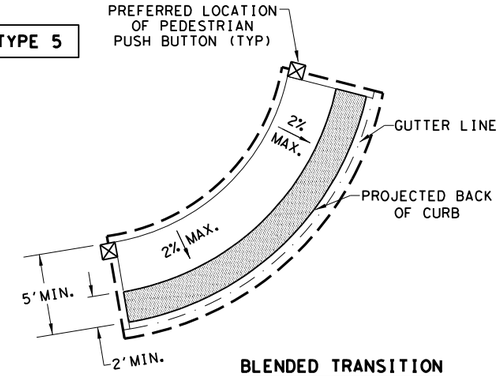


CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.



DIRECTIONAL RAMPS WITHIN RADIUS

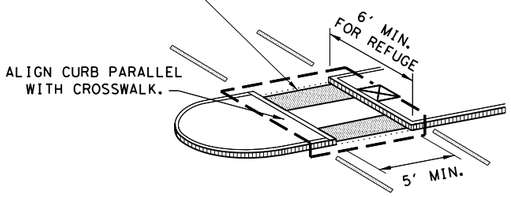
TYPE 5



BLENDED TRANSITION
(FLUSH LANDING)

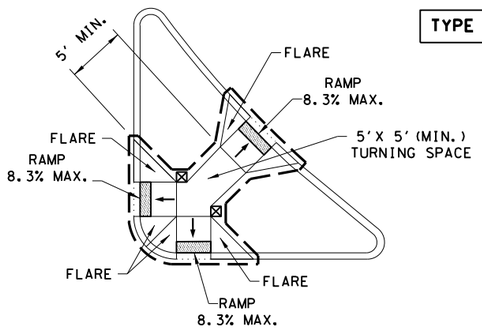
TYPE 21

INSTALL DETECTABLE WARNING SURFACE AT EACH END OF THE CUT-THROUGH RAMP WITH A MINIMUM 2' USUAL SIDEWALK SURFACE BETWEEN. IF MEDIAN IS LESS THAN 6' WIDE, ELIMINATE DETECTABLE WARNING SURFACES.



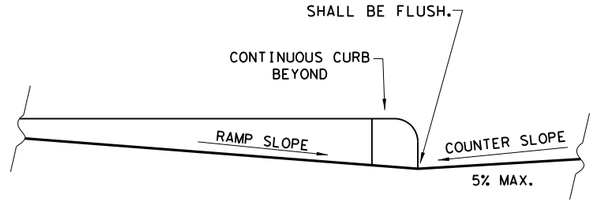
NOTE: CURB DETAILS ARE SHOWN ELSEWHERE IN THE PLANS.

TYPE 22



COMBINATION ISLAND RAMPS

BOTTOM GRADE BREAK OF CURB RAMP WILL NORMALLY BE AT GUTTER LINE. SURFACE SLOPES AT GRADE BREAKS SHALL BE FLUSH.



TYPICAL SECTION OF PERPENDICULAR CURB RAMP AT CONNECTION TO ROADWAY

NOTES / LEGEND:

SEE GENERAL NOTES ON SHEET 2 OF 4 FOR MORE INFORMATION.

DENOTES PLANTING OR NON-WALKING SURFACE NOT PART OF PEDESTRIAN CIRCULATION PATH.

DETECTABLE WARNING SURFACE

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON IF APPLICABLE.

GUTTER LINE

GRADE BREAK

RAMP LIMITS OF PAYMENT

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	14	240	IH-610
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY		SHEET NO.
	12	HARRIS		73

DATE: 3/11/2024
FILE: \\FS-HOUHQ.dot.state.tx.us\Data4\data\engdata\WCHAO\Design\Construction Projects\0271-14-240 IH 610 FROM OLD KATY RD TO W. 12TH ST\Plan Review\5. 90_95 Percent\07 ROADWAY STA

GENERAL NOTES

CURB RAMPS

1. Install a curb ramp or blended transition at each pedestrian street crossing.
2. All slopes shown are maximum allowable. Cross slopes of 1.5% and lesser running should be used. Adjust curb ramp length or grade of approach sidewalks as directed.
3. Maximum allowable cross slope on sidewalk and curb ramp surfaces is 2%.
4. The minimum sidewalk width is 5'. Where the sidewalk is adjacent to the back of curb, a 6' sidewalk width is desirable. Where a 5' sidewalk cannot be provided due to site constraints, sidewalk width may be reduced to 4' for short distances. 5'x 5' passing areas at intervals not to exceed 200' are required.
5. Turning Spaces shall be 5'x 5' minimum. Cross slope shall be maximum 2%.
6. Clear space at the bottom of curb ramps shall be a minimum of 4'x 4' wholly contained within the crosswalk and wholly outside the parallel vehicular travel path.
7. Provide flared sides where the pedestrian circulation path crosses the curb ramp. Flared sides shall be sloped at 10% maximum, measured parallel to the curb. Returned curbs may be used only where pedestrians would not normally walk across the ramp, either because the adjacent surface is planted, substantially obstructed, or otherwise protected.
8. Additional information on curb ramp location, design, light reflective value and texture may be found in the latest draft of the Proposed Guidelines for Pedestrian Facilities in the Public Right of Way (PROWAG) as published by the U.S. Architectural and Transportation Barriers Compliance Board (Access Board).
9. To serve as a pedestrian refuge area, the median should be a minimum of 6' wide, measured from back of curbs. Medians should be designed to provide accessible passage over or through them.
10. Small channelization islands, which do not provide a minimum 5'x 5' landing at the top of curb ramps, shall be cut through level with the surface of the street.
11. Crosswalk dimensions, crosswalk markings and stop bar locations shall be as shown elsewhere in the plans. At intersections where crosswalk markings are not required, curb ramps shall align with theoretical crosswalks unless otherwise directed.
12. Provide curb ramps to connect the pedestrian access route at each pedestrian street crossing. Handrails are not required on curb ramps.
13. Curb ramps and landings shall be constructed and paid for in accordance with Item 531 "Sidewalks".
14. Place concrete at a minimum depth of 5" for ramps, flares and landings, unless otherwise directed.
15. Furnish and install No. 3 reinforcing steel bars at 18" o.c. both ways, unless otherwise directed.
16. Provide a smooth transition where the curb ramps connect to the street.
17. Curbs shown on sheet 1 within the limits of payment are considered part of the curb ramp for payment, whether it is concrete curb, gutter, or combined curb and gutter.
18. Existing features that comply with applicable standards may remain in place unless otherwise shown on the plans.

DETECTABLE WARNING MATERIAL

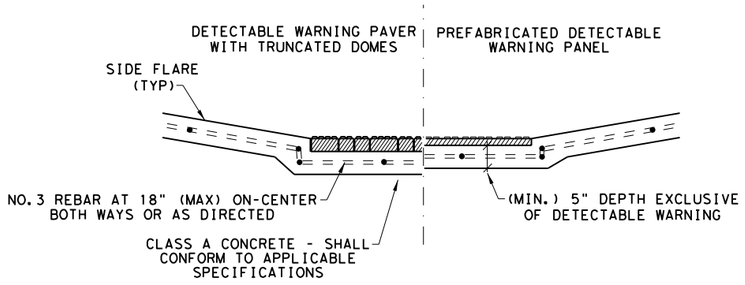
19. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with PROWAG. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material adjacent to uncolored concrete, unless specified elsewhere in the plans.
20. Detectable Warning Materials must meet TxDOT Departmental Materials Specification DMS 4350 and be listed on the Material Producer List. Install products in accordance with manufacturer's specifications.
21. Detectable warning surfaces must be firm, stable and slip resistant.
22. Detectable warning surfaces shall be a minimum of 24 inches in depth in the direction of pedestrian travel, and extend the full width of the curb ramp or landing where the pedestrian access route enters the street.
23. Detectable warning surfaces shall be located so that the edge nearest the curb line is at the back of curb and neither end of that edge is greater than 5 feet from the back of curb. Detectable warning surfaces may be curved along the corner radius.
24. Shaded areas on Sheet 1 of 4 indicate the approximate location for the detectable warning surface for each curb ramp type.

DETECTABLE WARNING PAVERS (IF USED)

25. Furnish detectable warning paver units meeting all requirements of ASTM C-936, C-33. Lay in a two by two unit basket weave pattern or as directed.
26. Lay full-size units first followed by closure units consisting of at least 25 percent (25%) of a full unit. Cut detectable warning paver units using a power saw.

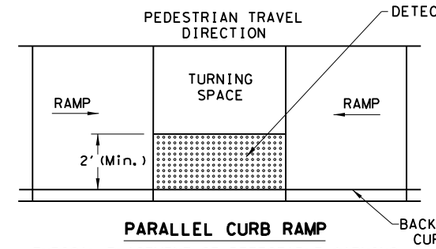
SIDEWALKS

27. Provide clear ground space at operable parts, including pedestrian push buttons. Operable parts shall be placed within unobstructed reach range specified in PROWAG section R406.
28. Place traffic signal or illumination poles, ground boxes, controller boxes, signs, drainage facilities and other items so as not to obstruct the pedestrian access route or clear ground space.
29. Street grades and cross slopes shall be as shown elsewhere in the plans.
30. Changes in level greater than 1/4 inch are not permitted.
31. The least possible grade should be used to maximize accessibility. The running slope of sidewalks and crosswalks within the public right of way may follow the grade of the parallel roadway. Where a continuous grade greater than five percent (5%) must be provided, handrails may be desirable to improve accessibility. Handrails may also be needed to protect pedestrians from potentially hazardous conditions. If provided, handrails shall comply with PROWAG R409.
32. Handrail extensions shall not protrude into the usable landing area or into intersecting pedestrian routes.
33. Driveways and turnouts shall be constructed and paid for in accordance with Item "Intersections, Driveways and Turnouts". Sidewalks shall be constructed and paid for in accordance with Item, "Sidewalks".
34. Sidewalk details are shown elsewhere in the plans.

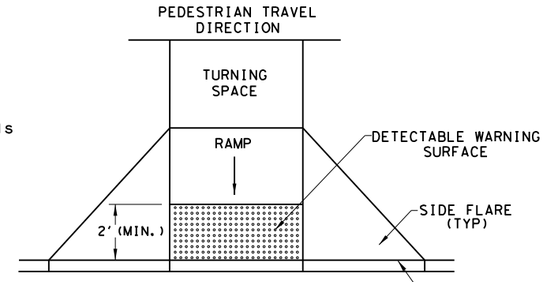


SECTION VIEW DETAIL
CURB RAMP AT DETECTIBLE WARNINGS

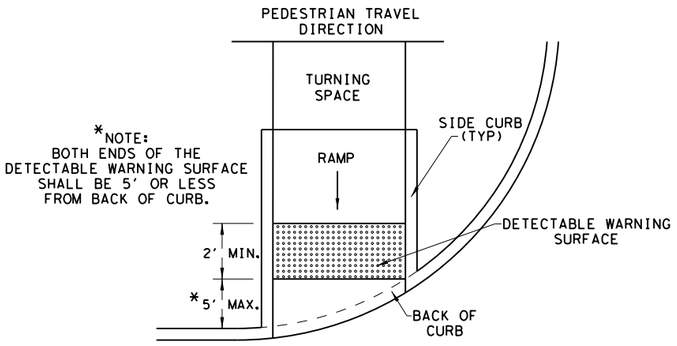
DETECTABLE WARNING SURFACE DETAILS



PARALLEL CURB RAMP
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON LANDING AT STREET EDGE.



PERPENDICULAR CURB RAMP
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.



DIRECTIONAL CURB RAMP
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.

Texas Department of Transportation | Design Division Standard

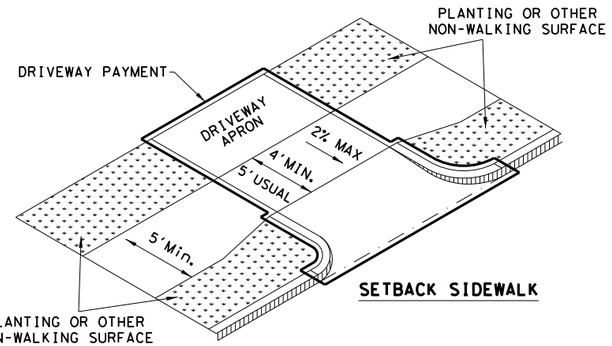
PEDESTRIAN FACILITIES CURB RAMPS

PED-18

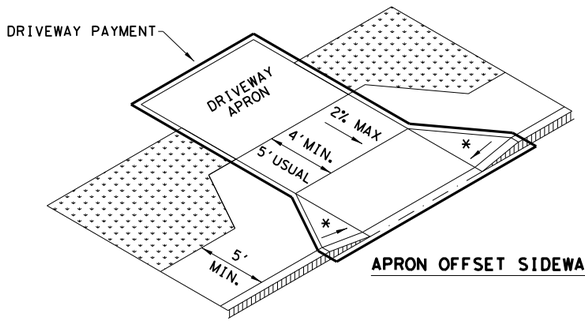
FILE: ped18	DN: TxDOT		DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB		HIGHWAY
REVISIONS	0271	14	240		IH-610
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY			SHEET NO.
	12	HARRIS			74

DATE: 3/11/2024
FILE: \\FS-HOUHQ.dot.state.tx.us\Data4\data\engdata\WCHAO\Design\Construction Projects\0271-14-240 IH 610 FROM OLD KATY RD TO W. 12TH ST\Plan Reviews\5. 90_95 Percent\07 ROADWAY STA

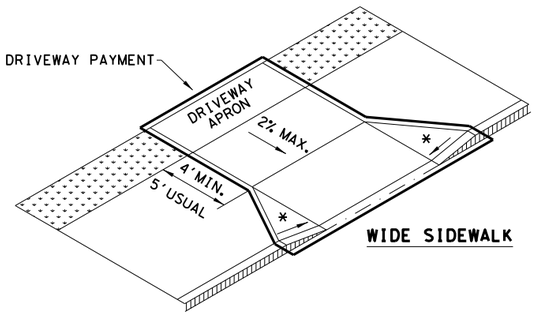
SIDEWALK TREATMENT AT DRIVEWAYS



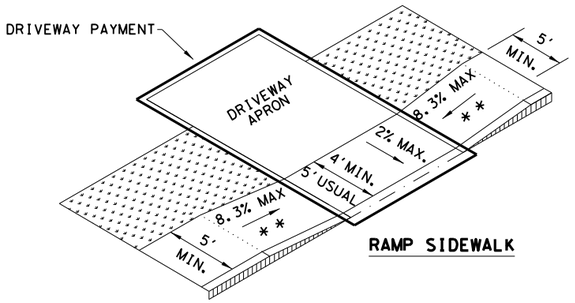
SETBACK SIDEWALK



APRON OFFSET SIDEWALK



WIDE SIDEWALK

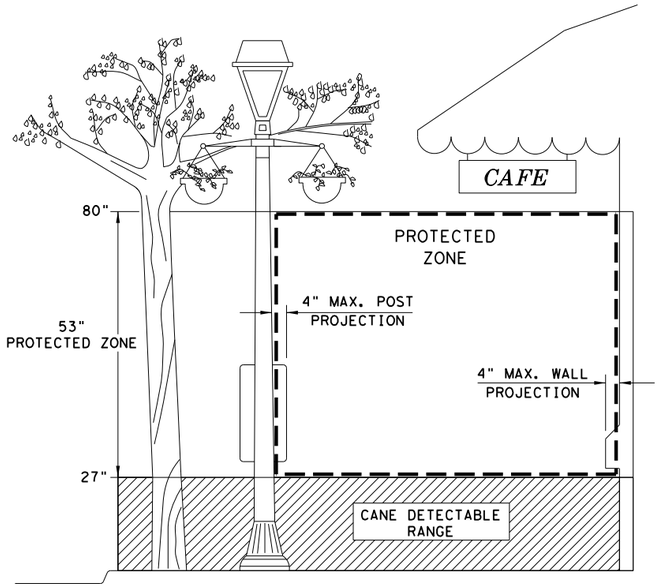


RAMP SIDEWALK

NOTES:

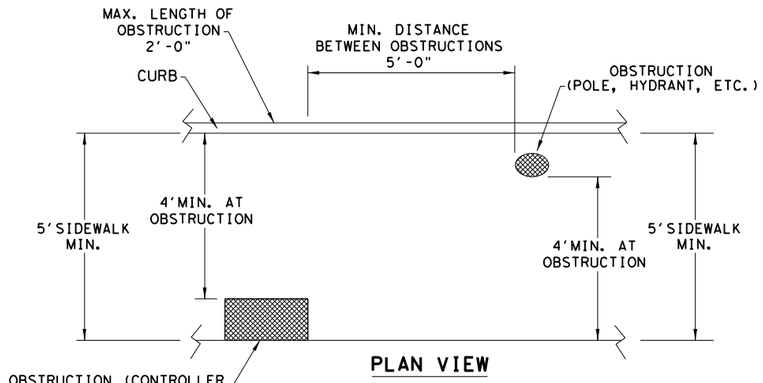
* WHERE DRIVEWAYS CROSS THE PEDESTRIAN ROUTE, SIDES SHALL BE FLARED AT 10% MAX SLOPE.

* * IF CURB HEIGHT IS GREATER THAN 6 INCHES, USE GRADE LESS THAN OR EQUAL TO 5%. HANDRAIL AND DETECTABLE WARNING ARE NOT REQUIRED.



PROTECTED ZONE

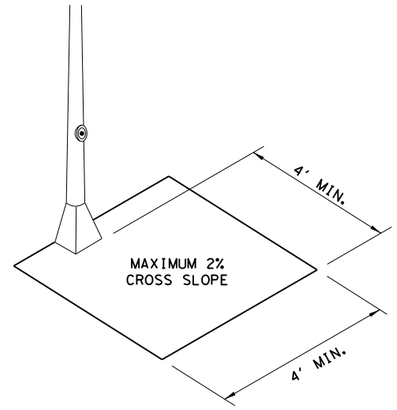
NOTE: IN PEDESTRIAN CIRCULATION AREA, MAXIMUM 4" PROJECTION FOR POST OR WALL MOUNTED OBJECTS BETWEEN 27" AND 80" ABOVE THE SURFACE.



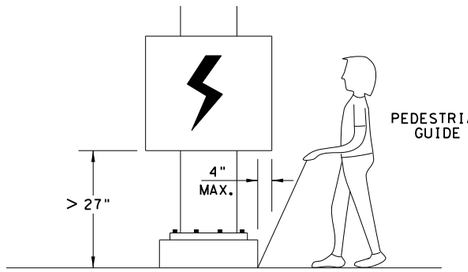
PLAN VIEW

PLACEMENT OF STREET FIXTURES

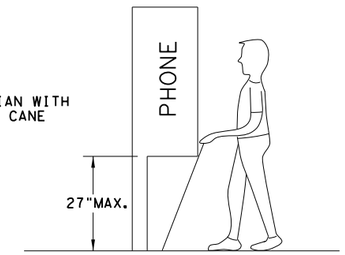
NOTE: ITEMS NOT INTENDED FOR PUBLIC USE. MINIMUM 4' X 4' CLEAR GROUND SPACE REQUIRED AT PUBLIC USE FIXTURES.



CLEAR SPACE ADJACENT TO PEDESTRIAN PUSH BUTTON



WHEN AN OBSTRUCTION OF A HEIGHT GREATER THAN 27" FROM THE SURFACE WOULD CREATE A PROTRUSION OF MORE THAN 4" INTO THE PEDESTRIAN CIRCULATION AREA, CONSTRUCT ADDITIONAL CURB OR FOUNDATION AT THE BOTTOM TO PROVIDE A MAXIMUM 4" OVERHANG.



PROTRUDING OBJECTS OF A HEIGHT ≤ 27" ARE DETECTABLE BY CANE AND DO NOT REQUIRE ADDITIONAL TREATMENT.

DETECTION BARRIER FOR VERTICAL CLEARANCE < 80"

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

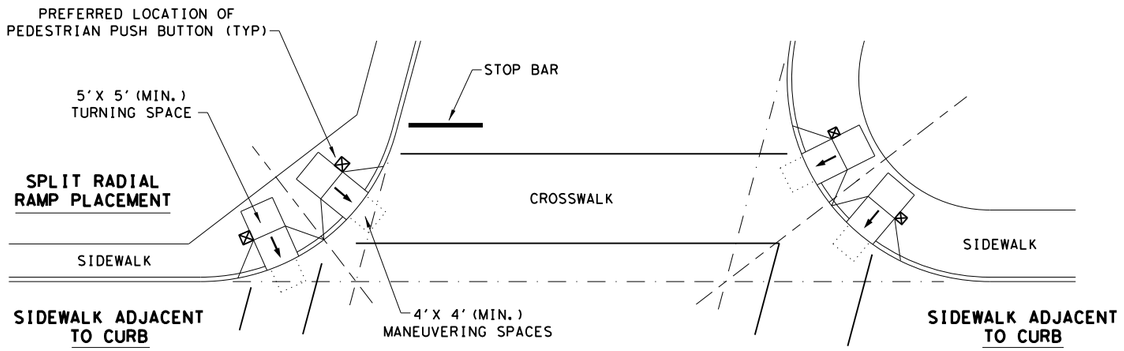
PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	14	240	IH-610
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY		SHEET NO.
	12	HARRIS		75

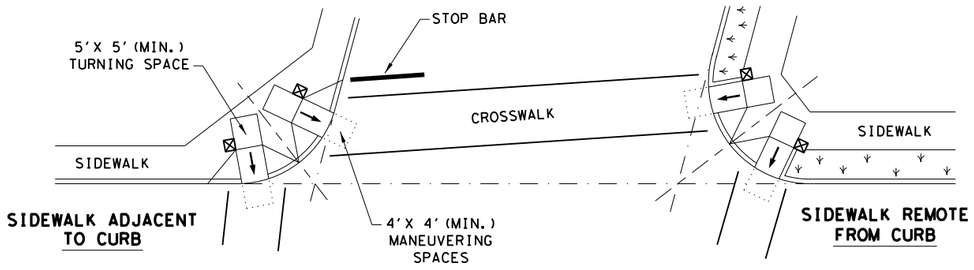
DATE: 3/11/2024
FILE: \\FS-HOUHQ.dot.state.tx.us\Data4\Data\Vengdata\WCHAO\Design\Construction Projects\0271-14-240 IH 610 FROM OLD KATY RD TO W. 12TH ST\Plan Review\5. 90_95 Percent\07 ROADWAY STA

TYPICAL CROSSING LAYOUTS

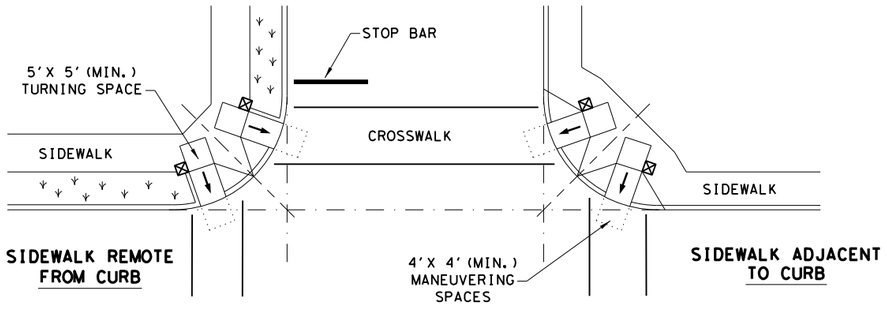
SEE SHEET 1 OF 4 FOR DETAILS AND DIMENSIONS



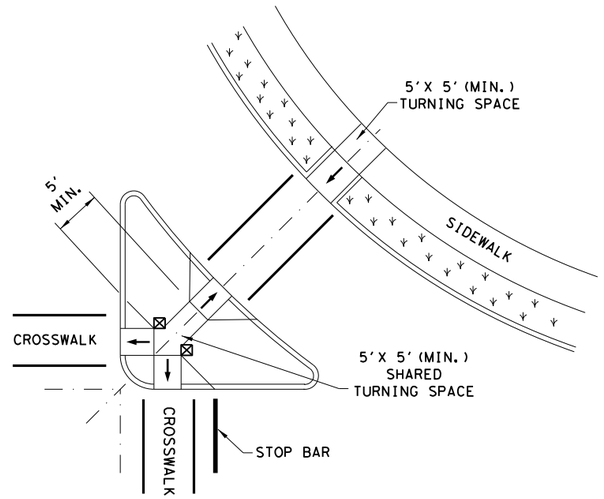
SKEWED INTERSECTION WITH "LARGE" RADIUS



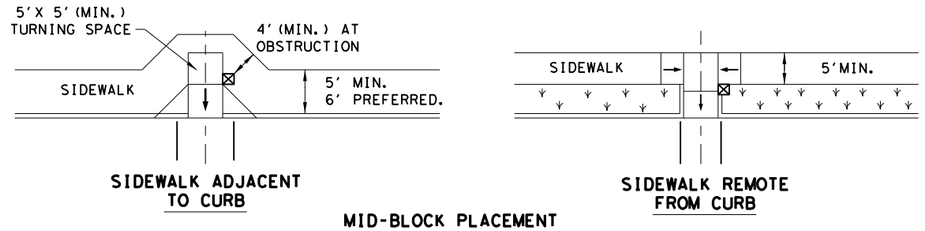
SKEWED INTERSECTION WITH "SMALL" RADIUS



NORMAL INTERSECTION WITH "SMALL" RADIUS



AT INTERSECTION
W/FREE RIGHT TURN & ISLAND



MID-BLOCK PLACEMENT
PERPENDICULAR RAMPS

LEGEND:

SHOWS DOWNWARD SLOPE. →

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON (IF APPLICABLE). ☒

DENOTES PLANTING OR NON-WALKING SURFACE NOT PART OF PEDESTRIAN CIRCULATION PATH.

SHEET 4 OF 4

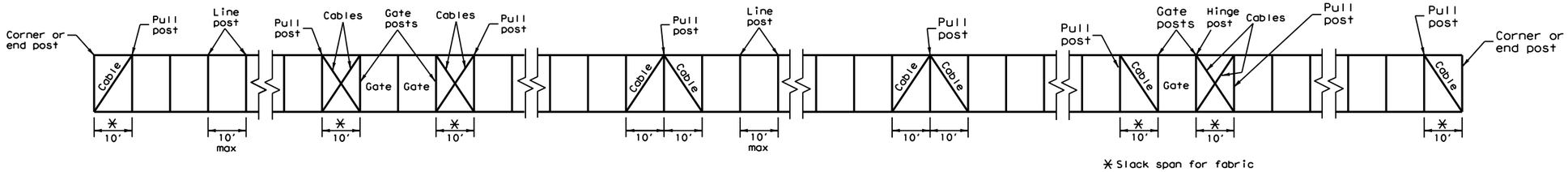
Texas Department of Transportation — Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

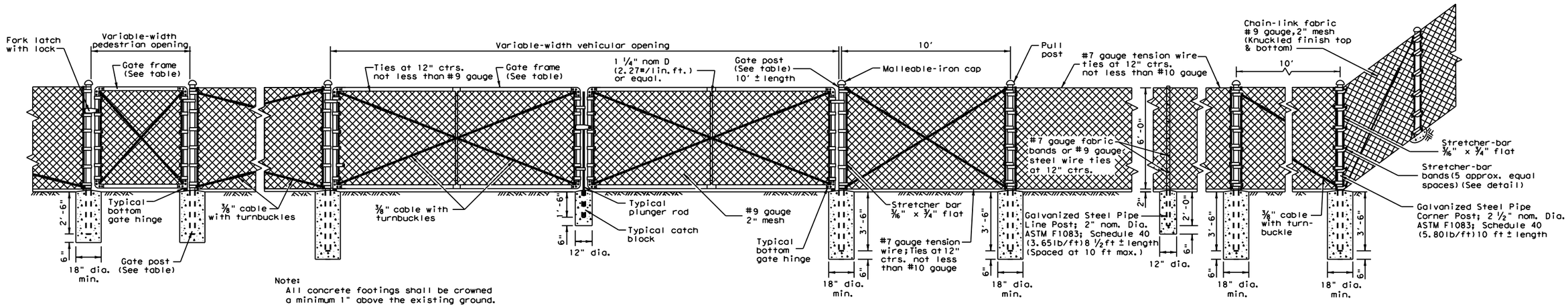
PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	14	240	IH-610
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY		SHEET NO.
	12	HARRIS		76

DATE:
FILE:



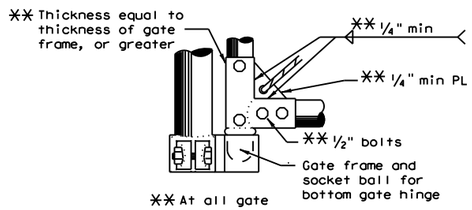
TYPICAL CABLE AND POST ARRANGEMENT



Note:
All concrete footings shall be crowned a minimum 1" above the existing ground.

CHAIN-LINK BARRIER FENCE (6 FT.)

Foundation designs shown are "minimums" for a 6 ft. fence.
Taller fences may require larger foundation designs.

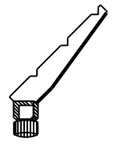


TYPICAL BOTTOM GATE HINGE

GATE (TYPES AND SIZES)	
Single Inclusive	Double Inclusive
Up to 6' Over 6' to 12' Over 12' to 18' Over 18'	Up to 12' Over 12' to 26' Over 26' to 36' Over 36'

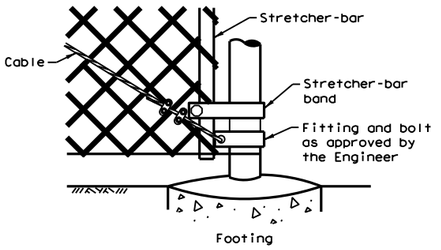
GATE FRAME (WEIGHT)		GATE POST (WEIGHT)	
SIZE	WT./LIN. FT.	SIZE	WT./LIN. FT.
1 ½" nom dia. or equal	2.72 Lbs.	2 ½" nom dia. or equal	5.79 Lbs.
		3 ½" nom dia. or equal	9.11 Lbs.
		6" nom dia.	18.97 Lbs.
		8" nom dia.	24.70 Lbs.

TYPICAL STRETCHER-BAR BAND

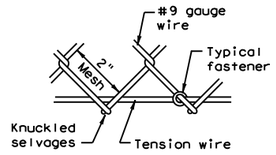


"OPTIONAL" 3 WIRE 45° BARBED WIRE ARM

Barbed wire arm related items shall conform to Item 550, "Chain Link Fence."



TERMINAL POST DETAIL



FABRIC & TENSION WIRE DETAIL, TOP & BOTTOM

GENERAL NOTES

1. Items hereon shall conform to Item 550, "Chain Link Fence."
2. Typical installation plan may vary as shown elsewhere on the plans or as directed by the Engineer. Location of gates shown elsewhere on plans.
3. Gate-frame members shall be bolted, at frame corners, to joint fittings with four ½" bolts per joint.
4. All cable connections are to be made with two ⅜" cable clamps.
5. All pull posts and end posts and their foundations shall have the same respective dimensions as those shown for corner post.
6. All pull post shall be furnished with two stretcher bars.
7. One end of each turnbuckle may be attached directly to fittings with a clevis.
8. Concrete footings are to be crowned at the top to shed water.

Texas Department of Transportation

Design Division Standard

CHAIN LINK FENCE

CLF-10

FILE: clf10.dgn	DN: TxDOT	CK: AM	DW: BD	CK: VP
© TxDOT 1996	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	14	240	IH-610
	DIST	COUNTY		SHEET NO.
	12	HARRIS		77

NOTES FOR PERMANENT TRAFFIC SIGNAL(S):

1. FURNISH SYMBOL TYPE PEDESTRIAN COUNTDOWN SIGNALS. INSTALL USING MOUNTING HEIGHT IN ACCORDANCE WITH THE LATEST TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

2. FURNISH MATERIALS NECESSARY TO INSTALL ACCESSIBLE PEDESTRIAN SIGNAL UNITS AND SIGNS AS SHOWN IN THE PLANS. INSTALL AT 3 FT. - 6 IN. TO 4 FT. - 0 IN. ABOVE THE SIDEWALK OR CONCRETE WALKWAY.

3. THE CITY OF HOUSTON CONSTRUCTION AND MAINTENANCE OFFICE WILL PROVIDE PHASING AND TIMING FOR TEMPORARY AND PERMANENT TRAFFIC SIGNALS.

4. REPAIR OR REPLACE PAVEMENT AND SIDEWALKS DAMAGED BY THE CONTRACTOR'S FORCES DURING CONSTRUCTION AT NO COST TO THE DEPARTMENT.

5. FURNISH AND INSTALL URETHANE FOAM TO ENCLOSE THE ENDS OF ALL CONDUITS CONTAINING SIGNAL CABLES AND ELECTRICAL CONDUCTORS.

6. PROVIDE CONTINUED OPERATION OF THE EXISTING SIGNAL(S) DURING CONSTRUCTION AND UNTIL THE PROPOSED OPERATION IS COMPLETED.

7. ONCE THE INTEGRITY AND/OR FUNCTION OF THE EXISTING TRAFFIC SIGNAL(S) IS ALTERED BY THE CONTRACTOR, MAINTAIN AND OPERATE THE EXISTING TRAFFIC SIGNAL(S) UNTIL THE TRAFFIC SIGNAL WORK IS ACCEPTED BY THE DEPARTMENT. DURING THE CONSTRUCTION OF THE PROPOSED TRAFFIC SIGNAL WORK, MAINTAIN THE EXISTING TRAFFIC SIGNAL(S) AND/OR TEMPORARY CONSTRUCTION TRAFFIC SIGNAL(S) IN CONFORMANCE WITH THE LATEST TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

8. MAINTAIN THE INTEGRITY AND FUNCTION OF EACH EXISTING SIGNALIZED INTERSECTION. ONCE THE INTEGRITY OR FUNCTION OF THE SIGNAL HAS BEEN ALTERED, PURSUE THE WORK AT THAT LOCATION WITHOUT DELAY OR INTERRUPTION TO RESTORE OPERATION TO ITS ORIGINAL OR FINAL OPERATIONAL DESIGN.

9. WRAP SIGNAL HEADS WITH DARK PLASTIC OR SUITABLE MATERIAL TO CONCEAL THE SIGNAL FACES FROM THE TIME OF INSTALLATION UNTIL PLACING INTO OPERATION.

10. REFER TO TXDOT'S WEBSITE FOR PREQUALIFIED PRODUCTS LIST REGARDING VIVDS CAMERAS, VEHICLE LED TRAFFIC SIGNAL LAMP UNIT, SYMBOLIC PEDESTRIAN SIGNAL HEAD, SYMBOLIC PEDESTRIAN SIGNAL LAMP, CONDUIT, CONDUCTORS, GROUND BOXES, AND ELECTRIC SERVICE. CHECK WEBSITE PERIODICALLY FOR CURRENT UPDATES.

11. GROUND ALL EXISTING METAL GROUND BOX COVERS AS OUTLINED ON LATEST STANDARD SHEET ED (4)-14. REPLACEMENTS FOR THESE GROUND BOXES MUST BE MADE OF POLYMER CONCRETE AS DETAILED ON THE LATEST STANDARD SHEET ED (4)-14. THE MATERIALS AND LABOR ASSOCIATED WITH THIS WORK IS SUBSIDIARY TO VARIOUS BID ITEMS IN THE PROJECT.

12. WRAP SIGNAL HEADS WITH DARK PLASTIC OR SUITABLE MATERIAL TO CONCEAL THE SIGNAL FACES FROM THE TIME OF INSTALLATION UNTIL PLACING INTO OPERATION.

13. GROUND ALL EXISTING METAL GROUND BOX COVERS AS OUTLINED ON LATEST STANDARD SHEET ED (4)-14. REPLACEMENTS FOR THESE GROUND BOXES MUST BE MADE OF POLYMER CONCRETE AS DETAILED ON THE LATEST STANDARD SHEET ED (4)-14. THE MATERIALS AND LABOR ASSOCIATED WITH THIS WORK IS SUBSIDIARY TO VARIOUS BID ITEMS IN THE PROJECT.

14. CONTACT MR. TOM MCCULLOCH (TELEPHONE NUMBER 832-395-6737) WITH THE ELECTRICAL DIVISION OF THE CITY OF HOUSTON, 2 DAYS PRIOR TO BEGINNING ANY UNDERGROUND WORK.

15. ELECTRICAL POWER TO OPERATE THE TRAFFIC SIGNAL INSTALLATION(S) WILL BE PLACED IN THE CITY OF HOUSTON'S NAME. THIS INCLUDES ALL POWER TO OPERATE THE SIGNAL(S) DURING THE VARIOUS PHASES OF CONSTRUCTION AND DURING THE TEST PERIOD PRIOR TO ACCEPTANCE OF THE WORK BY THE DEPARTMENT.

16. FURNISH BLACK HOUSING FOR VEHICLE AND PEDESTRIAN SIGNALS.

17. FURNISH VEHICLE AND PEDESTRIAN SIGNALS WITH LIGHT EMMITING DIODE (LED) SIGNAL LAMP UNITS.

18. ASSUME OWNERSHIP OF THE REMOVED EXISTING SIGNS.

IH-610 AT
OLD KATY RD

TRAFFIC SIGNAL
NOTES

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

06/20/2024

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH 610
DIST	COUNTY		SHEET NO.
HOU	HARRIS		78

6/20/2024 3:29:53 PM
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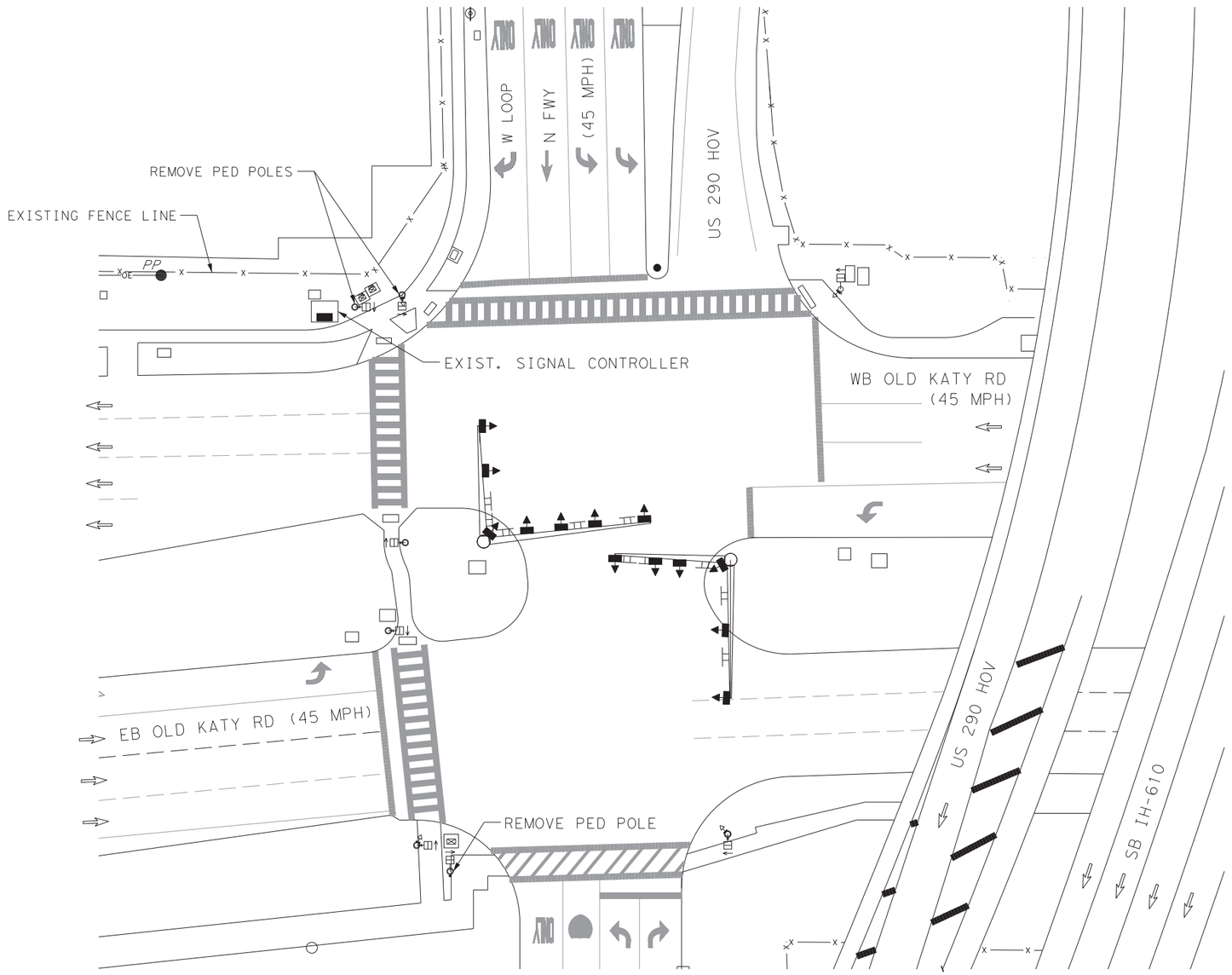
LEGEND:

- TRAFFIC DIRECTION
- PP — POWER POLE
- X — EXIST. FENCE LINE
- OE — OVERHEAD POWER LINE
- EXIST. SIGNAL HEAD
- EXIST. SIGNAL CONTROLLER
- EXIST. GROUND BOX
- EXIST. MAST ARM
- EXIST. PED POLE
- EXIST. PED POLE SIGNAL
- EXIST. PED POLE PUSH BUTTON
- EXISTING TRAFFIC SIGN



IH-610 AT OLD KATY RD

TRAFFIC SIGNAL EXISTING PLAN LAYOUT

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

06/20/2024

0 20 40
SCALE: 1" = 40'

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH 610
DIST	COUNTY		SHEET NO.
HOU	HARRIS		79

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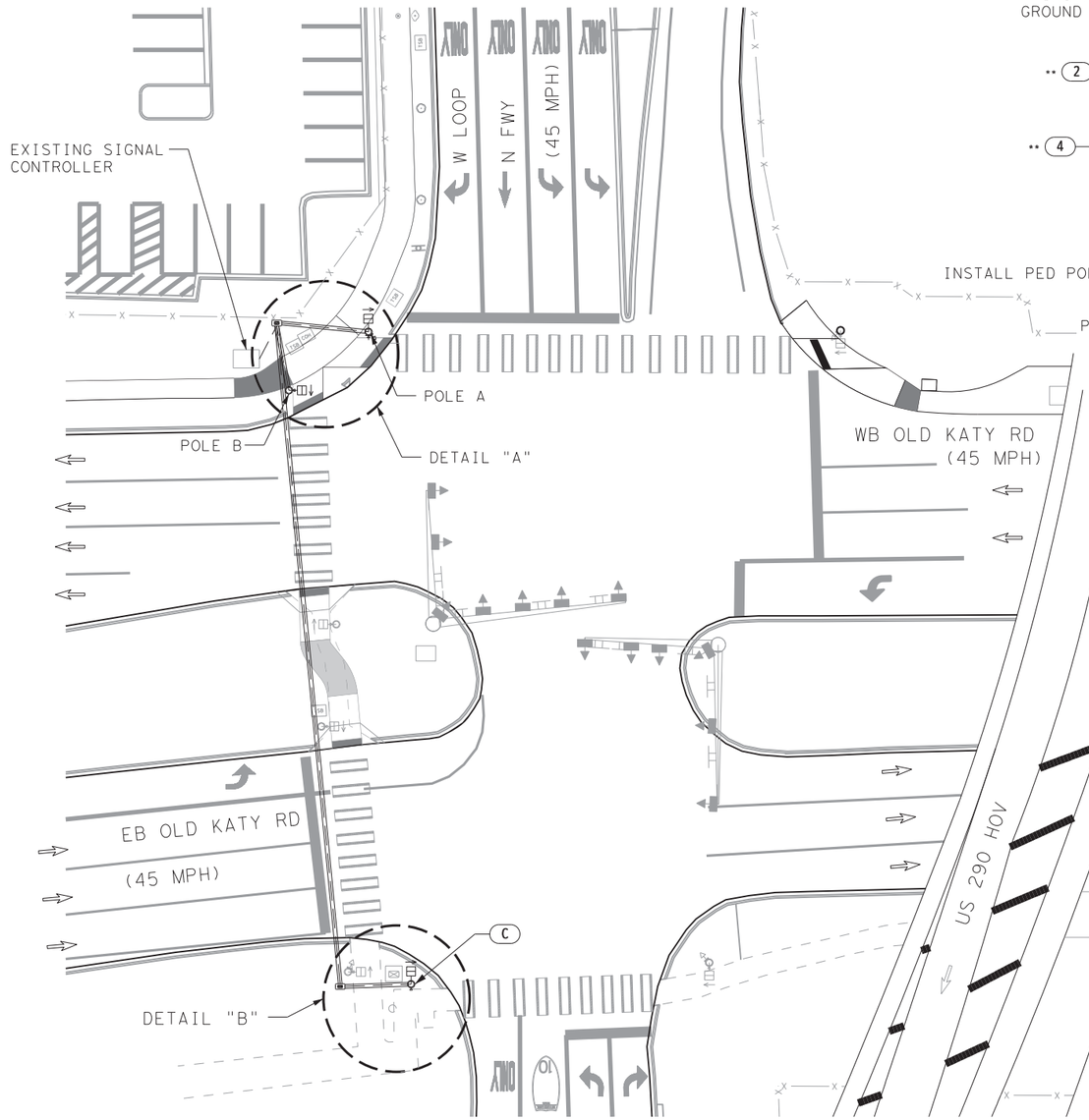
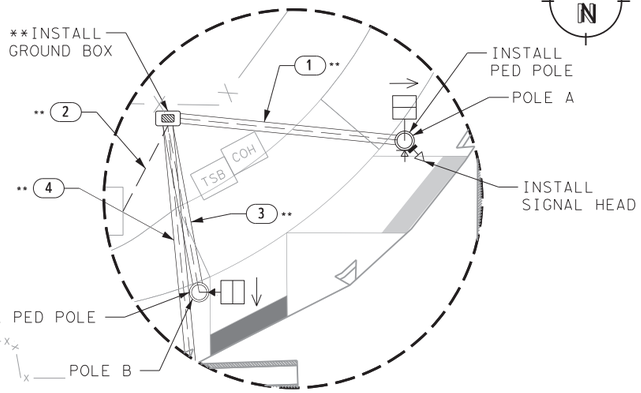
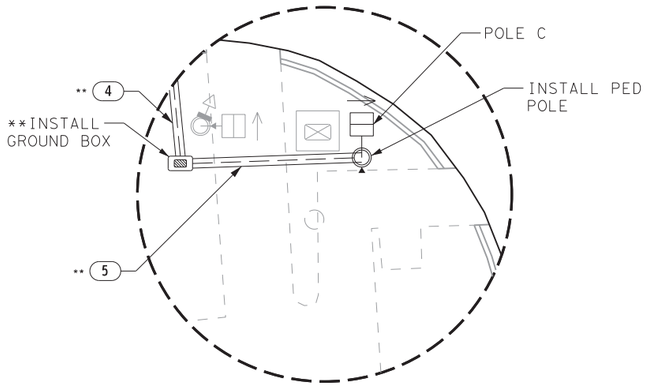
LEGEND:

- TRAFFIC DIRECTION
- EXISTING FENCE LINE
- EXISTING SIGNAL CONTROLLER
- EXISTING GROUND BOX
- EXISTING PED POLE
- EXISTING PED POLE SIGNAL
- EXISTING TRAFFIC SIGN
- PROPOSED PED POLE
- PROPOSED SIGNAL HEAD
- PROPOSED PED POLE PUSH BUTTON
- PROPOSED COUDUIT (TRENCH)
- PROPOSED CONDUIT (BORE)
- **PROPOSED GROUND BOX TY D
- PROPOSED TRAFFIC SIGN



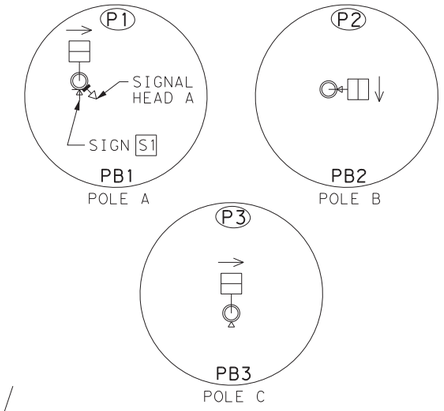


DETAIL "A"
NTS



DETAIL "B"
NTS

PUSH BUTTON DETAIL:



NOTES:

-UTILITIES ARE SHOWN IN APPROXIMATE LOCATIONS ONLY. THE CONTRACTOR SHALL LOCATE ALL UTILITIES PRIOR TO COMMENCING WORK. THE CONTRACTOR SHALL CONTACT PUBLIC AND PRIVATE UTILITIES FOR LOCATION OF UNDERGROUND FACILITIES AT LEAST 72 HOURS PRIOR TO ANY DRILLING, BORING, TRENCHING OR EXCAVATING. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY DAMAGE CAUSED BY CONTRACTOR'S FAILURE TO LOCATE AND PRESERVE THESE UTILITIES WHETHER UNDERGROUND, ABOVE GROUND OR OVERHEAD.

-PROPOSED POLE LOCATIONS ARE APPROXIMATE. CONTRACTOR IS TO VERIFY POLE LOCATIONS BEFORE DRILLING.

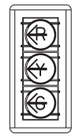
** IF EXISTING GROUND BOXES ARE FOUND TO BE INSUFFICIENT IN SIZE TO ACCOMMODATE THE PROPOSED CONDUITS AND CABLES AS SHOWN ON THE PLANS OR IF THEY HAVE BEEN DAMAGED TO THE EXTENT THEY WILL NOT ACCOMMODATE THE ADDITIONAL CONDUITS AND CABLES, REPLACE THE GROUND BOX WITH A NEW GROUND BOX (SIZE AS REQUIRED) OR INSTALL A NEW GROUND BOX ADJACENT TO THE EXISTING GROUND BOX AS APPROVED BY THE ENGINEER. SUCH REPAIR OR REPLACEMENT IS INCIDENTAL TO ITEM 624, "GROUND BOX".

PROPOSED SIGN:

S1

R10-5L (24"x30")

PROPOSED SIGNAL HEADS:



A

06/20/2024

0 20 40
SCALE: 1" = 40'

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH 610
DIST	COUNTY		SHEET NO.
HOU	HARRIS		80

IH-610 AT OLD KATY RD

TRAFFIC SIGNAL PROPOSED PLAN LAYOUT

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CONDUIT AND CONDUCTOR RUNS

RUN NO.	CONDUIT (618)				CONDUCTORS (620)		CABLES (SUBSIDIARY TO ITEM 681-7001)					
	PVC				GROUND		PEDESTRIAN				SIGNAL	
	2" (SCHD 80)				#8 BARE		#14/3C		#14/5C		#14/7C	
	(7054)		(7055)		(7007)		(7029)		(7031)		(7033)	
	NO.	TRENCH	NO.	BORE	NO.	LENGTH	NO.	LENG	NO.	LENG	NO.	LENGT
	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF
1			1	30	1	30	1	30	1	30	1	30
2	1	15			1	15	3	15	3	15	1	15
3			1	25	1	25	1	25	1	25		
4			1	185	1	185	1	185	1	185		
5			1	25	1	25	1	25	1	25		
POLE A							1	15	1	15	1	20
POLE B							1	15	1	15		
POLE C							1	15	1	15		
TOTAL (LF)		15		265		280		355		355		65
EST. TOTAL		**20**		**280**		**295**		**375**		**375**		**70**

POLE ID	DESCRIPTION
A	PROP. 4 1/2" x 20' PEDESTAL POLE w/PEDESTRIAN SIGNAL HEAD(S) (COUNTDOWN TYPE) (1 EA), PEDESTRIAN SIGN(S) (R10-3e) (1 EA), PEDESTRIAN PUSH BUTTON (APS UNIT) (1 EA) AND 3 SECTION SIGNAL HEAD.
B	PROP. 4 1/2" PEDESTAL POLE w/PEDESTRIAN SIGNAL HEAD(S) (COUNTDOWN TYPE) (1 EA), PEDESTRIAN SIGN(S) (R10-3e) (1 EA), AND PEDESTRIAN PUSH BUTTON (APS UNIT) (1 EA)
C	PROP. 4 1/2" PEDESTAL POLE w/PEDESTRIAN SIGNAL HEAD(S) (COUNTDOWN TYPE) (1 EA), PEDESTRIAN SIGN(S) (R10-3e) (1 EA), AND PEDESTRIAN PUSH BUTTON (APS UNIT) (1 EA)

PROPOSED PEDESTRIAN SIGNS AND SIGNALS:

P1-P3

R10-3eL

APS PUSH BUTTONS
PB2

R10-3eR

APS PUSH BUTTONS
PB1 & PB3

IH 610 AT
OLD KATY RD

TRAFFIC SIGNAL
LEGEND FOR
PLAN LAYOUT

06/20/2024

0 20 40
SCALE: 1" = 40'

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH 610
DIST	COUNTY		SHEET NO.
HOU	HARRIS		81

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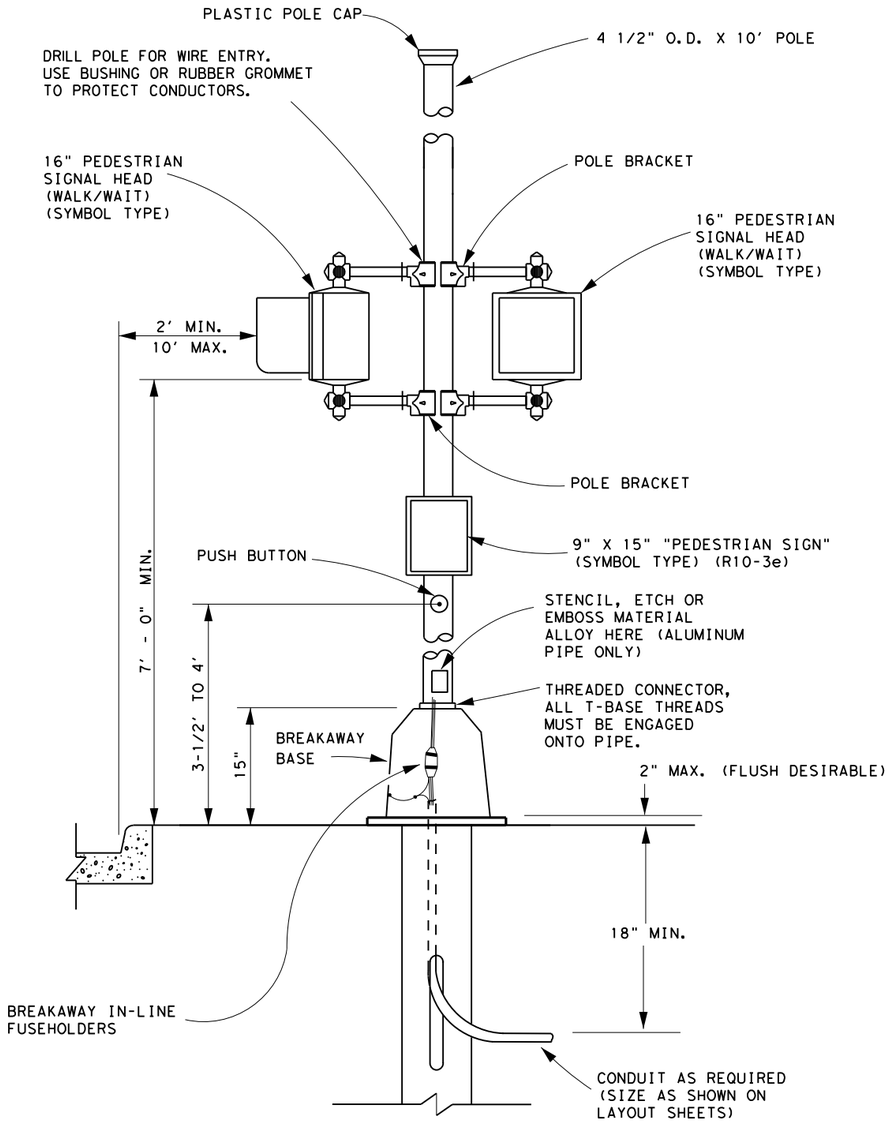
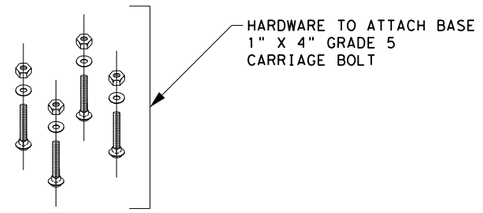
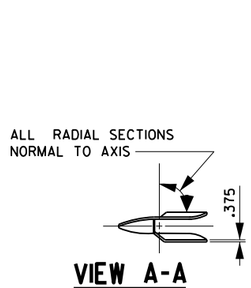




HARDWARE DETAIL



VIEW A-A

SCREW ANCHOR FOUNDATION DETAIL

NOTE:

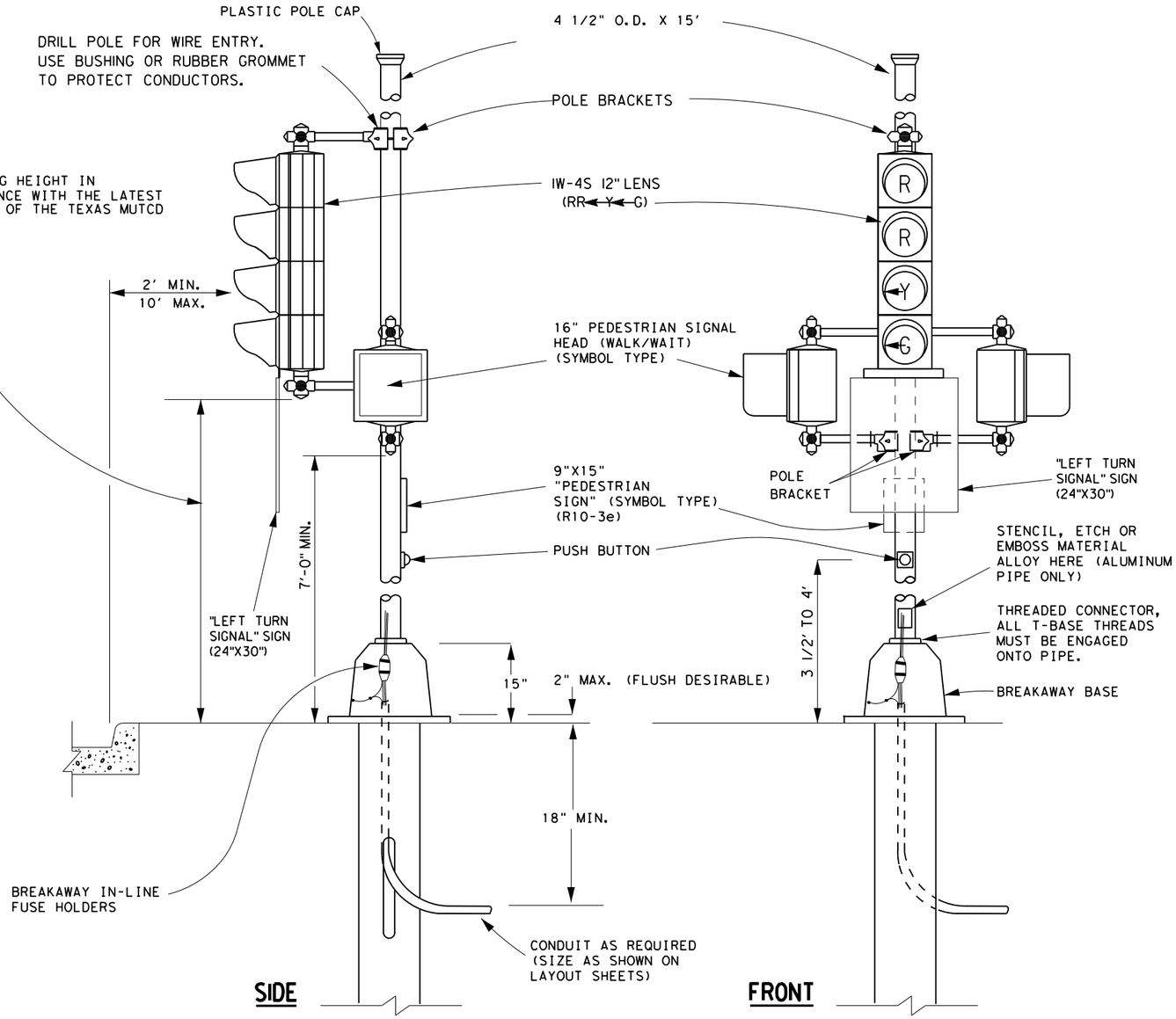
SEE STANDARD (RFBA - 13) FOR NOTES AND NON - FUSED BREAKAWAY ELECTRICAL CONNECTOR DETAILS

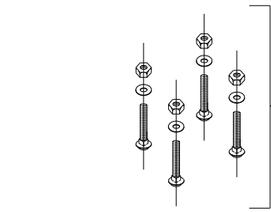
Texas Department of Transportation
Houston District

SIGNAL DETAILS/STANDARDS CONSTRUCTION DETAILS FOR POLE MOUNTED PEDESTRIAN SIGNALS

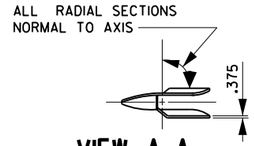
CD/PMPS

FILE:	DN:	CK:	DW:	CK:
© TxDOT 2007	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 04-05 11-08 02-15 05-05 01-14 03-07 07-14	HOU	6		82
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	HARRIS	0271	14	240	IH-610





HARDWARE DETAIL



VIEW A-A

SCREW ANCHOR FOUNDATION DETAIL

NOTE:

SEE STANDARD (RFBA - 13) FOR NOTES AND
NON - FUSED BREAKAWAY ELECTRICAL CONNECTOR DETAILS

Texas Department of Transportation
Houston District

SIGNAL DETAILS/STANDARDS CONSTRUCTION DETAILS FOR POLE MOUNTED VEHICLE AND PEDESTRIAN SIGNALS

CD/PM/PS

FILE:	DN:	CK:	DW:	CK:
© TxDOT 2007	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 04-05 11-08 02-15 05-05 01-14 03-07 07-14	HOU	6		83
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	HARRIS	0271	14	240	IH-610

STD-M5

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

FILE:	ed1-14.dgn	DN:	CK:	DW:	CK:
© TxDOT	October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS		0271	14	240	IH 610
		DIST	COUNTY		SHEET NO.
		HOU	HARRIS		84

71A

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.

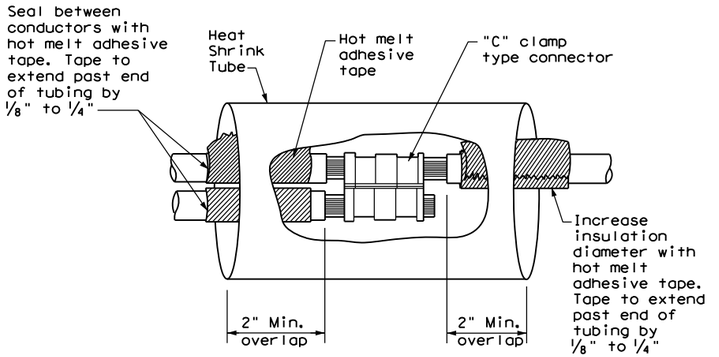
3. Install ground rods so the imprinted part number is at the upper end of the rod.

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

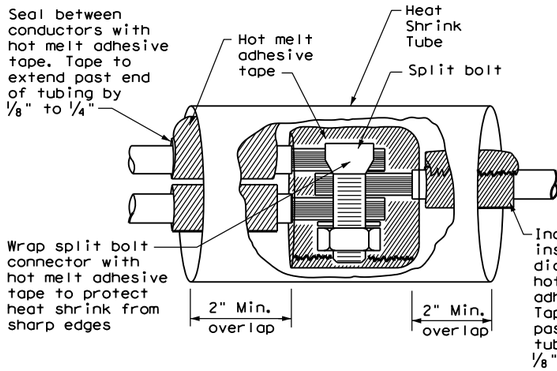
5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.

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.

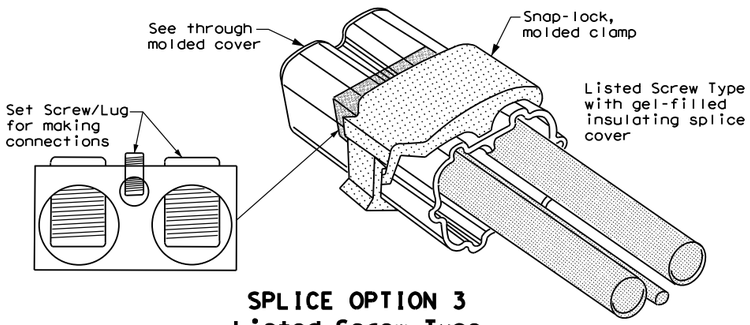
7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.



SPLICE OPTION 1
Compression Type



SPLICE OPTION 2
Split Bolt Type



SPLICE OPTION 3
Listed Screw Type

Texas Department of Transportation

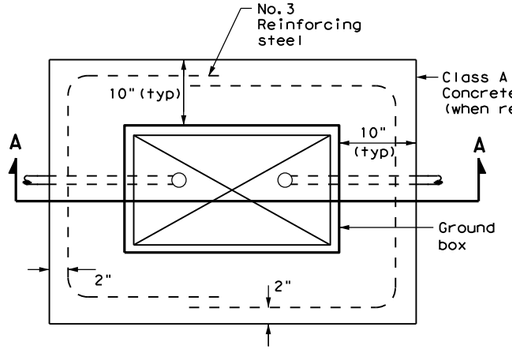
Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUCTORS

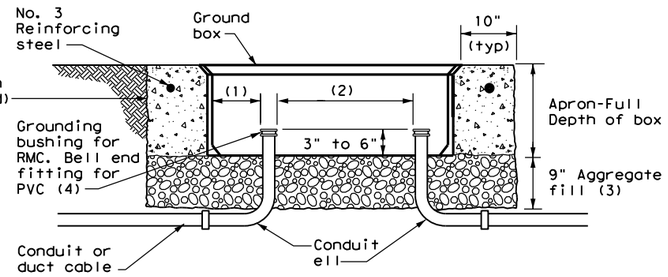
ED(3)-14

FILE: ed3-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	14	240	IH 610
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		85

71C



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.

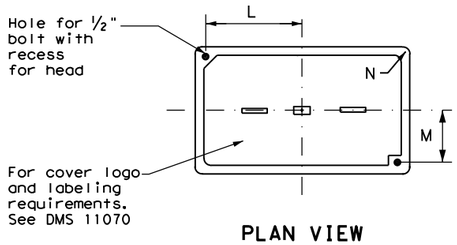
(2) Maintain sufficient space between conduits to allow for proper installation of bushing.

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

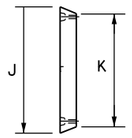
(4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

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



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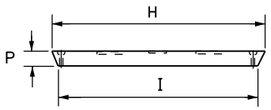


SIDE

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

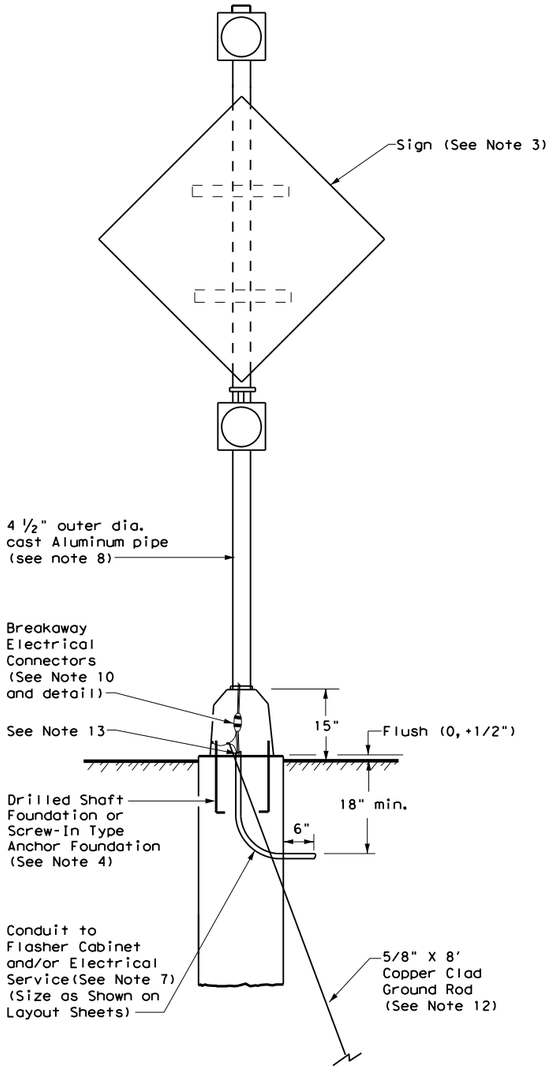
ELECTRICAL DETAILS
GROUND BOXES

ED(4)-14

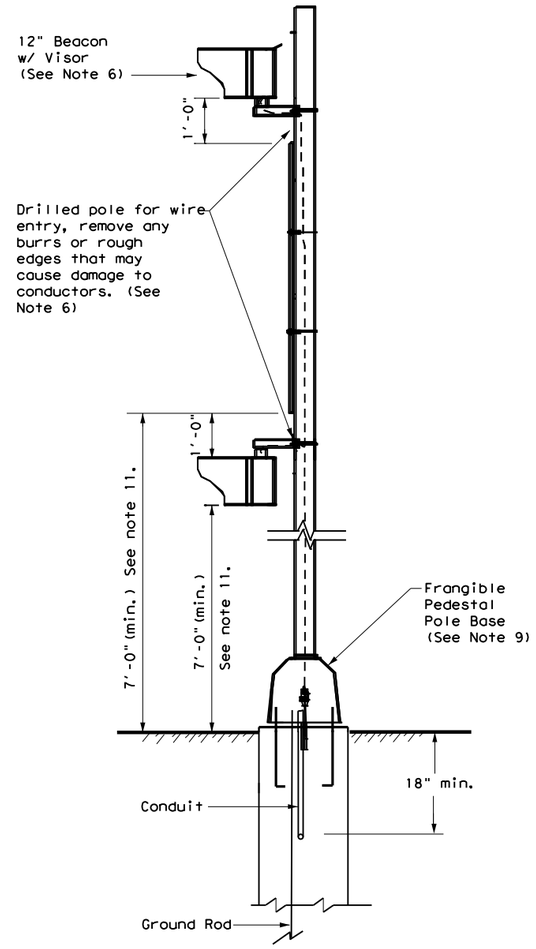
FILE: ed4-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	14	240	IH-610
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		86

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. 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.
7. Conduit in foundation and within 6 in. of foundation is subsidiary to the Item 685, "Roadside Flashing Beacon Assemblies."
8. 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.
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 of 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. 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.
12. Make connections to ground rods according to NEC. Ground rod clamps shall be listed for their intended purpose.
13. Ensure height of conduit and ground rod is below top of anchor bolts.



FRONT



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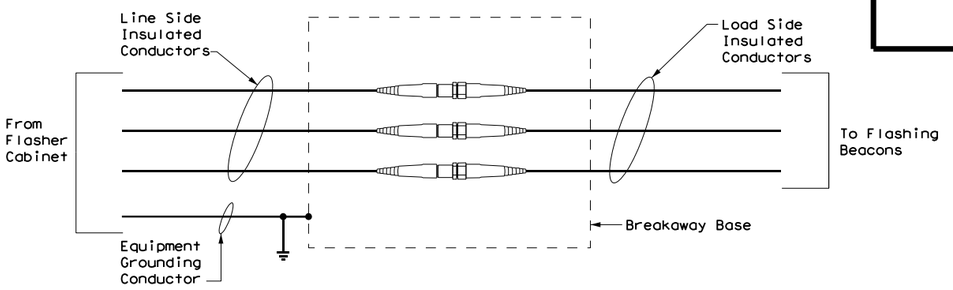
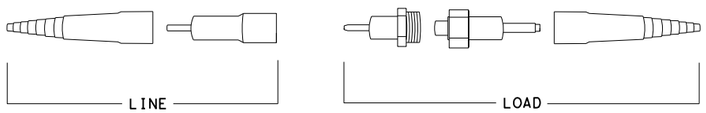


NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS



NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS
EXPLODED VIEW

Texas Department of Transportation

Traffic Operations Division Standard

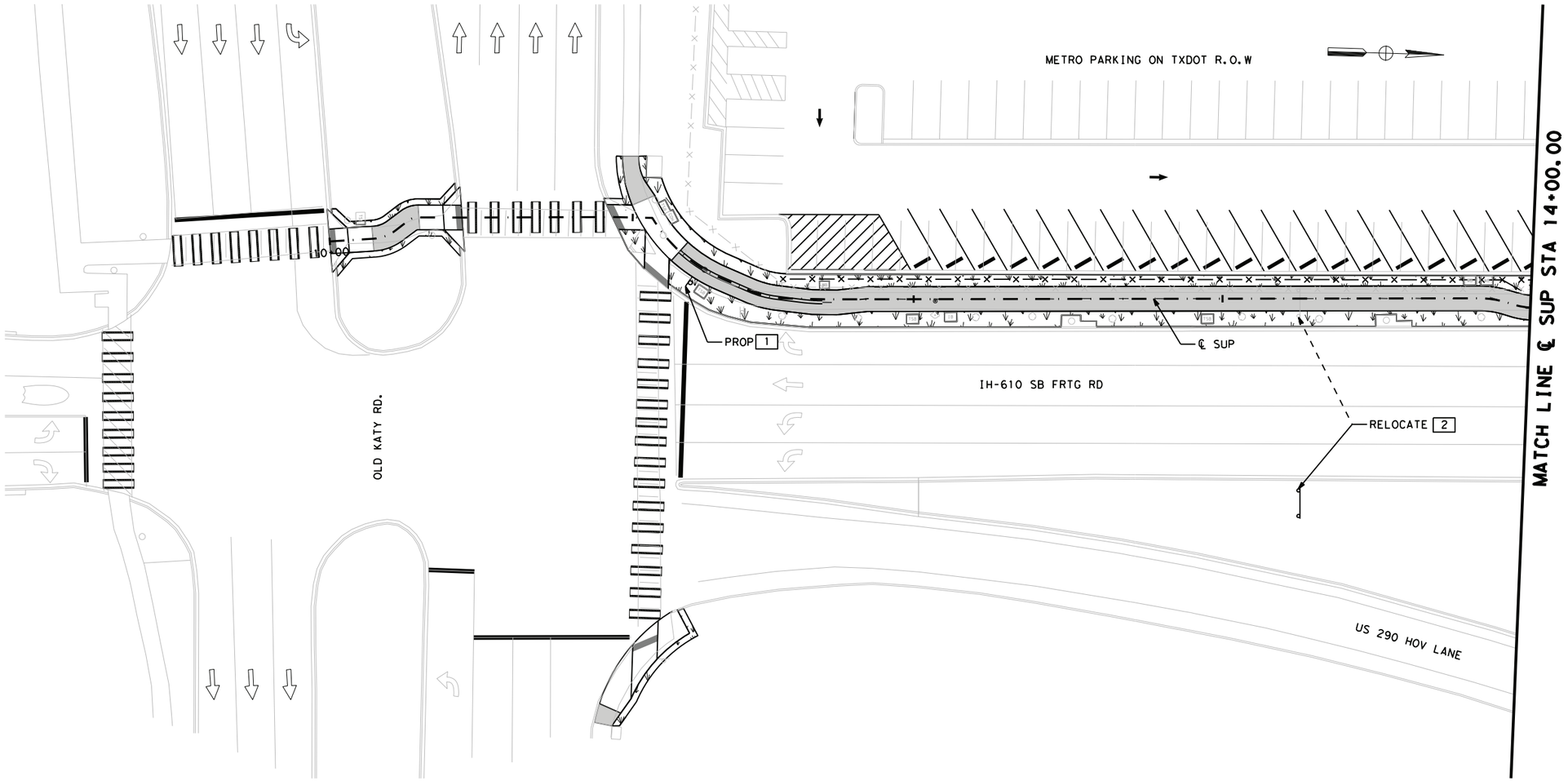
ROADSIDE FLASHING BEACON ASSEMBLY

RFBA-13

FILE: rfba-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS 5-93 12-04 10-93 3-13 4-98	0271	14	240	IH 610
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		87

LEGEND:

SM RD SN SUP&AM



1

NO MOTOR VEHICLES

R5-3
24"x24"

2

N Post Oak Rd →
Silber Rd →

D1-2
108"x24"

STATE OF TEXAS
STEVE VAN
137551
LICENSED PROFESSIONAL ENGINEER

Steve Van, P.E.

06.14.24

IH-610
SB FRTG RD (SUP)
SIGN LAYOUT

SCALE: 1":40' HORZ

SHEET 1 OF 2

TEXAS DEPARTMENT OF TRANSPORTATION

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610
DIST	COUNTY		SHEET NO.
12	HARRIS		88

DATE: 6/14/2024 11:50:09 AM
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FILE: \\FS-HOUHQ.dot.state.tx.us\Data4\data\vengdata\WCHAO\Design\Construction Projects\0271-14-240 IH 610 FROM OLD KATY RD TO W. 12TH ST\Plan Set\8. Traffic\Sign\Sign Layout 01.dgn

LEGEND:

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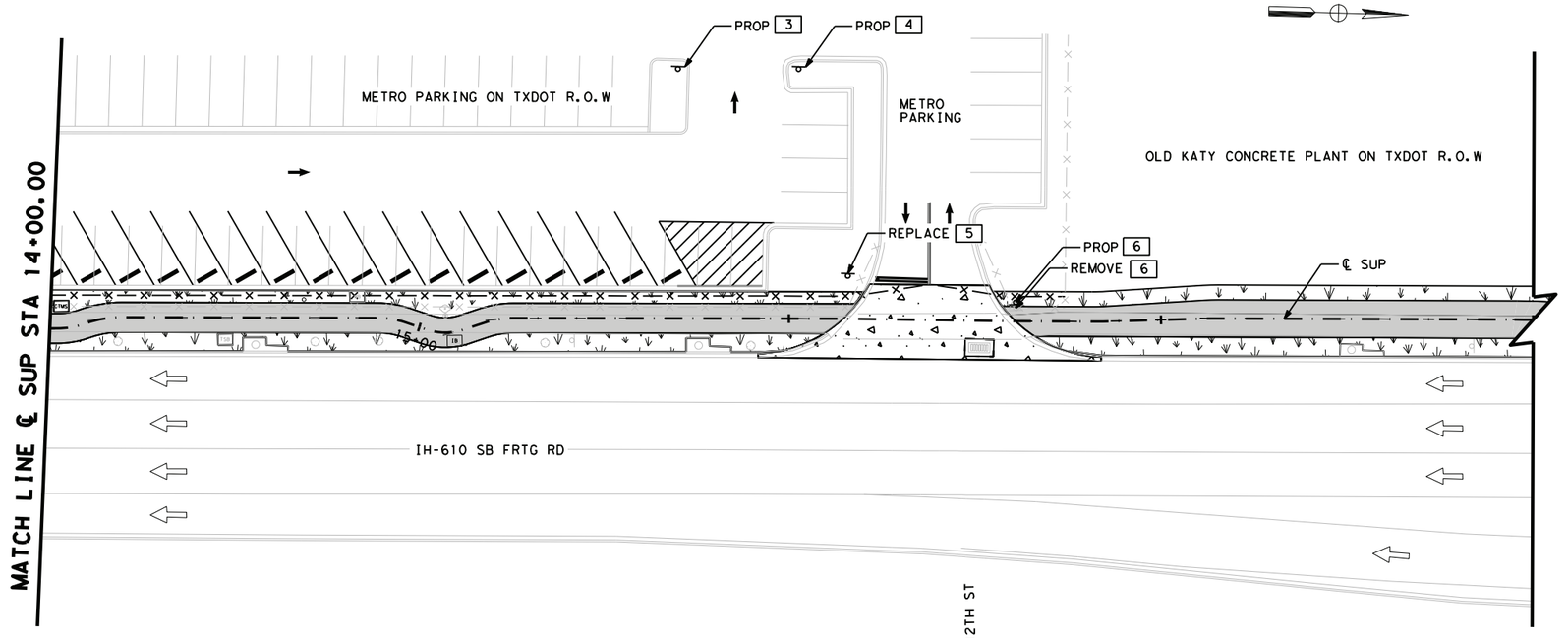

3 4
DO NOT ENTER
R5-1
30"x30"

5
STOP
R1-1
30"x30"
ONLY
R3-5R
30"x36"

6
NO TRUCKS
R5-2A
24"x24"
R5-2
24"x24"

7
NO MOTOR VEHICLES
R5-3
24"x24"
STOP
R1-1
30"x30"

STATE OF TEXAS
STEVE VAN
137551
LICENSED PROFESSIONAL ENGINEER

Steve Van, P.E.

06.14.24

IH-610
SB FRTG RD (SUP)
SIGN LAYOUT

SCALE: 1":40' HORZ

SHEET 2 OF 2

TEXAS DEPARTMENT OF TRANSPORTATION

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610
DIST	COUNTY		SHEET NO.
12	HARRIS		89

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SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION PREFABRICATED	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE
							FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	1 or 2	UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	P = "Plain" T = "T" U = "U"		TY N TY S
1	1	R5-3	NO MOTOR VEHICLES	24 x 24	X		10BWG	1	SA	P		
1	2	D1-2	(DESTINATION - 2 LINE)	108 x 24	X		10BWG	2	SA	P	BM	
2	3	R5-1	DO NOT ENTER	30 x 30	X		10BWG	1	SA	P		
2	4	R5-1	DO NOT ENTER	30 x 30	X		10BWG	1	SA	P		
2	5	R1-1	STOP	30 x 30	X		10BWG	1	SA	P		
2		R3-5R	<RIGHT TURN ARROW> ONLY	30 x 36	X							
2	6	R5-2A	NO TRUCKS	24 x 24	X		10BWG	1	SA	P		
2		R5-2	SYMBOL - TRUCKS PROHIBITED	24 x 24	X							
2	7	R5-3	NO MOTOR VEHICLES	24 x 24	X		10BWG	1	SA	P		
2		R1-1	STOP	30 x 30	X							

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

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		0271	14	240	IH-610
4-16		DIST	COUNTY		SHEET NO.
8-16		12	HARRIS		90

18

DATE: 4/2/2024 7:54:31 AM
FILE: \\FS-HOUHQ.dot.state.tx.us\Data4\data\engdata\WCHA0\Design\Construction Projects\0271-14-240 IH 610 FROM OLD KATY RD TO W. 12TH ST\Plan Set\8. Traffic\Sign\Summary of Small S

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.

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

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

Number of Posts (1 or 2)

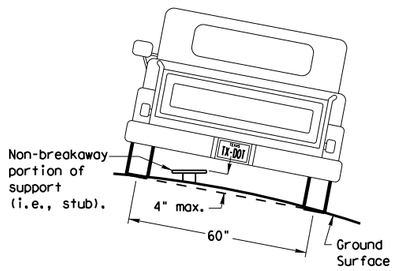
Anchor Type

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

Sign Mounting Designation

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

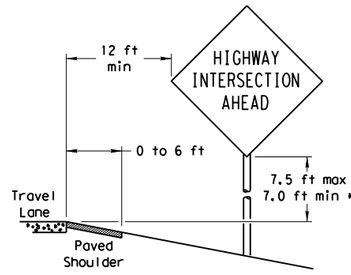
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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

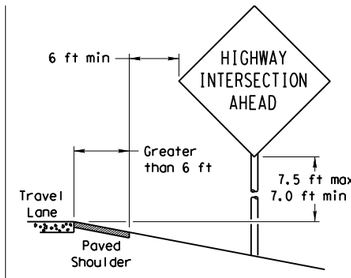
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

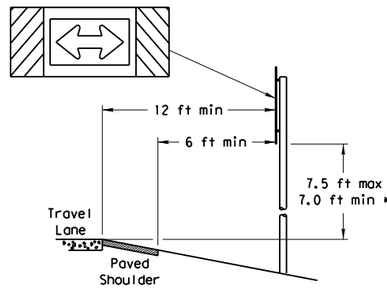
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



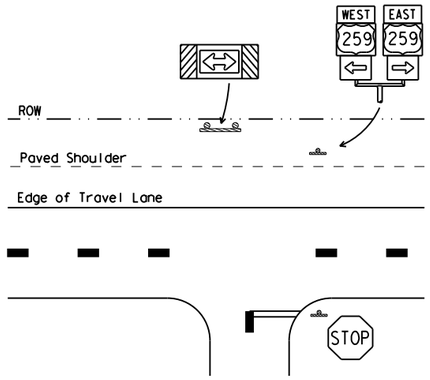
GREATER THAN 6 FT. WIDE

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

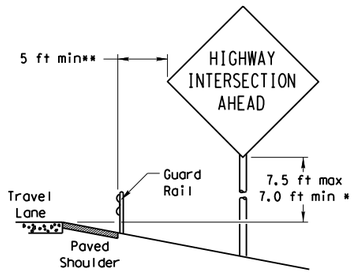
T-INTERSECTION



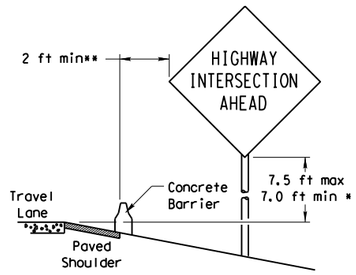
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

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

* Signs shall be mounted using the following condition that results in the greatest sign elevation:

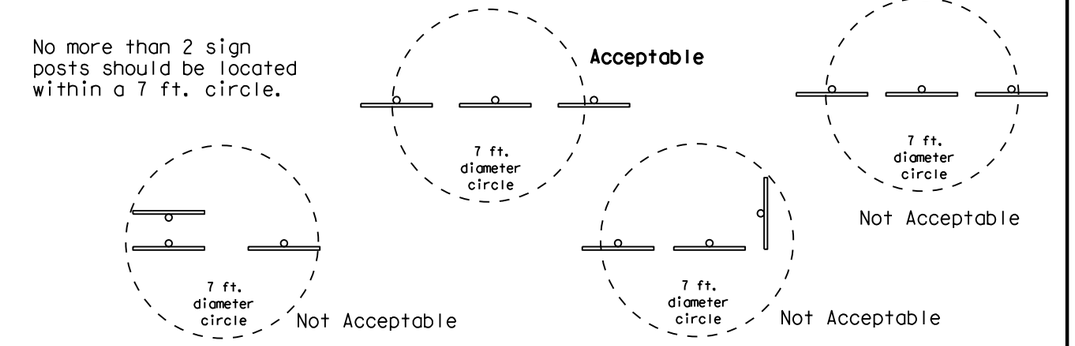
(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

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

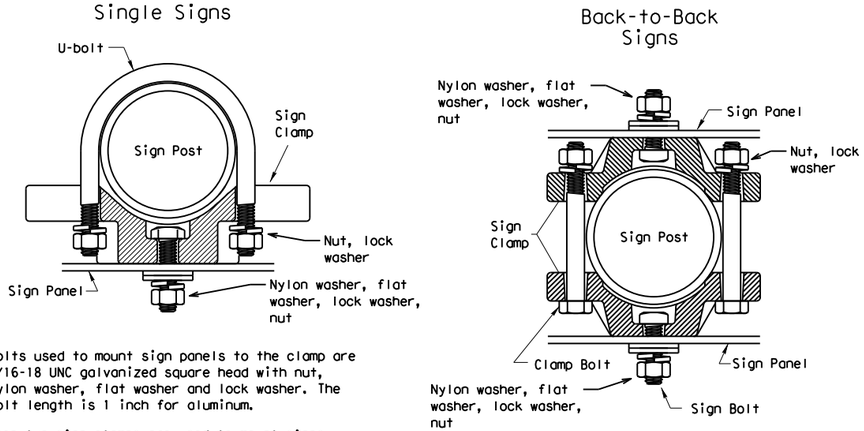
The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

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



TYPICAL SIGN ATTACHMENT DETAIL



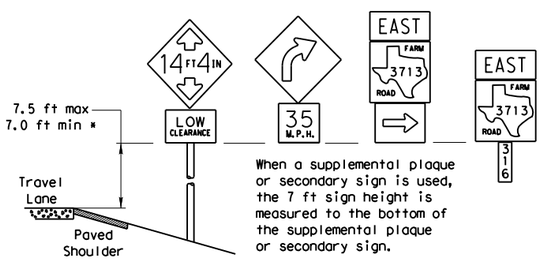
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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

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

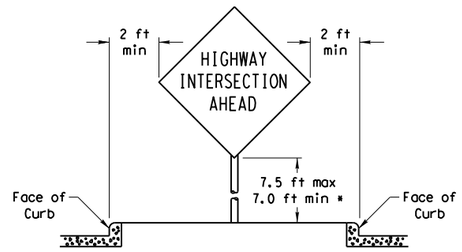
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



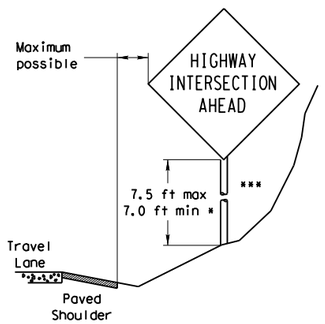
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



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

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

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

REVISIONS
9-08

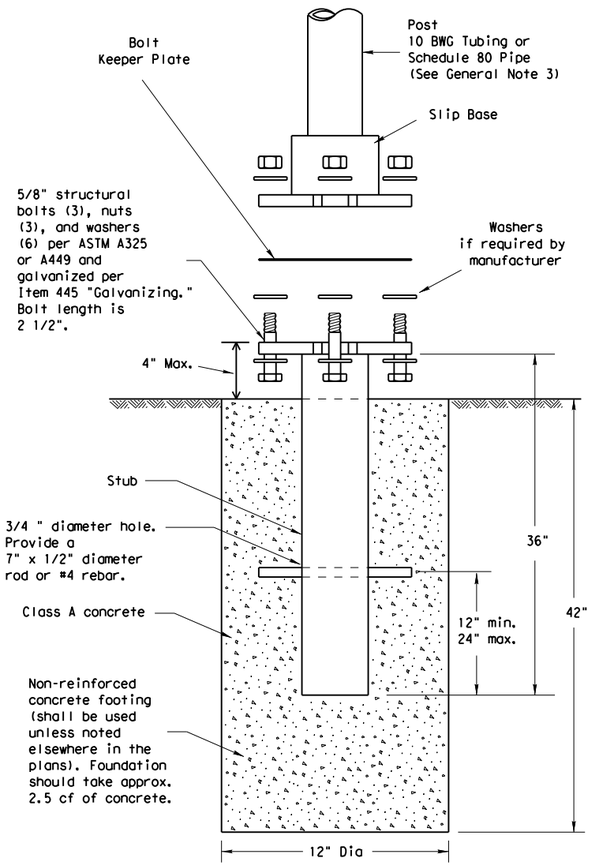
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610

DIST	COUNTY	SHEET NO.
12	HARRIS	91

DATE:
FILE:

TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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

NOTE

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

GENERAL NOTES:

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

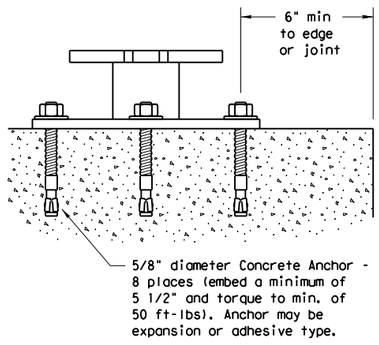
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum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

ASSEMBLY PROCEDURE

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

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

CONCRETE ANCHOR



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

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

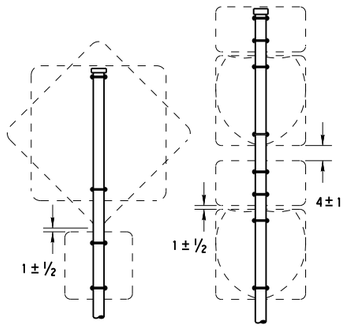
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS 9-08

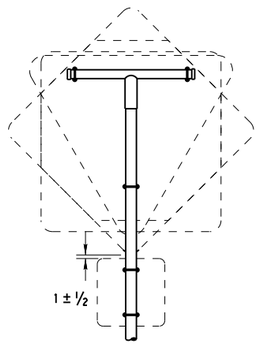
CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610

DIST	COUNTY	SHEET NO.
12	HARRIS	92

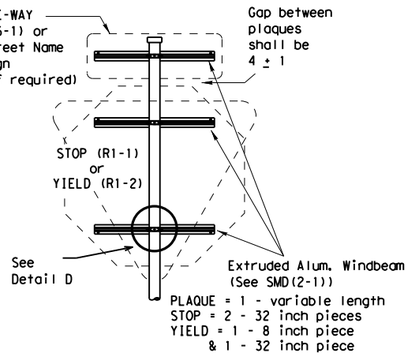
DATE:
FILE:



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

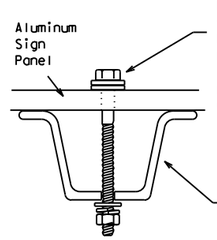


SM RD SGN ASSM TY XXXXX(1)XX(T)



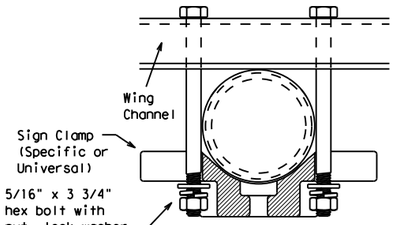
PLAQUE = 1 - variable length
STOP = 2 - 32 inch pieces
YIELD = 1 - 8 inch piece
& 1 - 32 inch piece

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



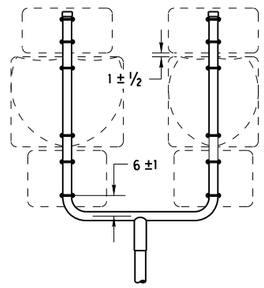
Top View

Detail A

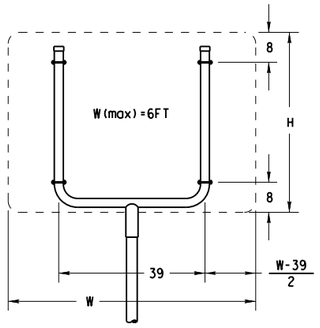


Top View

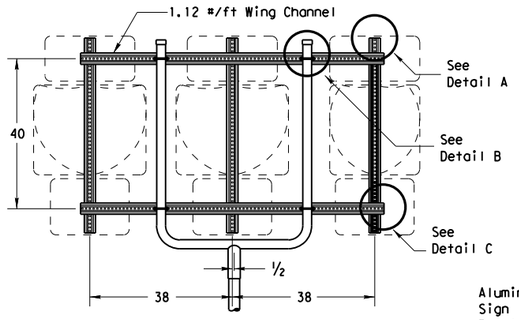
Detail B



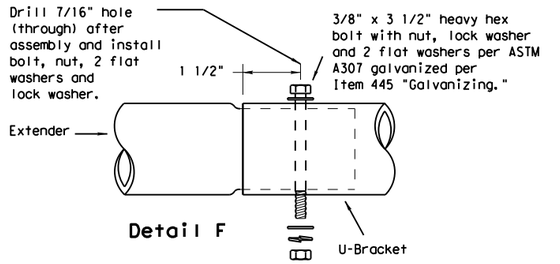
SM RD SGN ASSM TY XXXXX(1)XX(U)



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

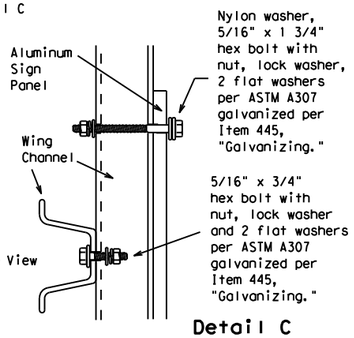


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

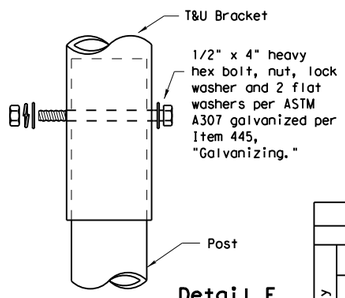


Detail F

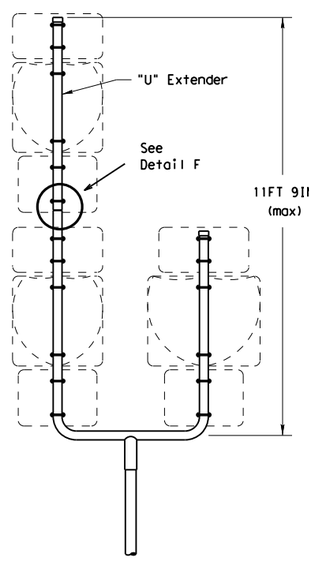
Splices shall only be allowed behind the sign substrate.



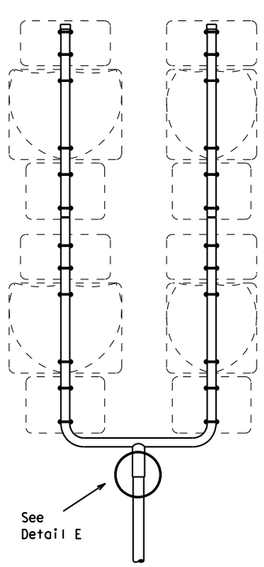
Detail C



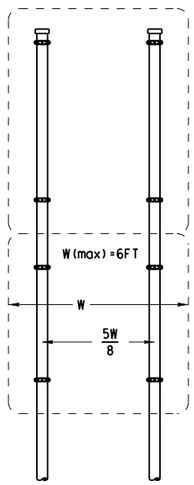
Detail E



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

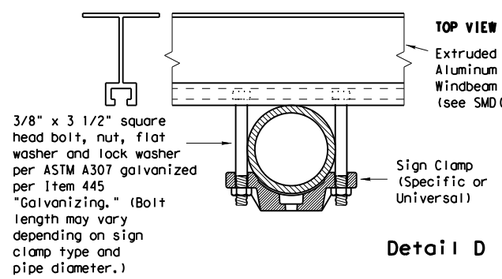


SM RD SGN ASSM TY S80(1)XX(U-2EXT)

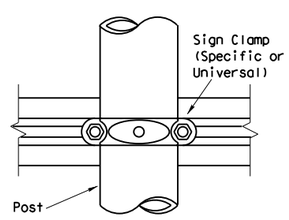


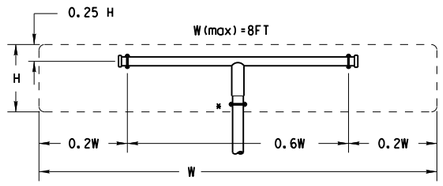
SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW



Detail D

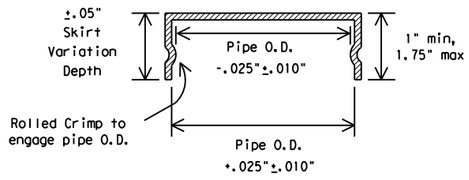




All dimensions are in english
unless detailed otherwise.

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

FRICTION CAP DETAIL



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

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

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

GENERAL NOTES:

1.

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

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

REQUIRED SUPPORT

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

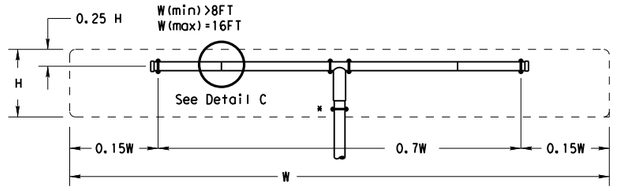
SMD(SLIP-2)-08

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

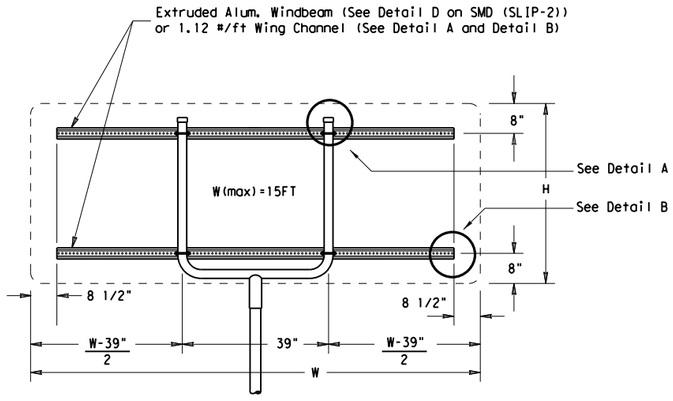
REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	0271	14	240	IH-610
	DIST	COUNTY		SHEET NO.
	12	HARRIS		93

DATE:
FILE:

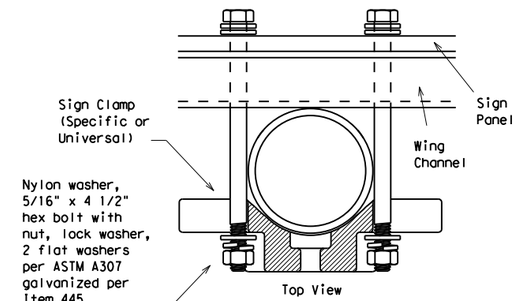
DATE:
FILE:



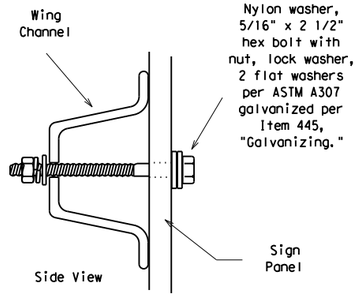
SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



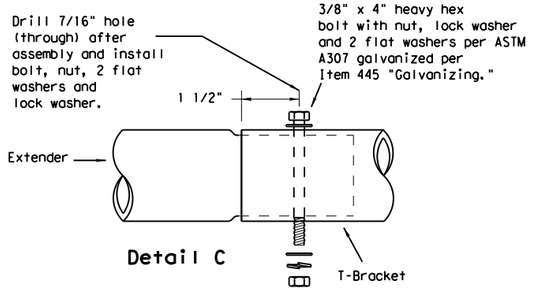
SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



Detail A

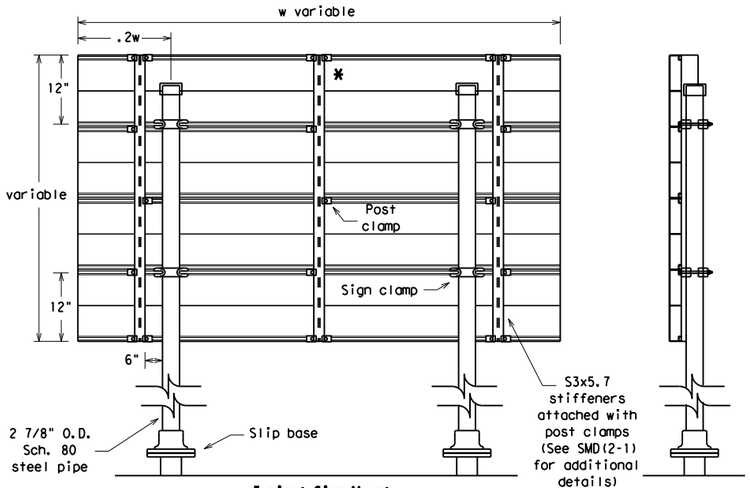


Detail B



Detail C

Splices shall only be allowed behind the sign substrate.

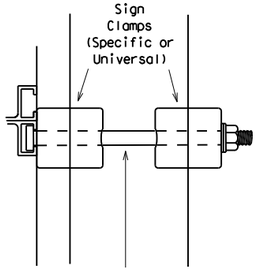


Typical Sign Mount

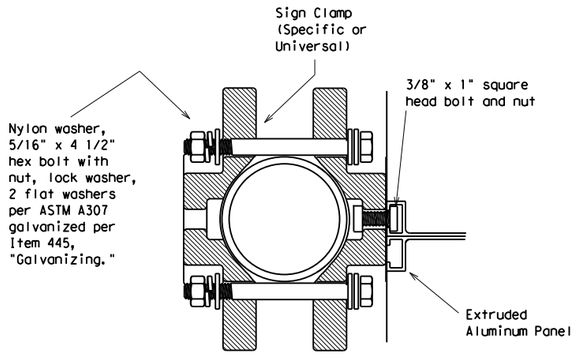
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

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

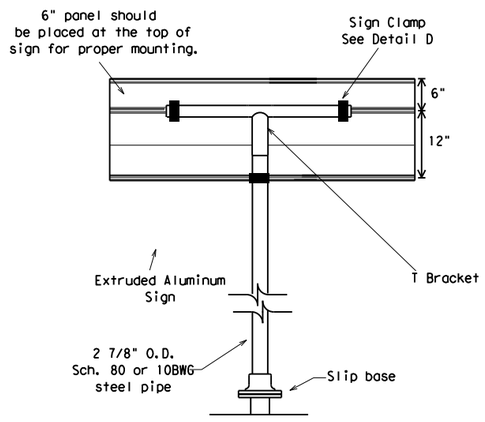
See Detail E
for clamp installation



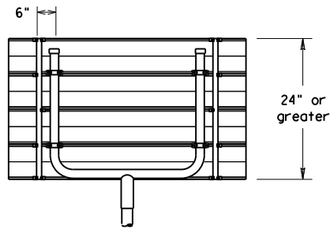
Detail E



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET



Extruded Aluminum Sign
With T Bracket



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

See Detail E
for clamp installation

GENERAL NOTES:

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

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

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

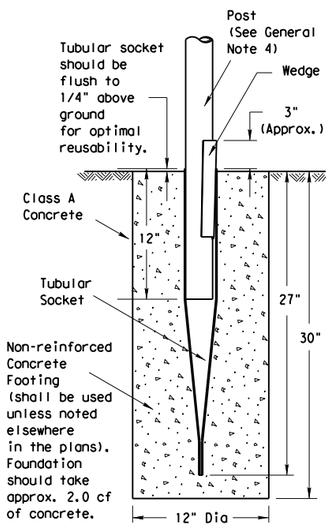
SMD(SLIP-3)-08

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

REVISIONS
9-08

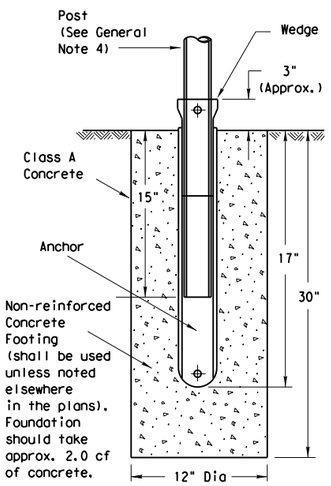
CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610
DIST	COUNTY		SHEET NO.
12	HARRIS		94

Wedge Anchor Steel System



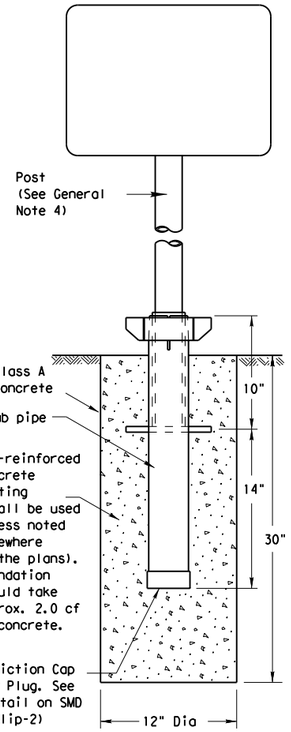
SM RD SGN ASSM TY TWT(X)WS(X)

Wedge Anchor High Density Polyethylene (HDPE) System

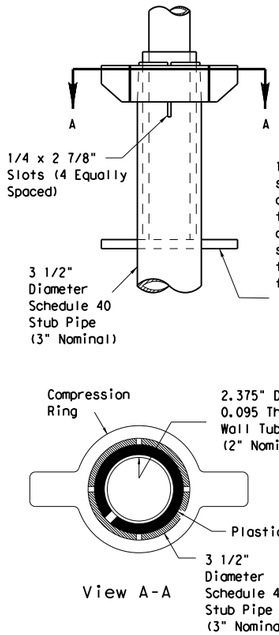


SMD RD SGN ASSM TY TWT(X)WP(X)

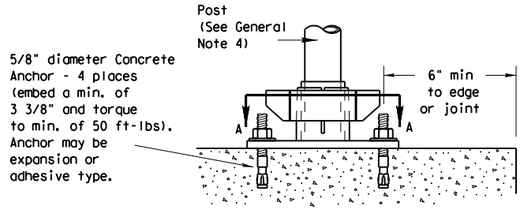
Universal Anchor System with Thin-Walled Tubing Post



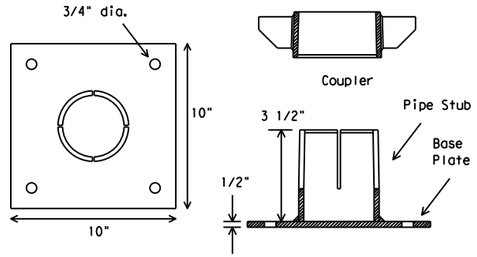
SM RD SGN ASSM TY TWT(X)UA(P)



Plastic insert must be used when using the TWT with either the Universal Anchor System or the Bolt Down Universal Anchor System. The insert should be approx. 10" long and cover the tubing from just above the top of the stub pipe to the bottom of the sign post when using the Universal Anchor System. The insert should be cut to approx. 4 1/2" when used with the Bolt Down Universal Anchor System.

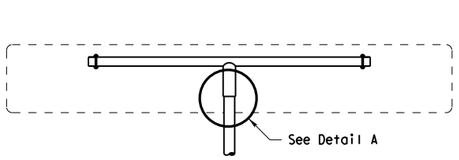


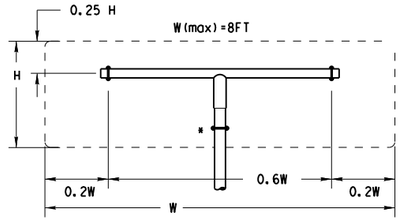
Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Top of bolt shall extend at least flush with top of nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 3 3/8" minimum embedment, shall have a minimum allowable tension and shear of 2450 and 1525 psi, respectively. Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations.



SM RD SGN ASSM TY TWT(X)UB(P)

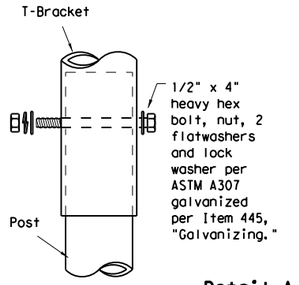
Sign Installation Using a Prefabricated T-Bracket for Thin-Wall Tubing Post





SM RD SGN ASSM TY TWT(X)XX(T)

(* - See General Note 6)



Detail A

9/16" hole may need to be drilled through post to accommodate bolt.

NOTE

The devices shall be installed per manufacturer's recommendations.
Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. The Wedge Anchor System and the Universal Anchor System with thin wall tubing post may be used to support up to 10 square feet of sign area.
2. The tubular socket, wedge and prefabricated T-bracket shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to the approval of the TxDOT Traffic Standards Engineer.
3. Except for posts (13 BWG Tubing), clamps, nuts and bolts, all components shall be prequalified. A list of prequalified vendors may be obtained from the Material Producer List web page. The website address is: http://www.txdot.gov/business/producer list.htm
4. Material used as post with this system shall conform to the following specifications:
   13 BWG Tubing (2.375" outside diameter) (TWT)
   0.095" nominal wall thickness
   Seamless or electric-resistance welded steel tubing
   Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   Other steels may be used if they meet the following:
   55,000 PSI minimum yield strength
   70,000 PSI minimum tensile strength
   18% minimum elongation in 2"
   Wall thickness (uncoated) shall be within the range of .083" to .099"
   Outside diameter (uncoated) shall be within the range of 2.369" to 2.381"
   Galvanization per ASTM 123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.
5. Sign blanks shall be the sizes and shapes shown on the plans.
6. Additional sign clamp required on the "T-bracket" post for 24" high signs. Place clamp at least 3" above bottom of sign when possible.
7. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
8. See the Traffic Operations Division website for detailed drawings of sign clamps and Wedge Anchor System components. The website address is: http://www.txdot.gov/publications/traffic.htm

WEDGE ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Place concrete into hole until it is approximately flush with the ground. Concrete shall be Class A.
3. Insert tubular socket into concrete until top of socket is approximaely 1/4 " above the concrete footing.
4. Plumb the socket. Allow a minimum 4 days for concrete to set, unless otherwise directed by Engineer..
5. Attach the sign to the sign post.
6. Insert the sign post into socket and align sign face with roadway.
7. Drive the wedge into the socket to secure post. This will leave approximately 3 inches of the wedge exposed.

UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. Insert base post in hole to depths shown and backfill hole with concrete.
3. Level and plumb the base post using a torpedo level and allow concrete adequate time to set. The bottom of the slots provided in the stub pipe shall remain above the top of the concrete foundation.
4. Attach the sign to the sign post.
5. Install plastic insert around bottom of post.
6. Insert sign post into base post. Lower until the post comes to rest on steel rod.
7. Seat compression ring using a hammer. Typically, the top of compression ring will be approximately level with top of stub post when optimally installed.
8. Check sign post by hand to ensure it is unable to turn. If loose, increase the tightening of the compression ring.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS WEDGE & UNIVERSAL ANCHOR WITH THIN WALL TUBING POST

SMD(TWT)-08

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

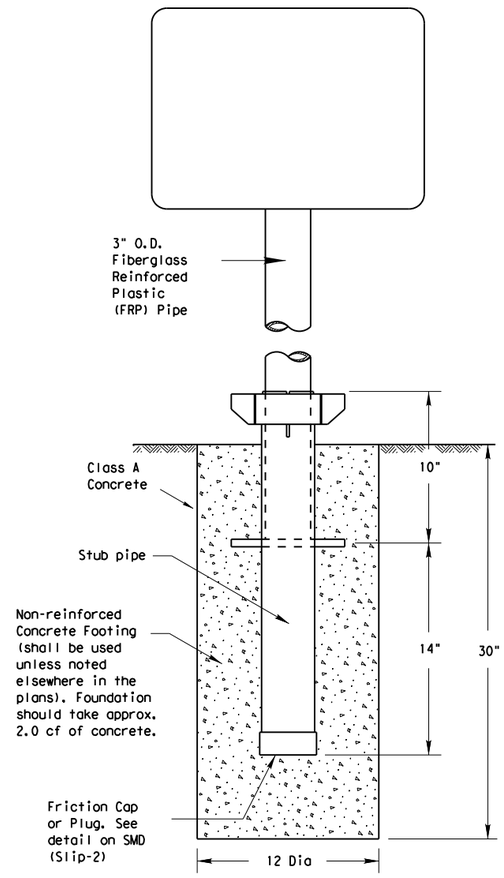
9-08 REVISIONS

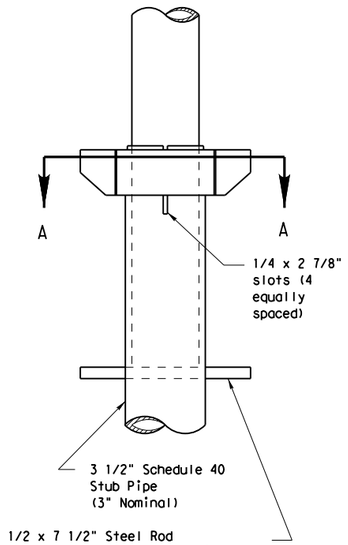
CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610
DIST	COUNTY		SHEET NO.
12	HARRIS		95

26E

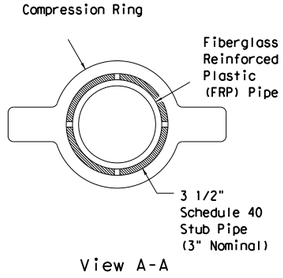
DATE:
FILE:

Universal Anchor System with Fiberglass Reinforced Plastic (FRP) Post



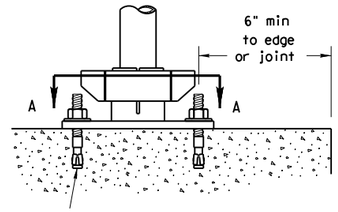


1/2 x 7 1/2" Steel Rod
Acts as a "stop" for the sign post
and prevents stub from turning in
the foundation.



View A-A

SM RD SGN ASSM TY FRP(X)UA(P)



5/8" diameter Concrete Anchor - 4 places (embed a min. of 3 3/8" and torque to min. of 50 ft-lbs). Anchor may be expansion or adhesive type.

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Top of bolt shall extend at least flush with top of nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 3 3/8" minimum embedment, shall have a minimum allowable tension and shear of 2450 and 1525 psi, respectively. Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations.

BOLT-DOWN DETAILS

SM RD SGN ASSM TY FRP(X)UB(P)

GENERAL NOTES:

1. FRP sign supports for a single type sign support may be used for signs up to and including 16 square feet. Dual post installation may be used for signs up to and including 32 square feet.
2. All nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing."
3. See the Traffic Operations Division website for detailed drawings of sign clamps. The website address is:
   http://www.txdot.gov/publications/traffic.htm

FRP POST REQUIREMENTS

1. Materials shall conform to the requirements of Departmental Material Specification DMS-4410 and will be furnished in a yellow or gray color as specified elsewhere in the plans.
2. Thickness of FRP sign support is 0.125" + 0.031", - 0.0".
3. FRP sign supports are prequalified by the Traffic Operations Division. Prequalification procedures are obtained by writing:
   Texas Department of Transportation
   Traffic Operations Division
   125 East 11th Street
   Austin, Texas 78701-2483

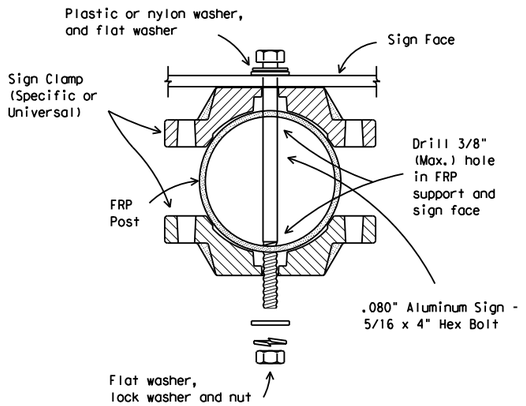
UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURES

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Insert base post in foundation hole to depths shown and fill hole with concrete. Cut base post from bottom and ensure a minimum of 18" embedment if installed in solid rock.
4. Level and plumb the base post with coupler using a torpedo level and let concrete set a minimum of 4 days, unless otherwise directed by Engineer. Bottom of base post slots shall be above the concrete footing.
5. Attach sign to FRP post.
6. Insert sign post into base post. Lower until the post comes to rest on the steel rod.
7. Use hammer to ensure the coupler is firmly seated. Top of coupler should be level with top of base post in most instances.
8. Check sign to ensure there is no twist. If loose, increase the tightening of coupler.

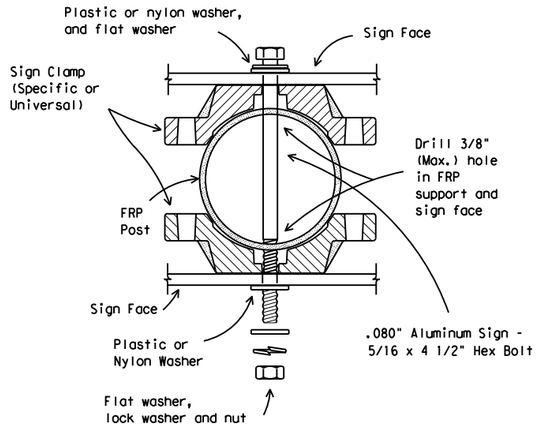
BOLT DOWN SIGN SUPPORT

1. Position base plate with coupler on existing concrete.
2. Drill holes into concrete and insert the 5/8" diameter bolts with wedge anchors, and tighten nuts.
3. Attach sign to FRP post.
4. Insert bottom of sign post into pipe stub.
5. Use hammer to ensure the coupler is firmly seated. Top of coupler should be level with top of base post in most instances.
6. Check sign to ensure there is no twist. If loose, increase the tightening of coupler.

Typical Sign Mounting Detail for FRP Support with Single Sign



Typical Sign Mounting Detail for FRP Support with Back-to-Back Signs



Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS UNIVERSAL ANCHOR SYSTEM WITH FRP POST

SMD(FRP)-08

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

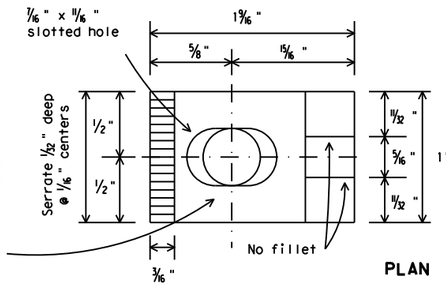
REVISIONS

9-08

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610

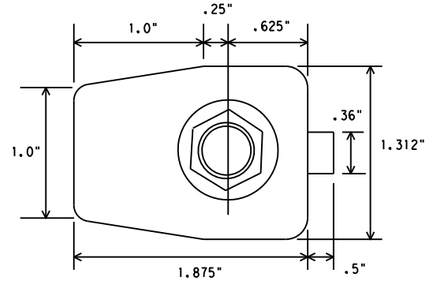
DIST	COUNTY	SHEET NO.
12	HARRIS	96

DATE:
FILE:

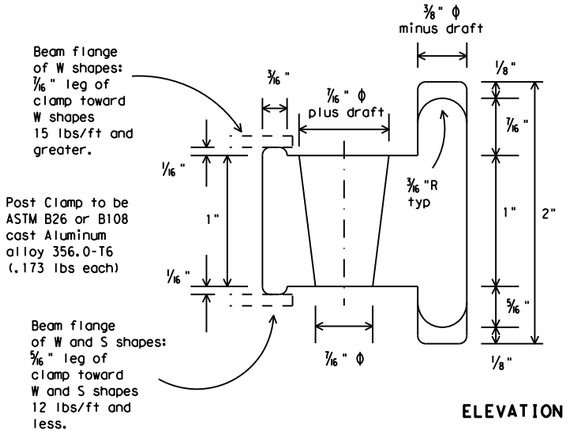


NOTE: centerline of hole for 3/8" diameter squarehead bolt x 2 1/4" long with a flat washer and self-locking nut, or lock washer and hex. nut. Bolt head dimensions shall be in accordance with ANSI B 18.2.1 as referred to in the AISC Manual of steel construction. Bolt assembly shall be galvanized.

PLAN

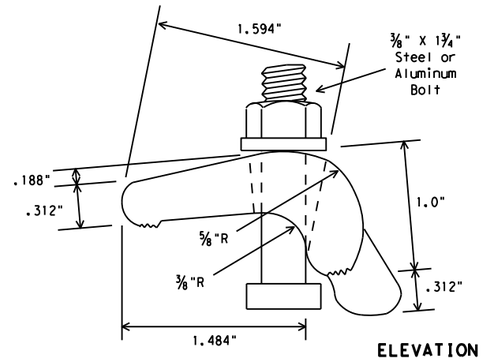


PLAN



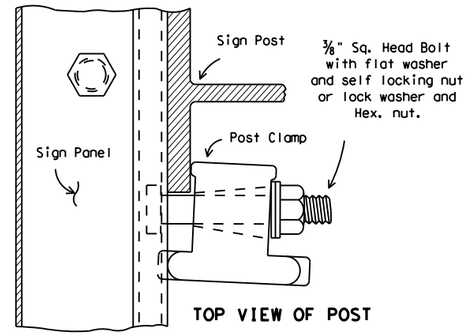
ELEVATION

POST CLAMP DETAIL

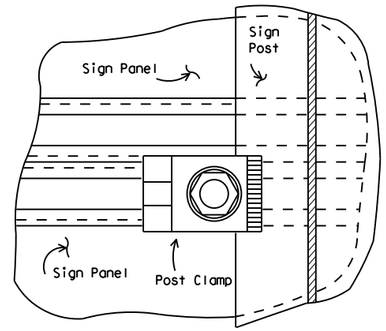


ELEVATION

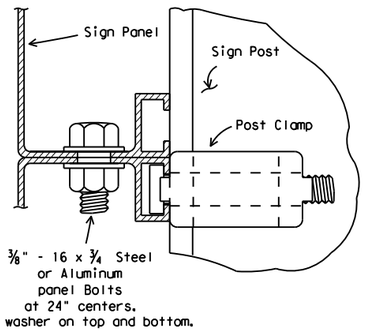
ALTERNATE POST CLAMP DETAIL



TOP VIEW OF POST



TOP VIEW OF CLAMP



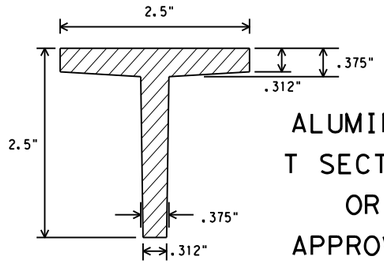
SIDE VIEW OF PANELS

CONNECTION DETAILS

DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN HARDWARE	DMS-7120

GENERAL NOTES:

1. Design conforms with AASHTO Specifications for the design and construction of structural supports for highway signs.
2. Materials and fabrication shall conform to the requirements of the Department material specifications.
3. Structural steel shall be "low-alloy steel" for non-bridge structures per Item 442, "Metal For Structures."
4. For fiberglass substrate connection details, see manufacturer's recommendations.

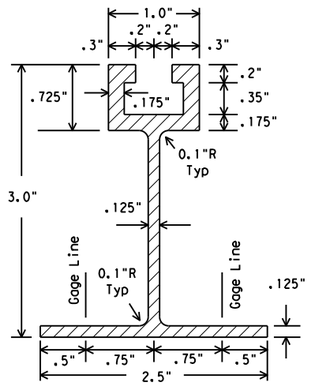


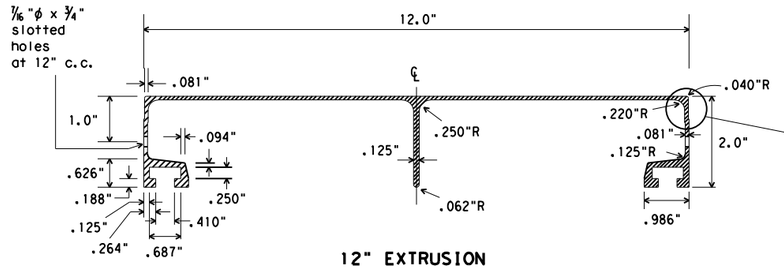
1.912 lbs/ft

ALUMINUM T SECTION OR APPROVED ALTERNATIVE

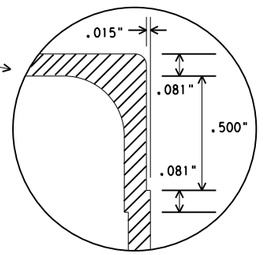
WINDBEAM CROSS SECTION

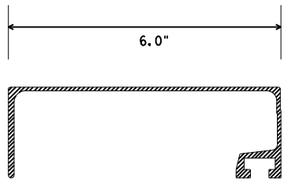
Windbeam to be extruded aluminum (1.175 lbs/ft) or approved alternative



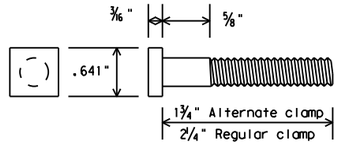


12" EXTRUSION





6" EXTRUSION



POST CLAMP BOLT DETAIL

ALUMINUM SIGN PANEL EXTRUSION DETAILS

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS- EXTRUDED ALUMINUM SIGN PANELS & HARDWARE

SMD(2-1)-08

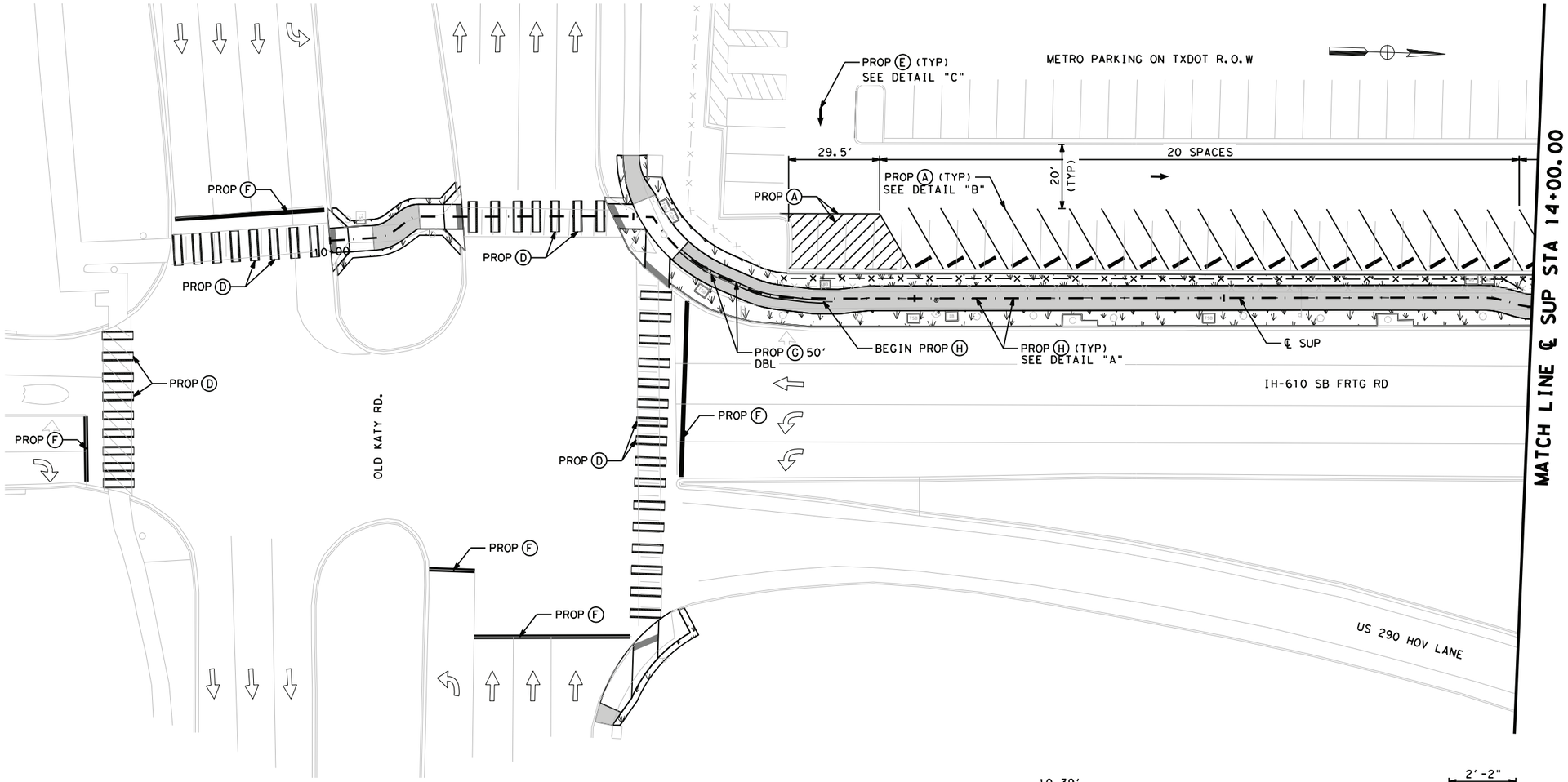
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

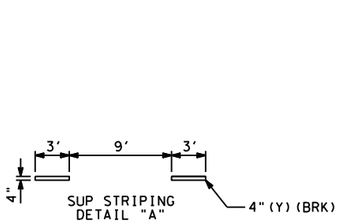
REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	0271	14	240	IH-610
	DIST	COUNTY		SHEET NO.
	12	HARRIS		97

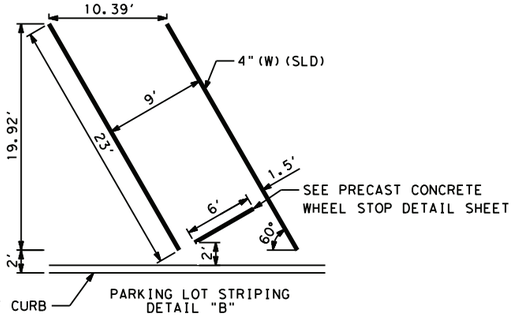
DATE:
FILE:

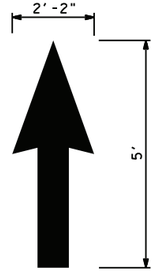
LEGEND:

- (A) REFL PAV MRK TY I (W)4"(SLD)(100MIL)
- (B) REFL PAV MRK TY I (Y)4"(SLD)(100MIL)
- (C) REFL PAV MRK TY I (W)24"(SLD)(100MIL)
- (D) PREFAB PM TY C (W)(24")(SLD)CONTRAST
- (E) PREFAB PM TY C (W)(ARROW)
- (F) RE PM TY III (W)(24")(SLD)
- (G) RE PM TY III (Y)(4")(SLD)
- (H) RE PM TY III (Y)(4")(BRK)









NOTES:

1. THE CONTRAST CROSSWALK LINE CONSISTING OF 24" WHITE AND TWO 6" BLACK SOLID LINES WILL BE PAID FOR UNDER ITEM 668-7090.
2. THE SEALER FOR CONTRAST CROSSWALK LINE WILL BE PAID FOR UNDER ITEM 666-7347 AND ITEM 666-7352.
3. THE SURFACE PREPARATION FOR CONTRAST CROSSWALK LINE WILL BE PAID FOR UNDER ITEM 678-7002 AND 678-7008.

STATE OF TEXAS
STEVE VAN
137551
LICENSED
PROFESSIONAL ENGINEER

Steve Van, P.E.

06.14.24

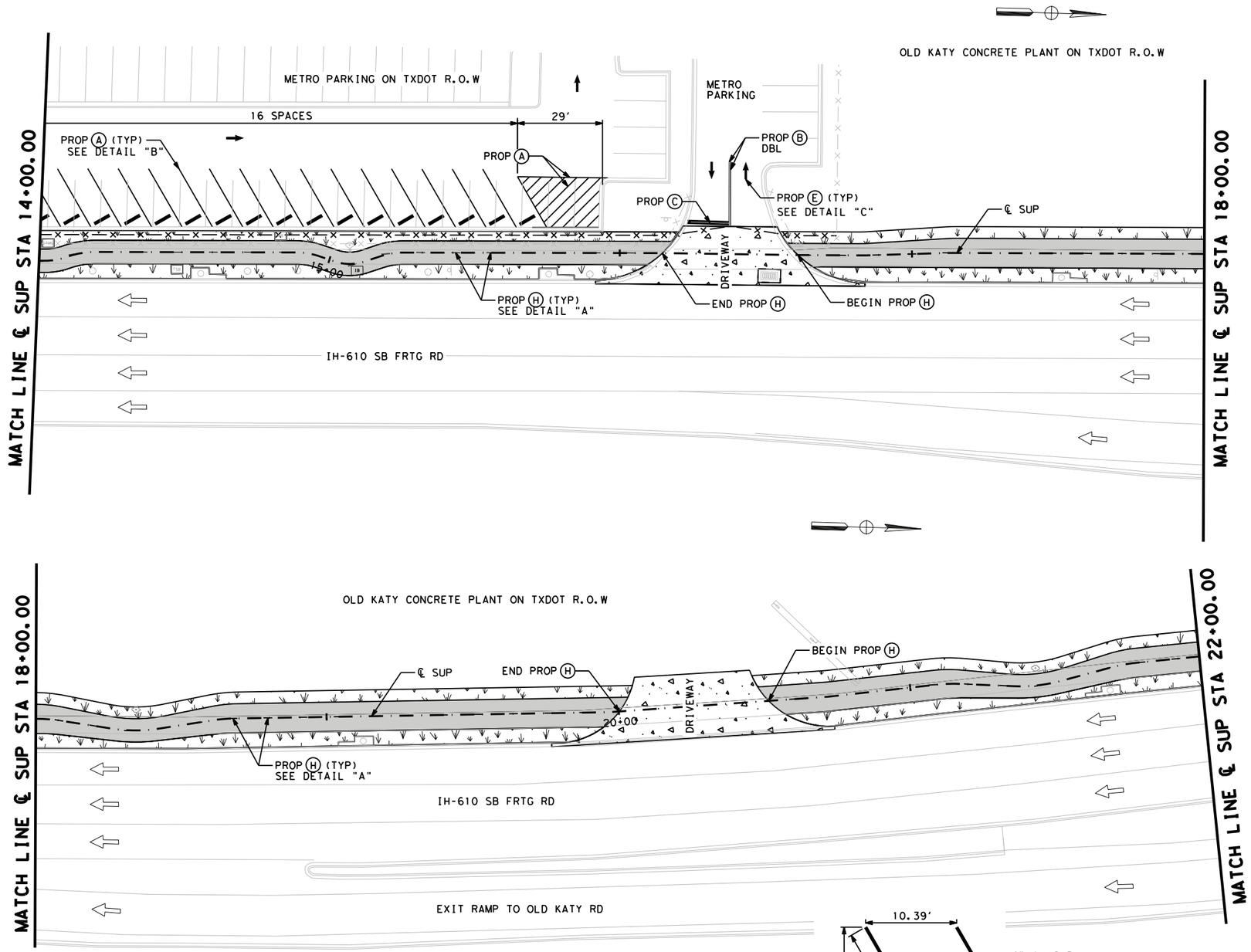
IH-610
SB FRTG RD (SUP)
PAVEMENT MARKING LAYOUT

SCALE: 1":40' HORZ

SHEET 1 OF 4

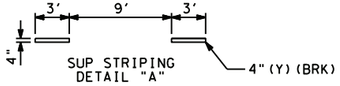
TEXAS DEPARTMENT OF TRANSPORTATION

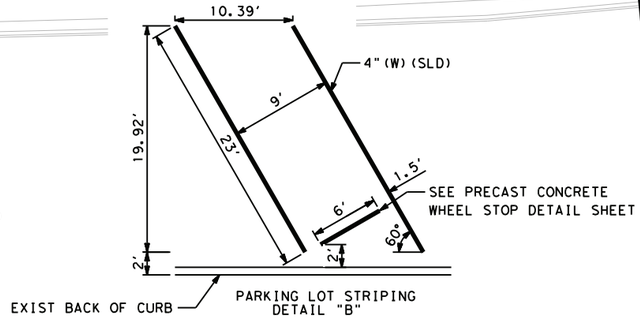
CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610
DIST	COUNTY		SHEET NO.
12	HARRIS		98

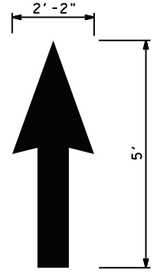


LEGEND:

- (A) REFL PAV MRK TY I (W)4"(SLD)(100MIL)
- (B) REFL PAV MRK TY I (Y)4"(SLD)(100MIL)
- (C) REFL PAV MRK TY I (W)24"(SLD)(100MIL)
- (D) PREFAB PM TY C (W)(24")(SLD)CONTRAST
- (E) PREFAB PM TY C (W)(ARROW)
- (F) RE PM TY III (W)(24")(SLD)
- (G) RE PM TY III (Y)(4")(SLD)
- (H) RE PM TY III (Y)(4")(BRK)







STATE OF TEXAS
STEVE VAN
137551
LICENSED PROFESSIONAL ENGINEER

Steve Van, P.E.

06.14.24

IH-610
SB FRTG RD (SUP) PAVEMENT MARKING LAYOUT

SCALE: 1":40' HORZ

SHEET 2 OF 4

TEXAS DEPARTMENT OF TRANSPORTATION

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610
DIST	COUNTY		SHEET NO.
12	HARRIS		99

DATE: 6/14/2024 11:50:01 AM
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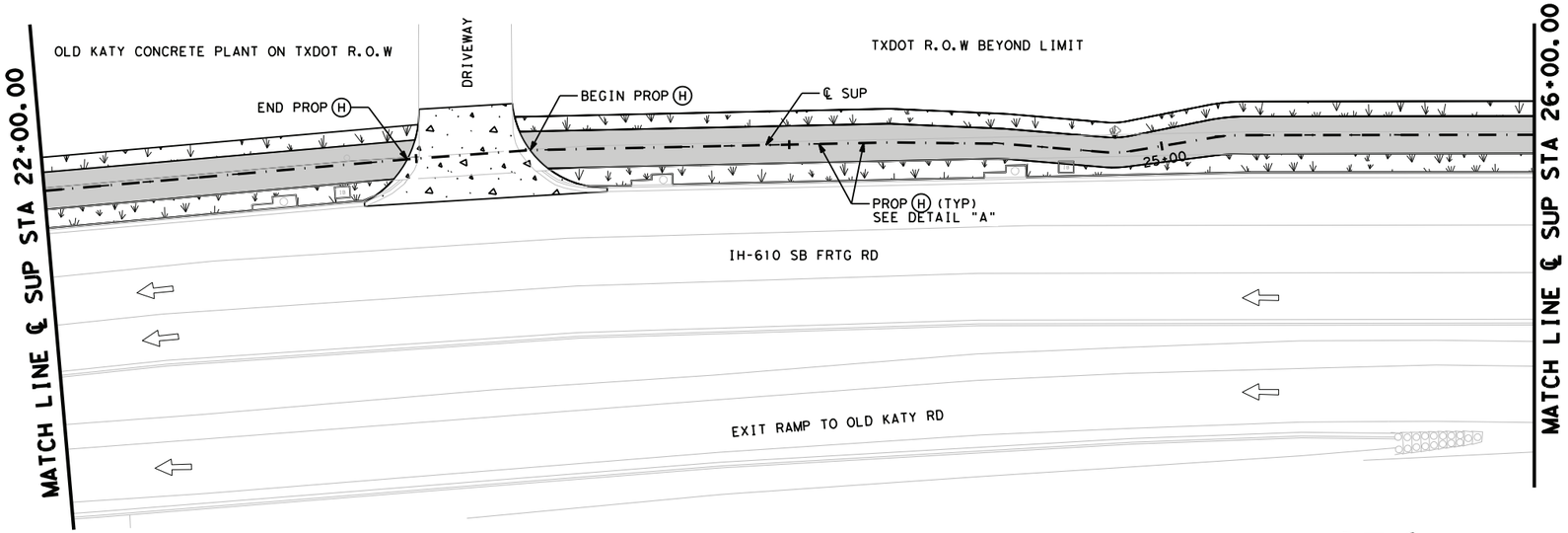

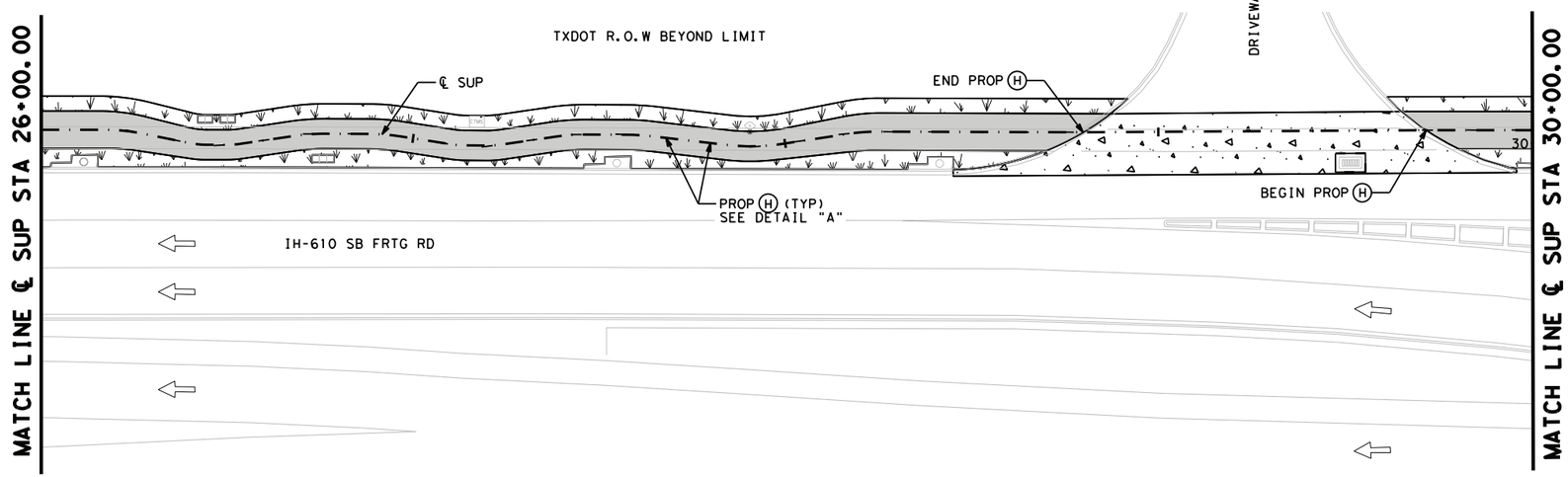

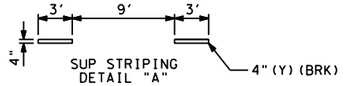

LEGEND:

- (A) REFL PAV MRK TY I (W) 4" (SLD) (100MIL)
- (B) REFL PAV MRK TY I (Y) 4" (SLD) (100MIL)
- (C) REFL PAV MRK TY I (W) 24" (SLD) (100MIL)
- (D) PREFAB PM TY C (W) (24") (SLD) CONTRAST
- (E) PREFAB PM TY C (W) (ARROW)
- (F) RE PM TY III (W) (24") (SLD)
- (G) RE PM TY III (Y) (4") (SLD)
- (H) RE PM TY III (Y) (4") (BRK)

STATE OF TEXAS
STEVE VAN
137551
LICENSED
PROFESSIONAL ENGINEER

Steve Van, P.E.

06.14.24

IH-610
SB FRTG RD (SUP)
PAVEMENT MARKING LAYOUT

SCALE: 1": 40' HORZ

SHEET 3 OF 4

TEXAS DEPARTMENT OF TRANSPORTATION

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610
DIST	COUNTY		SHEET NO.
12	HARRIS		100

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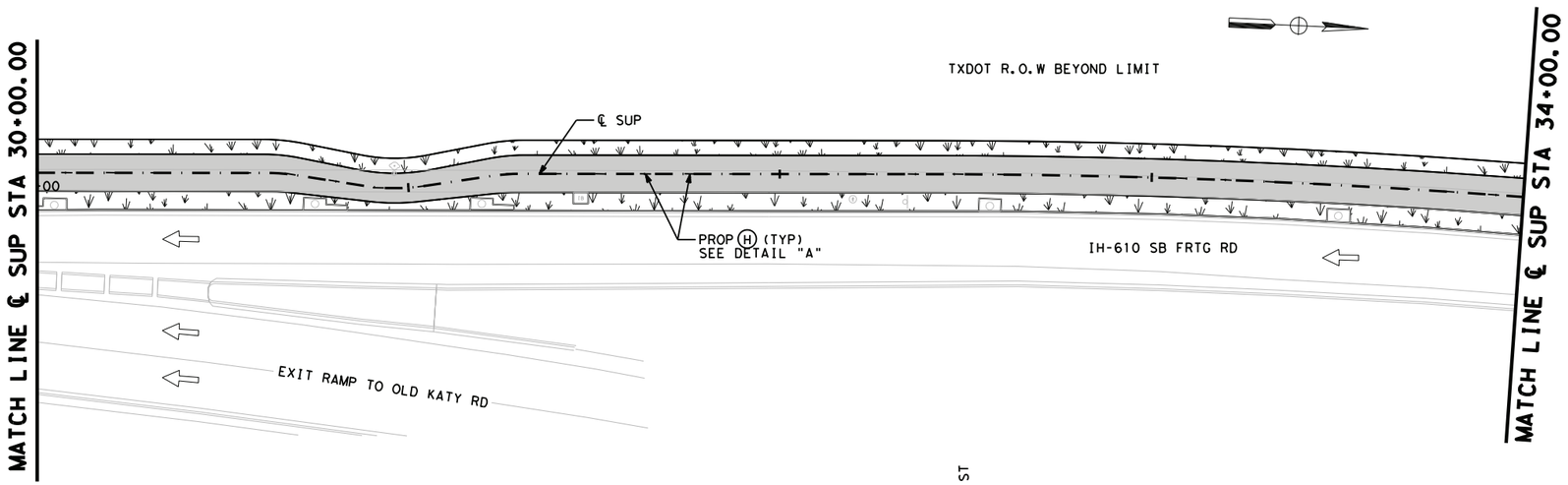

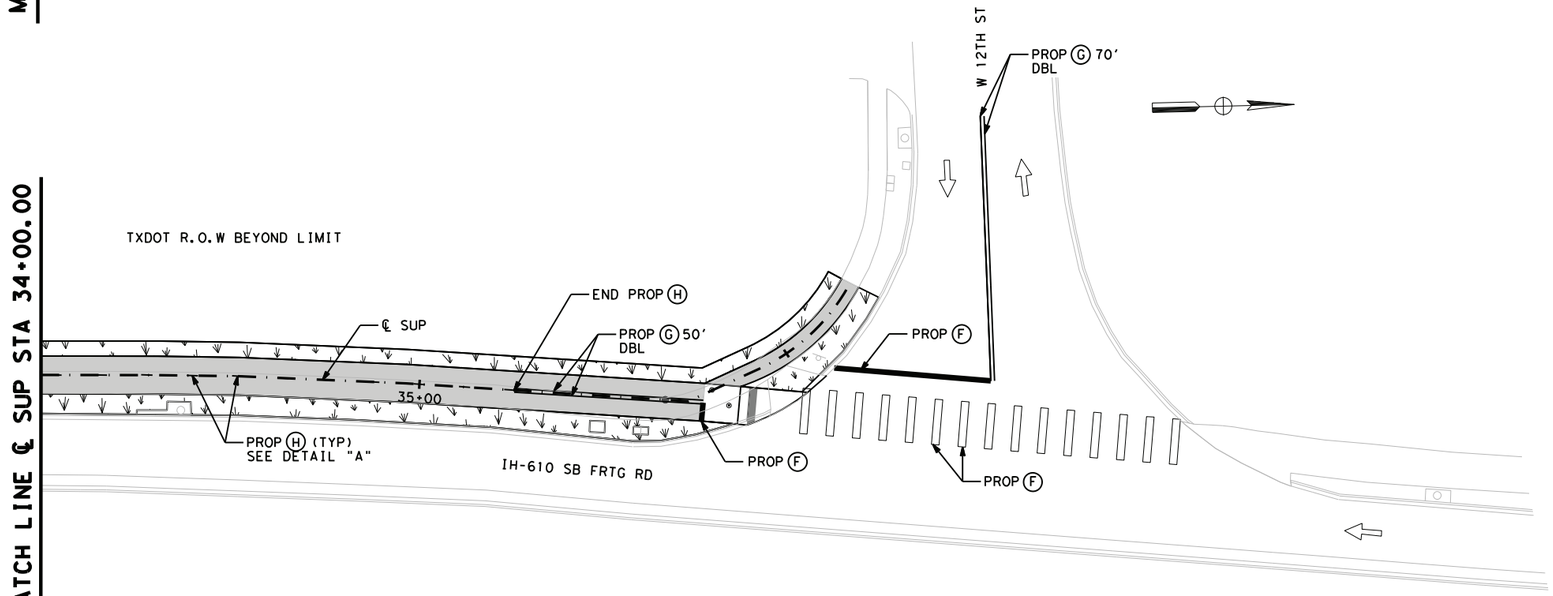

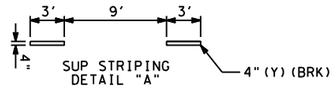

LEGEND:

- (A) REFL PAV MRK TY I (W) 4" (SLD) (100MIL)
- (B) REFL PAV MRK TY I (Y) 4" (SLD) (100MIL)
- (C) REFL PAV MRK TY I (W) 24" (SLD) (100MIL)
- (D) PREFAB PM TY C (W) (24") (SLD) CONTRAST
- (E) PREFAB PM TY C (W) (ARROW)
- (F) RE PM TY III (W) (24") (SLD)
- (G) RE PM TY III (Y) (4") (SLD)
- (H) RE PM TY III (Y) (4") (BRK)

STATE OF TEXAS
STEVE VAN
137551
LICENSED
PROFESSIONAL ENGINEER

Steve Van, P.E.

06.14.24

IH-610
SB FRTG RD (SUP)
PAVEMENT MARKING LAYOUT

SCALE: 1":40' HORZ

SHEET 4 OF 4

TEXAS DEPARTMENT OF TRANSPORTATION

CONT	SECT	JOB	HIGHWAY
0271	14	240	IH-610
DIST	COUNTY		SHEET NO.
12	HARRIS		101

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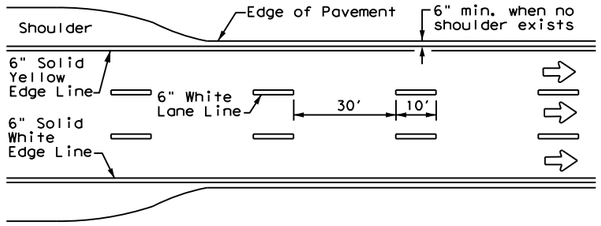
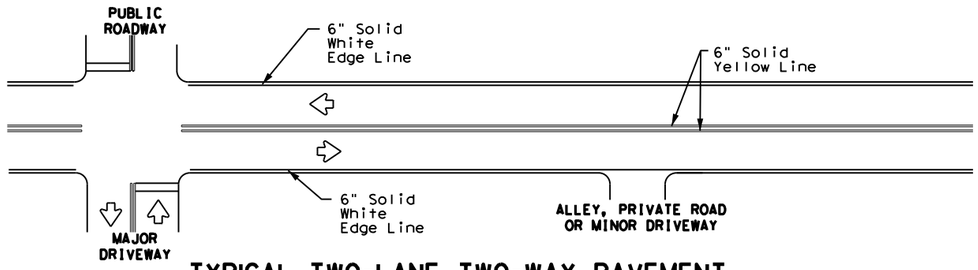
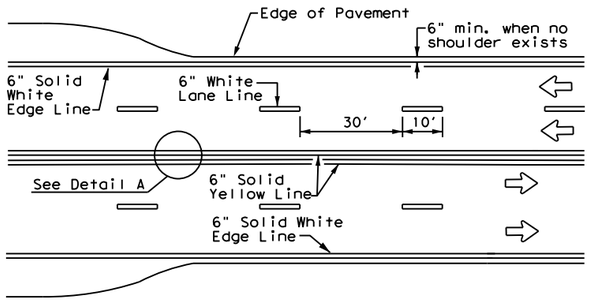
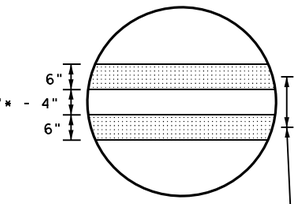


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



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





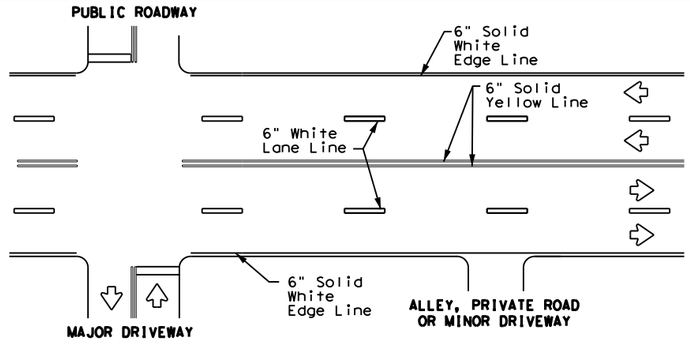
DETAIL "A"

9"** min. - 10" typ.
(18" max. for traveled way greater than 48' only)

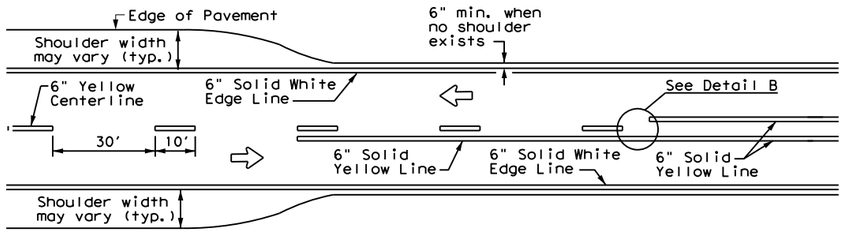
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

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

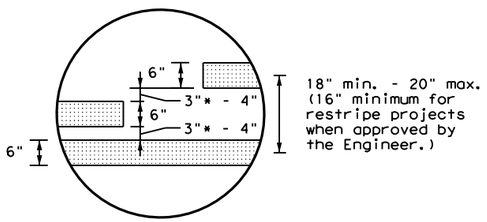
** 8" minimum for restripe projects when approved by the Engineer.



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

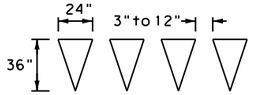


TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



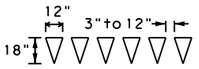
DETAIL "B"

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

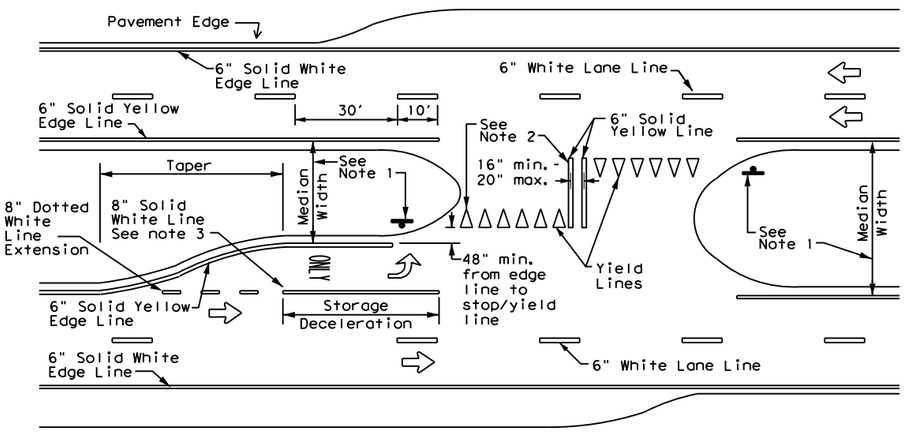


For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES



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



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

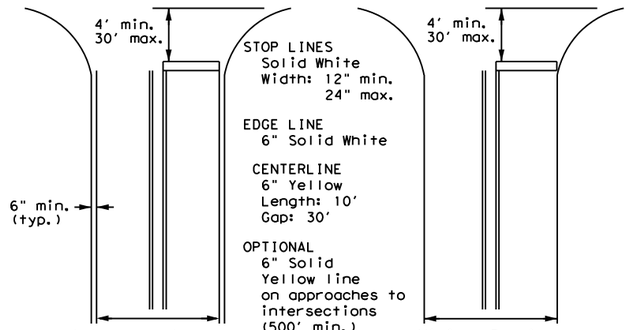
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling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

GENERAL NOTES

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

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

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



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

GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Roadways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

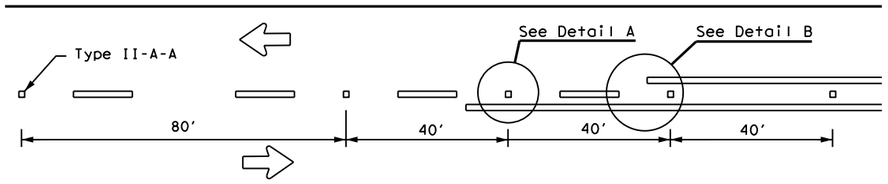
PM(1)-22

FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	14	240	IH-610
11-78 8-00 6-20	DIST	COUNTY		SHEET NO.
8-95 3-03 12-22	12	HARRIS		102
5-00 2-12				

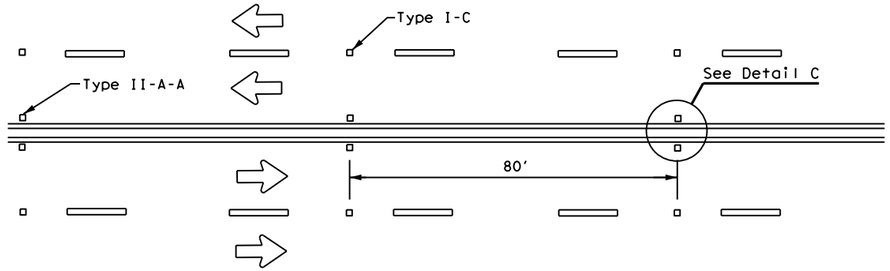
22A

DATE: 3/12/2024 2:56:05 PM
FILE: C:\Engdata\output\plot\SUP\Standards\Pav Mrk\pm1-22.dgn

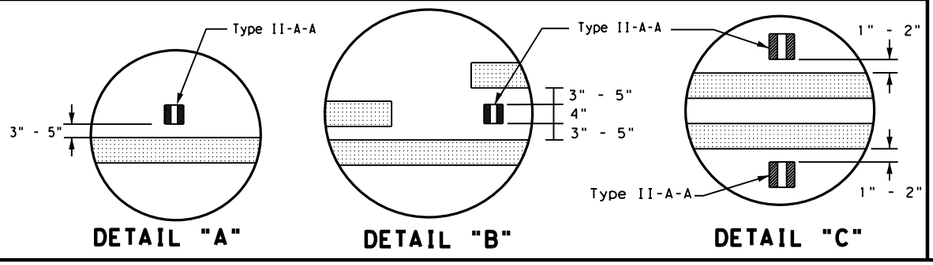
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

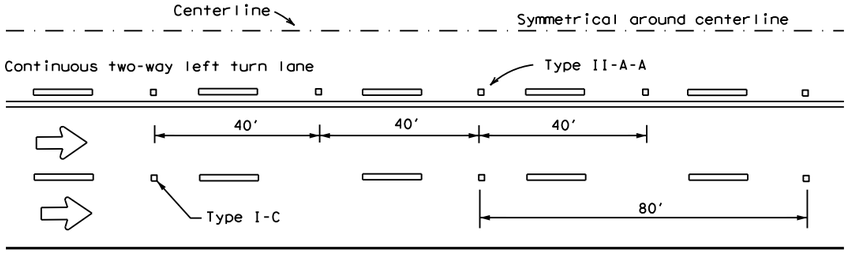


CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS

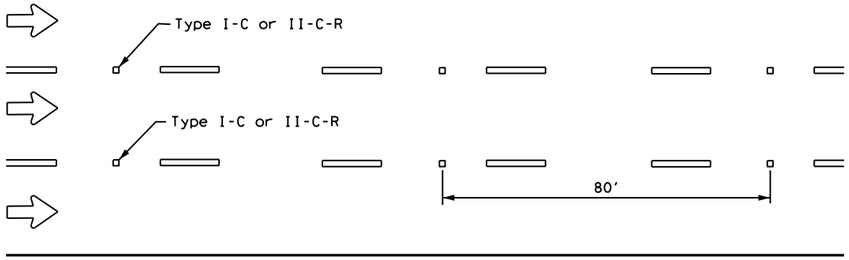


CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS





CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



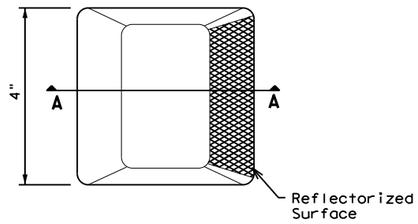
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

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

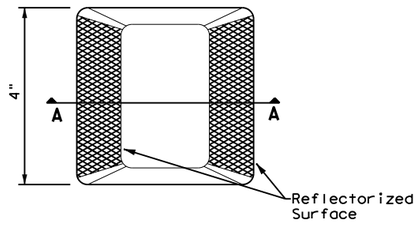
See Note 3.

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

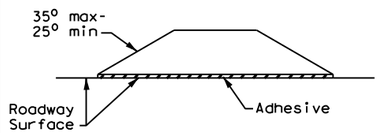
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

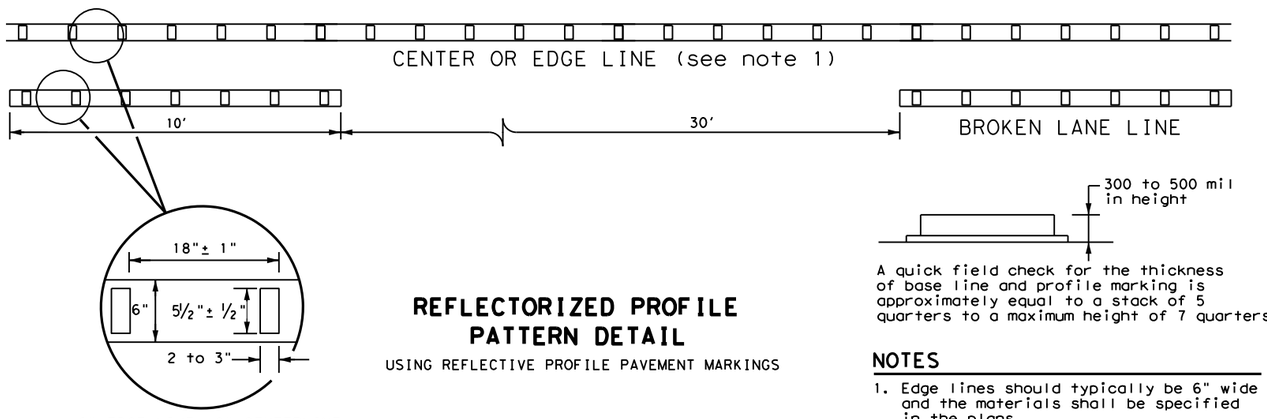


Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS



6" EDGE LINE, 6" CENTERLINE OR 6" LANE LINE

REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTES

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Safety Division Standard

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

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-77 8-00 6-20 4-92 2-10 12-22 5-00 2-12	0271	14	240	IH-610
	DIST	COUNTY		SHEET NO.
	12	HARRIS		103

22B

DATE: 3/12/2024 2:56:05 PM
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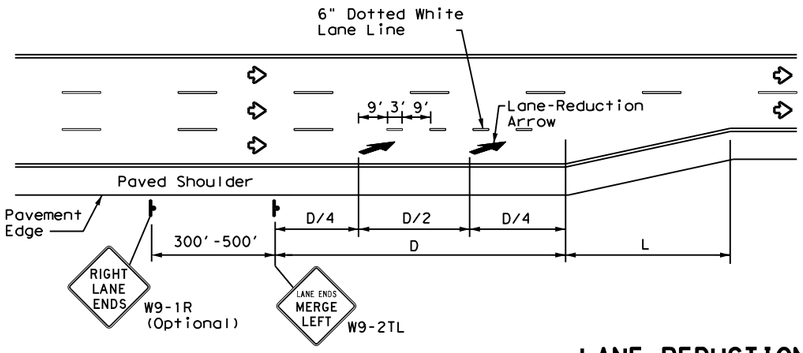
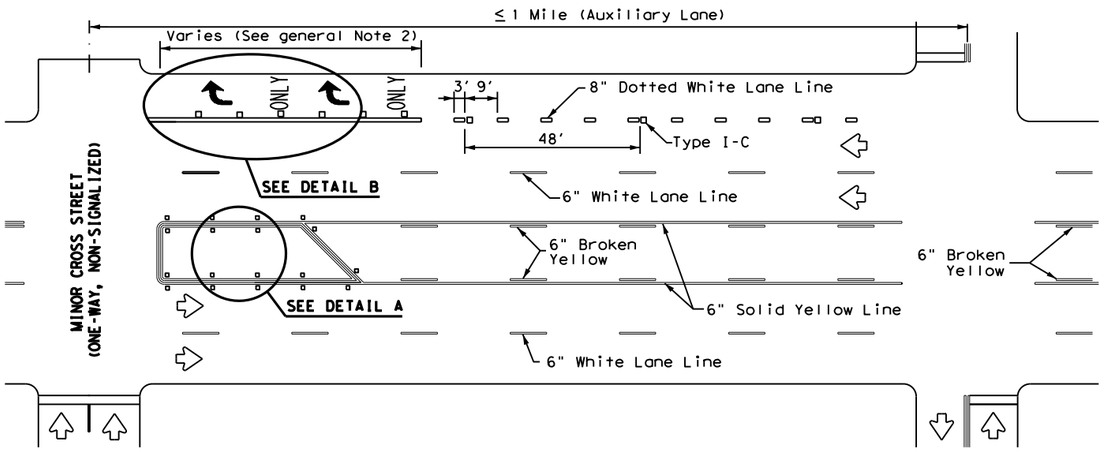


LANE REDUCTION

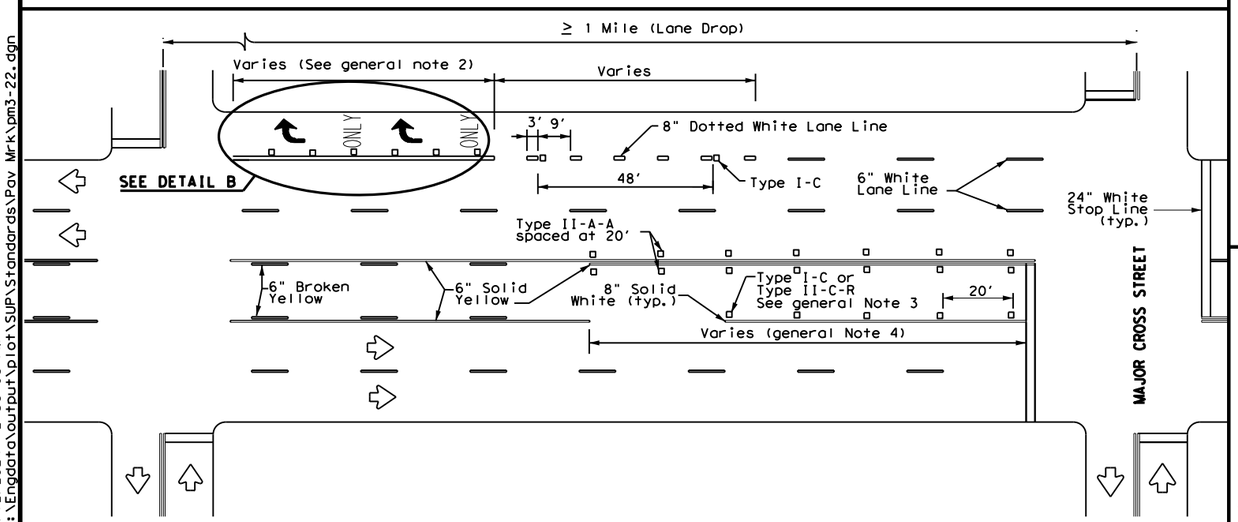
NOTES

1. Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. For Texas Super 2 Passing Lanes, see TS2(PL) standard sheets.
2. On divided highways, an additional RIGHT LANE ENDS (W9-1R) sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
3. Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.

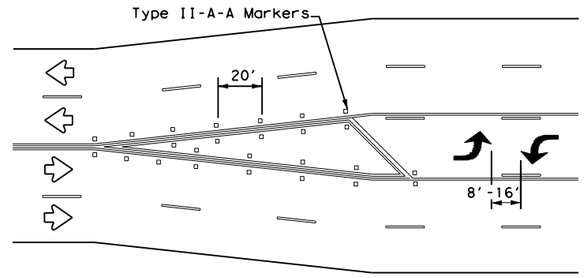
ADVANCED WARNING SIGN DISTANCE (D)		
Posted Speed	D (ft)	L (ft)
30 MPH	460	$L=\frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	



TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE

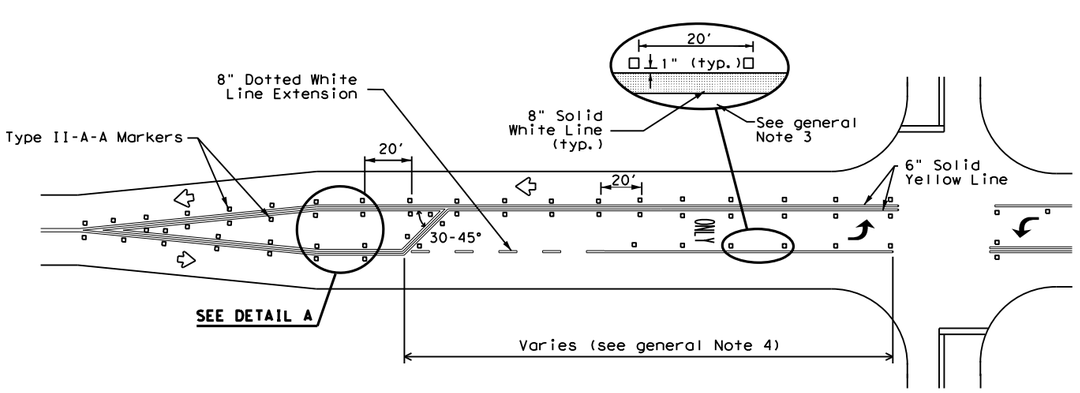


TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP

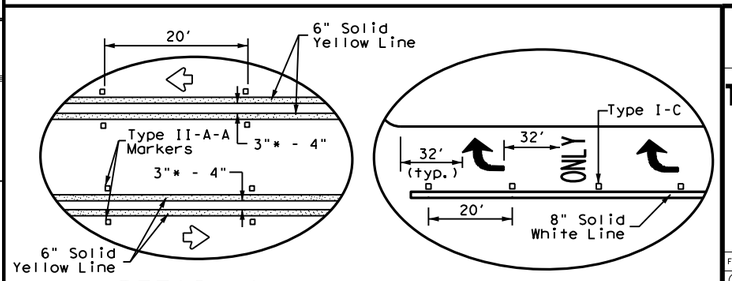


A two-way left-turn (TWLT) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY



TYPICAL TWO-LANE ROADWAY INTERSECTION WITH LEFT TURN BAYS



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

GENERAL NOTES

1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
2. When lane-use words and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow or word and arrow marking is used for a short turn lane, it should be located at or near the upstream end of the full-width turn lane.
3. Use raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.
4. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer. See Chapter 3 of the Roadway Design Manual for additional information on turning lanes or storage lengths.

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

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

Texas Department of Transportation

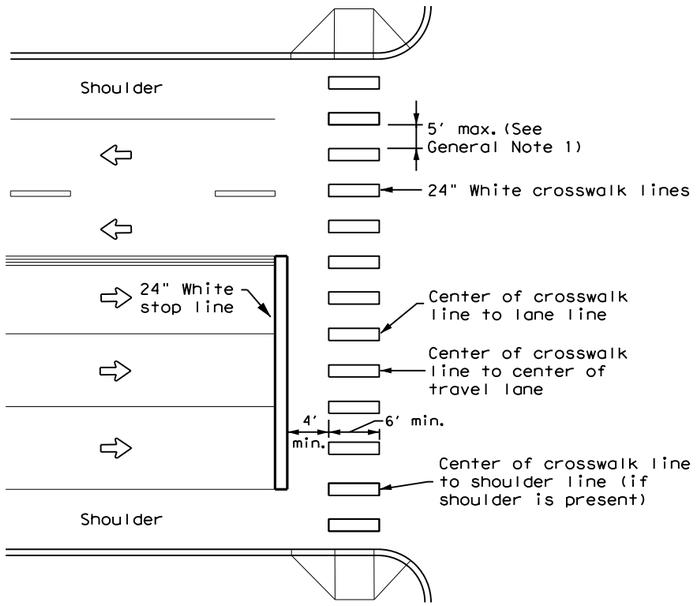
Traffic Safety Division Standard

TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS

PM(3)-22

FILE: pm3-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-98 3-03 6-20 5-00 2-10 12-22 8-00 2-12	0271	14	240	IH-610
	DIST	COUNTY		SHEET NO.
	12	HARRIS		104

22C



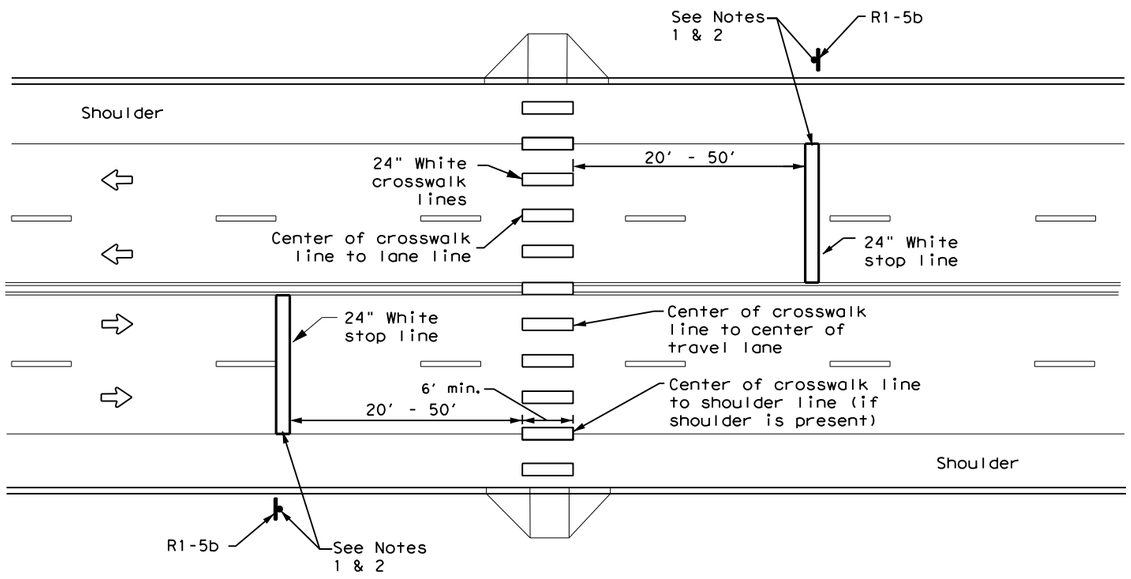
HIGH-VISIBILITY LONGITUDINAL CROSSWALK AT CONTROLLED APPROACH

GENERAL NOTES

1. Longitudinal crosswalk lines should not be placed in the wheel path of vehicles. Center the crosswalk lines on travel lanes, lane lines, and shoulder lines (if present).
2. A minimum 6" clear distance shall be provided to the curb face. If the last crosswalk line falls into this distance it must be omitted.
3. For divided roadways, adjustments in spacing of the crosswalk lines should be made in the median so that the crosswalk lines are maintained in their proper location across the travel portion of the roadway.
4. At skewed crosswalks, the crosswalk lines are to remain parallel to the lane lines.
5. Each crosswalk shall be a minimum of 6' wide.
6. The High-Visibility Longitudinal Crosswalk is the preferred crosswalk pattern on State Highways. Other crosswalk patterns as shown in the "Texas Manual on Uniform Traffic Control Devices" may be used. All crosswalk designs and dimension shall comply with the "Texas Manual on Uniform Traffic Control Devices."
7. Final placement of Stop Bar and Crosswalk shall be approved by the Engineer in the field.

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

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



UNSIGNALIZED MIDBLOCK HIGH-VISIBILITY LONGITUDINAL CROSSWALK

NOTES:

1. Use stop bars with Stop Here For Pedestrians (R1-5b) signs at unsignalized midblock cross walks.
2. Use stop bars with STOP HERE ON RED (R10-6 or R10-6a) signs at mid block crosswalks controlled by traffic signals or pedestrian hybrid beacons.

Texas Department of Transportation

Traffic Safety Division Standard

CROSSWALK PAVEMENT MARKINGS

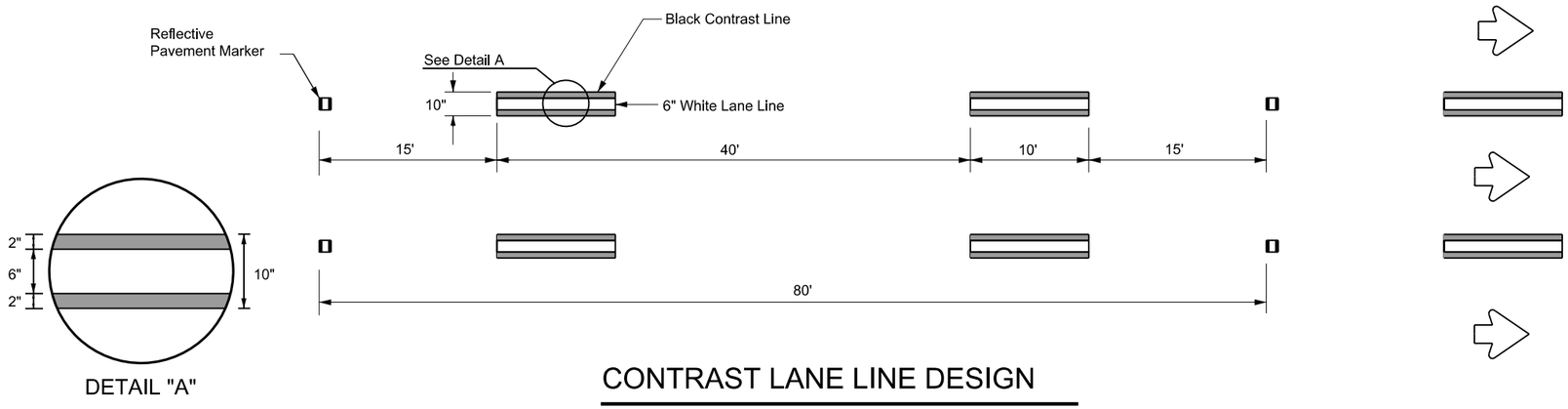
PM(4)-22A

FILE: pm4-22a.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	14	240	IH-610
6-20	DIST	COUNTY		SHEET NO.
6-22	12	HARRIS		105
12-22				

22D

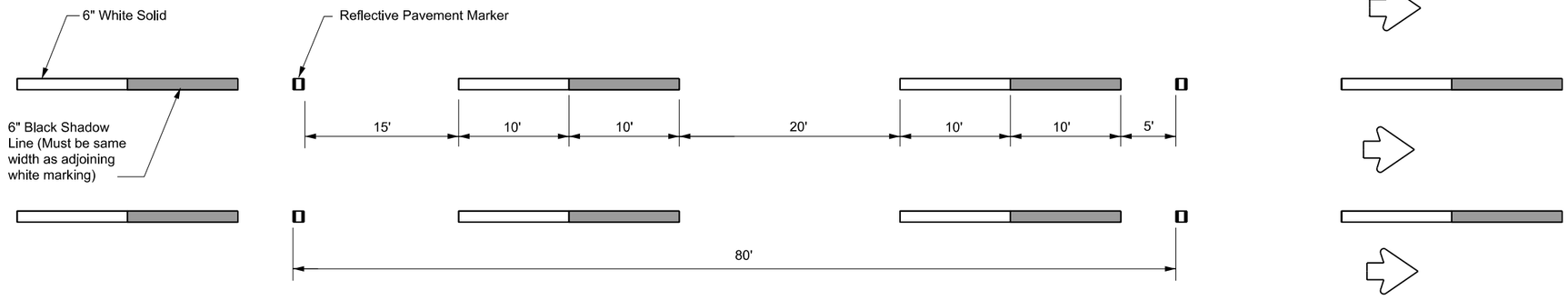
DATE: 3/12/2024 2:56:06 PM
FILE: C:\Engdata\Output\plot\SUP\Standards\Pav Mrk\pm4-22a.dgn

DATE:
FILE:

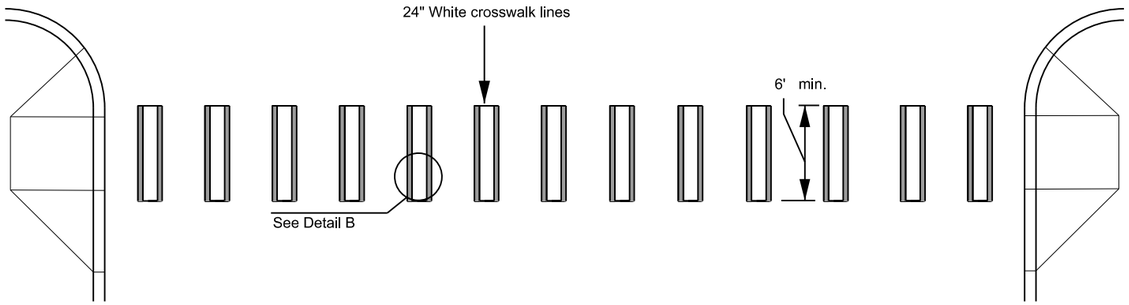


DETAIL "A"

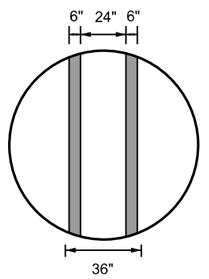
CONTRAST LANE LINE DESIGN



SHADOW LANE LINE DESIGN



CONTRAST CROSSWALK DESIGN



DETAIL "B"

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

GENERAL NOTES

1. Contrast and Shadow markings may only be used on concrete pavements.
2. Contrast and Shadow markings shall not be used on edge lines.
3. Contrast lane lines shall be permanent prefabricated pavement markings meeting DMS 8240.
4. Shadow lane line designs shall be a liquid markings system approved by TxDOT.
5. All raised reflective pavement markers placed in broken lines shall be placed in line with and midway between the white stripes.
6. See PM(2) for raised reflective pavement markings installation details.

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

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

Texas Department of Transportation

Traffic Safety Division Standard

CONTRAST AND SHADOW PAVEMENT MARKINGS

CPM(1)-23

FILE: CPM(1)-23.dgn	DN:	CK:	DW:	CK:
© TxDOT February 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	14	240	IH-610
5-14 2-23	DIST	COUNTY		SHEET NO.
	12	HARRIS		106

22N

DATE: 3/12/2024 2:56:04 PM
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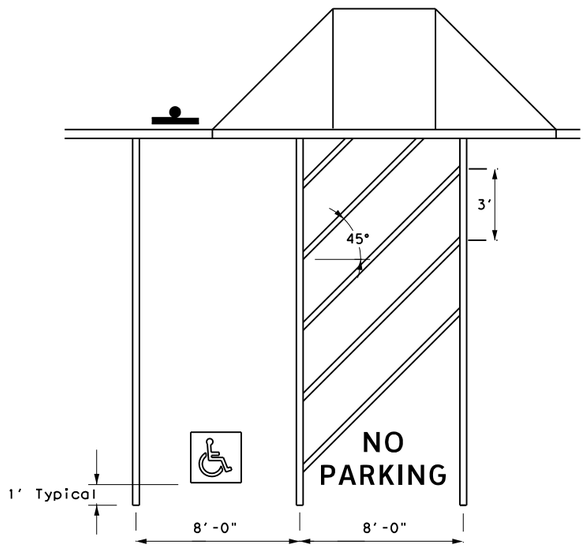
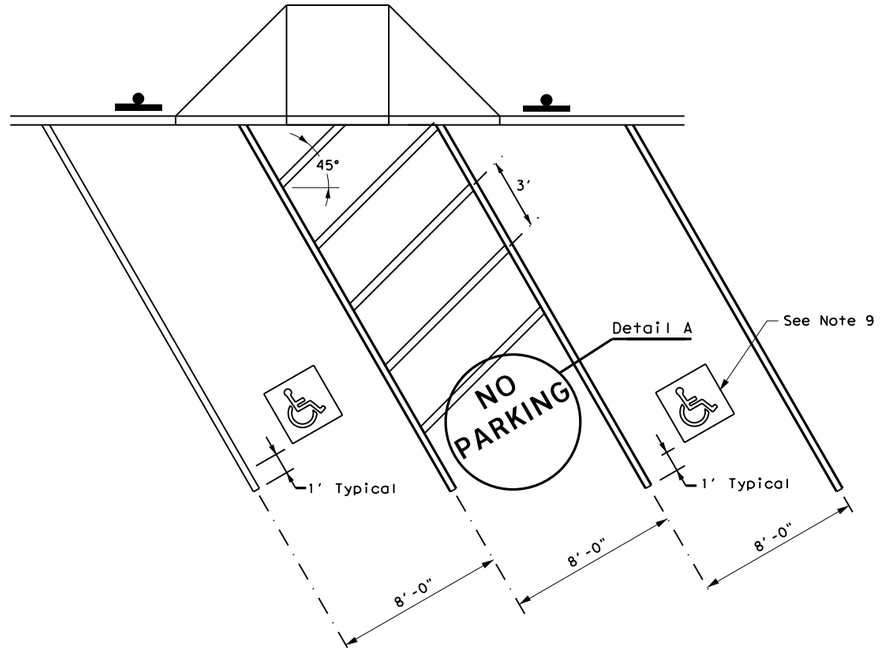




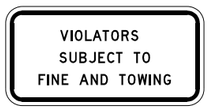
PERPENDICULAR OR ANGLED ACCESSIBLE PARKING SPACE DIMENSIONS

GENERAL NOTES:

1. All paved accessible parking space limit lines shall be 4" solid white lines.
2. Paved accessible parking spaces must include a white International Symbol of Accessibility applied conspicuously on the surface in a color that contrasts the pavement. A blue background with white border may supplement the symbol for additional contrast.
3. The words "NO PARKING" must be applied on any access aisle adjacent to the parking space. The words must be white, applied:
   a) in all capital letters.
   b) centered within each access aisle adjacent to the parking space.
4. RESERVED PARKING (R7-8T) sign including the International Symbol of Accessibility.
   a) shall be REQUIRED for each accessible parking space.
   b) shall NOT be placed between two accessible parking spaces.
   c) shall NOT be placed in a location that restricts movement of wheelchairs within the adjacent sidewalk.
   d) shall have a mounting height of 7 feet to the bottom of the sign.
5. A sign identifying the consequences of parking illegally in a paved accessible parking space. Must:
   a) at a minimum state "VIOLATORS SUBJECT TO FINE AND TOWING" (Plaque)(R7-8aPT).
   b) be mounted on a pole, post, wall or freestanding board.
   c) be no more than eight inches (8") below sign R7-8T a sign required by the Texas Accessibility Standards, 502.6.
   d) be installed so that the bottom edge of the sign is no lower than 48 inches and no higher than 80 inches above the ground level.
6. Signs identifying van parking spaces shall contain the designation "VAN ACCESSIBLE" (R7-8P) Signs shall be 60 inches minimum above the ground level measured to the bottom of the sign.
7. Perpendicular or angled parking spaces shall be 8 feet wide minimum with an access aisle 8 feet minimum wide (van accessible). Two parking spaces are permitted to share a common access aisle.
8. Access aisles shall be at street level, extend the full length of the parking space they serve, follow ADA surface requirements, and marked to discourage parking in the access aisle. Curb ramps shall connect the access aisle to the adjacent pedestrian access route. Curb ramps shall not be located within the access aisle.
9. International Symbol of Accessibility Parking Space Marking and sign details can be found in The Standard Highway Sign Designs for Texas (SHSD) at the following website. http://www.txdot.gov/

R7-8T

R7-8P



R7-8aPT

ACCESSIBLE PARKING SIGNS

Detail A

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

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
SIGN FACE MATERIALS	DMS-8300

Texas Department of Transportation

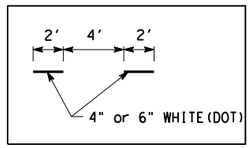
Traffic Safety Division Standard

PAVEMENT MARKINGS AND SIGNING FOR ACCESSIBLE PARKING

PM(AP)-21

FILE: pm(ap)-21	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT July 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	14	240	IH-610
	DIST	COUNTY		SHEET NO.
	12	HARRIS		107

22F



DETAIL "A"

*4"or 6" WHITE(SLD) 40 LF EA.

TYPICAL PLACEMENT OF DOTTED EXTENSION AT INTERSECTIONS

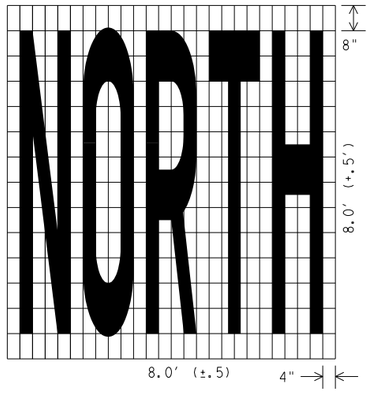
Texas Department of Transportation
Houston District

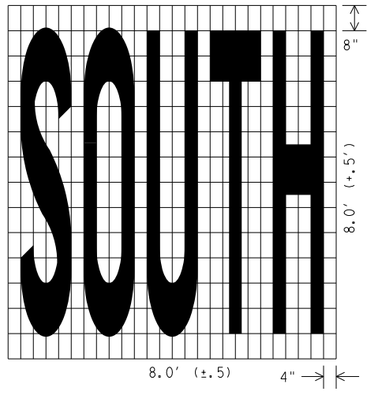
PAVEMENT MARKINGS
(DOTTED EXTENSION DETAILS)

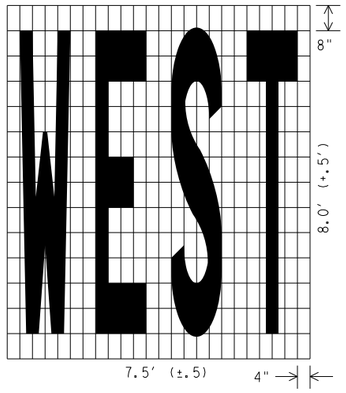
PM(DOT)-11

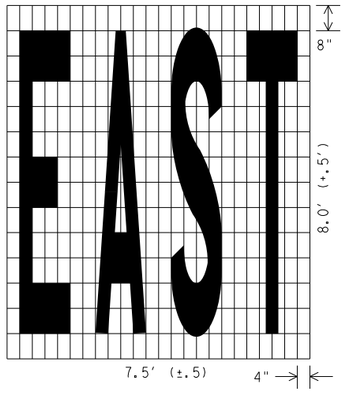
FILE:	DN:	CK:	DW:	CK:
© TxDOT 2010	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 4/2010 4/2011	HOU	6		108
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	HARRIS	0271	14	240	IH-610

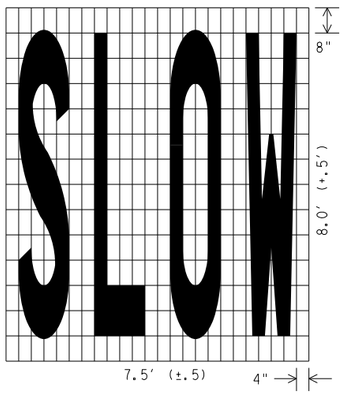
STD N-28

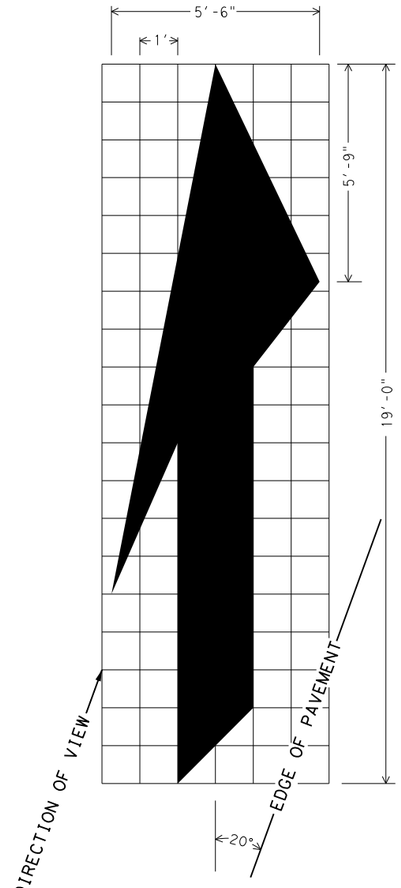






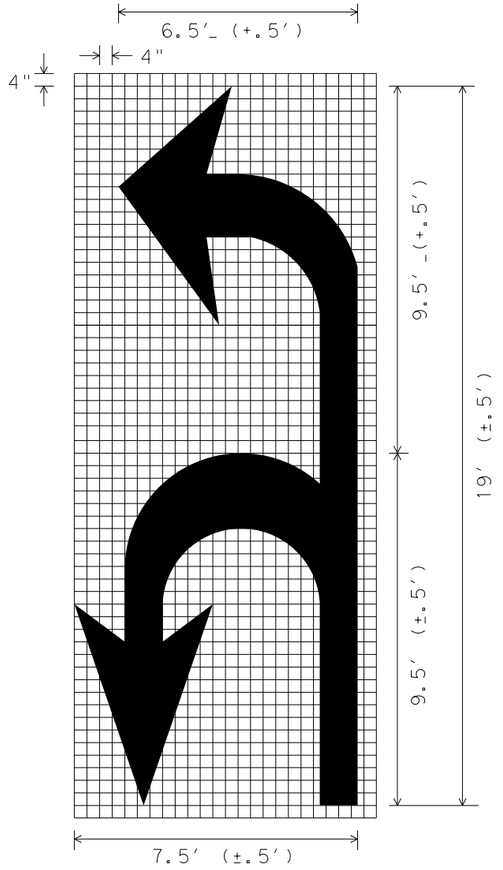




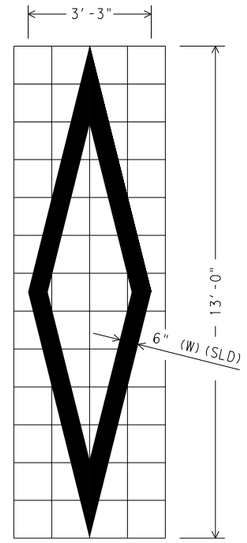


ISOMETRIC ARROW

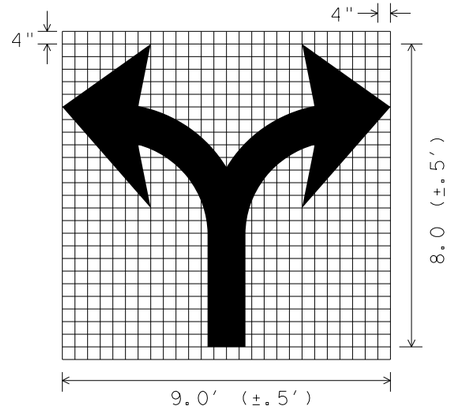
12 INCH GRID
AREA = 42 SQ. FT.
RIGHT LANE DROP ARROW
(FOR LEFT LANE, USE MIRROR IMAGE)



U-L ARROW



DIAMOND SYMBOL



SCALE 1/4" = 1′

Texas Department of Transportation
Houston District

PAVEMENT MARKINGS (WORDS, ARROWS & SYMBOLS)

PM(WAS)-07

FILE:	DN:	CK:	DW:	CK:
© TxDOT 2007	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 03-19-07	HOU	6		109
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	HARRIS	0271	14	240	IH-610

STD-N31

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with TxDOT policy for projects disturbing less than 1 acre of soil, and not part of a larger common plan of development.

For projects with less than one acre of soil disturbing activity and that have Environmental, Permits, Issues, and Commitments (EPICs) dependent on stormwater controls and water quality measures TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office, Area Office, or electronically.

This SWP3 is consistent with requirements specified in applicable stormwater plans, and the project's environmental permits, issues, and commitments (EPICs).

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):

0271-14-240

1.2 PROJECT LIMITS:

From: Old Katy Road

To: West 12th Street

1.3 PROJECT COORDINATES:

BEGIN: (Lat) 29.7839283 ,(Long) -95.4533188

END: (Lat) 29.7910685 ,(Long) -95.4534367

1.4 TOTAL PROJECT AREA (Acres): 0.60

1.5 TOTAL AREA TO BE DISTURBED (Acres): 0.20

1.6 NATURE OF CONSTRUCTION ACTIVITY:

BICYCLE AND PEDESTRIAN SHARED USE PATH (SUP) IMPROVEMENTS, SIGNAGE AND PAVEMENT MARKINGS, SIGNAL, PEDESTRIAN ACTUATION, PEDESTRIAN CURB RAMPS, FENCING, AND DRIVEWAYS.

1.7 MAJOR SOIL TYPES:

Soil Type	Description
Aris	0-6 Loam
	6-14 Silt loam, loam
	14-20 Silt loam, clay loam, loam, silty clay loam
	20-60 Silty clay, silty clay loam, sandy clay loam, silty clay loam

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):

PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

☐ PSLs determined during preconstruction meeting
☐ PSLs determined during construction
☒ No PSLs planned for construction

Type	Sheet #s

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

1.9 CONSTRUCTION ACTIVITIES:

(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.3.)

☒ Mobilization
☒ Install sediment and erosion controls
☒ Blade existing topsoil into windrows, prep ROW, clear and grub
☒ Remove existing pavement
☒ Grading operations, excavation, and embankment
☒ Excavate and prepare subgrade for proposed pavement widening
☐ Remove existing culverts, safety end treatments (SETs)
☐ Remove existing metal beam guard fence (MBGF), bridge rail
☐ Install proposed pavement per plans
☐ Install culverts, culvert extensions, SETs
☐ Install mow strip, MBGF, bridge rail
☐ Place flex base
☐ Rework slopes, grade ditches
☐ Blade windrowed material back across slopes
☒ Revegetation of unpaved areas
☐ Achieve site stabilization and remove sediment and erosion control measures
☒ Other: install 8'-10' concrete shared use path
☐ Other: _____
☐ Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

☒ Sediment laden stormwater from stormwater conveyance over disturbed area
☐ Fuels, oils, and lubricants from construction vehicles, equipment, and storage
☐ Solvents, paints, adhesives, etc. from various construction activities
☒ Transported soils from offsite vehicle tracking
☒ Construction debris and waste from various construction activities
☐ Contaminated water from excavation or dewatering pump-out water
☒ Sanitary waste from onsite restroom facilities
☒ Trash from various construction activities/receptacles
☐ Long-term stockpiles of material and waste
☒ Discharges from concrete washout activities, runoff from concrete cutting activities, and other concrete related activities
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.11 RECEIVING WATERS:

Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody
Newman Branch, Buffalo Bayou, Ship Channel, Galveston Bay	Newman Branch (1014M) Buffalo Bayou (1014)
	*Ship Channel (1007); impaired for dioxin and PCBs
	*Galveston Bay (2421); impaired for dioxin and PCBs
NO TMDLs or I-PLANS WERE IDENTIFIED	

* Add (*) for impaired waterbodies with pollutant in ().

1.12 ROLES AND RESPONSIBILITIES: TxDOT

☒ Development of plans and specifications
☒ Perform SWP3 inspections
☒ Maintain SWP3 records and update to reflect daily operations
☐ Other: _____
☐ Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

☒ Day To Day Operational Control
☒ Maintain schedule of major construction activities
☒ Install, maintain and modify BMPs
☐ Other: _____
☐ Other: _____
☐ Other: _____

STATE OF TEXAS
STEVE VAN
137551
LICENSED
PROFESSIONAL ENGINEER

Steve Van, P.E.
06.14.24

STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

July 2023 Sheet 1 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			110
STATE	STATE DIST.	COUNTY	
TEXAS	HOU	HARRIS	
CONT.	SECT.	JOB	HIGHWAY NO.
0271	14	240	IH 610

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

- ☐ ☐ Protection of Existing Vegetation
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Soil Retention Blankets
- ☐ ☐ Geotextiles
- ☐ ☐ Mulching/ Hydromulching
- ☐ X Soil Surface Treatments
- ☐ ☐ Temporary Seeding
- ☐ X Permanent Planting, Sodding or Seeding
- X ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Vertical Tracking
- ☐ ☐ Interceptor Swale
- ☐ ☐ Riprap
- ☐ ☐ Diversion Dike
- ☐ ☐ Temporary Pipe Slope Drain
- ☐ ☐ Embankment for Erosion Control
- ☐ ☐ Paved Flumes
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

- ☐ ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Dewatering Controls
- X ☐ Inlet Protection
- ☐ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Sandbag Berms
- X ☐ Sediment Control Fence
- X ☐ Stabilized Construction Exit
- ☐ ☐ Floating Turbidity Barrier
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Vegetated Filter Strips
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- X Excess dirt/mud on road removed daily
- X Haul roads dampened for dust control
- X Loaded haul trucks to be covered with tarpaulin
- X Stabilized construction exit
- X Daily street sweeping
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- ☐ Chemical Management
- X Concrete and Materials Waste Management
- X Debris and Trash Management
- X Dust Control
- ☐ Sanitary Facilities
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- X Fire hydrant flushings
- X Irrigation drainage
- X Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- X Potable water sources
- X Springs
- X Uncontaminated groundwater
- X Water used to wash vehicles or control dust
- X Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 DEWATERING:

Dewatering discharges of accumulated stormwater, groundwater, and surface water including discharges from dewatering of trenches, excavations, foundations, vaults, and other points of accumulation are prohibited unless managed by appropriate controls to prevent and minimize the offsite discharge of sediment and other pollutants.

2.9 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3 .

2.10 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3.

STATE OF TEXAS
STEVE VAN
137551
LICENSED
PROFESSIONAL ENGINEER

Steve Van, P.E.
06.14.24

STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

July 2023 Sheet 2 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			111
STATE	STATE DIST.	COUNTY	
TEXAS	HOU	HARRIS	
CONT.	SECT.	JOB	HIGHWAY NO.
0271	14	240	IH 610

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: Nov 09, 2023
FILE:

Version 2.2

Texas Department of Transportation

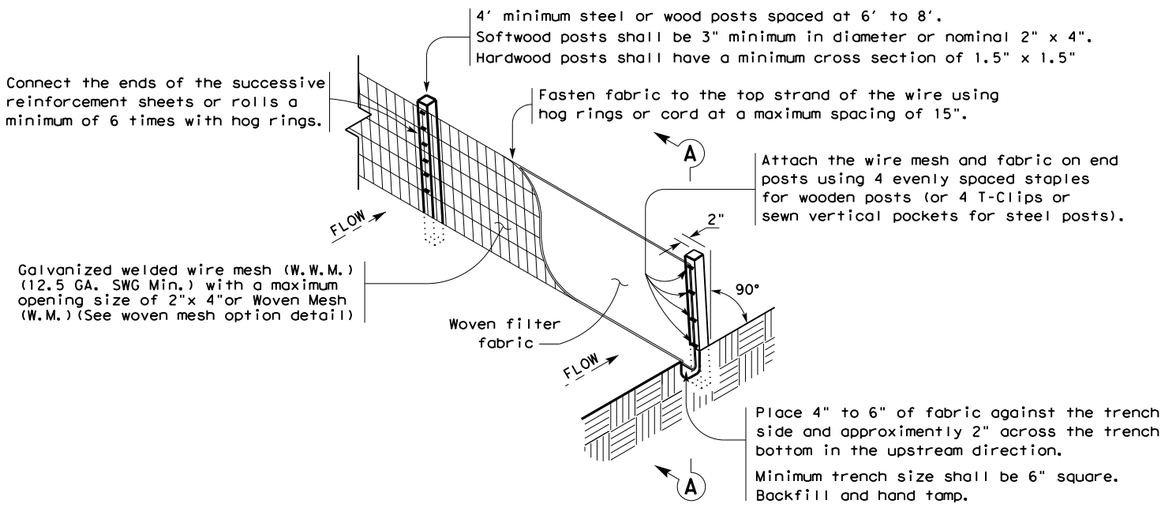
TxDOT Houston District

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

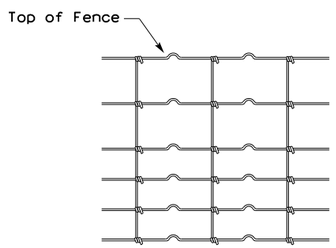
FILE: EPIC Sheet.dgn	DN:	CK:	DW:	CK:
© TxDOT: March 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	14	240	IH 610
UPDATED section V. text and added definition (10/17) ADDED USCG and USACE notes in Section VII (04/18)	DIST	COUNTY		SHEET NO.
	12	Harris		112

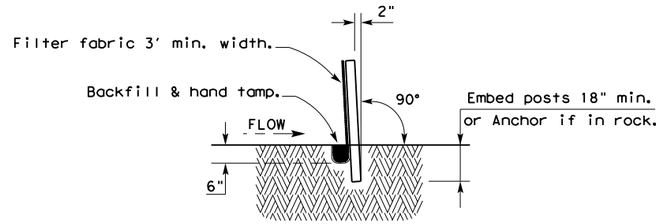
DATE 3/12/2024
FILE \\FS-HOUHQ.dot.state.tx.us\Data4\data\engdata\WCHAO\Design\Construction Projects\0271-14-240 IH 610 FROM OLD KATY RD TO W. 12TH ST\Plan Review\5. 90_95 Percent\15 ENVIROMENTAL



TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

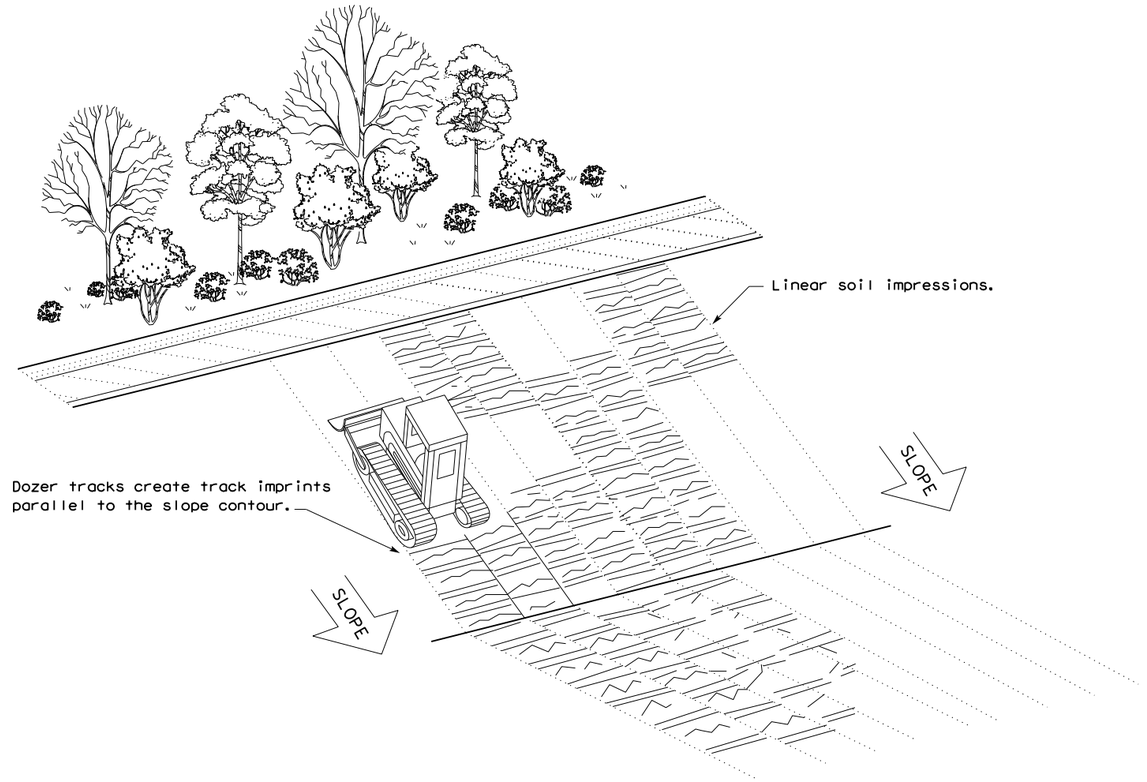
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

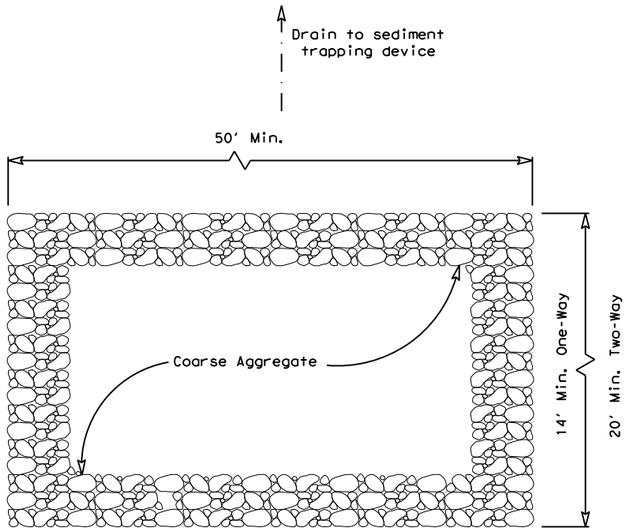
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

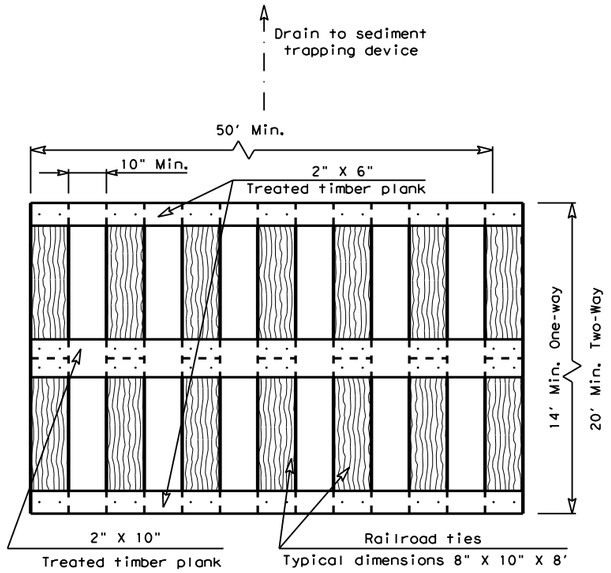
EC(1)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	14	240	IH-610
	DIST	COUNTY		SHEET NO.
	12	HARRIS		113

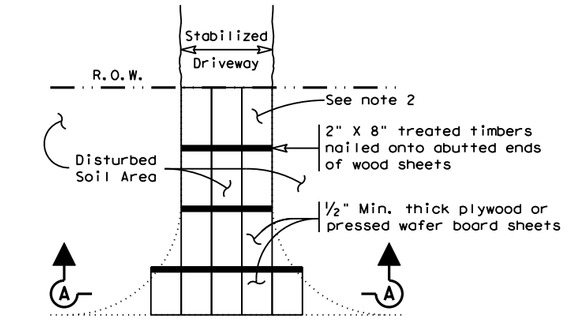
DATE: 3/12/2024
FILE: \\FS-HOUHQ.dot.state.tx.us\Data4\data\engdata\WCHAO\Design\Construction Projects\0271-14-240 IH 610 FROM OLD KATY RD TO W. 12TH ST\Plan Review\5. 90_95 Percent\15 ENVIROMENTA



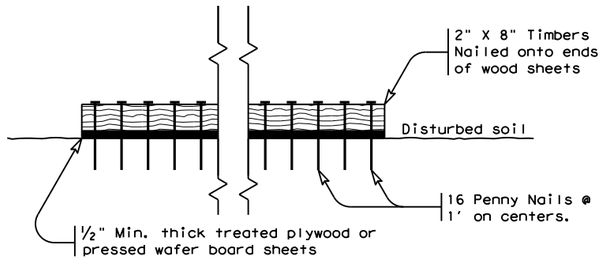
PLAN VIEW



PLAN VIEW



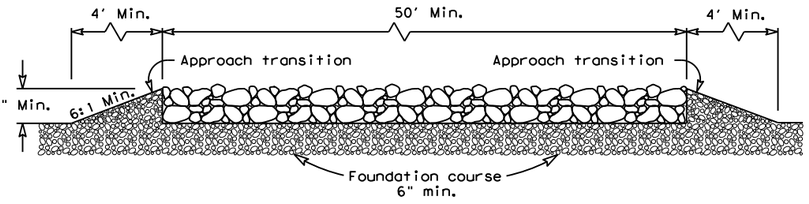
PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

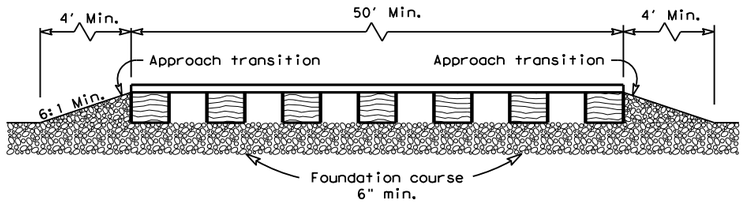
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50'.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

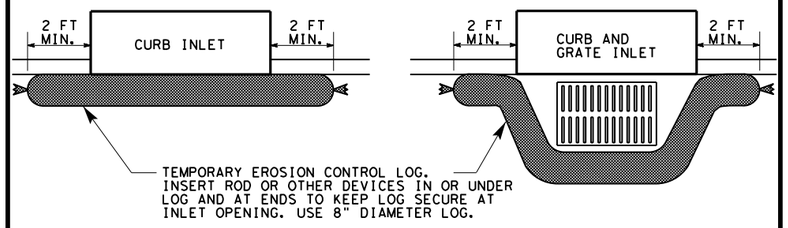
CONSTRUCTION EXITS

EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	14	240	IH-610
	DIST	COUNTY		SHEET NO.
	12	HARRIS		114

CURB INLETS
8" DIAMETER LOGS

ITEM 506-6040 BIODEG EROSN CONT LOGS (INSTL) (8")



MATERIAL REQUIREMENTS

FILL:

Use 100% shredded mulch or other non-compost biodegradable material as fill for logs. No compost or fines.

DO NOT USE MATERIAL WHICH PROHIBITS WATER INFILTRATION.

LOG MESH:
Use mesh with 1/4" openings or larger. Mesh must allow water infiltration but also hold fill material in place.

SEDIMENT BASIN & TRAP USAGE GUIDELINES

A sediment trap (erosion control log) may be used to filter sediment out of runoff draining from an unstabilized area.

Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Sediment traps should be placed in the following locations:
1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way

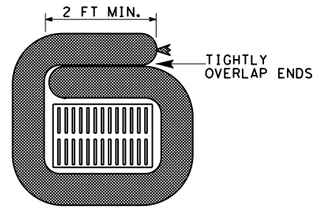
The trap should be cleaned when the capacity has been reduced by 1/2 or the sediment has accumulated to a depth of 1', whichever is less.

REQUIRED ITEMS:

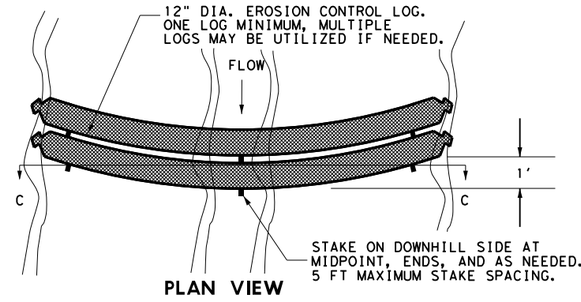
- ITEM 506-6040 BIODEG EROSN CONT LOGS (INSTL) (8") LF
- ITEM 506-6041 BIODEG EROSN CONT LOGS (INSTL) (12") LF
- ITEM 506-6043 BIODEG EROSN CONT LOGS (REMOVE) LF

DROP INLETS AND OTHER LOCATIONS
12" DIAMETER LOGS

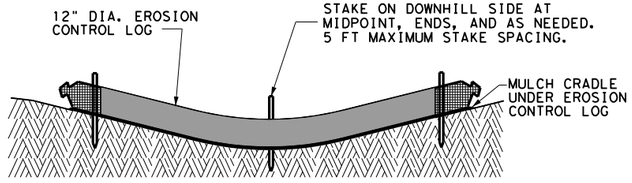
ITEM 506-6041 BIODEG EROSN CONT LOGS (INSTL)(12")



DROP INLETS

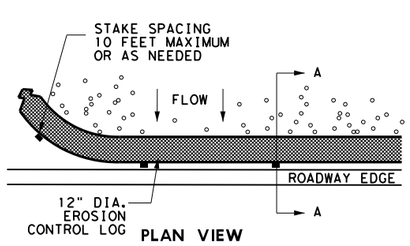


PLAN VIEW

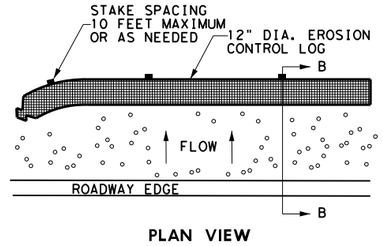


SECTION C-C

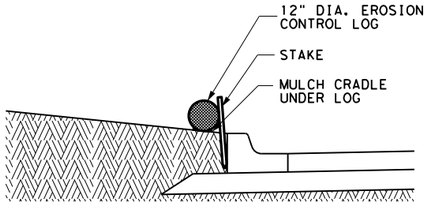
DRAINAGE SWALE OR DITCH



PLAN VIEW

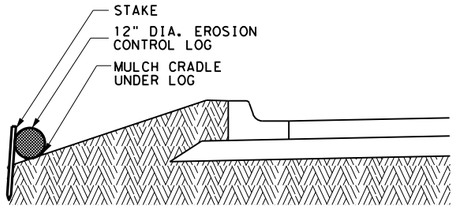


PLAN VIEW



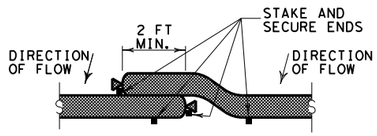
SECTION A-A

SLOPE TO ROADWAY EDGE

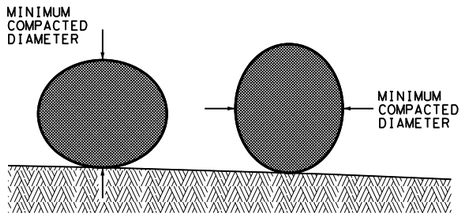


SECTION B-B

SLOPE AWAY FROM ROADWAY EDGE



END OF LOG OVERLAP



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

Texas Department of Transportation
Houston District

EROSION CONTROL LOG

ECL-12

FILE: STDG4a.DGN	DN: TxDot	CK: TxDot	DW: TxDot	CK: TxDot
© TxDOT 2014	DISTRICT	FED REG	PROJECT NUMBER	SHEET
REVISIONS 3/15 MINOR CORRECTIONS	HOU	6		115
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	HARRIS	0271	14	240	IH-610

STD G-4A

TYPE OF WORK — ITEMS AND REQUIREMENTS FOR EACH TYPE OF WORK

SODDING	PERMANENT SEEDING	TEMPORARY SEEDING	Reference Item 161, 162, 164, 166, 168 of the Texas Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges 2024 for specifications, dimensions, volumes and measurements that are not shown. Use latest Houston District, Special Provisions for those items indicated.		
	✓		**161-7002 COMPOST MANUF TOPSOIL (4") SY**	APPLICATION RATE Item 161.2.1. Compost Manufactured Topsoil (CMT)	Item 161.2. Materials Submit quality control (QC) documentation to the Engineer. Compost producer's STA certification must be dated to meet STA requirements (certification must be within 30 or 90 days per STA requirements). Lab analysis performed by an STA-certified lab must be dated within 30 days before delivery of the compost.
✓			**162-7002 BLOCK SODDING SY**	GRASS SPECIES Item 162.2. Materials Common Bermuda (Cynodon Dactylon)	Item 162.2.1. Block Sod Use block palletized or roll type sod. **REMOVE PLASTIC BACKING FROM ROLL TYPE SOD.** Place sod within 48 hours of delivery to site. No exceptions. Place sod with joints alternating on each row to prevent continuous joint lines. Peg sod as needed with wood pegs to hold sod in place. Pegging sod is subsidiary to Item 162.
	✓		**164-7016 DRILL SEEDING (OPT1) SY** Item 164.1. Description Provide and install seeding as shown on District Standard	PLANTING MONTH / SEED MIX March, April, May, June, July, August, September, October: Hulled - Bermudagrass (Cynodon dactylon).....40.0 lbs PLS/acre; Foxtail Millet (Setaria italica).....34.0 lbs PLS/acre; Green Sprangletop (Leptochloa dubia).....4.0 lbs PLS/acre; Sideoats Grama (Bouteloua curtipendula).....3.2 lbs PLS/acre; Little Bluestem (Schizachyrium scoparium).....1.4 lbs PLS/acre November, December, January, February: Unhulled - Bermudagrass (Cynodon dactylon).....40.0 lbs PLS/acre; Oats (Avena sativa).....72.0 lbs PLS/acre; Green Sprangletop (Leptochloa dubia).....4.0 lbs PLS/acre; Sideoats Grama (Bouteloua curtipendula).....3.2 lbs PLS/acre; Little Bluestem (Schizachyrium scoparium).....1.4 lbs PLS/acre	Item 164.2.1. Seed Provide documentation of PLS (Pure Live Seed) requirements. Item 164.3. Construction Scarify the area to a depth of 4 inches before placing the seed mixtures otherwise directed. When performing permanent seeding after completed to lines and grades as shown on the plans. Item 164.3.2. Broadcast Seeding Use broadcast seeding method where site conditions prevent drill seeding method. Distribute the dry seed or dry seed mixture uniformly over the areas shown on the plans using hand or mechanical distribution on top of so**HYDRO SEEDING NOT ALLOWED.**
	✓		**164-7008 BROADCAST SEED (OPT1) SY** Item 164.1. Description Provide and install seeding as shown on District Standard		
		✓	**164-7015 DRILL SEED (TEMP*WARM*COOL) SY** Item 164.1. Description Provide and install seeding as shown on District Standard	PLANTING MONTH / SEED MIX March, April, May, June, July, August, September, October: Foxtail Millet (Setaria italica).....34.0 lbs PLS/acre November, December, January, February: Oats (Avena sativa).....72.0 lbs PLS/acre	Item 164.3.5. Drill Seeding Plant seed or seed mixture uniformly over the area shown on the plans at a depth of 1/4 to 1/3 inch using a cultipacker(turfgrass type seeder. Plant seed along the contour of the slopes.
		✓	**164-7007 BROADCAST SEED (TEMP*WARM*COOL) SY** Item 164.1. Description Provide and install seeding as shown on District Standard		
	✓	✓	**164-7065 STRAW OR HAY MULCH SY**	APPLICATION RATE Immediately after planting the seed or seed mixture, apply straw or hay mulch uniformly over the seeded area. Apply straw or hay mulch at 2 tons per acre. Use tacking agent with straw or hay mulch as described on this sheet.	Use straw or hay mulch in conformance with Article 162.2.5. Mulch. Use biodegradable tacking agents only applied at a rate in accordance with manufacturer's recommendations. Use the following products or an approved equal(see note this sheet): Conweb/Contac Guar Gum, Profile Products Corporation, (307) 655-9565 Ramtec/Procol/Viscol Guar Gum, Ramtec Corporation, (800) 366-1180
✓	✓	✓	**166-7001 FERTILIZER AC** Item 166.2. Materials Use fertilizer as shown in District Standard	APPLICATION RATE Deliver and evenly distribute fertilizer at a rate of 4000 lbs/acre.	Use a NON-CHEMICAL fertilizer which meets all the following criteria: (1) BRAND NAME must be registered with the Texas State Chemist as a commercial fertilizer. (2) Meets USEPA guidelines for unrestricted use. (3) Derived from biological sources such as, but not limited to: sewage sludge, manures, vegetation, etc. (4) In granular form and essentially dust free. Submit proof of registration and nutrient source to Engineer. Use the following products or an approved equal(see note this sheet): Sigma, SIGMA AgriScience, 281-706-8171 Sustanite-standard grade, Automation Nation, Inc., 713-675-4999 Milorganite, MMSD, 800-287-9645
✓	✓	✓	**168-7001 VEGETATIVE WATERING TGL**	APPLICATION RATE Item 168.3. Construction 6 TGL (6000 gallons/acre per working day) X 20 consecutive working days = 120 TGL (120,000 gallons total/acre)	Begin watering immediately after installation of seed or sod. Replace, fertilize, and water any seed or sod in poor condition due to the failure to apply the specified amount of water within the time allowed at no expense to the Department.

SEQUENCE OF WORK

SODDING	PERMANENT SEEDING	TEMPORARY SEEDING
1. FERTILIZER 2. SCARIFY SOIL (ITEM 162.3) 3. BLOCK SOD 4. VEGETATIVE WATERING	1. FERTILIZER 2. COMPOST MANUFACTURED TOPSOIL (ITEM 161.2.1) 3. BLEND/SCARIFY SOIL (ITEMS 161.3.1 AND 164.3) 4. PERMANENT SEEDING 5. STRAW/HAY MULCH 6. VEGETATIVE WATERING	1. FERTILIZER 2. SCARIFY SOIL (ITEM 164.3) 3. TEMPORARY SEEDING 4. STRAW/HAY MULCH 5. VEGETATIVE WATERING

Texas Department of Transportation

HOUSTON DISTRICT

FERTILIZER, SEED, SOD, STRAW, COMPOST, AND WATER

SHEET 1 OF 1

FSSSCW-15

REVISIONS
10/2014 UPDATED TO 2014 SPECS
3/2015 MINOR CORRECTIONS
3/2023 ADDED SHEET ABBREVIATION
6/2024 UPDATED TO 2024 SPECS

	FED DIV	STATE	PROJECT NUMBER			SHEET
FILE:	6	TEXAS				116
ORIGINAL:	DIST	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	12	HARRIS	0271	14	240	IH-610

STD K-1