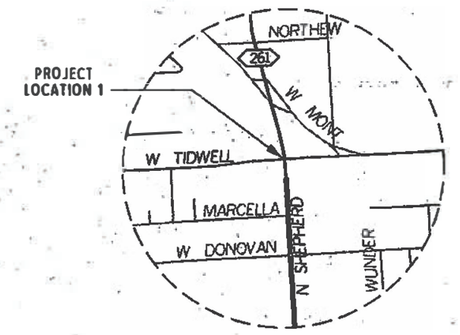
FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY
6	TEXAS	STP 2023(749)HES			SS 261
STATE DISTRICT	COUNTY	CONTROL	SECTION	JOB	SHEET NO.
HOU	HARRIS	0110	06	154	1
LETTING DATE: MAY 2023					

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT
PROJECT NO. STP 2023(749)HES

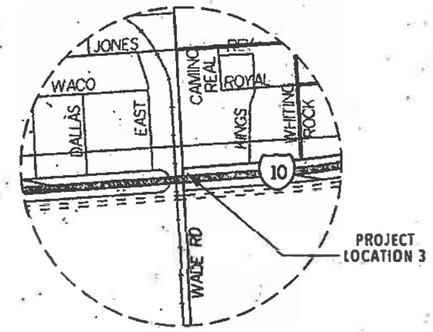
CONTROL CSJ: 0110-06-154
SS 261, ETC.
HARRIS COUNTY
LIMITS: AT TIDWELL, ETC.
SAFETY IMPROVEMENT PROJECTS:
IMPROVE TRAFFIC SIGNALS & INSTALL ADVANCED WARNING SIGNALS



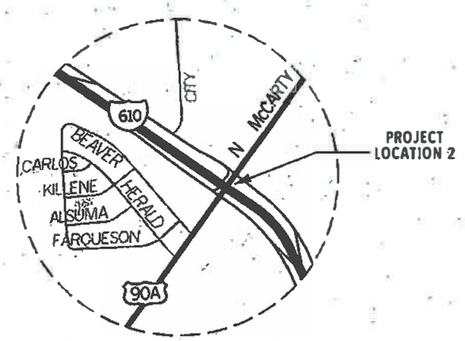
CSJ: 0110-06-154
HWY: SS 261
LIMITS: AT TIDEWELL RD

NO.	CSJ	HWY	LIMITS	FUNCTIONAL CLASS	2023 ADT	2043 ADT	LENGTH
1	0110-06-154	SS 261	AT TIDWELL RD	PRINCIPAL ARTERIAL	27,500	38,800	0.2
2	0271-14-243	IH 610	AT UA 90	INTERSTATE	126,100	241,000	0.2
3	0508-01-384	IH 10	AT WADE RD	INTERSTATE	77,800	148,600	1.1

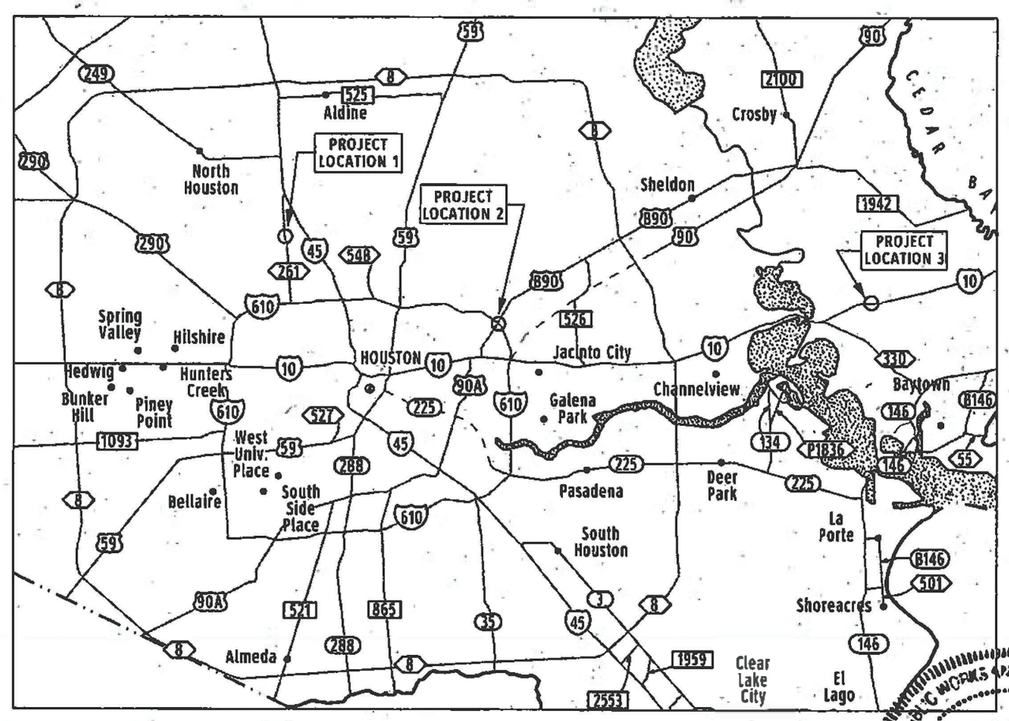
TOTAL: 1.5 MI



CSJ: 0508-01-384
HWY: IH 10
LIMITS: AT WADE RD



CSJ: 0271-14-243
HWY: IH 610
LIMITS: AT UA 90



VICINITY MAP · N.T.S.

REGISTERED ACCESSIBILITY SPECIALIST (RAS) INSPECTION REQUIRED.
TDLR PROJECT NO: TABS2023015066

NO EXCEPTIONS
NO RAILROAD CROSSINGS
NO EQUATIONS

NOTES:

1. SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014, AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISION S FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, JULY 5, 2022).
2. FOR BARRICADES AND SIGNING AT INDIVIDUAL INTERSECTIONS UNDER SIGNAL CONSTRUCTION, REFER TO STANDARD SHEETS, WZ(BTS-1)-13 & WZ(BTS-2)-13.

TEXAS DEPARTMENT OF TRANSPORTATION

SUBMITTED FOR LETTING: 03/01/2023

For DISTRICT TRAFFIC ENGINEER

APPROVED FOR LETTING: 3/2/23

For DISTRICT ENGINEER

ACCEPTED AND FILED
PUBLIC WORKS AND ENGINEERING
74191
CITY DRAWING NUMBER
HOUSTON, TEXAS

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

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

Director of Houston Public Works — Date: 10/7/2022

GENERAL

TRAFFIC CONTROL STANDARDS

TRAFFIC SIGNAL ITEMS

TRAFFIC SIGNAL STANDARDS

H.D.S. = HOUSTON DISTRICT STANDARD

DATE: 3/1/2023 12:01:58 PM
FILE: H:\TrfSignals\Hal Tran\CCSJ 0110-06-154\MAIN.dgn

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

03/01/2023

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

INDEX OF SHEETS

SHEET 1 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0110	06	154	SS 261
DIST	COUNTY		SHEET NO.
HOU	HARRIS		2

46	*	ED(8)-14	- ELECTRICAL DETAILS - TYPICAL TRAFFIC SIGNAL SYSTEM DETAILS
47		SMA-100(1)-12	- TRAFFIC SIGNAL SUPPORT STRUCTURES - SINGLE MAST ARM ASSEMBLY (100 MPH WIND ZONE) - SHEET 1 OF 2
48	*	SMA-100(2)-12	- TRAFFIC SIGNAL SUPPORT STRUCTURES - SINGLE MAST ARM ASSEMBLY (100 MPH WIND ZONE) - SHEET 2 OF 2
49		TS-FD-12	- TRAFFIC SIGNAL POLE FOUNDATION
50	*	LMA(1)-12	- TRAFFIC SIGNAL SUPPORT STRUCTURES - LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE) - SHEET 1 OF 5
51	*	LMA(2)-12	- TRAFFIC SIGNAL SUPPORT STRUCTURES - LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE) - SHEET 2 OF 5
52	*	LMA(3)-12	- TRAFFIC SIGNAL SUPPORT STRUCTURES - LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE) - SHEET 3 OF 5
53	*	LMA(4)-12	- TRAFFIC SIGNAL SUPPORT STRUCTURES - LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE) - SHEET 4 OF 5
54		LMA(5)-12	- TRAFFIC SIGNAL SUPPORT STRUCTURES - LONG MAST ARM ASSEMBLY PARTS LIST - SHEET 5 OF 5
55	*	CFA-12	- CLAMP ON FITTING ASSEMBLY FOR LUMINAIRE MAST ARM
56	*	LUM-A-12	- STANDARD ASSEMBLY DRAWING FOR LUMINAIRE SUPPORT STRUCTURES - ARM DETAILS
57	*	MA-C-12	- STANDARD ASSEMBLY FOR TRAFFIC SIGNAL SUPPORT STRUCTURES - MAST ARM CONNECTIONS
58	*	MA-D-12	- STANDARD SIGNAL SUPPORT STRUCTURES - MAST ARM POLE DETAILS
59	*	MA-DPD-20	- MAST ARM DAMPING PLATE DETAILS
60	*	TS-BP-20	- TRAFFIC SIGNAL HEAD WITH BACKPLATE
61	*	PM(1)-20	- TYPICAL STANDARD PAVEMENT MARKINGS
62	*	PM(2)-20	- POSITION GUIDANCE USING RAISED MARKERS - REFLECTORIZED PROFILE MARKINGS
63	*	PM(3)-20	- TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS
64	*	PM(4)-20	- CROSSWALK PAVEMENT MARKINGS
65	*	PM(DOT)-11	- PAVEMENT MARKINGS (DOTTED EXTENSION DETAILS) (H.D.S.)
66	*	SPRFBA(1)-13	- SOLAR POWERED ROADSIDE FLASHING BEACON ASSEMBLY DETAILS
67	*	SMD(GEN)-08	- SIGN MOUNTING DETAILS - SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS
68	*	SMD(SLIP-1)-08	- SIGN MOUNTING DETAILS - SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM - SHEET 1 OF 3
69	*	SMD(SLIP-2)-08	- SIGN MOUNTING DETAILS - SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM - SHEET 2 OF 3
70	*	SMD(SLIP-3)-08	- SIGN MOUNTING DETAILS - SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM - SHEET 3 OF 3

ENVIRONMENTAL ISSUES

71	*	EC(1)-16	- TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
72	*	ECL-12	- EROSION CONTROL LOG
73		SWP3	- TxDOT STORM WATER POLLUTION PREVENTION PLAN
74		EPIC	- ENVIRONMENTAL PERMITS ISSUES AND COMMITMENTS

H.D.S. = HOUSTON DISTRICT STANDARD

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

03/01/2023

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

INDEX OF SHEETS

SHEET 2 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0110	06	154	SS 261
DIST	COUNTY		SHEET NO.
HOU	HARRIS		3

DATE: 2/28/2023 8:09:28 AM
FILE: H:\Traffic Signals\Hou Tran\CCSJ 0110-06-154\MAIN.dgn

CK: DW: CK: DW:

General Notes:

General:

Area Engineer contact information for this project follows:

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

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

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

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

All relevant project documentation, including Contract Time Determinations and cross-sections will continue to be provided on the following FTP site:

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

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

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.

Right of way parcels or utility adjustments shown to be unclear on the plans but not listed on the special provisions will have no effect on construction.

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 http://ftp.dot.state.tx.us/pub/txdot-info/cmd/mpl/riaes.pdf) as shown on the Department's Material Producers List and the Roadway Illumination and Electrical Supplies List. Check the latest links on the Department's website for these lists. No substitutions will be allowed for materials found on these lists.

General: Site Management

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.

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

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

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

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

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

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

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

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

Item 5: Control of Work

Submit shop drawings electronically for the fabrication of items as documented in Table 1 or Table 2 below. Information and requirements for electronic submittals can be viewed in the "Guide to Electronic Shop Drawing Submittal" which can be accessed through the following web link, ftp://ftp.dot.state.tx.us/pub/txdot-info/library/pubs/bus/bridge/e_submit_guide.pdf. References to 11 in. x 17 in. sheets in individual specifications for structural items imply electronic CAD sheets.

Table 1

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

Spec Item No.'s	Product	Submittal Required	Approval Required (Y/N)	Contractor/ Fabricator P.E. Seal Required	Reviewing Party	Shop or Working Drawing (Note 1)
7.16.1&.2	Construction Load Analyses	Y	Y	Y	B	WD
400	Excavation and Backfill for Structures (cofferdams)	Y	N	Y	A	WD
403	Temporary Special Shoring	Y	N	Y	C	WD
420	Formwork/Falsework	Y	N	Y	A	WD
423	Retaining Walls, (calcs req'd.)	Y	Y	Y	C	SD
425	Optional Design Calculations (Prstrs Bms)	Y	Y	Y	B	SD
425	Prestr Concr Sheet Piling	Y	Y	N	B	SD
425	Prestr Concr Beams	Y	Y	N	B	SD
425	Prestr Concr Bent	Y	Y	N	B	SD
426	Post Tension Details	Y	Y	N	B	SD
434	Elastomeric Bearing Pads (All)	Y	Y	N	B	SD
441	Bridge Protective Assembly	Y	Y	N	B	SD
441	Misc Steel (various steel assemblies)	Y	Y	N	B	SD
441	Steel Pedestals (bridge raising)	Y	Y	N	B	SD
441	Steel Bearings	Y	Y	N	B	SD
441	Steel Bent	Y	Y	N	B	SD
441	Steel Diaphragms	Y	Y	N	B	SD
441	Steel Finger Joint	Y	Y	N	B	SD
441	Steel Plate Girder	Y	Y	N	B	SD
441	Steel Tub-Girders	Y	Y	N	B	SD
441	Erection Plans, including Falsework	Y	N	Y	A	WD
449	Sign Structure Anchor Bolts	Y	Y	N	T	SD
450	Railing	Y	Y	N	A	SD
462	Concrete Box Culvert	Y	Y	N	C	SD
462	Concrete Box Culvert (Alternate Designs Only,calcs reqd.)	Y	Y	Y	B	SD
464	Reinforced Concrete Pipe (Jack and Bore only; ONLY when requested)	Y	Y	Y	A	SD
465	Pre-cast Junction Boxes, Grates, and Inlets	Y	Y	N	A	SD
465	Pre-cast Junction Boxes, Grates, and Inlets (Alternate Designs Only, calcs req'd.)	Y	Y	Y	B	SD
466	Pre-cast Headwalls and Wingwalls	Y	Y	N	A	SD
467	Pre-cast Safety End Treatments	Y	Y	N	A	SD
495	Raising Existing Structure (calcs reqd.)	Y	Y	Y	B	SD
610	Roadway Illumination Supports (Non-Standard only, calcs reqd.)	Y	Y	Y	BRG	SD
613	High Mast Illumination Poles (Non-standard only, calcs reqd.)	Y	Y	Y	BRG	SD
627	Treated Timber Poles	Y	Y	N	T	SD
644	Special Non-Standard Supports (Bridge Mounts, Barrier Mounts, Etc.)	Y	Y	Y	T	SD
647	Large Roadside Sign Supports	Y	Y	Y	T	SD
650	Cantilever Sign Structure Supports - Alternate Design Calcs.	Y	Y	Y	T	SD
650	Sign Structures	Y	Y	N	T	SD
680	Installation of Highway Traffic Signals	Y	Y	N	T	SD
682	Vehicle and Pedestrian Signal Heads	Y	Y	N	T	SD
684	Traffic Signal Cables	Y	Y	N	T	SD
685	Roadside Flashing Beacon Assemblies	Y	Y	N	T	SD
686	Traffic Signal Pole Assemblies (Steel) (Non-Standard only)	Y	Y	Y	T	SD
687	Pedestal Pole Assemblies	Y	Y	N	T	SD
688	Detectors	Y	Y	N	A	SD
784	Repairing Steel Bridge Members	Y	Y	Y	B	WD
SS	Prestr Concr Crown Span	Y	Y	N	B	SD
SS	Sound Barrier Walls	Y	Y	Y	A	SD
SS	Camera Poles	Y	Y	Y	TMS	SD
SS	Pedestrian Bridge (Calcs req'd.)	Y	Y	Y	B	SD
SS	Screw-In Type Anchor Foundations	Y	Y	N	T	SD
SS	Fiber Optic/Communication Cable	Y	Y	N	TMS	SD
SS	Spread Spectrum Radios for Signals	Y	Y	N	T	SD
SS	VIVDS System for Signals	Y	Y	N	T	SD
SS	CTMS Equipment	Y	Y	N	TMS	SD

Notes:

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

County: Harris **Sheet: 4B**

Highway: SS 261 **Control: 0110-06-154**

General Notes

Key to Reviewing Party

A - Area Office

Area Office	Email Address
Brazoria Area Office	HOU-BRZAShpDrwgs@txdot.gov
Fort Bend Area Office	HOU-FBAShpDrwgs@txdot.gov
Galveston Area Office	HOU-GALVAShpDrwgs@txdot.gov
Montgomery Area Office	HOU-MONTAShpDrwgs@txdot.gov
North Harris Area Office	HOU-NHAShpDrwgs@txdot.gov
Southeast Area Office	HOU-SEHAShpDrwgs@txdot.gov
Traffic Systems Construction Office	HOU-TSCShpDrwgs@txdot.gov
West/Central Harris Area Office	HOU-WWCHAOShpDrwgs@txdot.gov

B - Houston Bridge Engineer

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

BRG - Austin Bridge Division

Bridge Design (Austin TxDOT)	BRG_ShopPlanReview@txdot.gov

C - Construction Office

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

T - Traffic Engineer

Traffic Operations	HOU-TrfShpDrwgs@txdot.gov

TMS – Traffic Management System

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

Item 6: Control of Materials

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

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

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

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

Item 7: Legal Relations and Responsibilities

Do not initiate activities in a Project Specific Location (PSL), associated with a U.S. Army Corps of Engineers (USACE) permit area, that have not been previously evaluated by the USACE as part of the permit review of this project. Such activities include those pertaining to, but are not limited to, haul roads, equipment staging areas, borrow and disposal sites. Associated defined here means materials are delivered to or from the PSL. The permit area includes the waters of the U.S. or associated wetlands

affected by activities associated with this project. Special restrictions may be required for such work. Assume responsibility for consultations with the USACE regarding activities, including PSLs that have not been previously evaluated by the USACE. Provide the Department with a copy of consultations or approvals from the USACE before initiating activities.

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

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

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

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

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

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 *standard* workweek in accordance with Section 8.3.1.*4.*

The maximum number of days the time charges on this contract may be suspended due to traffic signal pole procurement, fabrication, or processing delays is *120* days. The Engineer and the Contractor may mutually agree, in writing, to decrease this maximum number of days.

The Lane Closure Assessment Fee depends on the current A.D.T. 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." For the current A.D.T., see link to Statewide Planning Map: https://www.txdot.gov/apps/statewide_mapping/StatewidePlanningMap.html. Contractor must verify the A.D.T with the area office as work orders are being issued for each site location.

CURRENT A.D.T.	LANE ASSESSMENT AMOUNT PER LANE / PER HOUR	CURRENT A.D.T.	LANE ASSESSMENT AMOUNT PER LANE / PER HOUR
2,500 – 4,999	100.00	140,000 – 159,999	3,500.00
5,000 – 9,999	200.00	160,000 – 179,999	4,000.00
10,000 – 14,999	300.00	180,000 – 199,999	4,500.00
15,000 – 19,999	400.00	200,000 – 219,999	5,000.00
20,000 – 39,999	500.00	220,000 – 239,999	5,500.00
40,000 – 59,999	1,000.00	240,000 – 259,999	6,000.00
60,000 – 79,999	1,500.00	260,000 – 279,999	6,500.00
80,000 – 99,999	2,000.00	280,000 – 299,999	7,000.00
100,000 – 119,999	2,500.00	300,000 +	7,500.00
120,000 – 139,999	3,000.00		

Item 104: Removing Concrete

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

Item 416: Drilled Shaft Foundations

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

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

Item 432: Riprap

If stone riprap is shown on the plans, use common stone riprap in accordance with Section 432.2.3.3, placed dry in accordance with Section 432.3.2.3. Do not grout. Crushed concrete may also be used.

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."

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.

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

Day	Daytime Closure Hours	Nighttime Closure Hours	Restricted Hours Subject to Lane Assessment Fee
Monday	9:00 AM - 3:00 PM	N/A	05:00 AM - 09:00 AM 03:00 PM - 09:00 PM
Tuesday	9:00 AM - 3:00 PM	N/A	05:00 AM - 09:00 AM 03:00 PM - 09:00 PM
Wednesday	9:00 AM - 3:00 PM	N/A	05:00 AM - 09:00 AM 03:00 PM - 09:00 PM
Thursday	9:00 AM - 3:00 PM	N/A	05:00 AM - 09:00 AM 03:00 PM - 09:00 PM
Friday	9:00 AM - 3:00 PM	N/A	05:00 AM - 09:00 AM 03:00 PM - 09:00 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.

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.

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

Plan, that could not be foreseen in the project planning and design stage. These enhancements will be mutually agreed upon by the Engineer and the Contractor’s Responsible Person based on weekly or more frequent traffic management reviews on the project. The Engineer may choose to use existing bid items if it does not slow the implementation of enhancement.

Item 506: Temporary Erosion, Sedimentation and Environmental Controls

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

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.

Item 531: Sidewalks

An air-entraining admixture is not required.

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

Item 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.

If placing the conduit under existing pavement to reach the service poles, bore the conduit in place and extend it a minimum distance of 5 ft. beyond the edge of shoulder or the back of curb.

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 628: Electrical Services

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

Verify and coordinate the electrical service location with the engineering section of the appropriate utility district or company.

Identify the electrical service pole with an address number assigned by the Utility Service Provider. Provide 2-in. numerals visible from the highway. Provide numbers cut out aluminum figures nailed to wood poles or painted figures on steel poles or service cabinets.

Item 636: Signs

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

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

Item 644: Small Roadside Sign Assemblies

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

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

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

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

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

Assume ownership of the removed existing signs.

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 677: Eliminating Existing Pavement Markings and Markers

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

Item 678: Pavement Surface Preparation for Markings

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

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

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

Do not clean concrete pavement by grinding.

Item 680: Highway Traffic Signals

Clearly mark or highlight on the shop drawings the items being furnished for this project.

Furnish labor, tools, equipment, and materials as shown on the plans and specifications for a complete and operating signal installation.

Complete traffic signal construction work, including correcting discrepancies shown on the Department inspector’s “Traffic Signal Installation Inspection Report” before the beginning of the test period.

Provide a full-time qualified traffic signal technician responsible for installing, maintaining, or replacing traffic signal devices.

Staking in the field is subject to approval.

Adjust project construction, if needed, due to conflicts with underground utilities.

Do not aim the luminaire arms mounted on traffic signal poles into the intersection. Aim each arm perpendicular to the centerline of the roadway it is intended to cover, to develop the proper illumination pattern for the intersection.

Allow the electrical work to be inspected by the City. Complying with the provisions and requirements of the City electrical ordinance is not required. Such inspection does not make the City a party to this contract.

Provide continuous conductors without splices from signal controller to signal heads. Route the conductors for luminaires to the service enclosure. Splices or attachments to the terminal block in the access compartment of the mast arm pole are not permitted except for the luminaire cable.

Abrasions to the conductor insulation caused while pulling cable for the traffic signal system are cause for immediate rejection. Remove and replace the entire damaged cable at no expense to the Department.

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

Bond the controller housing, signal poles, conduit, and spans to a minimum No. 6 AWG stranded copper conductor. An equipment grounding conductor is required in every conduit to form a continuous grounding system. Effectively connect the grounding system to ground rods or concrete encased grounding electrodes as indicated in the plans.

Wrap signal heads with dark plastic or suitable material to conceal the signal faces from the time of installation until placing into operation. Do not use burlap.

Furnish signal heads from the same manufacturer.

Use Type B (high intensity prismatic) or Type D (diamond grade) retroreflective sheeting for signs mounted under or adjacent to the signal heads.

Furnish solid conductors for traffic signal cable.

The Contractor may use ready mix concrete.

Apply membrane curing on concrete work in accordance with Section 420.4.10.3, “Membrane Curing.”

The standard 4.5-in. galvanized pipe type poles, except the breakaway type, are subject only to the Engineer’s inspection for their acceptance. Mill test reports or documentation will not be required.

Item 682: Vehicle and Pedestrian Signal Heads

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

Item 685: Roadside Flashing Beacon Assemblies

When shown on the plans, provide solar powered flasher controller assemblies in accordance with Departmental Material Specifications DMS-11150, "Solar Power Flasher Controller Assembly."

When solar powered school zone signs are shown on the plans, provide solar powered flasher controller assemblies capable of 24-hour operations.

Item 686: Traffic Signal Pole Assemblies (Steel)

For a steel mast arm or steel strain pole assembly, hold the anchor bolts and conduits rigidly in place with a welded steel template.

Leave a minimum of one full diameter thread exposed on each anchor bolt securing a signal pole.

Set the anchor bolts for the steel strain poles so that two are in compression and two are in tension.

Use a Texas Cone Penetrometer reading of 10. The drilled shaft length is from the surface elevation to the bottom of the drilled shaft. Provide an additional length of the pole foundation from the surface level to the roadway level, if required for unusual locations. Provide the drilled shaft depth regardless of the length of the pole foundation. The pole foundation depth from the surface level to the roadway level is a maximum of 4 ft., or as approved.

Locate traffic signal pole assembly foundations a minimum of 4 ft. from the roadway curb or pavement edge, or as shown on the plans.

Place steel strain poles at a 10 ft. desirable minimum distance from the roadway curb or pavement edge.

After the traffic signal pole assembly is plumb and the nuts are tight, tack-weld each anchor bolt nut in two places to its washer. Tack-weld each washer to the base plate in two places. Do not weld components to the bolt. Perform tack-welding in accordance with the Item, "Steel Structures." After tack-welding, repair galvanizing damage on bolts, nuts, and washers in accordance with Section 445.3.5, "Repairs."

The Department may test the anchor bolts using ultrasonic methods for traffic signal poles after they are installed. Replace faulty anchor bolts as directed. Do not weld the anchor bolts.

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.

If the loop sealant supplied by the Contractor is not on the Department's pre-qualified product list, before applying the sealant provide a 5-gal. container of loop sealant for testing.

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

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

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

A total of one (1) shadow vehicle with a TMA/TA is required for the work with the exception of Pavement Marking Operations. The Contractor is responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMAs/TAs needed on the project.

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

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0110-06-154 **DISTRICT** Houston **COUNTY** Harris
HIGHWAY IH 10, IH 610, SS 261

				0110-06-154		0271-14-243		0508-01-384		TOTAL EST.	TOTAL FINAL
			CONTROL SECTION JOB								
			PROJECT ID	**A00180614**		**A00180765**		**A00180731**			
			COUNTY	**Harris**		**Harris**		**Harris**			
			HIGHWAY	**SS 261**		**IH 610**		**IH 10**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	104-6009	REMOVING CONC (RIPRAP)	SY	15.000		15.000				30.000	
	104-6021	REMOVING CONC (CURB)	LF	20.000		10.000				30.000	
	104-6036	REMOVING CONC (SIDEWALK OR RAMP)	SY	50.000		85.000				135.000	
	416-6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF			31.000				31.000	
	416-6034	DRILL SHAFT (TRF SIG POLE) (48 IN)	LF	88.000		88.000				176.000	
	432-6003	RIPRAP (CONC)(6 IN)	CY	2.000		25.000				27.000	
	500-6001	MOBILIZATION	LS	1.000						1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	12.000						12.000	
	529-6011	CONC CURB (DOWEL)	LF	60.000		535.000				595.000	
	529-6024	CONC CURB (MOUNTABLE)	LF	10.000						10.000	
	531-6004	CURB RAMPS (TY 1)	EA	6.000		4.000				10.000	
	531-6005	CURB RAMPS (TY 2)	EA			4.000				4.000	
	531-6008	CURB RAMPS (TY 5)	EA	2.000						2.000	
	531-6016	CURB RAMPS (TY 21)	EA			2.000				2.000	
	531-6017	CURB RAMPS (TY 22)	EA	1.000		4.000				5.000	
	618-6046	CONDT (PVC) (SCH 80) (2")	LF	1,175.000		1,535.000				2,710.000	
	618-6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	520.000		1,105.000				1,625.000	
	618-6053	CONDT (PVC) (SCH 80) (3")	LF	130.000		65.000				195.000	
	618-6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF			270.000				270.000	
	618-6058	CONDT (PVC) (SCH 80) (4")	LF	95.000		295.000				390.000	
	618-6059	CONDT (PVC) (SCH 80) (4") (BORE)	LF	365.000		630.000				995.000	
	620-6007	ELEC CONDR (NO.8) BARE	LF	2,275.000		3,895.000				6,170.000	
	620-6012	ELEC CONDR (NO.4) INSULATED	LF	120.000		905.000				1,025.000	
	621-6005	TRAY CABLE (4 CONDR) (12 AWG)	LF	465.000		2,660.000				3,125.000	
	624-6010	GROUND BOX TY D (162922)W/APRON	EA	22.000		28.000				50.000	
	624-6028	REMOVE GROUND BOX	EA	5.000		11.000				16.000	
	628-6145	ELC SRV TY D 120/240 060(NS)SS(E)SP(O)	EA	1.000		1.000				2.000	
	636-6001	ALUMINUM SIGNS (TY A)	SF					9.000		9.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA					2.000		2.000	
	666-6018	REFL PAV MRK TY I (W)6"(DOT)(100MIL)	LF			240.000				240.000	
	666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	605.000		825.000				1,430.000	
	666-6225	PAVEMENT SEALER 6"	LF			240.000				240.000	
	666-6230	PAVEMENT SEALER 24"	LF	605.000		825.000				1,430.000	
	677-6002	ELIM EXT PAV MRK & MRKS (6")	LF	40.000		120.000				160.000	
	677-6003	ELIM EXT PAV MRK & MRKS (8")	LF	30.000						30.000	
	677-6005	ELIM EXT PAV MRK & MRKS (12")	LF	760.000		1,625.000				2,385.000	
	677-6007	ELIM EXT PAV MRK & MRKS (24")	LF	200.000		280.000				480.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0110-06-154 **DISTRICT** Houston **COUNTY** Harris
HIGHWAY IH 10, IH 610, SS 261

			CONTROL SECTION JOB	**0110-06-154**		**0271-14-243**		**0508-01-384**		TOTAL EST.	TOTAL FINAL
			PROJECT ID	**A00180614**		**A00180765**		**A00180731**			
			COUNTY	**Harris**		**Harris**		**Harris**			
			HIGHWAY	**SS 261**		**IH 610**		**IH 10**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	678-6002	PAV SURF PREP FOR MRK (6")	LF			240.000				240.000	
	678-6008	PAV SURF PREP FOR MRK (24")	LF	605.000		825.000				1,430.000	
	680-6003	INSTALL HWY TRF SIG (SYSTEM)	EA	1.000		1.000				2.000	
	680-6004	REMOVING TRAFFIC SIGNALS	EA	1.000						1.000	
	680-6012	REMOVING TRAFFIC SIGNALS (DIAMOND)	EA			1.000				1.000	
	682-6001	VEH SIG SEC (12")LED(GRN)	EA	10.000		21.000				31.000	
	682-6002	VEH SIG SEC (12")LED(GRN ARW)	EA	6.000		2.000				8.000	
	682-6003	VEH SIG SEC (12")LED(YEL)	EA	10.000		21.000		2.000		33.000	
	682-6004	VEH SIG SEC (12")LED(YEL ARW)	EA	6.000		2.000				8.000	
	682-6005	VEH SIG SEC (12")LED(RED)	EA	10.000		21.000				31.000	
	682-6006	VEH SIG SEC (12")LED(RED ARW)	EA	12.000		4.000				16.000	
	682-6018	PED SIG SEC (LED)(COUNTDOWN)	EA	10.000						10.000	
	682-6021	BACK PLATE (12")(1 SEC)	EA					2.000		2.000	
	682-6049	BACKPLATE W/REFL BRDR(4 SEC)	EA	6.000		2.000				8.000	
	682-6060	BACKPLATE W/REFL BRDR(3 SEC)	EA	10.000		21.000				31.000	
	684-6029	TRF SIG CBL (TY A)(14 AWG)(3 CONDR)	LF	1,615.000		4,225.000				5,840.000	
	684-6031	TRF SIG CBL (TY A)(14 AWG)(5 CONDR)	LF	1,665.000		4,305.000				5,970.000	
	684-6033	TRF SIG CBL (TY A)(14 AWG)(7 CONDR)	LF	3,555.000		7,440.000				10,995.000	
	684-6080	TRF SIG CBL (TY C)(14 AWG)(2 CONDR)	LF	9,920.000		19,725.000				29,645.000	
	685-6004	INSTL RDSD FLSH BCN ASSM (SOLAR PWRD)	EA					1.000		1.000	
	686-6043	INS TRF SIG PL AM(S)1 ARM(40')LUM	EA			2.000				2.000	
	686-6053	INS TRF SIG PL AM(S)1 ARM(50')	EA	2.000						2.000	
	686-6055	INS TRF SIG PL AM(S)1 ARM(50')LUM	EA	1.000		3.000				4.000	
	686-6063	INS TRF SIG PL AM(S)1 ARM(60')LUM	EA	1.000		1.000				2.000	
	687-6001	PED POLE ASSEMBLY	EA	8.000		12.000				20.000	
	688-6001	PED DETECT PUSH BUTTON (APS)	EA	10.000		16.000				26.000	
	688-6003	PED DETECTOR CONTROLLER UNIT	EA	2.000		2.000				4.000	
	688-6004	VEH LP DETECT (SAWCUT)	LF	2,360.000		3,070.000				5,430.000	
	6058-6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1.000		1.000				2.000	
	6185-6002	TMA (STATIONARY)	DAY	180.000						180.000	
	6227-6002	SOLAR POWERED LED ROADSIDE SIGN	EA					1.000		1.000	
	18	SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000						1.000	
		LAW ENFORCEMENT: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000						1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000						1.000	

MATERIALS FOR HIGHWAY TRAFFIC SIGNAL				SS 261 AT TIDWELL RD	IH 610 AT UA 90	IH 10 AT WADE RD	
ITEM	DESC CODE	DESCRIPTION	UNIT	QUANTITY	QUANTITY	QUANTITY	TOTAL
104	6009	REMOVING CONC (RIPRAP)	SY	15	15		**30**
104	6021	REMOVING CONC (CURB)	LF	20	10		**30**
104	6036	REMOVING CONC (SIDEWALK OR RAMP)	SY	50	85		**135**
416	6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF		31		**31**
416	6034	DRILL SHAFT (TRF SIG POLE) (48 IN)	LF	88	88		**176**
432	6003	RIPRAP (CONC)(6 IN)	CY	2	25		**27**
529	6011	CONC CURB (DOWEL)	LF	60	535		**595**
529	6024	CONC CURB (MOUNTABLE)	LF	10			**10**
531	6004	CURB RAMPS (TY 1)	EA	6	4		**10**
531	6005	CURB RAMPS (TY 2)	EA		4		**4**
531	6008	CURB RAMPS (TY 5)	EA	2			**2**
531	6016	CURB RAMPS (TY 21)	EA		2		**2**
531	6017	CURB RAMPS (TY 22)	EA	1	4		**5**
618	6046	CONDT (PVC) (SCH 80) (2")	LF	1175	1535		**2710**
618	6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	520	1105		**1625**
618	6053	CONDT (PVC) (SCH 80) (3")	LF	130	65		**195**
618	6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF		270		**270**
618	6058	CONDT (PVC) (SCH 80) (4")	LF	95	295		**390**
618	6059	CONDT (PVC) (SCH 80) (4") (BORE)	LF	365	630		**995**
620	6007	ELEC CONDR (NO.8) BARE	LF	2275	3895		**6170**
620	6012	ELEC CONDR (NO.4) INSULATED	LF	120	905		**1025**
621	6005	TRAY CABLE (4 CONDR) (12 AWG)	LF	465	2660		**3125**
624	6010	GROUND BOX TY D (162922)W/APRON	EA	22	28		**50**
624	6028	REMOVE GROUND BOX	EA	5	11		**16**
628	6145	ELC SRV TY D 120/240 060(NS)SS(E)SP(O)	EA	1	1		**2**
636	6001	ALUMINUM SIGNS (TY A)	SF			9	**9**
	****	STOP AHEAD (W3-1) (36" X 36") [9 SQFT]	EA			1	**1**
644	6076	REMOVE SM RD SN SUP&AM	EA			2	**2**
666	6018	REFL PAV MRK TY I (W)6"(DOT)(100MIL)	LF		240		**240**
666	6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	605	825		**1430**
666	6225	PAVEMENT SEALER 6"	LF		240		**240**
666	6230	PAVEMENT SEALER 24"	LF	605	825		**1430**
677	6002	ELIM EXT PAV MRK & MRKS (6")	LF	40	120		**160**
677	6003	ELIM EXT PAV MRK & MRKS (8")	LF	30			**30**
677	6005	ELIM EXT PAV MRK & MRKS (12")	LF	760	1625		**2385**
677	6007	ELIM EXT PAV MRK & MRKS (24")	LF	200	280		**480**
678	6002	PAV SURF PREP FOR MRK (6")	LF		240		**240**
678	6008	PAV SURF PREP FOR MRK (24")	LF	605	825		**1430**
680	6003	INSTALL HWY TRF SIG (SYSTEM)	EA	1	1		**2**
	****	CONTROLLER FULL-ACTUATED W/CABINET	EA	1	1		**2**
	****	TRAFFIC SIGNAL CONTROLLER FOUNDATION	EA	1	1		**2**

**** MATERIALS SUBSIDIARY TO PERTINENT ITEM

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TRAFFIC SIGNAL SUMMARY OF QUANTITIES

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0110	06	154	SS 261
DIST	COUNTY		SHEET NO.
HOU	HARRIS		6

MATERIALS FOR HIGHWAY TRAFFIC SIGNAL				SS 261 AT TIDWELL RD	IH 610 AT UA 90	IH 10 AT WADE RD	
ITEM	DESC CODE	DESCRIPTION	UNIT	QUANTITY	QUANTITY	QUANTITY	TOTAL
	****	GROUND ROD, 5/8 X 10' COPPER-CLAD	EA	1	1		**2**
	****	18-INCH CABINET BASE EXTENSION	EA	1	1		**2**
	****	DETECTOR CARD RACK (8 SLOT & 4 SLOT)	EA	1	1		**2**
	****	DETECTOR UNIT (DUAL CHANNEL)	EA	12	12		**24**
	****	LED RDWY LUMINAIRE (250W HPS EQ)	EA	2	6		**8**
	****	MAST ARM DAMPER	EA	4	6		**10**
	****	SIGN R10-3ER (9" X 15") [.9375 SF]	EA	5	8		**13**
	****	SIGN R10-3EL (9" X 15") [.9375 SF]	EA	5	8		**13**
	****	SIGN "N SHEPHERD DR" (96" X 18") [12 SF]	EA	2			**2**
	****	SIGN "W TIDWELL RD" (78" X 18") [9.75 SF]	EA	2			**2**
	****	SIGN "NORTH LOOP E" (114" X 18") [14.25 SF]	EA		4		**4**
	****	SIGN "N McCARTY ST" (90" X 18") [11.25 SF]	EA		2		**2**
	****	SIGN R3-8L (30" X 30") [6.25 SF]	EA		4		**4**
	****	SIGN R6-2R (18" X 24") [3 SF]	EA		2		**2**
	****	SIGN R6-2L (18" X 24") [3 SF]	EA		2		**2**
680	6004	REMOVING TRAFFIC SIGNALS	EA	1			**1**
680	6012	REMOVING TRAFFIC SIGNALS (DIAMOND)	EA		1		**1**
682	6001	VEH SIG SEC (12")LED(GRN)	EA	10	21		**31**
682	6002	VEH SIG SEC (12")LED(GRN ARW)	EA	6	2		**8**
682	6003	VEH SIG SEC (12")LED(YEL)	EA	10	21	2	**33**
682	6004	VEH SIG SEC (12")LED(YEL ARW)	EA	6	2		**8**
682	6005	VEH SIG SEC (12")LED(RED)	EA	10	21		**31**
682	6006	VEH SIG SEC (12")LED(RED ARW)	EA	12	4		**16**
682	6018	PED SIG SEC (LED)(COUNTDOWN)	EA	10	16		**26**
682	6021	BACK PLATE (12")(1 SEC)	EA			2	**2**
682	6049	BACKPLATE W/REFL BRDR(4 SEC)	EA	6	2		**8**
682	6060	BACKPLATE W/REFL BRDR(3 SEC)	EA	10	21		**31**
684	6029	TRF SIG CBL (TY A)(14 AWG)(3 CONDR)	LF	1615	4225		**5840**
684	6031	TRF SIG CBL (TY A)(14 AWG)(5 CONDR)	LF	1665	4305		**5970**
684	6033	TRF SIG CBL (TY A)(14 AWG)(7 CONDR)	LF	3555	7440		**10995**
684	6080	TRF SIG CBL (TY C)(14 AWG)(2 CONDR)	LF	9920	19725		**29645**
685	6004	INSTL RDSD FLSH BCN ASSM (SOLAR PWRD)	EA			1	**1**
	****	SCREW-IN TYPE ANCHOR FOUNDATION	EA			1	**1**
686	6043	INS TRF SIG PL AM(S)1 ARM(40')LUM	EA		2		**2**
686	6053	INS TRF SIG PL AM(S)1 ARM(50')	EA	2			**2**
686	6055	INS TRF SIG PL AM(S)1 ARM(50')LUM	EA	1	3		**4**
686	6063	INS TRF SIG PL AM(S)1 ARM(60')LUM	EA	1	1		**2**
687	6001	PED POLE ASSEMBLY	EA	8	12		**20**
	****	SCREW-IN TYPE ANCHOR FOUNDATION	EA	8	12		**20**
688	6001	PED DETECT PUSH BUTTON (APS)	EA	10	16		**26**
688	6003	PED DETECTOR CONTROLLER UNIT	EA	2	2		**4**
688	6004	VEH LP DETECT (SAWCUT)	LF	2360	3070		**5430**
	****	CONDT (PVC) (SCH 80) (1 1/4")	LF	245	295		**540**
	****	ELEC CONDR (NO.14) INSULATED	LF	5385	6965		**12350**
6058	6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1	1		**2**
6227	6002	SOLAR POWERED LED ROADSIDE SIGN	EA			1	**1**
	****	STOP SIGN (R1-1) (36"X36") [9 SQFT]	EA			1	**1**

**** MATERIALS SUBSIDIARY TO PERTINENT ITEM

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TRAFFIC SIGNAL SUMMARY OF QUANTITIES

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0110	06	154	SS 261
DIST	COUNTY		SHEET NO.
HOU	HARRIS		7

NOTES:

1. INSTALL SIGNALS HORIZONTALLY ON MAST ARM, 17 FT. - 6 IN. ABOVE THE ROADWAY.

2. INSTALL YELLOW HOUSING FOR ALL SIGNALS WITH BLACK LOUVERED BACKPLATES PER THE CITY'S STANDARD.

3. FURNISH VEHICLE AND PEDESTRIAN SIGNALS WITH LIGHT EMITTING DIODE (LED) SIGNAL LAMP UNITS.

4. USE TYPE B (HIGH INTENSITY PRISMATIC) OR TYPE D (DIAMOND GRADE) RETROREFLECTIVE SHEETING FOR SIGNS MOUNTED UNDER OR ADJACENT TO THE SIGNAL HEADS.

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

6. 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.

7. ROUTE CABLE FOR LUMINAIRES (#14/4C - TRAY CABLE) TO THE SERVICE ENCLOSURE. SEE ELECTRICAL DETAIL SHEETS. DO NOT PASS LUMINAIRE CONDUCTORS THROUGH THE SIGNAL CONTROLLER CABINET.

8. FURNISH AND INSTALL FULL-ACTUATED CONTROLLERS WITH INTERNAL TIME BASE COORDINATION UNIT IN A BASE MOUNTED CABINET.

9. WIRE LOOP DETECTORS IN THE CONTROLLER AS PER THE DETECTOR CHART SHOWN ON THE WIRING DIAGRAM SUPPLIED WITH THE CONTROLLER CABINET.

10. THE CITY OF HOUSTON (COH) TRAFFIC SIGNAL CONSTRUCTION AND MAINTENANCE OFFICE WILL PROVIDE PHASING AND TIMING FOR TEMPORARY AND PERMANENT TRAFFIC SIGNALS.

11. LOCATE CONTROLLER(S), MAST ARM STEEL POLES, DETECTORS, ETC., AS APPROVED.

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

13. CONTACT MR. MICHAEL AWA, P.E., AT TEXAS DEPARTMENT OF TRANS-PORTATION, P.O. BOX 1386, HOUSTON, TEXAS 77251-1386, TEL. NO. (713) 802-5661. WHEN REMOVING EXISTING SIGNAL SYSTEMS; HIS EMPLOYEES WILL DETERMINE WHICH ITEMS WILL BE SALVAGED. ITEMS DEEMED SALVAGEABLE WILL BE DELIVERED TO THE DEPARTMENT'S SIGNAL SHOP AT 6810 KATY ROAD, HOUSTON, TEXAS, BETWEEN 9:00 AM AND 3:00 PM, MONDAY THROUGH FRIDAY. CAREFULLY REMOVE THE MATERIALS SO THAT THEY WILL NOT BE MARRED OR DAMAGED. REPLACE MATERIALS THAT ARE SCARRED, BATTERED OR BROKEN BY THE CONTRACTOR AT NO EXPENSE TO THE DEPARTMENT. DISPOSE OF OTHER ITEMS REMOVED BY THE CONTRACTOR AT NO EXPENSE TO THE DEPARTMENT.

14. ASSUME OWNERSHIP OF THE REMOVED EXISTING SIGNS.

15. 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.

16. INSTALL EACH LOOP DETECTOR IN A SEPARATE SAW CUT FROM THE DETECTOR TO THE EDGE OF ROADWAY. INSTALL EACH LOOP DETECTOR RUN IN A SEPARATE CONDUIT (SIZE AS REQUIRED) FROM THE EDGE OF ROADWAY TO A GROUND BOX AS SHOWN ON THE PLAN LAYOUT.

17. CAP SPARE CONDUITS INSTALLED IN POLE FOUNDATIONS AND GROUND BOXES USING APPROVED CAPPING DEVICES.

18. DO NOT PLACE SIGNAL HEADS OVER THE ROADWAY UNTIL ALL NECESSARY MATERIALS ARE ON HAND AS APPROVED.

19. INSTALL TWO SET SCREWS ON ALL VEHICLE SIGNAL HEAD MOUNTING HARDWARE FITTINGS.

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

21. 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 TEMPORARLLY CONSTRUCTED TRAFFIC SIGNAL(S) IN CONFORMANCE WITH THE LATEST TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

22. DURING CONSTRUCTION OF THE PROPOSED SIGNAL WORK, IF THE EXISTING TRAFFIC SIGNAL EQUIPMENT REQUIRES REPLACEMENT DUE TO WEAR, DETERIORATION, OR ANY CIRCUMSTANCE OVER WHICH THE CONTRACTOR HAS NO CONTROL, THE EQUIPMENT WILL BE FURNISHED BY THE DEPARTMENT AT NO COST TO THE CONTRACTOR. INSTALL THIS EQUIPMENT AT NO COST TO THE DEPARTMENT. SUCH MATERIALS WILL BE PROVIDED AT THE DEPARTMENT'S SIGNAL SHOP LOCATED AT 6810 KATY ROAD, HOUSTON, TEXAS. CONTACT MR. MICHAEL AWA, P.E., AT TELEPHONE NUMBER (713) 802-5661.

23. 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.

24. INSTALL A 5/8-IN. (MINIMUM) EYE BOLT FOR THE POINT OF ATTACHMENT BELOW THE SERVICE ENTRANCE WEATHERHEAD FOR THE SERVICE DROP TO STEEL OR WOOD POLE.

25. AIM LUMINAIRE ARMS MOUNTED ON TRAFFIC SIGNAL POLES PERPENDICULAR TO THE CENTERLINE OF THE ROADWAY IT IS INTENDED TO COVER, TO DEVELOP THE PROPER ILLUMINATION PATTERN FOR THE INTERSECTION.

26. PROVIDE 250 WATT HPS (HIGH PRESSURE SODIUM) EQUIVALENT LIGHT EMITTING DIODE (LED) LUMINAIRES OPERATING AT 240 VOLTS.

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

28. GROUND STEEL MAST ARM POLE ASSEMBLIES IN ACCORDANCE WITH REQUIREMENTS SHOWN ON THE LATEST TRAFFIC SIGNAL POLE FOUNDATION STANDARD. USE THE GROUNDING LUG ON THE POLE TO GROUND THE POLE TO THE GROUND CONDUCTORS FROM THE CONDUITS.

29. VERIFY THE CORRECT MAST ARM POLE LENGTHS FOR EACH SIGNALIZED INTERSECTION PRIOR TO ORDERING THE EQUIPMENT.

30. INSTALL A CLOSE NIPPLE WITH LOCK NUT AND BUSHING (SIZE AS REQUIRED) WHERE THE CABLE ENTERS THE UPPER PORTION OF THE SIGNAL POLE.

31. REFER TO TXDOT'S WEBSITE FOR PRE-QUALIFIED PRODUCTS LIST, 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.

32. THE CONTRACTOR SUPPLIED CONTROLLER WILL BE DELIVERED TO THE CITY OF HOUSTON TRAFFIC OPERATIONS CENTER, 2200 PATTERSON STREET, HOUSTON, TEXAS 77007 (TELEPHONE NUMBER 713-803-3011) FOR THE PHASE SEQUENCING AND TESTING.

33. PICK UP THE SIGNAL CONTROLLER(S) AT THE TRAFFIC OPERATIONS CENTER, 2200 PATTERSON STREET, HOUSTON, TEXAS 77007 (TELEPHONE NUMBER 713-803-3011). CONTACT MR. STEVE UREN AT THE ABOVE ADDRESS, IN WRITING, NINETY (90) DAYS IN ADVANCE OF PICKUP. INSTALL THE CONTROLLER(S) IN ACCORDANCE WITH THE PLANS.

34. CONTACT MR. LAYTON HOBBS (TELEPHONE NUMBER 713-641-7853) WITH THE ELETRICAL DIVISION OF THE CITY OF HOUSTON, TWO (2) DAYS PRIOR TO BEGINNING ANY UNDERGROUND WORK.

35. 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 VARIOUS PHASES OF CONSTRUCTION AND DURING THE TEST PERIOD PRIOR TO ACCEPTANCE OF THE WORK BY THE DEPARTMENT.

36. REMOVE THE EXISTING PAVEMENT MARKINGS AS DIRECTED. REMOVE THE PAVEMENT MARKINGS TO THE EXTENT THAT THEY ARE EITHER COMPLETELY REMOVED OR OBLITERATED TO THE SATISFACTION OF THE ENGINEER.

37. PLACE PAVEMENT MARKINGS AS SHOWN ON THE PLANS OR AS DIRECTED.

38. THE CONTRACTOR IS RESPONSIBLE FOR THE SIGNAL CARRYING CAPABILITY AND PERFORMANCE OF THE CABLE. INSTALL EACH WIRE WITH A LIGHTNING PROTECTION DEVICE UNLESS OTHERWISE NOTED.

39. NO LOOP DETECTOR SHALL BE CUT IN A PARALLEL EXPANSION JOINT. LOOPS CUT ACROSS EXPANSION JOINTS SHALL HAVE A SLACK IN THE CABLE FOR EXPANSION.

40. DETECTION LOOP SAW CUTS SHALL BE FLUSHED WITH WATER UNDER PRESSURE AND THEN DRIED WITH AIR UNDER PRESSURE.

41. ALL VEHICLE ROADWAY DETECTION LOOP CABLES SHALL BE #14 AWG IMSA 51-5-1985 CABLE. LEAD-IN CABLES SHALL BE #14 AWG IMSA 50-2-1984 CABLE. NO SPLICE SHALL BE ALLOWED IN THE ROADWAY DETECTION LOOP CABLE EXCEPT AT THE PULL BOX ADJACENT TO THE LOOP. THE DETECTOR LEAD-IN CABLE SHALL NOT BE SPLICED.

42. WIMAX COMMUNICATION AND OTHER ITS EQUIPMENTS MAY EXIST AT THIS INTERSECTION. PRIOR TO CONSTRUCTION, CONTACT CITY OF HOUSTON. EQUIPMENT WILL NEED TO BE REMOVED AND BE REINSTALLED BY OTHERS.

43. CONTRACTOR TO ADJUST SIGNAL HEAD ALIGNMENT, AS NEEDED, USING ARTICULATING SIGNAL BRACKET ASSEMBLIES WITH A MINIMUM OF THREE ADJUSTABLE AXEX, WHICH SHALL BE SUBSIDIARY TO THE PROJECT.

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

03/01/2023

TRAFFIC SIGNAL NOTES

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0110	06	154	SS 261
DIST	COUNTY		SHEET NO.
HOU	HARRIS		8

DATE: 2/28/2023 8:10:54 AM
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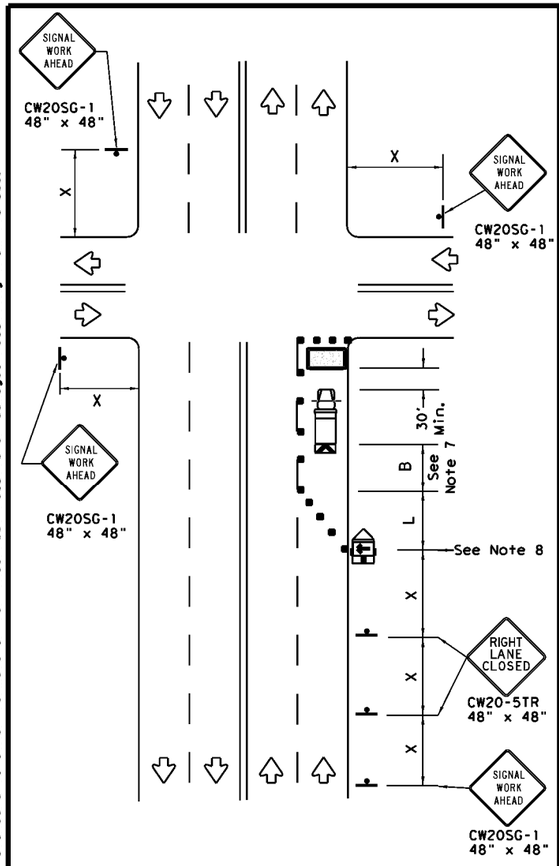
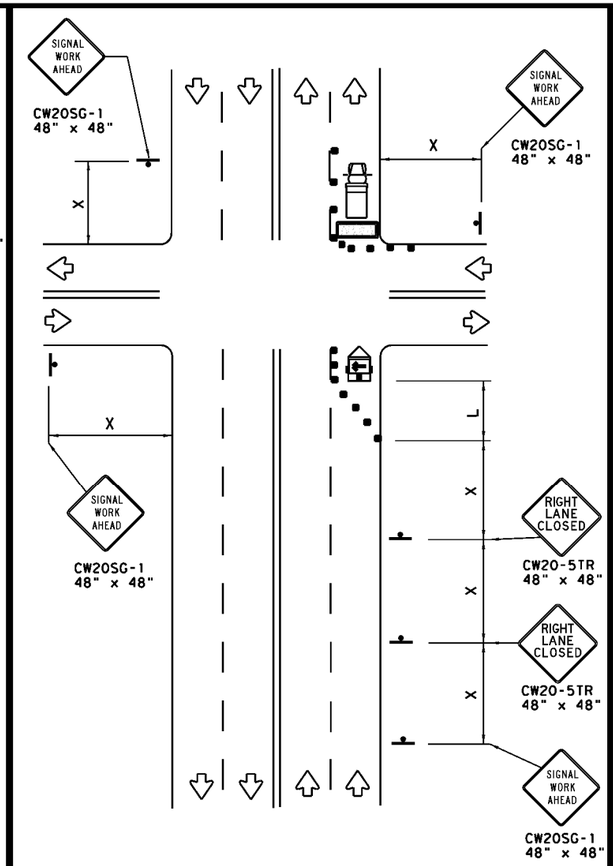


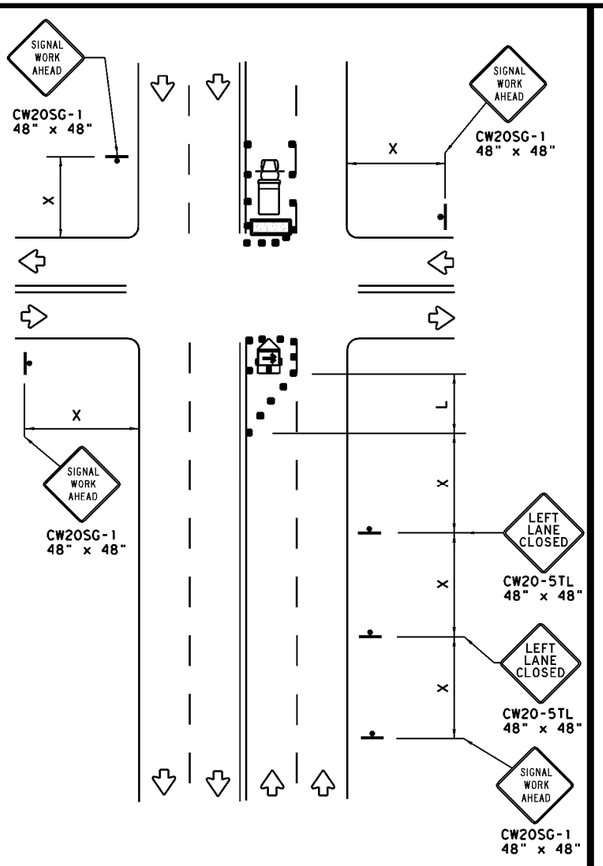
NEAR SIDE LANE CLOSURE

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

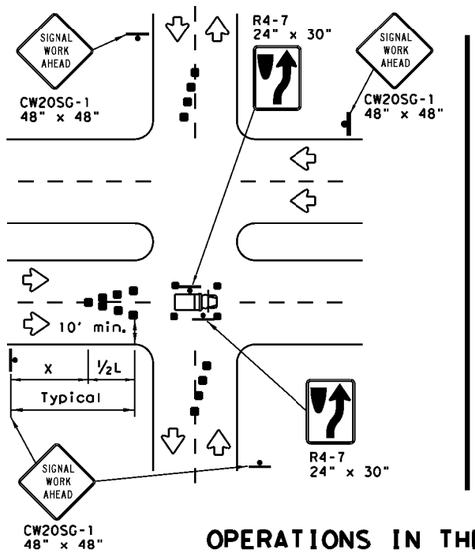
LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

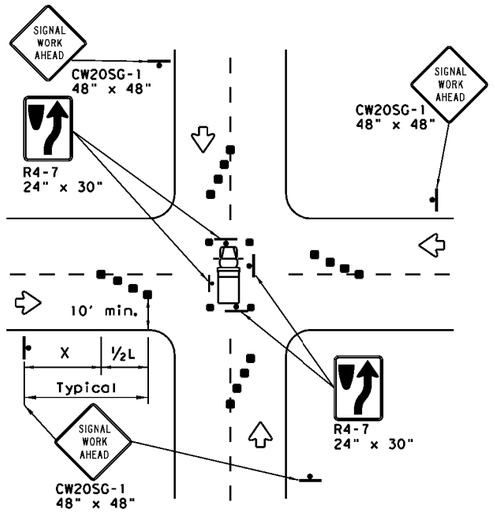
Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	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

FILE: wzbts-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	0110	06	154	SS 261
2-98 10-99 7-13	DIST	COUNTY		SHEET NO.
4-98 3-03	HOU	HARRIS		9

DATE: 11/28/2022 3:07:34 PM
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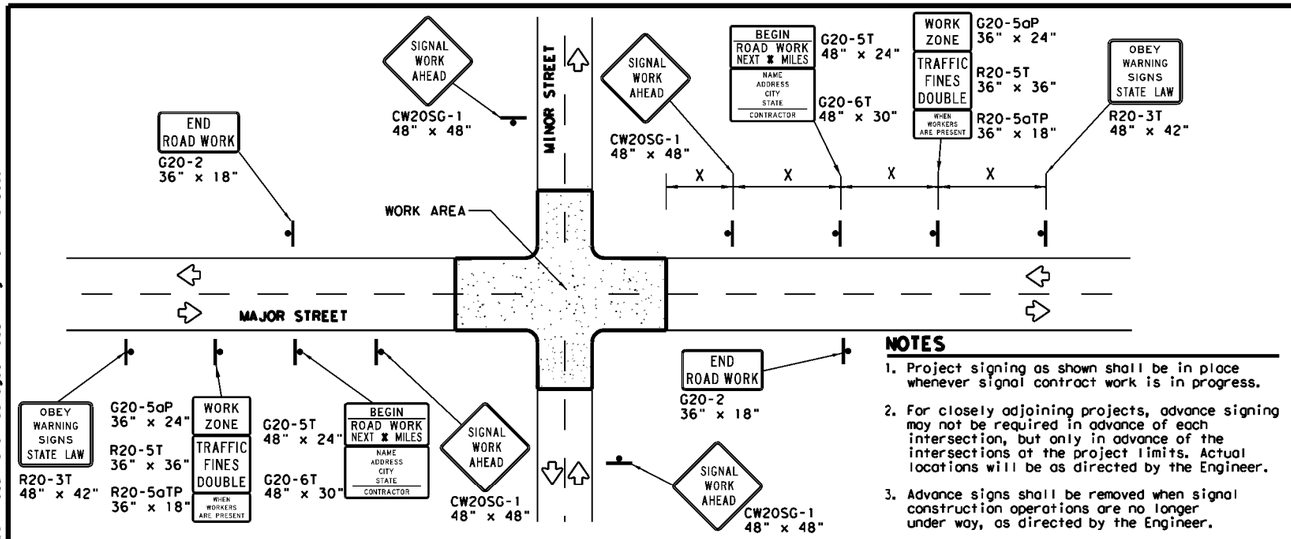


TYPICAL ADVANCE SIGNAL PROJECT SIGNING

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

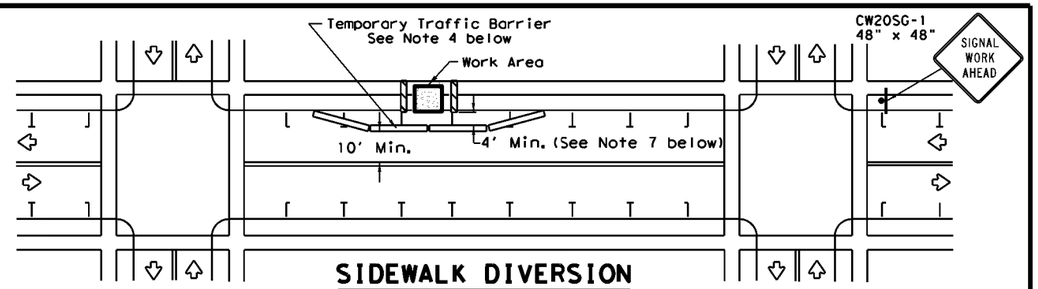
1. Weights used to keep signs from turning over should be sandbags filled with dry, cohesionless material.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects will not be permitted for use as sign support 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

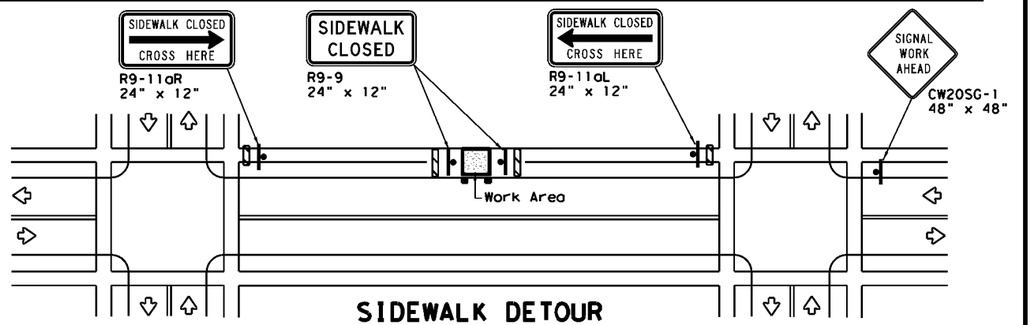
DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN FACE MATERIALS	DMS-8300
FLEXIBLE ROLL-UP REFLECTIVE SIGNS	DMS-8310

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

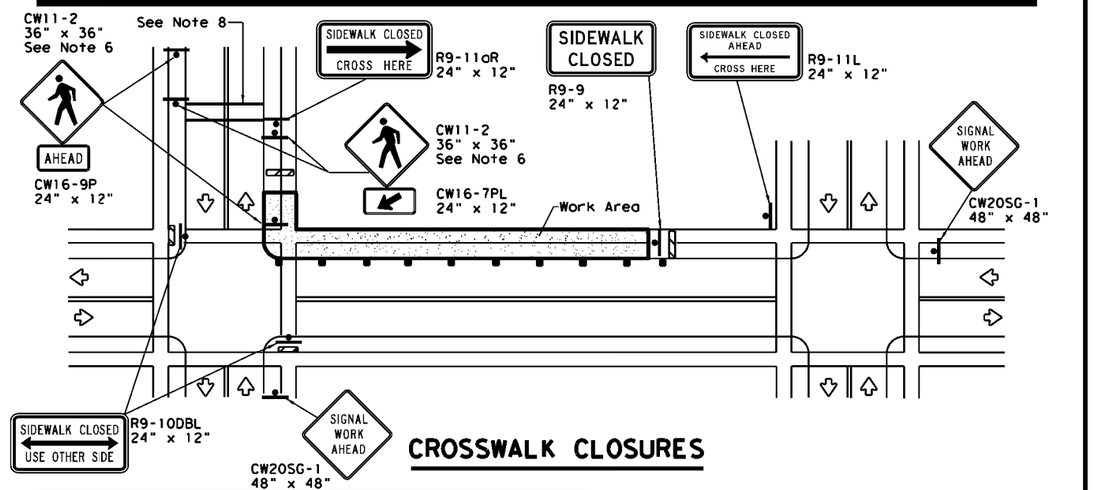
Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found at the following web address:
http://www.txdot.gov/txdot_library/publications/construction.htm



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

FILE: wzbts-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	0110	06	154	SS 261
2-98 10-99 7-13	DIST	COUNTY		SHEET NO.
4-98 3-03	HOU	HARRIS		10

115

DATE: 11/28/2022 3:07:57 PM
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CALLOUT

(A) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE WITH PEDESTRIAN SIGNAL HEADS (2 EA), SIGNS (2 EA), PUSH BUTTONS (2 EA) AND VIVDS CAMERA. (TO BE REMOVED)

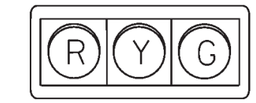
(B) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE WITH PEDESTRIAN SIGNAL HEADS (2 EA), SIGNS (2 EA), PUSH BUTTONS (2 EA) AND VIVDS CAMERA. (TO BE REMOVED)

(C) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE WITH PEDESTRIAN SIGNAL HEADS (2 EA), SIGNS (2 EA), PUSH BUTTONS (2 EA) AND VIVDS CAMERA. (TO BE REMOVED)

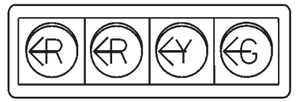
(D) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE WITH PEDESTRIAN SIGNAL HEADS (2 EA), SIGNS (2 EA), PUSH BUTTONS (2 EA), VIVDS CAMERA, SERVICE METER AND SERVICE DISCONNECT. (TO BE REMOVED)

(E) EXIST. TRAFFIC SIGNAL CONTROLLER (TO BE REMOVED)

EXISTING TRAFFIC SIGNAL HEADS



B,C,E,F,H,J,L,M



A,D,G,K

LEGEND

- DIRECTION OF TRAFFIC FLOW
- PP — EXIST. POWER POLE
- PP/T — EXIST. POWER POLE W/TRANSFORMER
- EXIST. TRAFFIC SIGNAL POLE
- EXIST. PEDESTRIAN SIGNAL HEAD
- EXIST. TRAFFIC SIGNAL HEAD
- EXIST. OVERHEAD SIGN
- EXIST. TRAFFIC SIGNAL CONTROLLER
- EXIST. GROUND BOX
- EXIST. LOOP DETECTOR
- EXIST. VIVDS CAMERA

N

W TIDWELL RD (35 MPH)

N SHEPHERD DR (35 MPH)

ONLY

A B C D E F G H J K L M

PP PP/T

Texas Department of Transportation

SS 261 AT TIDWELL RD TRAFFIC SIGNAL EXISTING LAYOUT

0 20 40
SCALE IN FEET
1" = 40'

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER

P.E.

03/01/2023

CONT	SECT	JOB	HIGHWAY
0110	06	154	SS 261
DIST	COUNTY		SHEET NO.
HOU	HARRIS		11

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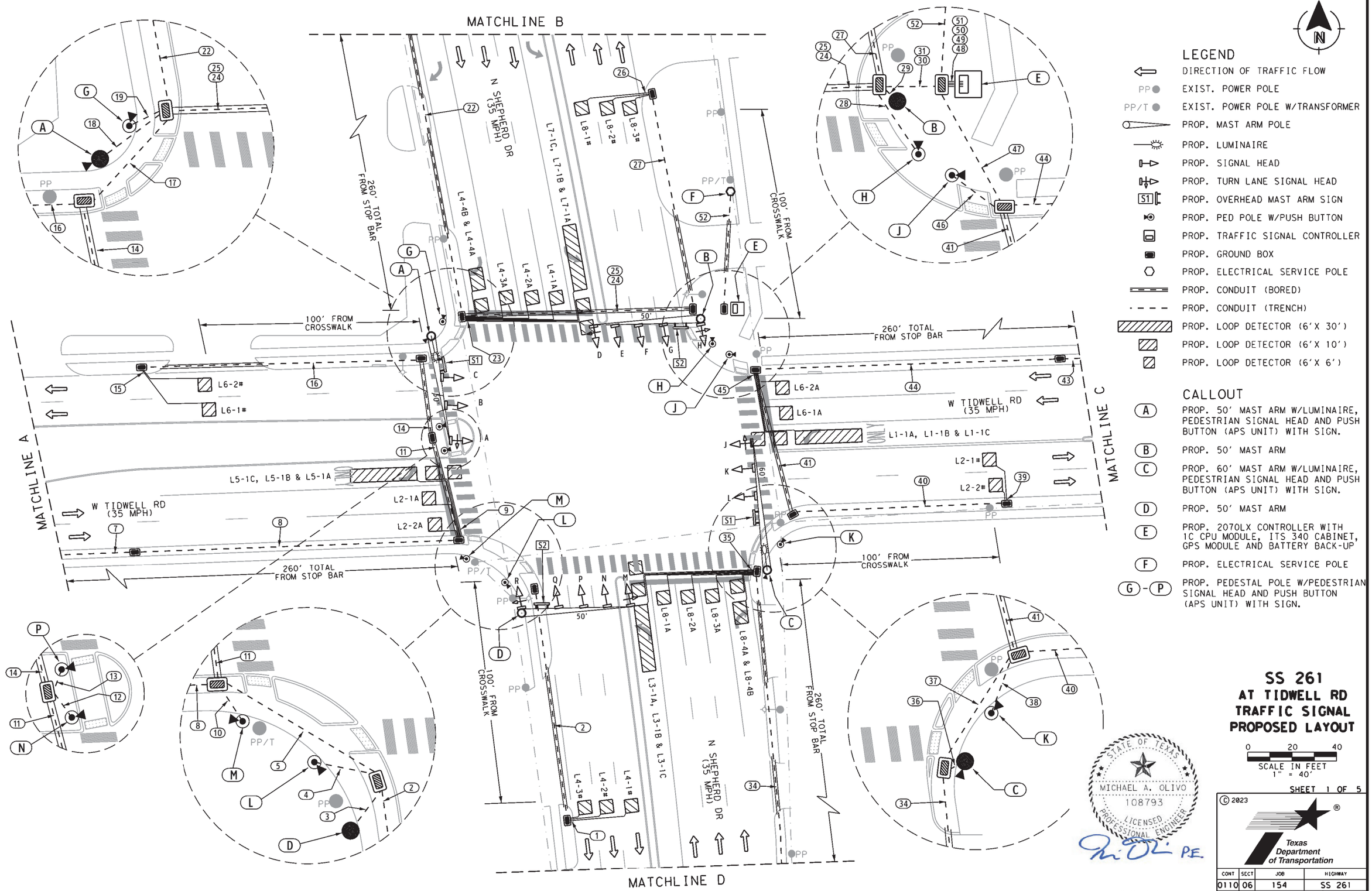

SS 261
AT TIDWELL RD
TRAFFIC SIGNAL
PROPOSED LAYOUT

0 20 40
SCALE IN FEET
1" = 40'

SHEET 1 OF 5

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0110	06	154	SS 261
DIST	COUNTY		SHEET NO.
HOU	HARRIS		12

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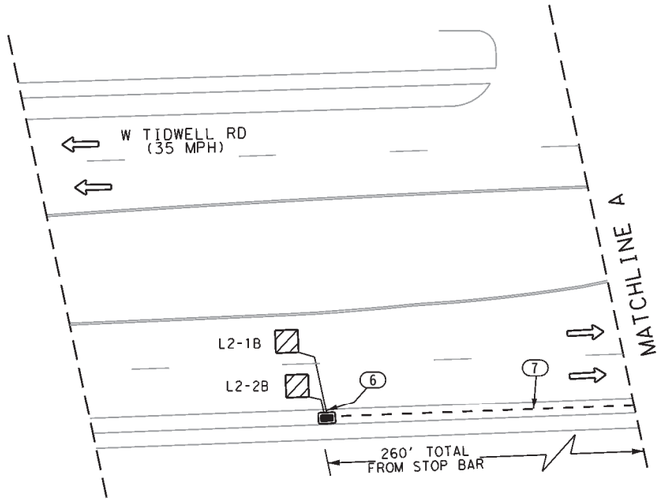
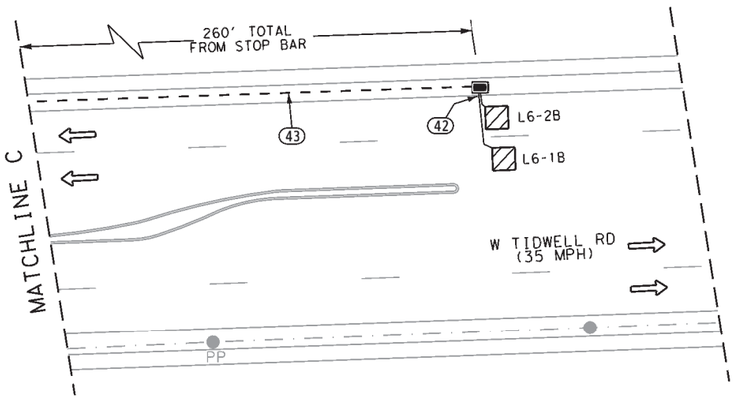


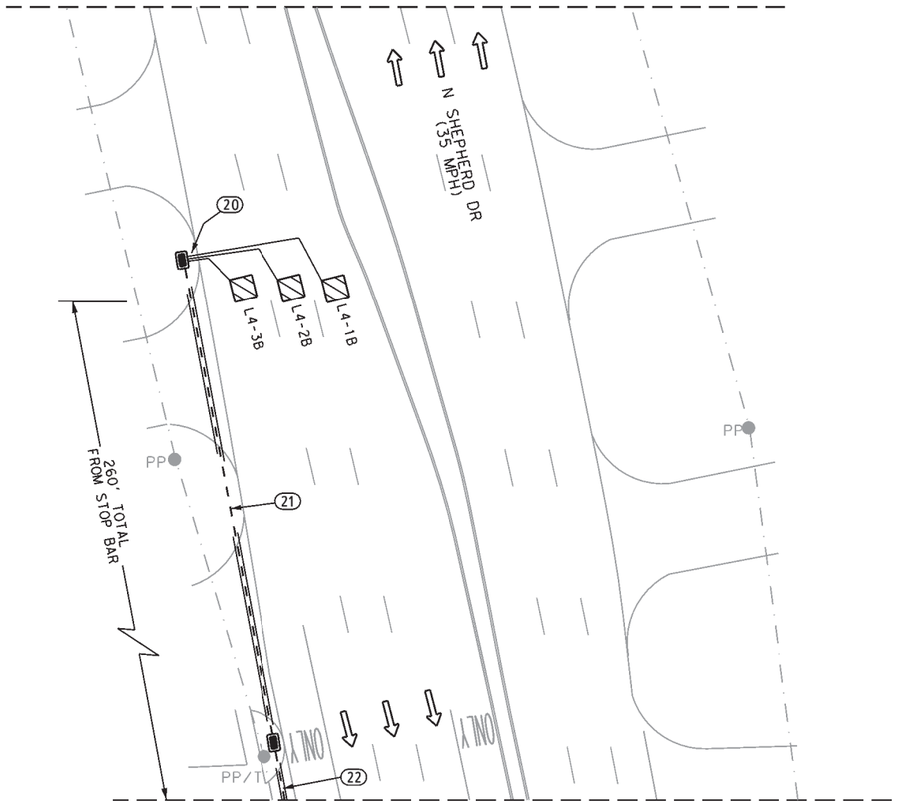


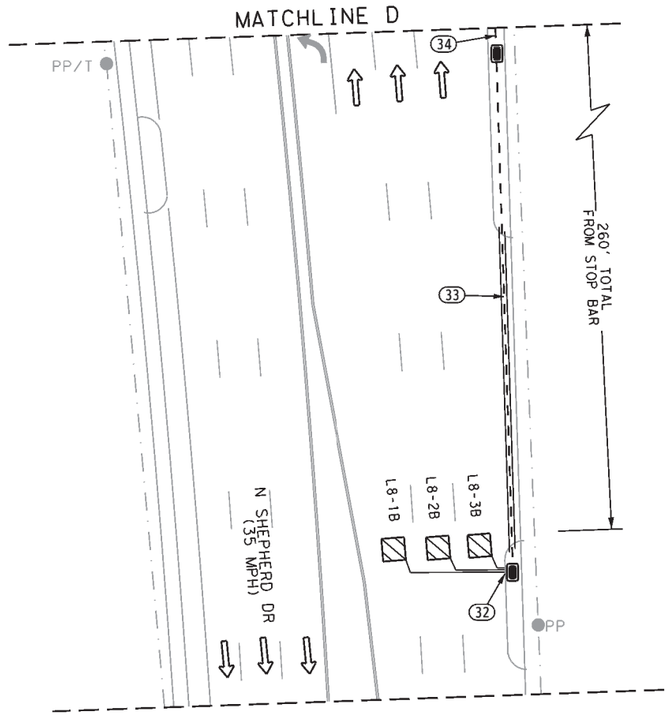
NOTES

-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 48 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.

-REMOVE ALL GROUND BOX, ABANDON CONDUIT AND CABLE THAT WILL NOT REUSED AS PART OF PROPOSED SIGNAL INSTALLATION.

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





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

03/01/2023

SS 261
AT TIDWELL RD
TRAFFIC SIGNAL
PROPOSED LAYOUT

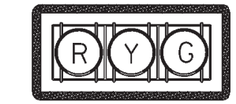
0 20 40
SCALE IN FEET
1" = 40'

SHEET 2 OF 5

Texas Department of Transportation

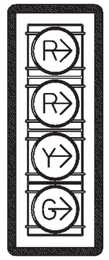
CONT	SECT	JOB	HIGHWAY
0110	06	154	SS 261
DIST	COUNTY		SHEET NO.
HOU	HARRIS		13

PROPOSED TRAFFIC SIGNAL HEADS:



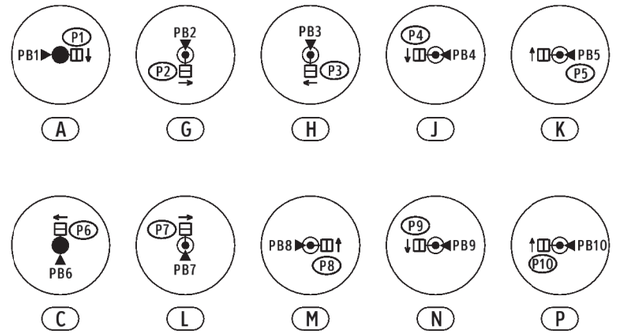
B, C, E, F, G,
K, L, N, P, Q

A, D, J, M



H, R

PROPOSED DIRECTION OF PEDESTRIAN SIGNAL HEADS AND LOCATION OF PUSH BUTTONS (APS UNITS)



- PROP. TRAFFIC SIGNAL POLE
- PROP. PEDESTAL POLE
- PROP. PEDESTRIAN SIGNAL HEAD
- PROP. PEDESTRIAN PUSH BUTTON (APS UNITS)

PROPOSED PEDESTRIAN SIGNAL HEADS AND PUSH BUTTONS (APS UNITS) WITH SIGNS

R10-3EL
(9"X15")

PB2, PB4, PB6, PB8, PB9

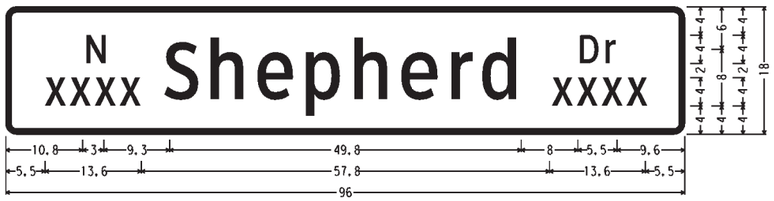
P1 – P10

R10-3ER
(9"X15")

PB1, PB3, PB5, PB7, PB10

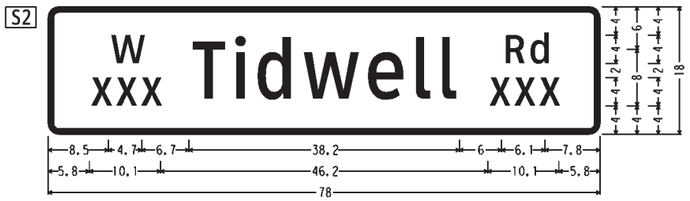
PROPOSED OVERHEAD MAST ARM SIGNS

S1



1.5" Radius, 0.8" Border, White on, Green;
"N", ClearviewHwy-3-W; "XXXX", ClearviewHwy-3-W;
"Shepherd", ClearviewHwy-3-W 75% spacing;
"Dr", ClearviewHwy-3-W; "XXXX", ClearviewHwy-3-W;

S2



1.5" Radius, 0.8" Border, White on, Green;
"W", ClearviewHwy-3-W; "XXX", ClearviewHwy-3-W;
"Tidwell", ClearviewHwy-3-W 75% spacing;
"Rd", ClearviewHwy-3-W; "XXX", ClearviewHwy-3-W;

NOTE: BLOCK NUMBERS TO BE CONFIRMED WITH CITY OF HOUSTON PRIOR TO INSTALLATION.

ELECTRICAL SERVICE DATA

ELECTRICAL SERVICE NAME	CALLOUT	ELECTRICAL SERVICE DESCRIPTION (SEE ED(5), ED(6), ED (7) & ED(8)-14)	SERVICE CONDUIT SIZE (RMC)	SERVICE CONDUCTORS NO./SIZE	SAFETY SWITCH AMPS	MAIN CKT. BRK. POLE/AMP	TWO-POLE CONTACTOR AMPS	PANELBD./ LOADCENTER AMP RATING (MIN)	CIRCUIT NO.	BRANCH CKT. BRK. POLE/AMPS	BRANCH CIRCUIT AMPS	kVA LOAD
SS 261 AT TIDWELL RD	F	ELEC SERV TY D (120/240)060(NS)SS(E)SP(O)	1-1/4"	3/#6	N/A	2P/60	30	100	TRF. SIG	1P/50	40	6.2
									LIGHTING	2P/20	2	

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

03/01/2023

SS 261
AT TIDWELL RD
TRAFFIC SIGNAL
PROPOSED LAYOUT

SHEET 3 OF 5

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0110	06	154	SS 261
DIST	COUNTY		SHEET NO.
HOU	HARRIS		14

DATE: 2/28/2023 8:12:29 AM
FILE: H:\TrfSignals\Hou Trans\CCSJ 0110-06-154\MAIN.dgn

DETECTOR ID	DETECTOR SETTING	DETECTOR SIZE	ITEM BY DIRECTION	LOCATION DESCRIPTION
L1-1A	PRESENCE	6' X 6'	WESTBOUND TIDWELL RD	4' DOWNSTREAM FROM STOP BAR
L1-1B	PRESENCE	6' X 6'	WESTBOUND TIDWELL RD	6' UPSTREAM FROM STOP BAR
L1-1C	PRESENCE	6' X 30'	WESTBOUND TIDWELL RD	40' UPSTREAM FROM STOP BAR
L2-1A	PRESENCE	6' X 6'	EASTBOUND TIDWELL RD	10' UPSTREAM FROM STOP BAR
L2-2A	PRESENCE	6' X 6'	EASTBOUND TIDWELL RD	10' UPSTREAM FROM STOP BAR
L2-1B	PULSE	6' X 6'	EASTBOUND TIDWELL RD	260' UPSTREAM FROM STOP BAR
L2-2B	PULSE	6' X 6'	EASTBOUND TIDWELL RD	260' UPSTREAM FROM STOP BAR
L2-1#	PULSE	6' X 6'	EASTBOUND TIDWELL RD	100' DOWNSTREAM FROM CROSSWALK
L2-2#	PULSE	6' X 6'	EASTBOUND TIDWELL RD	100' DOWNSTREAM FROM CROSSWALK
L3-1A	PRESENCE	6' X 6'	NORTHBOUND N SHEPHERD DR	4' DOWNSTREAM FROM STOP BAR
L3-1B	PRESENCE	6' X 6'	NORTHBOUND N SHEPHERD DR	6' UPSTREAM FROM STOP BAR
L3-1C	PRESENCE	6' X 30'	NORTHBOUND N SHEPHERD DR	40' UPSTREAM FROM STOP BAR
L4-1A	PRESENCE	6' X 6'	SOUTHBOUND N SHEPHERD DR	10' UPSTREAM FROM STOP BAR
L4-2A	PRESENCE	6' X 6'	SOUTHBOUND N SHEPHERD DR	10' UPSTREAM FROM STOP BAR
L4-3A	PRESENCE	6' X 6'	SOUTHBOUND N SHEPHERD DR	10' UPSTREAM FROM STOP BAR
L4-4A	PRESENCE	6' X 6'	SOUTHBOUND N SHEPHERD DR	6' UPSTREAM FROM STOP BAR
L4-1B	PULSE	6' X 6'	SOUTHBOUND N SHEPHERD DR	260' UPSTREAM FROM STOP BAR
L4-2B	PULSE	6' X 6'	SOUTHBOUND N SHEPHERD DR	260' UPSTREAM FROM STOP BAR
L4-3B	PULSE	6' X 6'	SOUTHBOUND N SHEPHERD DR	260' UPSTREAM FROM STOP BAR
L4-4B	PRESENCE	6' X 10'	SOUTHBOUND N SHEPHERD DR	20' UPSTREAM FROM STOP BAR
L4-1#	PULSE	6' X 6'	SOUTHBOUND N SHEPHERD DR	100' DOWNSTREAM FROM CROSSWALK
L4-2#	PULSE	6' X 6'	SOUTHBOUND N SHEPHERD DR	100' DOWNSTREAM FROM CROSSWALK
L4-3#	PULSE	6' X 6'	SOUTHBOUND N SHEPHERD DR	100' DOWNSTREAM FROM CROSSWALK

NOTE: LOCATION DESCRIPTION REFER TO LEADING EDGE OF DETECTOR

DETECTOR ID	DETECTOR SETTING	DETECTOR SIZE	ITEM BY DIRECTION	LOCATION DESCRIPTION
L5-1A	PRESENCE	6' X 6'	EASTBOUND TIDWELL RD	4' DOWNSTREAM FROM STOP BAR
L5-1B	PRESENCE	6' X 6'	EASTBOUND TIDWELL RD	6' UPSTREAM FROM STOP BAR
L5-1C	PRESENCE	6' X 30'	EASTBOUND TIDWELL RD	40' UPSTREAM FROM STOP BAR
L6-1A	PRESENCE	6' X 6'	WESTBOUND TIDWELL RD	10' UPSTREAM FROM STOP BAR
L6-2A	PRESENCE	6' X 6'	WESTBOUND TIDWELL RD	10' UPSTREAM FROM STOP BAR
L6-1B	PULSE	6' X 6'	WESTBOUND TIDWELL RD	260' UPSTREAM FROM STOP BAR
L6-2B	PULSE	6' X 6'	WESTBOUND TIDWELL RD	260' UPSTREAM FROM STOP BAR
L6-1#	PULSE	6' X 6'	WESTBOUND TIDWELL RD	100' DOWNSTREAM FROM CROSSWALK
L6-2#	PULSE	6' X 6'	WESTBOUND TIDWELL RD	100' DOWNSTREAM FROM CROSSWALK
L7-1A	PRESENCE	6' X 6'	SOUTHBOUND N SHEPHERD DR	4' DOWNSTREAM FROM STOP BAR
L7-1B	PRESENCE	6' X 6'	SOUTHBOUND N SHEPHERD DR	6' UPSTREAM FROM STOP BAR
L7-1C	PRESENCE	6' X 30'	SOUTHBOUND N SHEPHERD DR	40' UPSTREAM FROM STOP BAR
L8-1A	PRESENCE	6' X 6'	NORTHBOUND N SHEPHERD DR	10' UPSTREAM FROM STOP BAR
L8-2A	PRESENCE	6' X 6'	NORTHBOUND N SHEPHERD DR	10' UPSTREAM FROM STOP BAR
L8-3A	PRESENCE	6' X 6'	NORTHBOUND N SHEPHERD DR	10' UPSTREAM FROM STOP BAR
L8-4A	PRESENCE	6' X 6'	NORTHBOUND N SHEPHERD DR	6' UPSTREAM FROM STOP BAR
L8-1B	PULSE	6' X 6'	NORTHBOUND N SHEPHERD DR	260' UPSTREAM FROM STOP BAR
L8-2B	PULSE	6' X 6'	NORTHBOUND N SHEPHERD DR	260' UPSTREAM FROM STOP BAR
L8-3B	PULSE	6' X 6'	NORTHBOUND N SHEPHERD DR	260' UPSTREAM FROM STOP BAR
L8-4B	PRESENCE	6' X 10'	NORTHBOUND N SHEPHERD DR	20' UPSTREAM FROM STOP BAR
L8-1#	PULSE	6' X 6'	NORTHBOUND N SHEPHERD DR	100' DOWNSTREAM FROM CROSSWALK
L8-2#	PULSE	6' X 6'	NORTHBOUND N SHEPHERD DR	100' DOWNSTREAM FROM CROSSWALK
L8-3#	PULSE	6' X 6'	NORTHBOUND N SHEPHERD DR	100' DOWNSTREAM FROM CROSSWALK

NOTE: LOCATION DESCRIPTION REFER TO LEADING EDGE OF DETECTOR

CONDUIT AND CONDUCTOR RUNS

RUN NO.	CONDUIT (618)												CONDUCTORS (620)				TRAY CABLE (621)		CABLES (684)						LOOP (684)			
	PVC												POWER		GROUND		LUMINAIRE		PEDESTRIAN				SIGNAL		LOOP		LEAD-IN	
	1.25" (SCHD 80)		2" (SCHD 80)				3" (SCHD 80)		4" (SCHD 80)				#4 INSULATED		#8 BARE		#12/4C Tray Cable		#14/3C		#14/5C		#14/7C		#14 INSULATED		#14/2C	
	(Subsidiary)		(6046)		(6047)		(6053)		(6058)		(6059)		(6012)		(6007)		(6005)		(6029)		(6031)		(6033)		(Subsidiary)		(6080)	
	NO.	TRENCH	NO.	TRENCH	NO.	BORE	NO.	TRENCH	NO.	TRENCH	NO.	BORE	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH
	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF
POLE A																	1	40	1	5	1	10	3	20				
MAST ARM A																							3	50				
POLE B																							5	20				
MAST ARM B																							4	50				
POLE C																	1	40	1	5	1	10	3	20				
MAST ARM C																							3	60				
POLE D																							5	20				
MAST ARM D																							4	50				
PED POLE G																			1	5	1	10						
PED POLE H																			1	5	1	10						
PED POLE J																			1	5	1	10						
PED POLE K																			1	5	1	10						
PED POLE L																			1	5	1	10						
PED POLE M																			1	5	1	10						
PED POLE N																			1	5	1	10						
PED POLE P																			1	5	1	10						

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

03/01/2023

SS 261
AT TIDWELL RD
TRAFFIC SIGNAL
PROPOSED LAYOUT

SHEET 4 OF 5

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0110	06	154	SS 261
DIST	COUNTY		SHEET NO.
HOU	HARRIS		15

DATE: 2/28/2023 8:12:53 AM
FILE: H:\Trf\Signals\Hai Tran\CCSJ 0110-06-154\MAIN.dgn

CONDUIT AND CONDUCTOR RUNS

RUN NO.	CONDUIT (618)												CONDUCTORS (620)				TRAY CABLE (621)		CABLES (684)						LOOP (684)			
	PVC												POWER		GROUND		LUMINAIRE		PEDESTRIAN				SIGNAL		LOOP		LEAD-IN	
	1.25" (SCHD 80)		2" (SCHD 80)				3" (SCHD 80)		4" (SCHD 80)				#4 INSULATED		#8 BARE		#12/4C Tray Cable		#14/3C		#14/5C		#14/7C		#14 INSULATED		#14/2C	
	(Subsidiary)		(6046)		(6047)		(6053)		(6058)		(6059)		(6012)		(6007)		(6005)		(6029)		(6031)		(6033)		(Subsidiary)		(6080)	
	NO.	TRENCH	NO.	TRENCH	NO.	BORE	NO.	TRENCH	NO.	TRENCH	NO.	BORE	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH
	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF
1	3	5																							1	265		
2			1	35	1	65									1	100											3	100
3							1	15							1	15							5	15				
4			1	15											1	15			1	15	1	15						
5							1	40							1	40			1	40	1	40	5	40			3	40
6	2	5																							1	155		
7			1	130											1	130											2	130
8			1	130											1	130											2	130
9	5	5																							1	615		
10			1	10											1	10			1	10	1	10						
11											1	45			1	45			2	45	2	45	5	45			10	45
12			1	10											1	10			1	10	1	10						
13			1	10											1	10			1	10	1	10						
14											1	35			1	35			4	35	4	35	5	35			10	35
15	2	5																							1	240		
16			1	65	1	50									1	115											2	115
17									1	25					1	25			4	25	4	25	5	25			12	25
18							1	20							1	20	1	20	1	20	1	20	3	20				
19			1	10											1	10			1	10	1	10						
20	3	5																							1	265		
21			1	40	1	90									1	130											3	130
22			1	40	1	90									1	130											3	130
23	8	5																							1	1105		
24											1	100			1	100	1	100	6	100	6	100	8	100				
25											1	100			1	100											23	100
26	3	5																							1	265		
27			1	65	1	35									1	100											3	100
28			1	20											1	20			1	20	1	20						
29							1	5							1	5							5	5				
30									1	15					1	15			7	15	7	15	13	15				
31									1	15					1	15	1	15									26	15
32	3	5																							1	265		
33			1	50	1	80									1	130											3	130
34			1	70	1	60									1	130											3	130
35	8	5																							1	1105		
36							1	5							1	5	1	5	1	5	1	5	3	5				
37							1	30							1	30	1	30	1	30	1	30	3	30			11	30
38			1	15											1	15			1	15	1	15						
39	2	5																							1	155		
40			1	100											1	100											2	100
41											1	65			1	65	1	65	2	65	2	65	3	65			13	65
42	2	5																							1	155		
43			1	130											1	130											2	130
44			1	130											1	130											2	130
45	5	5																							1	535		
46			1	10											1	10			1	10	1	10						
47									1	25					1	25	1	25	3	25	3	25	3	25			20	25
48							1	5							1	5			10	5	10	5						
49									1	5					1	5							16	5			12	5
50									1	5					1	5											34	5
51			1	5									2	5	1	5												
52			1	25	1	25							2	50	1	50	2	50										
TOTAL (LF)		230		1115		495		120		90		345		110		2165		440		1535		1585		3385		5125		9445
EST. TOTAL		**245**		**1175**		**520**		**130**		**95**		**365**		**120**		**2275**		**465**		**1615**		**1665**		**3555**		**5385**		**9920**

03/01/2023

SS 261
AT TIDWELL RD
TRAFFIC SIGNAL
PROPOSED LAYOUT

SHEET 5 OF 5

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0110	06	154	SS 261
DIST	COUNTY		SHEET NO.
HOU	HARRIS		16

DATE: 2/28/2023 8:13:15 AM
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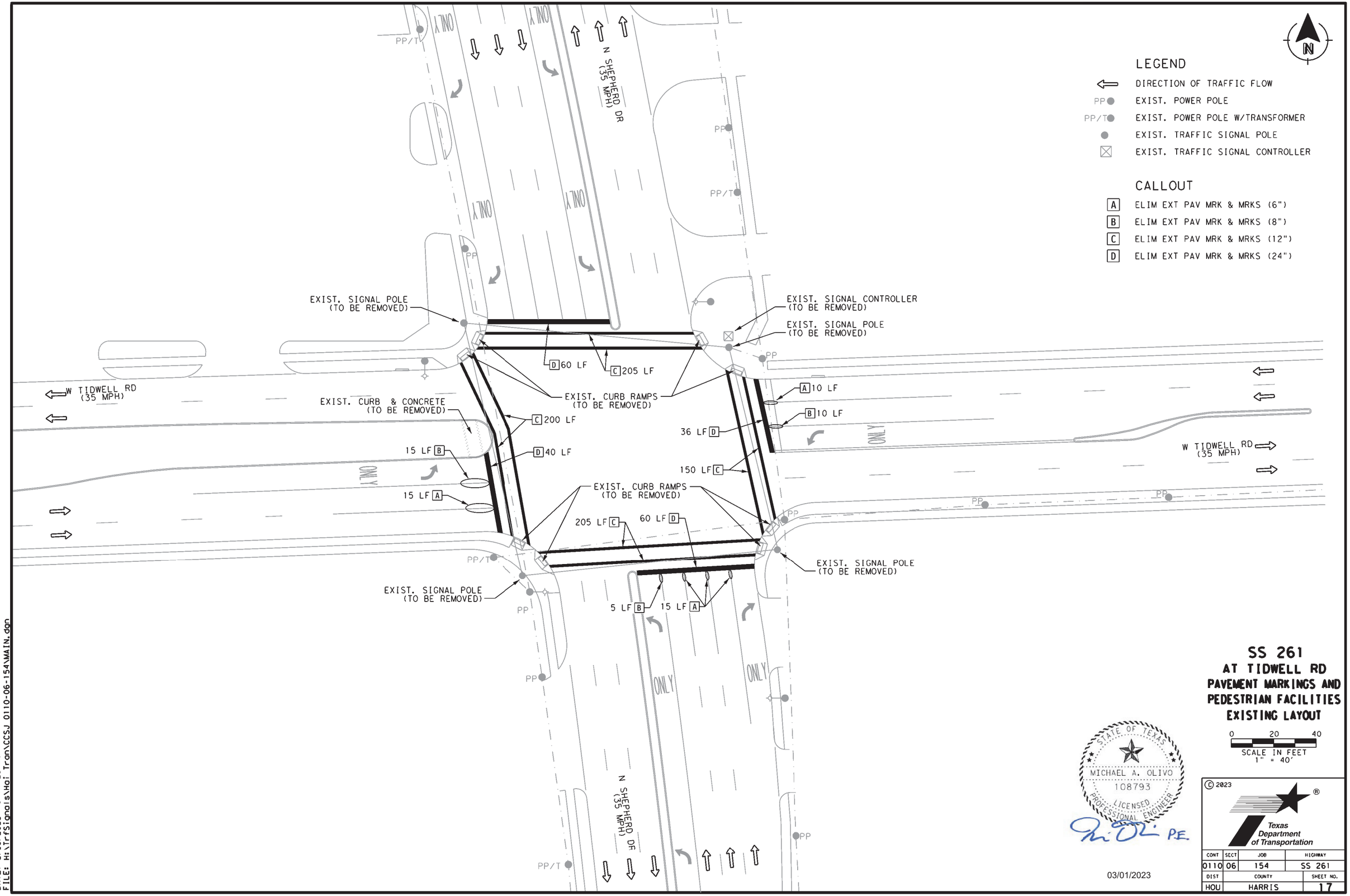

SS 261
AT TIDWELL RD
PAVEMENT MARKINGS AND PEDESTRIAN FACILITIES
EXISTING LAYOUT

0 20 40
SCALE IN FEET
1" = 40'

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

03/01/2023

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0110	06	154	SS 261
DIST	COUNTY		SHEET NO.
HOU	HARRIS		17

DATE: 2/28/2023 8:14:23 AM
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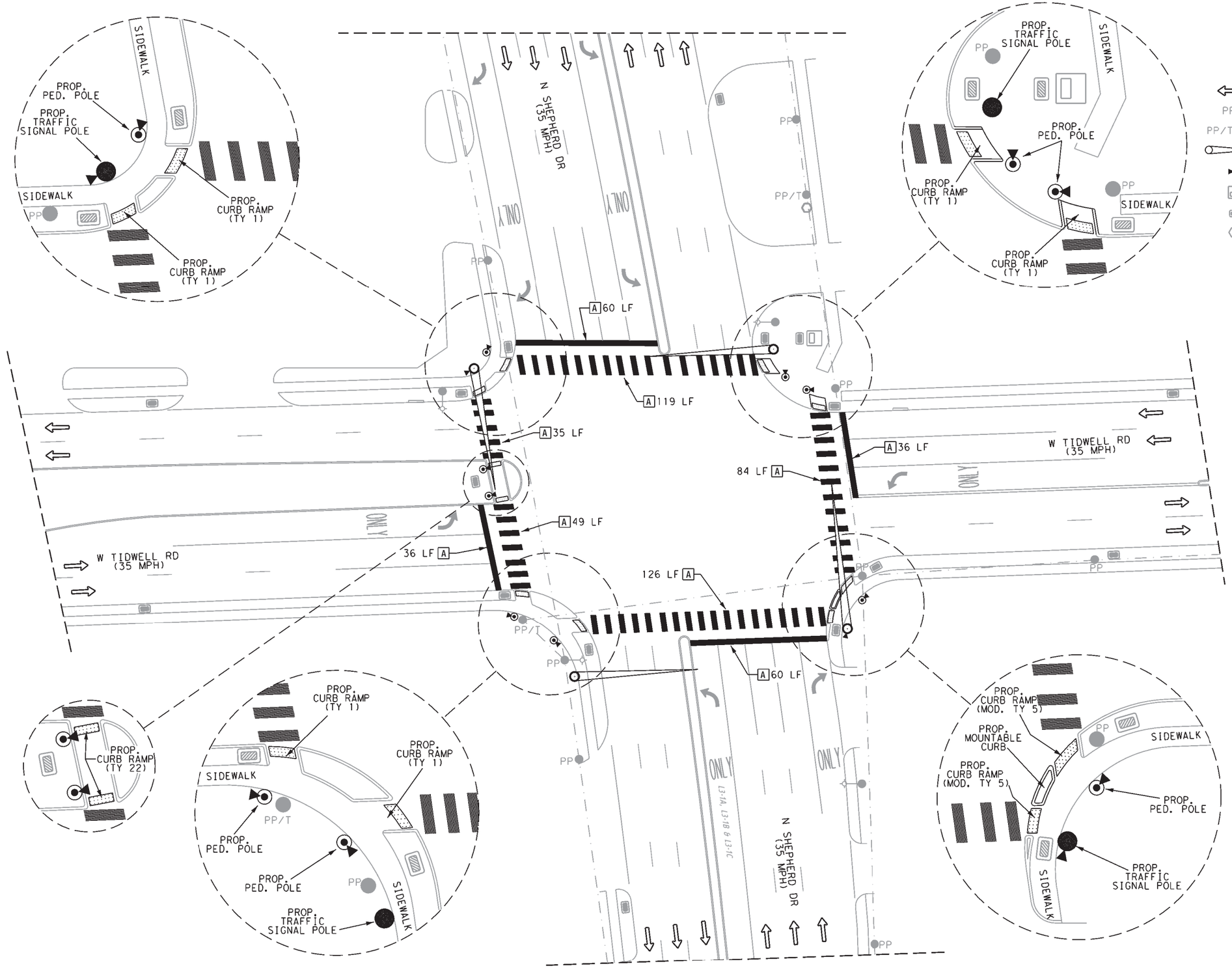

LEGEND

- DIRECTION OF TRAFFIC FLOW
- PP — EXIST. POWER POLE
- PP/T — EXIST. POWER POLE W/TRANSFORMER
- PROP. MAST ARM POLE
- PROP. PED POLE W/PUSH BUTTON
- PROP. TRAFFIC SIGNAL CONTROLLER
- PROP. GROUND BOX
- PROP. ELECTRICAL SERVICE POLE

CALLOUT

A — REFL PAV MRK TY I (W)24"(SLD)(100MIL)

STATE OF TEXAS
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03/01/2023

SS 261
AT TIDWELL RD
PAVEMENT MARKINGS AND PEDESTRIAN FACILITIES
PROPOSED LAYOUT

0 20 40
SCALE IN FEET
1" = 40'

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0110	06	154	SS 261
DIST	COUNTY		SHEET NO.
HOU	HARRIS		18

DATE: 2/28/2023 8:14:42 AM
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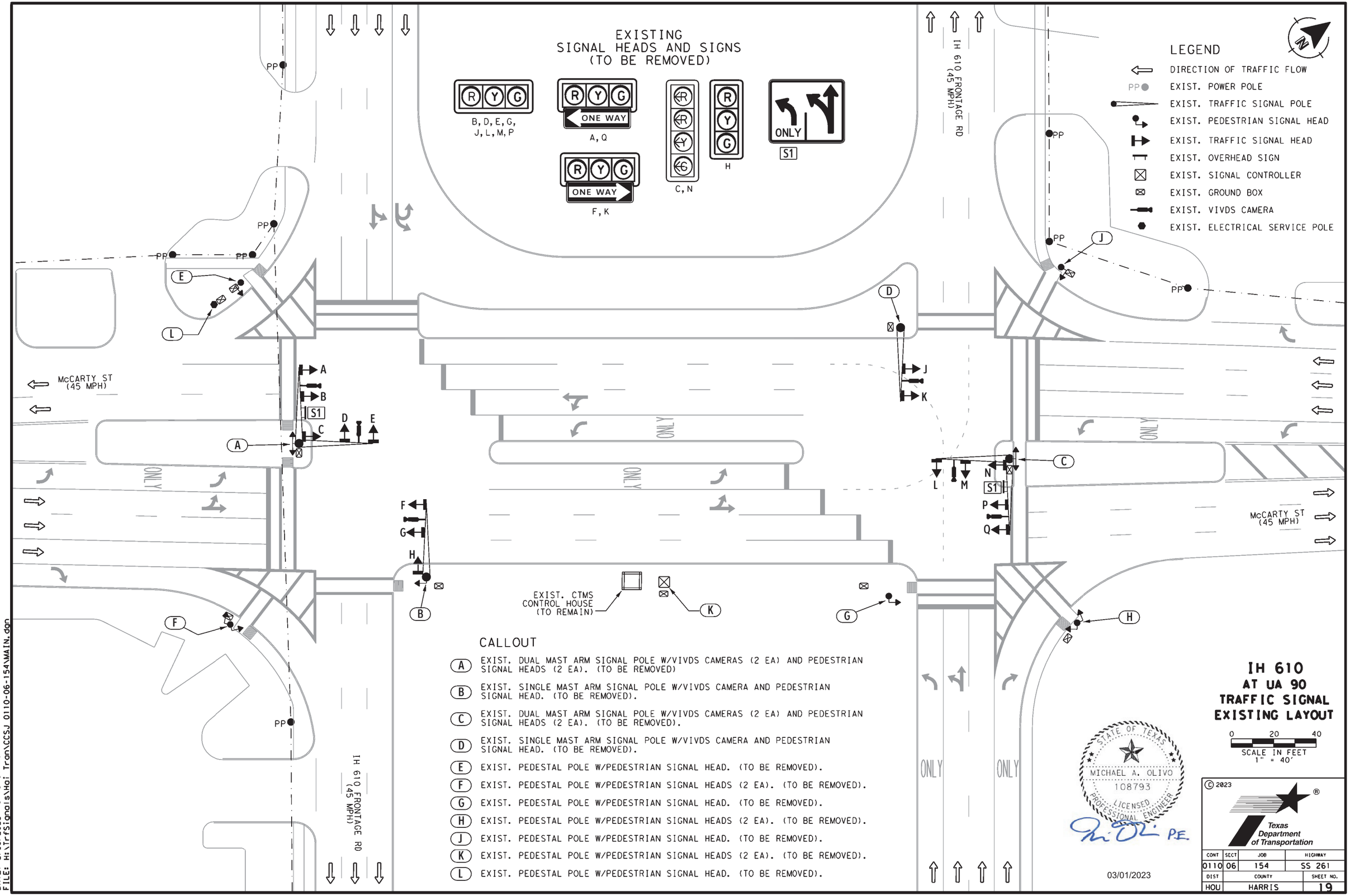

CALLOUT

- (A) EXIST. DUAL MAST ARM SIGNAL POLE W/VIVDS CAMERAS (2 EA) AND PEDESTRIAN SIGNAL HEADS (2 EA). (TO BE REMOVED)
- (B) EXIST. SINGLE MAST ARM SIGNAL POLE W/VIVDS CAMERA AND PEDESTRIAN SIGNAL HEAD. (TO BE REMOVED).
- (C) EXIST. DUAL MAST ARM SIGNAL POLE W/VIVDS CAMERAS (2 EA) AND PEDESTRIAN SIGNAL HEADS (2 EA). (TO BE REMOVED).
- (D) EXIST. SINGLE MAST ARM SIGNAL POLE W/VIVDS CAMERA AND PEDESTRIAN SIGNAL HEAD. (TO BE REMOVED).
- (E) EXIST. PEDESTAL POLE W/PEDESTRIAN SIGNAL HEAD. (TO BE REMOVED).
- (F) EXIST. PEDESTAL POLE W/PEDESTRIAN SIGNAL HEADS (2 EA). (TO BE REMOVED).
- (G) EXIST. PEDESTAL POLE W/PEDESTRIAN SIGNAL HEAD. (TO BE REMOVED).
- (H) EXIST. PEDESTAL POLE W/PEDESTRIAN SIGNAL HEADS (2 EA). (TO BE REMOVED).
- (J) EXIST. PEDESTAL POLE W/PEDESTRIAN SIGNAL HEAD. (TO BE REMOVED).
- (K) EXIST. PEDESTAL POLE W/PEDESTRIAN SIGNAL HEADS (2 EA). (TO BE REMOVED).
- (L) EXIST. PEDESTAL POLE W/PEDESTRIAN SIGNAL HEAD. (TO BE REMOVED).

IH 610
AT UA 90
TRAFFIC SIGNAL
EXISTING LAYOUT

0 20 40
SCALE IN FEET
1" = 40'

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

03/01/2023

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0110	06	154	SS 261
DIST	COUNTY		SHEET NO.
HOU	HARRIS		19

DATE: 2/28/2023 8:15:07 AM
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MATCHLINE A

LEGEND

- DIRECTION OF TRAFFIC FLOW
- PP — EXIST. POWER POLE
- PP/T — EXIST. POWER POLE W/TRANSFORMER
- PROP. MAST ARM POLE
- PROP. LUMINAIRE
- PROP. SIGNAL HEAD
- PROP. TURN LANE SIGNAL HEAD
- S1 — PROP. OVERHEAD MAST ARM SIGN
- PROP. PED POLE W/PUSH BUTTON
- PROP. TRAFFIC SIGNAL CONTROLLER
- PROP. GROUND BOX
- PROP. ELECTRICAL SERVICE POLE
- PROP. CONDUIT (BORED)
- PROP. CONDUIT (TRENCH)
- PROP. LOOP DETECTOR (6'X 30')
- PROP. LOOP DETECTOR (6'X 6')

PROPOSED TRAFFIC SIGNAL HEADS

R Y G

A, B, C, E, F, G, H, J, K, L, M, N, P, Q, R, S, T, U, W, X, Y

D, V

IH 610 FRONTAGE RD (45 MPH)

330' TOTAL FROM STOP BAR

100' FROM CROSSWALK

DETAIL 1

DETAIL 2

DETAIL 3

DETAIL 4

DETAIL 5

DETAIL 6

OL-C(4+3)-4A

OL-C(4+3)-3A

OL-C(4+3)-2A

OL-C(4+3)-1A

OL-A(1+2+11)-3#

OL-A(1+2+11)-2#

OL-A(1+2+11)-1#

OL-A(1+2+11)-3A

OL-A(1+2+11)-2A

OL-A(1+2+11)-1A

OL-A(1+2+11)-3B

OL-A(1+2+11)-2B

OL-A(1+2+11)-1B

180' FROM STOP BAR

170' FROM STOP BAR

160' FROM STOP BAR

OL-G(1+11)-1C

OL-G(1+11)-1B

OL-G(1+11)-1A

OL-H(5+15)-1A

OL-H(5+15)-1B

OL-H(5+15)-1C

OL-B(5+6+15)-1B

OL-B(5+6+15)-2B

OL-B(5+6+15)-3B

OL-B(5+6+15)-1A

OL-B(5+6+15)-2A

OL-B(5+6+15)-3A

OL-E(2)-1A

OL-E(2)-2A

OL-E(2)-3A

OL-E(2)-4A

OL-J(1+3+4+11)-3#

OL-J(1+3+4+11)-2#

OL-J(1+3+4+11)-1#

OL-I(5+7+8+15)-1#

OL-I(5+7+8+15)-2#

OL-I(5+7+8+15)-3#

OL-F(6)-4A

OL-F(6)-3A

OL-F(6)-2A

OL-F(6)-1A

OL-D(8+71)-1A

OL-D(8+71)-2A

OL-D(8+71)-3A

McCARTY ST (45 MPH)

IH 610 FRONTAGE RD (45 MPH)

ONLY

50'

40'

60'

EXIST. CTMS CONTROL HOUSE

PP/T

MATCHLINE B

MATCHLINE C

MATCHLINE D

CALLOUT

- (A) PROP. 40' MAST ARM W/LUMINAIRE, PED. SIGNAL HEAD AND PUSH BUTTON (APS UNIT) WITH SIGN.
- (B) PROP. 50' MAST ARM W/LUMINAIRE, PED. SIGNAL HEAD, SIGN & PUSH BUTTON
- (C) PROP. 50' MAST ARM W/LUMINAIRE
- (D) PROP. 50' MAST ARM W/LUMINAIRE
- (E) PROP. 40' MAST ARM W/LUMINAIRE, PED. SIGNAL HEAD, SIGN & PUSH BUTTON
- (F) PROP. 40' MAST ARM W/LUMINAIRE, PED. SIGNAL HEAD, SIGN & PUSH BUTTON
- (G) PROP. 2070LX CONTROLLER WITH 1C CPU MODULE, ITS 340 CABINET, GPS MODULE AND BATTERY BACK-UP
- (H) PROP. ELECTRICAL SERVICE POLE
- (J)-(V) PROP. PEDESTAL POLE W/PEDESTRIAN SIGNAL HEAD, SIGN & PUSH BUTTON

STATE OF TEXAS
MICHAEL A. OLIVO
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P.E.

03/01/2023

IH 610
AT UA 90
TRAFFIC SIGNAL
PROPOSED LAYOUT

0 20 40
SCALE IN FEET
1" = 40'

SHEET 1 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0110	06	154	SS 261
DIST	COUNTY		SHEET NO.
HOU	HARRIS		20

DATE: 2/28/2023 8:15:28 AM
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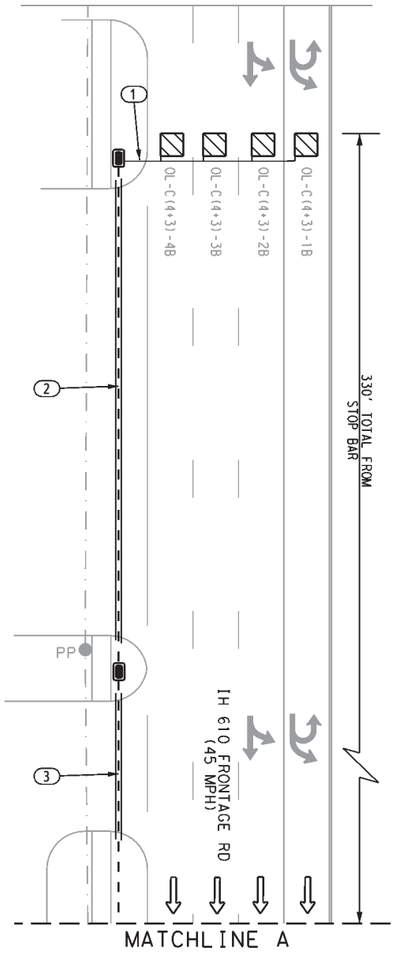

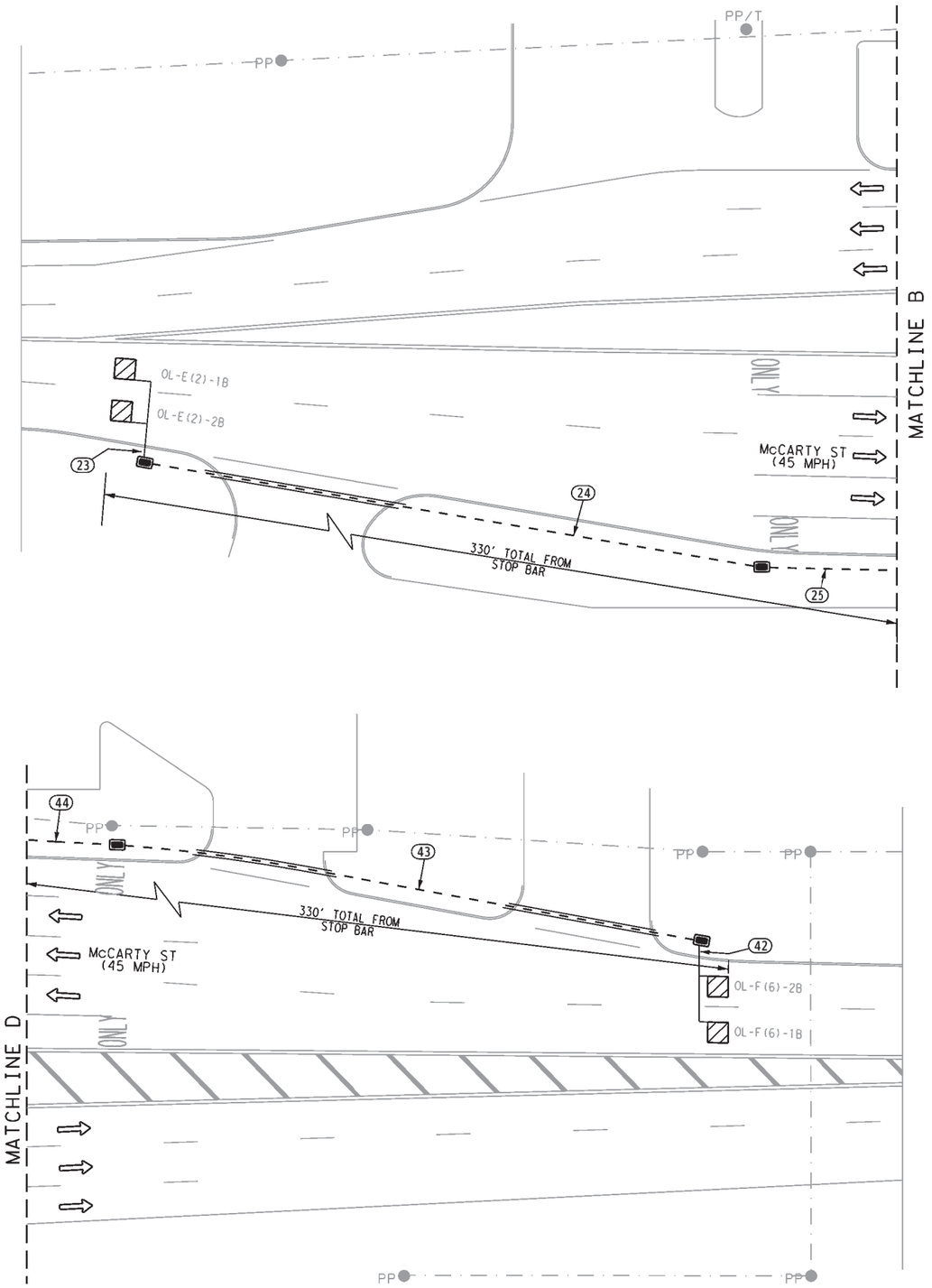

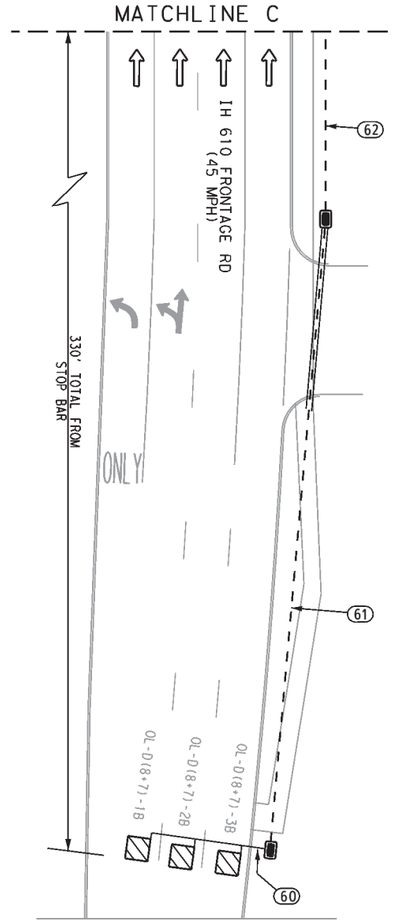

LEGEND

- DIRECTION OF TRAFFIC FLOW
- PP — EXIST. POWER POLE
- PP/T — EXIST. POWER POLE W/TRANSFORMER
- PROP. MAST ARM POLE
- PROP. LUMINAIRE
- PROP. SIGNAL HEAD
- PROP. TURN LANE SIGNAL HEAD
- S1 — PROP. OVERHEAD MAST ARM SIGN
- PROP. PED POLE W/PUSH BUTTON
- PROP. TRAFFIC SIGNAL CONTROLLER
- PROP. GROUND BOX
- PROP. ELECTRICAL SERVICE POLE
- PROP. CONDUIT (BORED)
- PROP. CONDUIT (TRENCH)
- PROP. LOOP DETECTOR (6'X 30')
- PROP. LOOP DETECTOR (6'X 6')

DATE: 2/28/2023 8:15:59 AM
FILE: H:\TrfSignals\Hou Tran\CCSJ 0110-06-154\MAIN.dgn

IH 610
AT UA 90
TRAFFIC SIGNAL
PROPOSED LAYOUT

0 20 40
SCALE IN FEET
1" = 40'

SHEET 2 OF 6

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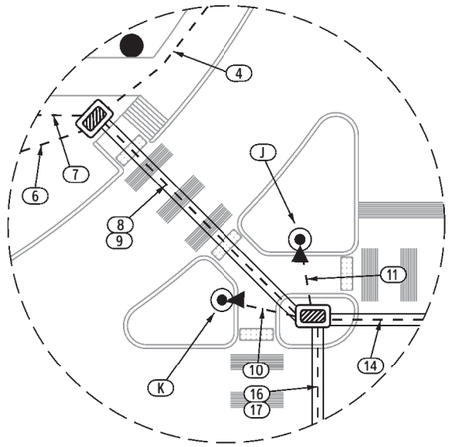
LICENSED
PROFESSIONAL ENGINEER
P.E.

03/01/2023

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0110	06	154	SS 261
DIST	COUNTY		SHEET NO.
HOU	HARRIS		21



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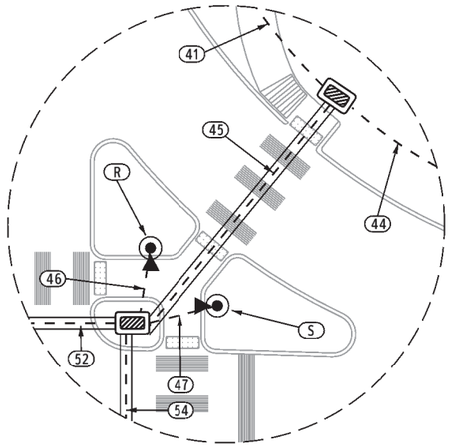

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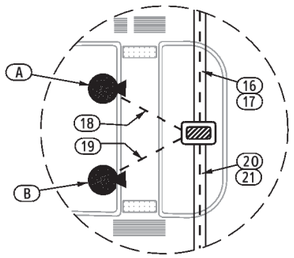

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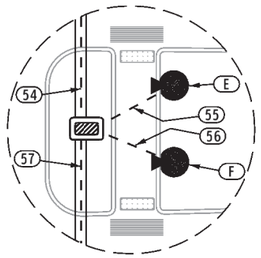

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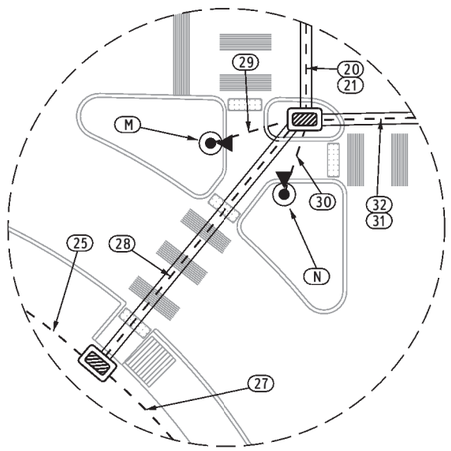

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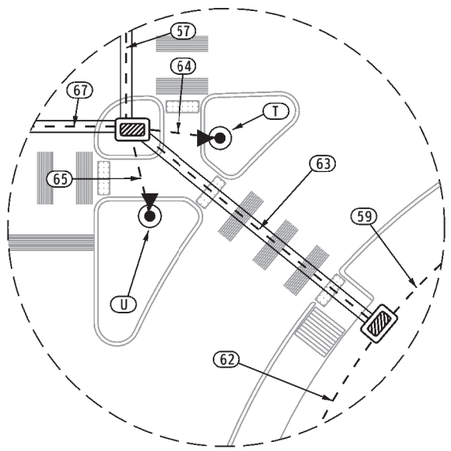
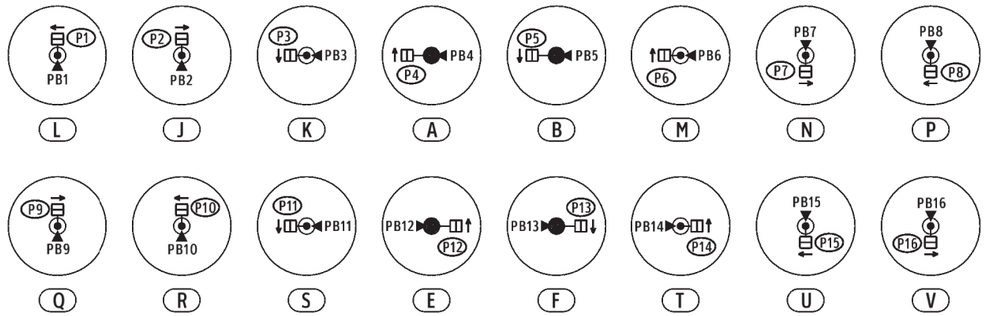


DETAIL 6
(N.T.S.)

PROPOSED DIRECTION OF PEDESTRIAN SIGNAL HEADS AND LOCATION OF PUSH BUTTONS (APS UNITS)



- PROP. TRAFFIC SIGNAL POLE
- PROP. PEDESTAL POLE
- PROP. PEDESTRIAN SIGNAL HEAD
- PROP. PEDESTRIAN PUSH BUTTON (APS UNITS)

PROPOSED PEDESTRIAN SIGNAL HEADS AND PUSH BUTTONS (APS UNITS) WITH SIGNS

R10-3EL
(9"X15")

PB1, PB3, PB5, PB7,
PB10, PB12, PB14, PB15

P1 – P16

R10-3ER
(9"X15")

PB2, PB4, PB6, PB8,
PB9, PB11, PB13, PB15

IH 610
AT UA 90
TRAFFIC SIGNAL
PROPOSED LAYOUT

03/01/2023

SHEET 3 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0110	06	154	SS 261
DIST	COUNTY		SHEET NO.
HOU	HARRIS		22

DATE: 2/28/2023 8:16:27 AM
FILE: H:\TrfSignals\Hal Tran\CCSJ 0110-06-154\MAIN.dgn

DETECTOR ID	DETECTOR SETTING	DETECTOR SIZE	ITEM BY DIRECTION	LOCATION DESCRIPTION
OL-A(1+2+11)-1A	PRESENCE	6' X 6'	SOUTHBOUND McCARTY ST	10' UPSTREAM FROM STOP BAR
OL-A(1+2+11)-2A	PRESENCE	6' X 6'	SOUTHBOUND McCARTY ST	10' UPSTREAM FROM STOP BAR
OL-A(1+2+11)-3A	PRESENCE	6' X 6'	SOUTHBOUND McCARTY ST	10' UPSTREAM FROM STOP BAR
OL-A(1+2+11)-1B	PULSE	6' X 6'	SOUTHBOUND McCARTY ST	180' UPSTREAM FROM STOP BAR
OL-A(1+2+11)-2B	PULSE	6' X 6'	SOUTHBOUND McCARTY ST	170' UPSTREAM FROM STOP BAR
OL-A(1+2+11)-3B	PULSE	6' X 6'	SOUTHBOUND McCARTY ST	160' UPSTREAM FROM STOP BAR
OL-A(1+2+11)-1#	PULSE	6' X 6'	SOUTHBOUND McCARTY ST	100' DOWNSTREAM FROM CROSSWALK
OL-A(1+2+11)-2#	PULSE	6' X 6'	SOUTHBOUND McCARTY ST	100' DOWNSTREAM FROM CROSSWALK
OL-A(1+2+11)-3#	PULSE	6' X 6'	SOUTHBOUND McCARTY ST	100' DOWNSTREAM FROM CROSSWALK
OL-B(5+6+15)-1A	PRESENCE	6' X 6'	NORTHBOUND McCARTY ST	10' UPSTREAM FROM STOP BAR
OL-B(5+6+15)-2A	PRESENCE	6' X 6'	NORTHBOUND McCARTY ST	10' UPSTREAM FROM STOP BAR
OL-B(5+6+15)-3A	PRESENCE	6' X 6'	NORTHBOUND McCARTY ST	10' UPSTREAM FROM STOP BAR
OL-B(5+6+15)-1B	PULSE	6' X 6'	NORTHBOUND McCARTY ST	180' UPSTREAM FROM STOP BAR
OL-B(5+6+15)-2B	PULSE	6' X 6'	NORTHBOUND McCARTY ST	170' UPSTREAM FROM STOP BAR
OL-B(5+6+15)-3B	PULSE	6' X 6'	NORTHBOUND McCARTY ST	160' UPSTREAM FROM STOP BAR
OL-B(5+6+15)-1#	PULSE	6' X 6'	NORTHBOUND McCARTY ST	100' DOWNSTREAM FROM CROSSWALK
OL-B(5+6+15)-2#	PULSE	6' X 6'	NORTHBOUND McCARTY ST	100' DOWNSTREAM FROM CROSSWALK
OL-B(5+6+15)-3#	PULSE	6' X 6'	NORTHBOUND McCARTY ST	100' DOWNSTREAM FROM CROSSWALK
OL-C(4+3)-1A	PRESENCE	6' X 6'	EASTBOUND IH 610 FRONTAGE RD	10' UPSTREAM FROM STOP BAR
OL-C(4+3)-2A	PRESENCE	6' X 6'	EASTBOUND IH 610 FRONTAGE RD	10' UPSTREAM FROM STOP BAR
OL-C(4+3)-3A	PRESENCE	6' X 6'	EASTBOUND IH 610 FRONTAGE RD	10' UPSTREAM FROM STOP BAR
OL-C(4+3)-4A	PRESENCE	6' X 6'	EASTBOUND IH 610 FRONTAGE RD	10' UPSTREAM FROM STOP BAR
OL-C(4+3)-1B	PULSE	6' X 6'	EASTBOUND IH 610 FRONTAGE RD	330' UPSTREAM FROM STOP BAR
OL-C(4+3)-2B	PULSE	6' X 6'	EASTBOUND IH 610 FRONTAGE RD	330' UPSTREAM FROM STOP BAR
OL-C(4+3)-3B	PULSE	6' X 6'	EASTBOUND IH 610 FRONTAGE RD	330' UPSTREAM FROM STOP BAR
OL-C(4+3)-4B	PULSE	6' X 6'	EASTBOUND IH 610 FRONTAGE RD	330' UPSTREAM FROM STOP BAR
OL-D(8+7)-1A	PRESENCE	6' X 6'	WESTBOUND IH 610 FRONTAGE RD	10' UPSTREAM FROM STOP BAR
OL-D(8+7)-2A	PRESENCE	6' X 6'	WESTBOUND IH 610 FRONTAGE RD	10' UPSTREAM FROM STOP BAR

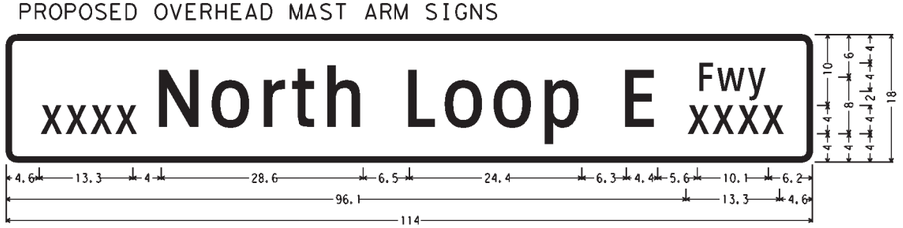
NOTE: LOCATION DESCRIPTION REFER TO LEADING EDGE OF DETECTOR

DETECTOR ID	DETECTOR SETTING	DETECTOR SIZE	ITEM BY DIRECTION	LOCATION DESCRIPTION
OL-D(8+7)-3A	PRESENCE	6' X 6'	WESTBOUND IH 610 FRONTAGE RD	10' UPSTREAM FROM STOP BAR
OL-D(8+7)-1B	PULSE	6' X 6'	WESTBOUND IH 610 FRONTAGE RD	330' UPSTREAM FROM STOP BAR
OL-D(8+7)-2B	PULSE	6' X 6'	WESTBOUND IH 610 FRONTAGE RD	330' UPSTREAM FROM STOP BAR
OL-D(8+7)-3B	PULSE	6' X 6'	WESTBOUND IH 610 FRONTAGE RD	330' UPSTREAM FROM STOP BAR
OL-E(2)-1A	PRESENCE	6' X 6'	NORTHBOUND McCARTY ST	10' UPSTREAM FROM STOP BAR
OL-E(2)-2A	PRESENCE	6' X 6'	NORTHBOUND McCARTY ST	10' UPSTREAM FROM STOP BAR
OL-E(2)-3A	PRESENCE	6' X 6'	NORTHBOUND McCARTY ST	10' UPSTREAM FROM STOP BAR
OL-E(2)-4A	PRESENCE	6' X 6'	NORTHBOUND McCARTY ST	10' UPSTREAM FROM STOP BAR
OL-E(2)-1B	PULSE	6' X 6'	NORTHBOUND McCARTY ST	330' UPSTREAM FROM STOP BAR
OL-E(2)-2B	PULSE	6' X 6'	NORTHBOUND McCARTY ST	330' UPSTREAM FROM STOP BAR
OL-F(6)-1A	PRESENCE	6' X 6'	SOUTHBOUND McCARTY ST	10' UPSTREAM FROM STOP BAR
OL-F(6)-2A	PRESENCE	6' X 6'	SOUTHBOUND McCARTY ST	10' UPSTREAM FROM STOP BAR
OL-F(6)-3A	PRESENCE	6' X 6'	SOUTHBOUND McCARTY ST	10' UPSTREAM FROM STOP BAR
OL-F(6)-4A	PRESENCE	6' X 6'	SOUTHBOUND McCARTY ST	10' UPSTREAM FROM STOP BAR
OL-F(6)-1B	PULSE	6' X 6'	SOUTHBOUND McCARTY ST	330' UPSTREAM FROM STOP BAR
OL-F(6)-2B	PULSE	6' X 6'	SOUTHBOUND McCARTY ST	330' UPSTREAM FROM STOP BAR
OL-G(1+11)-1A	PRESENCE	6' X 6'	SOUTHBOUND McCARTY ST	4' DOWNSTREAM FROM STOP BAR
OL-G(1+11)-1B	PRESENCE	6' X 6'	SOUTHBOUND McCARTY ST	6' UPSTREAM FROM STOP BAR
OL-G(1+11)-1C	PRESENCE	6' X 30'	SOUTHBOUND McCARTY ST	40' UPSTREAM FROM STOP BAR
OL-H(5+15)-1A	PRESENCE	6' X 6'	NORTHBOUND McCARTY ST	4' DOWNSTREAM FROM STOP BAR
OL-H(5+15)-1B	PRESENCE	6' X 6'	NORTHBOUND McCARTY ST	6' UPSTREAM FROM STOP BAR
OL-H(5+15)-1C	PRESENCE	6' X 30'	NORTHBOUND McCARTY ST	40' UPSTREAM FROM STOP BAR
OL-I(5+7+8+15)-1#	PULSE	6' X 6'	WESTBOUND IH 610 FRONTAGE RD	100' DOWNSTREAM FROM CROSSWALK
OL-I(5+7+8+15)-2#	PULSE	6' X 6'	WESTBOUND IH 610 FRONTAGE RD	100' DOWNSTREAM FROM CROSSWALK
OL-I(5+7+8+15)-3#	PULSE	6' X 6'	WESTBOUND IH 610 FRONTAGE RD	100' DOWNSTREAM FROM CROSSWALK
OL-J(1+3+4+11)-1#	PULSE	6' X 6'	EASTBOUND IH 610 FRONTAGE RD	100' DOWNSTREAM FROM CROSSWALK
OL-J(1+3+4+11)-2#	PULSE	6' X 6'	EASTBOUND IH 610 FRONTAGE RD	100' DOWNSTREAM FROM CROSSWALK
OL-J(1+3+4+11)-3#	PULSE	6' X 6'	EASTBOUND IH 610 FRONTAGE RD	100' DOWNSTREAM FROM CROSSWALK

NOTE: LOCATION DESCRIPTION REFER TO LEADING EDGE OF DETECTOR

PROPOSED OVERHEAD MAST ARM SIGNS

S1

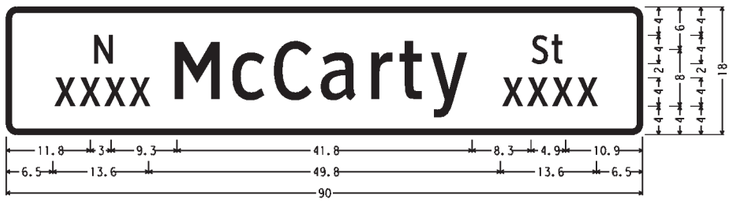


1.5" Radius, 0.8" Border, White on, Green;
"", ClearviewHwy-3-W; "XXXX", ClearviewHwy-3-W 75% spacing;
"North Loop E", ClearviewHwy-3-W 75% spacing;
"Fwy", ClearviewHwy-3-W 75% spacing; "XXXX", ClearviewHwy-3-W 75% spacing;

S3

R3-8L
30"x30"

S2



1.5" Radius, 0.8" Border, White on, Green;
"N", ClearviewHwy-3-W; "XXXX", ClearviewHwy-3-W; "McCarty",
ClearviewHwy-3-W 75% spacing;
"St", ClearviewHwy-3-W; "XXXX", ClearviewHwy-3-W;

S4

R6-2R
18"x24"

S5

R6-2L
18"x24"

NOTE: BLOCK NUMBERS "XXXX" TO BE CONFIRMED WITH CITY OF HOUSTON PRIOR TO INSTALLATION.

ELECTRICAL SERVICE DATA

ELECTRICAL SERVICE NAME	CALLOUT	ELECTRICAL SERVICE DESCRIPTION (SEE ED(5), ED(6), ED (7) & ED(8)-14)	SERVICE CONDUIT SIZE (RMC)	SERVICE CONDUCTORS NO./SIZE	SAFETY SWITCH AMPS	MAIN CKT. BRK. POLE/AMP	TWO-POLE CONTACTOR AMPS	PANELBD./ LOADCENTER AMP RATING (MIN)	CIRCUIT NO.	BRANCH CKT. BRK. POLE/AMPS	BRANCH CIRCUIT AMPS	kVA LOAD
IH 610 NORTH LOOP AT McCARTY ST	(H)	ELEC SERV TY D (120/240)060(NS)SS(E)SP(O)	1-1/4"	3/#6	N/A	2P/60	30	100	TRF. SIG	1P/50	40	6.2
									LIGHTING	2P/20	6	

DATE: 2/28/2023 8:16:52 AM
FILE: H:\rfSignals\Hal Tran\CCSJ 0110-06-154\MAIN.dgn

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

03/01/2023

IH 610
AT UA 90
TRAFFIC SIGNAL
PROPOSED LAYOUT

SHEET 4 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0110	06	154	SS 261
DIST	COUNTY		SHEET NO.
HOU	HARRIS		23

CONDUIT AND CONDUCTOR RUNS

RUN NO.	CONDUIT (618)														CONDUCTORS (620)				TRAY CABLE (621)		CABLES (684)						LOOP (684)			
	PVC														POWER		GROUND		LUMINAIRE		PEDESTRIAN				SIGNAL		LOOP		LEAD-IN	
	1.25" (SCHD 80)		2" (SCHD 80)				3" (SCHD 80)				4" (SCHD 80)				#4 INSULATED		#8 BARE		#12/4C Tray Cable		#14/3C		#14/5C		#14/7C		#14 INSULATED		#14/2C	
	(Subsidiary)		(6046)		(6047)		(6053)		(6054)		(6058)		(6059)		(6012)		(6007)		(6005)		(6029)		(6031)		(6033)		(Subsidiary)		(6080)	
	NO.	TRENCH	NO.	TRENCH	NO.	BORE	NO.	TRENCH	NO.	BORE	NO.	TRENCH	NO.	BORE	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH
	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF
1	4	5															1	140									1	400		
2					1	140											1	140											4	140
3			1	60	1	80											1	140											4	140
4			1	50													1	50											4	50
5	3	5																									1	265		
6			1	60	1	40											1	100											3	100
7			1	20											2	20	1	20	6	20										
8									1	35							1	35	6	35									7	35
9					1	35									2	35	1	35												
10			1	15													1	15			1	15	1	15						
11			1	15													1	15			1	15	1	15						
12			1	15													1	15			1	15	1	15						
13	6	5																									1	985		
14					1	55											1	55			1	55	1	55					6	55
15	4	5																									1	515		
16													1	55			1	55	6	55	3	55	3	55					17	55
17					1	55									2	55	1	55												
18							1	10									1	10	1	10	1	10	1	10	4	10				
19							1	10									1	10	1	10	1	10	1	10	4	10				
20									1	65			1	65			2	65	4	65	5	65	5	65	8	65			17	65
21					1	65									2	65	1	65												
22	4	5																									1	515		
23	2	5																									1	155		
24			1	120	1	60											1	180											2	180
25			1	140													1	140											2	140
26	3	5																									1	340		
27			1	60	1	40											1	100											3	100
28					1	40											1	40											5	40
29					1	15											1	15			1	15	1	15						
30					1	15											1	15			1	15	1	15						
31													2	55			2	55	4	55	7	55	7	55	8	55			26	55
32					1	55									2	55	1	55												
33			1	15													1	15			1	15	1	15						
34							1	10									1	10	1	10					4	15				
35											2	50					2	50	3	50	8	50	8	50	12	50			26	50
36			1	120											2	120	1	120												
37	3	5																									1	265		
38											2	70					2	70	3	70	8	70	8	70	12	70			29	70
39			1	70											2	70	1	70												
40	3	5																									1	385		
41			1	60													1	60											3	60
42	2	5																									1	155		
43			1	100	1	80											1	180											2	180
44			1	100	1	50											1	150											2	150
45					1	40											1	40											5	40
46			1	15													1	15			1	15	1	15						
47			1	15													1	15			1	15	1	15						
48	3	5																									1	265		
49			1	50													1	50											3	50
50							1	10									1	10	1	10					4	10				

03/01/2023

IH 610
AT UA 90
TRAFFIC SIGNAL
PROPOSED LAYOUT

SHEET 5 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0110	06	154	SS 261
DIST	COUNTY		SHEET NO.
HOU	HARRIS		24

DATE: 2/28/2023 8:17:16 AM
FILE: H:\rfSignals\Hal Tran\CCSJ 0110-06-154\MAIN.dgn

CONDUIT AND CONDUCTOR RUNS

RUN NO.	CONDUIT (618)														CONDUCTORS (620)				TRAY CABLE (621)		CABLES (684)						LOOP (684)			
	PVC														POWER		GROUND		LUMINAIRE		PEDESTRIAN				SIGNAL		LOOP		LEAD-IN	
	1.25" (SCHD 80)		2" (SCHD 80)				3" (SCHD 80)				4" (SCHD 80)				#4 INSULATED		#8 BARE		#12/4C Tray Cable		#14/3C		#14/5C		#14/7C		#14 INSULATED		#14/2C	
	(Subsidiary)		(6046)		(6047)		(6053)		(6054)		(6058)		(6059)		(6012)		(6007)		(6005)		(6029)		(6031)		(6033)		(Subsidiary)		(6080)	
	NO.	TRENCH	NO.	TRENCH	NO.	BORE	NO.	TRENCH	NO.	BORE	NO.	TRENCH	NO.	BORE	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH
	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF
51			1	15													1	15			1	15	1	15						
52									1	50							1	50	1	50	1	50	1	50	4	50			3	50
53	4	5																									1	515		
54													1	65			1	65	1	65	3	65	3	65	4	65			12	65
55							1	10									1	10	1	10	1	10	1	10	3	10				
56							1	10									1	10	1	10	1	10	1	10	4	10				
57									1	55			1	55			2	55	3	55	5	55	5	55	11	55			12	55
58	3	5																									1	265		
59			1	100													1	100											3	100
60	3	5																									1	265		
61			1	30	1	140											1	170											3	170
62			1	160													1	160											3	160
63					1	45											1	45											6	45
64			1	15													1	15			1	15	1	15						
65			1	15													1	15			1	15	1	15						
66	3	5																									1	355		
67									1	50			1	50			2	50	3	50	7	50	7	50	11	50			21	50
68	6	5																									1	985		
69			1	15													1	15			1	15	1	15						
70													2	100			2	100	3	100	8	100	8	100	11	100			27	100
71											4	10					4	10			16	10	16	10	23	10			56	10
72			1	10											2	10	1	10												
POLE A																			1	40	1	5	1	10	4	20				
MAST ARM A																									3	40				
POLE B																			1	40	1	5	1	10	4	20				
MAST ARM B																									4	60				
POLE C																			1	40					4	20				
MAST ARM C																									4	50				
POLE D																			1	40					4	20				
MAST ARM D																									4	50				
POLE E																			1	40	1	5	1	10	3	20				
MAST ARM E																									3	50				
POLE F																			1	40	1	5	1	10	4	20				
MAST ARM F																									3	40				
PED POLE J																					1	5	1	10						
PED POLE K																					1	5	1	10						
PED POLE L																					1	5	1	10						
PED POLE M																					1	5	1	10						
PED POLE N																					1	5	1	10						
PED POLE P																					1	5	1	10						
PED POLE Q																					1	5	1	10						
PED POLE R																					1	5	1	10						
PED POLE S																					1	5	1	10						
PED POLE T																					1	5	1	10						
PED POLE U																					1	5	1	10						
PED POLE V																					1	5	1	10						
TOTAL (LF)		280		1460		1050		60		255		280		600		860		3705		2530		4020		4100		7085		6630		18785
EST. TOTAL		**295**		**1535**		**1105**		**65**		**270**		**295**		**630**		**905**		**3895**		**2660**		**4225**		**4305**		**7440**		**6965**		**19725**

03/01/2023

IH 610
AT UA 90
TRAFFIC SIGNAL
PROPOSED LAYOUT

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0110	06	154	SS 261
DIST	COUNTY		SHEET NO.
HOU	HARRIS		25

DATE: 2/28/2023 8:17:35 AM
FILE: H:\rfSignals\Hal Tran\CCSJ 0110-06-154\MAIN.dgn

LEGEND

- DIRECTION OF TRAFFIC FLOW
- PP — EXIST. POWER POLE
- EXIST. TRAFFIC SIGNAL POLE
- EXIST. PEDESTRIAN SIGNAL HEAD
- EXIST. SIGNAL CONTROLLER
- EXIST. ELECTRICAL SERVICE POLE

IH 610 FRONTAGE RD (45 MPH)

McCARTY ST (45 MPH)

EXIST. CURB RAMP (TO BE REMOVED)
EXIST. PEDESTAL POLE (TO BE REMOVED)
EXIST. ELECTRICAL SERVICE POLE (TO BE REMOVED)
EXIST. CURB RAMPS (TO BE REMOVED)
EXIST. SIGNAL POLE (TO BE REMOVED)
EXIST. SIGNAL POLE (TO BE REMOVED)
EXIST. CTMS CONTROL HOUSE (TO REMAIN)
EXIST. TRAFFIC SIGNAL CONTROLLER (TO BE REMOVED)
EXIST. CURB RAMP (TO BE REMOVED)
EXIST. PEDESTAL POLE (TO BE REMOVED)
EXIST. CURB RAMP (TO BE REMOVED)
EXIST. SIGNAL POLE (TO BE REMOVED)
EXIST. CUT-THROUGH RAMPS (TO BE REMOVED)
EXIST. CURB RAMP (TO BE REMOVED)
EXIST. PEDESTAL POLE (TO BE REMOVED)
EXIST. PEDESTAL POLE (TO BE REMOVED)
EXIST. CURB RAMP (TO BE REMOVED)

36 LF B
96 LF B
48 LF C
72 LF B
205 LF B
215 LF B
190 LF B
60 LF A
12 LF C
36 LF C
48 LF C

ONLY

CALLOUT

- A — ELIM EXT PAV MRK & MRKS (6")
- B — ELIM EXT PAV MRK & MRKS (12")
- C — ELIM EXT PAV MRK & MRKS (24")

IH 610
AT UA 90
PAVEMENT MARKINGS AND PEDESTRIAN FACILITIES
EXISTING LAYOUT

0 20 40
SCALE IN FEET
1" = 40'

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

03/01/2023

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0110	06	154	SS 261
DIST	COUNTY		SHEET NO.
HOU	HARRIS		26

DATE: 2/28/2023 8:17:59 AM
FILE: H:\Traffic Signals\Hou Tran\CCSJ 0110-06-154\MAIN.dgn

LEGEND

- DIRECTION OF TRAFFIC FLOW
- PP — EXIST. POWER POLE
- PP/T — EXIST. POWER POLE W/TRANSFORMER
- PROP. MAST ARM POLE
- PROP. PED POLE W/PUSH BUTTON
- PROP. TRAFFIC SIGNAL CONTROLLER
- PROP. GROUND BOX
- PROP. ELECTRICAL SERVICE POLE

IH 610 FRONTAGE RD (45 MPH)

McCARTY ST (45 MPH)

PROP. CURB RAMP (TYPE 2)

PROP. CURB RAMPS (TYPE 22) (RAISED ISLANDS)

PROP. CURB RAMP (TYPE 1)

PROP. CURB RAMPS (TYPE 21)

EXIST. CTMS CONTROL HOUSE

DETAIL 1

DETAIL 2

DETAIL 3

DETAIL 4

ONLY

CALLOUT

A — REFL PAV MRK TY I (W)6"(DOT) (100MIL)

B — REFL PAV MRK TY I (W)24"(SLD) (100MIL)

IH 610
AT UA 90
PAVEMENT MARKINGS AND PEDESTRIAN FACILITIES
PROPOSED LAYOUT

0 20 40
SCALE IN FEET
1" = 40'

SHEET 1 OF 2

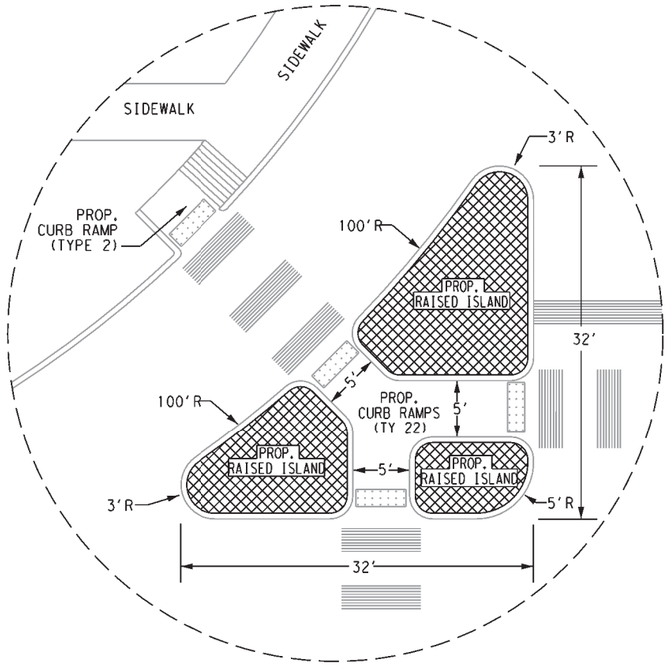
Texas Department of Transportation

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

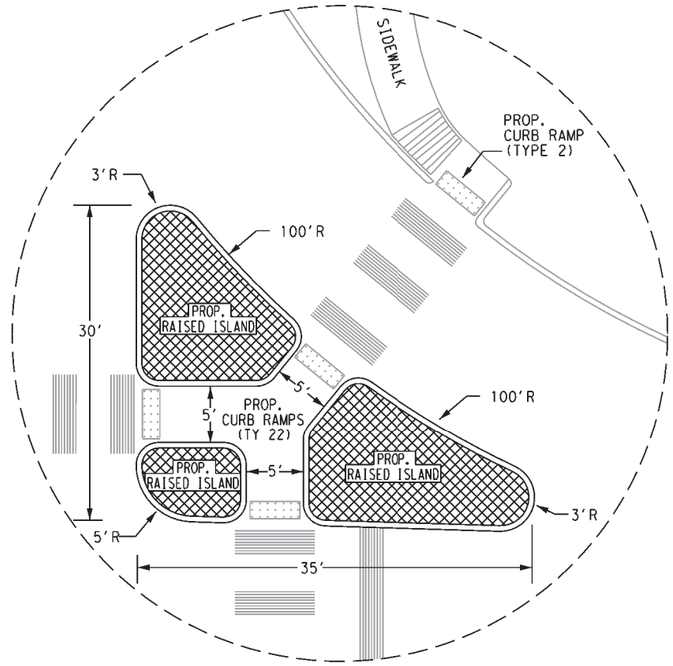
03/01/2023

CONT	SECT	JOB	HIGHWAY
0110	06	154	SS 261
DIST	COUNTY		SHEET NO.
HOU	HARRIS		27

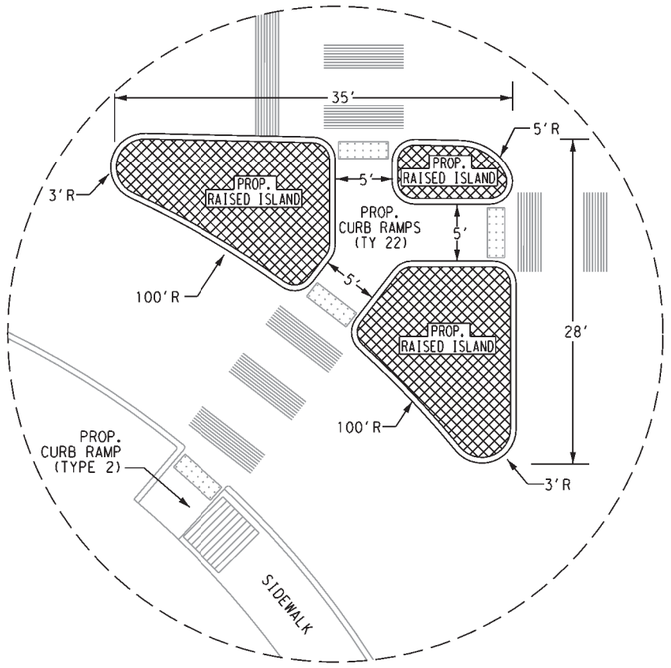
DATE: 2/28/2023 8:18:57 AM
FILE: H:\Traffic Signals\Houston TranSYS\CCSJ 0110-06-154\MAIN.dgn



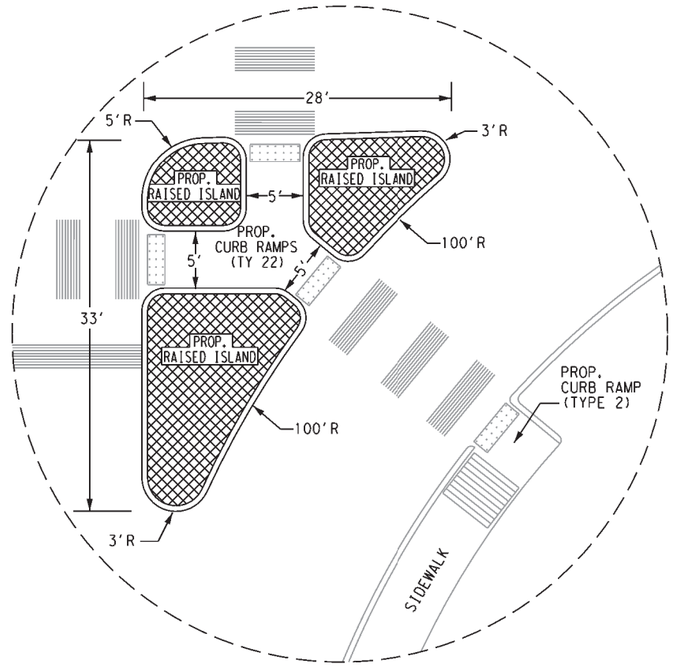
DETAIL 1
(N.T.S.)



DETAIL 3
(N.T.S.)



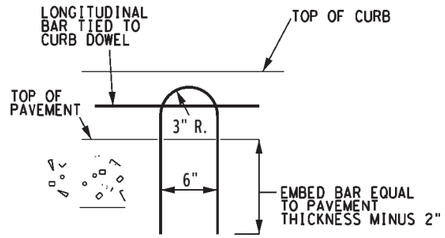
DETAIL 2
(N.T.S.)



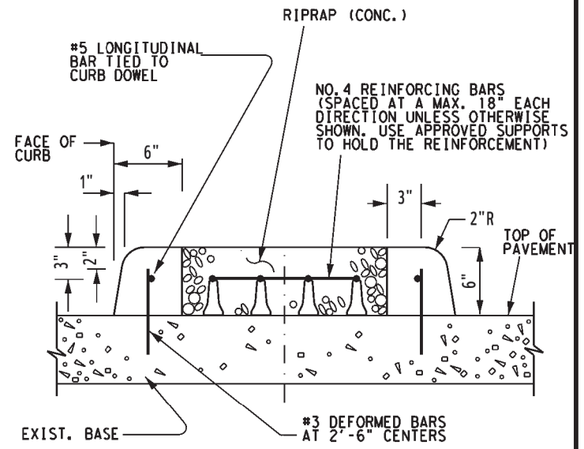
DETAIL 4
(N.T.S.)

NOTES:

1. EXACT LOCATION AND SIZE OF ISLAND TO BE APPROVED BY THE ENGINEER IN THE FIELD PRIOR TO ACTUAL CONSTRUCTION.
2. THE CONTRACTOR SHALL FURNISH AND INSTALL ALL MATERIALS NECESSARY TO INSTALL THE PROPOSED RAISED ISLAND. ANY ADDITIONAL MATERIALS NOT LISTED, BUT REQUIRED BY THE ENGINEER IN THE FIELD SHALL BE CONSIDERED SUBSIDIARY TO THE ITEM "INSTALLATION OF HIGHWAY TRAFFIC SIGNALS".



CURB DOWEL DETAIL



RAISED ISLAND SECTION

IH 610
AT UA 90
PAVEMENT MARKINGS AND PEDESTRIAN FACILITIES
PROPOSED LAYOUT

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

03/01/2023

SHEET 2 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0110	06	154	SS 261
DIST	COUNTY		SHEET NO.
HOU	HARRIS		28

DATE: 2/28/2023 8:19:47 AM
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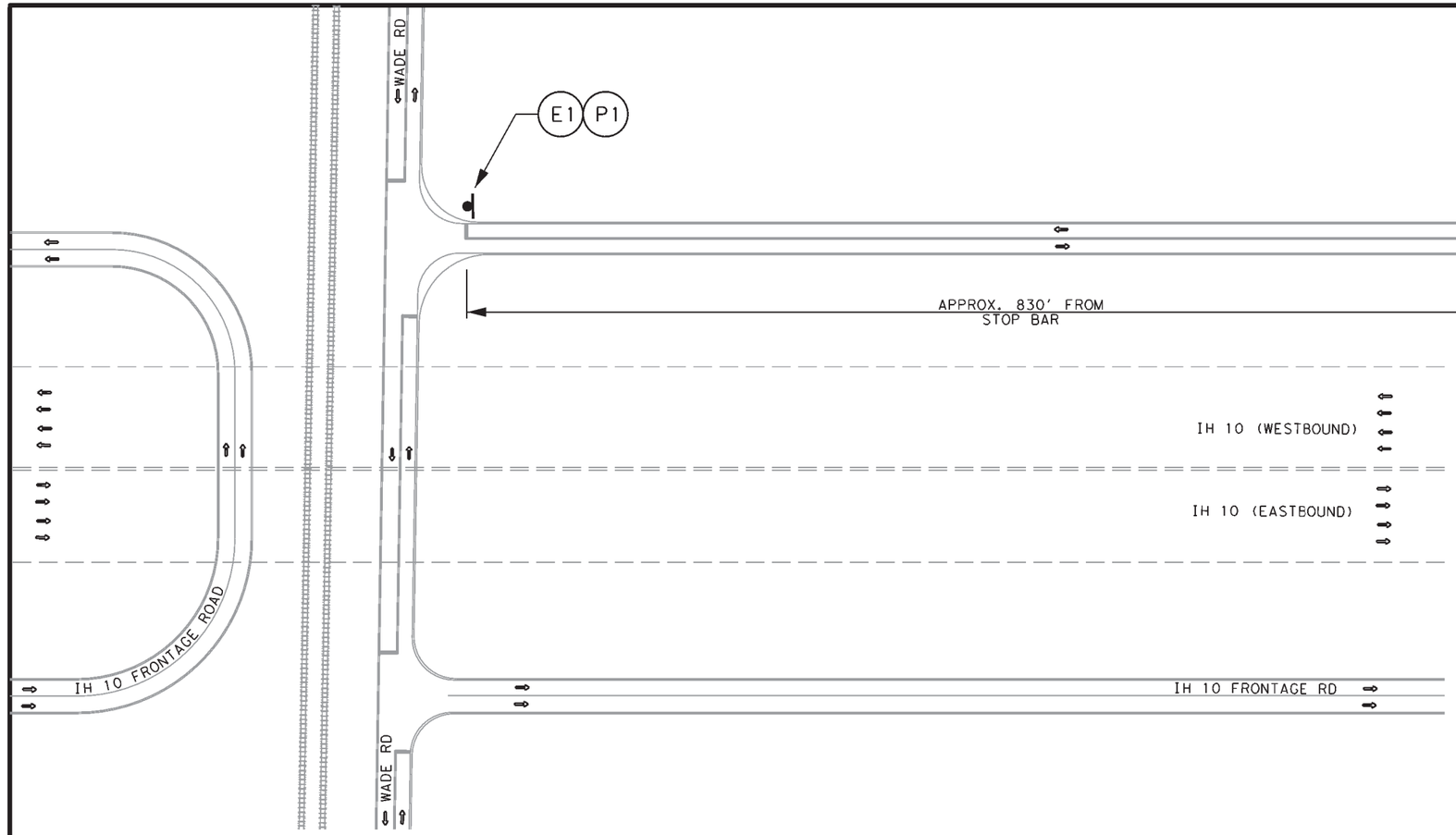


N

LEGEND

⇦ DIRECTION OF TRAFFIC FLOW

EXISTING SIGN ASSEMBLY

NOTES

-INSTALL SIGNALS WITH ALTERNATELY FLASHING YELLOW 12 IN. LENS.

-FURNISH BLACK HOUSING FOR VEHICLE SIGNALS. FURNISH BLACK VEHICLE SIGNAL HEAD BACK PLATES.

-FURNISH VEHICLE SIGNAL HEADS WITH LIGHT EMITTING DIODE (LED) SIGNAL LAMP UNITS.

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

-THE LOCATION OF SIGNS ARE APPROXIMATE. THE EXACT LOCATION WILL BE DETERMINED BY THE ENGINEER IN THE FIELD.

-PLACEMENT LOCATION FOR SOLAR PANEL REQUIRES DIRECT SUNLIGHT AND MUST BE APPROVED BY THE ENGINEER IN THE FIELD.

-REFER TO STANDARD SPECIFICATION 685: ROADSIDE FLASHING BEACON ASSEMBLIES FOR MORE DETAILS.

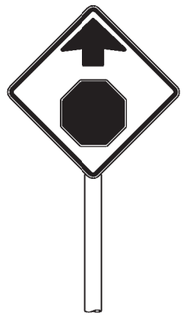
-REFER TO STANDARD SPECIFICATION 6227: SOLAR POWERED LED ROADSIDE SIGN FOR MORE DETAILS.

-POSTED SPEED LIMIT ON IH 10 FRONTAGE RD IS 35 MPH.

EXISTING
STOP SIGN ASSEMBLY
(TO BE REMOVED)

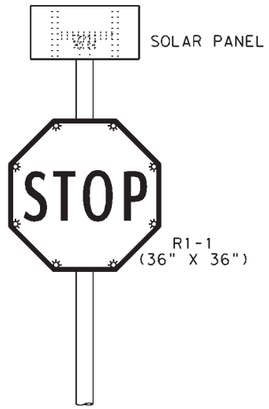
E1

EXISTING
STOP AHEAD
SIGN ASSEMBLY
(TO BE REMOVED)



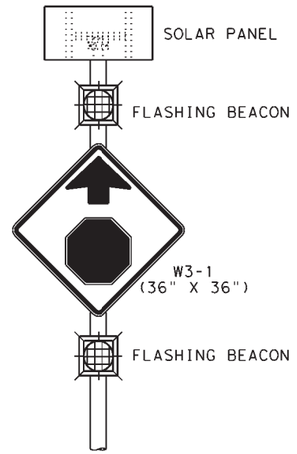
E2

PROPOSED
SOLAR-POWERED
LED STOP SIGN
ASSEMBLY



P1

PROPOSED
SOLAR-POWERED
WITH FLASHERS
STOP AHEAD
SIGN ASSEMBLY



P2

PROPOSED
LED-EMBEDDED
STOP SIGN

R1-1 36x36;
0.9" Border, White on, Red;
"STOP", C 60% spacing;

PROPOSED
STOP AHEAD
SIGN

W3-1 36x36;
36.0" across sides 2.25" Radius,
0.88" Border, 0.63" Indent,
Black on, Orange;
Down Arrow Custom - 13.5" 90';

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

03/01/2023

IH 10
AT WADE RD
TRAFFIC SIGNAL
PROPOSED LAYOUT

0 50 100
SCALE IN FEET
1" = 100'

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0110	06	154	SS 261
DIST	COUNTY		SHEET NO.
HOU	HARRIS		29

DATE: 2/28/2023 8:20:09 AM
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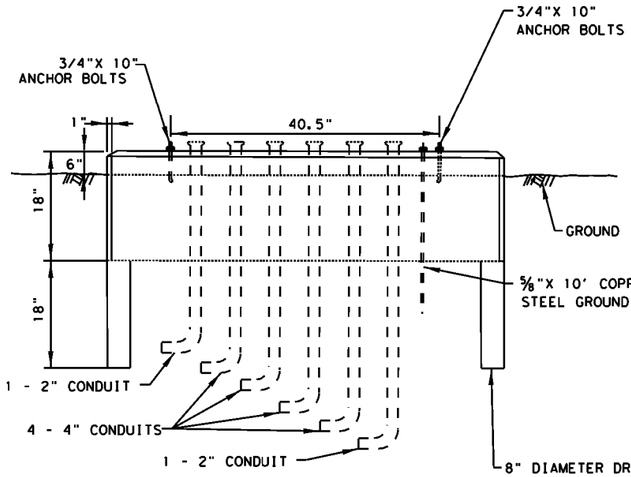
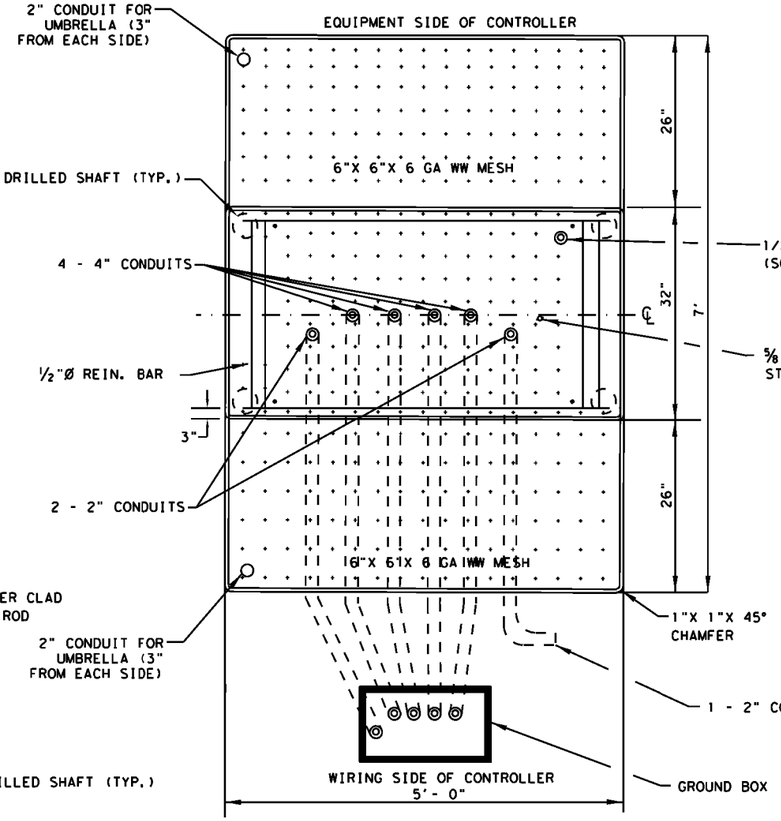
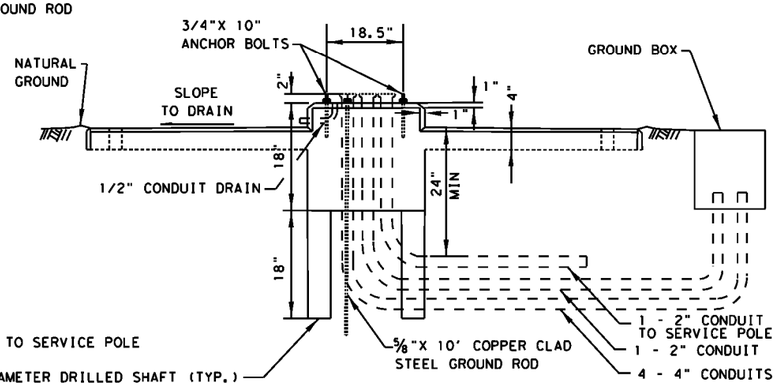


MODEL 340 DETAIL
FRONT VIEW



MODEL 340 DETAIL
TOP VIEW



MODEL 340 DETAIL
SIDE VIEW

NOTES:

1. CENTER THE CONTROLLER CABINET ON THE FOUNDATION.
2. MODIFY DIMENSIONS FOR CONCRETE BASE TO FIT EQUIPMENT FURNISHED, IF NECESSARY.
3. PROVIDE CONDUIT DRAIN FOR CONTROLLER CABINET AND GRAVEL DRAIN FOR ALL GROUND BOXES.
4. FURNISH CLASS "B" CONCRETE.
5. SET THE TOP OF THE STEP OF THE CONTROLLER CABINET FOUNDATION NO LOWER THAN THE LEVEL OF THE PAVEMENT SURFACE OR AS APPROVED BY THE ENGINEER.
6. FURNISH AT NO COST TO THE DEPARTMENT ANY ADDITIONAL CONCRETE WHICH MAY BE NECESSARY TO STABILIZE THE FOUNDATION AT UNUSUAL LOCATIONS.
7. PLACE REINFORCING BARS AS DIRECTED. (REFER TO SD/SCFD, 6" SLAB)
8. UPON INSTALLING THE CONTROLLER CABINET, APPLY A SILICON-BASED CAULKING COMPOUND AROUND THE BASE OF THE CONTROLLER CABINET.
9. INSTALL 1 1/2 " PVC CONDUIT WITH FIVE #6 AWG CONDUCTORS, TWO #18 AWG CONDUCTORS AND ONE CAT 5 CABLE WITH CONNECTOR BETWEEN THE BBU AND CONTROLLER CABINETS.

TEXAS DEPARTMENT OF TRANSPORTATION
HOUSTON DISTRICT

SIGNAL DETAILS/STANDARDS
340 ITS CONTROLLER CABINET FOUNDATION DETAILS

SCALE	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY
N. T. S.	6	TEXAS				SS 261
REVISIONS	STATE DISTRICT	COUNTY	CONTROL	SECTION	JOB	SHEET NO.
	HOU	HARRIS	0110	06	154	30

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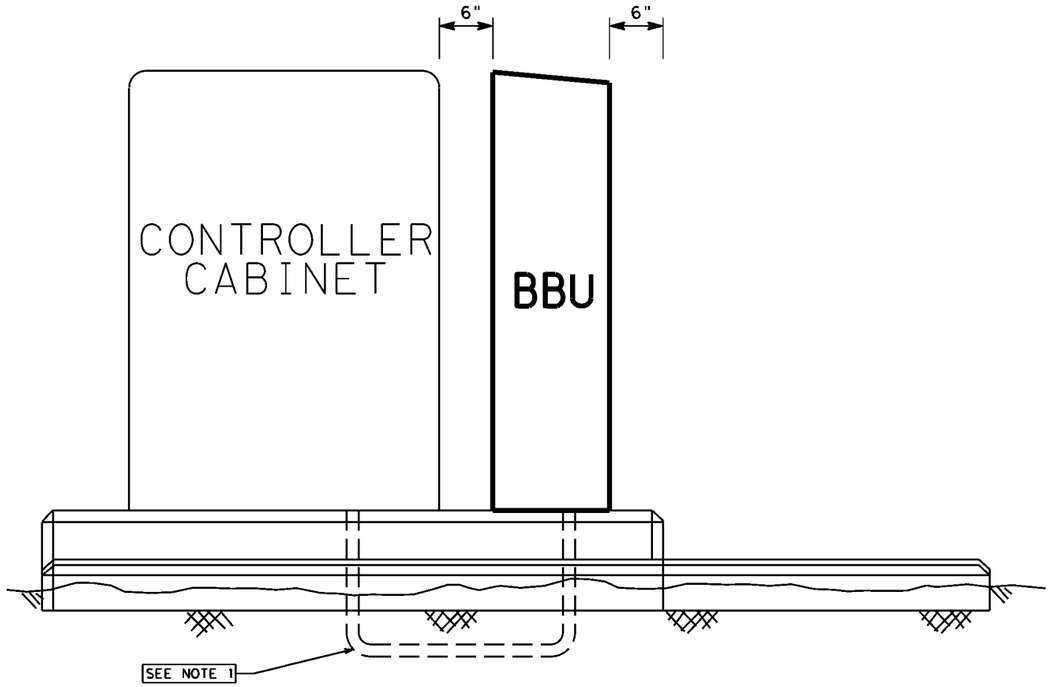
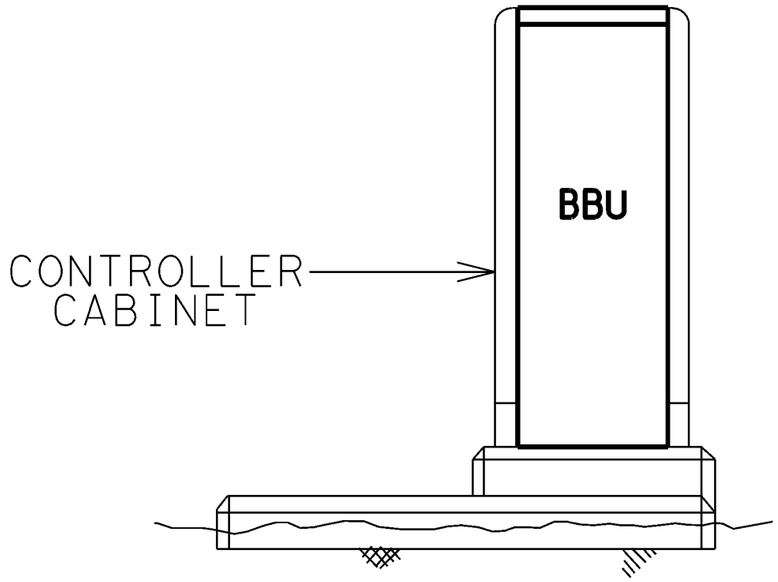
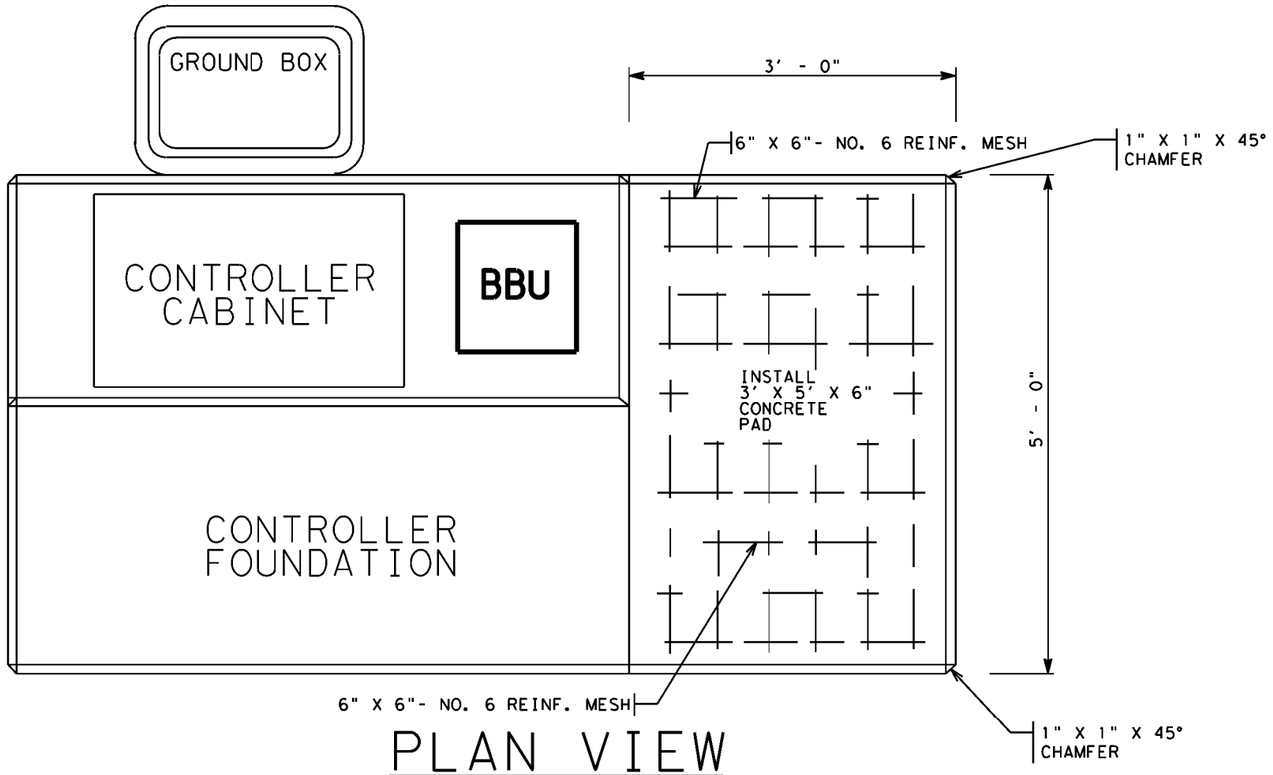


ELEVATION VIEW



SIDE VIEW



PLAN VIEW

NOTES:

1. INSTALL 1 1/2 " PVC CONDUIT WITH FIVE #6 AWG CONDUCTORS, TWO #18 AWG CONDUCTORS AND ONE CAT 5 CABLE WITH CONNECTOR BETWEEN THE TWO CABINETS.
2. EXTEND THE CONCRETE CONTROLLER PAD (REFER TO SD/SCFD, 6" SLAB) UNDER THE BBU AS SHOWN BELOW.
3. THE ABOVE WORK PERFORMED AND MATERIALS FURNISHED WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE SUBSIDIARY TO THE BBU ASSEMBLY.
4. FURNISH CLASS "B" CONCRETE FOR FOUNDATION.

TEXAS DEPARTMENT OF TRANSPORTATION
HOUSTON DISTRICT

SIGNAL DETAILS/STANDARDS INSTALLATION OF BBU EXTERNAL BATTERY CABINET (SIDE MOUNT)

SCALE	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY
N.T.S.	6	TEXAS				SS 261
REVISIONS	STATE DISTRICT	COUNTY	CONTROL	SECTION	JOB	SHEET NO.
5-14-14	HOU	HARRIS	0110	06	154	31

DATE: 11/28/2022 3:12:17 PM
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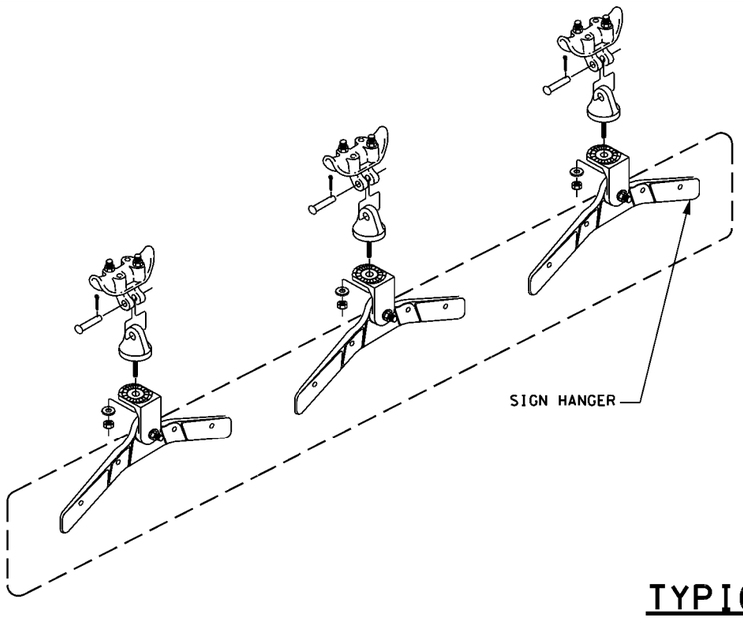
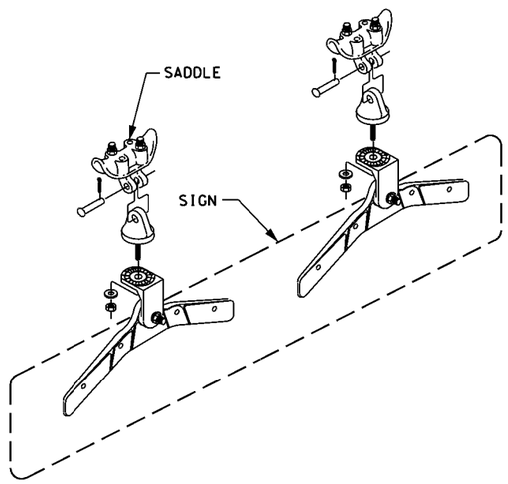
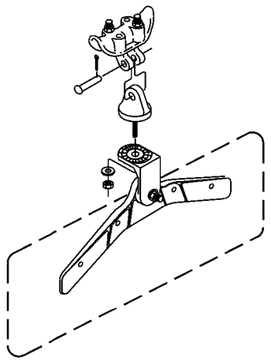
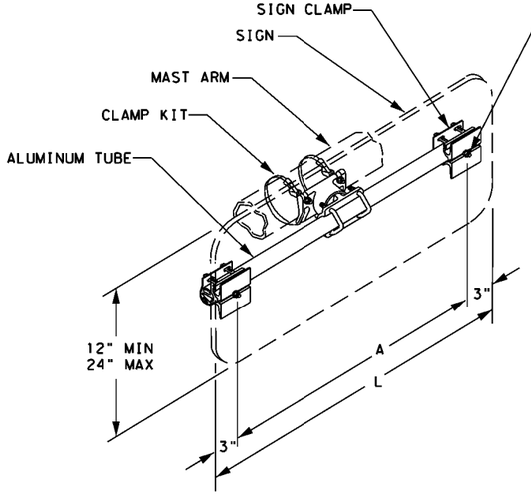


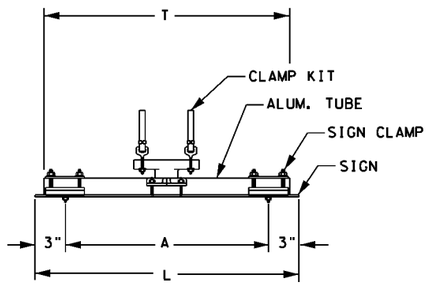


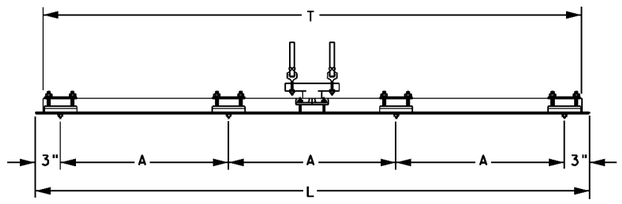


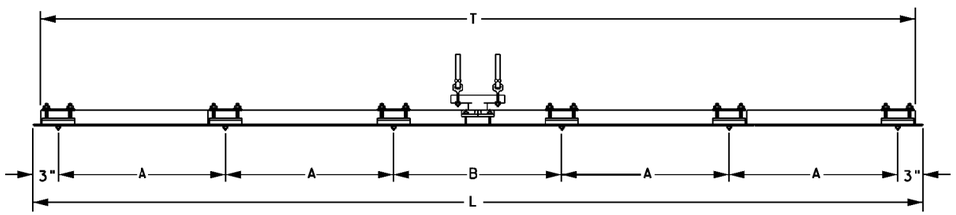
1. USE PELCO PARTS OR APPROVED EQUAL.
2. FURNISH HARDWARE FOR A COMPLETE INSTALLATION.
3. ATTACH THE 90 LB SPAN WIRE CLAMPS (SADDLES) TO TETHERS (SWAY CABLES).
4. FURNISH 1 ADJUSTABLE FREE SWINGING SIGN HANGER PER STREET NAME SIGN SMALLER THAN 3 FT. - 0 IN. SIGNS 3 FT - 0 IN. TO 6 FT.- 0 IN. REQUIRE 2 HANGERS. SIGNS LARGER THAN 6 FT. - 0 IN. REQUIRE 3 HANGERS.

TYPICAL SPAN WIRE SIGN HANGER DETAILS









SIGNS (1'-6" to 3'-0" Long)

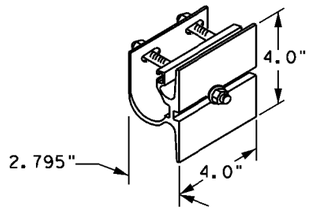
SIGN LENGTH (L)	TUBE LENGTH (T)	A
1'-6"	16"	12"
2'-0"	22"	18"
2'-6"	28"	24"
3'-0"	34"	30"

SIGNS (3'-6" to 8'-0" Long)

SIGN LENGTH (L)	TUBE LENGTH (T)	A
3'-6"	40"	12"
4'-0"	46"	14"
4'-6"	52"	16"
5'-0"	58"	18"
5'-6"	64"	20"
6'-0"	70"	22"
6'-6"	76"	24"
7'-0"	82"	26"
7'-6"	88"	28"
8'-0"	94"	30"

SIGNS (8'-6" to 10'-0" Long)

SIGN LENGTH (L)	TUBE LENGTH (T)	A	B
8'-6"	100"	19"	20"
9'-0"	106"	20"	22"
9'-6"	112"	21"	24"
10'-0"	118"	22"	26"



SIGN CLAMP DETAIL

GUSSETED TUBE CROSS SECTION

TYPICAL MAST ARM SIGN MOUNT DETAILS

DATE: 11/28/2022 3:12:43 PM
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Texas Department of Transportation
Houston District

SIGNAL DETAILS/STANDARDS
OVERHEAD STREET NAME SIGN
MOUNTING DETAILS

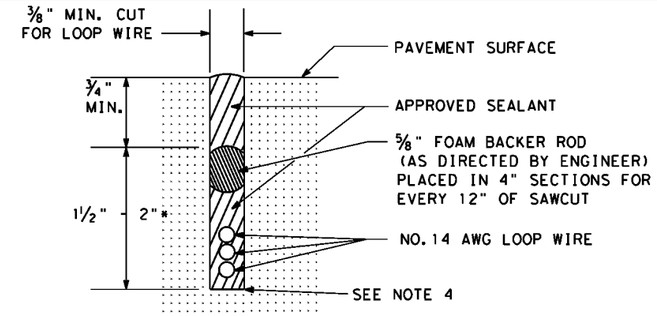
OSNS/MD

DN:	CK:	DW:	CK:

DIST	FED REG	PROJECT NO.	SHEET
HOU	6		32

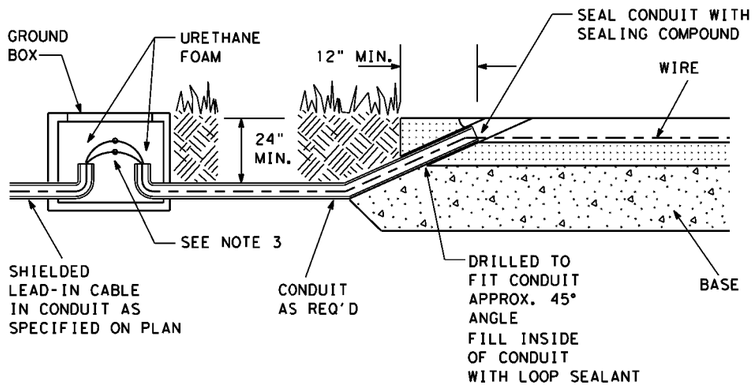
COUNTY	CONTROL	SECT	JOB	HIGHWAY
HARRIS	0110	06	154	SS 261

STD-M12

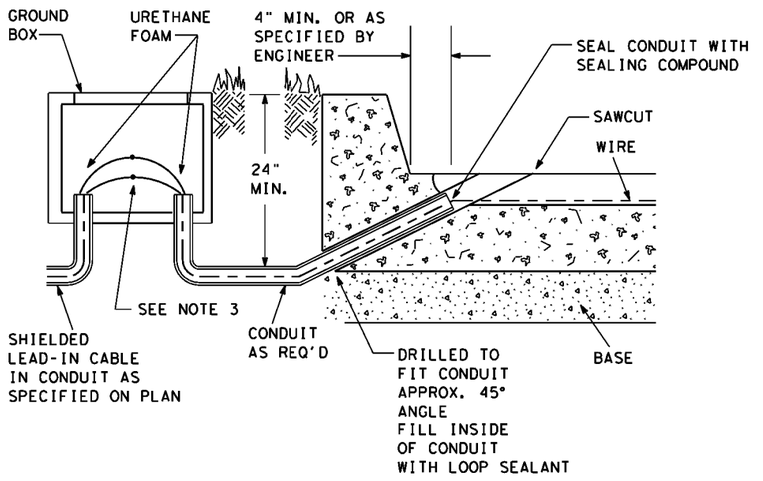


LOOP SAW CUT CROSS-SECTION

* SAWCUTS IN BRIDGE DECKS ARE TYPICALLY 1" DEPTH MAXIMUM
SAWCUTS IN BRIDGE DECKS AND ACROSS EXPANSION JOINTS
SHALL BE AS APPROVED BY ENGINEER

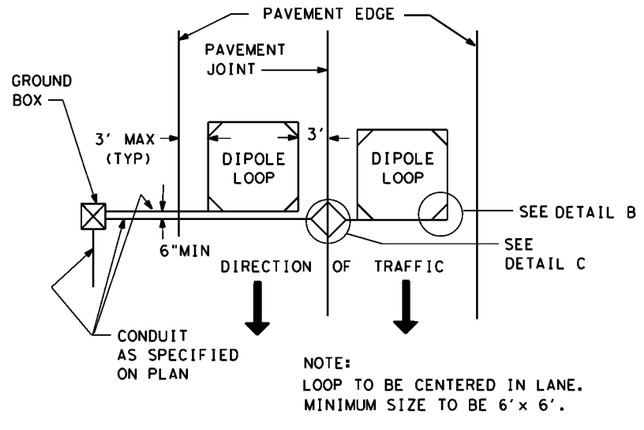


TYPICAL LEAD IN CONFIGURATION (WITHOUT CURBING)

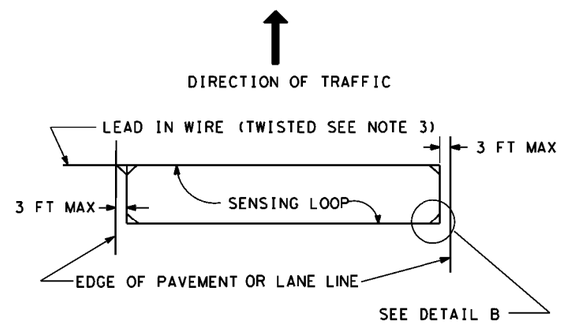


TYPICAL LEAD IN CONFIGURATION (WITH CURBING)

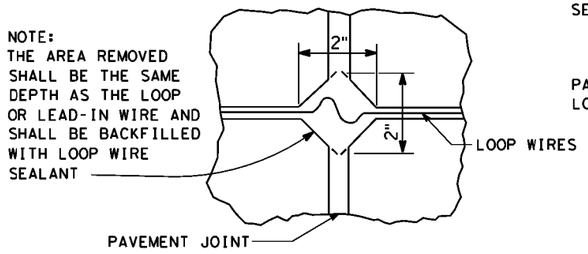
TYPE DET.	NUMBER OF LANES	LENGTH	WIDTH	TURNS OF WIRE
PULSE	1	6 FT.- 12 FT.	6 FT.	4
PULSE	2	13 FT.-26 FT.	6 FT.	3
PULSE	3	27 FT.-39 FT.	6 FT.	2
PULSE	4	40 FT.-46 FT.	6 FT.	1
PRES-ENCE	1	40 FT.	6 FT.	2



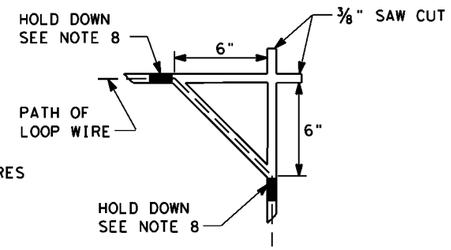
PAVEMENT JOINT DETAILS



TYPICAL LAYOUT OF DIPOLE LOOP



DETAIL C



DETAIL B

TYPICAL ALL FOUR CORNERS
(DIPOLE LOOPS)

NOTES:

1. INSTALL THE LOOP WIRES IN THE SHORTEST TIME PRACTICAL, NOT TO EXCEED 4 HOURS MAXIMUM AND SCHEDULE THIS WORK DURING OFF- PEAK HOURS TO MINIMIZE DELAY TO VEHICLE TRAFFIC.
2. CUT PAVEMENT WITH A CONCRETE SAW TO NEAT LINES AND REMOVE LOOSE MATERIAL. ENSURE A CLEAN AND DRY CUT WHEN PLACING THE SEALING COMPOUND.
3. TWIST LEAD-IN WIRES A MINIMUM OF FIVE TURNS PER FOOT AND DO NOT DISTURB THEM AFTER THE LOOP HAS BEEN TUNED. DO NOT TWIST LOOP WIRES IN SAW CUT.
4. SEAL WIRE PLACED IN THE SAW CUT BY FULLY ENCAPSULATING IT IN A SEALANT ACCEPTABLE TO THE ENGINEER. SEALING COMPOUND SHALL BE IN ACCORDANCE WITH DMS 6340.
5. INSTALL TWO-CONDUCTOR #14 SHIELDED CABLE FROM THE BASE OF A STEEL POLE OR TOP OF A WOOD POLE TO THE CONTROLLER OR AS APPROVED BY THE ENGINEER.
6. ENSURE CONNECTIONS ARE SOLDERED. SEAL SOLDER JOINT WITH SCOTCH CAST OR OTHER METHOD ACCEPTABLE TO THE ENGINEER.
7. FURNISH #14 XHHW LOOP WIRE LOOSELY ENCASED IN A FLEXIBLE VINYL OR PLASTIC TUBE. APPLY A WATERPROOF SEAL TO THE ENDS OF THE VINYL OR PLASTIC TUBING ENCASING THE WIRE IMMEDIATELY AFTER PLACING THE WIRE TO PREVENT MOISTURE FROM ENTERING THE TUBE.
8. SECURE THE LOOP WIRE IN PLACE EVERY 2 FT. WITH SHORT STRIPS OF RUBBER OR NEOPRENE FLEXIBLE TUBING OR POLYETHYLENE FOAM SEALANT BACKER APPROXIMATELY 1 IN. IN LENGTH. LEAVE STRIPS IN PLACE AND FILL THE SLOT WITH LOOP SEALER.
9. INSTALL SAWCUT OF SUFFICIENT DEPTH TO PROVIDE FOR A MINIMUM OF 1 IN. DEPTH OF SEALER OVER THE WIRE.
10. INSTALL EACH LOOP DETECTOR LEAD-IN IN A SEPARATE SAWCUT FROM THE DETECTOR TO THE EDGE OF ROADWAY. SEPARATE THE SAW CUTS AT A MINIMUM OF 6 IN. INSTALL EACH LOOP DETECTOR RUN IN A SEPARATE CONDUIT (SIZE AS REQUIRED) FROM THE EDGE OF ROADWAY TO A GROUND BOX AS SHOWN ON THE PLAN LAYOUT.
11. PLACE LOOP WIRE IN A FLEXIBLE VINYL OR POLYETHYLENE TUBING OF 0.184 IN. MINIMUM I.D., 0.031 IN. MINIMUM WALL THICKNESS AND 0.26 IN. MAXIMUM O.D., HAVING A SMOOTH BORE. ENSURE THE TUBING DOES NOT ADHERE TO THE LOOP WIRE IN ANY WAY. ENSURE TUBING IS CAPABLE OF RESISTING DETERIORATION FROM OILS, SOLVENTS AND TEMPERATURES UP TO 212°F. ENSURE TUBING IS HIGHLY ABRASION RESISTANT AND REMAINS FLEXIBLE FROM -22°F TO 212°F.

Texas Department of Transportation
Houston District

SIGNAL DETAILS/STANDARDS
LOOP DETECTOR DETAILS

LDD

FILE:	DN:	CK:	DW:	CK:
© TxDOT 2015	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 8/2004 7/2012 SPELLING 7/2015 °C TO °F	HOU	6		33
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	HARRIS	0110	06	154	SS 261

STD-M3

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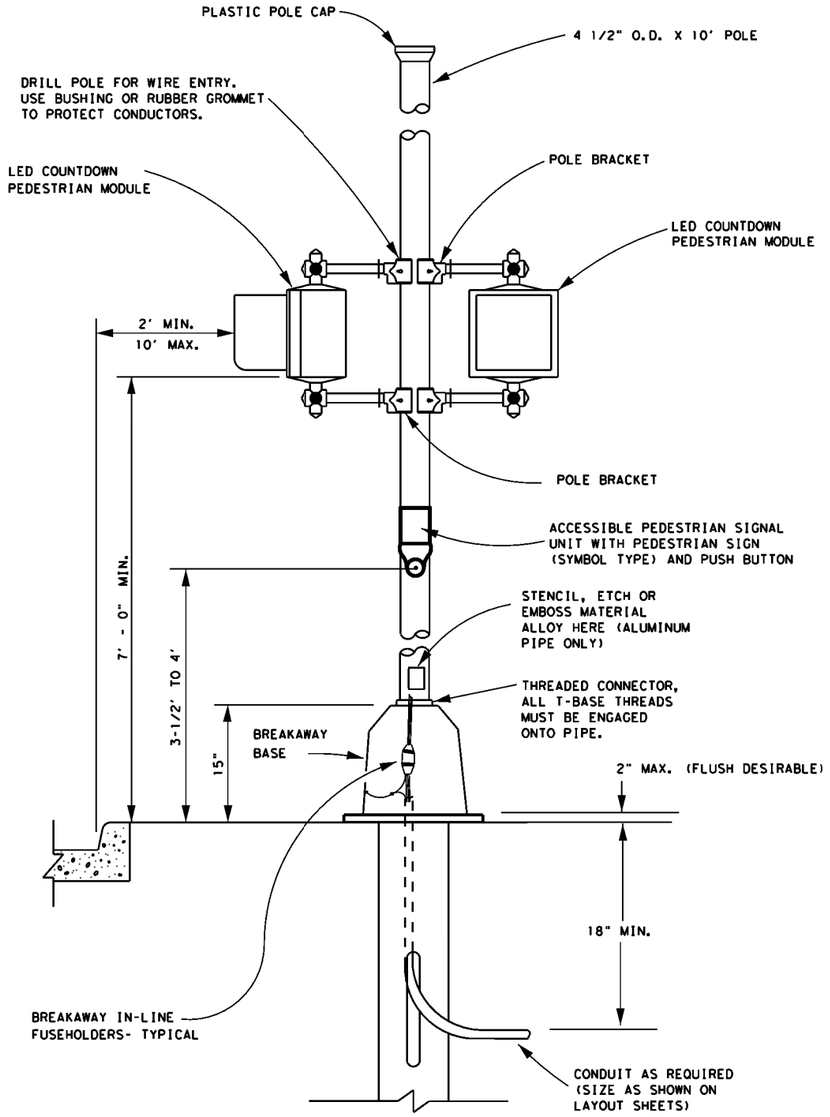
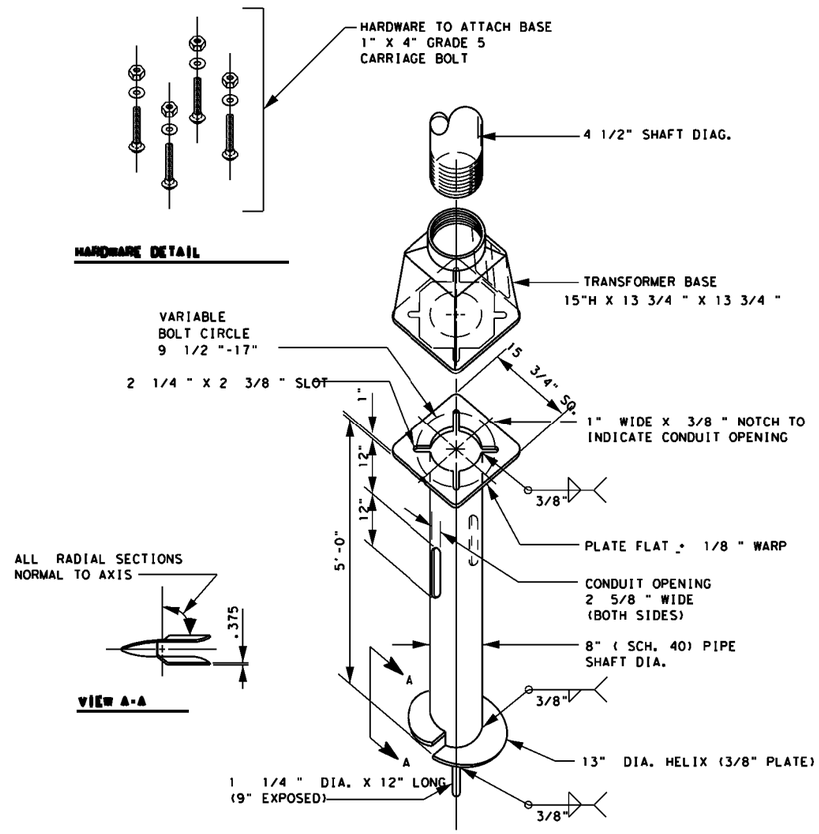
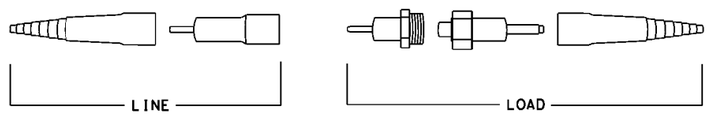




SCREW ANCHOR FOUNDATION DETAIL

NOTE:

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).



NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS
EXPLODED VIEW- TYPICAL

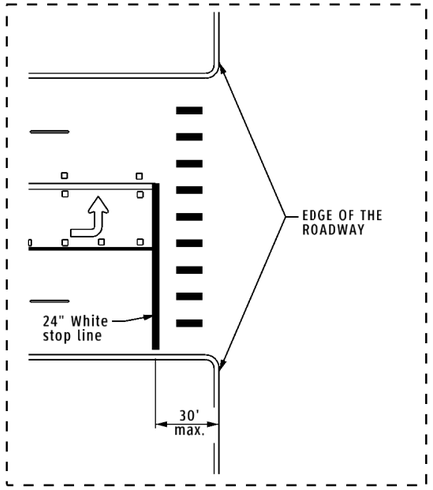
Texas Department of Transportation
Houston District

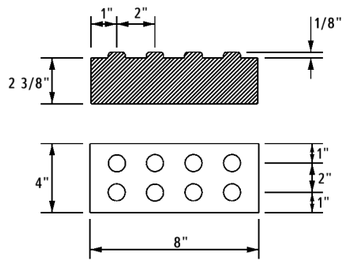
SIGNAL DETAILS/STANDARDS CONSTRUCTION DETAILS FOR POLE MOUNTED (APS) PEDESTRIAN SIGNALS

CD/PM(APS)PS(MOD)

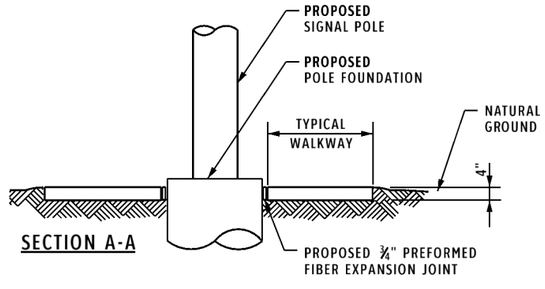
FILE:	DN:	CK:	DW:	CK:
© TxDOT 2012	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 07-14 02-15 02-23	HOU	6		34
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	HARRIS	0110	06	154	SS 261

STD-M19

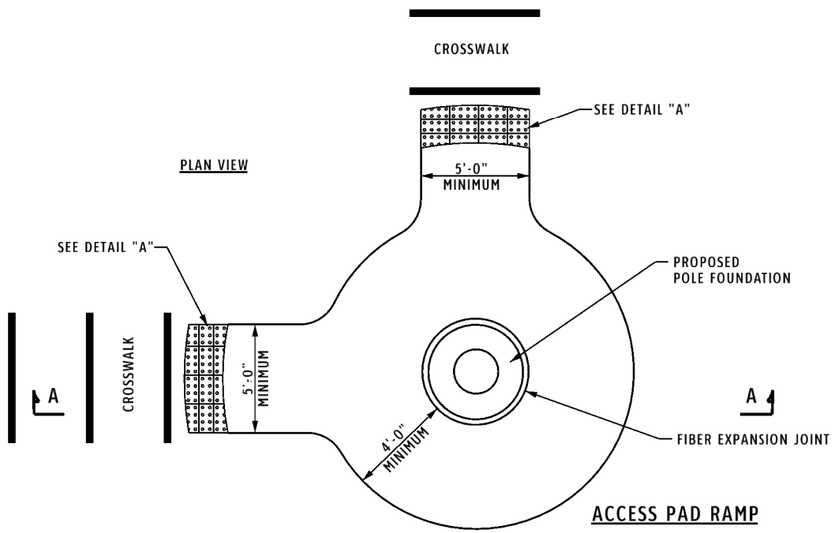




DETAIL "A"



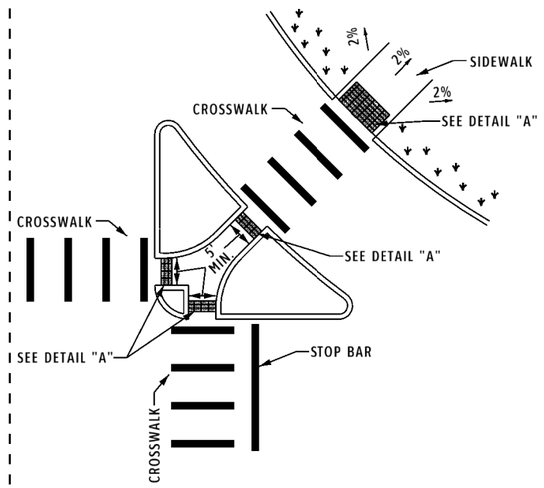
SECTION A-A

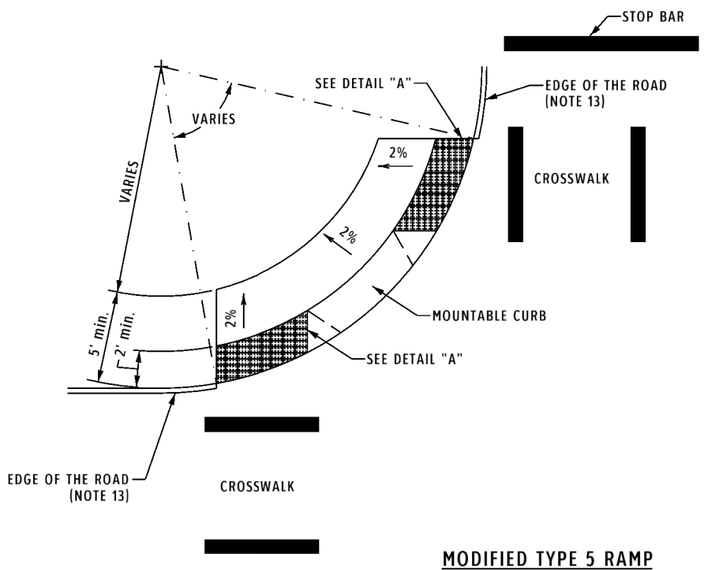


ACCESS PAD RAMP

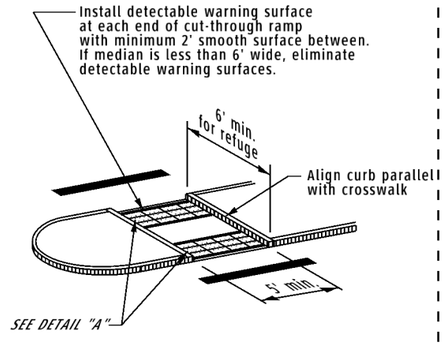
Pedestrian Facilities
General Notes

1. All slopes are maximum allowable. The least possible slope that will still drain properly should be used. Adjust access pad length or grade of approach sidewalks as directed.
2. Detectable Warning Paver shown in Detail "A" will be subsidiary to the Bid Item 531.
3. The minimum sidewalk width is 5'. Where the sidewalk is adjacent to the edge of pavement, a 6' sidewalk width is encouraged. Where a 5' sidewalk can not be provided due to site constraints, a minimum 3' sidewalk with 5'x 5' passing areas at intervals not to exceed 200' is required.
4. Landings shall be 5'x 5' minimum with a maximum 2% slope in any direction.
5. Maneuvering 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.
6. Maximum allowable cross slope on sidewalk and curb ramp surfaces is 2%.
7. Additional information on access pads/sidewalks location, design, light reflective value and texture may be found in the current edition of the Texas Accessibility Standards (TAS) and 16 TAC §68.102.
8. To serve as a pedestrian refuge area, the median should be a minimum of 5' wide. Medians should be designed to provide accessible passage over or through them.
9. 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.
10. Existing features that comply with TAS may remain in place unless otherwise shown on the plans.
11. Access pads/side walks and landings shall be constructed and paid for in accordance with Item 531 "Sidewalks".
12. Provide a smooth transition where the access pad/side walk connect to the street.
13. If ramps are in rural locations, curbs may not exist and shoulders may be present.





MODIFIED TYPE 5 RAMP
WITH DIRECTIONAL DETECTABLE WARNING SURFACE



TEXAS DEPARTMENT OF TRANSPORTATION
HOUSTON DISTRICT

ACCESS PAD RAMP DETAILS

ACCRD

SCALE	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY
N. T. S.	6	TEXAS				SS 261
REVISIONS	STATE DISTRICT	COUNTY	CONTROL	SECTION	JOB	SHEET NO.
		HARRIS	0110	06	154	35

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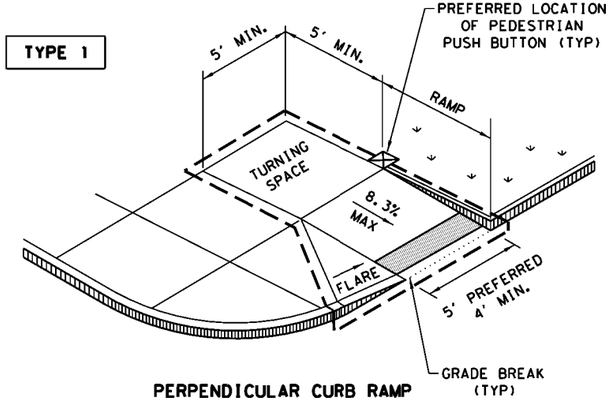
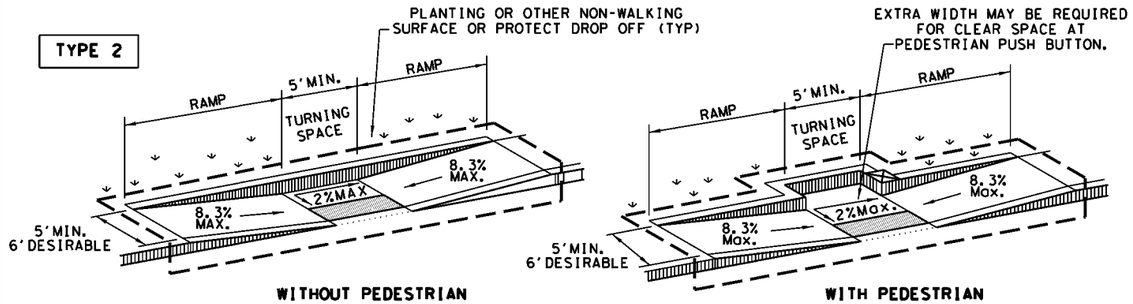
DATE: 11/28/2022
FILE: H:\TrfSignals\Hoi Tran\CCSJ 0110-06-154\MAIN.dgn

TYPE 1



PERPENDICULAR CURB RAMP

TYPE 2

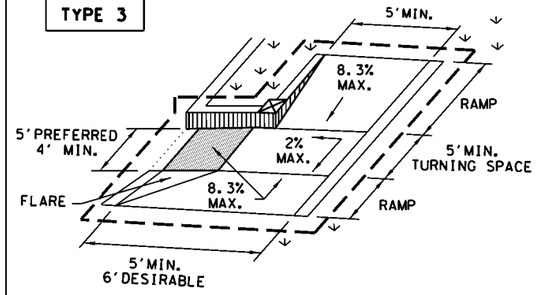


WITHOUT PEDESTRIAN PUSH BUTTON

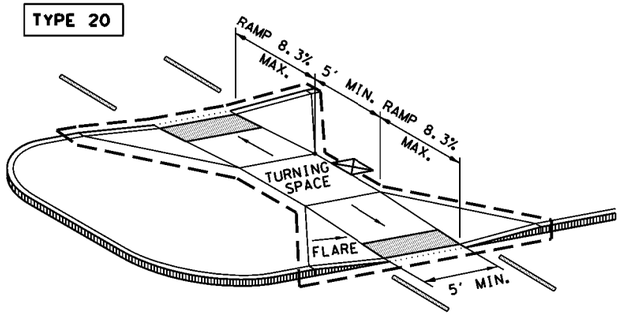
WITH PEDESTRIAN PUSH BUTTON

PARALLEL CURB RAMP

TYPE 3



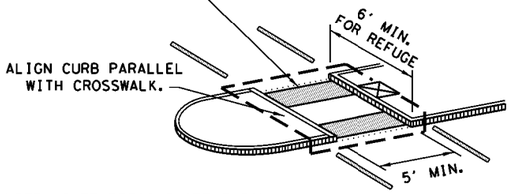
TYPE 20



CURB RAMPS AT MEDIAN ISLANDS

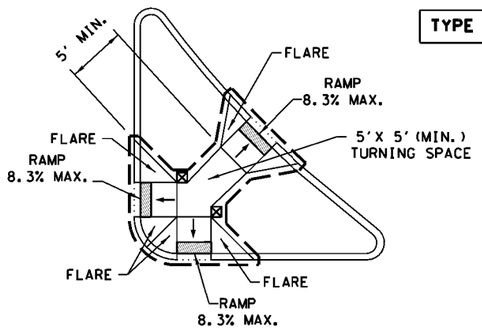
INSTALL DETECTABLE WARNING SURFACE AT EACH END OF THE CUT-THROUGH RAMP WITH A MINIMUM 2' USUAL SIDEWALK SURFACE BETWEEN. IF MEDIAN IS LESS THAN 6' WIDE, ELIMINATE DETECTABLE WARNING SURFACES.

TYPE 21



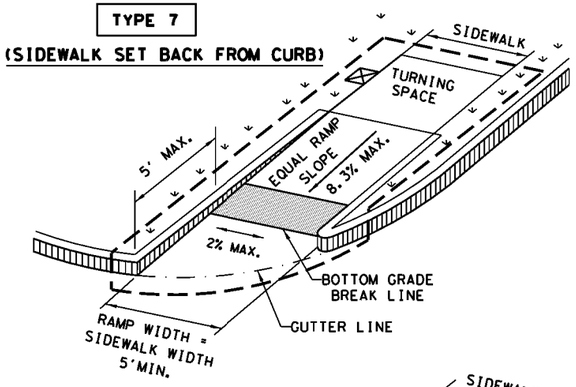
NOTE: CURB DETAILS ARE SHOWN ELSEWHERE IN THE PLANS.

TYPE 22

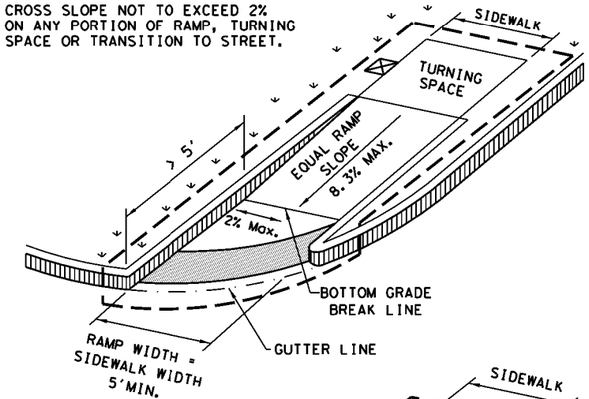


COMBINATION ISLAND RAMPS

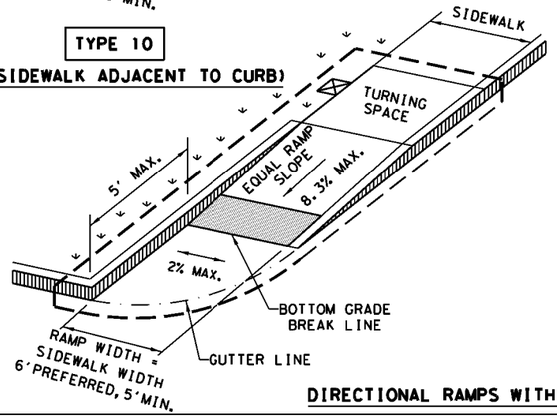
TYPE 7
(SIDEWALK SET BACK FROM CURB)



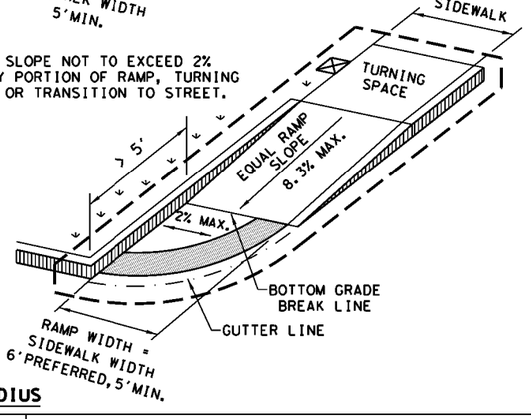
CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.



TYPE 10
(SIDEWALK ADJACENT TO CURB)

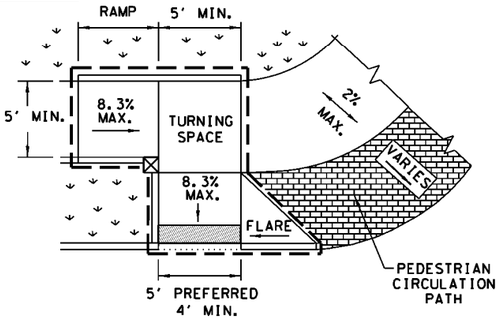


CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.



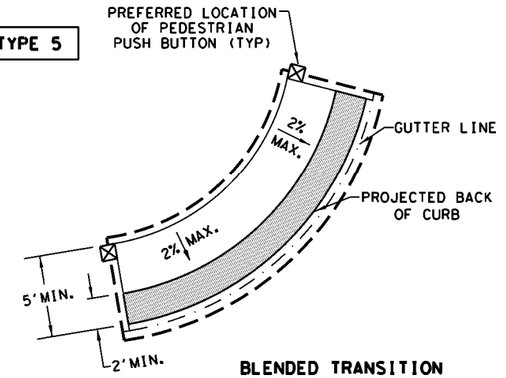
DIRECTIONAL RAMPS WITHIN RADIUS

TYPE 6



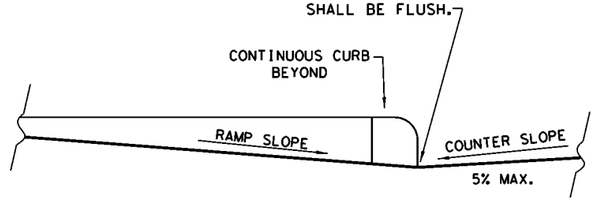
COMBINATION CURB RAMPS

TYPE 5



BLENDED TRANSITION
(FLUSH LANDING)

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	0110	06	154	SS 261
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		36

DATE: 11/28/2022
FILE: H:\Trf\Signals\Hoi Tran\CCSJ 0110-06-154\MAIN.dgn

GENERAL NOTES

CURB RAMPS

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

DETECTABLE WARNING MATERIAL

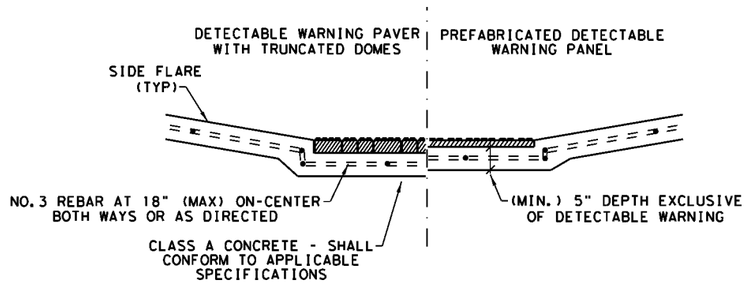
19. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with PROWAG. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material 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.

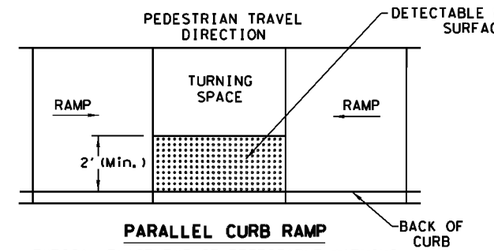
SIDEWALKS

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.

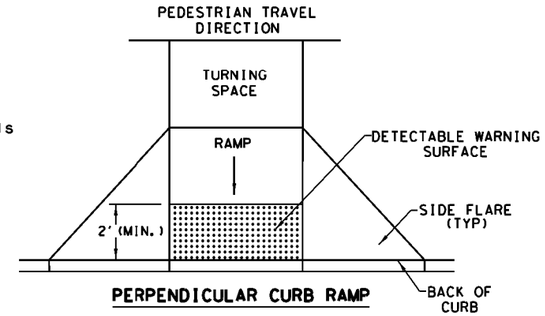


SECTION VIEW DETAIL
CURB RAMP AT DETECTIBLE WARNINGS

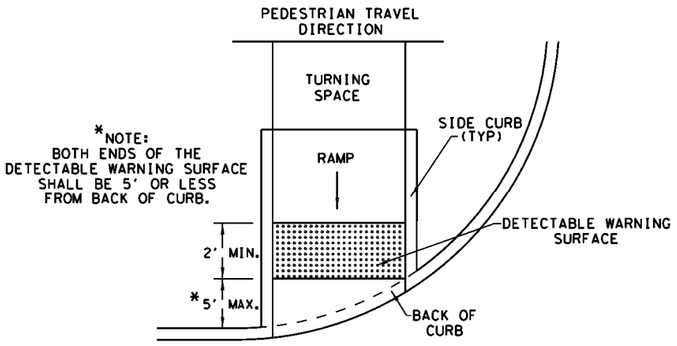
DETECTABLE WARNING SURFACE DETAILS



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

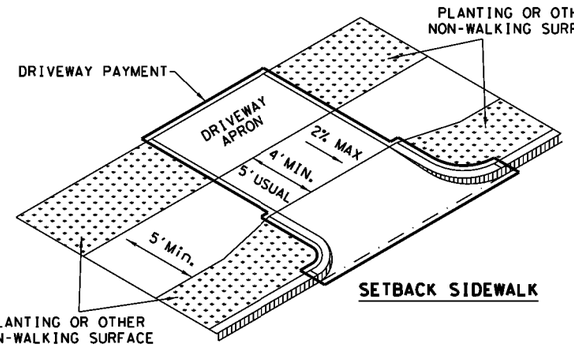
PEDESTRIAN FACILITIES CURB RAMPS

PED-18

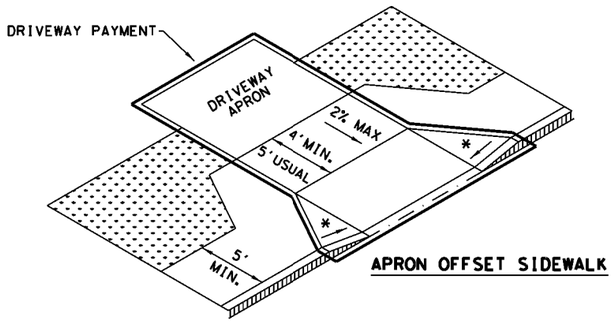
FILE: ped18	DN: TxDOT		DW: VP	CK: KM	CK: PK & JG	
© TxDOT: MARCH, 2002	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0110	06	154		SS 261	
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY			SHEET NO.	
	HOU	HARRIS			37	

DATE: 11/28/2022
FILE: H:\Traffic Signals\Hai Tran\CCSJ 0110-06-154\MAIN.dgn

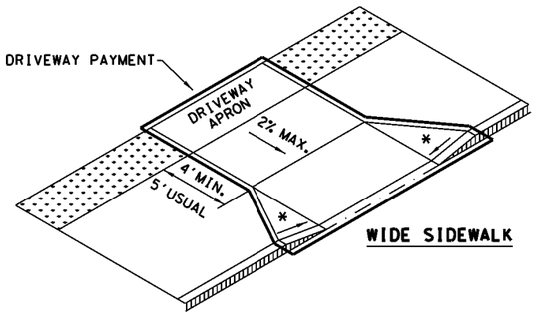
SIDEWALK TREATMENT AT DRIVEWAYS



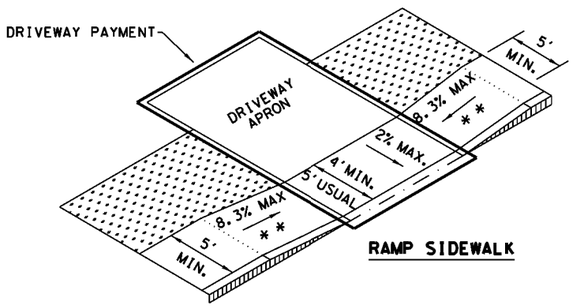
SETBACK SIDEWALK



APRON OFFSET SIDEWALK



WIDE SIDEWALK

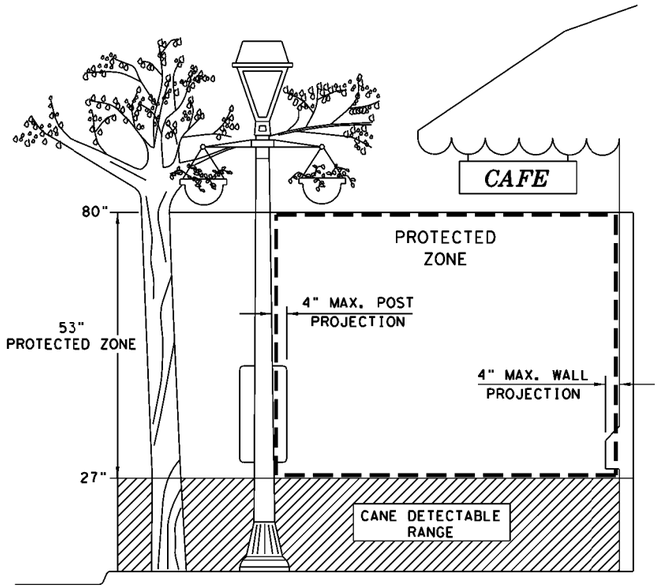


RAMP SIDEWALK

NOTES:

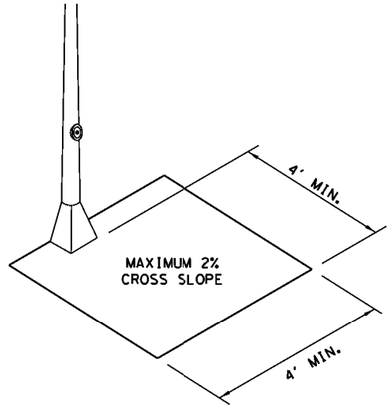
* WHERE DRIVEWAYS CROSS THE PEDESTRIAN ROUTE, SIDES SHALL BE FLARED AT 10% MAX SLOPE.

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

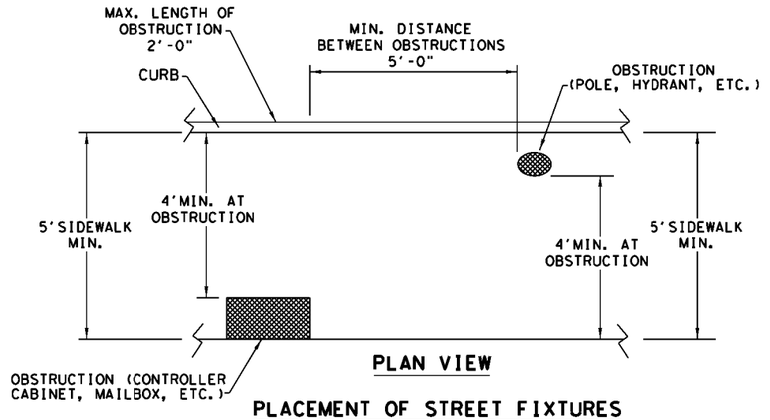


PROTECTED ZONE

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



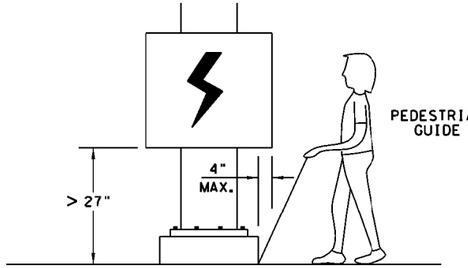
CLEAR SPACE ADJACENT TO PEDESTRIAN PUSH BUTTON



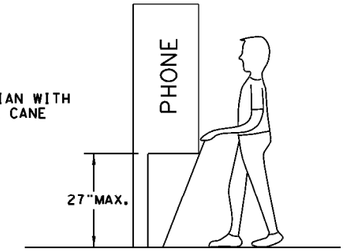
PLAN VIEW

PLACEMENT OF STREET FIXTURES

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



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



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

DETECTION BARRIER FOR VERTICAL CLEARANCE < 80"

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

PED-18

FILE: ped18	DN: TxDOT		DW: VP	CK: KM	CK: PK & JG
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REVISIONS	0110	06	154		SS 261
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY			SHEET NO.
	HOU	HARRIS			38

DATE: 11/28/2022
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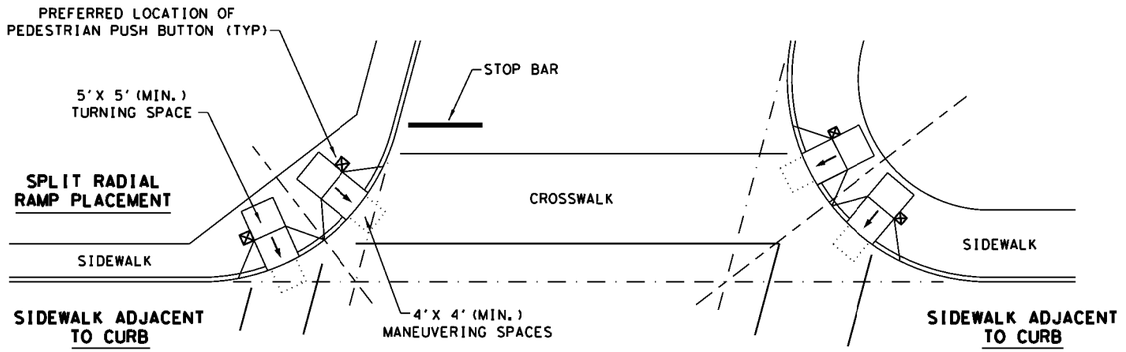
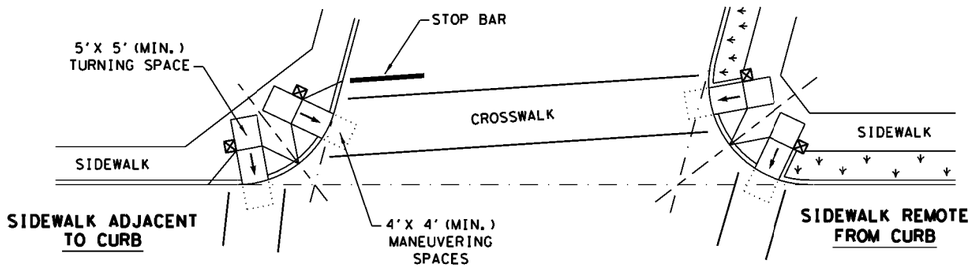
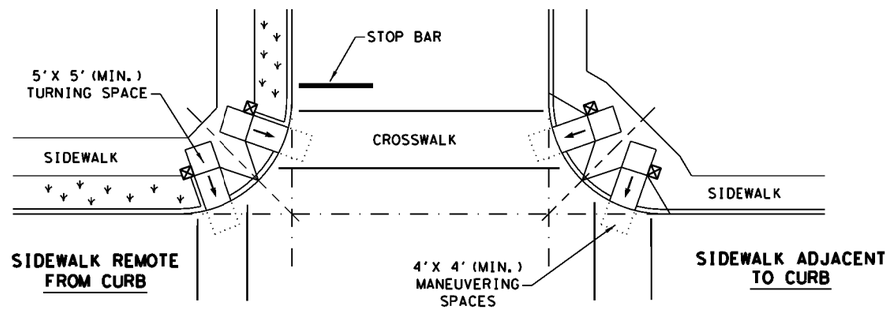
TYPICAL CROSSING LAYOUTS
SEE SHEET 1 OF 4 FOR DETAILS AND DIMENSIONS



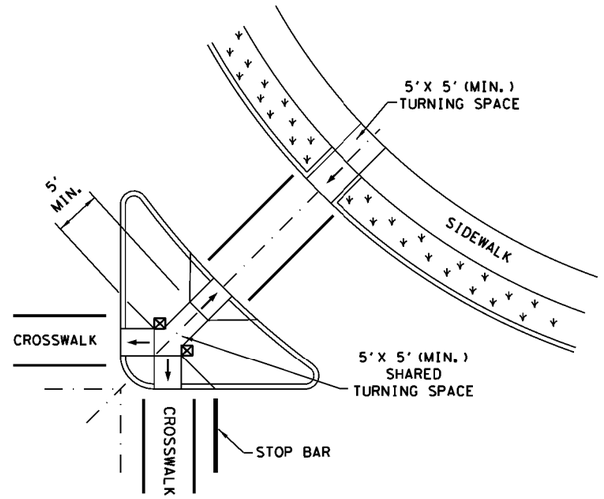
SKEWED INTERSECTION WITH "LARGE" RADIUS



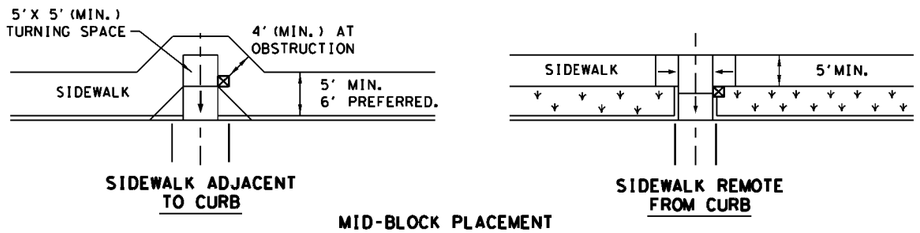
SKEWED INTERSECTION WITH "SMALL" RADIUS



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

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REVISIONS	0110	06	154		SS 261
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY			SHEET NO.
	HOU	HARRIS			39

GENERAL NOTES FOR ALL ELECTRICAL WORK

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

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

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

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

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

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

CONDUIT

A. MATERIALS

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

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

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

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

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

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

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

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

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

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

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

B. CONSTRUCTION METHODS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUITS & NOTES

ED(1)-14

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REVISIONS		0110	06	154	SS 261
		DIST	COUNTY		SHEET NO.
		HOU	HARRIS		40

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.

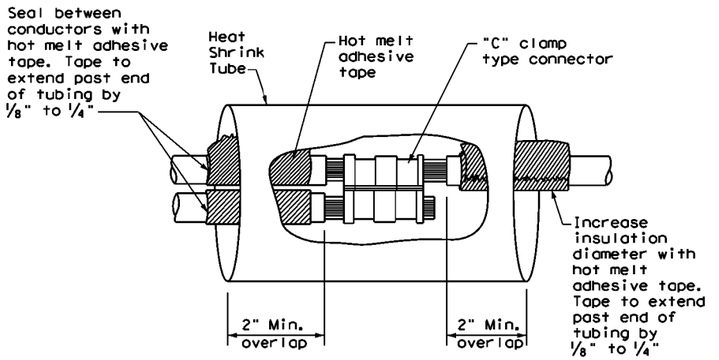
3. Install ground rods so the imprinted part number is at the upper end of the rod.

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

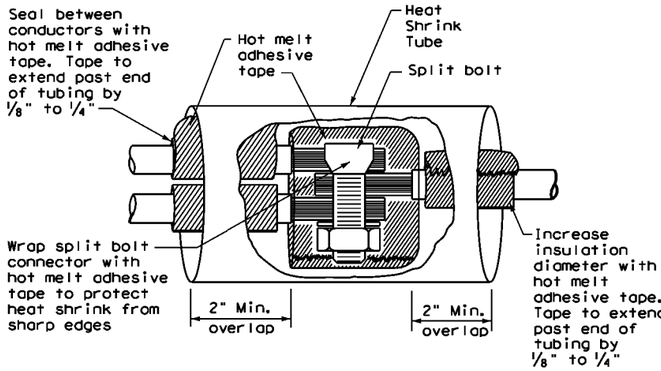
5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.

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.

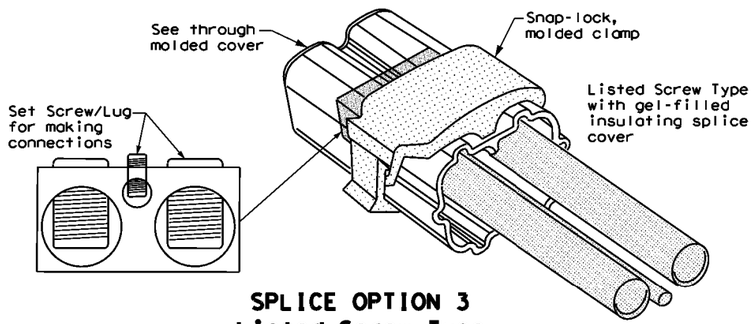
7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.



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

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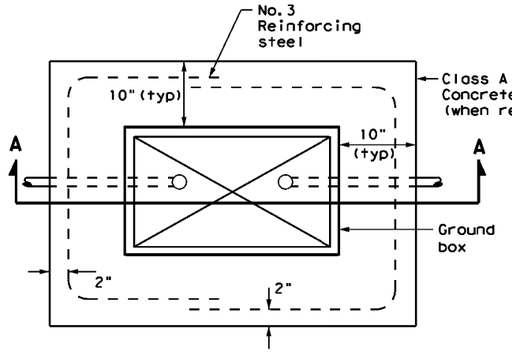
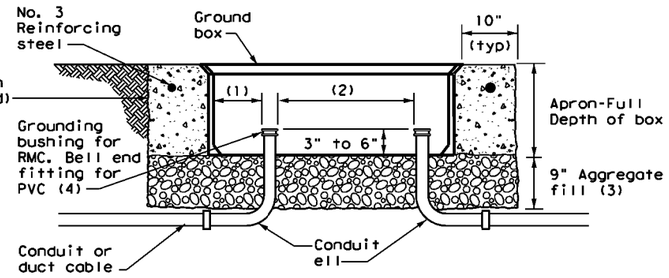


PLAN VIEW



SECTION A - A

APRON FOR GROUND BOX

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

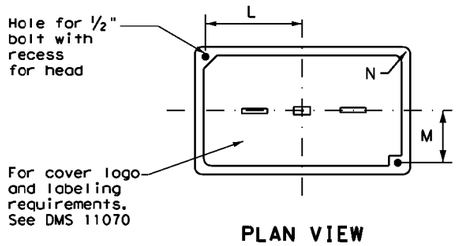
(2) Maintain sufficient space between conduits to allow for proper installation of bushing.

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

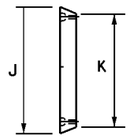
(4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

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

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



PLAN VIEW



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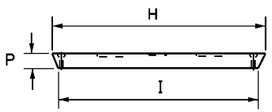

SIDE

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

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ELECTRICAL SERVICES NOTES

1. Provide new materials. Ensure installation and materials comply with the applicable provisions of the National Electrical Code (NEC) and National Electrical Manufacturers Association (NEMA) standards. Ensure material is Underwriters Laboratories (UL) listed. Provide and install electrical service conduits, conductors, disconnects, contactors, circuit breaker panels, and branch circuit breakers as shown on the Electrical Service Data chart in the plans. Faulty fabrication or poor workmanship in material, equipment, or installation is justification for rejection. Where manufacturers provide warranties and guarantees as a customary trade practice, furnish these to the State.

2. Provide electrical services in accordance with Electrical Details standard sheets, Departmental Material Specification (DMS) 11080 "Electrical Services,"DMS 11081 "Electrical Services-Type A," DMS 11082 "Electrical Services-Type C," DMS 11083 "Electrical Services-Type D," DMS 11084 "Electrical Services-Type T," DMS 11085 "Electrical Services-Pedestal (PS)", and Item 628 "Electrical Services" of the Standard Specifications. Provide electrical service types A, C, and D, as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 628. Provide other service types as detailed on the plans.

3. Provide all work, materials, services, and any incidentals needed to install a complete electrical service as specified in the plans.

4. Coordinate with the Engineer and the utility provider for metering and compliance with utility requirements. Primary line extensions, connection charges, meter charges, and other charges by the utility company to provide power to the location are paid for in accordance with Item 628. Get approval for the costs associated with these charges prior to engaging the utility company to do the work. Consult with the utility provider to determine costs and requirements, and coordinate the work as approved.

5. The enclosure manufacturer will provide Master Lock Type 2 with brass tumblers keyed #2195 for all custom electrical enclosures. Installing Contractor is to provide Master Lock #2195 Type 2 with brass tumblers for "off the shelf" enclosures. Master Lock #2195 keys and locks become property of the State. Unless otherwise approved, do not energize electrical service equipment until locks are installed.

6. Enclosures with external disconnects that de-energize all equipment inside the enclosure do not need a dead front trim. Protect incoming line terminations from incidental contact as required by the NEC.

7. When galvanized is specified for nuts, screws, bolts or miscellaneous hardware, stainless steel may be used.

8. Provide wiring and electrical components rated for 75°C. Provide red, black, and white colored XHHW service entrance conductors of minimum size 6 American Wire Gauge (AWG). Identify size 6 AWG conductors by continuous color jacket. Identify electrical conductors sized 4 AWG and larger by continuous color jacket or by colored tape. Mark at least 6 inches of the conductor's insulation with half laps of colored tape, when identifying conductors. Ensure each service entrance conductor exits through a separately bushed non-metallic opening in the weatherhead. The lengths of the conductors outside the weatherhead are to be 12 inches minimum, 18 inches maximum, or as required by utility.

9. All electrical service conduit and conductors attached to the electrical service including the riser or the elbow below ground are subsidiary to the electrical service. For an underground utility feed, all service conduit and conductors after the elbow, including service conduit and conductors for the utility pole riser when furnished by the Contractor, will be paid for separately.

10. Provide rigid metal conduit (RMC) for all conduits on service, except for the ½ in. PVC conduit containing the electrical service grounding electrode conductor. Size the service entrance conduit as shown in the plans. Ensure conduit for branch circuit entry to enclosure is the same size as that shown on the layout sheets for branch circuit conduit. Extend all rigid metal conduits a minimum of 6 inches underground and then couple to the type and schedule of the conduit shown on the layout for that particular branch circuit. Install a grounding bushing on the RMC where it terminates in the service enclosure.

11. Use of liquidtight flexible metal conduit (LFMC) is allowed between the meter and service enclosure when they are mounted 90 to 180 degrees to each other. Size the LFMC the same size as service entrance conduit. LFMC must not exceed 3 feet in length. Strap LFMC within 1 foot of each end. LFMC less than 12 inches in length need not be strapped. Each end of LFMC must have a grounding bushing or be terminated with a grounding fitting. The LFMC must contain a grounded (neutral) conductor. Ensure any bend in LFMC never exceeds 180 degrees. A pull test is required on all installed conductors, with at least six inches of free conductor movement demonstrated to the satisfaction of the Engineer.

12. Ensure all mounting hardware and installation details of services conform to utility company specifications.

13. For all electrical service enclosures listed under Item 628 on the MPL, the UL 508 enclosure manufacturers will prepare and submit a schematic drawing unique to each service. Before shipment to the job site, place the applicable laminated schematic drawings and the laminated plan sheet showing the electrical service data chart used to build the enclosure in the enclosure's data pocket. The installing contractor will copy and laminate the actual project plan sheets detailing all equipment and branch circuits supplied by that service. The laminated plan sheets are to be placed in the service enclosure's document pocket. Reduce 11 in. x 17 in. plan sheets to 8 ½ in. x 11 in. before laminating. If the installation differs from the plan sheets, the installing contractor is to redline plan sheets before laminating.

14. When providing an "Off The Shelf" Type D or Type T service, provide laminated plan sheets detailing equipment and branch circuits supplied by that service. Reduce 11 in. x 17 in. plan sheets to 8 ½ in. x 11 in before laminating. Deliver these drawings before completion of the work to the Engineer, instead of placing in enclosure that has no door pocket.

15. Do not install conduit in the back wall of a service enclosure where it would penetrate the equipment mounting panel inside the enclosure. Provide grounding bushings on all metal conduits, and terminate bonding jumpers to grounding bus. Grounding bushings are not required when the end of the metal conduit is fitted with a conduit sealing hub or threaded boss, such as a meter base hub.

SERVICE ASSEMBLY ENCLOSURE

1. Provide threaded hub for all conduit entries into the top of enclosure.

2. Type galvanized steel (GS) enclosures may be used for Type C panelboards and for Type D and T services that do not use an enclosure mounted photocell or lighting contactor. Provide GS enclosures in accordance with DMS 11080, 11082, 11083, and 11084.

3. Provide aluminum (AL) and stainless steel (SS) enclosures for Types A, C, and D in accordance with DMS 11080, 11081, 11082, 11083, and 11084. Do not paint stainless steel.

4. Provide pedestal service (PS) enclosures in accordance with ED(9) and DMS 11080 and 11085. Do not provide GS pedestal services. If GS is shown in the PS descriptive code, provide an AL enclosure.

MAIN DISCONNECT & BRANCH CIRCUIT BREAKERS

1. Field drill flange-mounted remote operator handle if needed, to ensure handle is lockable in both the "On" and "Off" positions.

2. When the utility company provides a transformer larger than 50 KVA, verify that the available fault current is less than the circuit breaker's ampere interrupting capacity (AIC) rating and provide documentation from the electric utility provider to the Engineer.

PHOTOELECTRIC CONTROL

1. Provide photocell as listed on the MPL. Move, adjust, or shield the photocell from stray or ambient night time light to ensure proper operation. Mount photocell facing north when practical. Mount top of pole photocells as shown on Top Mounted Photocell Detail.

*ELECTRICAL SERVICE DATA

Elec. Service ID	Plan Sheet Number	Electrical Service Description	Service Conduit **Size	Service Conductors No./Size	Safety Switch Amps	Main Ckt. Bkr. Pole/Amps	Two-Pole Contractor Amps	Panelbd/ Loadcenter Amp Rating	Branch Circuit ID	Branch Ckt. Bkr. Pole/Amps	Branch Circuit Amps	KVA Load
SB 183	289	ELC SRV TY A 240/480 100(SS)AL(E)SF(U)	2"	3/#2	100	2P/100	100	N/A	Lighting NB	2P/40	26	28.1
									Lighting SB	2P/40	25	
									Underpass	1P/20	15	
NB Access	30	ELC SRV TY D 120/240 060(NS)SS(E)TS(O)	1 ¼"	3/#6	N/A	2P/60		100	Sig. Controller	1P/30	23	5.3
							30		Luminaires	2P/20	9	
									CCTV	1P/20	3	
2nd & Main	58	ELC SRV TY T 120/240 000(NS)GS(N)SP(O)	1 ¼"	3/#6	N/A	N/A	N/A	70	Flashing Beacon 1	1P/20	4	1.0
									Flashing Beacon 2	1P/20	4	

* Example only, not for construction. All new electrical services must have electrical service data chart specific to that service as shown in the plans.

** Verify service conduit size with utility. Size may change due to utility meter requirements. Ensure conduit size meets the National ELectrical Code.

EXPLANATION OF ELECTRICAL SERVICE DESCRIPTIVE CODE

ELEC SERV TY X XXX/XXX XXX (XX) XX (X) XX (X)

Schematic Type

Service Voltage V / V

Disconnect Amp Rating
000 indicates main lug only/
Typically Type T

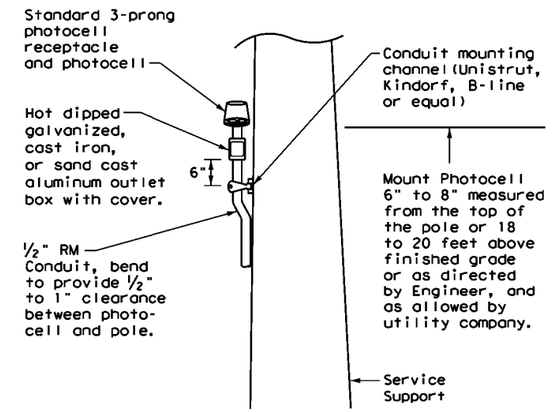
(SS)= Safety Switch Ahead of Meter-Check with Utility
(NS)= No safety Switch Ahead of Meter-Check with Utility

Enclosure Type
GS= Galvanized steel("off the shelf")
SS= Stainless steel(Custom Enclosure)See MPL
AL= Aluminum (Custom Enclosure)See MPL

Photocell Mounting Location
(E)= Inside Service/Enclosure Mounted
(T)= Top of pole
(L)= Luminaire mounted
(N)= None/No Photocell or Lighting Contactor Required

Service Support Type
GC= Granite concrete
OC= Other concrete
TP= Timber pole
SP= Steel pole
SF= Steel frame
OT= Pole by others or paid for separately
EX= Existing pole
TS= Service on traffic signal pole
PS= Pedestal Service

O= Overhead Service Feed from Utility
U= Underground Service Feed from Utility



TOP MOUNTED PHOTOCELL

Install conduit strap maximum 3 feet from box. 5 foot maximum spacing between straps supporting conduit.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE NOTES & DATA

ED(5)-14

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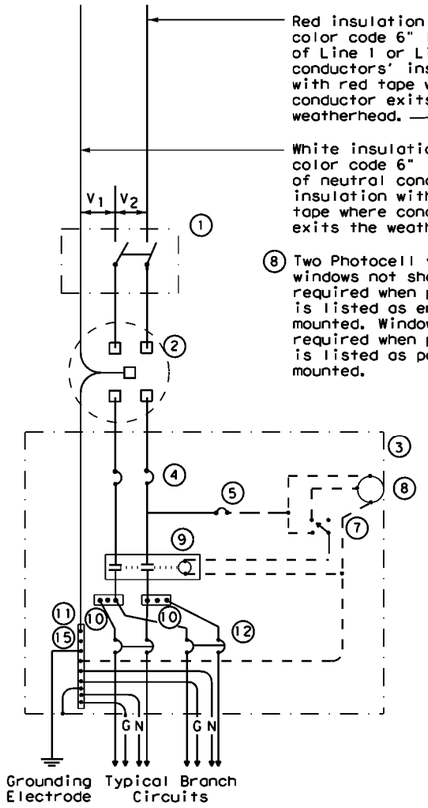
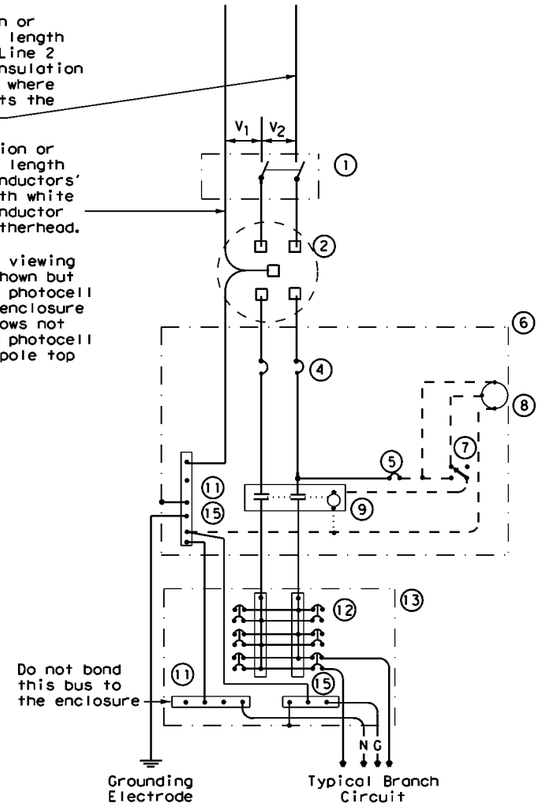
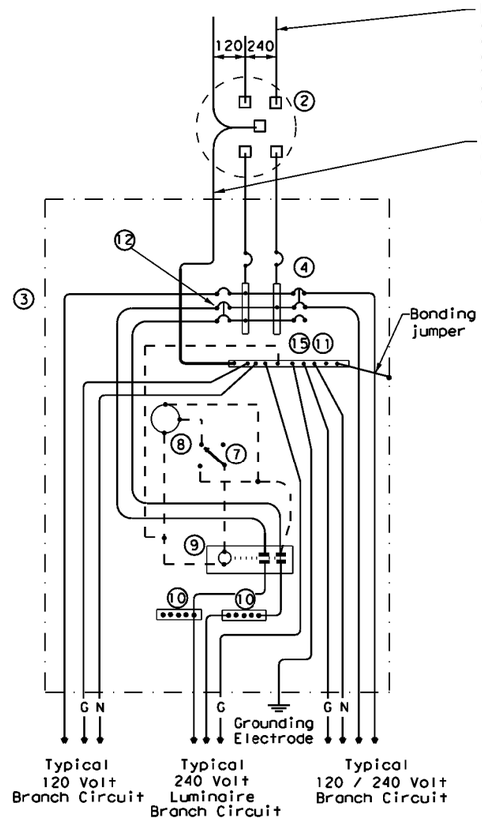


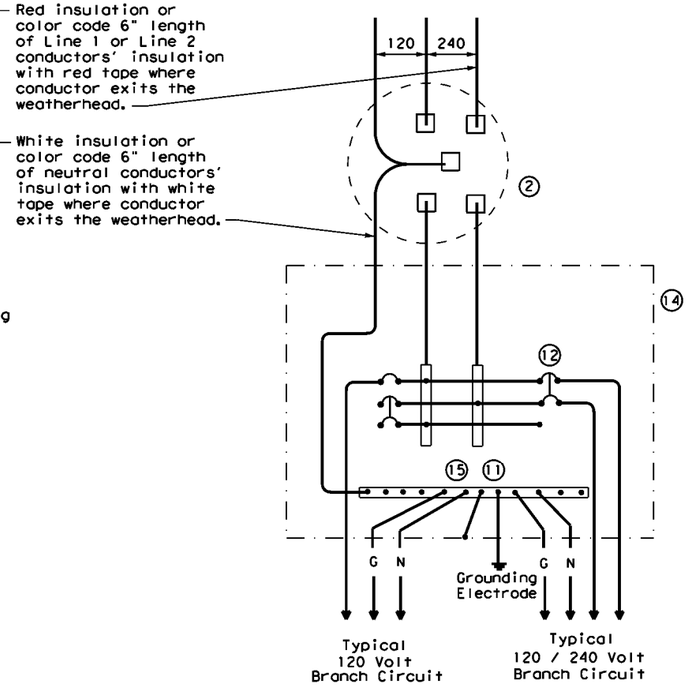
SCHEMATIC TYPE A
THREE WIRE



SCHEMATIC TYPE C
THREE WIRE



SCHEMATIC TYPE D - CUSTOM
120/240 VOLTS - THREE WIRE



SCHEMATIC TYPE T
120/240 VOLTS - THREE WIRE

Galvanized steel-"Buy Off The Shelf" only. When required install photocell top of the pole or on luminaire only, no lighting contractor will be installed.

WIRING LEGEND	
———	Power Wiring
- - - -	Control Wiring
—N—	Neutral Conductor
—G—	Equipment grounding conductor-always required

SCHEMATIC LEGEND	
1	Safety Switch (when required)
2	Meter (when required-verify with electric utility provider)
3	Service Assembly Enclosure
4	Main Disconnect Breaker (See Electrical Service Data)
5	Circuit Breaker, 15 Amp (Control Circuit)
6	Auxiliary Enclosure
7	Control Station ("H-O-A" Switch)
8	Photo Electric Control (enclosure-mounted shown)
9	Lighting Contactor
10	Power Distribution Terminal Blocks
11	Neutral Bus
12	Branch Circuit Breaker (See Electrical Service Data)
13	Separate Circuit Breaker Panelboard
14	Load Center
15	Ground Bus

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE ENCLOSURE AND NOTES

ED(6)-14

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SUPPORT TYPE STEEL POLE (SP) AND STEEL FRAME (SF)

1. Provide steel pole and steel frame supports as per TxDOT Departmental Material Specification (DMS)11080 "Electrical Services." Mount all equipment and conduit on 12 gauge galvanized steel or stainless steel channel strut, 1 ½ in. or 1 ⅝ in. wide by 1 in. up to 3 ¾ in. deep Unistrut, Kindorf, B-line or equal. Bolt or weld all channel and hardware to vertical members as approved. Do not stack channel. File smooth and paint field cut ends of all channel with zinc-rich paint before installing.

2. Provide poles for overhead service with an eyebolt or similar fitting for attachment of the service drop to the pole in conformance with the electric utility provider's specifications.

3. Provide and install galvanized ¾ in. x 18 in. x 4 in. (dia. x length x hook length) anchor bolts for underground service supports. Provide and install galvanized ¾ in. x 56 in. x 4 in. anchor bolts for overhead service supports. Ensure anchor bolts have 3 in of thread, with 3 ¼ in. to 3 ½ in. of the exposed anchor bolt projecting above finished foundation. Provide and install leveling nuts for all anchor bolts.

4. Bond one of the anchor bolts to the rebar cage with 6 AWG bare stranded copper conductor. Use listed mechanical connectors rated for embedment in concrete. See Inset B.

5. Furnish and install rigid metallic ells in all steel pole and steel frame foundations for all conduits entering the service from underground.

6. Use class C concrete for foundations. Ensure reinforcing steel is Grade 60 with 3" of unobstructed concrete cover.

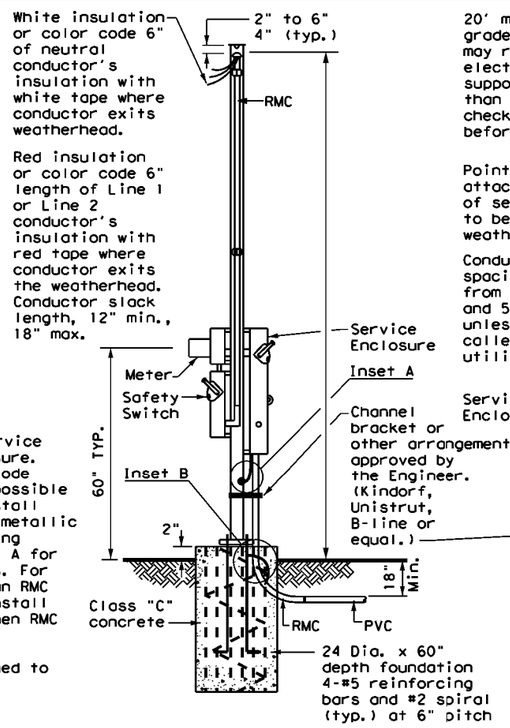
7. Drill and tap steel poles and frames for ½ in. X 13 UNC tank ground fitting. For steel pole service supports, provide and install tank ground fitting 4 in. to 6 in. below electrical service enclosure. Provide properly sized hole through the bottom of the enclosure for the service grounding electrode conductor. Ensure electrical service grounding electrode conductor is as short and straight as possible from the enclosure to the tank ground fitting. For steel frame service supports, provide and install tank ground fitting on steel frame post. Install service grounding electrode conductor in a non-metallic conduit or tubing from the enclosure to the steel frame post. Connect electrical service grounding electrode conductor to the tank ground fitting. See steel frame and steel pole details and Inset A for more information. Size service entrance conduit and branch circuit conduit as shown in the plans. For underground conduit runs from the electrical service, extend RMC from the service enclosure to an RMC elbow, and then connect the schedule type and size of conduit shown in the plans. Provide and install grounding bushings where RMC terminates in the enclosure. Grounding bushings are not required when RMC is fitted into a sealing hub or threaded boss.

8. If Steel pole or frame is painted, bond each separate painted piece with a bonding jumper attached to a tapped hole.

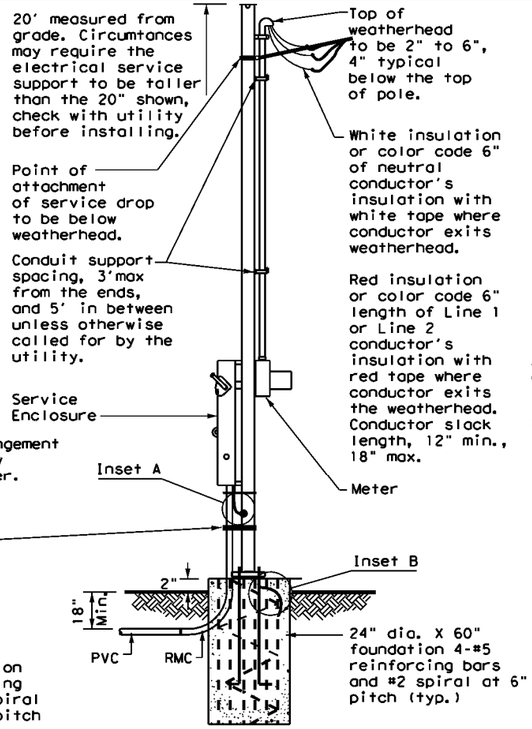
9. Provide ¼" - 20 machine screws for bonding. Do not use sheet metal screws. Remove all non-conductive material at contact points. Terminate bonding jumpers with listed devices. Install minimum size 6 AWG stranded copper bonding jumpers. Make up all threaded bonding connections wrench tight.

10. Avoid contact of the service drop and service entrance conductors with the metal pole to prevent abrasion of the insulated conductors.

11. Shop drawings are not required for service support structure unless specifically stated elsewhere or directed by the Engineer.

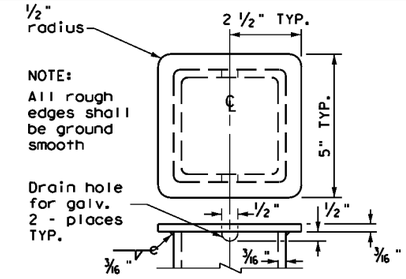


WITH SAFETY SWITCH

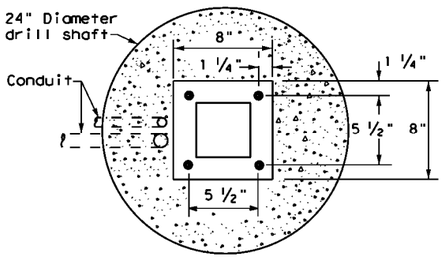


WITHOUT SAFETY SWITCH

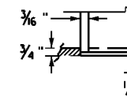
SERVICE SUPPORT TYPE SP (O) - OVERHEAD SERVICE



POLE TOP PLATE

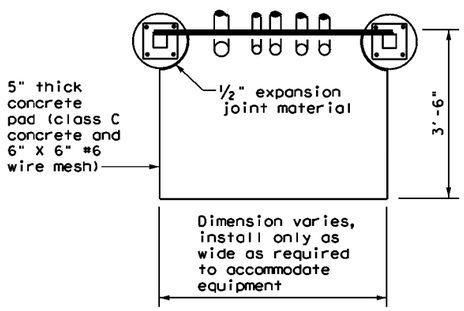


BASE PLATE DETAIL



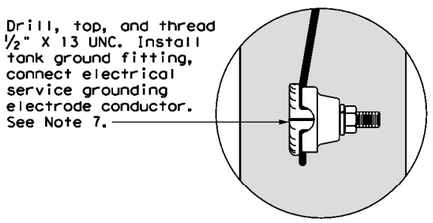
BOTTOM OF POLE

SERVICE SUPPORT TYPE SF & SP



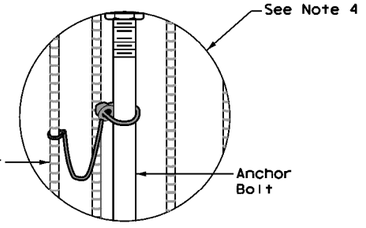
TOP VIEW

SERVICE SUPPORT TY SF (O) & SF (U)

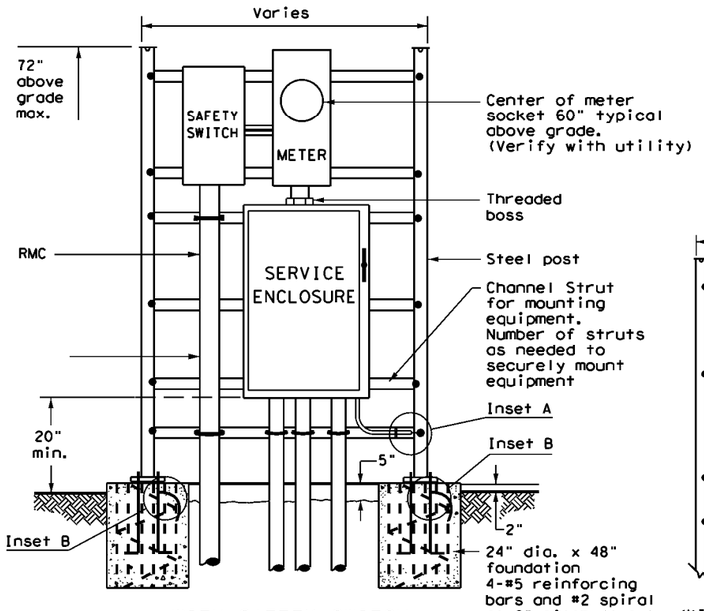


FRONT VIEW

INSET A

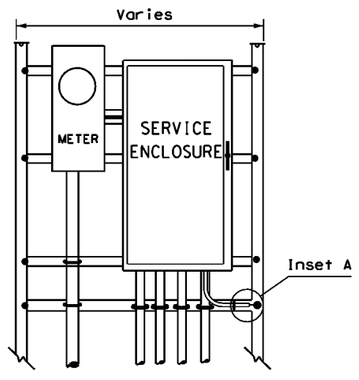


INSET B



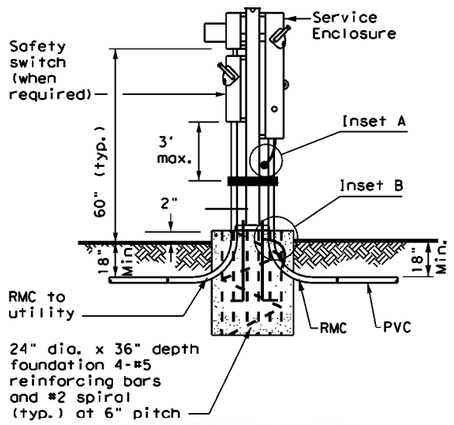
WITH SAFETY SWITCH

FRONT VIEW

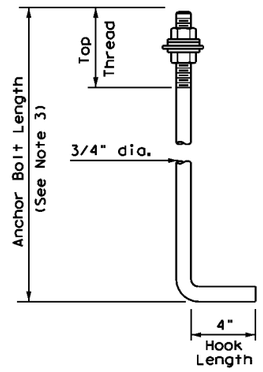


WITHOUT SAFETY SWITCH

SERVICE SUPPORT TYPE SF(U) - UNDERGROUND SERVICE



WITH SAFETY SWITCH



HOOKED ANCHOR DETAIL

SERVICE SUPPORT TYPE SP(U) - UNDERGROUND SERVICE

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE SUPPORT TYPES SF & SP

ED(7)-14

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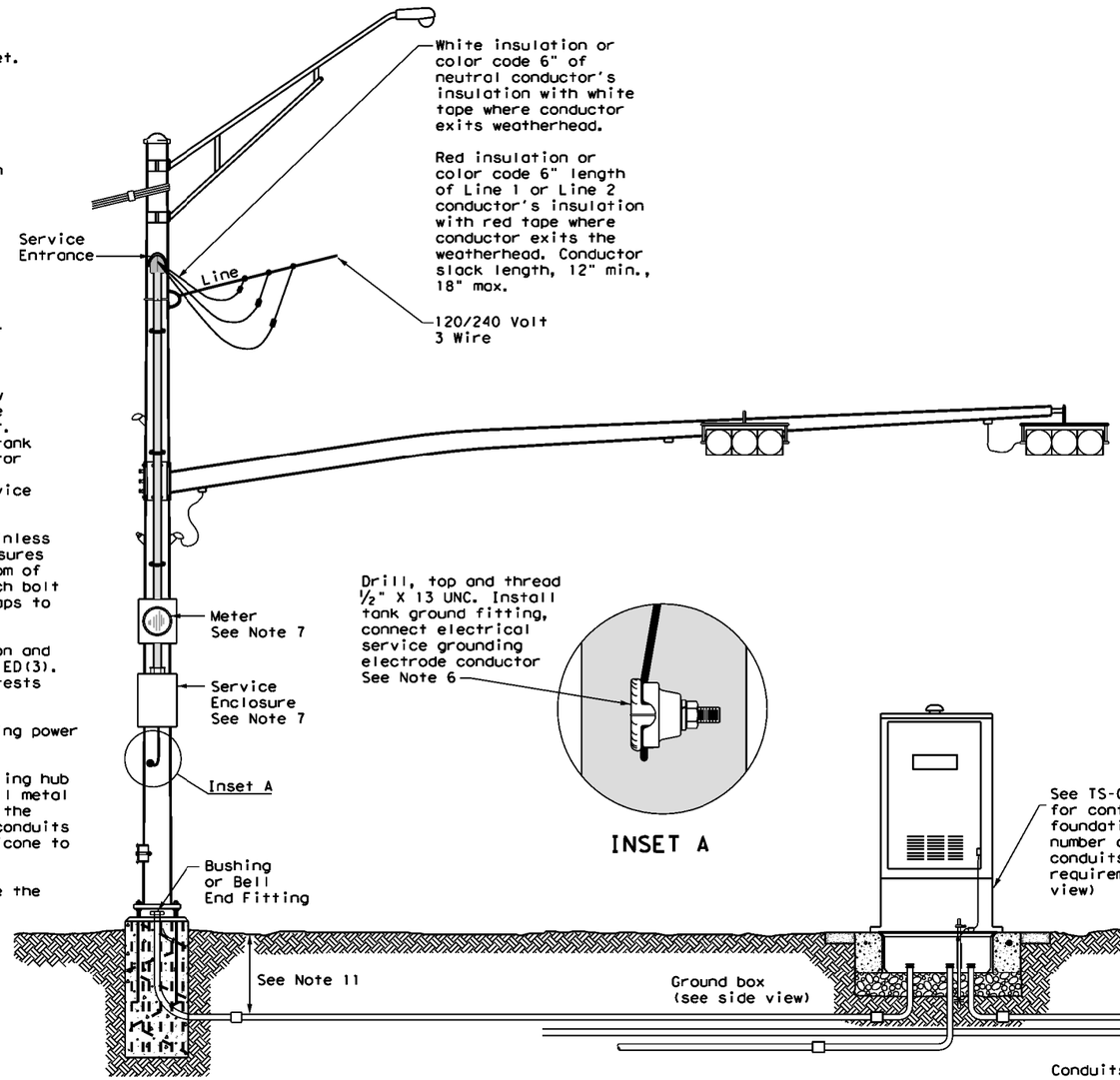
TRAFFIC SIGNAL NOTES

1. Do not pass luminaire conductors through the signal controller cabinet.
2. Include an equipment grounding conductor in all conduits throughout the electrical system. Bond all exposed metal parts to the grounding conductor.
3. Provide roadway luminaires, when required, in accordance with the material and construction sections of Item 610, "Roadway Illumination Assemblies," except for performance testing of luminaires. Test installed roadway luminaires for proper operation as a part of the associated traffic signal system test.
4. If internally illuminated street name signs are approved for use, ground the fixture to the pole with a 12 AWG green XHHW conductor.
5. Bond anchor bolts to rebar cage in two locations using #3 bars or 6 AWG stranded copper conductors. Use listed mechanical connectors rated for embedment in concrete. See TXDOT standard TS-FD for further details.
6. Drill and tap signal poles for ½ in. X 13 UNC tank ground fitting. Provide and install tank ground fitting 4 in. to 6 in. directly below electrical service enclosure. Provide properly sized hole through the bottom of the enclosure for the service grounding electrode conductor. Connect the electrical service grounding electrode conductor to the tank ground fitting. Ensure electrical service grounding electrode conductor is as short and straight as possible from the enclosure to the tank ground fitting. See Inset A detail for further information. Size service entrance conduit and branch circuit conduit as shown in the plans.
7. Mount electrical service enclosure and meter to signal pole with stainless steel bands. Ensure bands are a minimum width of ¾ in. Secure enclosures to bands using two-bolt brackets. Install brackets near top and bottom of each enclosure. Install properly sized stainless steel washers on each bolt in the enclosure. Band or drill and tap properly sized stand-off straps to signal pole for attaching conduit.
8. Conduct pull tests and insulation resistance tests on all illumination and power conductors as required in Item 620 "Electrical Conductors" and ED(3). To prevent electronics damage, do not conduct insulation resistance tests on traffic signal cables after termination.
9. Lock all enclosures and bolt down all ground box covers before applying power to the signal installation.
10. Terminate conduits entering the top of enclosures with a conduit-sealing hub or threaded boss such as meter hub. Install a grounding bushing on all metal conduits not connected to conduit-sealing hub or threaded boss. Bond the grounding bushing to the ground bus with a bonding jumper. Seal all conduits entering enclosures with duct seal or expanding foam. Do not use silicone to seal conduit ends.
11. For all conduits, ensure the burial depth is a minimum of 18". Ensure the minimum burial depth for conduit placed under a roadway is 24".

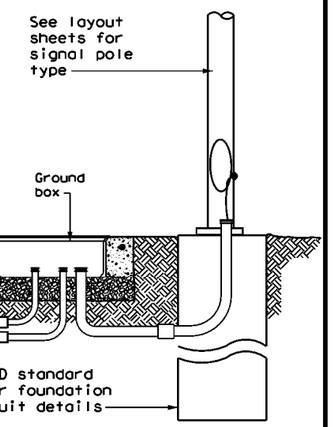


SIGNAL POLE WITH SERVICE

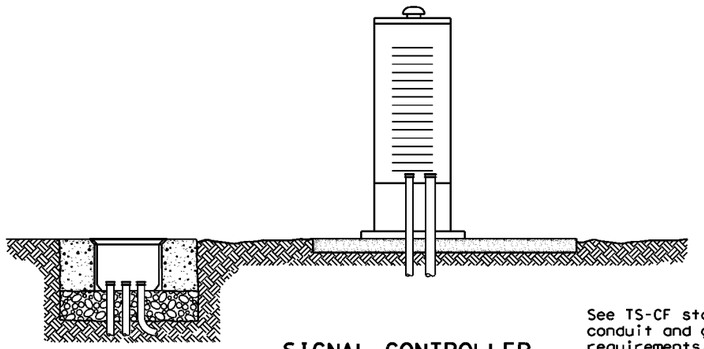
Type T electrical service mounted on signal pole shown as an example. See electrical details, layout sheets, and electrical service data chart for additional details.

INSET A

SIGNAL CONTROLLER FRONT VIEW



SIGNAL POLE



SIGNAL CONTROLLER SIDE VIEW

See TS-CF standard for conduit and grounding requirements. See layout sheets for ground box locations and any additional conduits that are required.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS TYPICAL TRAFFIC SIGNAL SYSTEM DETAILS

ED(8)-14

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REVISIONS	0110	06	154	SS 261
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		46

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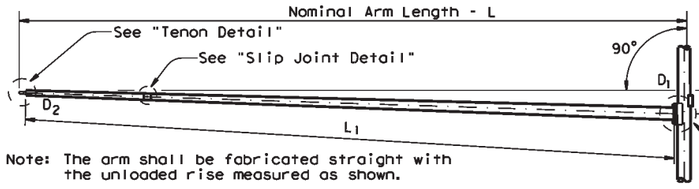
Arm Length	ROUND POLES					POLYGONAL POLES					Foundation Type
	D_B	D_{19}	D_{24}	D_{30}	① thk	D_B	D_{19}	D_{24}	D_{30}	① thk	
ft.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	
20	12.0	9.3	8.6	7.8	.239	12.5	9.5	8.7	7.8	.239	36-A
24	12.0	9.3	8.6	7.8	.239	13.0	10.0	9.2	8.3	.239	36-A
28	12.0	9.3	8.6	7.8	.239	13.5	10.5	9.7	8.8	.239	36-A
32	13.0	10.3	9.6	8.8	.239	14.0	11.0	10.2	9.3	.239	36-A
36	13.5	10.8	10.1	9.3	.239	15.0	12.0	11.2	10.3	.239	36-A
40	14.0	11.3	10.6	9.8	.239	16.0	13.0	12.2	11.3	.239	36-B
44	14.5	11.8	11.1	10.3	.239	16.5	13.5	12.7	11.8	.239	36-B

Arm Length	ROUND ARMS					POLYGONAL ARMS				
	L_1	D_1	D_2	① thk	Rise	L_1	D_1	② D_2	① thk	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	8.0	5.3	.179	1'-8"	19.1	8.0	3.5	.179	1'-7"
24	23.1	9.0	5.8	.179	1'-9"	23.1	9.0	3.5	.179	1'-8"
28	27.1	9.5	5.7	.179	1'-10"	27.1	10.0	3.5	.179	1'-9"
32	31.0	9.5	5.2	.239	1'-11"	31.0	9.5	3.5	.239	1'-10"
36	35.0	10.0	5.1	.239	2'-0"	35.0	10.0	3.5	.239	1'-11"
40	39.0	10.5	5.1	.239	2'-3"	39.0	11.0	3.5	.239	2'-1"
44	43.0	11.0	5.1	.239	2'-8"	43.0	11.5	4.0	.239	2'-3"

D_B = Pole Base O.D.
D_{19} = Pole Top O.D. with no Luminaire and no ILSN
D_{24} = Pole Top O.D. with ILSN w/out Luminaire
D_{30} = Pole Top O.D. with Luminaire
D_1 = Arm Base O.D.
D_2 = Arm End O.D.
L_1 = Shaft Length
L = Nominal Arm Length

① Thickness shown are minimums, thicker materials may be used.

② D_2 may be increased by up to 1" for polygonal arms.



Note: The arm shall be fabricated straight with the unloaded rise measured as shown.

TRAFFIC SIGNAL ARM

(Fixed Mount)

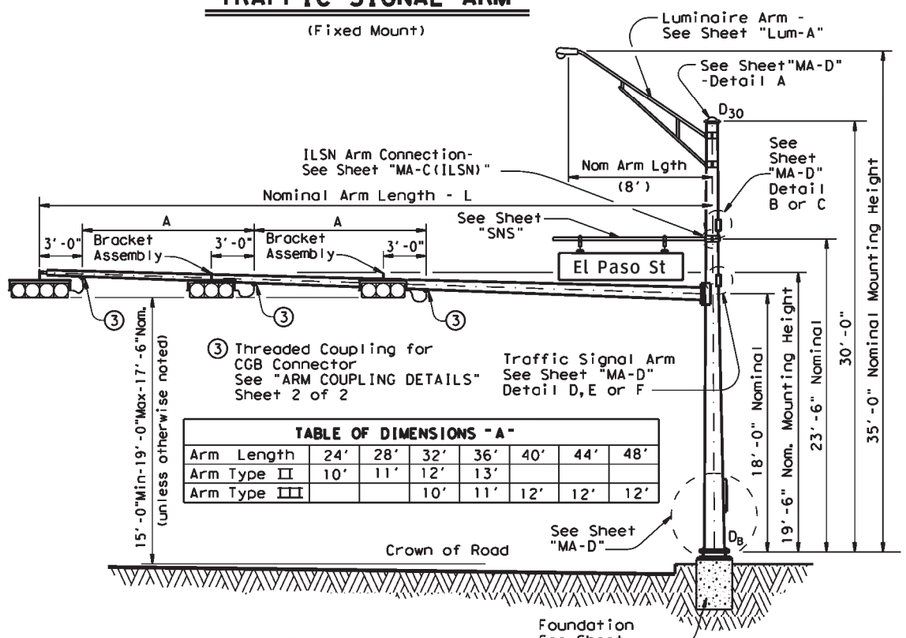


TABLE OF DIMENSIONS "A"

Arm Length	24'	28'	32'	36'	40'	44'	48'
Arm Type II	10'	11'	12'	13'			
Arm Type III			10'	11'	12'	12'	12'

STRUCTURE ASSEMBLY

SHIPPING PARTS LIST

Ship each pole with the following attached: enlarged hand hole, pole cap, fixed-arm connection bolts and washers and any additional hardware listed in the table.

Nominal Arm Length	30' Poles With Luminaire		24' Poles With ILSN		19' Poles With No Luminaire and No ILSN	
	Above hardware plus: One (or two if ILSN attached) small hand hole, clamp-on simplex		Above hardware plus one small hand hole		See note above	
ft	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20L-100		20S-100		20-100	
24	24L-100		24S-100		24-100	
28	28L-100		28S-100		28-100	
32	32L-100		32S-100		32-100	
36	36L-100		36S-100		36-100	
40	40L-100	2	40S-100		40-100	
44	44L-100		44S-100		44-100	

Traffic Signal Arms (1 per pole) Ship each arm with the listed equipment attached

Nominal Arm Length	Type I Arm (1 Signal)		Type II Arm (2 Signals)		Type III Arm (3 Signals)	
	1 CGB connector		1 Bracket Assembly and 2 CGB Connectors		2 Bracket Assemblies and 3 CGB Connectors	
ft	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20I-100					
24	24I-100		24II-100			
28	28I-100		28II-100			
32			32II-100		32III-100	
36			36II-100		36III-100	
40					40III-100	2
44					44III-100	

Luminaire Arms (1 per 30' pole)

Nominal Arm Length	Quantity
8' Arm	2

ILSN Arm (Max. 2 per pole) Ship with clamps, bolts and washers

Nominal Arm Length	Quantity
7' Arm	
9' Arm	

Anchor Bolt Assemblies (1 per pole)

Anchor Bolt Diameter	Anchor Bolt Length	Quantity
1 ½"	3'-4"	
1 ¾"	3'-10"	
2"	4'-3"	2

Each anchor bolt assembly consists of the following: Top and Bottom templates, 4 anchor bolts, 8 nuts, 8 flat washers, and 4 nut anchor devices (Type 2) per Standard Drawing "TS-FD".

Templates may be removed for shipment.

SHEET 1 OF 2

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

03/01/2023

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES

SINGLE MAST ARM ASSEMBLY

(100 MPH WIND ZONE)

SMA-100(1)-12

REVISIONS
5-96
11-99
1-12

DN: MS	CK: JSY	DW: MWF	CK: JSY
CONT	SECT	JOB	HIGHWAY
0110	06	154	SS 261
DIST	COUNTY		SHEET NO.
HOU	HARRIS		47

123A

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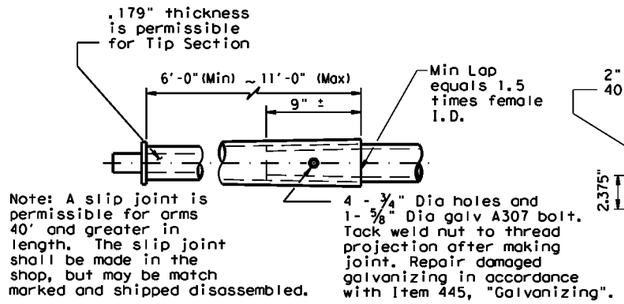
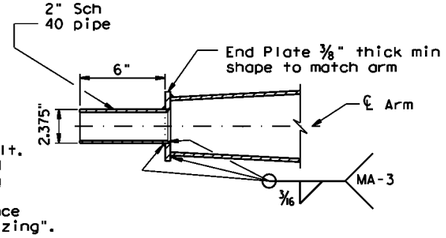


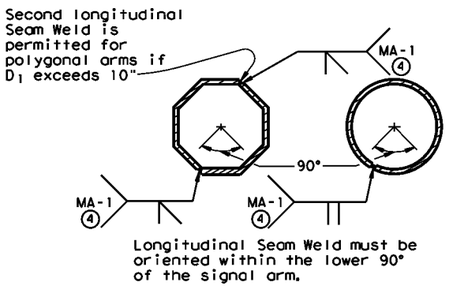
SLIP JOINT DETAIL



TENON DETAIL

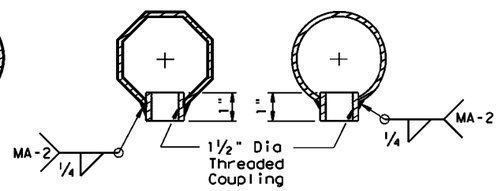
Stainless steel bands (or Cables) and cast bracket as in "Astro-Brac", "Sky Bracket" or "Easy Bracket" with 1 ½" Dia Threaded Coupling.

BRACKET ASSEMBLY



ARM WELD DETAIL

④60% Min. penetration
100% pemetration within 6" of circumferential base welds.



ARM COUPLING DETAILS

VIBRATION WARNING

Mast Arms of SMA and DMA structures and clamp-on Arms of LMA structures of approximately 40 ft or longer are subject to harmonic vertical vibrations in light wind conditions due to the aeroelastic characteristics of a few of the myriads of possible combinations of the following: signal numbers, weights and positions; existence/solidity of backplates; presence of additional attachments to the arm, such as signs and cameras; arm-wind orientation; and arm-pole stiffness.

Such vibrations may cause fatigue damage to the structure and may lead to galloping in moderate wind conditions which may further damage the structure and alarm the public. Tests have indicated that when wind is blowing toward the back side of signal heads having un-vented backplates attached the probability of unacceptable harmonic vibration and/or galloping is rather high.

If backplates are not required for improved visibility they should not be applied to the signal heads or, if they must be applied, they should be vented as a first and inexpensive measure to mitigate vibrations.

The traffic signal mast arms shall be visually inspected in 5 to 20 mph wind conditions after installation of signal heads and any attachments, including any required backpates. If vertical movements with a total excursion (maximum upward excursion to maximum downward excursion) of more than approximately 8" are observed at the arm tip, a damping plate shall be fitted to the arm. See "Damping Plate Mounting Details" on standard sheet, MA-DPD-10.

This visual inspection shall be repeated after each modification of the structure that could affect its aeroelastic response. Excessive vibrations shall not be allowed to continue for more than two days.

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design Wind Speed equals 100 mph plus a 1.3 gust factor.

Poles are designed to support one 8'-0" luminaire arm, one 9'-0" internally lighted street name sign and one traffic signal arm with a length as tabulated. The specified luminaire load applied at the end of the luminaire arm equals 60 lbs vertical dead load plus the horizontal wind load on an effective projected area of 1.6 sq ft. The specified internally lighted street name sign load applied 4.5 ft from the centerline of the pole equals 85 lbs vertical dead load plus horizontal wind load on an effective projected area of 11.5 sq ft. The specified signal load applied at the end of the traffic signal arm equals 180 lbs vertical dead load plus the horizontal wind load on an effective projected area of 32.4 sq ft (actual area times drag coefficient).

See Standard Sheet "MA-D" for pole details, "MA-C" for traffic signal arm connection details, "MA-C (ILSN)" for internally lighted street name sign arm connection details, "LUM-A" for luminaire arm and connection details, "SNS" for internally lighted street name sign details, and "TS-FD" for anchor bolt and foundation details. See "MA-C" for material specifications.

Fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Materials, fabrication tolerances, and shipping practices shall meet the requirements of this sheet and Item 686, "Traffic Signal Pole Assemblies (Steel)".

Unless otherwise noted, all parts shall be galvanized in accordance with Item 445, "Galvanizing", after fabrication.

Deviation from the details and dimensions shown herein require submission of shop drawings in accordance with Item 441, "Steel Structures". Alternate designs are not acceptable.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES

SINGLE MAST ARM ASSEMBLY

(100 MPH WIND ZONE)

SMA-100(2)-12

DN: MS	CK: JSY	DW: MMF	CK: JSY

REVISIONS
5-96
1-12

CONT	SECT	JOB	HIGHWAY
0110	06	154	SS 261
DIST	COUNTY		SHEET NO.
HOU	HARRIS		48

123B

FOUNDATION DESIGN TABLE

FDN TYPE	DRILLED SHAFT DIA	REINFORCING STEEL		EMBEDDED DRILLED SHAFT LENGTH-ft ④, ⑤, ⑥			ANCHOR BOLT DESIGN ①				FOUNDATION DESIGN LOAD ②		TYPICAL APPLICATION
		VERT BARS	SPIRAL & PITCH	TEXAS CONE PENETROMETER N blows/ft			ANCHOR BOLT DIA	Fy (ksi)	BOLT CIR DIA	ANCHOR TYPE	MOMENT K-ft	SHEAR Kips	
				10	15	40							
24-A	24"	4- #5	#2 at 12"	5.7	5.3	4.5	¾"	36	12 ¾"	1	10	1	Pedestal pole, pedestal mounted controller.
30-A	30"	8- #9	#3 at 6"	11.3	10.3	8.0	1 ½"	55	17"	2	87	3	Mast arm assembly. (see Selection Table)
36-A	36"	10- #9	#3 at 6"	13.2	12.0	9.4	1 ¾"	55	19"	2	131	5	Mast arm assembly. (see Selection Table) 30' strain pole with or without luminaire.
36-B	36"	12- #9	#3 at 6"	15.2	13.6	10.4	2"	55	21"	2	190	7	Mast arm assembly. (see Selection Table) Strain pole taller than 30' & strain pole with mast arm
42-A	42"	14- #9	#3 at 6"	17.4	15.6	11.9	2 ¼"	55	23"	2	271	9	Mast arm assembly. (see Selection Table)

NOTES:

① Anchor bolt design develops the foundation capacity given under Foundation Design Loads.

② Foundation Design Loads are the allowable moments and shears at the base of the structure.

③ Foundations may be listed separately or grouped according to similarity of location and type. Quantities are for the Contractor's information only.

④ Field Penetrometer readings at a depth of approximately 3 to 5 feet may be used to adjust shaft lengths.

⑤ If rock is encountered, the Drilled Shaft shall extend a minimum of two diameters into solid rock.

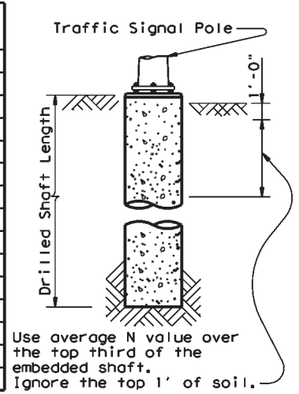
⑥ Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

FOUNDATION SUMMARY TABLE ③

LOCATION IDENTIFICATION	AVG. N BLOW /ft.	FDN TYPE	NO. EA	DRILLED SHAFT LENGTH ⑥ (FEET)				
				24-A	30-A	36-A	36-B	42-A
IH 610 AT UA 90								
POLE A	10	36-B	1			15.2		
POLE F	10	36-B	1			15.2		
TOTAL DRILLED SHAFT LENGTHS						30.4		

FOUNDATION SELECTION TABLE FOR STANDARD MAST ARM PLUS ILSN SUPPORT ASSEMBLIES (ft)

		FDN 30-A	FDN 36-A	FDN 36-B	FDN 42-A
80 MPH DESIGN WIND SPEED	MAX SINGLE ARM LENGTH	32'	48'		
	MAXIMUM DOUBLE ARM LENGTH COMBINATIONS	24' X 24'			
		28' X 28'			
		32' X 28'	32' X 32'		
			36' X 36'		
			40' X 36'		
			44' X 28'	44' X 36'	
100 MPH DESIGN WIND SPEED	MAX SINGLE ARM LENGTH		36'	44'	
	MAXIMUM DOUBLE ARM LENGTH COMBINATIONS		24' X 24'		
			28' X 28'		
			32' X 24'	32' X 32'	
				36' X 36'	
				40' x24'	40' X 36'
					44' x 36'



Use average N value over the top third of the embedded shaft. Ignore the top 1' of soil.

ANCHOR BOLT & TEMPLATE SIZES

BOLT DIA IN.	⑦ BOLT LENGTH	TOP THREAD	BOTTOM THREAD	BOLT CIRCLE	R2	R1
¾"	1'-6"	3"	—	12 ¾"	7 ⅛"	5 ⅝"
1 ½"	3'-4"	6"	4"	17"	10"	7"
1 ¾"	3'-10"	7"	4 ½"	19"	11 ¼"	7 ¾"
2"	4'-3"	8"	5"	21"	12 ½"	8 ½"
2 ¼"	4'-9"	9"	5 ½"	23"	13 ¾"	9 ¼"

⑦ Min dimensions given, longer bolts are acceptable.

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals and interim revisions thereto.

Reinforcing steel shall conform to Item 440, "Reinforcing Steel".

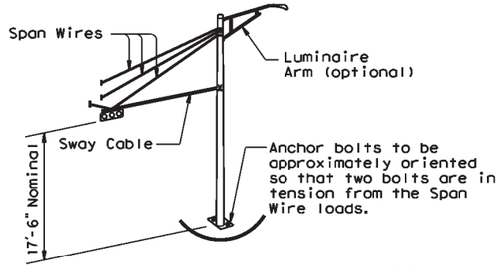
Concrete shall be Class "C".

Threads for anchor bolts and nuts shall be rolled or cut threads of 8UN series up to 2" in diameter or UNC series for all sizes. Bolts and nuts shall have Class 2A and 2B fit tolerances. Galvanized nuts shall be tapped after galvanizing.

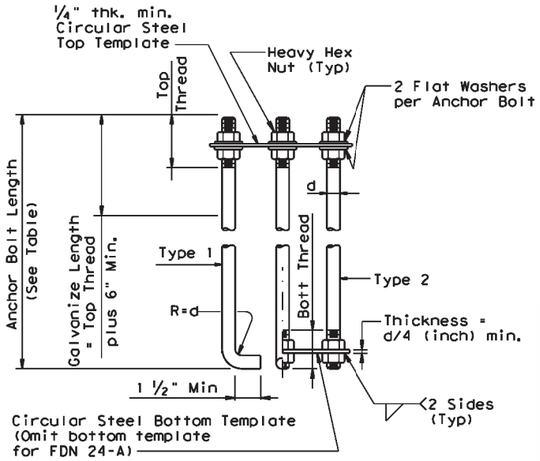
Anchor bolts that are larger than 1" in diameter shall conform to "alloy steel" or "medium-strength mild steel" per Item 449, "Anchor Bolts". Anchor bolts that are 1" in diameter or less shall conform to ASTM A36. Galvanize a minimum of the top end thread length plus 6" for all anchor bolts unless otherwise noted. Exposed washers and exposed nuts shall be galvanized. All galvanizing shall be in accordance with Item 445, "Galvanizing".

Templates and embedded nuts need not be galvanized. Lubricate and tighten anchor bolts when erecting the structure in accordance with Item 449, "Anchor Bolts".

EXAMPLE:
1. For 80mph design wind speed, foundation 30-A can support up to a 32' arm with another arm up to 28'
2. For 100mph design wind speed, foundation 36-A can support a single 36' mast arm.



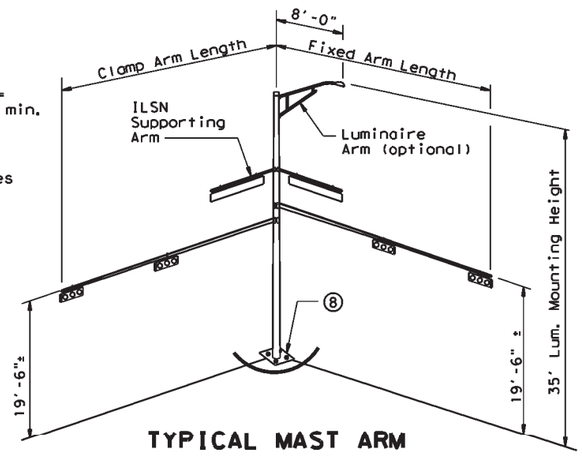
TYPICAL STRAIN POLE ASSEMBLY



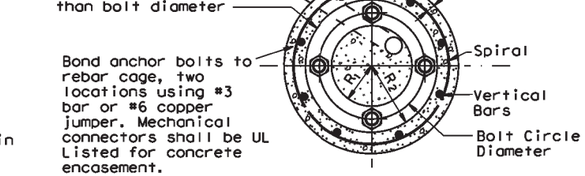
HOOKED ANCHOR (TYPE 1) NUT ANCHOR (TYPE 2)

ANCHOR BOLT ASSEMBLY

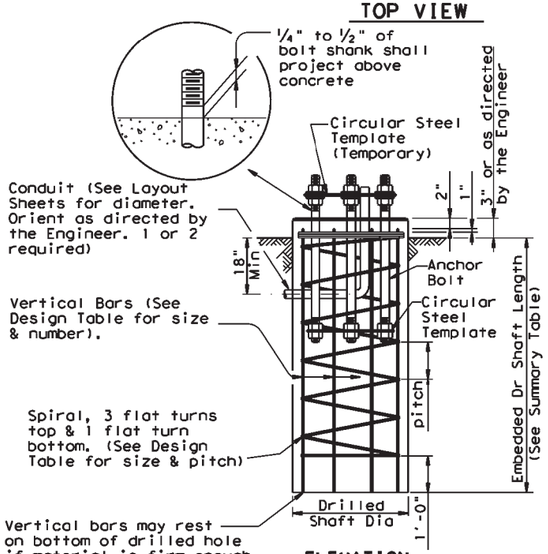
⑧ Orient anchor bolts orthogonal with the fixed arm direction to ensure that two bolts are in tension under dead load.



TYPICAL MAST ARM ASSEMBLY



TOP VIEW



ELEVATION

FOUNDATION DETAILS

STATE OF TEXAS
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108793
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03/01/2023

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL POLE FOUNDATION

TS-FD-12

REVISIONS	DN: MS	CK: JSY	DW: MAQ/MMF	CK: JSY/TEB
5-96 11-98 1-12	CONT	SECT	JOB	HIGHWAY
	0110	06	154	SS 261
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		49

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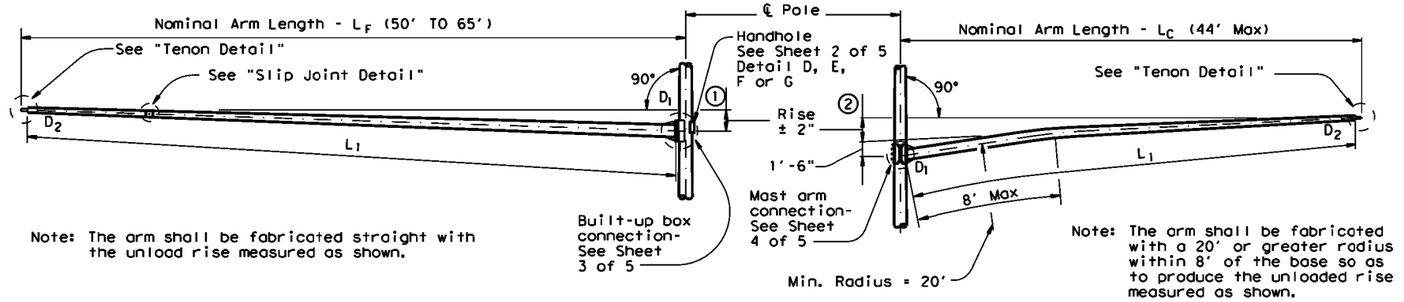
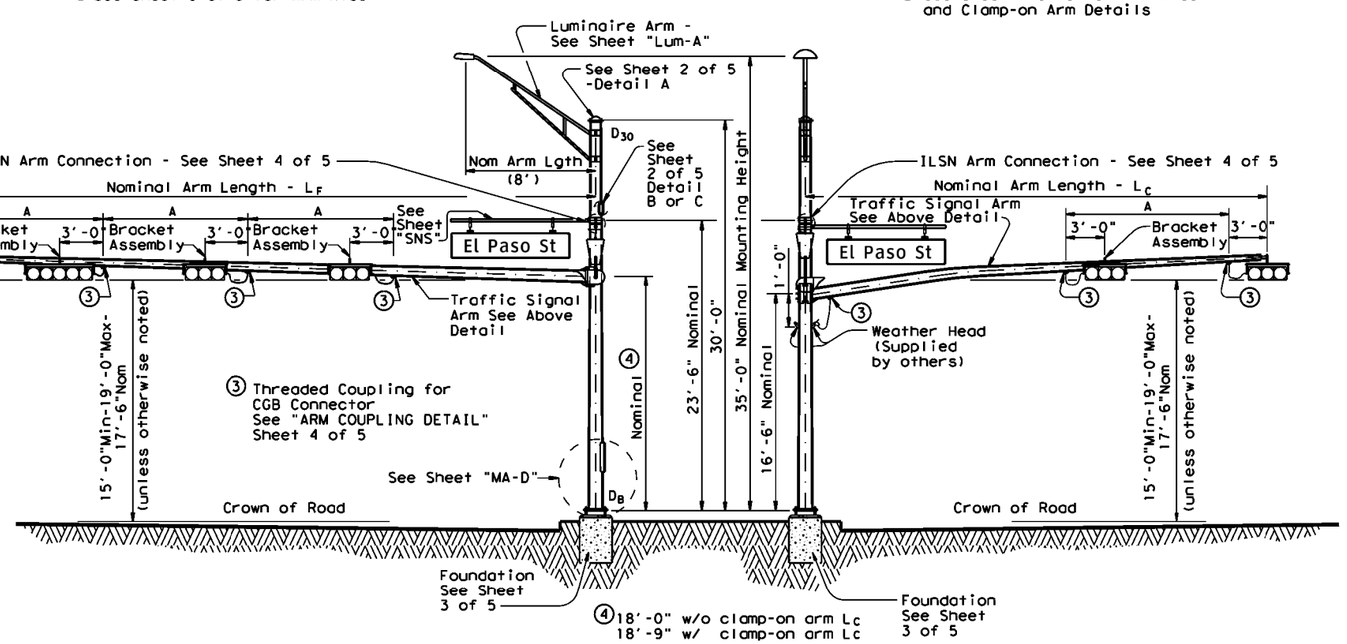


FIXED MOUNT TRAFFIC SIGNAL ARM

① See Sheet 3 of 5 for Arm Rise

CLAMP-ON TRAFFIC SIGNAL ARM (IF REQUIRED)

② See Sheet 4 of 5 for Arm Rise and Clamp-on Arm Details

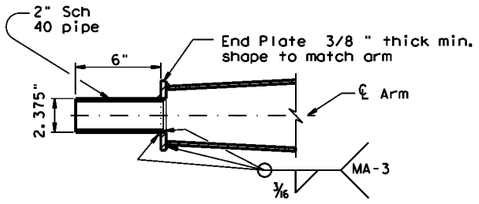


ELEVATION
(Showing fixed mount arm)

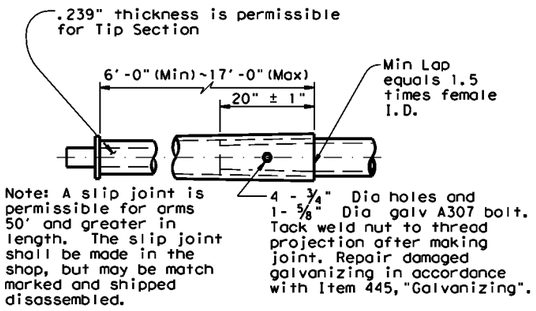
STRUCTURE ASSEMBLY

ELEVATION
(Showing clamp-on arm)

TABLE OF DIMENSIONS "A"										
Arm Length	24'	28'	32'	36'	40'	44'	50'	55'	60'	65'
Arm Type II	10'	11'	12'	13'						
Arm Type III			10'	11'	12'	12'				
Arm Type IV							12'	12'	12'	12'



TENON DETAIL



SLIP JOINT DETAIL (FIXED MOUNT ARM)

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design Wind Speed can be either 100 mph or 80 mph plus a 1.3 gust factor. If clamp-on traffic signal is required, designs are based on an arm included angle of 90 degrees or more. Angles of less than approximately 75 degrees will require a special design.

Poles are designed to support one 8'-0" luminaire arm, two 9'-0" internally lighted street name (ILSN) signs and two traffic signal arms with limited length combinations.

Each arm with its related attachment is shown below

Arm	Equivalent DL ⑤	WL EPA ⑤⑥
8' Luminaire Arm	Luminaire 60 lbs	1.6 sq ft
9' ILSN Arm	Sign 85 lbs	11.5 sq ft
50' to 65' Fixed Mount Arm	Signal Loads 310 lbs	52 sq ft
Up to 44' Clamp-on Arm	Signal Loads 180 lbs	32.4 sq ft

⑤ Equivalent dead load plus horizontal wind load applied at the end of arm except ILSN arm, which applied 4.5' from the centerline of the pole.

⑥ Effective projected area (actual area times drag coefficient) for the application of horizontal wind load.

Except as noted in Sheet 1 thru 5 of 5, other details not covered shall refer to Standard Sheet "MA-D" for pole details, "LUM-A" for luminaire arm and connection details, "SNS" for internally lighted street name sign details, and "TS-FD" for anchor bolt and foundation details.

Fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Material, fabrication tolerances, and shipping practices shall also meet the requirements of this sheet and Item 686, "Traffic Signal Pole Assemblies (Steel)".

Unless otherwise noted, all parts shall be galvanized in accordance with Item 445, "Galvanizing" after fabrication.

Deviations from the details and dimensions shown herein require submission of shop drawings in accordance with the Item 441, "Steel Structures". Alternate designs are not acceptable.

Installation of damping plate for the long mast arm is not recommended.

Provision of the bracket assembly used to support the traffic signal heads shall be under the direction of the Engineer for approval.

Design also conforms to NCHRP Report 412 for fatigue resistance except that there are no stiffeners at the base plate. TxDOT is conducting tests to determine if stiffeners at the base plate will or will not result in optimal performance; depending upon the results of the tests, poles may need a retrofit to ensure optimal fatigue performance.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES
LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)
LMA(1)-12

Sheet 1 of 5

DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT

REVISIONS
4-20-01
1-12

CONT	SECT	JOB	HIGHWAY
0110	06	154	SS 261
DIST	COUNTY		SHEET NO.
HOU	HARRIS		50

131A

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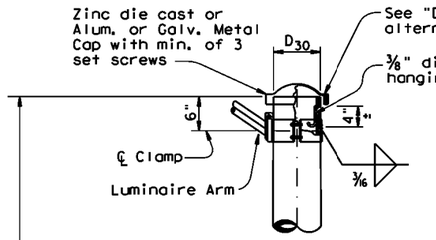
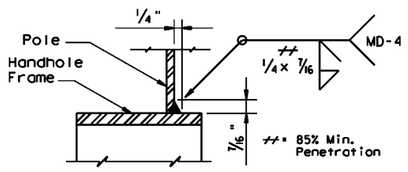
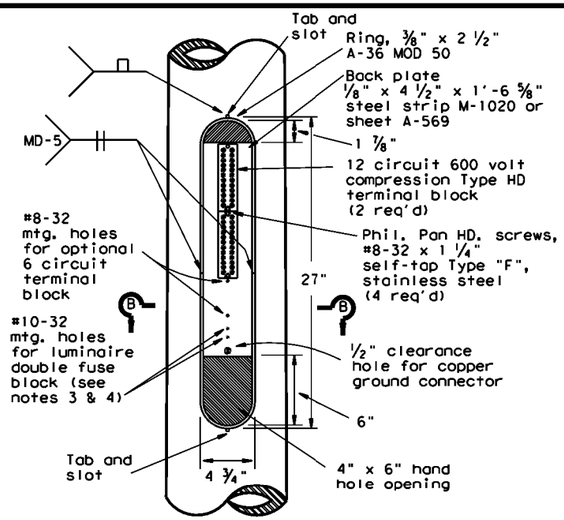


DETAIL A

(for pole with luminaire)



DETAIL H

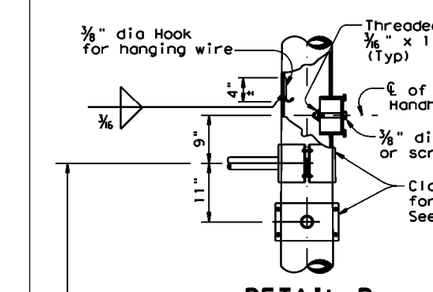


ACCESS COMPARTMENT

MATERIALS	
Round Shafts or Polygonal Shafts ⑦	ASTM A595 Gr.A, A588, A1008 HSLAS Gr.50 Class 2, A1011 HSLAS Gr.50 Class 2, A572 Gr.50 or A1011 SS Gr.50 ⑧
Plates ⑦	ASTM A36, A588, or A572 Gr.50
Connection Bolts	ASTM A325, or A449 except where noted
Pin Bolts	ASTM A325
Pipe ⑦	ASTM A53 Gr.B, A501, A1008 HSLAS-F Gr.50, A1011 HSLAS-F Gr.50
Misc. Hardware	Galvanized steel or stainless steel or as noted

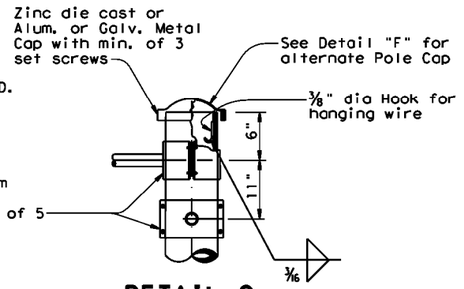
⑦ ASTM A572, A1008 HSLAS, A1011 HSLAS, A1008 HSLAS-F, A1011 HSLAS-F, or A1011 SS may have higher yield strengths but shall not have less elongation than the grade indicated.

⑧ ASTM A1011 SS Gr.50 shall also have a minimum elongation of 18 percent in 8 inches or 23 percent in 2 inches. Material thickness in excess of those stipulated under A1011 SS will be acceptable providing the material meets all other A1011 SS requirements and the requirements of this item.

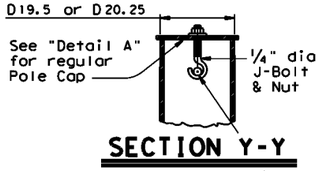


DETAIL B

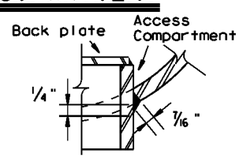
(If ILSN applied)



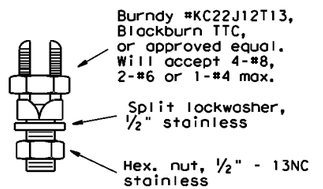
DETAIL C



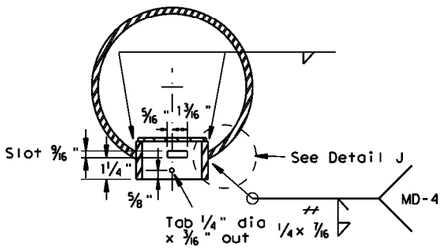
SECTION Y-Y



DETAIL J



COPPER GROUND CONNECTOR

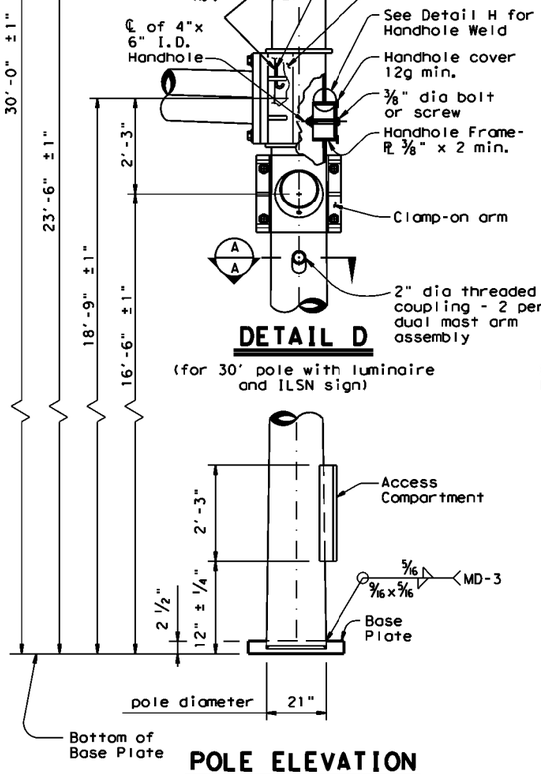


SECTION B-B

Opening for access compartment shall be no more than 1/16 inch wider than the access compartment itself.

ACCESS COMPARTMENT NOTES:

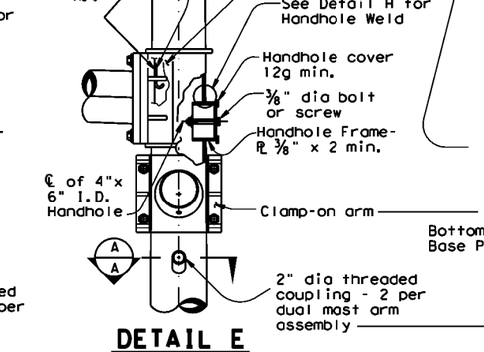
1. The cover shall be one piece formed from ABS plastic, shall be a pearl gray color, and shall be suitable for exposure to harsh sunlight and extreme weather. Cover shall latch with two screw latches and shall fit tightly to the enclosure ring to create a rainproof seal. Latch screws shall be 1/4-20 stainless flat socket head screws with tamper proof feature.
2. The pole manufacturer shall provide with each pole a separate kit consisting of: one cover with two latching assemblies, two terminal strips (Marathon #985GP12CU or approved equal), four #8-32 x 1 1/4" self tapping type "F" stainless steel pan head screws, and one ground connector (Blackburn TTC, Burndy KC22J12T13, or Ilsco SSS-5). The traffic signal contractor shall install the kit items in the field.
3. The screw hole spacing on the enclosure back plate shall be for two Marathon #985GP12 terminal strips, one Marathon #985GP06CU terminal strip, and one Bussmann #BM6032B fuse block.
4. Install one Bussmann #BM6032B, Littelfuse #L60030M-2C, or Ferraz-Shawmut #30352 fuse block for poles where luminaires are to be installed.



DETAIL D

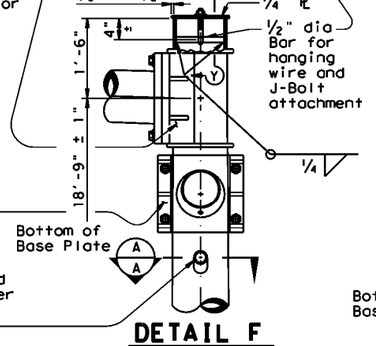
(for 30' pole with luminaire and ILSN sign)

POLE ELEVATION



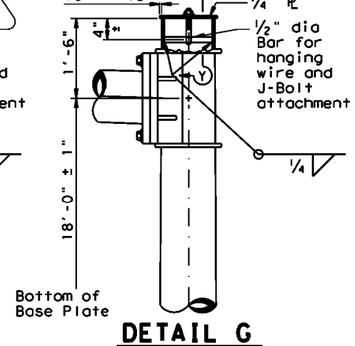
DETAIL E

(for 24' pole with ILSN sign and no luminaire, single or dual mast arm)



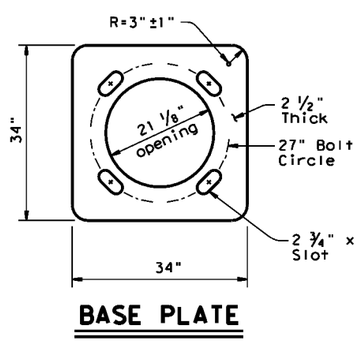
DETAIL F

(for 20.25' pole with no ILSN sign and no luminaire, dual mast arm)

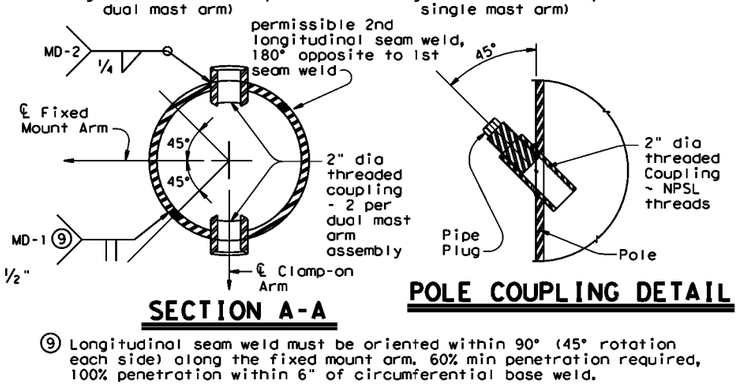


DETAIL G

(for 19.5' pole with no ILSN sign and no luminaire, single mast arm)



BASE PLATE



SECTION A-A

POLE COUPLING DETAIL

⑨ Longitudinal seam weld must be oriented within 90° (45° rotation each side) along the fixed mount arm. 60% min penetration required, 100% penetration within 6" of circumferential base weld.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES
LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)

Sheet 2 of 5

LMA(2)-12

DN: JSY	CK: ARC	DW: TGG	CK: JSY
REVISIONS	CONT	SECT	JOB	HIGHWAY
4-20-01 1-12	0110	06	154	SS 261
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		51

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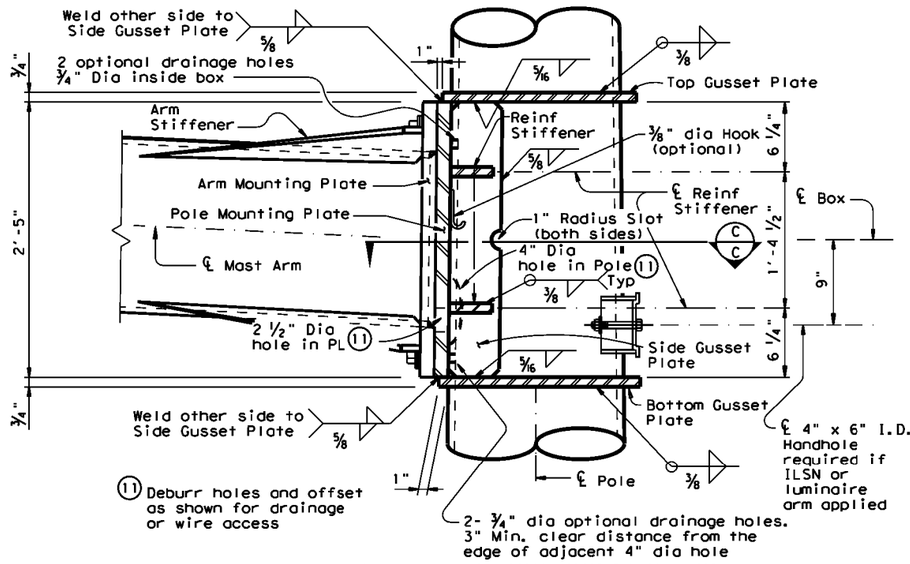
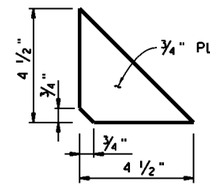
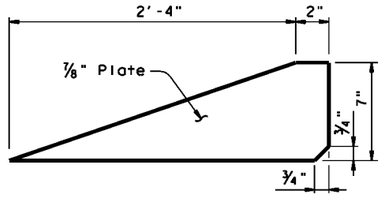


BUILT-UP BOX CONNECTION



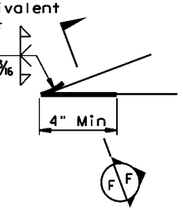
REINFORCING STIFFENER



ARM STIFFENER

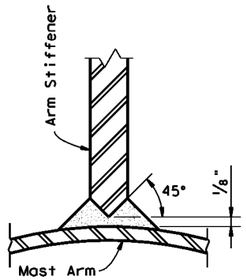
(Cut to match arm inclination and taper)

Provide Detail shown in SECTION F-F or equivalent 100% complete joint penetration weld from both sides.



Only 4" length at tip of Arm Stiffener requires a complete joint penetration weld. Smooth weld radius to connect Stiffener. Only a fillet weld is required for the remaining weld length.

DETAIL "K"



SECTION F-F

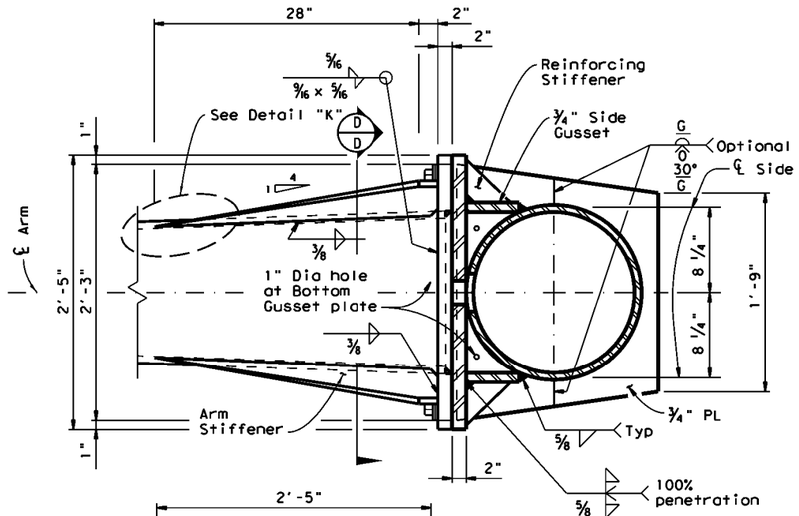
Fixed Mount Arm L_F	ROUND POLES (13)					Foundation Type
	D_B	$D_{19.5}$ or $D_{20.25}$	D_{24}	D_{30}	(12) thk	
ft.	in.	in.	in.	in.	in.	
50', 55' 60', 65'	21.0	18.2	17.6	16.8	.3125	48-A

Fixed Mount Arm L_F	ROUND ARMS (13)				
	L_1	D_1	D_2	(12) thk	Rise
ft.	ft.	in.	in.	in.	
50	49	18.5	11.7	.3125	3'- 3"
55	54	18.5	11.0	.3125	3'- 7"
60	59	18.5	10.3	.3125	3'-11"
65	64	18.5	9.6	.3125	4'- 4"

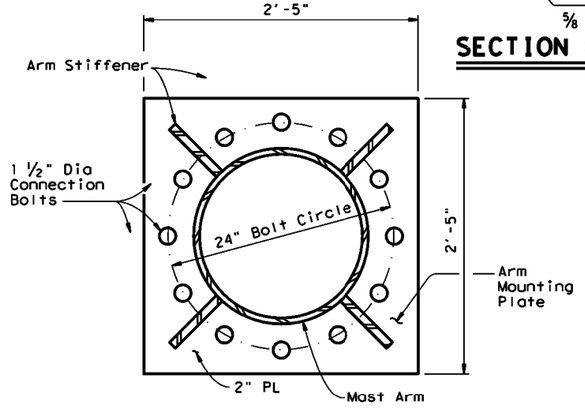
D_B = Pole Base O.D.
$D_{19.5}$ = Pole Top O.D. with no Luminaire and no ILSN (single mast arm)
$D_{20.25}$ = Pole Top O.D. with no Luminaire and no ILSN (dual mast arm)
D_{24} = Pole Top O.D. with ILSN w/out Luminaire
D_{30} = Pole Top O.D. with Luminaire
D_1 = Arm Base O.D.
D_2 = Arm End O.D.
L_1 = Shaft Length
L_F = Fixed Arm Length

(12) Thickness shown is minimum, thicker materials may be used.

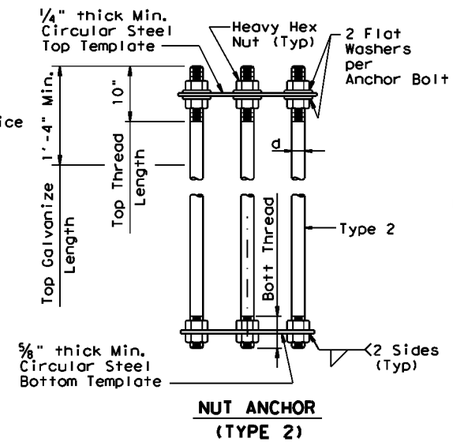
(13) Shaft profile 16-sided or 18-sided is considered to be equivalent to round section.



SECTION C-C

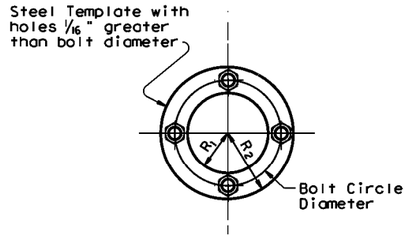


SECTION D-D



NUT ANCHOR
(TYPE 2)

ANCHOR BOLT ASSEMBLY



TEMPLATE DETAIL

ANCHOR BOLT & TEMPLATE SIZE						
Bolt Dia in.	Length ‡	Top Thread	Bottom Thread	Bolt Circle	R_2	R_1
2 1/2"	5'-2"	10"	6 1/2"	27"	16"	11"

‡ Min dimension given, longer bolts are acceptable.

FOUNDATION DESIGN TABLE													
FDN TYPE	DRILLED SHAFT DIA	REINFORCING STEEL		DRILLED SHAFT LENGTH-ft (16), (17), (18)			ANCHOR BOLT DESIGN (14)				FOUNDATION DESIGN LOAD (15)		TYPICAL APPLICATION
		VERT BARS	SPIRAL & PITCH	TEXAS CONE PENETROMETER N blows/ft			ANCHOR BOLT DIA	Fy (ksi)	BOLT CIR DIA	ANCHOR TYPE	MOMENT K-ft	SHEAR Kips	
				10	15	40							
48-A	48"	20 #9	#4 at 6"	21.9	19.5	14.7	2 1/2"	55	27"	2	490	10	50' to 65' Mast arm assembly.

SEE SHEET "TS-FD" FOR ADDITIONAL DETAILS.

(14) Anchor bolt design develops the foundation capacity given under Foundation Design Loads.

(15) Foundation Design Loads are the allowable moments and shears at the base of the structure.

(16) Field Penetrometer readings at a depth of approximately 3 to 5 feet may be used to adjust shaft lengths.

(17) If rock is encountered, the Drilled Shaft shall extend a minimum of two diameters into solid rock.

(18) Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

GENERAL NOTES:

Built-up Box Connection: For the welded arm-to-pole connection as a build-up box configuration illustrated here is an example only, fabricators are required to submit a shop drawing of box connection for approval. The drawing shall specify the details of each box element, welds of arm-to-pole connection, arm-to-plate socket connection, and arm rise creation. Specify the proper location of drain holes along the pole. 2 1/2" dia hole in the pole mounting plate and 4" dia hole in the pole need to be aligned for wiring access or drainage. Arm stiffeners cut to match arm inclination and taper shall also be included.

The deviation from flat for either arm or pole mounting plate shall not exceed 1/32 in., which is measured along the center of mounting plate to a radial distance of 13.5 in. The deformed-from-flat connection between arm and pole mounting plates shall not be allowed if the center of both mounting plates cannot contact directly.

Fixed mount details are used for single mast arm assemblies and for the first arm on dual mast arm assemblies.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES
LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)

Sheet 3 of 5 LMA(3)-12

REVISIONS	DN: JSY	CK: ARC	DW: TGG	CK: JSY
4-20-01 I-12	CONT	SECT	JOB	HIGHWAY
	0110	06	154	SS 261
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		52

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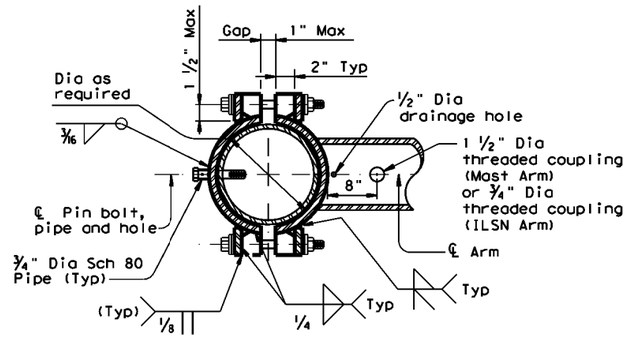
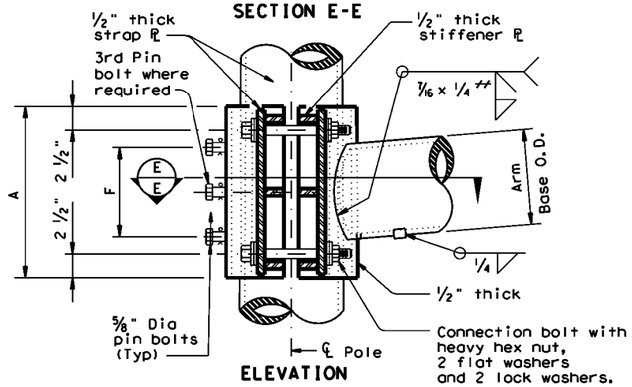


SECTION E-E



ELEVATION
(Mast Arm or ILSN Arm to pole)

= 85% Min. Penetration

CLAMP-ON CONNECTION

80 MPH WIND

Clamp-on Arm LC	ROUND ARMS					POLYGONAL ARMS				
	L_1	D_1	D_2	thk (12)	Rise	L_1	D_1	D_2	thk (12)	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	6.5	3.8	.179	1'-9"	19.1	7.0	3.5	.179	1'-8"
24	23.1	7.5	4.3	.179	1'-10"	23.1	7.5	3.5	.179	1'-9"
28	27.1	8.0	4.2	.179	1'-11"	27.1	8.0	3.5	.179	1'-10"
32	31.0	9.0	4.7	.179	2'-1"	31.0	9.0	3.5	.179	2'-0"
36	35.0	9.5	4.6	.179	2'-4"	35.0	10.0	3.5	.179	2'-1"
40	39.0	9.5	4.1	.239	2'-8"	39.0	9.5	3.5	.239	2'-3"
44	43.0	10.0	4.1	.239	2'-11"	43.0	10.0	3.5	.239	2'-6"

100 MPH WIND

Clamp-on Arm LC	ROUND ARMS					POLYGONAL ARMS				
	L_1	D_1	D_2	thk (12)	Rise	L_1	D_1	D_2	thk (12)	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	8.0	5.3	.179	1'-8"	19.1	8.0	3.5	.179	1'-7"
24	23.1	9.0	5.8	.179	1'-9"	23.1	9.0	3.5	.179	1'-8"
28	27.1	9.5	5.7	.179	1'-10"	27.1	10.0	3.5	.179	1'-9"
32	31.0	9.5	5.2	.239	1'-11"	31.0	9.5	3.5	.239	1'-10"
36	35.0	10.0	5.1	.239	2'-0"	35.0	10.0	3.5	.239	1'-11"
40	39.0	10.5	5.1	.239	2'-3"	39.0	11.0	3.5	.239	2'-1"
44	43.0	11.0	5.1	.239	2'-8"	43.0	11.5	4.0	.239	2'-3"

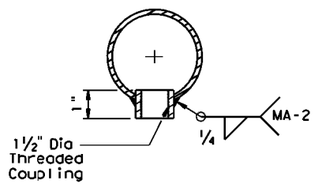
D1 = Arm Base O.D.
D2 = Arm End O.D.
L1 = Shaft Length
LC = Clamp-on Arm Length

(12) Thickness shown is minimum, thicker materials may be used.

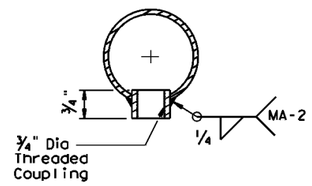
CLAMP-ON ARM CONNECTION

ILSN Arm Size		A	F	4 Conn. Bolts	⅝" Dia. Pin Bolts
Sch 40 pipe Dia	Thick			Dia	No.
in.	in.	in.	in.	in.	ea
3	.216	10	4	¾	2

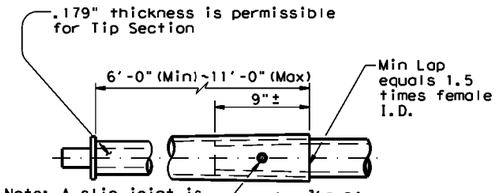
Mast Arm Size		A	F	4 Conn. Bolts	⅝" Dia. Pin Bolts
Base Dia	Thick			Dia	No.
in.	in.	in.	in.	in.	ea
6.5	.179	12	6	1	2
7.5	.179	14	8	1	2
8.0	.179	14	8	1	2
9.0	.179	16	10	1	2
9.5	.179	18	12	1 ¼	3
9.5	.239	18	12	1 ¼	3
10.0	.239	18	12	1 ¼	3
10.5	.239	18	12	1 ¼	3
11.0	.239	18	12	1 ¼	3
11.5	.239	18	12	1 ¼	3



ARM COUPLING DETAIL



ILSN ARM COUPLING DETAIL

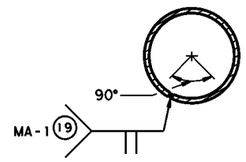


Note: A slip joint is permissible for arms 40' and greater in length. The slip joint shall be made in the shop, but may be match marked and shipped disassembled.

SLIP JOINT DETAIL (CLAMP-ON ARM)

Stainless steel bands (or Cables) and cast bracket as in "Astro-Brac", "Sky Bracket" or "Easy Bracket" with 1 ½" Dia Threaded Coupling.

BRACKET ASSEMBLY



ARM WELD DETAIL

(19) Longitudinal Seam Weld must be oriented within the lower 90° of the signal arm.
60% Min penetration
100% penetration within 6" of circumferential base welds.

GENERAL NOTES:

Clamp-on details are used for the second arm on dual mast arm assemblies or ILSN arm support. For a clamp-on mast arm, a maximum 1 ½" wide vertical slotted hole may be cut in the front clamp plate to facilitate drainage during galvanizing. The slot shall be centered behind the arm and shall be no longer than the arm diameter minus 1". For an ILSN arm, a 1 ½" diameter hole shall be cut in the front clamp plate for wire access. A matched hole shall be field drilled through the pole to provide wire access after arm is oriented. Deburr both holes.

Where duplicate parts occur on a detail, welds shown for part shall apply to all similar parts on the detail.

Pin bolts are required to prevent rotation of clamp-on arms under design wind forces. Pin bolts shall be ASTM A325 with threads excluded from the shear plane. Pin bolt and ¾" diameter pipe shall have 3/16" diameter holes for a ⅛" diameter galvanized cotter pin. Back clamp plate shall be furnished with a ¾" diameter hole for each pin bolt. An 11/16" diameter hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES
LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)

Sheet 4 of 5 — LMA(4)-12

DN: JK	CK: GRB	DW: FDN	CK: CAL

REVISIONS
4-20-01
1-12

CONT	SECT	JOB	HIGHWAY
0110	06	154	SS 261
DIST	COUNTY		SHEET NO.
HOU	HARRIS		53

131D

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Shipping Parts List

Ship each pole with the following attached: enlarged hand hole, pole cap, fixed arm connection bolts and washers, and any additional hardware listed in the table.

Nominal Arm Length	30' Poles with Luminaire: See note above plus: one (or two if ILSN attached) small hand hole, clamp-on simplex		24' Poles with ILSN: See note above plus one small hand hole		19.50' (Single Mast Arm) 20.25' (Dual Mast Arm) Poles with no Luminaire and no ILSN: See note above	
Single Mast Arm						
Lf ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
50	50L	4	50S		50	2
55	55L		55S		55	
60	60L	2	60S		60	
65	65L		65S		65	
Dual Mast Arm						
Lf ft. / Lc ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
50 / 20	5020L		5020S		5020	
24	5024L		5024S		5024	
28	5028L		5028S		5028	
32	5032L		5032S		5032	
36	5036L		5036S		5036	
40	5040L		5040S		5040	
44	5044L		5044S		5044	
55 / 20	5520L		5520S		5520	
24	5524L		5524S		5524	
28	5528L		5528S		5528	
32	5532L		5532S		5532	
36	5536L		5536S		5536	
40	5540L		5540S		5540	
44	5544L		5544S		5544	
60 / 20	6020L		6020S		6020	
24	6024L		6024S		6024	
28	6028L		6028S		6028	
32	6032L		6032S		6032	
36	6036L		6036S		6036	
40	6040L		6040S		6040	
44	6044L		6044S		6044	
65 / 20	6520L		6520S		6520	
24	6524L		6524S		6524	
28	6528L		6528S		6528	
32	6532L		6532S		6532	
36	6536L		6536S		6536	
40	6540L		6540S		6540	
44	6544L		6544S		6544	

Foundation Summary Table **

Location Ident.	Avg. N Blow/ft.	No. Each	Drill Shaft *** Length (feet) 48-A
SS 261 AT TIDWELL RD			
POLE A	10	1	21.9
POLE B	10	1	21.9
POLE C	10	1	21.9
POLE D	10	1	21.9
IH 610 AT UA 90			
POLE B	10	1	21.9
POLE C	10	1	21.9
POLE D	10	1	21.9
POLE E	10	1	21.9
Total Drill Shaft Length			175.2

Notes
** Foundations may be listed separately or grouped according to similarity of location and type. Quantities are for the Contractor's information only.
*** Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

Abbreviations
Lf= Fixed Arm Length
Lc= Clamp-on Arm Length (44' Max.)

Shipping Parts List

Traffic Signal Arms (Fixed Mount) (1 per pole)
Ship each arm with listed equipment attached

Nominal Arm Length	Type IV Arm (4 Signals) 3 Bracket Assembly and 4 CGB Connectors	
ft.	Designation	Quantity
50	50IV	6
55	55IV	
60	60IV	2
65	65IV	

Luminaire Arms (1 per 30' pole)

Nominal Arm Length	Quantity
8' Arm	6

ILSN Arm (Max. 2 per pole) Ship with clamps, bolts and washers

Nominal Arm Length	Quantity
7' Arm	
9' Arm	

Traffic Signal Arms (80 MPH Clamp-On Mount) (1 per pole) Ship each arm with listed equipment attached

Nominal Arm Length	Type I Arm (1 Signal) 2 CGB connector and 1 clamp w/bolts and washers		Type II Arm (2 Signals) 1 Bracket Assembly and 3 CGB connectors, and 1 clamp w/bolts and washers		Type III Arm (3 Signals) 2 Bracket Assembly and 4 CGB connectors, and 1 clamp w/bolts and washers	
ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20I-80					
24	24I-80		24II-80			
28	28I-80		28II-80			
32			32II-80		32III-80	
36			36II-80		36III-80	
40					40III-80	
44					44III-80	

Traffic Signal Arms (100 MPH Clamp-On Mount) (1 per pole) Ship each arm with listed equipment attached

Nominal Arm	Type I Arm (1 Signal) 2 CGB connector and 1 clamp w/bolts and washers		Type II Arm (2 Signals) 1 Bracket Assembly and 3 CGB connectors, and 1 clamp		Type III Arm (3 Signals) 2 Bracket Assembly and 4 CGB connectors, and 1 clamp	
ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20I-100					
24	24I-100		24II-100			
28	28I-100		28II-100			
32			32II-100		32III-100	
36			36II-100		36III-100	
40					40III-100	
44					44III-100	

Anchor Bolt Assemblies (1 per pole)

Anchor Bolt Diameter	Anchor Bolt Length	Quantity
2 1/2 "	5' - 3"	8

Each anchor bolt assembly consists of the following: Top and bottom templates, 4 anchor bolts, 8 nuts, 8 flat washers and 4 nut anchor devices (type 2) per Standard Drawing "TS-FD". Templates may be removed for shipment.

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

03/01/2023

Texas Department of Transportation
Traffic Operations Division

LONG MAST ARM ASSEMBLY PARTS LIST

LMA(5)-12

Sheet 5 of 5

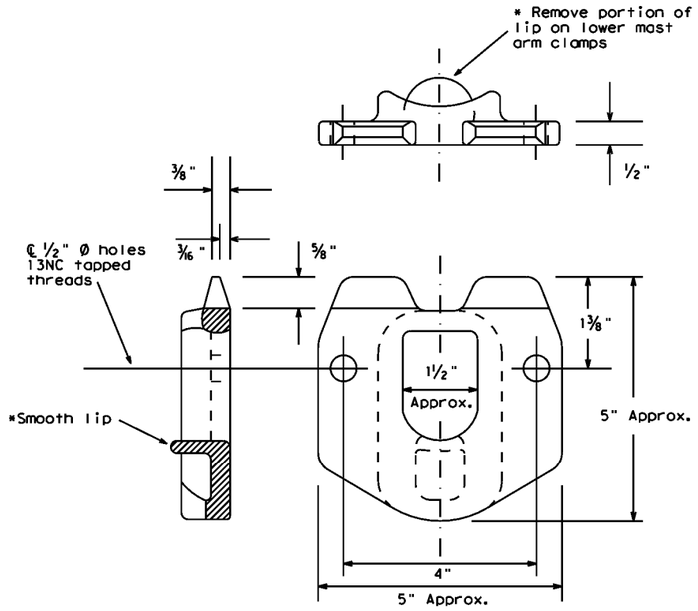
DN: JK	CK: GRB	DW: FDN	CK: CAL

REVISIONS
4-20-01
1-12

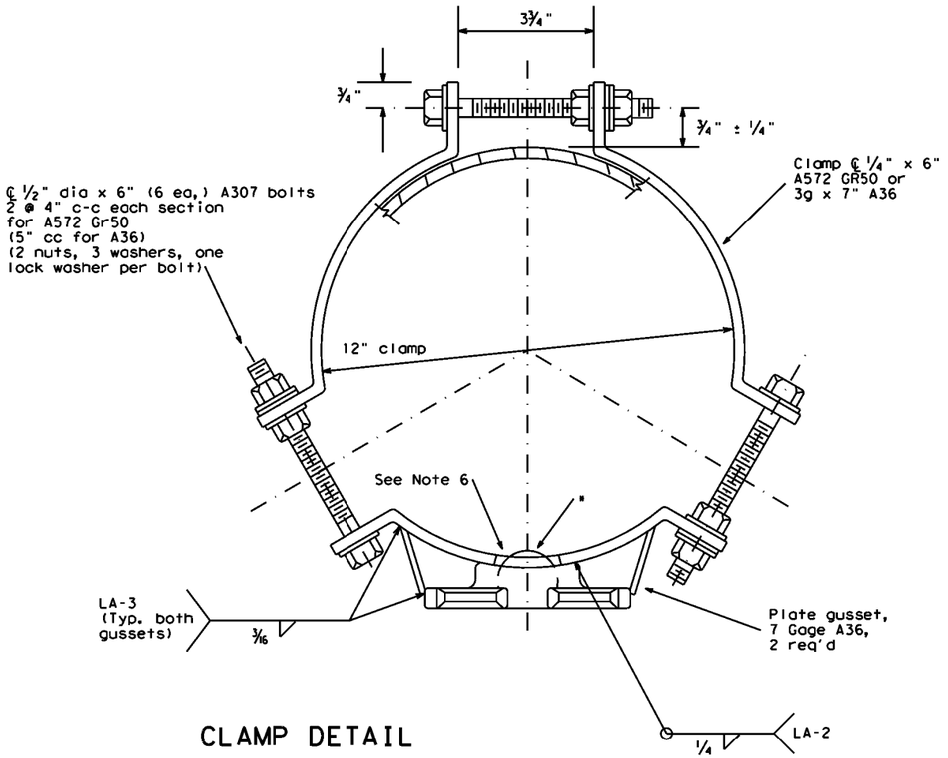
CONT	SECT	JOB	HIGHWAY
0110	06	154	SS 261

DIST	COUNTY	SHEET NO.
HOU	HARRIS	54

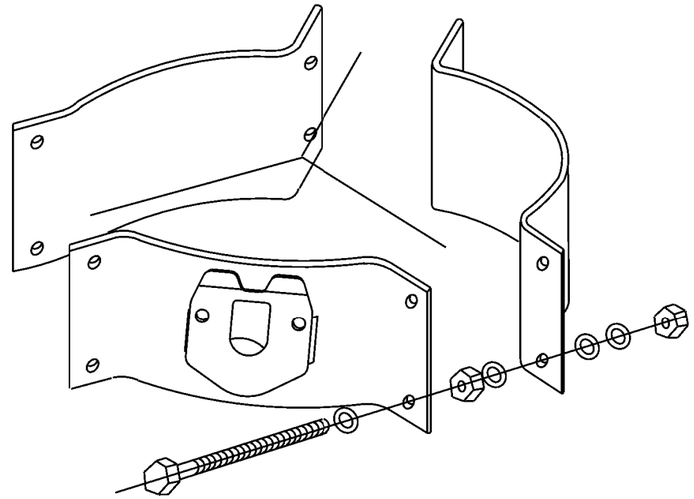
131E



POLE SIMPLEX DETAILS



CLAMP DETAIL



PROJECTION

OTHER MATERIALS:

1. Pole simplex shall be ASTM A27 GR65-35 or A148 GR80-50 or A576 GR1021. ASTM A576 must be suitable for forging and also meet minimum tensile of 65ksi, minimum yield of 35ksi, and a minimum elongation of 22 percent in 2 inches.
2. Welded tabs and backplates shall be ASTM A-36 steel or better.
3. Nylon insert locknuts shall conform to ASTM A563.

GENERAL NOTES:

1. Materials and fabrication shall be in accordance with Standard Sheet "MA-C" and with the details, dimensions, and weld procedures shown herein. Weld references call for preappproved weld procedures which the Fabricator must obtain prior to fabrication. In the absence of specified fabrication tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.
2. All parts shall be galvanized after fabrication in accordance with Item 445, "Galvanizing". The throat of the Simplex shall be made free of all rough or sharp edges resulting from the galvanizing process.
3. Each simplex fitting shall be supplied with 2 ASTM A325 bolts, 1/2in. X 1 1/2in. and 2 lock washers. The bolts and lock washers shall be secured to the clamp with the other hardware items. The Fabricator shall ship clamp assembly together in a single package, including all bolts, nuts, and washers required for the clamp and simplex fitting.
4. Design conforms to 1994 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals" and interim revisions thereto. Design Wind Speed equals 80 mph plus a 1.3 gust factor. Clamps are designed to support a 60 lb. luminaire having an effective projected area (actual area times drag coefficient) of 1.6 sq.ft.,12 ft. maximum arm length.
5. Each assembly shall consist of one upper piece simplex fitting having a smooth lip and one lower piece simplex fitting with the lip removed.
6. Approximately 2 in. diameter hole in upper mast arm clamp.

For 8.9 - 12 inch diameter Signal Poles
(Two req'd for each mast arm)

Texas Department of Transportation
Traffic Operations Division

CLAMP ON FITTING ASSEMBLY FOR LUMINAIRE MAST ARM

CFA-12

DN: KAB	CK: RES	DW: FDN	CK: CAL

REVISIONS
11-99
1-12

CONT	SECT	JOB	HIGHWAY
0110	06	154	SS 261

DIST	COUNTY	SHEET NO.
HOU	HARRIS	55

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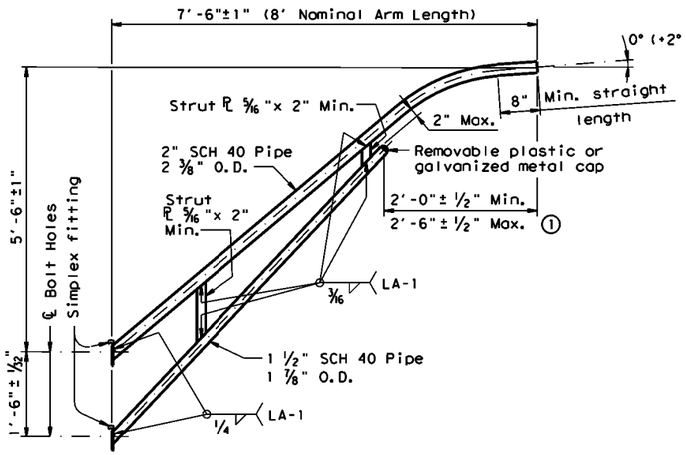
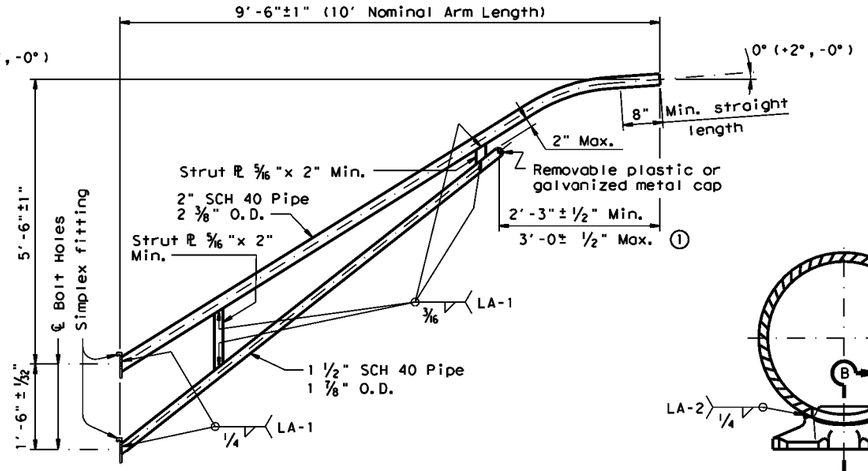


8-FOOT LUMINAIRE ARM



10-FOOT LUMINAIRE ARM

DIRECT ATTACHMENT DETAIL

MATERIALS	
Pole or Arm Simplex	ASTM A27 Gr.65-35 or A148 Gr.80-50, A576 Gr.1021 (3), or A36 (Arm only)
Arm Pipes	ASTM A53 Gr.B, A501, A1008 HSLAS-F Gr.50 (4), or A1011 HSLAS-F Gr.50 (4)
Arm Strut Plates (2)	ASTM A36, A572 Gr.50 (4), or A588
Misc.	ASTM designations as noted

(1) Dimensional limits are given to show acceptable variation in design. All of a Fabricator's production of a particular arm length shall have the same dimensions within specified tolerances.

(2) Any of the materials listed for plates may be used where the drawings do not specify a particular ASTM designation.

(3) A576 must be suitable for forging and also meet minimum tensile strength of 65 ksi, minimum yield of 35 ksi, and elongation in 2 inches of 22 percent.

(4) ASTM A572, A1008 HSLAS-F, and A1011 HSLAS-F may have higher yield strengths but shall not have less elongation than the grade indicated.

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Revisions thereto. Design Wind Speed equals 90 mph plus a 1.3 gust factor. Arms are designed to support a 60 lb. luminaire having an effective projected area (actual area times drag coefficient) of 1.6 sq. ft.

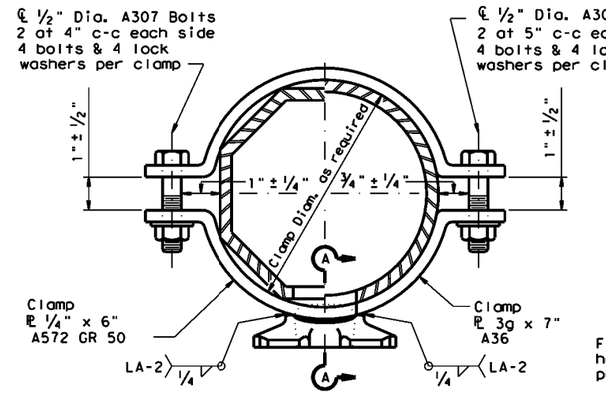
Materials and fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. In the absense of specified Fabricaton tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.

Unless otherwise noted, all parts shall be galvanized after fabrication in accordance with Item 445, "Galvanizing".

Deviation from the details and dimensions shown herein require submission of shop drawings in accordance with Item 441, "Steel Structures". Alternate designs are not acceptable.

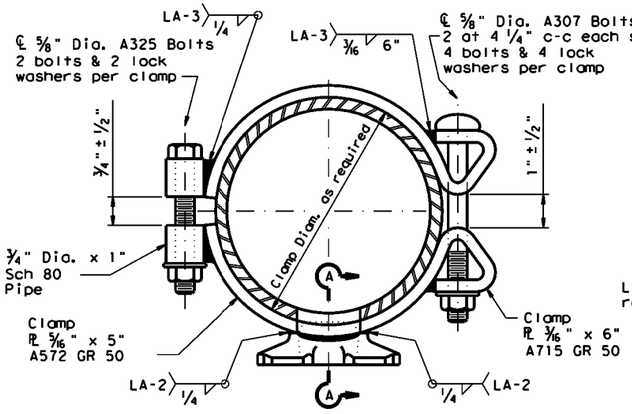
Each pole simplex fitting shall be supplied with 2 ASTM A325 bolts and 2 lock washers of the size specified. The bolts and lock washers shall be secured to the pole with the other hardware items called for in the plans. When clamp attachment is specified, the Fabricator shall ship the clamp assembly securely attached to the pole at the location shown on the plans.

If clamp assemblies are ordered without poles, the Fabricator shall ship one upper and one lower clamp assembly together in a single package, including all nuts and washers required for the clamps and simplex fittings.



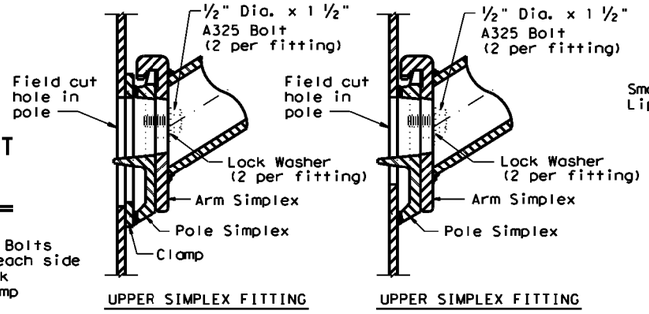
CLAMP ATTACHMENT DETAIL NO. 1 (HALF SECTION)

CLAMP ATTACHMENT DETAIL NO. 2 (HALF SECTION)



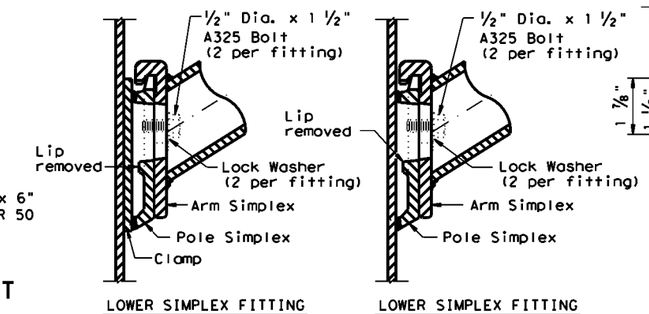
CLAMP ATTACHMENT DETAIL NO. 3 (HALF SECTION)

CLAMP ATTACHMENT DETAIL NO. 4 (HALF SECTION)



UPPER SIMPLEX FITTING

UPPER SIMPLEX FITTING

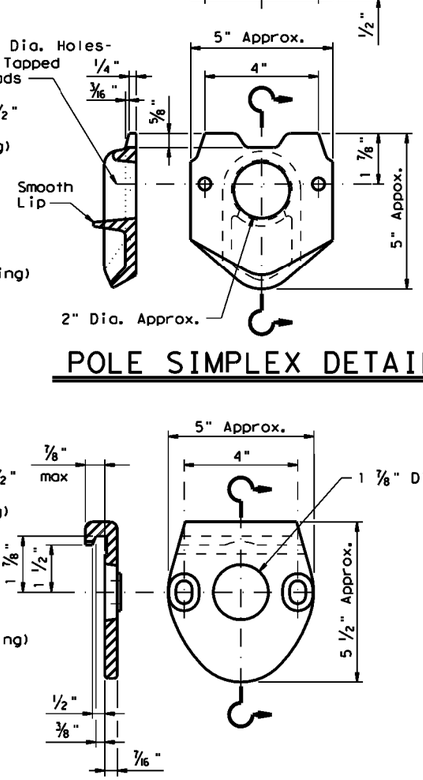


LOWER SIMPLEX FITTING

LOWER SIMPLEX FITTING

SECTON A-A

SECTON B-B



POLE SIMPLEX DETAIL

ARM SIMPLEX DETAIL

Texas Department of Transportation
Traffic Operations Division

STANDARD ASSEMBLY DRAWINGS FOR LUMINAIRE SUPPORT STRUCTURES

ARM DETAILS

LUM-A-12

DN: LEH	CK: JSY	DW: LTT	CK: TEB

REVISIONS: 5-96, 1-99, 1-12

CONT	SECT	JOB	HIGHWAY
0110	06	154	SS 261
DIST	COUNTY		SHEET NO.
HOU	HARRIS		56

DATE: 11/28/2022 3:23:53 PM
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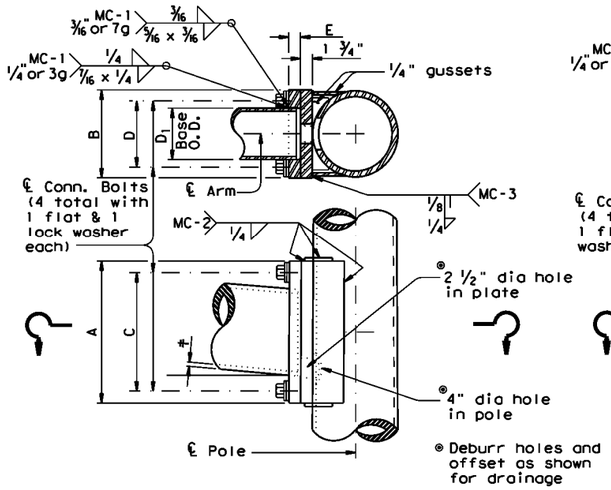
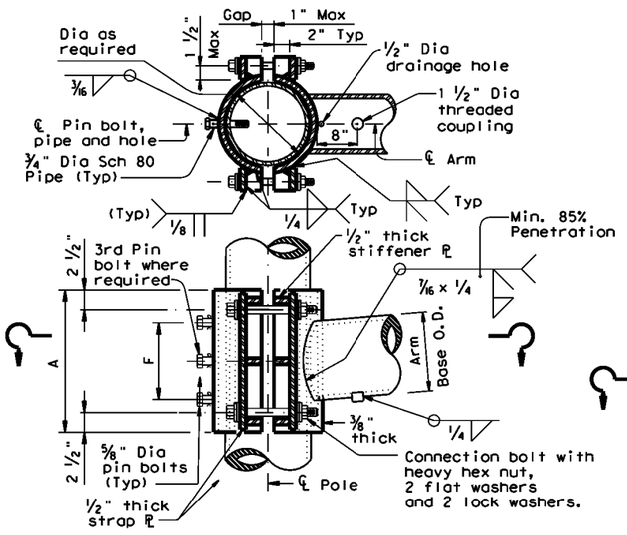
ARM SIZE D_1	ARM SIZE ϕ	A	B	C	D	E	CONN BOLT DIA
in.	in.	in.	in.	in.	in.	in.	in.
6.5	.179	12	9	9	6	1 ¾	1
7.5	.179	13	9	10	6	1 ¾	1
8.0	.179	14	10	11	7	2	1 ¼
9.0	.179	16	11	13	8	2	1 ¼
9.5	.179	17	12	14	9	2	1 ¼
9.5	.239	18	12	15	9	2	1 ¼
10.0	.239	18	12	15	9	2	1 ¼
10.5	.239	18	13	15	10	3	1 ½
11.0	.239	18	13	15	10	3	1 ½



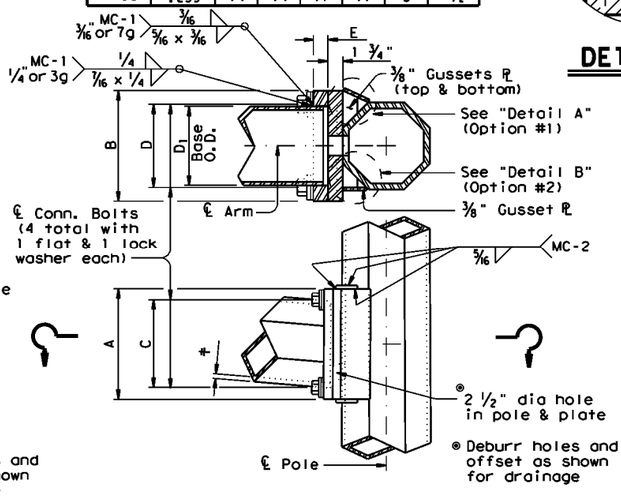
FIXED MOUNT DETAIL 1

ARM SIZE D_1	ARM SIZE ϕ	A	F	CONN. BOLTS No.	CONN. BOLTS Dia	PIN BOLTS No.	PIN BOLTS Dia
in.	in.	in.	in.	ea.	in.	ea.	in.
6.5	.179	12	6	4	1	2	⅝
7.5	.179	14	8	4	1	2	⅝
8.0	.179	14	8	4	1	2	⅝
9.0	.179	16	10	4	1	2	⅝
9.5	.179	18	12	4	1 ¼	3	⅝
9.5	.239	18	12	4	1 ¼	3	⅝
10.0	.239	18	12	4	1 ¼	3	⅝



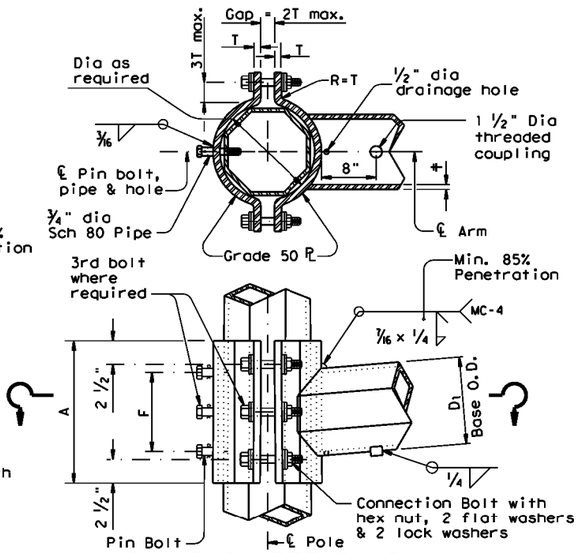
CLAMP-ON DETAIL 1

ARM SIZE D_1	ARM SIZE ϕ	A	B	C	D	E	CONN BOLT DIA
in.	in.	in.	in.	in.	in.	in.	in.
7.0	.179	11	11	8	8	1 ¾	1 ¼
7.5	.179	11	11	8	8	1 ¾	1 ¼
8.0	.179	11	11	8	8	2	1 ¼
9.0	.179	13	13	10	10	2	1 ¼
10.0	.179	13	13	10	10	2	1 ¼
9.5	.239	13	13	10	10	2	1 ¼
10.0	.239	14	14	11	11	2	1 ½
11.0	.239	14	14	11	11	3	1 ½
11.5	.239	14	14	11	11	3	1 ½



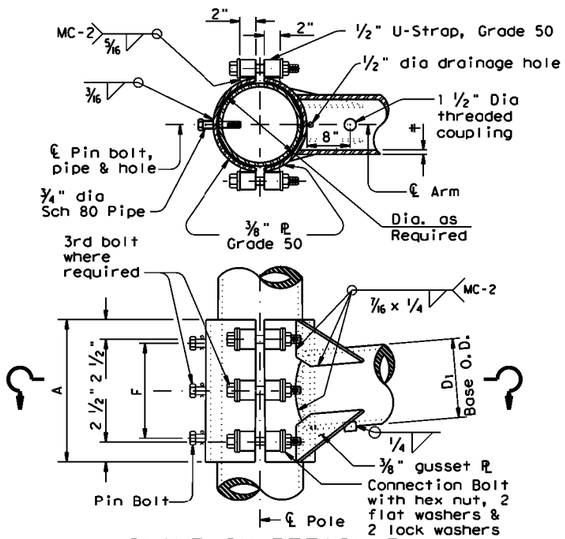
FIXED MOUNT DETAIL 2

ARM SIZE D_1	ARM SIZE ϕ	A	F	T	CONN. BOLTS No.	CONN. BOLTS Dia	PIN BOLTS No.	PIN BOLTS Dia
in.	in.	in.	in.	in.	ea.	in.	ea.	in.
7.0	.179	12	6	¾	4	¾	2	⅝
7.5	.179	14	8	¾	4	¾	2	⅝
8.0	.179	14	8	¾	4	¾	2	⅝
9.0	.179	16	10	⅞	4	1	2	⅝
10.0	.179	18	10	⅞	4	1	2	⅝
9.5	.239	18	10	1	6	1	3	⅝
10.0	.239	18	10	1	6	1	3	⅝

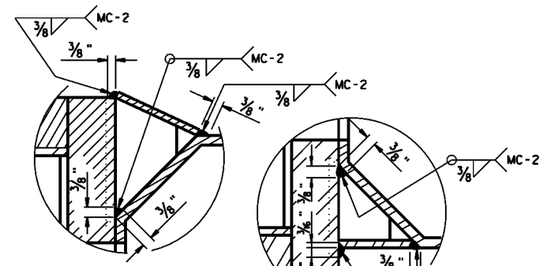


CLAMP-ON DETAIL 2

ARM SIZE D_1	ARM SIZE ϕ	A	F	CONN. BOLTS No.	CONN. BOLTS Dia	PIN BOLTS No.	PIN BOLTS Dia
in.	in.	in.	in.	ea.	in.	ea.	in.
6.5	.179	12	6	4	1	2	⅝
7.5	.179	14	8	4	1	2	⅝
8.0	.179	14	8	4	1	2	⅝
9.0	.179	16	10	4	1	2	⅝
9.5	.179	18	12	6	1	3	⅝
9.5	.239	18	12	6	1	3	⅝
10.0	.239	18	12	6	1	3	⅝

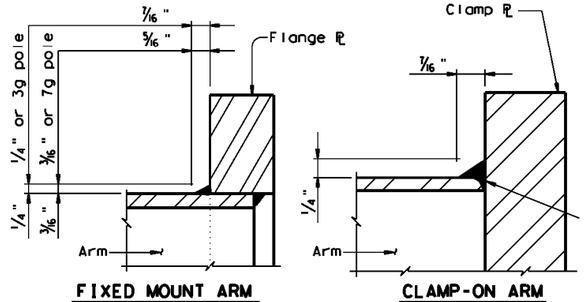


CLAMP-ON DETAIL 3



DETAIL A

DETAIL B



FIXED MOUNT ARM

CLAMP-ON ARM

ARM BASE WELD DETAILS

ARM SIZE D_1	ARM SIZE ϕ	A	F	CONN. BOLTS No.	CONN. BOLTS Dia	PIN BOLTS No.	PIN BOLTS Dia
in.	in.	in.	in.	ea.	in.	ea.	in.
6.5	.179	12	6	4	1	2	⅝
7.5	.179	14	8	4	1	2	⅝
8.0	.179	14	8	4	1	2	⅝
9.0	.179	16	10	4	1	2	⅝
9.5	.179	18	12	6	1	3	⅝
9.5	.239	18	12	6	1	3	⅝
10.0	.239	18	12	6	1	3	⅝

MATERIALS	
Round Shafts or Polygonal Shafts ①	ASTM A595 Gr.A, A588, A1008 HSLAS Gr.50 Class 2, A1011 HSLAS Gr.50 Class 2, A572 Gr.50 or A1011 SS Gr.50 ②
Plates ①	ASTM A36, A588, or A572 Gr.50
Connection Bolts	ASTM A325 or A449, except where noted
Pin Bolts	ASTM A325
Pipe ①	ASTM A53 Gr.B, A501, A1008 HSLAS-F Gr.50, A1011 HSLAS-F Gr.50
Misc. Hardware	Galvanized steel or stainless steel or as noted

① ASTM A572, A1008 HSLAS, A1011 HSLAS, A1008 HSLAS-F, A1011 HSLAS-F or A1011 SS may have higher yield strengths but shall not have less elongation than the grade indicated.

② ASTM A1011 SS Gr.50 material shall also have a minimum elongation of 18 percent in 8 inches or 23 percent in 2 inches. Material thickness in excess of those stipulated under A1011 SS will be acceptable providing the material meets all other A1011 SS requirements and the requirements of this item.

GENERAL NOTES:

Clamp-on details are used for the second arm on dual mast arm assemblies. A Maximum 1 ½" wide vertical slotted hole shall be cut in the front clamp plate to facilitate drainage during galvanizing. The slot shall be centered behind the arm and shall be no longer than the arm diameter minus 1"

Fixed mount details are used for single mast arm assemblies and for the first arm on dual mast arm assemblies.

Where duplicate parts occur on a detail, welds shown for one part shall apply to all similar parts on the detail.

Pin bolts are required to prevent rotation of clamp-on arms under design wind forces.

NOTE:

Pin bolts shall be A325 with threads excluded from the shear plane. Pin bolt and ¾" dia pipe shall have 5/16" dia holes for a 1/8" dia galvanized cotter pin. Back clamp plate shall be furnished with a ¾" dia hole for each pin bolt. An 11/16" dia hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.

Texas Department of Transportation
Traffic Operations Division

STANDARD ASSEMBLY FOR TRAFFIC SIGNAL SUPPORT STRUCTURES

MAST ARM CONNECTIONS

MA-C-12

REVISIONS	DN: MS	CK: JSY	DW: MMF	CK: JSY
5-96	CONT	SECT	JOB	HIGHWAY
5-09	0110	06	154	SS 261
1-12	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		57

126A

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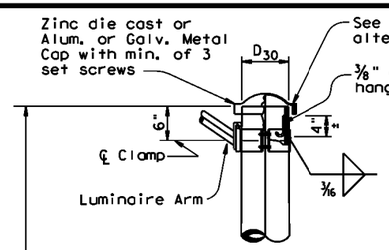
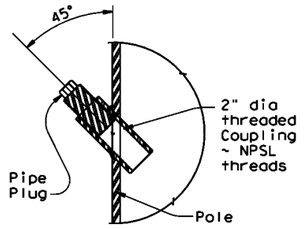
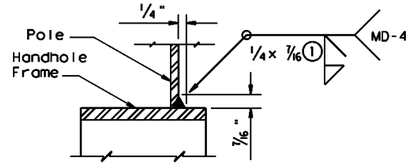


DETAIL A

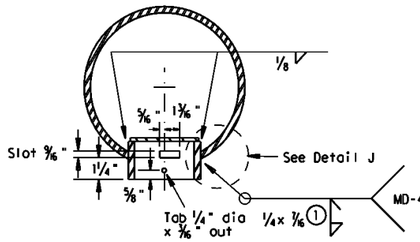
(for pole with luminaire)



POLE COUPLING DETAIL

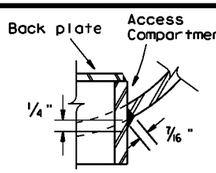


DETAIL G

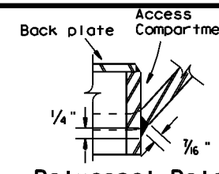


SECTION X-X

Opening for access compartment shall be no more than 1/16 inch wider than the access compartment itself.

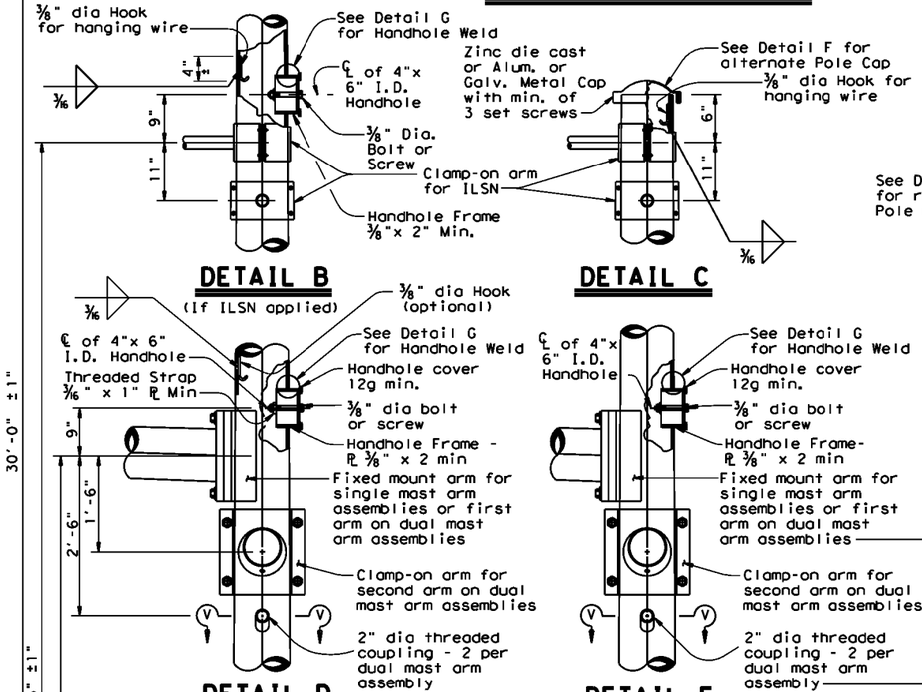


Round Pole



Polygonal Pole

DETAIL J



DETAIL B

(If ILSN applied)

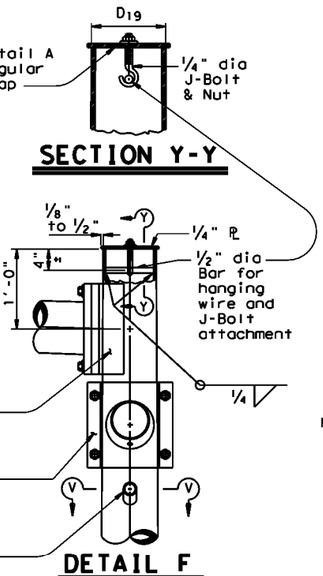
DETAIL C

DETAIL D

(for 30' pole with luminaire and ILSN sign)

DETAIL E

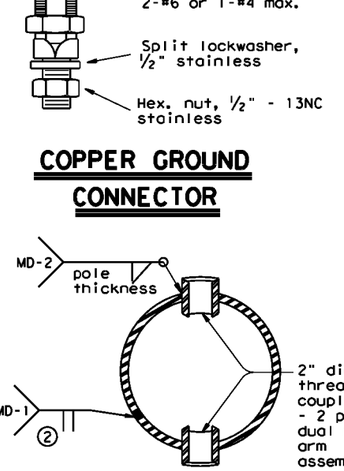
(for 24' pole with ILSN sign and no luminaire)



SECTION Y-Y

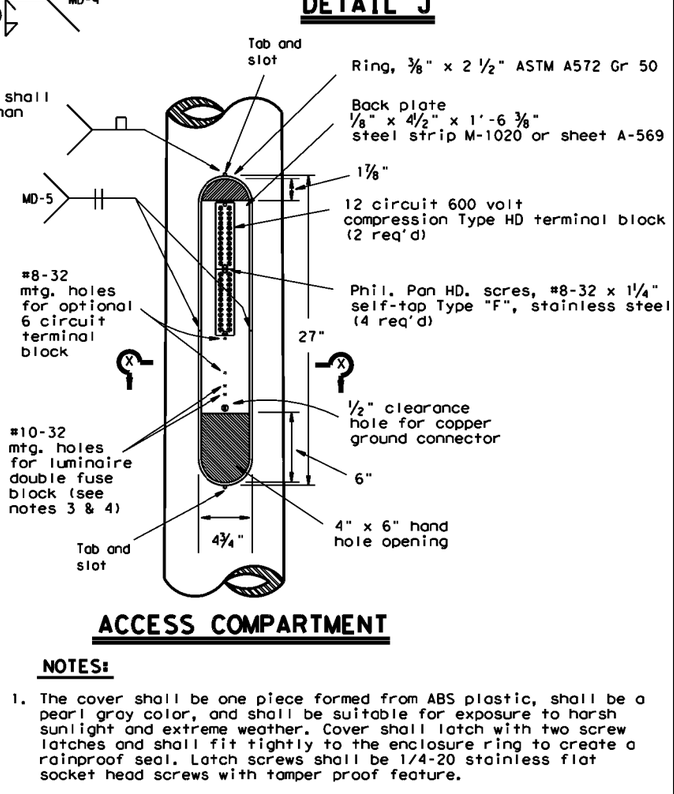
DETAIL F

(for 19' pole with no ILSN sign and no luminaire)



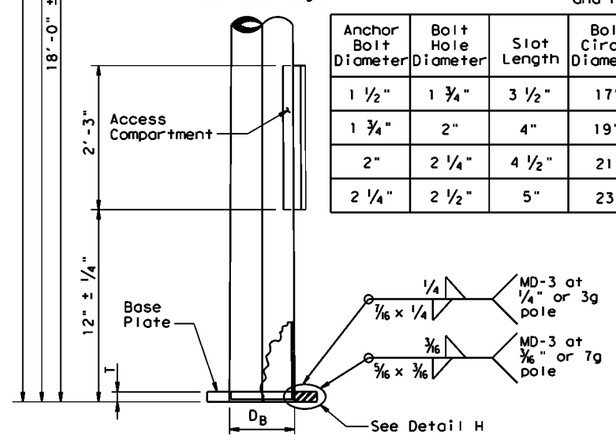
COPPER GROUND CONNECTOR

SECTION V-V

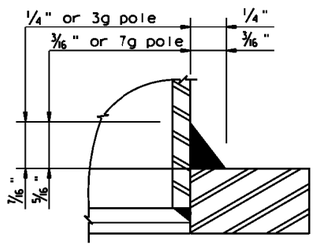


ACCESS COMPARTMENT

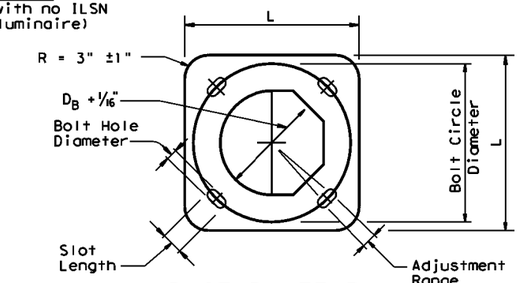
Anchor Bolt Diameter	Bolt Hole Diameter	Slot Length	Bolt Circle Diameter	Base ℞ Dim. L x T	Adjust. Range
1 1/2"	1 3/4"	3 1/2"	17"	18" x 1 1/2"	13.4°
1 3/4"	2"	4"	19"	20" x 1 3/4"	13.5°
2"	2 1/4"	4 1/2"	21"	22" x 2"	13.6°
2 1/4"	2 1/2"	5"	23"	24" x 2 1/4"	13.7°



POLE ELEVATION



DETAIL H



BASE PLATE PLAN

① 85% Min. penetration

② 60% Min. penetration 100% pemetration within 6" of circumferential base welds.

NOTES:

1. The cover shall be one piece formed from ABS plastic, shall be a pearl gray color, and shall be suitable for exposure to harsh sunlight and extreme weather. Cover shall latch with two screw latches and shall fit tightly to the enclosure ring to create a rainproof seal. Latch screws shall be 1/4-20 stainless flat socket head screws with tamper proof feature.
2. The pole manufacturer shall provide with each pole a separate kit consisting of: one cover with two latching assemblies, two terminal strips (Marathon #985GP12CU or approved equal), four #8-32 x 1 1/4" self tapping type "F" stainless steel pan head screws, and one ground connector (Blackburn TTC, Burndy KC22J12T13, or Ilsco SSS-5). The traffic signal contractor shall install the kit items in the field.
3. The screw hole spacing on the enclosure back plate shall be for two Marathon #985GP12 terminal strips, one Marathon #985GP06CU terminal strip, and one Bussmann #BM6032B fuse block.
4. Install one Bussmann #BM6032B, Littelfuse #L60030M-2C, or Ferraz-Shawmut #30352 fuse block for poles where luminaires are to be installed.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES MAST ARM POLE DETAILS

MA-D-12

REVISIONS
8-99
1-12

DN: MS	CK: JSY	DW: FDN	CK: CAL

CONT	SECT	JOB	HIGHWAY
0110	06	154	SS 261

DIST	COUNTY	SHEET NO.
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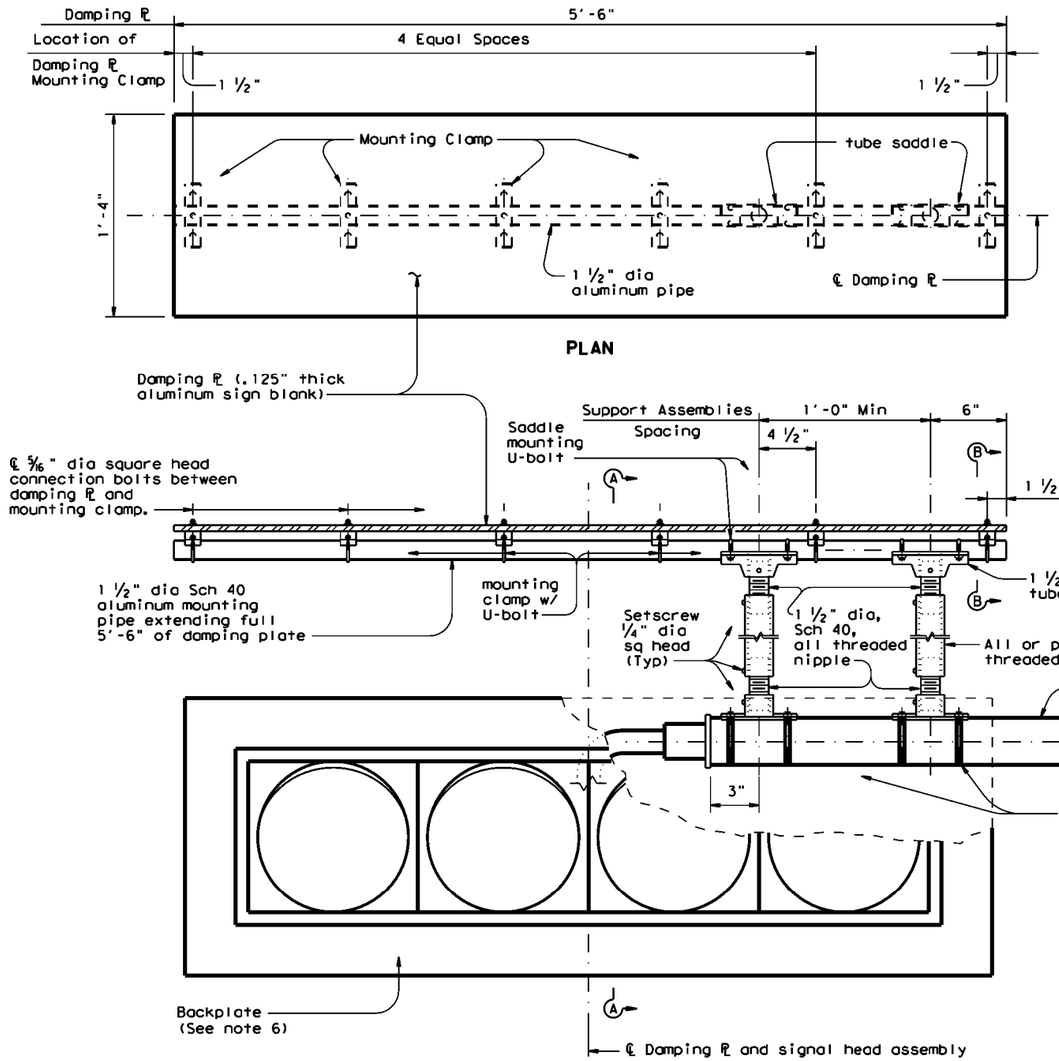
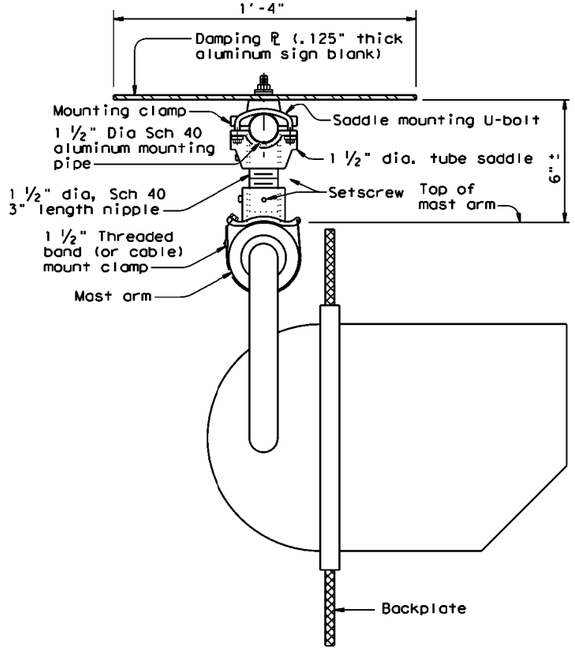


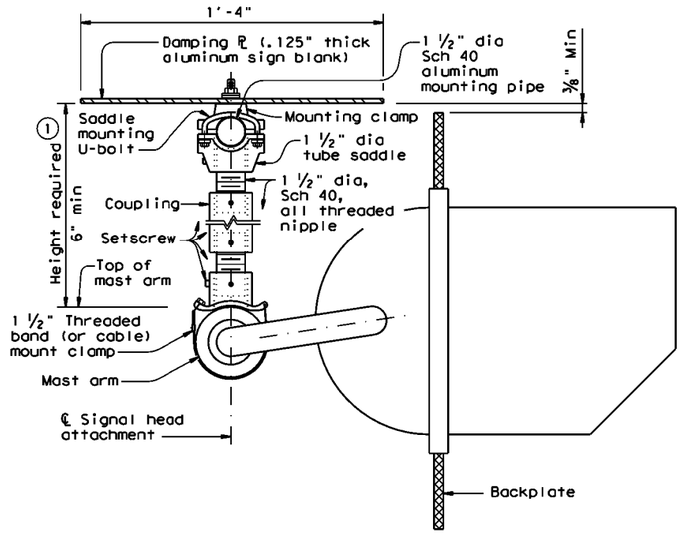
DAMPING PLATE MOUNTING DETAILS

(Showing alternate placement of signal head)



SECTION A-A

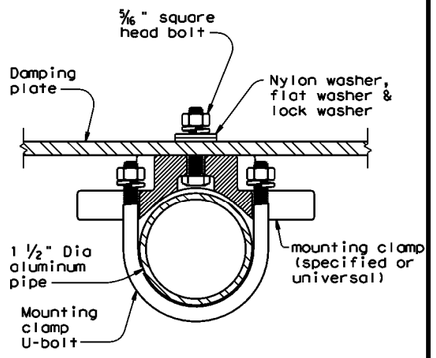
(Showing standard placement of signal head)
(Mounting clamp U-bolt is not shown for clarity)



SECTION A-A

(Showing alternate placement of signal head)
(Mounting clamp U-bolt is not shown for clarity)

① Recommended supporting assemblies to achieve required height for horizontal section heads			
Height required	One nipple each length	Two nipples each length plus	One coupling each length
6"-6 ¾"	3"	-	-
7"-8 ½"	4"	-	-
9"-10 ½"	6"	-	-
11"-15 ½"	-	4"	5"
16"-24"	-	6"	10"



SECTION B-B

(Showing damping plate attachment)

GENERAL NOTES:

1. In accordance with the findings of TxDOT sponsored research, the installation of a damping plate in accordance with the details shown here at the end of signal mast arms of SMA and DMA standard structures reduces excessive harmonic vertical vibration, and thus fatigue damage. Any deviation from these details may reduce the effectiveness of this damping device.
2. Aluminum sign blank for damping plate will conform to Departmental Material Specifications DMS-7110. Materials for mast arm mounting clamp and tube saddle will be aluminum castings or aluminum alloys as in accordance with manufacturers' stipulations. Mounting pipe, pipe nipple and coupling will be aluminum alloy 6061-T6 or 6063-T6. Damping plate mounting clamp and u-bolt assemblies will conform to Standard sheet SMD(GEN). U-bolts for saddle mounting will have a minimum yield strength of 36 ksi.
3. Damping plate will be mounted horizontally. Position centerline of damping plate to align with centerline of mast arm or horizontal signal head assembly. Vertical clearance between signal head (with or without backing plate)and bottom of damping plate will be maintained as shown. The attachments shown here are examples only, other supporting details which meet both alignment and vertical clearance requirements are also acceptable.
4. Unless stipulated by the manufacturers, all steel parts will be galvanized finish in accordance with Standard Specification Item 445, "Galvanizing".
5. Contractor will verify applicable field dimensions before the installation.
6. Backplates are optional for traffic signals. When backplates are used, Backplates will have a 2-inch fluorescent yellow AASHTO Type B_{FL} or C_{FL} retroreflective border conforming to TxDOT DMS-8300 "Sign Face Materials." See Sheet TS-BP-20 for backplate details.

Texas Department of Transportation

Traffic Safety Division Standard

MAST ARM DAMPING PLATE DETAILS

MA-DPD-20

FILE: ma-dpd-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT June 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-20 6-20	0110	06	154	SS 261
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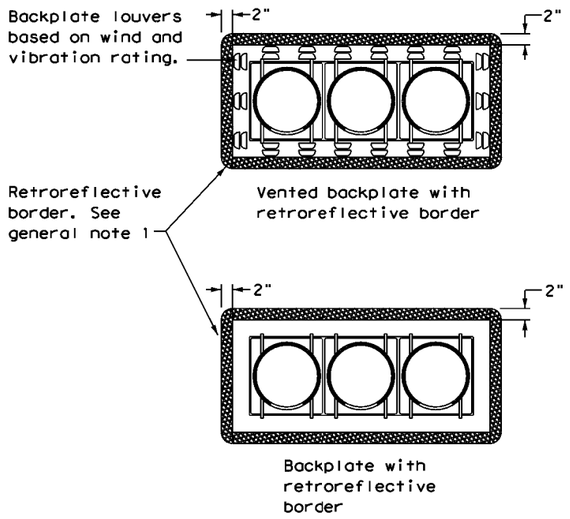
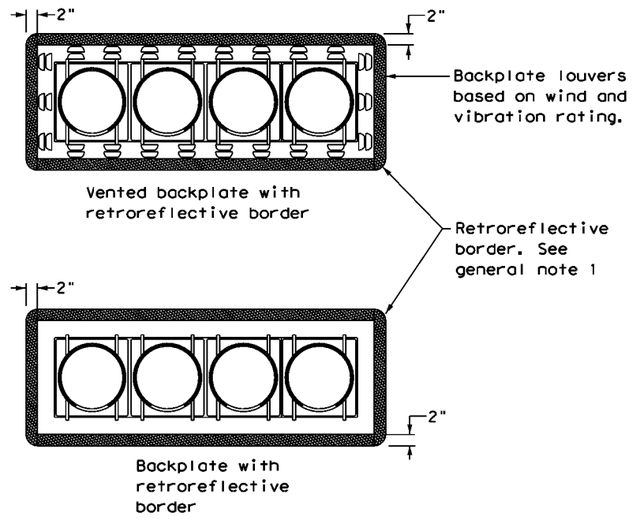
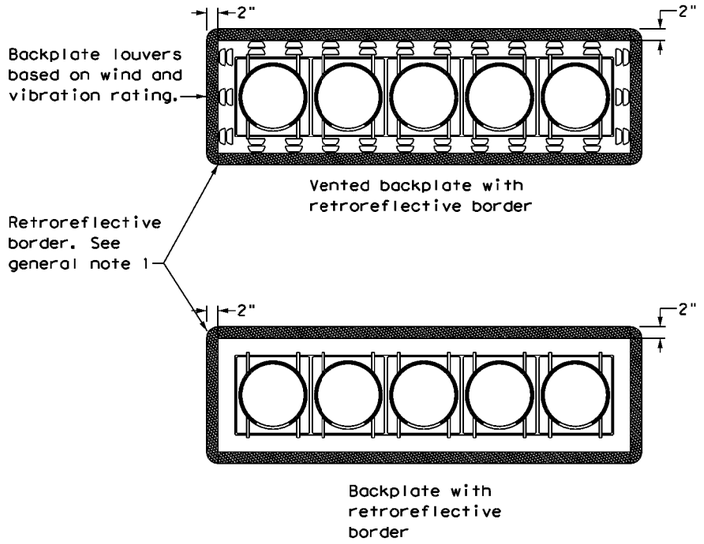


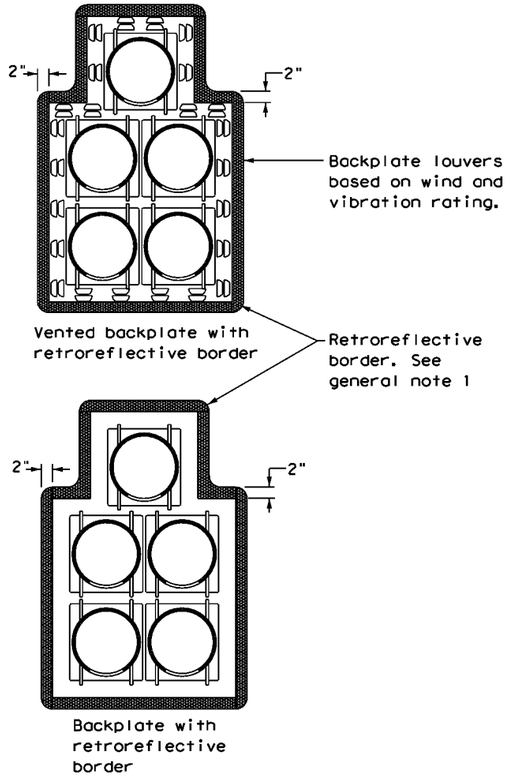
THREE-SECTION HEAD
HORIZONTAL OR VERTICAL



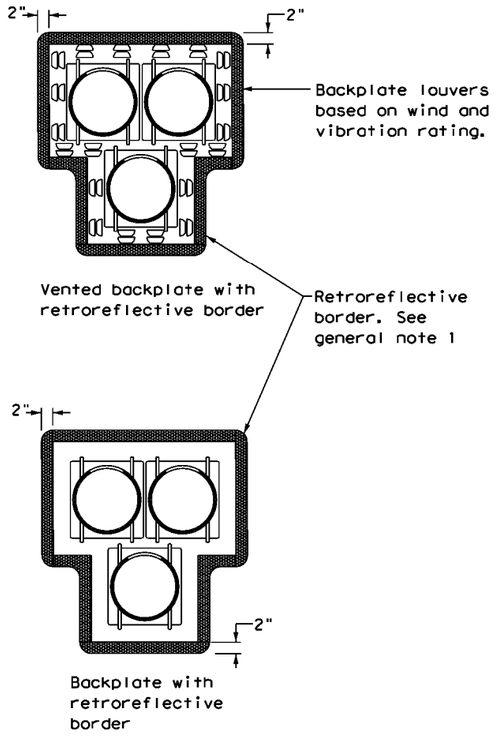
FOUR-SECTION HEAD
HORIZONTAL OR VERTICAL



FIVE-SECTION HEAD
HORIZONTAL OR VERTICAL



FIVE-SECTION HEAD
CLUSTER



PEDESTRIAN HYBRID
BEACON

GENERAL NOTES:

1. Backplates are optional for traffic signals and pedestrian hybrid beacons. When backplates are used, a 2-inch wide fluorescent yellow AASHTO Type B_{FL} or C_{FL} retroreflective border conforming to TxDOT DMS-8300 is required. Place on all approaches when used.
2. Signal head and backplate compatability must be verified by the contractor prior to installation.
3. When using backplates on signal heads, venting is preferred to reduce cyclic vibration stress.
4. When a vented backplate is used, the retroreflective border must not be placed over the louvers.
5. This standard sheet applies to all signal heads with backplates, including but not limited to:
   - Pole mounted
   - Overhead mounted
   - Span wire mounted
   - Mast arm mounted
   - Vertical signal heads
   - Horizontal signal heads
   - Clustered signal heads
   - Pedestrian hybrid beacons

Texas Department of Transportation

Traffic Safety Division Standard

TRAFFIC SIGNAL HEAD WITH BACKPLATE
TS-BP-20

FILE: ts-bp-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT June 2020	CONT	SECT	JOB	HIGHWAY
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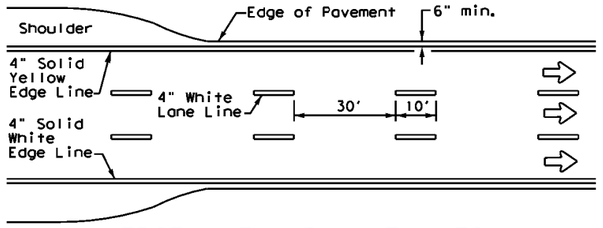
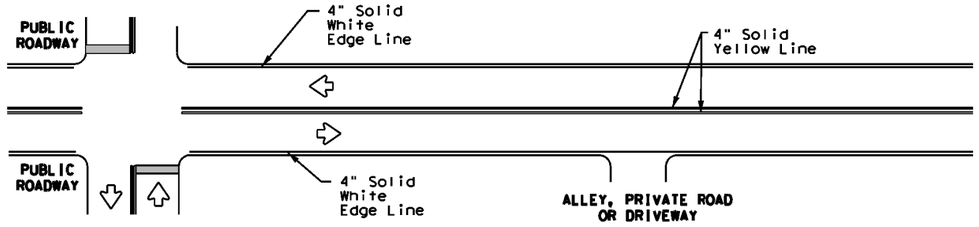
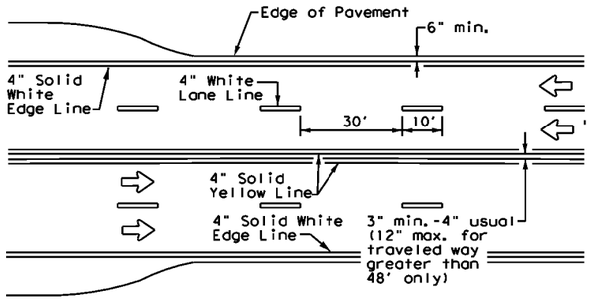


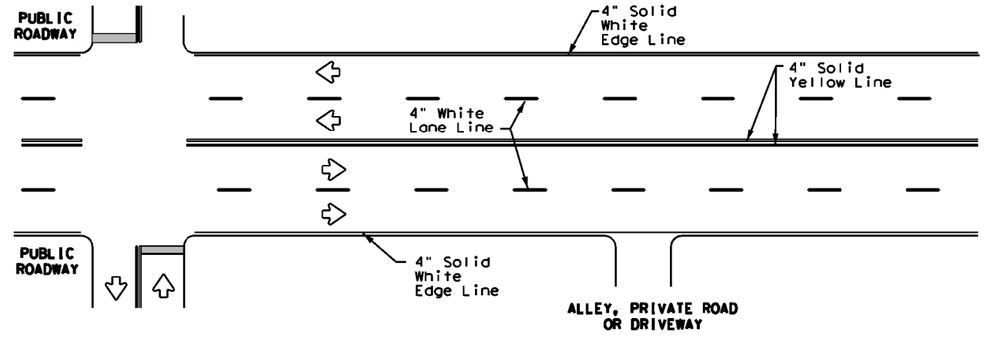
EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



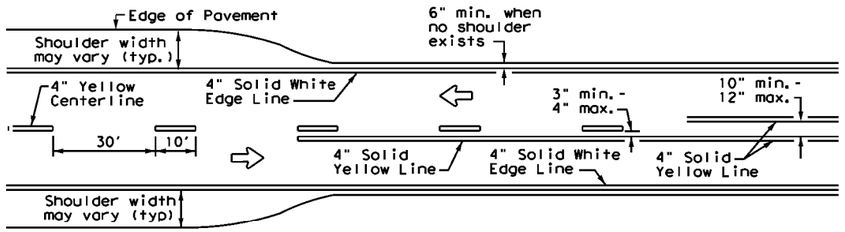
TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



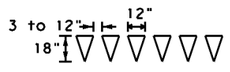
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



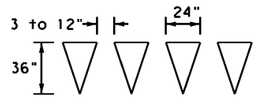
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

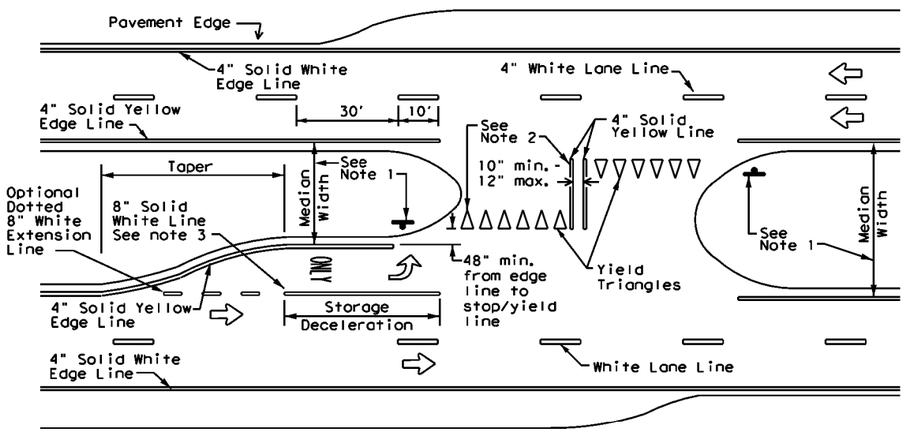


For posted speed on road being marked equal to or less than 40 MPH.



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

YIELD LINES



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs are optional as determined by the Engineer.

2. Install median striping (double yellow centerlines and stop bars/yield triangles) when a 50' or greater median centerline can be placed. Stop bars shall only be used with stop signs. Yield traingles shall only be used with yield signs.

3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

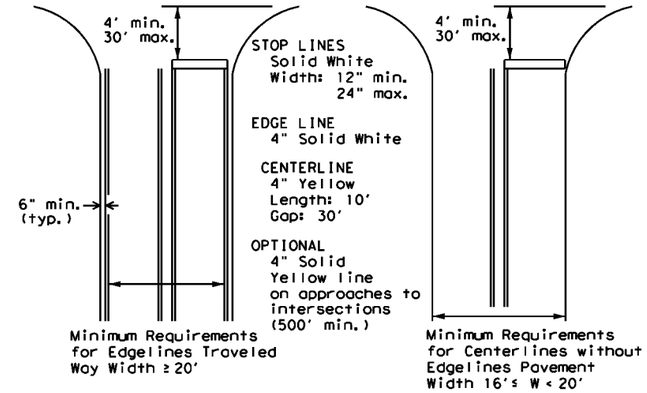
GENERAL NOTES

1. Edgeline striping shall be as shown in the plans or as directed by the Engineer. The edgeline should not be placed less less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edgelines are not required in curb and gutter sections of roadways.

2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the inside of edgeline to the inside of edgeline of a two lane roadway.

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

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



GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Highways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-20

FILE: pm1-20.dgn	DN:	CK:	DW:	CK:
©TxDOT November 1978	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0110	06	154	SS 261
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	HOU	HARRIS		61

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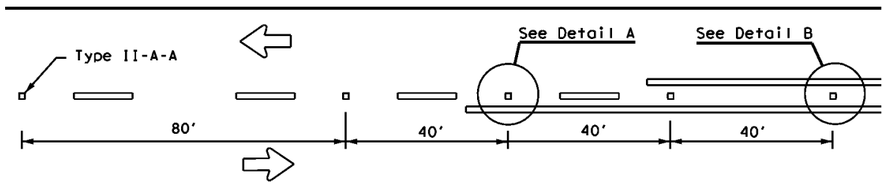
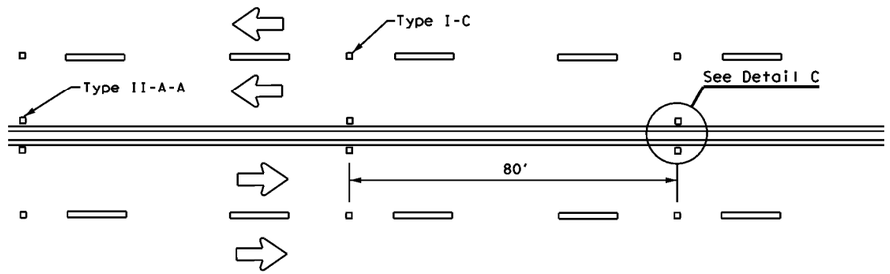
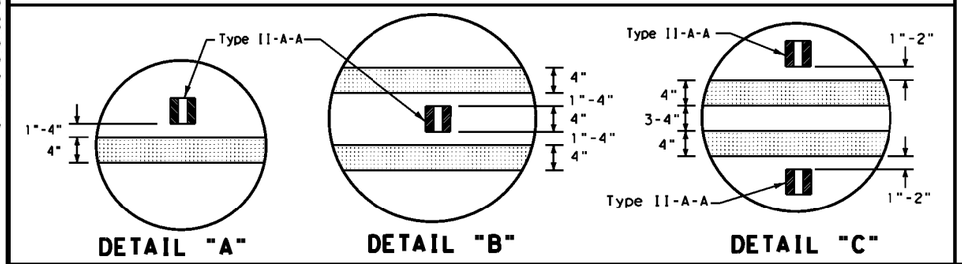
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



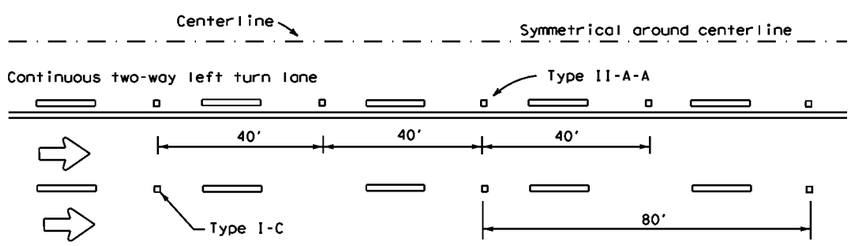
CENTERLINE FOR ALL TWO LANE ROADWAYS



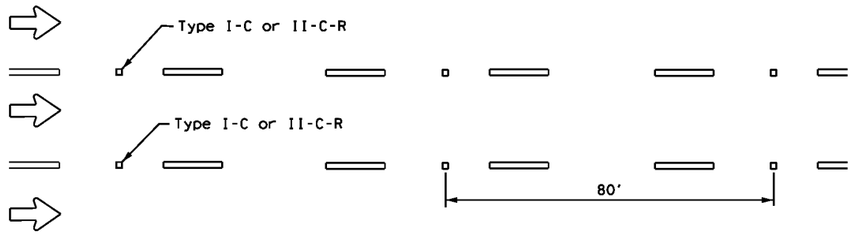
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS



DETAIL "A" **DETAIL "B"** **DETAIL "C"**

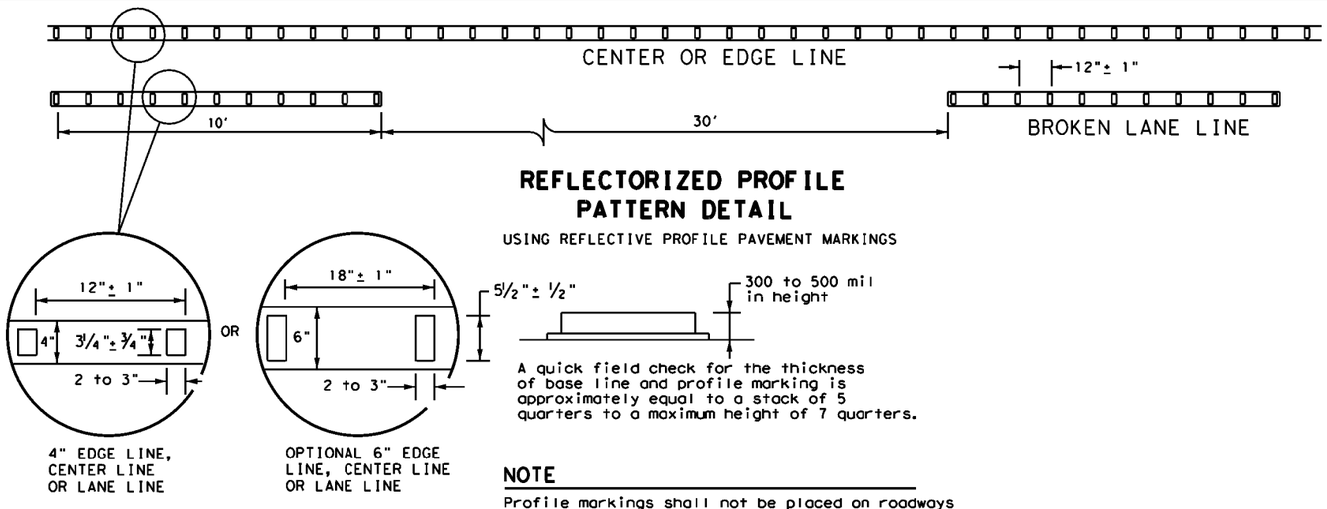


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



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

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



REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

4" EDGE LINE, CENTER LINE OR LANE LINE

OPTIONAL 6" EDGE LINE, CENTER LINE OR LANE LINE

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTE

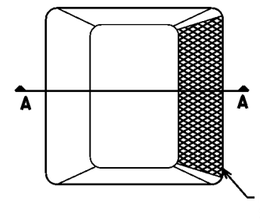
Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

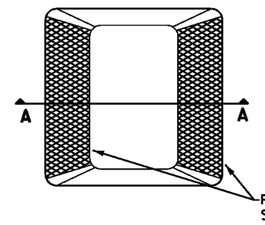
1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

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

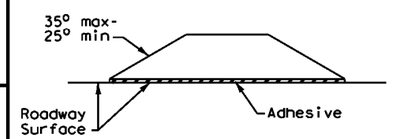
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS

Texas Department of Transportation

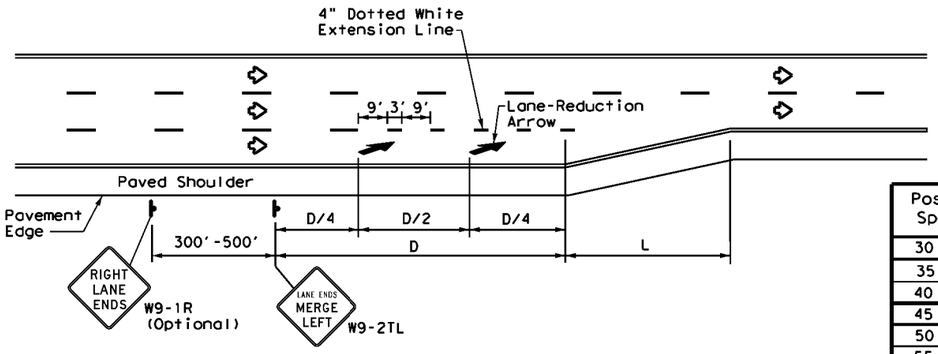
Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS REFLECTORIZED PROFILE MARKINGS PM(2)-20

FILE: pm2-20.dgn	DN:	CK:	DW:	CK:
©TxDOT April 1977	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-92 2-10	0110	06	154	SS 261
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	HOU	HARRIS		62

228

DATE: 11/28/2022 3:26:34 PM
FILE: H:\TrfSignals\Hai Tran\CCSJ 0110-06-154\MAIN.dgn

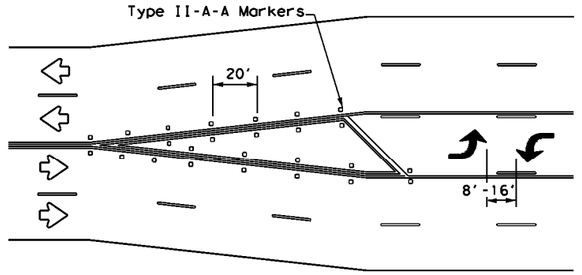


LANE REDUCTION

Posted Speed	D (ft)	L (ft)
30 MPH	460	$L=\frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	

NOTES

1. Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. For Texas Super 2 Passing Lanes, see TS2(PL) standard sheets.
2. On divided highways, an additional W9-1R "RIGHT LANE ENDS" sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
3. Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.



A two-way left-turn (TWLT) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

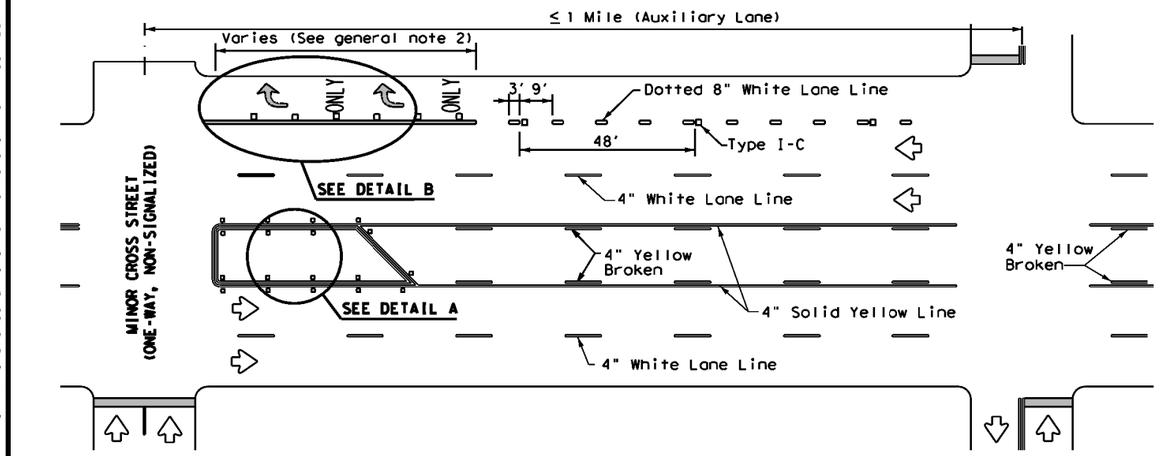
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

GENERAL NOTES

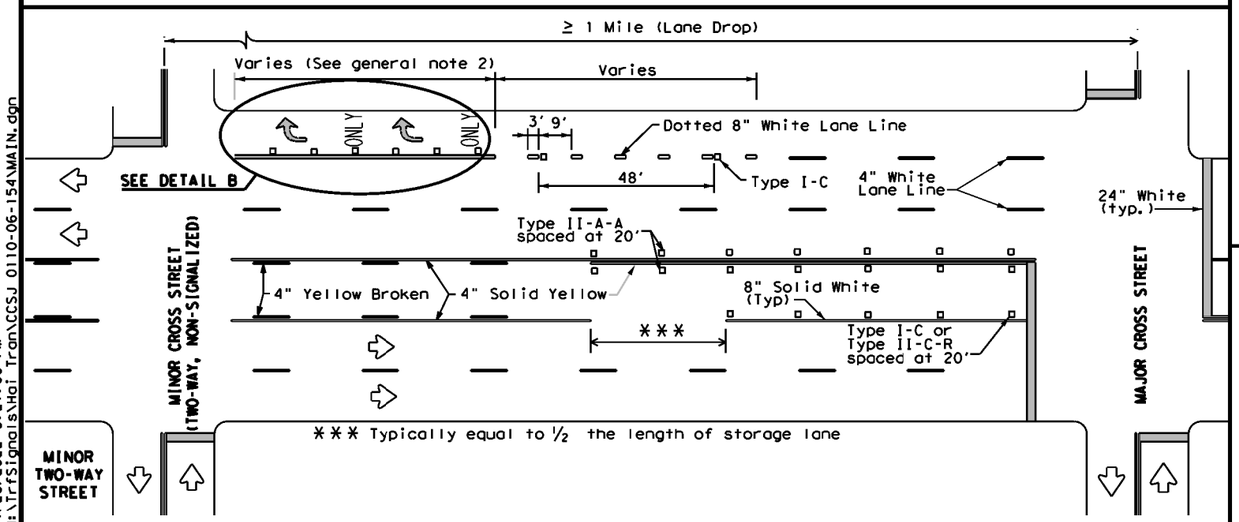
1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
2. When lane-use words and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow or word and arrow marking is used for a short turn lane, it should be located at or near the upstream end of the full-width turn lane.
3. Use raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.
4. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

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

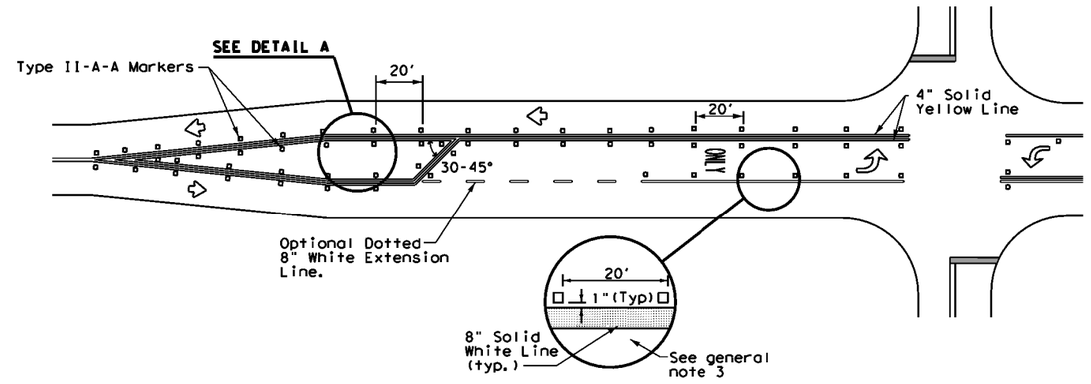
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



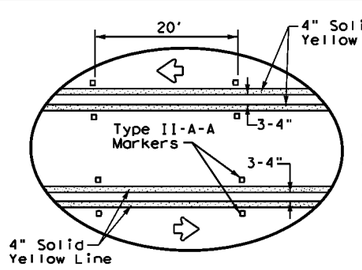
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



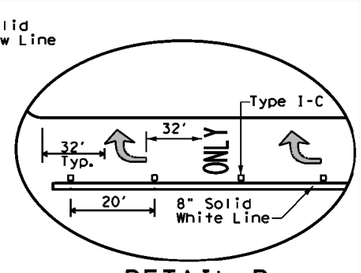
TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP



TYPICAL TWO-LANE HIGHWAY INTERSECTION WITH LEFT TURN BAYS



DETAIL A



DETAIL B

Texas Department of Transportation

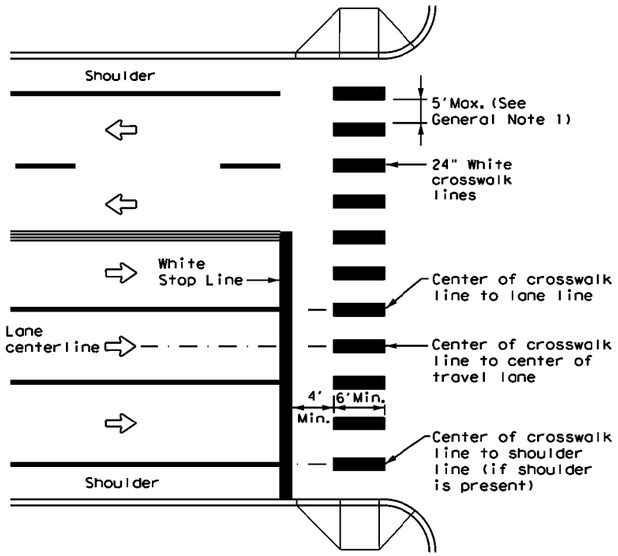
Traffic Safety Division Standard

TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS PM(3)-20

FILE: pm3-20.dgn	DN:	CK:	DW:	CK:
©TxDOT April 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 5-00 2-10 8-00 2-12 3-03 6-20	0110	06	154	SS 261
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		63

22C

DATE: 11/28/2022 3:27:00 PM
FILE: H:\Trf\Signals\Hal Tran\CCSJ 0110-06-154\MAIN.dgn



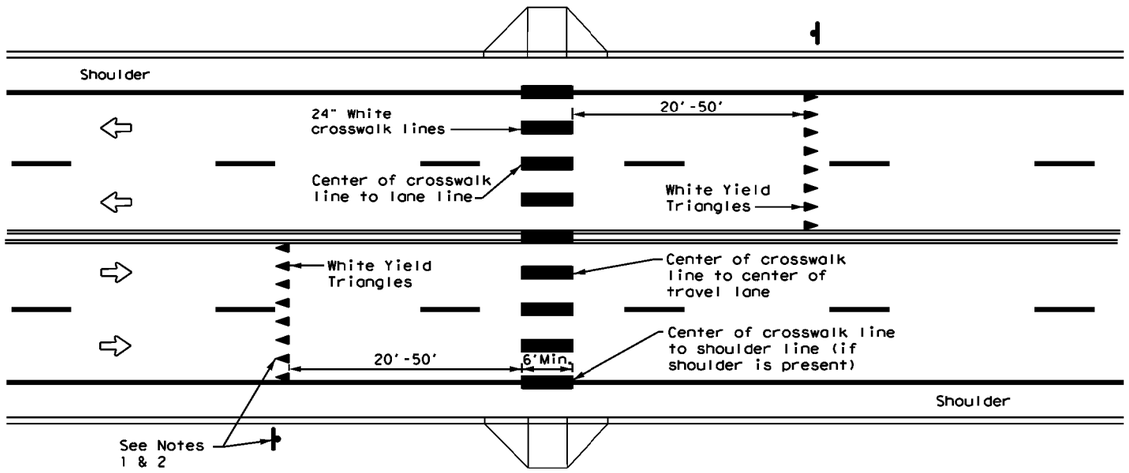
HIGH-VISIBILITY LONGITUDINAL CROSSWALK AT CONTROLLED APPROACH

GENERAL NOTES

1. Longitudinal crosswalk lines should not be placed in the wheel path of vehicles. Center the crosswalk lines on travel lanes, lane lines, and shoulder lines (if present).
2. A minimum 6" clear distance shall be provided to the curb face. If the last crosswalk line falls into this distance it must be omitted.
3. For divided roadways, adjustments in spacing of the crosswalk lines should be made in the median so that the crosswalk lines are maintained in their proper location across the travel portion of the roadway.
4. At skewed crosswalks, the crosswalk lines are to remain parallel to the lane lines.
5. Each crosswalk shall be a minimum of 6' wide.
6. The High-Visibility Longitudinal Crosswalk is the preferred crosswalk pattern on State Highways. Other crosswalk patterns as shown in the "Texas Manual on Uniform Traffic Control Devices" may be used. All crosswalk designs and dimension shall comply with the "Texas Manual on Uniform Traffic Control Devices."
7. Final placement of Stop Bar/Yield Triangles and Crosswalk shall be approved by the Engineer in the field.

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

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



UNSIGNALIZED MID BLOCK HIGH-VISIBILITY LONGITUDINAL CROSSWALK

NOTES

1. Use yield triangles with "Yield Here to Pedestrians" signs at unsignalized mid block crosswalks.
2. Use stop bars with "Stop Here on Red" signs at mid block crosswalks controlled by traffic signals or pedestrian hybrid beacons.

Texas Department of Transportation

Traffic Safety Division Standard

CROSSWALK PAVEMENT MARKINGS

PM(4)-20

FILE: pm4-20.dgn	DN:	CK:	DW:	CK:
© TxDOT June 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0110	06	154	SS 261
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		64

DATE: 11/28/2022 3:27:27 PM
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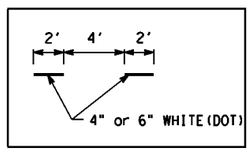


DETAIL "A"

4"or 6" WHITE(DOT)(TO INTERSECTING ROADWAY WITHOUT MANDATORY TURN LANES). SEE DETAIL "A"

4" or 6" WHITE(DOT)(TO INTERSECTING ROADWAY WITH ONE EXCLUSIVE AND ONE OPTIONAL TURN LANE). SEE DETAIL "A"

4"or 6" WHITE(DOT) SEE DETAIL "A"

8" WHITE SOLID W/ RAISED REFLECTIVE PAVEMENT MARKERS @ 20' SPA.

℄ MAINLANES

290+00

4"or 6" WHITE (DOT)(TO INTERSECTING ROADWAY W/ TWO EXCLUSIVE LEFT TURN LANES). SEE DETAIL "A"

4"or 6" WHITE(DOT)(TO INTERSECTING ROADWAY WITHOUT MANDATORY TURN LANES). SEE DETAIL "A"

*4"or 6" WHITE(SLD) 40 LF EA.

TYPICAL PLACEMENT OF DOTTED EXTENSION AT INTERSECTIONS

Texas Department of Transportation
Houston District

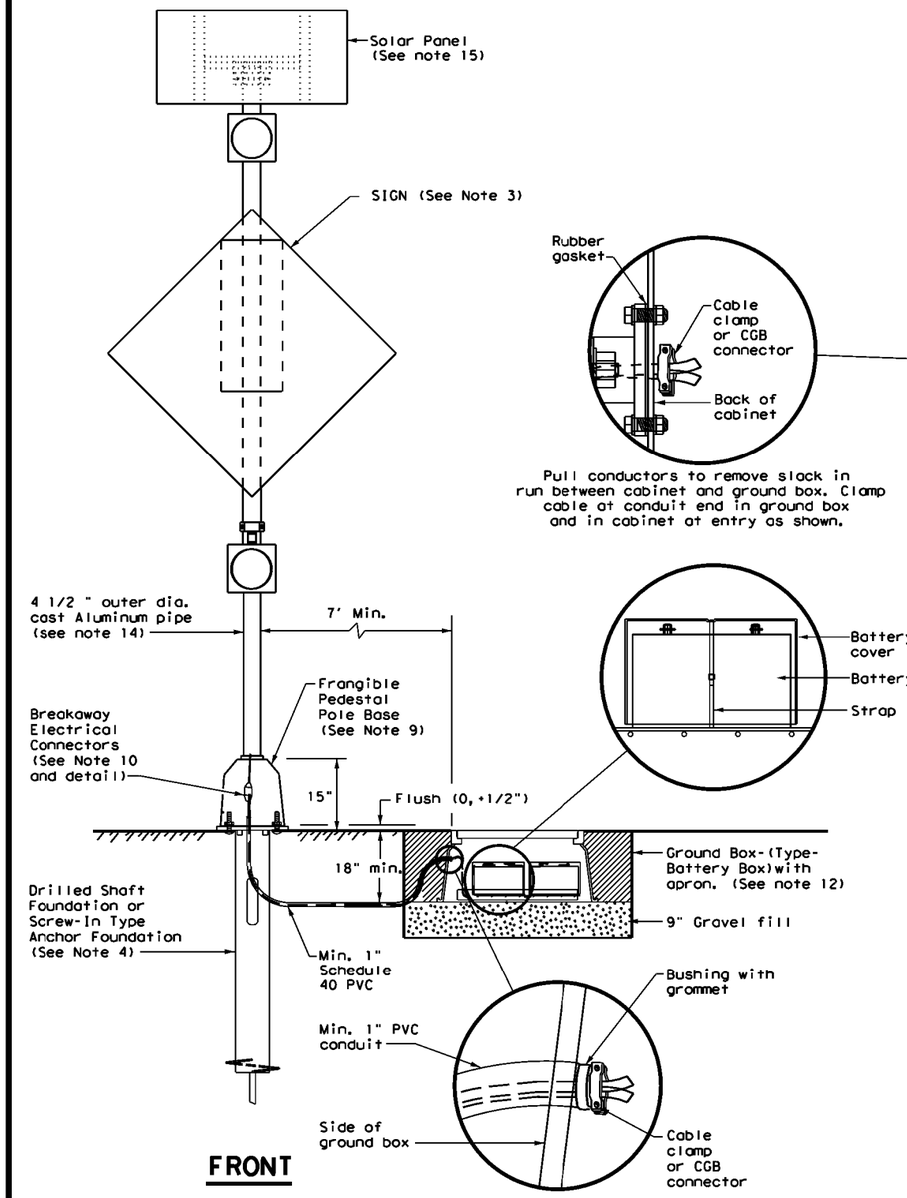
PAVEMENT MARKINGS
(DOTTED EXTENSION DETAILS)

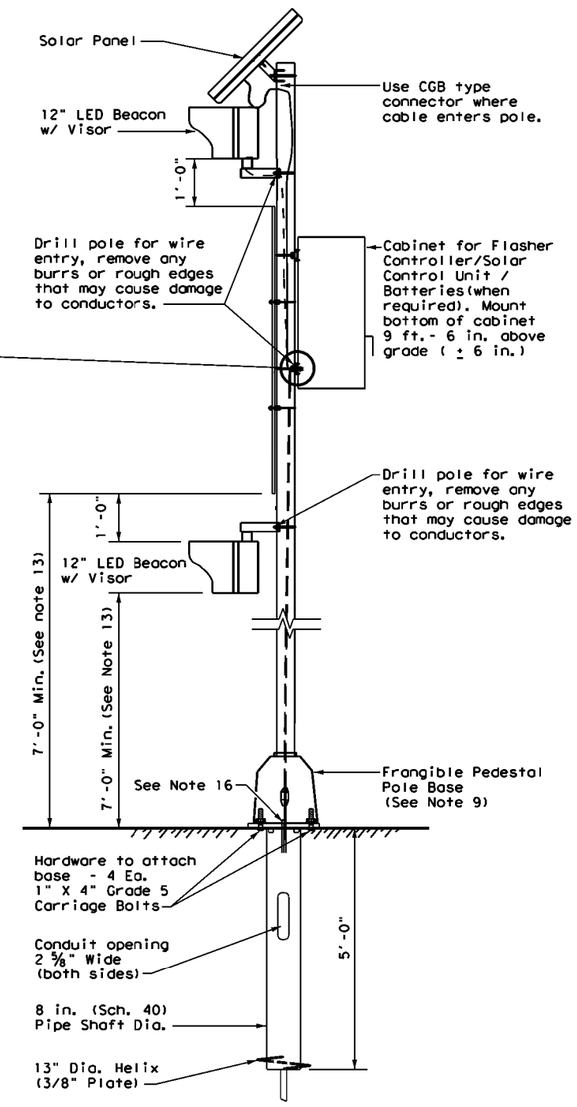
PM(DOT)-11

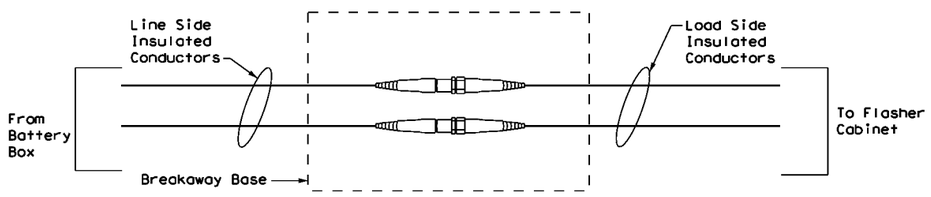
FILE:	DN:	CK:	DW:	CK:
© TxDOT 2010	DIST	FED RFG	PROJECT NO.	SHEET
REVISIONS 4/2010 4/2011	HOU	6		65
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	HARRIS	0110	06	154	SS 261

GENERAL NOTES:

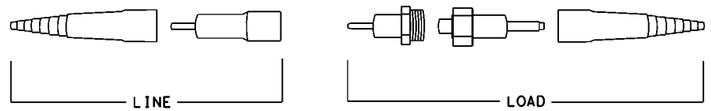
1. Details show a typical warning sign with two flashing beacon heads, other arrangements are possible. When only one beacon is required, install the upper beacon.
2. See Item 685, "Roadside Flashing Beacon Assemblies" for further requirements.
3. See SMD standard sheets for lateral and vertical clearances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







NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS



NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS
EXPLODED VIEW

Texas Department of Transportation

Traffic Operations Division Standard

SOLAR POWERED ROADSIDE FLASHING BEACON ASSEMBLY DETAILS

SPRFBA(1)-13

FILE: spb1-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0110	06	154	SS 261
12-04 3-13	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		66

75A

DATE: 11/28/2022 3:28:33 PM
FILE: H:\Trf\Signals\Hal Tran\CCSJ 0110-06-154\MAIN.dgn

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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)

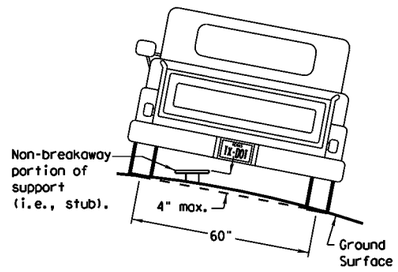
Anchor Type

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-3))

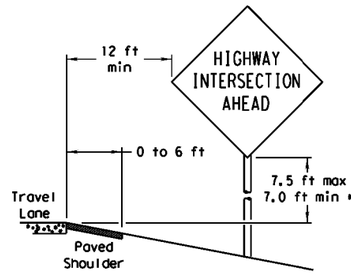
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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).

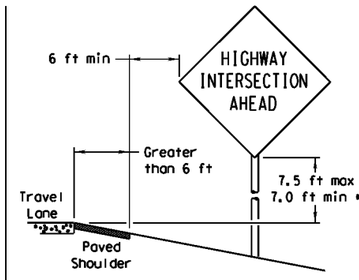
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

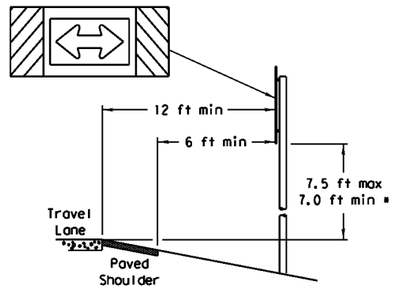
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



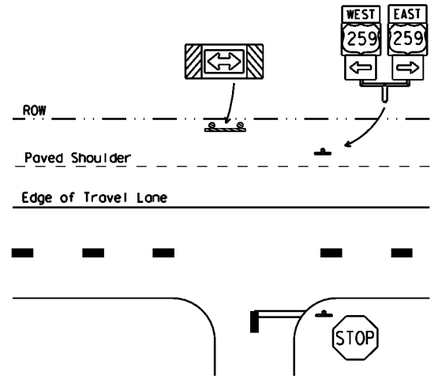
GREATER THAN 6 FT. WIDE

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.

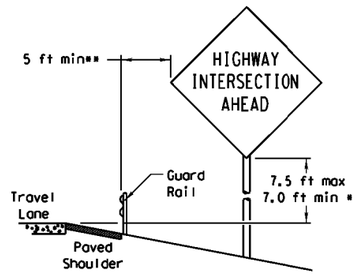
T-INTERSECTION



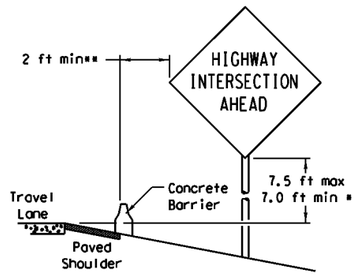
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



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

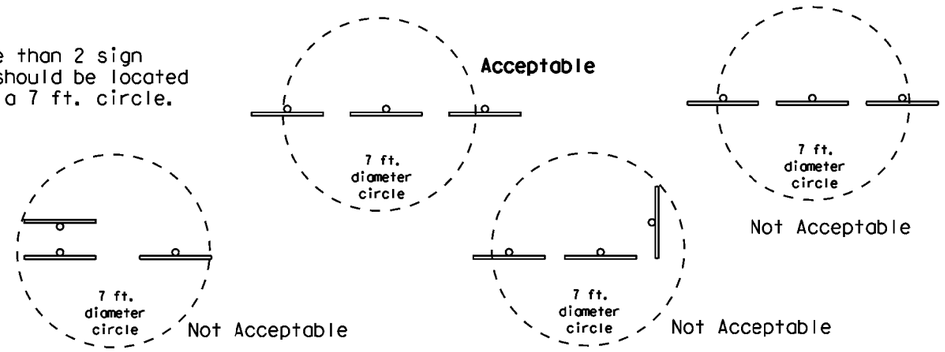
(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

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.

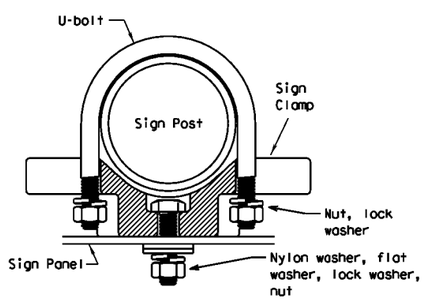
The website address is:
http://www.txdot.gov/publications/traffic.htm

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



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

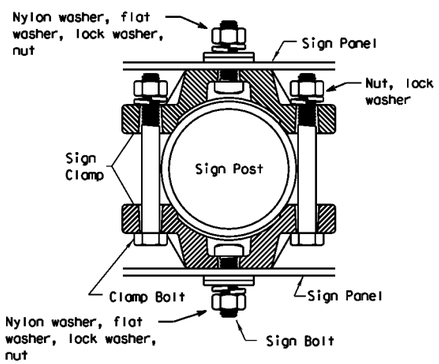


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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

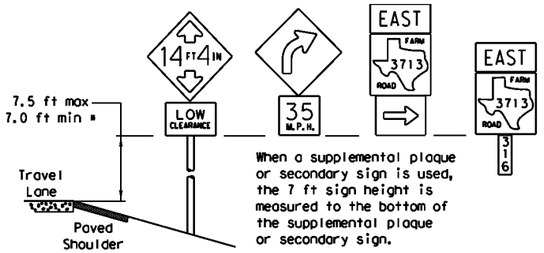
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



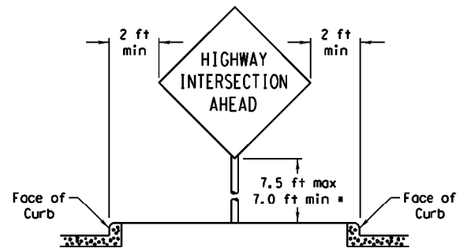
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



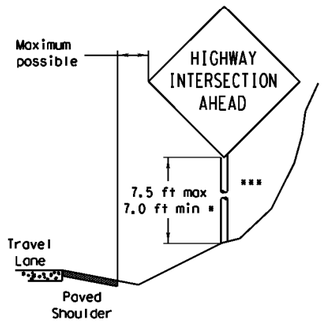
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



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

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

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

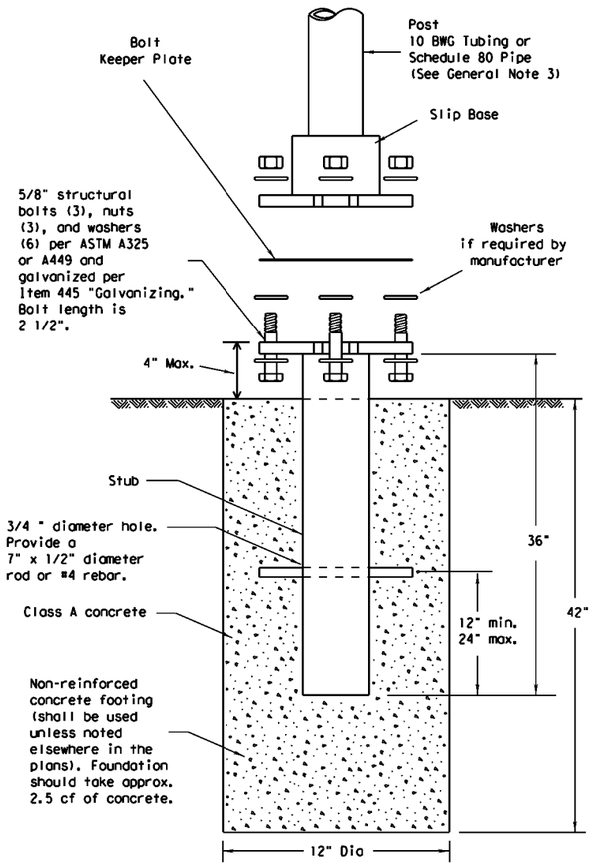
SMD(GEN)-08

© TxDOT July 2002	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0110	06	154	SS 261
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		67

26A

DATE: 11/28/2022 3:29:02 PM
FILE: H:\Traffic\Signals\Hai Tran\CCSJ 0110-06-154\MAIN.dgn

TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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

NOTE

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

GENERAL NOTES:

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

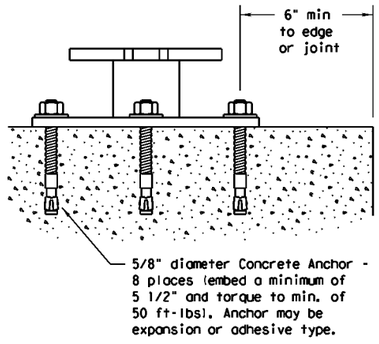
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum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

ASSEMBLY PROCEDURE

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

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

CONCRETE ANCHOR



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

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
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	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		68

DATE: 11/28/2022 3:29:22 PM
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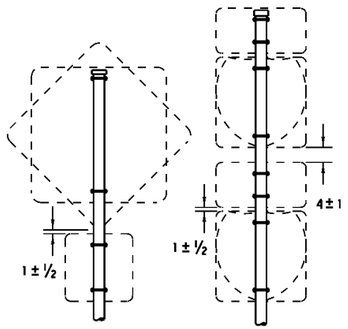
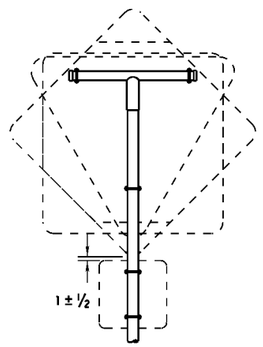
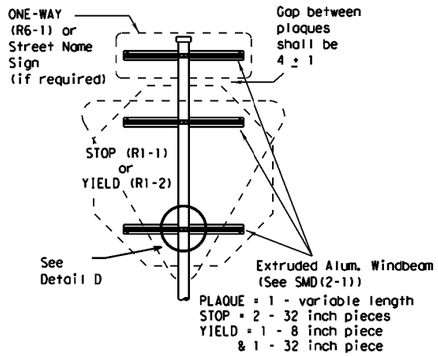


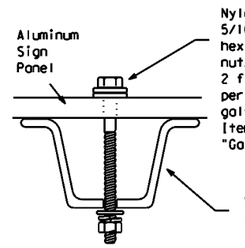
SM RD SGN ASSM TY XXXXX(1)XX(P)



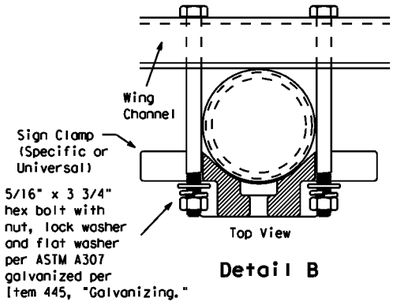
SM RD SGN ASSM TY XXXXX(1)XX(T)



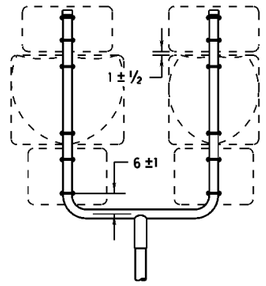
SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



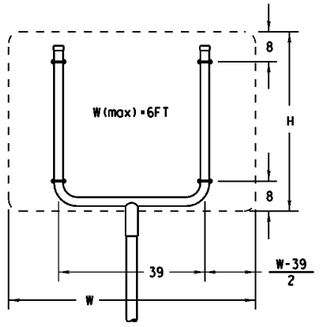
Detail A



Detail B



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



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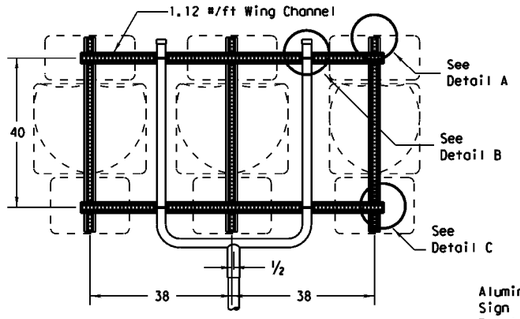
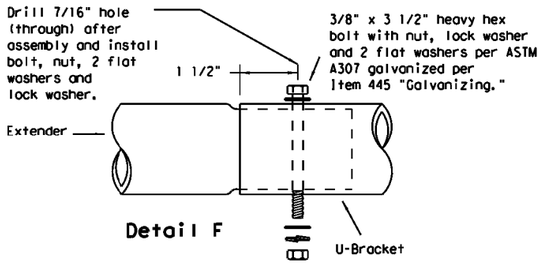
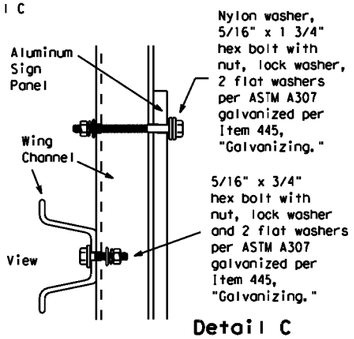


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

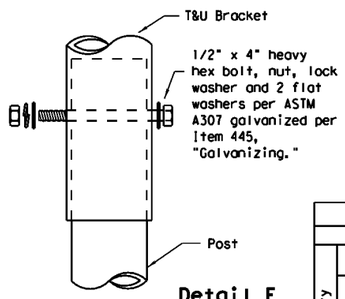


Detail F

Splices shall only be allowed behind the sign substrate.



Detail C

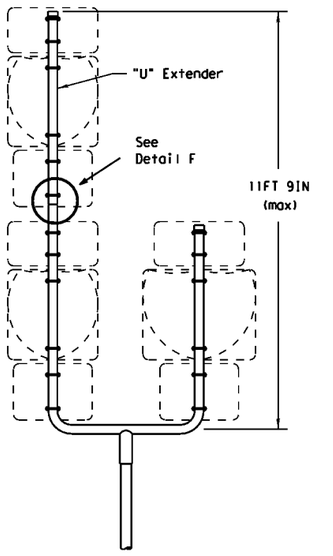


Detail E

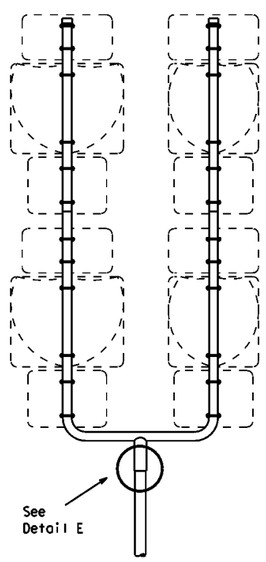
GENERAL NOTES:

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

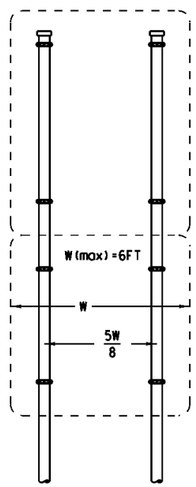
1. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
2. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
3. Aluminum sign blanks shall conform to Departmental Material 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. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
10. 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.
11. Post open ends shall be fitted with Friction Caps.
12. Sign blanks shall be the sizes and shapes shown on the plans.



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

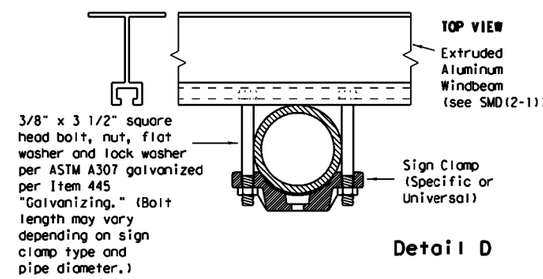


SM RD SGN ASSM TY S80(1)XX(U-2EXT)

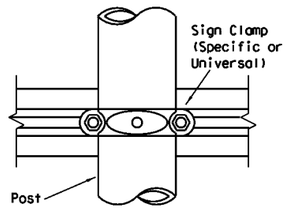


SM RD SGN ASSYM TY XXXXX(2)XX(P)

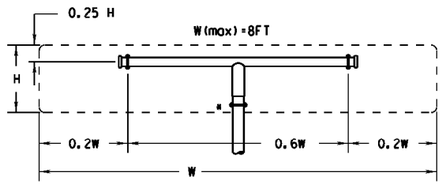
SIDE VIEW



Detail D



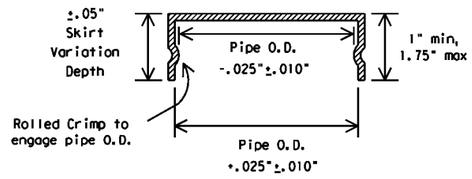
REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)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



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

All dimensions are in english unless detailed otherwise.

FRICTION CAP DETAIL



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

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

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		69

26C

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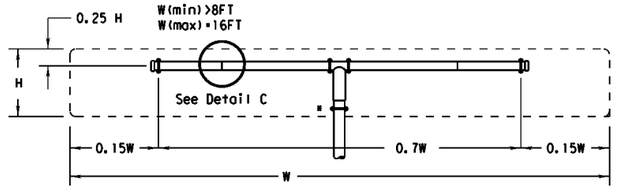
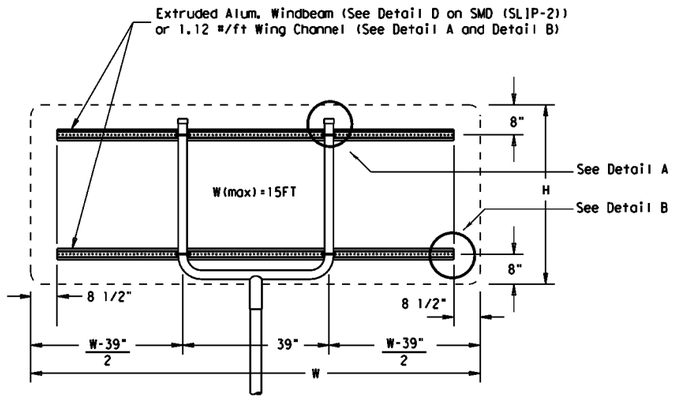
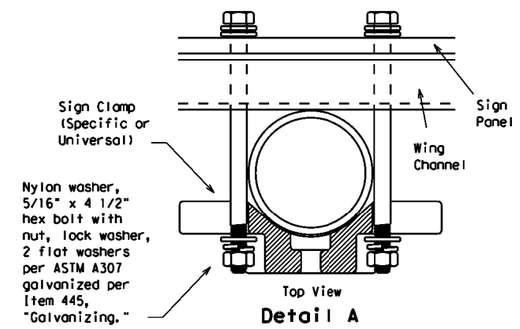


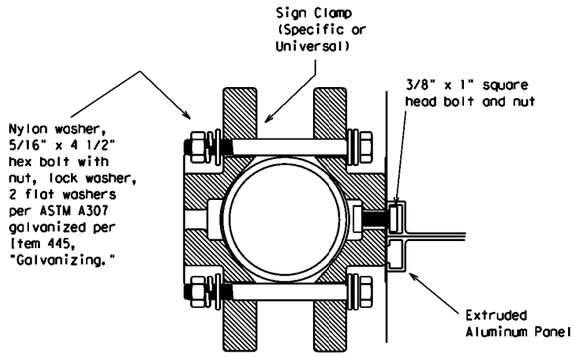
SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



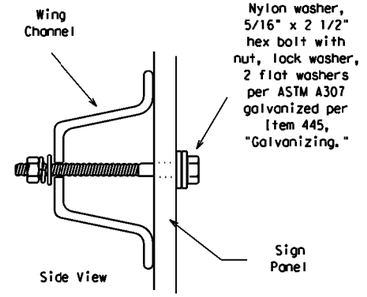
SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



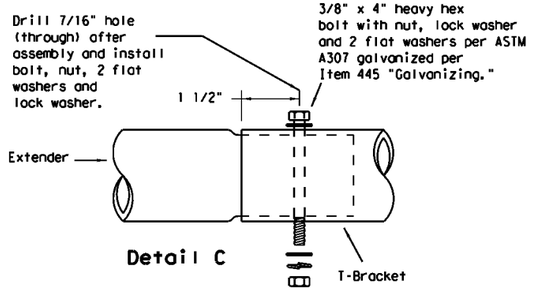
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET

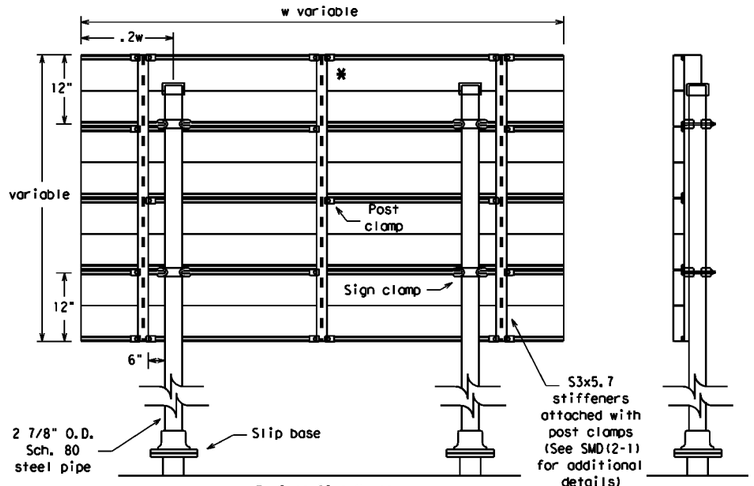


Detail B



Detail C

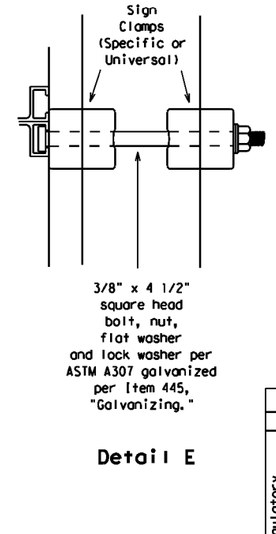
Splices shall only be allowed behind the sign substrate.



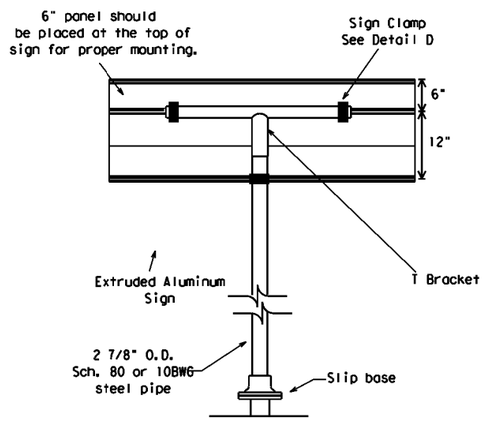
Typical Sign Mount

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

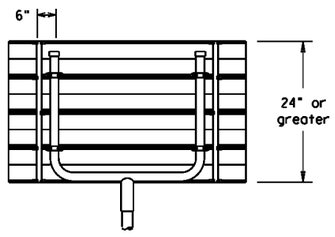
* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.



Detail E



Extruded Aluminum Sign
With T Bracket



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

See Detail E
for clamp installation

GENERAL NOTES:

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

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

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

Texas Department of Transportation
Traffic Operations Division

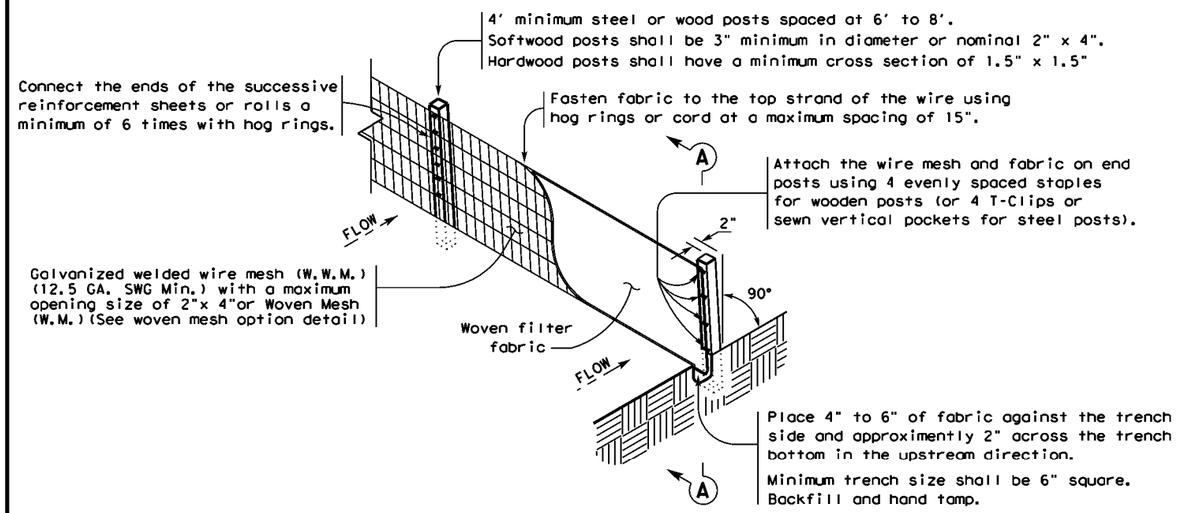
SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0110	06	154	SS 261
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		70

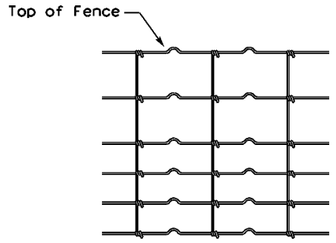
26D

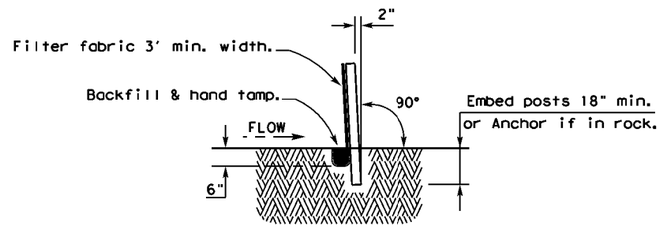
DATE: 11/28/2022 3:30:12 PM
FILE: H:\Traffic\Signals\Hai Tran\CCSJ 0110-06-154\MAIN.dgn



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.

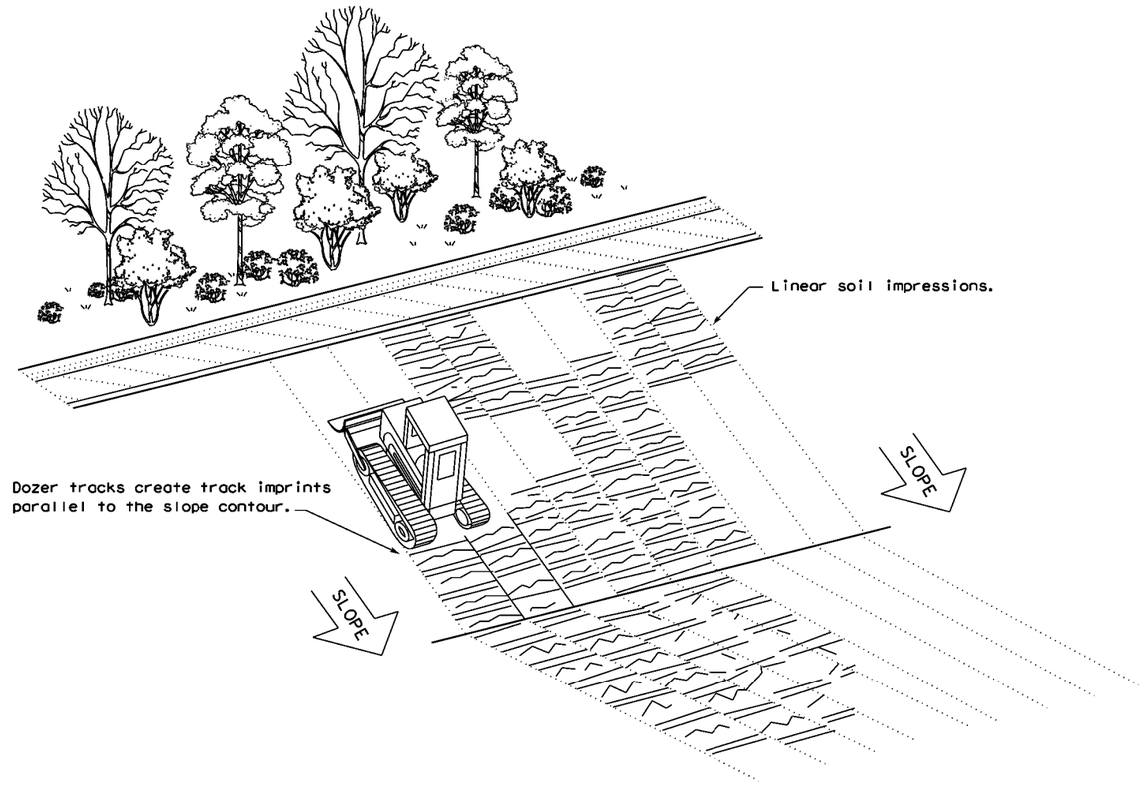
LEGEND

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

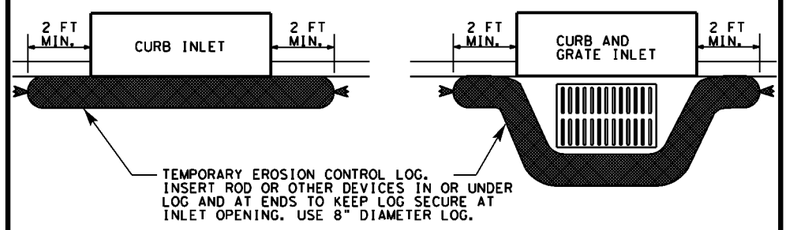
EC(1)-16

FILE: ec116	DN: TxDOT		CK: KM	DW: VP		CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0110	06	154		SS 261	
	DIST	COUNTY			SHEET NO.	
	HOU	HARRIS			71	

DATE 11/28/2022
FILE H:\Traffic\Signals\Hai Tran\CCSJ 0110-06-154\MAIN.dgn

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

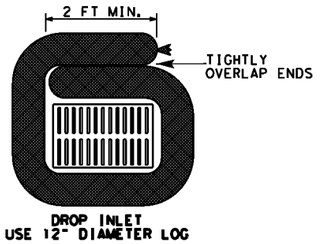
The trap should be cleaned when the capacity has been reduced by 1/2 or the sediment has accumulated to a depth of 1', whichever is less.

REQUIRED ITEMS:

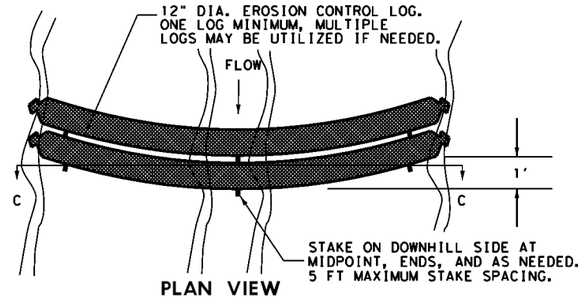
- ITEM 506-6040 BIODEG EROSN CONT LOGS (INSTL) (8") LF
- ITEM 506-6041 BIODEG EROSN CONT LOGS (INSTL) (12") LF
- ITEM 506-6043 BIODEG EROSN CONT LOGS (REMOVE) LF

DROP INLETS AND OTHER LOCATIONS
12" DIAMETER LOGS

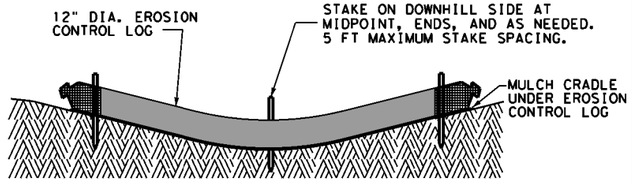
ITEM 506-6041 BIODEG EROSN CONT LOGS (INSTL)(12")



DROP INLETS

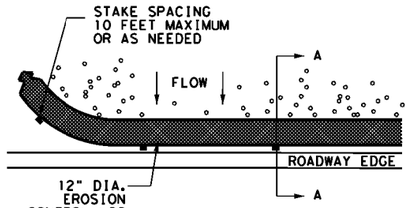


PLAN VIEW

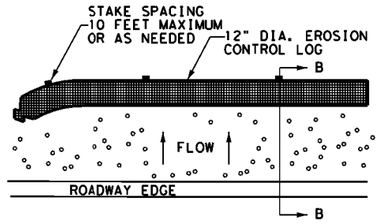


SECTION C-C

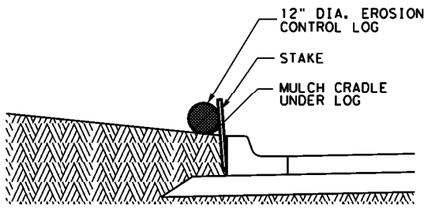
DRAINAGE SWALE OR DITCH



PLAN VIEW

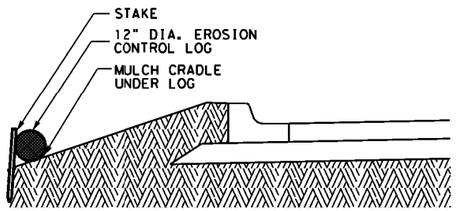


PLAN VIEW



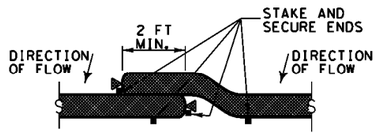
SECTION A-A

SLOPE TO ROADWAY EDGE

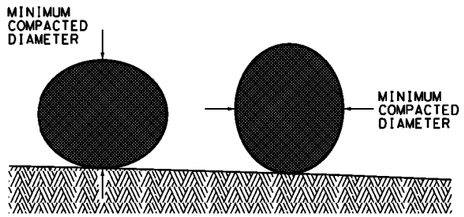


SECTION B-B

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					72
	COUNTY		CONTROL	SECT	JOB	HIGHWAY	
	HARRIS		0110	06	154$S	26	

SITE DESCRIPTION

PROJECT LIMITS: SS 261 at Tidwell Rd
IH 610 at UA 90
IH 10 at Wade Rd

PROJECT DESCRIPTION: Improve traffic signals.
Install advanced warning signals.

MAJOR SOIL DISTURBING ACTIVITIES: Trenching for installation of conduits and foundations.

TOTAL PROJECT AREA: Less than 1 acre

TOTAL AREA TO BE DISTURBED: Less than 1 acre

WEIGHTED RUNOFF COEFFICIENT:
(AFTER CONSTRUCTION): N/A

EXISTING CONDITION OF SOIL & VEGETATIVE COVER AND % OF EXISTING VEGETATIVE COVER:
Existing ground cover occupies approximately 5% of the area to be disturbed.
The proposed condition shall have ground cover on approximately 5% of the acre to be disturbed.

NAME OF RECEIVING WATERS: N/A

EROSION AND SEDIMENT CONTROLS

SOIL STABILIZATION PRACTICES:

____ TEMPORARY SEEDING
__X__ PERMANENT PLANTING, SODDING, OR SEEDING
____ MULCHING
____ SOIL RETENTION BLANKET
____ BUFFER ZONES
____ PRESERVATION OF NATURAL RESOURCES

OTHER:

STRUCTURAL PRACTICES:

__X__ SILT FENCES
____ HAY BALES
____ ROCK BERMS
____ DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
____ DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
____ DIVERSION DIKE AND SWALE COMBINATIONS
____ PIPE SLOPE DRAINS
____ PAVED FLUMES
____ ROCK BEDDING AT CONSTRUCTION EXIT
____ TIMBER MATTING AT CONSTRUCTION EXIT
____ CHANNEL LINERS
____ SEDIMENT TRAPS
____ SEDIMENT BASINS
____ STORM INLET SEDIMENT TRAP
____ STONE OUTLET STRUCTURES
____ CURBS AND GUTTERS
____ STORM SEWERS
____ VELOCITY CONTROL DEVICES
____ EROSION CONTROL LOGS

OTHER:

NARRATIVE - SEQUENCE OF CONSTRUCTION (STORM WATER MANAGEMENT) ACTIVITIES:

N/A

STORM WATER MANAGEMENT: Storm water drainage will be provided by both existing open ditch system and curb and gutter.

OTHER EROSION AND SEDIMENT CONTROLS:

MAINTENANCE: All erosion and sediment controls will be maintained in good working order. If a repair is necessary it will be done at the earliest date possible, but no later than 7 calendar days after the surrounding exposed ground has dried sufficiently to prevent further damage from heavy equipment. The area adjacent to creeks and drainageways shall have priority followed by devices protecting storm sewer inlets.

INSPECTION: All inspections will be performed by a TxDOT inspector per one of the options below as directed by the Area Engineer
1. At least every 7 calendar days
2. At least every 14 days or after 0.5 inches or more of rainfall
An inspection and maintenance report should be made for each inspection. Based on the inspection results, the controls shall be revised according to the inspection report.

WASTE MATERIALS: The dumpster used to store all waste material will meet all state and local city solid waste management regulations. All trash and construction debris will be deposited in the dumpster. The dumpster will be emptied as necessary or as required by local regulation and the trash will be hauled to a local dump. No construction waste material will be buried on site.

HAZARDOUS WASTE (INCLUDING SPILL REPORTING): In the event of a spill which may be considered hazardous, the Houston District Safety Office shall be contacted immediately at 713-802-5962.

SANITARY WASTE: All Sanitary Waste will be collected from the portable units as necessary or as required by local regulations by a licensed sanitary waste management contractor.

OFFSITE VEHICLE TRACKING:

____ HAUL ROADS DAMPENED FOR DUST CONTROL
____ LOADED HAUL TRUCKS TO BE COVERED WITH TARPAULIN
____ EXCESS DIRT ON ROAD REMOVED DAILY
____ STABILIZED CONSTRUCTION ENTRANCE

OTHER:

REMARKS: Disposal areas, stockpiles, and haul roads shall be constructed in a manner that will minimize and control the sediment that may enter receiving waterways. Disposal areas shall not be located in any waterway, waterbody or streambed. Construction staging areas and vehicle maintenance areas shall be constructed by the contractor in a manner which minimizes the runoff of all pollutants. All waterways shall be cleared as soon as practical of temporary embankments, temporary bridges, matting, falsework, piling, debris, and other obstructions placed during construction operations that are not part of the finished work.

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

03/01/2023

Texas Department of Transportation
Houston District

TxDOT STORM WATER POLLUTION PREVENTION PLAN

SWP3

FILE: STDG1.DGN	DN: TxDot	CK: TxDot	DW: TxDot	CK: TxDot
©TxDOT JANUARY 2007	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS	HOU	6		73
9/2010 INSPECTION NOTE	COUNTY		CONTROL	SECT	JOB	HIGHWAY
9/2013 INSPECTION NOTE	HARRIS		0110	06	154	SS 261
11/2013 SW3P TO SWP3						
05/2015 2014 SPECS						

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 Storm Water Pollution Prevention Plan (SWP3) Houston District standard plan.

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: Aug 29, 2022
FILE:

Version 2.1

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	0110	06	154	SS 261
UPDATED section V. text and added definition (10/17) ADDED USCG and USACE notes in Section VII (04/18)	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		74