FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	STP 2B24(319)VRU			FM 1959
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
12	HARRIS	1844	01	029	1

INDEX OF SHEETS
SEE SHEETS 2-3

FUNCTIONAL CLASSIFICATION: URBAN PRINCIPAL ARTERIAL	
DESIGN SPEED	
FM 1959 40 MPH	
ADT	
YR \ CSJ	1844-01-029
2024	8,900
2044	12,500

REGISTERED ACCESSIBILITY SPECIALIST (RAS) INSPECTION REQUIRED. TDLR NO.: TABS2024013187

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED STATE HIGHWAY IMPROVEMENT

PROJECT NO.
STP 2B24(354)VRU

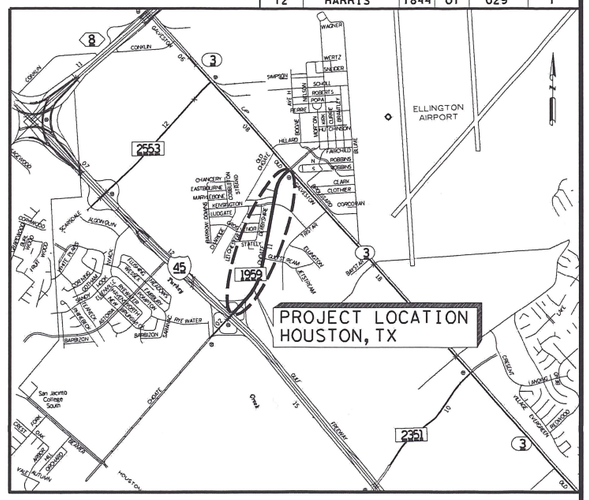
STATE CONTROL
CSJ: 1844-01-029

NET LENGTH OF PROJECT: 5,548 FT. = 1.050 MILES

HARRIS COUNTY
FM 1959

LIMITS: FROM IH 45 TO SH 3

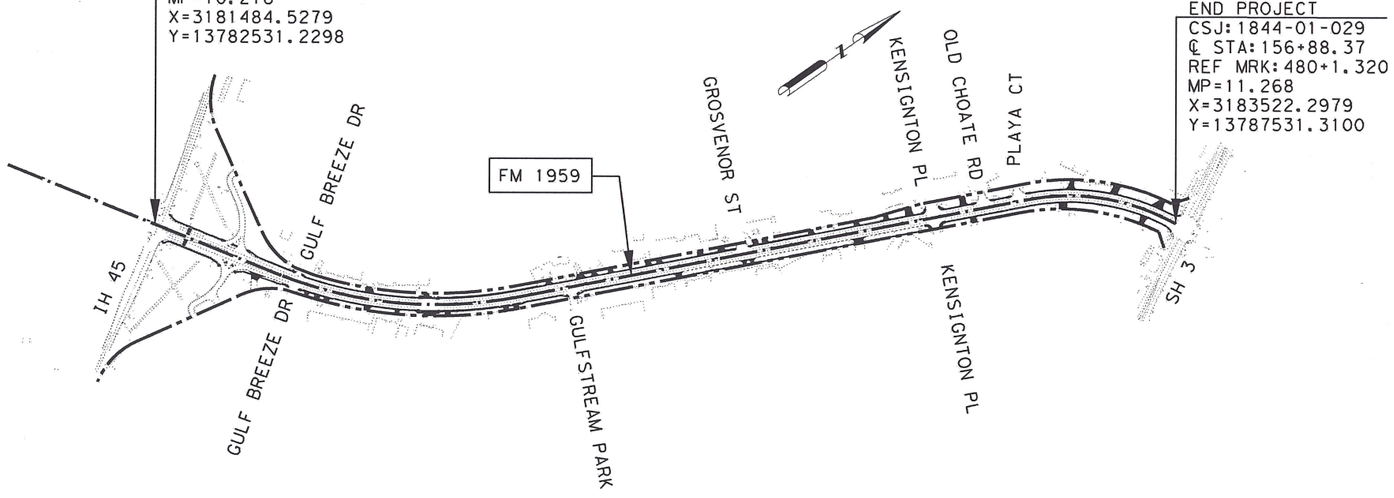
FOR THE CONSTRUCTION OF MISCELLANEOUS WORK
CONSISTING OF SIDEWALKS, CURB RAMPS, AND DRIVEWAYS.



VICINITY MAP
SCALE = NTS

BEGIN PROJECT
CSJ: 1844-01-029
℄ STA: 101+40.00
REF MRK: 480+0.270
MP=10.218
X=3181484.5279
Y=13782531.2298

END PROJECT
CSJ: 1844-01-029
℄ STA: 156+88.37
REF MRK: 480+1.320
MP=11.268
X=3183522.2979
Y=13787531.3100



LAYOUT MAP
NOT TO SCALE

EQUATIONS : NONE
EXCEPTIONS : NONE
RR CROSSING : NONE

NOTES:

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORATION, NOVEMBER 1, 2014, AND THE SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, OCTOBER 23, 2023).

TEXAS DEPARTMENT OF TRANSPORTATION

SUBMITTED FOR LETTING
DocuSigned by: 5/13/2024
SUPERVISING DESIGN ENGINEER
DA508AE859FB4A2...

APPROVED FOR LETTING
DocuSigned by: 5/21/2024
for Brett McLeod P.E.
DISTRICT ENGINEER
FE9C2D7C24E543D...

APPLICABLE FOR TRAFFIC SIGNAL ONLY
NOTE: CITY SIGNATURE VALID FOR ONE YEAR ONLY, AFTER DATE OF SIGNATURE
CITY OF HOUSTON
HOUSTON PUBLIC WORKS
05/23/24
Director of Houston Public Works Date

COUNTY HARRIS PROJ. NO. STP 2B24(354)VRU
HWY. NO. FM 1959 LETTING DATE AUGUST 2024
DATE ACCEPTED

5/13/2024
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I. GENERAL

1	TITLE SHEET
2 - 3	INDEX OF SHEET
4 - 5	EXISTING TYPICAL SECTIONS
6 - 7	PROPOSED TYPICAL SECTIONS
8,8A -8L	GENERAL NOTES
9 - 11	ESTIMATE AND QUANTITY SHEET
12	SUMMARY OF ROADWAY QUANTITIES
13	SUMMARY OF STORMSEWER, DEMOLITION AND TRAFFIC CONTROL QUANTITIES
14	SUMMARY OF PERMANENT PAVEMENT MARKING QUANTITIES
15	TRAFFIC SIGNAL SUMMARY OF QUANTITIES
16	SUMMARY OF DRIVEWAY LOCATIONS
17 - 18	SUMMARY OF SMALL SIGNS

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19	CONSTRUCTION SEQUENCE OVERVIEW

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33	* DS TC8020-04 (HOU DIST)
34	* TCP (1-4)-18
35	* TCP (2-4)-18
36	* TCP (3-1)-13
37	* TCP (3-2)-13
38	* TCP (3-4)-13
39	* WZ (BTS-1)-13
40	* WZ (BTS-2)-13

IV. ROADWAY

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42 - 43	HORIZONTAL AND VERTICAL CONTROL SHEET
44	HORIZONTAL ALIGNMENT DATA
45 - 57	SIDEWALK PLAN
58 - 64	DEMOLITION PLAN
65	CHECKER PLATE DETAILS
66	SIDEWALK AND TYPE C2 CURB DETAILS
67	ACCESS PAD RAMP DETAILS

V. ROADWAY STANDARDS

68	* CC & DID (HOU DIST)
69	* CCCG-22
70 - 73	* PED-18
74 - 76	* PRD-13
77	* FSSSCW-15 (HOU DIST)
78	* CRCP-FT (HOU DIST)
79 - 81	* DRIVEWAY DETAILS DD (HOU DIST)
82	* TREE PROTECTION (HOU DIST)

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88	* MSD (HOU DIST)
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90	* PSET-SP
91	* PSET-RR

VIII. PAVEMENT MARKINGS

92 - 96	SIGNING & PAVEMENT MARKING LAYOUT
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100	* PM(4)-22A
101	* TSR(4)-13
102	* SMD (GEN)-08
103	* SMD (SLIP-1)-08
104	* SMD (SLIP-2)-08
105	* SMD (SLIP-3)-08

STATE OF TEXAS
SANJAY POKHAREL
140149
LICENSED PROFESSIONAL ENGINEER

* STANDARDS

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

Pokharel P.E.

SANJAY POKHAREL, P.E. 4/26/2024

TEXAS DEPARTMENT OF TRANSPORTATION

FM 1959
INDEX OF SHEETS

N. T. S. SHEET 1 OF 2

DN:	DRAWING FILE NAME:	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK. DN:		6	TX				FM 1959
DW:	REVISIONS:	STATE DIST.NO	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK. DW:		12	HARRIS	1844	01	029	2
TR:							
CK. TR:							

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X. TRAFFIC SIGNAL

106	PERMANENT TRAFFIC SIGNAL NOTES
107	TRAFFIC SIGNAL EXISTING LAYOUT - FM 1959 AT FIRE STATION 93
108 - 109	TRAFFIC SIGNAL PROPOSED PLAN LAYOUT - FM 1959 AT FIRE STATION 93
110	SMA-100(1)-12 - FM 1959 AT FIRE STATION 93
111	TS-FD-12 - FM 1959 AT FIRE STATION 93
112	LMA-100(5)-12 - FM 1959 AT FIRE STATION 93
113	TRAFFIC SIGNAL EXISTING LAYOUT - FM 1959 AT KENSINGTON PI
114 - 115	TRAFFIC SIGNAL PROPOSED PLAN LAYOUT - FM 1959 AT KENSINGTON PI
116	SMA-100(1)-12 - FM 1959 AT KENSINGTON PI
117	TS-FD-12 - FM 1959 AT KENSINGTON PI
118	340 ITS CONTROLLER
119	BBU/EXTERNAL BATTERY CABINET (SIDE MOUNT)
120	MAST-PED PUSH BUTTON DETAILS

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121	* OSNS/MD (H0U DIST)
122	* VC-MD (H0U DIST)
123	* ED(1)-14
124	* ED(3)-14
125	* ED(4)-14
126	* ED(5)-14
127	* ED(6)-14
128	* ED(7)-14
129	* ED(8)-14
130	* SMA-100 (2)-12
131	* LMA(1)-12
132	* LMA(2)-12
133	* LMA(3)-12
134	* LMA(4)-12
135	* MA-C-12
136	* MA-D-12
137	* MA-DPD-20
138	* LUM-A-12
139	* CFA-12
140	* TS-BP-20
141	* ITS 346 CONTROLLER FOUNDATION (CITY OF HOUSTON)

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142	ENVIRONMENTAL PERMITS ISSUES AND COMMITMENTS EPIC (HOU DIST)
143 - 144	TxDOT STORM WATER POLLUTION PREVENTION PLAN SWP3
145 - 151	TxDOT STORM WATER POLLUTION PREVENTION PLAN

XIII. ENVIRONMENTAL ISSUES STANDARDS

152	* EC(1)-16
153	* EC(3)-16
154 - 156	* EC(9)-16

STATE OF TEXAS
SANJAY POKHAREL
140149
LICENSED PROFESSIONAL ENGINEER

* STANDARDS

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

P.E.
SANJAY POKHAREL, P.E. 4/26/2024

TEXAS DEPARTMENT OF TRANSPORTATION

FM 1959
INDEX OF SHEETS

N. T. S. SHEET 2 OF 2

DN:	DRAWING FILE NAME:	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK. DN:		6	TX				FM 1959
DW:	REVISIONS:	STATE DIST. NO	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK. DW:		12	HARRIS	1844	01	029	3
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CK. TR:							

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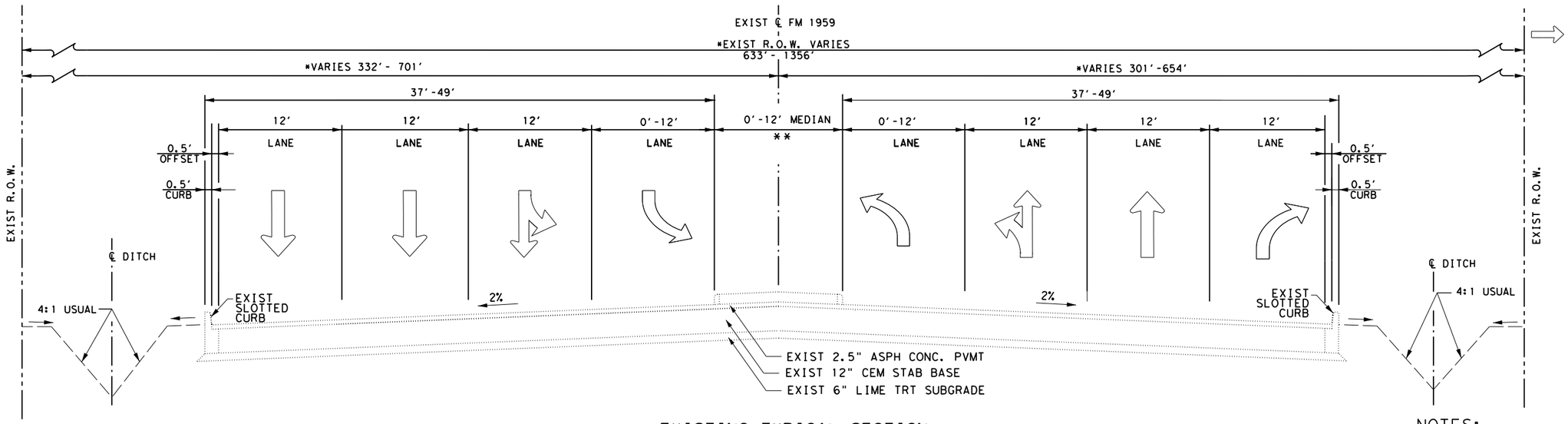


EXISTING TYPICAL SECTION

LEFT
STA 102+00.00 TO STA 105+50.40

RIGHT
STA 102+18.58 TO STA 105+72.30

LEGEND:

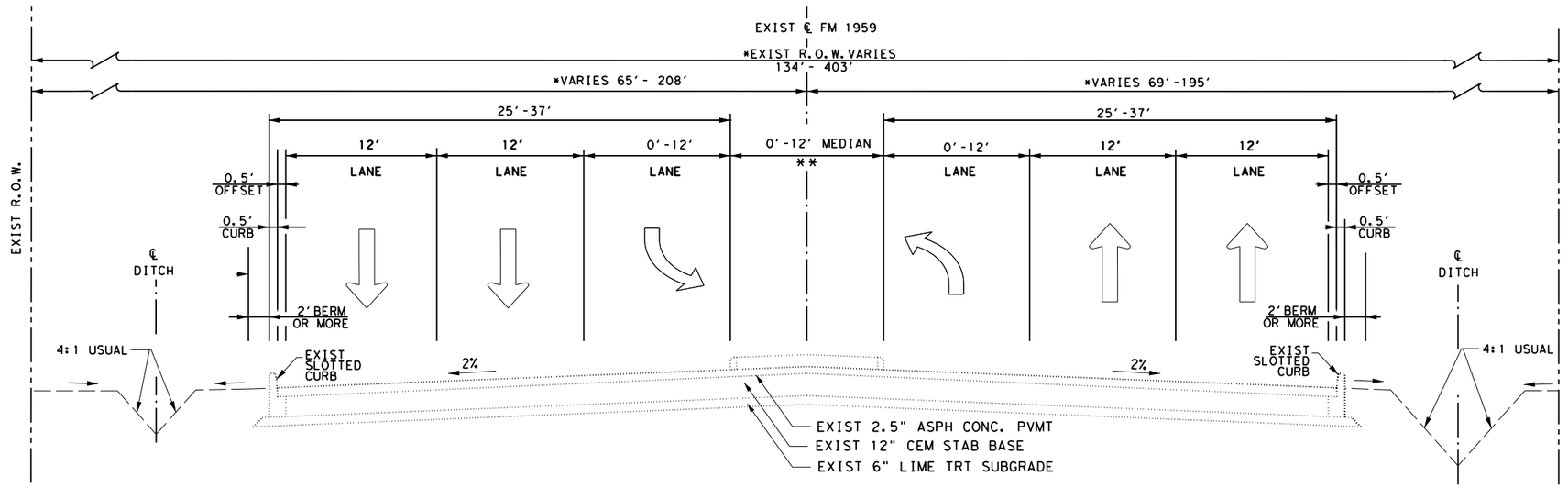
DIRECTION OF TRAFFIC

NOTES:

1. LOCATION OF EXIST LEFT TURN LANE VARIES FROM WB TO EB DIRECTION THROUGHOUT THE PROJECT.
2. EXIST SIDEWALK THAT DOESN'T CONFORM TO TXDOT ADA POLICY WILL BE REMOVED AND REPLACED THROUGHOUT THE PROJECT.
3. FOR PAVEMENT MARKINGS, SEE PAVEMENT MARKINGS LAYOUT AND STANDARD SHEETS.
4. MATCH EXISTING DRAINAGE FLOWLINES AT R.O.W. DITCH.

* THE EXIST R.O.W. VARIES. IT SHIFTS TOWARDS THE NORTH WEST DIRECTION.

** THE LOCATION OF THE MEDIAN SHIFTS WITH RESPECT TO THE CENTERLINE ALIGNMENT.



EXISTING TYPICAL SECTION

LEFT
STA 105+50.40 TO STA 109+19.30

RIGHT
STA 105+72.30 TO STA 109+19.30

STATE OF TEXAS
SANJAY POKHAREL
140149
LICENSED PROFESSIONAL ENGINEER

SANJAY POKHAREL, P.E. 4/18/2024

SCALE: N.T.S.

TEXAS DEPARTMENT OF TRANSPORTATION

FM 1959

EXIST TYPICAL SECTION

SHEET 1 OF 2

DN:	ORIGINAL DATE OF DRAWING:	FED.RD. DIST.NO.	STATE	FEDERAL PROJECT NO.	HIGHWAY NO.
CK DN:	REVISIONS:	6	TEXAS		FM 1959
DW:		STATE DIST.NO	COUNTY	CONTROL NO. / SECTION NO. / JOB NO. / SHEET NO.	
CK DW:		12	HARRIS	1844 / 01 / 029 / 4	
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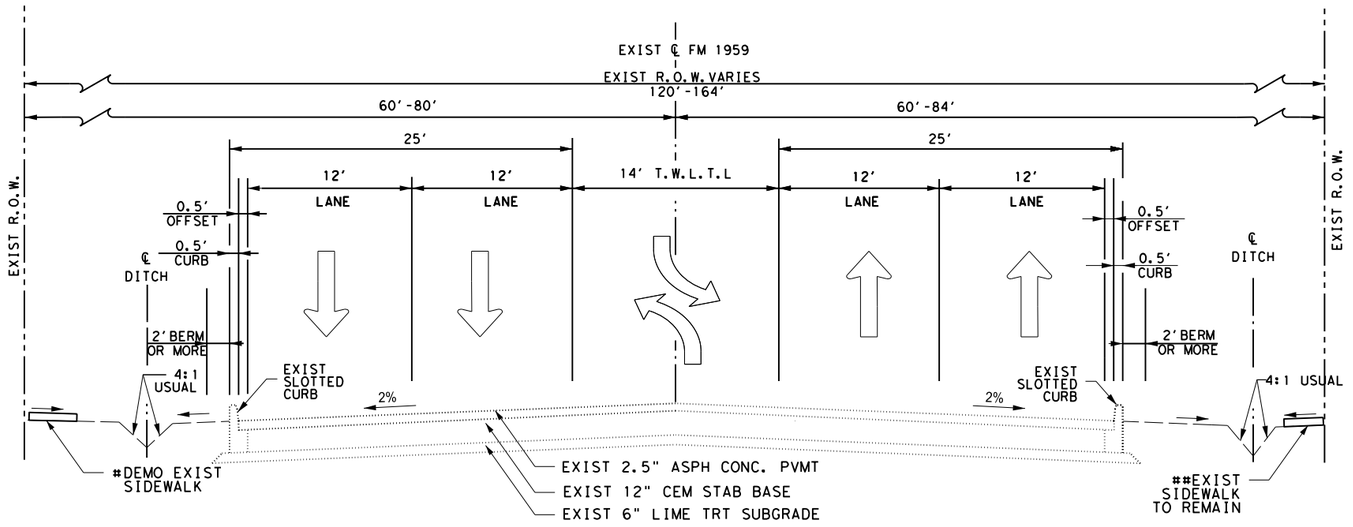

EXISTING TYPICAL SECTION

LEFT	RIGHT
STA 109+19.30 TO STA 129+79.80	STA 109+19.30 TO STA 129+79.80
STA 129+79.80 TO STA 143+41.35	STA 129+79.80 TO STA 143+41.35
STA 143+41.35 TO STA 156+88.37	STA 143+41.35 TO STA 156+88.37
#	##
STA 135+18.80 TO STA 143+38.97	STA 151+57.53 TO STA 153+18.43

LEGEND:

⇨ DIRECTION OF TRAFFIC

NOTES:

1. LOCATION OF EXIST LEFT TURN LANE VARIES FROM WB TO EB DIRECTION THROUGHOUT THE PROJECT.
2. EXIST SIDEWALK THAT DOESN'T CONFORM TO TXDOT ADA POLICY WILL BE REMOVED AND REPLACED THROUGHOUT THE PROJECT.
3. FOR PAVEMENT MARKINGS, SEE PAVEMENT MARKINGS LAYOUT AND STANDARD SHEETS.
4. MATCH EXISTING DRAINAGE FLOWLINES AT R.O.W. DITCH.

STATE OF TEXAS
SANJAY POKHAREL
140149
LICENSED
PROFESSIONAL ENGINEER

SANJAY POKHAREL, P.E. 4/18/2024

SCALE: N.T.S.

TEXAS DEPARTMENT OF TRANSPORTATION

FM 1959

EXIST TYPICAL SECTION

SHEET 2 OF 2

DN:	ORIGINAL DATE OF DRAWING:	FED.RD. DIST.NO.	STATE	FEDERAL PROJECT NO.			HIGHWAY NO.
CK DN:		6	TEXAS				FM 1959
DW:	REVISIONS:	STATE DIST.NO	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:		12	HARRIS	1844	01	029	5
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CK TR:							

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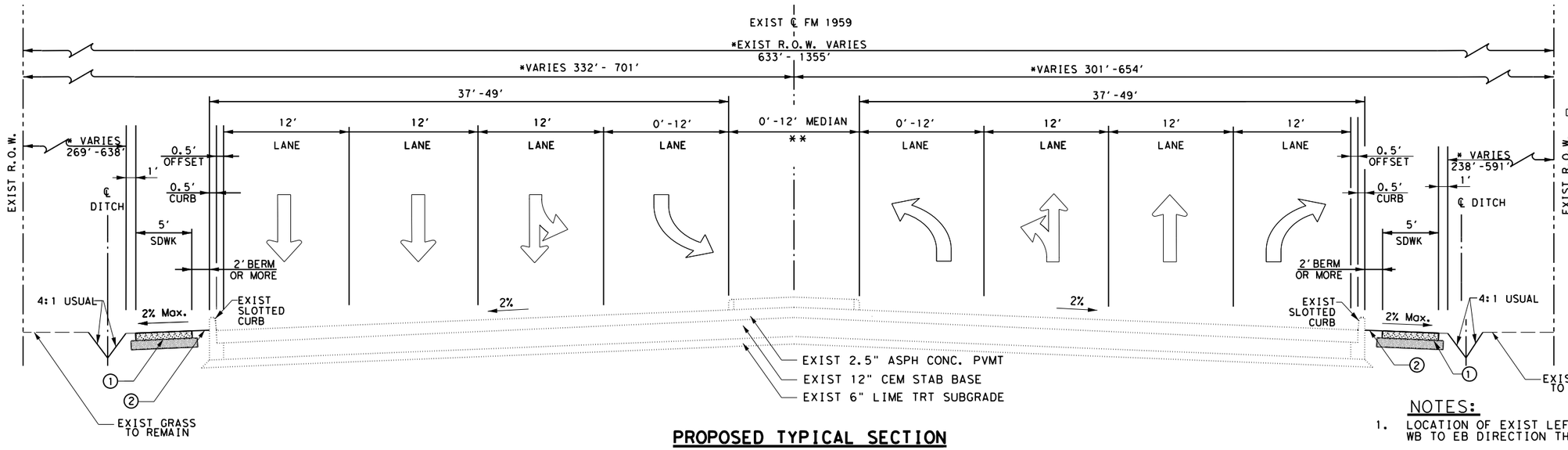
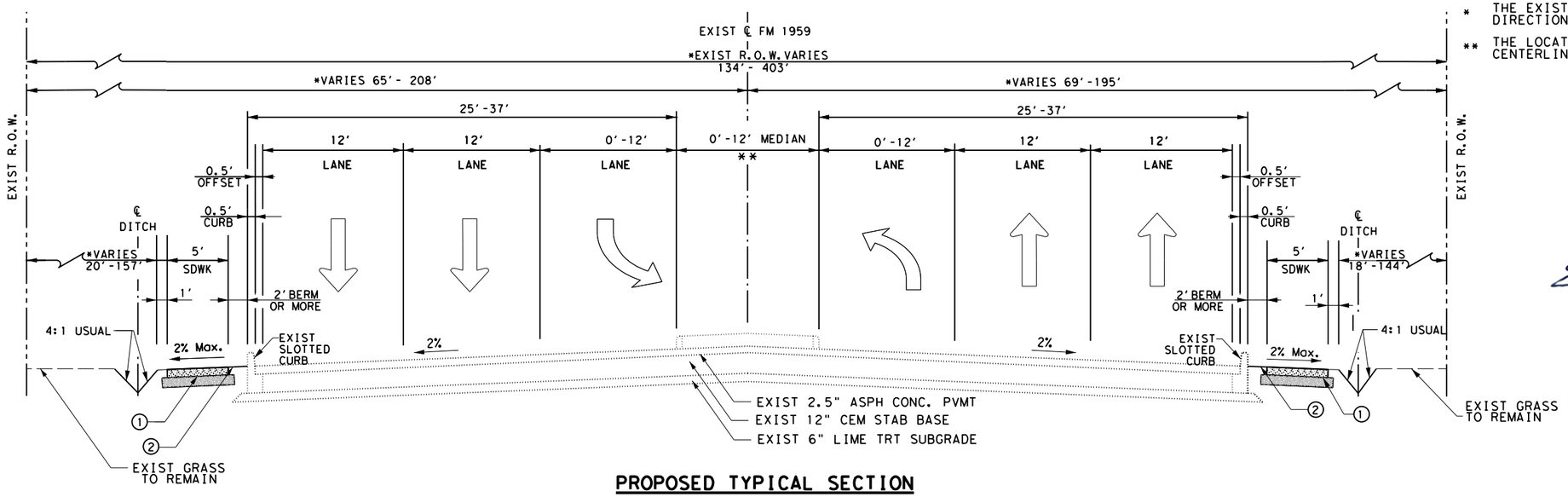


PROPOSED TYPICAL SECTION

LEFT	RIGHT
STA 102+00.00 TO STA 105+50.40	STA 102+18.58 TO STA 105+72.30



PROPOSED TYPICAL SECTION

LEFT	RIGHT
STA 105+50.40 TO STA 109+19.30	STA 105+50.40 TO STA 109+19.30

LEGEND:

① 4" CONC. SIDEWALK
ITEM 531-6001
OVER 6" CEM STAB BKFL
ITEM 400-6005

② BLOCK SOD ITEM 162-6002

⇨ TRAFFIC FLOW DIRECTION

NOTES:

1. LOCATION OF EXIST LEFT TURN LANE VARIES FROM WB TO EB DIRECTION THROUGHOUT THE PROJECT.
2. EXIST SIDEWALK THAT DOESN'T CONFORM TO TXDOT ADA POLICY SHALL BE REMOVED AND REPLACED THROUGHOUT THE PROJECT.
3. PROPOSED SIDEWALK SHOULD BE 6 FEET WIDE WHEN CONSTRUCT NEXT TO CURB.
   PROPOSED SIDEWALK SHOULD BE 5 FEET WIDE WHEN CONSTRUCT AWAY FROM CURB.
4. SIDEWALK WIDTH MAY VARY AS SHOWN ON PLANS TO AVOID CONFLICTS. SIDEWALK CAN BE REDUCED TO A MINIMUM WIDTH OF 4 FEET AT CONFLICT POINT WITH APPROVAL OF THE FIELD ENGINEER.
5. ALL C2 CURB TO BE SLOTTED EVERY 20 FEET TO ENSURE THE EXCESS FLOW FROM THE ROAD TOWARDS THE EXIST DITCH IS NOT HALTED DURING HEAVY RAINFALL.
6. MATCH EXISTING DRAINAGE FLOWLINES AT R.O.W. DITCH.

* THE EXIST R.O.W. VARIES. IT SHIFTS TOWARDS THE NORTH WEST DIRECTION.

** THE LOCATION OF THE MEDIAN SHIFTS WITH RESPECT TO THE CENTERLINE ALIGNMENT.

STATE OF TEXAS
SANJAY POKHAREL
140149
LICENSED
PROFESSIONAL ENGINEER

SANJAY POKHAREL, P.E. 4/19/2024

SCALE: N.T.S.

TEXAS DEPARTMENT OF TRANSPORTATION

FM 1959

PROPOSED TYPICAL SECTION

SHEET 1 OF 2

DN:	ORIGINAL DATE OF DRAWING:	FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.				HIGHWAY NO.
CK. DN:	REVISIONS:	6	TEXAS					FM 1959
DW:		STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
CK. DW:		12	HARRIS	1844	01	029		6
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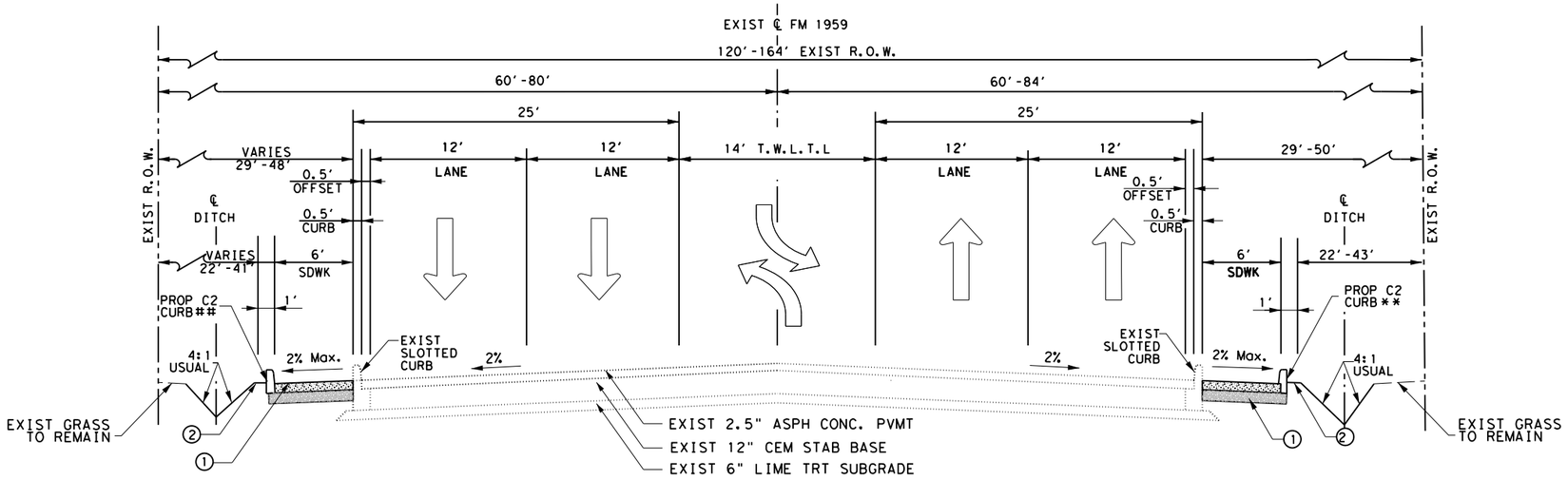


PROPOSED TYPICAL SECTION

LEFT	RIGHT
STA 109+19.30 TO STA 129+79.80	STA 109+19.30 TO STA 129+79.80
##	**
STA 115+95.54 TO STA 116+30.70	STA 117+12.63 TO STA 122+47.88
STA 116+97.01 TO STA 117+40.93	
STA 117+75.56 TO STA 120+18.19	
STA 143+41.35 TO STA 156+88.37	STA 143+41.35 TO STA 156+88.37

LEGEND:

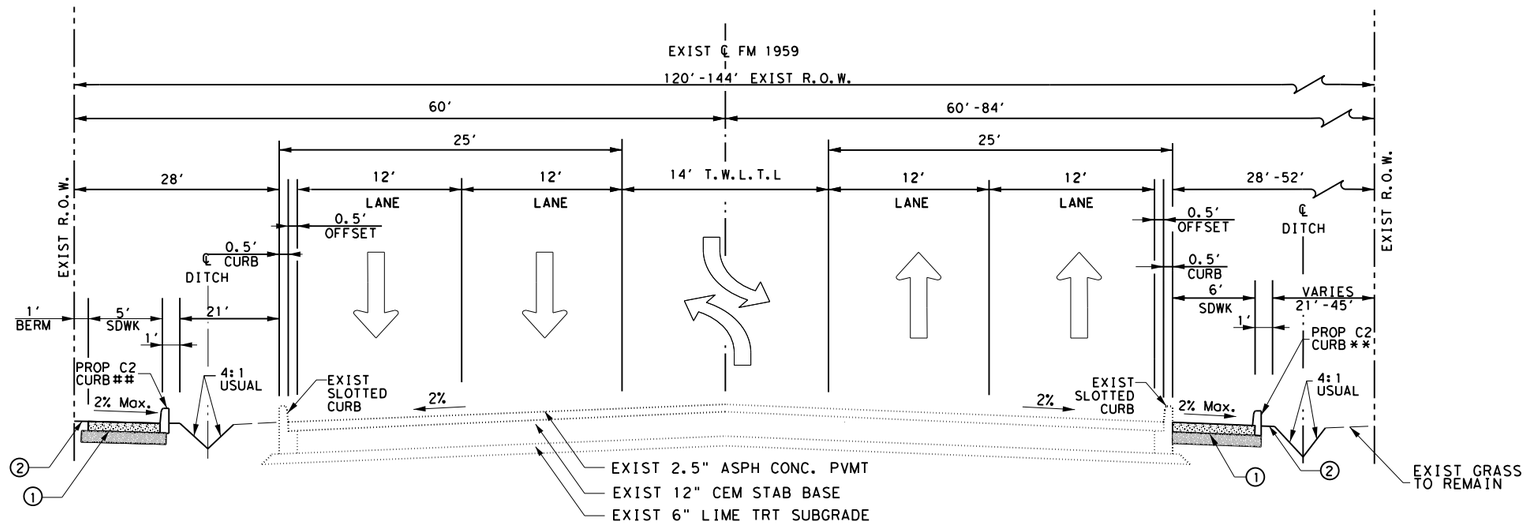
① 4" CONC. SIDEWALK ITEM 531-6001
OVER 6" CEM STAB BKFL ITEM 400-6005

② BLOCK SOD ITEM 162-6002

⇨ TRAFFIC FLOW DIRECTION

NOTES:

1. LOCATION OF EXIST LEFT TURN LANE VARIES FROM WB TO EB DIRECTION THROUGHOUT THE PROJECT.
2. EXIST SIDEWALK THAT DOESN'T CONFORM TO TXDOT ADA POLICY SHALL BE REMOVED AND REPLACED THROUGHOUT THE PROJECT.
3. PROPOSED SIDEWALK SHOULD BE 6 FEET WIDE WHEN CONSTRUCT NEXT TO CURB.
PROPOSED SIDEWALK SHOULD BE 5 FEET WIDE WHEN CONSTRUCT AWAY FROM CURB.
4. SIDEWALK WIDTH MAY VARY AS SHOWN ON PLANS TO AVOID CONFLICTS. SIDEWALK CAN BE REDUCED TO A MINIMUM WIDTH OF 4 FEET AT CONFLICT POINT WITH APPROVAL OF THE FIELD ENGINEER.
5. ALL C2 CURB TO BE SLOTTED EVERY 20 FEET TO ENSURE THE EXCESS FLOW FROM THE ROAD TOWARDS THE EXIST DITCH IS NOT HALTED DURING HEAVY RAINFALL.
6. MATCH EXISTING DRAINAGE FLOWLINES AT R.O.W. DITCH.



PROPOSED TYPICAL SECTION

LEFT	RIGHT
STA 129+79.80 TO STA 143+41.35	STA 129+79.80 TO STA 143+41.35
##	**
STA 131+32.05 TO STA 132+07.05	STA 131+42.32 TO STA 132+15.97
	STA 132+57.70 TO STA 132+99.23
	STA 133+81.31 TO STA 134+03.91
	STA 134+37.15 TO STA 134+54.09
	STA 135+87.77 TO STA 136+98.38

STATE OF TEXAS
SANJAY POKHAREL
140149
LICENSED PROFESSIONAL ENGINEER

SANJAY POKHAREL, P.E. 4/19/2024

SCALE: N.T.S.

TEXAS DEPARTMENT OF TRANSPORTATION

FM 1959
PROPOSED TYPICAL SECTION

SHEET 2 OF 2

DN:	ORIGINAL DATE OF DRAWING:	FED.RD. DIV.NO.	STATE	FEDERAL PROJECT NO.		HIGHWAY NO.
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CK DW:		12	HARRIS	1844	01	029	7
TR:							
CK TR:							

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County: Harris **Control:** 1844-01-029

Highway: FM 1959

General Notes:

General:

Area Engineer contact information for this project follows:

Jamal Elahi, P.E. Email: Jamal.Elahi@txdot.gov Phone:(281) 464-5501
Vanessa Bosques, P.E. Email: Vanessa.Bosques@txdot.gov Phone:(281) 464-5503

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

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

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

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

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

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

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

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

Superelevate the curves to match the existing surface.

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

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

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

Sheet 8

County: Harris **Control:** 1844-01-029

Highway: FM 1959

Grade street intersections and median openings for surface drainage.

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

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

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

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

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

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

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

General: Roadway Illumination and Electrical

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

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

General: Traffic Signals

For traffic signal items, use materials from the Pre-Qualified Producers List (located at http://www.dot.state.tx.us/GSD/purchasing/supps.htm) and the materials pre-qualified for illumination and electrical items (located at 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

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

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

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

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

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

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

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

General: Traffic Control and Construction

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

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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 below. Information and requirements for electronic submittals can be viewed in the "Guide to Electronic Shop Drawing Submittal" which can be accessed through the following web link, https://ftp.txdot.gov/pub/txdot-info/library/pubs/bus/bridge/e_submit_guide.pdf References to 11 in. x 17 in. sheets in individual specifications for structural items imply electronic CAD sheets.

Table 1

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

Spec Item No.'s	Product	Submittal Required	Approval Required (Y/N)	Contractor/ Fabricator P.E. Seal Required	Reviewing Party	Shop or Working Drawing (Note 1)
7.16.1&.2	Construction Load Analyses	Y	Y	Y	B	WD
400	Excavation and Backfill for Structures (cofferdams)	Y	N	Y	A	WD
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

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425	Prestr Concr Bent	Y	Y	N	B	SD
426	Post Tension Details	Y	Y	N	B	SD
434	Elastomeric Bearing Pads (All)	Y	Y	N	B	SD
441	Bridge Protective Assembly	Y	Y	N	B	SD
441	Misc Steel (various steel assemblies)	Y	Y	N	B	SD
441	Steel Pedestals (bridge raising)	Y	Y	N	B	SD
441	Steel Bearings	Y	Y	N	B	SD
441	Steel Bent	Y	Y	N	B	SD
441	Steel Diaphragms	Y	Y	N	B	SD
441	Steel Finger Joint	Y	Y	N	B	SD
441	Steel Plate Girder	Y	Y	N	B	SD
441	Steel Tub-Girders	Y	Y	N	B	SD
441	Erection Plans, including Falsework	Y	N	Y	A	WD
449	Sign Structure Anchor Bolts	Y	Y	N	T	SD
450	Railing	Y	Y	N	A	SD
462	Concrete Box Culvert	Y	Y	N	C	SD
462	Concrete Box Culvert (Alternate Designs Only,calcs reqd.)	Y	Y	Y	B	SD
464	Reinforced Concrete Pipe (Jack and Bore only; ONLY when requested)	Y	Y	Y	A	SD
465	Pre-cast Junction Boxes, Grates, and Inlets	Y	Y	N	A	SD
465	Pre-cast Junction Boxes, Grates, and Inlets (Alternate Designs Only, calcs req'd.)	Y	Y	Y	B	SD
466	Pre-cast Headwalls and Wingwalls	Y	Y	N	A	SD
467	Pre-cast Safety End Treatments	Y	Y	N	A	SD
495	Raising Existing Structure (calcs reqd.)	Y	Y	Y	B	SD
610	Roadway Illumination Supports (Non-Standard only, calcs reqd.)	Y	Y	Y	BRG	SD
613	High Mast Illumination Poles (Non-standard only, calcs reqd.)	Y	Y	Y	BRG	SD
627	Treated Timber Poles	Y	Y	N	T	SD
644	Special Non-Standard Supports (Bridge Mounts, Barrier Mounts, Etc.)	Y	Y	Y	T	SD
647	Large Roadside Sign Supports	Y	Y	Y	T	SD
650	Cantilever Sign Structure Supports - Alternate Design Calcs.	Y	Y	Y	T	SD
650	Sign Structures	Y	Y	N	T	SD
680	Installation of Highway Traffic Signals	Y	Y	N	T	SD
682	Vehicle and Pedestrian Signal Heads	Y	Y	N	T	SD
684	Traffic Signal Cables	Y	Y	N	T	SD
685	Roadside Flashing Beacon Assemblies	Y	Y	N	T	SD
686	Traffic Signal Pole Assemblies (Steel) (Non-Standard only)	Y	Y	Y	T	SD
687	Pedestal Pole Assemblies	Y	Y	N	T	SD
688	Detectors	Y	Y	N	A	SD

784	Repairing Steel Bridge Members	Y	Y	Y	B	WD
SS	Prestr Concr Crown Span	Y	Y	N	B	SD
SS	Sound Barrier Walls	Y	Y	Y	A	SD
SS	Camera Poles	Y	Y	Y	TMS	SD
SS	Pedestrian Bridge (Calcs req'd.)	Y	Y	Y	B	SD
SS	Screw-In Type Anchor Foundations	Y	Y	N	T	SD
SS	Fiber Optic/Communication Cable	Y	Y	N	TMS	SD
SS	Spread Spectrum Radios for Signals	Y	Y	N	T	SD
SS	VIVDS System for Signals	Y	Y	N	T	SD
SS	CTMS Equipment	Y	Y	N	TMS	SD

Notes:

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

Key to Reviewing Party

A - Area Office

Area Office	Email Address
North Harris Area Office	HOU-NHAShpDrwgs@txdot.gov

C - Construction Office

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

T - Traffic Engineer

Traffic Operations	HOU-TrfShpDrwgs@txdot.gov

TMS – Traffic Management System

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

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

Item 6: Control of Materials

To comply with the latest provisions of the Build America, Buy America Act (BABA Act) of the Bipartisan Infrastructure Law, the Contractor must submit 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.

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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.

The total area disturbed for this project is 2.058 acres. The disturbed area in this project, the project locations in the Contract, and Contractor project specific locations (PSLs) within 1 mile of the project limits for the Contract, will further establish the authorization requirements for storm water discharges. The Department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction activities shown on the plans. The Contractor is to obtain required authorization from the TCEQ for Contractor PSLs for construction support activities on or off the ROW. When the total area disturbed in the Contract and PSLs within 1 mile of the project limits exceeds 5 acres, provide a copy of the Contractor NOI for PSLs on the ROW to the Engineer (to the appropriate MS4 operator when on an off-state system route) and to the local government that operates a separate storm drain system.

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

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

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

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

Take measures to prevent the building of nests on any structures or trees within the project limits throughout the duration of the construction if work / removal will be performed during the nesting / breeding season. This can be accomplished by application of bird repellent gel, netting by hand every 3 to 4 days, or any other non-threatening method approved by the Houston

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District Environmental Section. Obtain this approval well in advance of the planned use. Contact the Houston District Environmental Section at 713-802-5244. The cost of this work is subsidiary to the various bid items.

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 Lane Closure Assessment Fee is $ *500*. This fee applies to the Contractor for closures or obstructions that overlap into restricted hour traffic for each hour or portion thereof, per lane, regardless of the length of lane closure or obstruction. For Restricted Hours subject to Lane Assessment Fee refer to the Item, "Barricades, Signs, and Traffic Handling." The time increment for the Lane Closure Assessment fee for this project is one hour.

Item 100: Preparing Right of Way

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

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

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

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

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

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

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Item 104: Removing Concrete

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

Item 105: Removing Treated and Untreated Base and Asphalt Pavement

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

Item 104: Removing Concrete
Item 105: Removing Treated and Untreated Base and Asphalt Pavement
Item 305: Salvaging, Hauling, and Stockpiling Reclaimable Asphalt Pavement

Removing the Asphalt Concrete Pavement (ACP) material is paid under the Item, "Salvaging, Hauling, and Stockpiling Reclaimable Asphalt Pavement."

Removing the concrete pavement material is paid under the Item, "Removing Concrete."

Removing the base material is paid under the Item, "Removing Treated and Untreated Base and Asphalt Pavement."

Remove the ACP separately from the base. The removed depth is as uniform as possible during each removal pass if the pavement depth being removed is composed of different asphalt layers. Stockpile the RAP of differing types of quality separately by its intended use such as for asphalt treatment, cement treatment, lime treatment, or asphalt concrete pavement. Break, crush, or mill the stockpiled materials so that 100 percent pass the 2-in. sieve.

Item 110: Excavation

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

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

Item 132: Embankment

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

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

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

For unpaved areas, provide a finished grade with the top 4 in. capable of sustaining vegetation. Use fertile soil that is easily cultivated, free from objectionable material and highly resistant to erosion. Topsoil work is paid under the Item, "Topsoil."

Furnish material with a maximum Liquid Limit (LL) of 65.

Item 162: Sodding for Erosion Control
Item 164: Seeding for Erosion Control
Item 166: Fertilizer
Item 168: Vegetative Watering

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

Item 305: Salvaging, Hauling, and Stockpiling Reclaimable Asphalt Pavement

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

Items 360, 420, and 421: All Concrete Items

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

Item 400: Excavation and Backfill for Structures

Plugging existing pipe culverts is subsidiary to the various bid items.

If Recycled Cement Treatment (Type D) is included in the plans, the following additional requirements apply:

1. Use only approved sand, crushed concrete, or salvaged base free from deleterious matter, as aggregate for cement-stabilized backfill.

2. Provide crushed concrete or salvaged base backfill material in accordance with the Item, "Cement Treatment (Plant-Mixed) (Type D)" (base or crushed concrete), except the recycled Type D material must not contain Reclaimed Asphalt Pavement (RAP).

3. For backfill material below the spring line of pipes, use cement-stabilized sand rather than Recycled Type D backfill material.

4. For the cement-stabilized sand backfill, use a minimum of 7 percent of hydraulic cement based on the dry weight of backfill material. The cement content for the crushed concrete and salvaged base is specified in the Item, “Cement Treatment (Plant-Mixed) (Type D).”

5. Place and compact the stabilized backfill material using a gradation that provides a dense mass without segregating and is impervious to passing of water.

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 420: Concrete Substructures

Unless otherwise noted, use Class C concrete with an ordinary surface finish for signal, lighting, or sign structure foundations.

Item 421: Hydraulic Cement Concrete

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

Item 464: Reinforced Concrete Pipe

Rubber gaskets are required for concrete pipe joints except for connections of safety end treatments, driveway culverts, and joints between the existing pipes and extensions.

Open, install, and backfill each section, or a portion of a section, in the same day at locations requiring pipe culverts under existing roadways.

Place the pipe drains across existing roadways half at a time to allow passage of traffic. No trenches may remain open overnight.

Known locations of existing stub-outs are shown on the plans, but these stub-outs may be in a different position or condition. Delays, inconveniences, or additional work required will not be a basis for additional compensation.

Provide leave-outs or holes in the proposed storm drain structures and pipes for drainage during interim construction. This work is subsidiary to the various bid items.

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The flowline elevations of side road structures are based on the proposed ditches. Field-verify these elevations and adjust them as necessary to meet the field conditions. Before placing these structures, prepare and submit for approval, the data (revised elevation, alignment, length, etc.) for the adjusted structures.

Item 465: Junction Boxes, Manholes, and Inlets

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

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

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

Do not leave excavations or trenches open overnight.

Item 502: Barricades, Signs, and Traffic Handling

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

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

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

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

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

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

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

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

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

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

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

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

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

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

One Lane Closure

Day	Daytime Closure Hours	Nighttime Closure Hours	Restricted Hours Subject to Lane Assessment Fee
Monday	09:00 AM - 04:00 PM	NA	06:00 AM - 09:00 AM 04:00 PM – 07:00 PM
Tuesday	09:00 AM - 04:00 PM	NA	06:00 AM - 09:00 AM 04:00 PM – 07:00 PM
Wednesday	09:00 AM - 04:00 PM	NA	06:00 AM - 09:00 AM 04:00 PM – 07:00 PM
Thursday	09:00 AM - 04:00 PM	NA	06:00 AM - 09:00 AM 04:00 PM – 07:00 PM
Friday	09:00 AM - 04:00 PM	NA	06:00 AM - 09:00 AM 04:00 PM – 07:00 PM

Day	Daytime Closure Hours	Nighttime Closure Hours	Restricted Hours Subject to Lane Assessment Fee
Saturday	*09:00 AM - 04:00 PM	NA	06:00 AM - 09:00 AM 04:00 PM – 07:00 PM
Sunday	*09:00 AM - 04:00 PM	NA	06:00 AM - 09:00 AM 04:00 PM – 07:00 PM

- Weekend work requires Engineer approval.

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

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

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

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.

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 529: Concrete Curb, Gutter, and Combined Curb and Gutter
Item 530: Intersections, Driveways, and Turnouts
Item 531: Sidewalks

An air-entraining admixture is not required.

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

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

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

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

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

Item 618: Conduit

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

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

Unless otherwise shown on the plans, install underground conduit a minimum of 24 in. deep. Install the conduit in accordance with the latest National Electrical Code (NEC) and applicable

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Department standard sheets. Place conduit under driveways or roadways a minimum of 24 in. below the pavement surface.

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.

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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

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 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.

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 666: Retroreflectorized Pavement Markings
Item 668: Prefabricated Pavement Markings
Item 6038: Multipolymer Pavement Markings (MPM)

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

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

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

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

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

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

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

Stripe all roadways before opening them to traffic.

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

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

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

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.

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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.

Furnish the type of controller cabinet specified on the plans. Refer to the table shown in the Departmental Material Specifications (DMS-11170, Fully Actuated, Solid-State Traffic Signal Controller Assembly), Section 11170.6.A, Type 2 cabinet, page 4 of 39, regarding the size of the cabinet, back panel configuration, and the size of the load bay. Use the following website to view this specification:

https://www.txdot.gov/business/resources/materials/material-specifications.html

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.

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.

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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.

Furnish black housings for vehicle and pedestrian signals. Furnish black vehicle signal head back plates with 2 in. retroreflective yellow borders.

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.

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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.

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.

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

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

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

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

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

Item 6306: Video Imaging Vehicle Detection System

Furnish the cable to operate the Video Imaging Vehicle Detection System (VIVDS) in accordance with the manufacturer's recommendations or purchase it from the same manufacturer as the VIVDS equipment.

Supply VIVDS equipment that can process up to a maximum of 6 camera inputs per intersection. Additional equipment to accommodate up to 6 camera inputs is subsidiary to the various bid items. No extra compensation will be allowed for additional equipment needed to make the VIVDS equipment fully operational under this Item.

Supply a laptop computer and a video monitor as described in this Special Specification Item.

Detector zone videotaping for this project will not be required.

Supply 2 video channel VIVDS processor cards equipped with a NEMA TS1 detector interface and a 332 cabinet detector interface for a minimum of 4 detector outputs that are compatible with the City of Houston COH 2070 traffic signal controller.

Special Specification 6306 Video Imaging Vehicle Detection System Requirements

Specification Items	Description	Not Required	Required	State Supplied
1	**Description**		**X**	
	Variable Focal Cameras		**X**	
	VIVDS Card Rack Processor System		**X**	
	Field Setup Computer (1 Required) (Laptop)	**X**		
	Field Setup Video Monitor (1 Ea. Controller)		**X**	

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	Connectors and Camera Mounting Hardware		**X**	
3	**Functional Capabilities**			
	System Software		**X**	
4	**Vehicle Detection**			
	Detection Zone Video Taping	**X**		
5	**VIVDS Processor Unit**			
	Provide both TS1 and TS2 Environmental Requirements		**X**	
	12 Volt/5 Amp Power Supply		**X**	
6	**Camera Assembly**			
	Camera Interface Panel		**X**	
7	**Field Communications Link**			
	Lightning and Transient Surge Suppression Devices		**X**	
9	**Temporary Use and Retesting**		**X**	
10	**Operation from Central Control**	**X**		
	Telephone Interconnect	**X**		
	ISDN Interconnect	**X**		
11	**Installation and Training**		**X**	

Other items not specifically listed in this table are required. When shown in the plans, remove and deliver temporary VIVDS equipment to the Department's Signal Shop, 6810 Old Katy Rd., Houston, Texas, or as directed.

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						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**1844-01-029**			
		PROJECT ID		**A00180580**			
		COUNTY		**Harris**			
		HIGHWAY		**FM 1959**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	100-6002	PREPARING ROW	STA	55.000		55.000	
	104-6017	REMOVING CONC (DRIVEWAYS)	SY	711.000		711.000	
	104-6021	REMOVING CONC (CURB)	LF	502.000		502.000	
	104-6036	REMOVING CONC (SIDEWALK OR RAMP)	SY	452.000		452.000	
	104-6040	REMOVING CONC (PAVERS)	SY	54.000		54.000	
	105-6058	REMOVING STAB BASE & ASPH PAV (10"-12")	SY	4,587.000		4,587.000	
	110-6001	EXCAVATION (ROADWAY)	CY	1,574.000		1,574.000	
	132-6005	EMBANKMENT (FINAL)(ORD COMP)(TY C)	CY	787.000		787.000	
	162-6002	BLOCK SODDING	SY	2,012.000		2,012.000	
	164-6009	BROADCAST SEED (TEMP) (WARM)	SY	156.000		156.000	
	166-6001	FERTILIZER	AC	0.450		0.450	
	168-6001	VEGETATIVE WATERING	MG	52.000		52.000	
	305-6003	SALV, HAUL & STKPL RCL APH PV (2 TO 4")	SY	4,587.000		4,587.000	
	400-6001	STRUCT EXCAV	CY	127.000		127.000	
	400-6005	CEM STABIL BKFL	CY	1,236.000		1,236.000	
	400-6006	CUT & RESTORING PAV	SY	16.000		16.000	
	416-6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	101.000		101.000	
	416-6033	DRILL SHAFT (TRF SIG POLE) (42 IN)	LF	22.000		22.000	
	423-6008	RETAINING WALL (CAST - IN - PLACE)	SF	1,946.000		1,946.000	
	432-6009	RIPRAP (CONC) (CL B) (4")	CY	25.000		25.000	
	442-6007	STR STEEL (MISC NON - BRIDGE)	LB	1,435.000		1,435.000	
	450-6050	RAIL (HANDRAIL)(TY D)	LF	208.000		208.000	
	450-6052	RAIL (HANDRAIL)(TY F)	LF	117.000		117.000	
	464-6003	RC PIPE (CL III)(18 IN)	LF	14.000		14.000	
	464-6005	RC PIPE (CL III)(24 IN)	LF	150.000		150.000	
	465-6005	JCTBOX(COMPL)(PJB)(3FTX3FT)	EA	1.000		1.000	
	467-6395	SET (TY II) (24 IN) (RCP) (6: 1) (P)	EA	4.000		4.000	
	496-6007	REMOV STR (PIPE)	LF	71.000		71.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	9.000		9.000	
	506-6020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	152.000		152.000	
	506-6024	CONSTRUCTION EXITS (REMOVE)	SY	152.000		152.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	444.000		444.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	444.000		444.000	
	506-6040	BIODEG EROSN CONT LOGS (INSTL) (8")	LF	48.000		48.000	
	506-6041	BIODEG EROSN CONT LOGS (INSTL) (12")	LF	268.000		268.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	316.000		316.000	

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			CONTROL SECTION JOB		**1844-01-029**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00180580**		
			COUNTY		**Harris**		
			HIGHWAY		**FM 1959**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	529-6005	CONC CURB (MONO) (TY II)	LF	166.000		166.000	
	530-6004	DRIVEWAYS (CONC)	SY	470.000		470.000	
	530-6005	DRIVEWAYS (ACP)	SY	4,233.000		4,233.000	
	530-6025	DRIVEWAYS (CONC) (FAST TRACK)	SY	240.000		240.000	
	531-6001	CONC SIDEWALKS (4")	SY	5,281.000		5,281.000	
	531-6004	CURB RAMPS (TY 1)	EA	4.000		4.000	
	531-6008	CURB RAMPS (TY 5)	EA	6.000		6.000	
	531-6010	CURB RAMPS (TY 7)	EA	10.000		10.000	
	531-6013	CURB RAMPS (TY 10)	EA	6.000		6.000	
	531-6016	CURB RAMPS (TY 21)	EA	3.000		3.000	
	618-6046	CONDT (PVC) (SCH 80) (2")	LF	510.000		510.000	
	618-6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	165.000		165.000	
	618-6053	CONDT (PVC) (SCH 80) (3")	LF	275.000		275.000	
	618-6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	450.000		450.000	
	618-6058	CONDT (PVC) (SCH 80) (4")	LF	45.000		45.000	
	620-6007	ELEC CONDR (NO.8) BARE	LF	1,435.000		1,435.000	
	620-6012	ELEC CONDR (NO.4) INSULATED	LF	740.000		740.000	
	621-6005	TRAY CABLE (4 CONDR) (12 AWG)	LF	1,180.000		1,180.000	
	624-6010	GROUND BOX TY D (162922)W/APRON	EA	13.000		13.000	
	628-6145	ELC SRV TY D 120/240 060(NS)SS(E)SP(O)	EA	2.000		2.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	37.000		37.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	3.000		3.000	
	644-6030	IN SM RD SN SUP&AM TYS80(1)SA(T)	EA	2.000		2.000	
	644-6033	IN SM RD SN SUP&AM TYS80(1)SA(U)	EA	1.000		1.000	
	644-6034	IN SM RD SN SUP&AM TYS80(1)SA(U-1EXT)	EA	1.000		1.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	49.000		49.000	
	666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	1,404.000		1,404.000	
	668-6077	PREFAB PAV MRK TY C (W) (ARROW)	EA	2.000		2.000	
	668-6085	PREFAB PAV MRK TY C (W) (WORD)	EA	2.000		2.000	
	668-6092	PREFAB PAV MRK TY C (W) (36")(YLD TRI)	EA	10.000		10.000	
	677-6005	ELIM EXT PAV MRK & MRKS (12")	LF	662.000		662.000	
	677-6007	ELIM EXT PAV MRK & MRKS (24")	LF	418.000		418.000	
	678-6008	PAV SURF PREP FOR MRK (24")	LF	2,048.000		2,048.000	
	678-6009	PAV SURF PREP FOR MRK (ARROW)	EA	2.000		2.000	
	678-6016	PAV SURF PREP FOR MRK (WORD)	EA	2.000		2.000	
	678-6023	PAV SURF PREP FOR MRK (36")(YLD TRI)	EA	10.000		10.000	
	680-6003	INSTALL HWY TRF SIG (SYSTEM)	EA	2.000		2.000	

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HIGHWAY FM 1959

			CONTROL SECTION JOB		**1844-01-029**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00180580**		
			COUNTY		**Harris**		
			HIGHWAY		**FM 1959**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	682-6001	VEH SIG SEC (12")LED(GRN)	EA	16.000		16.000	
	682-6002	VEH SIG SEC (12")LED(GRN ARW)	EA	8.000		8.000	
	682-6003	VEH SIG SEC (12")LED(YEL)	EA	16.000		16.000	
	682-6004	VEH SIG SEC (12")LED(YEL ARW)	EA	8.000		8.000	
	682-6005	VEH SIG SEC (12")LED(RED)	EA	16.000		16.000	
	682-6006	VEH SIG SEC (12")LED(RED ARW)	EA	8.000		8.000	
	682-6060	BACKPLATE W/REFL BRDR(3 SEC)	EA	24.000		24.000	
	684-6029	TRF SIG CBL (TY A)(14 AWG)(3 CONDR)	LF	2,780.000		2,780.000	
	684-6031	TRF SIG CBL (TY A)(14 AWG)(5 CONDR)	LF	2,780.000		2,780.000	
	684-6033	TRF SIG CBL (TY A)(14 AWG)(7 CONDR)	LF	5,100.000		5,100.000	
	686-6025	INS TRF SIG PL AM (S)1 ARM(24')	EA	1.000		1.000	
	686-6029	INS TRF SIG PL AM (S)1 ARM(28')	EA	1.000		1.000	
	686-6037	INS TRF SIG PL AM(S)1 ARM(36')	EA	2.000		2.000	
	686-6043	INS TRF SIG PL AM(S)1 ARM(40')LUM	EA	2.000		2.000	
	686-6047	INS TRF SIG PL AM(S)1 ARM(44')LUM	EA	1.000		1.000	
	686-6055	INS TRF SIG PL AM(S)1 ARM(50')LUM	EA	1.000		1.000	
	687-6001	PED POLE ASSEMBLY	EA	12.000		12.000	
	688-6001	PED DETECT PUSH BUTTON (APS)	EA	16.000		16.000	
	688-6003	PED DETECTOR CONTROLLER UNIT	EA	2.000		2.000	
	760-6001	DITCH CLEANING AND RESHAPING (FOOT)	LF	6,736.000		6,736.000	
	1004-6001	TREE PROTECTION	EA	5.000		5.000	
	6038-6013	MULTIPOLYMER PAV MRK (W)(24")(SLD)	LF	644.000		644.000	
	6058-6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	2.000		2.000	
	6185-6002	TMA (STATIONARY)	DAY	130.000		130.000	
	6306-6009	VIVDS PROSR SYS (INSTALL ONLY)	EA	2.000		2.000	
	6306-6010	VIVDS CAM ASSY (INSTALL ONLY)	EA	8.000		8.000	
	6306-6012	VIVDS CABLING (INSTALL ONLY)	LF	1,720.000		1,720.000	
	06	MATERIAL FURNISHED BY THE STATE	LS	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	

DISTRICT	COUNTY	CCSJ	SHEET
Houston	Harris	1844-01-029	11

SUMMARY OF ROADWAY QUANTITIES

FM 1959 SIDEWALK PLAN SHEET	ITEM NO.	ITEM 100	ITEM 110	ITEM 132	ITEM 162	ITEM 164	ITEM 166	ITEM 168	ITEM 400		ITEM 423	ITEM 432	ITEM 442	ITEM 450	
	DESC. CODE	6002	6001	6005	6002	6009	6001	6001	6005	6006	6008	6009	6007	6050	6052
	CENTERLINE STATION LIMITS	PREPARING ROW	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (ORD) (COMP) (TY C)	BLOCK SODDING	BROADCAST SEED (TEMP) (WARM)	FERTILIZER	VEGETATIVE WATERING	CEM STABIL BACKFILL	CUT AND RESTORE PAV	RETAINING WALL (CAST-IN-PLACE)	RIPRAP CONC (CL B) (4")	STR STEEL (MISC) (NON- BRIDGE)	RAIL (HANDRAIL) (TY D)	RAIL (HANDRAIL) (TY F)
		STA	CY	CY	SY	SY	AC	MG	CY	SY	SF	CY	LB	LF	LF
1	BEGIN TO 104+50	3.1	83	42	183		0.04	4.8	59.8						
2	104+50 TO 109+00	4.5	107	53	148	24	0.04	4.8	79.2						
3	109+00 TO 113+50	4.5	116	58	141	24	0.03	3.6	84.9	16				19	
4	113+50 TO 118+00	4.5	106	53	146	36	0.04	4.8	93.0		285	3.5		32	117
5	118+00 TO 122+50	4.5	165	83	189		0.04	4.8	119.4		1,000	5.9			
6	122+50 TO 127+00	4.5	135	67	147	12	0.03	3.6	90.3						
7	127+00 TO 131+50	4.5	140	70	163		0.03	3.6	102.1		38	7.4	574	18	
8	131+50 TO 136+00	4.5	111	56	144	12	0.03	3.6	82.8		474	6.2	861	139	
9	136+00 TO 140+50	4.5	138	69	168		0.03	3.6	99.6		149				
10	140+50 TO 145+00	4.5	126	63	155	24	0.04	4.8	82.5						
11	145+00 TO 149+50	4.5	111	55	144	24	0.03	3.6	81.0						
12	149+50 TO 154+00	4.5	144	72	169		0.03	3.6	104.2						
13	154+00 TO END	2.88	91	45	115		0.02	2.4	65.3						
TOTAL		**55**	**1,574**	**787**	**2,012**	**156**	**0.45**	**52**	**1,144**	**16**	**1,946**	**23**	**1,435**	**208**	**117**

SUMMARY OF ROADWAY QUANTITIES (CONTINUED)

FM 1959 SIDEWALK PLAN SHEET	ITEM NO.	ITEM 500	ITEM 529	ITEM 530			ITEM 531						ITEM 760	ITEM 1004
	DESC. CODE	6001	6005	6004	6005	6025	6001	6004	6008	6010	6013	6016	6001	6001
	CENTERLINE STATION LIMITS	MOBILIZATION	CONC CURB (MONO) (TY II)	DRIVEWAYS (CONC)	DRIVEWAYS (ACP)	DRIVEWAYS (FAST TRK)	CONC SIDEWALKS (4")	CURB RAMPS (TY 1)	CURB RAMPS (TY 5) (MOD)	CURB RAMPS (TY 7)	CURB RAMPS (TY 10)	CURB RAMPS (TY 21)	DITCH CLEANING AND RESHAPING	TREE PROTECTION
		LS	LF	SY	SY	SY	SY	EA	EA	EA	EA	EA	LF	EA
1	BEGIN TO 104+50						276.2						477	
2	104+50 TO 109+00		127		179.2		365.7	2		2		3	493	
3	109+00 TO 113+50		34		545.3		392.0			4			561	
4	113+50 TO 118+00			83.0	208.5	240	429.1	2	2	2			684	
5	118+00 TO 122+50				203.4		550.9						811	
6	122+50 TO 127+00		5	85.6	349.0		416.6			2			393	
7	127+00 TO 131+50				409.7		471.3						704	2
8	131+50 TO 136+00				475.1		382.3				2		682	3
9	136+00 TO 140+50				383.4		459.9						739	
10	140+50 TO 145+00				334.4		380.7		4				414	
11	145+00 TO 149+50			113.2	216.8		373.9				4		407	
12	149+50 TO 154+00			187.8	455.9		480.8						371	
13	154+00 TO END				471.9		301.6							
TOTAL		**1**	**166**	**470**	**4,233**	**240**	**5,281**	**4**	**6**	**10**	**6**	**3**	**6,736**	**5**

TEXAS DEPARTMENT OF TRANSPORTATION

FM 1959
SUMMARY OF ROADWAY QUANTITIES

N. T. S.

SHEET 1 OF 1

DN:	DRAWING FILE NAME:	FED.RD. DIV.NO.	STATE	PROJECT NO.		HIGHWAY NO.
CK DN:		6	TX			FM 1959
DW:	REVISIONS:	STATE DIST. NO	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:		12	HARRIS	1844	01	029	12
TR:							
CK TR:							

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3/15/2024

SUMMARY OF STORMSEWER QUANTITIES

FM 1959 DRIVEWAY CULVERT P&P SHEET	ITEM NO.	ITEM 400		ITEM 432	ITEM 464		ITEM 465	ITEM 467
	DESC. CODE	6001	6005	6009	6003	6005	6005	6395
	CENTERLINE STATIONLIMITS	STRUCT EXCAV	CEM STABIL BKFL	RIPRAP CONC (CL B) (4")	RC PIPE (CL III) (18 IN)	RC PIPE (CL III) (24 IN)	MANH (COMP) (TY A) (24")	SET (TY II) (24 IN)(RCP) (6:1) (P)
		CY	CY	CY	LF	LF	EA	EA
1	WESTBOUND P&P SHEET	80	58	1	14	100	1	2
2	EASTBOUND P&P SHEET	47	34	1		50		2
TOTAL		**127**	**92**	**2**	**14**	**150**	**1**	**4**

SUMMARY OF TRAFFIC CONTROL

ITEM NO.	ITEM 502	ITEM 6185
DESC. CODE	6001	6002
	BARRICADES, SIGNS AND TRAFFIC HANDLING	TMA (STATIONARY)
	MO	DAY
	9	130
TOTAL	**9**	**130**

SUMMARY OF DEMOLITION QUANTITIES

FM 1959 DEMOLITION SHEET NO	ITEM NO.	ITEM 104				ITEM 105	ITEM 305	ITEM 496
	DESC. CODE	6017	6021	6036	6040	6058	6003	6007
	CENTERLINE STATIONLIMITS	REMOVING CON (DRIVEWAYS)	REMOVING CONC (CURB)	REMOVING CONC (SIDEWALK OR RAMP)	REMOVING CONC (PAVERS)	REMOVING STAB BASE AND ASPH PAV (10"-12")	SALV, HAUL & STKPL RCL APH PV (2 TO 4")	REMOVE STR (PIPE)
		SY	LF	SY	SY	SY	SY	SY
1	BEGIN TO 108+40.00		59		54	179.2	179.2	
2	108+40.00 TO 116+80.00	234.2	60	61		674.3	674.3	38
3	116+80.00 TO 125+20.00	90.0	23	37		697.6	697.6	
4	125+20.00 TO 129+40.00	85.6	25			760.2	760.2	33
5	133+60.00 TO 142+00.00		19	260		780.3	780.3	
6	142+00.00 TO 150+40.00	113.2	295	83		481.4	481.4	
7	150+40.00 TO END	187.8	21	11		1013.9	1013.9	
TOTAL		**711**	**502**	**452**	**54**	**4,587**	**4,587**	**71**

SUMMARY OF STORM WATER POLLUTION PREVENTION (SWP3) QUANTITIES

FM 1959 SW3P SHEET NO	ITEM NO.	ITEM 506						
	DESC. CODE	6020	6024	6038	6039	6040	6041	6043
	CENTERLINE STATION LIMITS	CONSTRUCTION EXIT (INSTALL) (TY I)	CONSTRUCTION EXIT (REMOVE)	TEMPORARY SEDIMENT CONTROL (INSTALL)	TEMPORARY SEDIMENT CONTROL (REMOVE)	BIODEG EROSN CONT LOGS (INSTALL) (8")	BIODEG EROSN CONT LOGS (INSTALL) (12")	BIODEG EROSN CONT LOGS (REMOVE)
		SY	SY	LF	LF	LF	LF	LF
1	BEGIN TO 108+40.00	76	76	108	108	48	28	76
2	108+40.00 TO 116+80.00			168	168		28	28
3	116+80.00 TO 125+20.00			36	36		60	60
4	125+20.00 TO 129+40.00			132	132		72	72
5	133+60.00 TO 142+00.00						24	24
6	142+00.00 TO 150+40.00						28	28
7	150+40.00 TO END	76	76				28	28
TOTAL		**152**	**152**	**444**	**444**	**48**	**268**	**316**

TEXAS DEPARTMENT OF TRANSPORTATION

FM 1959

SUMMARY OF STORMSEWER, DEMOLITION, SWP3 AND TRAFFIC CONTROL QUANTITIES

N. T. S.

SHEET 1 OF 1

DN:	DRAWING FILE NAME:	FED.RD. DIV.NO.	STATE	PROJECT NO.	HIGHWAY NO.
CK DN:		6	TX		FM 1959
DW:	REVISIONS:	STATE DIST.NO	COUNTY	CONTROL NO. / SECTION NO. / JOB NO.	SHEET NO.
CK DW:		12	HARRIS	1844 / 01 / 029	13
TR:					
CK TR:					

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SUMMARY OF PERMANENT PAVEMENT MARKING QUANTITIES

ITEM NO.	ITEM 666	ITEM 668			ITEM 677		ITEM 678				ITEM 6038
DESC. CODE	6048	6077	6085	6092	6005	6007	6008	6009	6016	6023	6013
FM 1959 SIGNING & PAVEMENT MARKING LAYOUT	REFL PAV MRK TY I (W) 24" (SLD) (100 MIL)	PREFAB PAV MRK TY C (W)(ARROW)	PREFAB PAV MRK TY C (W)(WORD)	PREFAB PAV MRK TY C (W)(36")(YLD TRI)	ELIM EXT PAV MRK & MRKS (12")	ELIM EXT PAV MRK & MRKS (24")	PAV SURF PREP FOR MRK (24")	PAV SURF PREP FOR MRK (ARROW)	PAV SURF PREP FOR MRK (WORD)	PAV SURF PREP FOR MRK (36")(YLD TRI)	MULTIPOLYMER PAV MRK (W) (24")(SLD)
	LF	EA	EA	EA	LF	LF	LF	EA	EA	EA	LF
1	146	2	2	10	422	160	790	2	2	10	644
2	471	0	0	0	240	92	471	0	0	0	0
3	113	0	0	0	0	0	113	0	0	0	0
4	674	0	0	0	0	166	674	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**1,404**	**2**	**2**	**10**	**662**	**418**	**2,048**	**2**	**2**	**10**	**644**

TEXAS DEPARTMENT OF TRANSPORTATION

SUMMARY OF PERMANENT PAVEMENT MARKING QUANTITIES

N.T.S.

SHEET 1 OF 1

DN:	DRAWING FILE NAME:	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN:		6	TX				FM 1959
DW:	REVISIONS:	STATE DIST.NO	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:		12	HARRIS	1844	01	029	14
TR:							
CK TR:							

$FILE$ $DATE$

CK:
DW:
CK:
DN:

MATERIALS FOR HIGHWAY TRAFFIC SIGNAL

ITEM	DESC CODE	DESCRIPTION	UNIT	FM 1959 AT FIRE STATION 93	FM 1959 AT KENSINGTON PI	TOTAL
				QUANTITY	QUANTITY	QUANTITY
0416	6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	44	57	101
0416	6033	DRILL SHAFT (TRF SIG POLE) (42 IN)	LF	22		22
0618	6046	CONDT (PVC) (SCH 80) (2")	LF	280	230	510
0618	6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	80	85	165
0618	6053	CONDT (PVC) (SCH 80) (3")	LF	185	90	275
0618	6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	200	250	450
0618	6058	CONDT (PVC) (SCH 80) (4")	LF		45	45
0620	6007	ELEC CONDR (NO.8) BARE	LF	745	690	1435
0620	6012	ELEC CONDR (NO.4) INSULATED	LF	465	275	740
0621	6005	TRAY CABLE (4 CONDR) (12 AWG)	LF	570	610	1180
0624	6010	GROUND BOX TY D (162922)W/APRON	EA	7	6	13
0628	6145	ELC SRV TY D 120/240 060(NS)SS(E)SP(O)	EA	1	1	2
0644	6076	REMOVE SM RD SN SUP&AM	EA		2	2
0680	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
		* TRAFFIC SIGNAL 18 INCH CABINETBASE EXTENSION	EA	1	1	2
		* MAST ARM DAMPER	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	2	4
		* GROUND ROD, 5/8" X 10' COPPER-CLAD (CONTROLLER ONLY)	EA	1	1	2
		* SIGN [FM 1959 Rd / 800 999] (90" X 24") [15 SF]	EA	1		1
		* SIGN [FM 1959 Rd / 999 800] (90" X 24") [15 SF]	EA	1		1
		* SIGN [FM 1959 Rd / 300 400] (90" X 24") [15 SF]	EA		1	1
		* SIGN [FM 1959 Rd / 400 300] (90" X 24") [15 SF]	EA		1	1
		* SIGN [Kensington PI / 13900 14000] (120" X 24") [20 SF]	EA		1	1
		* SIGN [Kensington PI / 14000 13900] (120" X 24") [20 SF]	EA		1	1
		* SIGN "LEFT TURN SIGNAL" (36" X 30") [7.5 SF]	EA	4	4	8
		* 4G LTE CELLULAR MODEM W/ ANTENNA AND POWER SUPPLY (INSTALL ONLY)	EA	1	1	2
0682	6001	VEH SIG SEC (12")LED(GRN)	EA	8	8	16
0682	6002	VEH SIG SEC (12")LED(GRN ARW)	EA	4	4	8
0682	6003	VEH SIG SEC (12")LED(YEL)	EA	8	8	16
0682	6004	VEH SIG SEC (12")LED(YEL ARW)	EA	4	4	8
0682	6005	VEH SIG SEC (12")LED(RED)	EA	8	8	16
0682	6006	VEH SIG SEC (12")LED(RED ARW)	EA	4	4	8
0682	6060	BACKPLATE W/REFL BRDR(3 SEC)	EA	12	12	24
0684	6029	TRF SIG CBL (TY A)(14 AWG)(3 CONDR)	LF	1420	1360	2780
0684	6031	TRF SIG CBL (TY A)(14 AWG)(5 CONDR)	LF	1420	1360	2780
0684	6033	TRF SIG CBL (TY A)(14 AWG)(7 CONDR)	LF	2555	2545	5100
0686	6025	INS TRF SIG PL AM (S)1 ARM(24')	EA	1		1
0686	6029	INS TRF SIG PL AM (S)1 ARM(28')	EA	1		1
0686	6037	INS TRF SIG PL AM(S)1 ARM(36')	EA		2	2
0686	6043	INS TRF SIG PL AM(S)1 ARM(40')LUM	EA	1	1	2
0686	6047	INS TRF SIG PL AM(S)1 ARM(44')LUM	EA		1	1
0686	6055	INS TRF SIG PL AM(S)1 ARM(50')LUM	EA	1		1
0687	6001	PED POLE ASSEMBLY	EA	7	5	12
		*FURNISH AND INSTAL SCREW-IN TYPE ANCHOR FOUNDATION				
0688	6001	PED DETECT PUSH BUTTON (APS)	EA	8	8	16
0688	6003	PED DETECTOR CONTROLLER UNIT	EA	1	1	2
6058	6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1	1	2
6306	6009	VIVDS PROSR SYS (INSTALL ONLY)	EA	1	1	2
6306	6010	VIVDS CAM ASSY (INSTALL ONLY)	EA	4	4	8
6306	6012	VIVDS CABLING (INSTALL ONLY)	LF	870	850	1720

* MATERIAL AND LABOR SUBSIDIARY TO PERTINENT ITEMS.

ITEM 6306 VIVDS CAMERAS UNITS WILL BE PROVIDED BY TXDOT THROUGH STATE FORCE ACCOUNT.

FM 1959
AT VARIOUS
TRAFFIC SIGNAL
SUMMARY OF QUANTITIES

Texas Department of Transportation

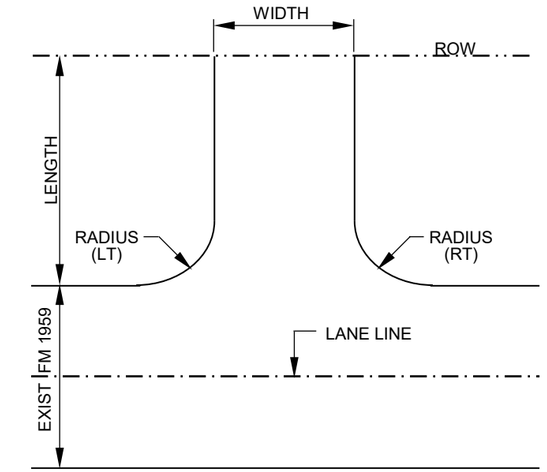
CONT	SECT	JOB	HIGHWAY
1844	01	029	FM 1959
DIST	COUNTY		SHEET NO.
HOU	HARRIS		15

DATE: 4/12/2024 TIME
FILE: H:\Traffic Signals\LienNguyen\FM 1959 1844 01 029\00- SUMMARY 106- NOTES FOR PERMANENT TRAFFIC SIGNAL(S).dgn

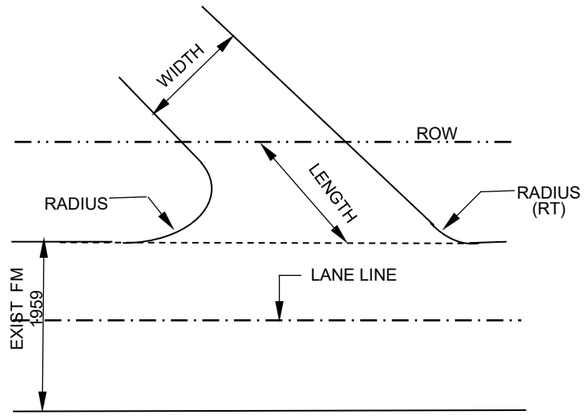
SUMMARY OF DRIVEWAYS

FM 1959 ROADWAY PLAN VIEW SHEET	WB / EB	DRVWY NO	APPROX STATION AT DRIVEWAY CENTERLINE	SURF TYPE (CONC/ASPH)	LT RADIUS (FT)	RT RADIUS (FT)	WIDTH (FT)	LENGTH (FT)	ITEM 530 6004 DRVWY (CONC) ** (SY)	ITEM 530 6005 DRVWY (ACP) ** (SY)	ITEM 530 6025 DRVWY (CONC) (FAST TRACK) ** (SY)
2 OF 13	EB	1	107+42.00	ASPH	39.0	25.0	33.0	33.0		179.2	
3 OF 13	EB	2	110+16.56	ASPH	20.0	23.0	16.0	29.0		83.0	
3 OF 13	EB	3	110+73.22	ASPH	14.0	13.0	29.0	28.0		95.3	
3 OF 13	EB	4	111+26.66	ASPH	11.0	17.0	28.0	28.0		95.5	
3 OF 13	WB	5	113+42.47	ASPH	18.0	22.0	40.0	30.0		153.0	
3 OF 13	EB	6	113+43.62	ASPH	13.0	15.0	29.0	30.0		118.5	
4 OF 13	WB	7	115+02.08	CONC	12.0	22.0	22.0	30.0	83.0		
4 OF 13	WB	8	116+45.74	ASPH	21.0	18.0	26.0	29.0		101.3	
4 OF 13	EB	9	116+64.93	CONC	25.0	24.0	64.0	30.0			240.0
4 OF 13	EB	10	117+60.11	ASPH	15.0	14.0	53.0	30.0		107.2	
5 OF 13	EB	11	120+64.49	ASPH	15.0	14.0	46.0	30.0		100.1	
5 OF 13	EB	12	121+16.89	ASPH	15.0	29.0	52.0	29.0		103.3	
6 OF 13	WB	13	123+09.60	ASPH	23.0	31.0	55.0	28.0		96.9	
6 OF 13	WB	14	124+75.55	ASPH	27.0	31.0	75.0	30.0		149.0	
6 OF 13	WB	15	125+59.35	ASPH	20.0	28.0	23.0	30.0		103.1	
6 OF 13	WB	16	126+46.21	CONC	17.0	18.0	23.0	29.0	85.6		
7 OF 13	WB	17	128+43.76	ASPH	19.0	18.0	26.0	29.0		103.7	
7 OF 13	WB	18	129+05.25	ASPH	16.0	20.0	27.0	29.0		102.8	
7 OF 13	EB	19	129+94.04	ASPH	21.0	16.0	26.0	29.0		100.1	
7 OF 13	WB	20	131+24.71	ASPH	13.0	16.0	25.0	29.0		103.1	
8 OF 13	WB	21	132+36.50	ASPH	14.0	14.0	32.0	30.0		128.0	
8 OF 13	EB	22	133+45.60	ASPH	17.0	11.0	52.0	29.0		74.2	
8 OF 13	EB	23	133+84.90	ASPH	10.0	23.0	19.0	28.0		74.2	
8 OF 13	WB	24	134+19.13	ASPH	14.0	14.0	18.0	29.0		97.1	
8 OF 13	WB	25	134+73.73	ASPH	14.0	14.0	28.0	29.0		101.6	
9 OF 13	WB	26	137+16.91	ASPH	21.0	22.0	30.0	30.0		110.6	
9 OF 13	EB	27	139+60.24	ASPH	16.0	15.0	26.0	30.0		102.3	
9 OF 13	WB	28	139+64.00	ASPH	17.0	23.0	47.0	30.0		170.5	
10 OF 13	WB	29	141+21.03	ASPH	27.0	23.0	26.0	37.0		122.7	
10 OF 13	WB	30	142+47.91	ASPH	20.0	22.0	23.0	48.0		211.7	
11 OF 13	WB	31	145+34.94	ASPH	20.0	19.0	34.0	55.0		216.8	
11 OF 13	EB	32	145+73.68	CONC	14.0	16.0	29.0	30.0	113.2		
12 OF 13	EB	33	150+63.16	CONC	12.0	13.0	24.0	38.0	187.8		
12 OF 13	WB	34	151+00.85	ASPH	37.0	24.0	41.0	57.0		210.8	
12 OF 13	WB	35	153+19.23	ASPH	25.0	14.0	23.0	57.0		245.1	
13 OF 13	EB	36	155+16.79	ASPH	20.0	22.0	38.0	48.0		182.5	
13 OF 13	WB	37	155+55.29	ASPH	33.0	20.0	27.0	57.0		289.4	
TOTAL									470	4233	240

** FOR CONTRACTORS INFORMATION ONLY



DRIVEWAY DETAIL
NOT TO SCALE



FM 1959
DRIVEWAYS LOCATIONS

SHEET 1 OF 1

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			16
STATE	STATE DIST. NO.	COUNTY	
TEXAS	12	HARRIS	
CONT.	SECT.	JOB	HIGHWAY NO.
1844	01	029	FM 1959

H:\CDA\1844-01-029 (FM 1959)\Quantities\FM 1959 DRIVEWAYSUM.xls,DRIVEWAYS,2/18/2024

SUMMARY OF SMALL SIGNS (CSJ #1844-01-029)

PLAN SHEET NO.	SIGN NO.	SIGN TYPE	SIGN TEXT	SIGN DIMENSIONS (See above Note)	ALUMINUM TYPE A	ALUMINUM TYPE G	644-INS SM RD SN SUP & AM 6001 TY 10BWG (1) SA (P) EA	6002 TY 10BWG (1) SA (P-BM) EA	6004 TY 10BWG (1) SA (T) EA	6005 TY 10BWG (1) SA (T-2EXT) EA	6007 TY 10BWG (1) SA (U) EA	6028 TY S80 (1) SA (P-BM) EA	6030 TY S80 (1) SA (T) EA	6033 TY S80 (1) SA (U) EA	6034 TY S80 (1) SA (U-1EXT) EA	6035 TY S80 (1) SA (U-2EXT) EA	6036 TY S80 (1) SA (U-BM) EA	6039 TY S80 (1) SB (P) EA	6051 TY S80 (2) SA (P-EXAL) EA	6064 IN BRIDGE MNT CLR SGN ASSM (TY N) EA	6065 IN BRIDGE MNT CLR SGN ASSM (TY S) EA	6076 REMOVE SM RD SN SUP & AM EA	636 6001 ALUM SIGNS (TY A) SF	636 6007 REPLACE EXT ALUM SIGNS (TY A) SF
1	1	M3-3B	SOUTH	24 x 12	X										X									
		M1-1T	INTERSTATE TEXAS 45	24 X 24	X																			
		M5-1BL	ADVANCE LEFT TURN ARROW	21 X 15	X																			
		EM-1aT	EVACUATION ROUTE	24 DIA	X																			
		M3-1B	NORTH	24 x 12	X																			
		M1-1T	INTERSTATE TEXAS 45	24 X 24	X																			
		M6-1B	RIGHT TURN ARROW	21 X 15	X																			
	2	D1-2	⇦ Galveston / Houston ⇧	90 x 30	X								X											
	3	R1-1	STOP	36 x 36	X		X																	
	4	D9-2		24 x 24	X		X																	
		D9-13aP		24 x 12	X																			
		M6-3B		21 x 15	X																			
	5	R2-1	SPEED LIMIT 40	30 x 36	X		X																	
	6	R3-7R	RIGHT LANE MUST TURN RIGHT	36 x 36	X		X																	
	7	R1-5cL	STOP HERE FOR PEDESTRIANS	36 x 48	X				X															
	8	R1-2	YIELD	48 x 48 x 48	X				X															
	9	R1-1	STOP	36 x 36	X		X																	
	10	M3-2	EAST	24 x 12	X		X																	
		M1-6F	FM 1959	24 x 24	X																			
	11	M4-6A	BEGIN	24 x 12	X		X																	
		R3-9b	CENTER LANE ONLY	24 x 36	X																			
	12	R1-1	STOP	36 x 36	X		X																	
	13	R2-1	SPEED LIMIT 40	30 x 36	X		X																	
	14	W11-8R		36 x 36	X		X																	
																						12		
2	1	R8-3aT	NO PARKING DOUBLE ARROW	24 x 30	X		X																	
	2	R3-9b	CENTER LANE ONLY	24 x 36	X		X																	
	3	R8-3aT	NO PARKING DOUBLE ARROW	24 x 30	X		X																	
	4	R8-3aT	NO PARKING DOUBLE ARROW	24 x 30	X		X																	
	5	R10-6L	STOP HERE ON RED	24 x 36	X		X																	
	6	M2-1B	JCT	21 x 15	X		X																	
		M1-1	INTERSTATE 45	24 x 24	X																			
	7	W11-8L		36 x 36	X		X																	
	8	W3-3	SIGNAL AHEAD SYMBOL	48 x 48	X				X															
	9	R10-6L	STOP HERE ON RED	24 x 36	X		X																	
	10	R1-1	STOP	36 x 36	X		X																	
	11	R1-1	STOP	36 x 36	X		X																	
																						13		
3	1	R2-1	SPEED LIMIT 40	30 x 36	X		X																	
	2	R1-1	STOP	36 x 36	X		X																	
																						3		
SHEET TOTAL							22		3				1		1							28		

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

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

http://www.txdot.gov/

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).
4. Speed Limit with "XX" shall be provided after Speed Study. For further clarification, refer General Notes item" 644.
5. Actual Clearance/distance to be shown will be verified in the field by the Contractor and approved by the Engineer prior to fabrication of this sign.

SUMMARY OF SMALL SIGNS

 SHEET 1 OF 2

STATE DISTRICT	FEDERAL REGION	PROJECT NO.			SHEET
HOU	6				17
COUNTY		CONTROL	SECTION	JOB	HIGHWAY NO.
HARRIS		1844	01	029	FM 1959

STD-N29

DATE: $DATE$
FILE: $FILE$

DATE: $DATE$
FILE: $FILE$

SUMMARY OF SMALL SIGNS (CSJ #1844-01-029)

PLAN SHEET NO.	SIGN NO.	SIGN TYPE	SIGN TEXT	SIGN DIMENSIONS (See above Note)	ALUMINUM TYPE A	ALUMINUM TYPE G	644-INS SM RD SN SUP & AM															636	
							6001	6002	6004	6005	6007	6028	6030	6033	6034	6035	6036	6039	6051	6064	6065	6076	6001	6007
							TY 10BWG (1) SA (P)	TY 10BWG (1) SA (P-BM)	TY 10BWG (1) SA (T)	TY 10BWG (1) SA (T-2EXT)	TY 10BWG (1) SA (U)	TY S80 (1) SA (P-BM)	TY S80 (1) SA (T)	TY S80 (1) SA (U)	TY S80 (1) SA (U-1EXT)	TY S80 (1) SA (U-2EXT)	TY S80 (1) SA (U-BM)	TY S80 (1) SB (P)	TY S80 (2) SA (P-EXAL)	IN BRIDGE MNT CLR SGN ASSM (TY N)	IN BRIDGE MNT CLR SGN ASSM (TY S)	REMOVE SM RD SN SUP & AM	ALUM SIGNS (TY A)	REPLACE EXT ALUM SIGNS (TY A)
							EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	SF	SF
4	1	R3-9b	CENTER LANE ONLY	24 x 36	X		X																	
	2	R2-1	SPEED LIMIT 40	30 x 36	X		X																	
	3	R1-1	STOP	36 x 36	X		X																	
	4	R1-1	STOP	36 x 36	X		X																	
	5	R2-1	SPEED LIMIT 40	30 x 36	X		X																	
	6	R8-3aT	NO PARKING DOUBLE ARROW	24 x 30	X		X																	
	7	M2-1	JCT	21 x 15	X		X																	
		M1-6T	TEXAS 3	24 x 24	X																			
	8	R8-3aT	NO PARKING DOUBLE ARROW	24 x 30	X		X																	
	9	R2-1	SPEED LIMIT 40	30 x 36	X		X																	
	10	R3-9b	CENTER LANE ONLY	24 x 36	X		X																	
																						12		
5	1	R2-1	SPEED LIMIT 40	30 x 36	X		X																	
	2	M3-4	WEST	24 x 12	X		X																	
		M1-6F	FM 1959	24 x 24	X																			
	3	M4-6A	BEGIN	24 x 12	X		X																	
		R3-9b	CENTER LANE ONLY	24 x 36	X																			
	4	W10-1		36 DIA	X		X																	
	5	D9-2		24 x 24	X		X																	
		D5-5aTPR		18 x 6	X																			
	6			78 x 30	X								X											
	7	M3-1	NORTH	24 x 12	X									X										
		M1-6T	TEXAS 3	24 X 24	X																			
		M6-1L	LEFT TURN ARROW	21 X 15	X																			
		M3-3	SOUTH	24 x 12	X																			
		M1-6T	TEXAS 3	24 X 24	X																			
		M6-1R	RIGHT TURN ARROW	21 X 15	X																			
																						7		
SHEET TOTAL							15						1	1								19		
PROJECT TOTAL							37		3				2	1	1							47		

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, to a suitable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCSS)Standard Sheet.
3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details (SMD(GEN)).
4. Speed Limit with "XX" shall be provided after Speed Study. For further clarification, refer General Notes Item 644.
5. Actual Clearance/distance to be shown will be verified in the field by the Contractor and approved by the Engineer prior to fabrication of this sign.

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.
http://www.txdot.gov/

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

SUMMARY OF SMALL SIGNS

 SHEET 2 OF 2

DISTRICT	COUNTY	CONTROL	SECTION	JOB	HIGHWAY
HOU	HARRIS	1844	01	029	FM 1959

STD-N29

CONSTRUCTION SEQUENCE:

THE CONTRACTOR SHALL FOLLOW THE STEPS FROM 1 TO 11 AS SEQUENCE OF CONSTRUCTION ACTIVITIES AS DESCRIBED BELOW.

1. INITIAL TRAFFIC CONTROL
2. PREPARE ROW
3. REMOVE STAB BASE AND ASPHALT PAVEMENTS AND DRIVEWAYS
4. REMOVE CONCRETE DRIVEWAYS
5. INSTALL DRIVEWAYS AND DRIVEWAY CULVERT
6. INSTALL CONC SIDEWALK AND CURB RAMPS
7. CLEANING AND RESHAPING ROADSIDE DITCHES
8. TRAFFIC SIGNAL WORK
9. PAVEMENT MARKINGS
10. SEEDING AND SODDING
11. FINAL CLEANUP

NOTES:

ALL WORK AND MATERIAL TO ACHIEVE TRAFFIC CONTROL SHALL BE AS PER TXMUTCD AND INCIDENTAL TO ITEM 502.

ALL WORK DESCRIBED IN CONSTRUCTION SEQUENCE SHALL BE PERFORMED WITHIN THE ALLOCATED LANE CLOSURE TIME AS DESCRIBED UNDER ITEM 502 IN GENERAL NOTES UNLESS OTHERWISE APPROVED BY THE ENGINEER.

THIS IS A SUGGESTED SEQUENCE OF WORK, THE CONTRACTOR MAY SUBMIT A REVISED SEQUENCE OF WORK TO THE ENGINEER FOR APPROVAL.

STATE OF TEXAS
SANJAY POKHAREL
140149
LICENSED PROFESSIONAL ENGINEER

SANJAY POKHAREL, P.E. 4/17/2024

TEXAS DEPARTMENT OF TRANSPORTATION

FM 1959
CONSTRUCTION SEQUENCE OVERVIEW

SCALE 1"=100' SHEET 1 OF 1

DN:	DRAWING FILE NAME:	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN:		6	TX				FM 1959
DW:	REVISIONS:	STATE DIST. NO	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:							
TR:		12	HARRIS	1844	01	029	19
CK TR:							

H:\CDA\1844-01-029 (FM 1959)\Traffic Control Plan\FM 1959 TCP NARRATIVE.dgn 4/17/2024

DATE: 2/23/2024 11:54:45 AM
FILE: H:\CDA\1844-01-029 (FM 1959)\Standards\BC Standards\bc-21.dgn

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

SHEET 1 OF 12

Texas Department of Transportation

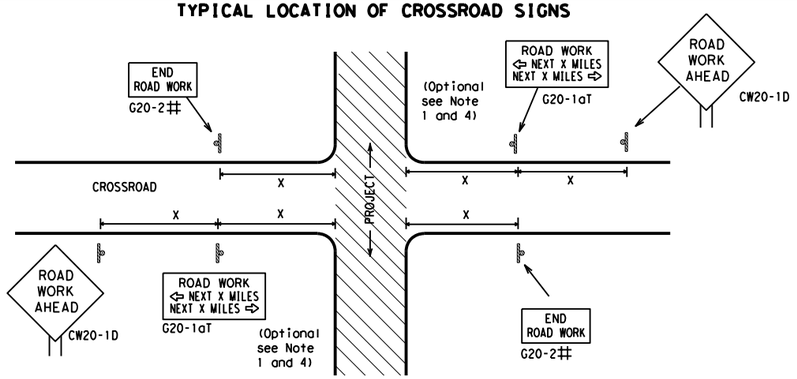
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13 9-07 8-14 5-10 5-21	1844	01	029	FM 1959
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		20

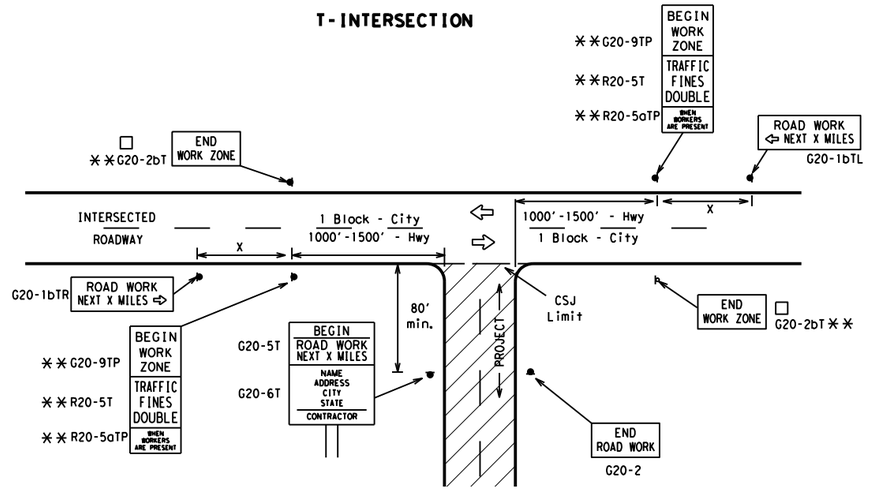
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

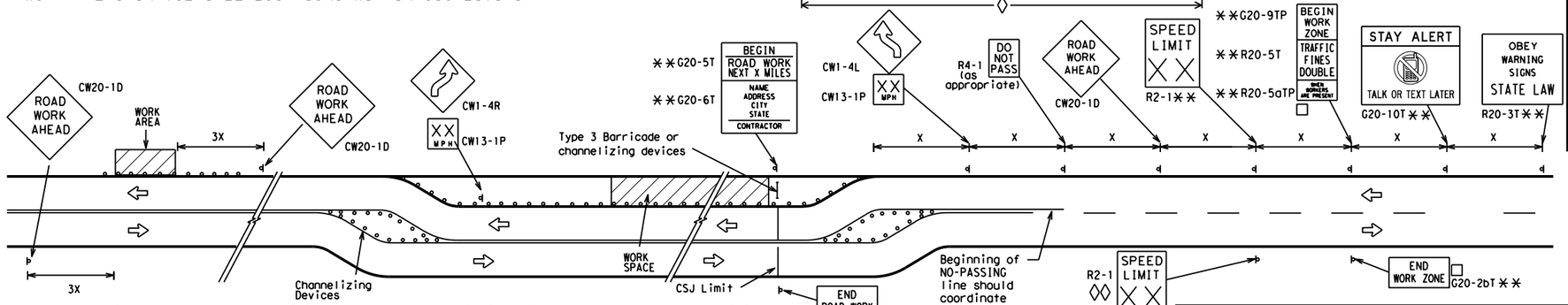
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

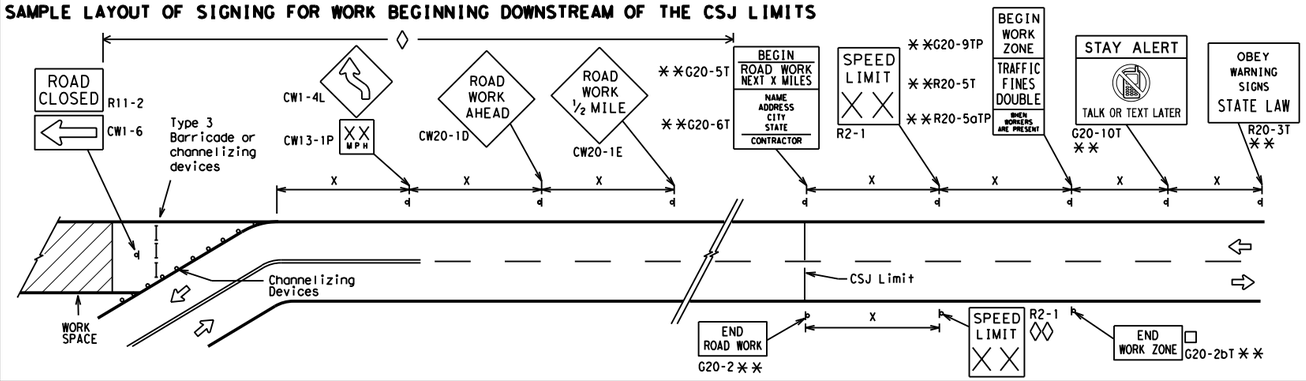
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

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



SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

NOTES

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

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

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

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

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

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

SHEET 2 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1844	01	029	FM 1959
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	HOU	HARRIS		21

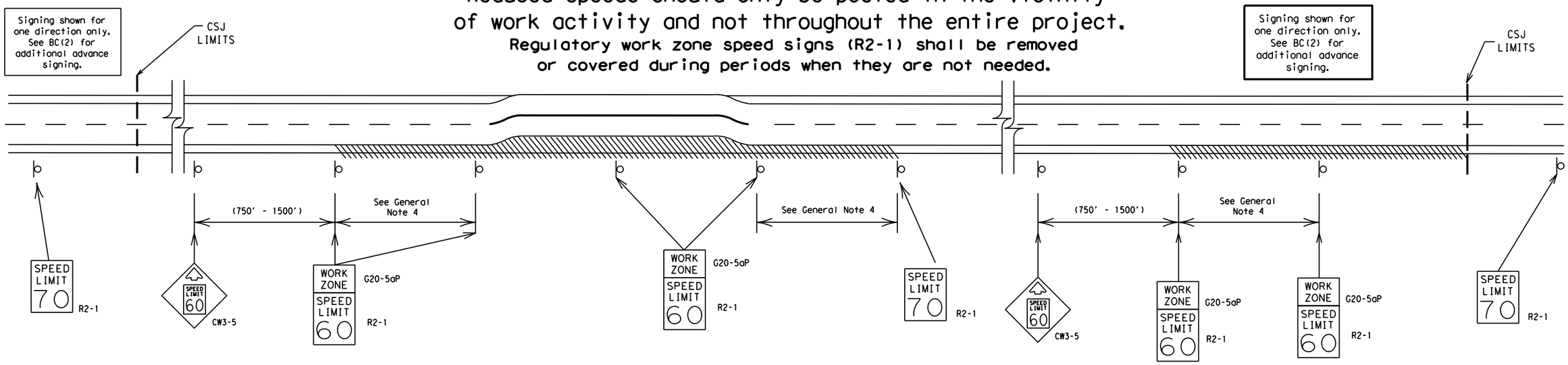
DATE: 2/23/2024 11:56:14 AM
FILE: H:\CDA\1844-01-029 (FM 1959)\Standards\BC Standards\bc-21.dgn

TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

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SHEET 3 OF 12

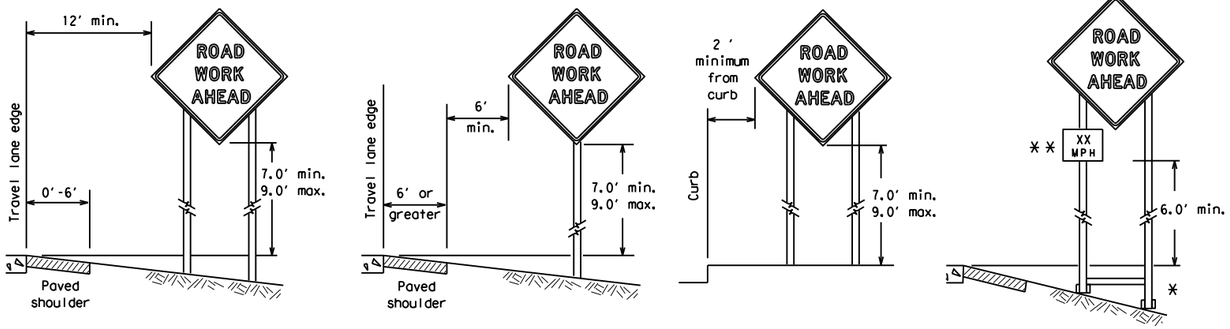
Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1844	01	029	FM 1959
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	HOU	HARRIS		22

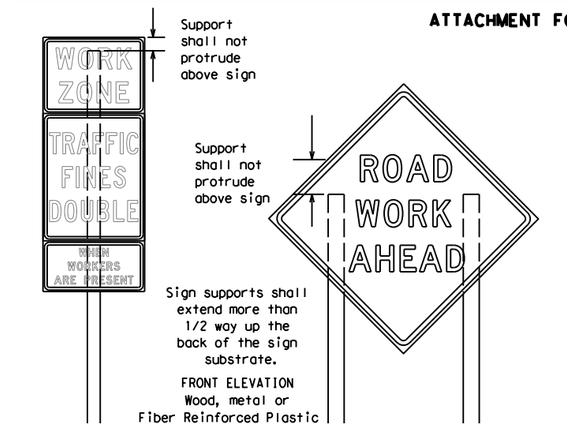
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

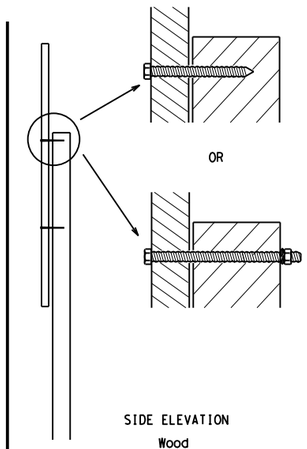


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





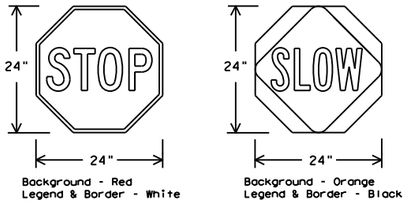
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1844	01	029	FM 1959
9-07 8-14	DIST	COUNTY		SHEET NO.
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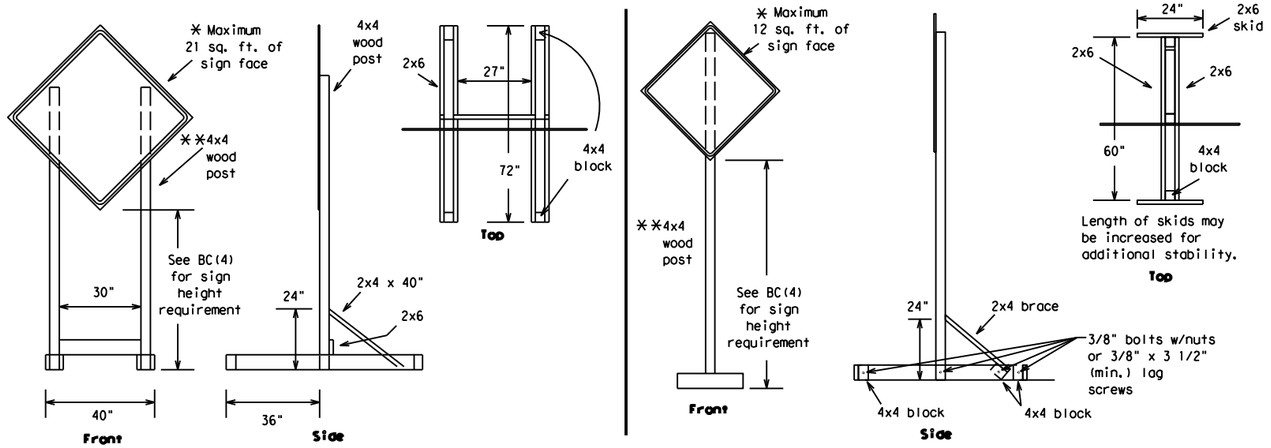
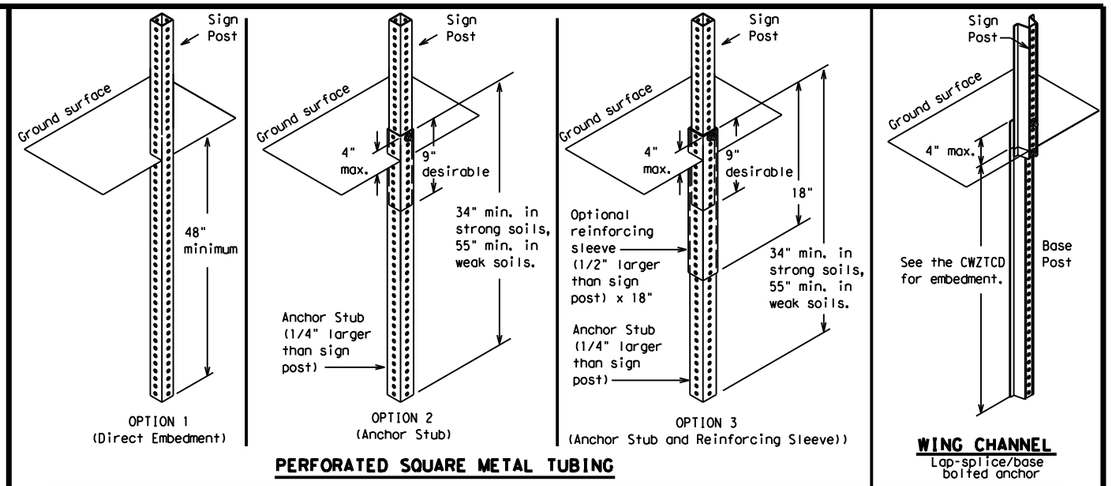


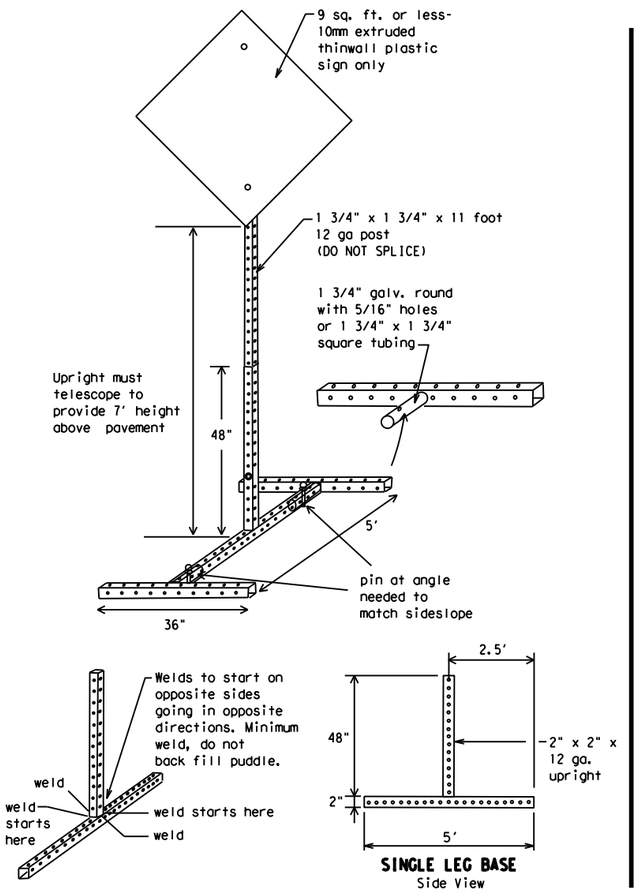
SKID MOUNTED WOOD SIGN SUPPORTS

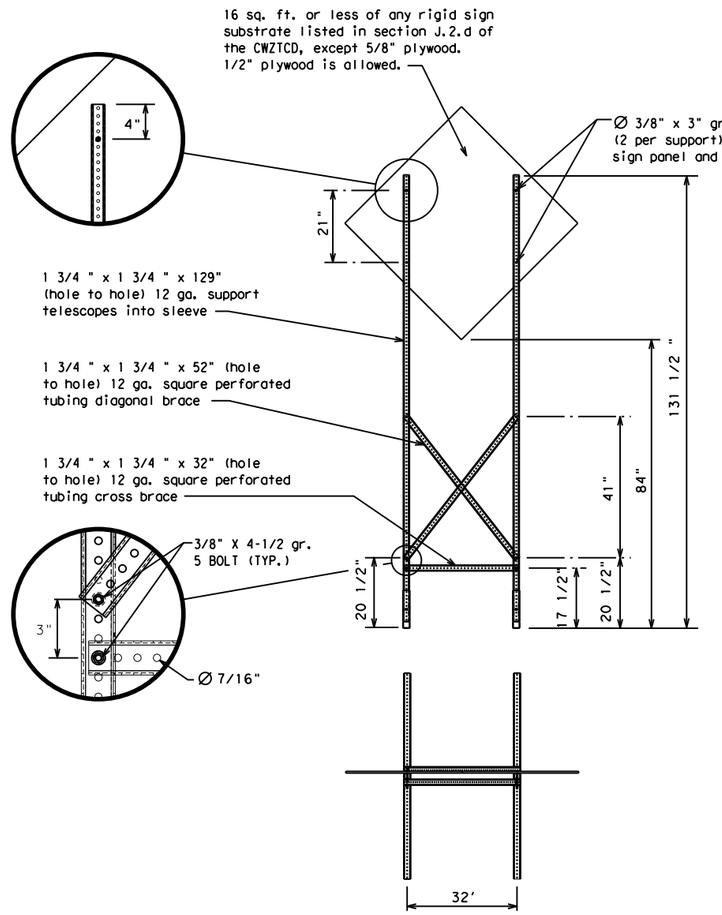
*** LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS**

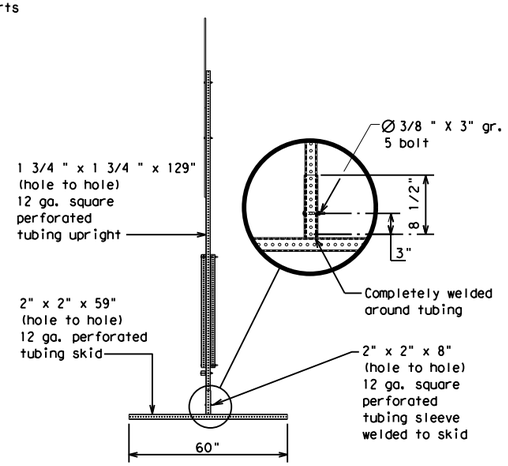


GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

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Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD
Alternate	ALT
Avenue	AVE
Best Route	BEST RTE
Boulevard	BLVD
Bridge	BRDG
Cannot	CANT
Center	CTR
Construction Ahead	CONST AHD
CROSSING	XING
Detour Route	DETOUR RTE
Do Not	DONT
East	E
Eastbound	(route) E
Emergency	EMER
Emergency Vehicle	EMER VEH
Entrance, Enter	ENT
Express Lane	EXP LN
Expressway	EXPWY
XXXX Feet	XXXX FT
Fog Ahead	FOG AHD
Freeway	FRWY, FWY
Freeway Blocked	FWY BLKD
Friday	FRI
Hazardous Driving	HAZ DRIVING
Hazardous Material	HAZMAT
High-Occupancy	HOV
Vehicle Highway	HWY
Hour(s)	HR, HRS
Information	INFO
It Is	ITS
Junction	JCT
Left	LFT
Left Lane	LFT LN
Lane Closed	LN CLOSED
Lower Level	LWR LEVEL
Maintenance	MAINT
Major	MAJ
Miles	MI
Miles Per Hour	MPH
Minor	MNR
Monday	MON
Normal	NORM
North	N
Northbound	(route) N
Parking	PKING
Road	RD
Right Lane	RT LN
Saturday	SAT
Service Road	SERV RD
Shoulder	SHLDR
Slippery	SLIP
South	S
Southbound	(route) S
Speed	SPD
Street	ST
Sunday	SUN
Telephone	PHONE
Temporary	TEMP
Thursday	THURS
To Downtown	TO DWNTN
Traffic	TRAF
Travelers	TRVLRS
Tuesday	TUES
Time Minutes	TIME MIN
Upper Level	UPR LEVEL
Vehicles (s)	VEH, VEHS
Warning	WARN
Wednesday	WED
Weight Limit	WT LIMIT
West	W
Westbound	(route) W
Wet Pavement	WET PVMT
Will Not	WONT

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1844	01	029	FM 1959
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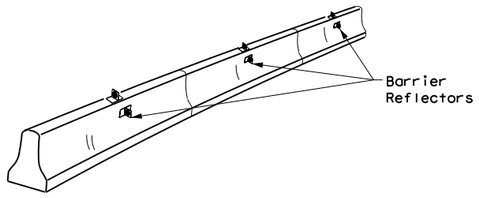
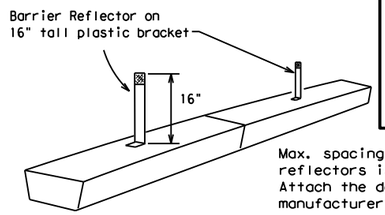
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost of the reflectors shall be considered subsidiary to Item 512.



CONCRETE TRAFFIC BARRIER (CTB)

3. Where traffic is on one side of the CTB, two (2) Barrier Reflectors shall be mounted in approximately the midsection of each section of CTB. An alternate mounting location is uniformly spaced at one end of each CTB. This will allow for attachment of a barrier grapple without damaging the reflector. The Barrier Reflector mounted on the side of the CTB shall be located directly below the reflector mounted on top of the barrier, as shown in the detail above.
4. Where CTB separates two-way traffic, three barrier reflectors shall be mounted on each section of CTB. The reflector unit on top shall have two yellow reflective faces (Bi-Directional)while the reflectors on each side of the barrier shall have one yellow reflective face, as shown in the detail above.
5. When CTB separates traffic traveling in the same direction, no barrier reflectors will be required on top of the CTB.
6. Barrier Reflector units shall be yellow or white in color to match the edgeline being supplemented.
7. Maximum spacing of Barrier Reflectors is forty (40) feet.
8. Pavement markers or temporary flexible-reflective roadway marker tabs shall NOT be used as CTB delineation.
9. Attachment of Barrier Reflectors to CTB shall be per manufacturer's recommendations.
10. Missing or damaged Barrier Reflectors shall be replaced as directed by the Engineer.
11. Single slope barriers shall be delineated as shown on the above detail.

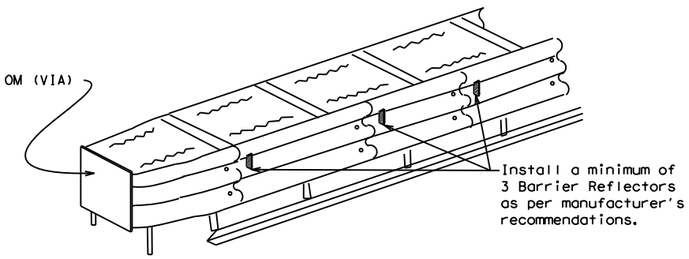


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

LOW PROFILE CONCRETE BARRIER (LPCB)

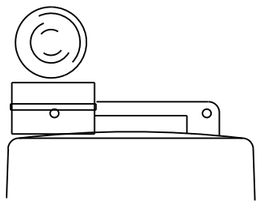


DELINEATION OF END TREATMENTS

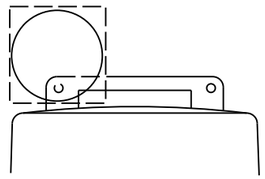
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

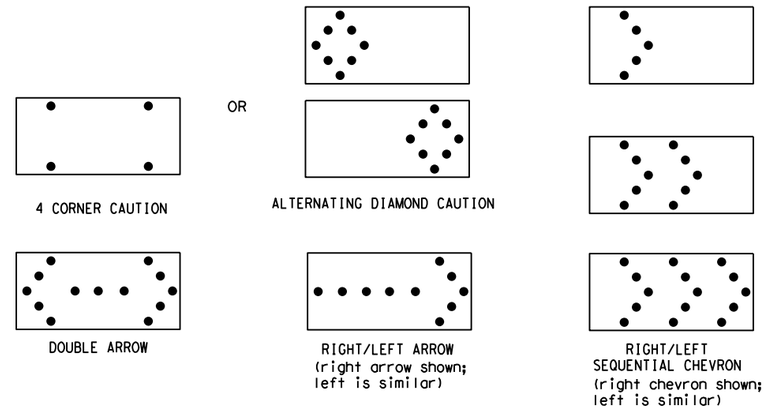
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation — Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1844	01	029	FM 1959
9-07 8-14	DIST	COUNTY		SHEET NO.
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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

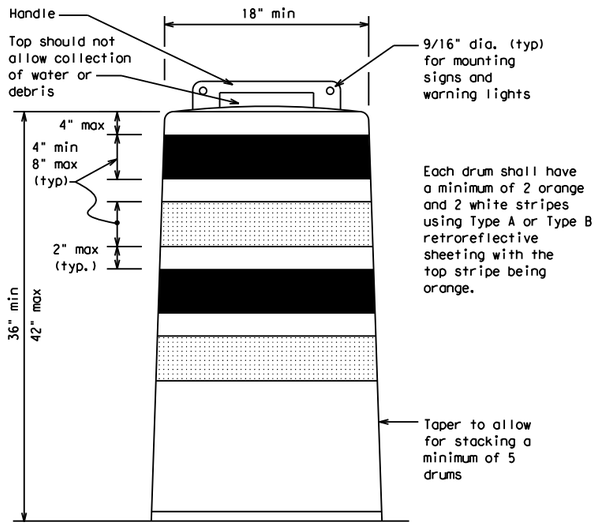
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

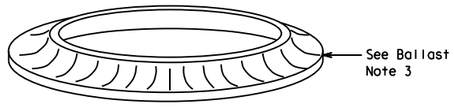
RETROREFLECTIVE SHEETING

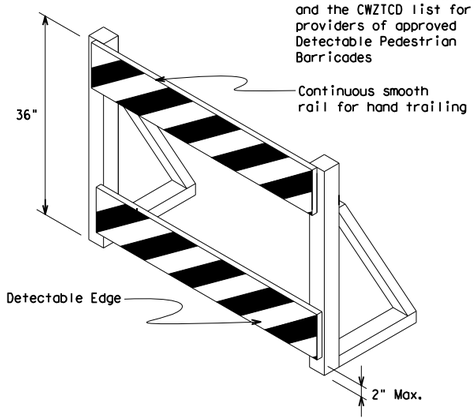
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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



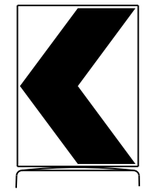




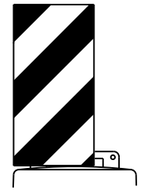
This detail is not intended for fabrication. See note 3 and the CWZTCD list for providers of approved Detectable Pedestrian Barricades

DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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7-13				

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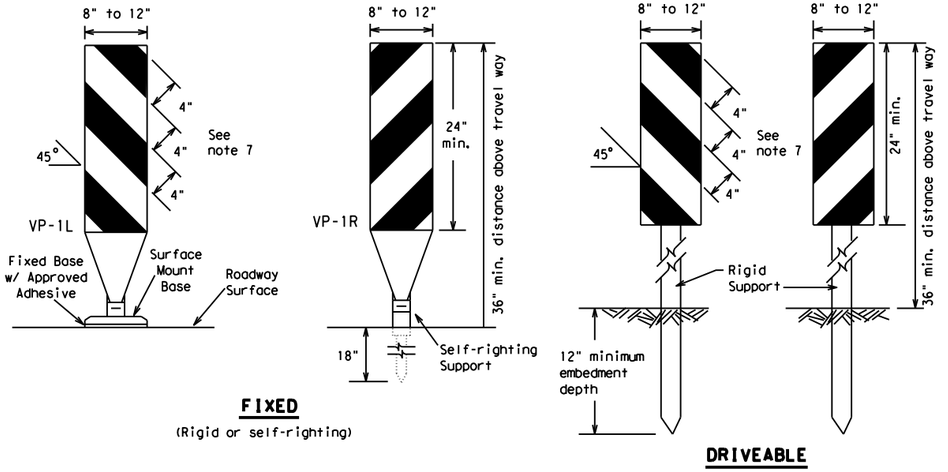
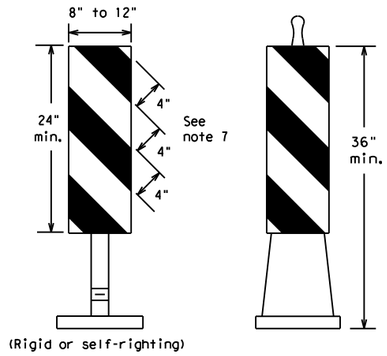


FIXED
(Rigid or self-righting)

DRIVEABLE

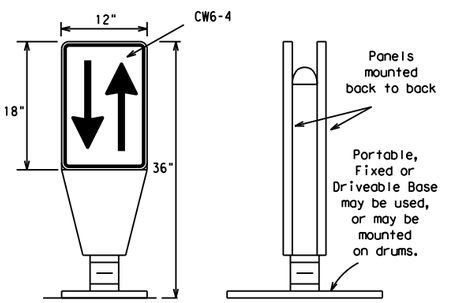


(Rigid or self-righting)

PORTABLE

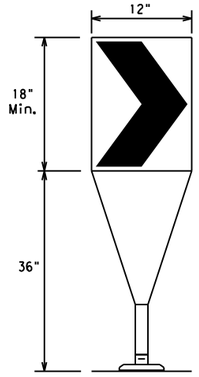
VERTICAL PANELS (VPs)

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



OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

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



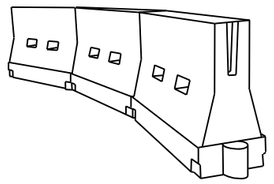
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

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Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	1844	01	029	FM 1959
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7-13 5-21	HOU	HARRIS		28

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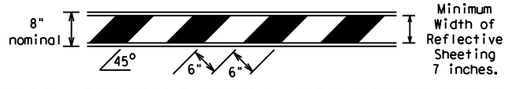
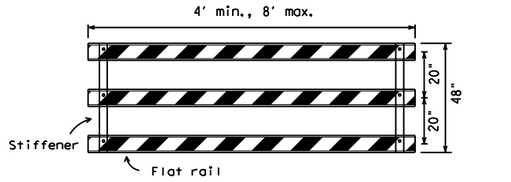
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



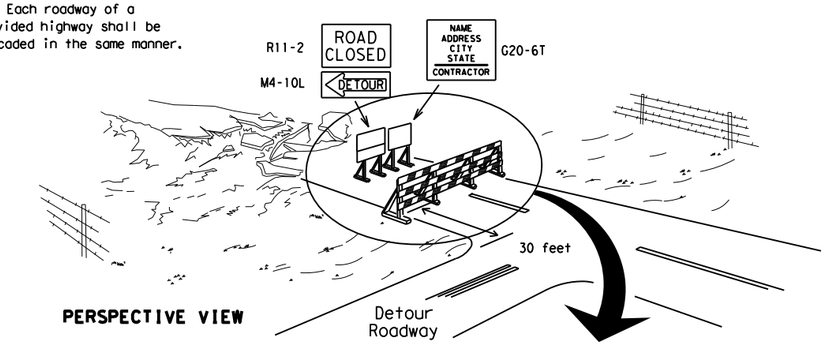
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

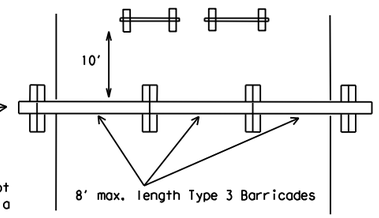
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

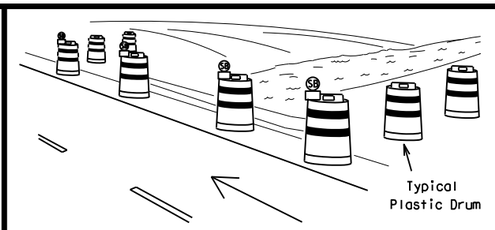
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

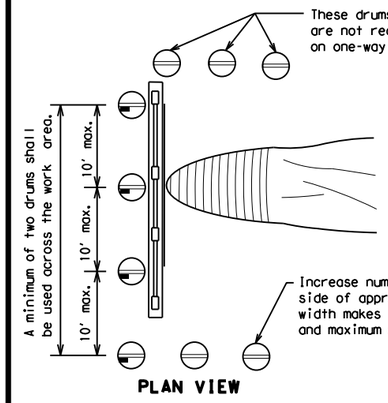
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

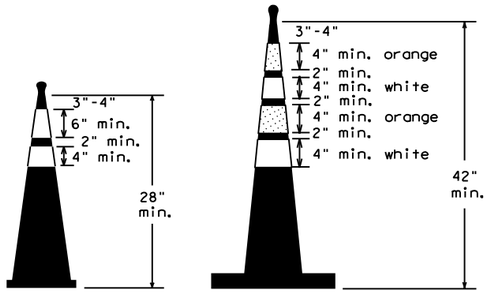
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



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

PLAN VIEW

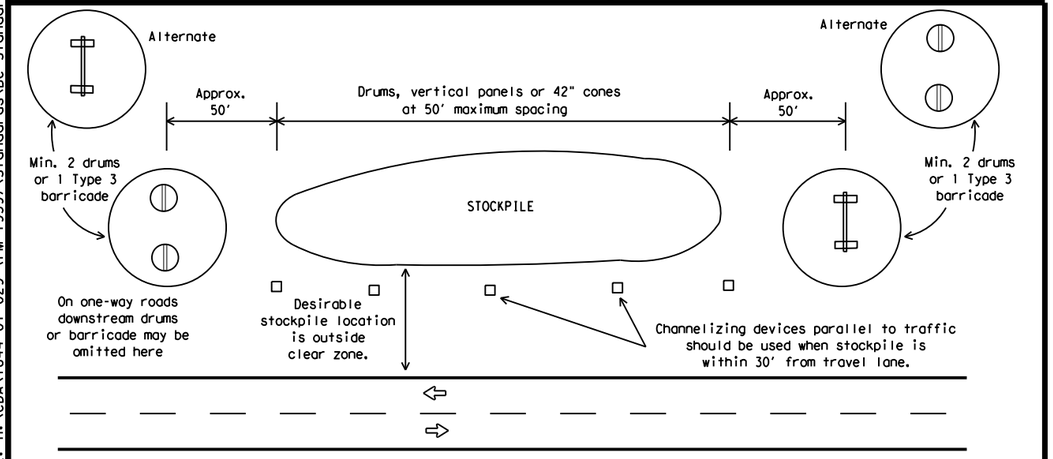
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

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

1. Traffic cones and tubular markers shall be predominantly orange, and meet the height and weight requirements shown above.
2. One-piece cones have the body and base of the cone molded in one consolidated unit. Two-piece cones have a cone shaped body and a separate rubber base, or ballast, that is added to keep the device upright and in place.
3. Two-piece cones may have a handle or loop extending up to 8" above the minimum height shown, in order to aid in retrieving the device.
4. Cones or tubular markers shall have white or white and orange reflective bands as shown above. The reflective bands shall have a smooth, sealed outer surface and meet the requirements of Departmental Material Specification DMS-8300 Type A or Type B.
5. 28" cones and tubular markers are generally suitable for short duration and short-term stationary work as defined on BC(4). These should not be used for intermediate-term or long-term stationary work unless personnel is on-site to maintain them in their proper upright position.
6. 42" two-piece cones, vertical panels or drums are suitable for all work zone durations.
7. Cones or tubular markers used on each project should be of the same size and shape.



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

SHEET 10 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

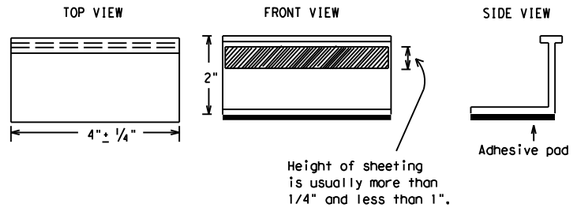
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

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1-02 7-13	HOU	HARRIS		30
11-02 8-14				

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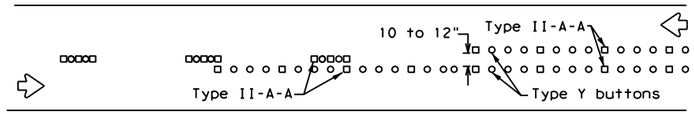
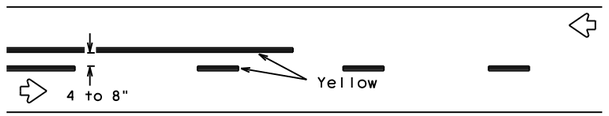
PAVEMENT MARKING PATTERNS

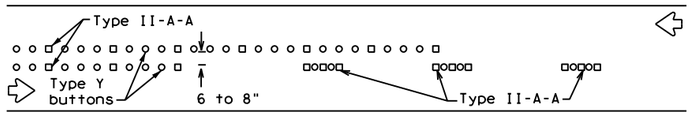
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



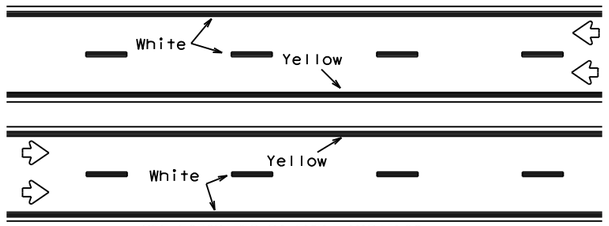
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



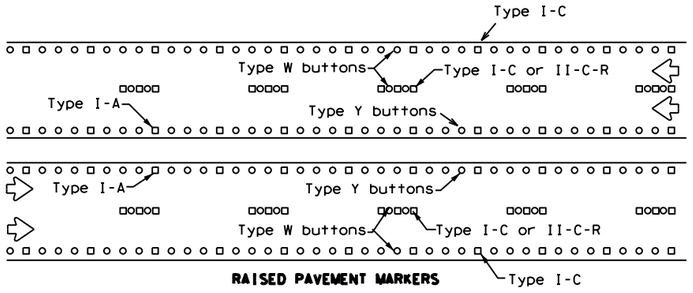
RAISED PAVEMENT MARKERS - PATTERN B

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

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



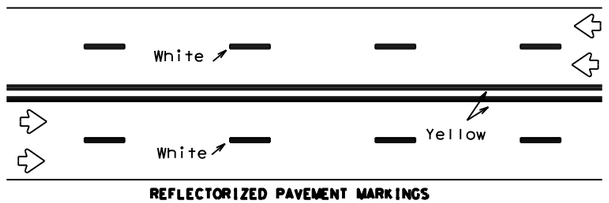
REFLECTORIZED PAVEMENT MARKINGS



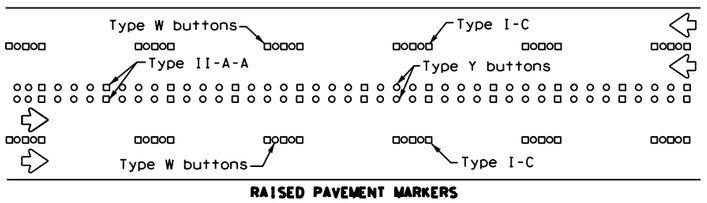
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



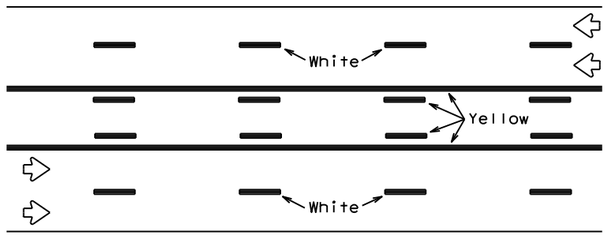
REFLECTORIZED PAVEMENT MARKINGS



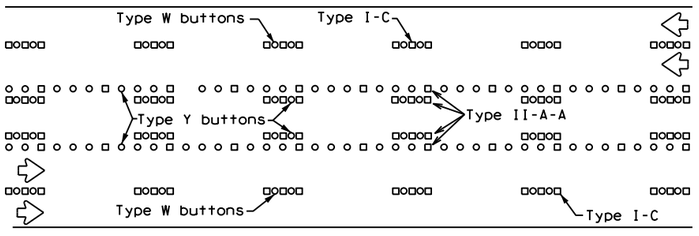
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

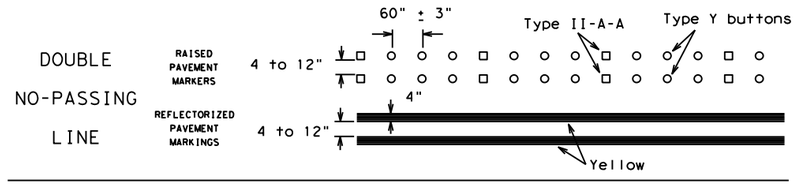
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

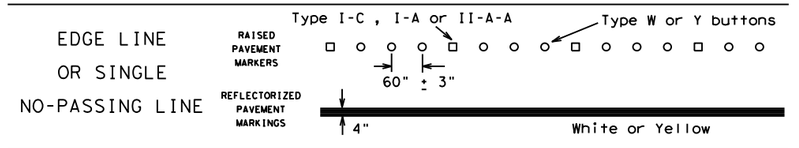
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

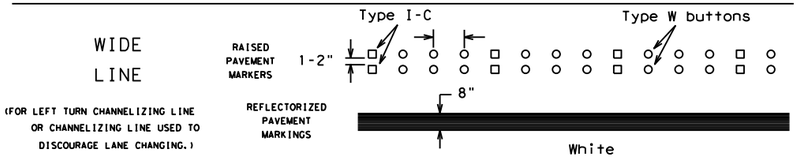


EDGE LINE OR SINGLE NO-PASSING LINE



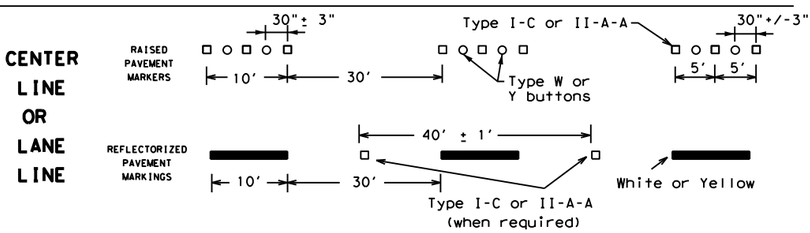
WIDE LINE

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

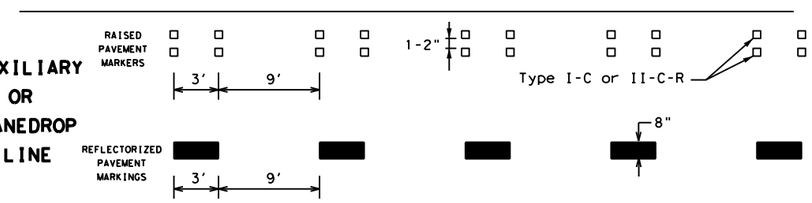


BROKEN LINES

CENTER LINE OR LANE LINE

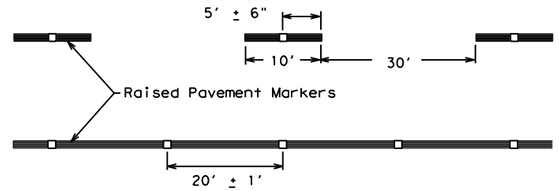


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

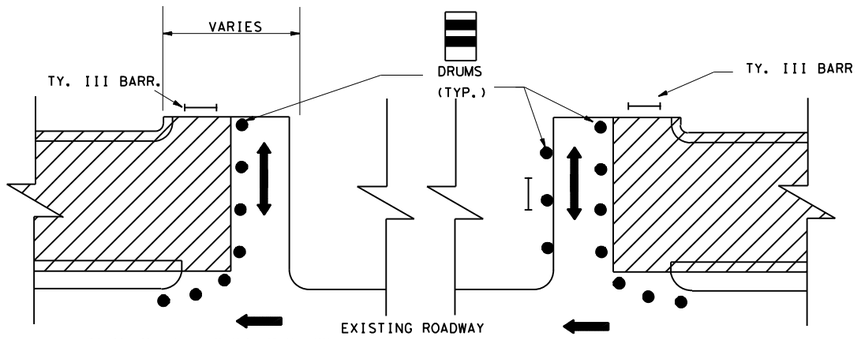
Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

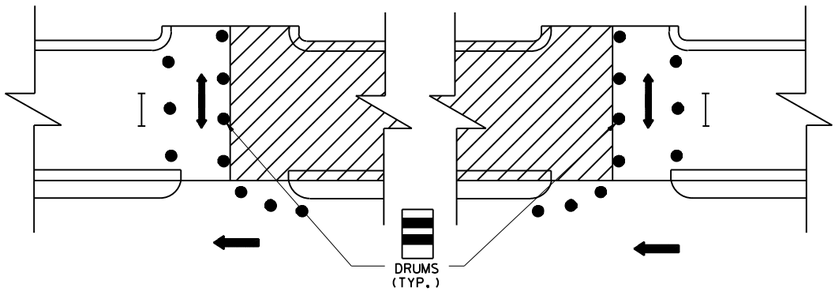
BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	1844	01	029	FM 1959
1-97 9-07 5-21	DIST	COUNTY		SHEET NO.
2-98 7-13	HOU	HARRIS		31
11-02 8-14				

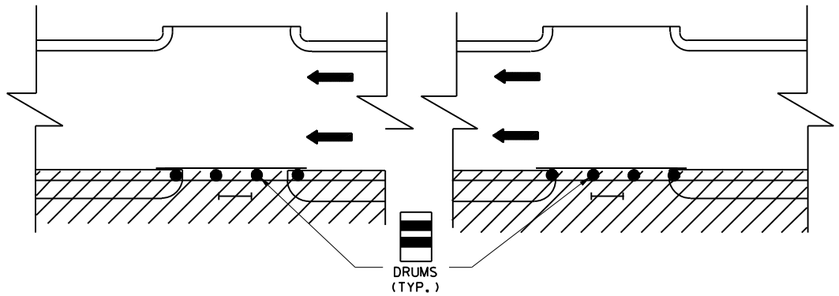


1) WITH TRAFFIC ON EXISTING
BUILD ONE-HALF OF DRIVE.

2) BUILD OTHER HALF OF DRIVE



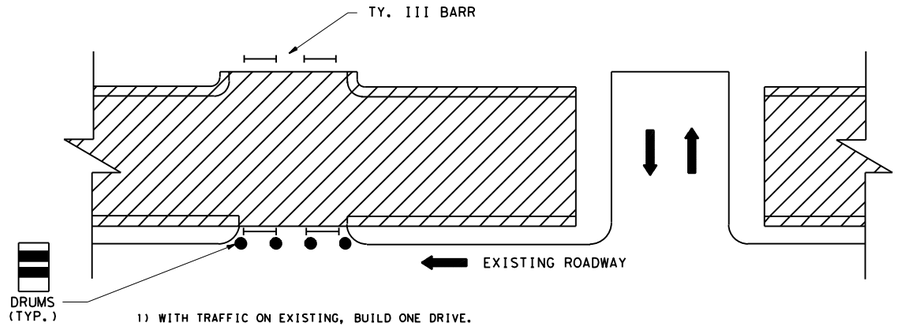
2) BUILD OTHER HALF OF DRIVE



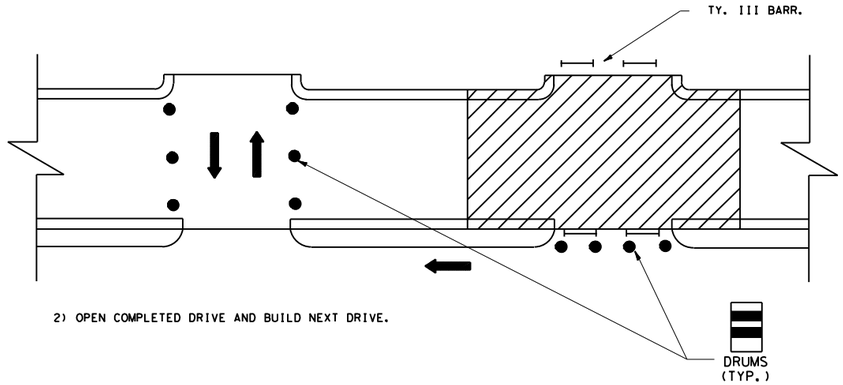
3) OPEN DRIVE

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

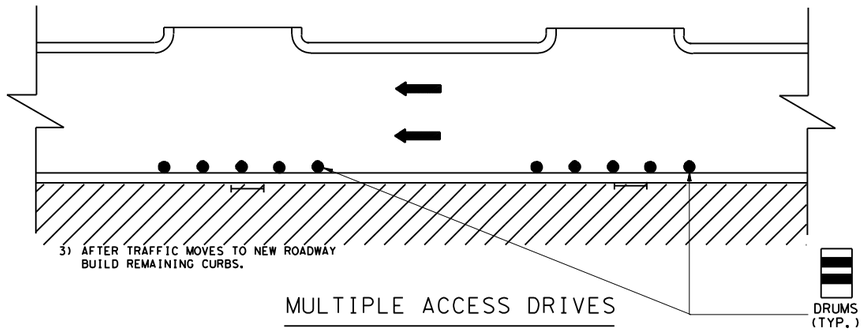
SINGLE ACCESS DRIVES



1) WITH TRAFFIC ON EXISTING, BUILD ONE DRIVE.



2) OPEN COMPLETED DRIVE AND BUILD NEXT DRIVE.



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

MULTIPLE ACCESS DRIVES

Texas Department of Transportation
Houston District

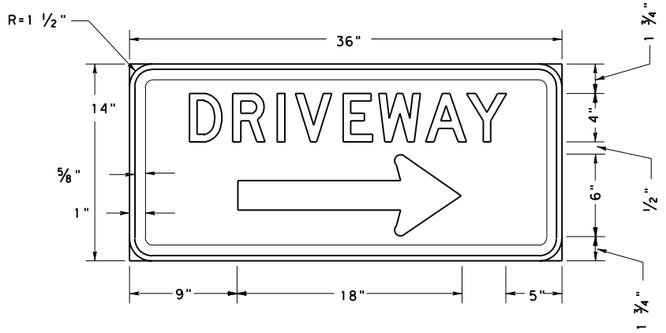
CONSTRUCTION SEQUENCE FOR MISCELLANEOUS DRIVES

CSMD TC8010-2020

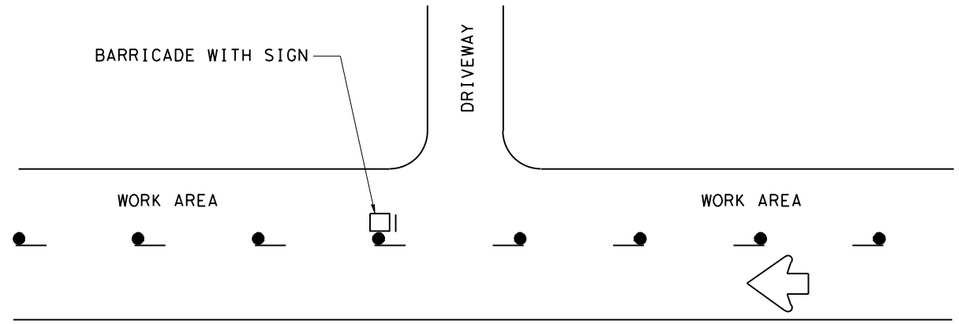
FILE:	DN:	CK:	DW:	CK:
© TxDOT 2020	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS	HOU			32
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	HARRIS	1844	01	029	FM 1959

DATE: 2/23/2024
FILE: H:\CDA\1844-01-029 (FM 1959)\Standards\CSMD TC 8010-20.dgn

STD H-29



LETTERS: WHITE
BORDER: WHITE
BACKGROUND: BLUE



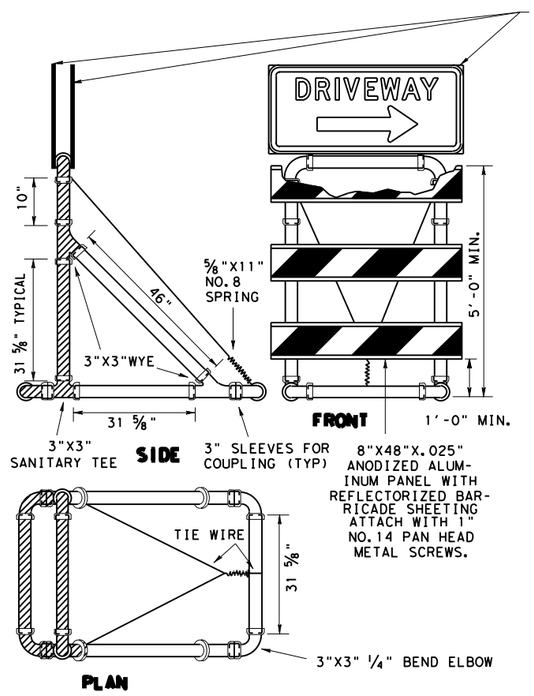
TYPICAL LOCATION OF DRIVEWAY SIGN

TYPE III PVC BARRICADES TYPICAL DESIGN DETAILS

MAY BE USED AT THE OPTION OF THE CONTRACTOR.

NOTES:

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



CONSTRUCTION SIGN NOTES

MATERIALS

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

SIGN SHEETING

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

TYPE C SHEETING SHALL BE USED FOR THIS APPLICATION.

SIGN LETTERS

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

Texas Department of Transportation
Houston District

DRIVEWAY SIGNING

DS TC8020-04

FILE:	DN:	CK:	DW:	CK:	
© TxDOT 2004	DIST	FED REG	PROJECT NO.		SHEET
REVISIONS	HOU	6			33
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	HARRIS		1844	01	029	FM 1959

DATE: 2/23/2024
FILE: H:\CDA\1844-01-029 (FM 1959)\Standards\DS TC8020-04.dgn

STD H-30

DATE: 2/23/2024 7:26:02 AM
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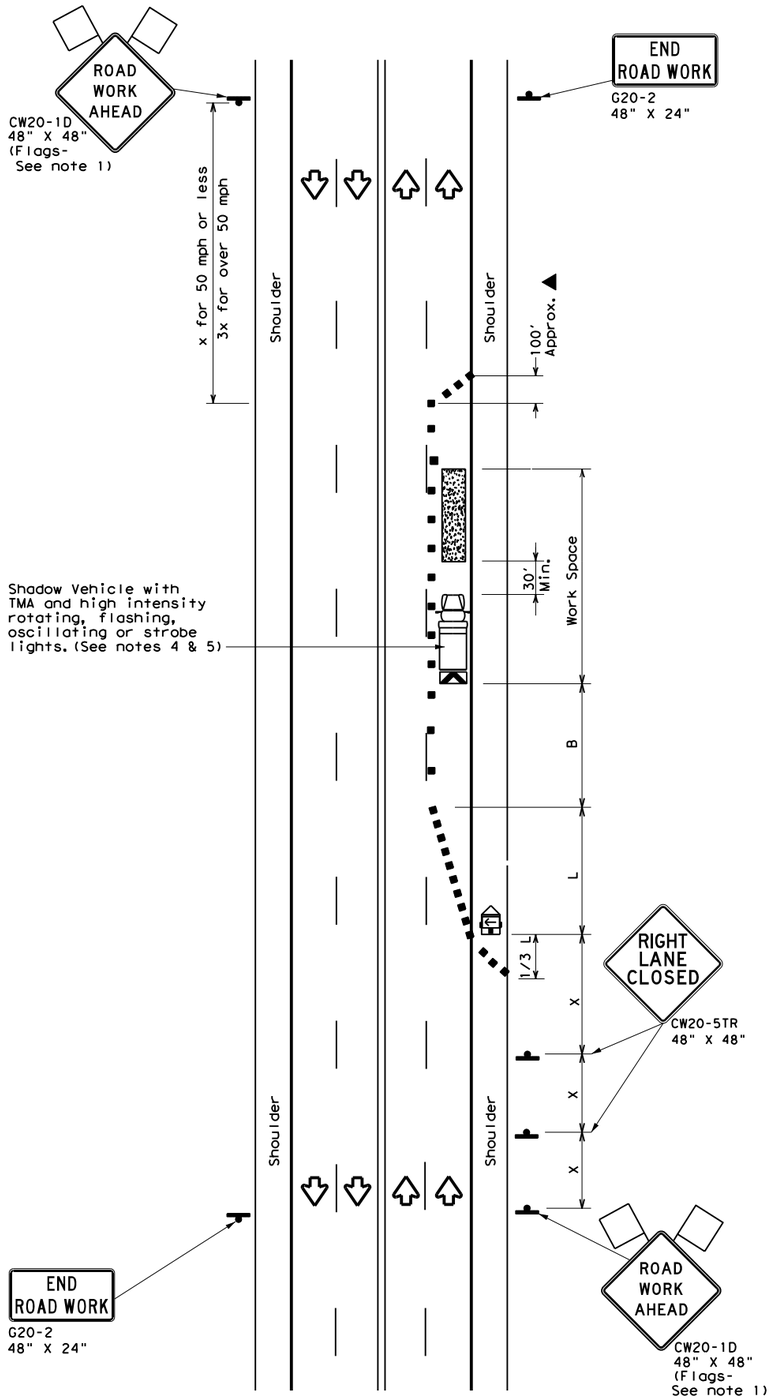
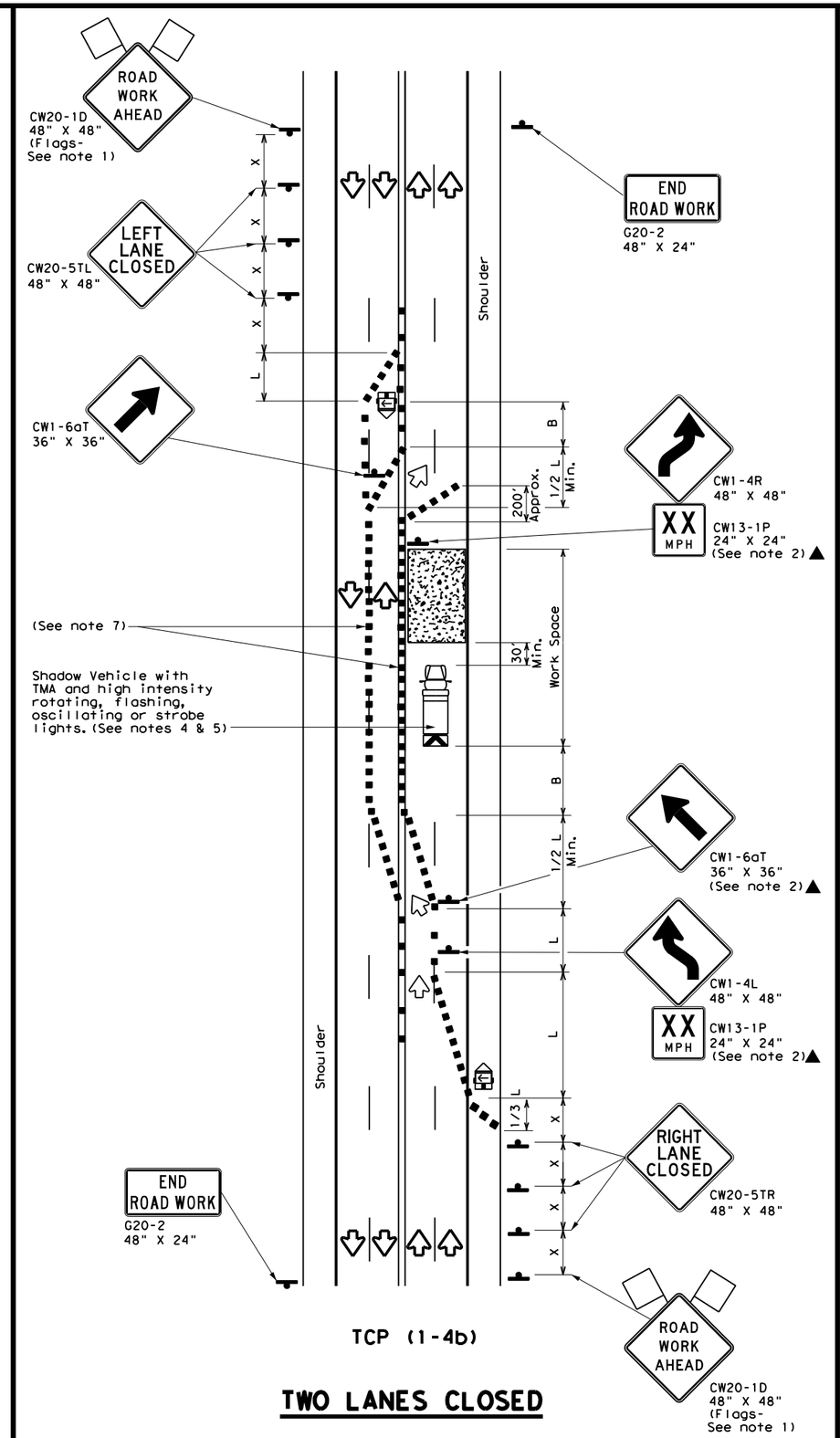


TCP (1-4a)

ONE LANE CLOSED



TCP (1-4b)

TWO LANES CLOSED

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

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

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

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

GENERAL NOTES

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

TCP (1-4a)

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

TCP (1-4b)

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

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(1-4)-18

FILE: tcp1-4-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	1844	01	029	FM 1959
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	HOU	HARRIS		34
1-97 2-18				

DATE: 2/23/2024 7:35:13 AM
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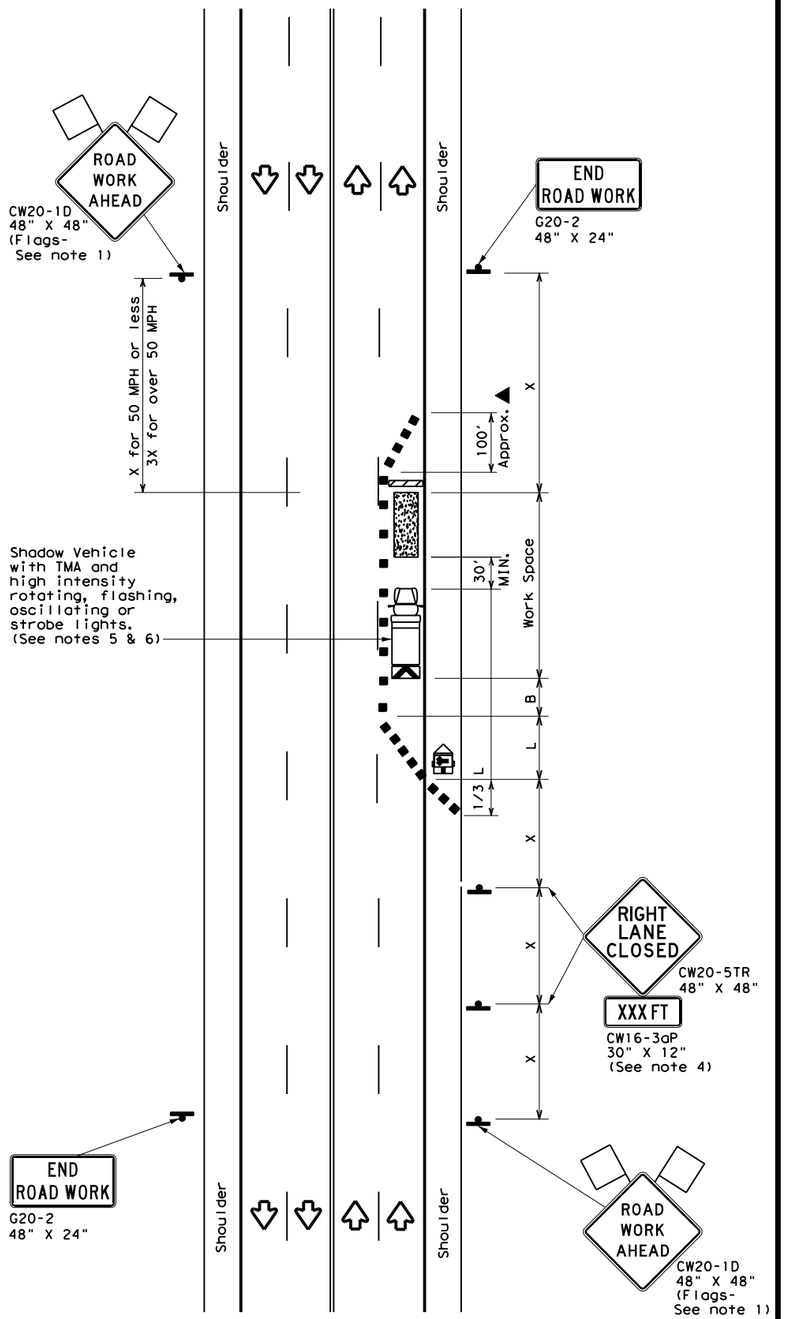
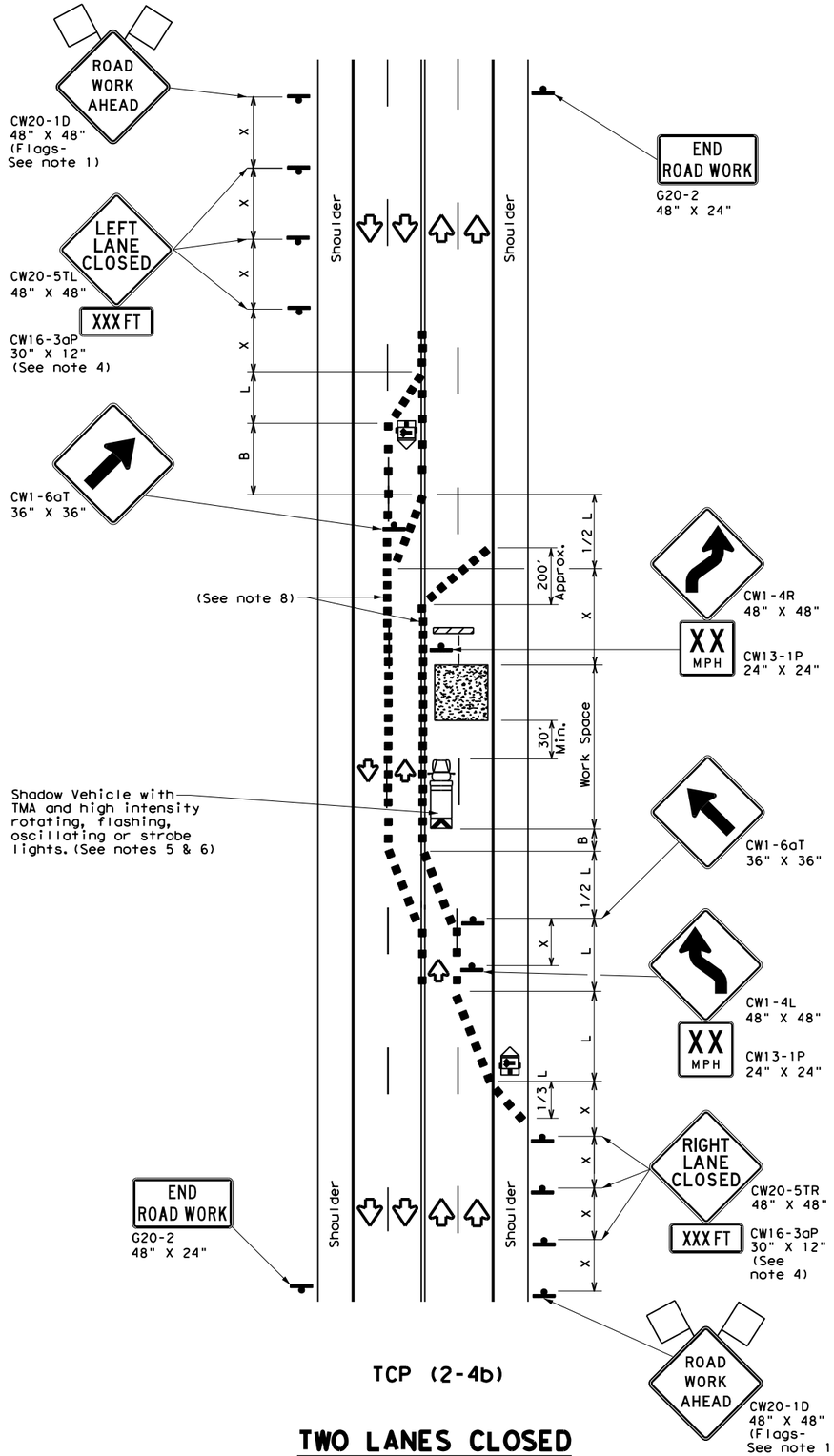


TCP (2-4a)

ONE LANE CLOSED



TCP (2-4b)

TWO LANES CLOSED

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

TCP (2-4a)

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

TCP (2-4b)

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

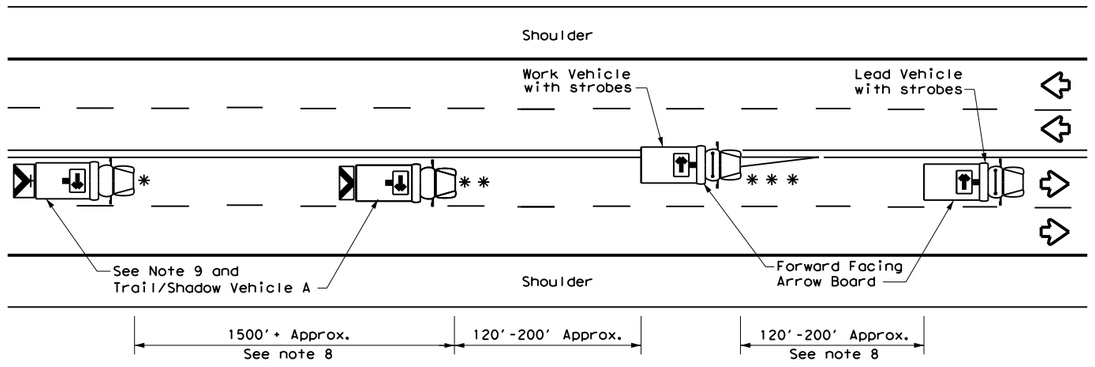
Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

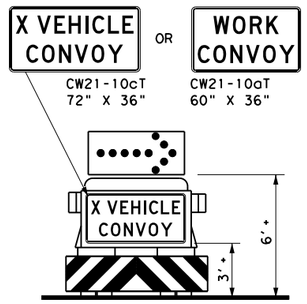
TCP(2-4)-18

FILE: tcp2-4-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	1844	01	029	FM 1959
1-97 2-12	DIST	COUNTY		SHEET NO.
4-98 2-18	HOU	HARRIS		35



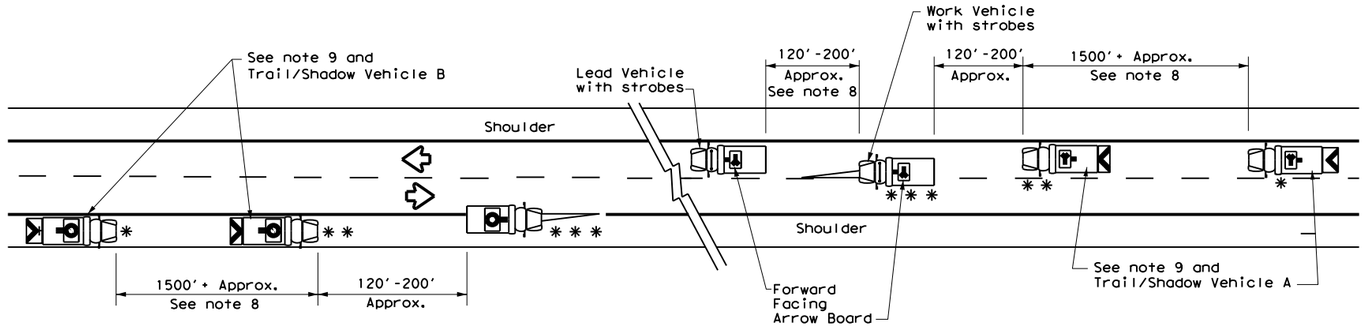
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

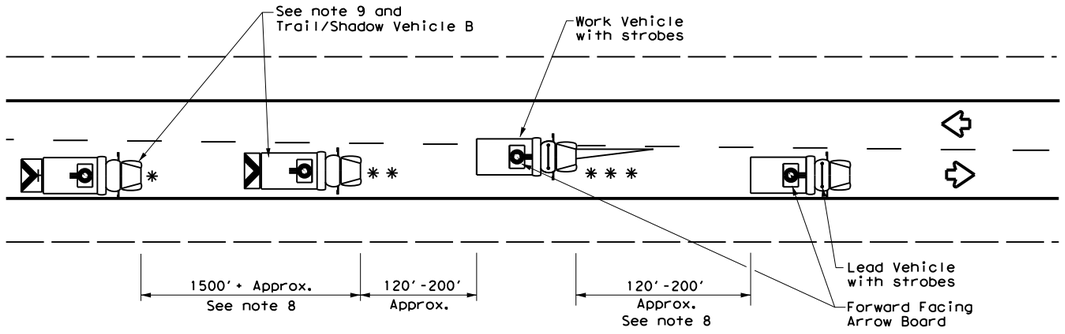


WORK ON SHOULDER

WORK ON TRAVEL LANE

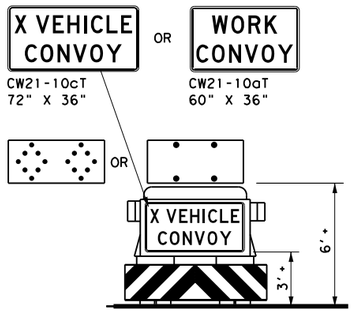
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board in CAUTION display

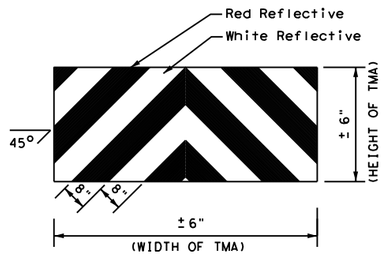
LEGEND

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

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

GENERAL NOTES

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



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

FILE: tcp3-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 7-13 1-97	1844	01	029	FM 1959
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		36

DATE: 2/23/2024 7:40:23 AM
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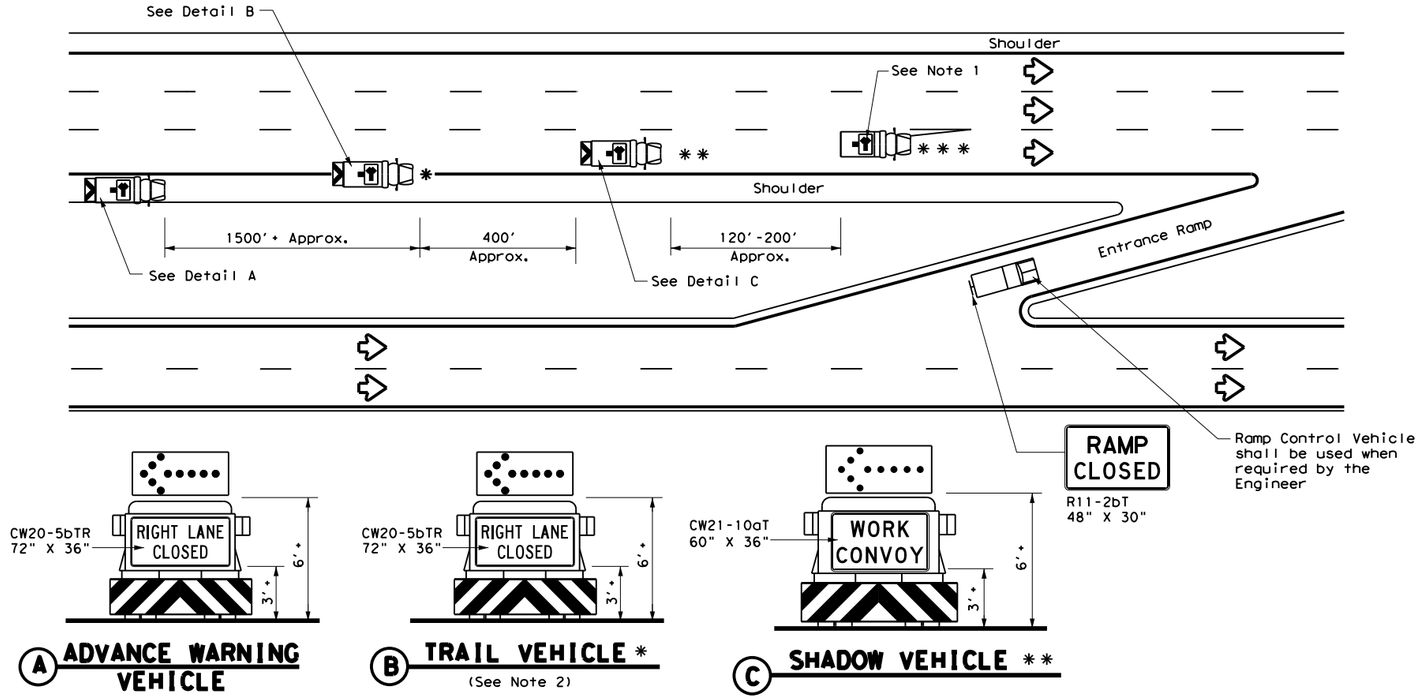
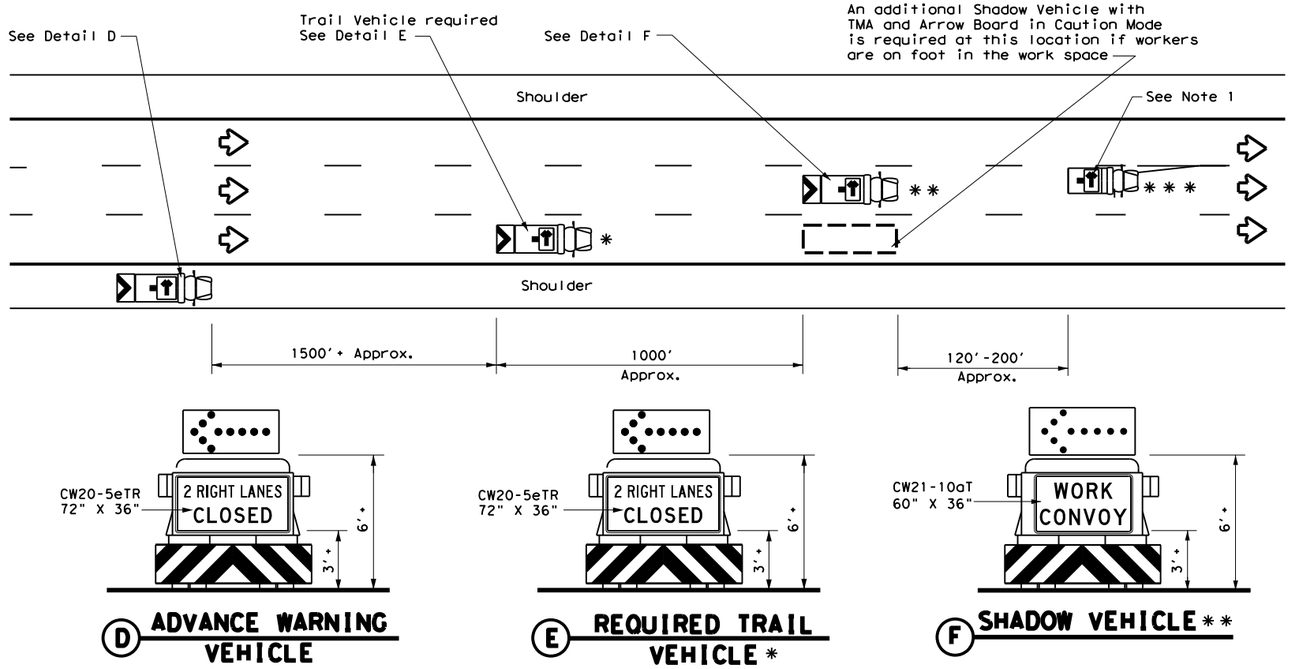


RIGHT LANE CLOSURE ON DIVIDED HIGHWAY - TCP(3-2a)



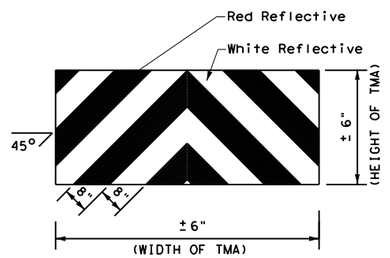
INTERIOR LANE CLOSURE ON MULTI-LANE DIVIDED HIGHWAY - TCP(3-2b)

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

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

GENERAL NOTES

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



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS DIVIDED HIGHWAYS

TCP(3-2)-13

FILE: tcp3-2.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS 2-94 4-98 8-95 7-13 1-97	1844	01	029	FM 1959
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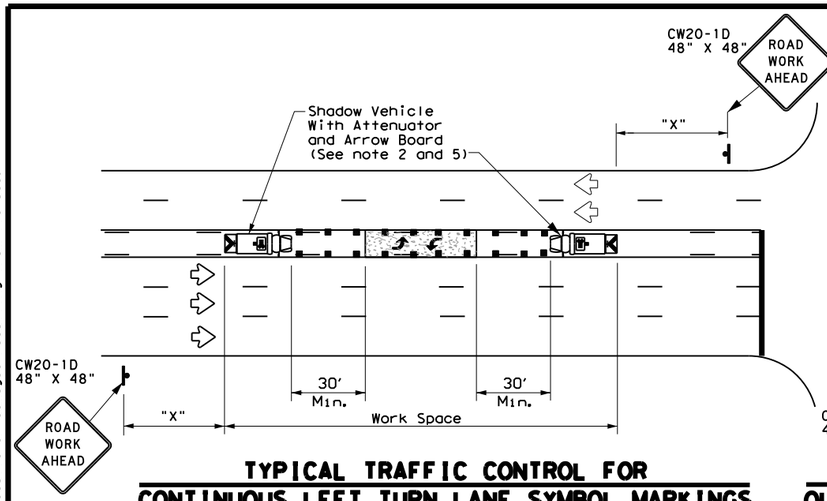
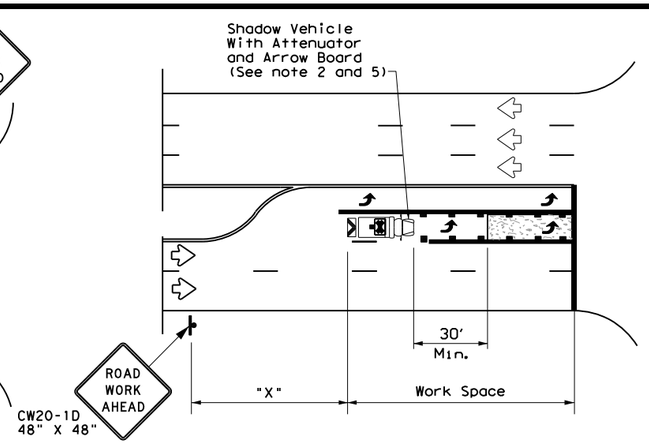
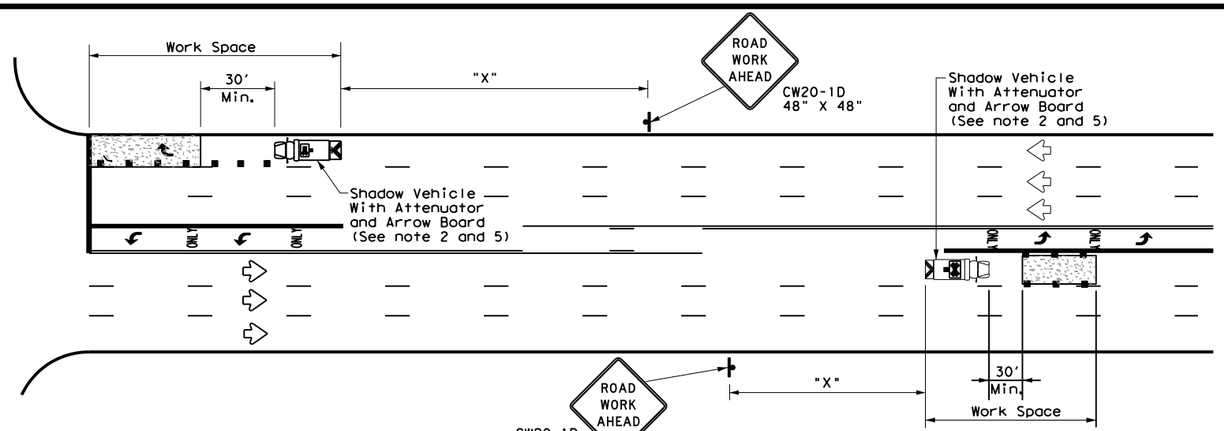


TYPICAL TRAFFIC CONTROL FOR CONTINUOUS LEFT TURN LANE SYMBOL MARKINGS

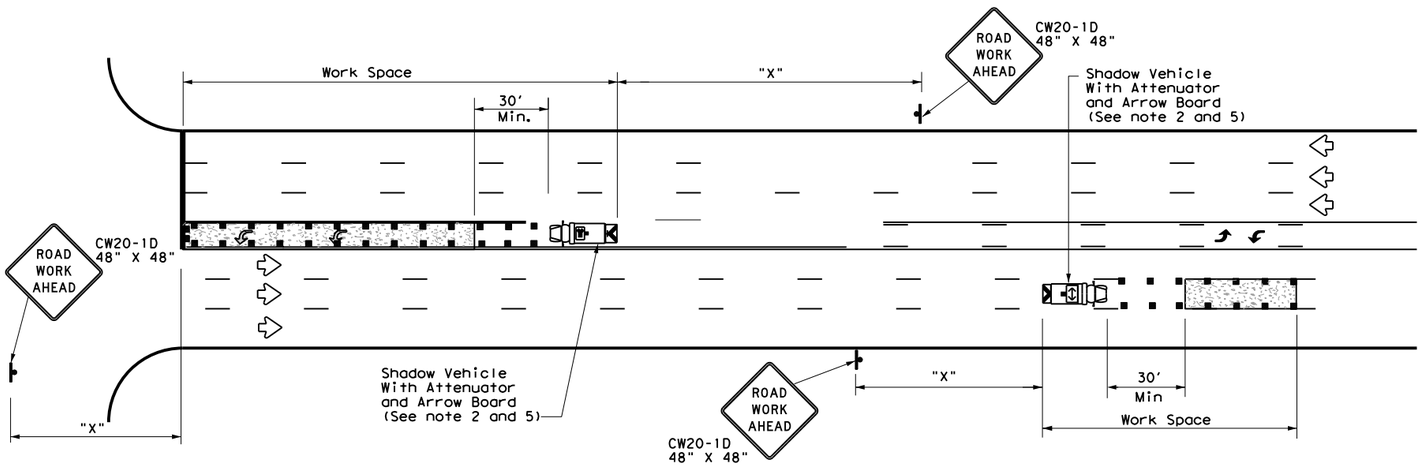


TYPICAL TRAFFIC CONTROL FOR OUTSIDE DUAL LEFT TURN LANE SYMBOL MARKINGS



TYPICAL TRAFFIC CONTROL FOR OUTSIDE LANE MARKINGS

TYPICAL TRAFFIC CONTROL FOR INSIDE LANE MARKINGS



TYPICAL TRAFFIC CONTROL FOR LEFT TURN LANE MARKINGS

TYPICAL TRAFFIC CONTROL FOR CENTER LANE MARKINGS

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

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

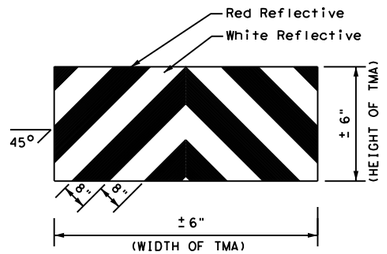
* Conventional Roads Only

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

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

GENERAL NOTES

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



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS FOR ISOLATED WORK AREAS UNDIVIDED HIGHWAYS

TCP(3-4)-13

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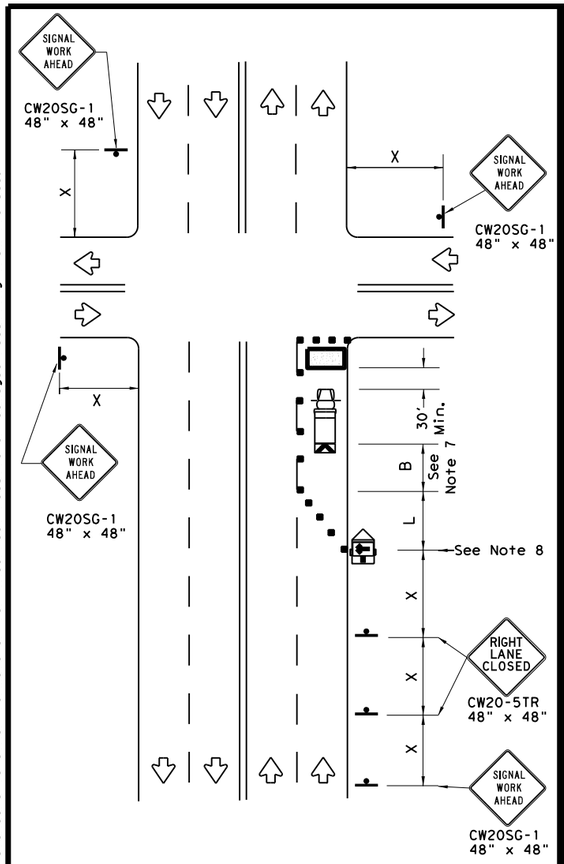
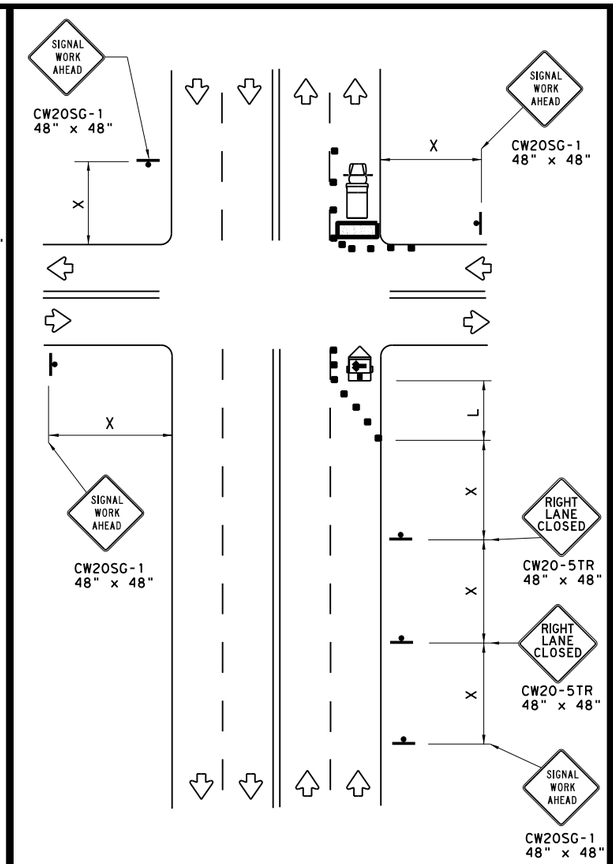


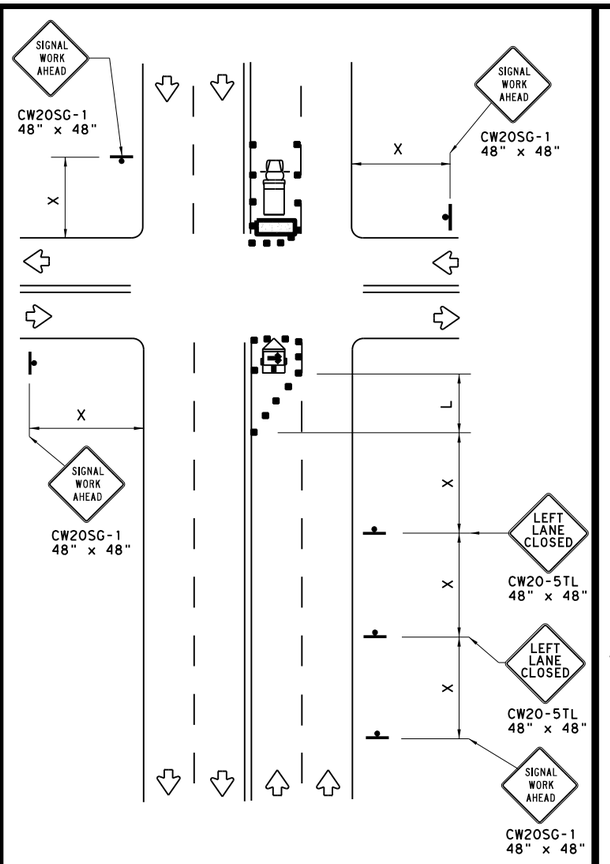
NEAR SIDE LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY



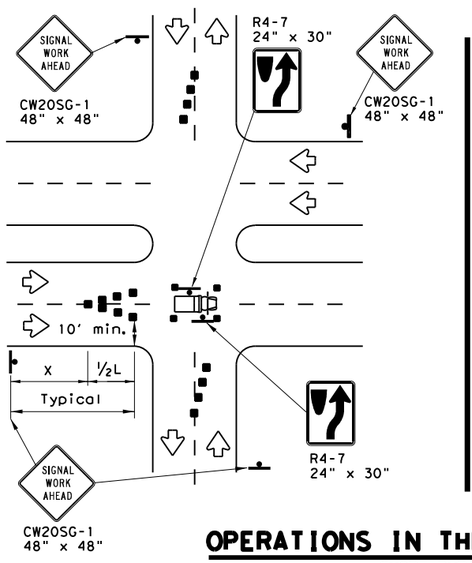
FAR SIDE RIGHT LANE CLOSURE

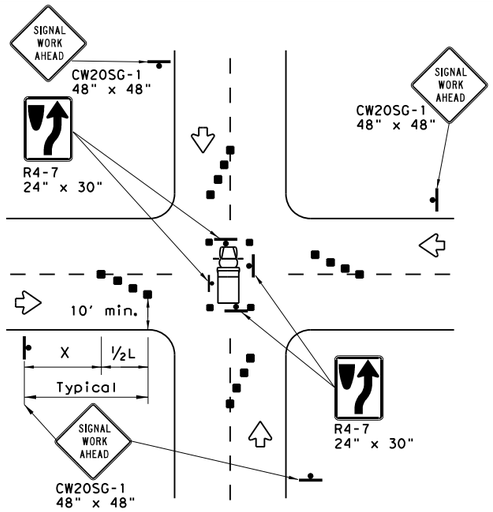
SHORT DURATION OR SHORT TERM STATIONARY



FAR SIDE LEFT LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY





OPERATIONS IN THE INTERSECTION

SHORT DURATION

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.

GENERAL NOTES

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

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC SIGNAL WORK TYPICAL DETAILS

WZ(BTS-1)-13

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4-98 3-03	HOU	HARRIS		39

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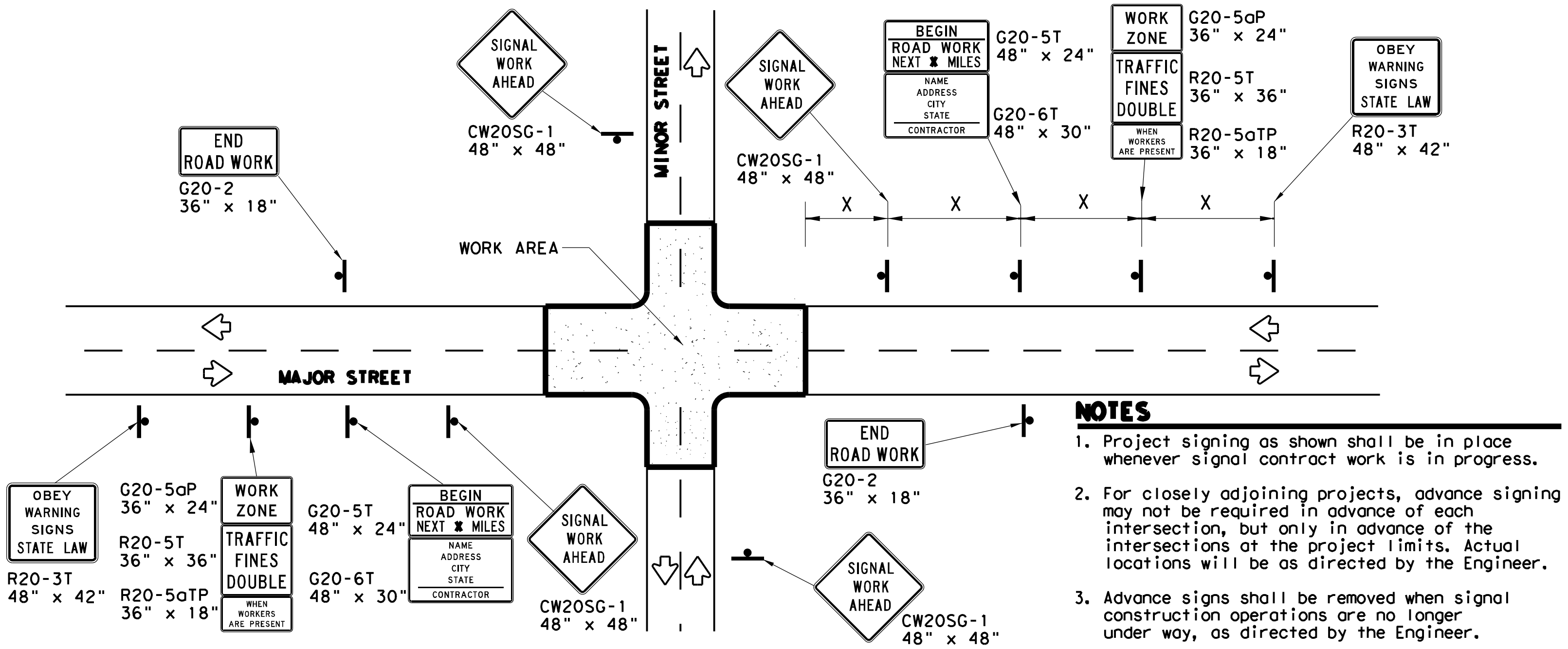


TYPICAL ADVANCE SIGNAL PROJECT SIGNING

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

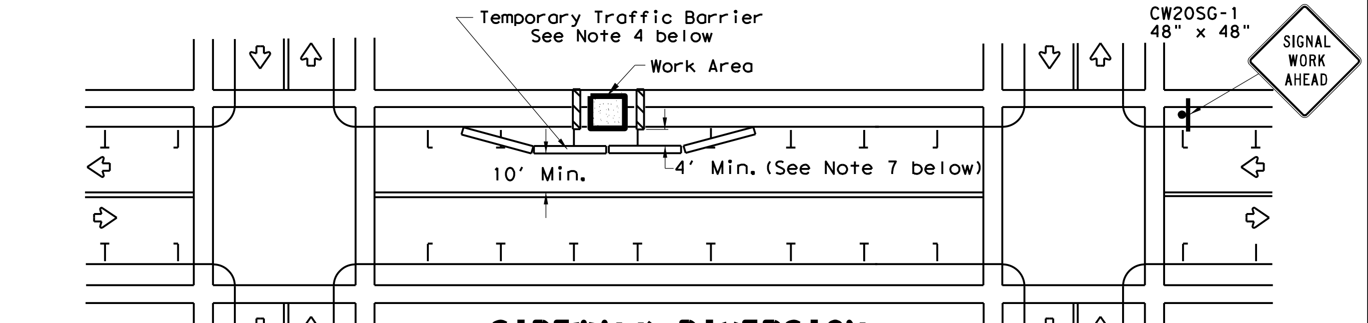
1. Weights used to keep signs from turning over should be sandbags filled with dry, cohesionless material.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects will not be permitted for use as sign support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

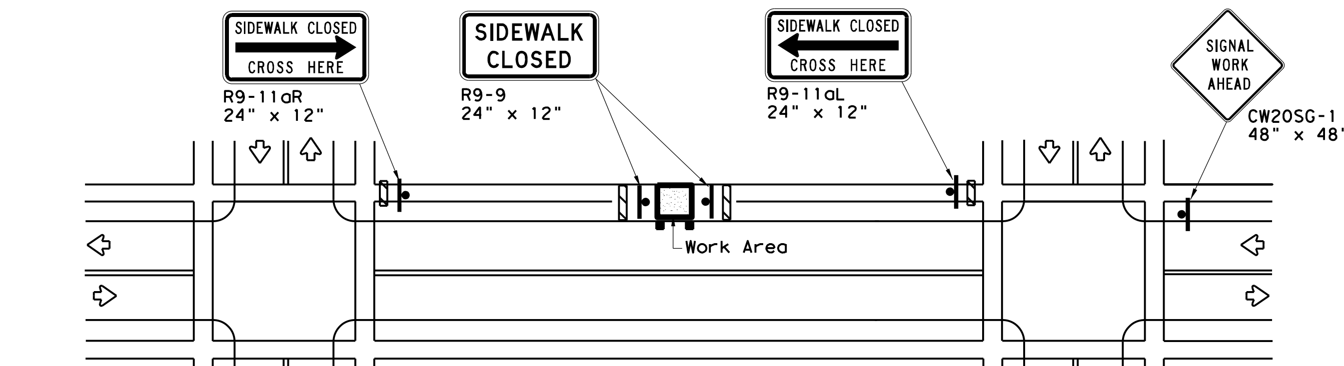
DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN FACE MATERIALS	DMS-8300
FLEXIBLE ROLL-UP REFLECTIVE SIGNS	DMS-8310

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

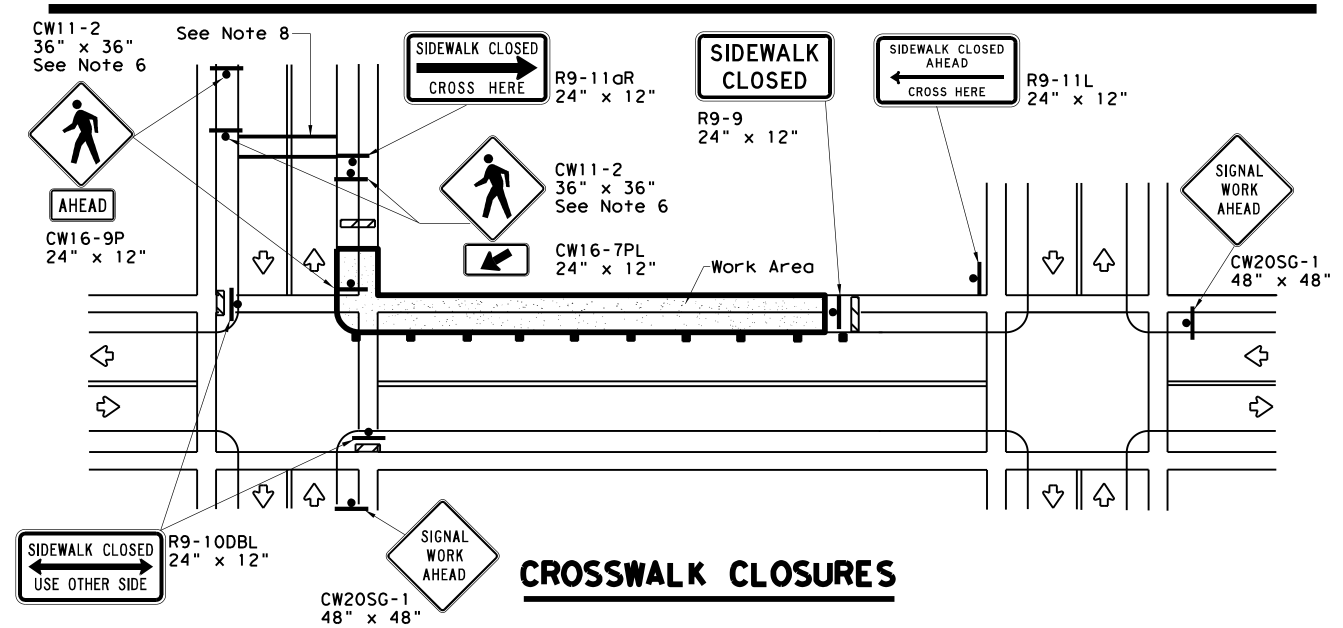
Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found at the following web address:
http://www.txdot.gov/txdot_library/publications/construction.htm



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.

SHEET 2 OF 2

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC SIGNAL WORK BARRICADES AND SIGNS

WZ(BTS-2)-13

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2-98 10-99 7-13	DIST		COUNTY	SHEET NO.
4-98 3-03	HOU		HARRIS	40

NOTES:
1. ALL BEARING AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NORTH AMERICAN DATUM OF 1983, 2011 ADJUSTMENT EPOCH 2010.00.

2. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY DIVIDING BY A COMBINED ADJUSTMENT FACTOR OF 1.00013.

3. HORIZONTAL VALUES SHOWN HEREON WERE DERIVED FROM RTK-GPS OBSERVATIONS, HOLDING EXISTING SURVEY CONTROL H-8. ALL SURVEY CONTROL WAS LOCATED WITH MULTIPLE GPS OBSERVATIONS AND AVERAGED FOR FINAL HORIZONTAL VALUES.

4.ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), GEOID 12B, VERTICAL VALUES SHOWN HEREON WERE DERIVED FROM DIGITAL LEVELING, AND BASED ON THE PUBLISHED ELEVATION OF EXISTING SURVEY CONTROL H-8 (33.81').

5. ALL MEASURMENTS ARE U.S. SURVEY FEET.

05/26/2023

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

STATE OF TEXAS
REGISTERED
TRAVIS S. TABOR
6428
PROFESSIONAL
LAND SURVEYOR

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

P.E. 4/21/24

PROFESSIONAL ENGINEER DATE

CONTROL BY OTHERS - SURFACE

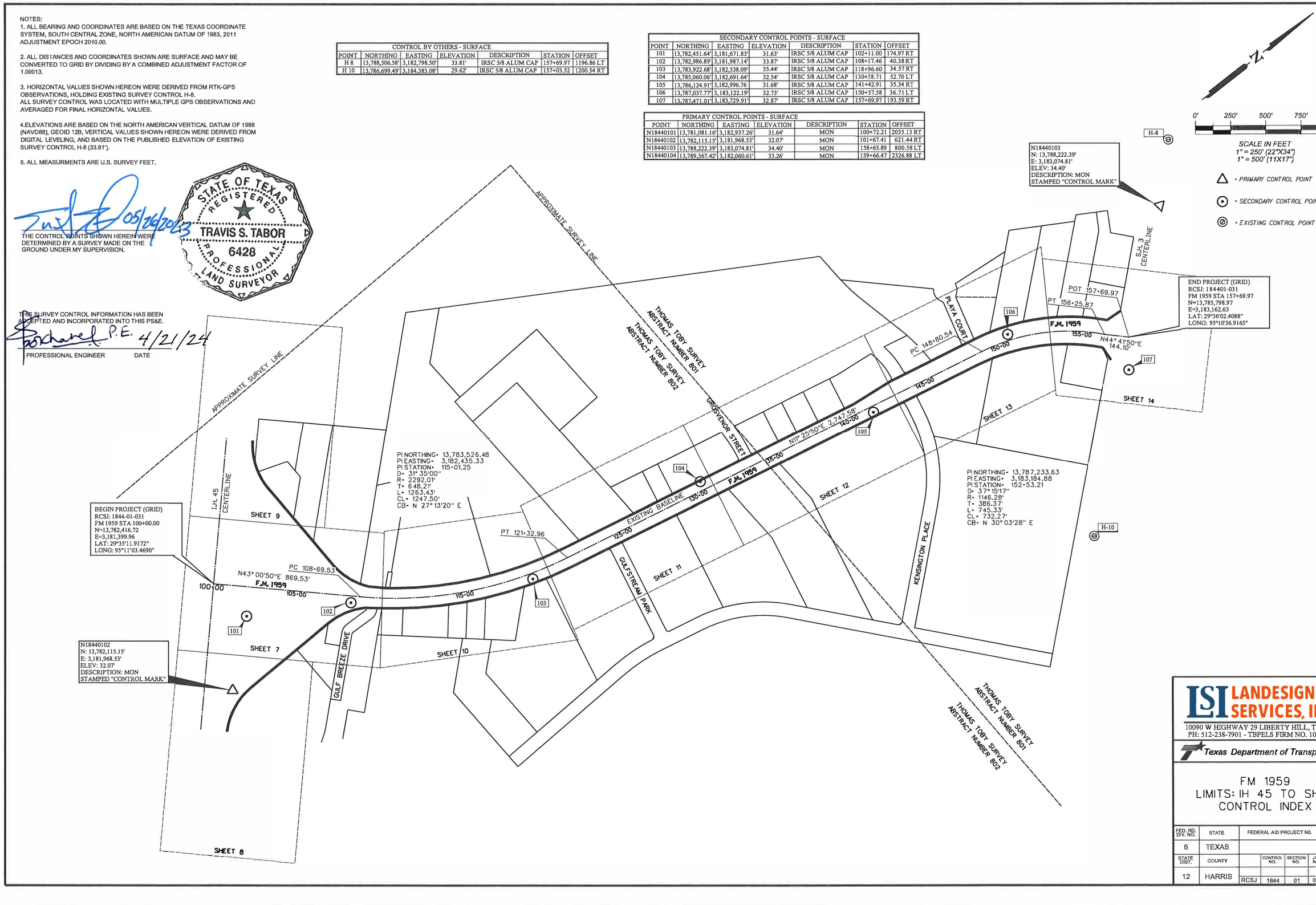
POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION	STATION	OFFSET
H 8	13,788,506.58'	3,182,798.50'	33.81'	IRSC 5/8 ALUM CAP	157+69.97	1196.86 LT
H 10	13,786,699.49'	3,184,383.08'	29.62'	IRSC 5/8 ALUM CAP	157+03.52	1200.54 RT

SECONDARY CONTROL POINTS - SURFACE

POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION	STATION	OFFSET
101	13,782,451.64'	3,181,671.83'	31.63'	IRSC 5/8 ALUM CAP	102+11.00	174.97 RT
102	13,782,986.89'	3,181,987.14'	33.87'	IRSC 5/8 ALUM CAP	108+17.46	40.38 RT
103	13,783,922.68'	3,182,538.09'	35.44'	IRSC 5/8 ALUM CAP	118+96.60	34.57 RT
104	13,785,060.06'	3,182,691.64'	32.54'	IRSC 5/8 ALUM CAP	130+38.71	52.70 LT
105	13,786,124.91'	3,182,996.76	31.68'	IRSC 5/8 ALUM CAP	141+42.91	35.34 RT
106	13,787,037.77'	3,183,122.19'	32.73'	IRSC 5/8 ALUM CAP	150+57.58	36.71 LT
107	13,787,471.01'	3,183,729.91'	32.87'	IRSC 5/8 ALUM CAP	157+69.97	193.59 RT

PRIMARY CONTROL POINTS - SURFACE

POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION	STATION	OFFSET
N18440101	13,781,081.16'	3,182,937.26'	31.64'	MON	100+72.21	2035.13 RT
N18440102	13,782,115.15'	3,181,968.53'	32.07'	MON	101+67.41	621.44 RT
N18440103	13,788,222.39'	3,183,074.81'	34.40'	MON	158+65.89	800.58 LT
N18440104	13,789,367.42'	3,182,060.61'	33.26'	MON	159+66.47	2326.88 LT



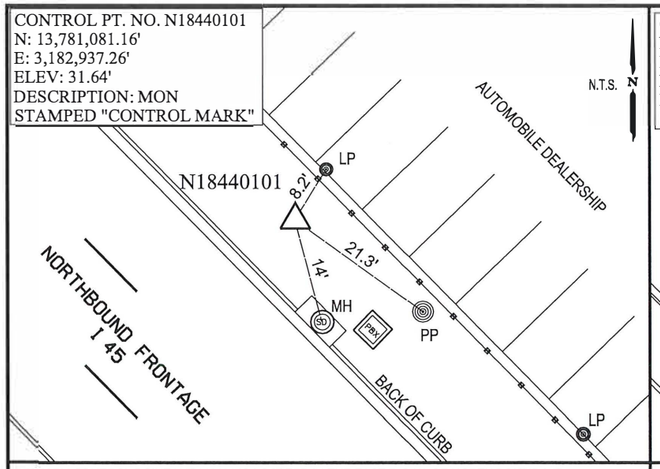
LSI LANDESIGN SERVICES, INC.
10090 W HIGHWAY 29 LIBERTY HILL, TX 78642
PH: 512-238-7901 - TBPELS FIRM NO. 10001800

Texas Department of Transportation

FM 1959
LIMITS: IH 45 TO SH 3
CONTROL INDEX

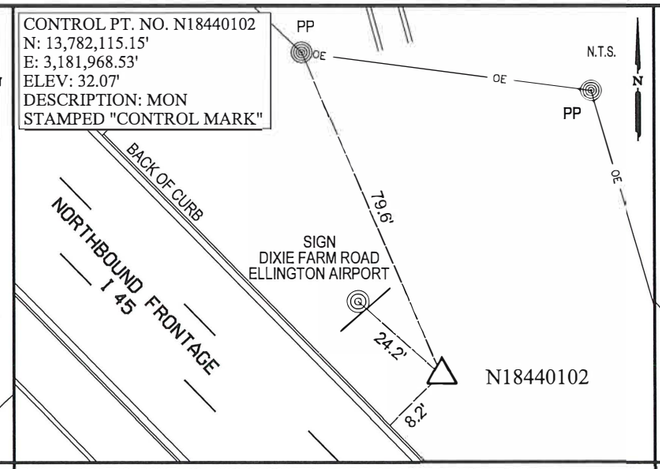
FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				HIGHWAY NO.
6	TEXAS					FM 1959
STATE DIST.	COUNTY		CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
12	HARRIS	RCSJ	1844	01	031	41

CONTROL PT. NO. N18440101
N: 13,781,081.16'
E: 3,182,937.26'
ELEV: 31.64'
DESCRIPTION: MON
STAMPED "CONTROL MARK"



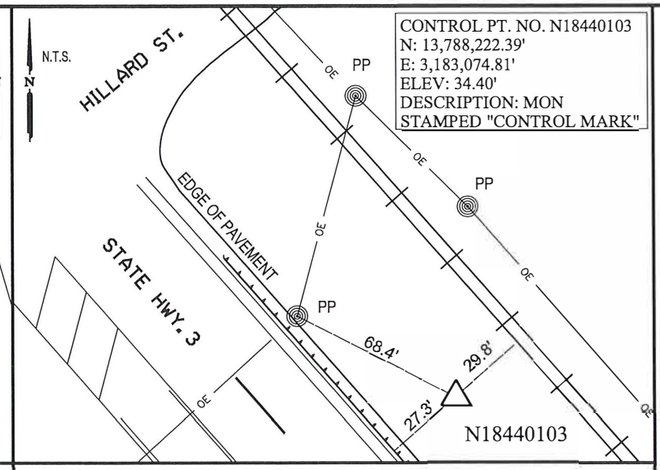
PRIMARY CONTROL POINT N18440101 IS LOCATED IN THE EAST R.O.W. OF NORTH BOUND I 45 FRONTAGE RD, APPROXIMATELY 390' FEET SOUTH OF TRISTAR DR.

CONTROL PT. NO. N18440102
N: 13,782,115.15'
E: 3,181,968.53'
ELEV: 32.07'
DESCRIPTION: MON
STAMPED "CONTROL MARK"



PRIMARY CONTROL POINT N18440102 IS LOCATED IN THE EAST R.O.W. OF NORTHBOUND I 45 FRONTAGE RD, APPROXIMATELY 636' FEET SOUTH OF FM 1959.

CONTROL PT. NO. N18440103
N: 13,788,222.39'
E: 3,183,074.81'
ELEV: 34.40'
DESCRIPTION: MON
STAMPED "CONTROL MARK"



PRIMARY CONTROL POINT N18440103 IS LOCATED IN THE EAST R.O.W. OF STATE HWY 3, APPROXIMATELY 152 FEET SOUTH OF HILLARD ST.

NOTES:
1. ALL BEARING AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NORTH AMERICAN DATUM OF 1983, 2011 ADJUSTMENT EPOCH 2010.00.

2. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY DIVIDING BY A COMBINED ADJUSTMENT FACTOR OF 1.00013.

3. HORIZONTAL VALUES SHOWN HEREON WERE DERIVED FROM RTK-GPS OBSERVATIONS, HOLDING EXISTING SURVEY CONTROL H-8.
ALL SURVEY CONTROL WAS LOCATED WITH MULTIPLE GPS OBSERVATIONS AND AVERAGED FOR FINAL HORIZONTAL VALUES.

4.ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), GEOID 12B, VERTICAL VALUES SHOWN HEREON WERE DERIVED FROM DIGITAL LEVELING, AND BASED ON THE PUBLISHED ELEVATION OF EXISTING SURVEY CONTROL H-8 (33.81').

5. ALL MEASURMENTS ARE U.S. SURVEY FEET.

05/26/2023

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

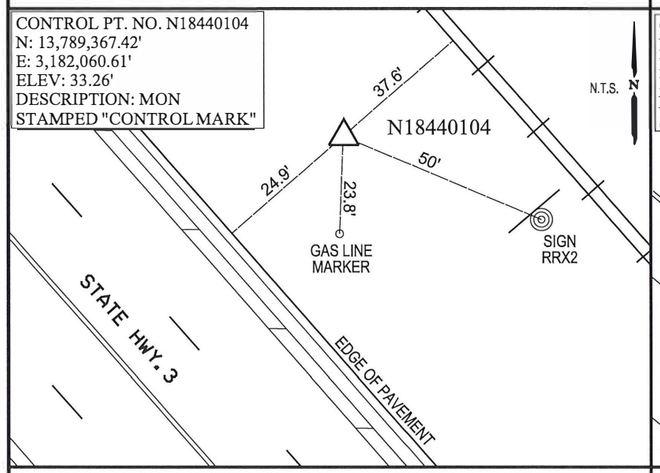
STATE OF TEXAS
REGISTERED
TRAVIS S. TABOR
6428
PROFESSIONAL
LAND SURVEYOR

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

P.E. 4/21/24

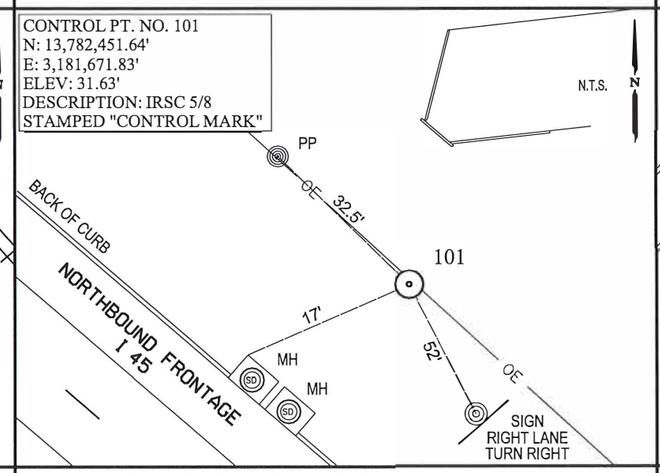
PROFESSIONAL ENGINEER DATE

CONTROL PT. NO. N18440104
N: 13,789,367.42'
E: 3,182,060.61'
ELEV: 33.26'
DESCRIPTION: MON
STAMPED "CONTROL MARK"



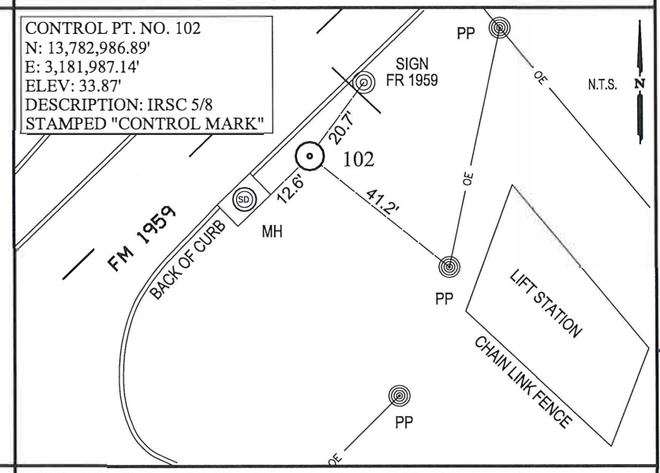
PRIMARY CONTROL POINT N18440104 IS LOCATED IN THE EAST R.O.W. OF STATE HWY 3, APPROXIMATELY 1,380 FEET NORTH OF HILLARD ST.

CONTROL PT. NO. 101
N: 13,782,451.64'
E: 3,181,671.83'
ELEV: 31.63'
DESCRIPTION: IRSC 5/8
STAMPED "CONTROL MARK"



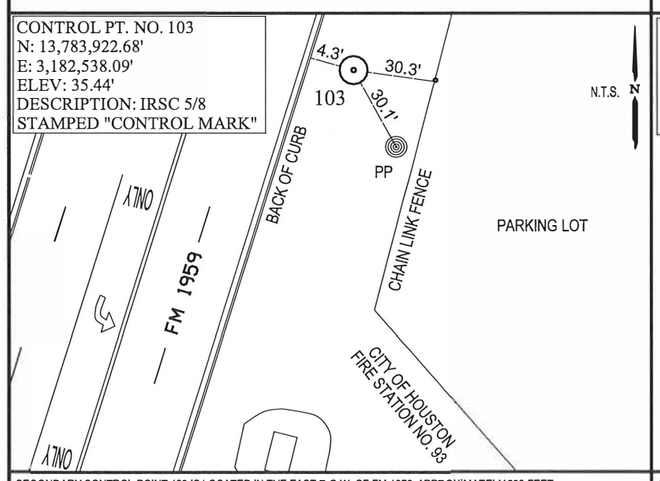
SECONDARY CONTROL POINT 101 IS LOCATED IN THE EAST R.O.W. OF I 45, APPROXIMATELY 185 FEET SOUTH OF FM 1959.

CONTROL PT. NO. 102
N: 13,782,986.89'
E: 3,181,987.14'
ELEV: 33.87'
DESCRIPTION: IRSC 5/8
STAMPED "CONTROL MARK"



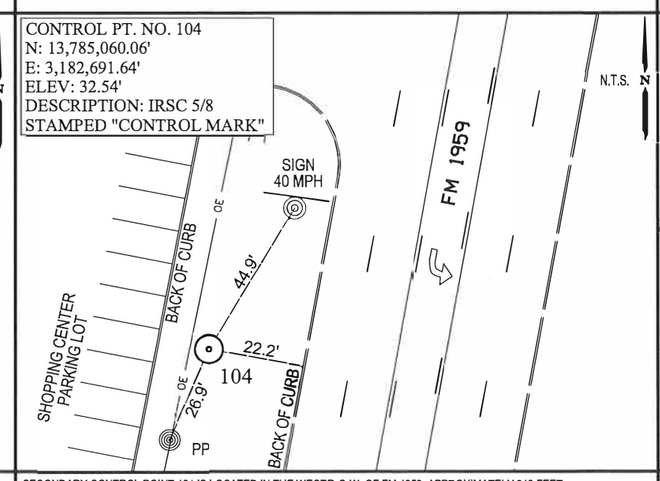
SECONDARY CONTROL POINT 102 IS LOCATED IN THE EAST R.O.W. OF FM 1959, APPROXIMATELY 130 FEET SOUTH OF GULF BREEZE DR.

CONTROL PT. NO. 103
N: 13,783,922.68'
E: 3,182,538.09'
ELEV: 35.44'
DESCRIPTION: IRSC 5/8
STAMPED "CONTROL MARK"



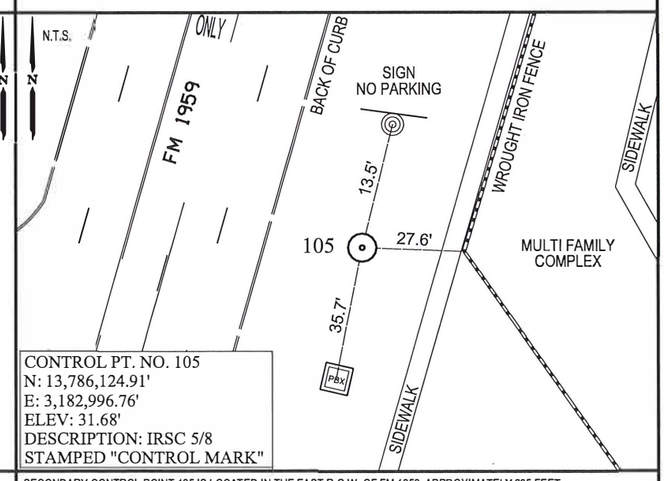
SECONDARY CONTROL POINT 103 IS LOCATED IN THE EAST R.O.W. OF FM 1959, APPROXIMATELY 230 FEET NORTH OF THE MAIN DRIVEWAY OF THE CITY OF HOUSTON FIRE STATION 93.

CONTROL PT. NO. 104
N: 13,785,060.06'
E: 3,182,691.64'
ELEV: 32.54'
DESCRIPTION: IRSC 5/8
STAMPED "CONTROL MARK"



SECONDARY CONTROL POINT 104 IS LOCATED IN THE WESTR.O.W. OF FM 1959, APPROXIMATELY 310 FEET SOUTH OF GROSVENOR ST.

CONTROL PT. NO. 105
N: 13,786,124.91'
E: 3,182,996.76'
ELEV: 31.68'
DESCRIPTION: IRSC 5/8
STAMPED "CONTROL MARK"



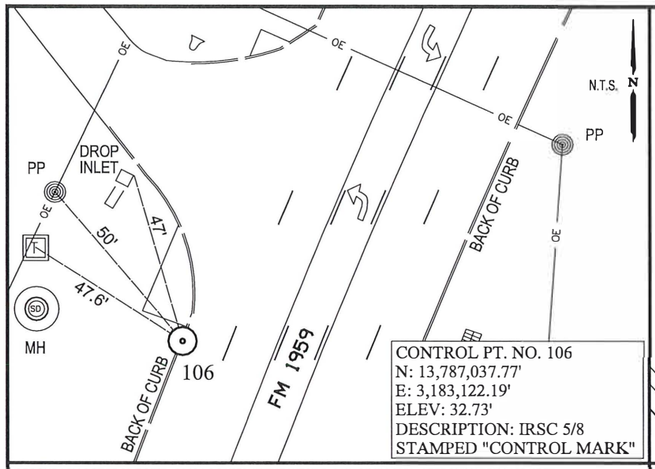
SECONDARY CONTROL POINT 105 IS LOCATED IN THE EAST R.O.W. OF FM 1959, APPROXIMATELY 235 FEET SOUTH OF KENSINGTON PL.

LSI LANDESIGN SERVICES, INC.
10090 W HIGHWAY 29 LIBERTY HILL, TX 78642
PH: 512-238-7901 - TBPELS FIRM NO. 10001800

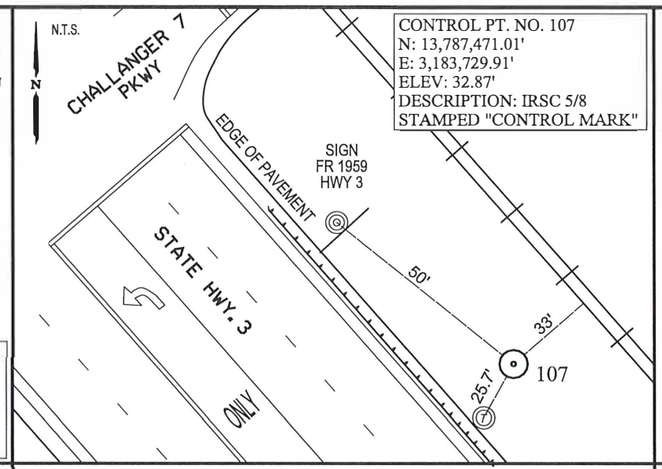
Texas Department of Transportation

FM 1959
LIMITS: IH 45 TO SH 3
HORIZONTAL AND VERTICAL
PROJECT CONTROL

FED. RD. DIV. NO.	STATE	FEDERAL A/D PROJECT NO.				HIGHWAY NO.
6	TEXAS					FM 1959
STATE DIST.	COUNTY		CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
12	HARRIS	RCSJ	1844	01	031	42



SECONDARY CONTROL POINT 106 IS LOCATED IN THE WEST R.O.W. OF FM 1959, APPROXIMATELY 235 FEET NORTH OF PLAYA CT.



PRIMARY CONTROL POINT 107 IS LOCATED IN THE EAST R.O.W. OF STATE HWY 3, APPROXIMATELY 181 FEET SOUTH CHALLANGER 7 PRWY.

NOTES:
1. ALL BEARING AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NORTH AMERICAN DATUM OF 1983, 2011 ADJUSTMENT EPOCH 2010.00.

2. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY DIVIDING BY A COMBINED ADJUSTMENT FACTOR OF 1.00013.

3. HORIZONTAL VALUES SHOWN HEREON WERE DERIVED FROM RTK-GPS OBSERVATIONS, HOLDING EXISTING SURVEY CONTROL H-8.
ALL SURVEY CONTROL WAS LOCATED WITH MULTIPLE GPS OBSERVATIONS AND AVERAGED FOR FINAL HORIZONTAL VALUES.

4.ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), GEOID 12B, VERTICAL VALUES SHOWN HEREON WERE DERIVED FROM DIGITAL LEVELING, AND BASED ON THE PUBLISHED ELEVATION OF EXISTING SURVEY CONTROL H-8 (33.81').

5. ALL MEASURMENTS ARE U.S. SURVEY FEET.

05/26/2023

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

STATE OF TEXAS
REGISTERED
TRAVIS S. TABOR
6428
PROFESSIONAL
LAND SURVEYOR

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

P.E. 4/21/24

PROFESSIONAL ENGINEER DATE

LSI LANDESIGN SERVICES, INC.
10090 W HIGHWAY 29 LIBERTY HILL, TX 78642
PH: 512-238-7901 - TBPELS FIRM NO. 10001800

Texas Department of Transportation

FM 1959
LIMITS: IH 45 TO SH 3
HORIZONTAL AND VERTICAL PROJECT CONTROL

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				HIGHWAY NO.
6	TEXAS					FM 1959
STATE DIST.	COUNTY		CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
12	HARRIS	RCSJ	1844	01	031	43

FM 1959 CENTERLINE

Chain FM_1959_CL contains:
PT01 CUR CURV_C1 CUR CURV_C2 PT06

Beginning chain FM_1959_CL description

Point PT01 X 3,180,898.4818 Y 13,781,929.4408 Sta 93+00.00

Course from PT01 to PC CURV_C1 N 44° 14′ 26.46" E Dist 1,568.6900

Curve Data

Curve CURV_C1

P.I. Station		115+16.89	X	3,182,435.0808	Y 13,783,527.2511
Delta	=	31° 34′ 59.92" (LT)			
Degree	=	2° 29′ 59.47"			
Tangent	=	648.2003			
Length	=	1,263.4063			
Radius	=	2,291.9651			
External	=	89.8971			
Long Chord	=	1,247.4713			
Mid. Ord.	=	86.5042			
P.C. Station		108+68.69	X	3,181,992.9160	Y 13,783,053.2745
P.T. Station		121+32.09	X	3,182,563.5125	Y 13,784,162.6005
C.C.			X	3,180,316.9866	Y 13,784,616.7209
Back	= N	43° 00′ 40.61" E			
Ahead	= N	11° 25′ 40.69" E			
Chord Bear	= N	27° 13′ 10.65" E			

Course from PT CURV_C1 to PC CURV_C2 N 11° 25′ 40.77" E Dist 2,747.6127

Curve Data

Curve CURV_C2

P.I. Station		152+66.12	X	3,183,184.4763	Y 13,787,234.4926
Delta	=	37° 16′ 08.82" (RT)			
Degree	=	4° 59′ 59.99"			
Tangent	=	386.4129			
Length	=	745.3826			
Radius	=	1,145.9160			
External	=	63.3972			
Long Chord	=	732.3111			
Mid. Ord.	=	60.0737			
P.C. Station		148+79.71	X	3,183,107.9141	Y 13,786,855.7404
P.T. Station		156+25.09	X	3,183,474.7614	Y 13,787,489.5406
C.C.			X	3,184,231.1118	Y 13,786,628.6936
Back	= N	11° 25′ 40.65" E			
Ahead	= N	48° 41′ 49.47" E			
Chord Bear	= N	30° 03′ 45.06" E			

Course from PT CURV_C2 to PT06 N 48° 41′ 41.18" E Dist 63.2850

Point PT06 X 3,183,522.3014 Y 13,787,531.3131 Sta 156+88.37

Ending chain FM_1959_CL description

STATE OF TEXAS
SANJAY POKHAREL
140149
LICENSED PROFESSIONAL ENGINEER

SANJAY POKHAREL, P.E. 4/21/2024

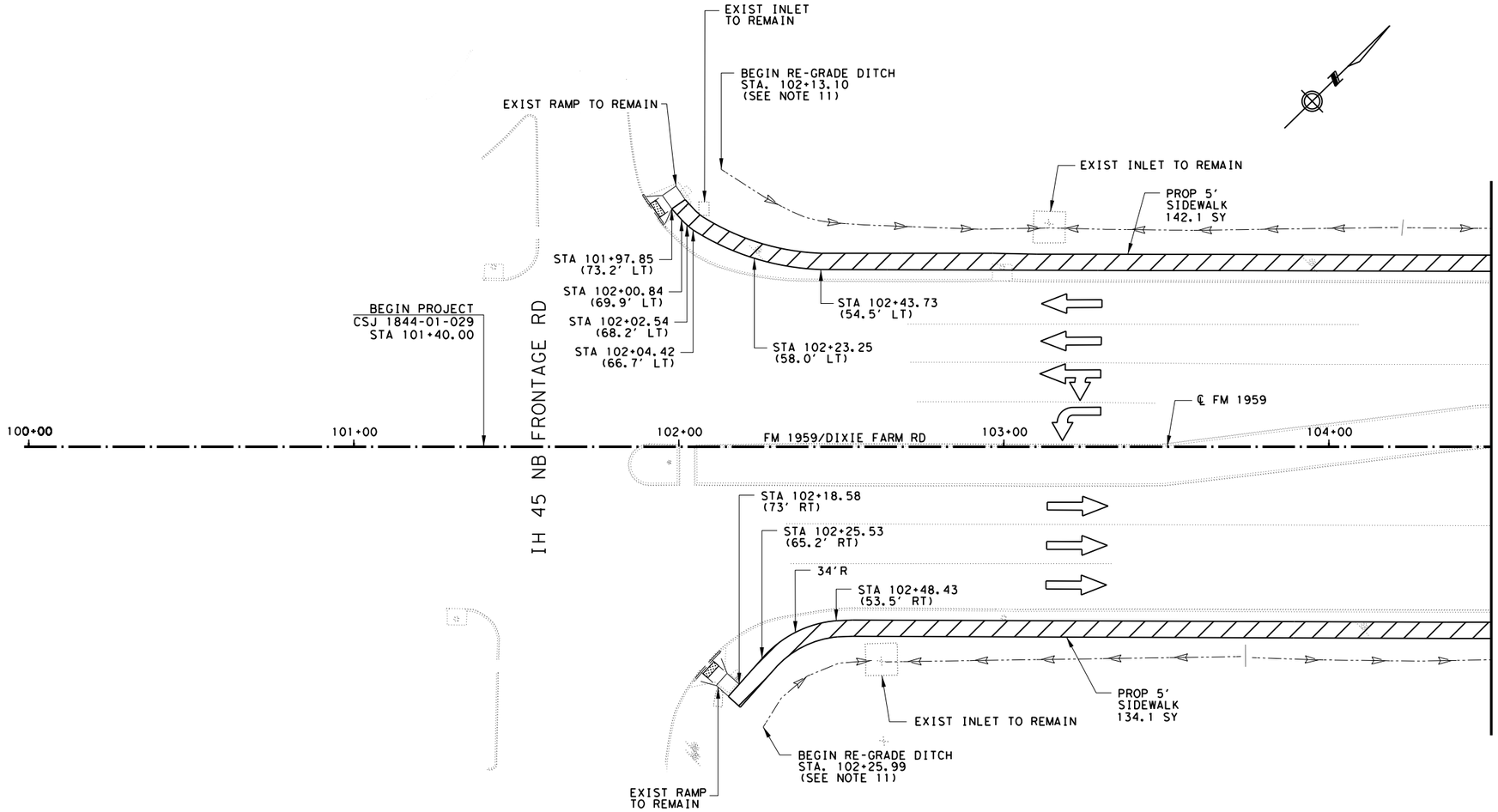
TEXAS DEPARTMENT OF TRANSPORTATION

FM 1959
HORIZONTAL ALIGNMENT DATA

SHEET 1 OF 1

DN:	ORIGINAL DATE OF DRAWING:	FED.RD. DIV.NO.	STATE	FEDERAL PROJECT NO.				HIGHWAY NO.
CK DN:		6	TEXAS					FM 1959
DW:	REVISIONS:	STATE DIST.NO	COUNTY		CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:		12	HARRIS		1844	01	029	44
TR:								
CK TR:								

H:\CDA\1844-01-029 (FM 1959)\General\Alignment\FM1959_Horizontal_Alignment_Data.dgn 4/21/2024



LEGEND:

- TRAFFIC FLOW DIRECTION
- [X] DRIVEWAY NUMBER
- SIDEWALK/RAMP CONSTRUCTION
- DRIVEWAY CONSTRUCTION
- CONCRETE RIPRAP
- CHECKER PLATE (TREE PROTECTION)
- C2 CURB

NOTES:

1. SEE "DRIVEWAY LOCATION TABLE" FOR ADDITIONAL INFORMATION.
2. MINOR ADJUSTMENTS TO HORIZONTAL LOCATION OF SIDEWALK & CURB RAMPS MAY BE MADE TO AVOID CONFLICTS WITH UTILITIES (POWER POLES, WATER METERS,UTILITY MARKERS, AT&T PEDESTALS,& MARKERS),MAILBOXES, LANDSCAPING(TREES, ETC) AS APPROVED BY THE ENGINEER.
3. PROPOSED SIDEWALK SHOULD BE 6 FEET WIDE WHEN CONSTRUCT NEXT TO CURB. PROPOSED SIDEWALK SHOULD BE 5 FEET WIDE WHEN CONSTRUCT AWAY FROM CURB.
4. PROTECT TREE ACCORDING TO HOUSTON DISTRICT TREE PROTECTION STANDARD. ADJUST SIDEWALK TO AVOID TREE. USE CHECKER PLATE DETAIL AS SHOWN ON SIDEWALK DETAILS.
5. IN AREAS WHERE SIDEWALKS ARE TO REMAIN, REMOVE EXISTING DETECTABLE WARNING PAVERS AT ALL DRIVEWAYS AND REPLACE PORTION OF SIDEWALK IF REQUIRED.
6. IN AREAS WHERE SIDEWALKS ARE TO REMAIN AND ONLY DRIVEWAYS ARE REPLACED, SIDEWALK REPLACEMENT ON EACH SIDE OF DRIVEWAY SHALL MATCH THE SURFACE TEXTURE AND COLOR OF THE EXISTING SIDEWALK AS CLOSELY AS POSSIBLE.
7. ALL OFFSETS ARE TO EDGE OF CONCRETE SIDEWALK.
8. ALL C2 CURB TO BE SLOTTED EVERY 20' TO ENSURE THE EXCESS FLOW FROM THE ROAD TOWARDS THE EXIST DITCH IS NOT HALTED DURING HEAVY RAINFALL.SEE DETAIL SHEET 66.
9. FOR FAST TRACK CONCRETE PROVIDE CLASS HES(HIGHLY EARLY STRENGTH) CONCRETE WITH A MINIMUM AVERAGE FLEXURAL STRENGTH OF 255 PSI OR A MINIMUM COMPRESSIVE STRENGTH OF 1,800 PSI IN 16 HOURS.
10. THE TOP OF THE EXISTING GROUND BOXES SHOULD BE LEVELLED WITH NON SLIP SURFACE AS PER TXDOT STANDARD.
11. REGRADE DITCH LOCATIONS ARE APPROXIMATE AND ENGINEER SHALL VERIFY THE EXACT FIELD LOCATIONS.REGRADED DITCHES SHALL MATCH THE EXIST DITCH SIDE SLOPE, DITCH CAPACITY AND ELEVATIONS OF EXIST INLETS. CONTRACTOR TO ENSURE POSITIVE FLOW WITH DITCH FLOWLINE MATCHING THE EXISTING.
12. THE RIPRAP LOCATIONS ARE APPROXIMATE AND SHOULD BE VERIFIED DURING THE CONSTRUCTION BY THE ENGINEER.RIPRAP IS PROPOSED BEHIND THE C2 CURB WHERE THE EXIST DITCH SIDE SLOPE IS STEEPER THAN 3:1 ONLY IF NEEDED AS PER SITE CONDITION AND APPROVED BY THE ENGINEER.

STATE OF TEXAS
SANJAY POKHAREL
140149
LICENSED PROFESSIONAL ENGINEER

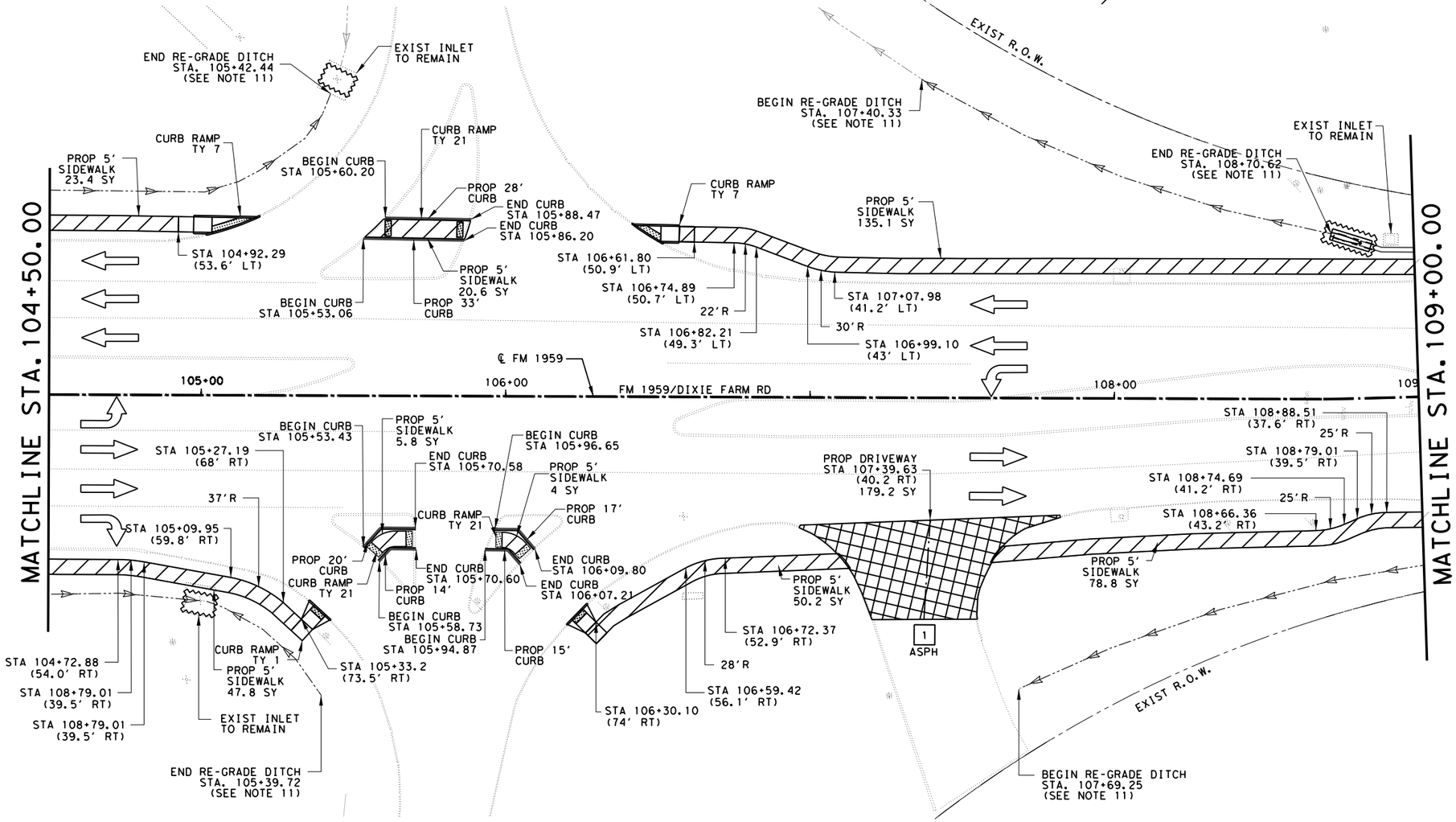
SANJAY POKHAREL, P.E. 4/16/2024

TEXAS DEPARTMENT OF TRANSPORTATION

FM 1959
SIDEWALK PLAN
(BEGIN TO STA 104+50.00)

SCALE: 1"=40' SHEET 1 OF 13 SHEETS

DN: MGA	DRAWING FILE NAME:	FED.RD. DIV.NO.	STATE	PROJECT NO.					HIGHWAY NO.
CK:		6	TX						FM 1959
DW: MGA	REVISIONS:	STATE DIST.NO	COUNTY		CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
CK:		12	HARRIS		1844	01	029		45
TR:									
CK:									



LEGEND:

- TRAFFIC FLOW DIRECTION
- X — DRIVEWAY NUMBER
- SIDEWALK/RAMP CONSTRUCTION
- DRIVEWAY CONSTRUCTION
- CONCRETE RIPRAP
- CHECKER PLATE (TREE PROTECTION)
- C2 CURB

NOTES:

1. SEE "DRIVEWAY LOCATION TABLE" FOR ADDITIONAL INFORMATION.
2. MINOR ADJUSTMENTS TO HORIZONTAL LOCATION OF SIDEWALK & CURB RAMPS MAY BE MADE TO AVOID CONFLICTS WITH UTILITIES (POWER POLES, WATER METERS, UTILITY MARKERS, AT&T PEDESTALS, & MARKERS), MAILBOXES, LANDSCAPING (TREES, ETC) AS APPROVED BY THE ENGINEER.
3. PROPOSED SIDEWALK SHOULD BE 6 FEET WIDE WHEN CONSTRUCT NEXT TO CURB. PROPOSED SIDEWALK SHOULD BE 5 FEET WIDE WHEN CONSTRUCT AWAY FROM CURB.
4. PROTECT TREE ACCORDING TO HOUSTON DISTRICT TREE PROTECTION STANDARD. ADJUST SIDEWALK TO AVOID TREE. USE CHECKER PLATE DETAIL AS SHOWN ON SIDEWALK DETAILS.
5. IN AREAS WHERE SIDEWALKS ARE TO REMAIN, REMOVE EXISTING DETECTABLE WARNING PAVERS AT ALL DRIVEWAYS AND REPLACE PORTION OF SIDEWALK IF REQUIRED.
6. IN AREAS WHERE SIDEWALKS ARE TO REMAIN AND ONLY DRIVEWAYS ARE REPLACED, SIDEWALK REPLACEMENT ON EACH SIDE OF DRIVEWAY SHALL MATCH THE SURFACE TEXTURE AND COLOR OF THE EXISTING SIDEWALK AS CLOSELY AS POSSIBLE.
7. ALL OFFSETS ARE TO EDGE OF CONCRETE SIDEWALK.
8. ALL C2 CURB TO BE SLOTTED EVERY 20' TO ENSURE THE EXCESS FLOW FROM THE ROAD TOWARDS THE EXIST DITCH IS NOT HALTED DURING HEAVY RAINFALL. SEE DETAIL SHEET 66.
9. FOR FAST TRACK CONCRETE PROVIDE CLASS HES (HIGHLY EARLY STRENGTH) CONCRETE WITH A MINIMUM AVERAGE FLEXURAL STRENGTH OF 255 PSI OR A MINIMUM COMPRESSIVE STRENGTH OF 1,800 PSI IN 16 HOURS.
10. THE TOP OF THE EXISTING GROUND BOXES SHOULD BE LEVELLED WITH NON SLIP SURFACE AS PER TXDOT STANDARD.
11. REGRADE DITCH LOCATIONS ARE APPROXIMATE AND ENGINEER SHALL VERIFY THE EXACT FIELD LOCATIONS. REGRADED DITCHES SHALL MATCH THE EXIST DITCH SIDE SLOPE, DITCH CAPACITY AND ELEVATIONS OF EXIST INLETS. CONTRACTOR TO ENSURE POSITIVE FLOW WITH DITCH FLOWLINE MATCHING THE EXISTING.
12. THE RIPRAP LOCATIONS ARE APPROXIMATE AND SHOULD BE VERIFIED DURING THE CONSTRUCTION BY THE ENGINEER. RIPRAP IS PROPOSED BEHIND THE C2 CURB WHERE THE EXIST DITCH SIDE SLOPE IS STEEPER THAN 3:1 ONLY IF NEEDED AS PER SITE CONDITION AND APPROVED BY THE ENGINEER.

STATE OF TEXAS
SANJAY POKHAREL
140149
LICENSED PROFESSIONAL ENGINEER

SANJAY POKHAREL, P.E. 4/19/2024

TEXAS DEPARTMENT OF TRANSPORTATION

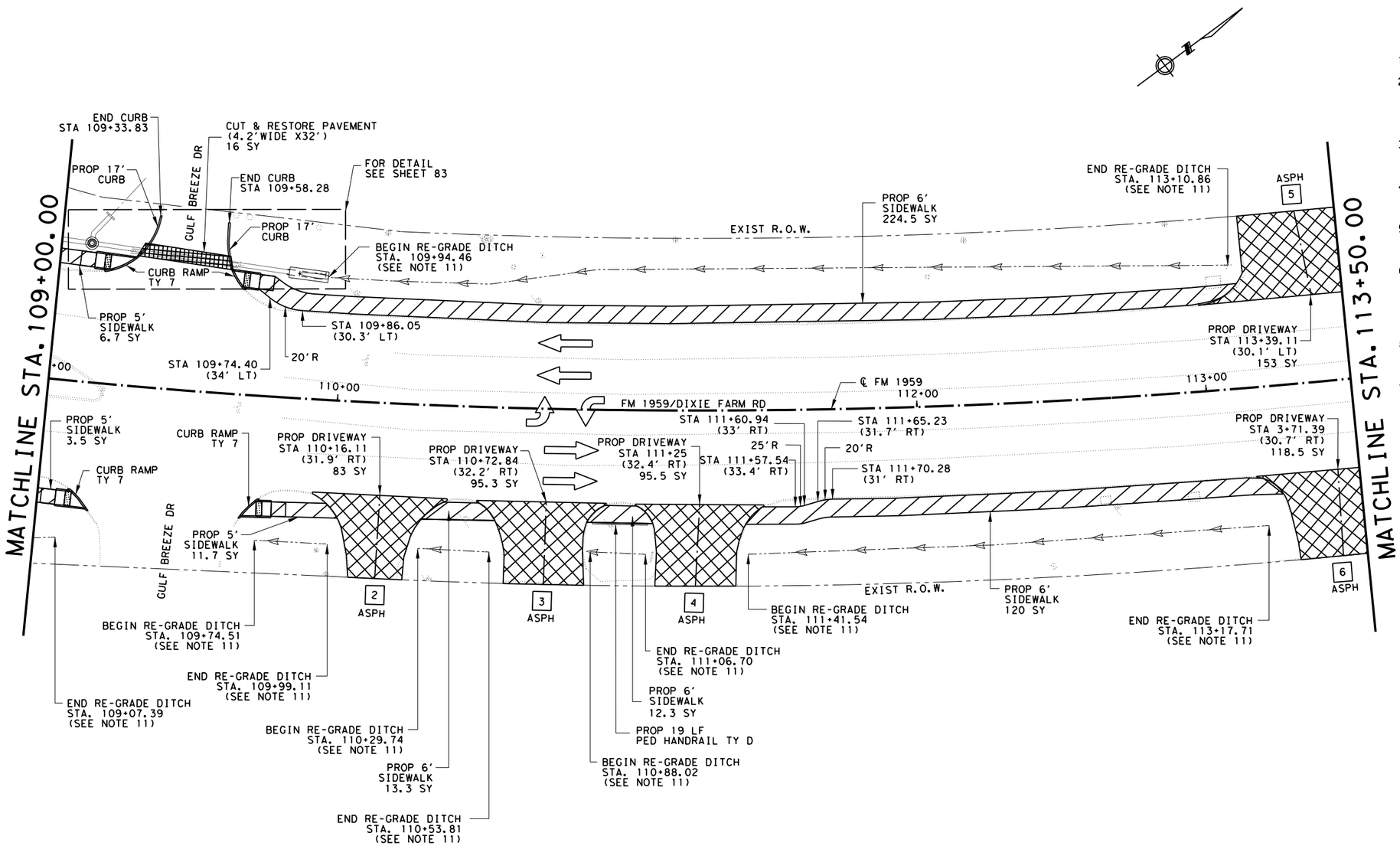
FM 1959
SIDEWALK PLAN

(STA 104+50.00 TO STA 109+00.00)

SCALE: 1"=40' SHEET 2 OF 13 SHEETS

DN: MGA	DRAWING FILE NAME:	FED.RD. DIV.NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK:		6	TX					FM 1959
DW: MGA	REVISIONS:	STATE DIST.NO	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
CK:		12	HARRIS	1844	01	029		46
TR:								
CK:								

H:\CDA\1844-01-029 (FM 1959)\Roadway Details\Sidewalk\Planview\90 Percent Plan View\PLAN2.dgn 4/19/2024



LEGEND:

- TRAFFIC FLOW DIRECTION
- X — DRIVEWAY NUMBER
- SIDEWALK/RAMP CONSTRUCTION
- DRIVEWAY CONSTRUCTION
- CONCRETE RIPRAP
- CHECKER PLATE (TREE PROTECTION)
- C2 CURB

NOTES:

1. SEE "DRIVEWAY LOCATION TABLE" FOR ADDITIONAL INFORMATION.
2. MINOR ADJUSTMENTS TO HORIZONTAL LOCATION OF SIDEWALK & CURB RAMPS MAY BE MADE TO AVOID CONFLICTS WITH UTILITIES (POWER POLES, WATER METERS,UTILITY MARKERS, AT&T PEDESTALS,& MARKERS),MAILBOXES, LANDSCAPING(TREES, ETC) AS APPROVED BY THE ENGINEER.
3. PROPOSED SIDEWALK SHOULD BE 6 FEET WIDE WHEN CONSTRUCT NEXT TO CURB. PROPOSED SIDEWALK SHOULD BE 5 FEET WIDE WHEN CONSTRUCT AWAY FROM CURB.
4. PROTECT TREE ACCORDING TO HOUSTON DISTRICT TREE PROTECTION STANDARD. ADJUST SIDEWALK TO AVOID TREE. USE CHECKER PLATE DETAIL AS SHOWN ON SIDEWALK DETAILS.
5. IN AREAS WHERE SIDEWALKS ARE TO REMAIN, REMOVE EXISTING DETECTABLE WARNING PAVERS AT ALL DRIVEWAYS AND REPLACE PORTION OF SIDEWALK IF REQUIRED.
6. IN AREAS WHERE SIDEWALKS ARE TO REMAIN AND ONLY DRIVEWAYS ARE REPLACED, SIDEWALK REPLACEMENT ON EACH SIDE OF DRIVEWAY SHALL MATCH THE SURFACE TEXTURE AND COLOR OF THE EXISTING SIDEWALK AS CLOSELY AS POSSIBLE.
7. ALL OFFSETS ARE TO EDGE OF CONCRETE SIDEWALK.
8. ALL C2 CURB TO BE SLOTTED EVERY 20' TO ENSURE THE EXCESS FLOW FROM THE ROAD TOWARDS THE EXIST DITCH IS NOT HALTED DURING HEAVY RAINFALL.SEE DETAIL SHEET 66.
9. FOR FAST TRACK CONCRETE PROVIDE CLASS HES(HIGHLY EARLY STRENGTH) CONCRETE WITH A MINIMUM AVERAGE FLEXURAL STRENGTH OF 255 PSI OR A MINIMUM COMPRESSIVE STRENGTH OF 1,800 PSI IN 16 HOURS.
10. THE TOP OF THE EXISTING GROUND BOXES SHOULD BE LEVELLED WITH NON SLIP SURFACE AS PER TXDOT STANDARD.
11. REGRADE DITCH LOCATIONS ARE APPROXIMATE AND ENGINEER SHALL VERIFY THE EXACT FIELD LOCATIONS.REGRADED DITCHES SHALL MATCH THE EXIST DITCH SIDE SLOPE, DITCH CAPACITY AND ELEVATIONS OF EXIST INLETS. CONTRACTOR TO ENSURE POSITIVE FLOW WITH DITCH FLOWLINE MATCHING THE EXISTING.
12. THE RIPRAP LOCATIONS ARE APPROXIMATE AND SHOULD BE VERIFIED DURING THE CONSTRUCTION BY THE ENGINEER.RIPRAP IS PROPOSED BEHIND THE C2 CURB WHERE THE EXIST DITCH SIDE SLOPE IS STEEPER THAN 3:1 ONLY IF NEEDED AS PER SITE CONDITION AND APPROVED BY THE ENGINEER.

STATE OF TEXAS
SANJAY POKHAREL
140149
LICENSED PROFESSIONAL ENGINEER

SANJAY POKHAREL, P.E. 4/16/2024

TEXAS DEPARTMENT OF TRANSPORTATION

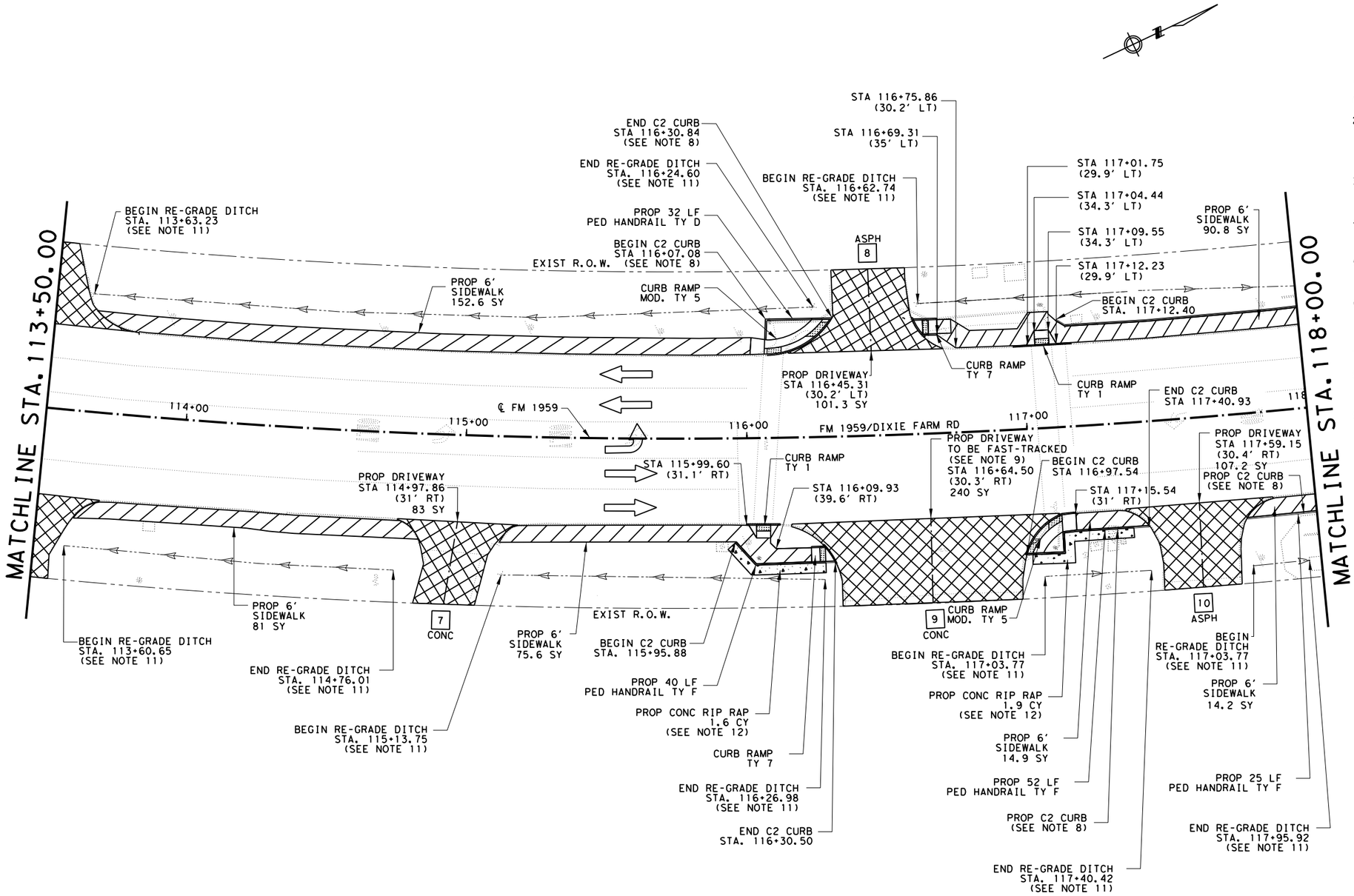
FM 1959
SIDEWALK PLAN

(STA 109+00.00 TO STA 113+50.00)

SCALE: 1"=40' SHEET 3 OF 13 SHEETS

DN: MGA	DRAWING FILE NAME:	FED.RD. DIV.NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK:		6	TX					FM 1959
DW: MGA	REVISIONS:	STATE DIST.NO	COUNTY		CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK:		12	HARRIS		1844	01	029	47
TR:								
CK:								

H:\CDA\1844-01-029 (FM 1959)\Roadway Details\Sidewalk\Planview\90 Percent Plan View\PLAN3.dgn 4/16/2024



LEGEND:

- TRAFFIC FLOW DIRECTION
- X — DRIVEWAY NUMBER
- SIDEWALK/RAMP CONSTRUCTION
- DRIVEWAY CONSTRUCTION
- CONCRETE RIPRAP
- CHECKER PLATE (TREE PROTECTION)
- C2 CURB

NOTES:

1. SEE "DRIVEWAY LOCATION TABLE" FOR ADDITIONAL INFORMATION.
2. MINOR ADJUSTMENTS TO HORIZONTAL LOCATION OF SIDEWALK & CURB RAMPS MAY BE MADE TO AVOID CONFLICTS WITH UTILITIES (POWER POLES, WATER METERS,UTILITY MARKERS, AT&T PEDESTALS,& MARKERS),MAILBOXES, LANDSCAPING(TREES, ETC) AS APPROVED BY THE ENGINEER.
3. PROPOSED SIDEWALK SHOULD BE 6 FEET WIDE WHEN CONSTRUCT NEXT TO CURB. PROPOSED SIDEWALK SHOULD BE 5 FEET WIDE WHEN CONSTRUCT AWAY FROM CURB.
4. PROTECT TREE ACCORDING TO HOUSTON DISTRICT TREE PROTECTION STANDARD. ADJUST SIDEWALK TO AVOID TREE. USE CHECKER PLATE DETAIL AS SHOWN ON SIDEWALK DETAILS.
5. IN AREAS WHERE SIDEWALKS ARE TO REMAIN, REMOVE EXISTING DETECTABLE WARNING PAVERS AT ALL DRIVEWAYS AND REPLACE PORTION OF SIDEWALK IF REQUIRED.
6. IN AREAS WHERE SIDEWALKS ARE TO REMAIN AND ONLY DRIVEWAYS ARE REPLACED, SIDEWALK REPLACEMENT ON EACH SIDE OF DRIVEWAY SHALL MATCH THE SURFACE TEXTURE AND COLOR OF THE EXISTING SIDEWALK AS CLOSELY AS POSSIBLE.
7. ALL OFFSETS ARE TO EDGE OF CONCRETE SIDEWALK.
8. ALL C2 CURB TO BE SLOTTED EVERY 20' TO ENSURE THE EXCESS FLOW FROM THE ROAD TOWARDS THE EXIST DITCH IS NOT HALTED DURING HEAVY RAINFALL.SEE DETAIL SHEET 66.
9. FOR FAST TRACK CONCRETE PROVIDE CLASS HES(HIGHLY EARLY STRENGTH) CONCRETE WITH A MINIMUM AVERAGE FLEXURAL STRENGTH OF 255 PSI OR A MINIMUM COMPRESSIVE STRENGTH OF 1,800 PSI IN 16 HOURS.
10. THE TOP OF THE EXISTING GROUND BOXES SHOULD BE LEVELLED WITH NON SLIP SURFACE AS PER TXDOT STANDARD.
11. REGRADE DITCH LOCATIONS ARE APPROXIMATE AND ENGINEER SHALL VERIFY THE EXACT FIELD LOCATIONS.REGRADED DITCHES SHALL MATCH THE EXIST DITCH SIDE SLOPE, DITCH CAPACITY AND ELEVATIONS OF EXIST INLETS. CONTRACTOR TO ENSURE POSITIVE FLOW WITH DITCH FLOWLINE MATCHING THE EXISTING.
12. THE RIPRAP LOCATIONS ARE APPROXIMATE AND SHOULD BE VERIFIED DURING THE CONSTRUCTION BY THE ENGINEER.RIPRAP IS PROPOSED BEHIND THE C2 CURB WHERE THE EXIST DITCH SIDE SLOPE IS STEEPER THAN 3:1 ONLY IF NEEDED AS PER SITE CONDITION AND APPROVED BY THE ENGINEER.

STATE OF TEXAS
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TEXAS DEPARTMENT OF TRANSPORTATION

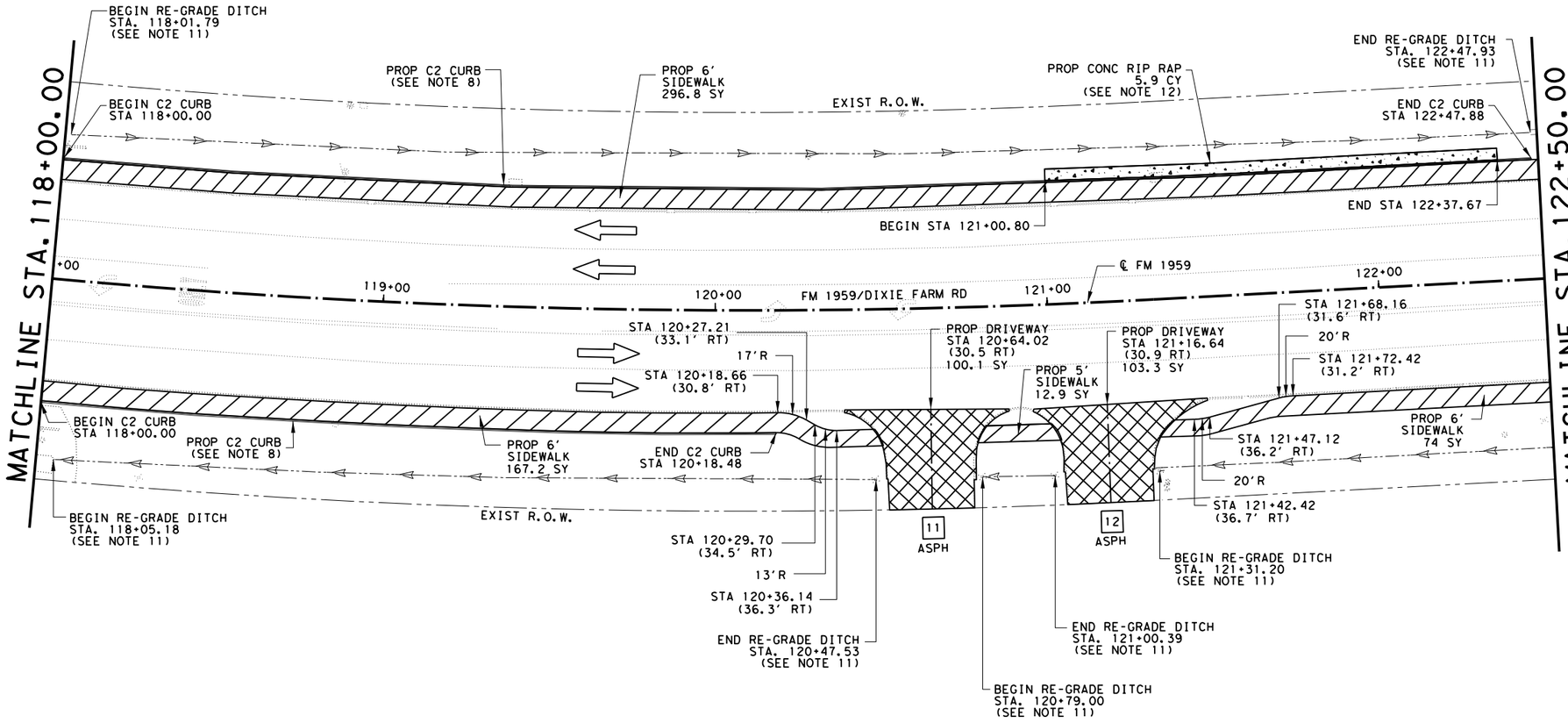
FM 1959
SIDEWALK PLAN

(STA 113+50.00 TO STA 118+00.00)

SCALE: 1"=40' SHEET 4 OF 13 SHEETS

DN: MGA	DRAWING FILE NAME:	FED.RD. DIV.NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK:		6	TX					FM 1959
DW: MGA	REVISIONS:	STATE DIST.NO	COUNTY		CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK:		12	HARRIS		1844	01	029	48
TR:								
CK:								

H:\CDA\1844-01-029 (FM 1959)\Roadway Details\Sidewalk\Planview\90 Percent Plan View\PLAN4.dgn 4/16/2024



LEGEND:

- TRAFFIC FLOW DIRECTION
- X — DRIVEWAY NUMBER
- SIDEWALK/RAMP CONSTRUCTION
- DRIVEWAY CONSTRUCTION
- CONCRETE RIPRAP
- CHECKER PLATE (TREE PROTECTION)
- C2 CURB

NOTES:

1. SEE "DRIVEWAY LOCATION TABLE" FOR ADDITIONAL INFORMATION.
2. MINOR ADJUSTMENTS TO HORIZONTAL LOCATION OF SIDEWALK & CURB RAMPS MAY BE MADE TO AVOID CONFLICTS WITH UTILITIES (POWER POLES, WATER METERS,UTILITY MARKERS, AT&T PEDESTALS,& MARKERS),MAILBOXES, LANDSCAPING(TREES, ETC) AS APPROVED BY THE ENGINEER.
3. PROPOSED SIDEWALK SHOULD BE 6 FEET WIDE WHEN CONSTRUCT NEXT TO CURB. PROPOSED SIDEWALK SHOULD BE 5 FEET WIDE WHEN CONSTRUCT AWAY FROM CURB.
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5. IN AREAS WHERE SIDEWALKS ARE TO REMAIN, REMOVE EXISTING DETECTABLE WARNING PAVERS AT ALL DRIVEWAYS AND REPLACE PORTION OF SIDEWALK IF REQUIRED.
6. IN AREAS WHERE SIDEWALKS ARE TO REMAIN AND ONLY DRIVEWAYS ARE REPLACED, SIDEWALK REPLACEMENT ON EACH SIDE OF DRIVEWAY SHALL MATCH THE SURFACE TEXTURE AND COLOR OF THE EXISTING SIDEWALK AS CLOSELY AS POSSIBLE.
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9. FOR FAST TRACK CONCRETE PROVIDE CLASS HES(HIGHLY EARLY STRENGTH) CONCRETE WITH A MINIMUM AVERAGE FLEXURAL STRENGTH OF 255 PSI OR A MINIMUM COMPRESSIVE STRENGTH OF 1,800 PSI IN 16 HOURS.
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TEXAS DEPARTMENT OF TRANSPORTATION

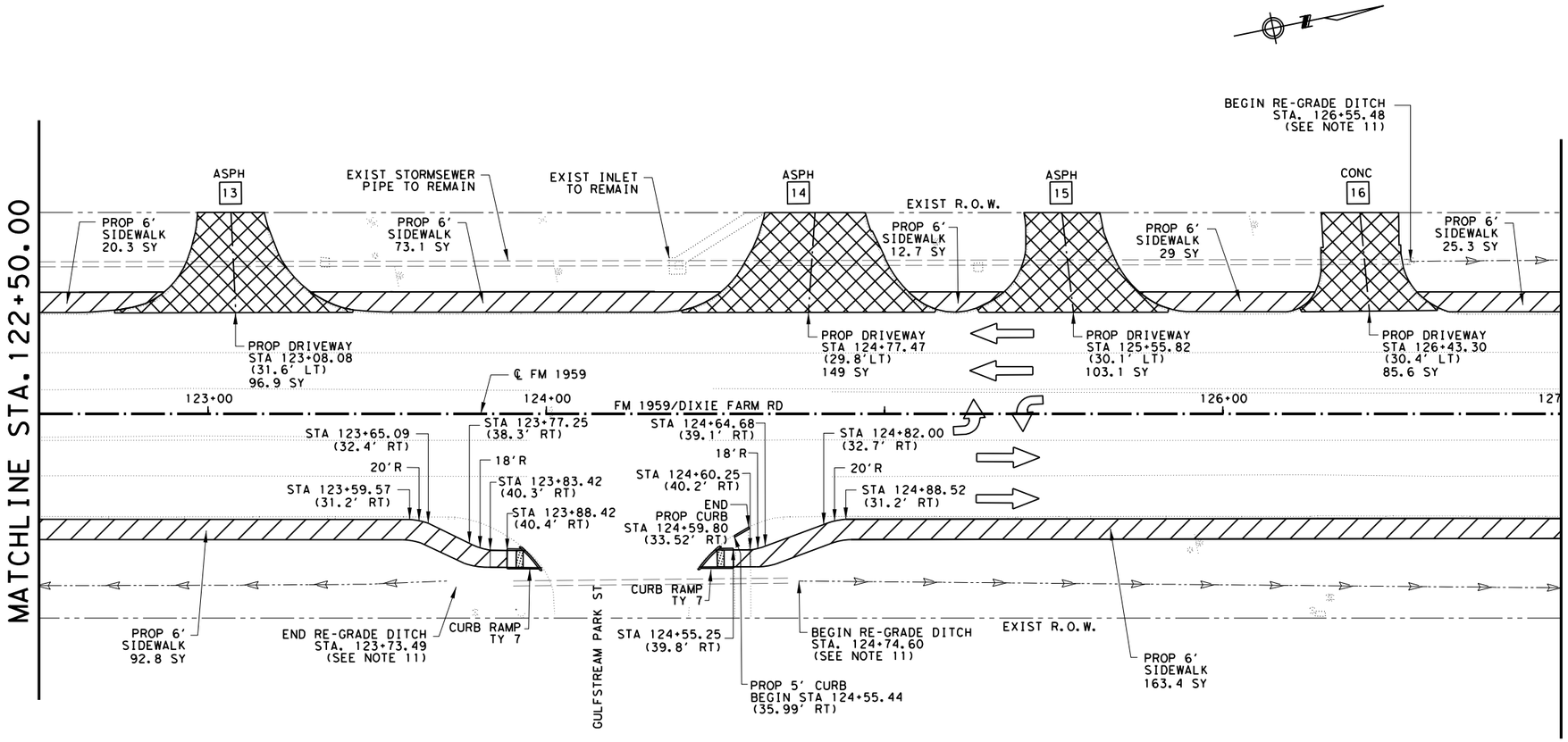
FM 1959
SIDEWALK PLAN

(STA 118+00.00 TO STA 122+50.00)

SCALE: 1"=40' SHEET 5 OF 13 SHEETS

DN: MGA	DRAWING FILE NAME:	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK:		6	TX				FM 1959
DW: MGA	REVISIONS:	STATE DIST.NO	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK:		12	HARRIS	1844	01	029	49
TR:							
CK:							

H:\CDA\1844-01-029 (FM 1959)\Roadway Details\Sidewalk\Planview\90 Percent Plan View\PLAN5.dgn 4/16/2024



LEGEND:

- TRAFFIC FLOW DIRECTION
- [X] DRIVEWAY NUMBER
- SIDEWALK/RAMP CONSTRUCTION
- DRIVEWAY CONSTRUCTION
- CONCRETE RIPRAP
- CHECKER PLATE (TREE PROTECTION)
- C2 CURB

NOTES:

1. SEE "DRIVEWAY LOCATION TABLE" FOR ADDITIONAL INFORMATION.
2. MINOR ADJUSTMENTS TO HORIZONTAL LOCATION OF SIDEWALK & CURB RAMPS MAY BE MADE TO AVOID CONFLICTS WITH UTILITIES (POWER POLES, WATER METERS,UTILITY MARKERS, AT&T PEDESTALS,& MARKERS),MAILBOXES, LANDSCAPING(TREES, ETC) AS APPROVED BY THE ENGINEER.
3. PROPOSED SIDEWALK SHOULD BE 6 FEET WIDE WHEN CONSTRUCT NEXT TO CURB. PROPOSED SIDEWALK SHOULD BE 5 FEET WIDE WHEN CONSTRUCT AWAY FROM CURB.
4. PROTECT TREE ACCORDING TO HOUSTON DISTRICT TREE PROTECTION STANDARD. ADJUST SIDEWALK TO AVOID TREE. USE CHECKER PLATE DETAIL AS SHOWN ON SIDEWALK DETAILS.
5. IN AREAS WHERE SIDEWALKS ARE TO REMAIN, REMOVE EXISTING DETECTABLE WARNING PAVERS AT ALL DRIVEWAYS AND REPLACE PORTION OF SIDEWALK IF REQUIRED.
6. IN AREAS WHERE SIDEWALKS ARE TO REMAIN AND ONLY DRIVEWAYS ARE REPLACED, SIDEWALK REPLACEMENT ON EACH SIDE OF DRIVEWAY SHALL MATCH THE SURFACE TEXTURE AND COLOR OF THE EXISTING SIDEWALK AS CLOSELY AS POSSIBLE.
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TEXAS DEPARTMENT OF TRANSPORTATION

FM 1959
SIDEWALK PLAN

(STA 122+50.00 TO STA 127+00.00)

SCALE: 1"=40' SHEET 6 OF 13 SHEETS

DN: MGA	DRAWING FILE NAME:	FED.RD. DIV.NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK:		6	TX					FM 1959
DW: MGA	REVISIONS:	STATE DIST.NO	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
CK:		12	HARRIS	1844	01	029		50
TR:								
CK:								

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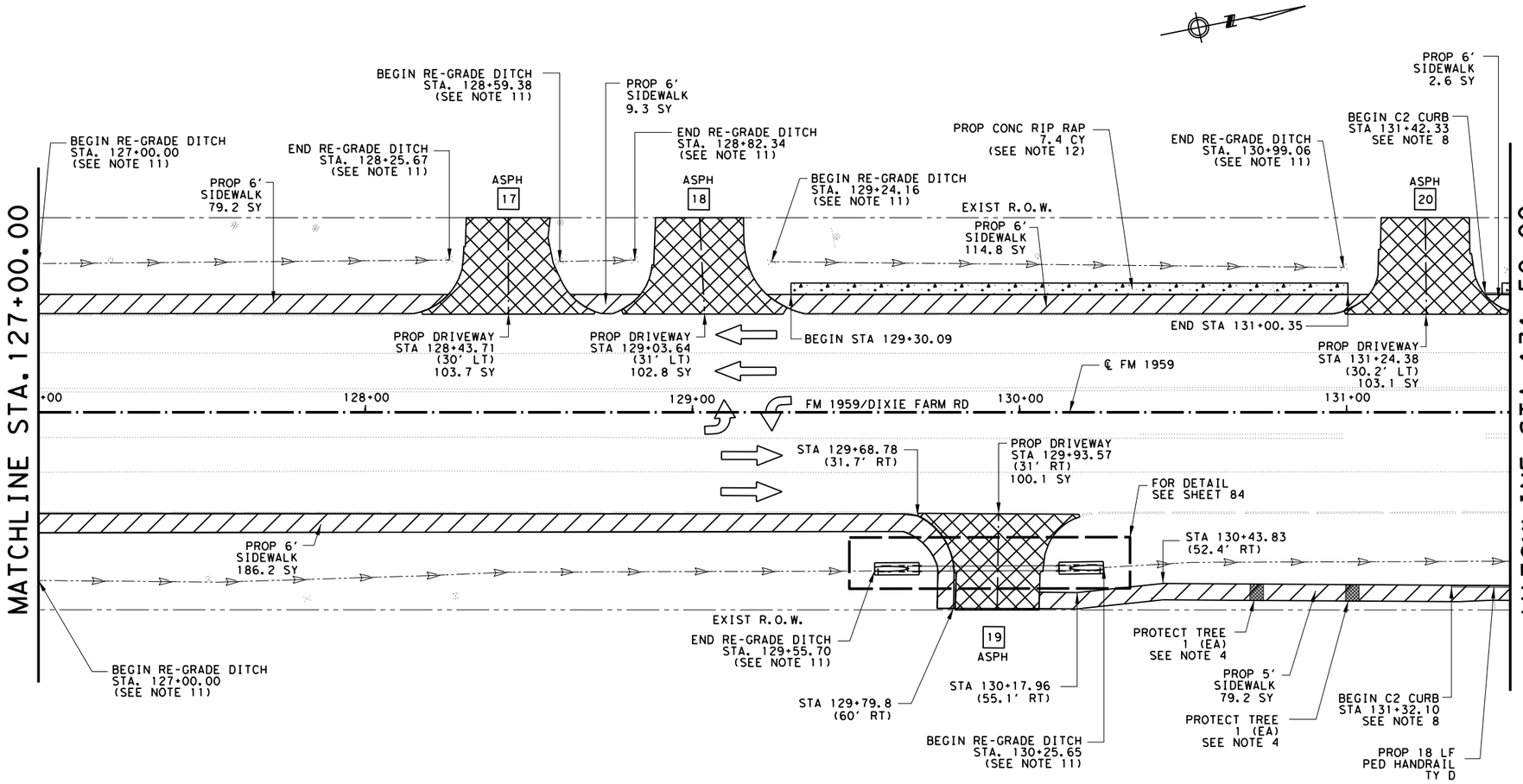

LEGEND:

- TRAFFIC FLOW DIRECTION
- X — DRIVEWAY NUMBER
- SIDEWALK/RAMP CONSTRUCTION
- DRIVEWAY CONSTRUCTION
- CONCRETE RIPRAP
- CHECKER PLATE (TREE PROTECTION)
- C2 CURB

NOTES:

1. SEE "DRIVEWAY LOCATION TABLE" FOR ADDITIONAL INFORMATION.
2. MINOR ADJUSTMENTS TO HORIZONTAL LOCATION OF SIDEWALK & CURB RAMPS MAY BE MADE TO AVOID CONFLICTS WITH UTILITIES (POWER POLES, WATER METERS,UTILITY MARKERS, AT&T PEDESTALS,& MARKERS),MAILBOXES, LANDSCAPING(TREES, ETC) AS APPROVED BY THE ENGINEER.
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STATE OF TEXAS
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S. Pokharel P.E.

SANJAY POKHAREL, P.E. 4/16/2024

TEXAS DEPARTMENT OF TRANSPORTATION

FM 1959
SIDEWALK PLAN
(STA 127+00.00 TO STA 131+50.00)

SCALE: 1"=40' SHEET 7 OF 13 SHEETS

DN: MGA	DRAWING FILE NAME:	FED.RD. DIV.NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK:		6	TX					FM 1959
DW: MGA	REVISIONS:	STATE DIST.NO	COUNTY		CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK:		12	HARRIS		1844	01	029	51
TR:								
CK:								

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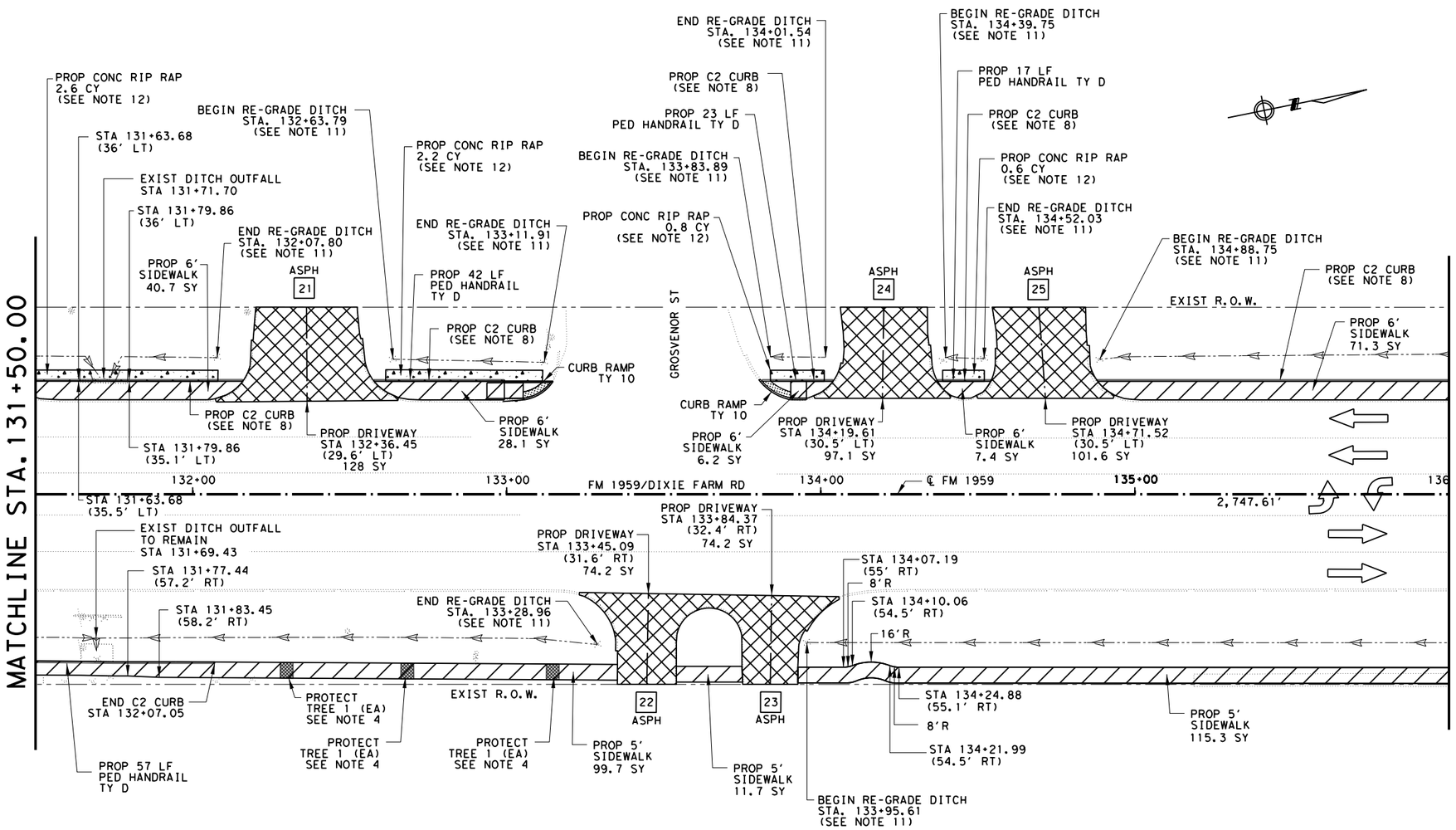

LEGEND:

- TRAFFIC FLOW DIRECTION
- X — DRIVEWAY NUMBER
- SIDEWALK/RAMP CONSTRUCTION
- DRIVEWAY CONSTRUCTION
- CONCRETE RIPRAP
- CHECKER PLATE (TREE PROTECTION)
- C2 CURB

NOTES:

1. SEE "DRIVEWAY LOCATION TABLE" FOR ADDITIONAL INFORMATION.
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5. IN AREAS WHERE SIDEWALKS ARE TO REMAIN, REMOVE EXISTING DETECTABLE WARNING PAVERS AT ALL DRIVEWAYS AND REPLACE PORTION OF SIDEWALK IF REQUIRED.
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9. FOR FAST TRACK CONCRETE PROVIDE CLASS HES (HIGHLY EARLY STRENGTH) CONCRETE WITH A MINIMUM AVERAGE FLEXURAL STRENGTH OF 255 PSI OR A MINIMUM COMPRESSIVE STRENGTH OF 1,800 PSI IN 16 HOURS.
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TEXAS DEPARTMENT OF TRANSPORTATION

FM 1959 SIDEWALK PLAN

(131+50 TO STA 136+00)

SCALE: 1"=40' SHEET 8 OF 13 SHEETS

DN: MGA	DRAWING FILE NAME:	FED.RD. DIV.NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK:		6	TX					FM 1959
DW: MGA	REVISIONS:	STATE DIST.NO	COUNTY		CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
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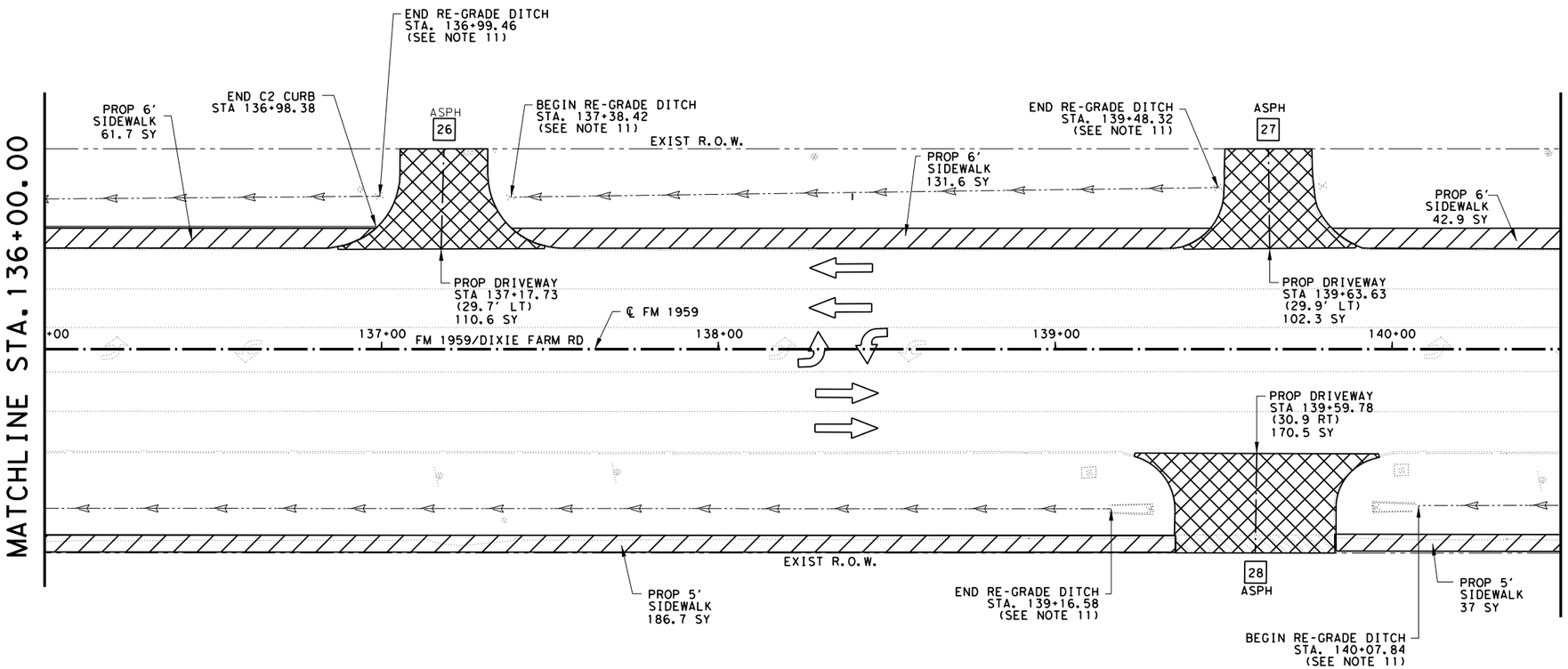
TR:								
CK:								



LEGEND:

- TRAFFIC FLOW DIRECTION
- [X] DRIVEWAY NUMBER
- SIDEWALK/RAMP CONSTRUCTION
- DRIVEWAY CONSTRUCTION
- CONCRETE RIPRAP
- CHECKER PLATE (TREE PROTECTION)
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NOTES:

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TEXAS DEPARTMENT OF TRANSPORTATION

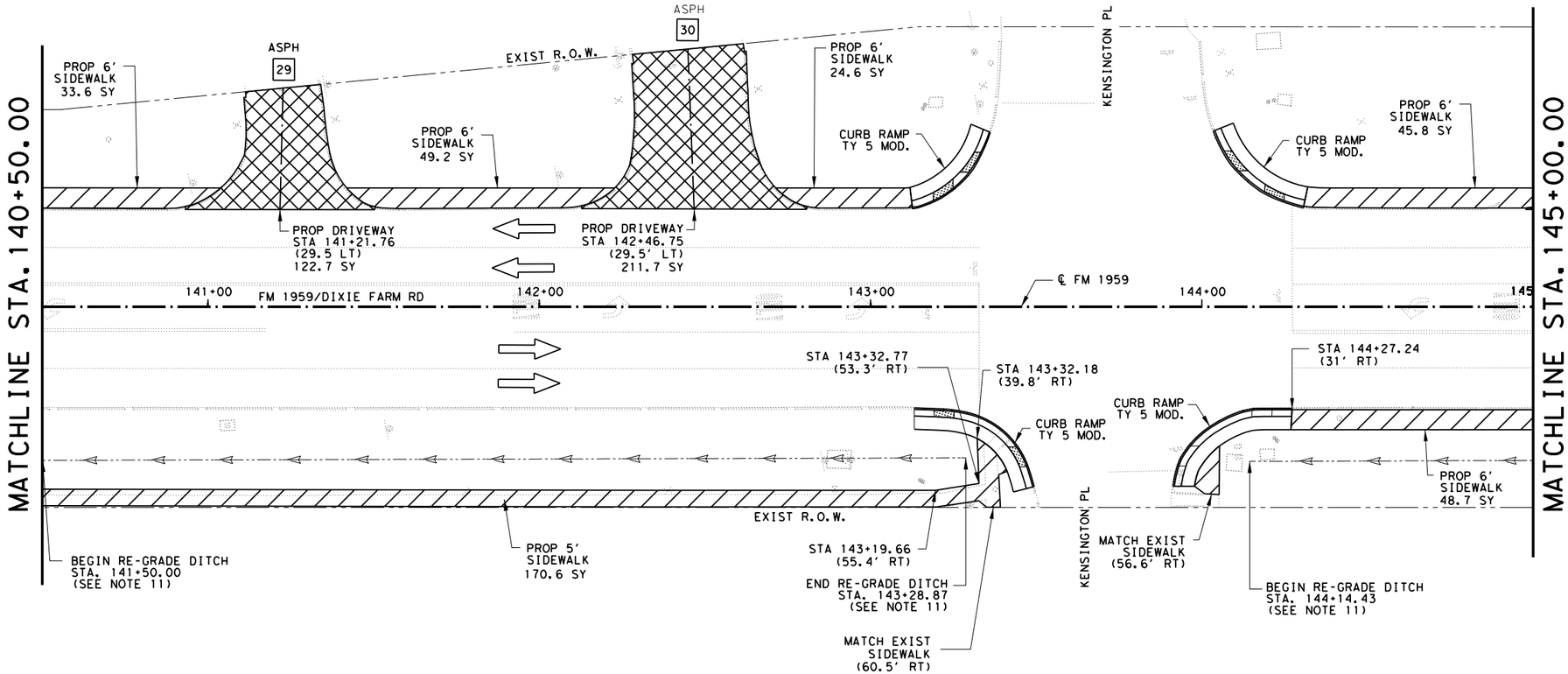
FM 1959
SIDEWALK PLAN

(STA 136+00.00 TO STA 140+50.00)

SCALE: 1"=40' SHEET 9 OF 13 SHEETS

DN: MGA	DRAWING FILE NAME:	FED.RD. DIV.NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK:		6	TX					FM 1959
DW: MGA	REVISIONS:	STATE DIST.NO	COUNTY		CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK:		12	HARRIS		1844	01	029	53
TR:								
CK:								

H:\CDA\1844-01-029 (FM 1959)\Roadway Details\Sidewalk\Planview\90 Percent Plan View\PLAN9.dgn 4/16/2024



LEGEND:

- TRAFFIC FLOW DIRECTION
- [X] DRIVEWAY NUMBER
- SIDEWALK/RAMP CONSTRUCTION
- DRIVEWAY CONSTRUCTION
- CONCRETE RIPRAP
- CHECKER PLATE (TREE PROTECTION)
- C2 CURB

NOTES:

1. SEE "DRIVEWAY LOCATION TABLE" FOR ADDITIONAL INFORMATION.
2. MINOR ADJUSTMENTS TO HORIZONTAL LOCATION OF SIDEWALK & CURB RAMPS MAY BE MADE TO AVOID CONFLICTS WITH UTILITIES (POWER POLES, WATER METERS,UTILITY MARKERS, AT&T PEDESTALS,& MARKERS),MAILBOXES, LANDSCAPING(TREES, ETC) AS APPROVED BY THE ENGINEER.
3. PROPOSED SIDEWALK SHOULD BE 6 FEET WIDE WHEN CONSTRUCT NEXT TO CURB. PROPOSED SIDEWALK SHOULD BE 5 FEET WIDE WHEN CONSTRUCT AWAY FROM CURB.
4. PROTECT TREE ACCORDING TO HOUSTON DISTRICT TREE PROTECTION STANDARD. ADJUST SIDEWALK TO AVOID TREE. USE CHECKER PLATE DETAIL AS SHOWN ON SIDEWALK DETAILS.
5. IN AREAS WHERE SIDEWALKS ARE TO REMAIN, REMOVE EXISTING DETECTABLE WARNING PAVERS AT ALL DRIVEWAYS AND REPLACE PORTION OF SIDEWALK IF REQUIRED.
6. IN AREAS WHERE SIDEWALKS ARE TO REMAIN AND ONLY DRIVEWAYS ARE REPLACED, SIDEWALK REPLACEMENT ON EACH SIDE OF DRIVEWAY SHALL MATCH THE SURFACE TEXTURE AND COLOR OF THE EXISTING SIDEWALK AS CLOSELY AS POSSIBLE.
7. ALL OFFSETS ARE TO EDGE OF CONCRETE SIDEWALK.
8. ALL C2 CURB TO BE SLOTTED EVERY 20' TO ENSURE THE EXCESS FLOW FROM THE ROAD TOWARDS THE EXIST DITCH IS NOT HALTED DURING HEAVY RAINFALL.SEE DETAIL SHEET 66.
9. FOR FAST TRACK CONCRETE PROVIDE CLASS HES(HIGHLY EARLY STRENGTH) CONCRETE WITH A MINIMUM AVERAGE FLEXURAL STRENGTH OF 255 PSI OR A MINIMUM COMPRESSIVE STRENGTH OF 1,800 PSI IN 16 HOURS.
10. THE TOP OF THE EXISTING GROUND BOXES SHOULD BE LEVELLED WITH NON SLIP SURFACE AS PER TXDOT STANDARD.
11. REGRADE DITCH LOCATIONS ARE APPROXIMATE AND ENGINEER SHALL VERIFY THE EXACT FIELD LOCATIONS.REGRADED DITCHES SHALL MATCH THE EXIST DITCH SIDE SLOPE, DITCH CAPACITY AND ELEVATIONS OF EXIST INLETS. CONTRACTOR TO ENSURE POSITIVE FLOW WITH DITCH FLOWLINE MATCHING THE EXISTING.
12. THE RIPRAP LOCATIONS ARE APPROXIMATE AND SHOULD BE VERIFIED DURING THE CONSTRUCTION BY THE ENGINEER.RIPRAP IS PROPOSED BEHIND THE C2 CURB WHERE THE EXIST DITCH SIDE SLOPE IS STEEPER THAN 3:1 ONLY IF NEEDED AS PER SITE CONDITION AND APPROVED BY THE ENGINEER.

STATE OF TEXAS
SANJAY POKHAREL
140149
LICENSED PROFESSIONAL ENGINEER

SANJAY POKHAREL, P.E. 4/16/2024

TEXAS DEPARTMENT OF TRANSPORTATION

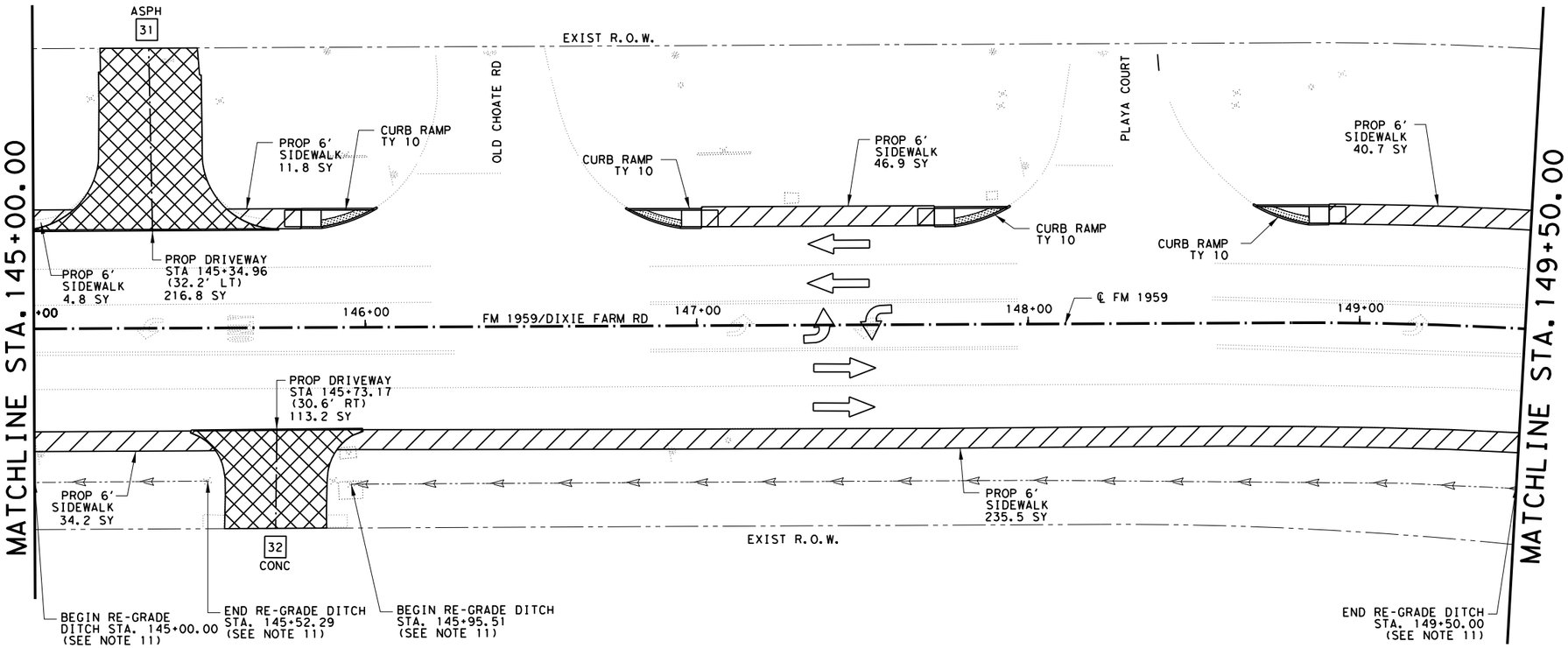
FM 1959
SIDEWALK PLAN

(STA 140+50.00 TO STA 145+00.00)

SCALE: 1"=40' SHEET 10 OF 13 SHEETS

DN: MGA	DRAWING FILE NAME:	FED.RD. DIV.NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK:		6	TX					FM 1959
DW: MGA	REVISIONS:	STATE DIST.NO	COUNTY		CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK:		12	HARRIS		1844	01	029	54
TR:								
CK:								

H:\CDA\1844-01-029 (FM 1959)\Roadway Details\Sidewalk\Planview\90 Percent Plan View\PLAN10.dgn 4/16/2024



LEGEND:

- TRAFFIC FLOW DIRECTION
- X — DRIVEWAY NUMBER
- SIDEWALK/RAMP CONSTRUCTION
- DRIVEWAY CONSTRUCTION
- CONCRETE RIPRAP
- CHECKER PLATE (TREE PROTECTION)
- C2 CURB

NOTES:

1. SEE "DRIVEWAY LOCATION TABLE" FOR ADDITIONAL INFORMATION.
2. MINOR ADJUSTMENTS TO HORIZONTAL LOCATION OF SIDEWALK & CURB RAMPS MAY BE MADE TO AVOID CONFLICTS WITH UTILITIES (POWER POLES, WATER METERS,UTILITY MARKERS, AT&T PEDESTALS,& MARKERS),MAILBOXES, LANDSCAPING(TREES, ETC) AS APPROVED BY THE ENGINEER.
3. PROPOSED SIDEWALK SHOULD BE 6 FEET WIDE WHEN CONSTRUCT NEXT TO CURB. PROPOSED SIDEWALK SHOULD BE 5 FEET WIDE WHEN CONSTRUCT AWAY FROM CURB.
4. PROTECT TREE ACCORDING TO HOUSTON DISTRICT TREE PROTECTION STANDARD. ADJUST SIDEWALK TO AVOID TREE. USE CHECKER PLATE DETAIL AS SHOWN ON SIDEWALK DETAILS.
5. IN AREAS WHERE SIDEWALKS ARE TO REMAIN, REMOVE EXISTING DETECTABLE WARNING PAVERS AT ALL DRIVEWAYS AND REPLACE PORTION OF SIDEWALK IF REQUIRED.
6. IN AREAS WHERE SIDEWALKS ARE TO REMAIN AND ONLY DRIVEWAYS ARE REPLACED, SIDEWALK REPLACEMENT ON EACH SIDE OF DRIVEWAY SHALL MATCH THE SURFACE TEXTURE AND COLOR OF THE EXISTING SIDEWALK AS CLOSELY AS POSSIBLE.
7. ALL OFFSETS ARE TO EDGE OF CONCRETE SIDEWALK.
8. ALL C2 CURB TO BE SLOTTED EVERY 20' TO ENSURE THE EXCESS FLOW FROM THE ROAD TOWARDS THE EXIST DITCH IS NOT HALTED DURING HEAVY RAINFALL.SEE DETAIL SHEET 66.
9. FOR FAST TRACK CONCRETE PROVIDE CLASS HES(HIGHLY EARLY STRENGTH) CONCRETE WITH A MINIMUM AVERAGE FLEXURAL STRENGTH OF 255 PSI OR A MINIMUM COMPRESSIVE STRENGTH OF 1,800 PSI IN 16 HOURS.
10. THE TOP OF THE EXISTING GROUND BOXES SHOULD BE LEVELLED WITH NON SLIP SURFACE AS PER TXDOT STANDARD.
11. REGRADE DITCH LOCATIONS ARE APPROXIMATE AND ENGINEER SHALL VERIFY THE EXACT FIELD LOCATIONS.REGRADED DITCHES SHALL MATCH THE EXIST DITCH SIDE SLOPE, DITCH CAPACITY AND ELEVATIONS OF EXIST INLETS. CONTRACTOR TO ENSURE POSITIVE FLOW WITH DITCH FLOWLINE MATCHING THE EXISTING.
12. THE RIPRAP LOCATIONS ARE APPROXIMATE AND SHOULD BE VERIFIED DURING THE CONSTRUCTION BY THE ENGINEER.RIPRAP IS PROPOSED BEHIND THE C2 CURB WHERE THE EXIST DITCH SIDE SLOPE IS STEEPER THAN 3:1 ONLY IF NEEDED AS PER SITE CONDITION AND APPROVED BY THE ENGINEER.

STATE OF TEXAS
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SANJAY POKHAREL, P.E. 4/16/2024

TEXAS DEPARTMENT OF TRANSPORTATION

FM 1959
SIDEWALK PLAN

(STA 145+00.00 TO STA 149+50.00)

SCALE: 1"=40' SHEET 11 OF 13 SHEETS

DN: MGA	DRAWING FILE NAME:	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK:		6	TX				FM 1959
DW: MGA	REVISIONS:	STATE DIST.NO	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK:		12	HARRIS	1844	01	029	55
TR:							
CK:							

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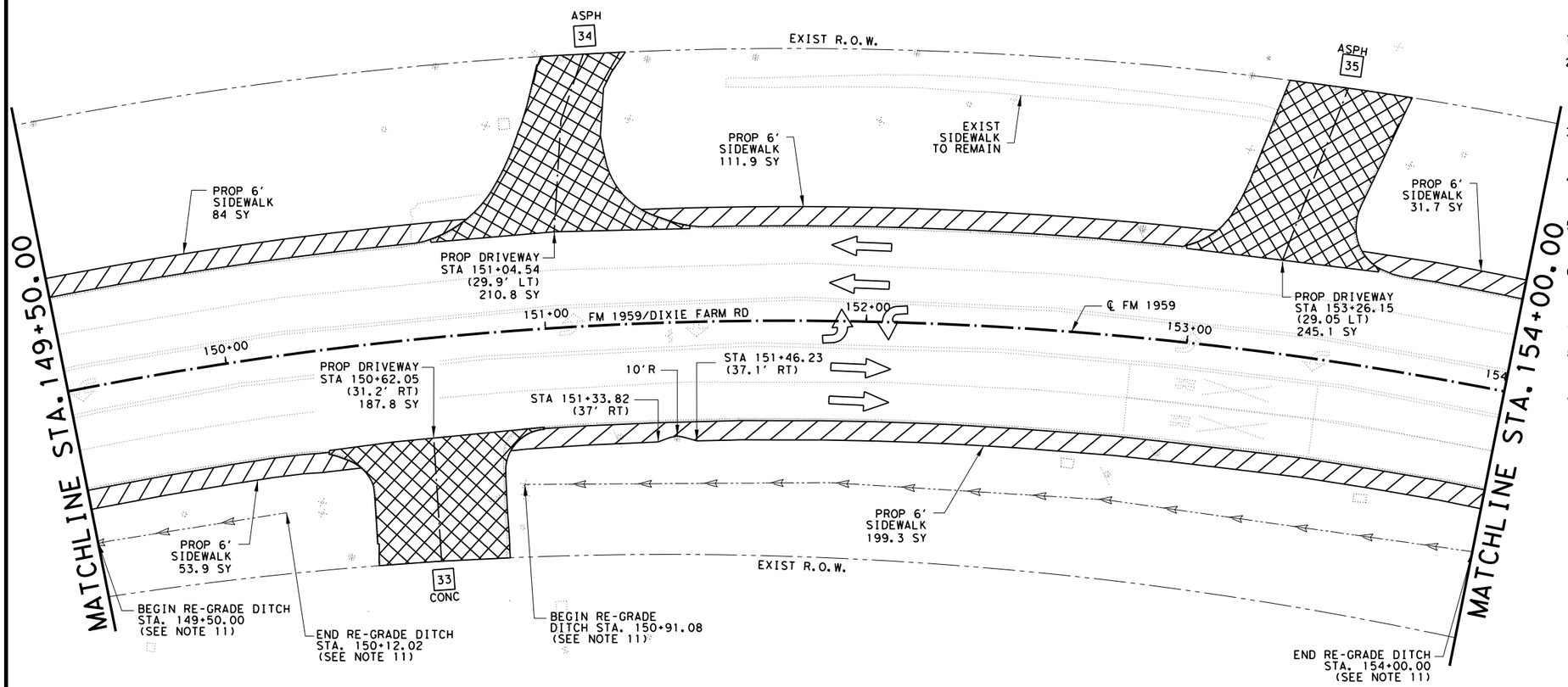

LEGEND:

- TRAFFIC FLOW DIRECTION
- X — DRIVEWAY NUMBER
- SIDEWALK/RAMP CONSTRUCTION
- DRIVEWAY CONSTRUCTION
- CONCRETE RIPRAP
- CHECKER PLATE (TREE PROTECTION)
- C2 CURB

NOTES:

1. SEE "DRIVEWAY LOCATION TABLE" FOR ADDITIONAL INFORMATION.
2. MINOR ADJUSTMENTS TO HORIZONTAL LOCATION OF SIDEWALK & CURB RAMPS MAY BE MADE TO AVOID CONFLICTS WITH UTILITIES (POWER POLES, WATER METERS,UTILITY MARKERS, AT&T PEDESTALS,& MARKERS),MAILBOXES, LANDSCAPING(TREES, ETC) AS APPROVED BY THE ENGINEER.
3. PROPOSED SIDEWALK SHOULD BE 6 FEET WIDE WHEN CONSTRUCT NEXT TO CURB. PROPOSED SIDEWALK SHOULD BE 5 FEET WIDE WHEN CONSTRUCT AWAY FROM CURB.
4. PROTECT TREE ACCORDING TO HOUSTON DISTRICT TREE PROTECTION STANDARD. ADJUST SIDEWALK TO AVOID TREE. USE CHECKER PLATE DETAIL AS SHOWN ON SIDEWALK DETAILS.
5. IN AREAS WHERE SIDEWALKS ARE TO REMAIN, REMOVE EXISTING DETECTABLE WARNING PAVERS AT ALL DRIVEWAYS AND REPLACE PORTION OF SIDEWALK IF REQUIRED.
6. IN AREAS WHERE SIDEWALKS ARE TO REMAIN AND ONLY DRIVEWAYS ARE REPLACED, SIDEWALK REPLACEMENT ON EACH SIDE OF DRIVEWAY SHALL MATCH THE SURFACE TEXTURE AND COLOR OF THE EXISTING SIDEWALK AS CLOSELY AS POSSIBLE.
7. ALL OFFSETS ARE TO EDGE OF CONCRETE SIDEWALK.
8. ALL C2 CURB TO BE SLOTTED EVERY 20' TO ENSURE THE EXCESS FLOW FROM THE ROAD TOWARDS THE EXIST DITCH IS NOT HALTED DURING HEAVY RAINFALL.SEE DETAIL SHEET 66.
9. FOR FAST TRACK CONCRETE PROVIDE CLASS HES(HIGHLY EARLY STRENGTH) CONCRETE WITH A MINIMUM AVERAGE FLEXURAL STRENGTH OF 255 PSI OR A MINIMUM COMPRESSIVE STRENGTH OF 1,800 PSI IN 16 HOURS.
10. THE TOP OF THE EXISTING GROUND BOXES SHOULD BE LEVELLED WITH NON SLIP SURFACE AS PER TXDOT STANDARD.
11. REGRADE DITCH LOCATIONS ARE APPROXIMATE AND ENGINEER SHALL VERIFY THE EXACT FIELD LOCATIONS.REGRADED DITCHES SHALL MATCH THE EXIST DITCH SIDE SLOPE, DITCH CAPACITY AND ELEVATIONS OF EXIST INLETS. CONTRACTOR TO ENSURE POSITIVE FLOW WITH DITCH FLOWLINE MATCHING THE EXISTING.
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STATE OF TEXAS
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LICENSED PROFESSIONAL ENGINEER

S. Pokharel P.E.

SANJAY POKHAREL, P.E. 4/16/2024

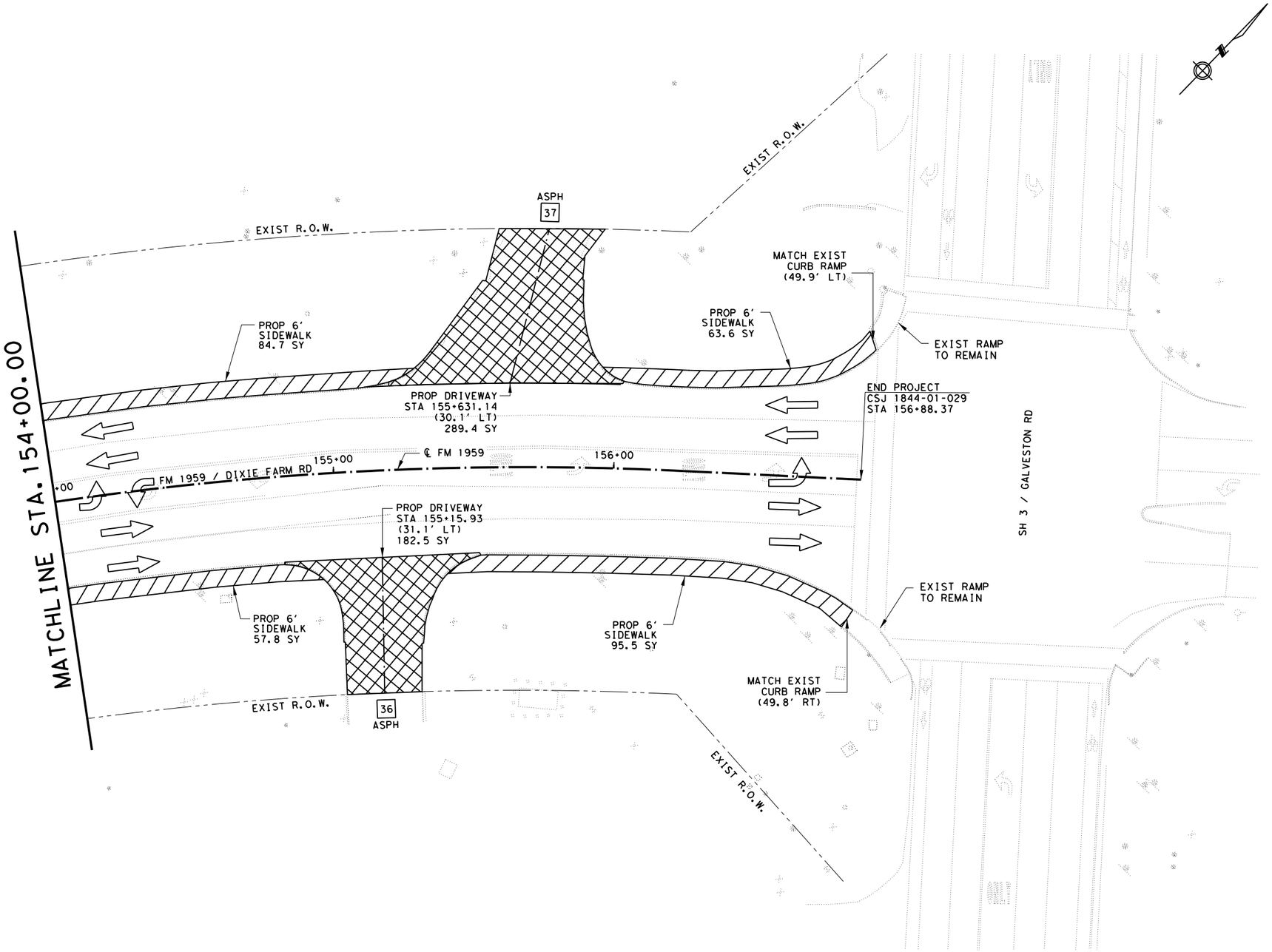
TEXAS DEPARTMENT OF TRANSPORTATION

FM 1959
SIDEWALK PLAN

(STA 149+50.00 TO STA 154+00.00)

SCALE: 1"=40' SHEET 12 OF 13 SHEETS

DN: MGA	DRAWING FILE NAME:	FED.RD. DIV.NO.	STATE	PROJECT NO.					HIGHWAY NO.
CK:		6	TX						FM 1959
DW: MGA	REVISIONS:	STATE DIST.NO	COUNTY		CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
CK:		12	HARRIS		1844	01	029		56
TR:									
CK:									



LEGEND:

- TRAFFIC FLOW DIRECTION
- X — DRIVEWAY NUMBER
- SIDEWALK/RAMP CONSTRUCTION
- DRIVEWAY CONSTRUCTION
- CONCRETE RIPRAP
- CHECKER PLATE (TREE PROTECTION)
- C2 CURB

NOTES:

1. SEE "DRIVEWAY LOCATION TABLE" FOR ADDITIONAL INFORMATION.
2. MINOR ADJUSTMENTS TO HORIZONTAL LOCATION OF SIDEWALK & CURB RAMPS MAY BE MADE TO AVOID CONFLICTS WITH UTILITIES (POWER POLES, WATER METERS,UTILITY MARKERS, AT&T PEDESTALS,& MARKERS),MAILBOXES, LANDSCAPING(TREES, ETC) AS APPROVED BY THE ENGINEER.
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5. IN AREAS WHERE SIDEWALKS ARE TO REMAIN, REMOVE EXISTING DETECTABLE WARNING PAVERS AT ALL DRIVEWAYS AND REPLACE PORTION OF SIDEWALK IF REQUIRED.
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TEXAS DEPARTMENT OF TRANSPORTATION

FM 1959
SIDEWALK PLAN
(STA 154+00.00 TO END)

SCALE: 1"=40' SHEET 13 OF 13 SHEETS

DN: MGA	DRAWING FILE NAME:	FED.RD. DIV.NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK:		6	TX					FM 1959
DW: MGA	REVISIONS:	STATE DIST.NO	COUNTY		CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK:		12	HARRIS		1844	01	029	57
TR:								
CK:								

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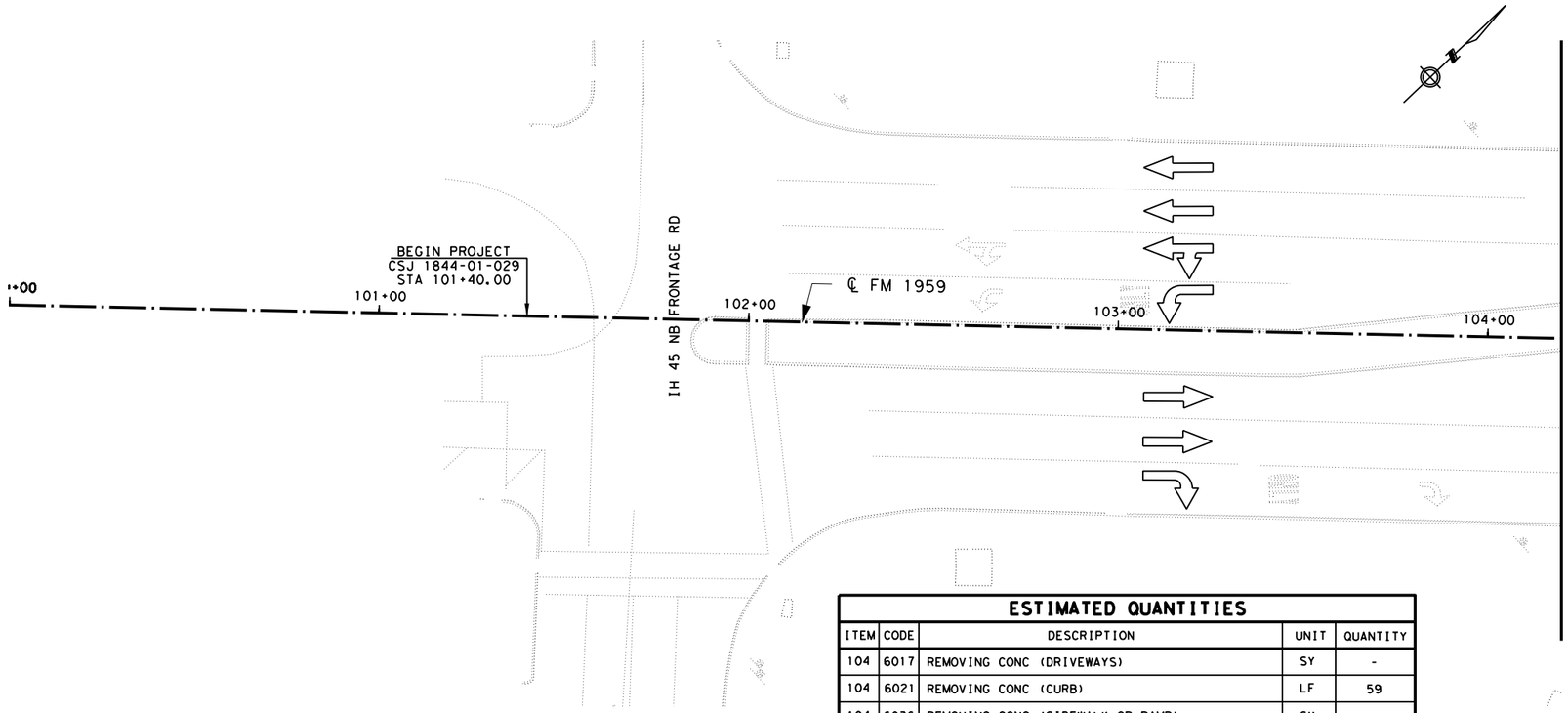


LEGEND:

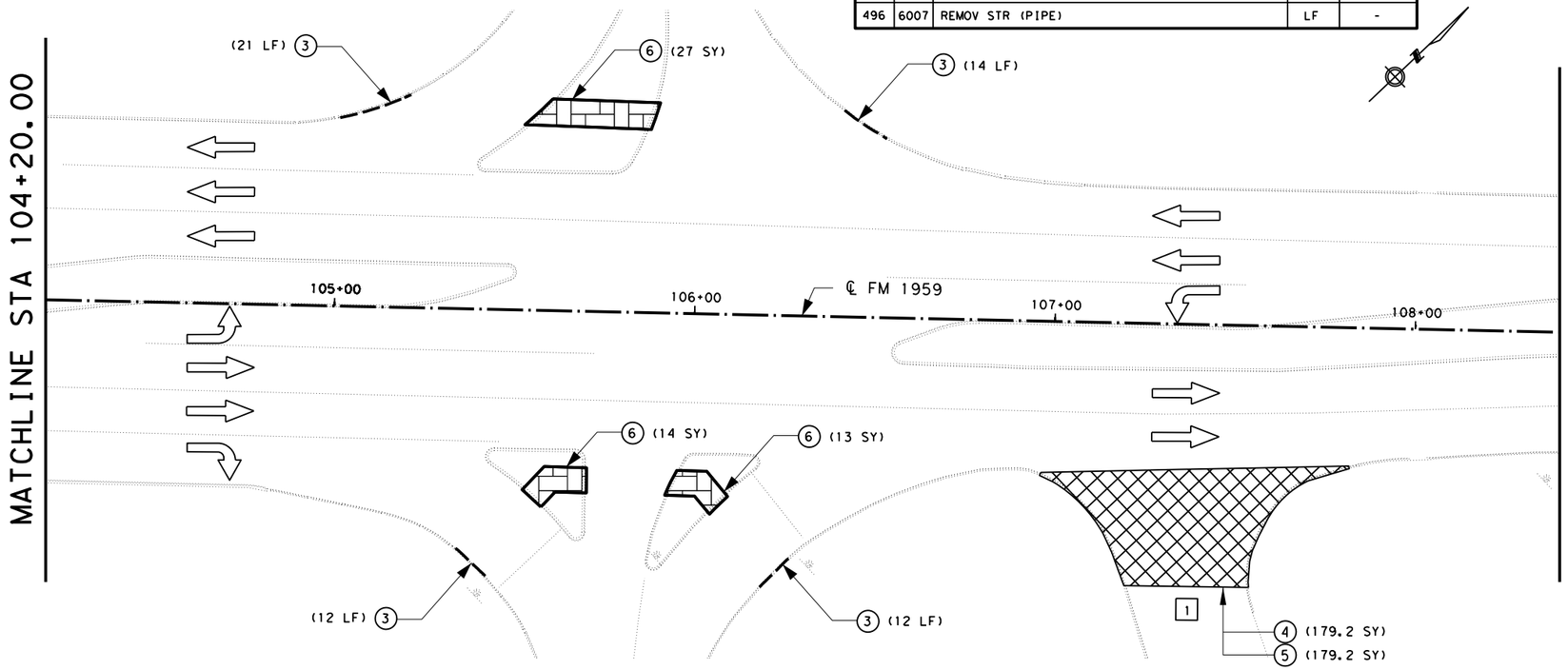
- (1) REMOVE CONC (SIDEWALK/RAMP)
- (2) REMOVING CONC (DRIVEWAYS)
- (3) REMOVING CONC (CURB)
- (4) REMOVE STAB BASE & ASPH PAV (10"-12")
- (5) SALV, HAUL & STKPL RCL APH PV (VAR DEPTH)
- (6) REMOVING CONC (PAVERS)
- (7) REMOVE STR (PIPE)
- TRAFFIC FLOW DIRECTION
- X — DRIVEWAY NUMBER

NOTES:

1. REMOVAL OF EXISTING SIDEWALK SHALL BE TO AN EXISTING JOINT.
2. SIDEWALK REMOVAL INCLUDES THE REQUIRED REMOVAL OF ANY RAMPS.
3. SEE "DRIVEWAY LOCATION TABLE" FOR ADDITIONAL DETAILS.

ESTIMATED QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
104	6017	REMOVING CONC (DRIVEWAYS)	SY	-
104	6021	REMOVING CONC (CURB)	LF	59
104	6036	REMOVING CONC (SIDEWALK OR RAMP)	SY	-
104	6040	REMOVING CONC (PAVERS)	SY	54
105	6058	REMOVING STAB BASE & ASPH PAV (10"-12")	SY	179.2
305	6003	SALV, HAUL & STKPL RCL APH PV(VAR DEPTH)	SY	179.2
496	6007	REMOV STR (PIPE)	LF	-



STATE OF TEXAS
SANJAY POKHAREL
140149
LICENSED PROFESSIONAL ENGINEER

SANJAY POKHAREL, P.E. 4/19/2024

TEXAS DEPARTMENT OF TRANSPORTATION

FM 1959
DEMOLITION PLANS
(BEGIN TO STA 108+40.00)

SCALE: 1"=40' SHEET 1 OF 7 SHEETS

DN: MGA	DRAWING FILE NAME:	FED.RD. DIST.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK:		6	TX				FM 1959
DW: MGA	REVISIONS:	STATE DIST.NO	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK:		12	HARRIS	1844	01	029	58
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CK:							

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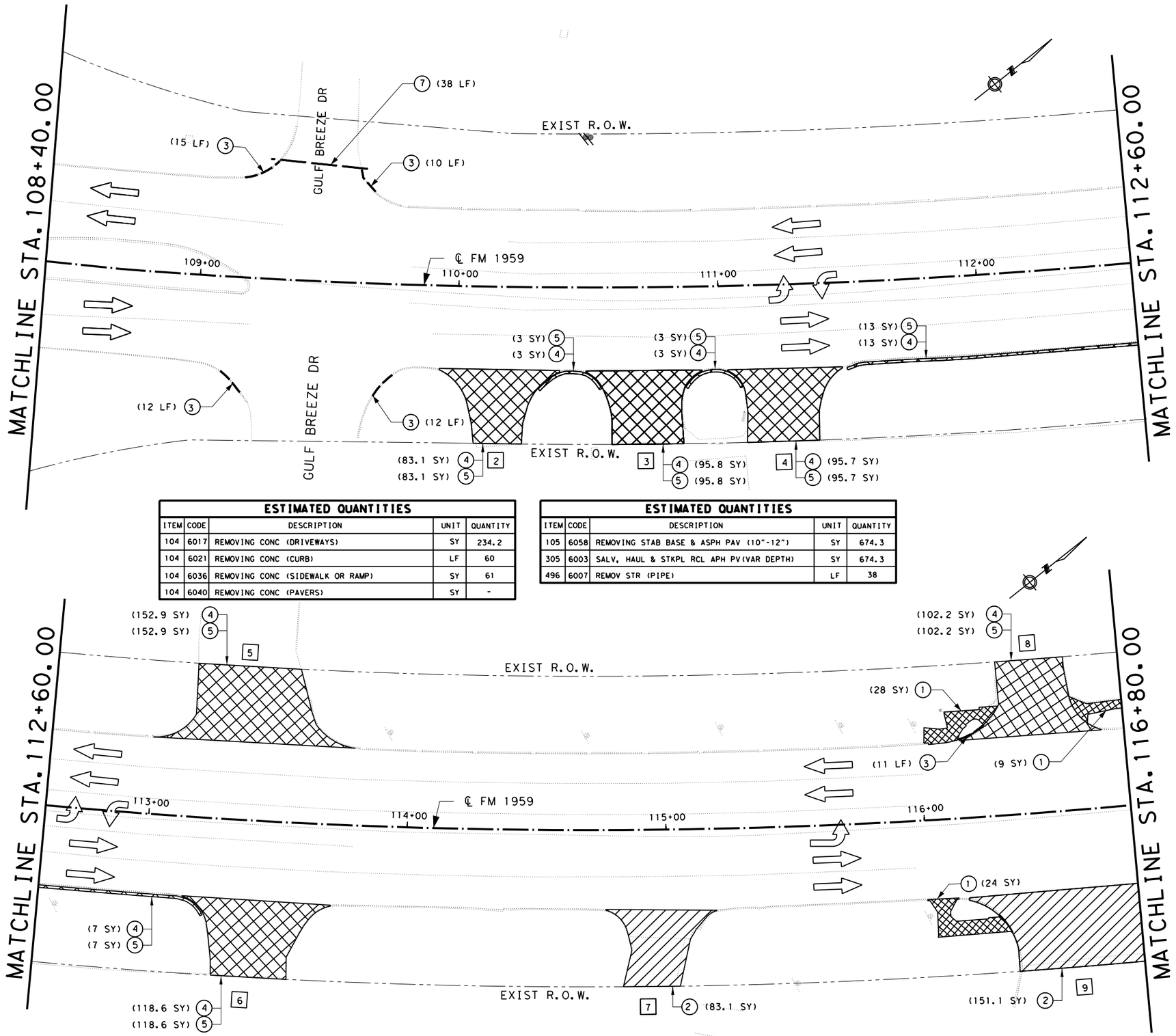

LEGEND:

- 1 REMOVE CONC (SIDEWALK/RAMP)
- 2 REMOVING CONC (DRIVEWAYS)
- 3 REMOVING CONC (CURB)
- 4 REMOVE STAB BASE & ASPH PAV (10"-12")
- 5 SALV, HAUL & STKPL RCL APH PV (VAR DEPTH)
- 6 REMOVING CONC (PAVERS)
- 7 REMOVE STR (PIPE)
- TRAFFIC FLOW DIRECTION
- X DRIVEWAY NUMBER

NOTES:

1. REMOVAL OF EXISTING SIDEWALK SHALL BE TO AN EXISTING JOINT.
2. SIDEWALK REMOVAL INCLUDES THE REQUIRED REMOVAL OF ANY RAMPS.
3. SEE "DRIVEWAY LOCATION TABLE" FOR ADDITIONAL DETAILS.

ESTIMATED QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
104	6017	REMOVING CONC (DRIVEWAYS)	SY	234.2
104	6021	REMOVING CONC (CURB)	LF	60
104	6036	REMOVING CONC (SIDEWALK OR RAMP)	SY	61
104	6040	REMOVING CONC (PAVERS)	SY	-

ESTIMATED QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
105	6058	REMOVING STAB BASE & ASPH PAV (10"-12")	SY	674.3
305	6003	SALV, HAUL & STKPL RCL APH PV(VAR DEPTH)	SY	674.3
496	6007	REMOV STR (PIPE)	LF	38

STATE OF TEXAS
SANJAY POKHAREL
140149
LICENSED PROFESSIONAL ENGINEER

SANJAY POKHAREL, P.E. 4/19/2024

TEXAS DEPARTMENT OF TRANSPORTATION

FM 1959
DEMOLITION PLANS
(STA 108+40.00 TO STA 116+80.00)

SCALE: 1"=40' SHEET 2 OF 7 SHEETS

DN: MGA CK: DW: MGA CK: TR: CK: DRAWING FILE NAME: REVISIONS:

FED.RD. DIST.NO.	STATE	PROJECT NO.	HIGHWAY NO.
6	TX		FM 1959

STATE DIST.NO	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
12	HARRIS	1844	01	029	59

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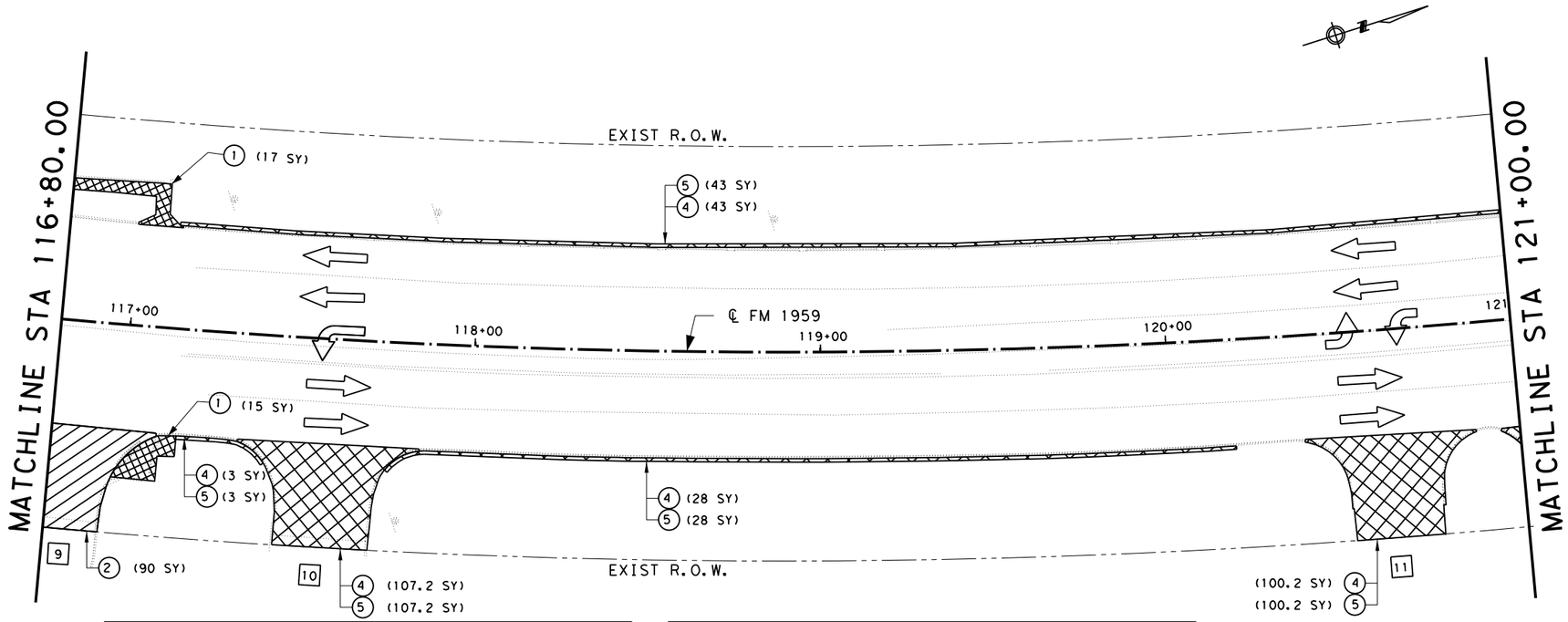


LEGEND:

- (1) REMOVE CONC (SIDEWALK/RAMP)
- (2) REMOVING CONC (DRIVEWAYS)
- (3) REMOVING CONC (CURB)
- (4) REMOVE STAB BASE & ASPH PAV (10"-12")
- (5) SALV, HAUL & STKPL RCL APH PV (VAR DEPTH)
- (6) REMOVING CONC (PAVERS)
- (7) REMOVE STR (PIPE)
- TRAFFIC FLOW DIRECTION
- X DRIVEWAY NUMBER

NOTES:

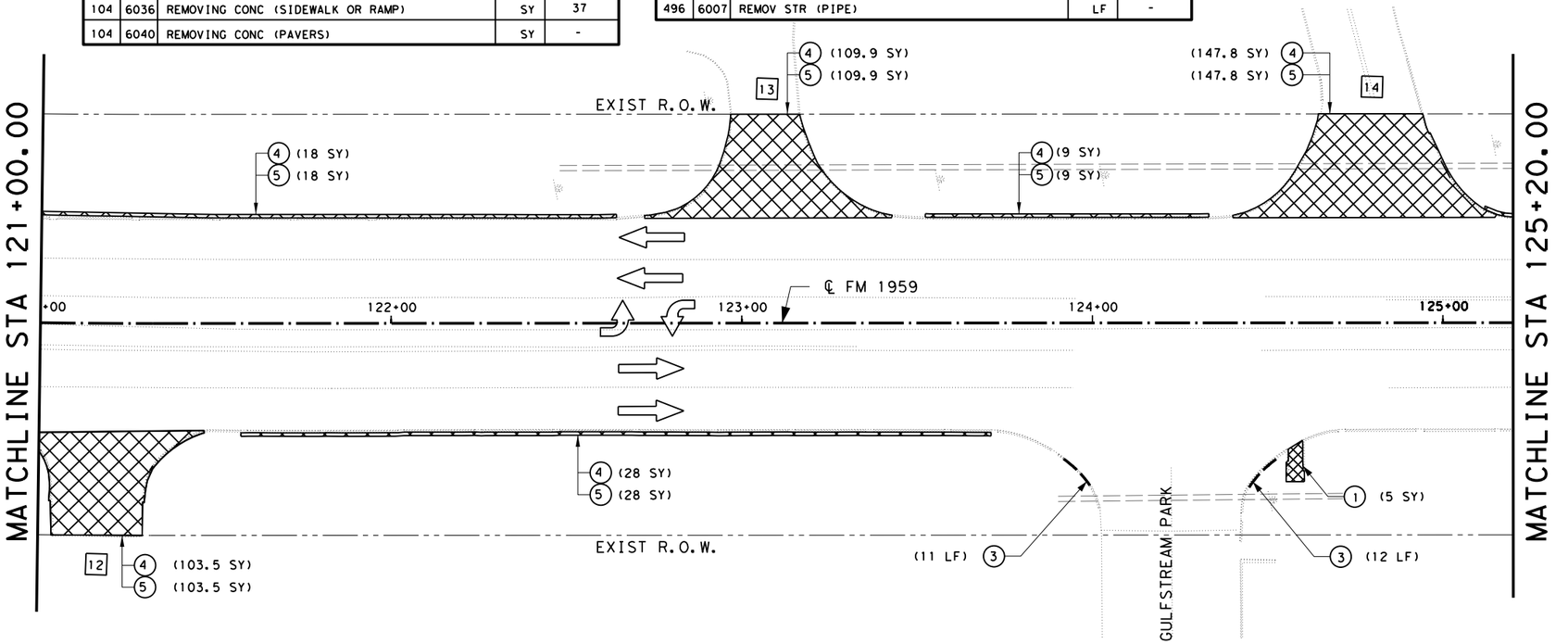
1. REMOVAL OF EXISTING SIDEWALK SHALL BE TO AN EXISTING JOINT.
2. SIDEWALK REMOVAL INCLUDES THE REQUIRED REMOVAL OF ANY RAMPS.
3. SEE "DRIVEWAY LOCATION TABLE" FOR ADDITIONAL DETAILS.

ESTIMATED QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
104	6017	REMOVING CONC (DRIVEWAYS)	SY	90
104	6021	REMOVING CONC (CURB)	LF	23
104	6036	REMOVING CONC (SIDEWALK OR RAMP)	SY	37
104	6040	REMOVING CONC (PAVERS)	SY	-

ESTIMATED QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
105	6058	REMOVING STAB BASE & ASPH PAV (10"-12")	SY	697.6
305	6003	SALV, HAUL & STKPL RCL APH PV(VAR DEPTH)	SY	697.6
496	6007	REMOV STR (PIPE)	LF	-



STATE OF TEXAS
SANJAY POKHAREL
140149
LICENSED PROFESSIONAL ENGINEER

SANJAY POKHAREL, P.E. 4/19/2024

TEXAS DEPARTMENT OF TRANSPORTATION

FM 1959
DEMOLITION PLANS
(STA 116+80.00 TO STA 125+20.00)

SCALE: 1"=40' SHEET 3 OF 7 SHEETS

DN: MGA	DRAWING FILE NAME:	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK:		6	TX				FM 1959
DW: MGA	REVISIONS:	STATE DIST.NO	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK:		12	HARRIS	1844	01	029	60
TR:							
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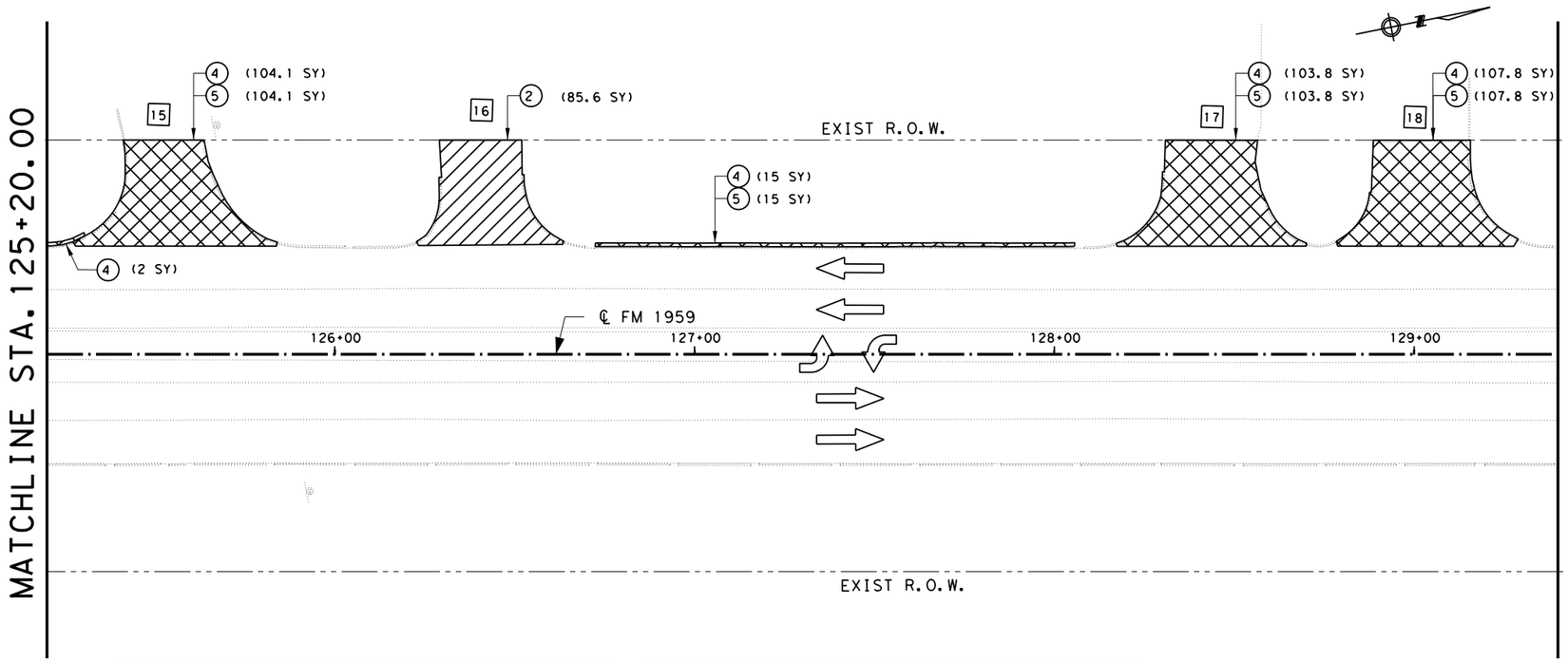


LEGEND:

- (1) REMOVE CONC (SIDEWALK/RAMP)
- (2) REMOVING CONC (DRIVEWAYS)
- (3) REMOVING CONC (CURB)
- (4) REMOVE STAB BASE & ASPH PAV (10"-12")
- (5) SALV, HAUL & STKPL RCL APH PV (VAR DEPTH)
- (6) REMOVING CONC (PAVERS)
- (7) REMOVE STR (PIPE)
- TRAFFIC FLOW DIRECTION
- [X] DRIVEWAY NUMBER

NOTES:

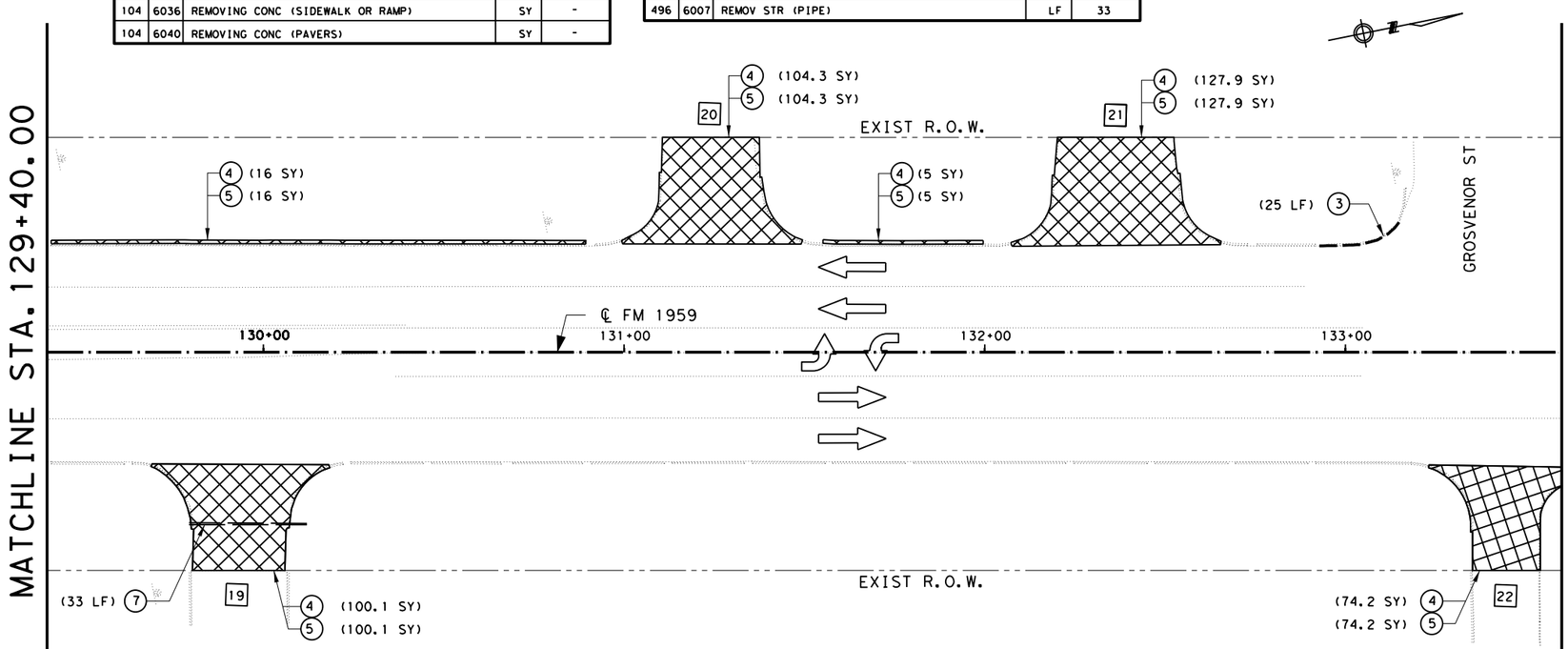
1. REMOVAL OF EXISTING SIDEWALK SHALL BE TO AN EXISTING JOINT.
2. SIDEWALK REMOVAL INCLUDES THE REQUIRED REMOVAL OF ANY RAMPS.
3. SEE "DRIVEWAY LOCATION TABLE" FOR ADDITIONAL DETAILS.

ESTIMATED QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
104	6017	REMOVING CONC (DRIVEWAYS)	SY	85.6
104	6021	REMOVING CONC (CURB)	LF	25
104	6036	REMOVING CONC (SIDEWALK OR RAMP)	SY	-
104	6040	REMOVING CONC (PAVERS)	SY	-

ESTIMATED QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
105	6058	REMOVING STAB BASE & ASPH PAV (10"-12")	SY	760.2
305	6003	SALV, HAUL & STKPL RCL APH PV(VAR DEPTH)	SY	760.2
496	6007	REMOV STR (PIPE)	LF	33



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140149
LICENSED PROFESSIONAL ENGINEER

SANJAY POKHAREL, P.E. 4/19/2024

TEXAS DEPARTMENT OF TRANSPORTATION

FM 1959
DEMOLITION PLANS
(STA 125+20.00 TO STA 133+60.00)

SCALE: 1"=40' SHEET 4 OF 7 SHEETS

DN: MGA	DRAWING FILE NAME:	FED.RD. DIV.NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK:		6	TX					FM 1959
DW: MGA	REVISIONS:	STATE DIST.NO	COUNTY		CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK:		12	HARRIS		1844	01	029	61
TR:								
CK:								

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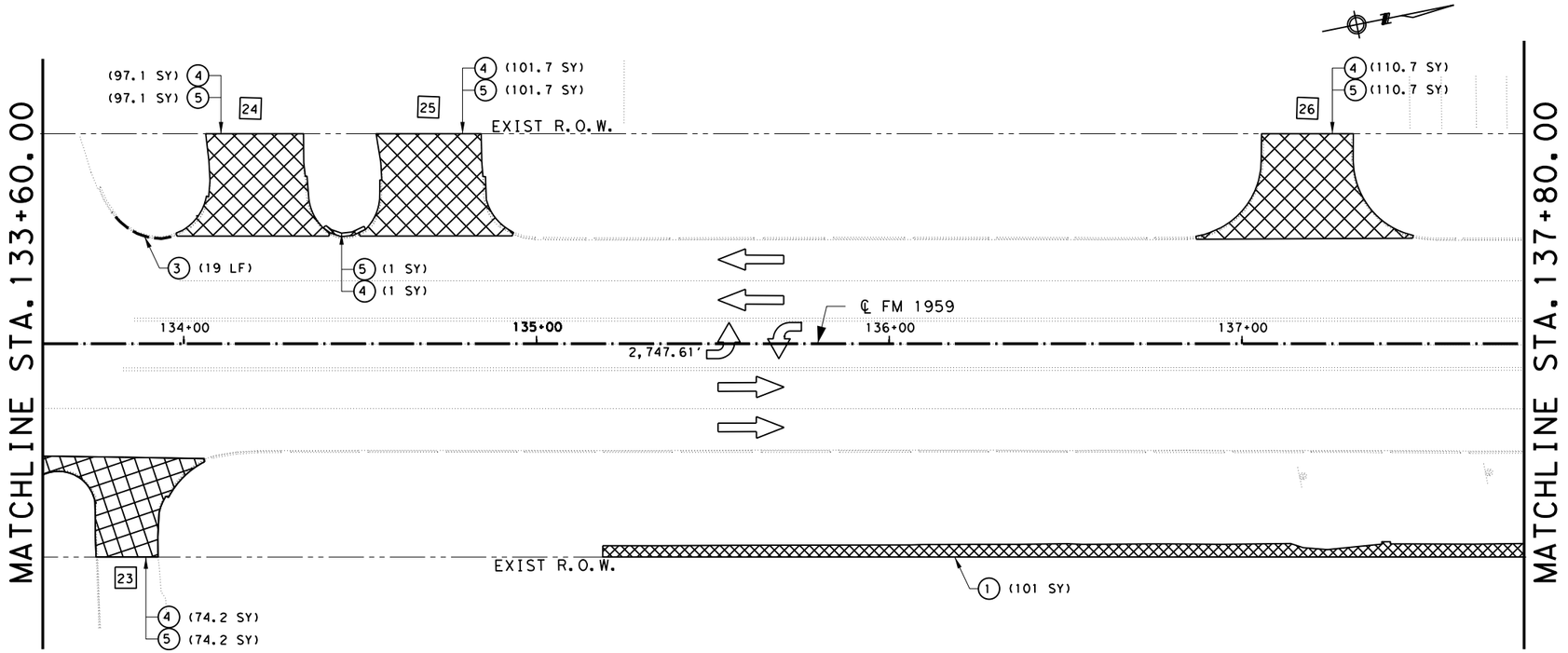

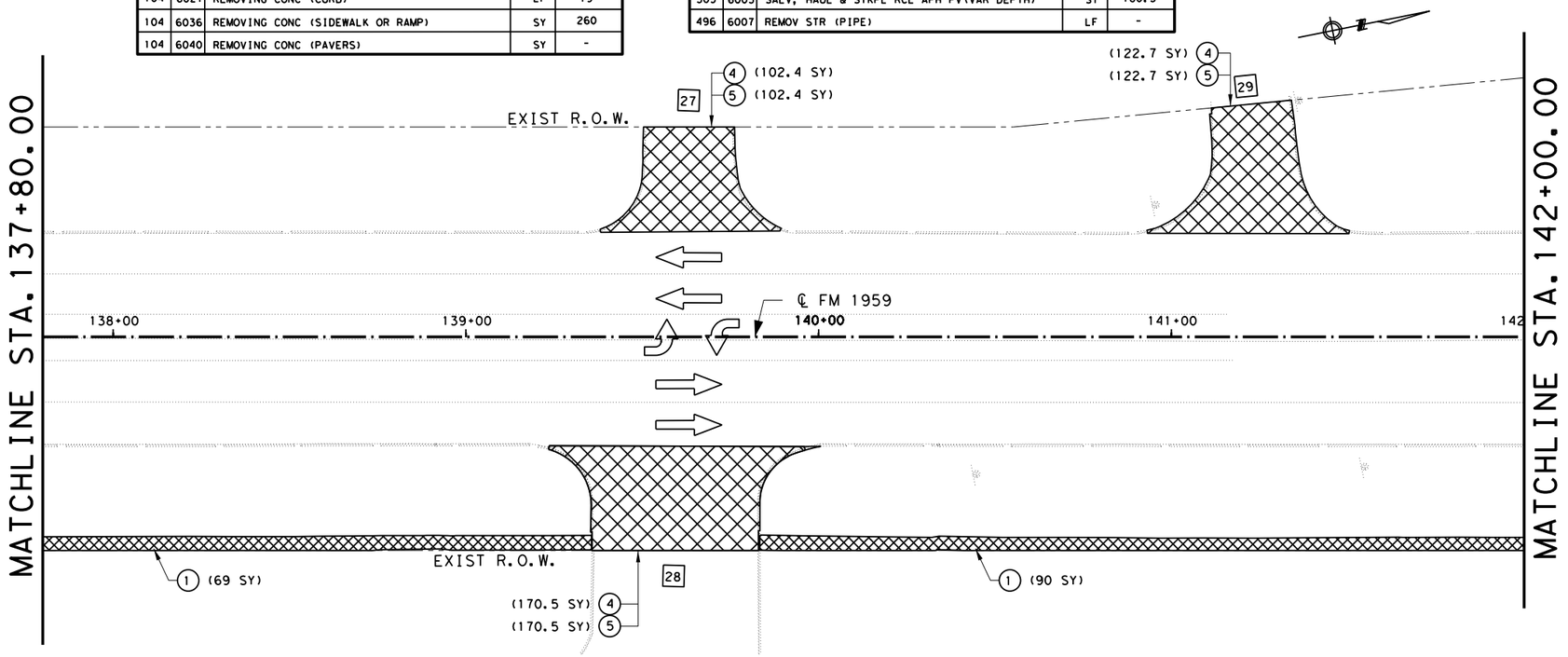

ESTIMATED QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
104	6017	REMOVING CONC (DRIVEWAYS)	SY	-
104	6021	REMOVING CONC (CURB)	LF	19
104	6036	REMOVING CONC (SIDEWALK OR RAMP)	SY	260
104	6040	REMOVING CONC (PAVERS)	SY	-

ESTIMATED QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
105	6058	REMOVING STAB BASE & ASPH PAV (10"-12")	SY	780.3
305	6003	SALV, HAUL & STKPL RCL APH PV(VAR DEPTH)	SY	780.3
496	6007	REMOV STR (PIPE)	LF	-

LEGEND:

- (1) REMOVE CONC (SIDEWALK/RAMP)
- (2) REMOVING CONC (DRIVEWAYS)
- (3) REMOVING CONC (CURB)
- (4) REMOVE STAB BASE & ASPH PAV (10"-12")
- (5) SALV, HAUL & STKPL RCL APH PV (VAR DEPTH)
- (6) REMOVING CONC (PAVERS)
- (7) REMOVE STR (PIPE)
- TRAFFIC FLOW DIRECTION
- X DRIVEWAY NUMBER

NOTES:

1. REMOVAL OF EXISTING SIDEWALK SHALL BE TO AN EXISTING JOINT.
2. SIDEWALK REMOVAL INCLUDES THE REQUIRED REMOVAL OF ANY RAMPS.
3. SEE "DRIVEWAY LOCATION TABLE" FOR ADDITIONAL DETAILS.

STATE OF TEXAS
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LICENSED PROFESSIONAL ENGINEER

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TEXAS DEPARTMENT OF TRANSPORTATION

FM 1959
DEMOLITION PLANS
(STA 133+60.00 TO STA 142+00.00)

SCALE: 1"=40' SHEET 5 OF 7 SHEETS

DN: MGA	DRAWING FILE NAME:	FED.RD. DIV.NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK:		6	TX					FM 1959
DW: MGA	REVISIONS:	STATE DIST.NO	COUNTY		CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK:		12	HARRIS		1844	01	029	62
TR:								
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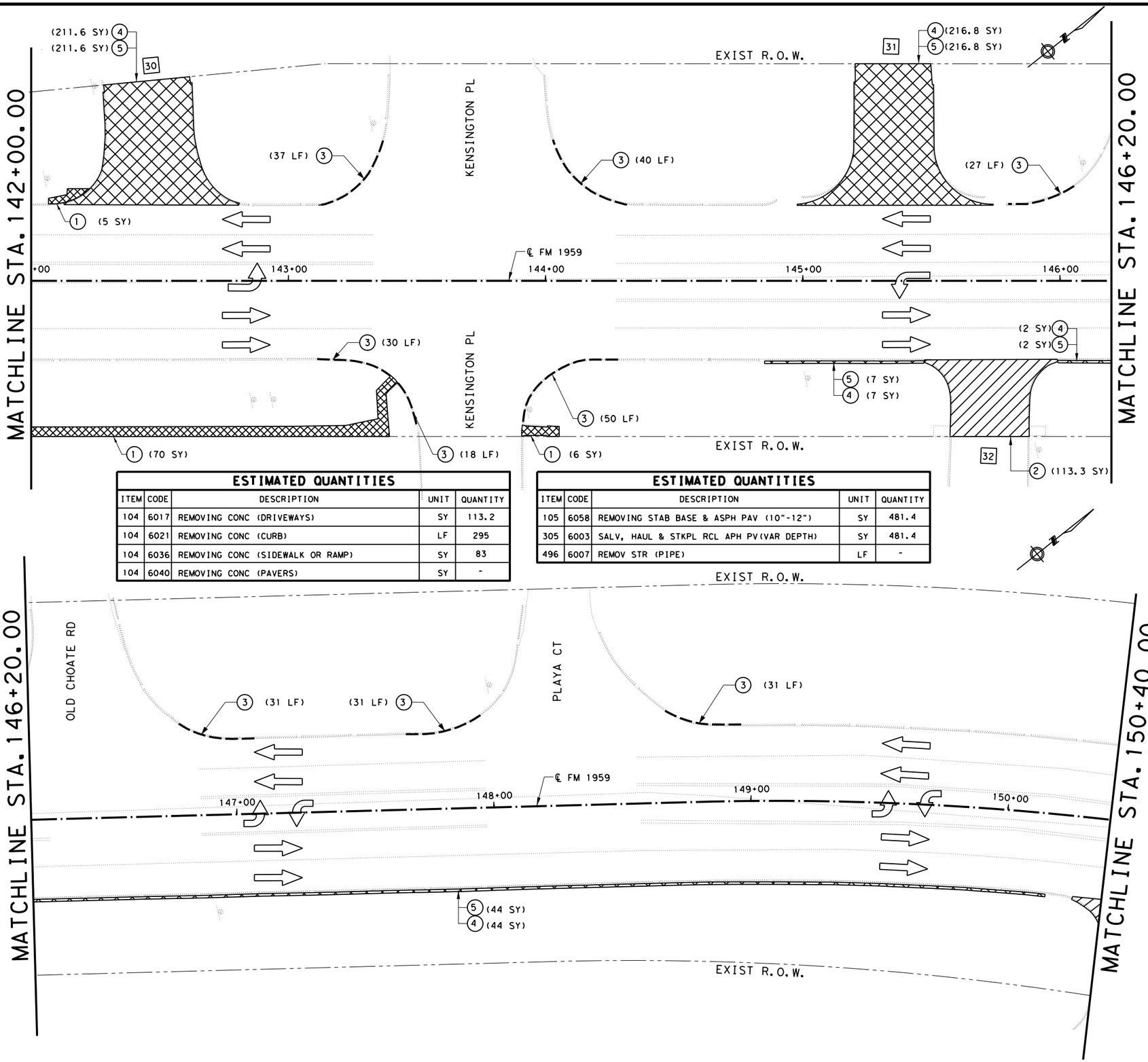

ESTIMATED QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
104	6017	REMOVING CONC (DRIVEWAYS)	SY	113.2
104	6021	REMOVING CONC (CURB)	LF	295
104	6036	REMOVING CONC (SIDEWALK OR RAMP)	SY	83
104	6040	REMOVING CONC (PAVERS)	SY	-

ESTIMATED QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
105	6058	REMOVING STAB BASE & ASPH PAV (10"-12")	SY	481.4
305	6003	SALV, HAUL & STKPL RCL APH PV(VAR DEPTH)	SY	481.4
496	6007	REMOV STR (PIPE)	LF	-

LEGEND:

1. REMOVE CONC (SIDEWALK/RAMP)
2. REMOVING CONC (DRIVEWAYS)
3. REMOVING CONC (CURB)
4. REMOVE STAB BASE & ASPH PAV (10"-12")
5. SALV, HAUL & STKPL RCL APH PV (VAR DEPTH)
6. REMOVING CONC (PAVERS)
7. REMOVE STR (PIPE)

TRAFFIC FLOW DIRECTION

X DRIVEWAY NUMBER

NOTES:

1. REMOVAL OF EXISTING SIDEWALK SHALL BE TO AN EXISTING JOINT.
2. SIDEWALK REMOVAL INCLUDES THE REQUIRED REMOVAL OF ANY RAMPS.
3. SEE "DRIVEWAY LOCATION TABLE" FOR ADDITIONAL DETAILS.

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TEXAS DEPARTMENT OF TRANSPORTATION

FM 1959
DEMOLITION PLANS
(STA 142+00.00 TO STA 150+40.00)

SCALE: 1"=40' SHEET 6 OF 7 SHEETS

DN: MGA	DRAWING FILE NAME:	FED.RD. DIV.NO.	STATE	PROJECT NO.	HIGHWAY NO.
CK:		6	TX		FM 1959
DW: MGA	REVISIONS:	STATE DIST.NO	COUNTY	CONTROL NO. / SECTION NO. / JOB NO.	SHEET NO.
CK:		12	HARRIS	1844 / 01 / 029	63
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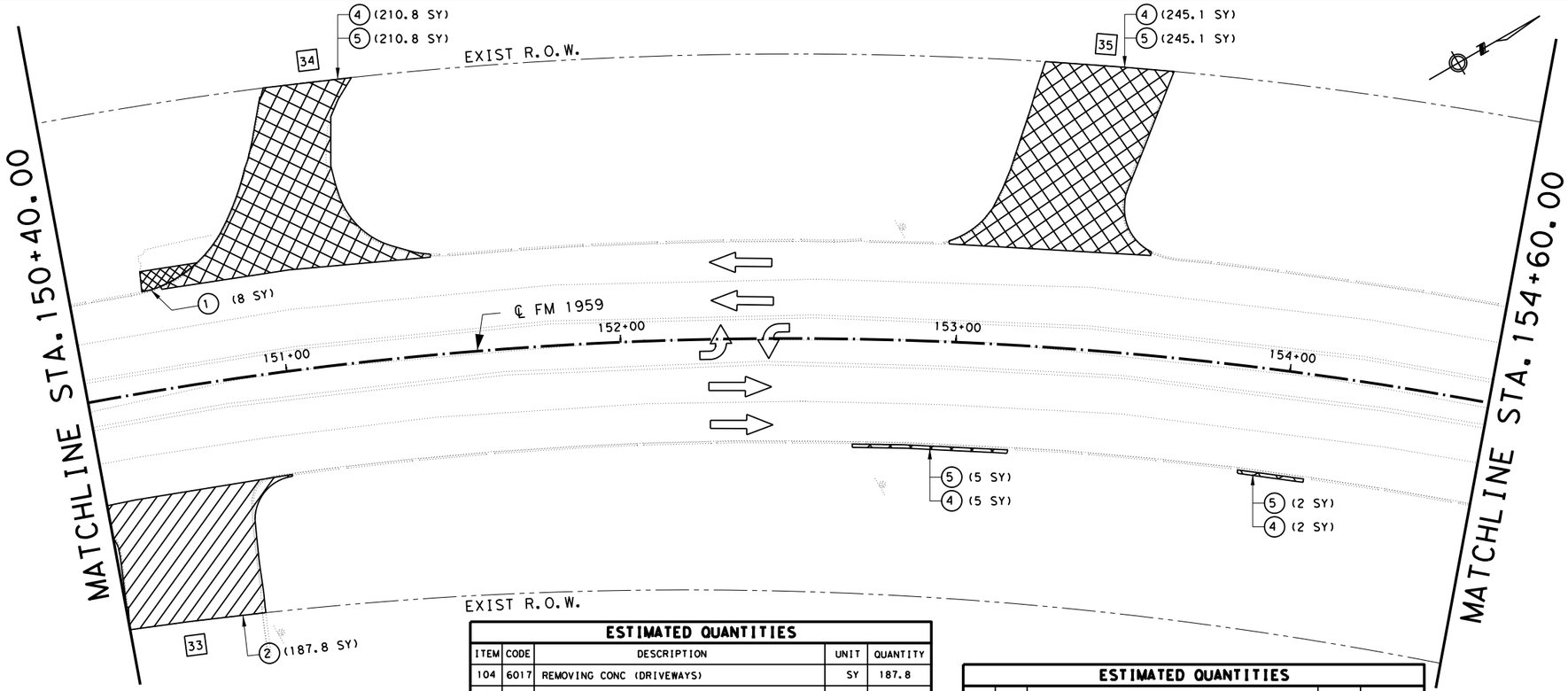

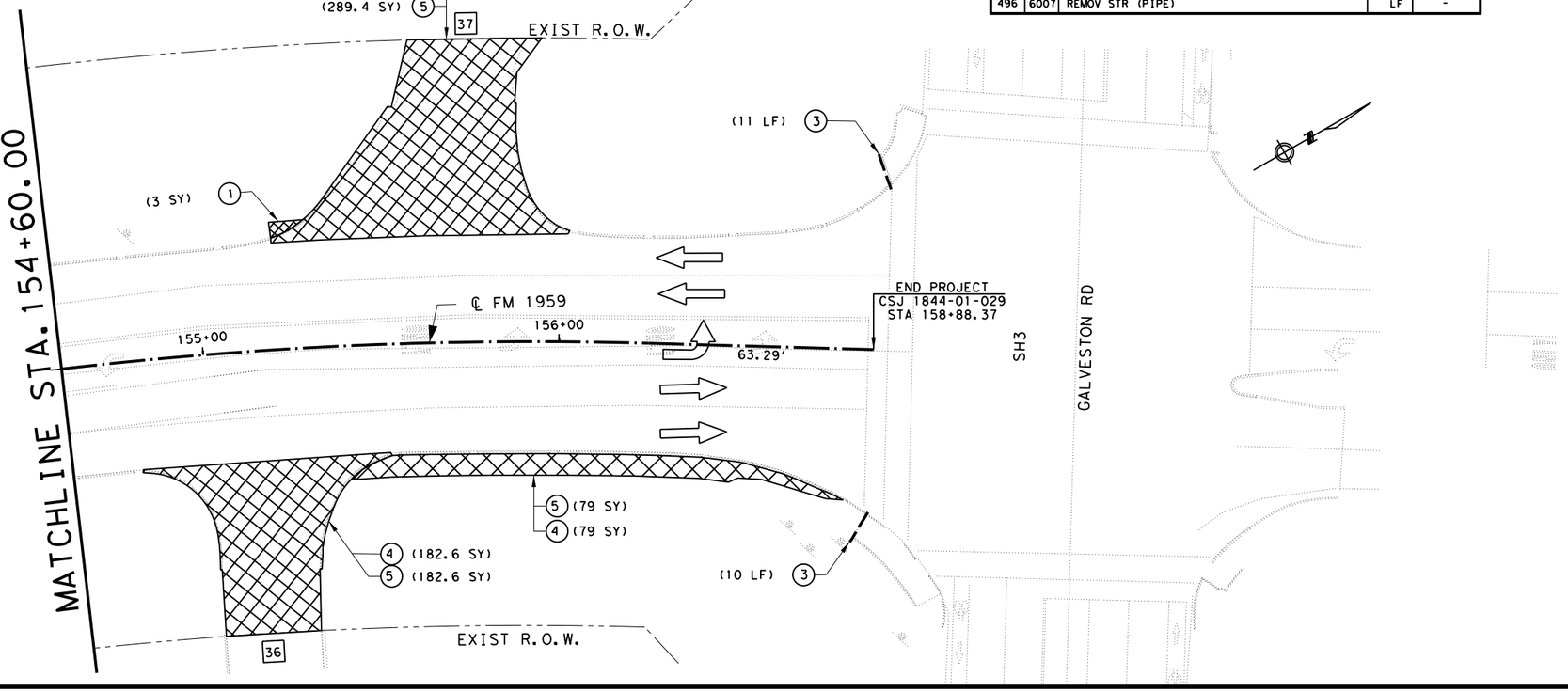

ESTIMATED QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
104	6017	REMOVING CONC (DRIVEWAYS)	SY	187.8
104	6021	REMOVING CONC (CURB)	LF	21
104	6036	REMOVING CONC (SIDEWALK OR RAMP)	SY	11
104	6040	REMOVING CONC (PAVERS)	SY	-

ESTIMATED QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
105	6058	REMOVING STAB BASE & ASPH PAV (10"-12")	SY	1013.9
305	6003	SALV, HAUL & STKPL RCL APH PV(VAR DEPTH)	SY	1013.9
496	6007	REMOV STR (PIPE)	LF	-

LEGEND:

1. REMOVE CONC (SIDEWALK/RAMP)
2. REMOVING CONC (DRIVEWAYS)
3. REMOVING CONC (CURB)
4. REMOVE STAB BASE & ASPH PAV (10"-12")
5. SALV, HAUL & STKPL RCL APH PV (VAR DEPTH)
6. REMOVING CONC (PAVERS)
7. REMOVE STR (PIPE)

TRAFFIC FLOW DIRECTION

X — DRIVEWAY NUMBER

NOTES:

1. REMOVAL OF EXISTING SIDEWALK SHALL BE TO AN EXISTING JOINT.
2. SIDEWALK REMOVAL INCLUDES THE REQUIRED REMOVAL OF ANY RAMPS.
3. SEE "DRIVEWAY LOCATION TABLE" FOR ADDITIONAL DETAILS.

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TEXAS DEPARTMENT OF TRANSPORTATION

FM 1959
DEMOLITION PLANS
(STA 150+40.00 TO END)

SCALE: 1"=40' SHEET 7 OF 7 SHEETS

DN: MGA	DRAWING FILE NAME:	FED.RD. DIV.NO.	STATE	PROJECT NO.	HIGHWAY NO.
CK:		6	TX		FM 1959
DW: MGA	REVISIONS:	STATE DIST.NO	COUNTY	CONTROL NO. / SECTION NO. / JOB NO.	SHEET NO.
CK:		12	HARRIS	1844 / 01 / 029	64
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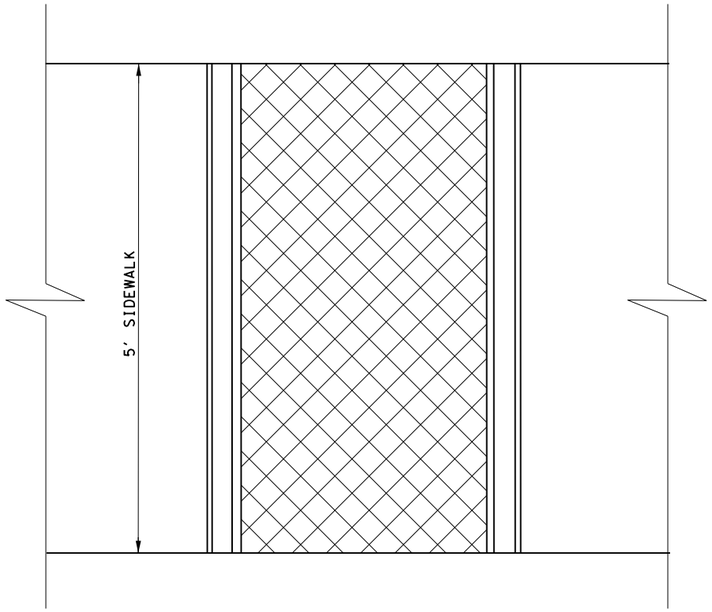
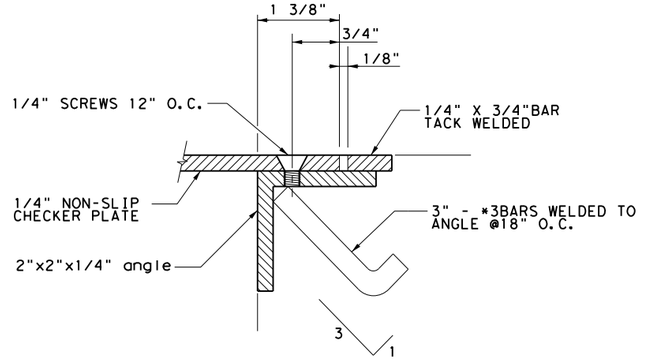


PLAN

CHECKER PLATE
NTS

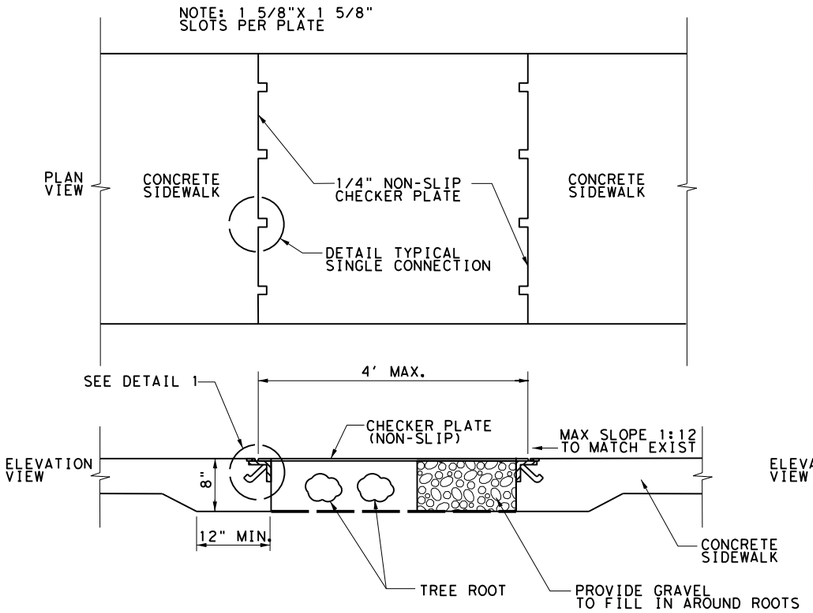


DETAIL 1
NTS

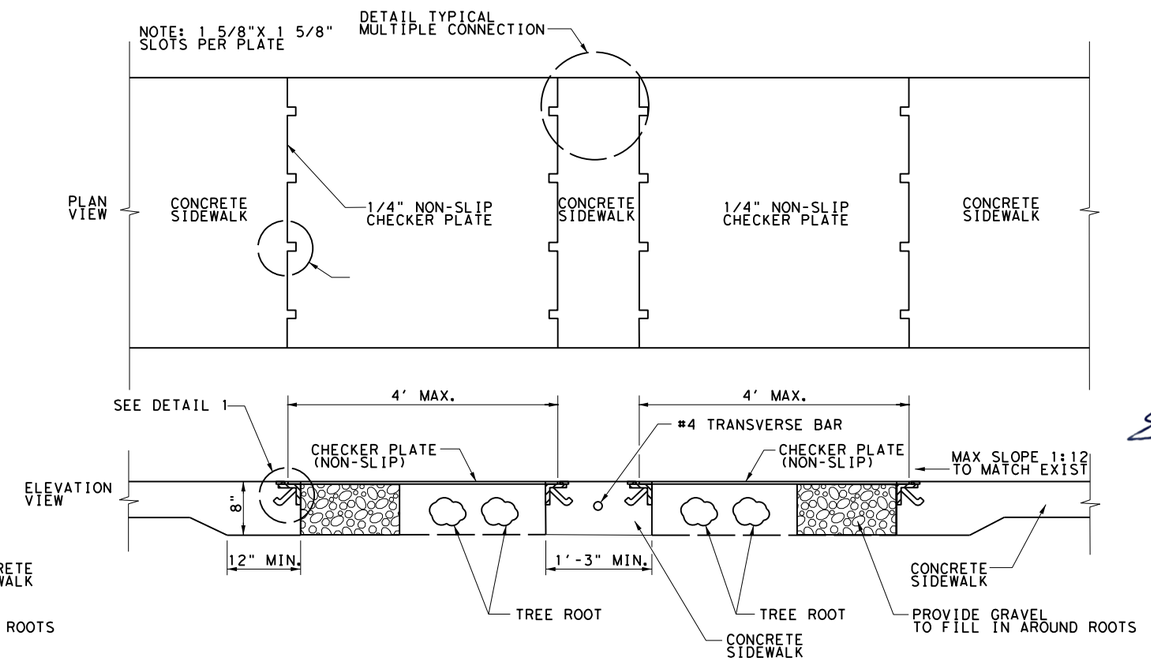
NOTES:

1. CHECKER PLATE IS PAID UNDER ITEM 442 STR STEEL (NON BRIDGE). THIS INCLUDES THE 2"x2" ANGLES AND BARS AND ALL WORK FOR THE CHECKER PLATE. ALL STEEL AND CONNECTIONS SHALL BE GALVANIZED.
2. CHECKER PLATE SHALL BE A NON-SLIP MATERIAL.
3. GRAVEL AND THICKENED SIDEWALK AND PLAN CONCRETE CONNECTION IS SUBSIDIARY TO CHECKER PLATE CONSTRUCTION.
4. ALL EXCAVATION AT TREE ROOTS TO BE CHECKER PLATE DONE BY HAND.
5. CHECKER PLATE LOCATIONS TO BE FIELD VERIFIED PER FINAL ROOT LOCATIONS.
6. CONTRACTOR TO SUBMIT SAMPLES OF DETAIL TYPICAL CHECKER PLATE TO THE ENGINEER FOR APPROVAL PRIOR TO MULTIPLE CONNECTION.

NOTE: 1¾ "X1¾" NOTE: 1¾ "X1¾"



CHECKER PLATE DETAILS
NTS



MULTIPLE CHECKER PLATE DETAILS
NTS

TO BE USED IN AREAS WHERE ROOTS ARE TOO WIDE FOR PLACEMENT OF JUST ONE PLATE

STATE OF TEXAS
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S. Pokharel P.E.

SANJAY POKHAREL, P.E. 4/17/2024

TEXAS DEPARTMENT OF TRANSPORTATION

FM 1959

CHECKER PLATE DETAILS

SHEET 1 OF 1

DN:	ORIGINAL DATE OF DRAWING:	FED.RD. DIV.NO.	STATE	FEDERAL PROJECT NO.				HIGHWAY NO.
CK DN:		6	TEXAS					FM 1959
DW:	REVISIONS:	STATE DIST.NO	COUNTY		CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
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TR:								
CK TR:								

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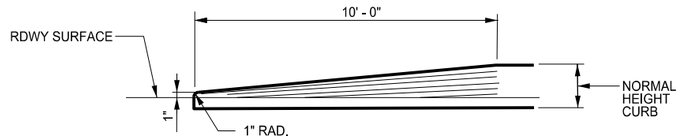
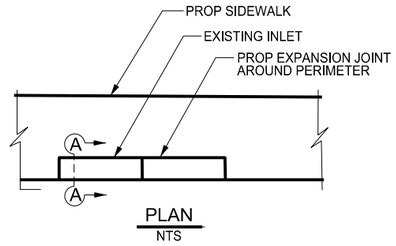
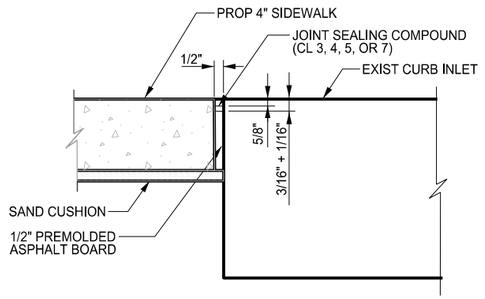


TRANSITION FOR CONRETE CURB ENDS

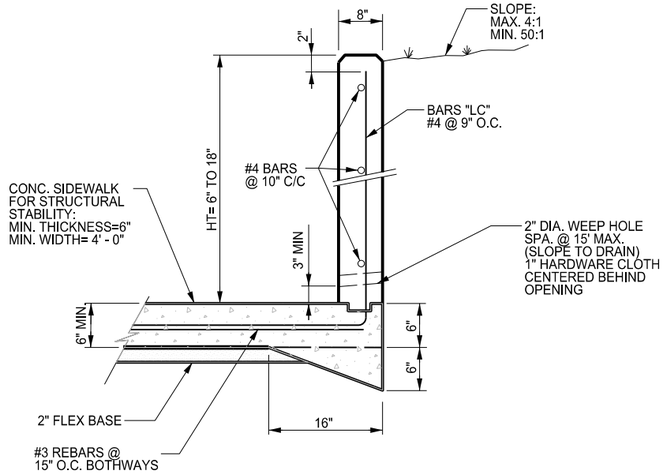


PLAN
NTS

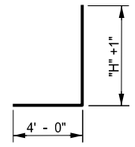


SECTION A-A

SIDEWALK ADJASCENT TO CURB INLET



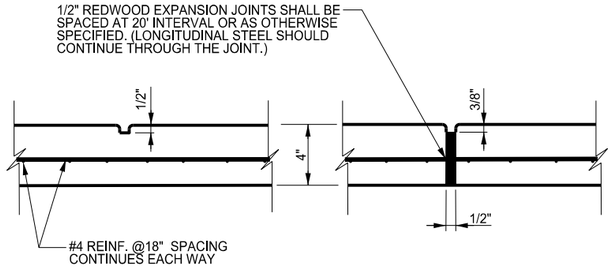
TYPE C2 CURB



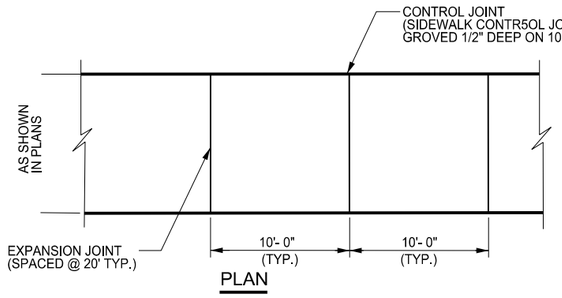
BAR "LC"

GENERAL NOTES:

1. ALL CONCRETE SHALL BE CLASS "C".
2. ALL REINFORCING STEEL SHALL BE GRADE 60.
3. TO BE PAID AS ITEM 423-6008.



CONTROL JOINT EXPANSION JOINT

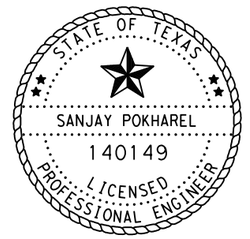


PLAN

CONCRETE SIDEWALK DETAILS

NOTES:

1. ALL EDGES SHALL BE ROUNDED WITH 3/8" RADIUS.
2. CONTROL JOINTS SHALL BE SPACED @ 10 FT. INTERVALS FOR SIDEWALK.
3. CONTROL JOINTS SHALL BE 1/2" DEEP AND TROWEL EDGE.
4. 1/2" EXPANSION MATERIAL REQUIRED WHERE SIDEWALKS ABUT BUILDINGS, CURBS, DRIVEWAYS, OR EXISTING SIDEWALKS.
5. EXPANSION JOINTS SHALL BE SPACED @ 20 FT. INTERVALS TYPICALLY.
6. WHERE NEW SIDEWALK IS PLACED AGAINST EXISTING SIDEWALK, SAWCUT EXISTING SIDEWALK FULL DEPTH TO AN EVEN STRAIGHT LINE PRIOR TO INSTALLATION OF THE NEW SIDEWALK.
7. ALL NEW SIDEWALK SHALL BE DOWELED INTO ADJASCENT CONCRETE STRUCTURES.



SANJAY POKHAREL, P.E. 4/17/2024

SCALE: N.T.S.

TEXAS DEPARTMENT OF TRANSPORTATION

FM 1959

SIDEWALK AND TY C2 CURB DETAILS

DN:	ORIGINAL DATE OF DRAWING:	FED.RD. DIST.NO.	STATE	FEDERAL PROJECT NO.				HIGHWAY NO.
CK. DN:		6	TEXAS					FM 1959
DW:	REVISIONS:	STATE DIST.NO	COUNTY		CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK. DW:		12	HARRIS		1844	01	029	66
TR:								
CK. TR:								

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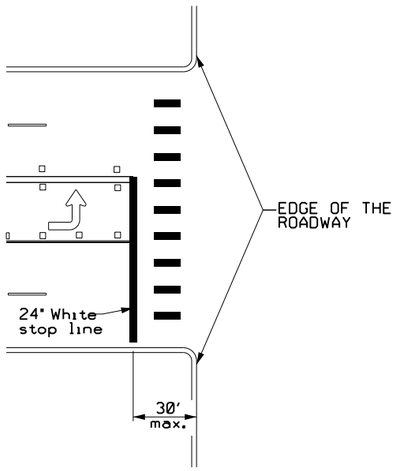
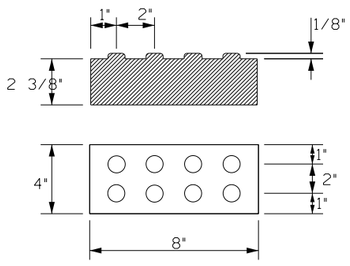
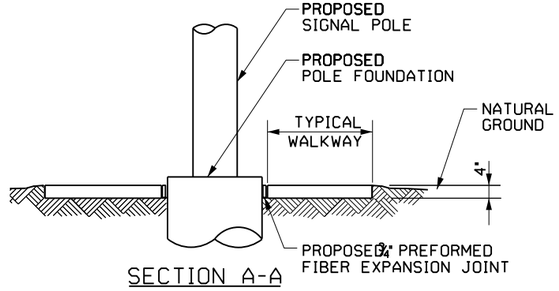


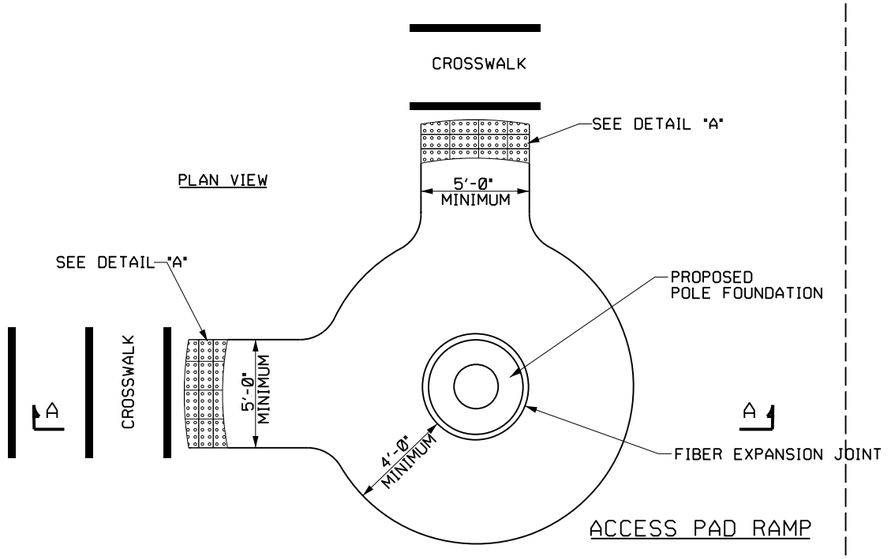


Detectable Warning Paver

DETAIL "A"



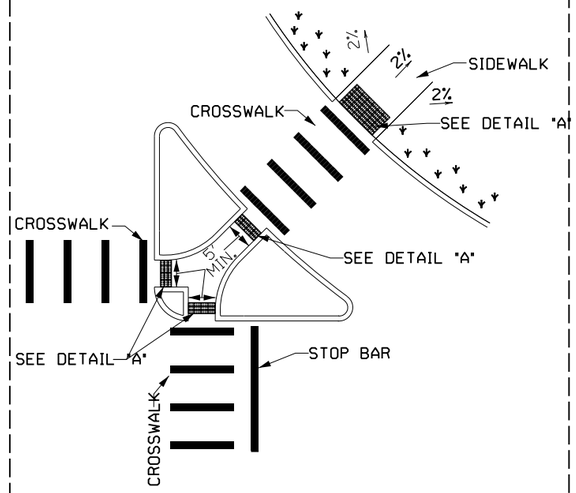
SECTION A-A



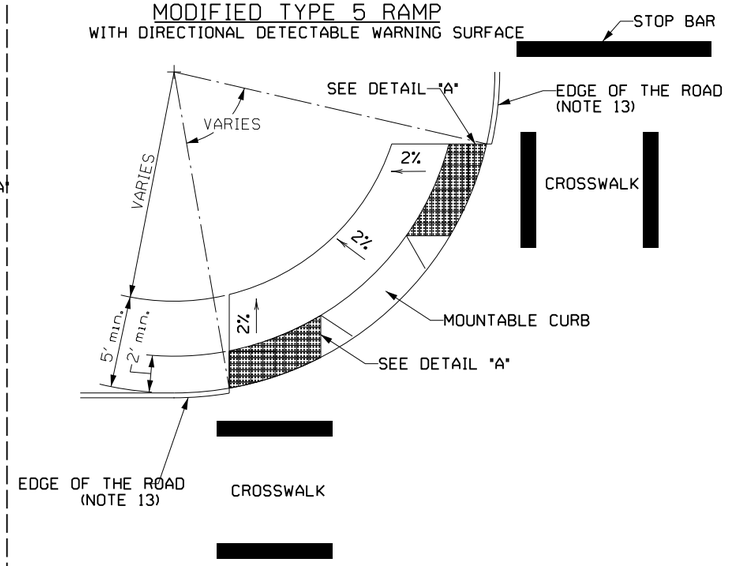
ACCESS PAD RAMP

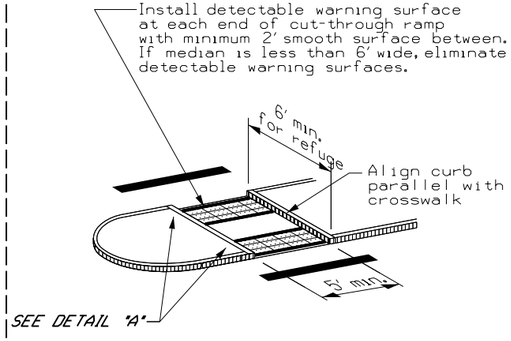
Pedestrian Facilities General Notes

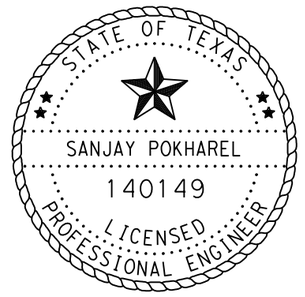
1. All slopes are maximum allowable. The least possible slope that willstill drain properly should be used. Adjust access pad length or grade of approach sidewalks as directed.
2. Detectable Warning Paver shown in Detail "A" will be subsidiary to the Bid Item 531.
3. The minimum sidewalk width is 5'. 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 parallelvehicular 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







SANJAY POKHAREL, P.E. 4/17/2024

TEXAS DEPARTMENT OF TRANSPORTATION
HOUSTON DISTRICT

FM 1959
ACCESS PAD RAMP DETAILS ACCRD

SCALE	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY
NTS	06	TEXAS				FM 1959
REVISIONS	STATE DISTRICT	COUNTY	CONTROL	SECTION	JOB	SHEET NO.
	HOU	HARRIS	1844	01	029	67

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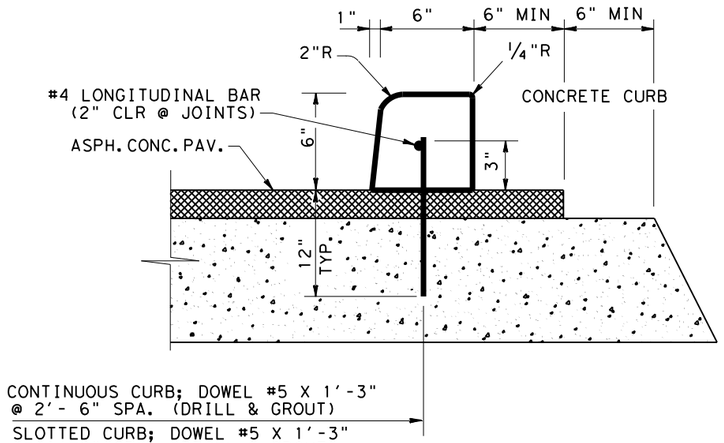
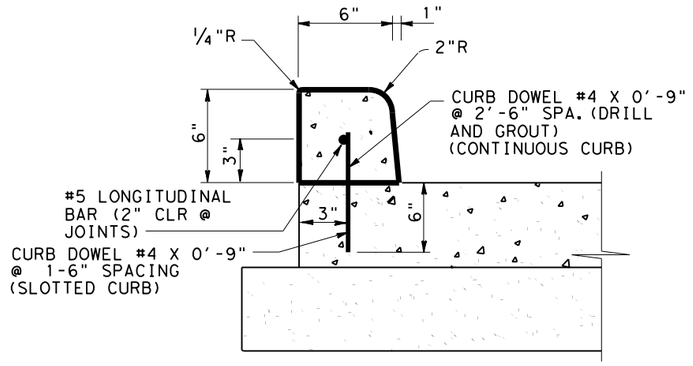


SHOWN ON EXISTING OR PROPOSED ACP PAVEMENT

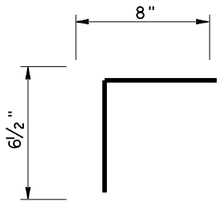
(PAY ITEM 529-6011) - FOR CONTINUOUS



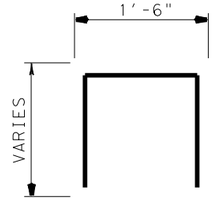
SHOWN ON EXISTING OR PROPOSED CONCRETE PAVEMENT

(PAY ITEM 529-6011) - FOR CONTINUOUS

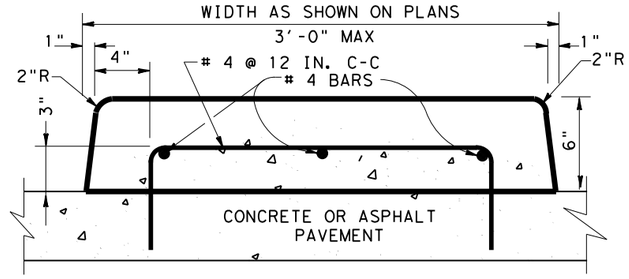
CONCRETE CURB (DOWEL) (6 IN.)



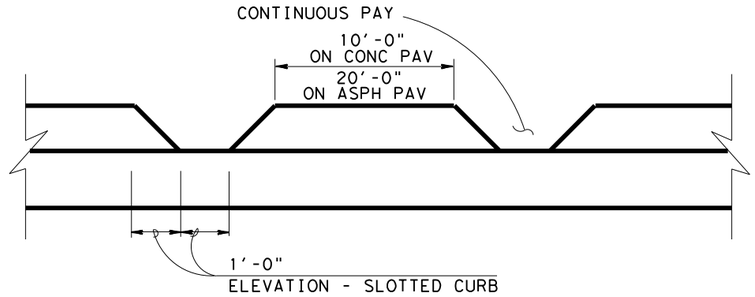
BAR K
#4



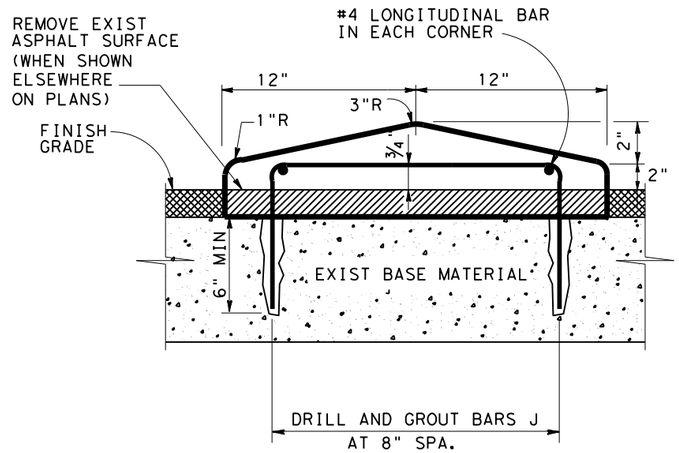
BAR J
#4



ITEM 536-6001 CONCRETE MEDIAN
SEE NOTE 2

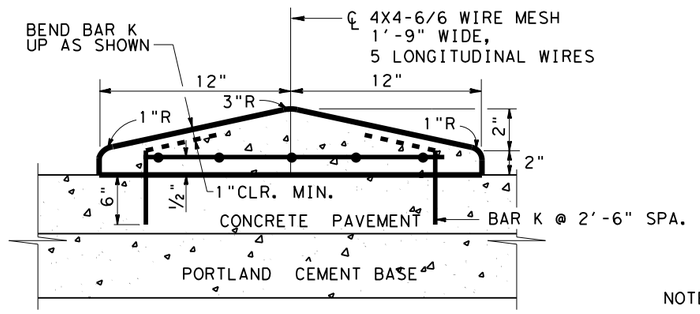


ITEM 529-6012 CONCRETE CURB (SLOTTED) - ON CONC.
ITEM 529-6009 CONC CURB (DOWEL)(SLOTTED) - ON ASPH.



SHOWN ON EXISTING ACP PAVEMENT

SEE NOTE 2 - ITEM 536-6003 CONC DIRECTIONAL ISLAND



SHOWN ON EXISTING OR PROPOSED CONCRETE PAVEMENT

SEE NOTE 2 - ITEM 536-6003 CONC DIRECTIONAL ISLAND

CONCRETE DIRECTIONAL ISLAND

NOTES:

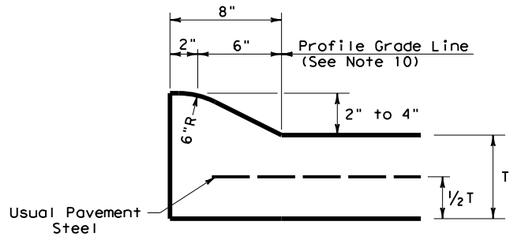
1. DRILL AND GROUT BARS SHOWN AS PER ITEM 420.4.7.10, 6" EMBEDMENT, MINIMUM ON CONC.
2. INSTALL A 2 INCH DRAINAGE OPENING AT 10 FT C-C WHEN CURB/ISLAND IS NOT ON TOP OF CROSS SECTION. (LOCATED ON A 2 OR 3 PERCENT TRANSVERSE GRADE, OR SUPERELEVATION.)

Texas Department of Transportation
Houston District

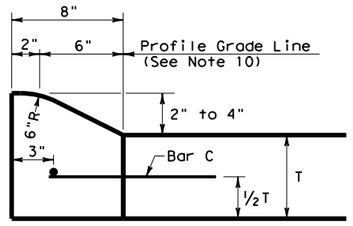
CONCRETE CURB AND DIRECTIONAL ISLAND DETAILS CC & DID

FILE: STDB-9.dgn	DN:	CK:	DW:	CK:
©TxDOT 2014	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS	HOU	6		68
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	HARRIS	1844	01	029	FM 1959

DATE: 2/23/2024
FILE: H:\CDA\1844-01-029 (FM 1959)\Standards\CC & DID.dgn



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



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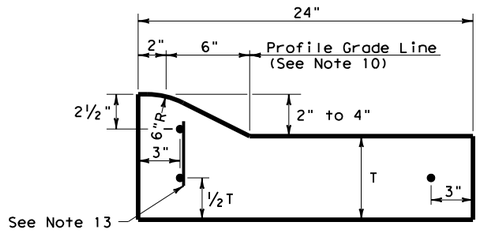
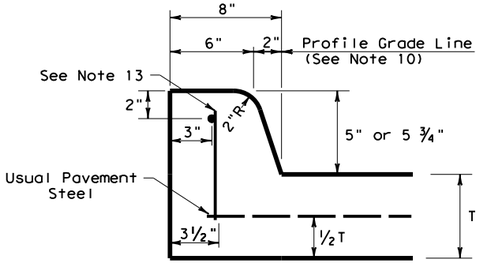
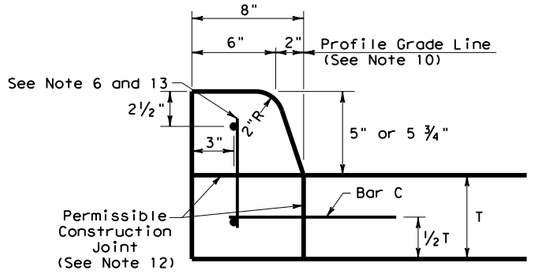


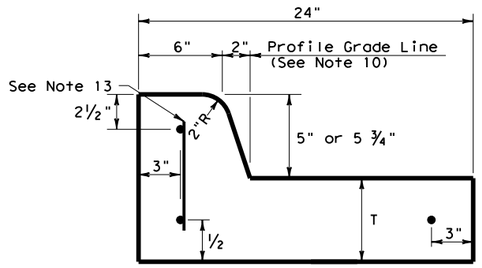
TYPE I CURB AND GUTTER
2" - 4" HEIGHT



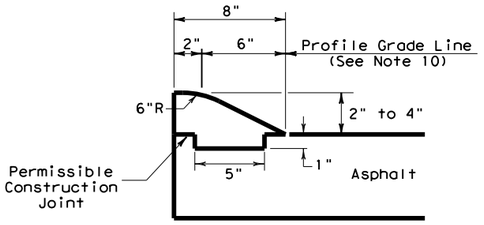
TYPE II CURB (MONOLITHIC)
5" - 5 ¾" HEIGHT



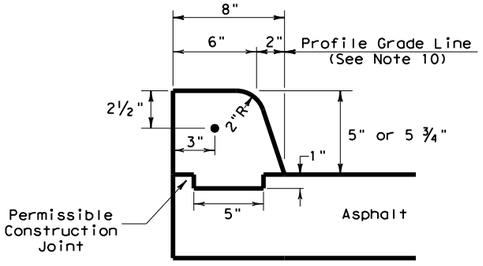
TYPE II CURB
5" - 5 ¾" HEIGHT



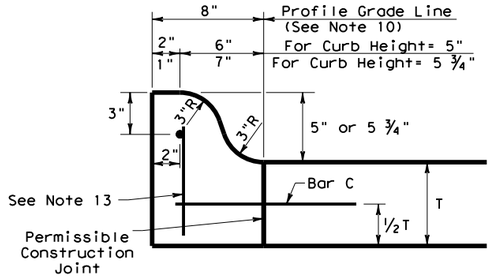
TYPE II CURB AND GUTTER
5" - 5 ¾" HEIGHT



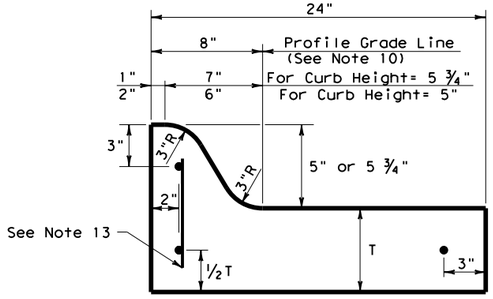
TYPE III CURB (KEYED)
2" - 4" HEIGHT



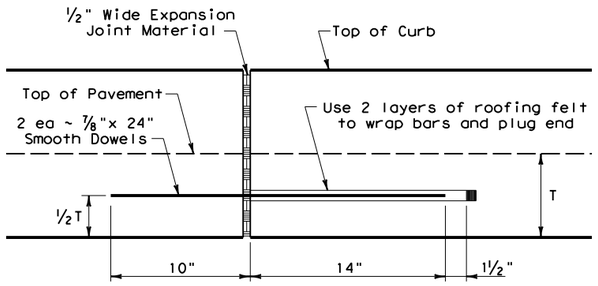
TYPE IV CURB (KEYED)
5" - 5 ¾" HEIGHT



TYPE IIa CURB
5" - 5 ¾" HEIGHT

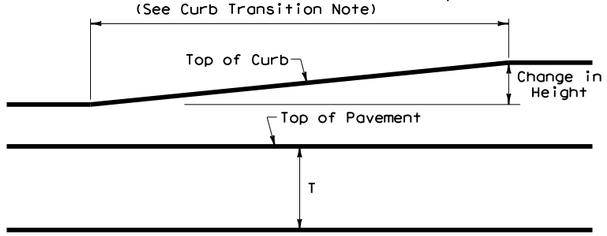


TYPE IIa CURB AND GUTTER
5" - 5 ¾" HEIGHT



EXPANSION JOINT DETAIL

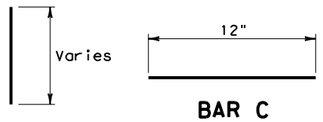
CURB TRANSITION NOTE:
Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans, or as directed by the Engineer.



CURB TRANSITION
Note: To be paid for as Highest Curb

GENERAL NOTES

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



BAR B **BAR C**

Texas Department of Transportation

Design Division Standard

CONCRETE CURB AND CURB AND GUTTER

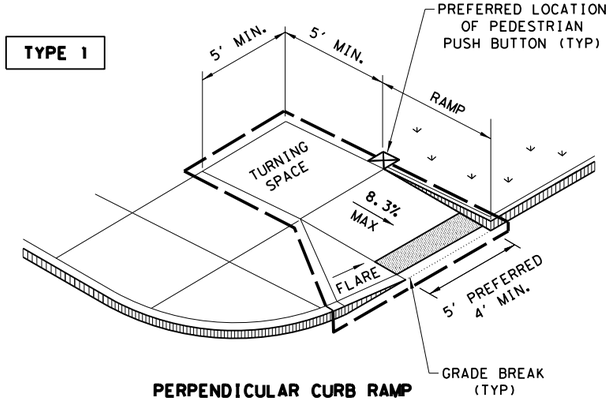
CCCG-22

FILE: cccg21.dgn	DN: TXDOT	CK: AN	DW: CS	CK: KM
© TxDOT: JUNE 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	1844	01	029	FM 1959
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		69

DATE: 2/23/2024
FILE: H:\CDA\1844-01-029 (FM 1959)\Standards\CCCG-22.dgn

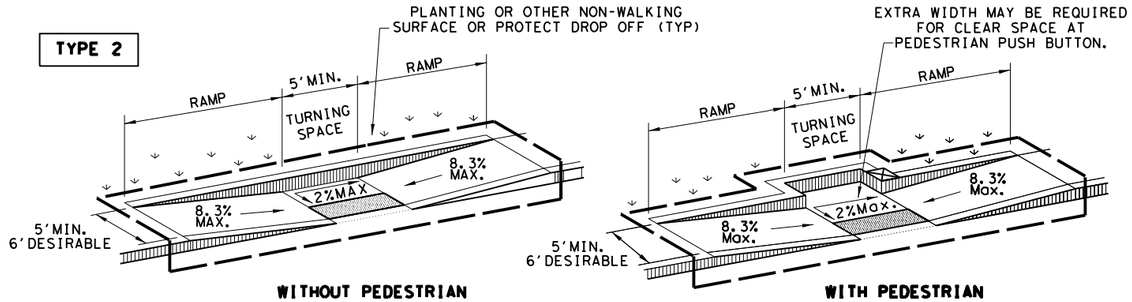
DATE: 2/23/2024
FILE: H:\CDA\1844-01-029 (FM 1959)\Standards\PED-18.dgn

TYPE 1



PERPENDICULAR CURB RAMP

TYPE 2

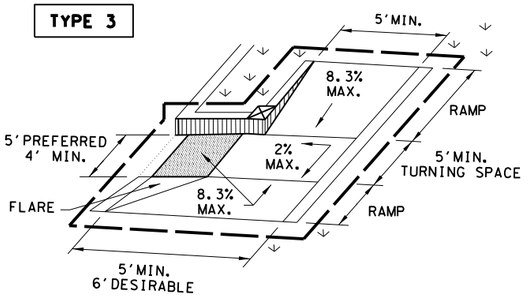


WITHOUT PEDESTRIAN PUSH BUTTON

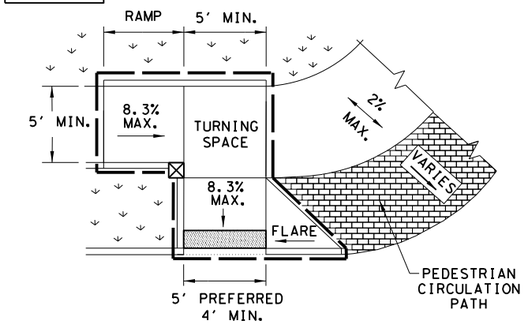
WITH PEDESTRIAN PUSH BUTTON

PARALLEL CURB RAMP

TYPE 3

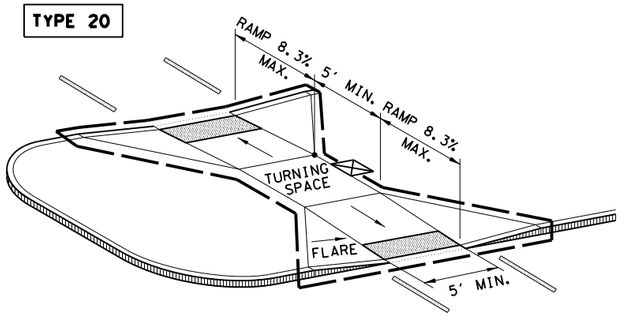


TYPE 6



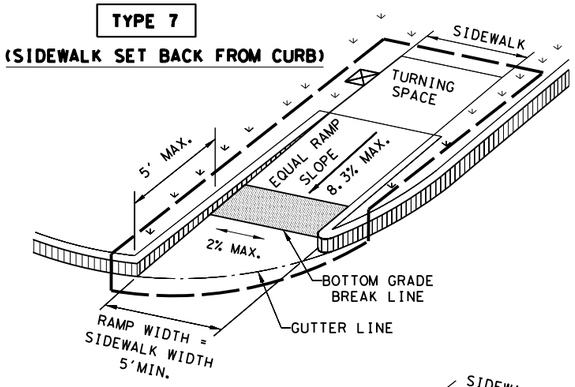
COMBINATION CURB RAMPS

TYPE 20

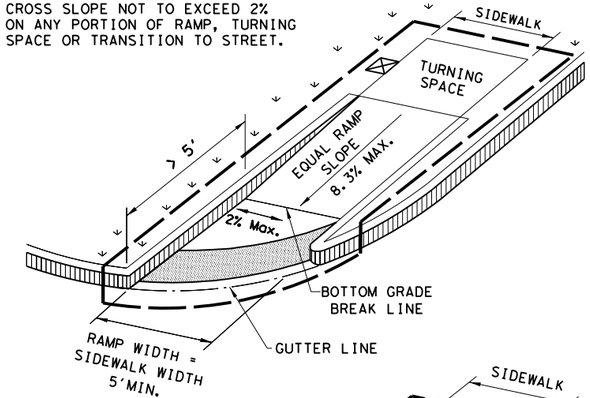


CURB RAMPS AT MEDIAN ISLANDS

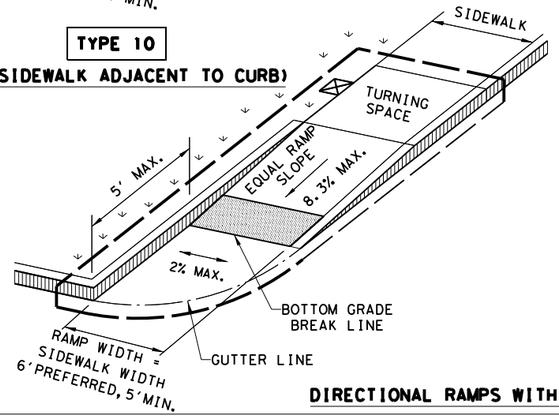
TYPE 7
(SIDEWALK SET BACK FROM CURB)



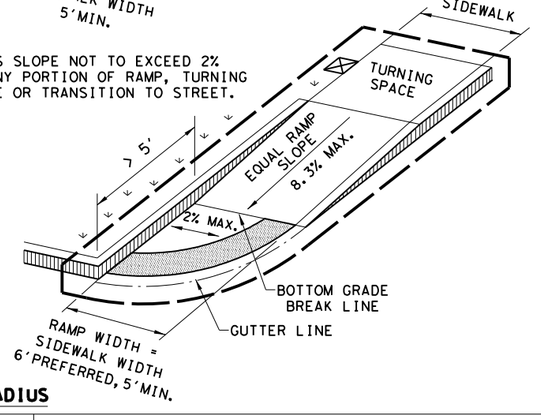
CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.



TYPE 10
(SIDEWALK ADJACENT TO CURB)

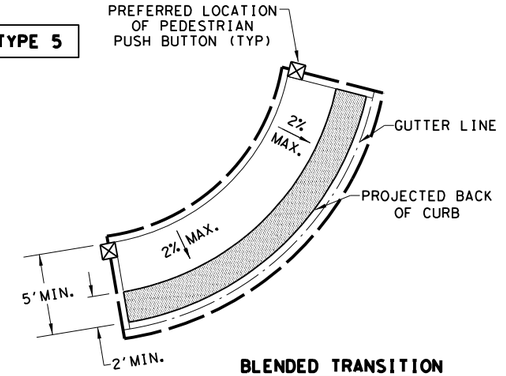


CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.



DIRECTIONAL RAMPS WITHIN RADIUS

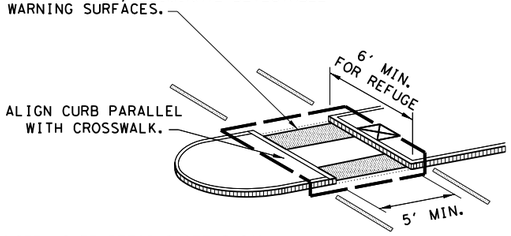
TYPE 5



BLENDED TRANSITION
(FLUSH LANDING)

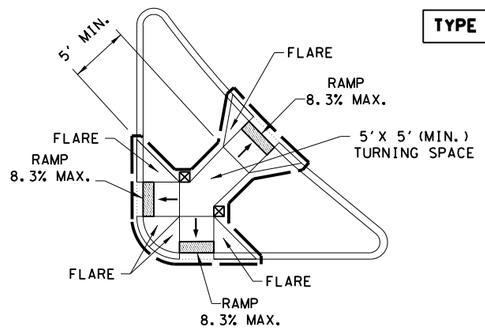
INSTALL DETECTABLE WARNING SURFACE AT EACH END OF THE CUT-THROUGH RAMP WITH A MINIMUM 2' USUAL SIDEWALK SURFACE BETWEEN. IF MEDIAN IS LESS THAN 6' WIDE, ELIMINATE DETECTABLE WARNING SURFACES.

TYPE 21



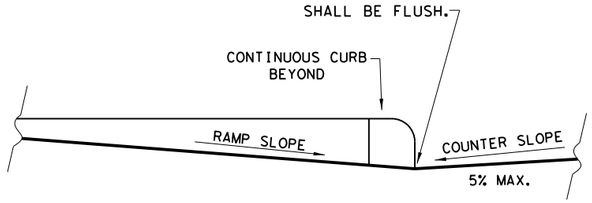
NOTE: CURB DETAILS ARE SHOWN ELSEWHERE IN THE PLANS.

TYPE 22



COMBINATION ISLAND RAMPS

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	1844	01	029	FM 1959
REVISED 08,2005	DIST	COUNTY		SHEET NO.
REVISED 06,2012	HOU	HARRIS		70
REVISED 01,2018				

DATE: 2/23/2024
FILE: H:\CDA\1844-01-029 (FM 1959)\Standards\PED-18.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 applicalble standards may remain in place unless otherwise shown on the plans.

DETECTABLE WARNING MATERIAL

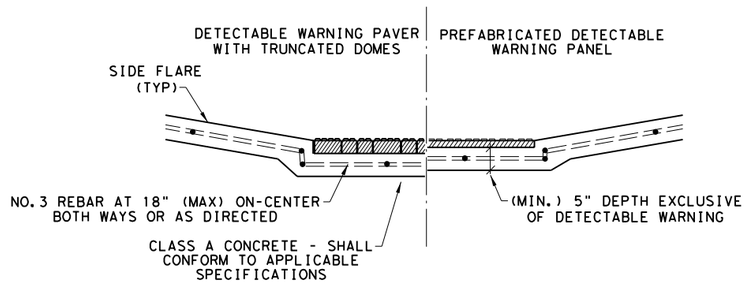
19. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with PROWAG. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material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

DETECTABLE WARNING PAVERS (IF USED)

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

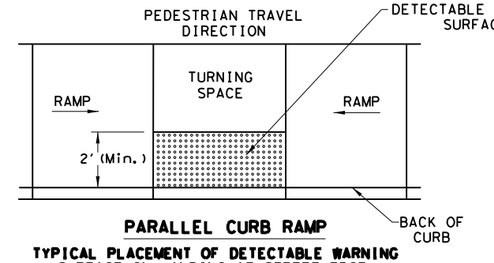
SIDEWALKS

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

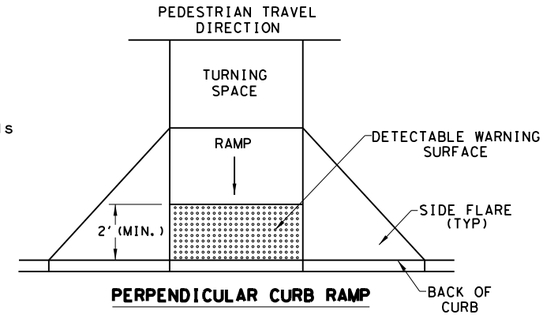


SECTION VIEW DETAIL
CURB RAMP AT DETECTIBLE WARNINGS

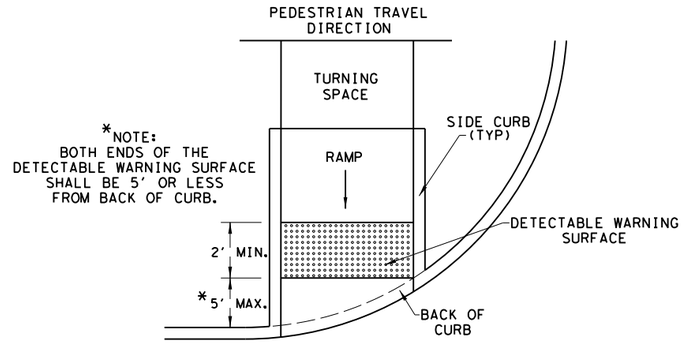
DETECTABLE WARNING SURFACE DETAILS



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



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



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

SHEET 2 OF 4

Texas Department of Transportation — Design Division Standard

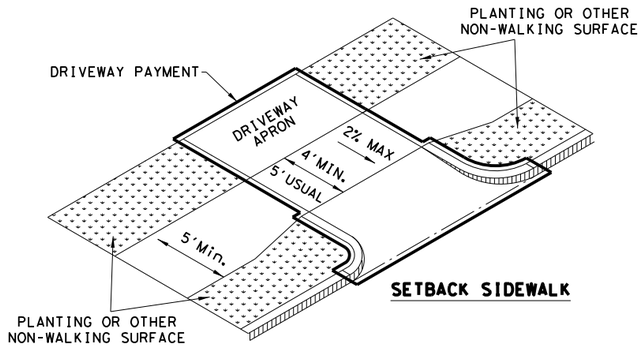
PEDESTRIAN FACILITIES CURB RAMPS

PED-18

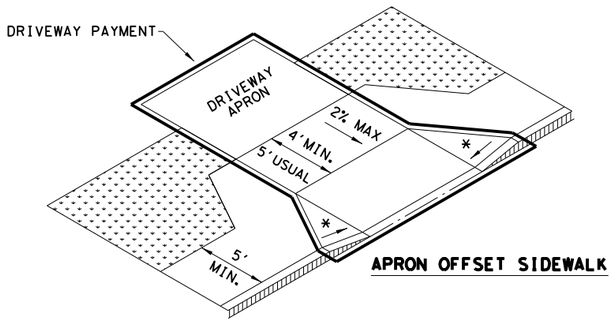
FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG	
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY	
REVISIONS	1844	01	029	FM 1959	
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY		SHEET NO.	
	HOU	HARRIS		71	

DATE: 2/23/2024
FILE: H:\CDA\1844-01-029 (FM 1959)\Standards\PED-18.dgn

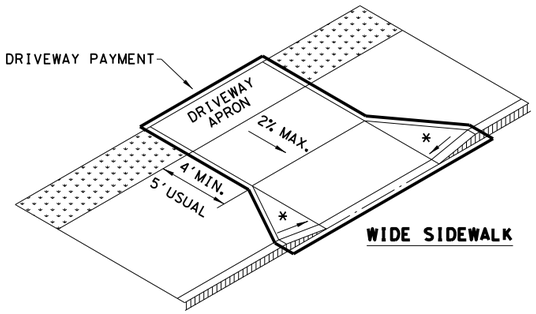
SIDEWALK TREATMENT AT DRIVEWAYS



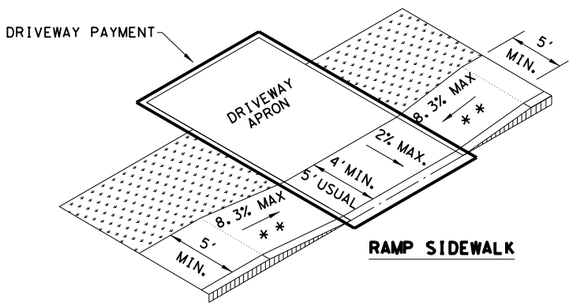
SETBACK SIDEWALK



APRON OFFSET SIDEWALK



WIDE SIDEWALK

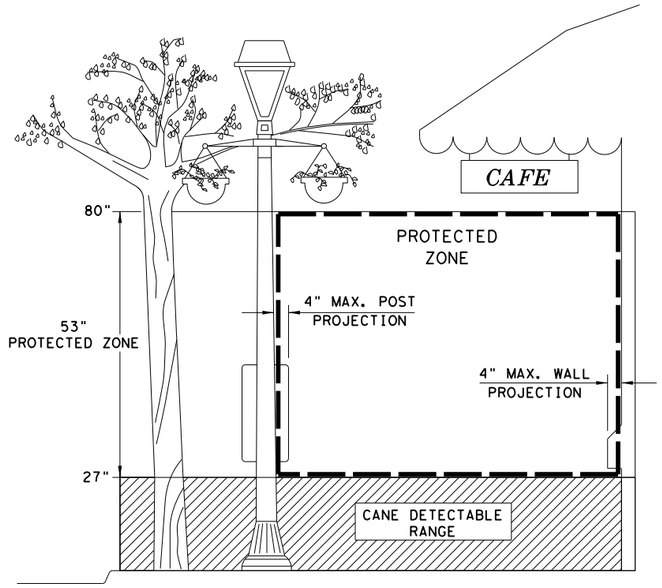


RAMP SIDEWALK

NOTES:

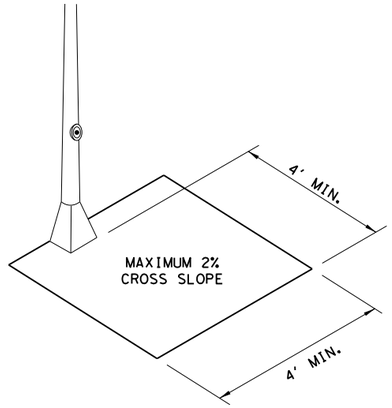
* WHERE DRIVEWAYS CROSS THE PEDESTRIAN ROUTE, SIDES SHALL BE FLARED AT 10% MAX SLOPE.

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

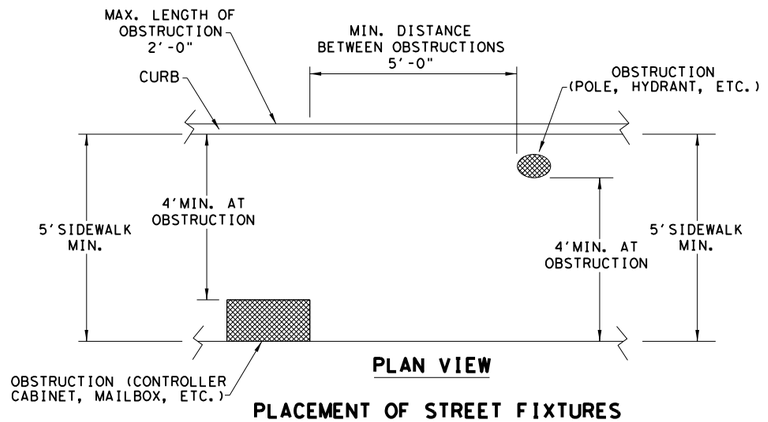


PROTECTED ZONE

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



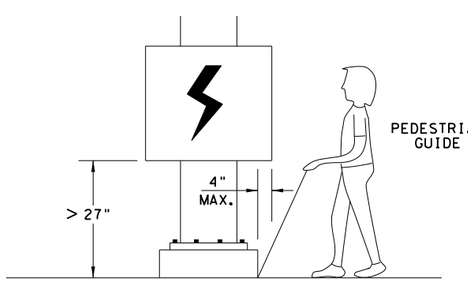
CLEAR SPACE ADJACENT TO PEDESTRIAN PUSH BUTTON



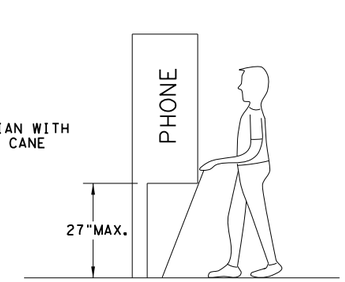
PLAN VIEW

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

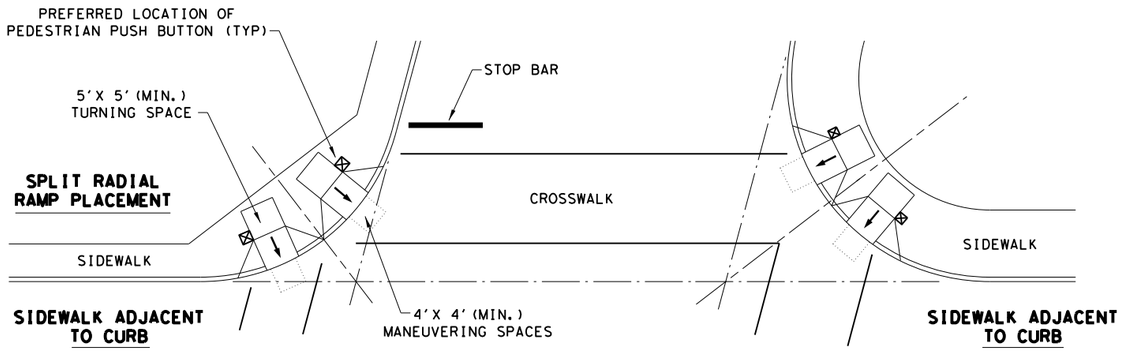
PEDESTRIAN FACILITIES CURB RAMPS

PED-18

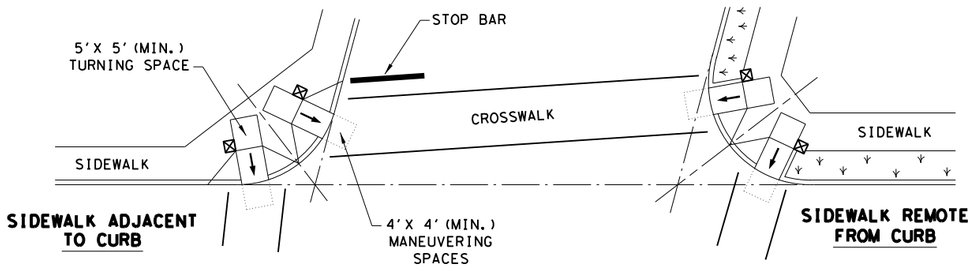
FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG	
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY	
REVISIONS	1844	01	029	FM 1959	
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY		SHEET NO.	
	HOU	HARRIS		72	

DATE: 2/23/2024
FILE: H:\CDA\1844-01-029 (FM 1959)\Standards\PED-18.dgn

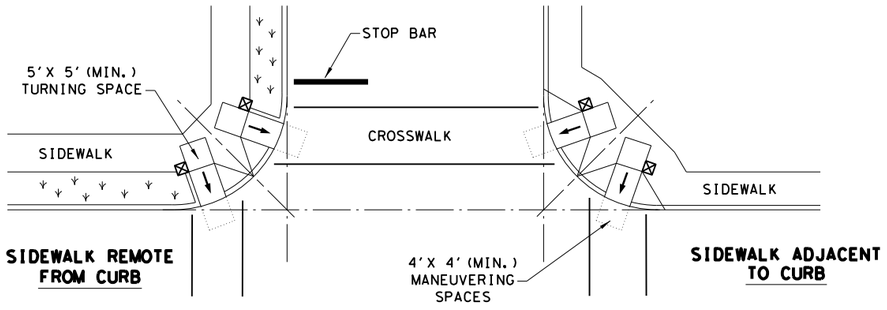
TYPICAL CROSSING LAYOUTS
SEE SHEET 1 OF 4 FOR DETAILS AND DIMENSIONS



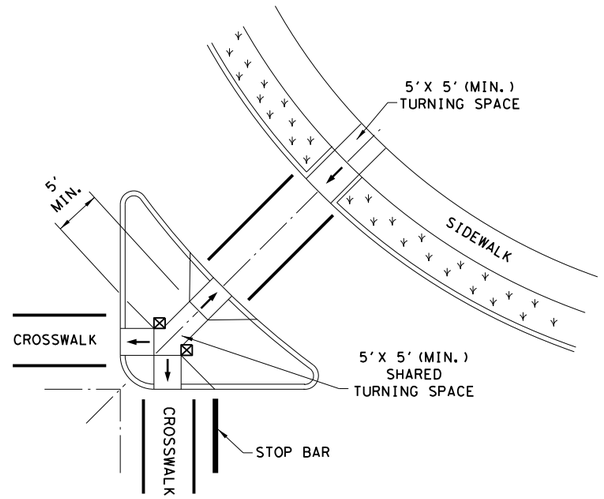
SKEWED INTERSECTION WITH "LARGE" RADIUS



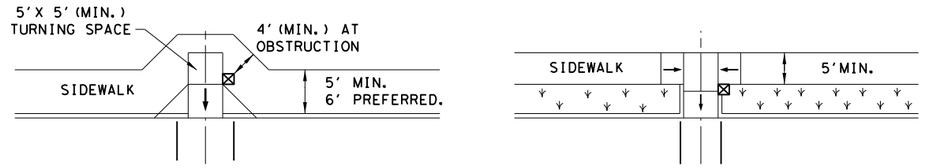
SKEWED INTERSECTION WITH "SMALL" RADIUS



NORMAL INTERSECTION WITH "SMALL" RADIUS



AT INTERSECTION
W/FREE RIGHT TURN & ISLAND



MID-BLOCK PLACEMENT
PERPENDICULAR RAMPS

LEGEND:

SHOWS DOWNWARD SLOPE. →

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

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

SHEET 4 OF 4

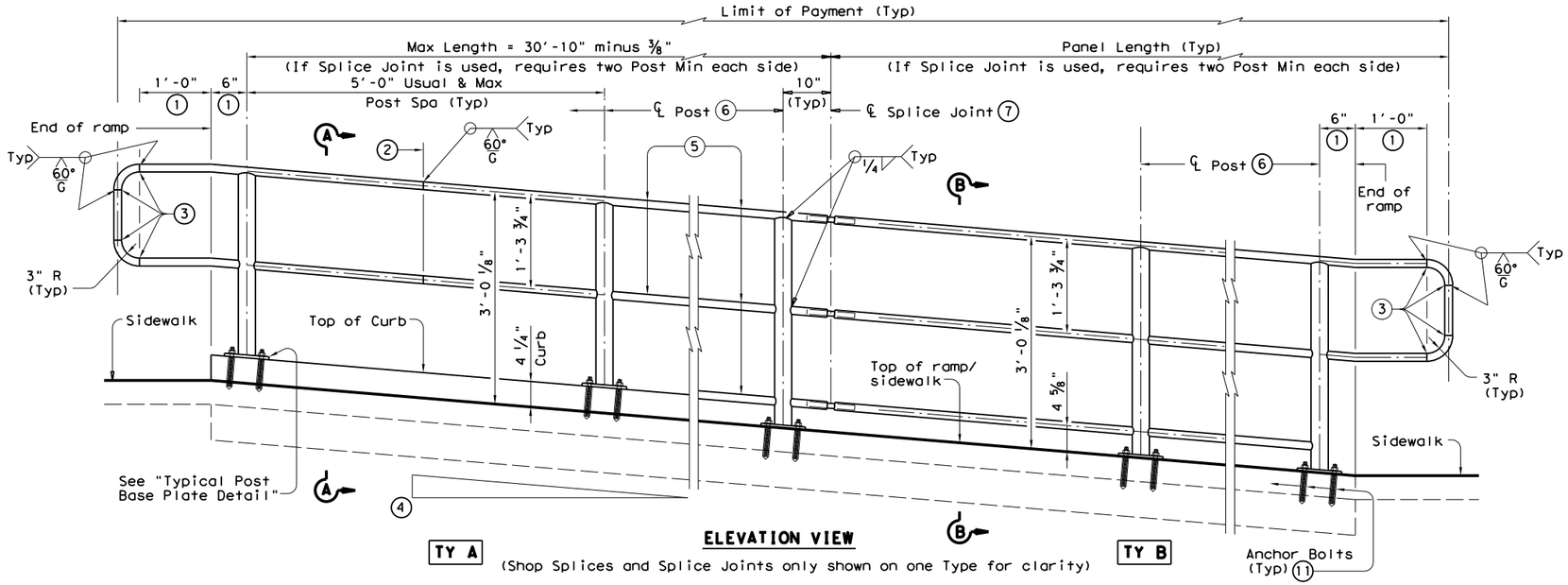
Texas Department of Transportation | Design Division Standard

PEDESTRIAN FACILITIES
CURB RAMPS

PED-18

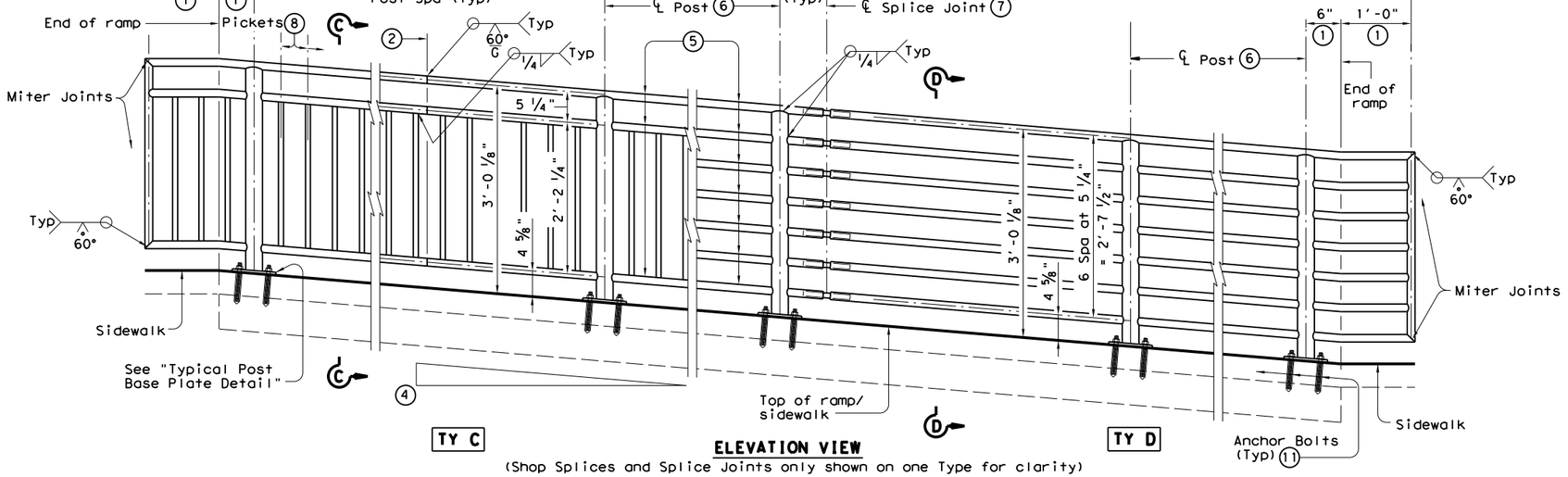
FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1844	01	029	FM 1959
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		73

DATE: 2/23/2024
FILE: H:\CDA\1844-01-029 (FM 1959)\Standards\prd13.dgn



ELEVATION VIEW

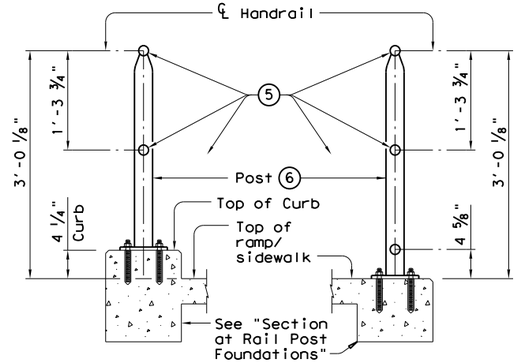
(Shop Splices and Splice Joints only shown on one Type for clarity)



ELEVATION VIEW

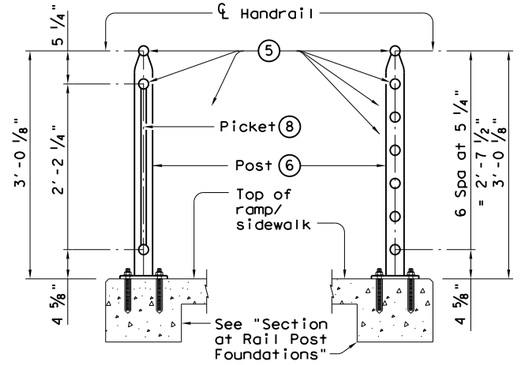
(Shop Splices and Splice Joints only shown on one Type for clarity)

RECOMMENDED USAGE (9) (10)	
Dropoff Height/ Condition	Recommended Rail Options
<30" dropoff	TY A, TY B, TY C, or TY D
≥ 30" dropoff, or along Bike Path	TY E or TY F



SECTION A-A
(Showing Handrail **TY A**)

SECTION B-B
(Showing Handrail **TY B**)



SECTION C-C
(Showing Handrail **TY C**)

SECTION D-D
(Showing Handrail **TY D**)

1. Parallel to ground.
2. One shop splice per panel is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.
3. Shop splice is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.
4. See Ramp Details located elsewhere in plans for ramp slope and dimensions. Maximum ramp slope will not exceed 8.3 percent. Level landing required for each 30" rise if grade exceeds 5 percent.
5. 1 ½" Dia. Standard Pipe (1.900" O.D., 0.145" wall thickness). Parallel to ramp / sidewalk. Provide holes as needed in 1 ½" Dia. pipe for galvanizing drainage and venting.
6. 2 ½" Dia. Standard Pipe (2.875" O.D., 0.203" wall thickness). See "Post Mount Detail" for crimping and trimming post to fit Dia. of top rail. Provide holes as needed in post for galvanizing drainage and venting. Plumb all posts.
7. See "Handrail Fabrication Details" for Splice Joints.
8. ℄ ⅝" Dia. Round Bar equal spacing at 4 ½" Max. Plumb all pickets.
9. When needed for accessibility (grade > 5 percent) or as needed for pedestrian safety.
10. Not to be used on bridges.
11. See "General Notes" for anchor bolt information.

SHEET 1 OF 3

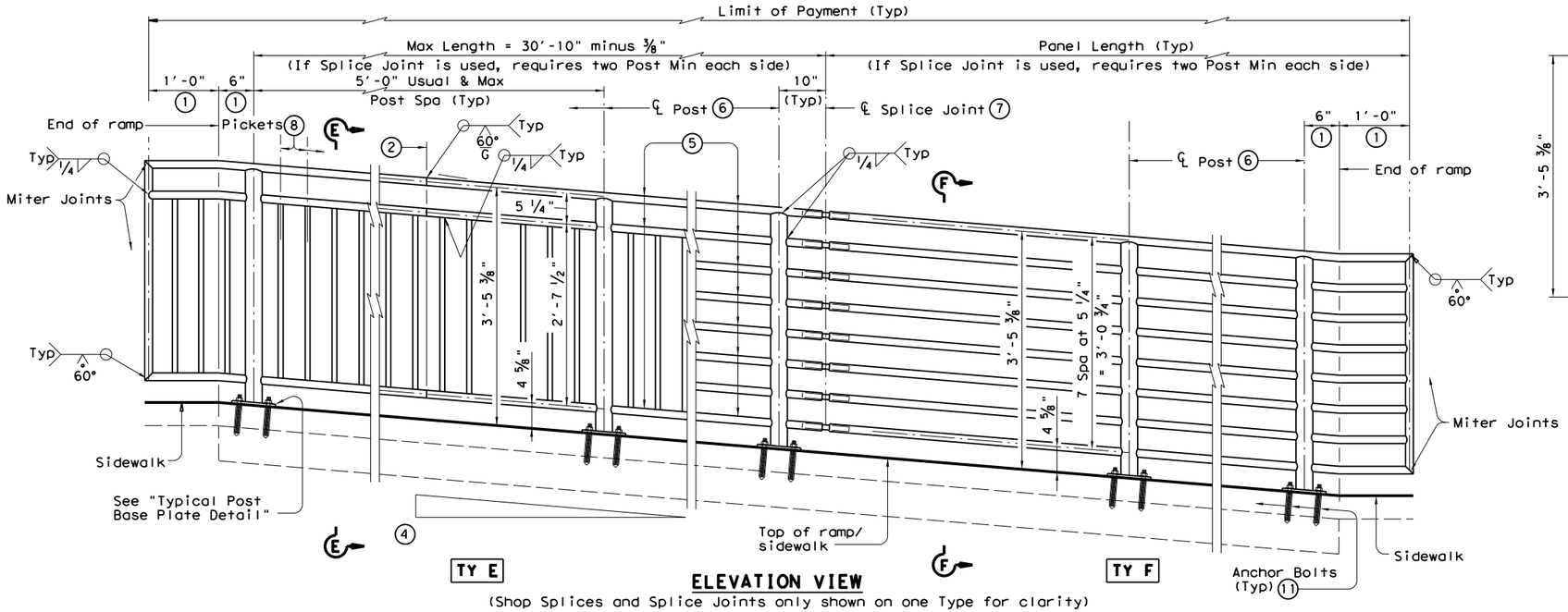
Texas Department of Transportation — Design Division Standard

PEDESTRIAN HANDRAIL DETAILS

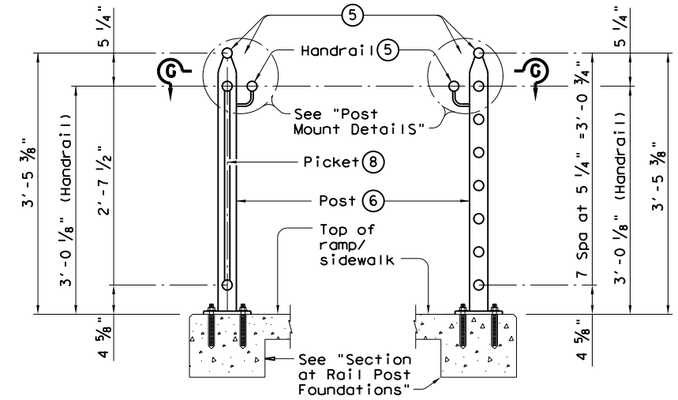
PRD-13

FILE: prd13.dgn	DN: TxDOT	CK: AM	DW: JTR	CK: CGL
© TxDOT Decmeber 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED MAY, 2013 (VP)	1844	01	029	FM 1959
	DIST	COUNTY		SHEET NO.
	12	HARRIS		74

DATE: 2/23/2024
FILE: H:\CDA\1844-01-029 (FM 1959)\Standards\prd13.dgn

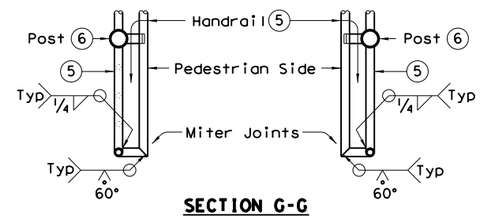


ELEVATION VIEW
(Shop Splices and Splice Joints only shown on one Type for clarity)

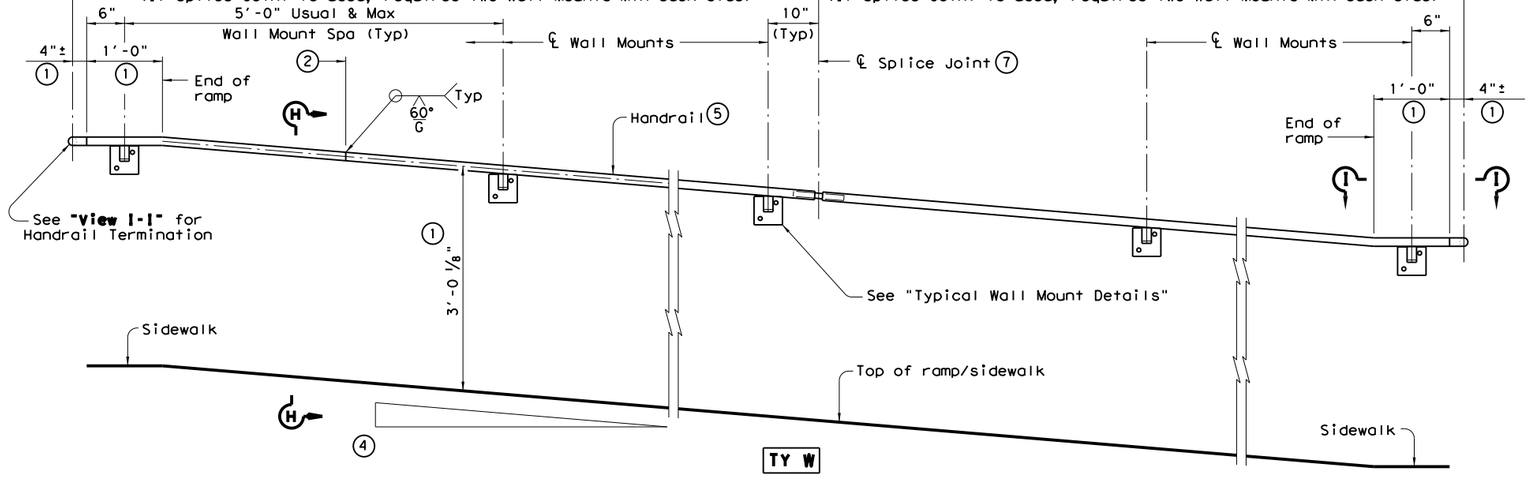


SECTION E-E
(Showing Handrail **TY E**)

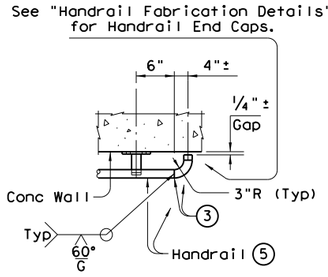
SECTION F-F
(Showing Handrail **TY F**)



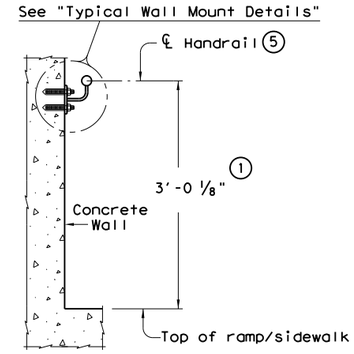
SECTION G-G
(Showing Handrail Termination)



ELEVATION VIEW



VIEW I-I
(Showing Handrail Termination)



SECTION H-H
(Showing Handrail **TY W**)

1. Parallel to ground.
2. One shop splice per panel is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.
3. Shop splice is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.
4. See Ramp Details located elsewhere in plans for ramp slope and dimensions. Maximum ramp slope will not exceed 8.3 percent. Level landing required for each 30" rise if grade exceeds 5 percent.
5. 1 ½" Dia. Standard Pipe (1.900" O.D., 0.145" wall thickness). Parallel to ramp / sidewalk. Provide holes as needed in 1 ½" Dia. pipe for galvanizing drainage and venting.
6. 2 ½" Dia. Standard Pipe (2.875" O.D., 0.203" wall thickness). See "Post Mount Detail" for crimping and trimming post to fit Dia. of top rail. Provide holes as needed in post for galvanizing drainage and venting. Plumb all posts.
7. See "Handrail Fabrication Details" for Splice Joints.
8. ℄ ⅝" Dia. Round Bar equal spacing at 4 ½" Max. Plumb all pickets.
11. See "General Notes" for anchor bolt information.

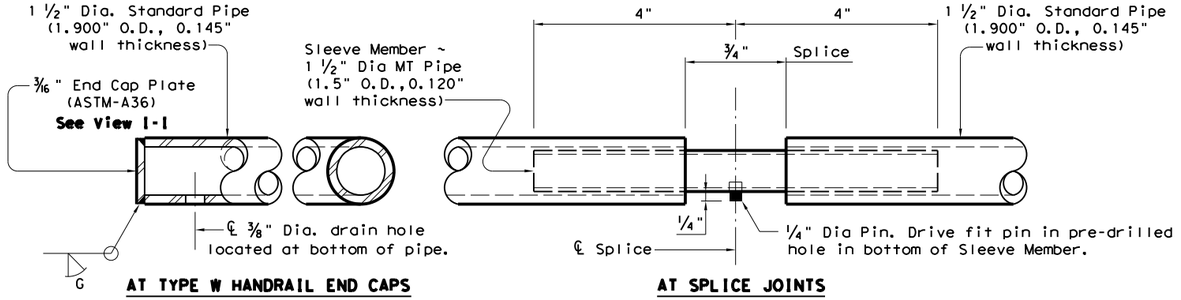
Texas Department of Transportation — Design Division Standard

PEDESTRIAN HANDRAIL DETAILS

PRD-13

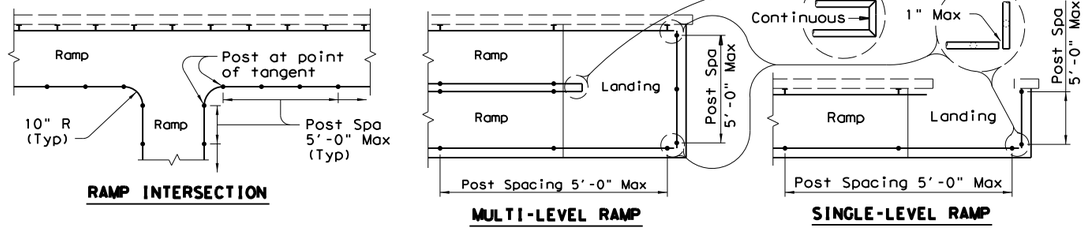
FILE: prd13.dgn	DN: TxDOT	CK: AM	DW: JTR	CK: CGL
©TxDOT December 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	1844	01	029	FM 1959
REVISED MAY, 2013 (VP)	DIST	COUNTY		SHEET NO.
	12	HARRIS		75

DATE: 2/23/2024
FILE: H:\CDA\1844-01-029 (FM 1959)\Standards\prd13.dgn



AT TYPE W HANDRAIL END CAPS

AT SPLICE JOINTS



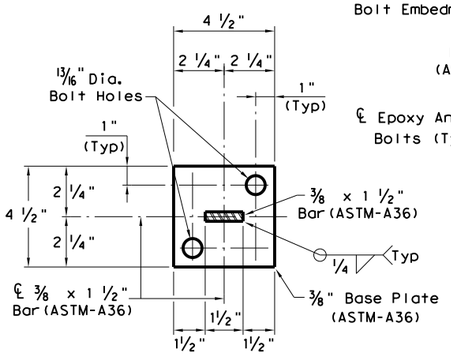
RAMP INTERSECTION

MULTI-LEVEL RAMP

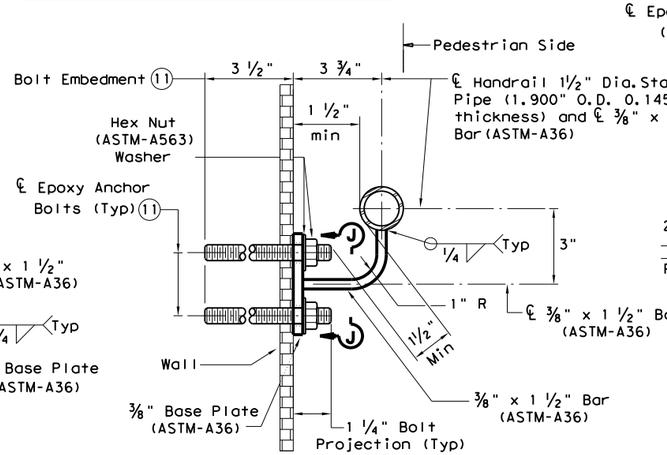
SINGLE-LEVEL RAMP

PLAN SHOWING RAIL AT RAMP CONDITIONS

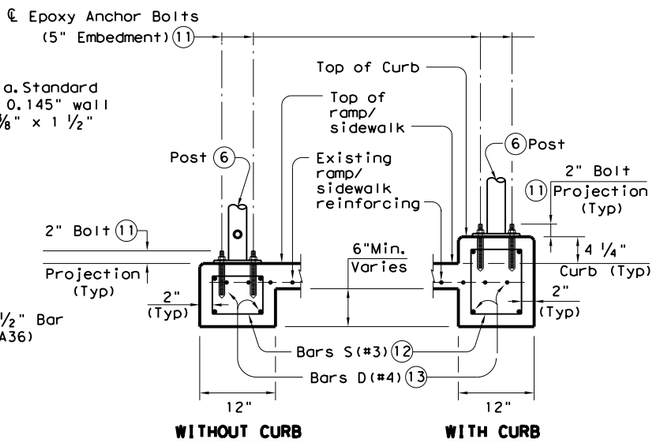
HANDRAIL FABRICATION DETAILS



SECTION J-J
(Anchor Bolts not shown for clarity)



SECTION AT WALL MOUNT



WITHOUT CURB

WITH CURB

SECTION AT RAIL POST FOUNDATIONS

GENERAL NOTES

Designed according to ADAAG, Texas Accessibility Standards, Uniform Building Code, and AASHTO LRFD Specifications.

Handrail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

Pipe will conform to ASTM-A53 Grade B or A500 Grade B. Steel plates and steel bars will conform to ASTM-A36. Mechanical tubing (MT) will conform to ASTM A513 Grade 1015 or higher. Galvanize all steel components except reinforcing steel unless noted otherwise.

Concrete for foundations will be in accordance with Item 531 "Sidewalks". All reinforcing steel must be Grade 60. Bar laps, where required, will be as follows: Uncoated ~ #4 = 1'-5" Epoxy coated ~ #4 = 2'-1"

When the plans require painted steel, follow the requirements for painting galvanized steel in Item 446, "Cleaning and Painting Steel". Sleeve Members will receive galvanization and only get field painted after installation unless directed otherwise by Engineer.

Epoxy Anchor bolts for wall mount and post base plate will be ⅝" Dia. ASTM A36 threaded rods with one hex nut and one hardened steel washer at each bolt. ⅝" Dia. threaded rod embedment depth for wall mounts is 3 ½" and embedment depth for post base plate is 5".

Embed threaded rods into concrete with a Type III (Class C) epoxy meeting the requirements of DMS-6100, "Epoxies and Adhesives". Mix and dispense adhesive with the manufacturer's static mixing nozzle/dual cartridge system. Core drill holes (percussion drilling not permitted).

At the contractor's option the post base plate anchor bolts may be cast with the Ramp/Sidewalk (See Cast-in-Place Anchor Bolt Options).

Optional cast-in-place anchor bolts will be ⅝" Dia ASTM A307 Grade A bolts (or A36 threaded rods with one tack welded hex nut each) with one hex nut and one hardened steel washer at each bolt. Embedment depth of cast-in-place bolt will be 8" for post base plate.

Handrails and any wall or other surface adjacent to them will be free of any sharp or abrasive elements.

Submit shop drawings to the Engineer unless otherwise noted. For curved handrail applications, fabricate the handrail to the curve if radius is less than 600 ft. Shop drawings are required when rail is fabricated to the curve.

For all handrails, erection drawings will be submitted to the Engineer for approval to ensure proper installation.

Drawings will show handrail mount locations with bolts setting, spacing, ramp slope, and/or splice joint locations, and handrail lengths with identification showing where each handrail goes on the layout.

Payment for concrete sidewalks or curb ramps will be paid for in accordance with Item 531 "Sidewalks".

Payment for all items shown is to be included in unit price bid in accordance with Item 450 "Railing" of the type specified.

All exposed edges will be rounded or chamfered to approximately ⅛" by grinding.

TYPICAL WALL MOUNT DETAILS

(5) 1 ½" Dia. Standard Pipe (1.900" O.D., 0.145" wall thickness). Parallel to ramp/sidewalk. Provide holes as needed in 1 ½" Dia. pipe for galvanizing drainage and venting.

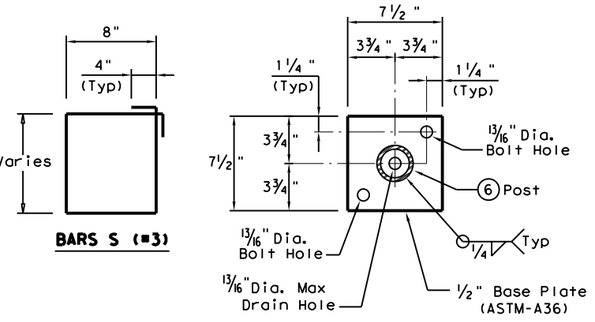
(6) 2 ½" Dia. Standard Pipe (2.875" O.D., 0.203" wall thickness). Plumb all posts. See "Post Mount Detail" for crimping and trimming post to fit the diamenter of top rail. Provide holes as needed in post for galvanizing drainage and venting.

(11) See "General Notes" for anchor bolt information.

(12) Bars S(#3) spaced at 12" Max (Spaced 3" from outside edge of overall length of Ramp/Sidewalk).

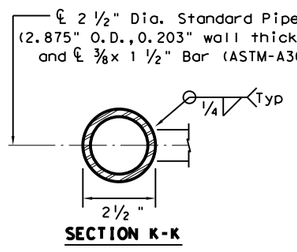
(13) Provide 1 ½" end cover to Bars D(#4) from outside edge of overall length of Ramp/Sidewalk.

CAST-IN-PLACE ANCHOR BOLT OPTIONS
(Used for Post Base Plate only)



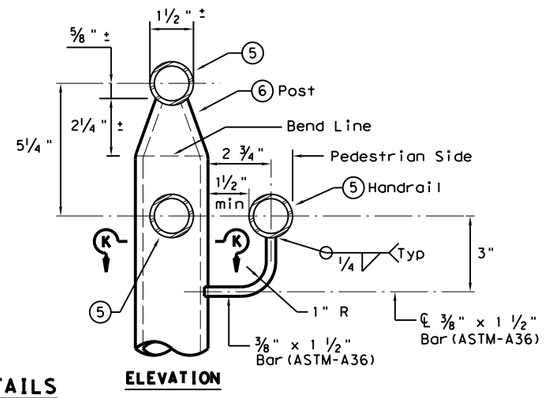
BARS S (#3)

TYPICAL POST BASE PLATE DETAIL



SECTION K-K

POST MOUNT DETAILS



ELEVATION

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

PEDESTRIAN HANDRAIL DETAILS

PRD-13

FILE: prd13.dgn	DN: TxDOT	CK: AM	DW: JTR	CK: CGL
©TxDOT December 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	1844	01	029	FM 1959
REVISED MAY, 2013 (VP)	DIST	COUNTY		SHEET NO.
	12	HARRIS		76

TYPE OF WORK — ITEMS AND REQUIREMENTS FOR EACH TYPE OF WORK

SODDING	PERMANENT SEEDING	TEMPORARY SEEDING	Reference Item 161, 162, 164, 166, 168 of the Texas Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges 2014 for specifications, dimensions, volumes and measurements that are not shown. Use latest Houston District, Special Provisions for those items indicated.		
	✓		**161-6017 COMPOST MANUF TOPSOIL (BIP)(4") SY**	APPLICATION RATE Item 161.2.1. Compost Manufactured Topsoil (CMT)	Item 161.2. Materials. Submit quality control (QC) documentation to the Engineer. Compost producer's STA certification must be dated to meet STA requirements (certification must be within 30 or 90 days per STA requirements). Lab analysis performed by an STA-certified lab must be dated within 30 days before delivery of the compost.
✓			**162-6002 BLOCK SODDING SY**	GRASS SPECIES Item 162.2. Materials. Common Bermuda (Cynodon Dactylon)	Item 162.2.1. Block Sod. Use block palletized or roll type sod. **REMOVE PLASTIC BACKING FROM ROLL TYPE SOD.** Place sod within 48 hours of delivery to site. No exceptions. Place sod with joints alternating on each row to prevent continuous joint lines. Peg sod as needed with wood pegs to hold sod in place. Pegging sod is subsidiary to Item 162.
	✓		**164-6066 DRILL SEEDING(PERM)(WARM OR COOL) SY** Item 164.1. Description Provide and install seeding as shown on District Standard	PLANTING MONTH / SEED MIX March, April, May, June, July, August, September, October: Hulled - Bermudagrass (Cynodon dactylon) - 40.0 lbs PLS/acre; Foxtail Millet (Setaria italica) - 34.0 lbs PLS/acre; Green Sprangletop (Leptochloa dubia) - 4.0 lbs PLS/acre; Sideoats Grama (Bouteloua curtipendula) - 3.2 lbs PLS/acre; Little Bluestem (Schizachyrium scoparium) - 1.4 lbs PLS/acre November, December, January, February: Unhulled - Bermudagrass (Cynodon dactylon) - 40.0 lbs PLS/acre; Oats (Avena sativa) - 72.0 lbs PLS/acre; Green Sprangletop (Leptochloa dubia) - 4.0 lbs PLS/acre; Sideoats Grama (Bouteloua curtipendula) - 3.2 lbs PLS/acre; Little Bluestem (Schizachyrium scoparium) - 1.4 lbs PLS/acre	PLS (Pure Live Seed) Provide documentation of PLS requirements per Item 164.2.1. CONSTRUCTION. Cultivate the area to a depth of 4 inches before placing the seed unless otherwise directed. When performing permanent seeding after an established temporary seeding, cultivate the seedbed to a depth of 4 inches or mow the area before placement of the permanent seed. Plant the seed and place the straw or hay mulch after the area has been completed to lines and grades as shown on the plans. Drill Seeding. Plant seed or seed mixture uniformly over the area shown on the plans at a depth of 1/4 to 1/3 inch using a cultipacker(turfgrass) type seeder. Plant seed along the contour of the slopes. Use broadcast seeding method where site conditions prevent drill seeding method. Broadcast Seeding. Distribute the dry seed or dry seed mixture uniformly over the areas shown on the plans using hand or mechanical distribution on top of soil.
	✓		**164-6052 BROADCAST SEED(PERM)(SPECIAL MIX) SY** Item 164.1. Description Provide and install seeding as shown on District Standard		
		✓	**164-6051 DRILL SEED(TEMP)(WARM OR COOL) SY** Item 164.1. Description Provide and install seeding as shown on District Standard	PLANTING MONTH / SEED MIX March, April, May, June, July, August, September, October: Foxtail Millet (Setaria italica) - 34.0 lbs PLS/acre November, December, January, February: Oats (Avena sativa - 72.0 lbs PLS/acre	
		✓	**164-6009 BROADCAST SEED(TEMP)(WARM) SY** Item 164.1. Description Provide and install seeding as shown on District Standard		
	✓	✓	**162-6003 STRAW OR HAY MULCH SY**	APPLICATION RATE Immediately after planting the seed or seed mixture, apply straw or hay mulch uniformly over the seeded area. Apply straw or hay mulch at 2 tons per acre. Use tacking agent with straw or hay mulch as described on this sheet.	Use straw or hay mulch in conformance with Article 162.2.5, "Mulch." Use biodegradable tacking agents only applied at a rate in accordance with manufacturer's recommendations. Use the following products or an approved equal(see note this sheet): Conweb/Contac Guar Gum, Profile Products Corporation, (307) 655-9565, Ramtec/Procol/Viscol Guar Gum, Ramtec Corporation, (800) 366-1180
✓	✓	✓	**166-6001 FERTILIZER AC** Item 166.2. Materials Use fertilizer as shown on District Standard	APPLICATION RATE Deliver and evenly distribute fertilizer at a rate of 4000 lbs/acre.	Use a **NON-CHEMICAL** fertilizer which meets all the following criteria: (1) BRAND NAME must be registered with the Texas State Chemist as a commercial fertilizer. (2) Meets USEPA guidelines for unrestricted use. (3) Derived from biological sources such as, but not limited to: sewage sludge, manures, vegetation, etc. (4) In granular form and essentially dust free. Submit proof of registration and nutrient source to Engineer. Use the following products or an approved equal(see note this sheet): Sigma, SIGMA AgriScience, 281-851-6749 Sustanite-standard grade, Automation Nation, Inc., 713-675-4999 Milorganite, MMSD, 800-287-9645 Agricultural Organic P/L, Ag Org, INC., 713-523-4396
✓	✓	✓	**168-6001 VEGETATIVE WATERING MG**	APPLICATION RATE Item 168.3 Construction. 6000 gallons/acre per working day x 20 consecutive working days = 120,000 gallons total/acre	Begin watering immediately after installation of seed or sod. Replace, fertilize, and water any seed or sod in poor condition due to the failure to apply the specified amount of water within the time allowed at no expense to the Department.

SEQUENCE OF WORK

BLOCK SOD	PERMANENT SEEDING	TEMPORARY SEEDING
1. FERTILIZER 2. CULTIVATE SOIL (ITEM 162.3) 3. SOD 4. VEGETATIVE WATERING	1. FERTILIZER 2. COMPOST MANUFACTURED TOPSOIL 3. CULTIVATE SOIL (ITEMS 164.3 AND 161.3.1) 4. PERMANENT SEEDING 5. STRAW OR HAY MULCH 6. VEGETATIVE WATERING	1. FERTILIZER 2. CULTIVATE SOIL (PER ITEM 164.3) 3. TEMPORARY SEEDING 4. STRAW OR HAY MULCH 5. VEGETATIVE WATERING

DATE: 2/23/2024
FILE: H:\CDA\1844-01-029 (FM 1959)\Standards\FERTILZR SEED SOD STRAW COMPST WTR.dgn

Texas Department of Transportation

HOUSTON DISTRICT

FERTILIZER, SEED, SOD, STRAW, COMPOST, AND WATER

FSSSCW-15

REVISIONS
10/2014 UPDATED TO 2014 SPECS
3/2015 MINOR CORRECTIONS
3/2023 ADDED SHEET ABBREVIATION

FILE: OCT 2014
ORIGINAL:

FED DIV	STATE	PROJECT NUMBER			SHEET
6	TEXAS				77
DIST	COUNTY	CONTROL	SECT	JOB	HIGHWAY
HOU	HARRIS	1844	01	029	FM 1959

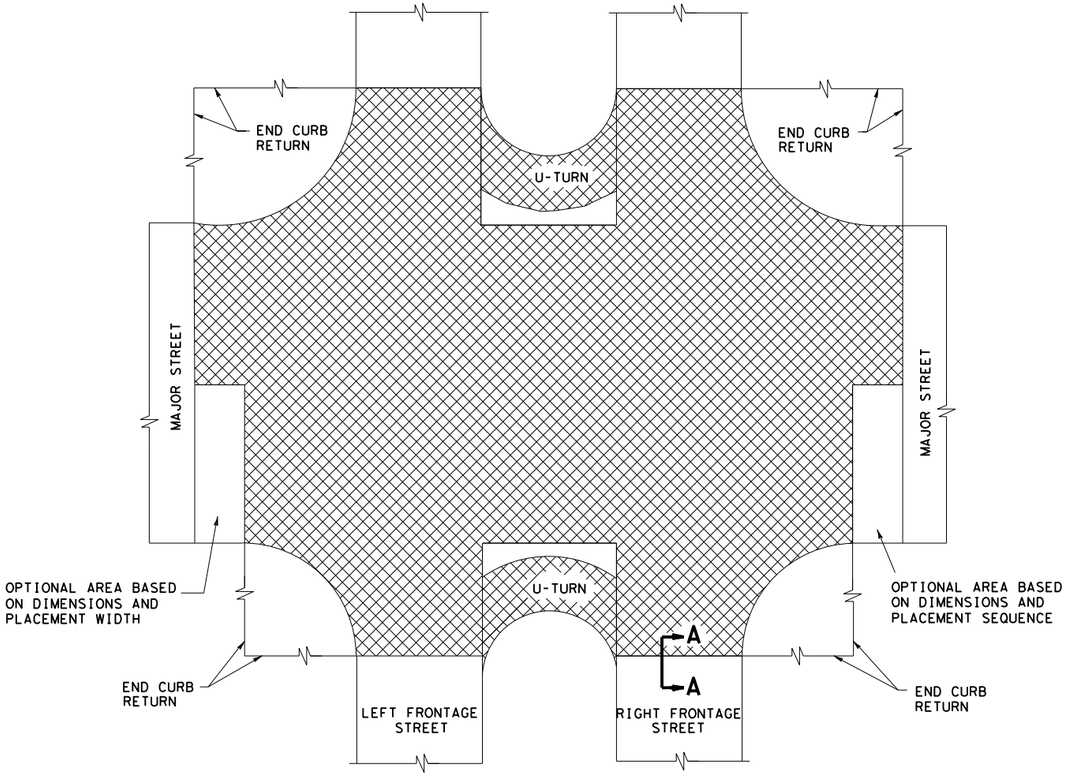


FIGURE 2

INTERSECTION OF MAJOR STREET
WITH FRONTAGE STREET

FAST TRACK PAVING AREA

TYPICAL PAVING PLANS

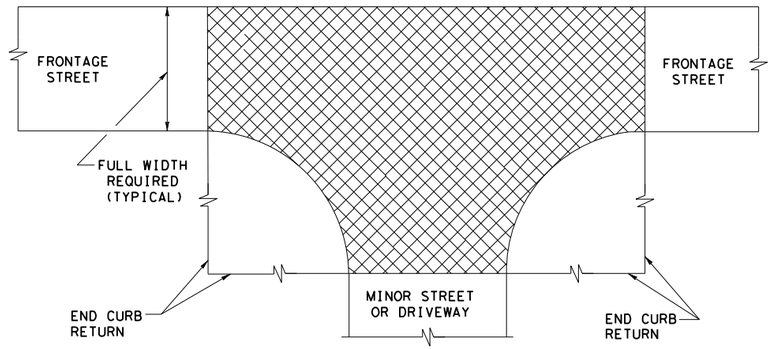


FIGURE 3

INTERSECTION OF MINOR STREET OR
DRIVEWAY WITH FRONTAGE STREET

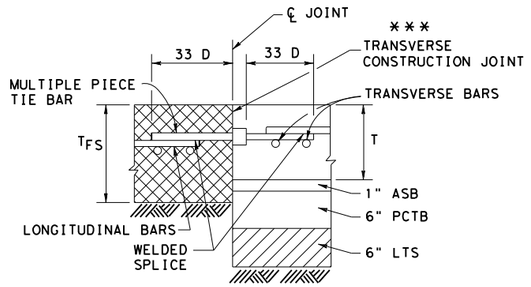
TABLE 1

EQUIVALENT PAVEMENT THICKNESS	
T * (IN.)	T_{FS} ** (IN.)
<=12"	T+3"
>12"	15"

*WITH BASE STRUCTURE OF:
1" ASPHALT STABILIZED BASE
6" PORTLAND CEMENT TREATED BASE
6" LIME TREATED SUBGRADE

**ON AS CUT SUBGRADE

***SEE JOINT SEALING DETAILS ON CRCP STANDARDS



SINGLE MAT

TRANSVERSE CONSTRUCTION JOINTS

SECTION A - A
FIGURE 1

GENERAL NOTES

1. DEFINITION OF TERMS

   T_{FS} - FAST TRACK CONCRETE PAVING DEPTH AT INTERSECTIONS AND LEAVE OUTS.
   T - NOMINAL CONCRETE PAVING DEPTH AS SHOWN IN THE PLANS.
   DETERMINE FAST TRACK CONCRETE PAVING DEPTH USING TABLE 1 AND THE NOMINAL CONCRETE PAVING DEPTH "T" SHOWN IN THE PLANS.

2. AT INTERSECTIONS AND LEAVE-OUT LOCATIONS USE THE SAME LONGITUDINAL AND TRANSVERSE BAR SPACING FOR THE FAST TRACK PAVING AREA AS THAT USED FOR THE ADJACENT CONCRETE PAVING DEPTH "T"(EXCEPT BAR SIZE SHALL BE #7 ON SINGLE MAT). FOR SINGLE MAT FAST TRACK PAVING, PLACE THE LONGITUDINAL AND TRANSVERSE BARS FOR THE FAST TRACK PAVING AREA AT THE HORIZONTAL PLANE ELEVATION THAT IS TWO TIE-BAR DIAMETERS LOWER THAN THAT USED FOR THE ADJACENT CONCRETE PAVEMENT DEPTH "T", AS SHOWN IN FIGURE 1. USE SINGLE MAT STEEL IN FAST TRACK PAVING AREAS ADJACENT TO PAVEMENT SLABS WITH SINGLE MAT REINFORCING. USE DOUBLE MAT STEEL IN FAST TRACK PAVING AREAS ADJACENT TO PAVEMENT SLABS WITH DOUBLE MAT REINFORCING.

3. THE REQUIRED FAST TRACK PAVING AREAS WILL BE SHOWN ON THE PLANS. THE CONTRACTOR HAS THE OPTION TO UTILIZE FAST TRACK CONCRETE PAVING AT U-TURNS, AT INTERSECTIONS, AT MINOR STREETS, AND AT DRIVEWAYS WITH FRONTAGE ROAD LEAVE-OUT AREAS THAT ARE NOT SHOWN ON THE PLANS, WITH PRIOR WRITTEN APPROVAL FROM THE ENGINEER. TYPICAL PAVING PLANS FOR THE INTERSECTION OF A MAJOR STREET WITH THE FRONTAGE ROAD ARE SHOWN AS FIGURE 2, AND FOR THE INTERSECTION OF A MINOR STREET OR DRIVEWAY WITH THE FRONTAGE ROAD AS FIGURE 3. FAST TRACK PAVE THE FRONTAGE ROAD FOR THE FULL FRONTAGE ROAD WIDTH AND PLACE IN STAGES AS REQUIRED.

4. USE ADDITIONAL #6 REINFORCING STEEL BARS (MINIMUM 42 INCHES LONG) AND SPACE THEM MIDWAY BETWEEN ALTERNATE LONGITUDINAL BARS ALONG THE THE TRANSVERSE CONSTRUCTION JOINT FORMED AT THE FAST TRACK PAVING INTERFACE (T_{FS}) WITH THE ADJACENT PAVEMENT SLAB (T).

5. SPLICE LENGTH IS A MINIMUM OF 33 TIMES THE NOMINAL STEEL DIAMETER.

6. PLACE THE CONCRETE PLACEMENT AT A UNIFORM DEPTH THROUGHOUT THE FAST TRACK CONCRETE PAVING AREA.

7. FOR CONTINUOUS SECTIONS OF ROADWAY WHERE FAST TRACK PAVING IS THE PRIMARY PAVEMENT TYPE, USE THE BAR SIZE AND SPACING FROM THE CRCP STANDARDS THAT CORRESPONDS TO THE FAST TRACK SLAB THICKNESS.

8. USE LONGITUDINAL TIE-BARS OF THE SAME SIZE DIAMETER AND SPACING AS THE LONGITUDINAL BAR. A SINGLE PIECE TIE-BAR MAY BE USED IF THE 33 TIMES DIAMETER TIE-BAR PROJECTION DOES NOT INTERFERE WITH THE SAFE HANDLING OF TRAFFIC.

9. BASE THE DEPTH OF SAW CUTS FOR SAWED JOINTS ON THE FAST TRACK CONCRETE PAVEMENT THICKNESS.

10. THIS STANDARD IS NOT INTENDED TO REPLACE OTHER STANDARDS EXCEPT WHERE SPECIFICALLY STATED HEREIN. FOR PAVING DETAILS NOT SHOWN ON THIS DRAWING, REFER TO THE STANDARD SHEETS FOR CONTINUOUSLY REINFORCED CONCRETE PAVEMENT SHOWN ELSEWHERE IN THE PLANS.

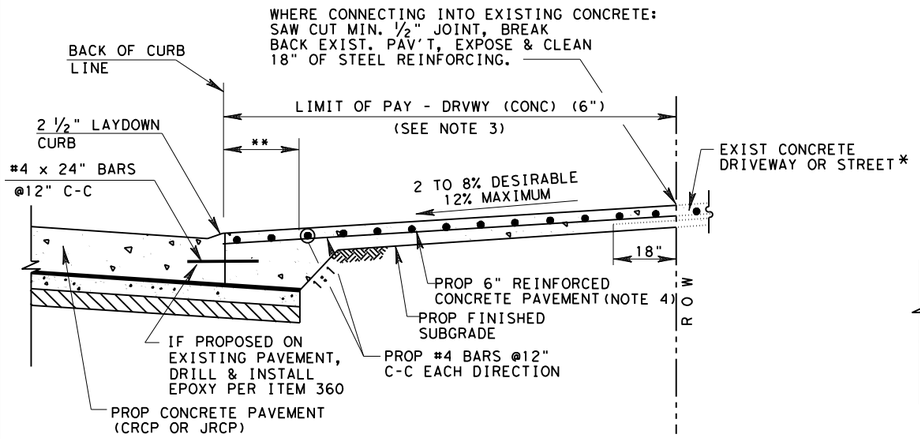
LEGEND

ASB - ASPHALT STABILIZED BASE
CRCP - CONTINUOUSLY REINFORCED CONCRETE PAVEMENT
D - DIAMETER
LTS - LIME TREATED SUBGRADE
PCTB - PORTLAND CEMENT TREATED BASE

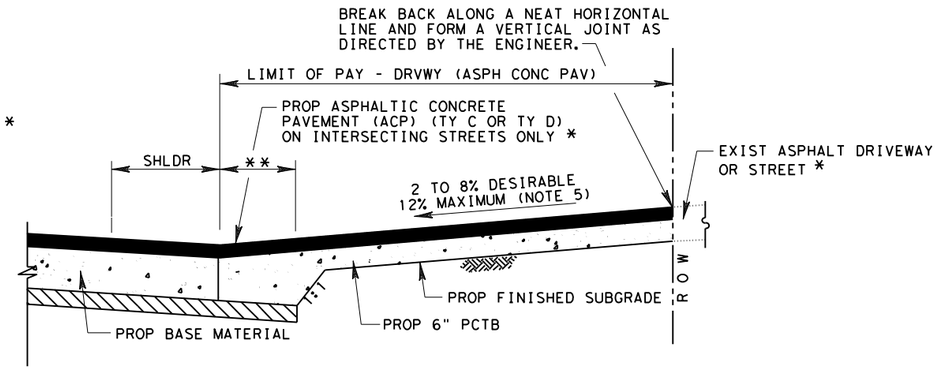
Texas Department of Transportation
Houston District

FAST TRACK CONTINUOUSLY REINFORCED CONCRETE PAVEMENT
DETAILS
CRCP-FT

FILE: STDB-4.dgn	DN:	CK:	DW:	CK:	
© TxDOT DEC. 2009	DIST	FED REG	PROJECT NO.		SHEET
REVISIONS 5/05 2004 SPECS 2/15 2014 SPECS	HOU	6			78
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	HARRIS		1844	01	029	FM 1959



PROPOSED DRIVEWAY DETAIL
REINFORCED CONCRETE AT CONCRETE CURB AND GUTTER ROADWAY



PROPOSED DRIVEWAY DETAIL
ASPHALT W/ PCTB AT ASPHALT ROADWAY

NOTES:

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

LEGEND:

PCTB- PORTLAND CEMENT TREATED BASE

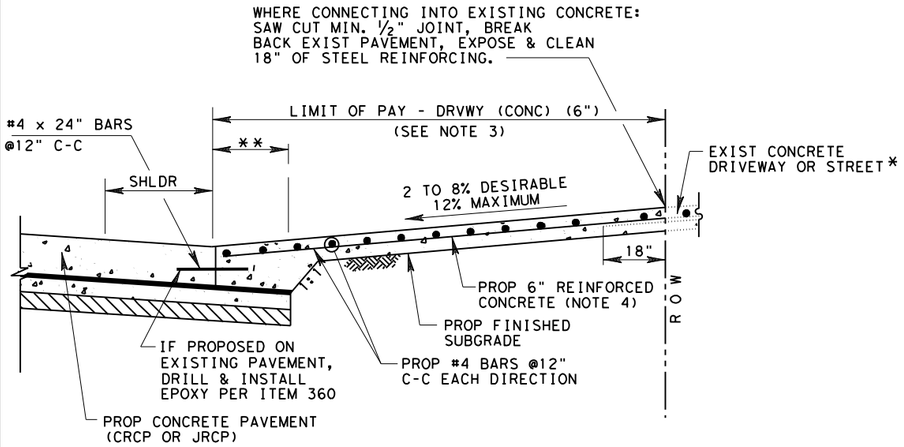
JRCP- JOINTED REINFORCED CONCRETE PAVEMENT

CRCP- CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

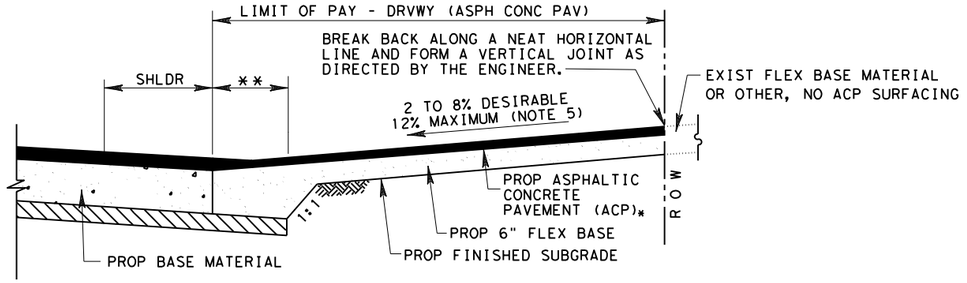
ACP- ASPHALTIC CONCRETE PAVEMENT

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

** PROPOSED LIMIT OF ROADWAY BASE AND/OR SUBGRADE



PROPOSED DRIVEWAY DETAIL
REINFORCED CONCRETE AT CONCRETE ROADWAY



PROPOSED DRIVEWAY DETAIL
ASPHALT W/ FLEX BASE AT ASPHALT ROADWAY

SHEET 1 OF 3

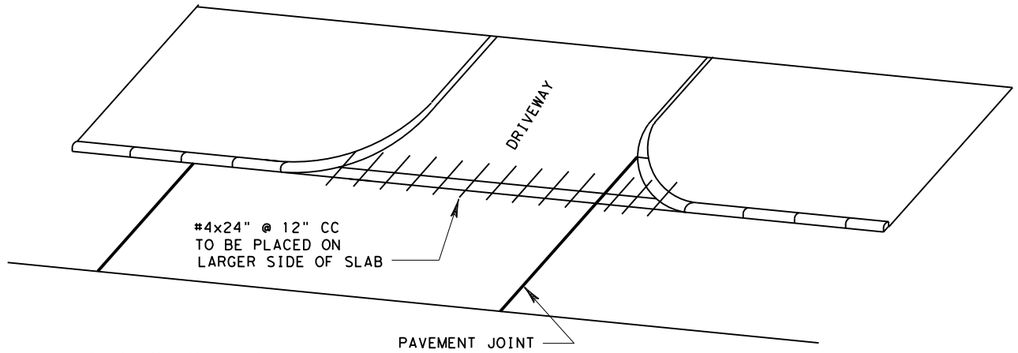
Texas Department of Transportation
Houston District

DRIVEWAY DETAILS

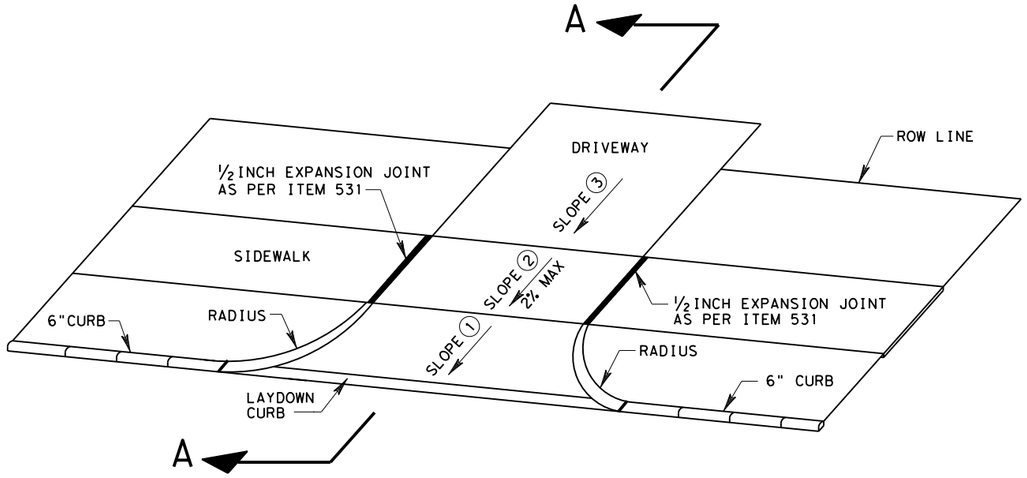
DD

FILE: STDB-8a.dgn	DN:	CK:	DW:	CK:		
© TxDOT SEPT. 2004	DIST	FED REG	PROJECT NO.			SHEET
REVISIONS 11/15 ADDED NOTE FOR PCTB 3/17 MODIFIED PAVEMENT SLOPES	HOU	6				79
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	HARRIS		1844	01	029	FM 1959

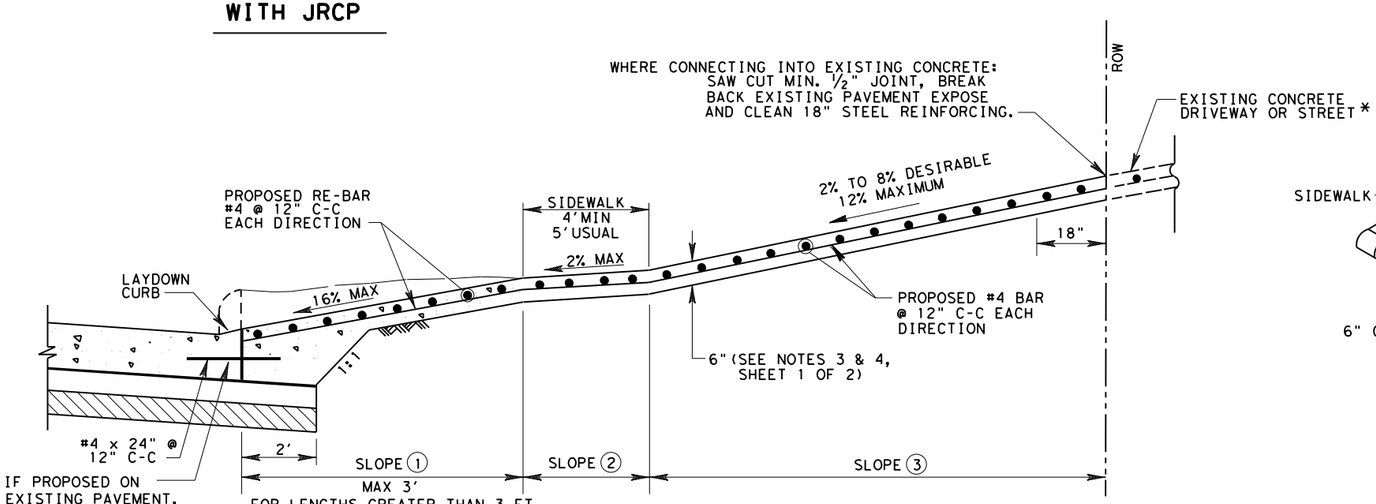
STDB8A



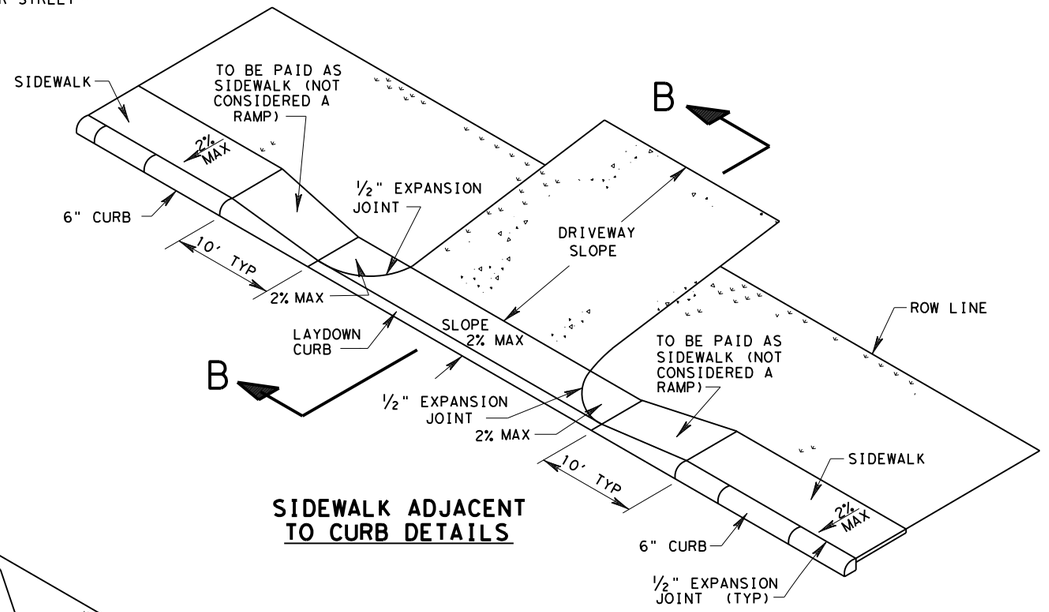
TIE BAR PLACEMENT WITH JRCP



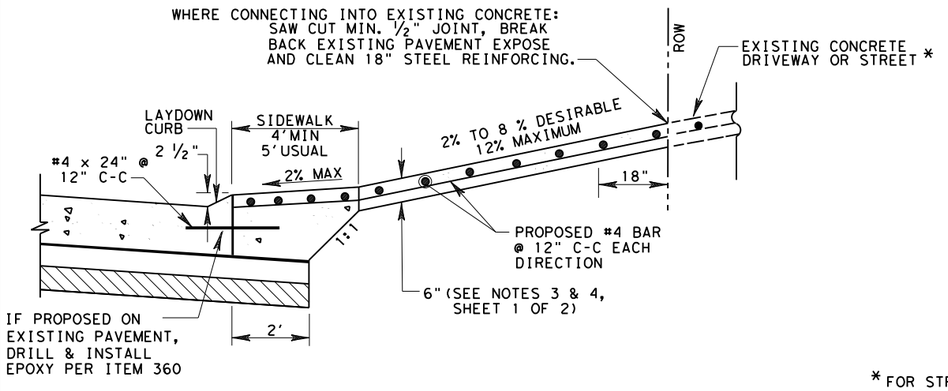
SIDEWALK OFFSET FROM CURB DETAILS



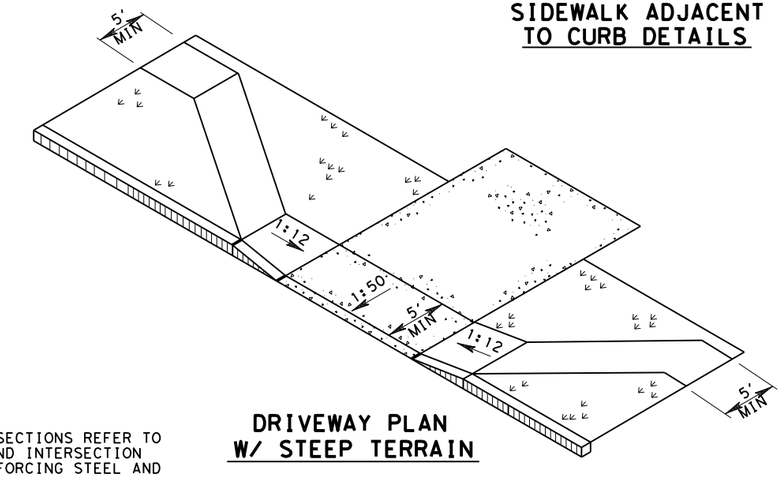
SLOPES W/ SIDEWALKS OFFSET FROM CURB (SECTION A-A)



SIDEWALK ADJACENT TO CURB DETAILS



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



DRIVEWAY PLAN W/ STEEP TERRAIN

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

SHEET 2 OF 3

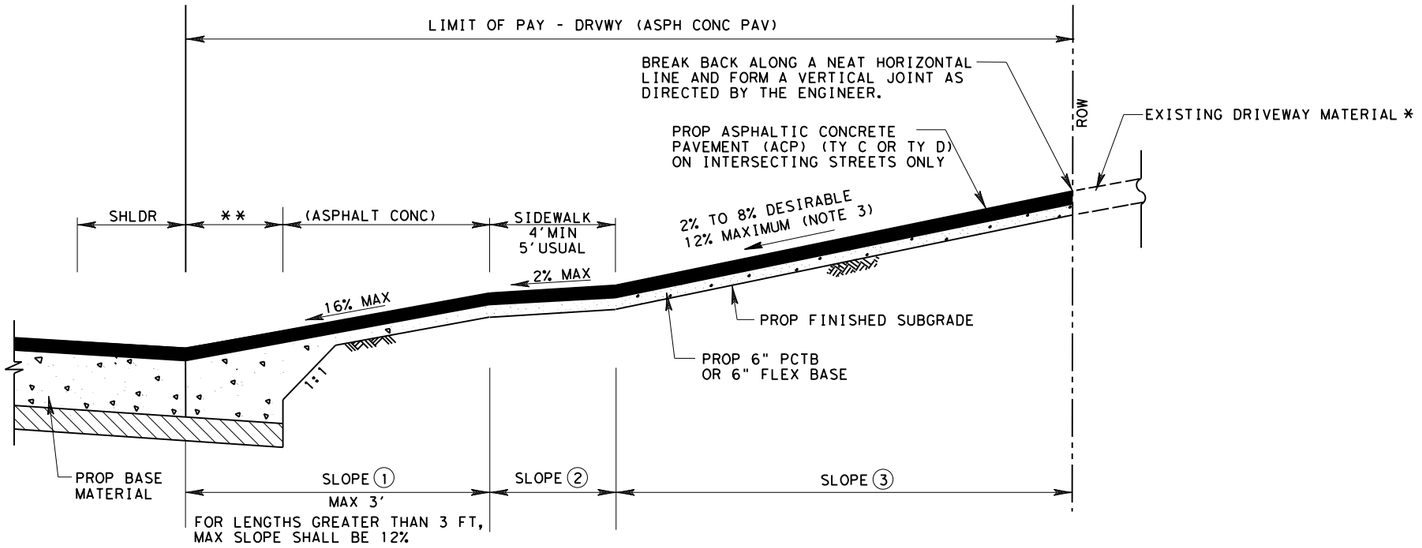
Texas Department of Transportation
Houston District

DRIVEWAY DETAILS

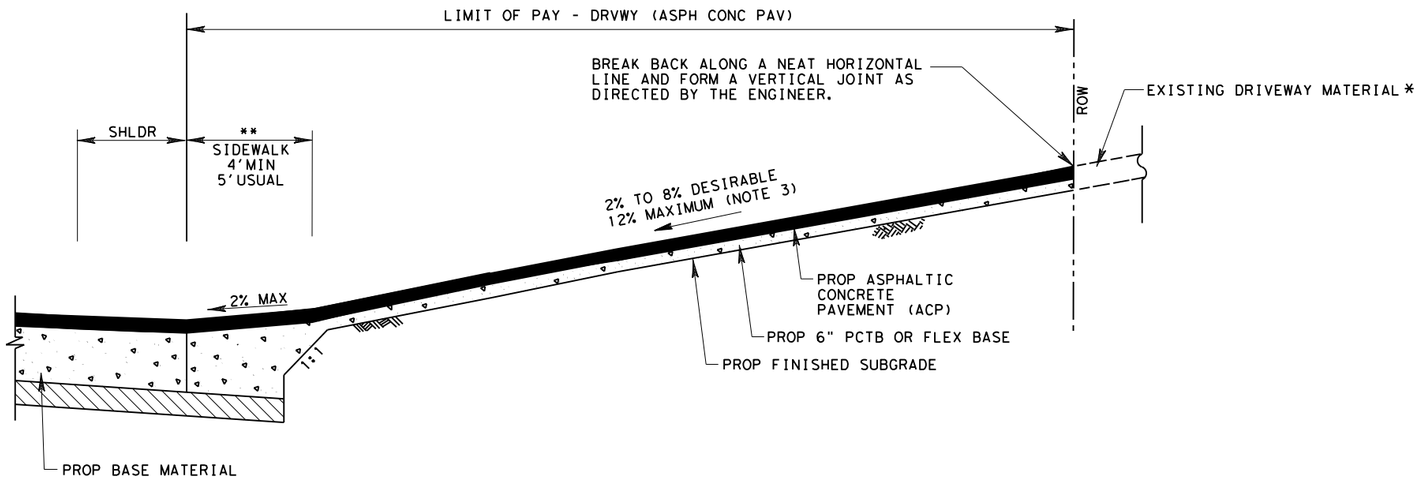
DD

FILE: STDB-8b.dgn	DN:	CK:	DW:	CK:		
©TxDOT SEPT. 2004	DIST	FED REG	PROJECT NO.			SHEET
REVISIONS	HOU	6				80
9/09 ADDED NOTE FOR ITEM 360.	COUNTY		CONTROL	SECT	JOB	HIGHWAY
1/15 ADDED NOTE FOR PCTB	HARRIS		1844	01	029	FM 1959

STDB8B



PROPOSED DRIVEWAY SLOPES WITH SIDEWALKS OFFSET



PROPOSED DRIVEWAY SLOPES WITH SIDEWALKS ADJACENT

NOTES:

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

LEGEND:

PCTB- PORTLAND CEMENT TREATED BASE

ACP- ASPHALTIC CONCRETE PAVEMENT

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

** PROPOSED LIMIT OF ROADWAY BASE AND/OR SUBGRADE

Texas Department of Transportation
Houston District

DRIVEWAY DETAILS

DD

FILE: STDB-8c.dgn	DN:	CK:	DW:	CK:		
© TxDOT SEPT. 2004	DIST	FED REG	PROJECT NO.			SHEET
REVISIONS 11/15 ADDED NOTE FOR PCTB 3/17 MODIFIED PAVEMENT SLOPES	HOU	6				81
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	HARRIS		1844	01	029	FM 1959

STDB8C

GENERAL TREE PROTECTION NOTES:

1. Protect and ensure the continued good health of existing trees identified on the plans or directed by the Engineer. Protective measures include providing, installing, maintaining and removing protective fences, bound wood planking, compost, berm pruning, boring, and watering.
2. Install tree protection before any heavy equipment arrives on the site and remains in place for the duration of the project.

PROTECTIVE FENCE

1. Critical Root Zone (CRZ)= 1 foot radius per 1 caliper inch of trunk diameter.
2. Place protective fence at the edge of the critical root zone of trees to be protected. Use 4 feet high orange plastic mesh or approved equivalent supported on steel T-posts. Use steel T-posts minimum of 6 feet long, spaced at intervals sufficient to keep fence pulled tight. Stretch smooth galvanized wire from post to post across the top of fence and draw tight. Attach plastic mesh to posts and top wire with aluminum tie wire or nylon ties.
3. No excavation, grading, filling, soil compaction, parking, or equipment storage is allowed within the fenced area.
4. When a construction zone overlaps the root zone due to lack of space, place fence within 2 feet of construction zone.
5. Install protective compost filter berm at base of protective fence as shown in detail and described in these notes under "Root Zone Protection". Compost filter berm functions as a protective filter from runoff associated with construction activities such as: concrete wash, erosion, fill, chemicals, cement and lime work and other activities.

VEGETATIVE WATERING FOR TREE PROTECTION

1. Water trees at a rate of 30 gallons per week for every week during construction activities. Watering is paid for separately under Item 168-6001 Vegetative Watering.

TRUNK PROTECTION

1. Where protective fence is located closer than 6 feet from a tree trunk from any direction, protect the tree trunk with bound wood planking. Wood planks may be construction grade lumber a minimum of 1 inch by 6 inch nominal. Band planks together with rope, band, or strap of sufficient gauge and quality to keep protective planking in place around tree trunk for the duration of the project. Install wood planks of sufficient length to protect the trunk to a height of 10 feet, or the height of the lowest major branching, whichever is less. Do not use nails, screws or other damaging attachment methods.

ROOT ZONE PROTECTION

1. Cover entire area of critical root zone with 4" depth of erosion control compost. Erosion control compost is paid for separately under Item 161-6009 Erosion Control Compost. See standard specification for compost requirements.
2. Install protective compost filter berm at base of protective fence along entire edge of critical root zone as shown on detail this sheet. Dimensions of compost filter berm are 1 foot tall, and 2 feet wide at base. Use erosion control compost for berm paid for under Item 161-6009 Erosion Control Compost. Maintain berm throughout project.
3. Vehicular traffic, stockpiling or storage of materials, parking of equipment and refueling equipment is prohibited in protected areas.

BORING, TRENCHING, GRADING, AND PRUNING

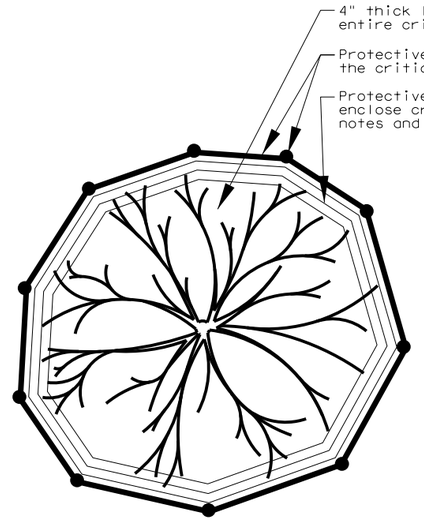
1. Where shown in plans, underground utilities crossing under protected areas will be bored beneath critical root zones. Avoid boring directly beneath root flare. Bore depth is 4 feet below existing grade.
2. No trenching, excavating, filling, or compaction is allowed within the critical root zone except as specifically identified in the plans and approved by the Engineer.
3. When existing grade must be cut within the critical root zone, contact the Engineer prior to beginning work. Before grading or excavation work, saw cut roots to the depth of the proposed disturbance along the edge of the proposed disturbance before excavation is begun.
4. Prune flush with soil any roots exposed by construction. Backfill root areas with good quality topsoil as soon as possible. If exposed root areas are not to be backfilled within two days, then cover with a minimum of six inches of erosion control compost. Erosion compost is paid for separately under Item 161-6009 Erosion Control Compost.
5. When grading within the critical root zone, use hand or small equipment and alter grade no more than two inches. No soil disturbance is allowed on the root flare under any circumstances.
6. Perform any pruning to provide clearance for structures, vehicular traffic, and construction equipment before construction damage might occur. Prune any limb damage within two hours of occurrence and according with ANSI A300-1995 standard.

MAINTENANCE OF TREE PROTECTION MATERIALS

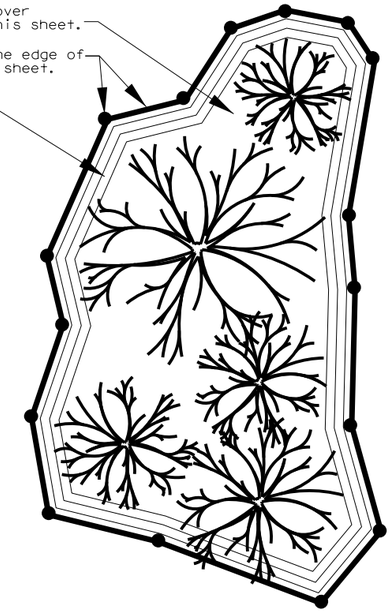
1. Maintain all tree protection materials throughout entire length of project. Repair damaged or affected tree protection materials. Additional erosion control compost may be required during the project and will be paid for separately.

REMOVAL OF TREE PROTECTION MATERIALS

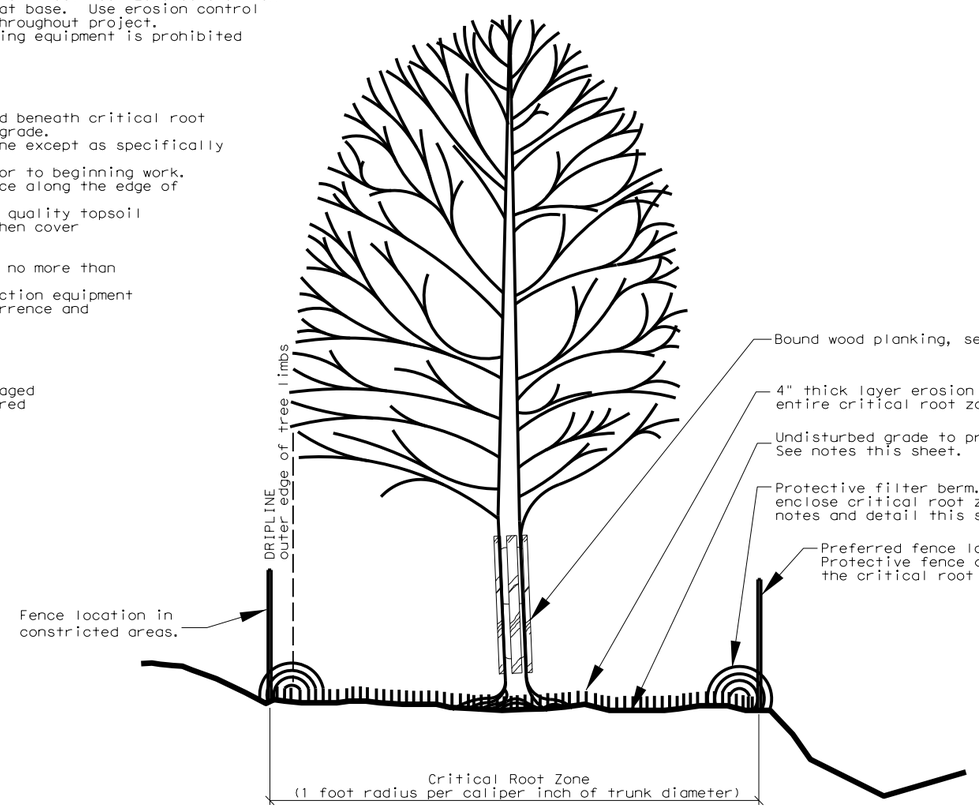
1. Remove and dispose of all protective fencing and trunk protection at end of project.



PLAN VIEW OF INDIVIDUAL TREE AND PROTECTIVE FENCE



PLAN VIEW OF TREE GROUP AND PROTECTIVE FENCE



TYPICAL TREE PROTECTION

REQUIRED ITEMS:

- Item 1004-6001 Tree Protection EA
- Item 1004-6002 Tree Protection AC
- Item 161-6009 Erosion Control Compost CY
- Item 168-6001 Vegetative Watering MG

DATE: 2/23/2024
FILE: N:\CDA\1844-01-029 (FM 1959)\Standards\TREE PROTECTION.dgn

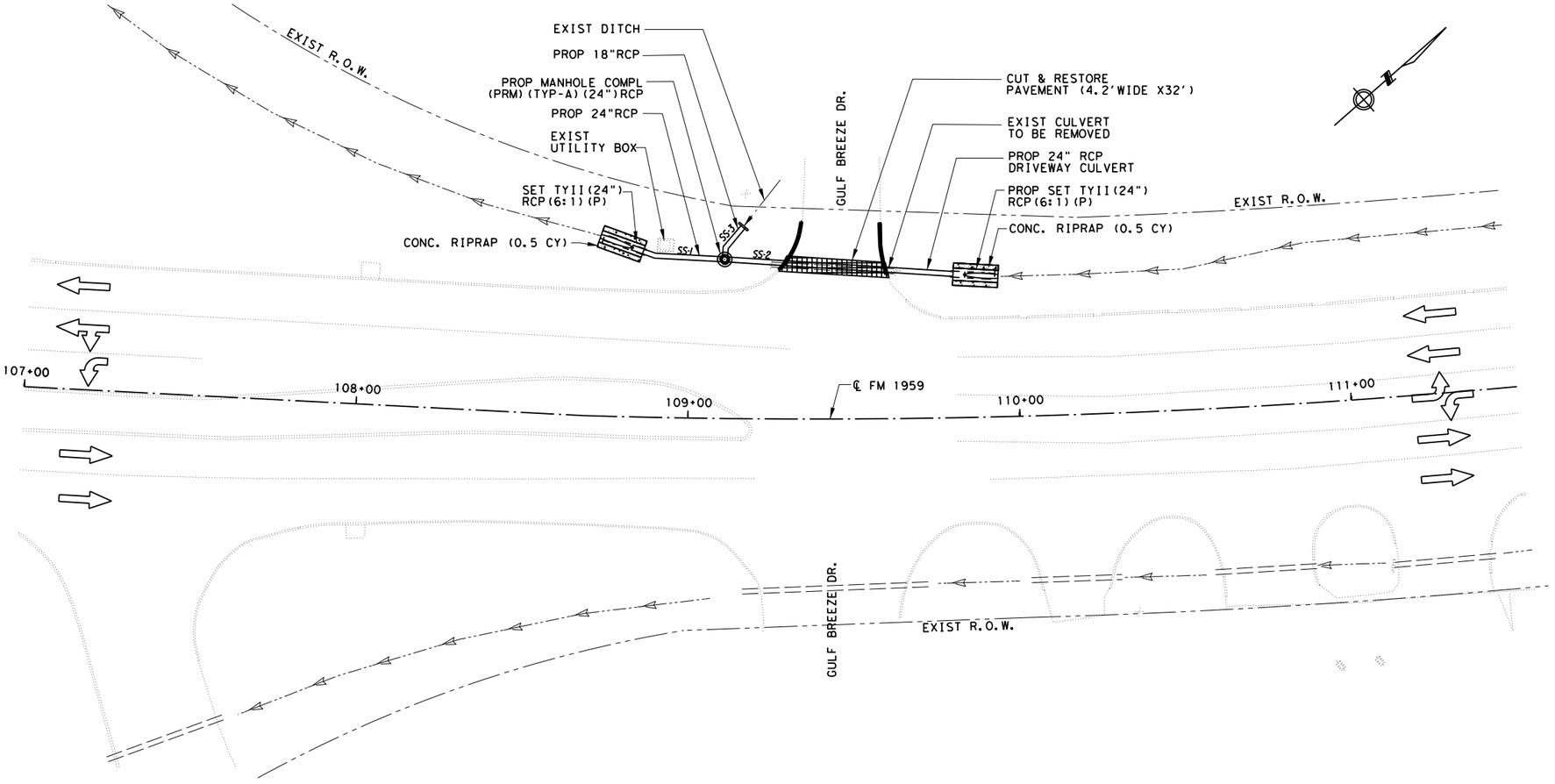
Texas Department of Transportation
HOUSTON DISTRICT

TREE PROTECTION
SHEET 1 OF 1

Details not to scale

FILE:	FED DIV	STATE	PROJECT NUMBER			SHEET
	6	TEXAS				82
REVISED: FEB 2015 FOR 2014 SPECS	DIST	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	12	HARRIS	1844	01	029	FM 1959

STD K-3

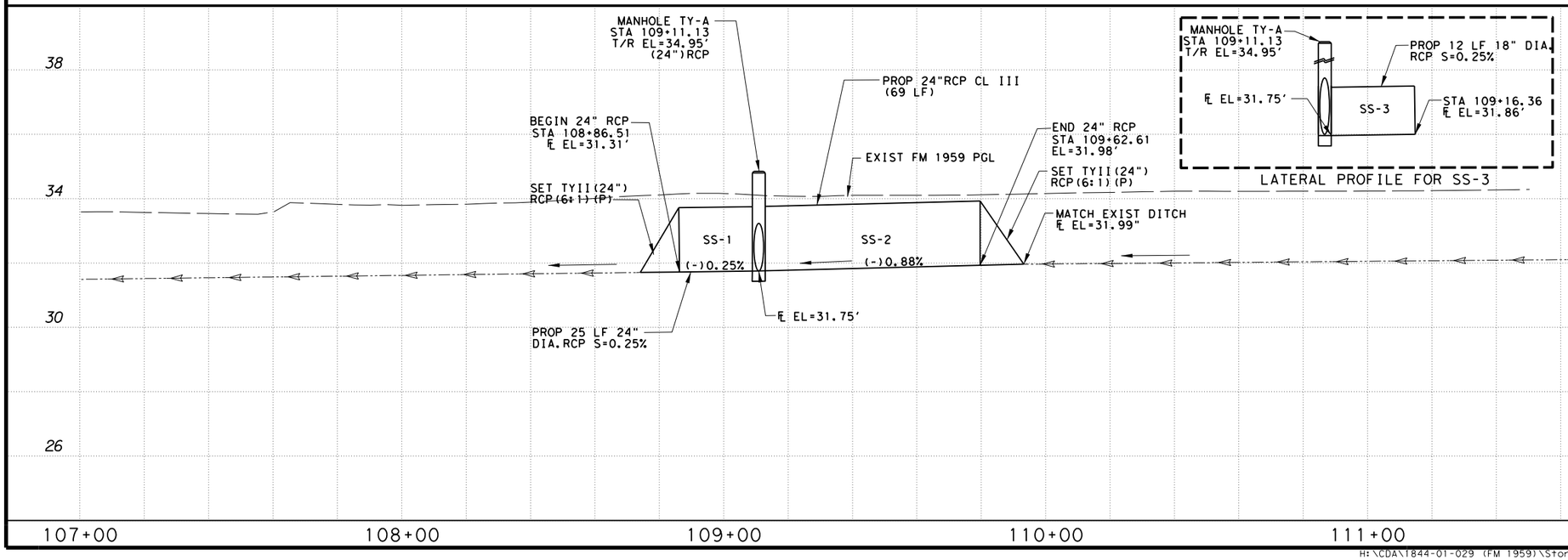


LEGEND AND SYMBOLS:

- EXIST DITCH
- EXIST STORM SEWER
- EXIST GRATE INLET
- PROP STORM SEWER
- PROP SET
- MH — PROP MANHOLE
- CUT & RESTORE PAV
- CONC. RIPRAP
- TYPICAL LIMITS OF PAY — T/R - TOP OF RING; T/G - TOP OF GRATE; T/C - TOP OF CURB

NOTES:

1. STATION OFFSET CALLOUTS FOR GRATE INLETS/MANHOLES ARE TO THE CENTER OF STRUCTURES.
2. STORM SEWER LENGTHS AND SLOPES ARE FROM CENTER TO CENTER OF DRAINAGE STRUCTURES.
3. LENGTH OF PAY, AS SHOWN IN QNTY SUMMARIES, IS FROM INSIDE TO INSIDE WALL OF INLET OR MANHOLE.



STATE OF TEXAS
SANJAY POKHAREL
140149
LICENSED PROFESSIONAL ENGINEER

SANJAY POKHAREL, P.E. 4/16/2024

TEXAS DEPARTMENT OF TRANSPORTATION

FM 1959
WESTBOUND DRIVEWAY CULVERT
PLAN & PROFILE

SCALE: 1"=40' HORIZ.
1"=4' VERT.

SHEET 1 OF 2 SHEETS

DN: MGA	DRAWING FILE NAME:	FED.RD. DIV.NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK:		6	TX					FM 1959
DW: MGA	REVISIONS:	STATE DIST.NO	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
CK:		12	HARRIS	1844	01	029		83
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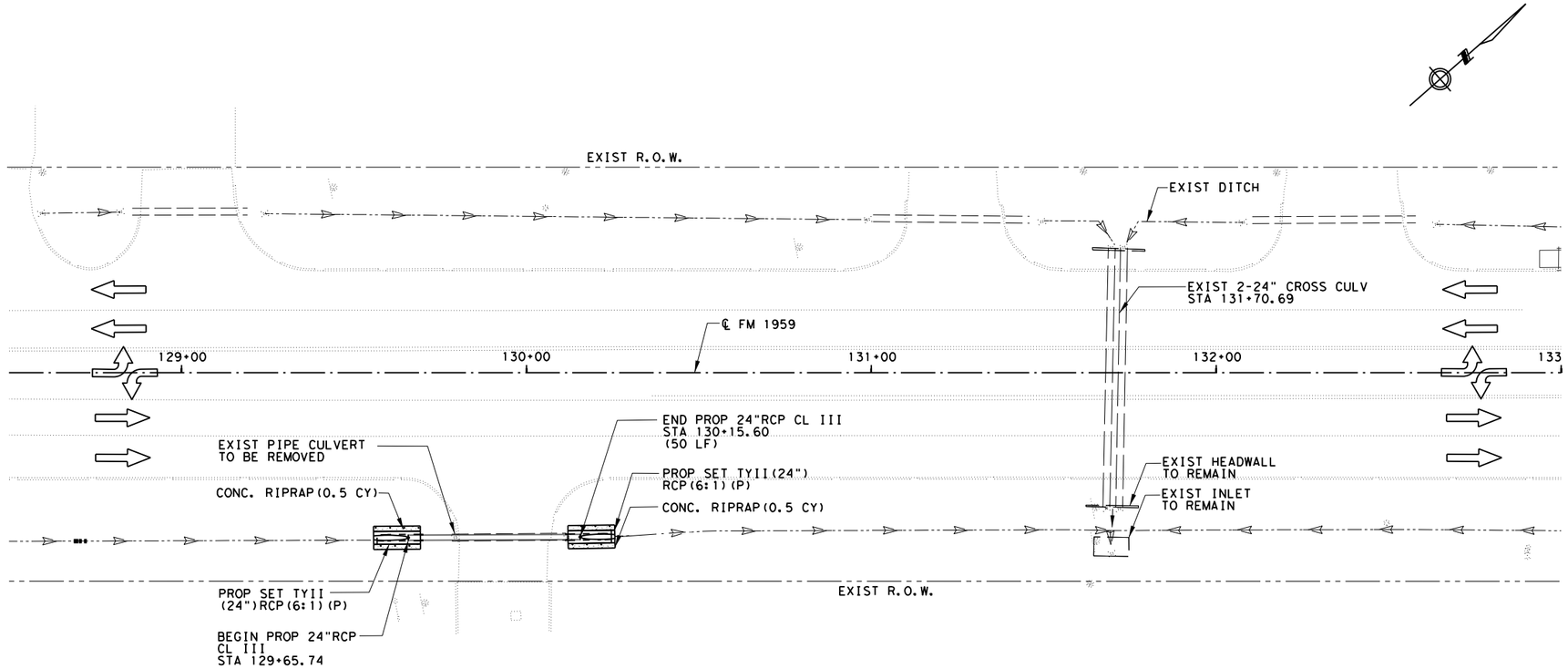

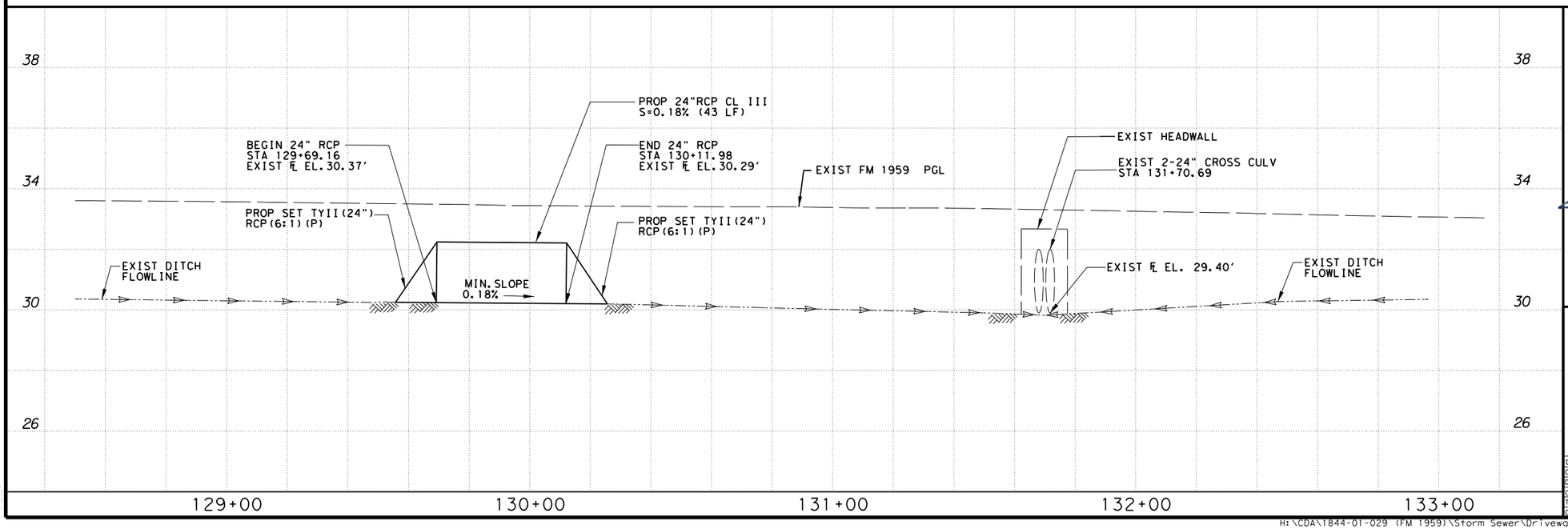

LEGEND AND SYMBOLS:

- EXIST DITCH
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- PROP STORM SEWER
- PROP SET
- MH — PROP MANHOLE
- CUT & RESTORE PAV
- CONC. RIPRAP
- TYPICAL LIMITS OF PAY
- T/R - TOP OF RING
- T/G - TOP OF GRATE
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NOTES:

1. STATION OFFSET CALLOUTS FOR GRATE INLETS/MANHOLES ARE TO THE CENTER OF STRUCTURES.
2. STORM SEWER LENGTHS AND SLOPES ARE FROM CENTER TO CENTER OF DRAINAGE STRUCTURES.
3. LENGTH OF PAY, AS SHOWN IN QNTY SUMMARIES, IS FROM INSIDE TO INSIDE WALL OF INLET OR MANHOLE.

STATE OF TEXAS
SANJAY POKHAREL
140149
LICENSED PROFESSIONAL ENGINEER

SANJAY POKHAREL, P.E. 4/16/2024

TEXAS DEPARTMENT OF TRANSPORTATION

FM 1959
EASTBOUND DRIVEWAY CULVERT PLAN & PROFILE

SCALE: 1"=40' HORIZ.
1"=4' VERT.

SHEET 2 OF 2 SHEETS

DN: MGA	DRAWING FILE NAME:	FED.RD. DIV.NO.	STATE	PROJECT NO.					HIGHWAY NO.
CK:		6	TX						FM 1959
DW: MGA	REVISIONS:	STATE DIST.NO	COUNTY		CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.	
CK:		12	HARRIS		1844	01	029	84	
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CK:									

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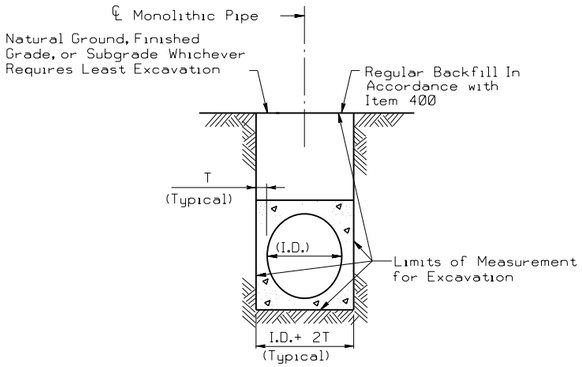
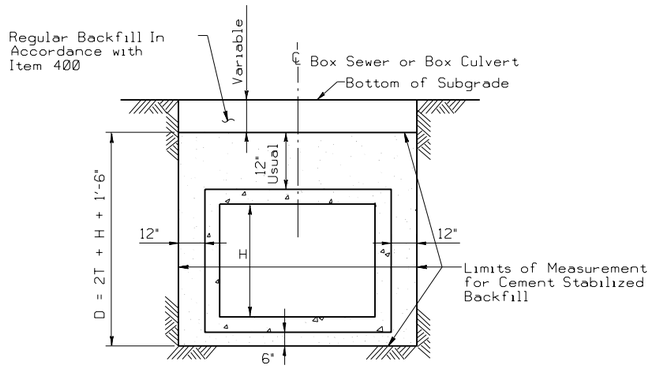


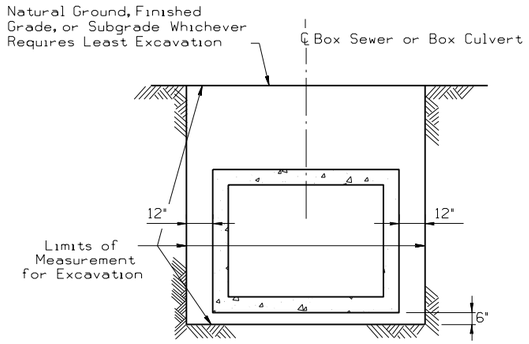
EXCAVATION DETAIL

MONOLITHIC PIPE
IN A PAVED OR GRADED AREA



BACKFILL DETAIL

BOX CULVERTS
IN A GRADED OR PAVED AREA
INCLUDING DETOURS *



EXCAVATION DETAIL

BOX CULVERTS
IN A GRADED AREA

REINFORCED CONCRETE PIPE

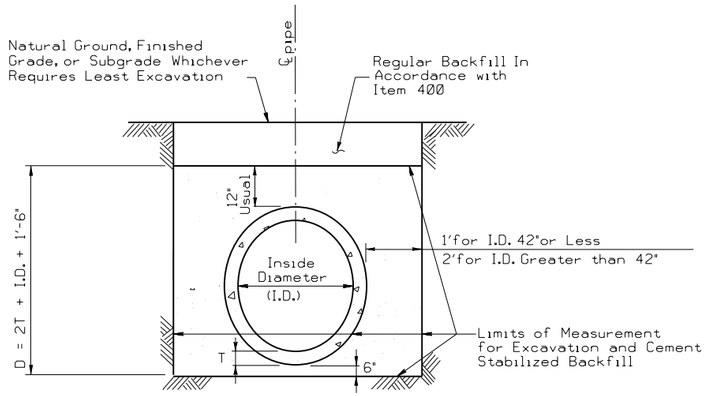
EXCAVATION AND BACKFILL QUANTITIES

PIPE DIA. IN.	T FT.	CULVERT OR SEWER EXCAVATION IN A PAVED OR GRADED AREA C.Y.PER L.F.PER FT.OF DEPTH	CEMENT STABILIZED BACKFILL IN A PAVED OR GRADED AREA C.Y.PER L.F. OF PIPE
18	0.19	0.144	0.383
24	0.23	0.165	0.478
30	0.29	0.188	0.586
36	0.33	0.210	0.692
42	0.38	0.231	0.808
48	0.42	0.327	1.394
54	0.46	0.349	1.560
60	0.50	0.370	1.731
66	0.54	0.392	1.907
72	0.58	0.414	2.088
78	0.62	0.435	2.275
84	0.67	0.457	2.474

MONOLITHIC PIPE

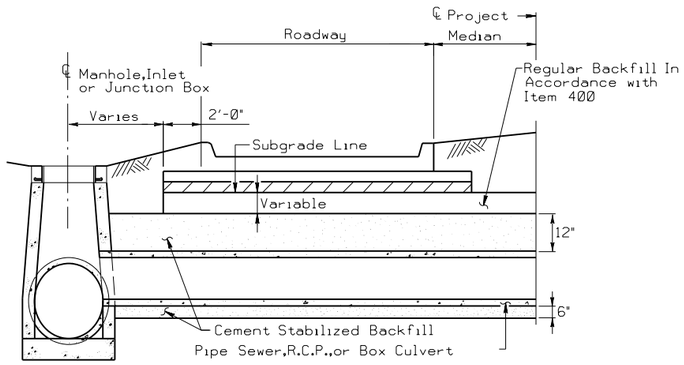
EXCAVATION QUANTITIES

PIPE DIA. IN.	T FT.	EXCAVATION C.Y.PER L.F.PER FT.OF DEPTH
36	0.417	0.142
42	0.458	0.164
48	0.458	0.182
54	0.500	0.204
60	0.583	0.228
66	0.583	0.247
72	0.625	0.269
78	0.625	0.287
84	0.625	0.306



EXCAVATION & BACKFILL DETAIL

REINFORCED CONCRETE PIPE
IN A GRADED OR PAVED AREA
INCLUDING DETOURS



BACKFILL DETAIL

AT MANHOLE, INLET OR JUNCTION BOX

D = Depth
H = Height
T = Thickness
R = Radius
Dia = Diameter

NOTE:

Cement stabilized backfill may be omitted in private driveways as indicated elsewhere in the plans.

Rubber gaskets shall be required for all joints on proposed cross drainage, pipe culverts and proposed storm sewer systems, unless otherwise shown in the plans.

* Backfill with cement stabilized material will be required for all structures under detours unless noted otherwise in the General Notes.

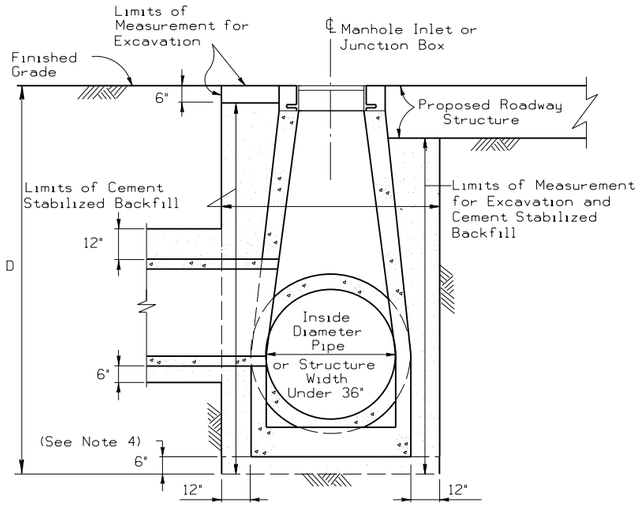
SHEET 1 OF 2

Texas Department of Transportation
Houston District

EXCAVATION AND BACKFILL DIAGRAMS

E&BD

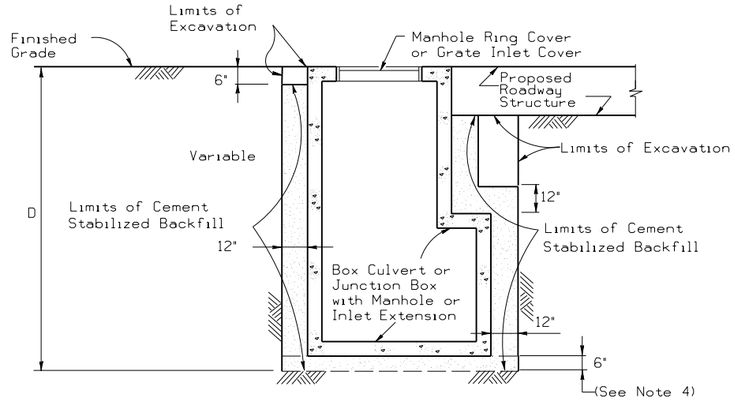
FILE: STDE1.DGN	DN: TxDot	CK: TxDot	DW: TxDot	CK: TxDot
© TxDOT FEB 2010	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS REVISED 11/05 REVISED 2/2010 Added note to Table 1,Sht 2 of 2. REVISED 6/12 REVISED 9/14	HOUSTON	6		85
	COUNTY		CONTROL SECT JOB	HIGHWAY
	HARRIS		1844 01 029	FM 1959



EXCAVATION AND BACKFILL DETAIL

MANHOLES SMALLER THAN 36 IN.
IN A PAVED OR GRADED AREAS

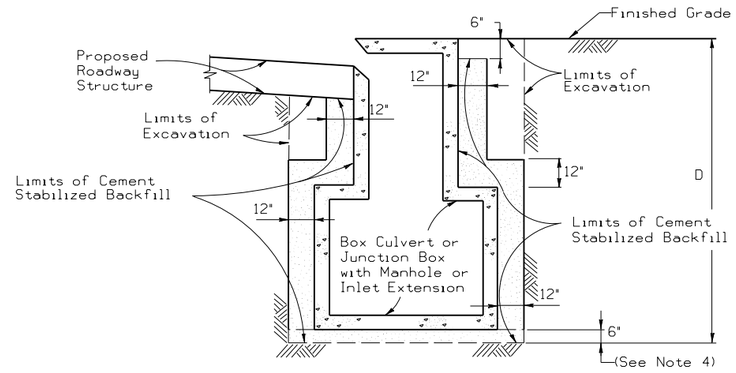
N.T.S.



EXCAVATION AND BACKFILL DETAIL

JUNCTION BOXES IN A
PAVED OR GRADED AREA

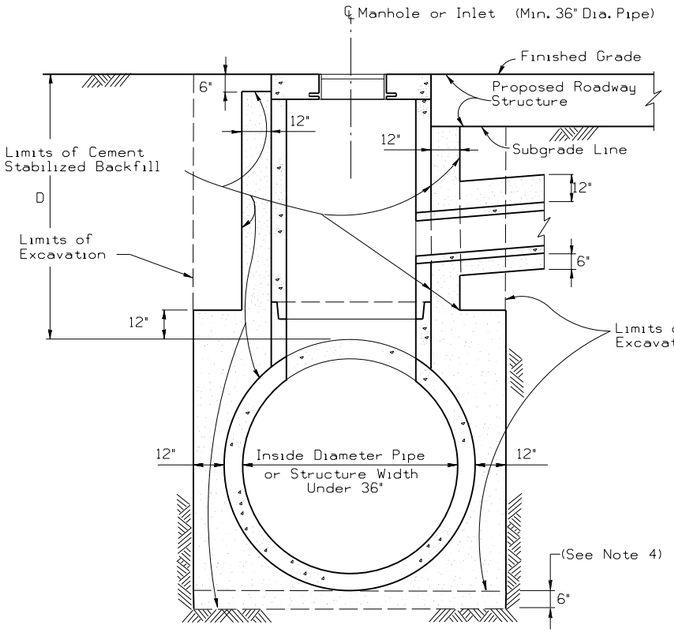
N.T.S.



EXCAVATION AND BACKFILL DETAIL

INLET EXTENSIONS ON A BOX CULVERT
IN A PAVED OR GRADED AREA

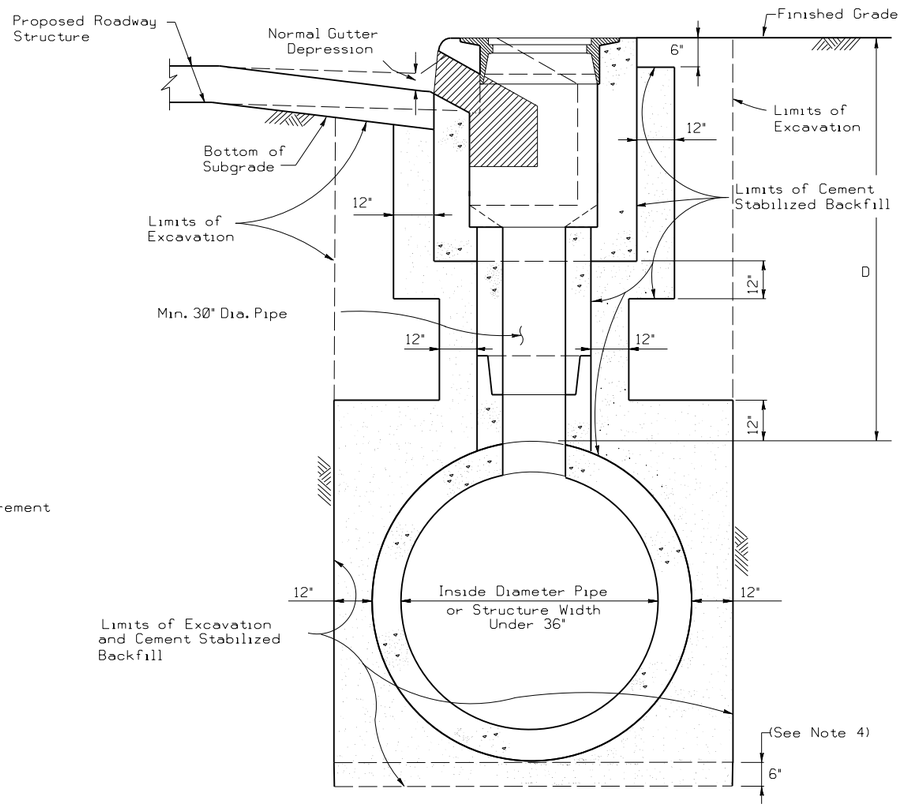
N.T.S.



EXCAVATION AND BACKFILL DETAIL

MANHOLES 36 IN. AND GREATER
IN A PAVED OR GRADED AREA

N.T.S.



EXCAVATION AND BACKFILL DETAIL

CURB INLETS IN A PAVED OR GRADED AREA

N.T.S.

TABLE I	
SCHEDULE FOR PAY QUANTITIES OF CEMENT STABILIZED BACKFILL (SEE NOTE 1)	
MANHOLE OR INLET DEPTH (D) IN FEET	CEMENT STABILIZED BACKFILL IN CUBIC YARDS
Ø through 5	5.75
> 5 through 10	8.25
greater than 10	12.75

TO BE PAID UNDER ITEM 400-6009 CEMENT STABILIZED BACKFILL (INLET OR MANHOLE)

NOTES:

1. The Contractor is paid a fixed estimated amount for cement stabilized backfill based on depth (D) and Table. 1.
2. Proposed roadway structure includes pavement, base and any subgrade.
3. For backfill of intersecting pipes and box culverts, see "Excavation and Backfill Diagram for Pipes and Box Culverts."
4. 6" cement stabilized backfill will be required only for precast units.

D = Depth
H = Height
T = Thickness
R = Radius
Dia = Diameter

Texas Department of Transportation
Houston District

EXCAVATION AND BACKFILL DIAGRAMS

E&BD

FILE: STDE1.DGN	DN: TxDot	CK: TxDot	DW: TxDot	CK: TxDot
© TxDOT FEB 2010	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS REVISED 2/2010 Added note to Table 1. REVISED 6/12 REVISED 9/14 REVISED 3/15	HOUSTON	6		86
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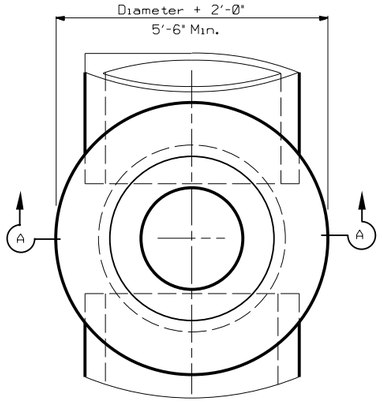
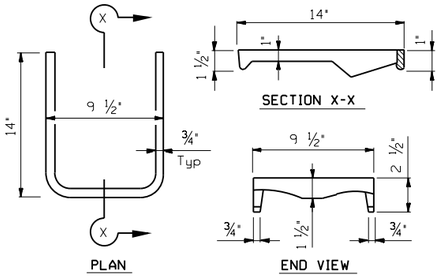
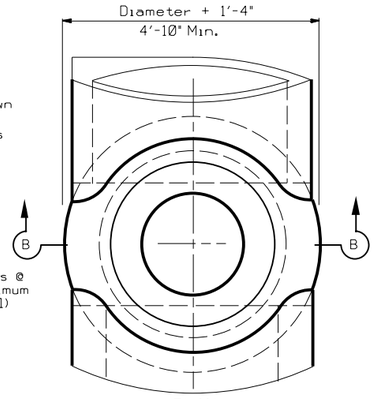


PLAN
OVER 12' HEIGHT

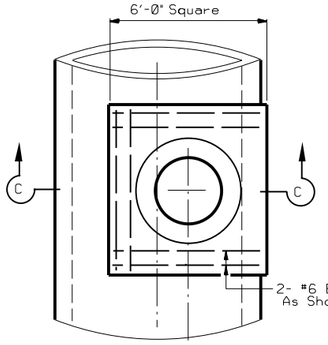


PLAN — SECTION X-X — END VIEW

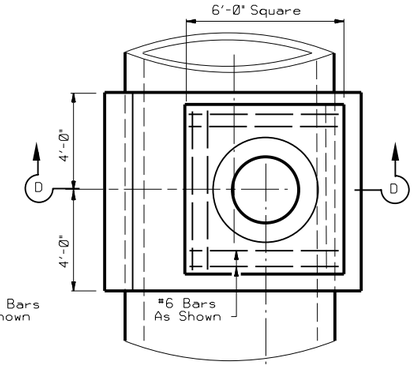
CAST IRON MANHOLE STEPS
(In Stock Locally)



PLAN
12' HEIGHT & UNDER



PLAN
MONOLITHIC SEWERS



PLAN
PRECAST PIPE SEWERS

GENERAL NOTES:

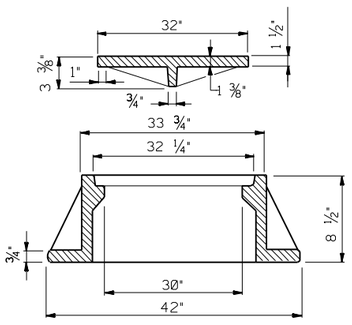
See Standard or Detail Sheet For Excavation And Backfill Diagrams.

All Manholes In Graded Areas Shall Be Built To Stage I And Finished After All Grading Operations Are Substantially Completed.

- But Not Less Than 6 Inches Above Highest Pipe.

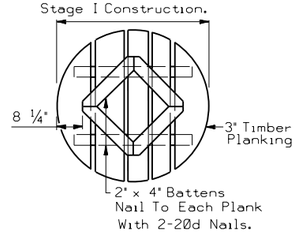
"T" Thickness Of Shell Equals That Of Larger Diameter Pipe.

Optional Monolithic Or Precast Designs Permitted. Optional Designs Shall Be Signed & Sealed By A Registered Professional Engineer.



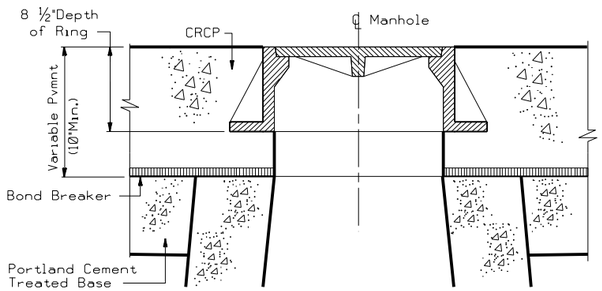
Heavy Duty 30"ID Ring as Required. Vulcan No.V-1419 w/ribbed cover, Neenah No.R1740-BTX

RING AND COVER

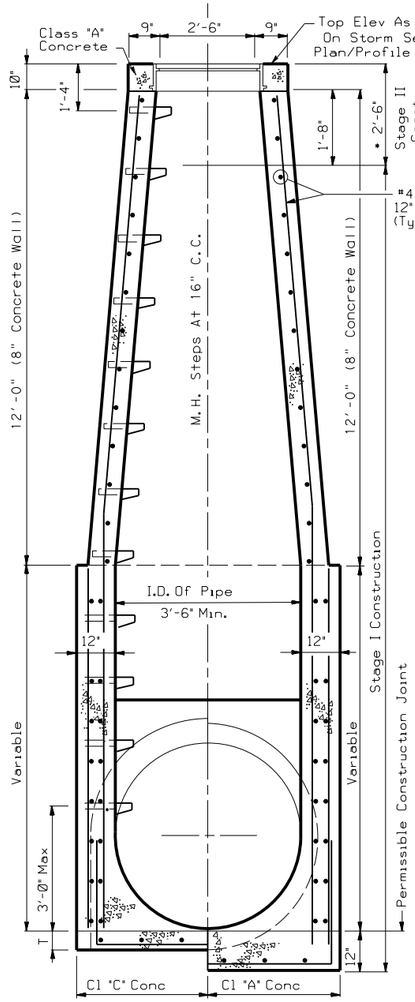


PLAN

TEMPORARY TIMBER COVER



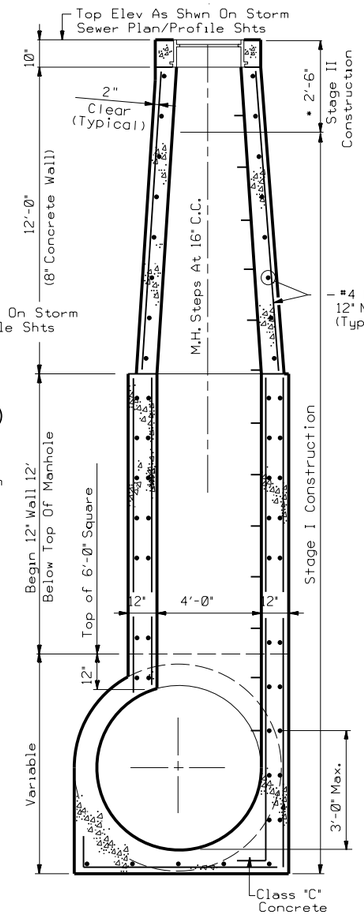
RING AND COVER CAST
MONOLITHICALLY WITH PAVEMENT



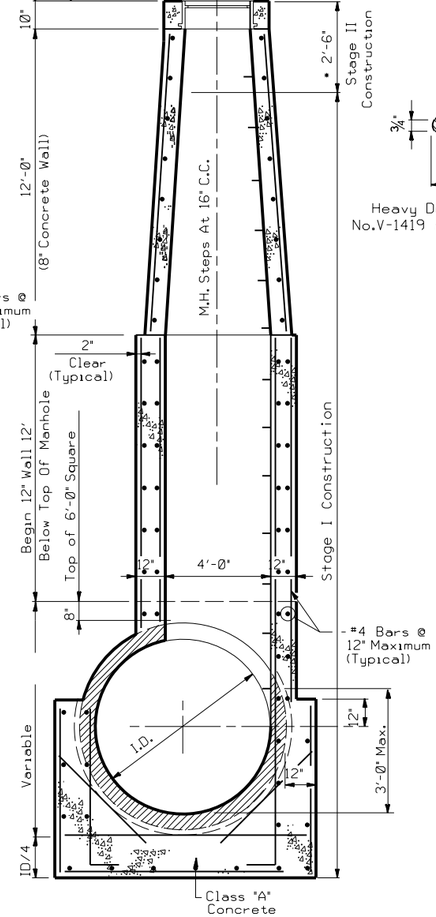
MONOLITHIC SEWERS PRECAST PIPE SEWERS
SECTION A-A

MONOLITHIC SEWERS PRECAST PIPE SEWERS
SECTION B-B

MANHOLE - TYPE A
FOR PIPES 54" AND SMALLER



SECTION C-C



SECTION D-D

MANHOLE - TYPE B
FOR PIPES 60" AND LARGER

d = Diameter
R = Radius

FOR DIRECT TRAFFIC

Texas Department of Transportation
Houston District

MANHOLES TYPE A & B

MH-A/B

FILE: STDD10.DGN	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT	STD:	
© TxDOT December 2006	DIST	FED REG	PROJECT NO.			SHEET
REVISIONS 3/15 MINOR CORRECTIONS	HOU	6				87
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	HARRIS		1844	01	029	FM 1959

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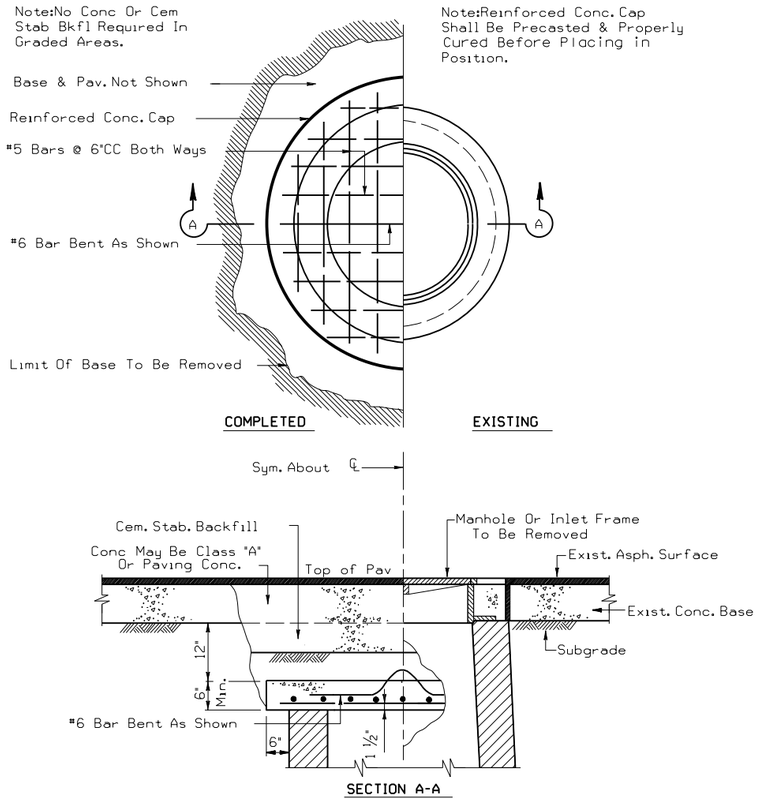
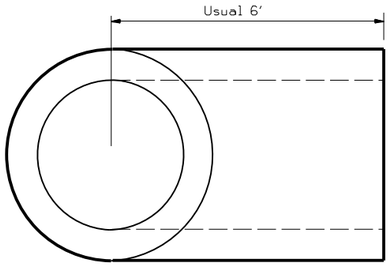
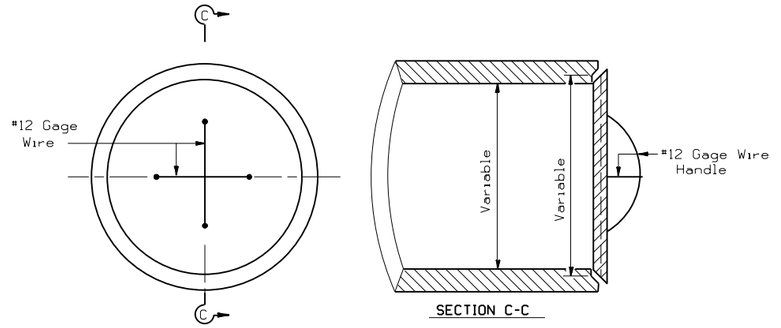


DETAIL SHOWING METHOD OF CAPPING ABANDONED MANHOLES OR INLETS (GRADED OR PAVED AREAS)



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

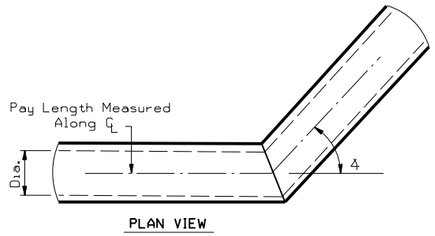
PRECAST STORM SEWER TEE



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

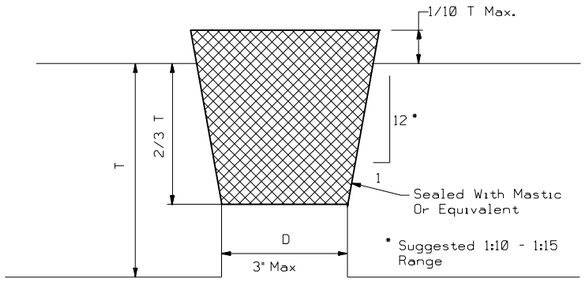
Concrete Plug For End Of Pipe Culvert Or Sewer

CONCRETE PLUG FOR PIPE



BENDING DETAIL

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

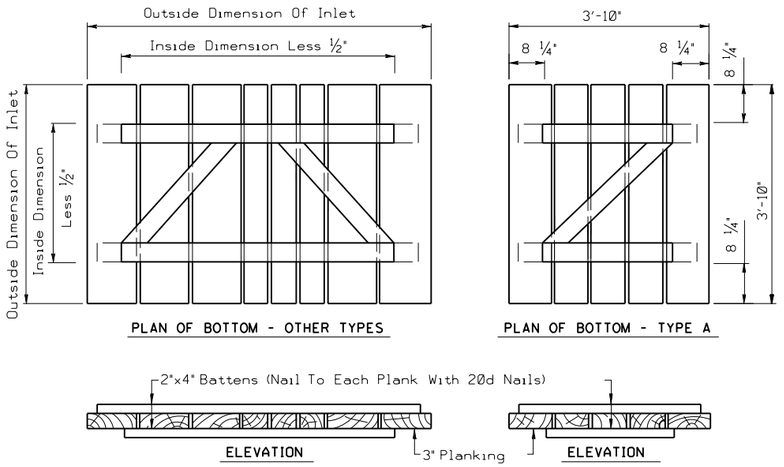


T = Wall Thickness On Top Of Box Or Pipe
D = Diameter Of Lifting Hole

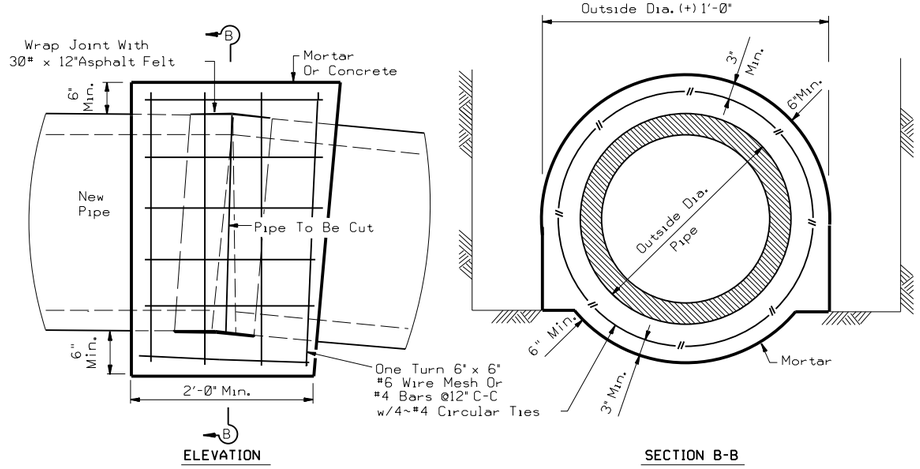
Minimum Length Of Plug Is 2/3 T +/-
Minimum Diameter At Bottom Of Plug = D - ⅛"
Maximum 1/10 T Of Plug Not Seated In Lifting Hole

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

DETAIL OF PLUG FOR LIFTING HOLES IN RCB AND RCP



TEMPORARY COVERS FOR ALL TYPES OF INLETS



PIPE COLLAR DETAIL

For Horizontal Or Vertical Placement

d = Diameter
R = Radius

Texas Department of Transportation
Houston District (Bridge)

MISCELLANEOUS SEWER DETAILS

MSD

FILE: STDD11.DGN	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK:
© TxDOT Mar 2004	DISTRICT	FED REG	PROJECT NO.	SHEET
REVISIONS 3/2015 2014 Specs	HOU			88
COUNTY	CONTROL	SECT	JOB	HIGHWAY
HARRIS	1844	01	029	FM 1959

STDD11.DGN

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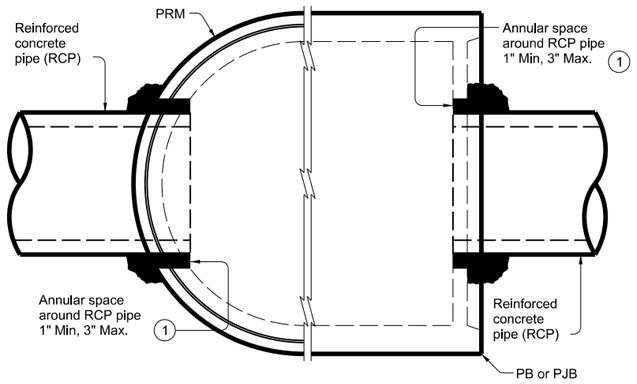
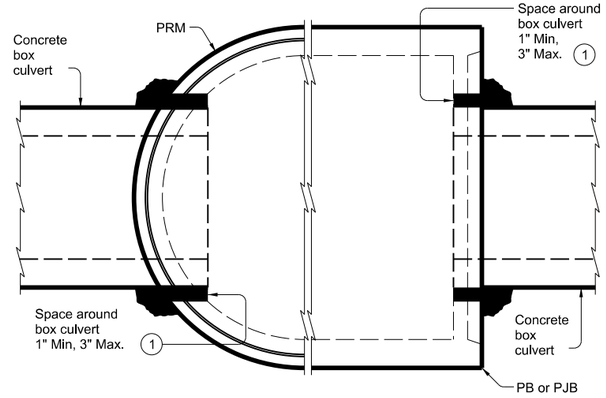


PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE

PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

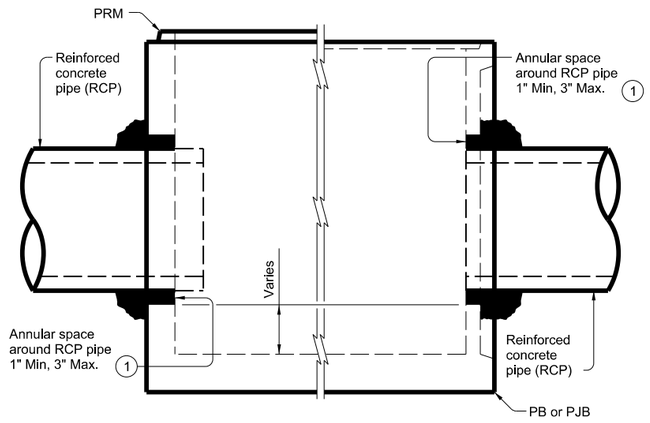
TYPICAL HALF PLAN



PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE

PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

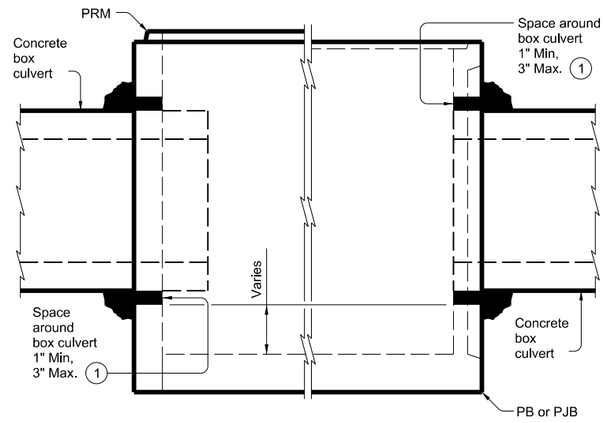
TYPICAL HALF PLAN



PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE

PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

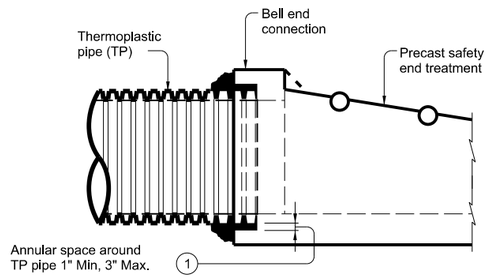
TYPICAL HALF ELEVATION



PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE

PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

TYPICAL HALF ELEVATION



TYPICAL PARTIAL ELEVATION OF PRECAST SAFETY END TREATMENTS

Showing square PSET for parallel drainage, cross drainage shown similar.

(1) Completely fill the void between the precast structure and the connecting pipe or box with cementitious grouts and mortars in accordance with DMS-4675 "Cementitious Grouts and Mortars for Miscellaneous Application."

CONSTRUCTION NOTES:

Do not grout rubber gasket joints without Manufacturer's recommendations.

Do not use bricks, masonry blocks, native stone, or similar materials in conjunction with grouted connections when filling void spaces around pipes or box culverts.

MATERIAL NOTES:

Provide grouted connections in accordance with DMS-4675 "Cementitious Grouts and Mortars for Miscellaneous Application."

GENERAL NOTES:

See applicable standards for notes and details not shown:

- Precast Base (PB)
- Precast Junction Box (PJB)
- Precast Round Manhole (PRM)
- Precast Safety End Treatments C/D Square (PSET-SC)
- Precast Safety End Treatments P/D Square (PSET-SP)

Provide Concrete Box Culverts in accordance with Item 462 "Concrete Box Culverts and Drains."

Provide Reinforced Concrete Pipe (RCP) in accordance with Item 464 "Reinforced Concrete Pipe."

Provide Thermoplastic Pipe (TP) in accordance with Special Specification Thermoplastic Pipe.

Payment for grouted connections is considered subsidiary to other bid Items.

Texas Department of Transportation

Bridge Division Standard

PIPE AND BOX GROUTED CONNECTIONS FOR PRECAST STRUCTURES

PBGC

FILE:	DN: TxDOT	CK: TAR	DW: JTR	CK: TAR
©TxDOT February 2020 REVISIONS	CONT	SECT	JOB	HIGHWAY
	1844	01	029	FM 1959
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		89

DATE: 2/23/2024 10:13:56 AM
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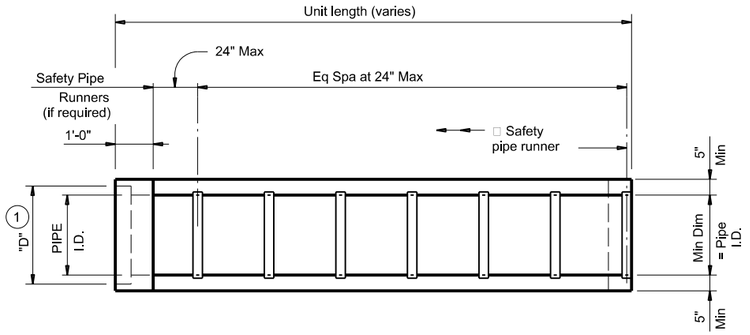
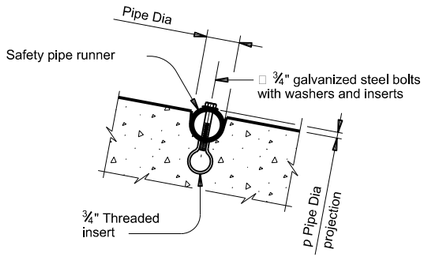


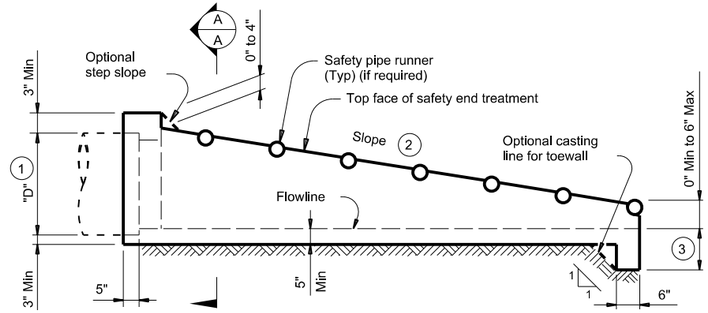
PLAN

(Showing bell end connection.)



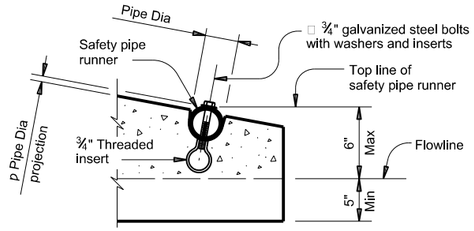
INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)

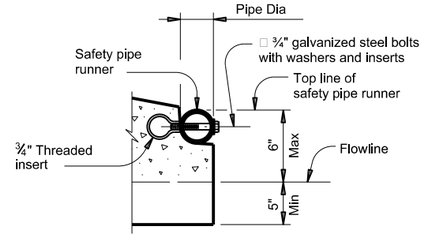


LONGITUDINAL ELEVATION

(Showing bell end connection.)



OPTION A



OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (7)	"D" (1)	Slope	Min Length	Pipe Runners Required		Required Pipe Runner Size		
						Single Pipe	Multiple Pipe	Nominal Dia.	O.D.	I.D.
12"	2"	1.15"	17.00"	6:1	4' - 9"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
15"	2 ¼"	1.30"	20.50"	6:1	6' - 5"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
18"	2 ½"	1.60"	24.00"	6:1	8' - 0"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
24"	3"	1.95"	31.00"	6:1	11' - 3"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
30"	3 ½"	2.65"	38.50"	6:1	14' - 8"	No	Yes	4" STD	4.500"	4.026"
36"	4"	2.75"	45.50"	6:1	17' - 11"	Yes	Yes	4" STD	4.500"	4.026"
42"	4 ½"	2.7"	52.50"	6:1	21' - 2"	Yes	Yes	4" STD	4.500"	4.026"

(1) Dimension "D" is based on reinforced concrete pipe (RCP) meeting the requirements of ASTM C-76, Class III, (RCP Wall "B" thickness). Adjust "D" for any other wall thickness used. For thermoplastic pipe (TP) take into account the annular space requirements for grouted connections.

(2) Slope as shown elsewhere in the plans. Slope of 6:1 or flatter is required for vehicle safety.

(3) Toewall to be used only when dimension is shown elsewhere in the plans.

(4) Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap is considered subsidiary to the Item 467, "Safety End Treatment."

(5) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

(6) Provide cement stabilized bedding and backfill in accordance with the Item 400, "Excavation and Backfill for Structures." Bedding and backfill is considered subsidiary to the Item 467, "Safety End Treatment." When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.

(7) Thermoplastic pipe wall thickness may vary. Adjust accordingly. Thermoplastic pipe requires the safety end treatments to have a bell end for grouted connections.

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe (RCP), and thermoplastic pipe (TP) may be used for TYPE II end treatment as specified in Item "Safety End Treatment."

When precast safety end treatment is used as a Contractor's alternate to mitered RCP, riprap will not be required unless noted otherwise on the plans.

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Manufacture this product in accordance with Item 467, "Safety End Treatment" except as noted below :

A. Provide minimum reinforcing of #4 at 6" (Grade 40) or #4 at 9" (Grade 60) each way or 6"x6" - D12 x D12 or 5"x5" - D10 x D10 welded wire reinforcement (WWR).

B. For precast (steel formed) sections, provide Class "C" concrete (f'c = 3,600 psi).

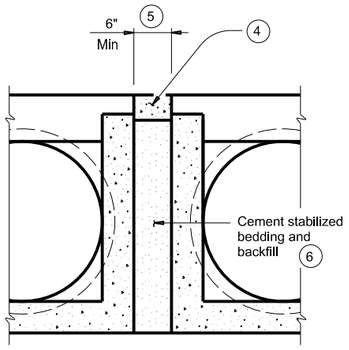
At the option and expense of the Contractor the next larger size of safety end treatment may be furnished; as long as the "D" dimension cast is that of the required size of pipe.

Pipe runners are designed for a traversing load of 10,000 Lbs at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

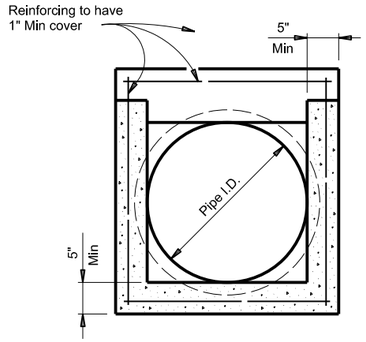
Provide pipe runners meeting the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

Galvanize all steel components except reinforcing steel after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

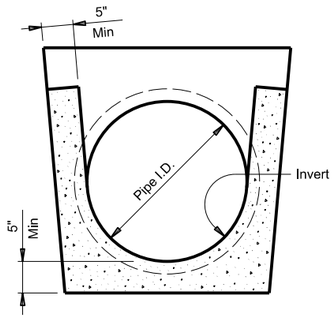
Connect RCP using the Optional Joint for RCP detail shown or in accordance with Item 464, "Reinforced Concrete Pipe." Connect TP by grouting. See Pipe and Box Grouted Connections (PBGC) standard for grouted connections with TP and precast safety end treatment.



MULTIPLE PIPE INSTALLATION

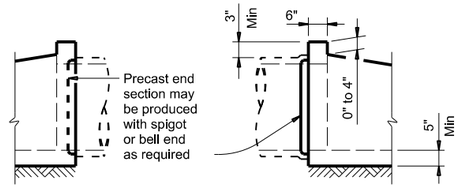


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



OPTIONAL JOINT FOR RCP

(Showing joint between RCP and precast safety end treatment.)

Texas Department of Transportation

Bridge Division Standard

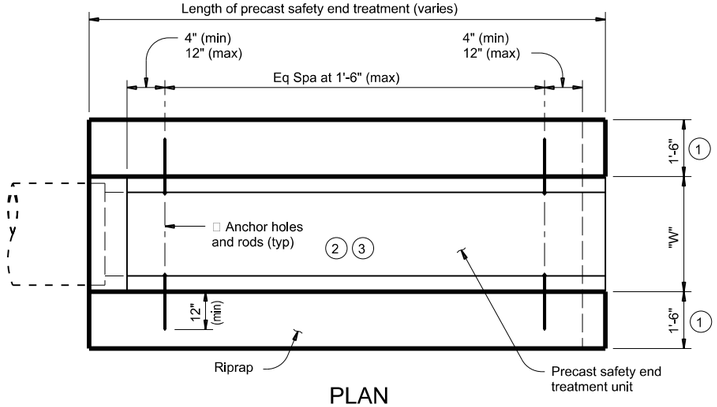
PRECAST SAFETY END TREATMENT

TYPE II ~ PARALLEL DRAINAGE

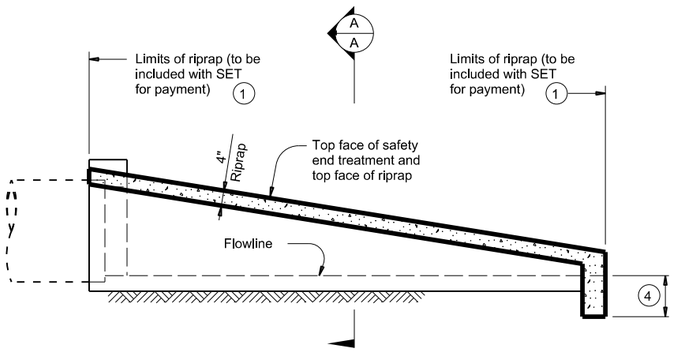
PSET-SP

FILE:	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-21: Added 42" TP	1844	01	029	FM 1959
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		90

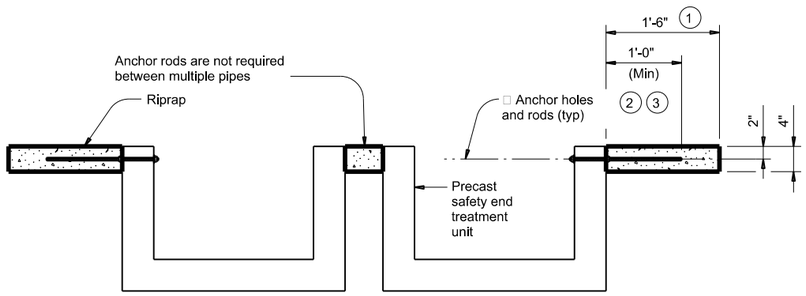
DATE: 2/23/2024 10:20:05 AM
FILE: H:\CDA\1844-01-029 (FM 1959)\Standards\Drainage standards\CAD Files\Precast End Treatment Riprap Details- CD-PSET-RR-20.dgn



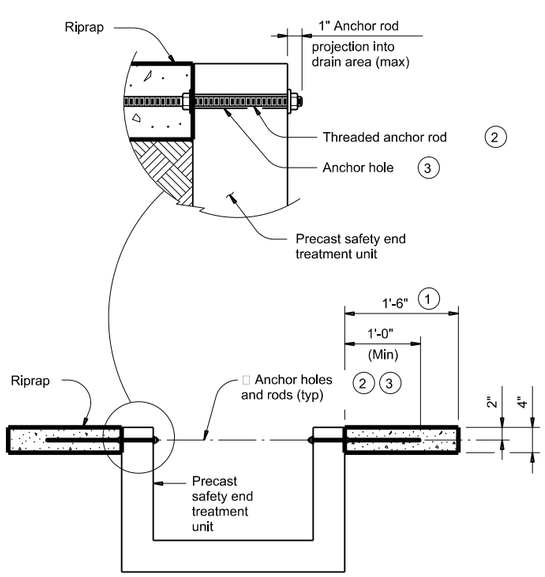
PLAN



LONGITUDINAL ELEVATION



MULTIPLE PIPE INSTALLATION



SINGLE PIPE INSTALLATION

SECTION A-A

ESTIMATED CONCRETE RIPRAP QUANTITIES (CY)

(5)

Nominal Culvert (Pipe) I.D.	PSET-SC and PSET-SP Standards				PSET-RC and PSET-RP Standards			
	Unit Width "W"	Side Slope			Unit Width "W"	Side Slope		
		3:1	4:1	6:1		3:1	4:1	6:1
12"	23.0"	0.1	0.2	0.2	16.0"	0.1	0.1	0.2
15"	26.5"	0.2	0.2	0.3	19.5"	0.1	0.2	0.2
18"	30.0"	0.2	0.2	0.3	23.0"	0.2	0.2	0.3
24"	37.0"	0.3	0.3	0.5	30.0"	0.2	0.3	0.4
30"	44.5"	0.3	0.4	0.6	37.0"	0.3	0.3	0.5
36"	51.5"	0.4	0.5	0.7	44.0"	0.3	0.4	0.6
42"	58.5"	0.5	0.6	0.8	51.0"	0.4	0.5	0.7

(1) Riprap placed beyond the limits shown will be paid as concrete riprap in accordance with Item 432, "Riprap." When riprap is cast integrally with the precast safety end treatment, this dimension is 1'-0" minimum.

(2) 1#2" Dia ASTM A307 Gr A threaded anchor rod with 2 nuts and 2 washers. Galvanize all components in accordance with Item 445, "Galvanizing." Repair galvanizing that is damaged during transport or construction in accordance with the specifications.

(3) 3#4" through holes in walls of safety end treatment for riprap anchor rods may be drilled with rotary (coring or masonry) type drilling equipment or may be formed. Do not use percussive (star) type drilling equipment. If holes are drilled, patch spalls in the inside face of the wall exceeding 1#2" from the holes.

(4) Provide riprap toe wall when dimension is shown elsewhere in the plans or when field conditions require a toe wall.

(5) Quantities shown are for one end of one reinforced concrete pipe culvert. For multiple pipe culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only. Quantities are based on the minimum unit lengths shown on the Precast Saftey End Treatment (SET) standard sheets.

MATERIAL NOTES:

Provide Class "B" riprap in accordance with Item 432, "Riprap."
Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise. The anchor rods shown are always required.

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe may be used for TYPE II end treatment as specified in Item 467, "Safety End Treatment."
Refer to PSET-SC or PSET-SP standard sheets for details of square safety end treatments not shown. Refer to PSET-RC or PSET-RP standard sheets for details of round safety end treatments not shown.
For precast units with integrally cast riprap, substitute reinforcing steel in the amount on 0.26 in./ft. minimum for the threaded anchor rods shown. When requested, submit sealed engineering drawings for approval prior to construction. Shop drawings will not be required. Note that a proprietary precast unit with integral riprap is available from L&R Precast Concrete Works, Inc. (956) 583-6293 or www.lrprecast.com.
Payment for riprap and toewalls is included in the price bid for each safety end treatment.

These riprap details are only applicable when notes that require placement of riprap with precast safety end treatments are shown elsewhere in the plans.

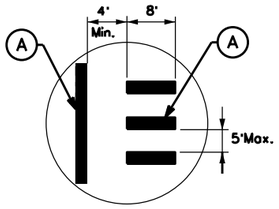
Precast units with integrally cast riprap are permitted unless noted otherwise on the plans.

Texas Department of Transportation

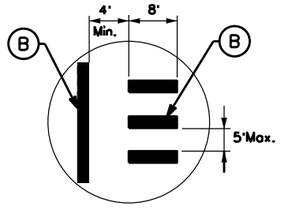
Bridge Division Standard

PRECAST SAFETY END TREATMENT
TYPE II
RIPRAP DETAILS
PSET-RR

FILE:	DN: GAF	CK: TxDOT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1844	01	029	FM 1959
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		91



DETAIL 'A'



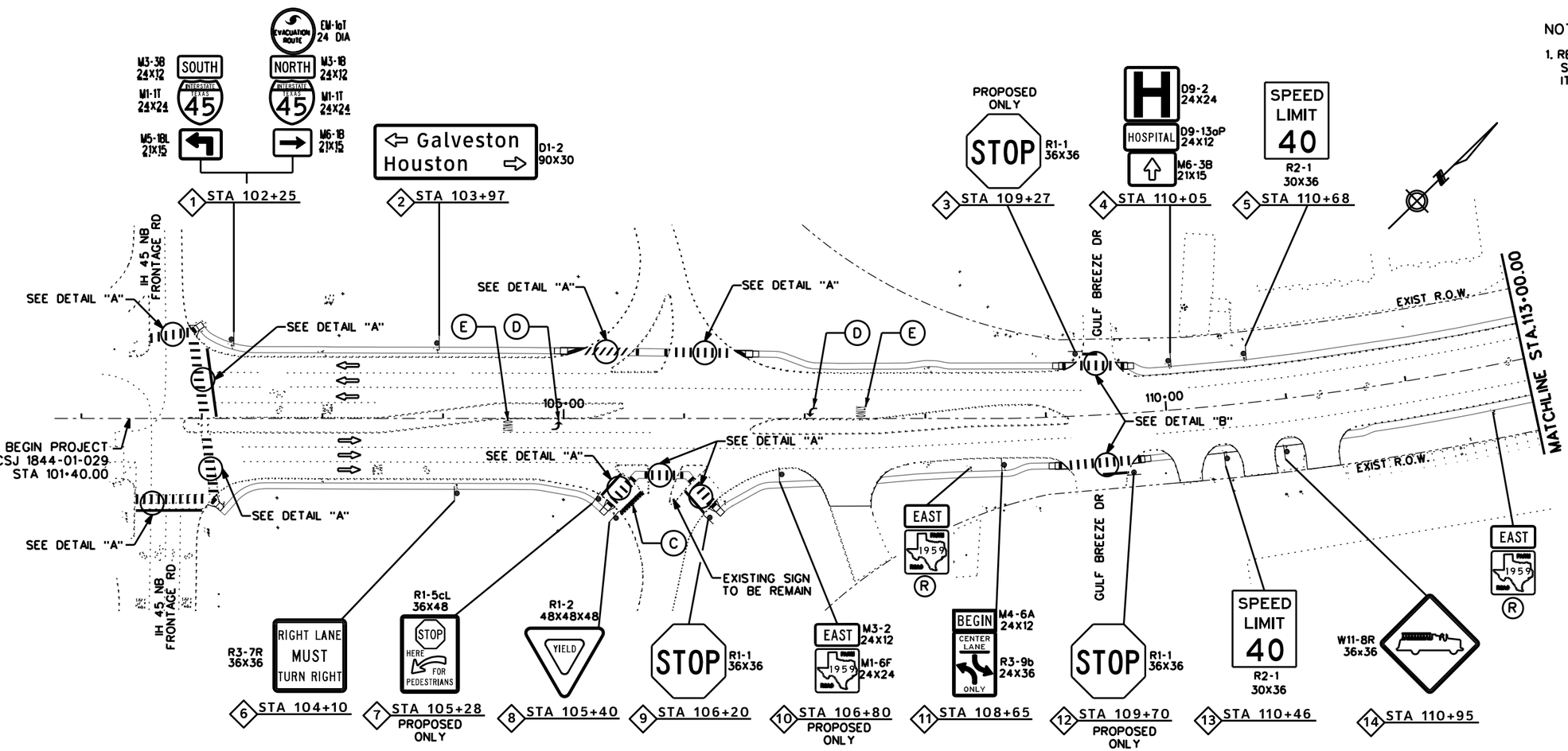
DETAIL 'B'

LEGEND:

- ⇦ DIRECTION OF TRAFFIC
- (A) MULTIPOLYMER PAV MRK (W) (24") (SLD)
- (B) REFL PAV MRK TY I(W) 24" (SLD) (100MIL)
- (C) PREFAB PAV MRK TY C (W) (36") (YLD TRI)
- (D) PREFAB PAV MRK TY C (W) (ARROW)
- (E) PREFAB PAV MRK TY C (W) (WORD)
- (R) SMALL SIGN ASSEMBLIES TO BE REMOVED
- ◇# SMALL SIGN ASSEMBLIES TO BE REMOVED AND PROPOSED WITH NEW ONE

NOTES:

1. REMOVAL OF EXISTING SMALL SIGNS THAT ARE SHOWN ON THE PLANS WILL BE PAID UNDER ITEM 644-6076.



STATE OF TEXAS
SURAJ CHAPAGAIN
135700
LICENSED
PROFESSIONAL ENGINEER

Suraj Chapagain, P.E.

4/12/2024

FM 1959
SIGNING & PAVEMENT MARKING LAYOUT

SHEET 1 OF 5

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1844	01	029	FM 1959
DIST	COUNTY		SHEET NO.
HOU	HARRIS		92

SCALE: 1" = 100'

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

LEGEND:

- ⇦ DIRECTION OF TRAFFIC
- (A) MULTIPOLYMER PAV MRK (W) (24") (SLD)
- (B) REFL PAV MRK TY I(W) 24" (SLD) (100MIL)
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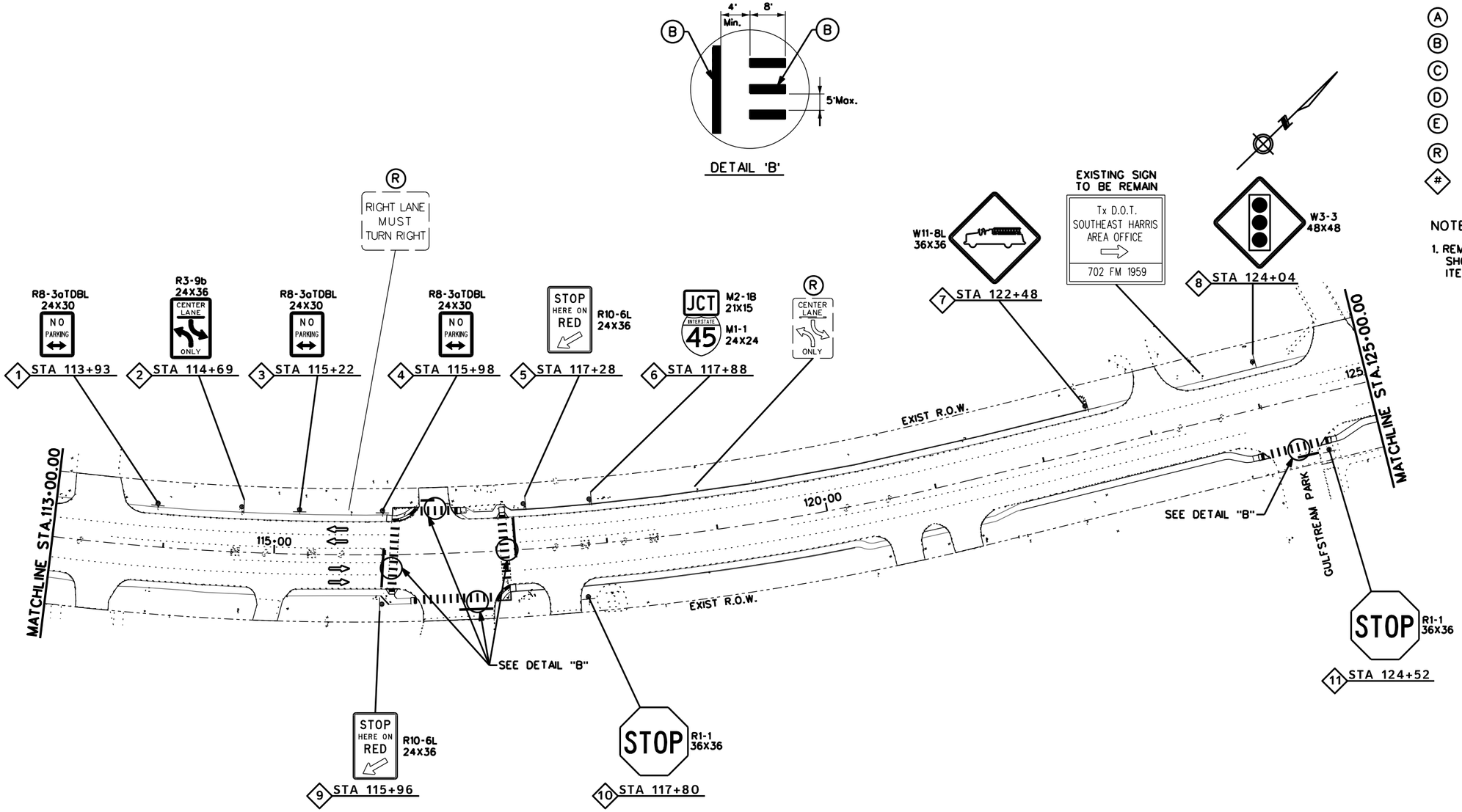
- (D) PREFAB PAV MRK TY C (W) (ARROW)
- (E) PREFAB PAV MRK TY C (W) (WORD)
- (R) SMALL SIGN ASSEMBLIES TO BE REMOVED
- ◇# SMALL SIGN ASSEMBLIES TO BE REMOVED AND PROPOSED WITH NEW ONE

NOTES:

1. REMOVAL OF EXISTING SMALL SIGNS THAT ARE SHOWN ON THE PLANS WILL BE PAID UNDER ITEM 644-6076.



STATE OF TEXAS
SURAJ CHAPAGAIN
135700
LICENSED PROFESSIONAL ENGINEER

Suraj Chapagain, P.E.

4/12/2024

FM 1959
SIGNING & PAVEMENT MARKING LAYOUT

SHEET 2 OF 5

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1844	01	029	FM 1959
DIST	COUNTY		SHEET NO.
HOU	HARRIS		93

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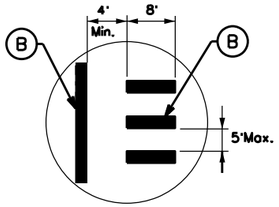

DETAIL 'B'

EXISTING SIGN TO BE REMAIN

Texas Department of Transportation
SOUTH HARRIS MAINTENANCE OFFICE

SPEED LIMIT 40
R2-1
30X36
1 STA 130+80

STOP R1-1 36X36
2 STA 133+13

GROSVENOR ST

SEE DETAIL "B"

EXIST R.O.W.

MATCHLINE STA.125+00.00

00

130+00

135+00

MATCHLINE STA.137+00.00

EXIST R.O.W.

Department of Public Safety
®

LEGEND:

- ⇦ DIRECTION OF TRAFFIC
- (A) MULTIPOLYMER PAV MRK (W) (24") (SLD)
- (B) REFL PAV MRK TY I(W) 24" (SLD) (100MIL)
- (C) PREFAB PAV MRK TY C (W) (36") (YLD TRI)
- (D) PREFAB PAV MRK TY C (W) (ARROW)
- (E) PREFAB PAV MRK TY C (W) (WORD)
- (R) SMALL SIGN ASSEMBLIES TO BE REMOVED
- ◇# SMALL SIGN ASSEMBLIES TO BE REMOVED AND PROPOSED WITH NEW ONE

NOTES:

1. REMOVAL OF EXISTING SMALL SIGNS THAT ARE SHOWN ON THE PLANS WILL BE PAID UNDER ITEM 644-6076.

STATE OF TEXAS
SURAJ CHAPAGAIN
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4/12/2024

FM 1959
SIGNING & PAVEMENT MARKING LAYOUT

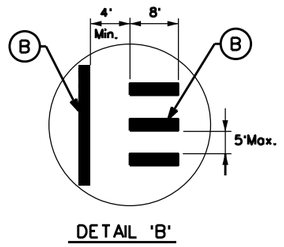
SHEET 3 OF 5

®2024
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1844	01	029	FM 1959
DIST	COUNTY		SHEET NO.
HOU	HARRIS		94

SCALE: 1" = 100'

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



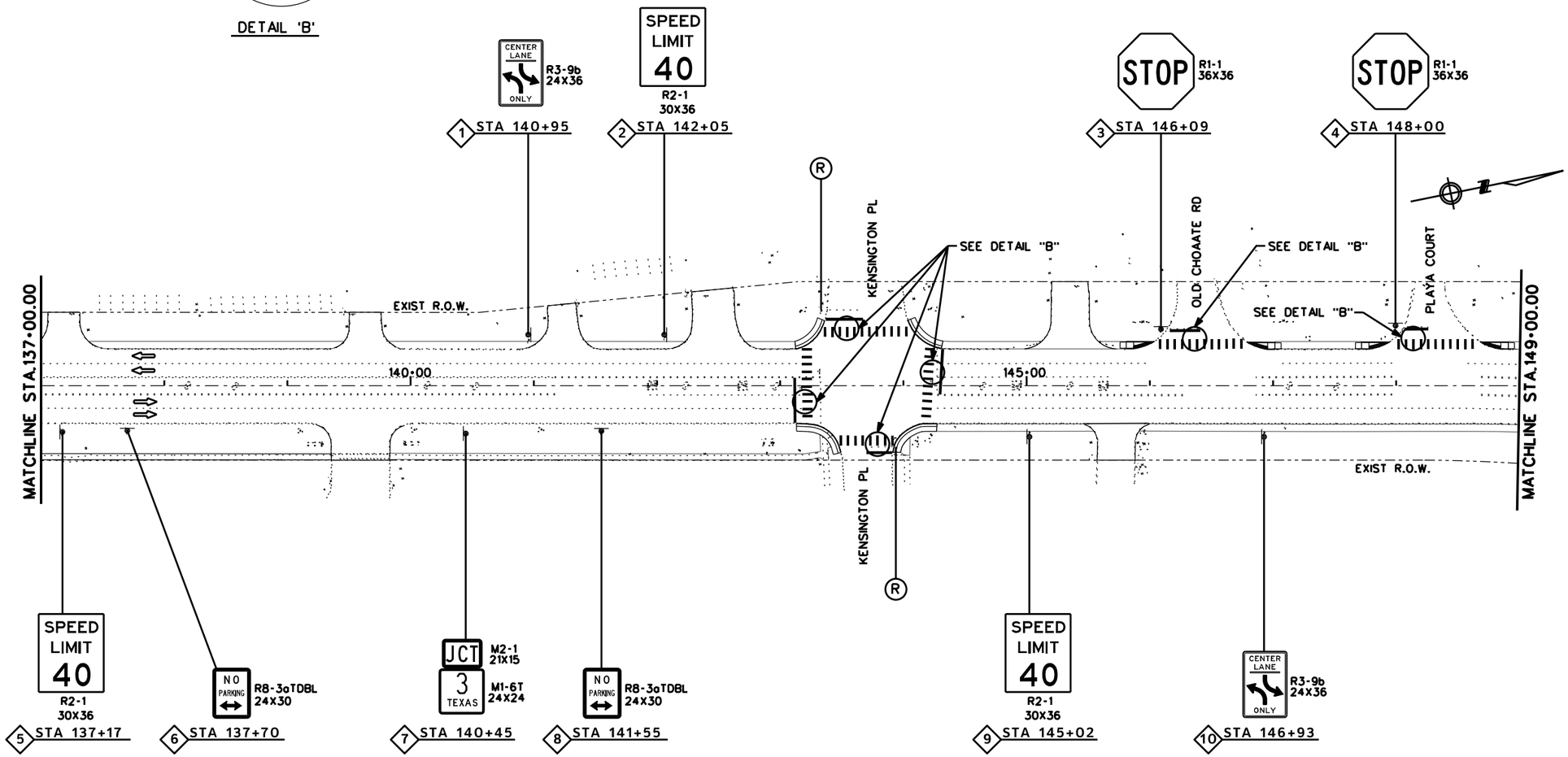
DETAIL 'B'

LEGEND:

- ⇦ DIRECTION OF TRAFFIC
- (A) MULTIPOLYMER PAV MRK (W) (24") (SLD)
- (B) REFL PAV MRK TY I(W) 24" (SLD) (100MIL)
- (C) PREFAB PAV MRK TY C (W) (36") (YLD TRI)
- (D) PREFAB PAV MRK TY C (W) (ARROW)
- (E) PREFAB PAV MRK TY C (W) (WORD)
- (R) SMALL SIGN ASSEMBLIES TO BE REMOVED
- ◇# SMALL SIGN ASSEMBLIES TO BE REMOVED AND PROPOSED WITH NEW ONE

NOTES:

1. REMOVAL OF EXISTING SMALL SIGNS THAT ARE SHOWN ON THE PLANS WILL BE PAID UNDER ITEM 644-6076.



SCALE: 1" : 100'

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

STATE OF TEXAS
SURAJ CHAPAGAIN
135700
LICENSED
PROFESSIONAL ENGINEER

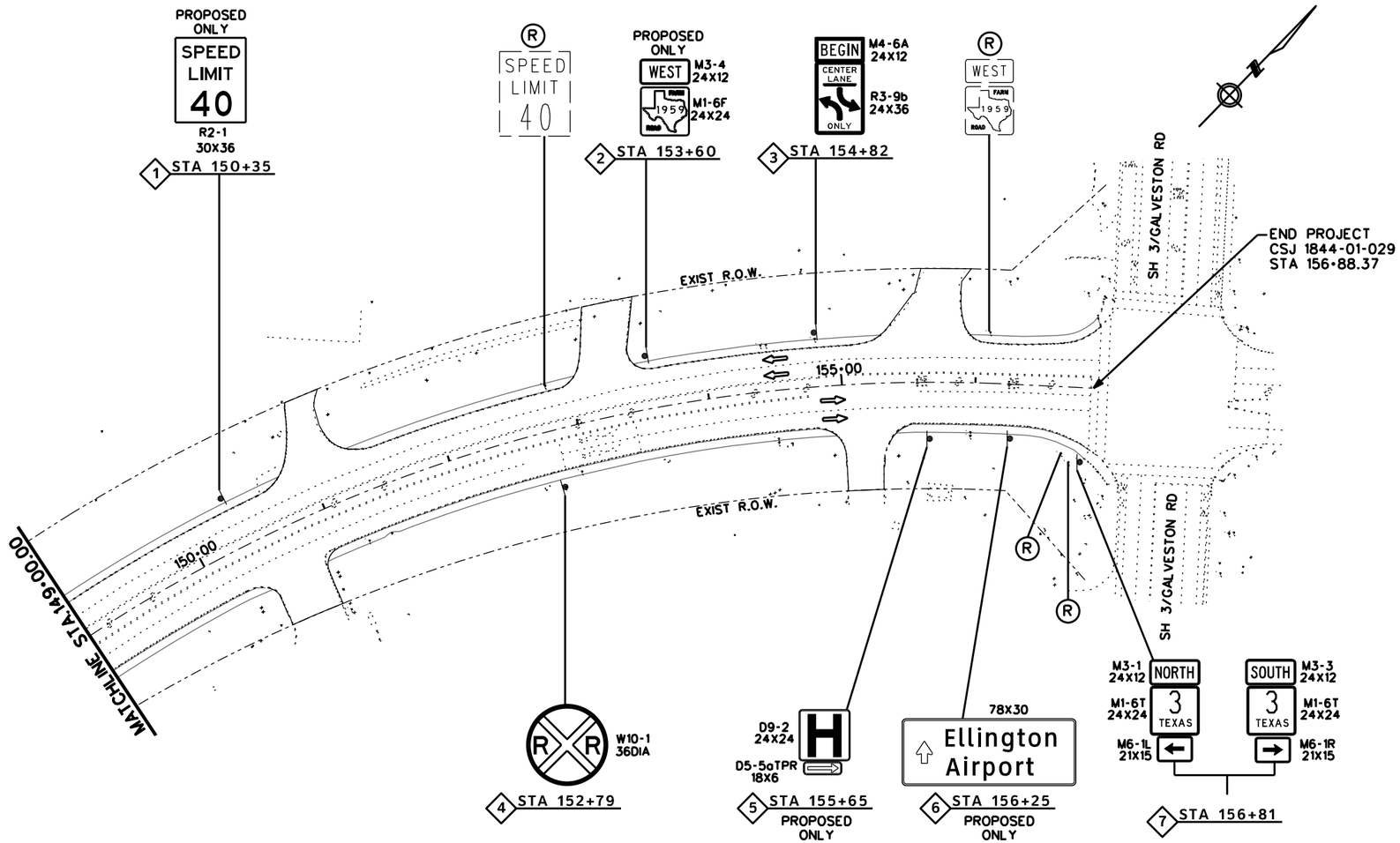
Suraj Chapagain, P.E.
4/12/2024

FM 1959
SIGNING & PAVEMENT MARKING LAYOUT

SHEET 4 OF 5

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1844	01	029	FM 1959
DIST	COUNTY		SHEET NO.
HOU	HARRIS		95



LEGEND:

- ⇦ DIRECTION OF TRAFFIC
- (A) MULTIPOLYMER PAV MRK (W) (24") (SLD)
- (B) REFL PAV MRK TY I(W) 24" (SLD) (100MIL)
- (C) PREFAB PAV MRK TY C (W) (36") (YLD TRI)
- (D) PREFAB PAV MRK TY C (W) (ARROW)
- (E) PREFAB PAV MRK TY C (W) (WORD)
- (R) SMALL SIGN ASSEMBLIES TO BE REMOVED
- ◇# SMALL SIGN ASSEMBLIES TO BE REMOVED AND PROPOSED WITH NEW ONE

NOTES:

1. REMOVAL OF EXISTING SMALL SIGNS THAT ARE SHOWN ON THE PLANS WILL BE PAID UNDER ITEM 644-6076.

STATE OF TEXAS
SURAJ CHAPAGAIN
135700
LICENSED PROFESSIONAL ENGINEER

Suraj Chapagain, P.E.

4/12/2024

FM 1959
SIGNING & PAVEMENT MARKING LAYOUT

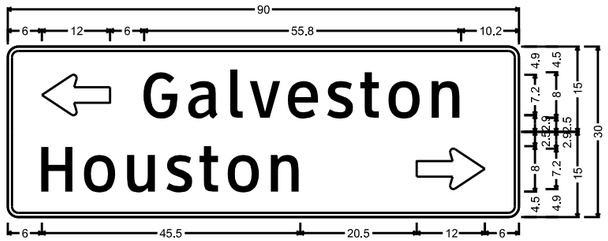
SHEET 5 OF 5

SCALE: 1" = 100'

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

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1844	01	029	FM 1959
DIST	COUNTY		SHEET NO.
HOU	HARRIS		96



D1-2 8in LT-RT;

1.9" Radius, 0.8" Border, White on Green;
Standard Arrow Custom 12.0" X 7.1" 180°; "Galveston", ClearviewHwy-3-W;

1.9" Radius, 0.8" Border, White on Green;
"Houston", ClearviewHwy-3-W; Standard Arrow Custom 12.0" X 7.1" 0°;

LAYOUT 1 OF 5: SIGN NO. 2 - STA 103+97

1.9" Radius, 0.8" Border, White on Green;
Standard Arrow Custom 10.0" X 7.1" 90°; "Ellington", ClearviewHwy-3-W;
"Airport", ClearviewHwy-3-W;

LAYOUT 5 OF 5: SIGN NO. 6 - STA 156+25

STATE OF TEXAS
SURAJ CHAPAGAIN
135700
LICENSED
PROFESSIONAL ENGINEER

Suraj Chapagain, P.E.
4/12/2024

FM 1959
SMALL GUIDE SIGN
DETAIL

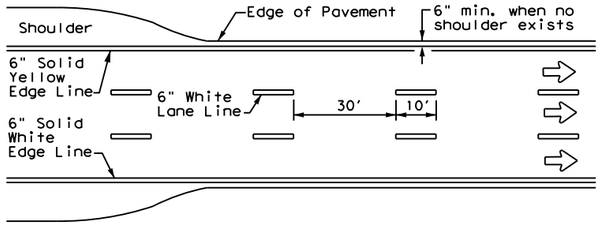
SHEET 1 OF 1

Texas Department of Transportation

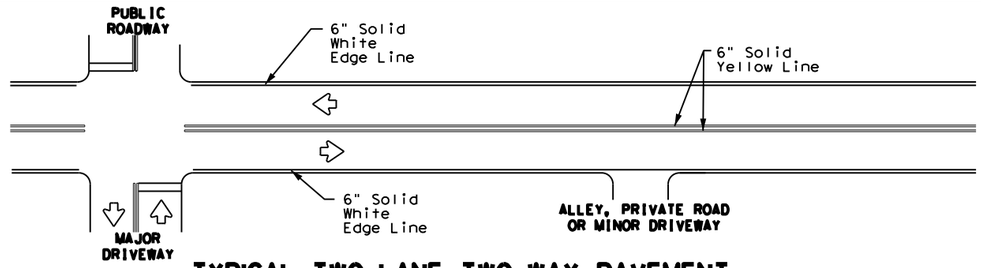
CONT	SECT	JOB	HIGHWAY
1844	01	029	FM 1959
DIST	COUNTY		SHEET NO.
HOU	HARRIS		97

SCALE: 1" = 100'

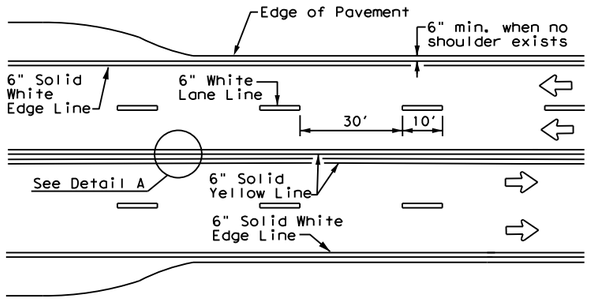
DATE: $DATE$ $TIME$
FILE: $FILE$

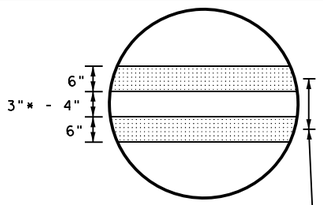


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



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





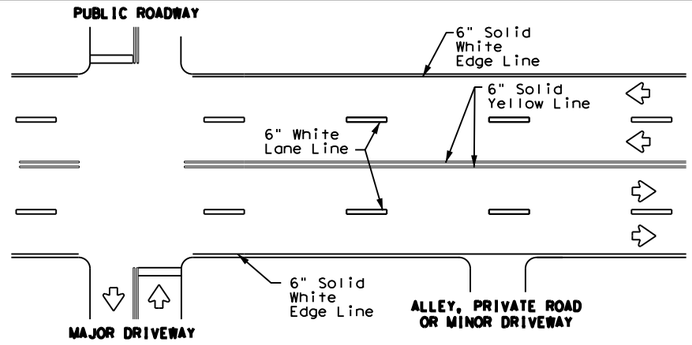
DETAIL "A"

9"** min. - 10" typ.
(18" max. for traveled way greater than 48' only)

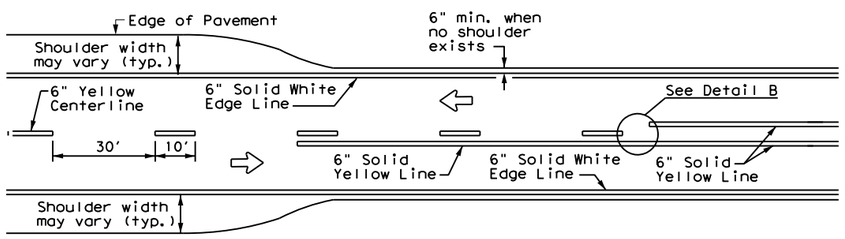
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

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

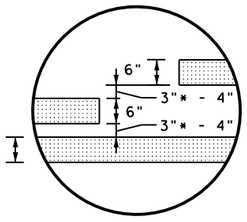
** 8" minimum for restripe projects when approved by the Engineer.



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



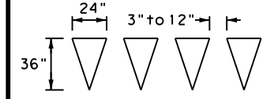
TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



18" min. - 20" max.
(16" minimum for restripe projects when approved by the Engineer.)

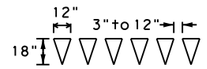
DETAIL "B"

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

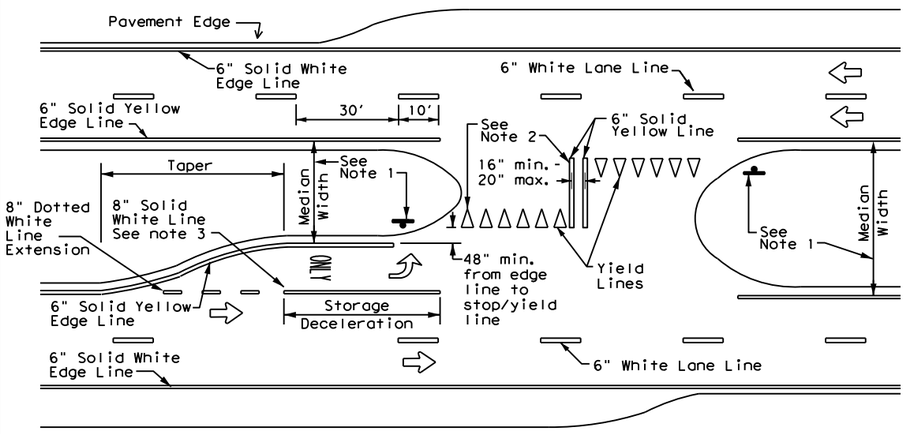


For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES



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



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

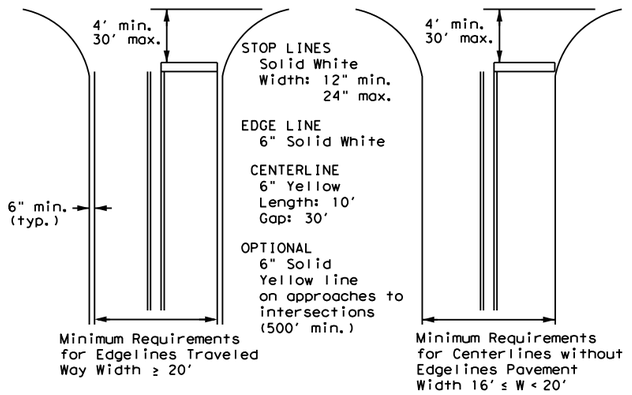
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling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

GENERAL NOTES

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

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

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



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

GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Roadways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-22

FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	1844	01	029	FM 1959
11-78 8-00 6-20	DIST	COUNTY		SHEET NO.
8-95 3-03 12-22	HOU	HARRIS		98
5-00 2-12				

22A

DATE: 2/23/2024 10:23:51 AM
FILE: H:\CDA\1844-01-029 (FM 1959)\Standards\Signing & Pavement Marking Standards\SMM029.dgn

DATE: 2/23/2024 10:26:26 AM
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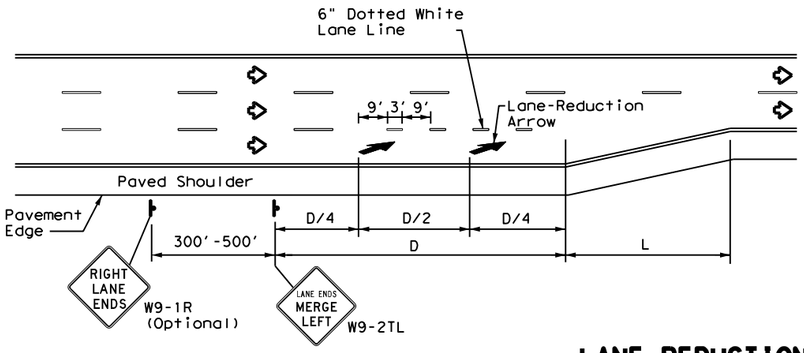


LANE REDUCTION

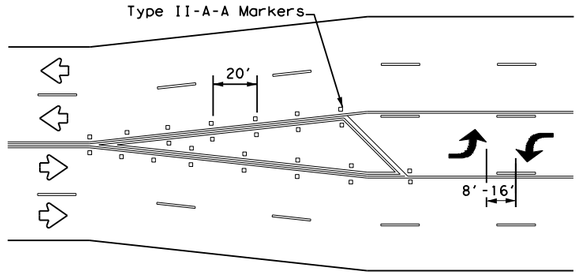
NOTES

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

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

GENERAL NOTES

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

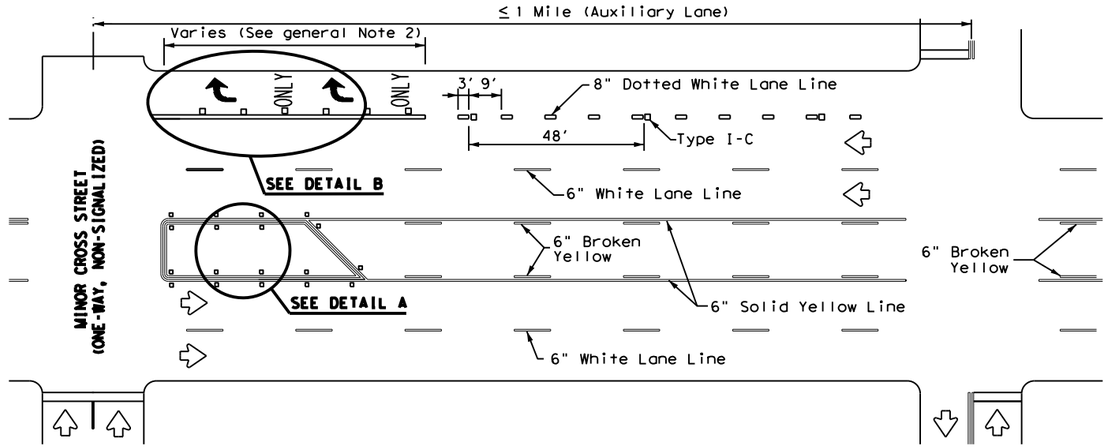


A two-way left-turn (TWLT) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

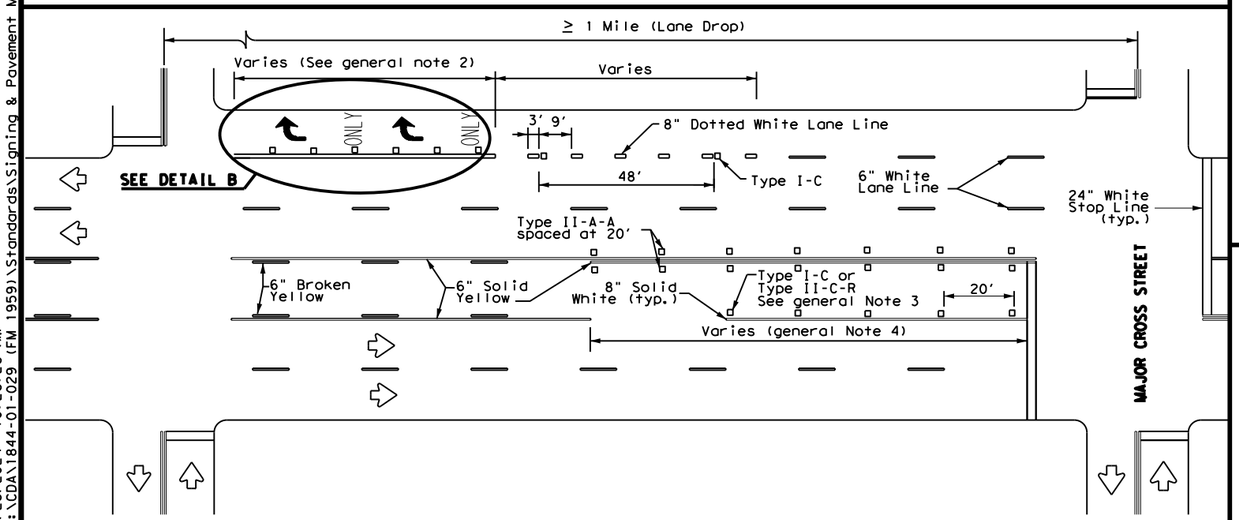
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

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

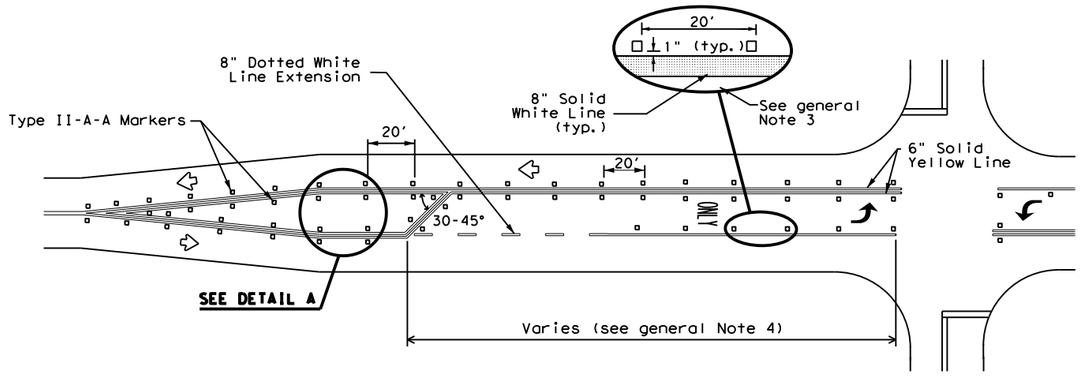
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



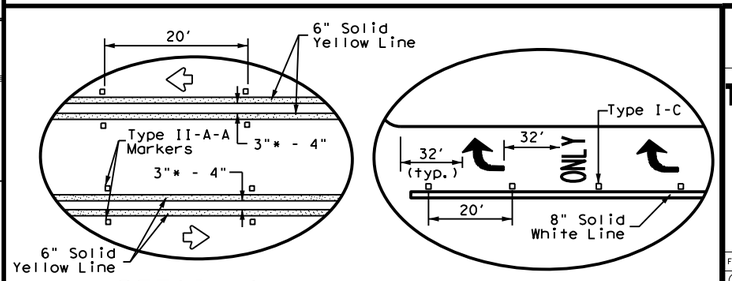
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



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



TYPICAL TWO-LANE ROADWAY INTERSECTION WITH LEFT TURN BAYS



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

Texas Department of Transportation

Traffic Safety Division Standard

TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS

PM(3)-22

FILE: pm3-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-98 3-03 6-20, 5-00 2-10 12-22, 8-00 2-12	1844	01	029	FM 1959
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		99

22C

DATE: 2/23/2024 10:29:00 AM
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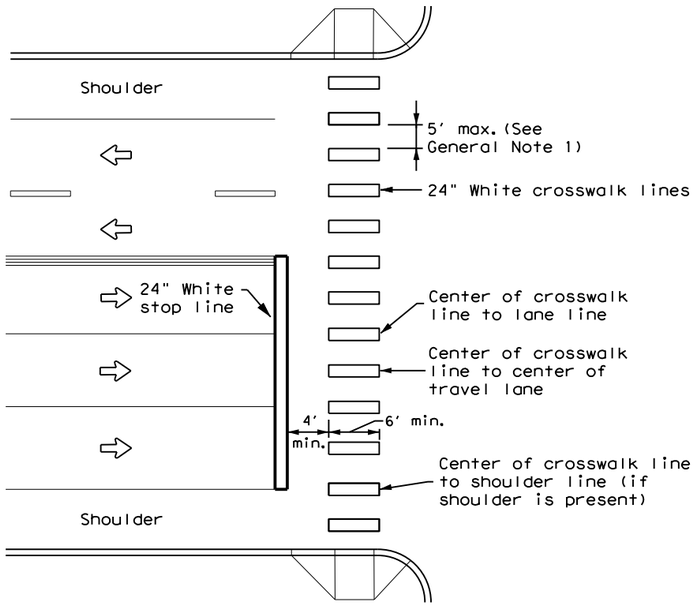


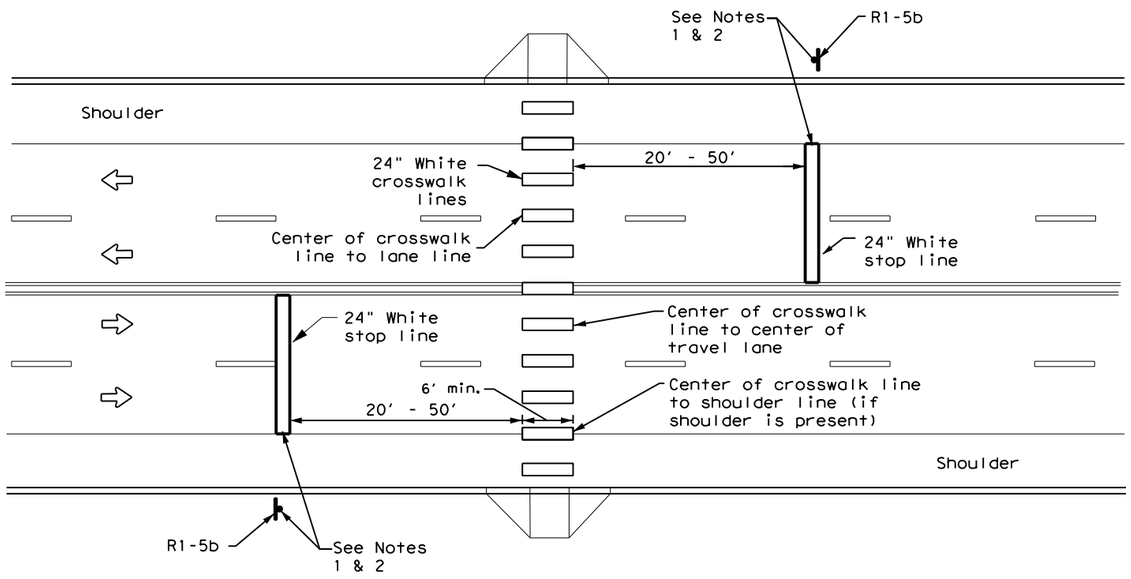
HIGH-VISIBILITY LONGITUDINAL CROSSWALK AT CONTROLLED APPROACH

GENERAL NOTES

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

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

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



UNSIGNALIZED MIDBLOCK HIGH-VISIBILITY LONGITUDINAL CROSSWALK

NOTES:

1. Use stop bars with Stop Here For Pedestrians (R1-5b) signs at unsignalized midblock cross walks.
2. Use stop bars with STOP HERE ON RED (R10-6 or R10-6a) signs at mid block crosswalks controlled by traffic signals or pedestrian hybrid beacons.

Texas Department of Transportation

Traffic Safety Division Standard

CROSSWALK PAVEMENT MARKINGS

PM(4)-22A

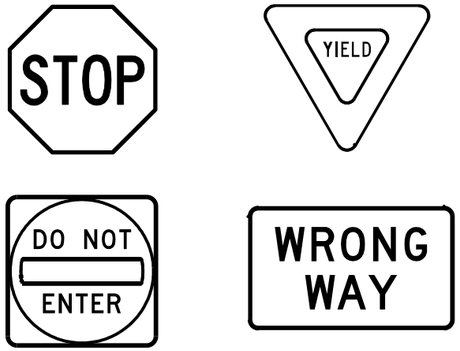
FILE: pm4-22a.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	1844	01	029	FM 1959
6-20	DIST	COUNTY		SHEET NO.
6-22	HOU	HARRIS		100
12-22				

22D

DATE: 2/23/2024 10:42:49 AM
FILE: H:\CDA\1844-01-029 (FM 1959)\Standards\Signing & Pavement Marking Standards\sgnmdg.dgn

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND, BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

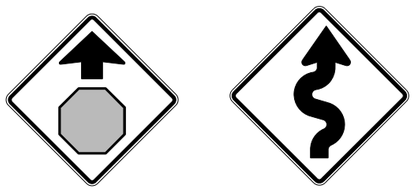
ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080
7.5 to 15	0.100
Greater than 15	0.125

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

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

http://www.txdot.gov/

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	1844	01	029	FM 1959
12-03 7-13 9-08	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		101

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

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

Number of Posts (1 or 2)

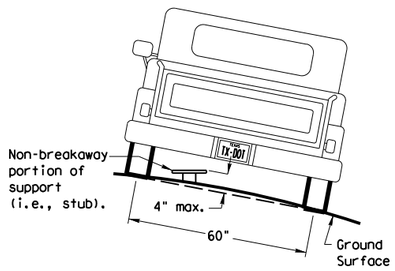
Anchor Type

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

Sign Mounting Designation

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

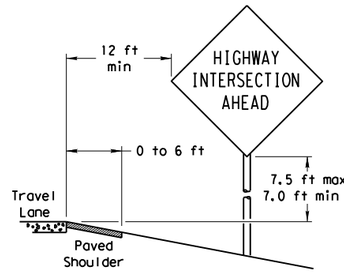
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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

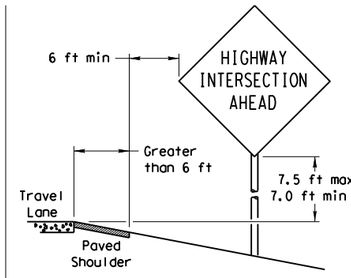
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

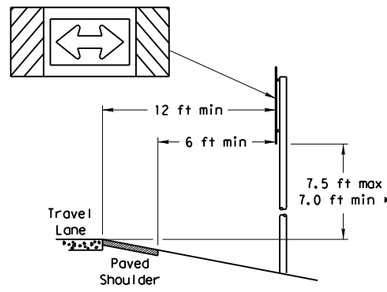
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



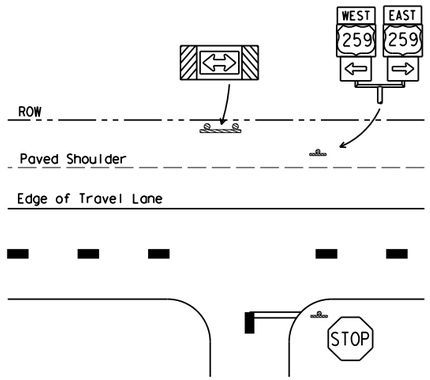
GREATER THAN 6 FT. WIDE

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

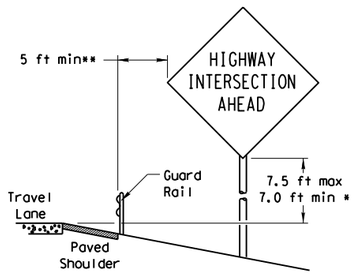
T-INTERSECTION



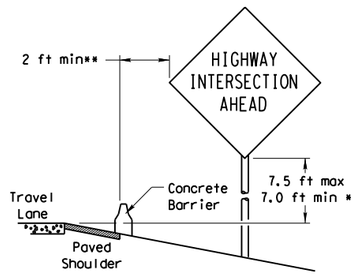
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

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

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

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

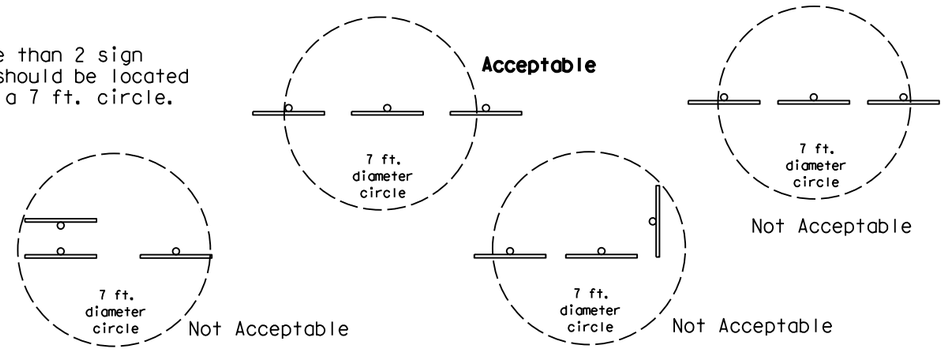
(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

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

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

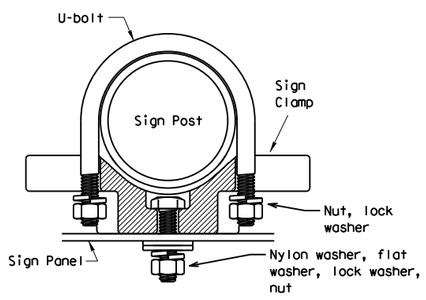
The website address is:
http://www.txdot.gov/publications/traffic.htm

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



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

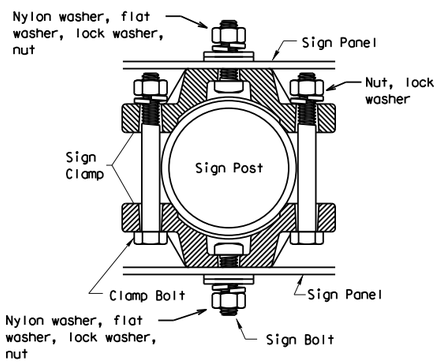


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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.

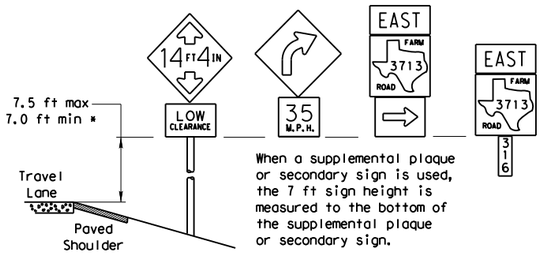
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



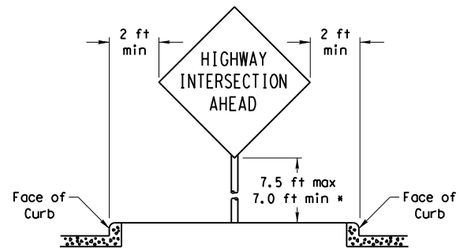
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



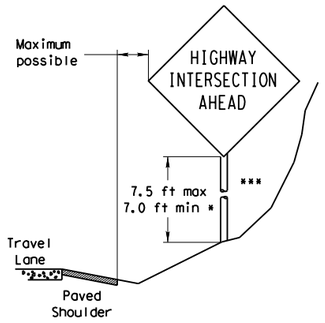
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

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

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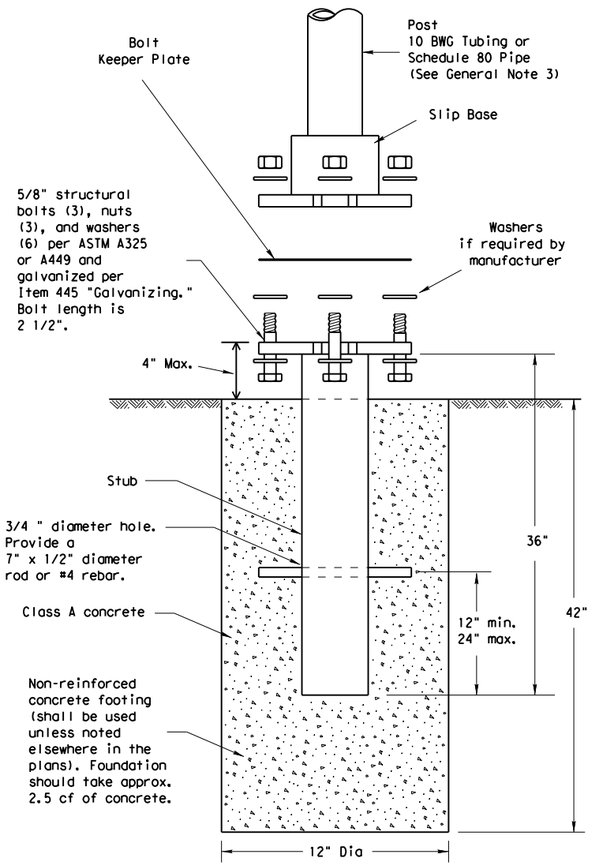
9-08 REVISIONS	CONT	SECT	JOB	HIGHWAY
	1844	01	029	HARRIS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		102

DATE:2/23/2024
FILE:H:\CDA\1844-01-029 (FM 1959)\Standards\Signing & Pavement Marking Standards\smdgen.dgn

TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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

NOTE

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

GENERAL NOTES:

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

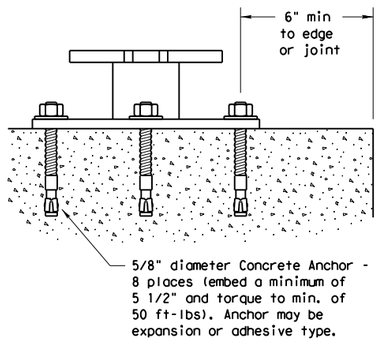
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum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

ASSEMBLY PROCEDURE

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

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

CONCRETE ANCHOR



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

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

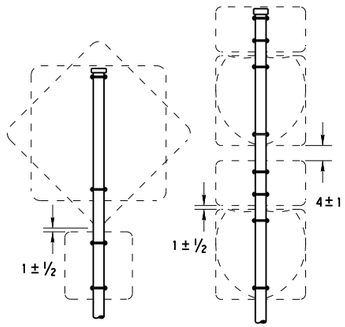
SMD(SLIP-1)-08

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

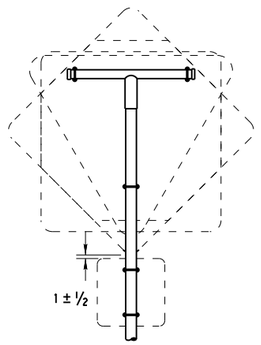
REVISIONS 9-08

CONT	SECT	JOB	HIGHWAY
1844	01	029	HARRIS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		103

DATE:2/23/2024
FILE:H:\CDA\1844-01-029 (FM 1959)\Standards\Signing & Pavement Marking Standards\smdsl.dgn



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



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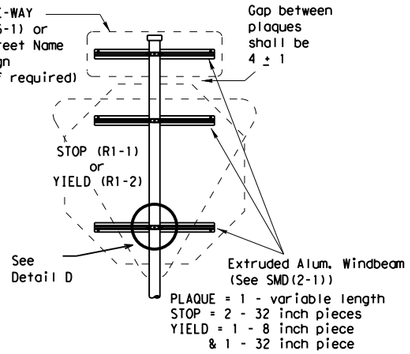

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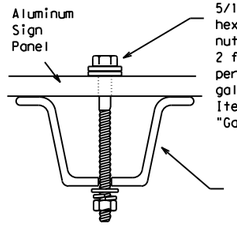
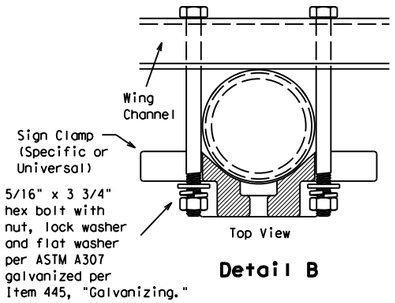
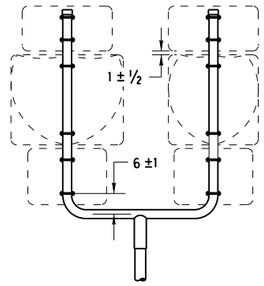


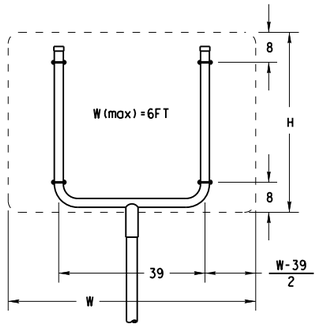
Detail A



Detail B



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



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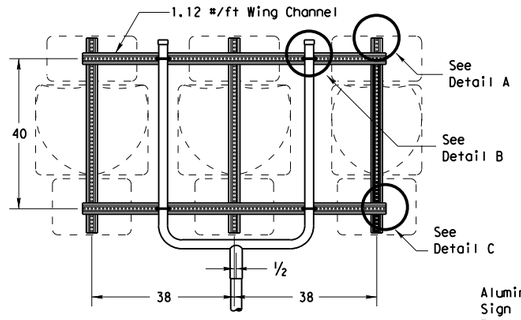
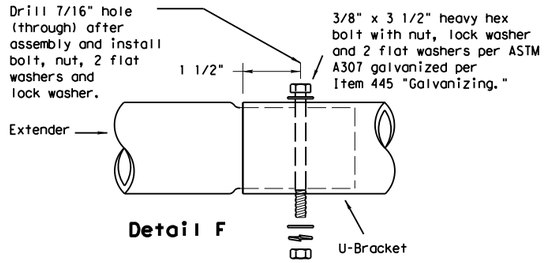
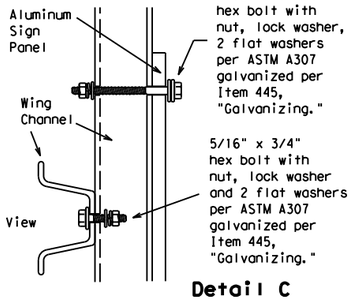


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

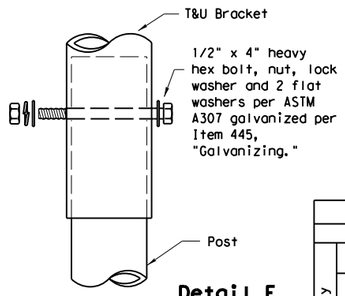


Detail F

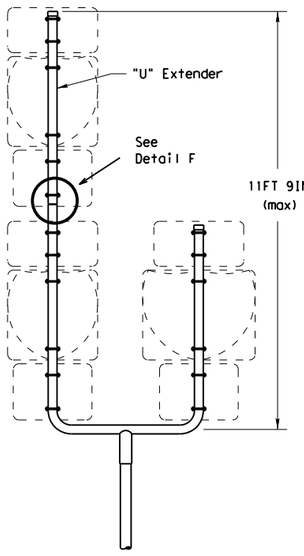
Splices shall only be allowed behind the sign substrate.



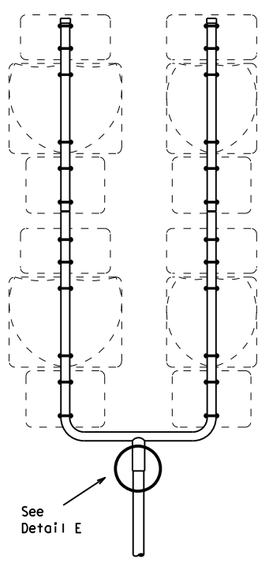
Detail C



Detail E



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



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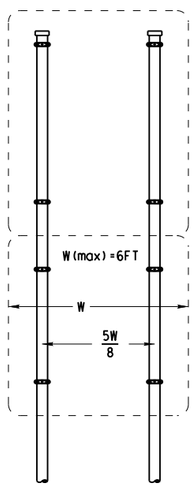
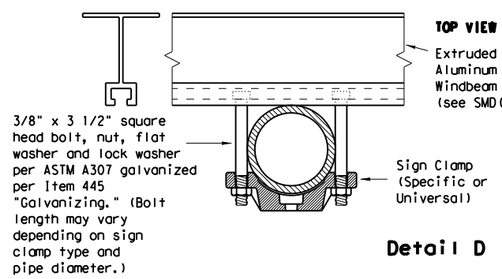
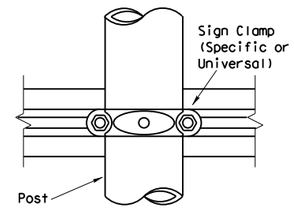


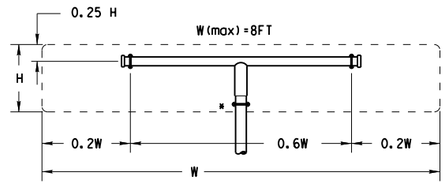
SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW



Detail D

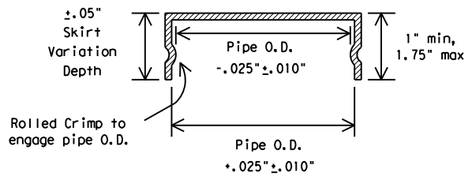




All dimensions are in english unless detailed otherwise.

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

FRICTION CAP DETAIL



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

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

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

GENERAL NOTES:

1.

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

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

REQUIRED SUPPORT

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

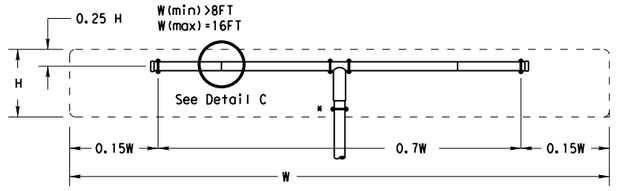
Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

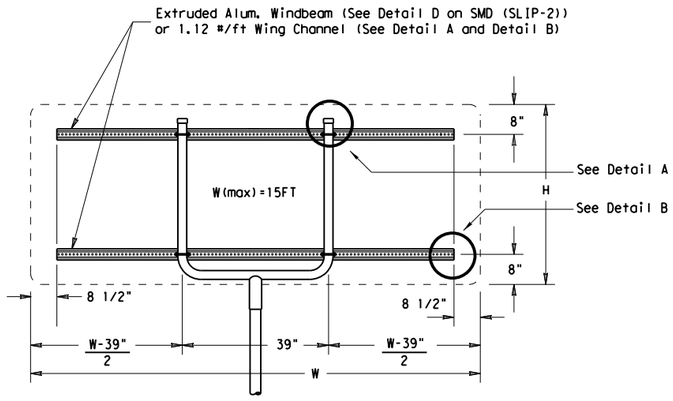
SMD(SLIP-2)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	1844	01	029	HARRIS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		104

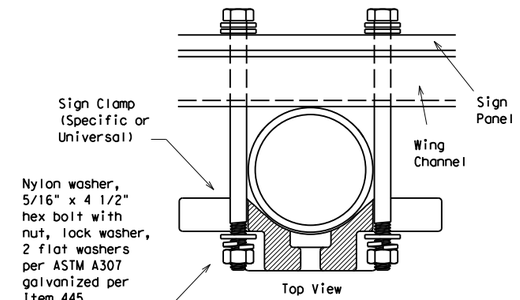
DATE:2/23/2024
FILE:H:\CDA\1844-01-029 (FM 1959)\Standards\Signing & Pavement Marking Standards\smds2.dgn



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

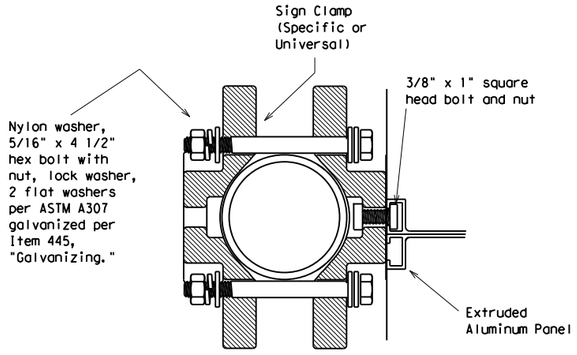


SM RD SGN ASSM TY XXXXX(1)XX(U-XX)

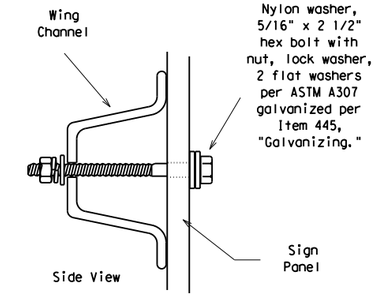


Top View

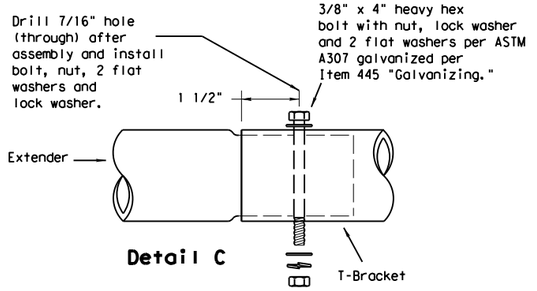
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET

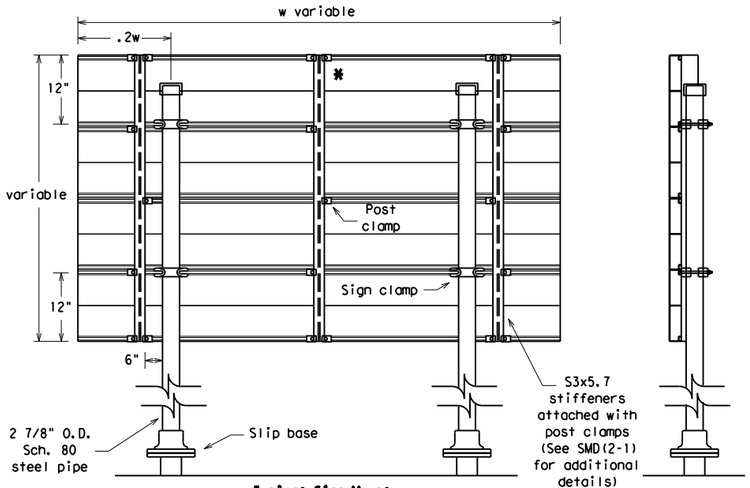


Detail B



Detail C

Splices shall only be allowed behind the sign substrate.

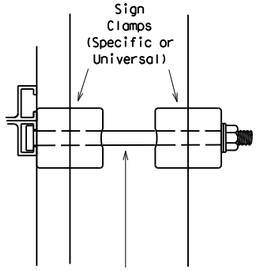


Typical Sign Mount

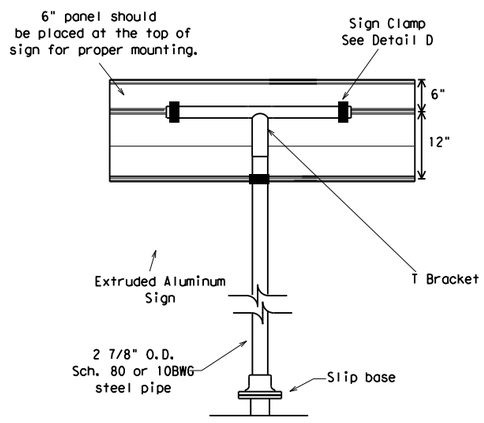
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

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

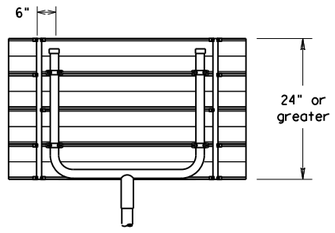
See Detail E
for clamp installation



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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

REVISIONS
9-08

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

CONT	SECT	JOB	HIGHWAY
1844	01	029	HARRIS

DIST	COUNTY	SHEET NO.
HOU	HARRIS	105

DATE:12/23/2024
FILE:H:\CDA\1844-01-029 (FM 1959)\Standards\Signing & Pavement Marking Standards\smds3.dgn

NOTES FOR PERMANENT TRAFFIC SIGNAL(S):

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

2. FURNISH YELLOW HOUSING FOR VEHICLE AND PEDESTRIAN SIGNALS. FURNISH BLACK VEHICLE SIGNAL HEAD BACK PLATES WITH 2 IN. RETROFLECTIVE YELLOW BORDER.

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 (#12/4C - 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 CONTROLLER WITH INTERNAL TIME BASE COORDINATION UNIT IN A CABINET, MOUNTED ON AN 18-INCH BASE EXTENSION.

9. LOCATE CABINET(S), STEEL SIGNAL POLES, SIGNAL DETECTORS, ETC., AS APPROVED.

10. ASSUME OWNERSHIP OF THE REMOVED EXISTING SIGNS.

11. 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 PERMANENT CONDUIT SEALANT. DO NOT USE SILICON CAULK AS A CONDUIT SEALANT.

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

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

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

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

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

17. 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.

18. 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.

19. 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.

20. 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.

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

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

23. 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.

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

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

26. REFER TO TXDOT'S WEBSITE FOR PREQUALIFIED PRODUCTS LIST REGARDING RADAR DETECTORS, VIVDS CAMERAS, WIRELESS MAGNETOMETERS, VEHICLE LED TRAFFIC SIGNAL LAMP UNIT, SYMBOLIC PEDESTRIAN SIGNAL HEAD, SYMBOLIC PEDESTRIAN SIGNAL LAMP, ACCESSIBLE PEDESTRIAN SIGNALS, SIGNAL CONTROLLERS, SIGNAL CABINETS, BUS INTERFACE UNITS, BATTERY BACKUP UNITS. CHECK WEBSITE PERIODICALLY FOR CURRENT UPDATES.

27. 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.

28. CONTRACTOR TO ADJUST SIGNAL HEAD ALIGNMENT, AS NEEDED, USING ARTICULATING SIGNAL BRACKET ASSEMBLIES WITH A MINIMUM OF THREE ADJUSTABLE AXES.

29. SEAL WITH WATERPROOF SEALANT EACH END OF THE COMMUNICATIONS CABLE THAT IS EXPOSED TO THE ELEMENTS DURING STORAGE OR AFTER INSTALLATION.

30. THE CONTRACTOR TO FURNISH AND INSTALL ALL EQUIPMENT CALLED FOR AND REQUIRED AS NEEDED FOR A FULLY OPERATIONAL TRAFFIC SIGNAL.

31. FURNISH VIDEO IMAGING VEHICLE DETECTION SYSTEM (VIVDS) CABLE RECOMMENDED BY MANUFACTURER OR PURCHASE CABLE FROM THE SAME MANUFACTURER THAT SUPPLIED/PROVIDED THE VIVDS EQUIPMENT.

32. FOR VIVDS CAMERA(S) MOUNTED TO LUMINAIRE ARMS, STRAP THE VIVDS CABLE TO THE LUMINAIRE ARMS WITH A METAL CABLE STRAP (ALUMINUM OR STAINLESS STEEL), 3/4-IN MINIMUM WIDTH AND TWO WRAPS AT 8 IN. MAXIMUM SPACING.

33. THE LOCATION OF THE VIVDS DETECTION ZONE IS APPROXIMATE. THE EXACT LOCATION WILL BE DETERMINED BY THE ENGINEER AND/OR DEPARTMENT'S TRAFFIC OPERATIONS SECTION.

34. ONCE THE CONTRACT HAS BEEN EXECUTED OR DURING THE KICK-OFF MEETING, THE ENGINEER OR HIS/HER REPRESENTATIVE WILL COORDINATE OR ARRANGE FOR THE VIVDS EQUIPMENT TO BE PROVIDED BY THE DEPARTMENT. 2. THE ENGINEER OR HIS/HER REPRESENTATIVE WILL COORDINATE THE ORDERING OF THE VIVDS EQUIPMENT BY USING THE FORCE ACCOUNT. ENGINEER OR HIS/HER REPRESENTATIVE WILL CONTACT ARNOLD TREVINO AT (713) 866-7101 TO ORDER THE RADAR EQUIPMENT.

35. 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.

36. 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.

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

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

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

40. PLEASE CHECK TO SEE IF EXISTING WiMAX COMMUNICATION OR OPTICOM EQUIPMENT IS INSTALLED AT THIS INTERSECTION. 30 DAYS PRIOR TO BEGINNING WORK CONTACT CITY OF HOUSTON, RAY OWENS 713-504-7185 OR MAZEN ABDUL-RAZZAK, P.E 713-881-3179, THAT EQUIPMENT WILL NEED TO BE REMOVED AND BE REINSTALLED BY OTHERS.

41. INSTALL A CONCRETE WALKWAY FROM THE END OF THE CURB RAMP OR EDGE OF PAVEMENT TO THE TRAFFIC SIGNAL POLE FOUNDATION TO PROVIDE ACCESS TO THE PEDESTRIAN PUSH BUTTON(S). PERFORM THIS WORK IN ACCORDANCE WITH ITEM 531, "SIDEWALKS".

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

04/15/2024

FM 1959
PERMANENT
TRAFFIC SIGNAL NOTES

Texas Department of Transportation

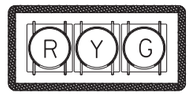
CONT	SECT	JOB	HIGHWAY
1844	01	029	FM 1959
DIST	COUNTY		SHEET NO.
HOU	HARRIS		106

DATE: 4/10/2024 TIME
FILE: H:\Traffic Signals\LienNguyen\FM 1959 1844 01 029\3- SUMMARY 4- NOTES FOR PERMANENT TRAFFIC SIGNAL(S).dgn

LEGEND:

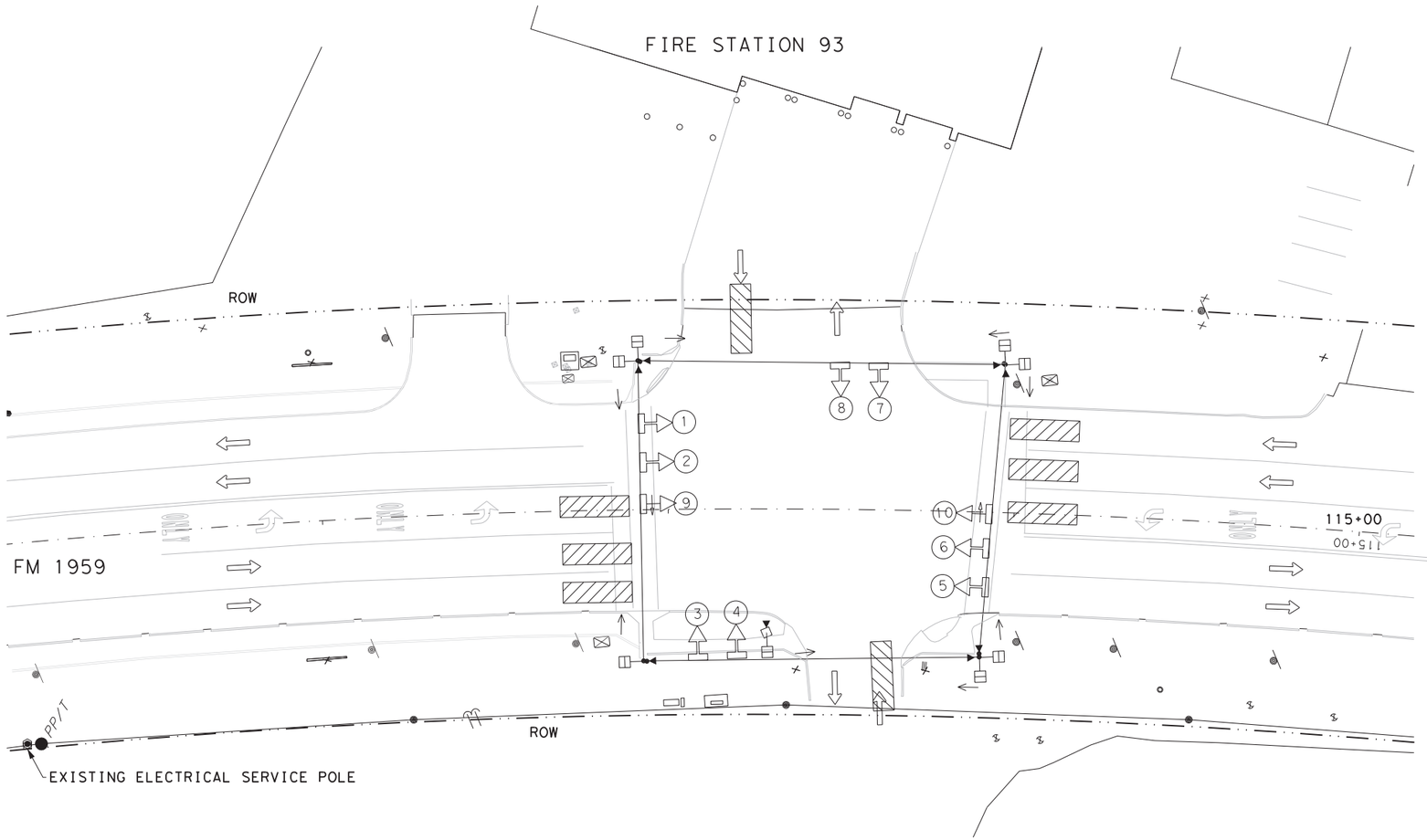
- DIRECTION OF TRAFFIC FLOW
- PP — POWER POLE
- PP/T — POWER POLE W/TRANSFORMER
- 1 — EXISTING SIGNAL HEAD
- 2 — EXISTING TURN LANE SIGNAL HEAD
- EXISTING LUMINAIRE
- EXISTING SIGNAL CONTROLLER W/BBU
- EXISTING GROUND BOX
- EXISTING ELECTRICAL SERVICE POLE
- EXISTING PED POLE W/PUSH BUTTON
- EXISTING LOOP DETECTOR

EXISTING SIGNAL HEAD SCHEDULE (LED)



1, 2, 3, 4, 5, 6, 7, 8.

9, 10.



NOTES:

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

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

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

04/24/2024

FM 1959 AT FIRE STATION 93 TRAFFIC SIGNAL EXISTING LAYOUT

0 20 40 FT
SCALE: 1" = 40'

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1844	01	029	FM 1959
DIST	COUNTY		SHEET NO.
HOU	HARRIS		107

DATE: 4/22/2024 TIME
FILE: H:\TrfSignals\LienNguyen\FM 1959 1844 01 029\107- TRAFFIC SIGNAL EXISTING LAYOUT FM 1959 AT FIRE STATION - INDEX-.dgn

LEGEND:

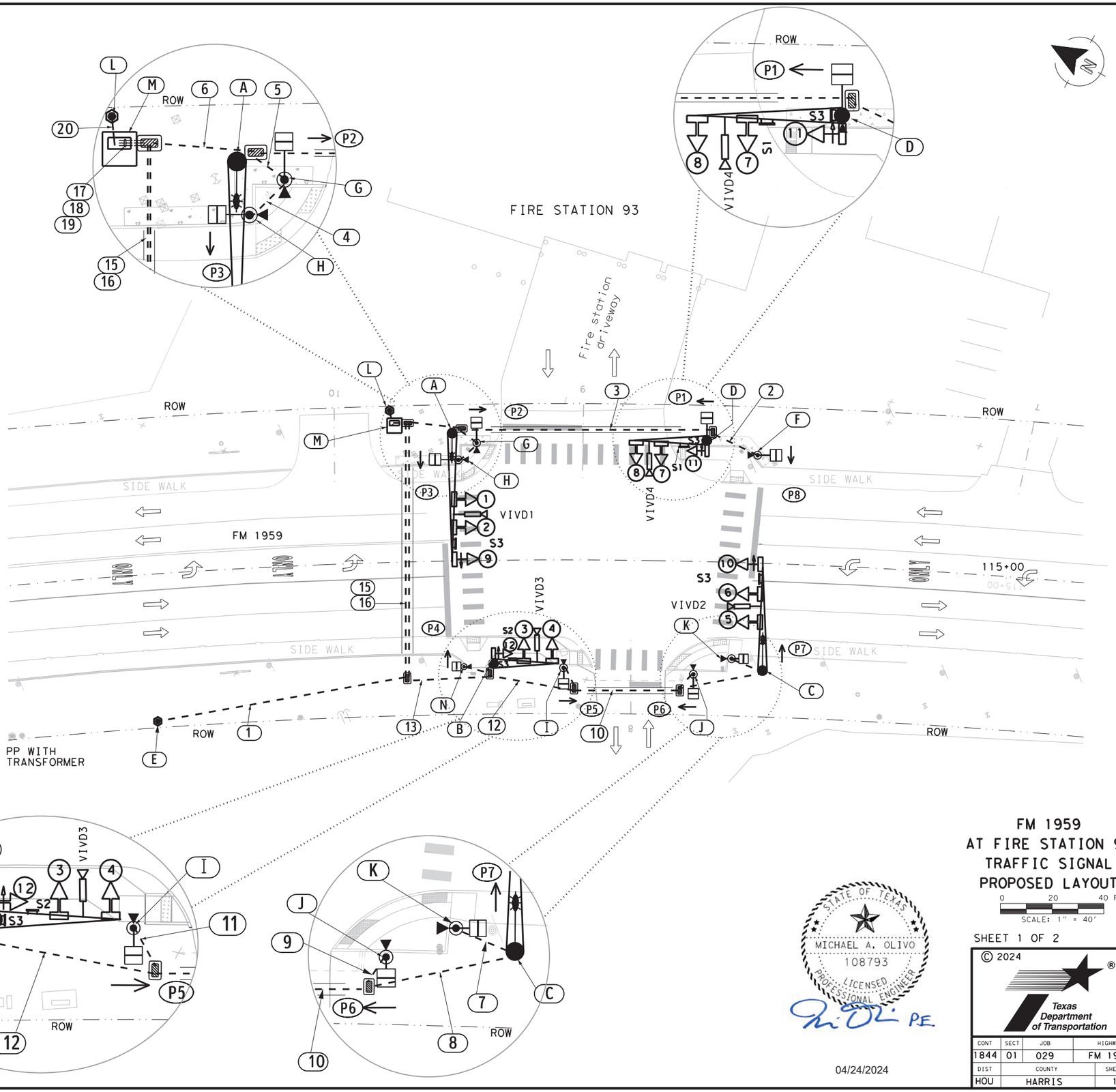
- PROPOSED ELECTRICAL SERVICE POLE TY T WITH METER (120/240 VOLT SERVICE), SERVICE ENCLOSURE AND SERVICE DISCONNECT
- PROPOSED ELECTRICAL SERVICE POLE TY D (SUBPANEL) WITH SERVICE ENCLOSURE AND SERVICE DISCONNECT
- PROP. 2070LX CONTROLLER WITH 1C CPU MODULE, ITS 346 CABINET, GPS MODULE AND BATTERY BACK-UP
- PROPOSED MAST ARM POLE
- PROPOSED LUMINAIRE
- S1 PROPOSED SIGN
- PROPOSED GROUND BOX
- PROPOSED CONDUIT (TRENCH)
- PROPOSED CONDUIT (BORE)
- PROPOSED SIGNAL HEAD
- PROPOSED PEDESTRIAN SIGNAL
- DIRECTION OF TRAFFIC

NOTES:

-THE CONTRACTOR SHALL LOCATE ALL UNDERGROUND AND ABOVE GROUND UTILITIES PRIOR TO COMMENCING WORK. THE CONTRACTOR SHALL CONTACT PUBLIC AND PRIVATE UTILITIES AT LEAST 72 HOURS PRIOR TO ANY WORK, TXDOT IS NOT A MEMBER OF 811, THE CONTRACTOR SHALL CONTACT TXDOT FIVE (5) BUSINESS DAYS TO LOCATE TXDOT OWNED EXISTING TXDOT COMMUNICATIONS, ILLUMINATION, AND TRAFFIC SIGNAL CABLING. TXDOT HOUSTON DISTRICT TRAFFIC OPERATIONS OFFICE CAN BE REACHED AT:
HOU-LocateRequest@txdot.gov

-THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY DAMAGES CAUSED BY CONTRACTOR' S FAILURE TO LOCATE AND PRESERVE THESE UTILITIES WHETHER UNDERGROUND OR ABOVE GROUND. UTILITIES ON THE PLANS ARE SHOWN IN APPROXIMATE LOCATIONS.

-CONTRACTOR WILL INSTALL THE OPTICOM WIRING AND NOTIFY CITY OF HOUSTON TO PROVIDE THE OPTICOM DEVICE FOR INSTALLATION.



FM 1959
AT FIRE STATION 93
TRAFFIC SIGNAL
PROPOSED LAYOUT

0 20 40 FT
SCALE: 1" = 40'

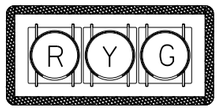
SHEET 1 OF 2

Texas Department of Transportation

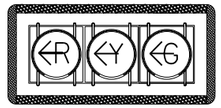
CONT	SECT	JOB	HIGHWAY
1844	01	029	FM 1959
DIST	COUNTY		SHEET NO.
HOU	HARRIS		108

DATE: 4/22/2024 TIME
FILE: H:\Traffic Signals\LienNguyen\FM 1959 1844 01 029\108, 109- TRAFFIC SIGNAL PROPOSED LAYOUT FM 1959 AT FIRE STATION.dgn

PROPOSED SIGNAL HEAD SCHEDULE
(LED)(RETROREFLECTIVE BORDER)



1, 2, 3, 4, 5, 6, 7, 8.



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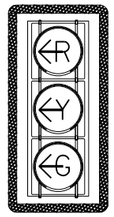


11, 12.

ELECTRICAL SERVICE DATA CHART*

ELEC. SERVICE NO.	CALLOUT	ELECTRICAL SERVICE DESCRIPTION (SEE ED (5) (6) & (7) - 14)	SERVICE CONDUIT SIZE	SERVICE CONDUCTORS NO./SIZE	SAFETY SWITCH AMPS	MAIN CKT. BKR. POLE/AMP	TWO-POLE CONTACTOR AMPS	PANELBD/ LOADCENTER AMP RATING	CIRCUIT NO.	FEEDER CKT. BKR. POLE/AMPS	FEEDER CIRCUIT AMPS	KVA LOAD
FM 1959 AT FIRE STATION 93	(E)	ELC SRV TY T 120/240 000(NS)GS(N)SP(O)	1 1/4"	3/#6	N/A	N/A	N/A	70	SUBPANEL	2P/60	45	10.8

SUBPANEL DATA CHART*

ELEC. SERVICE SUBPANEL NO.	CALLOUT	ELECTRICAL SERVICE DESCRIPTION (SEE ED (5) (6) (7) & (8) - 14)	SERVICE CONDUIT SIZE	SERVICE CONDUCTORS NO./SIZE	SAFETY SWITCH AMPS	MAIN CKT. BKR. POLE/AMP	TWO-POLE CONTACTOR AMPS	PANELBD/ LOADCENTER AMP RATING	CIRCUIT NO.	BRANCH CKT. BKR. POLE/AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
SUBPANEL FM 1959 AT FIRE STATION 93	(L)	ELC SRV TY D 120/240 060 (NS)SS(E)SP(U)	2"	3/#6	N/A	2P/60		100	TRAFFIC SIGNAL	1P/50	30	N/A
							30		LIGHTING	2P/20	10	

*NOTES: THE ELECTRICAL SERVICE WILL PAID FOR AS A TY D ELECTRICAL SERVICE - ITEM 0628 6145 ELC SRV TY D 120/240 060(NS)SS(E)SP(O). WHERE THE MAIN SERVICE PANEL WILL BE SUBSIDIARY TO THE PRICE OF THE SUBPANEL. THE TYPE T IS THE ELECTRICAL SERVICE AND THE TYPE D EQUIPMENT IS TO BE INSTALLED AS A SUBPANEL. ENSURE THE TYPE D HAS A NEUTRAL BUS THAT IS ISOLATED FROM THE GROUND. THE TYPE T WILL BE INSTALLED ON THE STEEL POLE CALLED OUT IN THE DESCRIPTION CODE SHOWN IN THE ELECTRICAL SERVICE DATA CHART, AND THE TYPE D WILL BE INSTALLED ON THE STEEL POLE AS SHOWN IN THE BID CODE. THE POWER FROM THE SERVICE TO THE SUBPANEL WILL BE FED UNDERGROUND. LOCATIONS FOR BOTH THE MAIN AND SUBPANEL ENCLOSURES ARE AS SHOWN ON PLANS.

LEGEND:

(A) PROPOSED 50' MAST ARM SIGNAL POLE WITH LUMINAIRE, VIDEO CAMERA ASSEMBLY (1 EA).

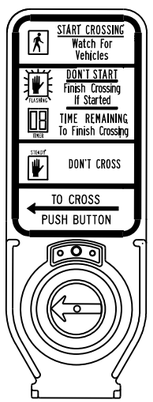
(B) PROPOSED 24' MAST ARM SIGNAL POLE WITH VIDEO CAMERA ASSEMBLY (1 EA). PEDESTRIAN SIGNAL HEAD (1 EA), PEDESTRIAN SIGN AND PEDESTRIAN PUSH BUTTON (1 EA)

(C) PROPOSED 40' MAST ARM SIGNAL POLE WITH LUMINAIRE, VIDEO CAMERA ASSEMBLY (1 EA).

(D) PROPOSED 28' MAST ARM SIGNAL POLE WITH VIDEO CAMERA ASSEMBLY (1 EA). PEDESTRIAN SIGNAL HEAD (1 EA), PEDESTRIAN SIGN AND PEDESTRIAN PUSH BUTTON (1 EA)

(F) (G) PROPOSED 4 1/2" DIAMETER PEDESTAL POLE WITH
(H) (I) PEDESTRIAN SIGNAL HEAD (COUNTDOWN TYPE)(1 EA),
(J) (K) PEDESTRIAN PUSH BUTTON (APS UNIT)AND PEDESTRIAN
(N) SIGN (1 EA)

R10-3eL



PB1, PB3, PB5, PB7, PB8.

R10-3eR

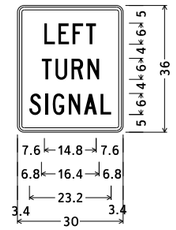
PB2, PB4, PB6, PB8.

P1 - P8.

CONDUIT AND CONDUCTOR RUNS

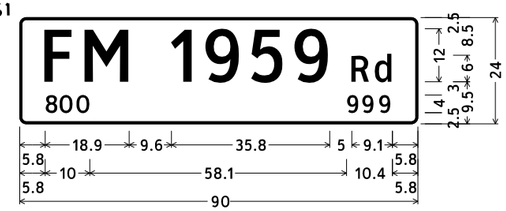
RUN NO.	CONDUIT (618) PVC 2" (SCHD 80) (6046) NO. EA	(6046) TRENCH LF	(6047) NO. EA	(6047) BORE LF	3" (SCHD 80) (6053) NO. EA	(6053) TRENCH LF	(6054) NO. EA	(6054) BORE LF	CONDUCTORS (620) POWER #4 INSULATED (6012) NO. EA	(6012) LENGTH LF	GROUND #8 BARE (6007) NO. EA	(6007) LENGTH LF	TRAY CABLE (621) LUMINAIRE #12/4C Tray Cable (6005) NO. EA	(6005) LENGTH LF	CABLES (684) PEDESTRIAN #14/3C (6029) NO. EA	(6029) LENGTH LF	PEDESTRIAN #14/5C (6031) NO. EA	(6031) LENGTH LF	SIGNAL #14/7C (6033) NO. EA	(6033) LENGTH LF	VIVDS (6306) VIVDS #14/3C (≤ 1000 FT) (Subsidiary) NO. EA	(Subsidiary) LENGTH LF
1	1	100							2	100	1	100	2	100								
2	1	20									1	20			1	20	1	20				
3					1	25	1	75			1	100			2	100	2	100	3	100	1	100
4	1	10									1	10			1	10	1	10				
5	1	15									1	15			2	15	2	15				
6					1	30					1	30	1	30	4	30	4	30	6	30	2	30
7	1	15									1	15			1	15	1	15				
8	1	35									1	35	1	35	1	35	1	35	3	35	1	35
9	1	5									1	5			1	5	1	5				
10					1	5	1	40			1	45	1	45	2	45	2	45	3	45	1	45
11	1	10									1	10			1	10	1	10				
12					1	35					1	35	1	35	3	35	3	35	3	35	1	35
13					1	35					1	35	1	35	4	35	4	35	6	35	2	35
14	1	10									1	10			1	10	1	10				
15					1	25	1	75			1	100	1	100	4	100	4	100	6	100	2	100
16	1	25	1	75					2	100	1	100										
17					1	10					1	10			8	10	8	10				
18					1	10					1	10							12	10	4	10
19	1	10							2	10	1	10										
20	1	10							2	10	1	10										
A													1	30					3	30	1	30
MA																			3	50	1	50
B															1	10	1	10	3	20	1	20
MB																			2	24	1	24
C													1	30					3	30	1	30
MC																			3	40	1	40
D															1	10	1	10	3	20	1	20
MD																			2	28	1	28
F															1	10	1	10				
G															1	10	1	10				
H															1	10	1	10				
I															1	10	1	10				
J															1	10	1	10				
K															1	10	1	10				
TOTAL (LF)		265		75		175		190		440		705		540		1350		1350		2429		827
EST. TOTAL		280		80		185		200		465		745		570		1420		1420		2555		870

S3



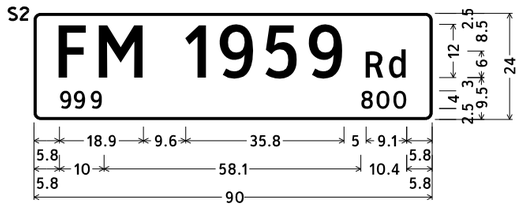
R10-10L_30x36;
1.9" Radius, 0.8" Border,
0.5" Indent, Black on, White;
"LEFT", C;
"TURN", C;
"SIGNAL", C;

S1



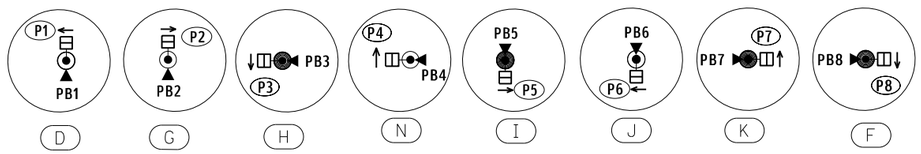
1.5" Radius, 0.5" Border, White on, Green;
"FM 1959", ClearviewHwy-3-W;
"Rd", ClearviewHwy-3-W;
"800", ClearviewHwy-3-W;
"999", ClearviewHwy-3-W;

S2



1.5" Radius, 0.5" Border, White on, Green;
"FM 1959", ClearviewHwy-3-W;
"Rd", ClearviewHwy-3-W;
"999", ClearviewHwy-3-W;
"800", ClearviewHwy-3-W;

PROPOSED PEDESTRIAN SIGNAL HEAD AND PUSH BUTTON ORIENTATION:



(P1) PROP. PEDESTRIAN SIGNAL HEAD

PB1 ▶ PROP. PEDESTRIAN PUSH BUTTON

PROPOSED VIVDS DETECTIONS SCHEDULE:

VIVD1	DESIGNATED FOR NORTHBOUND APPROACHING VEHICLES (FM 1959)
VIVD2	DESIGNATED FOR SOUTHBOUND APPROACHING VEHICLES (FM 1959)
VIVD3	DESIGNATED FOR EASTBOUND APPROACHING VEHICLES (FIRE STATION)
VIVD4	DESIGNATED FOR WESTHBOUND APPROACHING VEHICLES

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

04/15/2024

FM 1959 AT FIRE STATION 93 TRAFFIC SIGNAL PROPOSED LAYOUT

SHEET 2 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1844	01	029	FM 1959
DIST	COUNTY		SHEET NO.
HOU	HARRIS		109

DATE: 4/12/2024 TIME
FILE: H:\TrfSignals\LienNguyen\FM 1959 1844 01 029\108, 109- TRAFFIC SIGNAL PROPOSED LAYOUT FM 1959 AT FIRE STATION.dgn

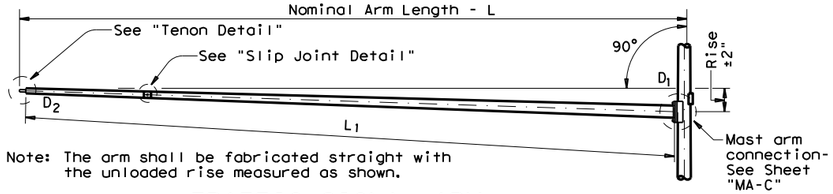
Arm Length	ROUND POLES					POLYGONAL POLES					Foundation Type
	D_B	D_{19}	D_{24}	D_{30}	① thk	D_B	D_{19}	D_{24}	D_{30}	① thk	
ft.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	
20	12.0	9.3	8.6	7.8	.239	12.5	9.5	8.7	7.8	.239	36-A
24	12.0	9.3	8.6	7.8	.239	13.0	10.0	9.2	8.3	.239	36-A
28	12.0	9.3	8.6	7.8	.239	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)

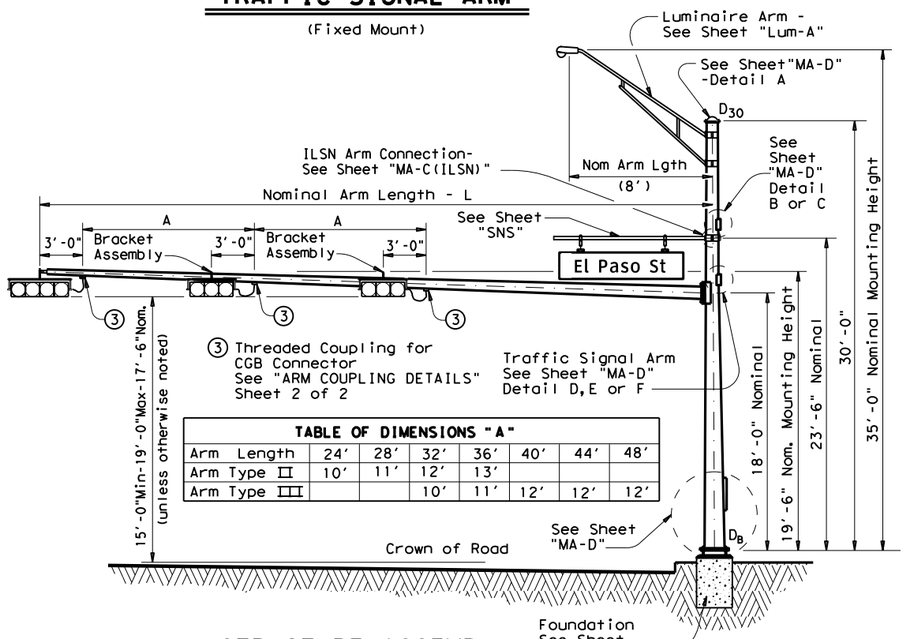


TABLE OF DIMENSIONS "A"

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	2
32	32L-100		32S-100		32-100	
36	36L-100		36S-100		36-100	
40	40L-100	1	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	2		
32			32II-100		32III-100	
36			36II-100		36III-100	
40					40III-100	1
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
2"	4'-3"	1

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.

FM 1959 AT FIRE STATION 93

SHEET 1 OF 2

04/15/2024

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES

SINGLE MAST ARM ASSEMBLY

(100 MPH WIND ZONE)

SMA-100(1)-12

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

REVISIONS
5-96
11-99
1-12

CONT	SECT	JOB	HIGHWAY
1844	01	029	FM 1959

DIST	COUNTY	SHEET NO.
HOU	HARRIS	110

123A

DATE:
H:\Traffic\Signals\LienNguyen\FM 1959 1844 01 029\8 - SMA-100(1)-12 - FM 1959 AT FIRE STATION.dgn

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.

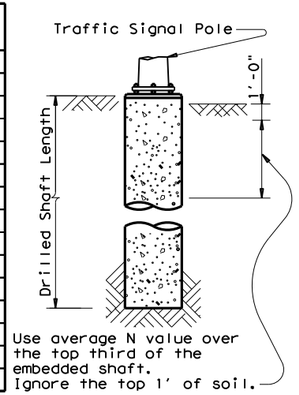
⑥ Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

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
FM 1959 AT FIRE STATION 93								
POLE B	10	36A	1				15.2	
POLE C	10	36B	1				15.2	
POLE D	10	36A	1			13.2		
TOTAL DRILLED SHAFT LENGTHS						44.0		

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'



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".

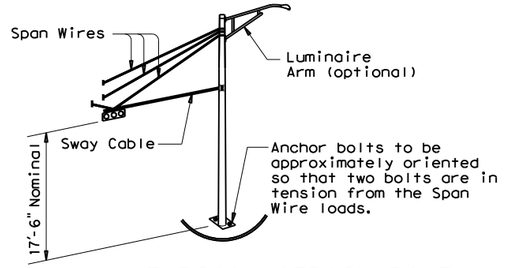
Concrete shall be Class "C".

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.

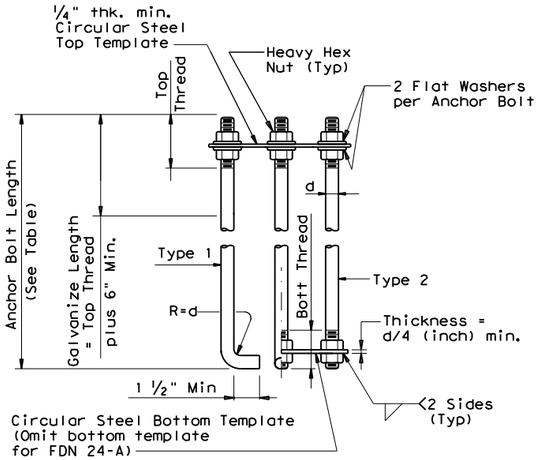
Anchor bolts that are larger than 1" in diameter shall conform to "alloy steel" or "medium-strength mild steel" per Item 449, "Anchor Bolts". Anchor bolts that are 1" in diameter or less shall conform to ASTM A36. Galvanize a minimum of the top end thread length plus 6" for all anchor bolts unless otherwise 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.



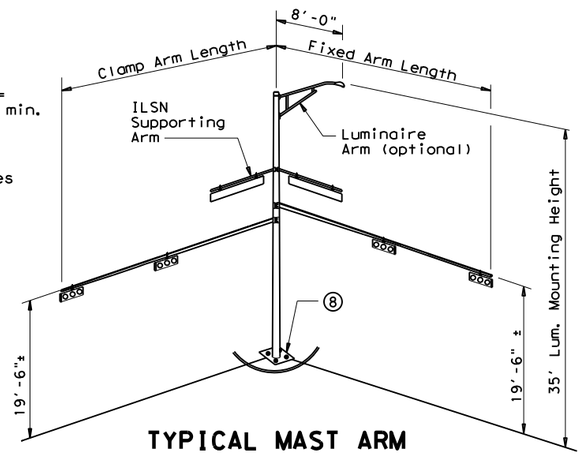
TYPICAL STRAIN POLE ASSEMBLY



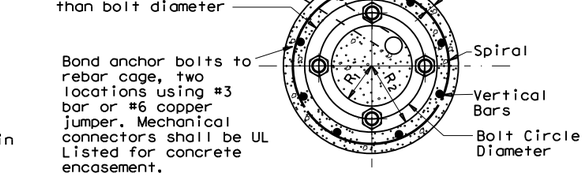
HOOKED ANCHOR (TYPE 1) NUT ANCHOR (TYPE 2)

ANCHOR BOLT ASSEMBLY

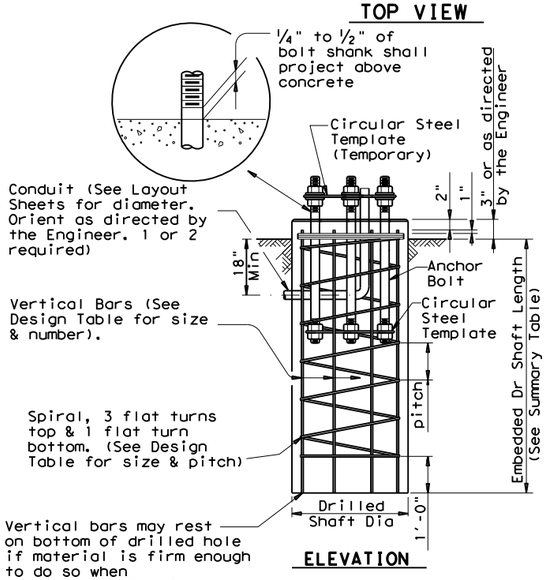
⑧ Orient anchor bolts orthogonal with the fixed arm direction to ensure that two bolts are in tension under dead load.



TYPICAL MAST ARM ASSEMBLY



TOP VIEW



ELEVATION

FOUNDATION DETAILS

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

04/15/2024

FM 1959 AT FIRE STATION 93

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL POLE FOUNDATION

TS-FD-12

© TxDOT August 1995	DN: MS	CK: JSY	DW: MAO/MMF	CK: JSY/TEE
REVISIONS 5-96 11-99 1-12	CONT	SECT	JOB	HIGHWAY
	1844	01	029	FM 1959
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		111

DATE:
H:\TrfSignals\LienNguyen\FM 1959 1844 01 029\9 -15 - TS-FD-12.dgn

DATE:
FILE:

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	1	50S		50	
55	55L		55S		55	
60	60L		60S		60	
65	65L		65S		65	
Dual Mast Arm						
Lf ft. / Lc ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
50 / 20	5020L		5020S		5020	
50 / 24	5024L		5024S		5024	
50 / 28	5028L		5028S		5028	
50 / 32	5032L		5032S		5032	
50 / 36	5036L		5036S		5036	
50 / 40	5040L		5040S		5040	
50 / 44	5044L		5044S		5044	
55 / 20	5520L		5520S		5520	
55 / 24	5524L		5524S		5524	
55 / 28	5528L		5528S		5528	
55 / 32	5532L		5532S		5532	
55 / 36	5536L		5536S		5536	
55 / 40	5540L		5540S		5540	
55 / 44	5544L		5544S		5544	
60 / 20	6020L		6020S		6020	
60 / 24	6024L		6024S		6024	
60 / 28	6028L		6028S		6028	
60 / 32	6032L		6032S		6032	
60 / 36	6036L		6036S		6036	
60 / 40	6040L		6040S		6040	
60 / 44	6044L		6044S		6044	
65 / 20	6520L		6520S		6520	
65 / 24	6524L		6524S		6524	
65 / 28	6528L		6528S		6528	
65 / 32	6532L		6532S		6532	
65 / 36	6536L		6536S		6536	
65 / 40	6540L		6540S		6540	
65 / 44	6544L		6544S		6544	

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	1
55	55IV	
60	60IV	
65	65IV	

Luminaire Arms (1 per 30' pole)

Nominal Arm Length	Quantity
8' Arm	1

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"	1

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.

Foundation Summary Table **

Location Ident.	Avg. N Blow/ft.	No. Each	Drill Shaft *** Length (feet) 48-A
FM 1959 AT FIRE STATION 93			
POLE A	10	1	22
Total Drill Shaft Length			22

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.)

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FM 1959 AT FIRE STATION 93

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

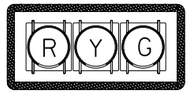
CONT	SECT	JOB	HIGHWAY
1844	01	029	FM 1959
DIST	COUNTY		SHEET NO.
HOU	HARRIS		112

131E

LEGEND:

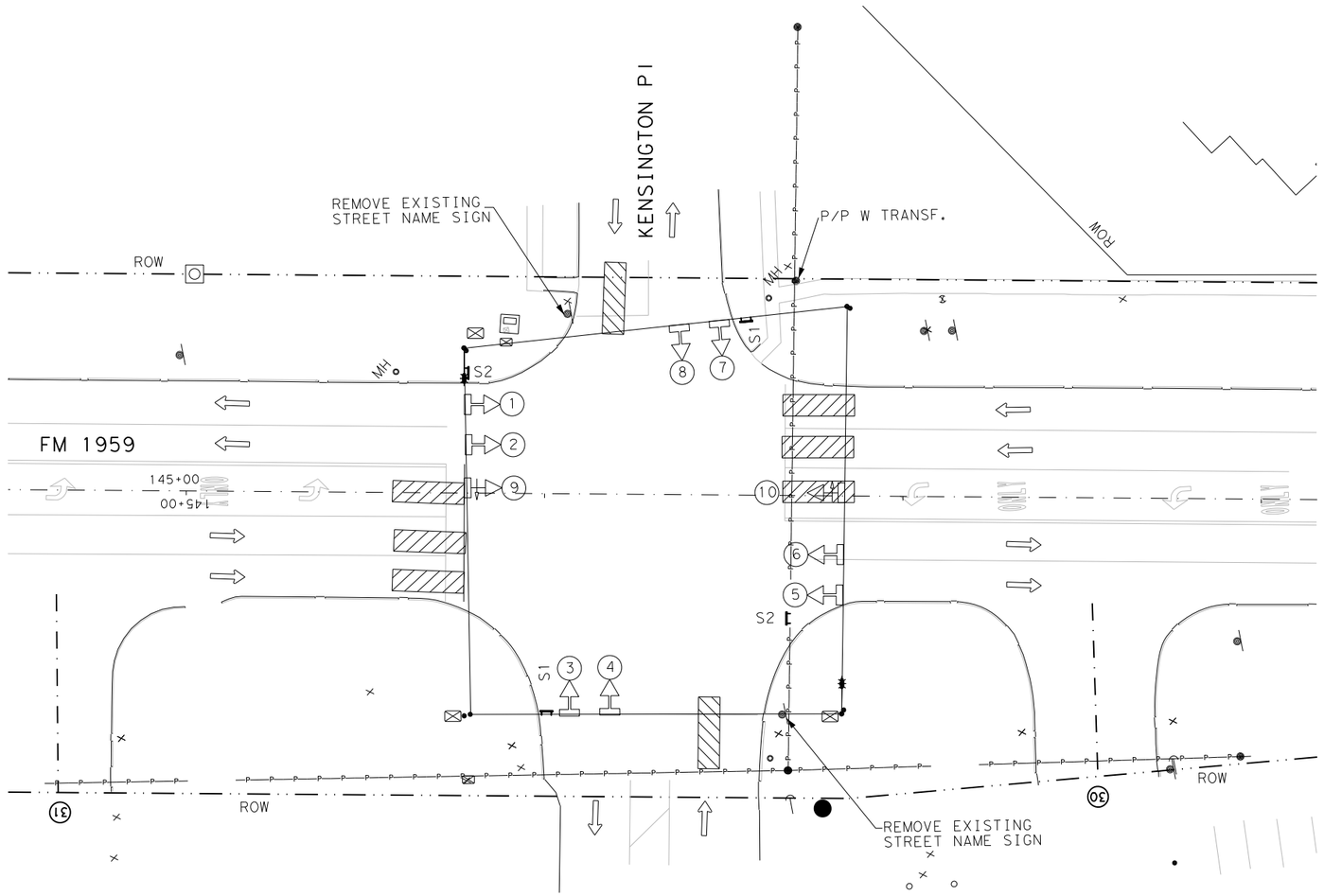
- DIRECTION OF TRAFFIC FLOW
- PP — POWER POLE
- PP/T — POWER POLE W/TRANSFORMER
- 1 — EXISTING SIGNAL HEAD
- 2 — EXISTING TURN LANE SIGNAL HEAD
- EXISTING LUMINAIRE
- EXISTING SIGNAL CONTROLLER W/BBU
- EXISTING GROUND BOX
- EXISTING ELECTRICAL SERVICE POLE
- EXISTING PED POLE W/PUSH BUTTON
- EXISTING LOOP DETECTOR

EXISTING SIGNAL HEAD SCHEDULE (LED)



1, 2, 3, 4, 5, 6, 7, 8.

9, 10.



NOTES:

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

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

STATE OF TEXAS
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04/15/2024

FM 1959
KENSINGTON PI
TRAFFIC SIGNAL
EXISTING LAYOUT

0 20 40 FT
SCALE: 1" = 40'

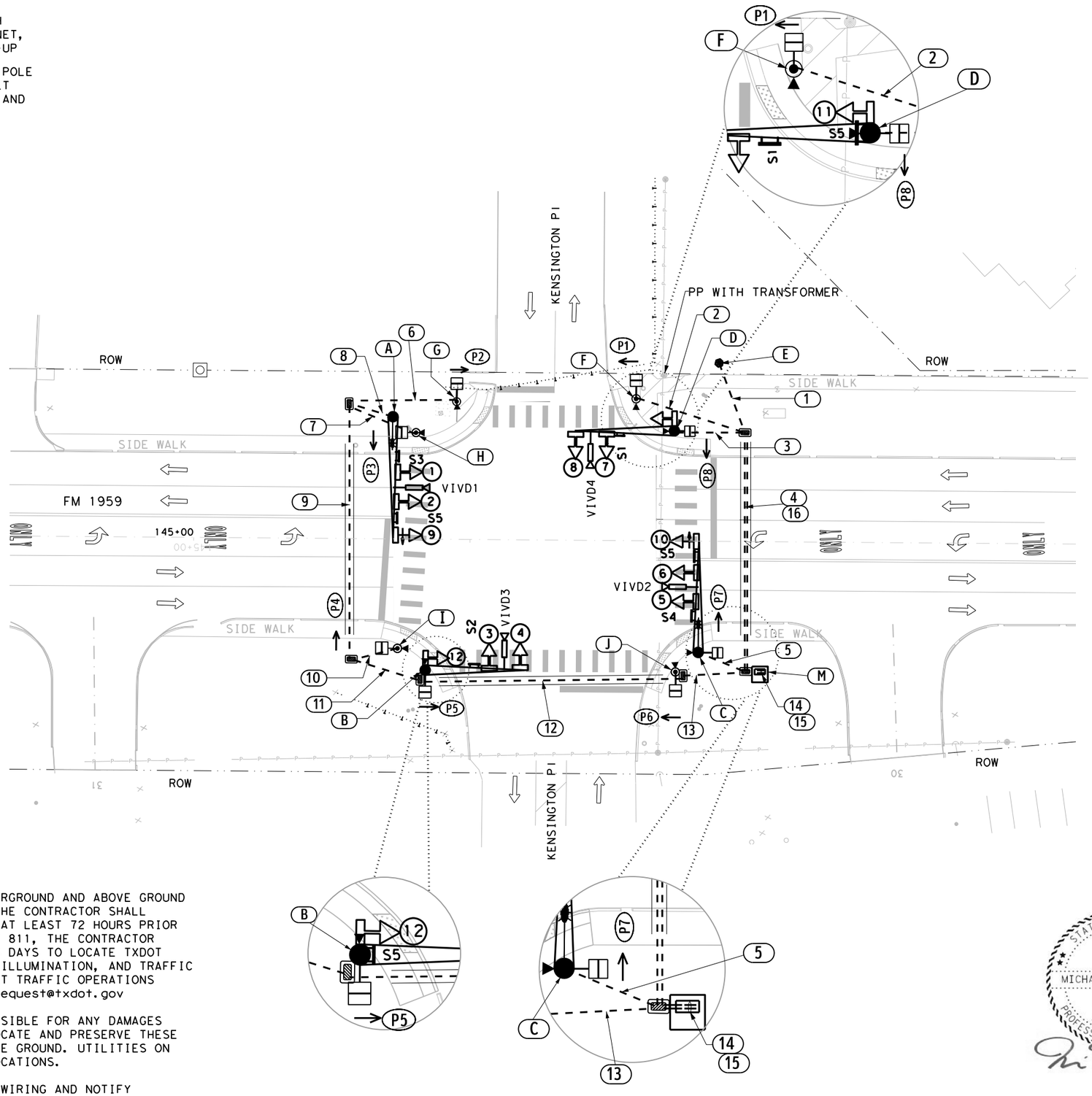
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1844	01	029	FM 1959
DIST	COUNTY		SHEET NO.
HOU	HARRIS		113

DATE: 4/12/2024 TIME
FILE: H:\Traffic Signals\LienNguyen\FM 1959 1844 01 029\113- TRAFFIC SIGNAL EXISTING LAYOUT FM 1959 AT KENSINGTON PI.dgn

LEGEND:

- PROP. 2070LX CONTROLLER WITH 1C CPU MODULE, ITS 340 CABINET, GPS MODULE AND BATTERY BACK-UP
- PROPOSED ELECTRICAL SERVICE POLE TY T WITH METER (120/240 VOLT SERVICE), SERVICE ENCLOSURE AND SERVICE DISCONNECT
- PROPOSED MAST ARM POLE
- PROPOSED LUMINAIRE
- S1 PROPOSED SIGN
- PROPOSED GROUND BOX
- PROPOSED CONDUIT (TRENCH)
- PROPOSED CONDUIT (BORE)
- PROPOSED SIGNAL HEAD
- P1 PROPOSED PEDESTRIAN SIGNAL
- DIRECTION OF TRAFFIC



NOTES:

-THE CONTRACTOR SHALL LOCATE ALL UNDERGROUND AND ABOVE GROUND UTILITIES PRIOR TO COMMENCING WORK. THE CONTRACTOR SHALL CONTACT PUBLIC AND PRIVATE UTILITIES AT LEAST 72 HOURS PRIOR TO ANY WORK, TXDOT IS NOT A MEMBER OF 811, THE CONTRACTOR SHALL CONTACT TXDOT FIVE (5) BUSINESS DAYS TO LOCATE TXDOT OWNED EXISTING TXDOT COMMUNICATIONS, ILLUMINATION, AND TRAFFIC SIGNAL CABLING. TXDOT HOUSTON DISTRICT TRAFFIC OPERATIONS OFFICE CAN BE REACHED AT: HOU-LocateRequest@txdot.gov

-THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY DAMAGES CAUSED BY CONTRACTOR' S FAILURE TO LOCATE AND PRESERVE THESE UTILITIES WHETHER UNDERGROUND OR ABOVE GROUND. UTILITIES ON THE PLANS ARE SHOWN IN APPROXIMATE LOCATIONS.

-CONTRACTOR WILL INSTALL THE OPTICOM WIRING AND NOTIFY CITY OF HOUSTON TO PROVIDE THE OPTICOM DEVICE FOR INSTALLATION.

STATE OF TEXAS
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04/15/2024

FM 1959
KENSINGTON PI
TRAFFIC SIGNAL
PROPOSED LAYOUT

0 20 40 FT
SCALE: 1" = 40'

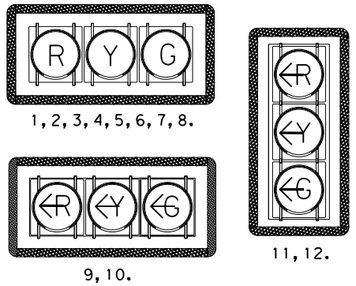
SHEET 1 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1844	01	029	FM 1959
DIST	COUNTY		SHEET NO.
HOU	HARRIS		114

DATE: 4/12/2024 TIME
FILE: H:\Traffic Signals\LienNguyen\FM 1959 1844 01 029\114-115- TRAFFIC SIGNAL PROPOSED LAYOUT FM 1959 AT KENGSINGTON PI.dgn

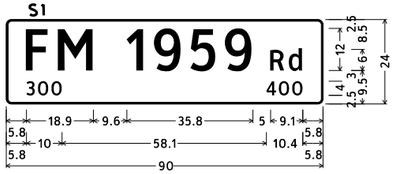
PROPOSED SIGNAL HEAD SCHEDULE (LED) (RETROREFLECTIVE BORDER)



ELECTRICAL SERVICE DATA CHART:

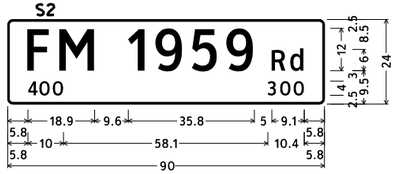
ELECTRICAL SERVICE NAME	CALLOUT	ELECTRICAL SERVICE DESCRIPTION (SEE ED(4))	SERVICE CONDUIT SIZE (RMC)	SERVICE CONDUCTORS NO./SIZE	SAFETY SWITCH AMPS	MAIN CKT. BRK. POLE/AMP	TWO-POLE CONTACTOR AMPS	PANELBD./ LOADCENTER AMP RATING (MIN)	CIRCUIT NO.	BRANCH CKT. BRK. POLE/AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
FM 1959 KENSINGTON PI	(E)	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	<7.1
									LIGHTING	2P/20	6	

S1



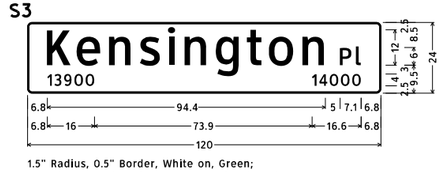
1.5" Radius, 0.5" Border, White on, Green;
"FM 1959", ClearviewHwy-3-W;
"Rd", ClearviewHwy-3-W; "300", ClearviewHwy-3-W;
"400", ClearviewHwy-3-W;

S2



1.5" Radius, 0.5" Border, White on, Green;
"FM 1959", ClearviewHwy-3-W;
"Rd", ClearviewHwy-3-W; "300", ClearviewHwy-3-W;
"400", ClearviewHwy-3-W;

S3

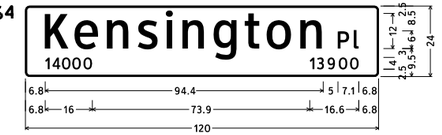


1.5" Radius, 0.5" Border, White on, Green;
"Kensington", ClearviewHwy-3-W; "Pl", ClearviewHwy-3-W;
"13900", ClearviewHwy-3-W; "14000", ClearviewHwy-3-W;

PROPOSED VIVDS DETECTIONS SCHEDULE:

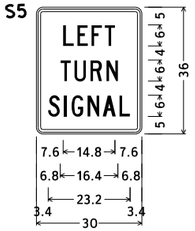
VIVD1	DESIGNATED FOR NORTHBOUND APPROACHING VEHICLES (FM 1959)
VIVD2	DESIGNATED FOR SOUTHBOUND APPROACHING VEHICLES (FM 1959)
VIVD3	DESIGNATED FOR EASTBOUND APPROACHING VEHICLES (KENSINGTON PI)
VIVD4	DESIGNATED FOR WESTBOUND APPROACHING VEHICLES (KENSINGTON PI)

S4



1.5" Radius, 0.5" Border, White on, Green;
"Kensington", ClearviewHwy-3-W; "Pl", ClearviewHwy-3-W;
"14000", ClearviewHwy-3-W; "13900", ClearviewHwy-3-W;

S5



R10-10L_30x36;
1.9" Radius, 0.8" Border, 0.5" Indent, Black on, White;
"LEFT", C;
"TURN", C;
"SIGNAL", C;

LEGEND:

(A) PROPOSED 44' MAST ARM SIGNAL POLE WITH LUMINAIRE, VIDEO CAMERA ASSEMBLY (1 EA).

(B) PROPOSED 36' MAST ARM SIGNAL POLE WITH VIDEO CAMERA ASSEMBLY (1 EA). PEDESTRIAN SIGNAL HEAD (1 EA), PEDESTRIAN SIGN AND PEDESTRIAN PUSH BUTTON (1 EA)

(C) PROPOSED 40' MAST ARM SIGNAL POLE WITH LUMINAIRE, VIDEO CAMERA ASSEMBLY (1 EA). PEDESTRIAN SIGNAL HEAD (1 EA), PEDESTRIAN SIGN AND PEDESTRIAN PUSH BUTTON (1 EA)

(D) PROPOSED 36' MAST ARM SIGNAL POLE WITH VIDEO CAMERA ASSEMBLY (1 EA). PEDESTRIAN SIGNAL HEAD (1 EA), PEDESTRIAN SIGN AND PEDESTRIAN PUSH BUTTON (1 EA)

(E) PROPOSED ELECTRICAL SERVICE POLE TY D WITH METER (120/240 VOLT SERVICE), SERVICE ENCLOSURE AND SERVICE DISCONNECT

(F) (G) (H) (I) (J) PROPOSED 4 1/2" DIAMETER PEDESTAL POLE WITH PEDESTRIAN SIGNAL HEAD (COUNTDOWN TYPE)(1 EA), PEDESTRIAN PUSH BUTTON (APS UNIT)AND PEDESTRIAN SIGN (1 EA)

R10-3eL

PB1, PB3
PB5, PB7.

R10-3eR

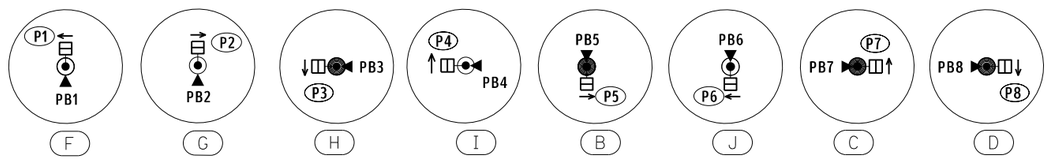
PB2, PB4,
PB6, PB8.

P1 - P8.

CONDUIT AND CONDUCTOR RUNS

RUN NO.	CONDUIT (618) PVC 2" (SCHD 80) (6046) NO. EA	2" (SCHD 80) (6046) TRENCH LF	2" (SCHD 80) (6047) NO. EA	2" (SCHD 80) (6047) BORE LF	3" (SCHD 80) (6053) NO. EA	3" (SCHD 80) (6053) TRENCH LF	3" (SCHD 80) (6054) NO. EA	3" (SCHD 80) (6054) BORE LF	4" (SCHD 80) (6058) NO. EA	4" (SCHD 80) (6058) TRENCH LF	CONDUCTORS (620) POWER #4 INSULATED (6012) NO. EA	#4 INSULATED (6012) LENGTH LF	#8 BARE (6007) NO. EA	#8 BARE (6007) LENGTH LF	#12/4C Tray Cable (6005) NO. EA	#12/4C Tray Cable (6005) LENGTH LF	PEDESTRIAN #14/3C (6029) NO. EA	#14/3C (6029) LENGTH LF	#14/5C (6031) NO. EA	#14/5C (6031) LENGTH LF	SIGNAL #14/7C (6033) NO. EA	#14/7C (6033) LENGTH LF	VIVDS (6306) VIVDS #14/3C (≤ 1000 FT) (Subsidiary) NO. EA	VIVDS #14/3C (≤ 1000 FT) (Subsidiary) LENGTH LF
1	1	30									2	30	1	30	2	30								
2	1	40											1	40			1	40	1	40				
3	1	25											1	25			1	25	1	25	3	25	1	25
4					1	10	1	80					1	90	2	90	2	90	2	90	3	90	1	90
5	1	15											1	15	1	15	1	15	1	15	3	15	1	15
6	1	45											1	45			1	45	1	45				
7	1	20											1	20			1	20	1	20				
8	1	15											1	15	1	15					3	15	1	15
9					1	20	1	75					1	95	1	95	2	95	2	95	3	95	1	95
10	1	15											1	15			1	15	1	15				
11					1	35							1	35	1	35	3	35	3	35	3	35	1	35
12					1	10	1	80					1	90	1	90	4	90	4	90	6	90	2	90
13									1	30			1	30	1	30	5	30	5	30	6	30	2	30
14					1	10							1	10			8	10	8	10				
15									1	10	2	10	1	10							12	10	4	10
16	1	10	1	80							2	90	1	90										
A															1	30					3	30	1	30
MA																					3	44	1	44
B																	1	10	1	10	3	20	1	20
MB																					3	32	1	32
C															1	30	1	10	1	10	3	30	1	30
MC																					3	40	1	40
D																	1	10	1	10	3	20	1	20
MD																					3	36	1	36
F																	1	10	1	10				
G																	1	10	1	10				
H																	1	10	1	10				
I																	1	10	1	10				
TOTAL (LF)		215		80		85		235		40		260		655		580		1295		1295		2421		807
EST. TOTAL		230		85		90		250		45		275		690		610		1360		1360		2545		850

PROPOSED PEDESTRIAN SIGNAL HEAD AND PUSH BUTTON ORIENTATION:



P1 PROP. PEDESTRIAN SIGNAL HEAD

PB1 PROP. PEDESTRIAN PUSH BUTTON

04/15/2024

FM 1959
KENSINGTON PI
TRAFFIC SIGNAL
EXISTING LAYOUT

SHEET 2 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1844	01	029	FM 1959
DIST	COUNTY		SHEET NO.
HOU	HARRIS		115

DATE: 4/12/2024 TIME
FILE: H:\Traffic Signals\LienNguyen\FM 1959 1844 01 029\114-115- TRAFFIC SIGNAL PROPOSED LAYOUT FM 1959 AT KENSINGTON PI.dgn

DATE:
H:\Traffic\Signals\LienNguyen\FM 1959 1844 01 029\116 - SMA-100(1)-12 -FM 1959 AT KENSINGTON Pl.dgn

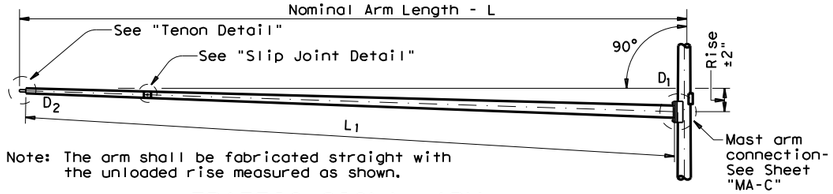
Arm Length	ROUND POLES					POLYGONAL POLES					Foundation Type
	D_B	D_{19}	D_{24}	D_{30}	① thk	D_B	D_{19}	D_{24}	D_{30}	① thk	
ft.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	
20	12.0	9.3	8.6	7.8	.239	12.5	9.5	8.7	7.8	.239	36-A
24	12.0	9.3	8.6	7.8	.239	13.0	10.0	9.2	8.3	.239	36-A
28	12.0	9.3	8.6	7.8	.239	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)

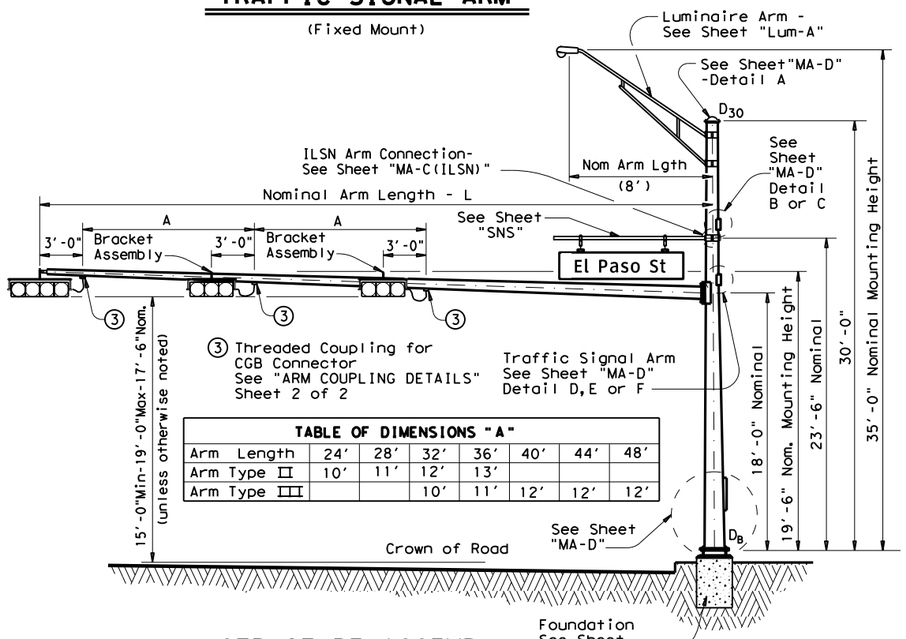


TABLE OF DIMENSIONS "A"

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	2
40	40L-100	1	40S-100		40-100	
44	44L-100	1	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	2	36III-100	
40					40III-100	1
44					44III-100	1

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
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.

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SHEET 1 OF 2

STATE OF TEXAS
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04/15/2024

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES

SINGLE MAST ARM ASSEMBLY

(100 MPH WIND ZONE)

SMA-100(1)-12

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

REVISIONS
5-96
11-99
1-12

CONT	SECT	JOB	HIGHWAY
1844	01	029	FM 1959

DIST	COUNTY	SHEET NO.
HOU	HARRIS	116

123A

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 10	15	40	ANCHOR BOLT DIA	Fy (ksi)	BOLT CIR DIA	ANCHOR TYPE	MOMENT K-ft	SHEAR Kips	
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.

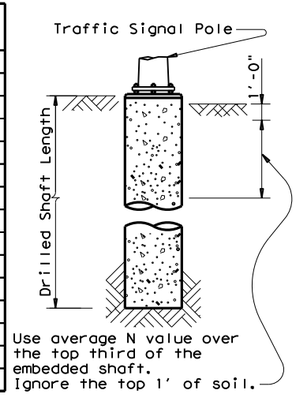
⑥ Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

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
FM 1959 AT KENSINGTON PI								
POLE A	10	36A	1				15.2	
POLE B	10	36A	1			13.2		
POLE C	10	36B	1				15.2	
POLE D	10	36A	1			13.2		
TOTAL DRILLED SHAFT LENGTHS						57.0		

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".

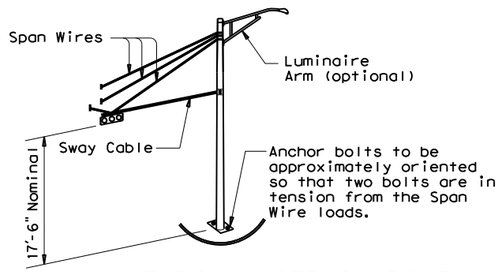
Concrete shall be Class "C".

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.

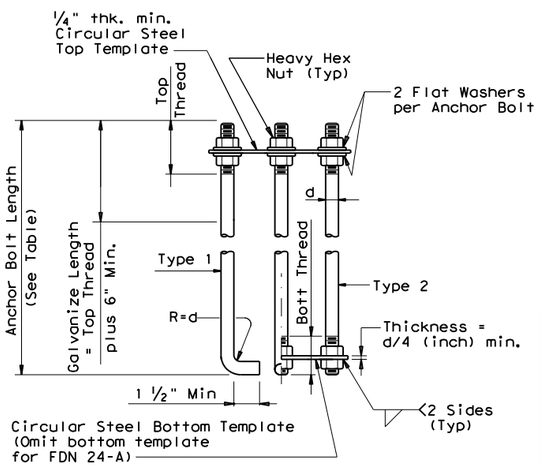
Anchor bolts that are larger than 1" in diameter shall conform to "alloy steel" or "medium-strength mild steel" per Item 449, "Anchor Bolts". Anchor bolts that are 1" in diameter or less shall conform to ASTM A36. Galvanize a minimum of the top end thread length plus 6" for all anchor bolts unless otherwise 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.



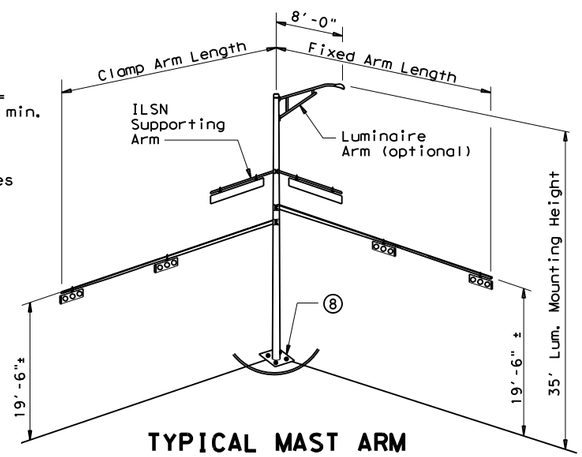
TYPICAL STRAIN POLE ASSEMBLY



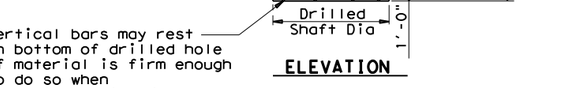
HOOKED ANCHOR (TYPE 1) NUT ANCHOR (TYPE 2)

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

04/15/2024

FM 1959 AT KENSINGTON PI

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL POLE FOUNDATION

TS-FD-12

REVISIONS 5-96 11-98 1-12

DN: MS	CK: JSY	DW: MAO/MMF	CK: JSY/TEB

CONT	SECT	JOB	HIGHWAY
1844	01	029	FM 1959

DIST	COUNTY	SHEET NO.
HOU	HARRIS	117

DATE:
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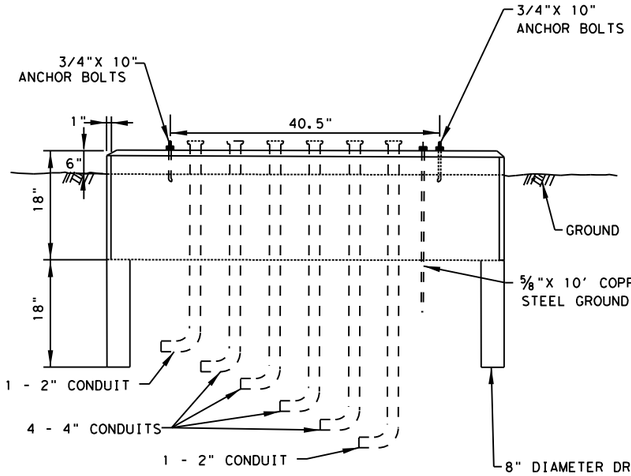
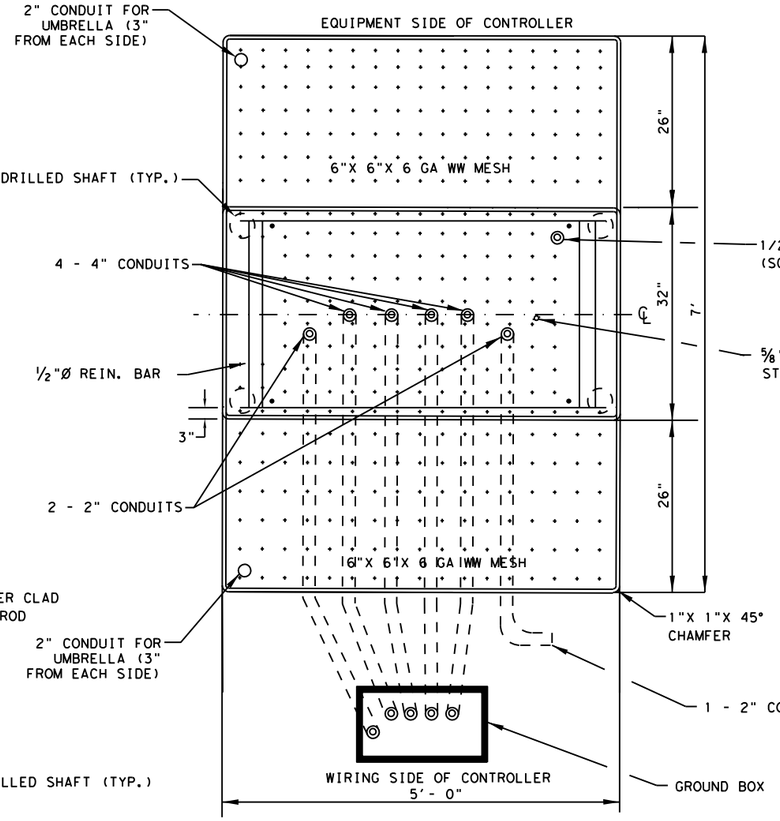
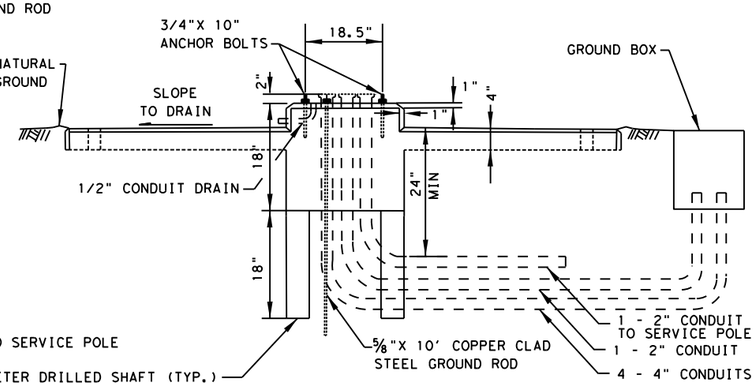


MODEL 340 DETAIL
FRONT VIEW



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.

04/15/2024

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					FM 1959
REVISIONS	STATE DISTRICT	COUNTY	CONTROL	SECTION	JOB		SHEET NO.
5-14-14	HOU	HARRIS	1844	01	029		118

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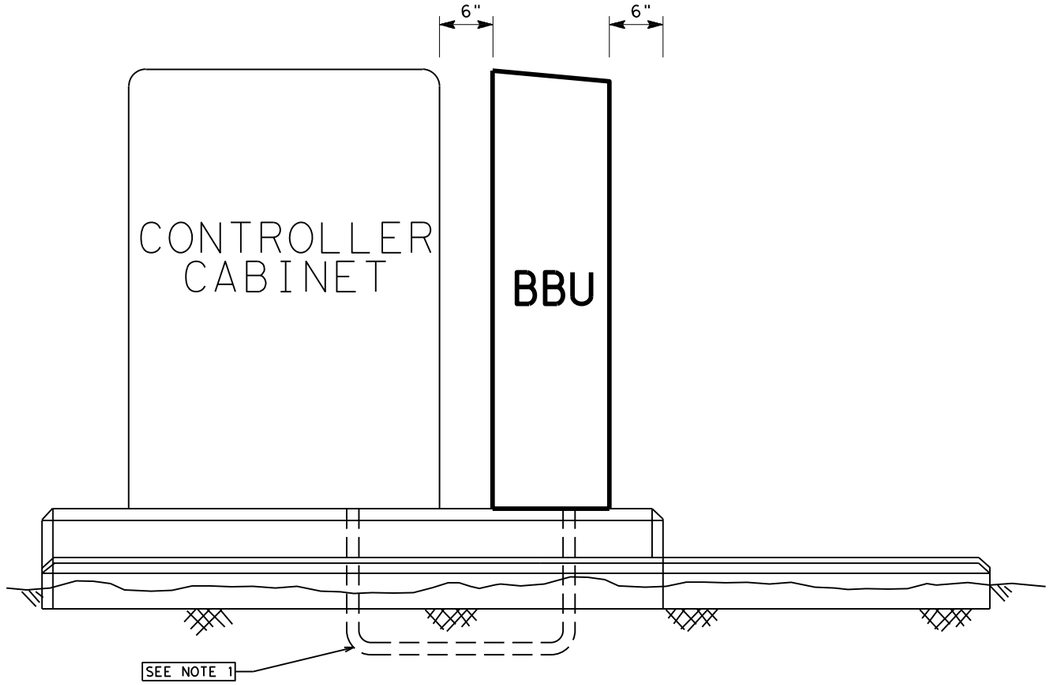
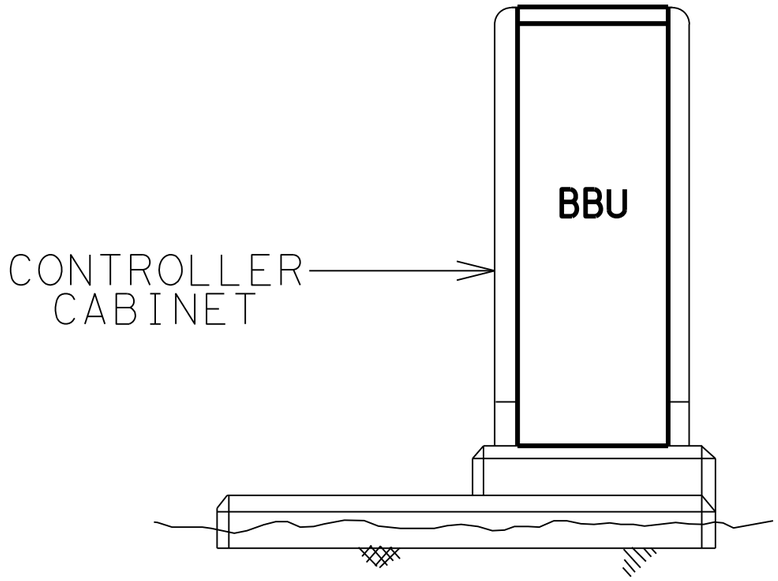
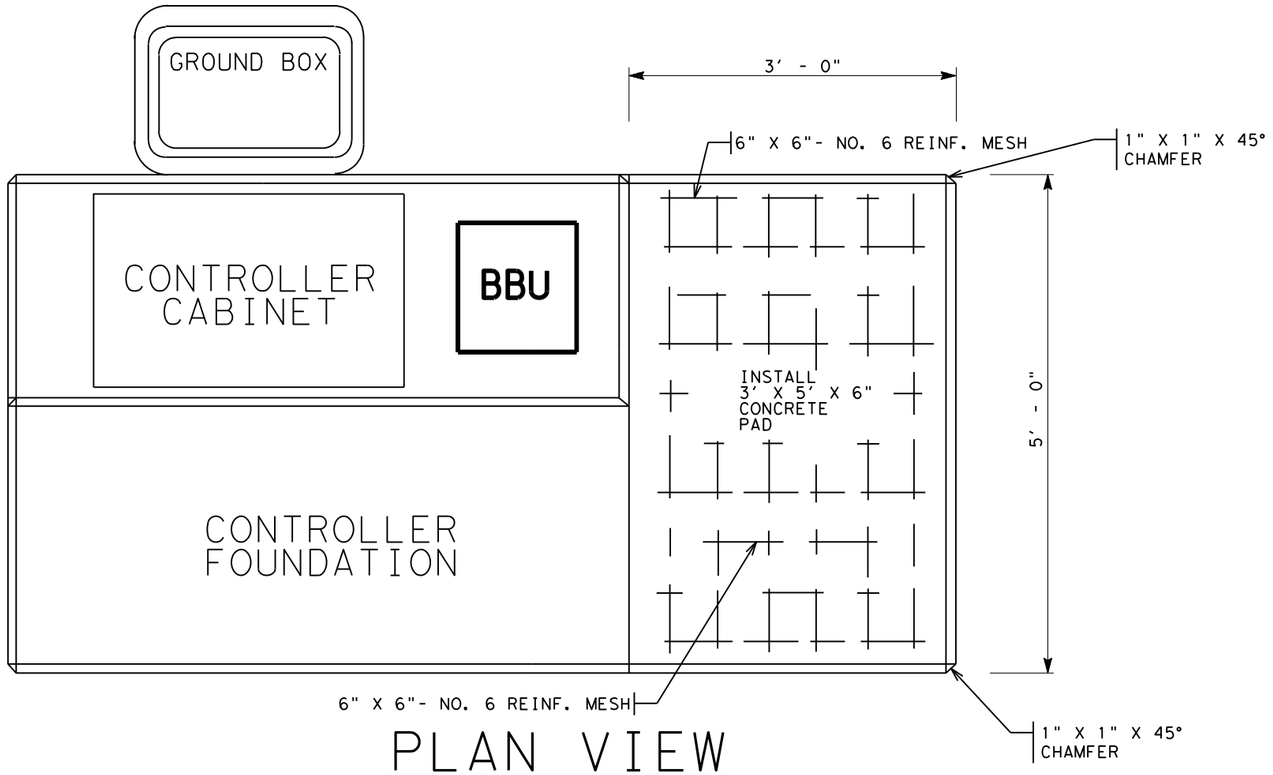


ELEVATION VIEW



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.

STATE OF TEXAS
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04/15/2024

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				FM 1959
REVISIONS	STATE DISTRICT	COUNTY	CONTROL	SECTION	JOB	SHEET NO.
5-14-14	HOU	HARRIS	1844	01	029	119

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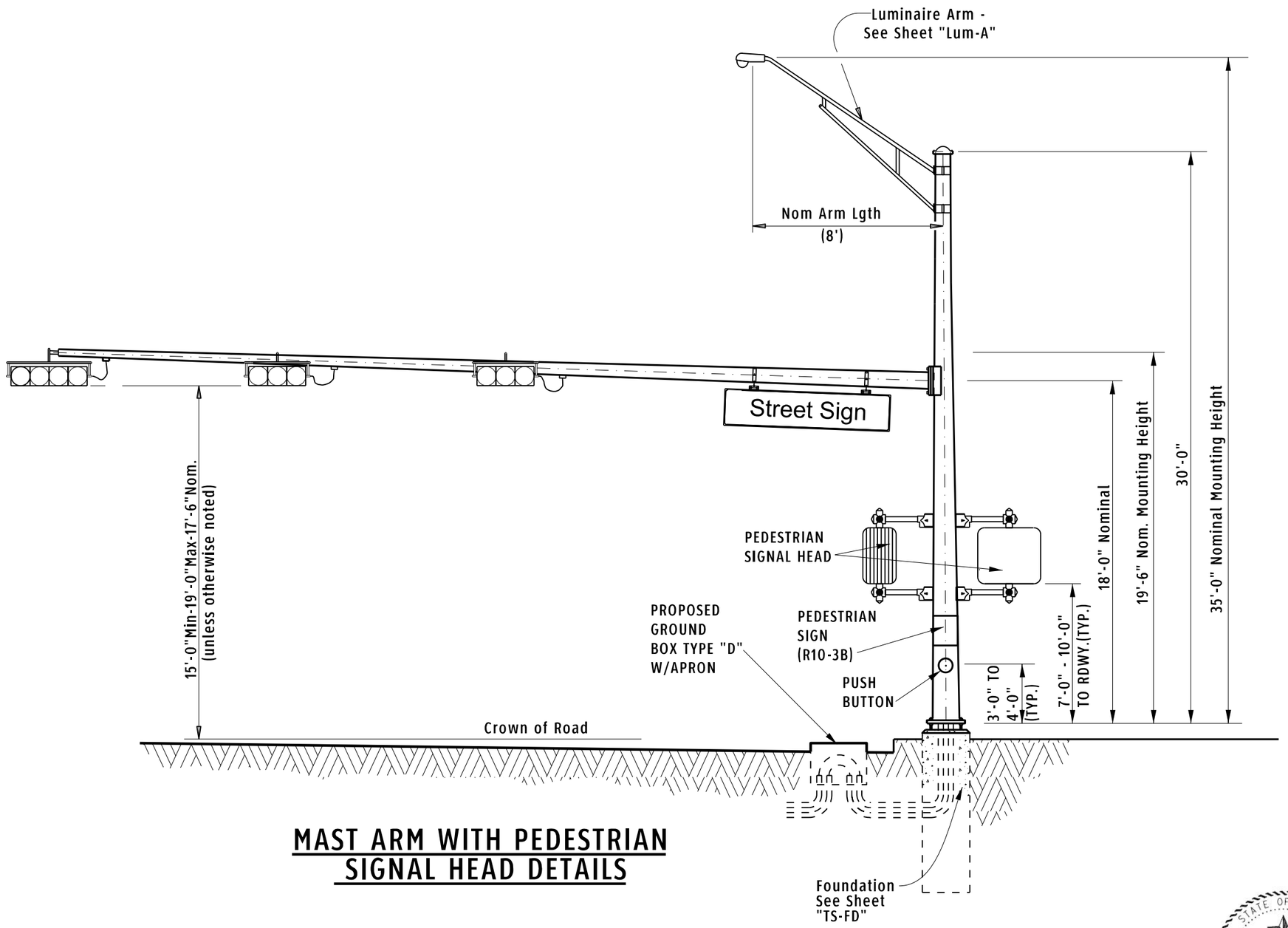

MAST ARM WITH PEDESTRIAN SIGNAL HEAD DETAILS

04/15/2024

TEXAS DEPARTMENT OF TRANSPORTATION
HOUSTON DISTRICT

TRAFFIC SIGNAL LAYOUTS MAST ARM POLE MOUNTED PEDESTRIAN SIGNAL DETAILS

SCALE	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY
N.T.S.	6	TEXAS				FM 1959
REVISIONS	STATE DISTRICT	COUNTY	CONTROL	SECTION	JOB	SHEET NO.
	HOU	HARRIS	1844	01	029	120

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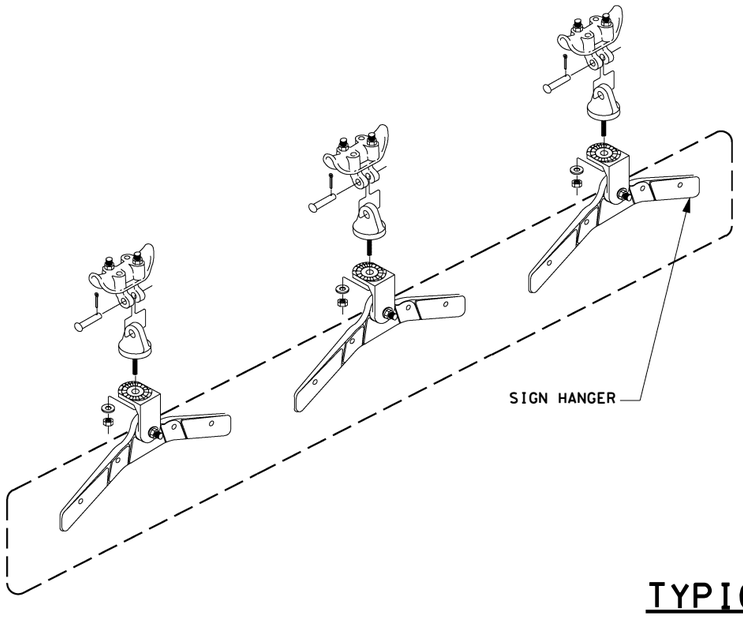
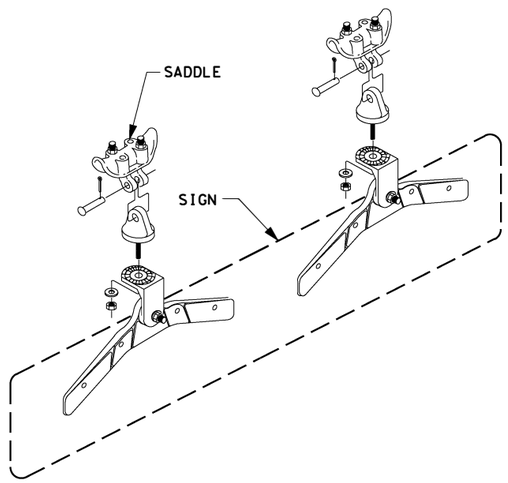
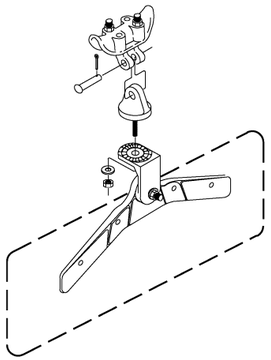
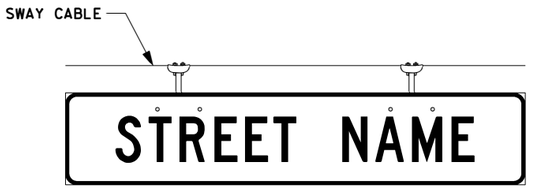
H:\TrfSignals\LienNguyen\FM 359 AND HUNT RD (Dock Gee)MA pole VIVDS\STANDARD\TRAFFIC SIGNAL LAYOUTS SIGNAL DETAILS- STANDARDS OVERHEAD STREET NAME SIGN MOUNTING



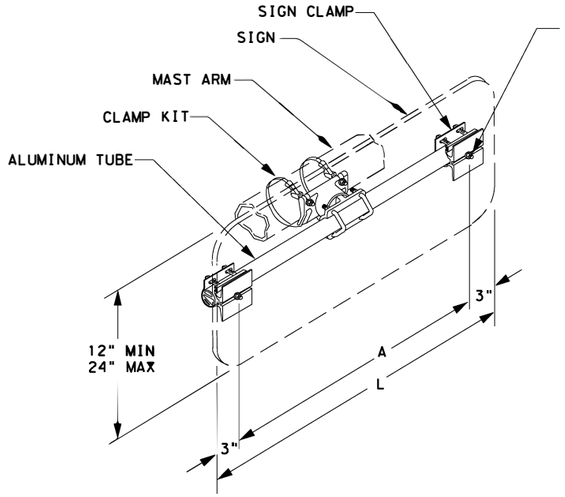


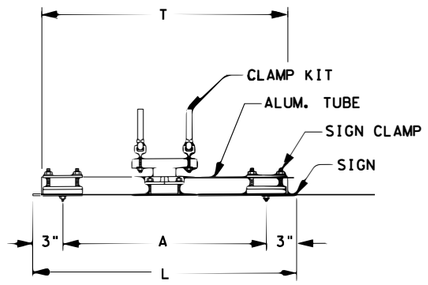


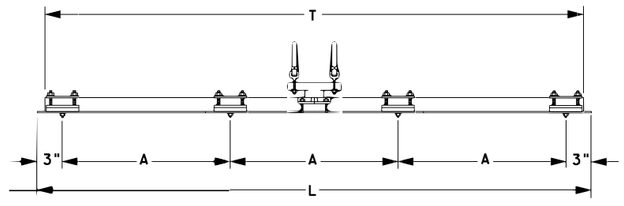


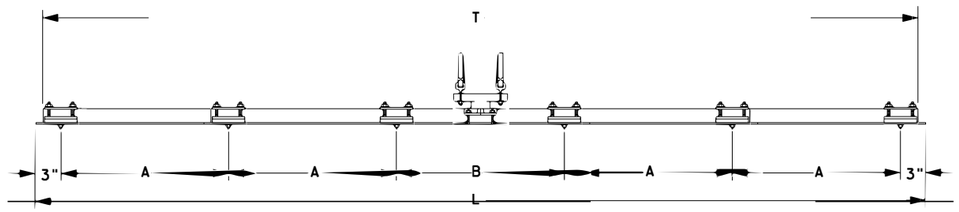
1. USE PELCO PARTS OR APPROVED EQUAL.
2. FURNISH HARDWARE FOR A COMPLETE INSTALLATION.
3. ATTACH THE 90 LB SPAN WIRE CLAMPS (SADDLES) TO TETHERS (SWAY CABLES).
4. FURNISH 1 ADJUSTABLE FREE SWINGING SIGN HANGER PER STREET NAME SIGN SMALLER THAN 3 FT. - 0 IN. SIGNS 3 FT - 0 IN. TO 6 FT.- 0 IN. REQUIRE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

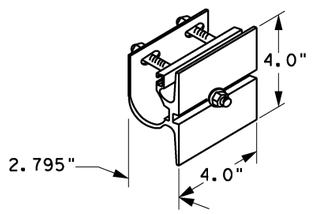
SIGN LENGTH (L)	TUBE LENGTH (T)	A
1'-6"	16"	12"
2'-0"	22"	18"
2'-6"	28"	24"
3'-0"	34"	30"

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

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		121

COUNTY	CONTROL	SECT	JOB	HIGHWAY
HARRIS	1844	01	029	FM 1959

STD-M12

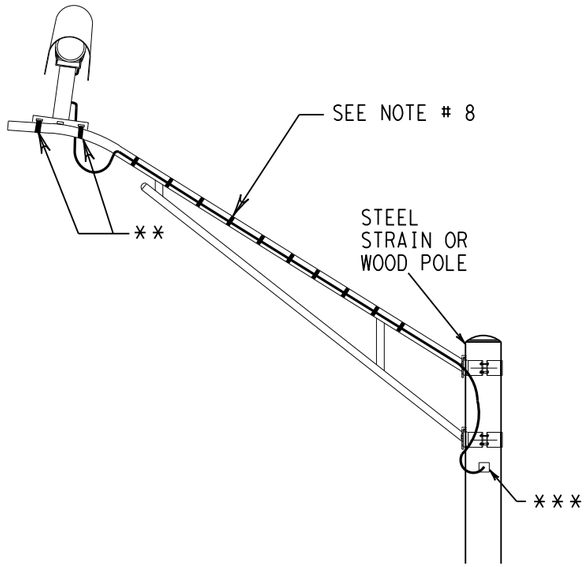
NOTES FOR VIDEO DETECTION:

1. INSTALL VIDEO DETECTION PROCESSOR UNIT INSIDE CONTROLLER CABINET.
2. INSTALL VIDEO DETECTION CAMERA & BRACKET AS DETAILED OR AS DIRECTED BY THE VIDEO DETECTION SUPPLIER.
3. MOUNT CAMERAS AS FAR OVER THE ROADWAY AS POSSIBLE.
4. USE ¾ IN. STAINLESS STEEL BANDING MATERIAL TO INSTALL CAMERA MOUNTS.
5. AIM CAMERA SO THAT HORIZON IS NOT VISIBLE IN THE FIELD OF VIEW.
6. INSTALL CAMERA ENCLOSURE ASSEMBLY SO THAT IT CAN ROTATE AFTER INSTALLATION TO PROVIDE PROPER ALIGNMENT.
7. PROVIDE WATER TIGHT CABLE ENTRY AND EXIT POINTS IN THE MAST ARM AND/OR POLES.
8. FOR VIVDS COAX AND POWER CABLES ATTACHED TO LUMINAIRE ARM, PROVIDE A METAL CABLE STRAP (ALUMINUM OR STAINLESS STEEL), 3/4-IN MINIMUM WIDTH AND TWO WRAPS AT 8 IN. MAXIMUM SPACING.

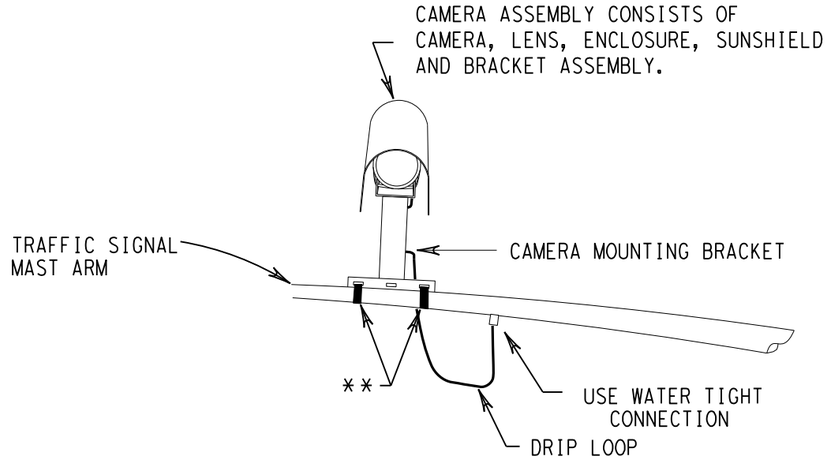
* 4 FT. PIPE EXTENSION WHEN MOUNTED ON TRAFFIC SIGNAL MAST ARM.

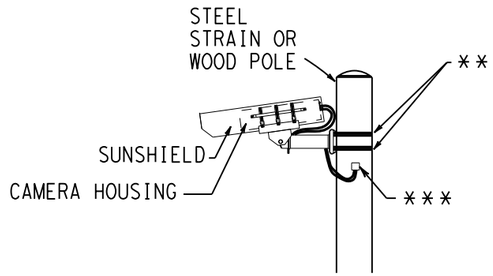
** ¾ IN. (MIN) STAINLESS STEEL BANDING 2 PLACES MIN.

*** ENTRY INTO STEEL POLE OR CONDUIT WEATHERHEAD ON WOOD POLE

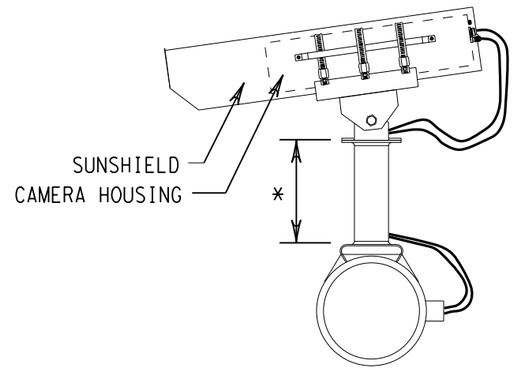


LUMINAIRE ARM MOUNT

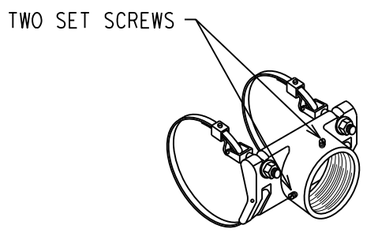




POLE MOUNT



SIDE VIEW



BAND MOUNT BRACKET DETAIL

Texas Department of Transportation
Houston District

SIGNAL DETAILS/STANDARDS VIVDS CAMERA MOUNTING DETAILS

VC/MD

FILE:	DN:	CK:	DW:	CK:
© TxDOT 2010	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS	HOU	6		122
02/2004 03/16/2006 09/2010	COUNTY	CONTROL	SECT JOB	HIGHWAY
	HARRIS	1844	01 029	FM 1959

STD-M13

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GENERAL NOTES FOR ALL ELECTRICAL WORK

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

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

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

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

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

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

CONDUIT

A. MATERIALS

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

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

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

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

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

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

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

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

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

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

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

B. CONSTRUCTION METHODS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUITS & NOTES

ED(1)-14

FILE:	ed1-14.dgn	DN:	CK:	DW:	CK:
© TxDOT	October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS		1844	01	029	FM 1959
		DIST	COUNTY		SHEET NO.
		HOU	HARRIS		123

71A

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ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

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

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

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

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

B. CONSTRUCTION METHODS

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

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

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

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

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

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

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

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

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

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

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

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

C. TEMPORARY WIRING

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

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

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

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

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

GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

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

B. CONSTRUCTION METHODS

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

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

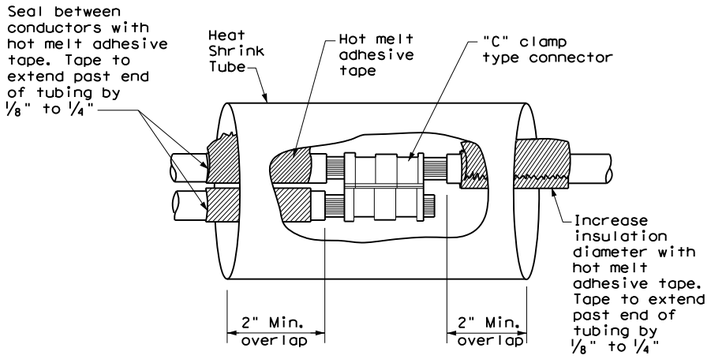
3. Install ground rods so the imprinted part number is at the upper end of the rod.

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

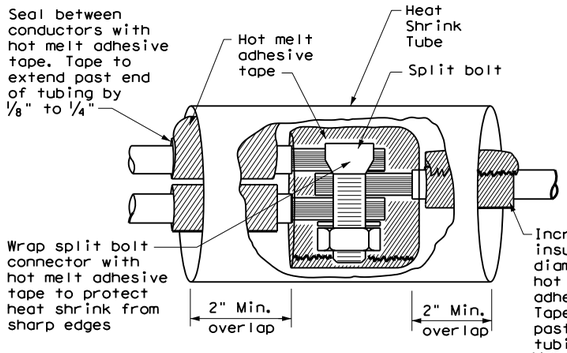
5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.

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

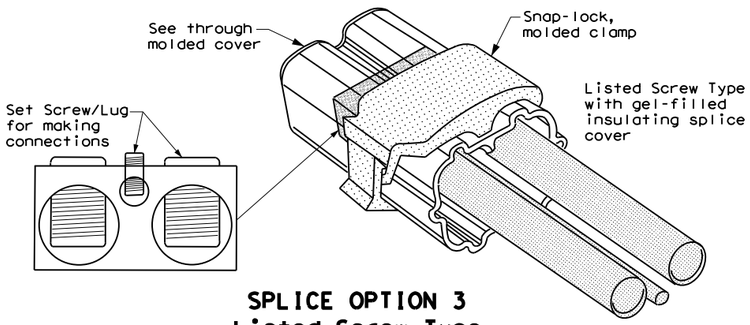
7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.



SPLICE OPTION 1
Compression Type



SPLICE OPTION 2
Split Bolt Type



SPLICE OPTION 3
Listed Screw Type

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUCTORS

ED(3)-14

FILE:	ed3-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS		1844	01	029	FM 1959
		DIST	COUNTY		SHEET NO.
		HOU	HARRIS		124

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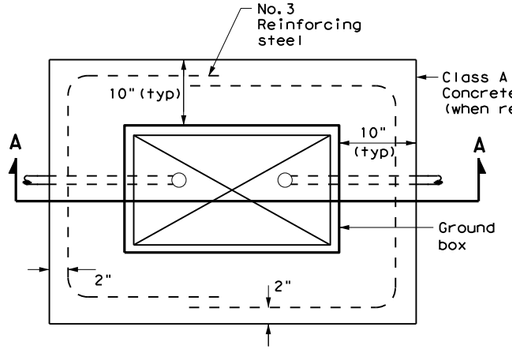
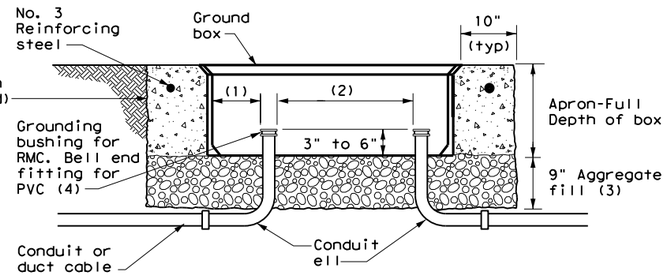


PLAN VIEW



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.

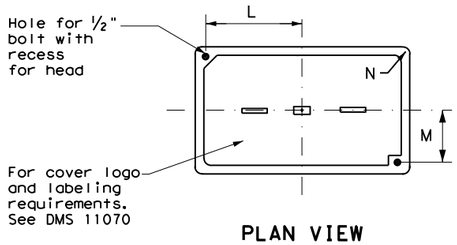
(2) Maintain sufficient space between conduits to allow for proper installation of bushing.

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

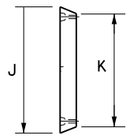
(4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

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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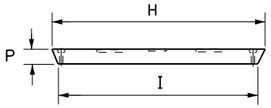

SIDE

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

FILE: ed4-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	1844	01	029	FM 1959
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		125

71D

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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

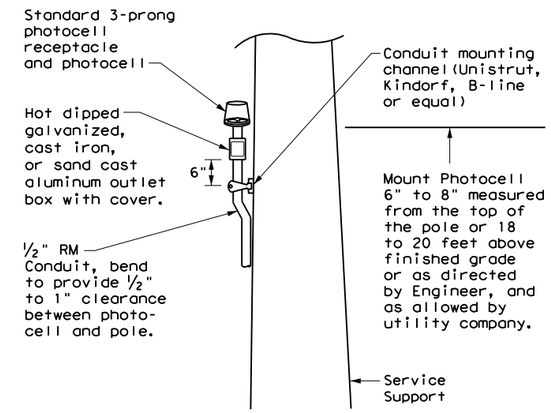
(SS)= Safety Switch Ahead of Meter-Check with Utility
(NS)= No safety Switch Ahead of Meter-Check with Utility

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

FILE: ed5-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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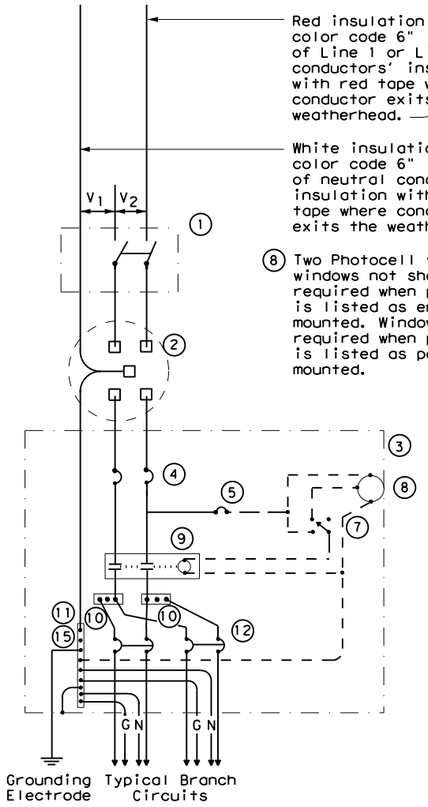
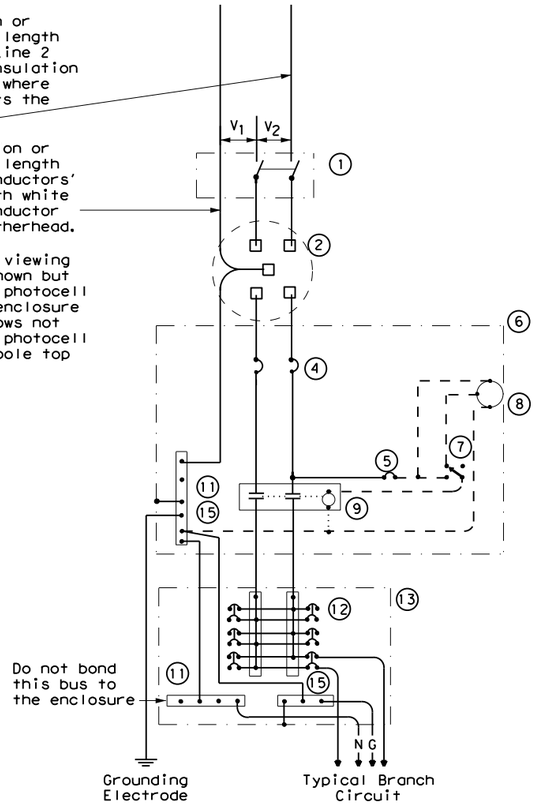
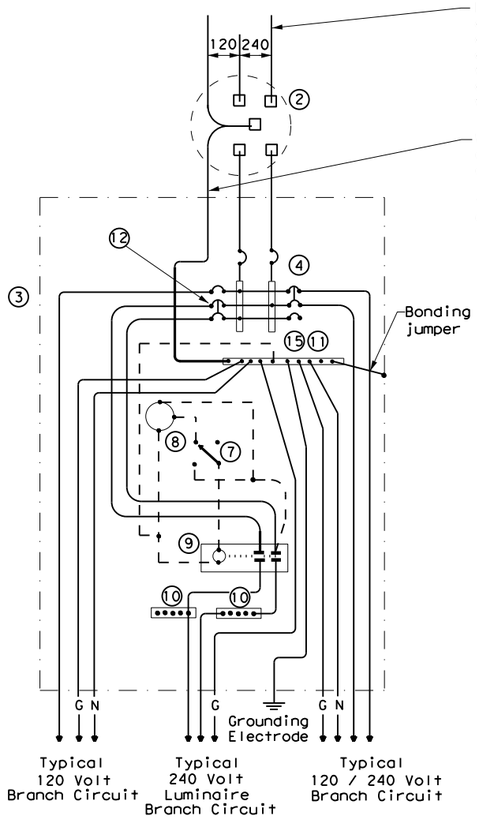


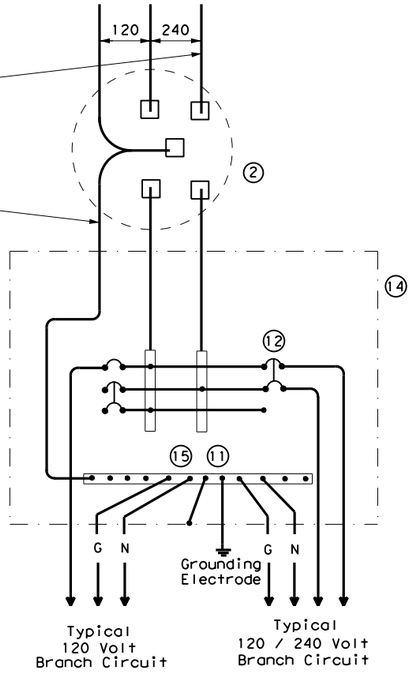
SCHEMATIC TYPE A
THREE WIRE



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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	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		127

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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 5/8 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.

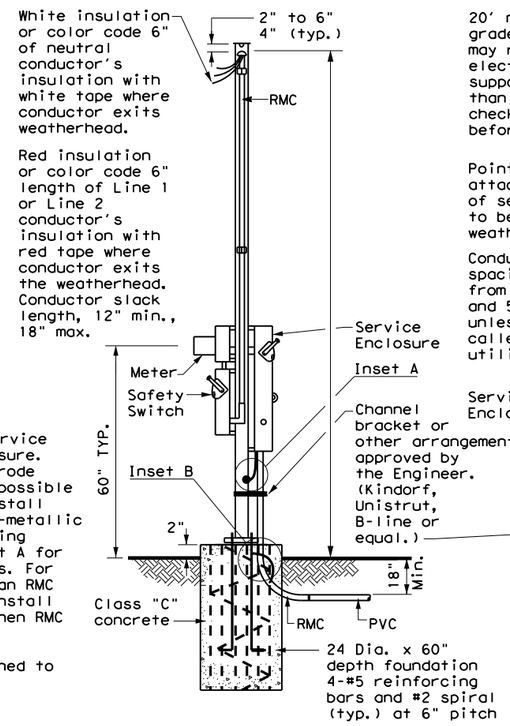
7. Drill and tap steel poles and frames for ½ in. X 13 UNC tank ground fitting. For steel pole service supports, provide and install tank ground fitting 4 in. to 6 in. below electrical service enclosure. Provide properly sized hole through the bottom of the enclosure for the service grounding electrode 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.

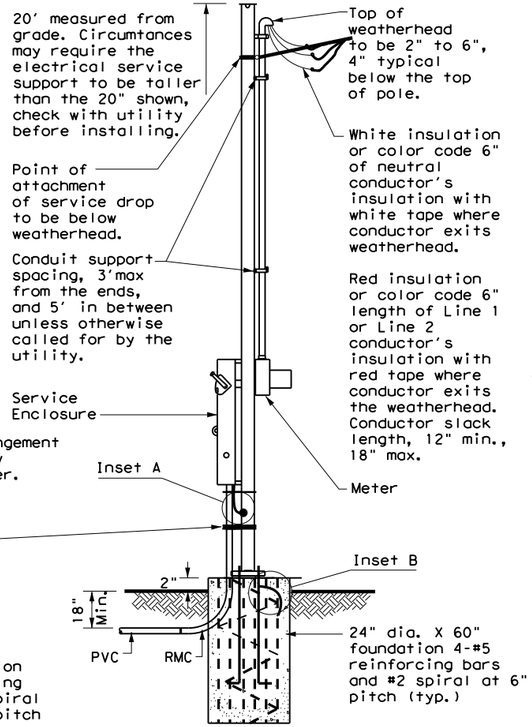
9. Provide ¼" - 20 machine screws for bonding. Do not use sheet metal screws. Remove all non-conductive material at contact points. Terminate bonding jumpers with listed devices. Install minimum size 6 AWG stranded copper bonding jumpers. Make up all threaded bonding connections wrench tight.

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.

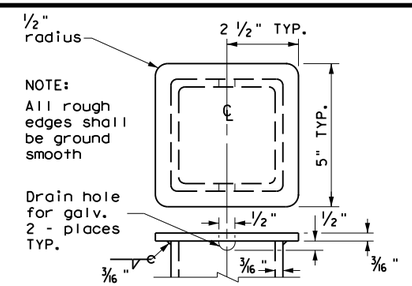


WITH SAFETY SWITCH

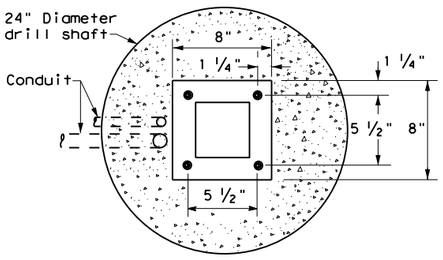


WITHOUT SAFETY SWITCH

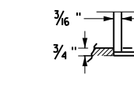
SERVICE SUPPORT TYPE SP (O) - OVERHEAD SERVICE



POLE TOP PLATE

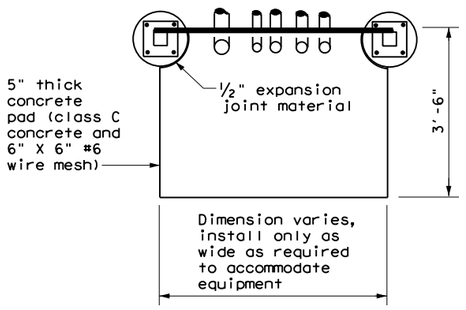


BASE PLATE DETAIL



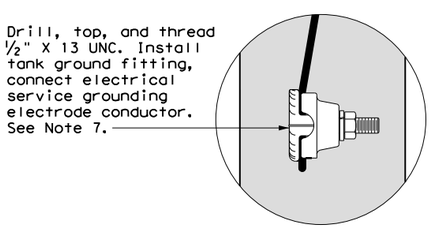
BOTTOM OF POLE

SERVICE SUPPORT TYPE SF & SP



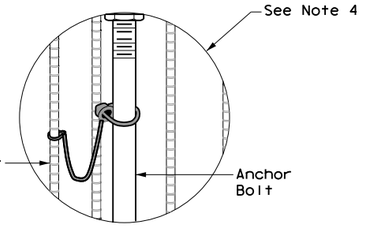
TOP VIEW

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

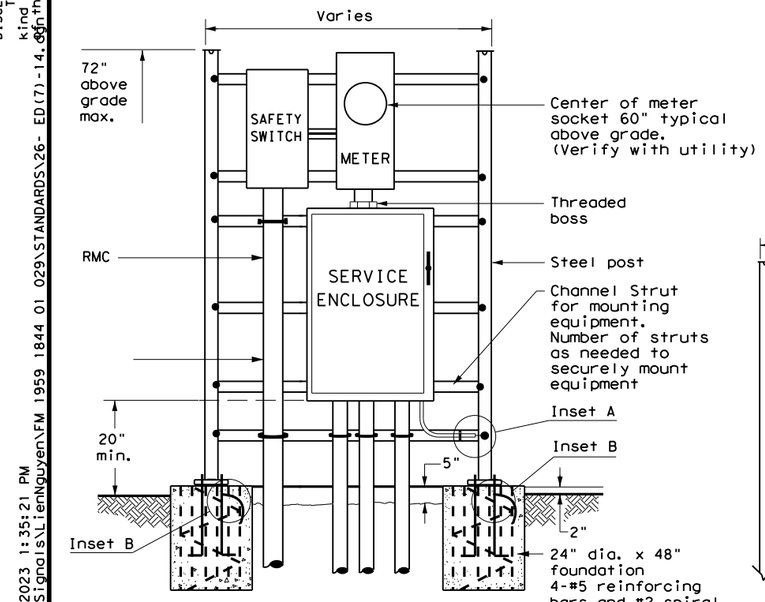


FRONT VIEW

INSET A

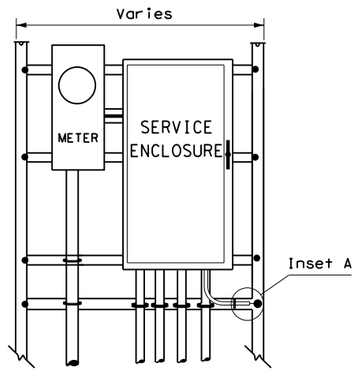


INSET B



WITH SAFETY SWITCH

FRONT VIEW



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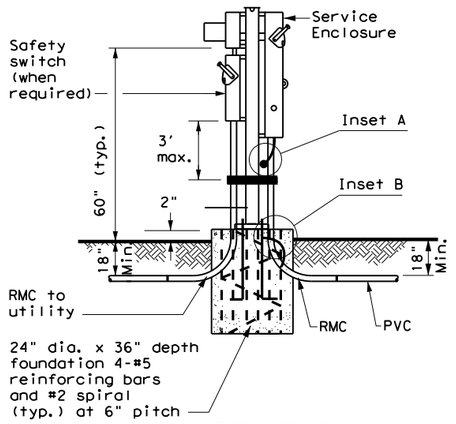
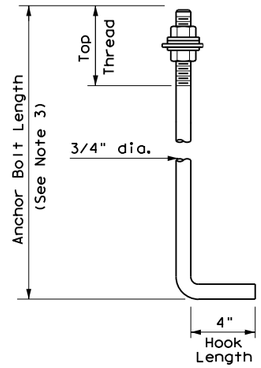


WITH SAFETY SWITCH



HOOKED ANCHOR DETAIL

SERVICE SUPPORT TYPE SF(U) - UNDERGROUND SERVICE

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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	HOU	HARRIS		128

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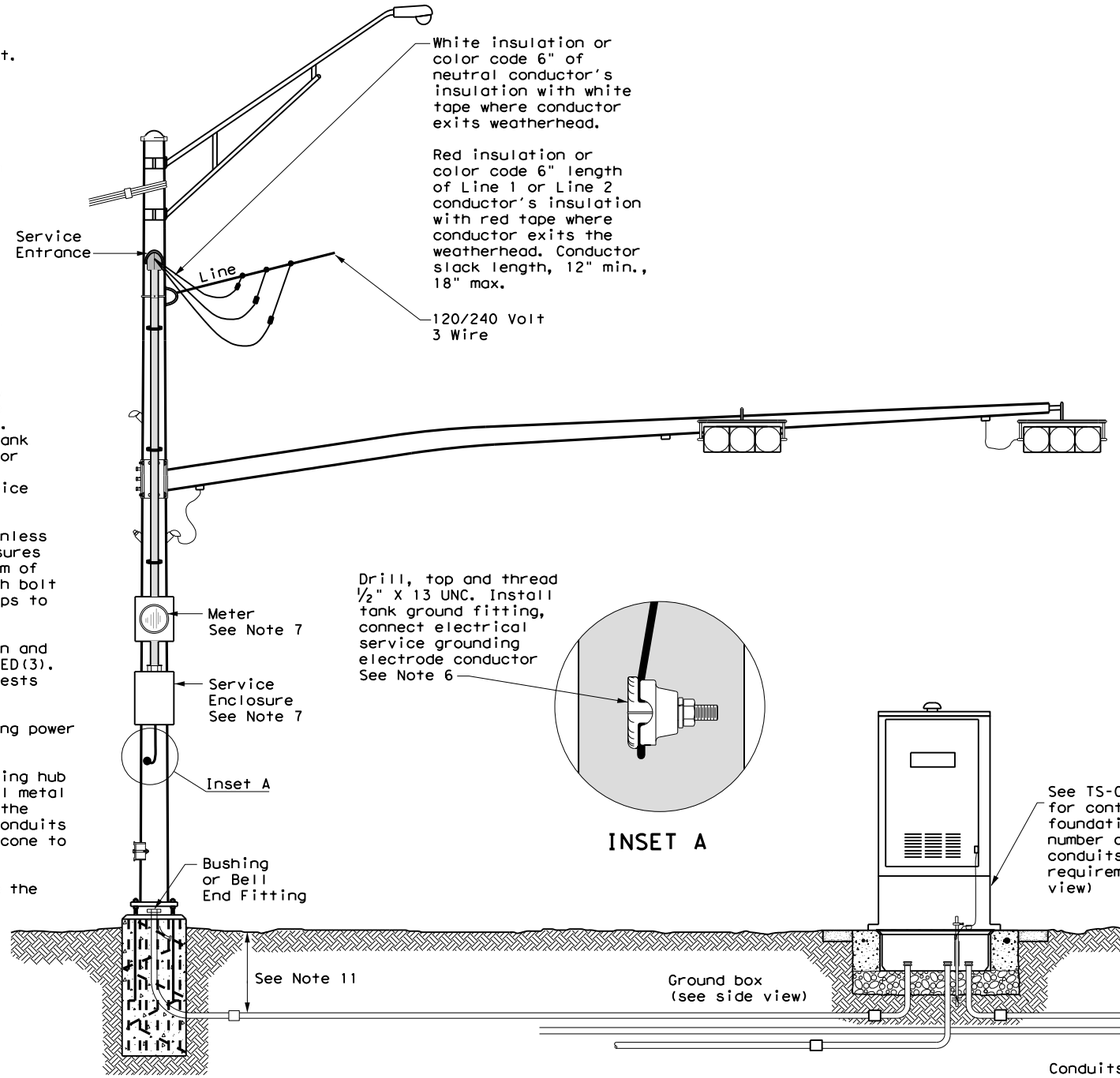
TRAFFIC SIGNAL NOTES

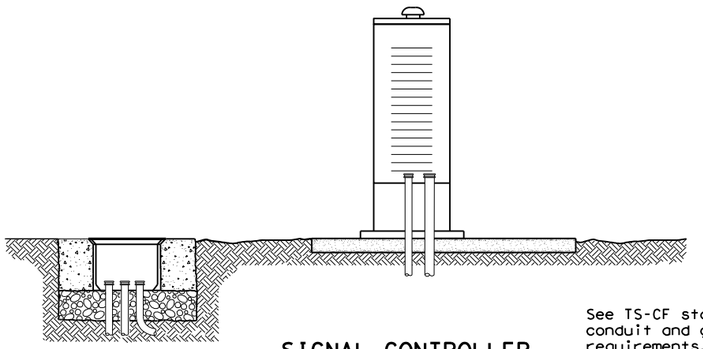
1. Do not pass luminaire conductors through the signal controller cabinet.
2. Include an equipment grounding conductor in all conduits throughout the electrical system. Bond all exposed metal parts to the grounding conductor.
3. Provide roadway luminaires, when required, in accordance with the material 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 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.

SIGNAL CONTROLLER FRONT VIEW

SIGNAL POLE

DATE:
FILE: H:\TrfSignals\LienNguyen\FM 1959 1844 01 029\STANDARDS\27- ED(8)-14.dgn

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS TYPICAL TRAFFIC SIGNAL SYSTEM DETAILS

ED(8)-14

FILE: ed8-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	1844	01	029	FM 1959
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		129

71H

DATE:
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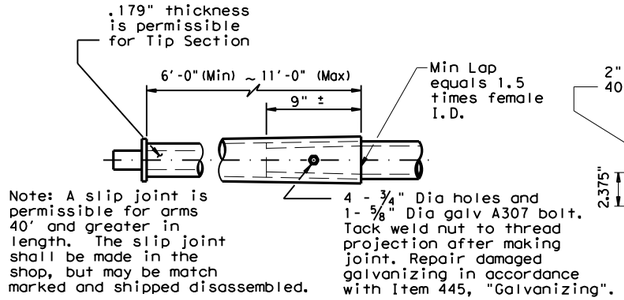
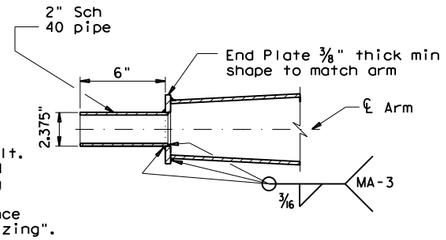


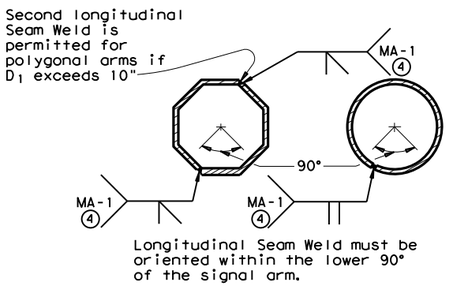
SLIP JOINT DETAIL



TENON DETAIL

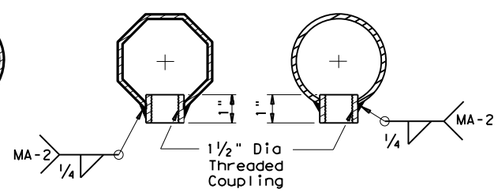
Stainless steel bands (or Cables) and cast bracket as in "Astro-Brac", "Sky Bracket" or "Easy Bracket" with 1 ½" Dia Threaded Coupling.

BRACKET ASSEMBLY



ARM WELD DETAIL

④ 60% 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)

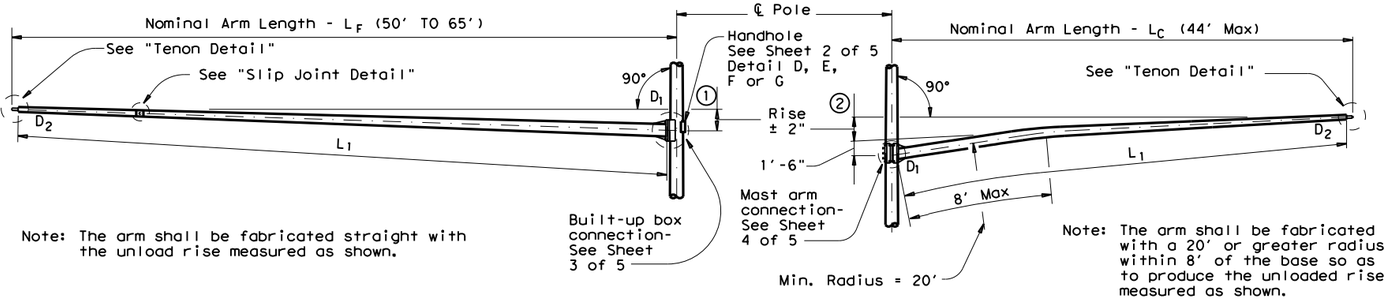
SMA-100(2)-12

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

REVISIONS
5-96
1-12

CONT	SECT	JOB	HIGHWAY
1844	01	029	FM 1959
DIST	COUNTY		SHEET NO.
HOU	HARRIS		130

123B



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

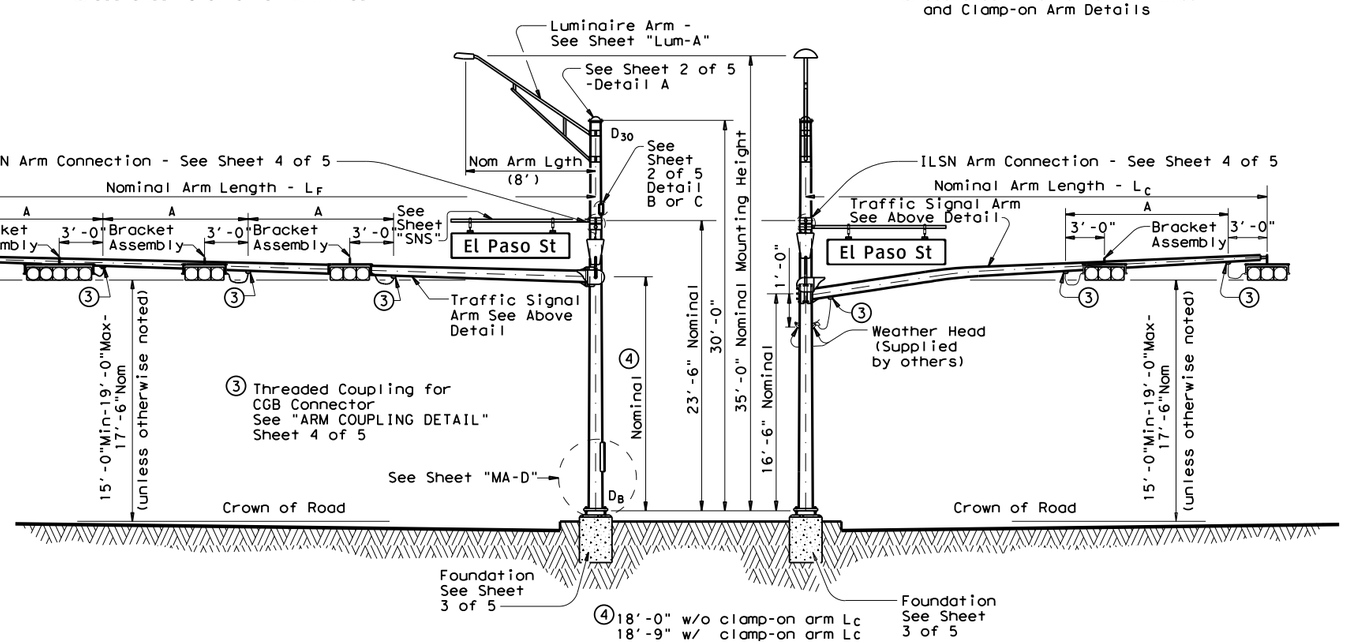
Note: The arm shall be fabricated with a 20' or greater radius within 8' of the base so as to produce the unloaded rise measured as shown.

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

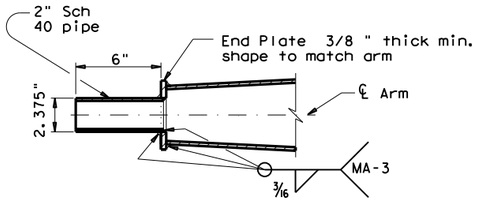
(Showing fixed mount arm)

STRUCTURE ASSEMBLY

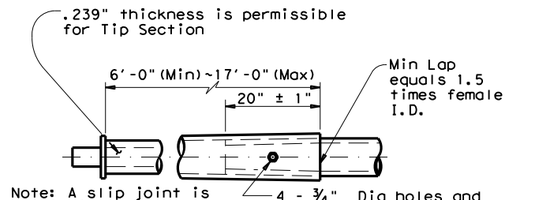
ELEVATION

(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



Note: A slip joint is permissible for arms 50' and greater in length. The slip joint shall be made in the shop, but may be match marked and shipped disassembled.

Tack weld nut to thread projection after making joint. Repair damaged galvanizing in accordance with Item 445, "Galvanizing".

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
1844	01	029	FM 1959
DIST	COUNTY		SHEET NO.
HOU	HARRIS		131

131A

DATE:
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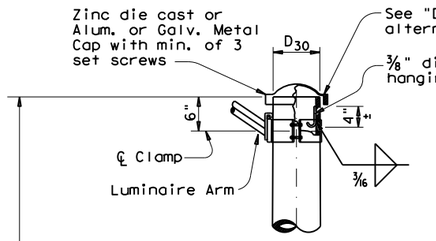
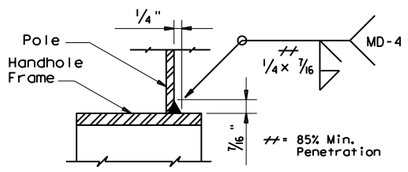
DATE:
FILE:

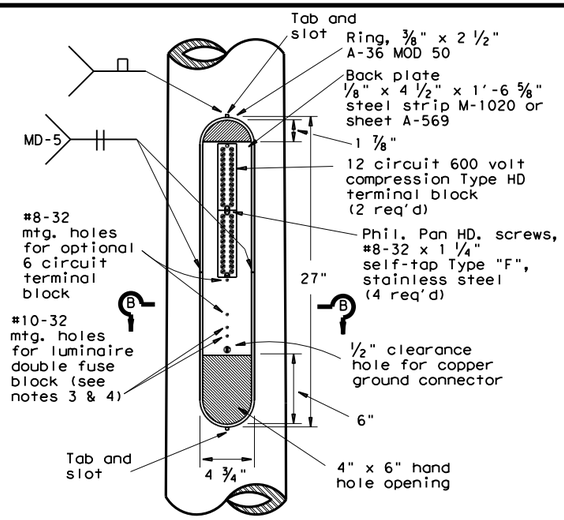


DETAIL A

(for pole with luminaire)



DETAIL H

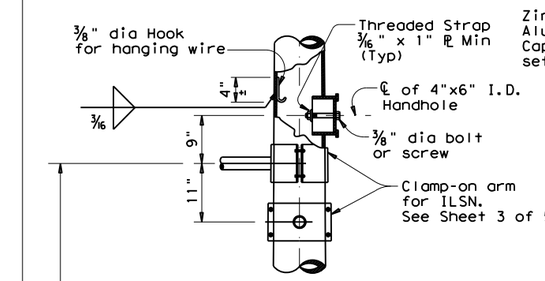


ACCESS COMPARTMENT

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

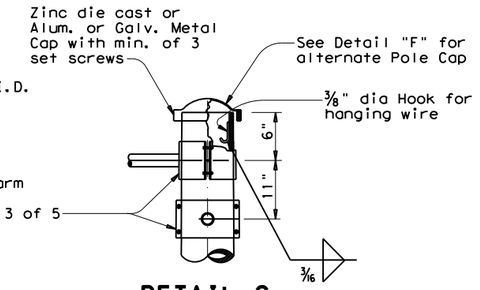
(7) ASTM A572, A1008 HSLAS, A1011 HSLAS, A1008 HSLAS-F, A1011 HSLAS-F, or A1011 SS may have higher yield strengths but shall not have less elongation than the grade indicated.

(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.

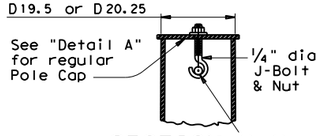


DETAIL B

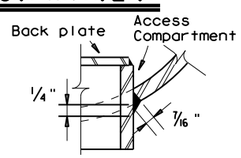
(If ILSN applied)



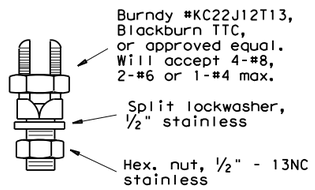
DETAIL C



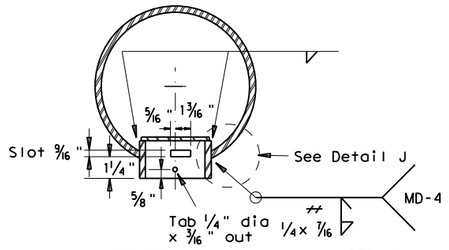
SECTION Y-Y



DETAIL J



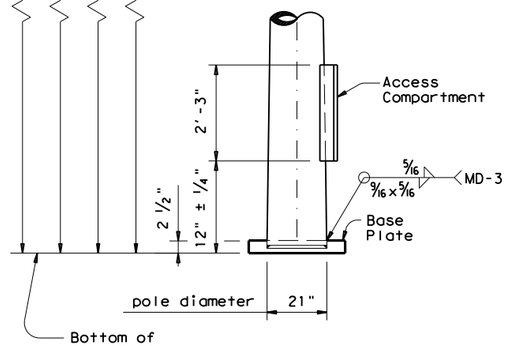
COPPER GROUND CONNECTOR



SECTION B-B

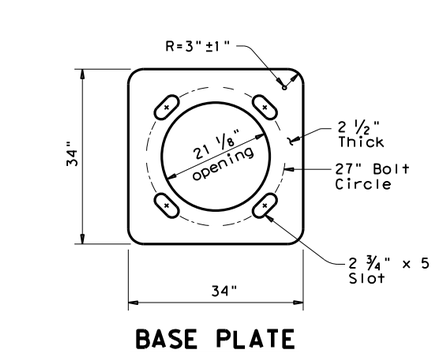
// = 85% Min. Penetration

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



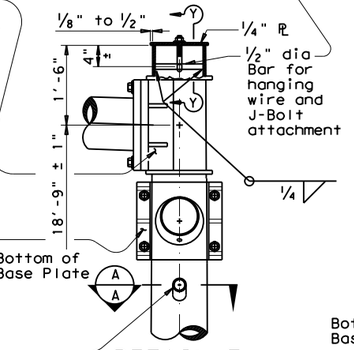
DETAIL D

(for 30' pole with luminaire and ILSN sign)



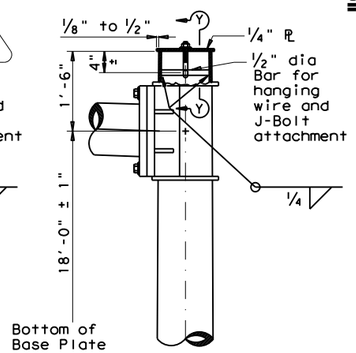
DETAIL E

(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)

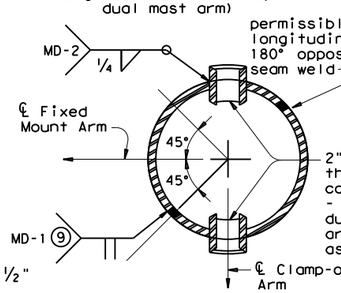


DETAIL G

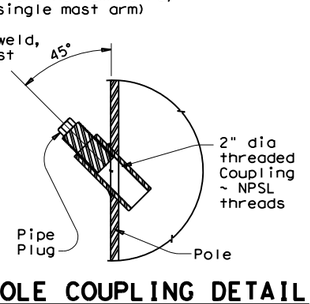
(for 19.5' pole with no ILSN sign and no luminaire, single mast arm)

POLE ELEVATION

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.

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.

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

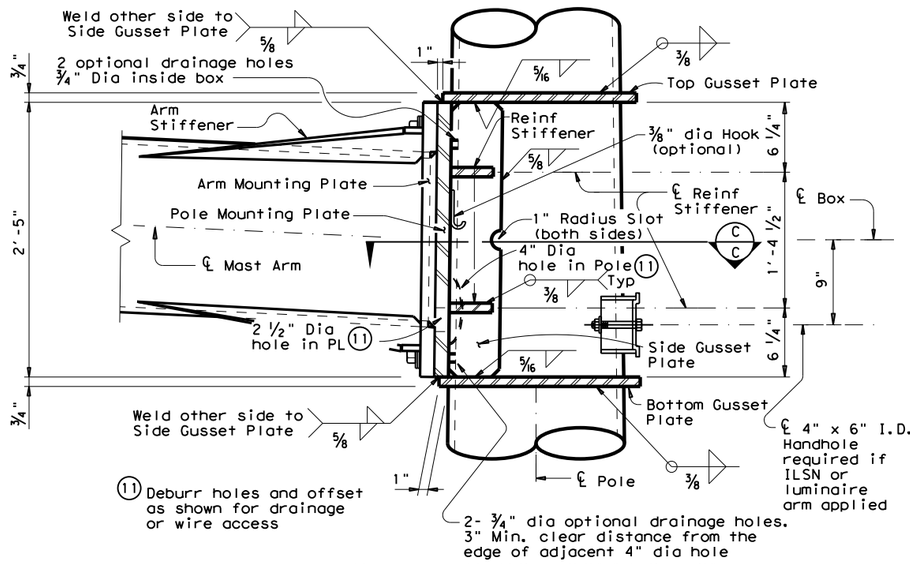
DN: JSY	CK: ARC	DW: TGG	CK: JSY

REVISIONS
4-20-01
1-12

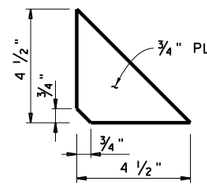
CONT	SECT	JOB	HIGHWAY
1844	01	029	FM 1959

DIST	COUNTY	SHEET NO.
HOU	HARRIS	132

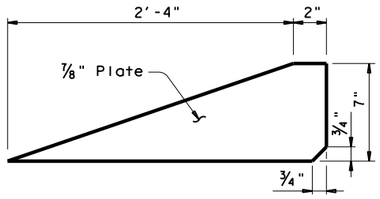
131B



BUILT-UP BOX CONNECTION

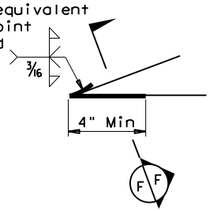


REINFORCING STIFFENER



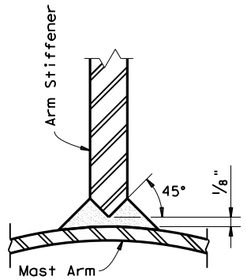
ARM STIFFENER
(Cut to match arm inclination and taper)

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

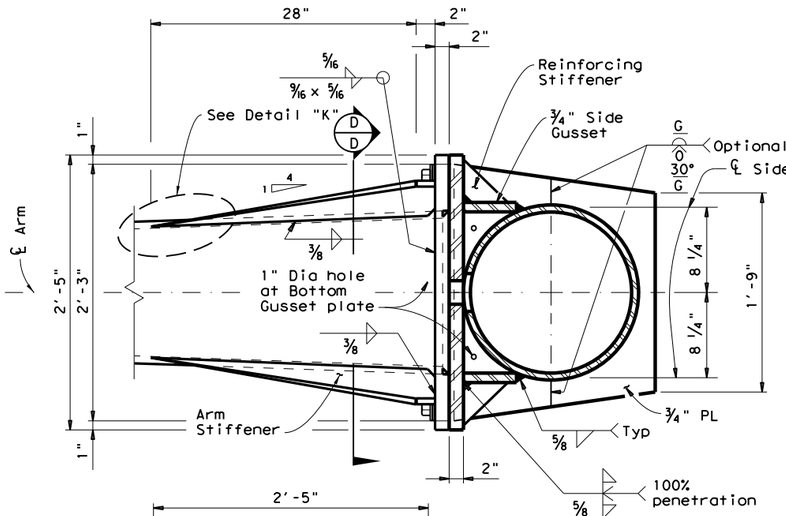
Fixed Mount Arm L_F	ROUND POLES (13)					Foundation Type
	D_B	$D_{19.5}$ or $D_{20.25}$	D_{24}	D_{30}	(12) thk	
ft.	in.	in.	in.	in.	in.	
50', 55' 60', 65'	21.0	18.2	17.6	16.8	.3125	48-A

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"

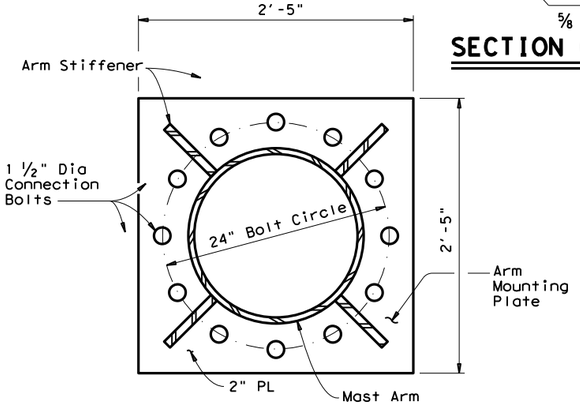
D_B = Pole Base O.D.
$D_{19.5}$ = Pole Top O.D. with no Luminaire and no ILSN (single mast arm)
$D_{20.25}$ = Pole Top O.D. with no Luminaire and no ILSN (dual mast arm)
D_{24} = Pole Top O.D. with ILSN w/out Luminaire
D_{30} = Pole Top O.D. with Luminaire
D_1 = Arm Base O.D.
D_2 = Arm End O.D.
L_1 =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

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

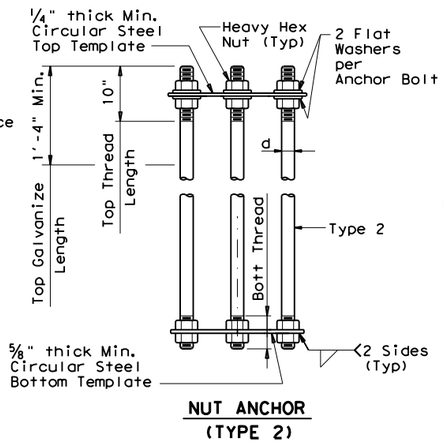
(13) Shaft profile 16-sided or 18-sided is considered to be equivalent to round section.



SECTION C-C

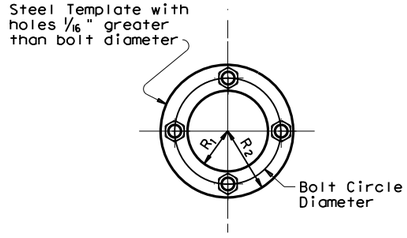


SECTION D-D



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

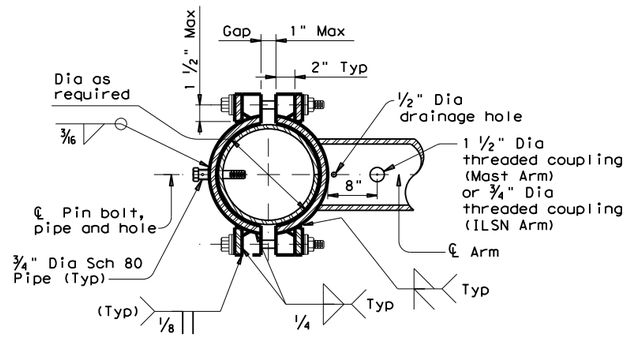
DN: JSY	CK: ARC	DW: TGG	CK: JSY

REVISIONS
4-20-01
1-12

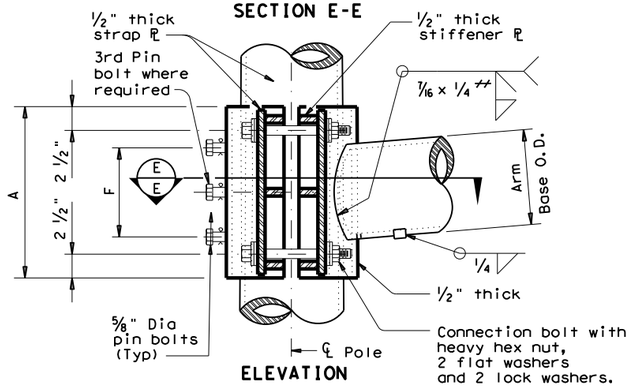
CONT	SECT	JOB	HIGHWAY
1844	01	029	FM 1959
DIST	COUNTY		SHEET NO.
HOU	HARRIS		133

DATE:
FILE:

131C



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"

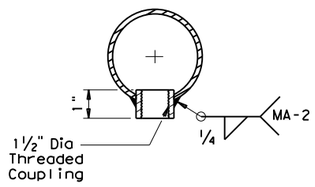
D1 = Arm Base O.D.
D2 = Arm End O.D.
L1 = Shaft Length
Lc = Clamp-on Arm Length

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

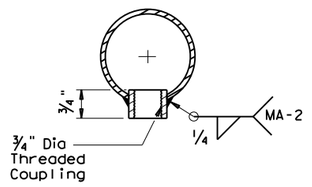
CLAMP-ON ARM CONNECTION

ILSN Arm Size		A	F	4 Conn. Bolts	5/8" 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	5/8" 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



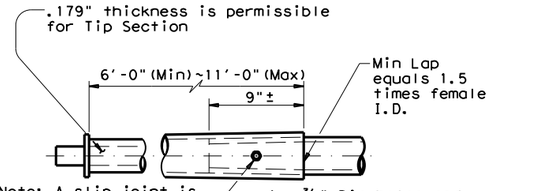
ILSN ARM COUPLING DETAIL

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 1/8" 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.

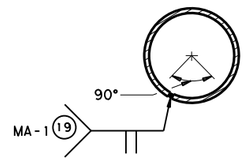


Note: A slip joint is permissible for arms 40' and greater in length. The slip joint shall be made in the shop, but may be match marked and shipped disassembled.

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.

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
1844	01	029	FM 1959

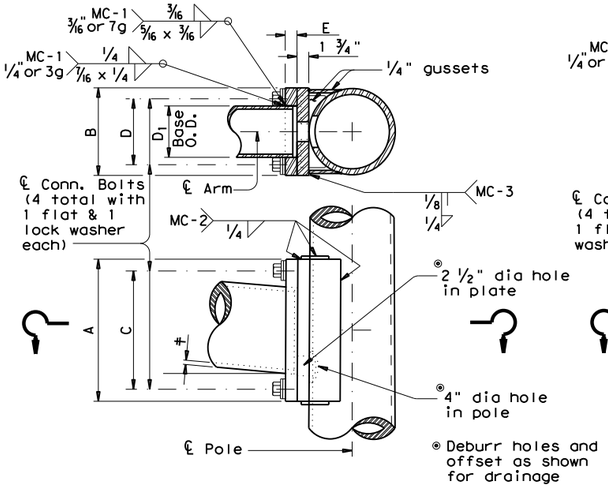
DIST	COUNTY	SHEET NO.
HOU	HARRIS	134

131D

DATE:
FILE:

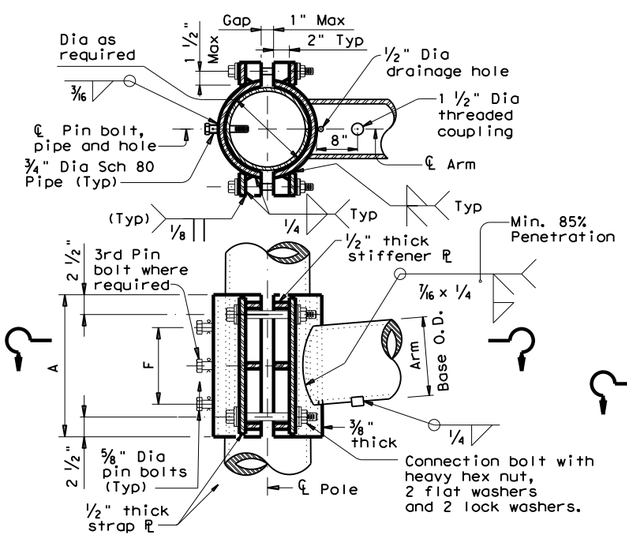
DATE:
H:\Traffsignals\LienNguyen\FM 1959 1844 01 029\STANDARDS\33- MA-C-12.dgn

ARM SIZE D_1	ARM SIZE ∓	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



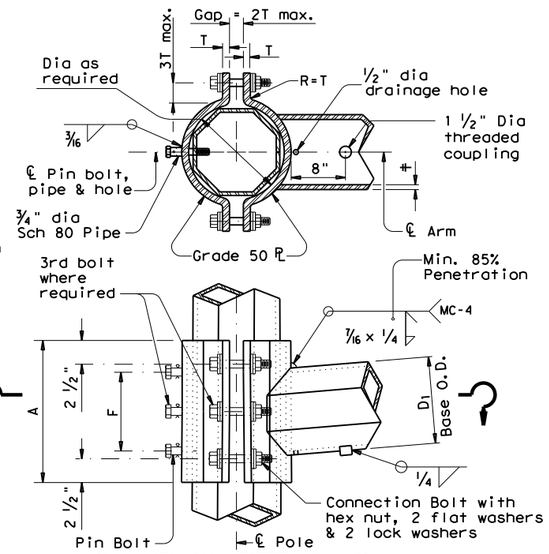
FIXED MOUNT DETAIL 1

ARM SIZE D_1	ARM SIZE ∓	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	5/8
7.5	.179	14	8	4	1	2	5/8
8.0	.179	14	8	4	1	2	5/8
9.0	.179	16	10	4	1	2	5/8
9.5	.179	18	12	4	1 ¼	3	5/8
9.5	.239	18	12	4	1 ¼	3	5/8
10.0	.239	18	12	4	1 ¼	3	5/8

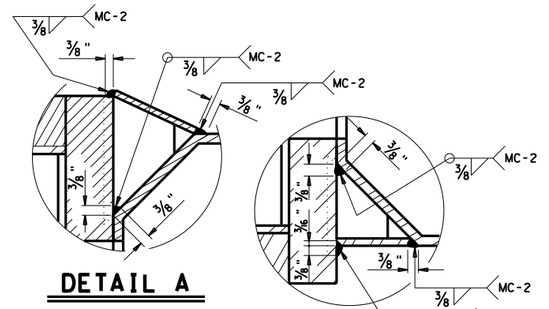


CLAMP-ON DETAIL 1

ARM SIZE D_1	ARM SIZE ∓	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	5/8
7.5	.179	14	8	¾	4	¾	2	5/8
8.0	.179	14	8	¾	4	¾	2	5/8
9.0	.179	16	10	⅞	4	1	2	5/8
10.0	.179	18	10	⅞	4	1	2	5/8
9.5	.239	18	10	1	6	1	3	5/8
10.0	.239	18	10	1	6	1	3	5/8

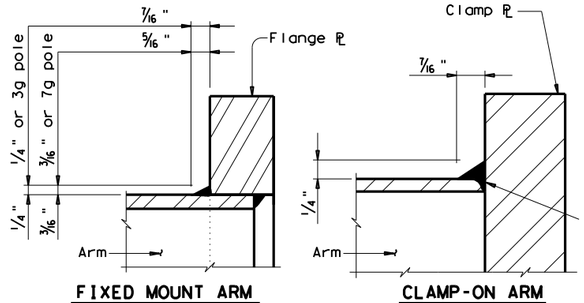


CLAMP-ON DETAIL 2



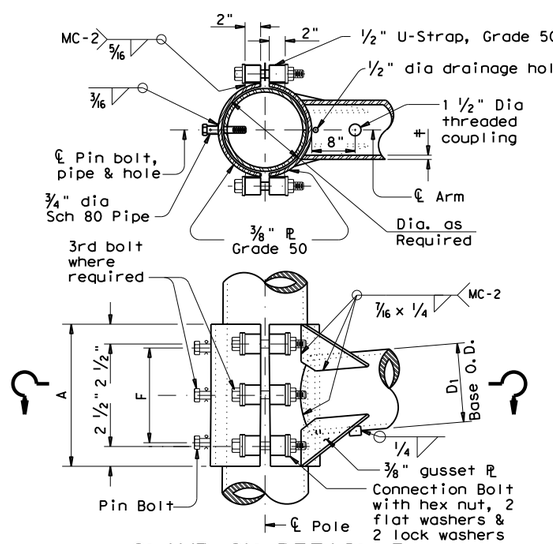
DETAIL A

DETAIL B



ARM BASE WELD DETAILS

ARM SIZE D_1	ARM SIZE ∓	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	5/8
7.5	.179	14	8	4	1	2	5/8
8.0	.179	14	8	4	1	2	5/8
9.0	.179	16	10	4	1	2	5/8
9.5	.179	18	12	6	1	3	5/8
9.5	.239	18	12	6	1	3	5/8
10.0	.239	18	12	6	1	3	5/8



CLAMP-ON DETAIL 3

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 9/16" dia holes for a ⅛" 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

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

REVISIONS
5-96
5-09
1-12

CONT	SECT	JOB	HIGHWAY
1844	01	029	FM 1959

DIST	COUNTY	SHEET NO.
HOU	HARRIS	135

126A

DATE:
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Zinc die cast or Alum. or Galv. Metal Cap with min. of 3 set screws

D_{30}

See Detail F for alternate Pole Cap

⅜" dia Hook for hanging wire

6"

4"±

℄ Clamp

Luminaire Arm

⅜

DETAIL A

(for pole with luminaire)

45°

2" dia threaded Coupling ~ NPSL threads

Pipe Plug

Pole

POLE COUPLING DETAIL

¼"

Pole

Handhole Frame

¼ x 7/16 ①

MD-4

7/16"

DETAIL G

⅜" dia Hook for hanging wire

See Detail G for Handhole Weld

℄ of 4"x 6" I.D. Handhole

4"±

9"

11"

⅜" Dia. Bolt or Screw

Clamp-on arm for ILSN

Handhole Frame ⅜"x 2" Min.

⅜

DETAIL B

(If ILSN applied)

Zinc die cast or Alum. or Galv. Metal Cap with min. of 3 set screws

See Detail F for alternate Pole Cap

⅜" dia Hook for hanging wire

6"

11"

⅜

DETAIL C

D_{19}

See Detail A for regular Pole Cap

¼" dia J-Bolt & Nut

SECTION Y-Y

⅜" dia Hook (optional)

℄ of 4"x 6" I.D. Handhole

See Detail G for Handhole Weld

Threaded Strap ⅜" x 1" ℞ Min

Handhole cover 12g min.

⅜" dia bolt or screw

Handhole Frame - ℞ ⅜" x 2 min

Fixed mount arm for single mast arm assemblies or first arm on dual mast arm assemblies

9"

1'-6"

2'-6"

Clamp-on arm for second arm on dual mast arm assemblies

2" dia threaded coupling - 2 per dual mast arm assembly

DETAIL D

(for 30' pole with luminaire and ILSN sign)

℄ of 4"x 6" I.D. Handhole

See Detail G for Handhole Weld

Handhole cover 12g min.

⅜" dia bolt or screw

Handhole Frame- ℞ ⅜" x 2 min

Fixed mount arm for single mast arm assemblies or first arm on dual mast arm assemblies

Clamp-on arm for second arm on dual mast arm assemblies

2" dia threaded coupling - 2 per dual mast arm assembly

DETAIL E

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

⅛" to ½"

¼" ℞

½" dia Bar for hanging wire and J-Bolt attachment

4"±

1'-0"

¼

DETAIL F

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

30'-0" ±1"

23'-6" ±1"

18'-0" ±1"

Access Compartment

2'-3"

12" ± ¼"

Base Plate

T

D_B

See Detail H

Anchor Bolt Diameter	Bolt Hole Diameter	Slot Length	Bolt Circle Diameter	Base ℞ Dim. L x T	Adjust. Range
1 ½"	1 ¾"	3 ½"	17"	18" x 1 ½"	13.4°
1 ¾"	2"	4"	19"	20" x 1 ¾"	13.5°
2"	2 ¼"	4 ½"	21"	22" x 2"	13.6°
2 ¼"	2 ½"	5"	23"	24" x 2 ¼"	13.7°

POLE ELEVATION

¼" or 3g pole

⅜" or 7g pole

¼"

⅜"

7/16" 5/16"

DETAIL H

⅛"

5/16" 1⅜"

Slot ⅜"

1¼"

⅝"

See Detail J

Tab ¼" dia x ⅜" out

¼ x 7/16 ①

MD-4

SECTION X-X

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

Back plate

Access Compartment

¼"

7/16"

Round Pole

Back plate

Access Compartment

¼"

7/16"

Polygonal Pole

DETAIL J

Burndy #KC22J12T13, Blackburn TTC, or approved equal. Will accept 4-#8, 2-#6 or 1-#4 max.

Split lockwasher, ½" stainless

Hex. nut, ½" - 13NC stainless

COPPER GROUND CONNECTOR

MD-2

pole thickness

2" dia threaded coupling - 2 per dual mast arm assembly

MD-1

②

SECTION V-V

Tab and slot

Ring, ⅜" x 2 ½" ASTM A572 Gr 50

Back plate ⅛" x 4½" x 1'-6 ⅜" steel strip M-1020 or sheet A-569

MD-5

1⅞"

12 circuit 600 volt compression Type HD terminal block (2 req'd)

#8-32 mtg. holes for optional 6 circuit terminal block

Phil. Pan HD. scres, #8-32 x 1¼" self-tap Type "F", stainless steel (4 req'd)

27"

X

X

½" clearance hole for copper ground connector

6"

#10-32 mtg. holes for luminaire double fuse block (see notes 3 & 4)

4" x 6" hand hole opening

Tab and slot

4¾"

ACCESS COMPARTMENT

L

R = 3" ±1"

D_B +1/16"

Bolt Hole Diameter

Slot Length

Bolt Circle Diameter

L

Adjustment Range

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 ¼" 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
1844	01	029	FM 1959

DIST	COUNTY	SHEET NO.
HOU	HARRIS	136

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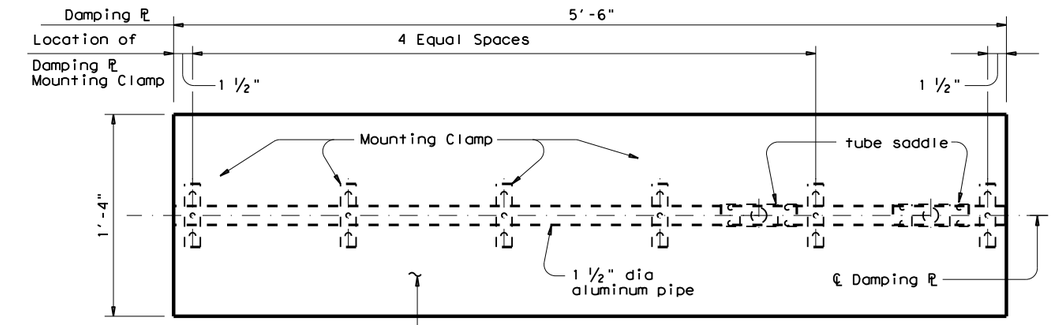
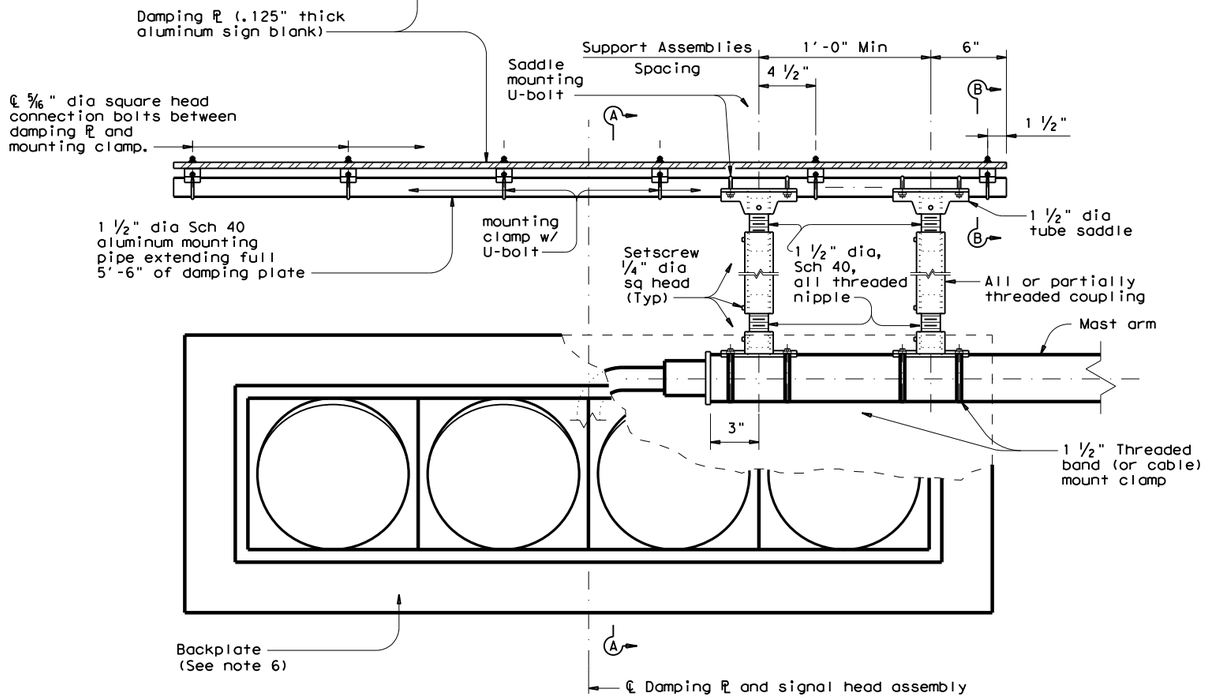


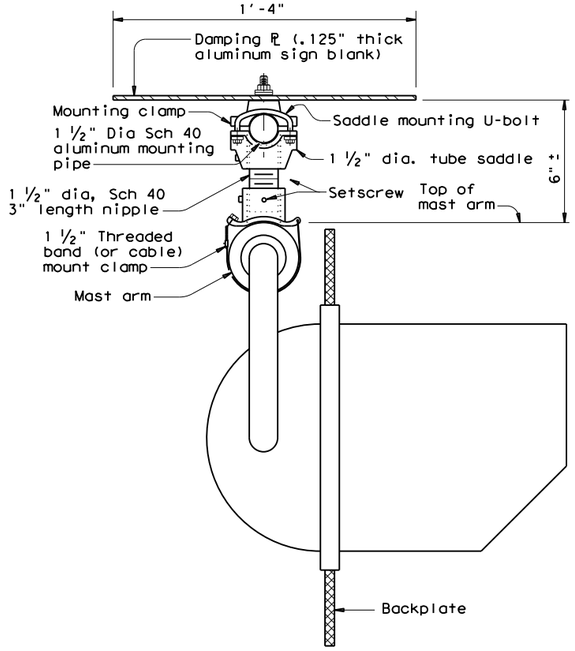
PLAN



ELEVATION

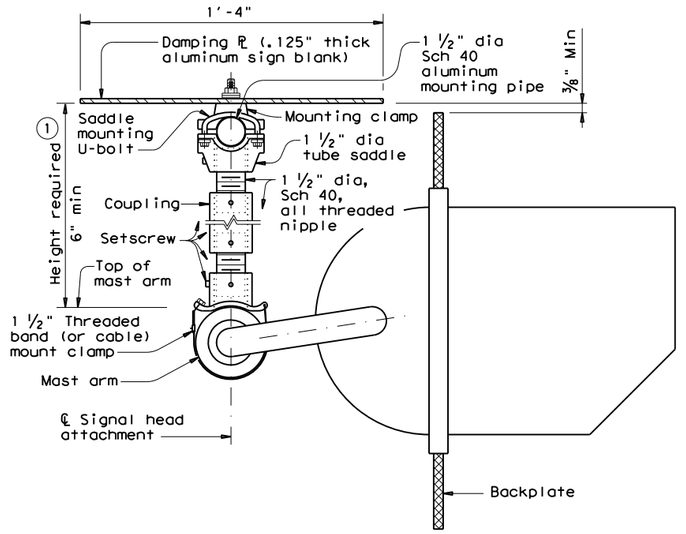
DAMPING PLATE MOUNTING DETAILS

(Showing alternate placement of signal head)



SECTION A-A

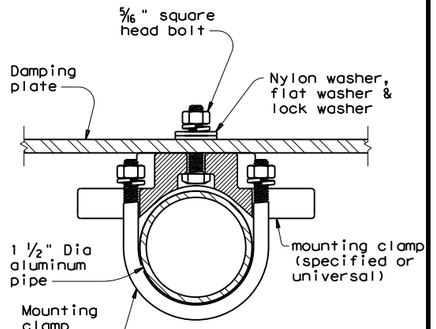
(Showing standard placement of signal head)
(Mounting clamp U-bolt is not shown for clarity)



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 January 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS	1844	01	029	FM 1959
6-20	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		137

DATE:
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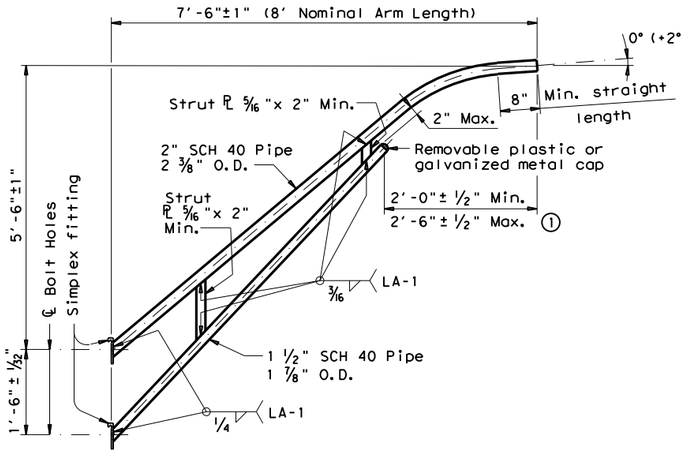
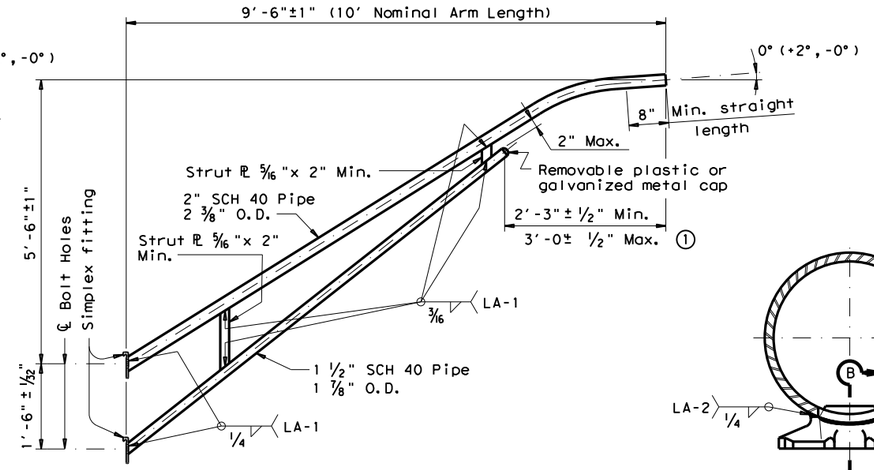


8-FOOT LUMINAIRE ARM



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.

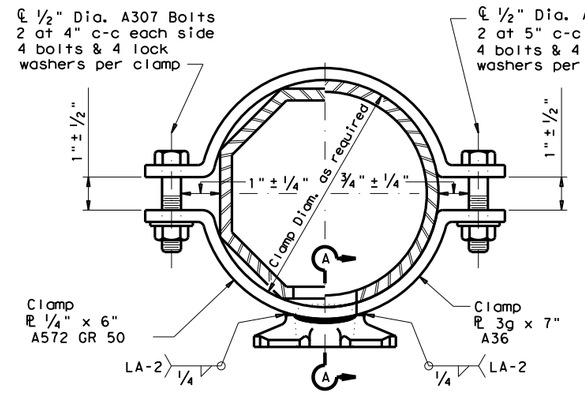
Materials and fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. In the absense of specified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

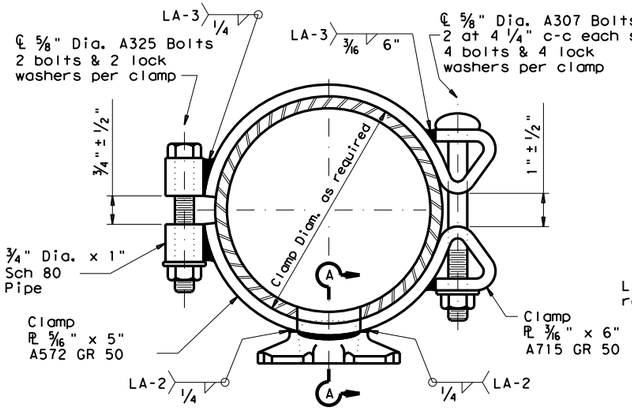
Each pole simplex fitting shall be supplied with 2 ASTM A325 bolts and 2 lock washers of the size specified. The bolts and lock washers shall be secured to the pole with the other hardware items called for in the plans. When clamp attachment is specified, the Fabricator shall ship the clamp assembly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



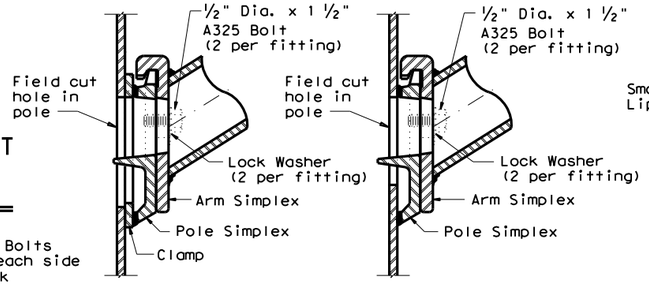
CLAMP ATTACHMENT DETAIL NO. 1 (HALF SECTION)

CLAMP ATTACHMENT DETAIL NO. 2 (HALF SECTION)



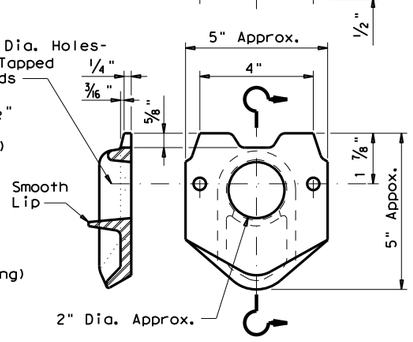
CLAMP ATTACHMENT DETAIL NO. 3 (HALF SECTION)

CLAMP ATTACHMENT DETAIL NO. 4 (HALF SECTION)

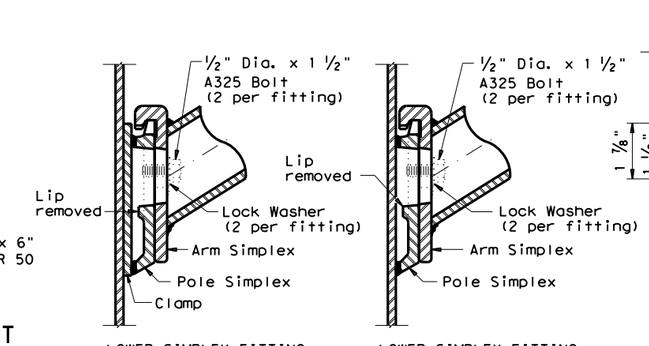


UPPER SIMPLEX FITTING

UPPER SIMPLEX FITTING



POLE SIMPLEX DETAIL

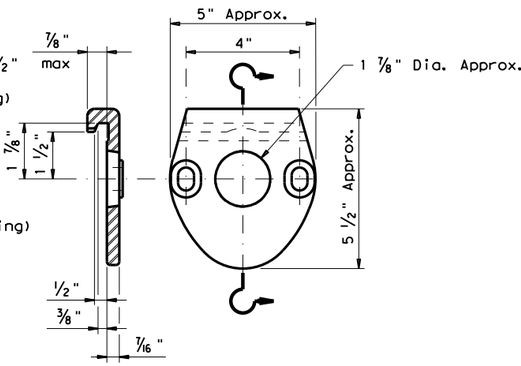


LOWER SIMPLEX FITTING

LOWER SIMPLEX FITTING

SECTON A-A

SECTON B-B



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
1844	01	029	FM 1959

DIST	COUNTY	SHEET NO.
HOU	HARRIS	138

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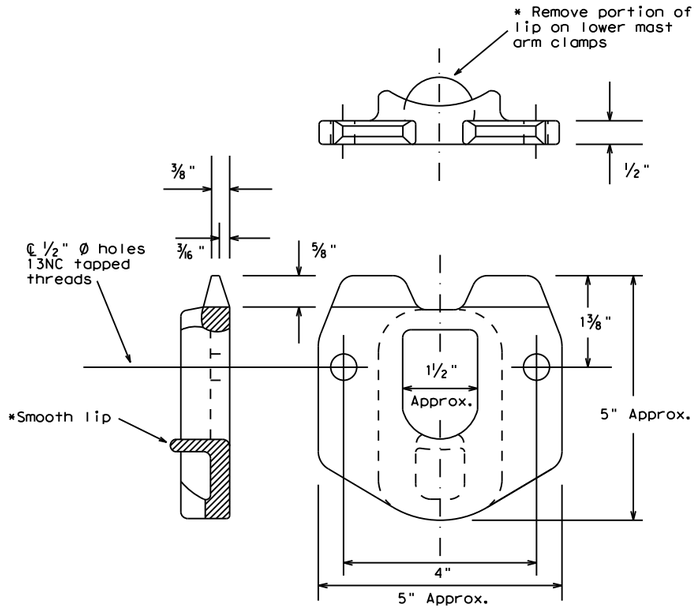
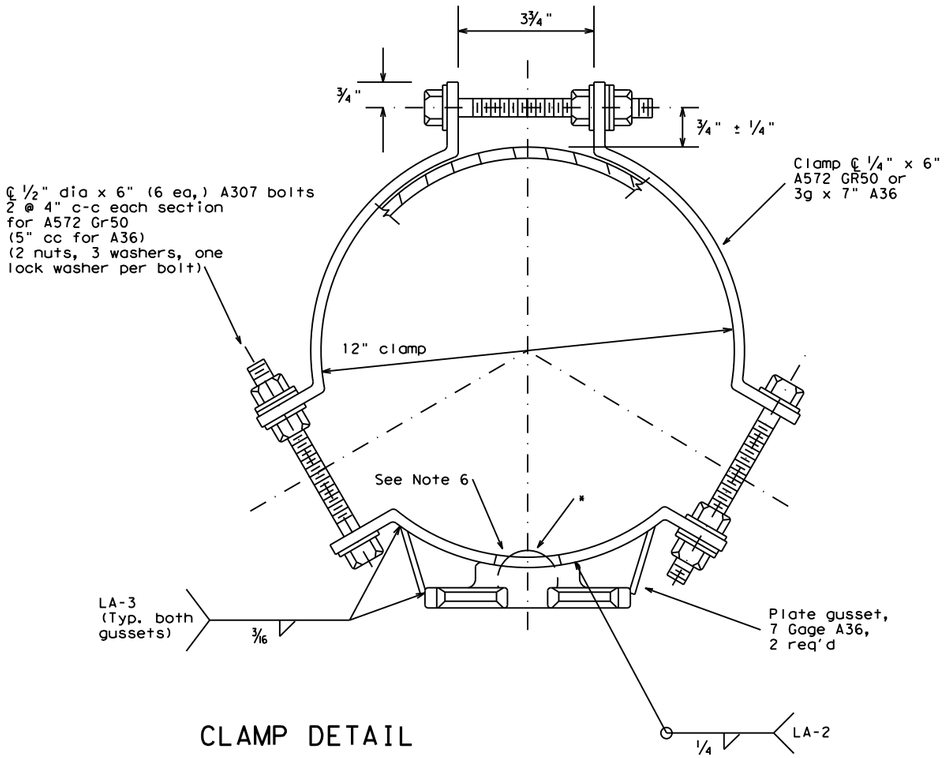


POLE SIMPLEX DETAILS



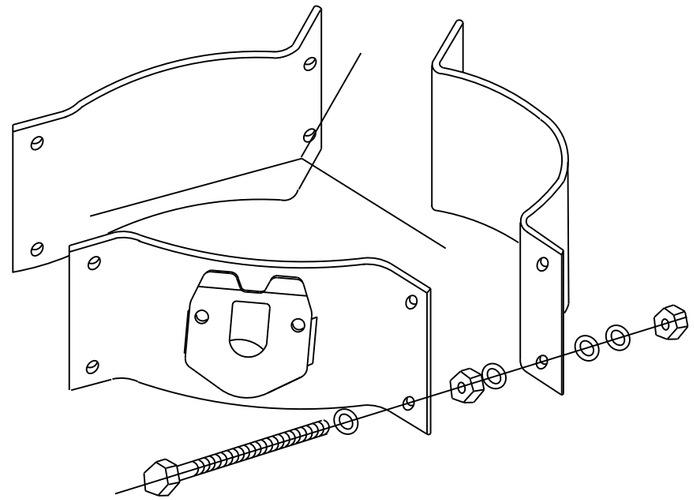
CLAMP DETAIL

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 preapproved 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, ½in. X 1½in. 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.



PROJECTION

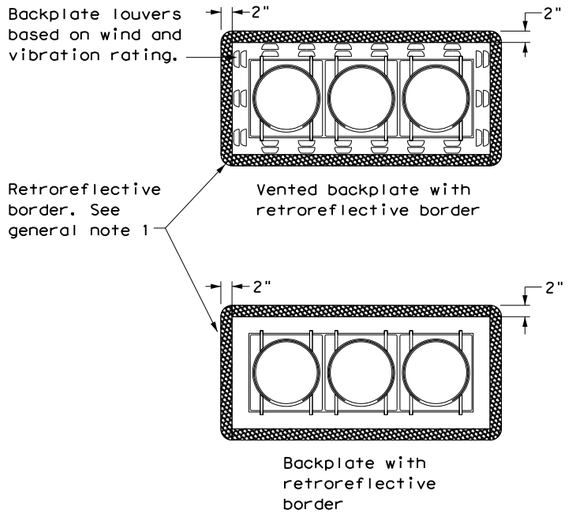
For 8.9 - 12 inch diameter Signal Poles
(Two req'd for each mast arm)

Texas Department of Transportation
Traffic Operations Division

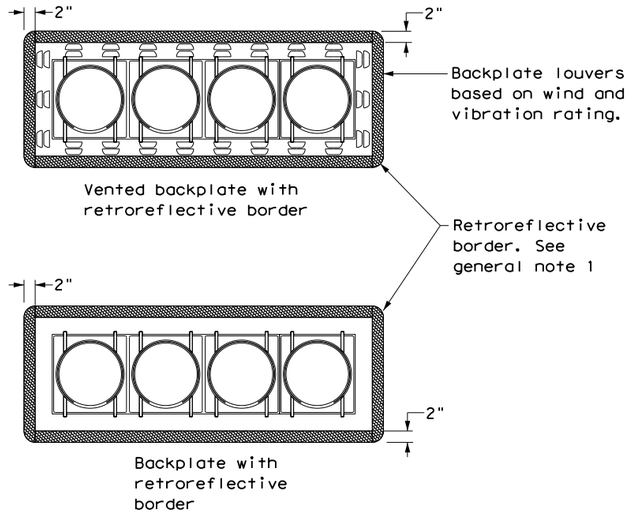
CLAMP ON FITTING ASSEMBLY FOR LUMINAIRE MAST ARM

CFA-12

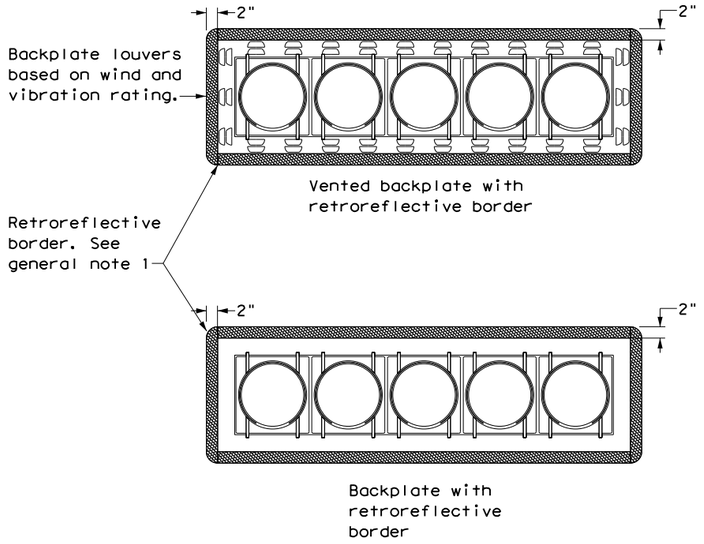
© TxDOT	DN: KAB	CK: RES	DW: FDN	CK: CAL
REVISIONS	CONT	SECT	JOB	HIGHWAY
11-99	1844	01	029	FM 1959
1-12	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		139



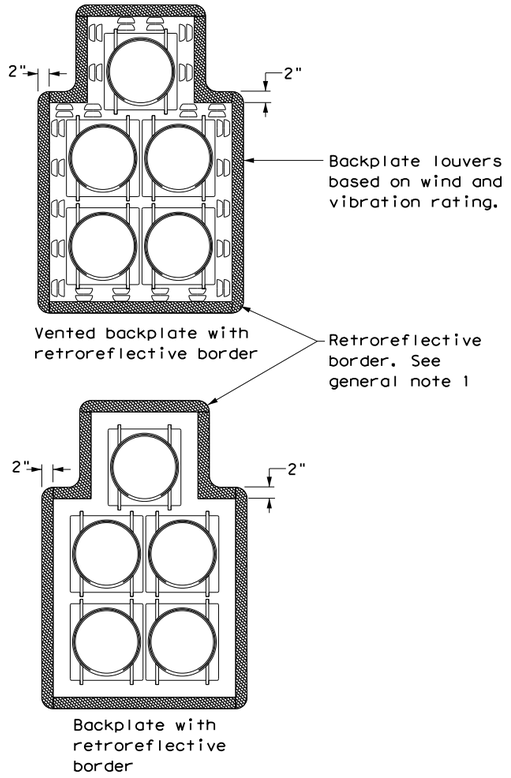
THREE-SECTION HEAD
HORIZONTAL OR VERTICAL



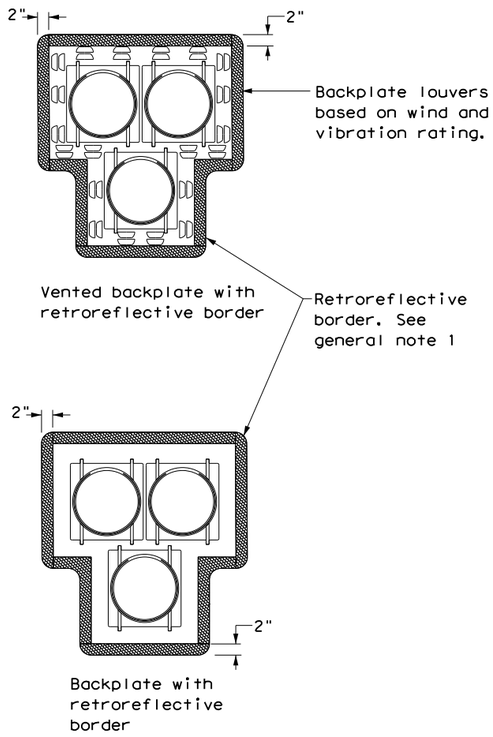
FOUR-SECTION HEAD
HORIZONTAL OR VERTICAL



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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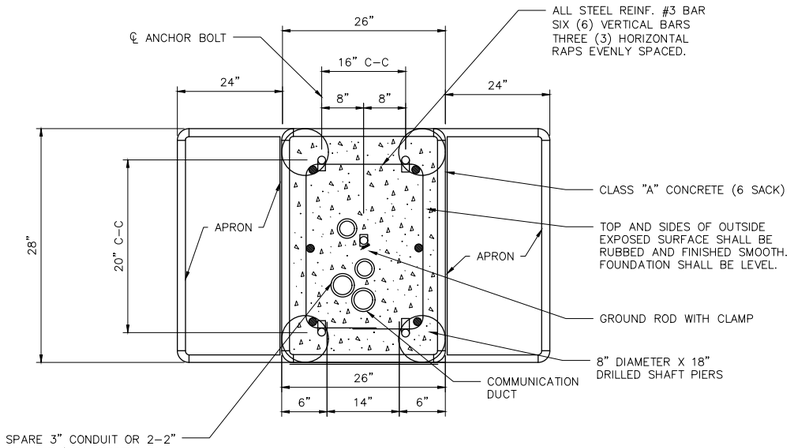
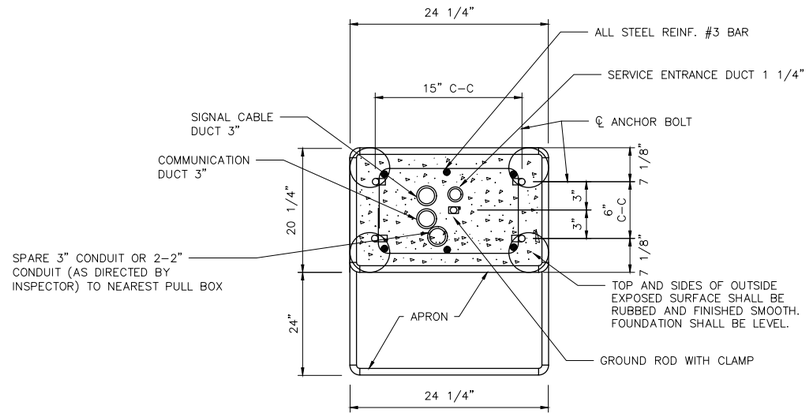
	HOU	HARRIS		140

DATE:
1844 01 029\STANDARDS\38- TS-BP-20.dgn
959



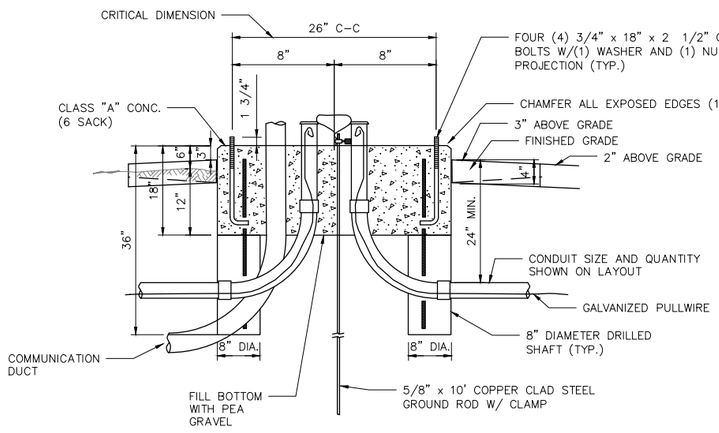
336 DETAIL
TOP VIEW



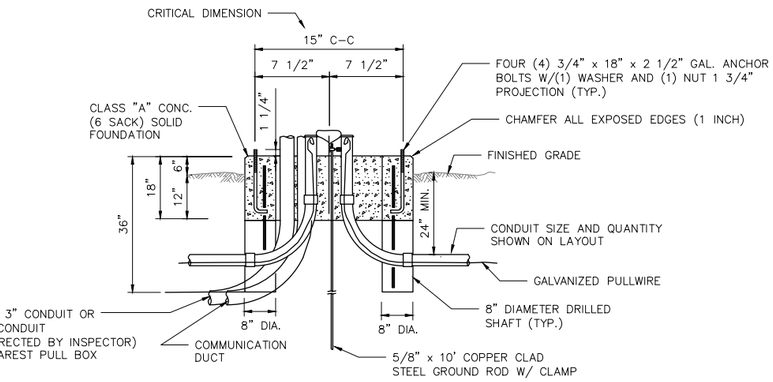
MODEL ITS 346 AND ATC 356i DETAIL
TOP VIEW

NOTES:

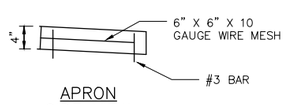
1. APRON TO BE INSTALLED IF NEEDED.



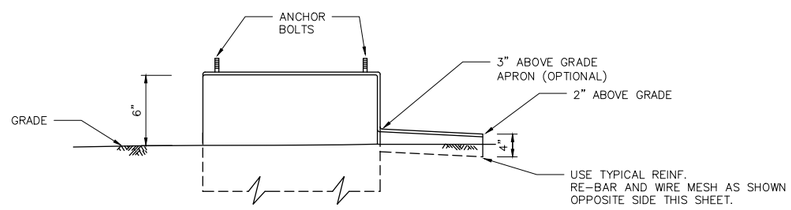
336 DETAIL
SIDE VIEW



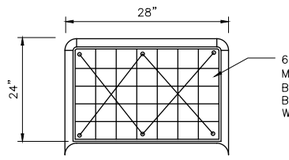
MODEL ITS 346 AND ATC 356i DETAIL
SIDE VIEW



APRON
SIDE VIEW



MODEL ITS 346 AND ATC 356i DETAIL



APRON DETAIL
TOP VIEW

APPROVED BY: DocuSigned by: Sukai Kanwar 9EFEB0C641F5478...	APPROVED BY: DocuSigned by: KHANG NGUYEN 95A29EFDA75B4CD...
CITY ENGINEER	CITY TRAFFIC ENGINEER
APPROVED BY: DocuSigned by: Carol Haddock A93C410B72B0452...	
DIRECTOR OF HOUSTON PUBLIC WORKS	
EFF DATE: NOV–27–2023	DWG NO: 16730–02

CITY OF HOUSTON
HOUSTON PUBLIC WORKS STANDARD

CONTROLLER FOUNDATIONS

SHEET 02 OF 03

DRAWING SCALE	FOR CITY OF HOUSTON USE ONLY
NOT TO SCALE	

SHEET NUMBER 141

I. STORMWATER POLLUTION PREVENTION

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

No Additional Comments

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS

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

☒ No United States Army Corps (USACE) Permit Required

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

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

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

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

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

☒ No United States Coast Guard (USCG) Coordination Required

☐ United States Coast Guard (USCG) Permit

☐ United States Coast Guard (USCG) Exemption

No Additional Comments

III. CULTURAL RESOURCES

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

No Additional Comments

IV. VEGETATION RESOURCES

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

No Additional Comments

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

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

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

No Additional Comments

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

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

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

No Additional Comments

VII. OTHER ENVIRONMENTAL ISSUES

Comments:

STATE OF TEXAS
SANJAY POKHAREL
140149
LICENSED
PROFESSIONAL ENGINEER

S. Pokharel P.E. 4/21/24

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	1844	01	029	FM 1959
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		142

Version 2.2

DATE: Oct 18, 2023
FILE:

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with the TPDES Construction General Permit TXR150000 (CGP). The Texas Department of Transportation (TxDOT) ensures that project specifications include adequate best management practices (BMPs) for this project.

For all projects with soil disturbing activity and for projects that have Environmental, Permits, Issues, and Commitments (EPICs) dependent on stormwater controls and water quality measures TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office, Area Office, or electronically.

This SWP3 is consistent with requirements specified in applicable stormwater plans and the projects environmental permits, issues, and commitments (EPICs). A copy of the CGP is included in Attachment 2.12 of the SWP3 binder.

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
CSJ: 1844-01-029

1.2 PROJECT LIMITS:
From: IH 45

To: SH 3

1.3 PROJECT COORDINATES:
BEGIN: (Lat) 29.5866° (N), (Long) 95.1843° (E)

END: (Lat) 29.6007° (N), (Long) 95.1769° (E)

1.4 TOTAL PROJECT AREA (Acres): 8.67 ACRES

1.5 TOTAL AREA TO BE DISTURBED (Acres): 2.058

1.6 NATURE OF CONSTRUCTION ACTIVITY:
For the construction of miscellaneous work consisting of 5'-6' sidewalks along north and south side of FM 1959, ADA curbs and reconstruction of driveways.

1.7 MAJOR SOIL TYPES:

Soil Type	Description
Bernard Clay Loam, 0 to 1% slopes	90% clay, 10% other types, somewhat poorly drained, high rate runoff
Lake Charles Clay, 0 to 1% slopes	100% clay, moderately well drained, high rate runoff

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):
PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

☐ PSLs determined during preconstruction meeting
☐ PSLs determined during construction
☒ No PSLs planned for construction

Type	Sheet #s

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

1.9 CONSTRUCTION ACTIVITIES:
(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.5.)

☒ Mobilization
☒ Install sediment and erosion controls
☒ Blade existing topsoil into windrows, prep ROW, clear and grub
☐ Remove existing pavement
☒ Grading operations, excavation, and embankment
☐ Excavate and prepare subgrade for proposed pavement widening
☒ Remove existing culverts, safety end treatments (SETs)
☐ Remove existing metal beam guard fence (MBGF), bridge rail
☐ Install proposed pavement per plans
☒ Install culverts, culvert extensions, SETs
☐ Install mow strip, MBGF, bridge rail
☐ Place flex base
☒ Rework slopes, grade ditches
☒ Blade windrowed material back across slopes
☒ Revegetation of unpaved areas
☒ Achieve site stabilization and remove sediment and erosion control measures
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

☒ Sediment laden stormwater from stormwater conveyance over disturbed area
☒ Fuels, oils, and lubricants from construction vehicles, equipment, and storage
☒ Solvents, paints, adhesives, etc. from various construction activities
☒ Transported soils from offsite vehicle tracking
☒ Construction debris and waste from various construction activities
☐ Contaminated water from excavation or dewatering pump-out water
☐ Sanitary waste from onsite restroom facilities
☒ Trash from various construction activities/receptacles
☒ Long-term stockpiles of material and waste
☒ Discharges from concrete washout activities, runoff from concrete cutting activities, and other concrete related activities.
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.11 RECEIVING WATERS:
Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody
Clear Creek Above Tidal, Turkey Creek	*Clear Creek Above Tidal (1102*02) Impaired for bacteria (Recreation Use) *Turkey Creek (1102D) Impaired for bacteria (Recreation Use) San Jacinto-Brazos Coastal Basin

* Add (*) for impaired waterbodies with pollutant in ().

1.12 ROLES AND RESPONSIBILITIES: TxDOT

☒ Development of plans and specifications
☒ Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
☒ Post Construction Site Notice
☒ Submit NOI/CSN to local MS4
☒ Perform SWP3 inspections
☒ Maintain SWP3 records and update to reflect daily operations
☒ Complete and submit Notice of Termination to TCEQ
☒ Maintain SWP3 records for 3 years
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

☒ Day To Day Operational Control
☒ Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
☒ Post Construction Site Notice
☒ Submit NOI/CSN to local MS4
☒ Maintain schedule of major construction activities
☒ Install, maintain and modify BMPs
☒ Complete and submit Notice of Termination to TCEQ
☒ Maintain SWP3 records for 3 years
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.14 LOCAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) OPERATOR COORDINATION:

MS4 Entity
City of Houston
Harris County

STATE OF TEXAS
SANJAY POKHAREL
140149
LICENSED PROFESSIONAL ENGINEER

SANJAY POKHAREL, P.E. 4/17/2024

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

July 2023 Sheet 1 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			143
STATE	STATE DIST.	COUNTY	
TEXAS	HOU	HARRIS	
CONT.	SECT.	JOB	HIGHWAY NO.
1844	01	029	FM 1959

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

- [X] [X] Protection of Existing Vegetation
- [ ] [ ] Vegetated Buffer Zones
- [ ] [ ] Soil Retention Blankets
- [ ] [ ] Geotextiles
- [X] [ ] Mulching/ Hydromulching
- [ ] [ ] Soil Surface Treatments
- [ ] [ ] Temporary Seeding
- [ ] [X] Permanent Planting, Sodding or Seeding
- [ ] [ ] Biodegradable Erosion Control Logs
- [ ] [ ] Rock Filter Dams/ Rock Check Dams
- [ ] [ ] Vertical Tracking
- [ ] [ ] Interceptor Swale
- [ ] [ ] Riprap
- [ ] [ ] Diversion Dike
- [ ] [ ] Temporary Pipe Slope Drain
- [ ] [ ] Embankment for Erosion Control
- [ ] [ ] Paved Flumes
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

- [X] [ ] Biodegradable Erosion Control Logs
- [ ] [ ] Dewatering Controls
- [X] [ ] Inlet Protection
- [ ] [ ] Rock Filter Dams/ Rock Check Dams
- [ ] [ ] Sandbag Berms
- [X] [ ] Sediment Control Fence
- [X] [ ] Stabilized Construction Exit
- [ ] [ ] Floating Turbidity Barrier
- [ ] [ ] Vegetated Buffer Zones
- [ ] [ ] Vegetated Filter Strips
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

Sediment control BMPs requiring design capacity calculations (See SWP3 Attachment 1.3.):

T / P

- [ ] [ ] Sediment Trap
  - [ ] Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
  - [ ] 3,600 cubic feet of storage per acre drained
- [ ] [ ] Sedimentation Basin
  - [ ] Not required (<10 acres disturbed)
  - [ ] Required (>10 acres) and implemented.
    - [ ] Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
    - [ ] 3,600 cubic feet of storage per acre drained
  - [ ] Required (>10 acres), but not feasible due to:
    - [ ] Available area/Site geometry
    - [ ] Site slope/Drainage patterns
    - [ ] Site soils/Geotechnical factors
    - [ ] Public safety
    - [ ] Other: _____

2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To
Block sodding	101+40.00	156+88.37

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- [X] Excess dirt/mud on road removed daily
- [X] Haul roads dampened for dust control
- [X] Loaded haul trucks to be covered with tarpaulin
- [X] Stabilized construction exit
- [X] Daily street sweeping
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- [X] Chemical Management
- [X] Concrete and Materials Waste Management
- [X] Debris and Trash Management
- [X] Dust Control
- [X] Sanitary Facilities
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- [X] Fire hydrant flushings
- [X] Irrigation drainage
- [X] Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- [X] Potable water sources
- [X] Springs
- [X] Uncontaminated groundwater
- [X] Water used to wash vehicles or control dust
- [X] Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 DEWATERING:

Dewatering discharges of accumulated stormwater, groundwater, and surface water including discharges from dewatering of trenches, excavations, foundations, vaults, and other points of accumulation are prohibited unless managed by appropriate controls to prevent and minimize the offsite discharge of sediment and other pollutants.

2.9 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

When dewatering activities are present, a daily inspection will be conducted once per day during those activities and documented in accordance with CGP and TxDOT requirements.

2.10 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

STATE OF TEXAS
SANJAY POKHAREL
140149
LICENSED PROFESSIONAL ENGINEER

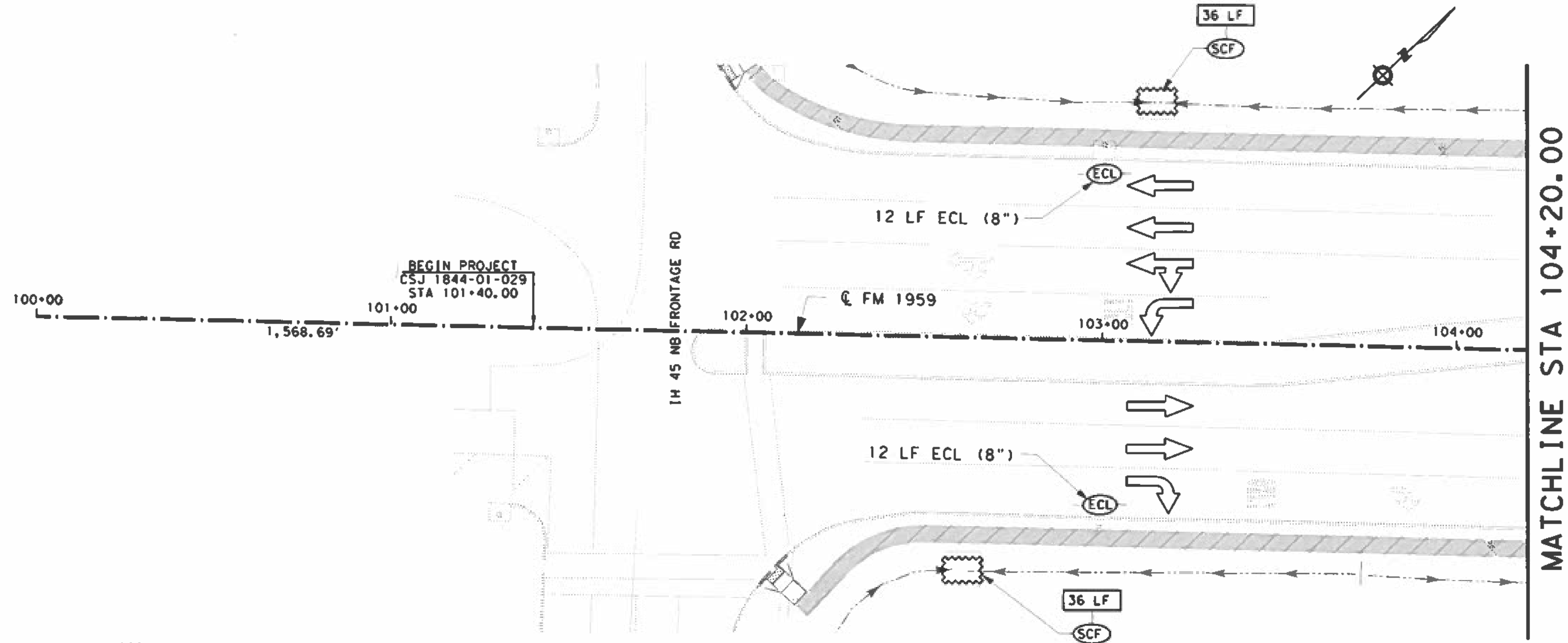
SANJAY POKHAREL, P.E. 4/17/2024

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

July 2023 Sheet 2 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			144
STATE	STATE DIST.	COUNTY	
TEXAS	HOU	HARRIS	
CONT.	SECT.	JOB	HIGHWAY NO.
1844	01	029	FM 1959



LEGEND:

- TRAFFIC FLOW DIRECTION
- X — DRIVEWAY NUMBER
- PROPOSED CONSTRUCTION
- SEDIMENT CONTROL FENCE (SCF)
- (ECL) — BIODEGRADABLE EROSION CONTROL LOGS (8")
- (CL-D) — BIODEGRADABLE EROSION CONTROL LOGS DAM (12")
- CONSTRUCTION EXIT(TY I)
- DIRECTION OF FLOW

NOTES:

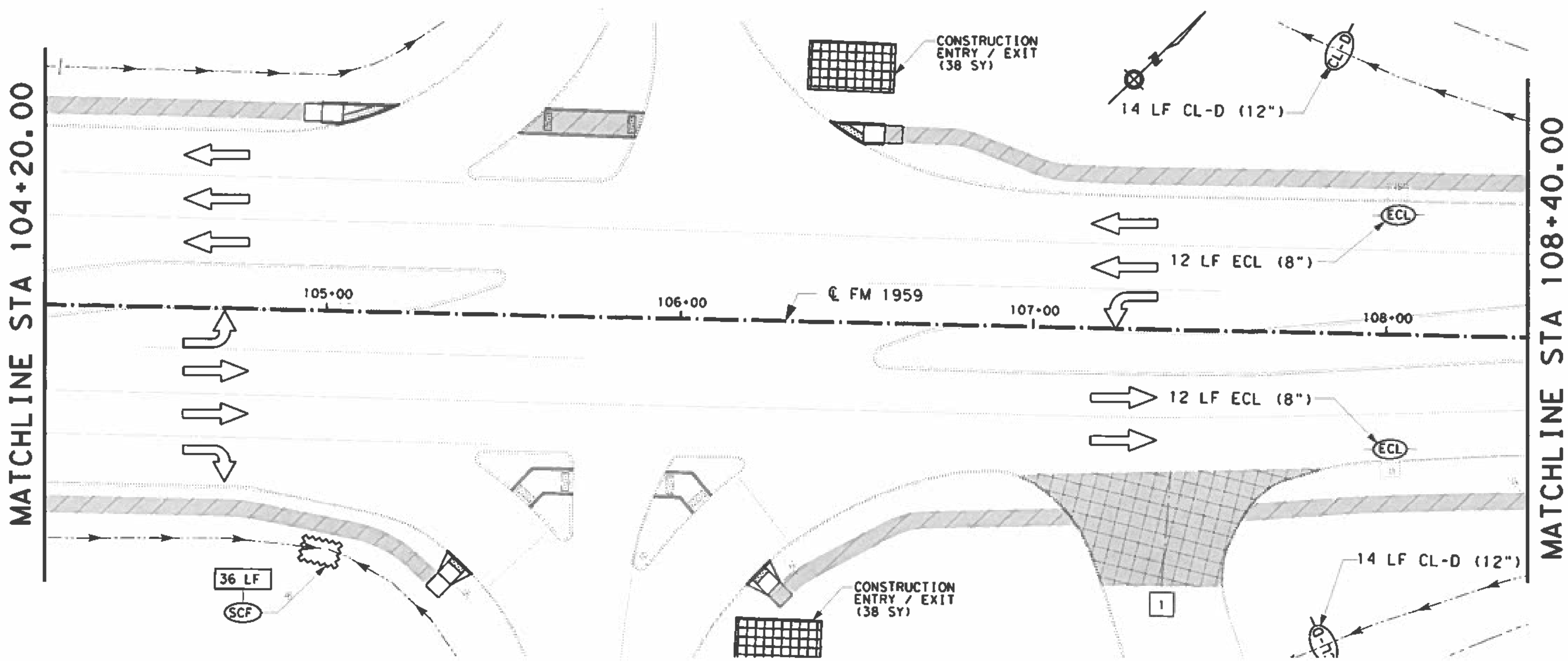
1. ALL EROSION CONTROL MEASURES ARE TO REMAIN IN PLACE UNTIL CONSTRUCTION IS COMPLETE, UNLESS OTHERWISE STATED.
2. SEE SW3P STANDARD SHEET FOR DETAILS.
3. TEMPORARY CONSTRUCTION EXITS ARE TO BE PLACED ALONG THE PROJECT DURING EACH PHASE FOR EACH DISTURBED AREA. THE LOCATION OF THESE CONSTRUCTION EXITS ARE TO BE APPROVED BY THE ENGINEER.

ESTIMATED QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
506	6020	CONSTRUCTION EXITS (INSTALL)(TY I)	SY	76
506	6024	CONSTRUCTION EXITS (REMOVE)	SY	76
506	6038	TEMPORARY SEDIMENT CONTROL FENCE (INSTALL)	LF	108
506	6039	TEMPORARY SEDIMENT CONTROL FENCE (REMOVE)	LF	108

ESTIMATED QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
506	6040	BIODEG EROSN CONT LOGS (INSTALL) 8"	LF	48
506	6041	BIODEG EROSN CONT LOGS (INSTALL) 12"	LF	28
506	6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	76



STATE OF TEXAS
SANJAY POKHAREL
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LICENSED PROFESSIONAL ENGINEER

Pokharel P.E.

SANJAY POKHAREL, P.E. 4/29/2024

TEXAS DEPARTMENT OF TRANSPORTATION

FM 1959
STORM WATER POLLUTION PREVENTION PLAN
(BEGIN TO STA 108+40.00)

SCALE: 1"=40' SHEET 1 OF 7 SHEETS

DN: MGA	DRAWING FILE NAME:	FED. RD. DIV. NO.	STATE	PROJECT NO.	HIGHWAY NO.
CK:		6	TX		FM 1959
DN: MGA	REVISIONS:	STATE DIST. NO	COUNTY	CONTROL NO. / SECTION NO. / JOB NO.	SHEET NO.
CK: / TR: / CK:		12	HARRIS	1844 / 01 / 029	145

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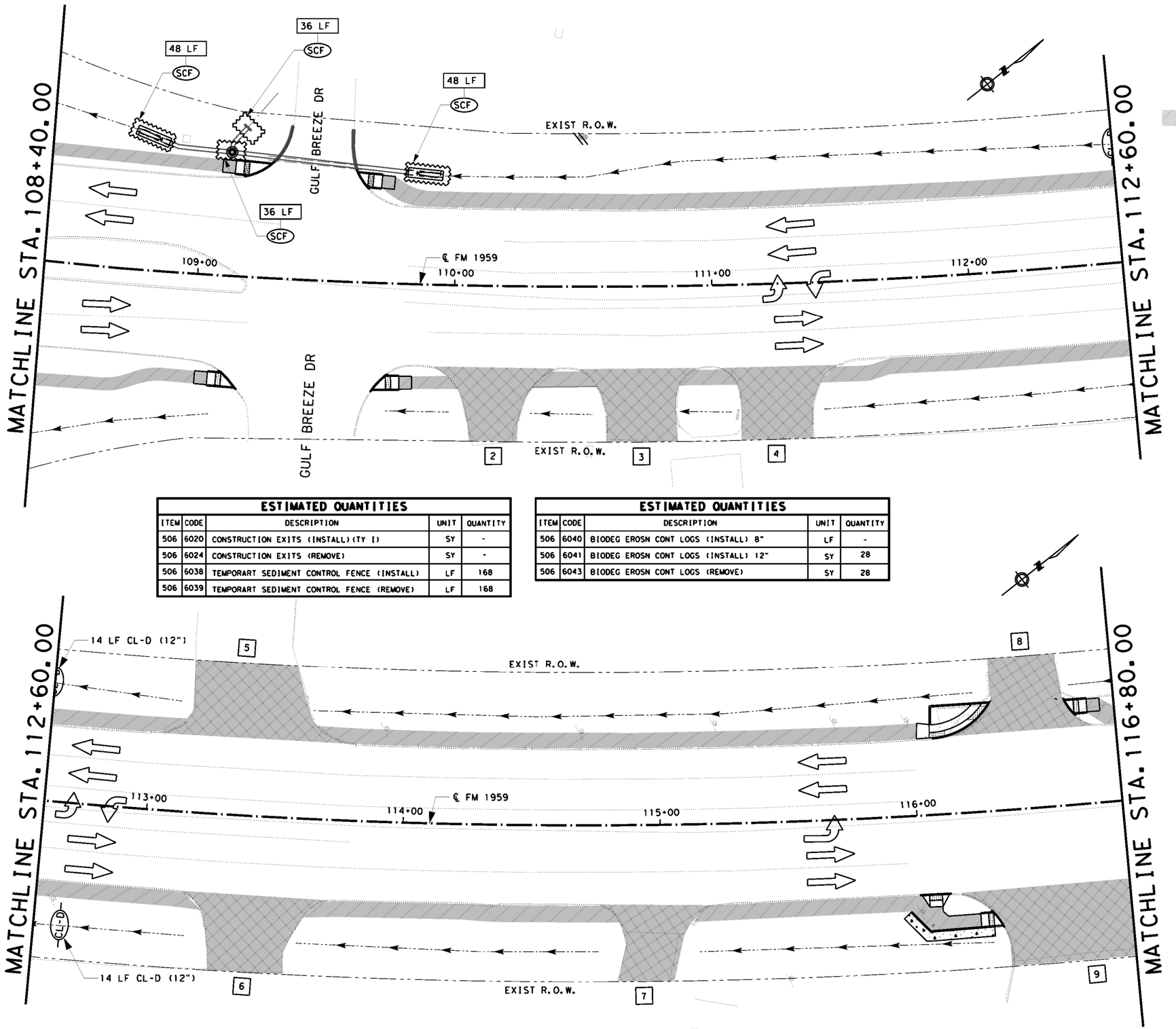

LEGEND:

- TRAFFIC FLOW DIRECTION
- X — DRIVEWAY NUMBER
- PROPOSED CONSTRUCTION
- SEDIMENT CONTROL FENCE (SCF)
- ECL — BIODEGRADABLE EROSION CONTROL LOGS (8")
- CL-D — BIODEGRADABLE EROSION CONTROL LOGS DAM (12")
- CONSTRUCTION EXIT(TY I)
- DIRECTION OF FLOW

NOTES:

1. ALL EROSION CONTROL MEASURES ARE TO REMAIN IN PLACE UNTIL CONSTRUCTION IS COMPLETE, UNLESS OTHERWISE STATED.
2. SEE SW3P STANDARD SHEET FOR DETAILS.
3. TEMPORARY CONSTRUCTION EXITS ARE TO BE PLACED ALONG THE PROJECT DURING EACH PHASE FOR EACH DISTURBED AREA. THE LOCATION OF THESE CONSTRUCTION EXITS ARE TO BE APPROVED BY THE ENGINEER.

ESTIMATED QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
506	6020	CONSTRUCTION EXITS (INSTALL)(TY I)	SY	-
506	6024	CONSTRUCTION EXITS (REMOVE)	SY	-
506	6038	TEMPORART SEDIMENT CONTROL FENCE (INSTALL)	LF	168
506	6039	TEMPORART SEDIMENT CONTROL FENCE (REMOVE)	LF	168

ESTIMATED QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
506	6040	BIODEG EROSN CONT LOGS (INSTALL) 8"	LF	-
506	6041	BIODEG EROSN CONT LOGS (INSTALL) 12"	SY	28
506	6043	BIODEG EROSN CONT LOGS (REMOVE)	SY	28

STATE OF TEXAS
SANJAY POKHAREL
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LICENSED
PROFESSIONAL ENGINEER

SANJAY POKHAREL, P.E. 4/29/2024

TEXAS DEPARTMENT OF TRANSPORTATION

FM 1959
STORM WATER POLLUTION PREVENTION PLAN
(STA 108+40.00 TO STA 116+80.00)

SCALE: 1"=40' SHEET 2 OF 7 SHEETS

DIST	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
12	HARRIS	1844	01	029	146

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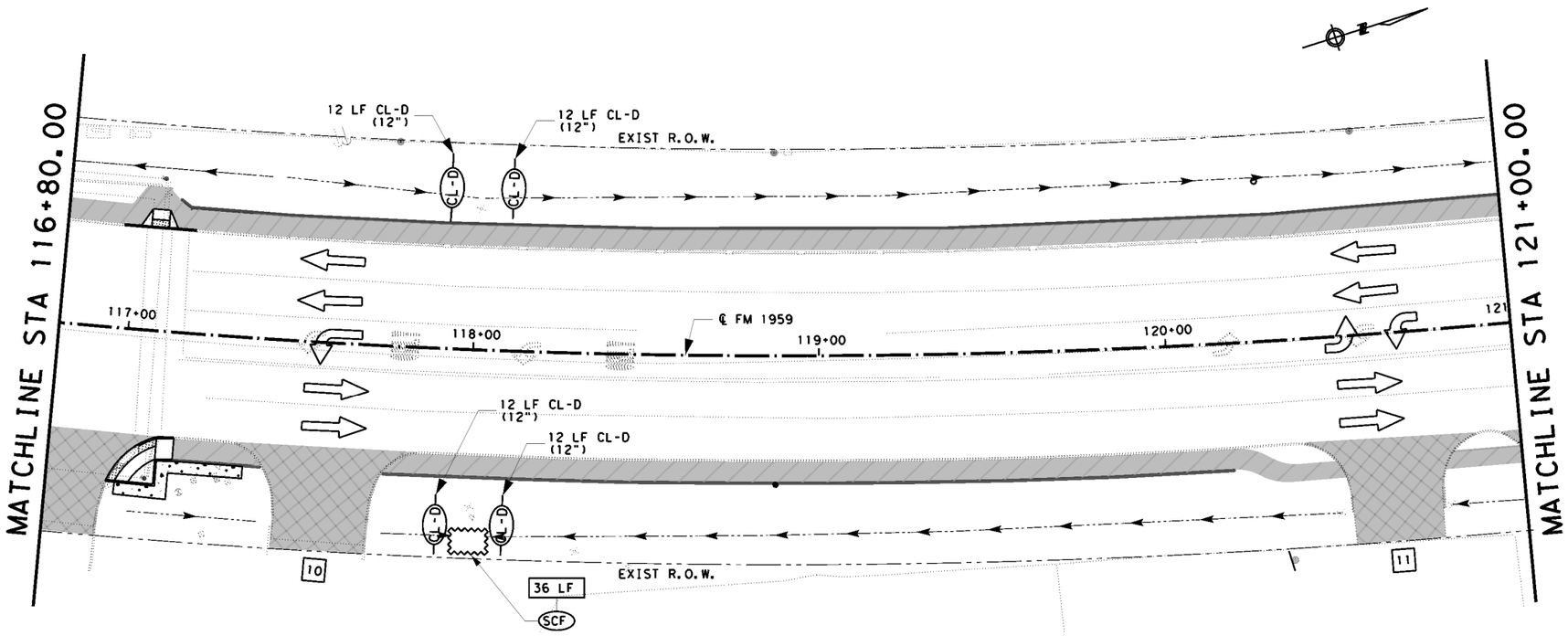

LEGEND:

- TRAFFIC FLOW DIRECTION
- X — DRIVEWAY NUMBER
- PROPOSED CONSTRUCTION
- SEDIMENT CONTROL FENCE (SCF)
- ECL — BIODEGRADABLE EROSION CONTROL LOGS (8")
- CL-D — BIODEGRADABLE EROSION CONTROL LOGS DAM (12")
- CONSTRUCTION EXIT(TY I)
- DIRECTION OF FLOW

NOTES:

1. ALL EROSION CONTROL MEASURES ARE TO REMAIN IN PLACE UNTIL CONSTRUCTION IS COMPLETE, UNLESS OTHERWISE STATED.
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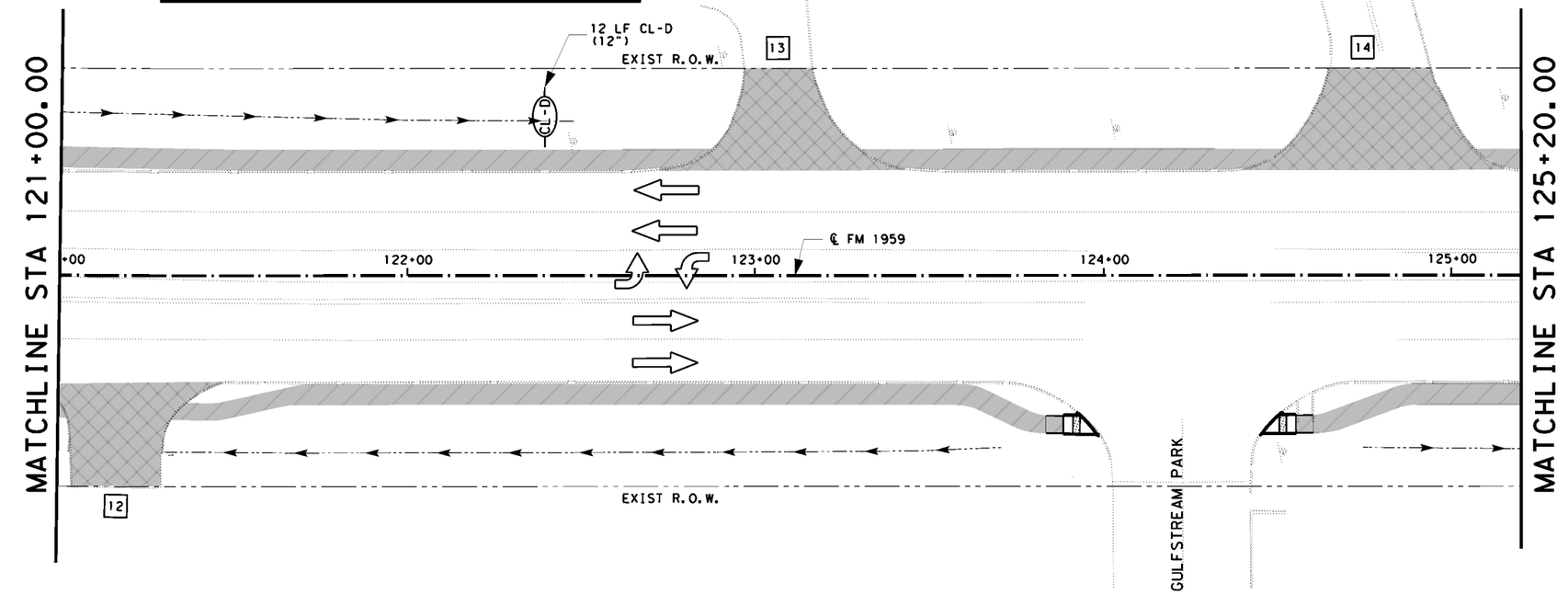
3. TEMPORARY CONSTRUCTION EXITS ARE TO BE PLACED ALONG THE PROJECT DURING EACH PHASE FOR EACH DISTURBED AREA. THE LOCATION OF THESE CONSTRUCTION EXITS ARE TO BE APPROVED BY THE ENGINEER.

ESTIMATED QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
506	6020	CONSTRUCTION EXITS (INSTALL)(TY I)	SY	-
506	6021	CONSTRUCTION EXITS (REMOVE)	SY	-
506	6038	TEMPORARY SEDIMENT CONTROL FENCE (INSTALL)	LF	36
506	6039	TEMPORARY SEDIMENT CONTROL FENCE (REMOVE)	LF	36

ESTIMATED QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
506	6040	BIODEG EROSN CONT LOGS (INSTALL) 8"	LF	-
506	6041	BIODEG EROSN CONT LOGS (INSTALL) 12"	LF	60
506	6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	60



STATE OF TEXAS
SANJAY POKHAREL
140149
LICENSED PROFESSIONAL ENGINEER

SANJAY POKHAREL, P.E. 4/29/2024

TEXAS DEPARTMENT OF TRANSPORTATION

FM 1959
STORM WATER POLLUTION PREVENTION PLAN
(STA 116+80.00 TO STA 125+20.00)

SCALE: 1"=40' SHEET 3 OF 7 SHEETS

DN: MGA	CK:	DW: MGA	CK:	TRF:	CK:
DRAWING FILE NAME:		REVISIONS:			

FED.RD. DIV.NO.	STATE	PROJECT NO.	FEDERAL NO.
6	TX		FM 1959

STATE DIST. NO	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
12	HARRIS	1844	01	029	147

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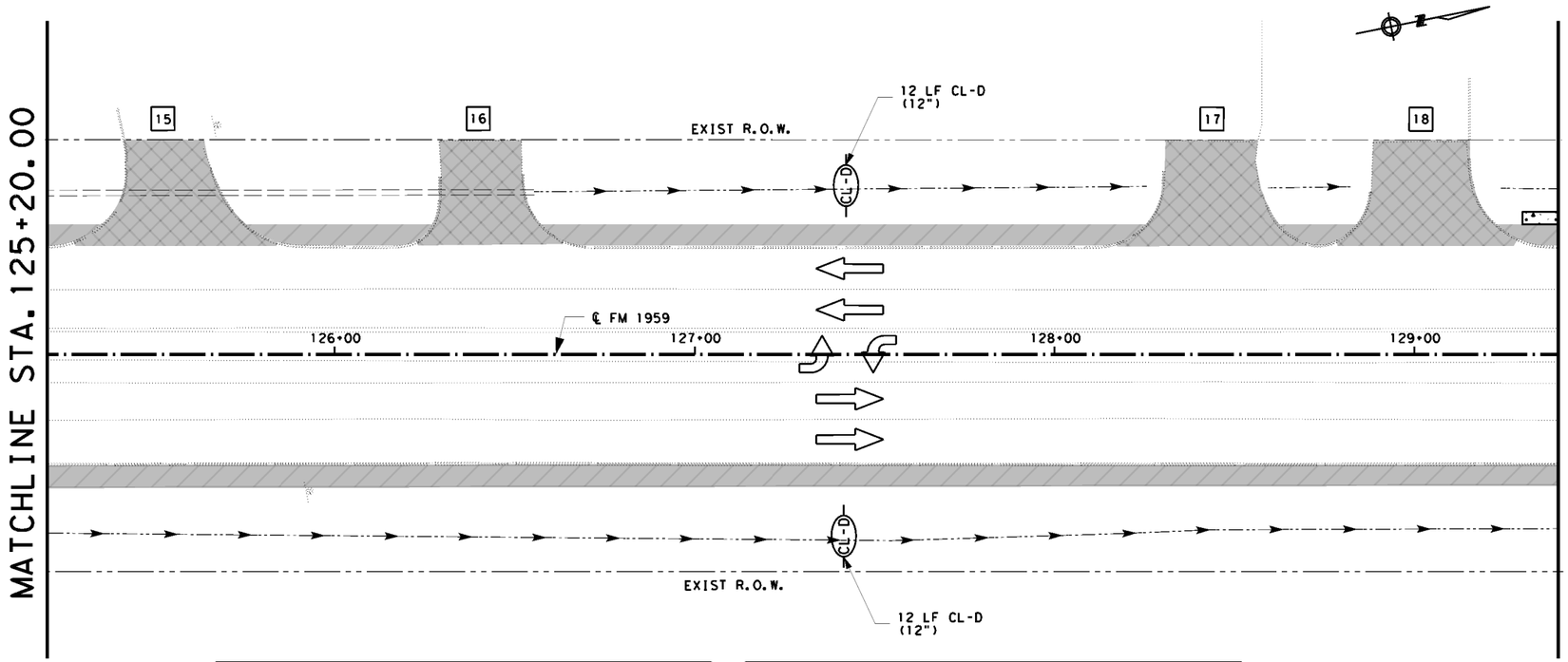


LEGEND:

- TRAFFIC FLOW DIRECTION
- X — DRIVEWAY NUMBER
- PROPOSED CONSTRUCTION
- SEDIMENT CONTROL FENCE (SCF)
- ECL — BIODEGRADABLE EROSION CONTROL LOGS (8")
- CL-D — BIODEGRADABLE EROSION CONTROL LOGS DAM (12")
- CONSTRUCTION EXIT(TY I)
- DIRECTION OF FLOW

NOTES:

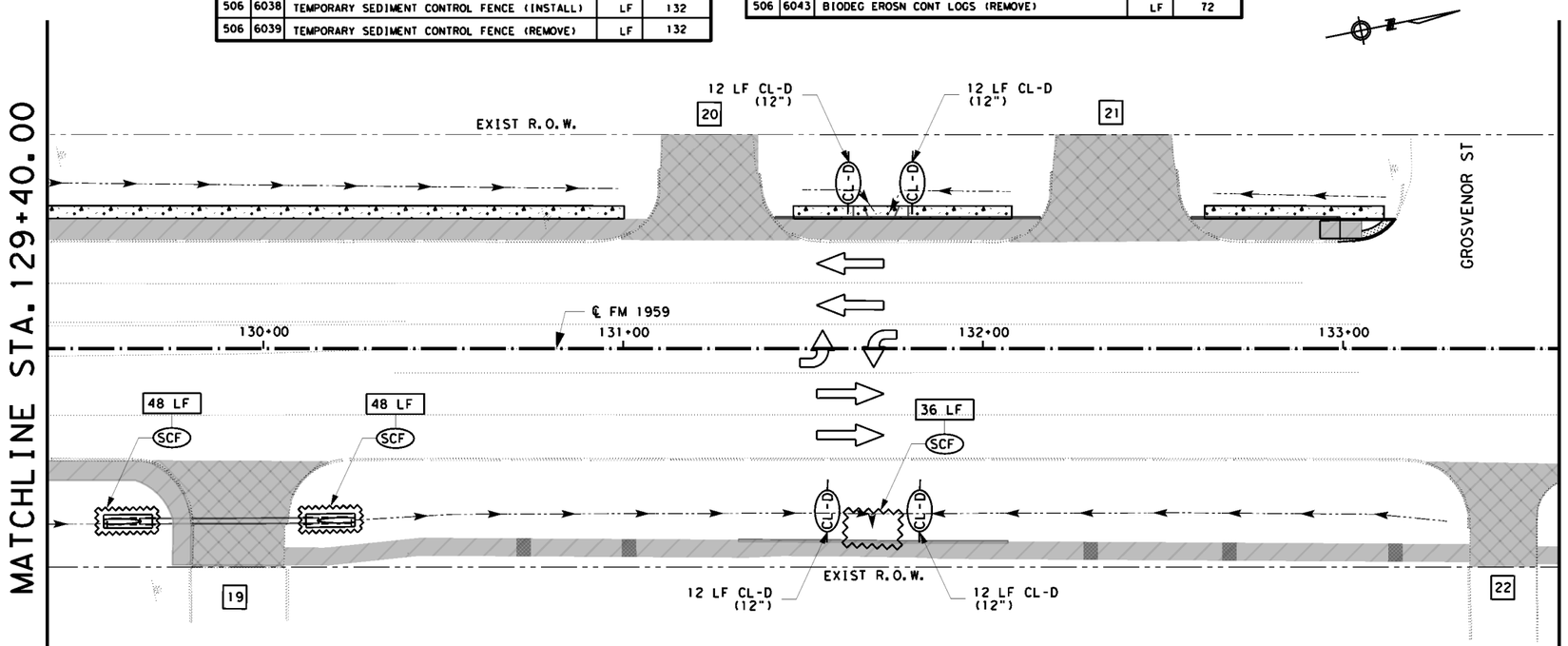
1. ALL EROSION CONTROL MEASURES ARE TO REMAIN IN PLACE UNTIL CONSTRUCTION IS COMPLETE, UNLESS OTHERWISE STATED.
2. SEE SW3P STANDARD SHEET FOR DETAILS.
3. TEMPORARY CONSTRUCTION EXITS ARE TO BE PLACED ALONG THE PROJECT DURING EACH PHASE FOR EACH DISTURBED AREA. THE LOCATION OF THESE CONSTRUCTION EXITS ARE TO BE APPROVED BY THE ENGINEER.

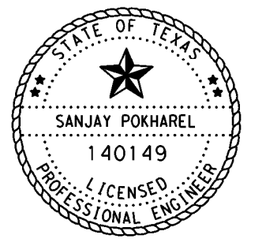
ESTIMATED QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
506	6020	CONSTRUCTION EXITS (INSTALL)(TY I)	SY	-
506	6024	CONSTRUCTION EXITS (REMOVE)	SY	-
506	6038	TEMPORARY SEDIMENT CONTROL FENCE (INSTALL)	LF	132
506	6039	TEMPORARY SEDIMENT CONTROL FENCE (REMOVE)	LF	132

ESTIMATED QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
506	6040	BIODEG EROSN CONT LOGS (INSTALL) 8"	LF	-
506	6041	BIODEG EROSN CONT LOGS (INSTALL) 12"	LF	72
506	6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	72





SANJAY POKHAREL, P.E. 4/29/2024

TEXAS DEPARTMENT OF TRANSPORTATION

FM 1959
STORM WATER POLLUTION PREVENTION PLAN
(STA 125+20.00 TO STA 133+60.00)

SCALE: 1"=40' SHEET 4 OF 7 SHEETS

DN: MGA	DRAWING FILE NAME:	DIST. NO.	STATE	PROJECT NO.				REVISION NO.
CK:		6	TX					FM 1959
DW: MGA	REVISIONS:	STATE DIST. NO	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
CK:		12	HARRIS	1844	01	029		148
TR:								
CK:								

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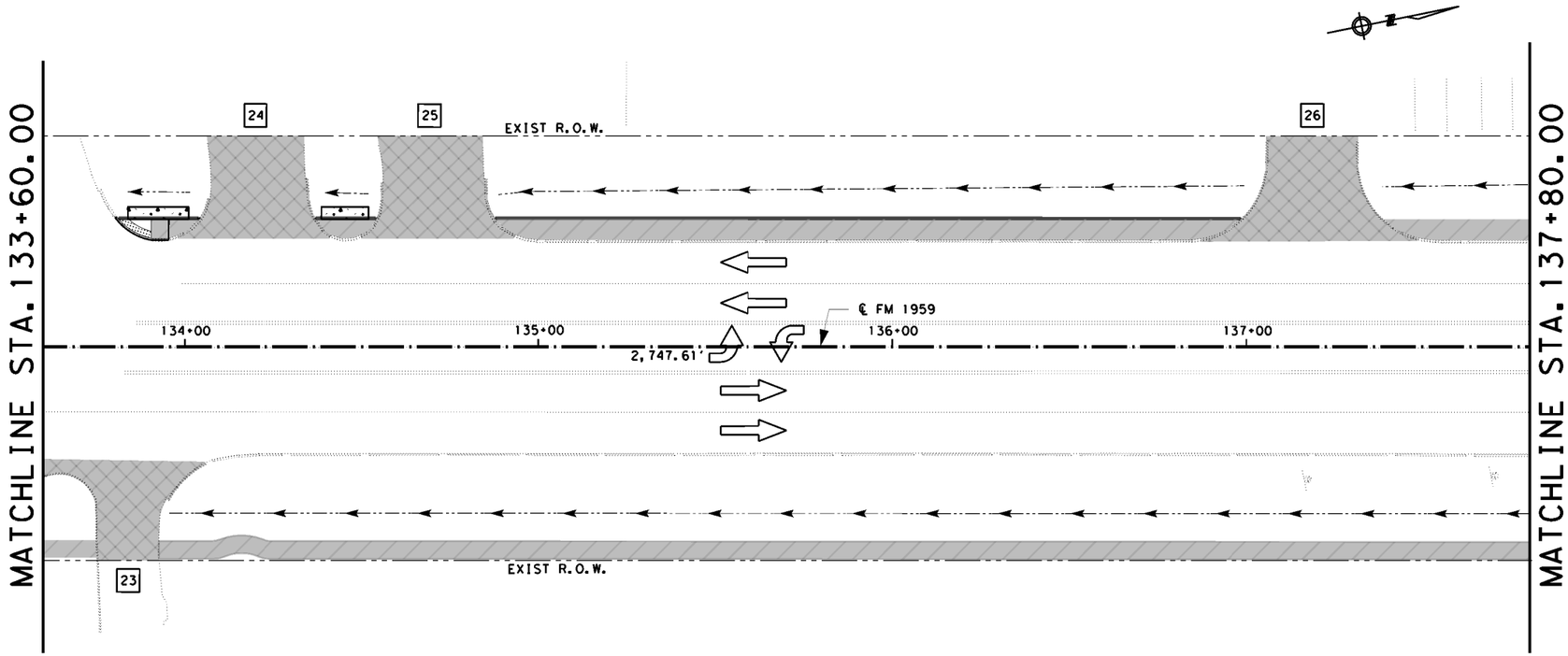


LEGEND:

- TRAFFIC FLOW DIRECTION
- X — DRIVEWAY NUMBER
- PROPOSED CONSTRUCTION
- SEDIMENT CONTROL FENCE (SCF)
- ECL — BIODEGRADABLE EROSION CONTROL LOGS (8")
- CL-D — BIODEGRADABLE EROSION CONTROL LOGS DAM (12")
- CONSTRUCTION EXIT(TY I)
- DIRECTION OF FLOW

NOTES:

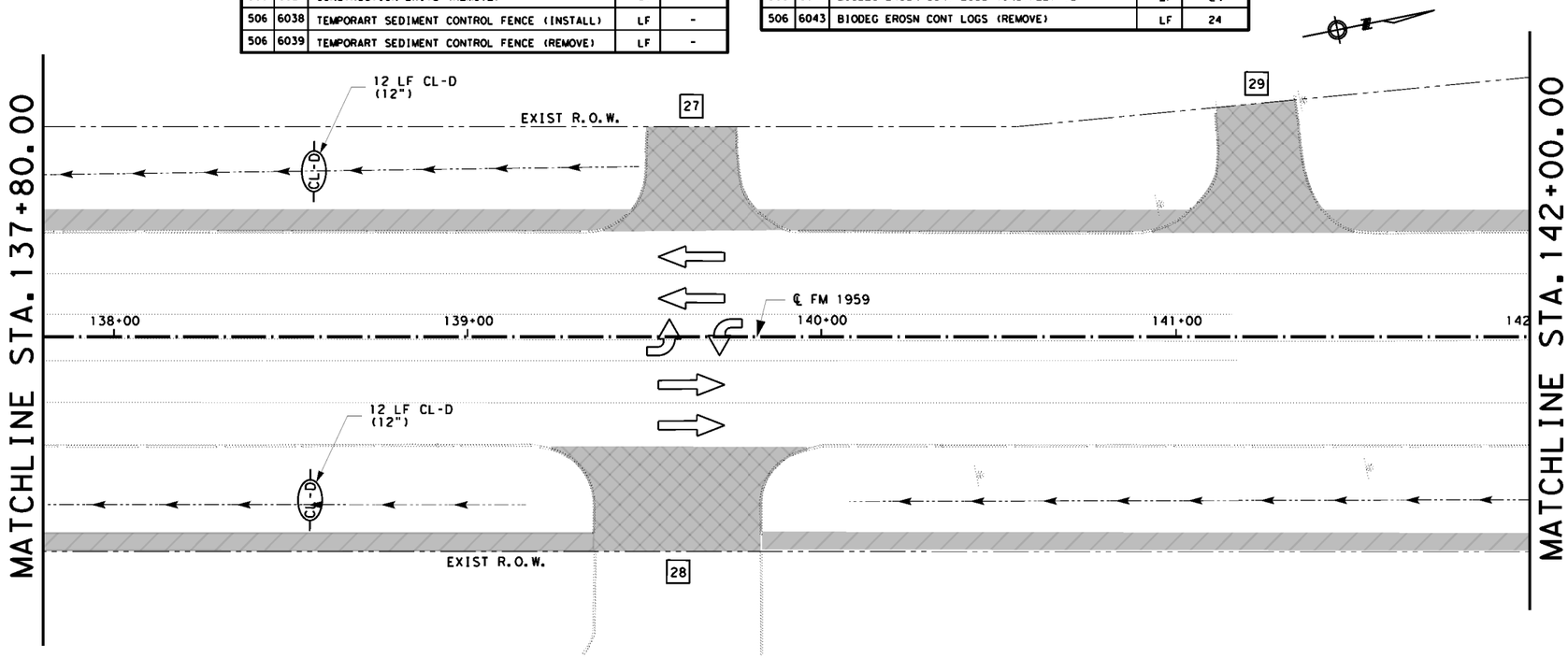
1. ALL EROSION CONTROL MEASURES ARE TO REMAIN IN PLACE UNTIL CONSTRUCTION IS COMPLETE, UNLESS OTHERWISE STATED.
2. SEE SW3P STANDARD SHEET FOR DETAILS.
3. TEMPORARY CONSTRUCTION EXITS ARE TO BE PLACED ALONG THE PROJECT DURING EACH PHASE FOR EACH DISTURBED AREA. THE LOCATION OF THESE CONSTRUCTION EXITS ARE TO BE APPROVED BY THE ENGINEER.

ESTIMATED QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
506	6020	CONSTRUCTION EXITS (INSTALL)(TY I)	SY	-
506	6021	CONSTRUCTION EXITS (REMOVE)	SY	-
506	6038	TEMPORART SEDIMENT CONTROL FENCE (INSTALL)	LF	-
506	6039	TEMPORART SEDIMENT CONTROL FENCE (REMOVE)	LF	-

ESTIMATED QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
506	6040	BIODEG EROSN CONT LOGS (INSTALL) 8"	LF	-
506	6041	BIODEG EROSN CONT LOGS (INSTALL) 12"	LF	24
506	6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	24



STATE OF TEXAS
SANJAY POKHAREL
140149
LICENSED PROFESSIONAL ENGINEER

SANJAY POKHAREL, P.E. 4/29/2024

TEXAS DEPARTMENT OF TRANSPORTATION

FM 1959
STORM WATER POLLUTION PREVENTION PLAN
(STA 133+60.00 TO STA 142+00.00)

SCALE: 1"=40' SHEET 5 OF 7 SHEETS

DN: MGA	DRAWING FILE NAME:	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK:		6	TX				FM 1959
DW: MGA	REVISIONS:	STATE DIST. NO	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK:		12	HARRIS	1844	01	029	149
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CK:							

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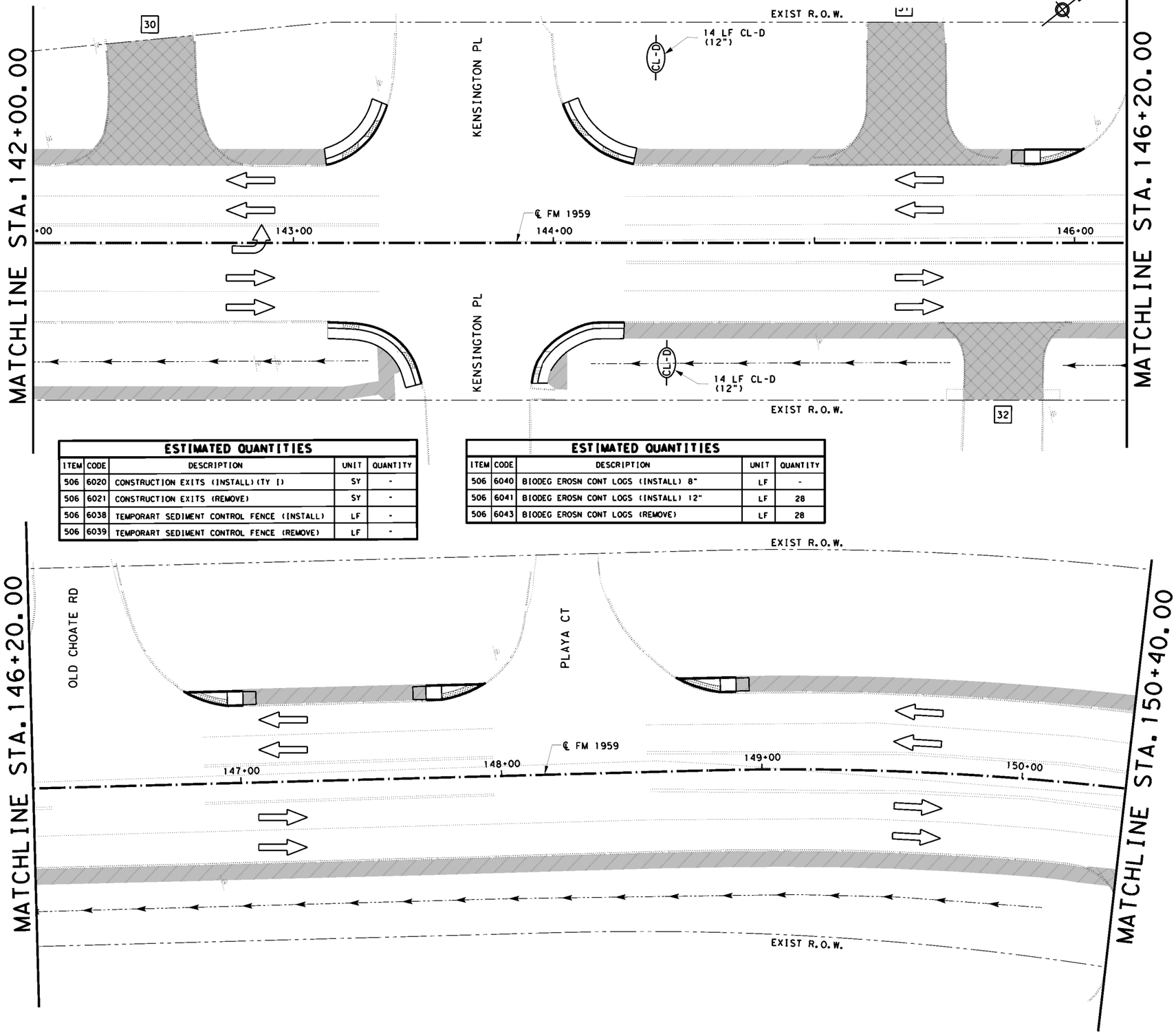

ESTIMATED QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
506	6020	CONSTRUCTION EXITS (INSTALL) (TY I)	SY	-
506	6021	CONSTRUCTION EXITS (REMOVE)	SY	-
506	6038	TEMPORART SEDIMENT CONTROL FENCE (INSTALL)	LF	-
506	6039	TEMPORART SEDIMENT CONTROL FENCE (REMOVE)	LF	-

ESTIMATED QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
506	6040	BIODEG EROSN CONT LOGS (INSTALL) 8"	LF	-
506	6041	BIODEG EROSN CONT LOGS (INSTALL) 12"	LF	28
506	6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	28

LEGEND:

- TRAFFIC FLOW DIRECTION
- X — DRIVEWAY NUMBER
- PROPOSED CONSTRUCTION
- SEDIMENT CONTROL FENCE (SCF)
- ECL — BIODEGRADABLE EROSION CONTROL LOGS (8")
- CL-D — BIODEGRADABLE EROSION CONTROL LOGS DAM (12")
- CONSTRUCTION EXIT(TY I)
- DIRECTION OF FLOW

NOTES:

1. ALL EROSION CONTROL MEASURES ARE TO REMAIN IN PLACE UNTIL CONSTRUCTION IS COMPLETE, UNLESS OTHERWISE STATED.
2. SEE SW3P STANDARD SHEET FOR DETAILS.
3. TEMPORARY CONSTRUCTION EXITS ARE TO BE PLACED ALONG THE PROJECT DURING EACH PHASE FOR EACH DISTURBED AREA. THE LOCATION OF THESE CONSTRUCTION EXITS ARE TO BE APPROVED BY THE ENGINEER.

STATE OF TEXAS
SANJAY POKHAREL
140149
LICENSED PROFESSIONAL ENGINEER

SANJAY POKHAREL, P.E. 4/29/2024

TEXAS DEPARTMENT OF TRANSPORTATION

FM 1959
STORM WATER POLLUTION PREVENTION PLAN
(STA 142+00.00 TO STA 150+40.00)

SCALE: 1"=40' SHEET 6 OF 7 SHEETS

DN: MGA	DRAWING FILE NAME:	DIST. NO.	STATE	PROJECT NO.	SHEET NO.
CK:		6	TX		FM 1959
DW: MGA	REVISIONS:	STATE DIST. NO	COUNTY	CONTROL NO. / SECTION NO. / JOB NO.	SHEET NO.
CK:		12	HARRIS	1844 / 01 / 029	150
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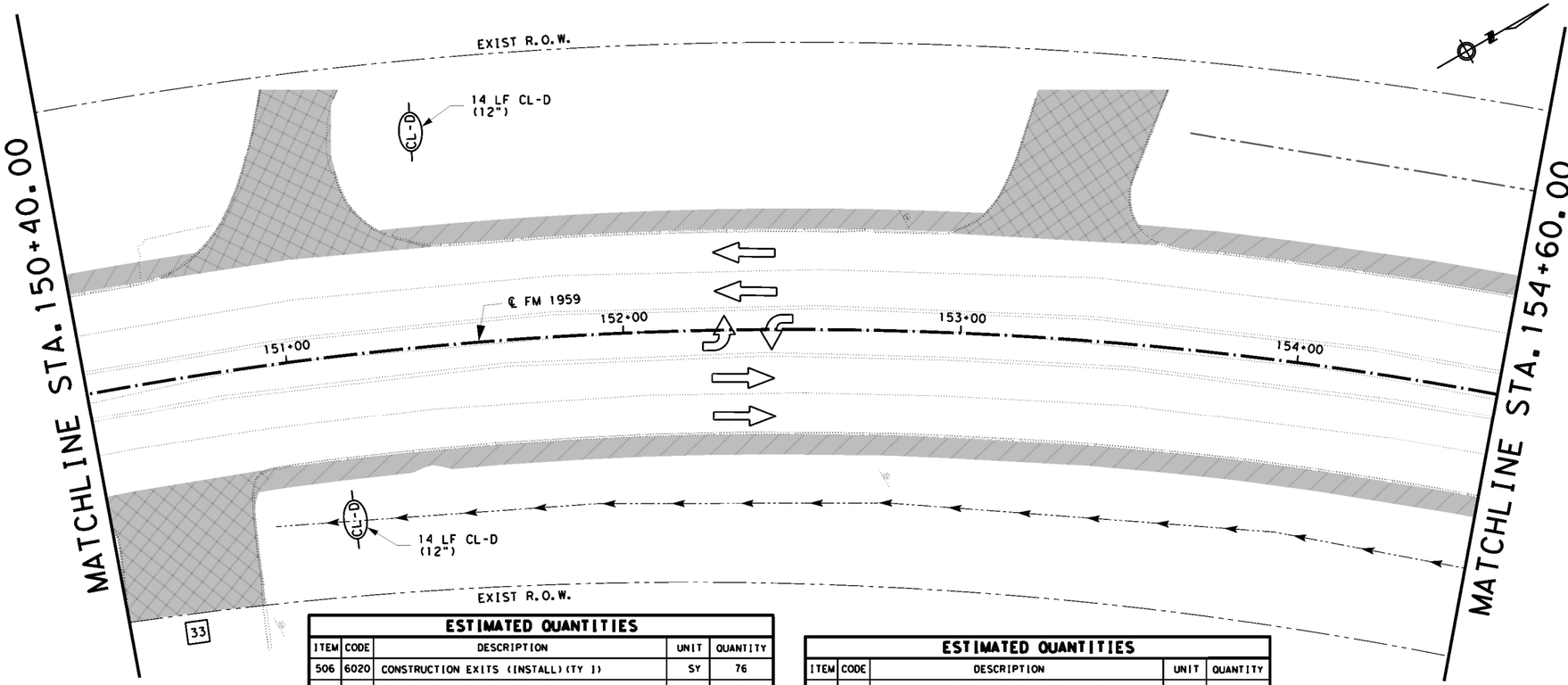


LEGEND:

- TRAFFIC FLOW DIRECTION
- X — DRIVEWAY NUMBER
- PROPOSED CONSTRUCTION
- SEDIMENT CONTROL FENCE (SCF)
- ECL — BIODEGRADABLE EROSION CONTROL LOGS (8")
- CL-D — BIODEGRADABLE EROSION CONTROL LOGS DAM (12")
- CONSTRUCTION EXIT(TY I)
- DIRECTION OF FLOW

ESTIMATED QUANTITIES

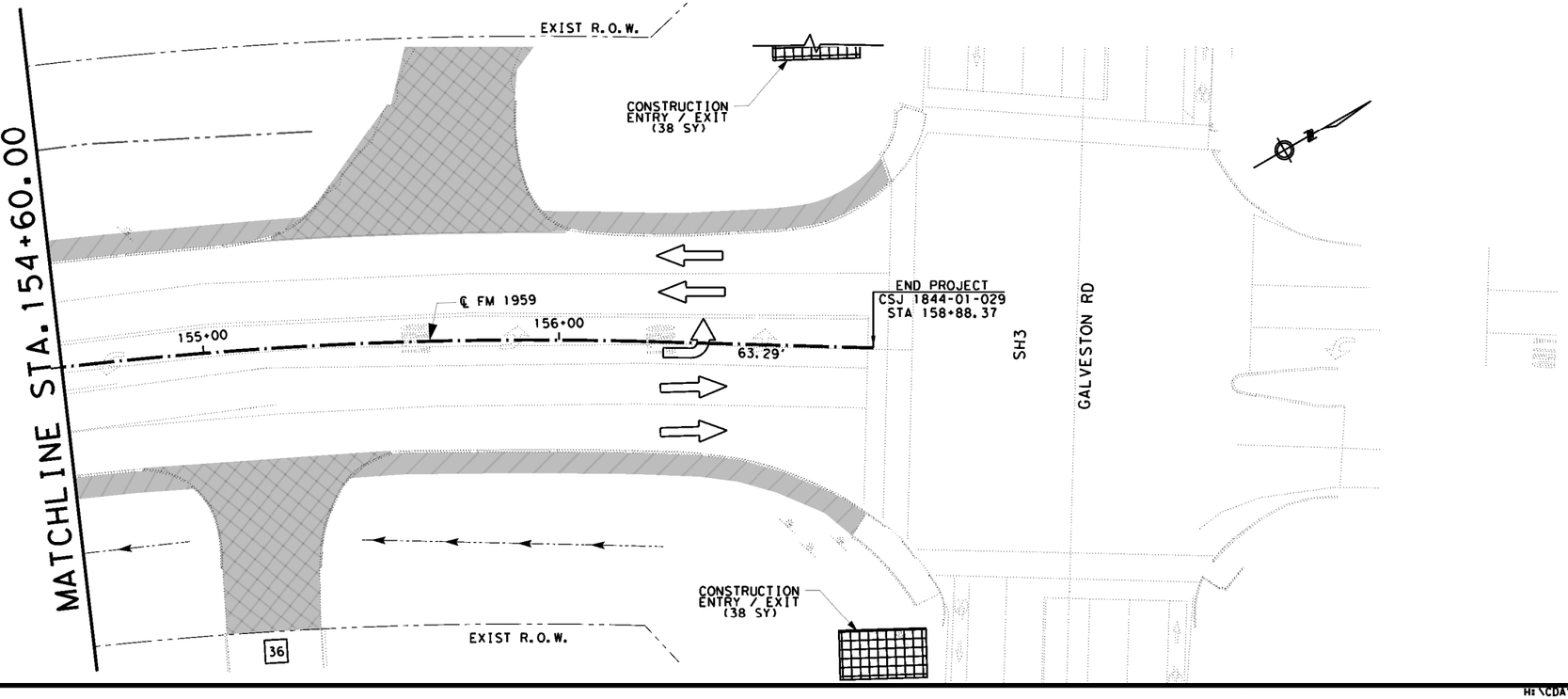
ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
506	6020	CONSTRUCTION EXITS (INSTALL)(TY I)	SY	76
506	6024	CONSTRUCTION EXITS (REMOVE)	SY	76
506	6038	TEMPORART SEDIMENT CONTROL FENCE (INSTALL)	LF	-
506	6039	TEMPORART SEDIMENT CONTROL FENCE (REMOVE)	LF	-

ESTIMATED QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
506	6040	BIODEG EROSN CONT LOGS (INSTALL) 8"	LF	-
506	6041	BIODEG EROSN CONT LOGS (INSTALL) 12"	LF	28
506	6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	28

NOTES:

1. ALL EROSION CONTROL MEASURES ARE TO REMAIN IN PLACE UNTIL CONSTRUCTION IS COMPLETE, UNLESS OTHERWISE STATED.
2. SEE SW3P STANDARD SHEET FOR DETAILS.
3. TEMPORARY CONSTRUCTION EXITS ARE TO BE PLACED ALONG THE PROJECT DURING EACH PHASE FOR EACH DISTURBED AREA. THE LOCATION OF THESE CONSTRUCTION EXITS ARE TO BE APPROVED BY THE ENGINEER.



STATE OF TEXAS
SANJAY POKHAREL
140149
LICENSED PROFESSIONAL ENGINEER

SANJAY POKHAREL, P.E. 4/29/2024

TEXAS DEPARTMENT OF TRANSPORTATION

FM 1959
STORM WATER POLLUTION PREVENTION PLAN
(STA 150+40.00 TO END)

SCALE: 1"=40' SHEET 7 OF 7 SHEETS

DES. MGA	DRAWING FILE NAME:	DIST. NO.	STATE	PROJECT NO.	SHEET NO.
DWN MGA		6	TX		FM 1959
CK:	REVISIONS:	STATE DIST. NO	COUNTY	CONTROL NO. / SECTION NO. / JOB NO.	SHEET NO.
DWN MGA		12	HARRIS	1844 / 01 / 029	151
CK:					
TRF:					
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DATE 4/26/2024
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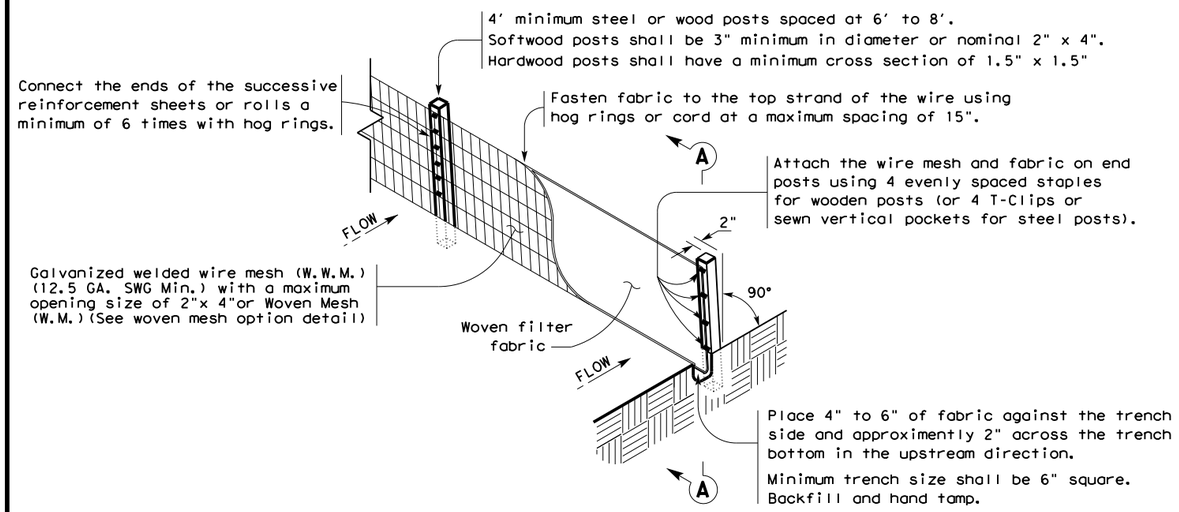
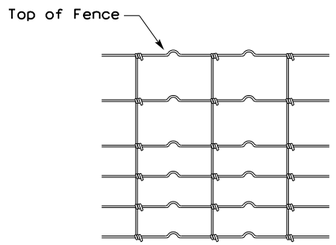
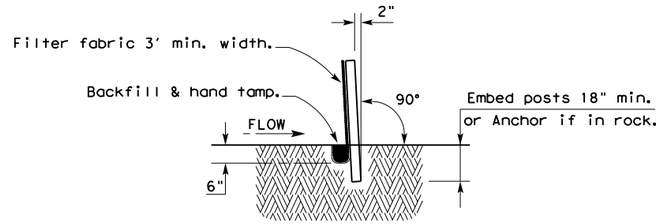


TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

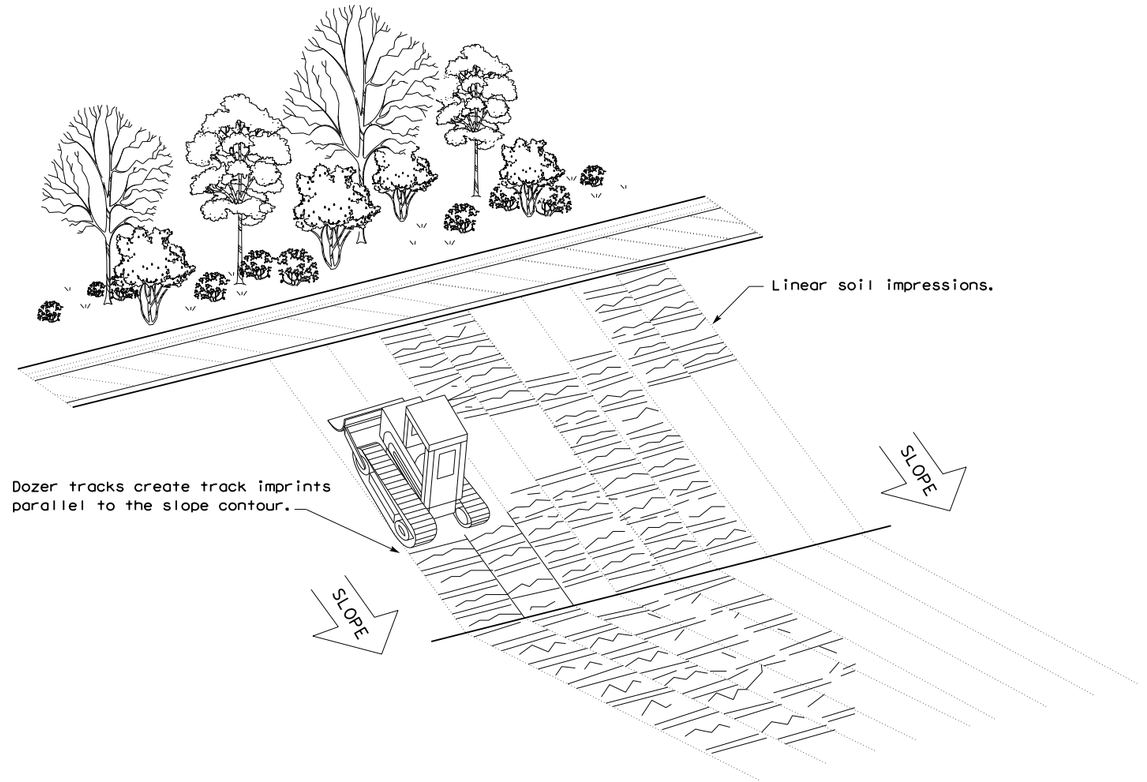
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

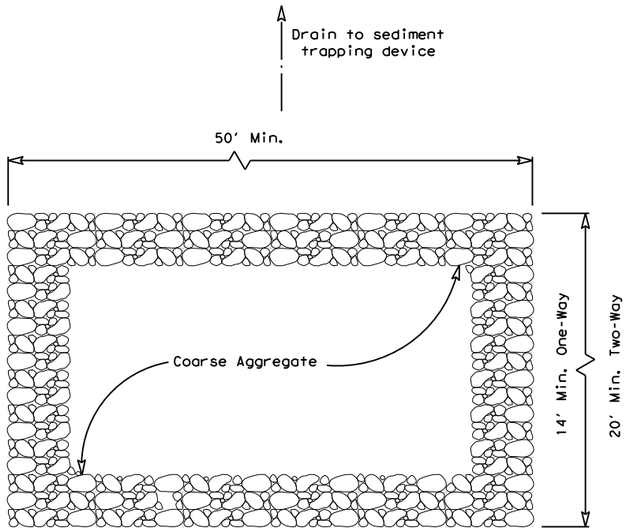
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

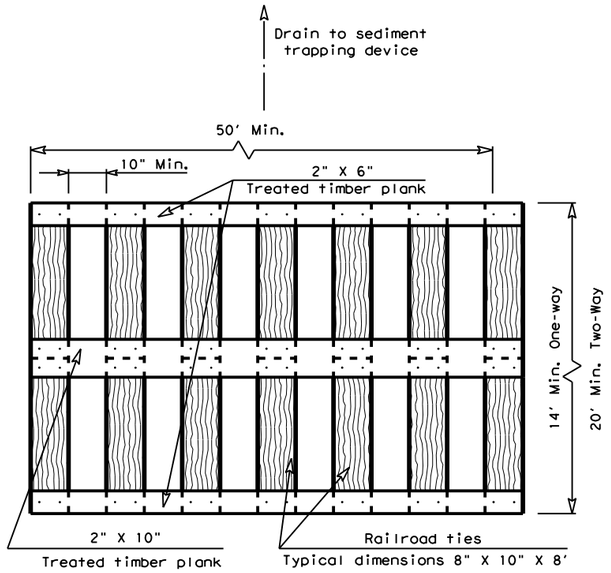
EC(1)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	1844	01	029	FM 1959
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		152

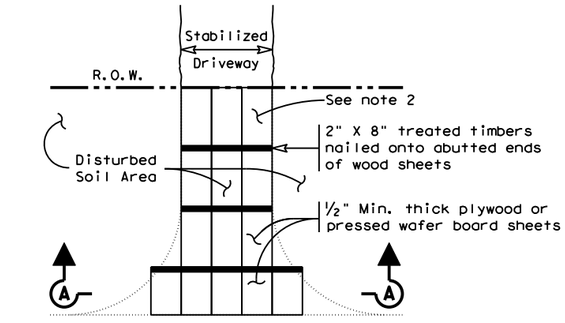
DATE: 4/26/2024
FILE: H:\CDA\1844-01-029 (FM 1959)\Standards\EC(X)-16\ec316.dgn



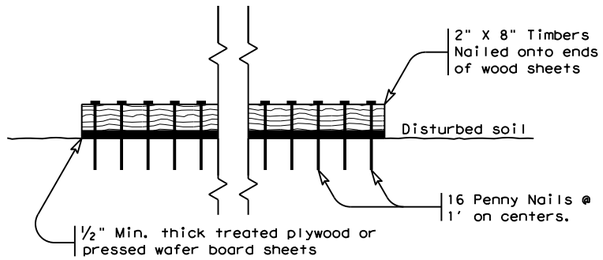
PLAN VIEW



PLAN VIEW



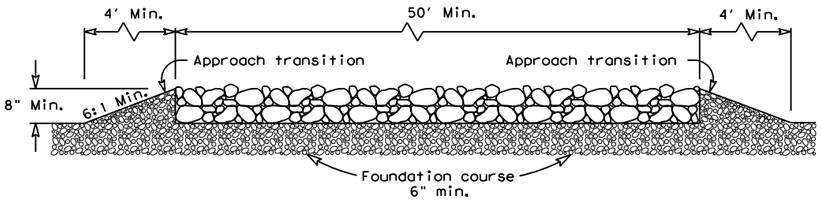
PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

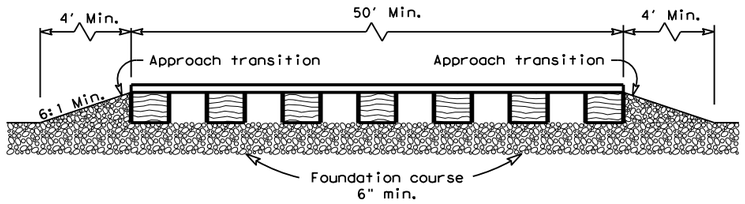
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50'.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
	CONT	SECT	JOB	HIGHWAY
REVISIONS	1844	01	029	FM 1959
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		153

DATE: 4/26/2024
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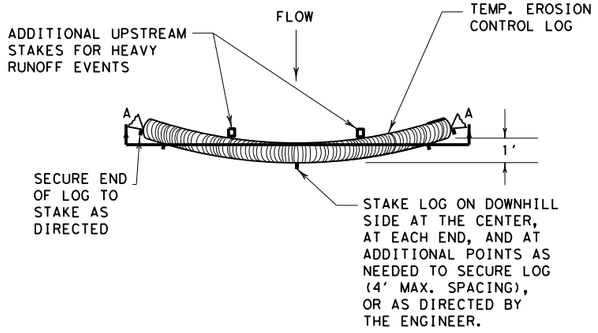
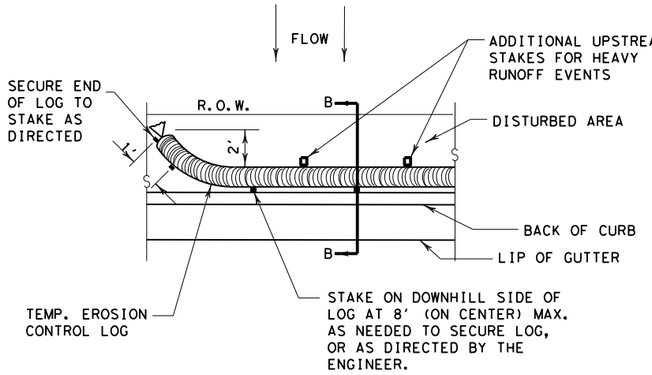
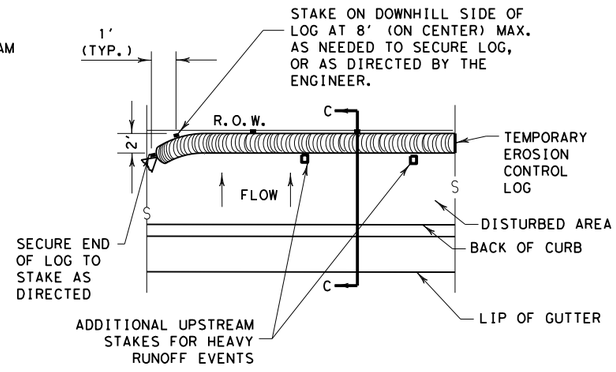


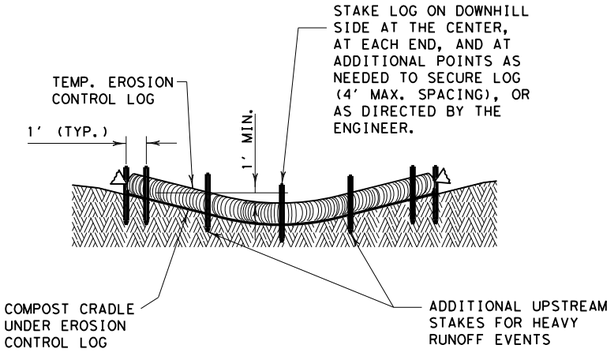
PLAN VIEW



PLAN VIEW



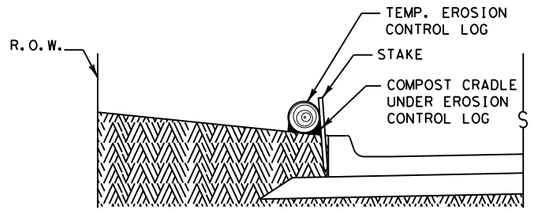
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

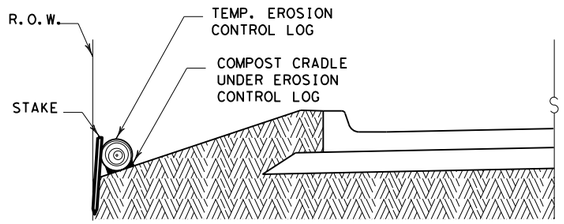
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

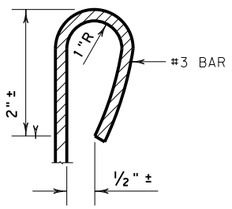
CL-BOC



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



REBAR STAKE DETAIL

LEGEND

- CL-D — EROSION CONTROL LOG DAM
- CL-BOC — EROSION CONTROL LOG AT BACK OF CURB
- CL-ROW — EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
- CL-SST — EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
- CL-SSL — EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
- CL-DI — EROSION CONTROL LOG AT DROP INLET
- CL-CI — EROSION CONTROL LOG AT CURB INLET
- CL-GI — EROSION CONTROL LOG AT CURB & GRATE INLET

GENERAL NOTES:

1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.

SEDIMENT BASIN & TRAP USAGE GUIDELINES

An erosion control log sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

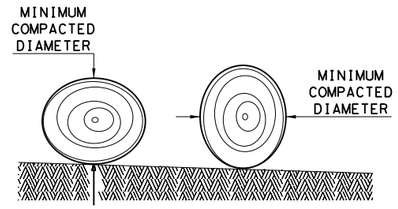
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916		DN: TxDOT		CK: KM	DW: LS/PT		CK: LS
© TxDOT: JULY 2016		CONT	SECT	JOB		HIGHWAY	
REVISIONS		1844	01	029		FM 1959	
		DIST		COUNTY			SHEET NO.
		HOU		HARRIS			154

DATE: 4/26/2024
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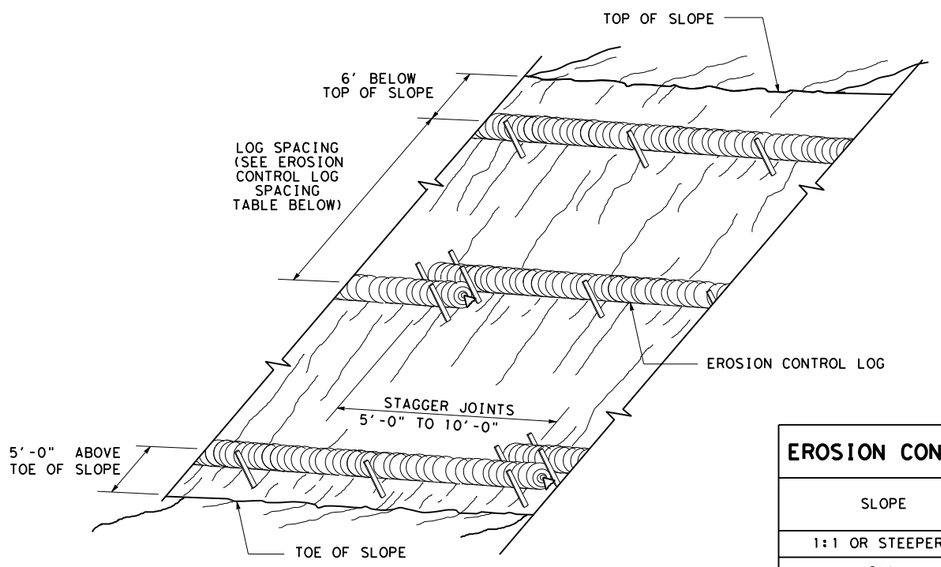
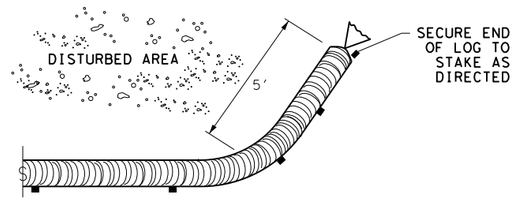


EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

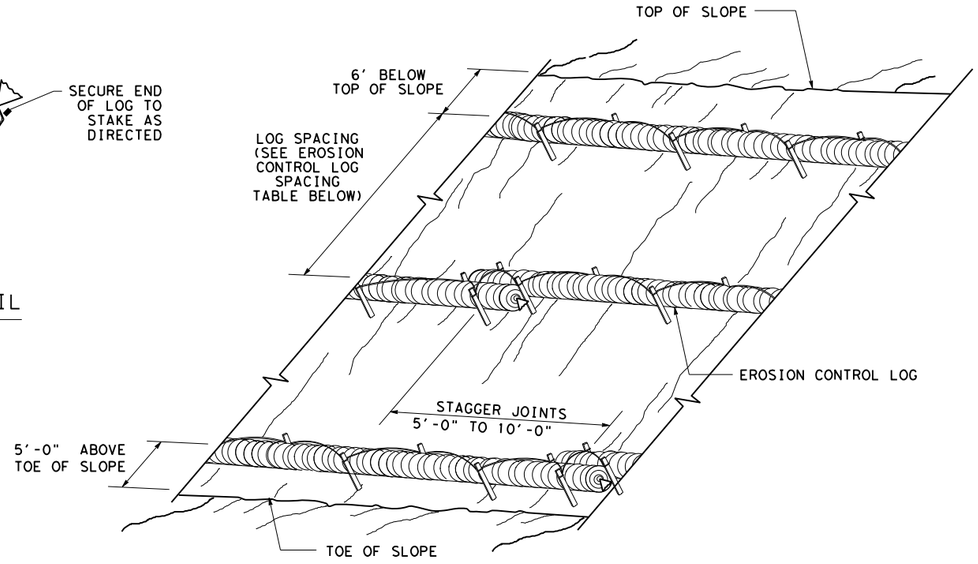
CL-SST



END SECTION RAP DETAIL

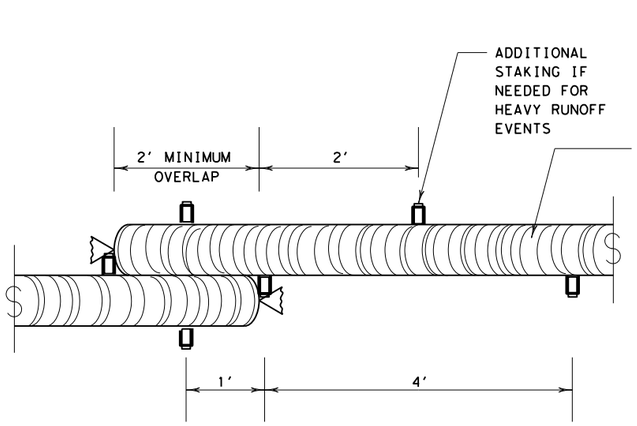
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

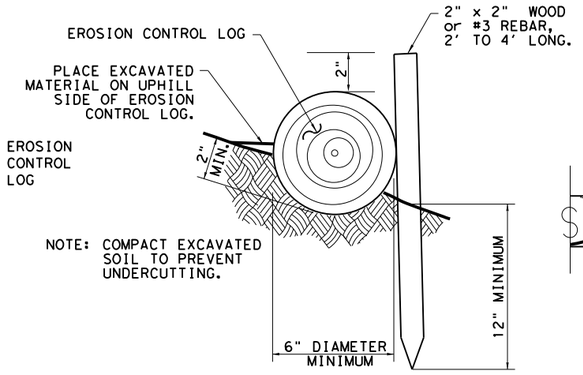
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

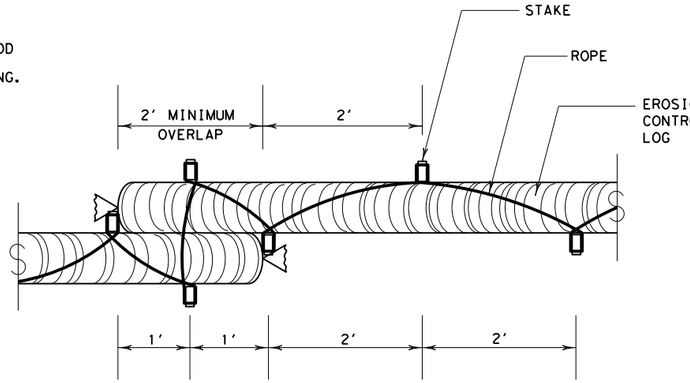


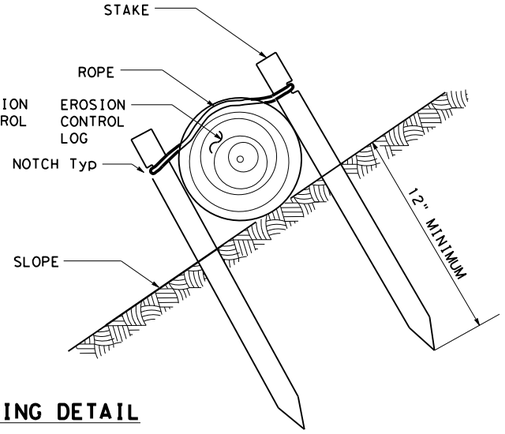


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

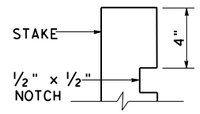
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

SHEET 2 OF 3

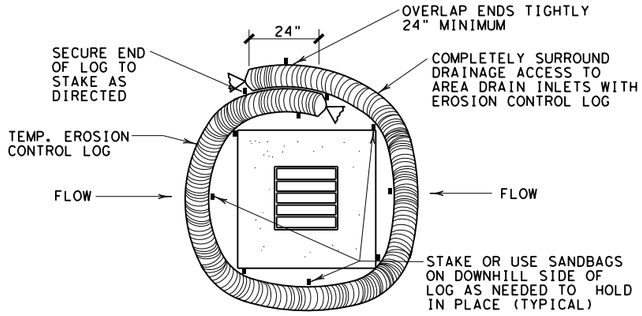
Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16

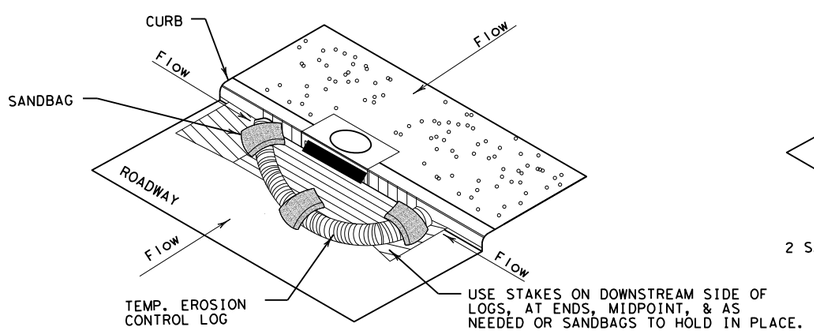
FILE: ec116	DN: TxDOT		CK: KM		DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	1844	01	029		FM 1959	
	DIST	COUNTY			SHEET NO.	
	HOU	HARRIS			155	

DATE: 4/26/2024
FILE: H:\CDA\1844-01-029 (FM 1959)\Standards\EC(9)16.dgn



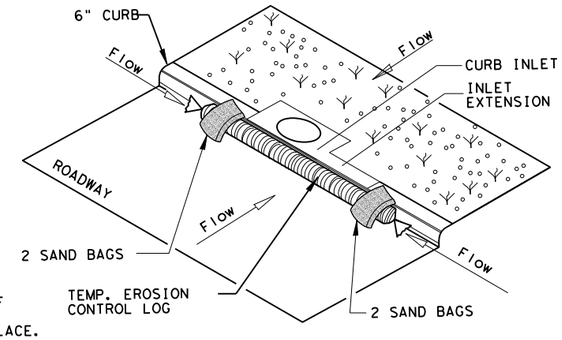
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

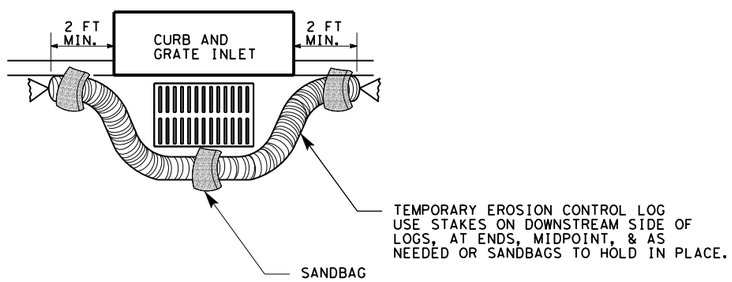
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

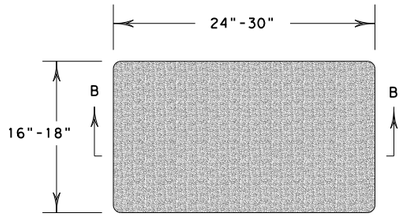
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	1844	01	029	FM 1959
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		156