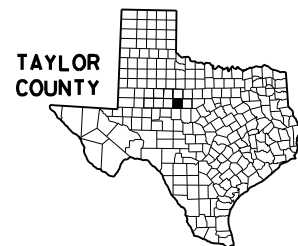


INDEX OF SHEETS
SEE SHEET 2



STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

DESIGN SPEED = N/A
CURRENT A.D.T. = N/A
PROJECTED A.D.T. = N/A
FUNCTIONAL CLASS = N/A
EXISTING NBI# = N/A
PROPOSED NBI# = N/A

FHWA TEXAS DIVISION	PROJECT NO.		SHEET NO.
	F2B24(142)		1
STATE	DISTRICT	COUNTY	
TEXAS	ABL	TAYLOR	
CONTROL	SECTION	JOB	HIGHWAY NO.
0908	00	130	SL 322

PROJECT NO. F2B24(142)

NET LENGTH OF ROADWAY= N/A
NET LENGTH OF BRIDGE = N/A
NET LENGTH OF PROJECT= N/A

SL 322, ETC.
TAYLOR COUNTY

LIMITS: VARIOUS LOCATIONS IN THE ABILENE MPO BOUNDARY
FOR THE CONSTRUCTION OF: ADVANCED TRAFFIC MANAGEMENT SYSTEM
CONSISTING OF: INSTALLATION OF DMS AND CAMERAS

FINAL PLANS

LETTING DATE: 06/2024
DATE CONTRACTOR BEGAN WORK: _____
DATE WORK WAS COMPLETED: _____
DATE WORK WAS ACCEPTED: _____
FINAL CONTRACT COST: \$ _____
CONTRACTOR : _____

CERTIFICATION FOR FINAL PLANS

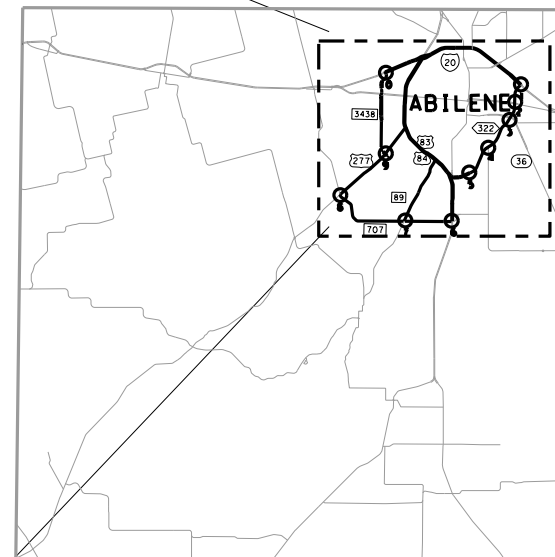
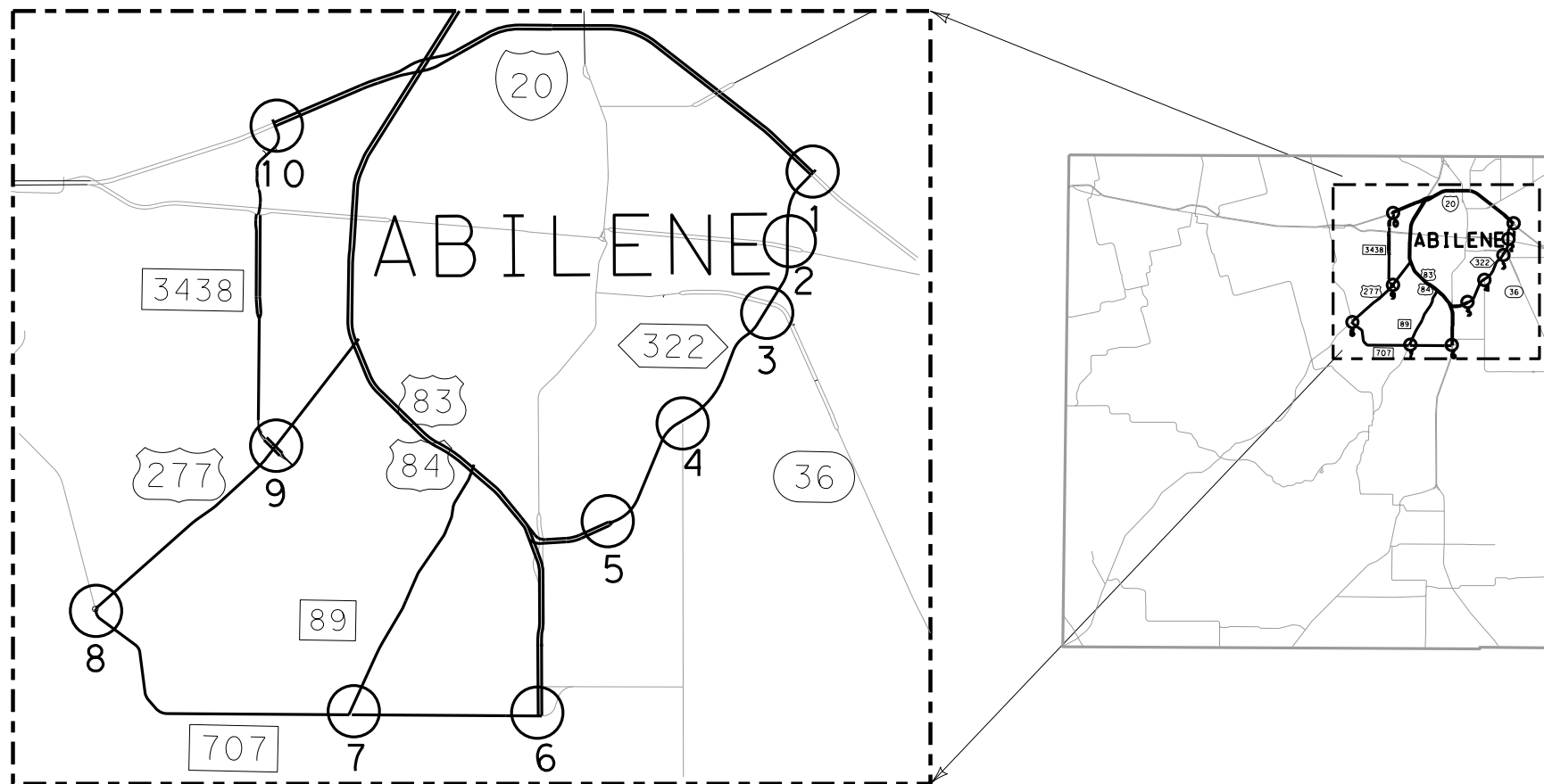
THIS PROJECT WAS BUILT ACCORDING TO THE PLANS AND SPECIFICATIONS. THESE FINAL PLANS REFLECT THE WORK DONE AND THE QUANTITIES SHOWN THEREON AND ON THE FINAL ESTIMATE ARE FINAL QUANTITIES.

AREA ENGINEER _____ DATE _____

THE DISTRICT TRAFFIC SAFETY COMMITTEE HAS REVIEWED THE TRAFFIC CONTROL PLAN FOR THIS PROJECT AND IT IS IN COMPLIANCE WITH CURRENT DISTRICT TRAFFIC CONTROL STANDARDS.

Michael Wittie, P.E. 4/3/2024
DISTRICT CHAIRMAN DATE

Texas Department of Transportation
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NOTE: NUMBERS ON THIS MAP ARE SITE NUMBERS. REFER TO PROPOSED ITS LAYOUTS FOR DETAILED LOCATION INFORMATION. ALSO SEE AREA OFFICE AND DISTRICT OFFICE LAYOUTS.

EXCEPTIONS: N/A
EQUATIONS: N/A
RAILROAD CROSSINGS: N/A

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

SUBMITTED FOR LETTING: 3/28/2024

Ryan Carrigan
RYAN A. GARRIGAN
TxDOT PROJECT MANAGER

RECOMMENDED FOR LETTING: 4/2/2024

Randee H. Shields P.E.
RANDEE H. SHIELDS, P.E.
DIRECTOR OF TRAFFIC OPERATIONS

RECOMMENDED FOR LETTING: 4/3/2024

Bryce M. Turentine P.E.
BRYCE M. TURENTINE, P.E.
AREA ENGINEER

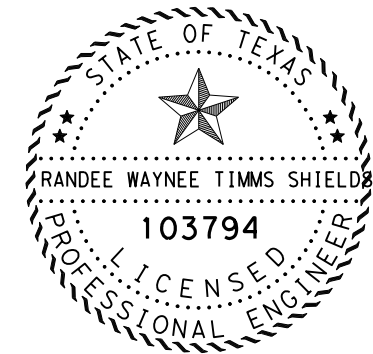
APPROVED FOR LETTING: 4/3/2024

Thomas S. Allbritton, P.E.
THOMAS S. ALLBRITTON, P.E.
DISTRICT ENGINEER


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 DATE: 4/3/2024 10:00:24 AM

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
GENERAL	
1	TITLE SHEET
2	INDEX OF SHEETS
3-6	GENERAL NOTES
7	ESTIMATE & QUANTITY SHEET
8	QUANTITY SUMMARY
TRAFFIC CONTROL PLAN	
9	TCP NARRATIVE
TRAFFIC CONTROL PLAN STANDARDS	
# 10-21	BC (1)-21 THRU BC (12)-21
# 22	TCP (1-1)-18
# 23	TCP (1-2)-18
# 24	TCP (1-4)-18
# 25	TCP (1-5)-18
# 26	TCP (5-1)-18
# 27	TCP (6-1)-12
# 28	TCP (6-2)-12
# 29	TCP (6-3)-12
# 30	TCP (6-4)-12
ITS DETAILS	
31	ELECTRICAL SERVICE SUMMARY
32	CONDUCTOR SUMMARY
33-44	PROPOSED ITS LAYOUTS
45-46	DMS TYPICAL DETAILS
47-49	CCTV TYPICAL DETAILS
50	PROPOSED ITS BLOCK DIAGRAMS

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
ITS STANDARDS	
# 51	WV & IZ-14
# 52	WV & IZ (LTS2013)-14
# 53	COSS-Z2I-10
# 54	COSS-Z3&Z3I-10
# 55-56	COSSD
# 57	COSSF
# 58	COSS-FD
# 59	ED (1)-14
# 60	ED(3)-14
# 61	ED(4)-14
# 62	ED(5)-14
# 63	ED(6)-14
# 64	ED(7)-14
# 65	ITS(1)-15
# 66	ITS(3)-16
# 67	ITS(4)-15
# 68	ITS(5)-15
# 69	ITS(6)-15
# 70	ITS(7)-15
# 71	ITS(14)-15
# 72	ITS(17)-15
# 73	ITS(18)-15
# 74	ITS(19)-17
# 75	ITS(20)-15
# 76	ITS(21)-15
# 77	ITS(22)-15
# 78	ITS(23)-15
# 79	ITS(27)-16
# 80	ITS(28)-16
# 81	ITS(35)-16
# 82	ITS(36)-16
ENVIRONMENTAL ISSUES	
83	ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS



THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ON THIS SHEET WITH A # HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

DocuSigned by:

 RAND73DA470CAD492, P.E. 4/3/2024
 (NAME) DATE

INDEX OF SHEETS



SCALE: N/A SHEET 1 OF 1

FHWA DIVISION	PROJECT NO.	HIGHWAY NO.	
6	SEE TITLE SHEET	SL 322	
STATE	COUNTY	SHEET NO.	
TEXAS	TAYLOR	2	
DISTRICT	CONTROL		SECTION
ABL	0908		00
		JOB	
		130	

CCSJ: 0908-00-130
 County: TAYLOR
 Highway: SL 322, ETC.

**ABILENE DISTRICT GENERAL NOTES
 2014 SPECIFICATIONS**

General

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

Randee Shields, P.E. / Phone: 325-676-6932 / Randee.Shields@txdot.gov
 Ryan Carrigan / Phone: 325-676-6927 / Ryan.Carrigan@txdot.gov
 (Abilene District Transportation Operations)

Contractor questions will be accepted through email, phone, and in person by the above individuals.

For Q&A's on Proposals navigate to

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

Use the dashboard to navigate to the project you are interested in by scrolling or filtering the dashboard using the controls on the left. Hover over the blue hyperlink for the project you want to view the Q&A for and click on the link in the window that pops up.

All relevant project documentation including contract time, cross sections, etc will be posted on the districts FTP website. <https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting%20Responses/>

Failure to make necessary corrections to traffic control items based on barricade inspections will be cause for withholding the monthly estimate until such corrections have been made.

Provide ingress/egress to the adjacent properties in areas under construction. Phased construction of driveways and streets shall be required to provide uninterrupted access to adjacent properties. Coordinate work with the property owners before beginning any construction in the vicinity of the drive.

Environmental

Endangered and Protected Species

1. Migratory Birds

- a. **Bird nesting season is typically 15Feb through 15Sep annually.**
- b. The Contractor will avoid disturbing, destroying, removing, or relocating migratory birds and active nests found in trees, culverts, bridges, on the ground, or anywhere they are encountered.
- c. Perform all tree trimming and other vegetation clearing activities during the non-breeding season (typically 15Sep-15Feb annually). Perform any inactive nest removal and bird exclusion methods to prevent birds from establishing nests. Phasing of work during construction may be necessary to stay in compliance.

General Notes

Sheet A

CCSJ: 0908-00-130
 County: TAYLOR
 Highway: SL 322, ETC.

- d. When active nests are unexpectedly encountered on-site during construction, the Contractor will stop work and immediately notify the Engineer. Take measures to avoid disturbance of these birds, their occupied nest, eggs, and/or young, in accordance with the Migratory Bird Treaty Act, Texas Parks and Wildlife Code, and TxDOT policy.
- e. The Engineer will notify the Contractor when work may resume.
- f. The Contractor should be prepared to prevent migratory birds from building nests by utilizing nest prevention methods, such as bird-deterrent netting and bird-repelling sprays and/or gels, between 15Feb and 15Sep. The Contractor can discuss other preventative measures with the Engineer and/or District Environmental Staff.

Best Management Practices

1. Bird BMPs

- a. Not disturbing, destroying, or removing active nests, including ground nesting birds, during the nesting season.
- b. Avoiding the removal of unoccupied, inactive nests, as practicable.
- c. Preventing the establishment of active nests during the nesting season on TxDOT owned and operated facilities and structures proposed for replacement or repair.
- d. Not collecting, capturing, relocating, or transporting birds, eggs, young, or active nests without a permit.

Item 5, "Control of Work"

Use Method C for construction surveying.

All known utilities are identified in the plans, including the crossing of power lines. Use this information to identify potential issues with power poles and power lines prior to bidding.

Make necessary arrangements with utility owners regarding temporary protections such as bracing power poles, and de-energizing power lines. The Department will not reimburse the cost of such temporary protections to the Contractor, unless the Engineer determines that inadequate information was available at the time the project was bid. **"Call Before You Dig" "Call 811"**

Provide notification to the District Traffic Engineering Section by telephone at 325-676-6991 and by email at ABL_TrafficFix@txdot.gov when planning drilling or excavation work in areas where existing TxDOT underground utilities exist. Visual evidence of TxDOT underground utilities in the area include illumination poles, ground boxes, flashing beacons, traffic signals, etc. This notification must be provided 72 hours in advance of performing the work.

Drilled shaft locations or excavation areas must be staked prior to the notification so that the underground utilities can be located in relationship to the proposed work. Preserve and

General Notes

Sheet B

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CONT	SECT	JOB	HIGHWAY
0908	00	130	SL 322
DIST	COUNTY		SHEET NO.
ABL	TAYLOR		3

CCSJ: 0908-00-130
County: TAYLOR
Highway: SL 322, ETC.

document the marked utility locations to prevent unnecessary secondary notifications. Notify the Engineer of conflicts between proposed work and underground utilities.

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

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

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

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

Item 7, “Legal Relations and Responsibilities”

The total area disturbed for this project is 0.5 acres. The disturbed area in this project, all project locations in the Contract, and the 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 and to the government that operates a separate storm sewer system.

Provide one SWP3 Notification Board for this project. Notification Boards are to be placed at locations within the right-of-way but outside the clear zone as directed by the Engineer. Consider this work to be subsidiary to the various bid items of the contract.

No significant traffic generator events identified.

Hard hats are required at all times during construction when construction personnel are in TxDOT Right-of-Way.

Patrol vehicles must be clearly marked to correspond with the officer’s agency and equipped with appropriate lights to identify them as law enforcement. For patrol vehicles not owned by a law enforcement agency, markings will be retroreflective and legible from 100 ft. from both sides and the rear of the vehicle. Lights will be high intensity and visible from all angles.

LIGHTING STANDARDS FOR HIGHWAY MAINTENANCE OR CONSTRUCTION VEHICLES AND SERVICE VEHICLES

General Notes

Sheet C

CCSJ: 0908-00-130
County: TAYLOR
Highway: SL 322, ETC.

VEHICLE LIGHTING SUMMARY

Vehicle	Color of Flashing Lights	Transportation Code
Police Vehicles	Red/Blue/White/Amber	547.305 & 547.702
Fire/EMS Vehicles	Red/Blue/White/Amber	547.305 & 547.702
Volunteer Fire/EMS	Red/Blue/White/Amber	547.305 & 547.702
School	Bus Red/White (rooftop) /Amber	547.305 & 547.701
Highway Maintenance or Construction Vehicles and Service Vehicles	Amber/Blue	547.105 & TxDOT Lighting Standards

Item 8 “Prosecution and Progress”

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

Coordinate and update the work schedule with the project inspector daily. Give a minimum of 24 hours of notice to project inspector if work requiring inspection or testing is to be performed. Failure to do so may cause that work to be delayed or postponed if TxDOT personnel are not available. Work performed without suitable inspection, as determined by the Engineer, may be ordered removed and replaced at Contractor’s expense.

This project includes a delayed start provision of 120 days for purchasing of manufactured ITS items and contractor mobilization.

Item 9, “Measurement and Payment”

The progress payment period shall end on the 25th of each month, unless directed by the Area Office Engineer. Material on Hand (MOH) is due two business days before estimate cut off.

Item 416, “Drilled Shaft Foundations”

All soil, water, and slurry removed from drilled shafts shall be captured and disposed of properly. No discharge of these materials into, or in close proximity to, the surrounding water will be allowed.

General Notes

Sheet D

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GENERAL NOTES

CONT	SECT	JOB	HIGHWAY
0908	00	130	SL 322
DIST	COUNTY		SHEET NO.
ABL	TAYLOR		4

CCSJ: 0908-00-130
County: TAYLOR
Highway: SL 322, ETC.

Item 502, “Barricades, Signs and Traffic Handling”

Mobile traffic control in accordance with TPC 3 series will be required for placement of short duration, short term, intermediate term, and long-term traffic control.

Provide the Engineer with written notification seven (7) days in advance of major traffic changes. A major traffic change is defined as the temporary (greater than one day) or permanent relocation of traffic lanes typically in an urban setting. The notice will, at a minimum, include the expected date, time and scope of the traffic change. The Department will utilize the information provided to inform the traveling public of the changes. Failure to provide advance notice, or to provide accurate information, will result in delaying the work until such time that the public has been notified.

Additional signs, barricades and traffic handling may be necessary to complete the work shown herein and will be provided by the contractor as required and will be considered subsidiary to this item.

Provide separate attenuators for each work area within a common lane closure as approved or directed by the Engineer.

In sections where traffic is restricted to one lane, two-way traffic, flaggers will be stationed at each end of that section with two-way communication devices and a pilot car will control operations.

All safety appurtenances such as signs, delineators, object markers and route markers will be in place prior to opening each phase of the construction to traffic, unless otherwise directed.

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.

The Contractor's person responsible for TCP compliance must be available by local telephone and have a response time within 45 minutes.

Work will not be allowed on both sides of the roadbed at the same time.

Equip all work vehicles within 30 feet of the traveled way with a functioning amber strobe light or rotating beacon visible from all directions.

Repair barricades within the timeline shown on the barricade inspection report. Failure to comply will cease all work until barricades are repaired to the satisfaction of the Department. Replace all damaged traffic control devices immediately. Remove any damaged traffic control devices from the project within 24 hours.

General Notes

Sheet E

CCSJ: 0908-00-130
County: TAYLOR
Highway: SL 322, ETC.

Item 506, “Temporary Erosion, Sedimentation, and Environmental Controls”

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

Item 618, “Conduit”

All conduit shall be SCH 80 PVC.

High density polyethylene (HDPE) may be substituted for schedule 80 PVC in bores.

High density polyethylene (HDPE) may be threaded and used with threaded PVC connectors or couplings.

Conduit elbows will be the long radius variety.

Rigid metal conduit elbows 1” and larger that are required to be installed on conduit system, will not be paid for separately, but will be considered subsidiary to the various bid items.

All couplings and connections shall be tight and waterproof. Each end of every PVC pipe connection and/or coupling shall be cleaned with PVC cleaner and glued thoroughly with PVC sealer. Proposed and existing conduit shall be brought into a pull box and elbowed unless otherwise shown. Where a rigid metal conduit run terminates, a bushing shall be provided to protect the wire from abrasion.

The conduit shall be placed at a minimum depth of 2 feet unless otherwise shown on the plans or directed by the Engineer. If utility lines or other obstacles are at the 2-foot minimum depth then the conduit shall be routed under the utility or obstacle unless otherwise approved by the Engineer.

The conduit shall be placed on a 2-inch sand cushion and then backfilled with a minimum of 6 inches of sand fill. The remainder of the trench shall be backfilled with flexible base or soil as required by location of conduit on the project.

Flexible metal shall not be used on this project.

Use materials from prequalified material producers list as shown on the Texas department of Transportation (TxDOT) – Construction Division’s (CST) material producer list. Category is “Roadway Illumination and Electrical Supplies”.

Item 620, “Electrical Conductors”

A bare copper wire No. 8 AWG or larger will be installed in every conduit throughout the electrical system in accordance with Item 620, the electrical detail sheets, and the latest edition of the National Electric Code (NEC).

General Notes

Sheet F

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Texas Department of Transportation

GENERAL NOTES

CONT	SECT	JOB	HIGHWAY
0908	00	130	SL 322
DIST	COUNTY		SHEET NO.
ABL	TAYLOR		5

CCSJ: 0908-00-130
County: TAYLOR
Highway: SL 322, ETC.

Grounding Conductors that share the same conduit, junction box, ground box or structure shall be bonded together at every accessible point in accordance with the current National Electrical Code.

Labeling conductors with label marker is acceptable.

Use ONLY certified persons to perform electrical work. See Item 7.18 "Electrical Requirements" for additional details.

For both transformer and shoe- base type illumination poles, provide double-pole breakaway fuse holder as shown on the Texas department of Transportation (TxDOT) – Construction Division's (CST) material producer list. Category is "Roadway Illumination and Electrical Supplies". Fuse holder is shown on the list under Items 610 and 620. Provide 10-amp time delay fuses.

For Flashing Beacons (Item 685), provide single-pole breakaway disconnects.

Use breakaway connectors listed on materials from pre-qualified material producers list.

Item 628, "Electrical Service"

Coordinate through the inspector or Area Engineer to coordinate new electrical services with the District Traffic Engineering Section by telephone at 325-676-6991 and by email at ABL-ElectricalServiceRequest@txdot.gov to insure the meter is installed under the proper account name.

Provide at least 30 days prior notification for new electrical services to be energized. Provide at least 30 days prior notification for existing electrical service disconnects.

Any service installed by others shall comply with all TxDOT Standards from weather head to fixtures.

Item 6185, "Truck Mounted Attenuator (TMA) and Trailer Attenuator (TA)"

Truck Mounted Attenuator (TMA) and Trailer Attenuator (TA) will not be considered a major item of work on this project.

TMA,s will only be paid while workers are present or to protect a blunt object.

The contractor will be responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMAs needed for the project. The Contractor must get approval from the Engineer for any changes in the number of TMA as shown in the plans.

General Notes

Sheet G

CCSJ: 0908-00-130
County: TAYLOR
Highway: SL 322, ETC.

If a TMA is used for both mobile and stationary traffic control on the same day, it will be paid for as stationary for that day.

BASIS OF ESTIMATE FOR STATIONARY TMAs				
		TMA (Stationary)		
Phase	Standard	Required	Additional	TOTAL
Drill Shafts	TCP(1-1),TCP(5-1),TCP(6-1),TCP(6-2)	1	0	1
Crane Operations	TCP(1-1),TCP(5-1),TCP(6-1),TCP(6-2)	1	0	1
Conduit and Concrete	TCP(1-1),TCP(5-1)	1	0	1
Site Completion	TCP(1-1),TCP(5-1)	1	0	1

General Notes

Sheet H

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Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0908-00-130

DISTRICT Abilene

COUNTY Taylor

HIGHWAY SL 322

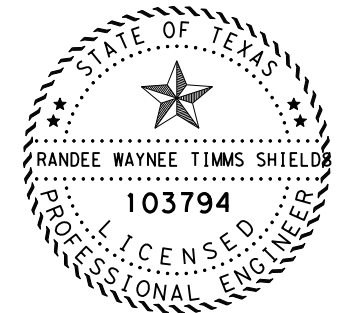
CONTROL SECTION JOB				0908-00-130		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00203306			
COUNTY				Taylor			
HIGHWAY				SL 322			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	104-6009	REMOVING CONC (RIPRAP)	SY	10.000		10.000	
	416-6005	DRILL SHAFT (42 IN)	LF	260.000		260.000	
	416-6022	DRILL SHAFT (SIGN MTS) (48 IN)	LF	54.000		54.000	
	432-6001	RIPRAP (CONC)(4 IN)	CY	15.000		15.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	5.000		5.000	
	618-6046	CONDT (PVC) (SCH 80) (2")	LF	2,170.000		2,170.000	
	618-6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	730.000		730.000	
	620-6007	ELEC CONDR (NO.8) BARE	LF	3,360.000		3,360.000	
	620-6008	ELEC CONDR (NO.8) INSULATED	LF	6,224.000		6,224.000	
	624-6010	GROUND BOX TY D (162922)W/APRON	EA	40.000		40.000	
	628-6122	ELC SRV TY D 120/240 060(NS)AL(N)SP(O)	EA	11.000		11.000	
	650-6028	INS OH SN SUP(30 FT BAL TEE)	EA	2.000		2.000	
	6010-6004	CCTV MOUNT (POLE)	EA	10.000		10.000	
	6027-6003	CONDUIT (PREPARE)	LF	130.000		130.000	
	6027-6008	GROUND BOX (PREPARE)	EA	2.000		2.000	
	6028-6001	INSTALL DMS (POLE MTD CABINET)	EA	2.000		2.000	
	6064-6037	ITS POLE (50 FT)(90 MPH)	EA	10.000		10.000	
	6064-6072	ITS POLE MNT CAB (TY 1)(CONF 1)	EA	10.000		10.000	
	6185-6002	TMA (STATIONARY)	DAY	67.000		67.000	
	6367-6002	INSTALLATION OF CELLULAR MODEM	EA	12.000		12.000	
	16	MATERIAL FURNISHED BY THE STATE (PARTICIPATING)	LS	1.000		1.000	
	18	SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	18,000.000		18,000.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	2,000.000		2,000.000	

SITE	SUMMARY OF ITS ITEMS																
	104 6009	416 6005	416 6022	432 6001	618 6046	618 6047	620 6007	620 6008	624 6010	628 6122	650 6028	6010 6004	6027 6003	6027 6008	6028 6001	6064 6037	6064 6072
	REMOVING CONC (RIPRAP)	DRILL SHAFT (42 IN)	DRILL SHAFT (SIGN MT) (48 IN)	RIPRAP (CONC) (4 IN)	CONDT (PVC) (SCH 80) (2")	CONDT (PVC) (SCH 80) (2") (BORE)	ELEC CONDR (NO. 8) BARE	ELEC CONDR (NO. 8) INSULATED	GROUND BOX TY D (162922) W/ APRON	ELC SRV TY D 120/240 060(NS)AL(N) SP(O)	INS OH SN SUP (30 FT BAL TEE)	CCTV MOUNT (POLE)	CONDUIT (PREPARE)	GROUND BOX (PREPARE)	INSTALL DMS (POLE MTD CABINET)	ITS POLE (50 FT) (90 MPH)	ITS POLE MNT CAB (TY 1) (CONF 1)
SY	LF	LF	CY	LF	LF	LF	LF	EA	EA	EA	EA	LF	EA	EA	EA	EA	
1		19		1.25	155	220	395	710	4	1		1				1	1
2		29		1.25	280	72	372	664	4	1		1				1	1
3		29		1.25	339	46	409	730	5	1		1				1	1
4		29		1.25	102	96	370	640	2			1	130	2		1	1
5		19		1.25	120	50	186	300	3	1		1				1	1
6	10	29		1.25	80	47	147	294	4	1		1				1	1
7		19		1.25	40		44	72	1	1		1				1	1
8		29		1.25	162	42	224	388	4	1		1				1	1
9		29		1.25	142	55	213	426	3	1		1				1	1
10		29		1.25	120	47	187	374	4	1		1				1	1
11			27	1.25	510	55	709	1418	3	1	1				1		
12			27	1.25	120		104	208	2	1	1				1		
TOTALS	10	260	54	15	2170	730	3360	6224	40	11	2	10	130	2	2	10	10

SUMMARY OF COMMUNICATION EQUIPMENT	
SITE	6367 6002
	INSTALLATION OF CELLULAR MODEM
	EA
1	1
2	1
3	1
4	1
5	1
6	1
7	1
8	1
9	1
10	1
11	1
12	1
TOTALS	12

SUMMARY OF EQUIPMENT PROVIDED BY THE STATE			
SITE	CELLULAR MODEM	CCTV AND FIELD EQUIPMNT	DMS SYSTEM AND FIELD EQUIPMENT
	EA	EA	EA
	1	1	1
2	1	1	
3	1	1	
4	1	1	
5	1	1	
6	1	1	
7	1	1	
8	1	1	
9	1	1	
10	1	1	
11	1		1
12	1		1
TOTALS	12	10	2

SUMMARY OF TRAFFIC CONTROL ITEMS	
	6185 6002
	TMA (STATIONARY)
	DAY
TOTAL	67



DocuSigned by:
Randee W Shields P.E.
 4/2/2024
 BA73DA470CAD492...

QUANTITY SUMMARY



SHEET 1 OF 1

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.	
6	SEE TITLE SHEET		SL 322	
STATE	COUNTY		SHEET NO.	
TEXAS	TAYLOR		8	
DISTRICT	CONTROL	SECTION		JOB
ABL	0908	00		130

GENERAL NOTES

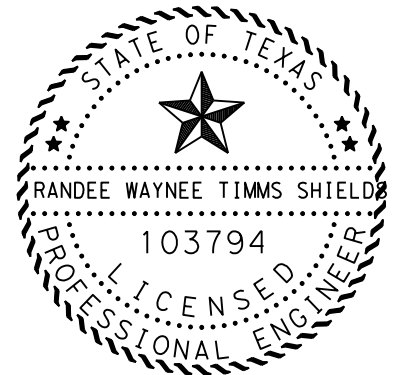
1. ITS SITES 1 THROUGH 12 MAY BE WORKED ON IN ANY ORDER, AS APPROVED BY THE ENGINEER.
2. WORK MAY PROCEED SIMULTANEOUSLY AT MULTIPLE SITES, AS APPROVED BY THE ENGINEER.
3. THE SEQUENCE OF WORK BELOW IS A TYPICAL SEQUENCE OF WORK FOR EACH SITE. DEVIATION FROM THIS SEQUENCE IS ALLOWABLE WITH THE APPROVAL OF THE ENGINEER.
4. IN GENERAL, MINIMIZE DISRUPTION OF TRAFFIC FLOW ON FREEWAY MAINLANES. WHEN POSSIBLE, USE FRONTAGE ROADS AND INTERSECTING STATE ROADWAYS FOR SITE ACCESS.
5. FOLLOW THE GUIDANCE IN THE TCP TABLE TO THE RIGHT FOR ITS SITES 1 THROUGH 12. ANY DEVIATION FROM THIS TABLE IS SUBJECT TO THE APPROVAL OF THE ENGINEER.
6. PROTECT EXPOSED EXCAVATIONS FROM VEHICLE AND PEDESTRIAN TRAFFIC IN A MANNER APPROVED BY THE ENGINEER.

SITE	TCP
1	TCP (1-1), TCP (1-2), TCP (5-1), TCP (6-1)
2	TCP (1-1), TCP (1-2), TCP (5-1), TCP (6-1)
3	TCP (1-1), TCP (1-2), TCP (5-1), TCP (6-1)
4	TCP (1-1), TCP (1-2), TCP (5-1), TCP (6-1)
5	TCP (1-1), TCP (1-2), TCP (5-1), TCP (6-1)
6	TCP (1-1), TCP (1-2), TCP (5-1), TCP (6-1)
7	TCP (1-1), TCP (1-2)
8	TCP (1-1), TCP (1-2), TCP (5-1), TCP (6-1)
9	TCP (1-1), TCP (1-2), TCP (5-1)
10	TCP (1-1), TCP (1-2), TCP (5-1), TCP (6-1)
11	TCP (1-1), TCP (1-2), TCP (5-1), TCP (6-1)
12	TCP (1-1), TCP (1-2), TCP (5-1), TCP (6-1)

SEQUENCE OF WORK

1. PREPARE SITE FOR WORK.
2. CONSTRUCT DRILL SHAFTS.
3. CONSTRUCT CONDUIT, GROUND BOXES, AND MISCELLANEOUS CONCRETE.
4. LIFT OVERHEAD SIGN SUPPORTS, ITS POLES, ELECTRIC SERVICE POLES, AND DMS BOARDS INTO PLACE.
5. INSTALL AND TEST ITS AND COMMUNICATION EQUIPMENT.
6. RETURN SITE TO A CLEAN AND PRESENTABLE CONDITION.

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4/3/2024

DocuSigned by:
Randee W Shields P.E.
 BA73DA470CAD492...

TCP NARRATIVE



SHEET 1 OF 1

FHWA DIVISION	PROJECT NO.	HIGHWAY NO.	
6	SEE TITLE SHEET	SL 322	
STATE	COUNTY	SHEET NO.	
TEXAS	TAYLOR	9	
DISTRICT	CONTROL	SECTION	JOB
ABL	0908	00	130

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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

- 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).
- The development and design of the Traffic Control Plan (TCP) is the responsibility of the Engineer.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- Traffic control devices should be in place only while work is actually in progress or a definite need exists.
- The Engineer has the final decision on the location of all traffic control devices.
- 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:


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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

- Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources.
- Work zone traffic control devices shall be compliant with the Manual for Assessing safety Hardware (MASH).

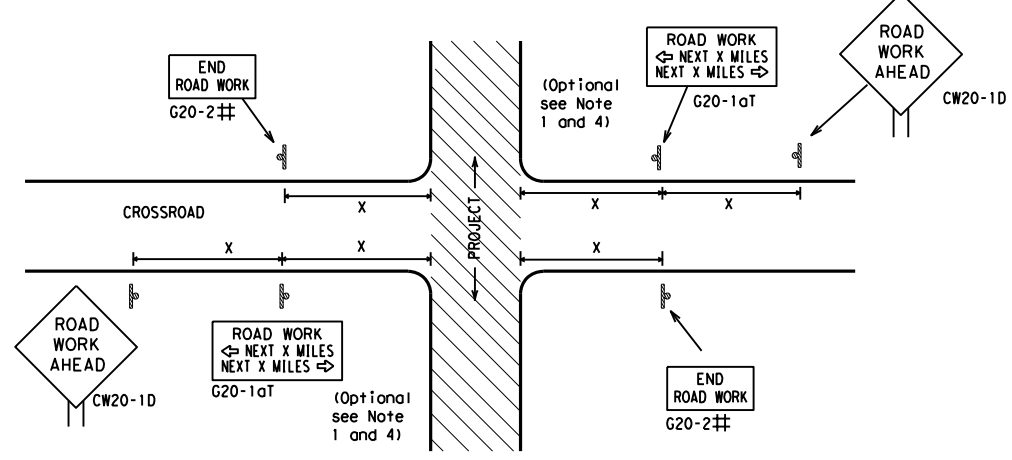
THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT http://www.txdot.gov
COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)
MATERIAL PRODUCER LIST (MPL)
ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS)"
STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS (SHSD)
TEXAS 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
© TxDOT	November 2002	CK:	TxDOT
		DW:	TxDOT
		CR:	TxDOT
		CONTRACT	0908 00
		SECTION	130
		JOB	SL 322
		HIGHWAY	
REVISIONS		DIST	COUNTY
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9-07	8-14		
5-10	5-21	ABL	TAYLOR
			SHEET NO.
			10

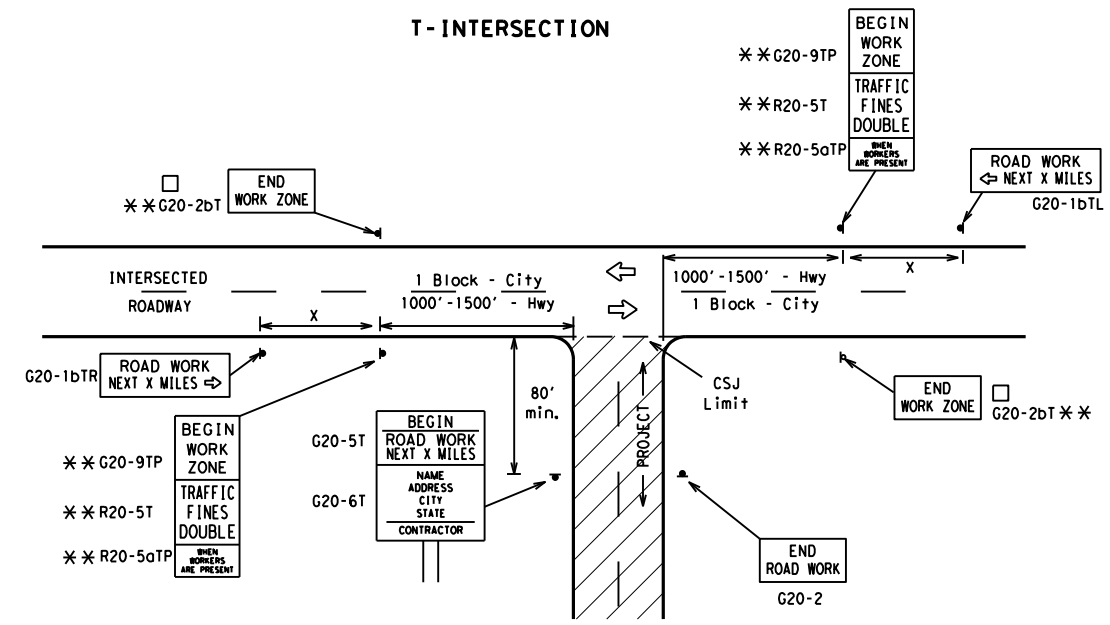
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TYPICAL LOCATION OF CROSSROAD SIGNS



- ## May be mounted on back of "ROAD WORK AHEAD" (CW20-1D) sign with approval of Engineer. (See note 2 below)
- 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.
 - 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.
 - 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.
 - 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.
 - Additional traffic control devices may be shown elsewhere in the plans for higher volume crossroads.
 - 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

- 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.
- 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}

Sign Number or Series	SIZE		SPACING	
	Conventional Road	Expressway/Freeway	Posted Speed MPH	Sign Δ Spacing "x" Feet (Apprx.)
CW20 ⁴	48" x 48"	48" x 48"	30	120
CW21			35	160
CW22			40	240
CW23			45	320
CW25			50	400
CW1, CW2, CW7, CW8, CW9, CW11, CW14	36" x 36"	48" x 48"	55	500 ²
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48" x 48"	48" x 48"	60	600 ²
			65	700 ²
			70	800 ²
			75	900 ²
			80	1000 ²
			*	* ³

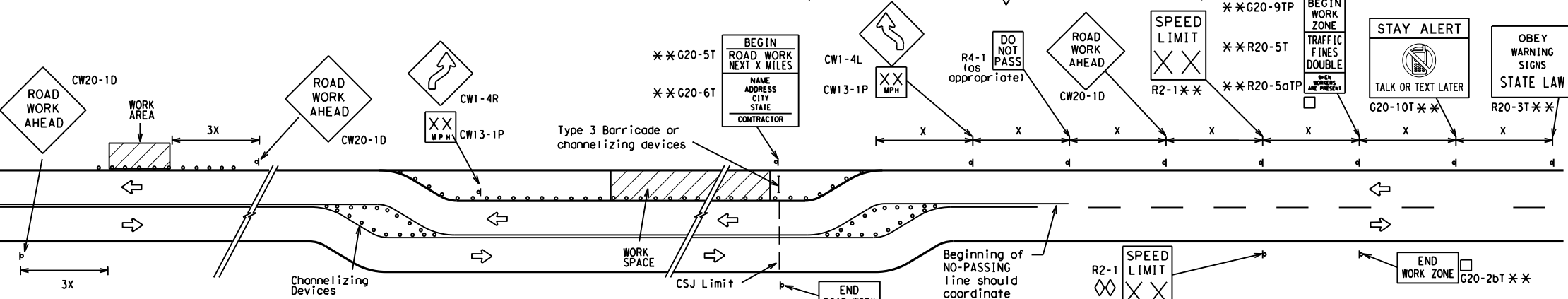
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

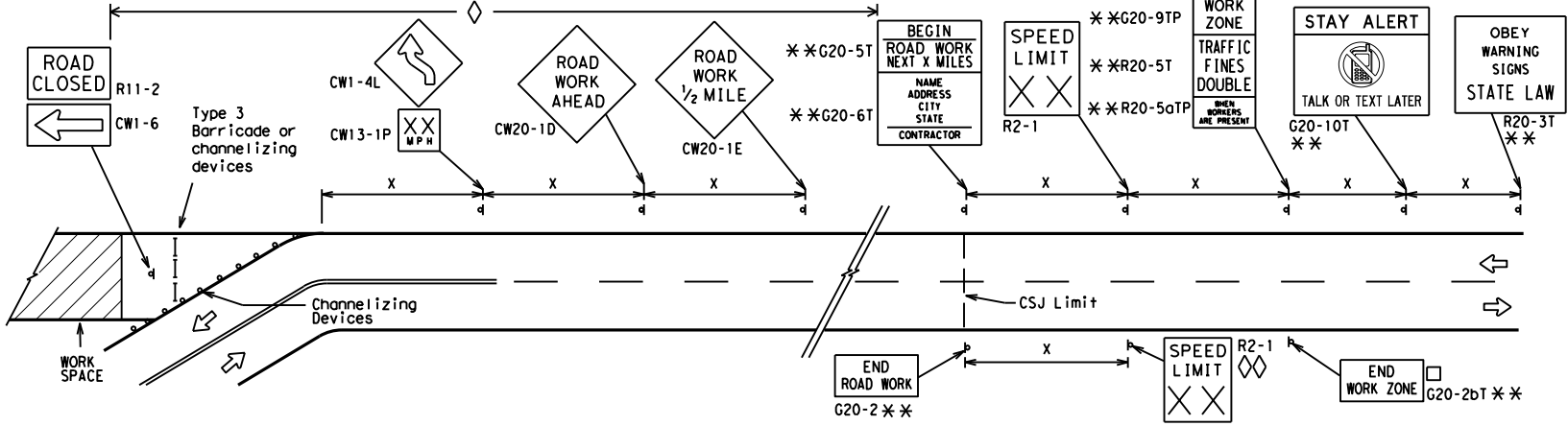
- Special or larger size signs may be used as necessary.
- Distance between signs should be increased as required to have 1500 feet advance warning.
- Distance between signs should be increased as required to have 1/2 mile or more advance warning.
- 36" x 36" "ROAD WORK AHEAD" (CW20-1D) signs may be 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".
- Only diamond shaped warning sign sizes are indicated.
- 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



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



BARRICADE AND CONSTRUCTION PROJECT LIMIT

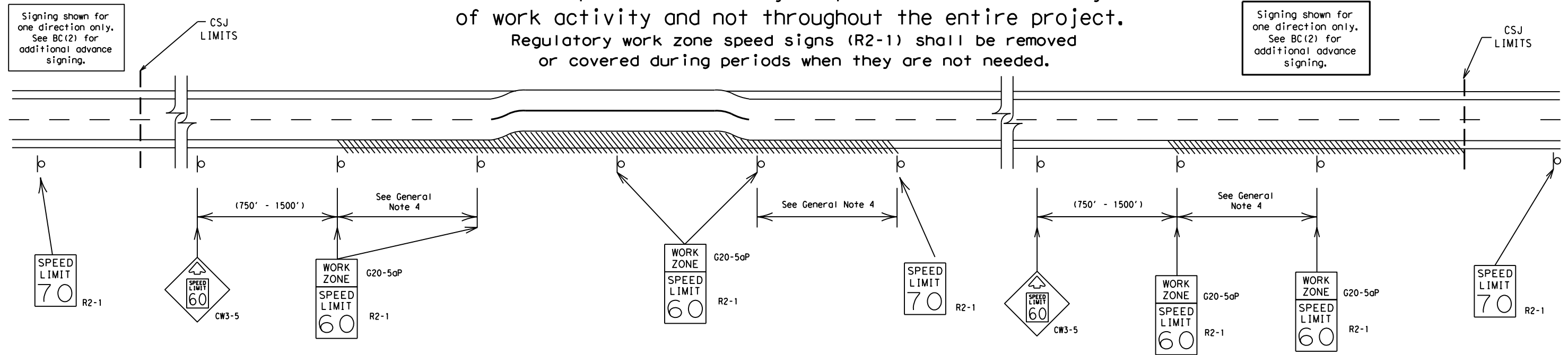
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© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ABL	TAYLOR		11

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:

- rough road or damaged pavement surface
- substantial alteration of roadway geometrics (diversions)
- construction detours
- grade
- width
- 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

- Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
- Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
- Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
- 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
- Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
- 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.
- Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
- Techniques that may help reduce traffic speeds include but are not limited to:
 - Law enforcement.
 - Flagger stationed next to sign.
 - Portable changeable message sign (PCMS).
 - Low-power (drone) radar transmitter.
 - Speed monitor trailers or signs.
- Speeds shown on details above are for illustration only. Work Zone Speed Limits should only be posted as approved for each project.
- 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.

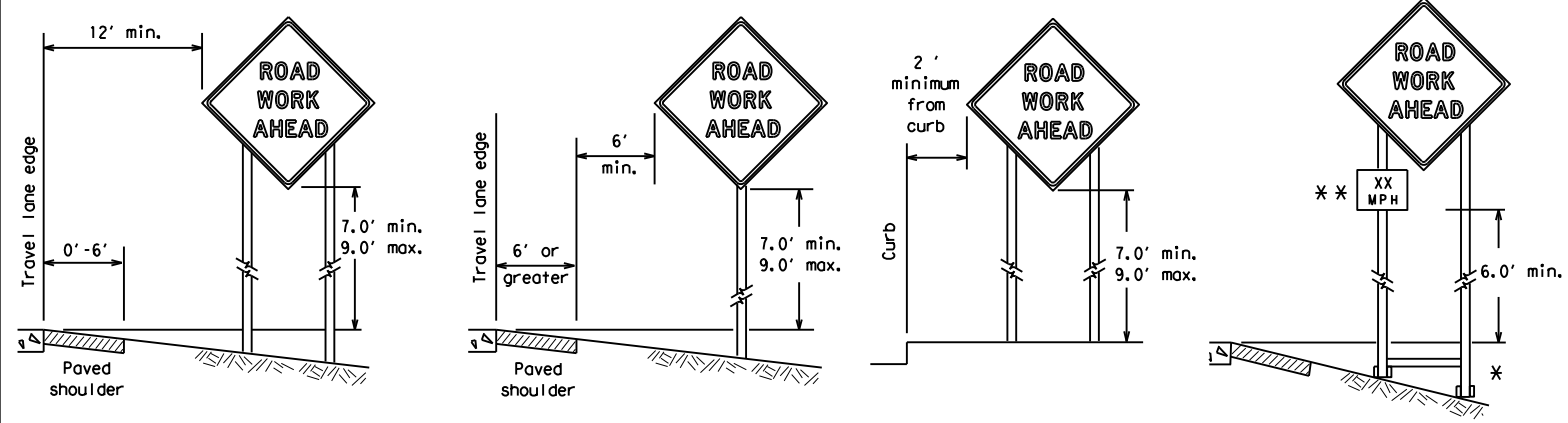
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SHEET 3 OF 12

		Traffic Safety Division Standard	
<h2>BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT</h2>			
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© TxDOT	November 2002	CON:	0908
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7-13	5-21	HIGHWAY:	SL 322
		DIST:	ABL
		COUNTY:	TAYLOR
		SHEET NO.:	12

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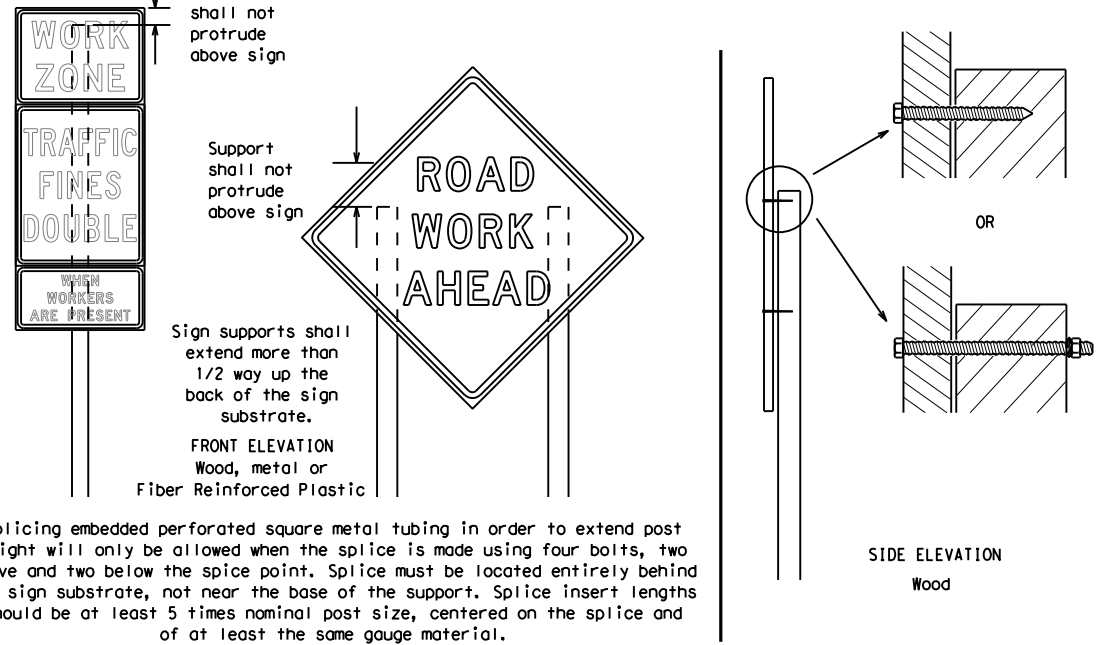
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



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

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

ATTACHMENT FOR SIGN SUPPORTS



Splicing embedded perforated square metal tubing in order to extend post height will only be allowed when the splice is made using four bolts, two above and two below the splice 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.

GENERAL NOTES FOR WORK ZONE SIGNS

- Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
- Wooden sign posts shall be painted white.
- Barricades shall NOT be used as sign supports.
- 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.
- The Contractor may furnish either the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD). The Engineer/Inspector may require the Contractor to furnish other work zone signs that are shown in the TMUTCD but may have been omitted from the plans. Any variation in the plans shall be documented by written agreement between the Engineer and the Contractor's Responsible Person. All changes must be documented in writing before being implemented. This can include documenting the changes in the Inspector's TxDOT diary and having both the Inspector and Contractor initial and date the agreed upon changes.
- The 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.
- 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.
- 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.
- 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)

- 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.
 - Long-term stationary - work that occupies a location more than 3 days.
 - 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.
 - Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
 - Short, duration - work that occupies a location up to 1 hour.
 - Mobile - work that moves continuously or intermittently (stopping for up to approximately 15 minutes.)

SIGN MOUNTING HEIGHT

- 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.
- 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.
- Long-term/Intermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
- 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.
- 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

- 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

- 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.
- "Mesh" type materials are NOT an approved sign substrate, regardless of the tightness of the weave.
- 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

- 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).
- White sheeting, meeting the requirements of DMS-8300 Type A, shall be used for signs with a white background.
- 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

- 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

- When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
- 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.
- 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.
- 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 shall NOT be used to cover signs.
- Duct tape or other adhesive material shall NOT be affixed to a sign face.
- Signs and anchor stubs shall be removed and holes backfilled upon completion of work.

SIGN SUPPORT WEIGHTS

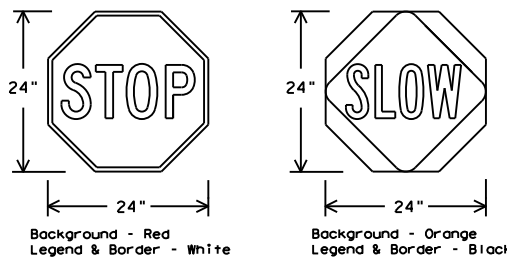
- Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
- The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
- Rock, concrete, iron, steel or other solid objects shall not be permitted for use as sign support weights.
- 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.
- 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.
- 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.
- Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

FLAGS ON SIGNS

- 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.

STOP/SLOW PADDLES

- STOP/SLOW paddles are the primary method to control traffic by flaggers. The STOP/SLOW paddle size should be 24" x 24".
- STOP/SLOW paddles shall be retroreflective when used at night.
- STOP/SLOW paddles may be attached to a staff with a minimum length of 6' to the bottom of the sign.
- 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

- 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.
- 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.
- When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
- 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.
- 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.
- 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.



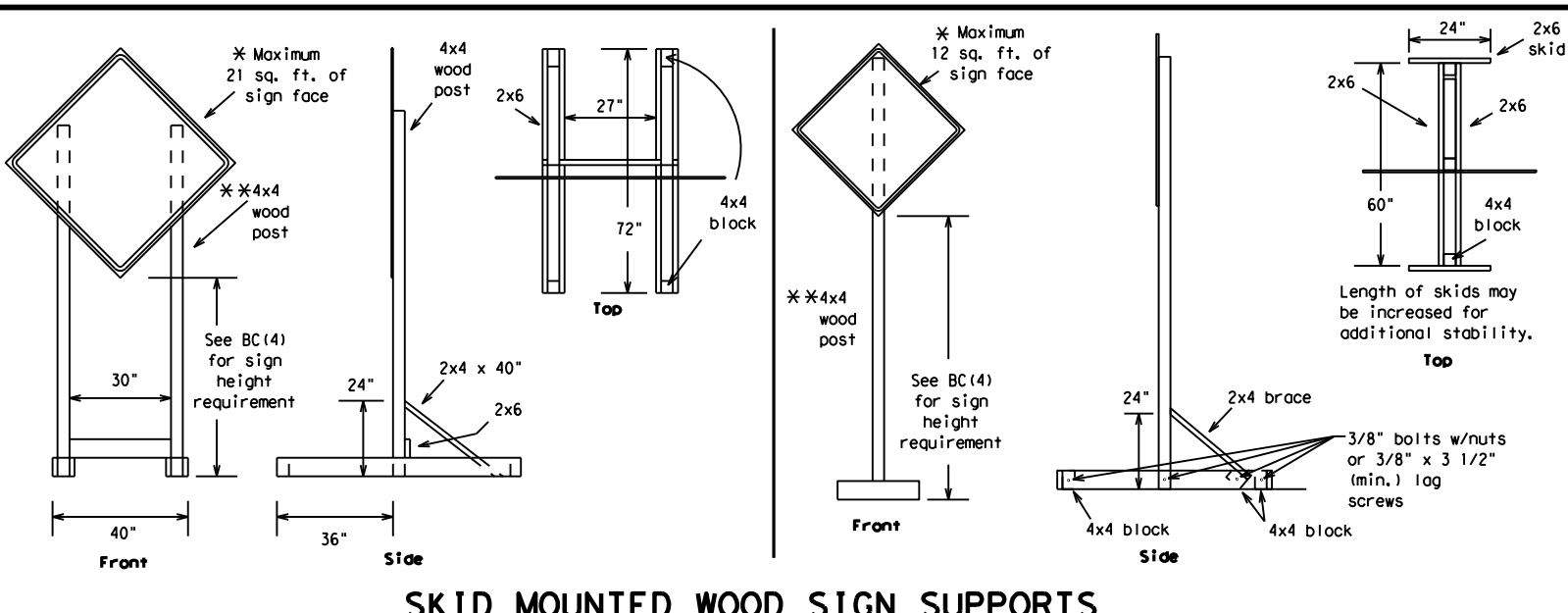
BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC (4) - 21

FILE: bc-21.dgn	DN: TxDOT	CR: TxDOT	OW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0908 00		130	SL 322
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ABL	TAYLOR		13

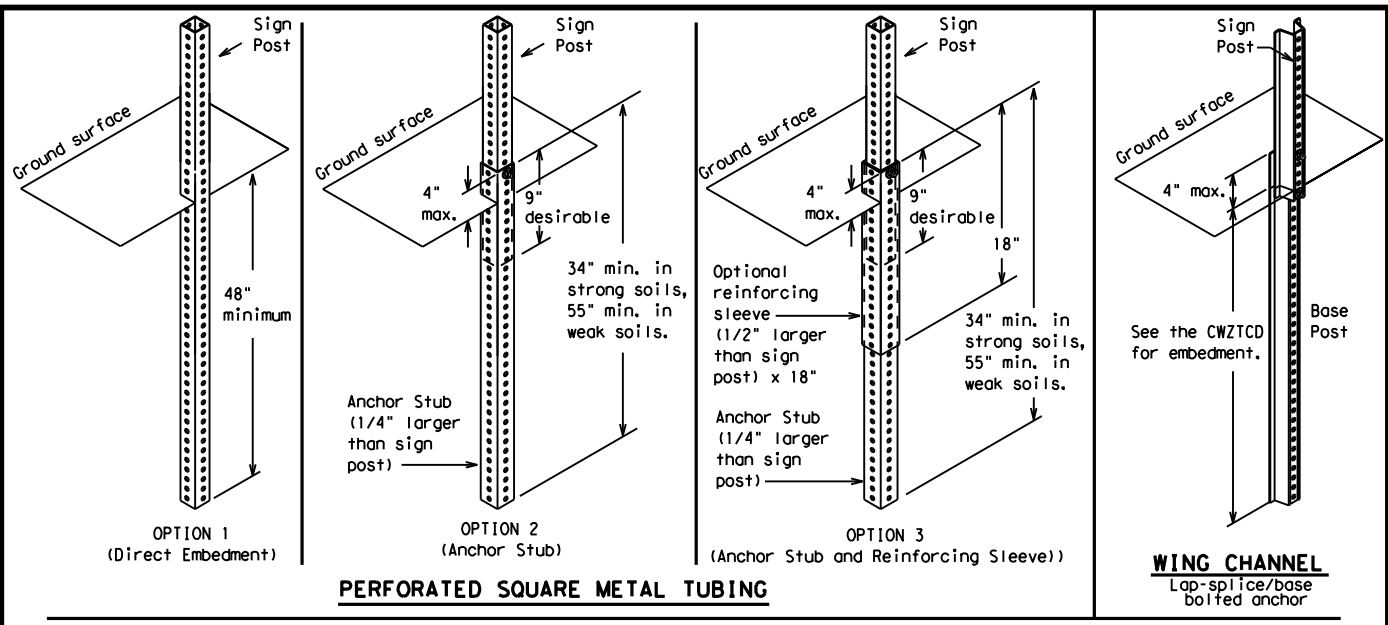
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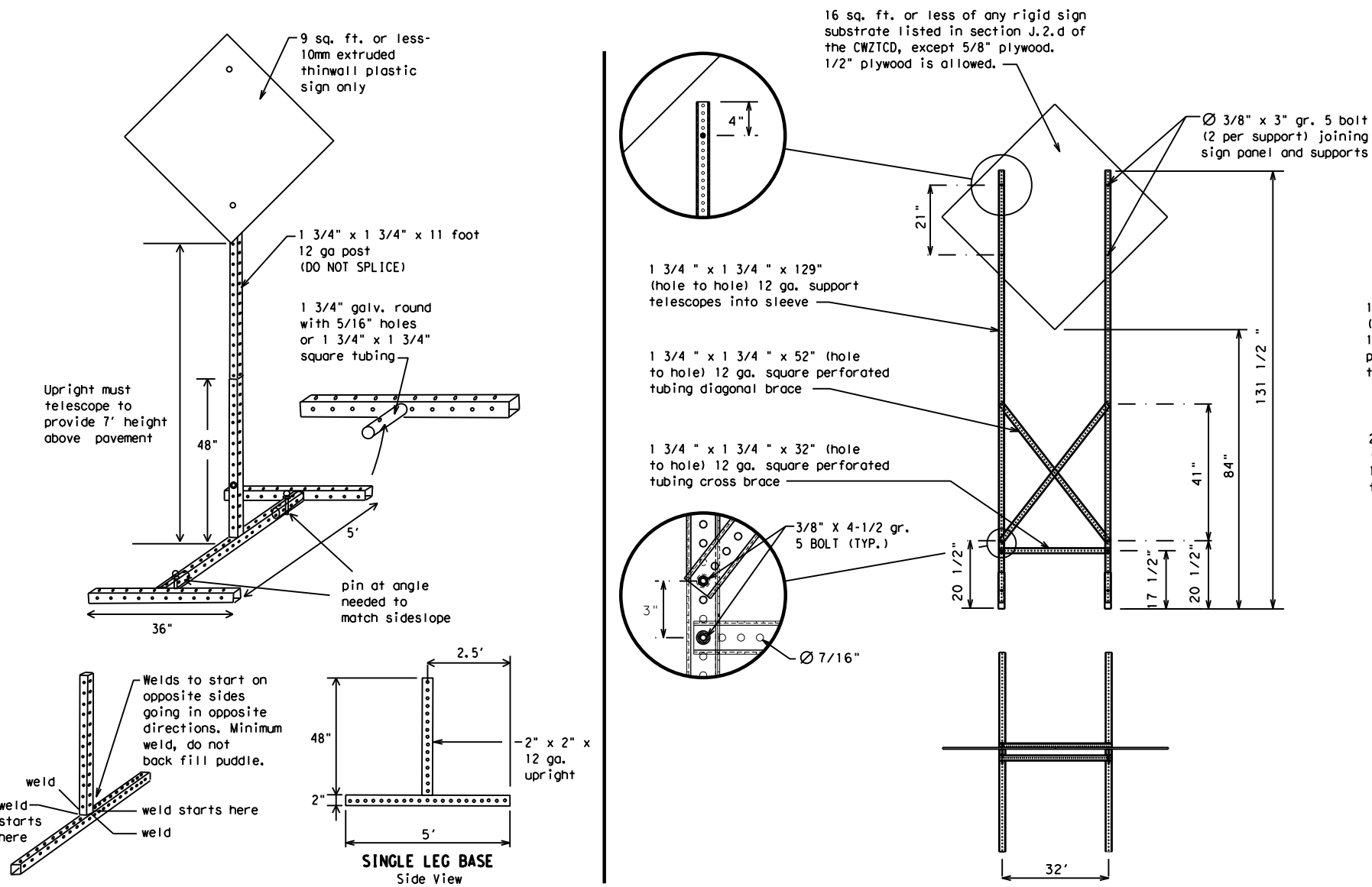
SKID MOUNTED WOOD SIGN SUPPORTS

* 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**
- 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.
 - No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
 - 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.

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5) - 21

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REVISIONS	0908	00	130	SL	322				
9-07	8-14	DIST	COUNTY	SHEET NO.					
7-13	5-21	ABL	TAYLOR	14					

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

PORTABLE CHANGEABLE MESSAGE SIGNS

- The Engineer/Inspector shall approve all messages used on portable changeable message signs (PCMS).
- 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.
- 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.
- Use the word "EXIT" to refer to an exit ramp on a freeway; i.e., "EXIT CLOSED." Do not use the term "RAMP."
- Always use the route or interstate designation (IH, US, SH, FM) along with the number when referring to a roadway.
- When in use, the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible.
- 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.
- 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.
- Do not "flash" messages or words included in a message. The message should be steady burn or continuous while displayed.
- 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.
- Do not use the word "Danger" in message.
- Do not display the message "LANES SHIFT LEFT" or "LANES SHIFT RIGHT" on a PCMS. Drivers do not understand the message.
- Do not display messages that scroll horizontally or vertically across the face of the sign.
- 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.
- 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.
- Each line of text should be centered on the message board rather than left or right justified.
- 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.

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
XXXXXXXX TO XXXXXXX
US XXX TO FM XXXX

Warning List

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

** Advance Notice List

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

- Only 1 or 2 phases are to be used on a PCMS.
- The 1st phase (or both) should be selected from the "Road/Lane/Ramp Closure List" and the "Other Condition List".
- A 2nd phase can be selected from the "Action to Take/Effect on Travel, Location, General Warning, or Advance Notice Phase Lists".
- A Location Phase is necessary only if a distance or location is not included in the first phase selected.
- 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.
- 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

- The words RIGHT, LEFT and ALL can be interchanged as appropriate.
- Roadway designations IH, US, SH, FM and LP can be interchanged as appropriate.
- EAST, WEST, NORTH and SOUTH (or abbreviations E, W, N and S) can be interchanged as appropriate.
- Highway names and numbers replaced as appropriate.
- ROAD, HIGHWAY and FREEWAY can be interchanged as needed.
- AHEAD may be used instead of distances if necessary.
- FT and MI, MILE and MILES interchanged as appropriate.
- AT, BEFORE and PAST interchanged as needed.
- 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

- 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.
- 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.
- 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.
- 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.

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

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



BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

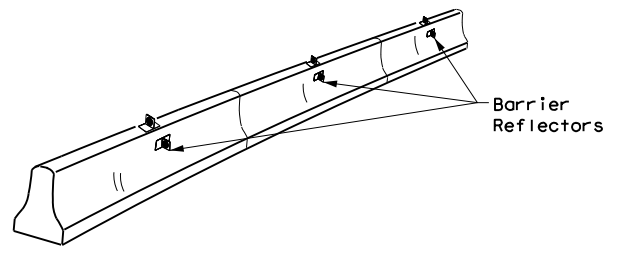
BC (6) - 21

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© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	ABL	TAYLOR	15	

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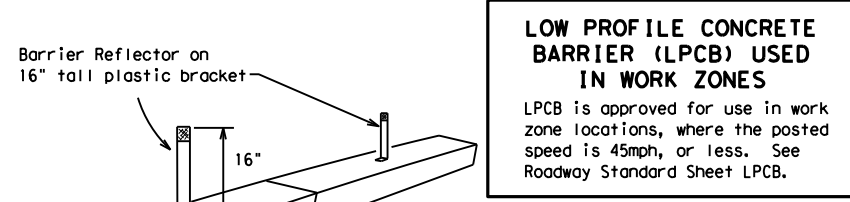
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- Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
- Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost of the reflectors shall be considered subsidiary to Item 512.



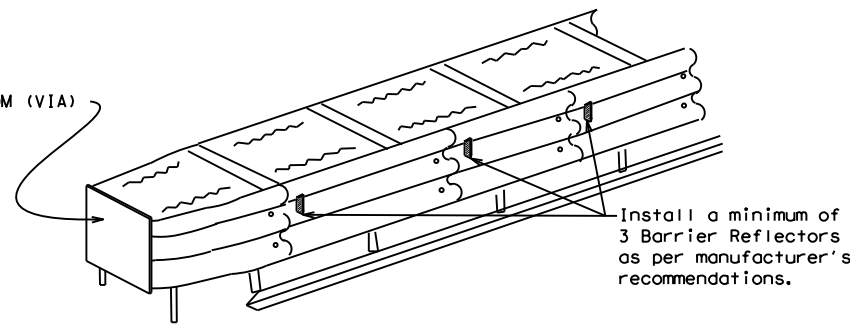
CONCRETE TRAFFIC BARRIER (CTB)

- 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.
- 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.
- When CTB separates traffic traveling in the same direction, no barrier reflectors will be required on top of the CTB.
- Barrier Reflector units shall be yellow or white in color to match the edgeline being supplemented.
- Maximum spacing of Barrier Reflectors is forty (40) feet.
- Pavement markers or temporary flexible-reflective roadway marker tabs shall NOT be used as CTB delineation.
- Attachment of Barrier Reflectors to CTB shall be per manufacturer's recommendations.
- Missing or damaged Barrier Reflectors shall be replaced as directed by the Engineer.
- Single slope barriers shall be delineated as shown on the above detail.



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 appropriate 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

WARNING LIGHTS

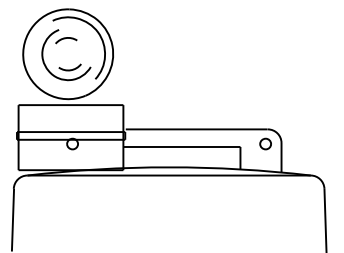
- Warning lights shall meet the requirements of the TMUTCD.
- Warning lights shall NOT be installed on barricades.
- Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet 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.
- 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".
- The Engineer/Inspector or the plans shall specify the location and type of warning lights to be installed on the traffic control devices.
- 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.
- 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.
- The location of warning lights and warning reflectors on drums shall be as shown elsewhere in the plans.

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

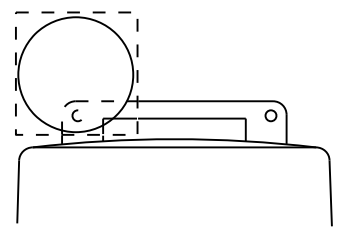
- Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
- Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
- A series of sequential flashing warning lights placed on channelizing 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.
- 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.
- Type A, Type C and Type D warning lights shall be installed at locations as detailed on other sheets in the plans.
- Warning lights shall not be installed on a drum that has a sign, chevron or vertical panel.
- 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

- 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.
- 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.
- The warning reflector shall have a minimum retroreflective surface area (one-side) of 30 square inches.
- Round reflectors shall be fully reflectorized, including the area where attached to the drum.
- 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.
- 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.
- When used near two-way traffic, both sides of the warning reflector shall be reflectorized.
- The warning reflector should be mounted on the side of the handle nearest approaching traffic.
- The maximum spacing for warning reflectors should be identical to the channelizing device spacing requirements.



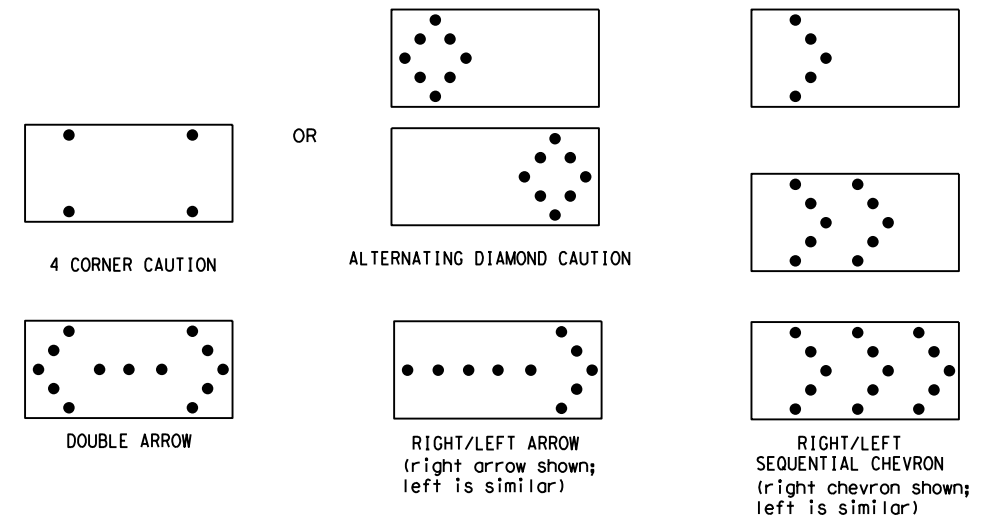
Type C Warning Light or approved substitute mounted on a drum adjacent to the travel way.



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

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.

- 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.
- 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.
- 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.
- The Flashing Arrow Board should be able to display the following symbols:



- The "CAUTION" display consists of four corner lamps flashing simultaneously, or the Alternating Diamond Caution mode as shown.
- The straight line caution display is NOT ALLOWED.
- 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.
- 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.
- The sequential arrow display is NOT ALLOWED.
- The flashing arrow display is the TxDOT standard; however, the sequential chevron display may be used during daylight operations.
- The Flashing Arrow Board shall be mounted on a vehicle, trailer or other suitable support.
- A Flashing Arrow Board SHALL NOT BE USED to laterally shift traffic.
- 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.
- Minimum mounting height of trailer mounted Arrow Boards should be 7 feet from roadway to bottom of panel.

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

ATTENTION
 Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

SHEET 7 OF 12

TRUCK-MOUNTED ATTENUATORS

- Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the Manual for Assessing Safety Hardware (MASH).
- Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
- Refer to the CWZTCD for a list of approved TMAs.
- TMAs are required on freeways unless otherwise noted in the plans.
- 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.
- The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is an extended distance from the TMA.



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

BC (7) -21

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GENERAL NOTES

- For long term stationary work zones on freeways, drums shall be used as the primary channelizing device.
- 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.
- 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.
- 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).
- 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.
- 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

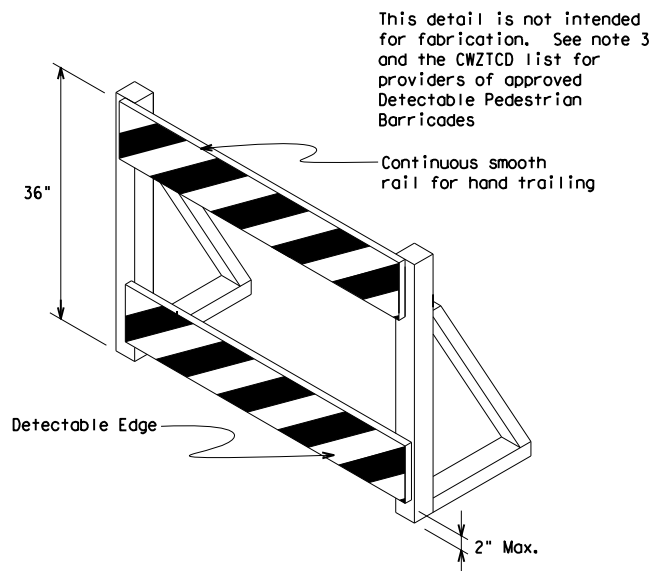
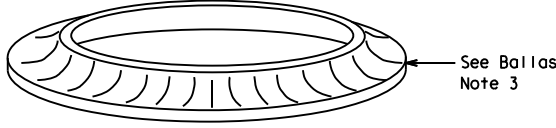
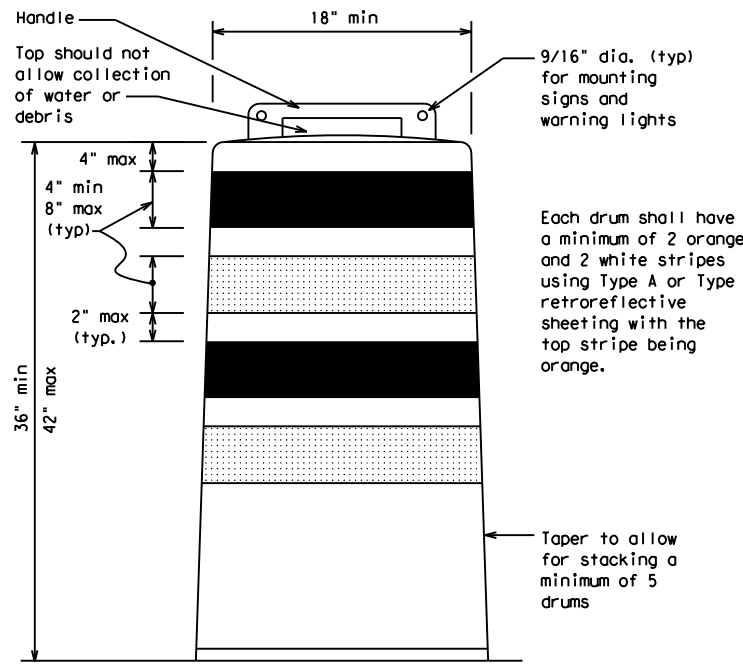
- Pre-qualified plastic drums shall meet the following requirements:
- Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
 - The body and base shall lock together in such a manner that the body separates from the base when impacted 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.
 - 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.
 - 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.
 - 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.
 - 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.
 - 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.
 - Plastic drums shall be constructed of ultra-violet stabilized, orange, high-density polyethylene (HDPE) or other approved material.
 - Drum body shall have a maximum unballasted weight of 11 lbs.
 - Drum and base shall be marked with manufacturer's name and model number.

RETROREFLECTIVE SHEETING

- 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.
- 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.

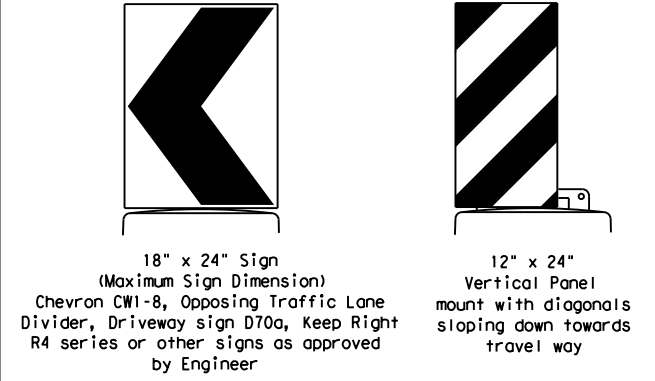
BALLAST

- 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.
- 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.
- Recycled truck tire sidewalls may be used for ballast on drums approved for this type of ballast on the CWZTCD list.
- 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.
- 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.
- Ballast shall not be placed on top of drums.
- Adhesives may be used to secure base of drums to pavement.



DETECTABLE PEDESTRIAN BARRICADES

- 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.
- 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.
- 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.
- 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.
- Warning lights shall not be attached to detectable pedestrian barricades.
- 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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

- Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
- 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.
- 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.
- 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.
- Signs shall be installed using a 1/2 inch bolt (nominal) and nut, two washers, and one locking washer for each connection.
- Mounting bolts and nuts shall be fully engaged and adequately torqued. Bolts should not extend more than 1/2 inch beyond nuts.
- 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.
- 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.

SHEET 8 OF 12

Traffic Safety Division Standard

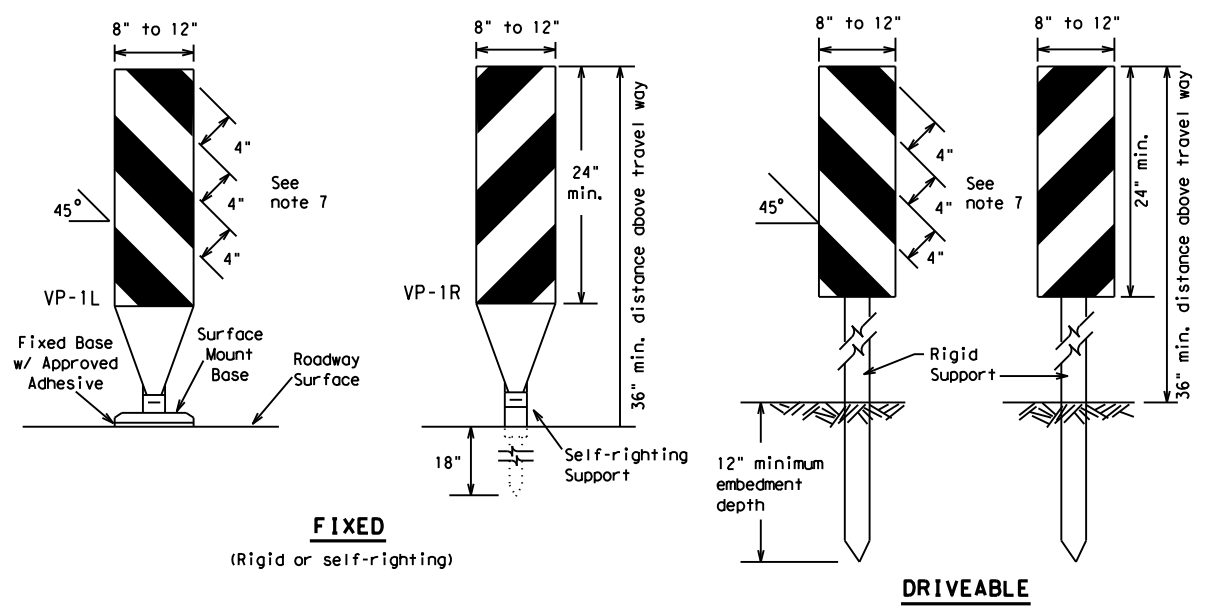
BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC (8) - 21

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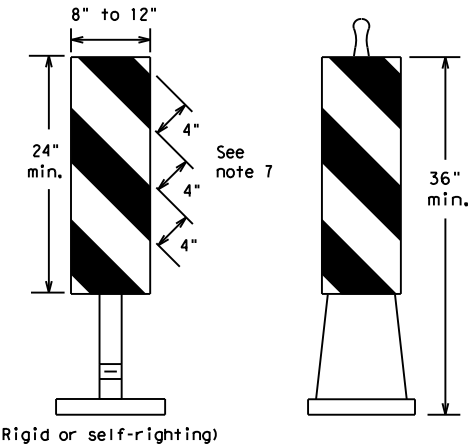
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FIXED
(Rigid or self-righting)

DRIVEABLE

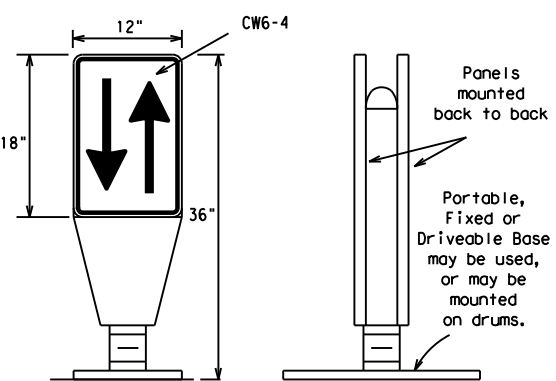


(Rigid or self-righting)

PORTABLE

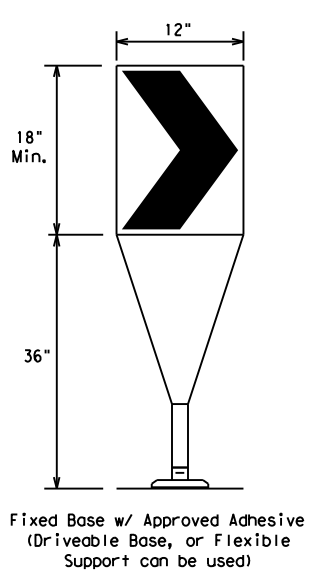
VERTICAL PANELS (VPs)

- Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
- 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.
- 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.
- VP's used on expressways and freeways or other high speed roadways, may have more than 270 square inches of retroreflective area facing traffic.
- Self-righting supports are available with portable base. See "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
- Sheeting for the VP's shall be retroreflective Type A or Type B conforming to Departmental Material Specification DMS-8300, unless noted otherwise.
- Where the height of reflective material on the vertical panel is 36 inches or greater, a panel stripe of 6 inches shall be used.



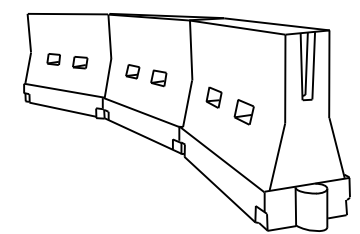
OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

- 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.
- The OTLD may be used in combination with 42" cones or VPs.
- Spacing between the OTLD shall not exceed 500 feet. 42" cones or VPs placed between the OTLD's should not exceed 100 foot spacing.
- 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.



- The chevron shall be a vertical rectangle with a minimum size of 12 by 18 inches.
- 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.
- 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.
- To be effective, the chevron should be visible for at least 500 feet.
- 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.
- 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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

- 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.
- LCDs may be used instead of a line of cones or drums.
- LCDs shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
- LCDs should not be used to provide positive protection for obstacles, pedestrians or workers.
- LCDs shall be supplemented with retroreflective delineation as required for temporary barriers on BC(7) when placed roughly parallel to the travel lanes.
- 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

- 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.
- 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.
- 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.
- 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.
- 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

GENERAL NOTES

- 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).
- 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.
- 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).
- 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.
- Portable bases shall be fabricated from virgin and/or recycled rubber. The portable bases shall weigh a minimum of 30 lbs.
- 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.
- 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.

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12



BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC (9) - 21

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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.

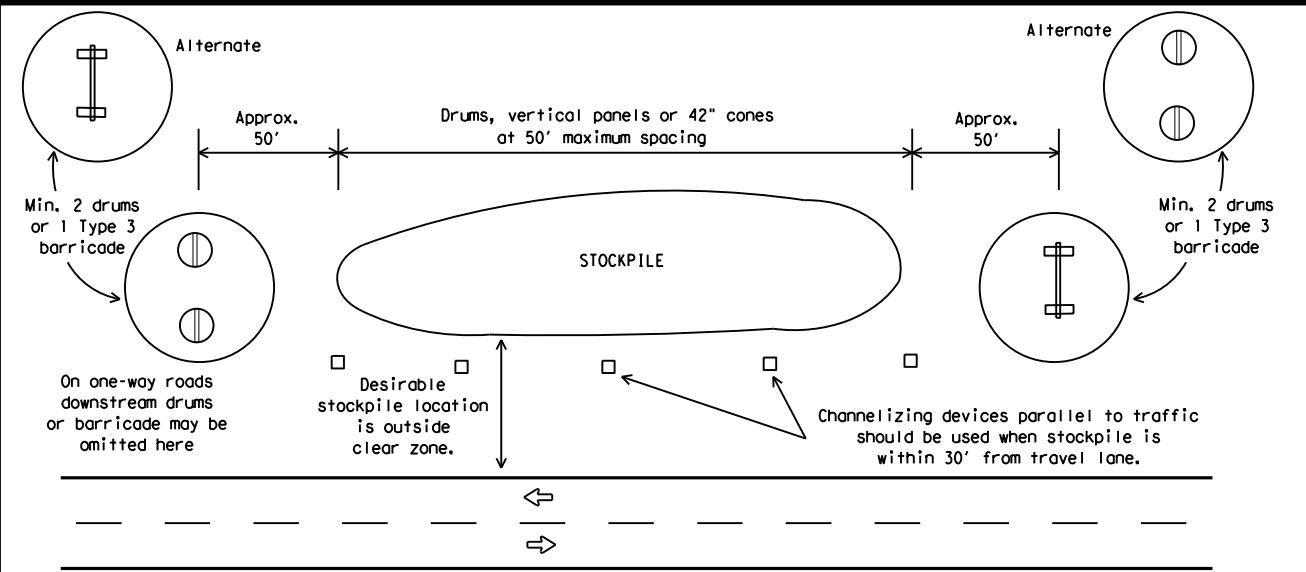


TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



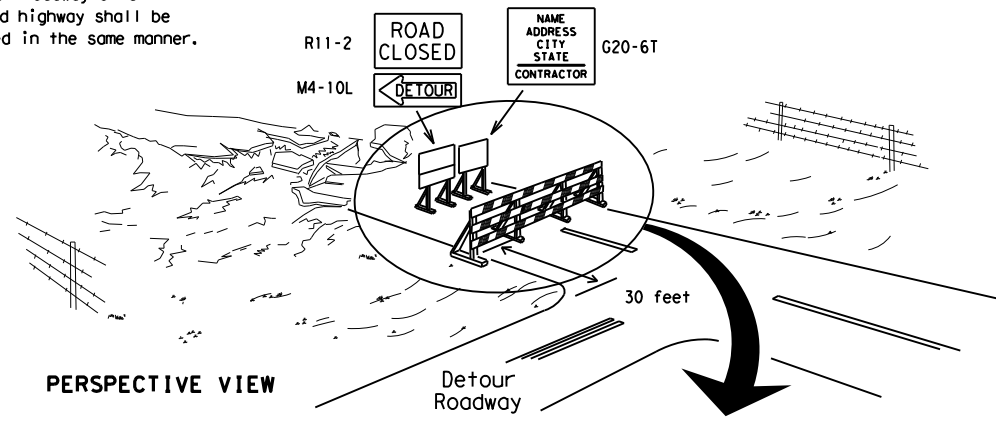
Stiffener may be inside or outside of support, but no more than 2 stiffeners shall be allowed on one barricade.

TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

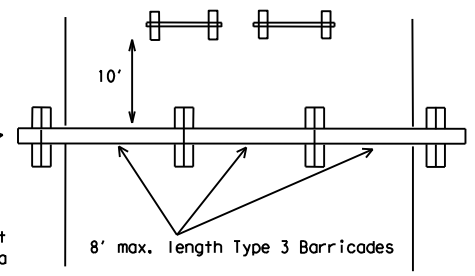
Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

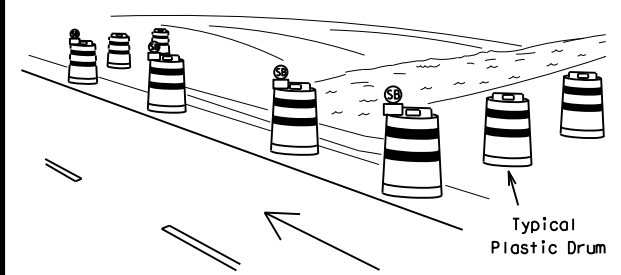
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic. Barricade striping should slant downward in the direction of detour.

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.

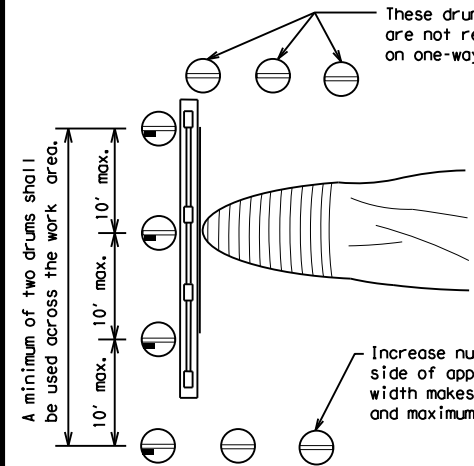


PLAN VIEW

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

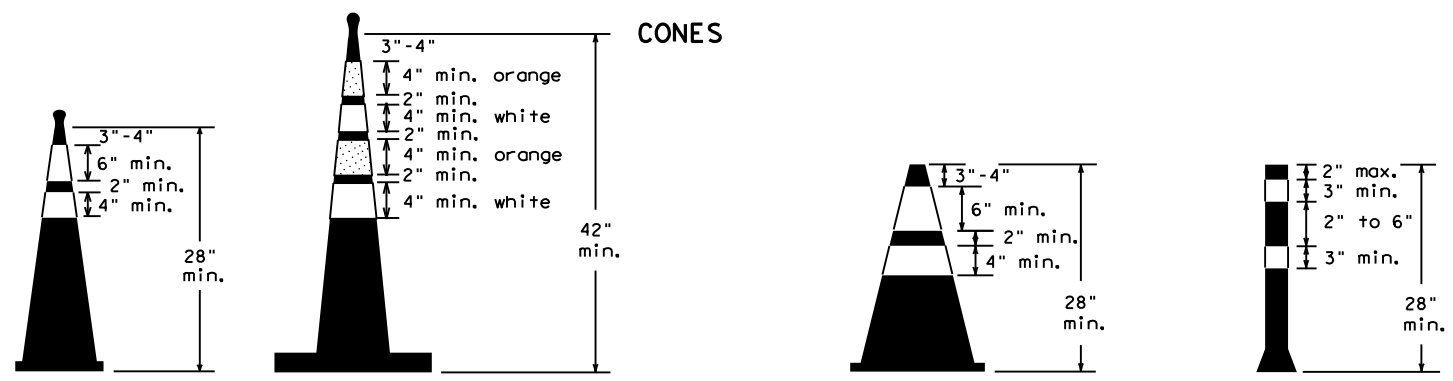


PLAN VIEW

1. Where positive redirection 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
	Steady burn warning light or yellow warning reflector

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones

One-Piece cones

Tubular Marker

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.



BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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7-13 5-21	ABL	TAYLOR	19	

WORK ZONE PAVEMENT MARKINGS

GENERAL

- 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.
- Color, patterns and dimensions shall be in conformance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
- Additional supplemental pavement marking details may be found in the plans or specifications.
- Pavement markings shall be installed in accordance with the TMUTCD and as shown on the plans.
- 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).
- 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.
- All work zone pavement markings shall be installed in accordance with Item 662, "Work Zone Pavement Markings."

RAISED PAVEMENT MARKERS

- Raised pavement markers are to be placed according to the patterns on BC(12).
- 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

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

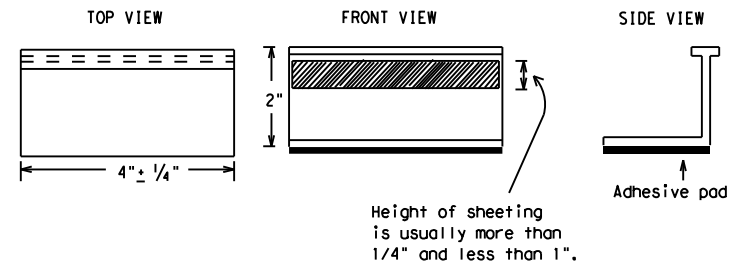
MAINTAINING WORK ZONE PAVEMENT MARKINGS

- The Contractor will be responsible for maintaining work zone pavement markings within the work limits.
- 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.
- 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.
- 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

- 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.
- 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.
- 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".
- The removal of pavement markings may require resurfacing or seal coating portions of the roadway as described in Item 677.
- Subject to the approval of the Engineer, any method that proves to be successful on a particular type pavement may be used.
- Blast cleaning may be used but will not be required unless specifically shown in the plans.
- Over-painting of the markings SHALL NOT BE permitted.
- Removal of raised pavement markers shall be as directed by the Engineer.
- 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.
- 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**

- Temporary flexible-reflective roadway marker tabs used as guidemarks shall meet the requirements of DMS-8242.
- 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.
 - 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.
 - 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.
- Small design variances may be noted between tab manufacturers.
- 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

- Raised pavement markers used as guidemarks shall be from the approved product list, and meet the requirements of DMS-4200.
- All temporary construction raised pavement markers provided on a project shall be of the same manufacturer.
- 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).

SHEET 11 OF 12



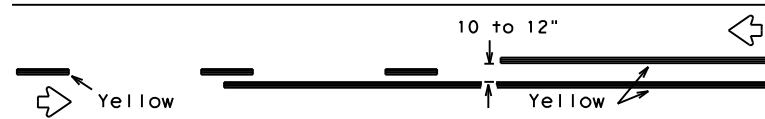
BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

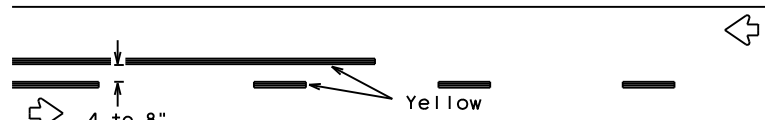
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© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
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2-98 9-07 5-21	DIST	COUNTY	SHEET NO.	
1-02 7-13	ABL	TAYLOR	20	
11-02 8-14				

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PAVEMENT MARKING PATTERNS

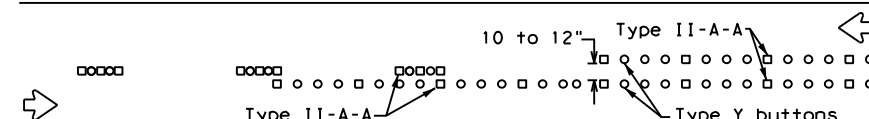


REFLECTORIZED PAVEMENT MARKINGS - PATTERN A

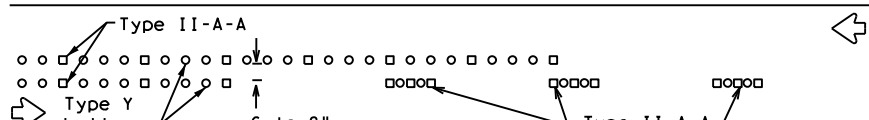


REFLECTORIZED PAVEMENT MARKINGS - PATTERN B

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.

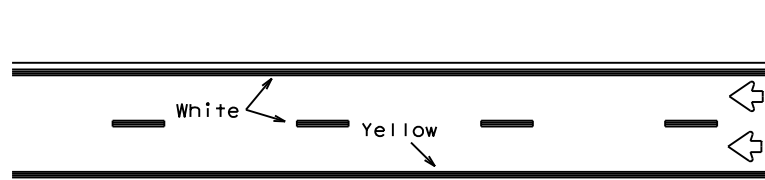


RAISED PAVEMENT MARKERS - PATTERN A



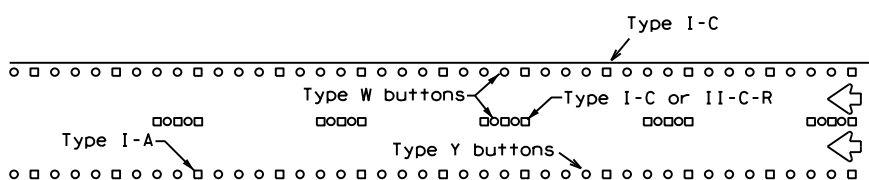
RAISED PAVEMENT MARKERS - PATTERN B

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



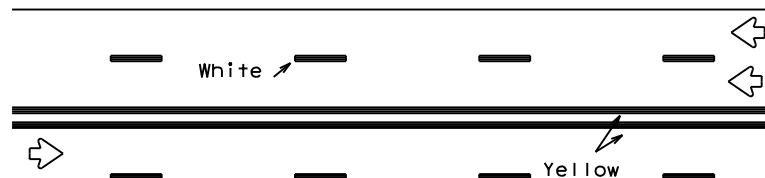
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectORIZED pavement markings.



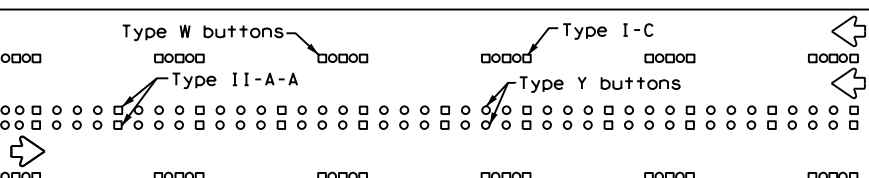
RAISED PAVEMENT MARKERS

EDGE & LANE LINES FOR DIVIDED HIGHWAY



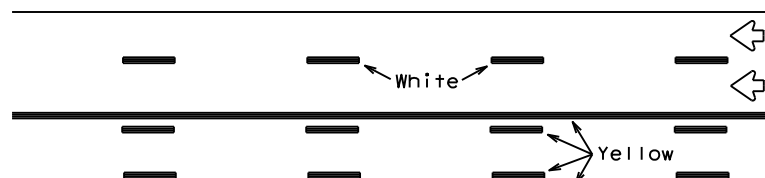
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectORIZED pavement markings.



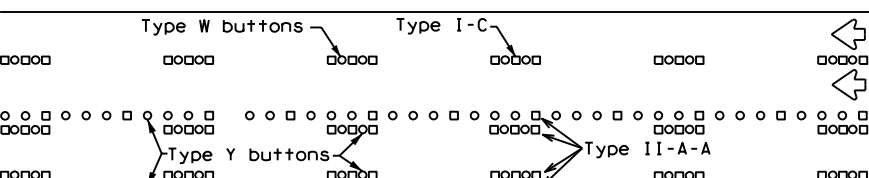
RAISED PAVEMENT MARKERS

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS

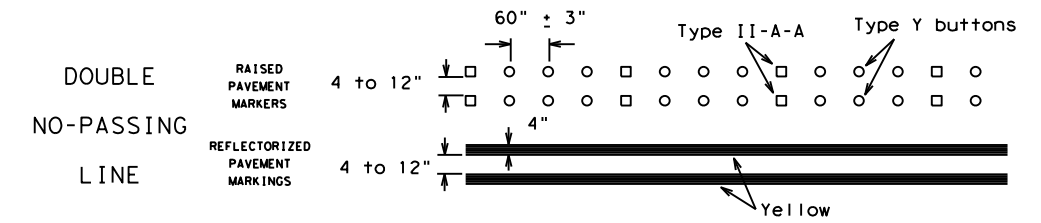
Prefabricated markings may be substituted for reflectORIZED pavement markings.



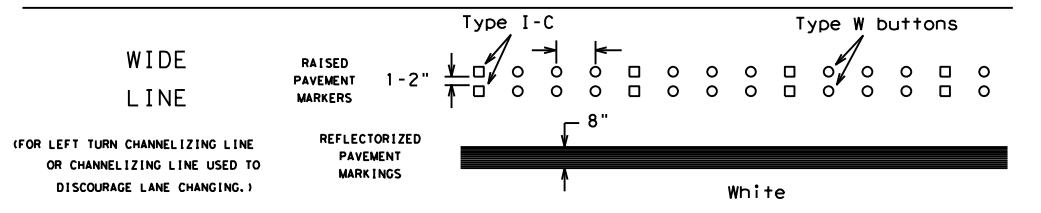
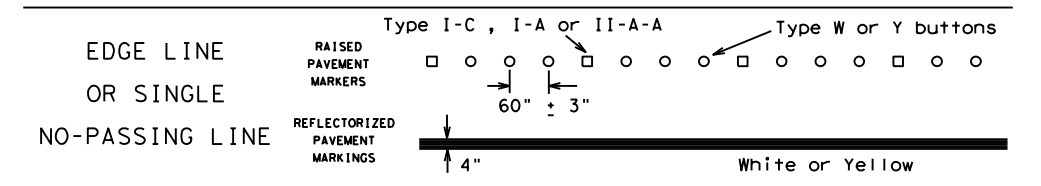
RAISED PAVEMENT MARKERS

TWO-WAY LEFT TURN LANE

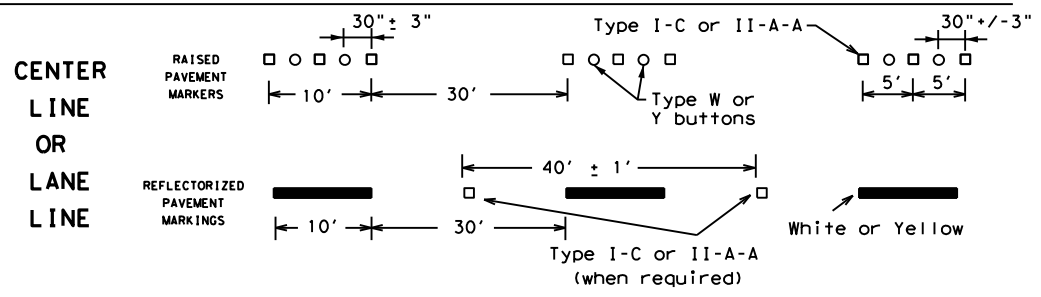
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



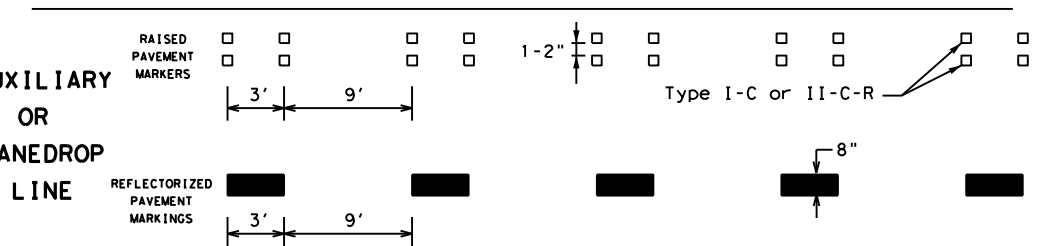
SOLID LINES



BROKEN LINES

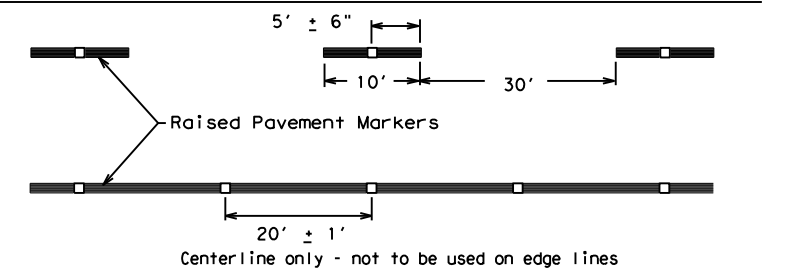


AUXILIARY OR LANEDROP LINE



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.



SHEET 12 OF 12



BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

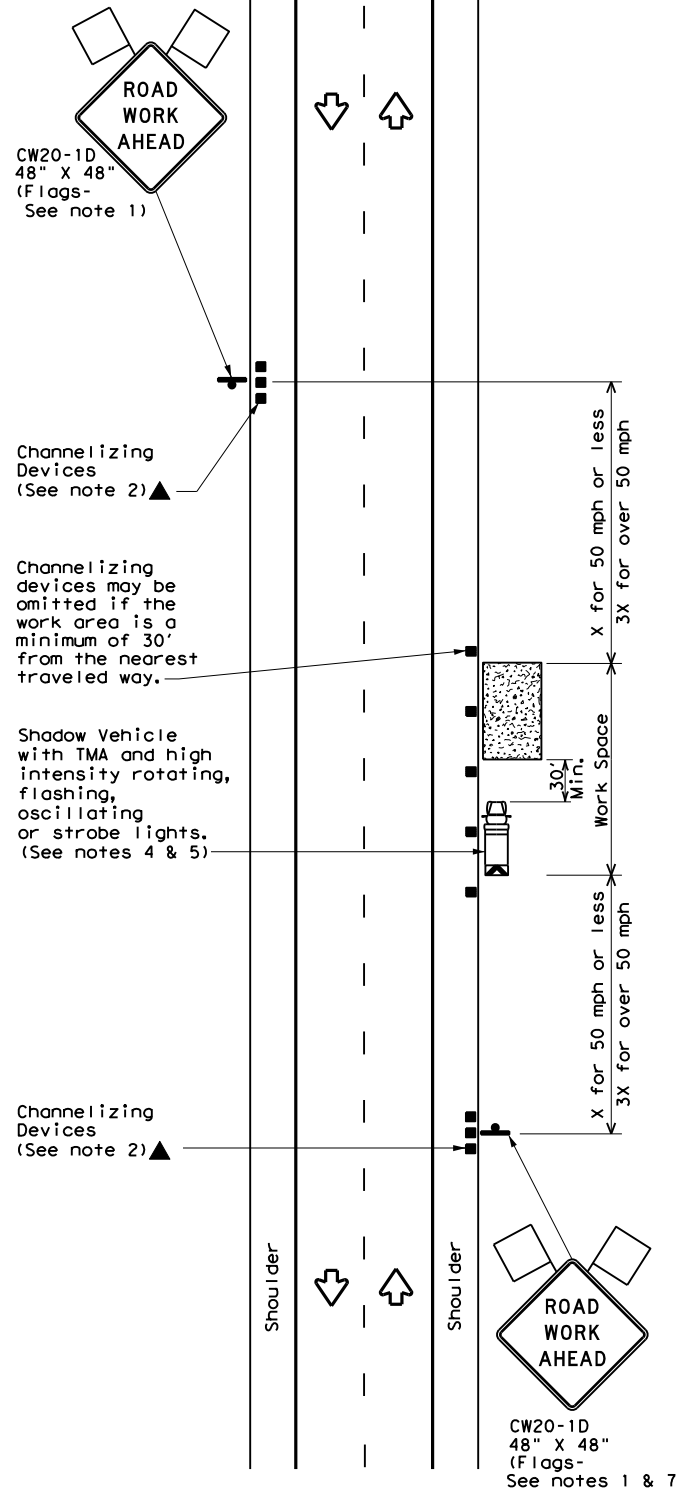
Raised pavement markers used as standard pavement markings shall be from the approved products list and meet the requirements of Item 672 "RAISED PAVEMENT MARKERS."

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©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0908 00		130	SL 322
1-97 9-07 5-21				
2-98 7-13				
11-02 8-14	ABL	COUNTY	TAYLOR	SHEET NO. 21

DATE: 4/3/2024 9:27:09 AM
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 DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TXDOT for any purpose whatsoever. TXDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

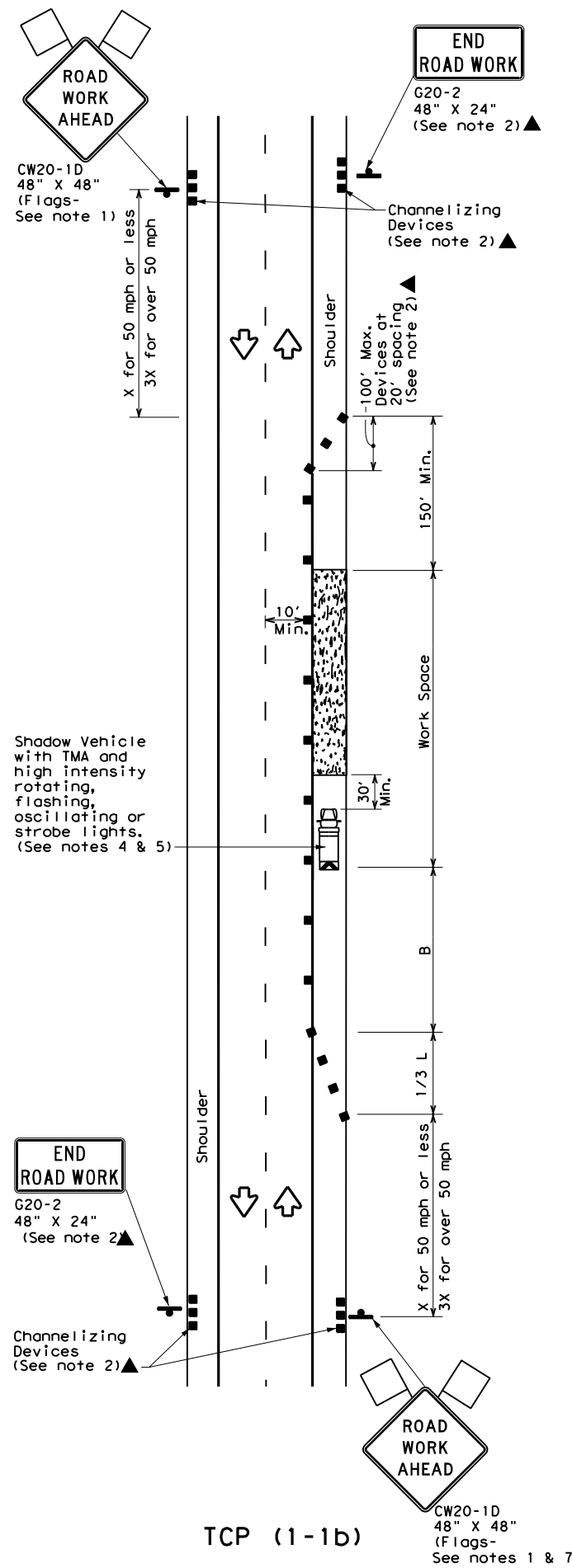
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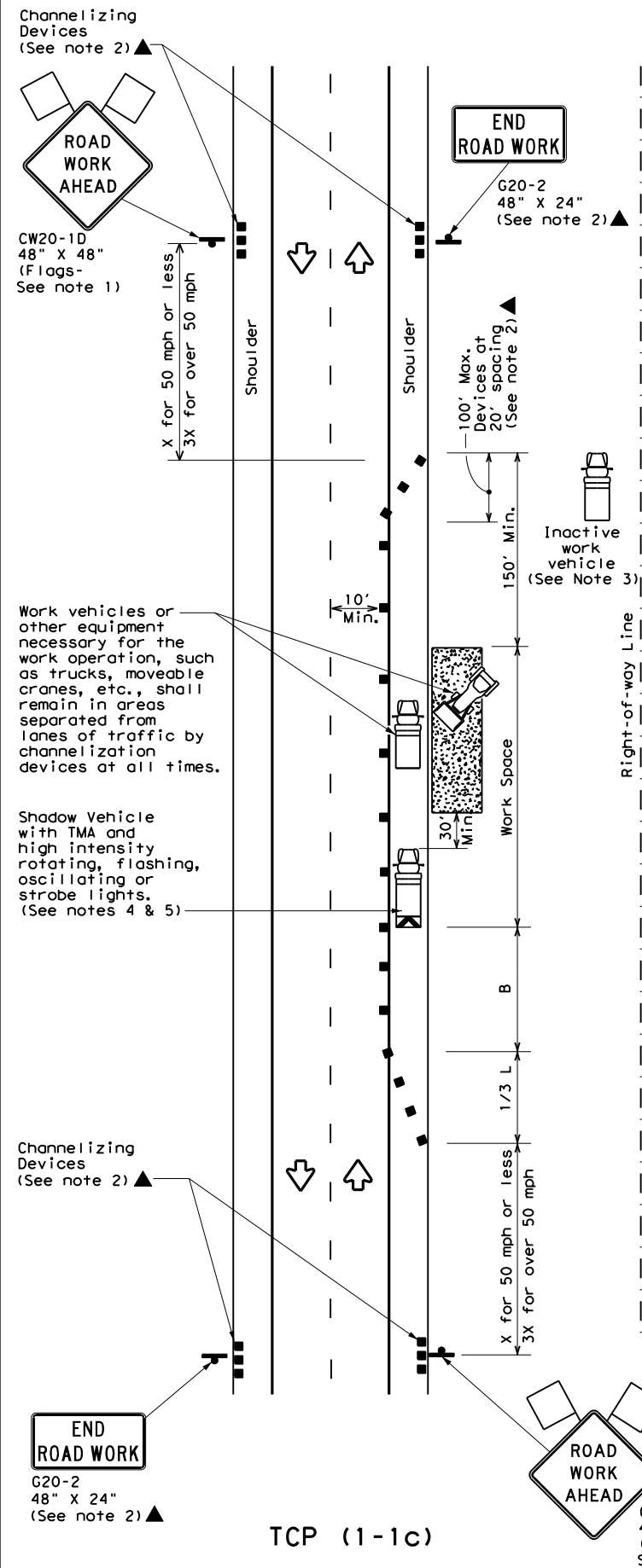
TCP (1-1a)

WORK SPACE NEAR SHOULDER
 Conventional Roads



TCP (1-1b)

WORK SPACE ON SHOULDER
 Conventional Roads



TCP (1-1c)

WORK VEHICLES ON SHOULDER
 Conventional Roads

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

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

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

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

GENERAL NOTES

- Flags attached to signs where shown are REQUIRED.
- 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.
- Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
- 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.
- Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
- See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
- CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

TRAFFIC CONTROL PLAN
CONVENTIONAL ROAD
SHOULDER WORK

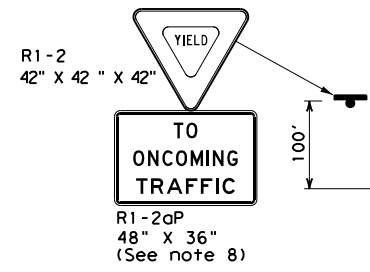
TCP (1-1) - 18

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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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2-94 4-98				
8-95 2-12				
1-97 2-18	ABL		TAYLOR	22

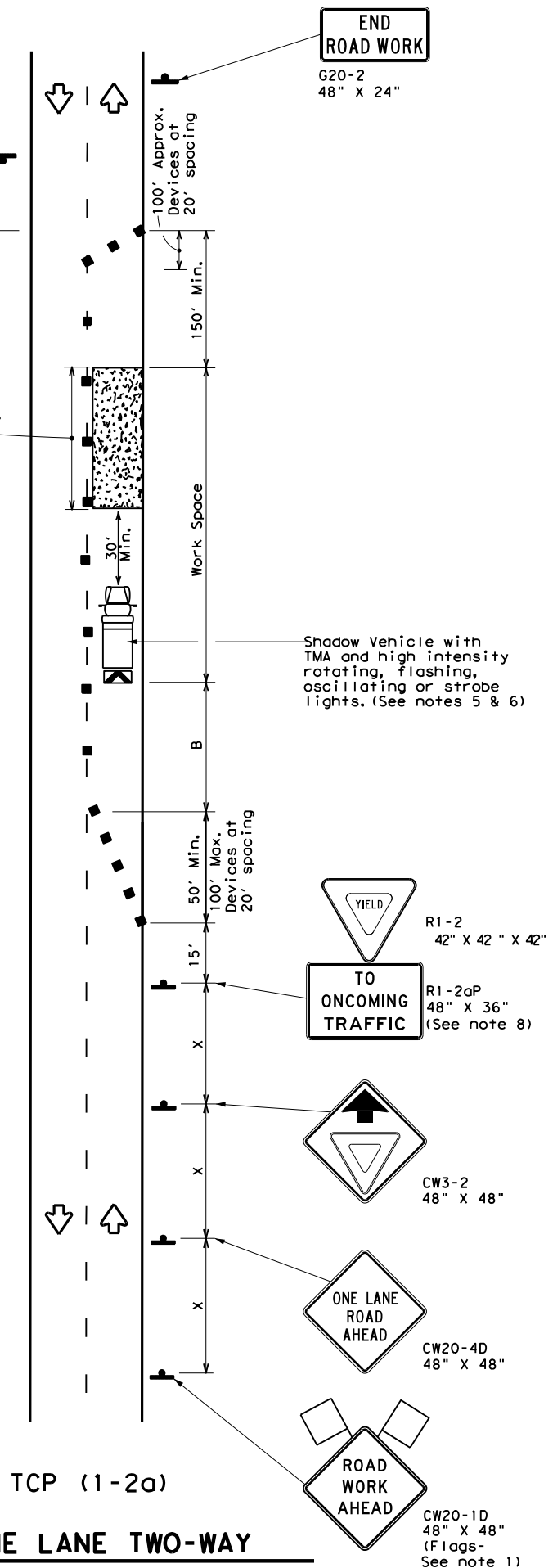
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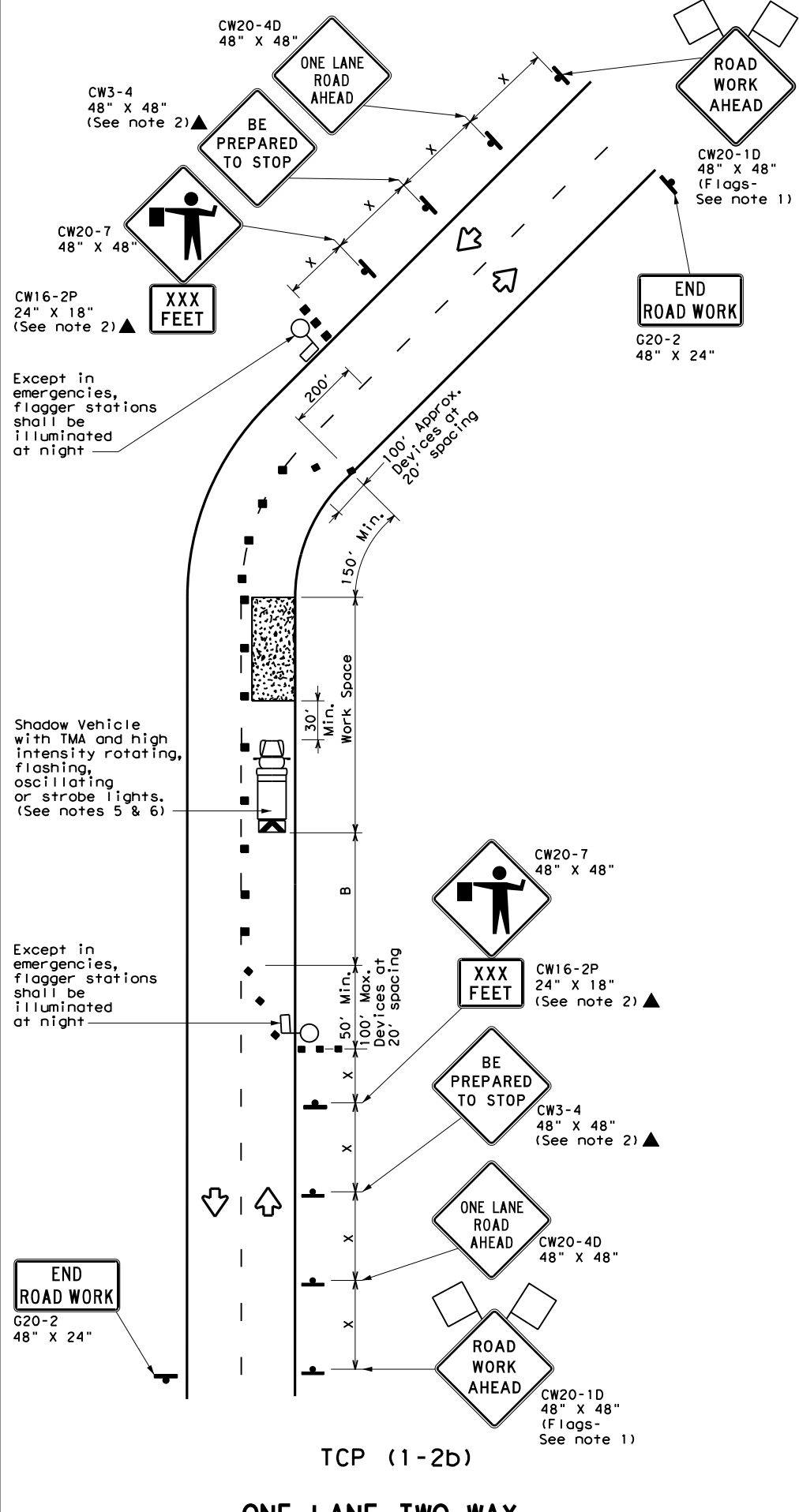
Warning Sign Sequence in Opposite Direction Same as Below



Channelizing devices separate work space from traveled way



TCP (1-2a)
ONE LANE TWO-WAY CONTROL WITH YIELD SIGNS
 (Less than 2000 ADT - See note 7)



TCP (1-2b)
ONE LANE TWO-WAY CONTROL WITH FLAGGERS

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

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

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

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

GENERAL NOTES

- Flags attached to signs where shown are REQUIRED.
- 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.
- The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4D "ONE LANE ROAD AHEAD" sign, but proper sign spacing shall be maintained.
- Sign spacing may be increased or an additional CW20-1D "ROAD WORK AHEAD" sign may be used if advance warning ahead of the flagger or R1-2 "YIELD" sign is less than 1500 feet.
- 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.
- Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.

TCP (1-2a)

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

TCP (1-2b)

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN

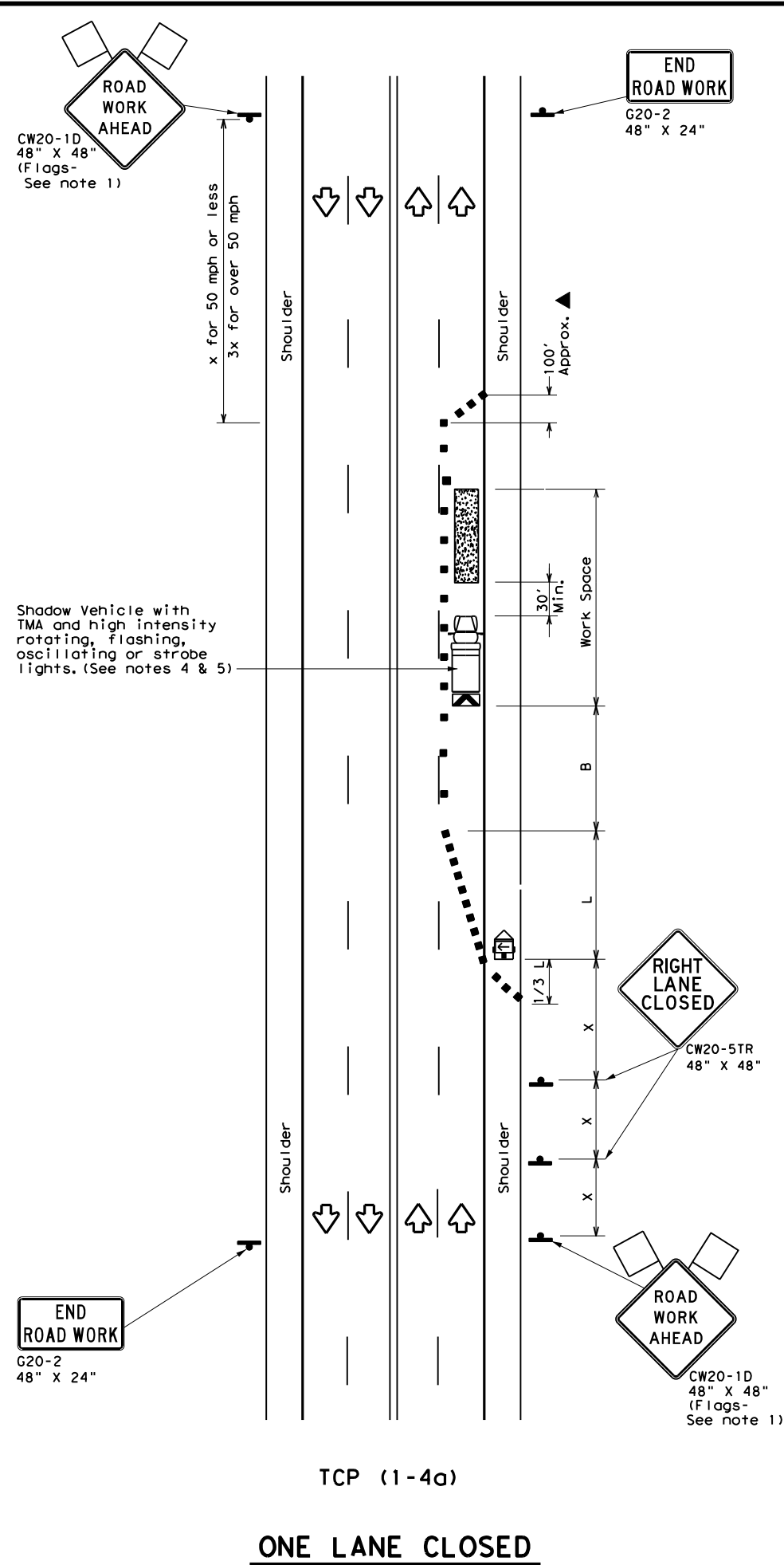
ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP (1-2) - 18

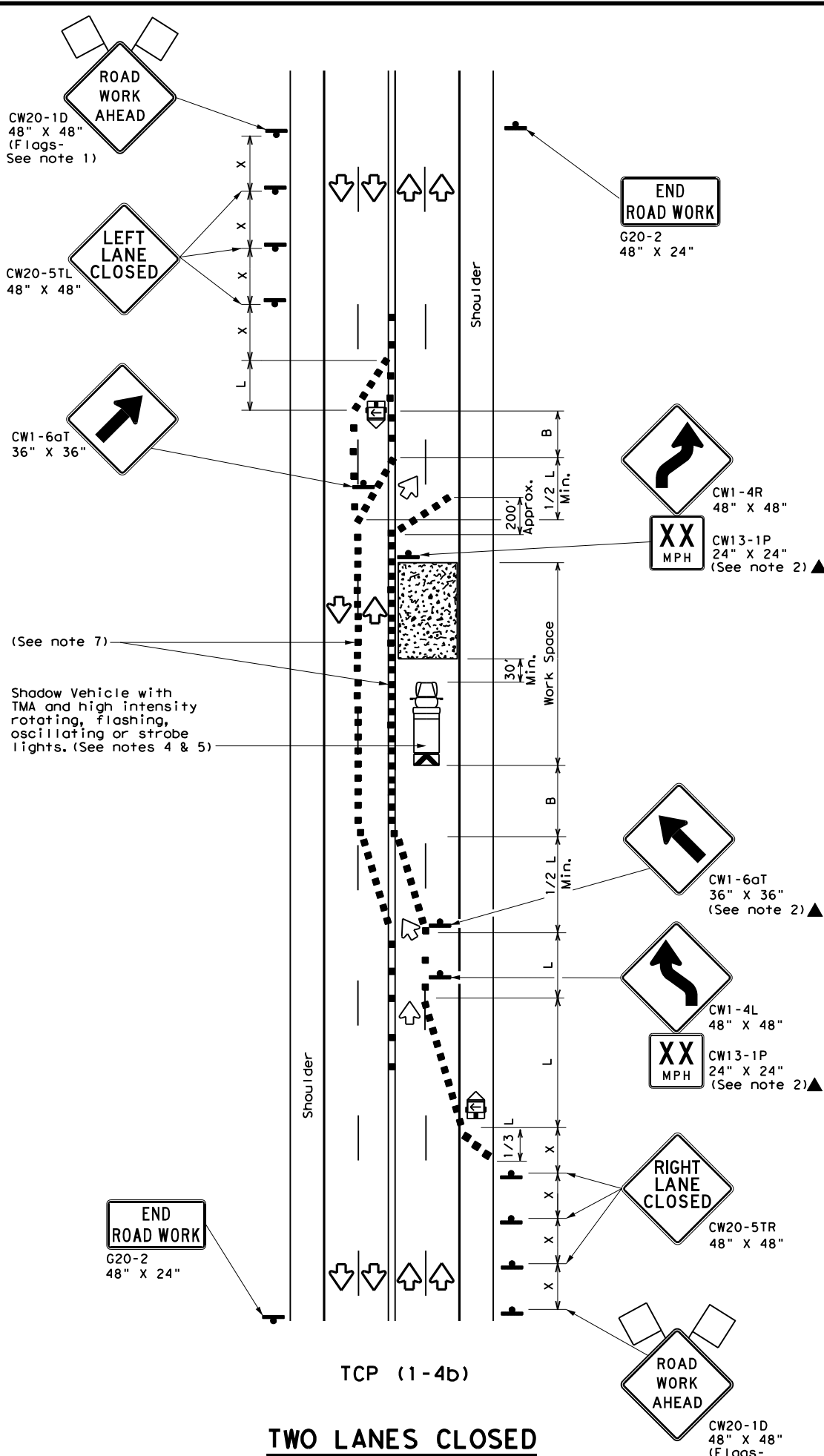
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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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4-90 4-98	DIST	COUNTY	SHEET NO.	
2-94 2-12	ABL	TAYLOR	23	
1-97 2-18				

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ONE LANE CLOSED



TWO LANES CLOSED

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

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

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

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

- GENERAL NOTES**
- Flags attached to signs where shown are REQUIRED.
 - 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.
 - The CW20-1D "ROAD WORK AHEAD" sign may be repeated if the visibility of the work zone is less than 1500 feet.
 - 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.
 - 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.

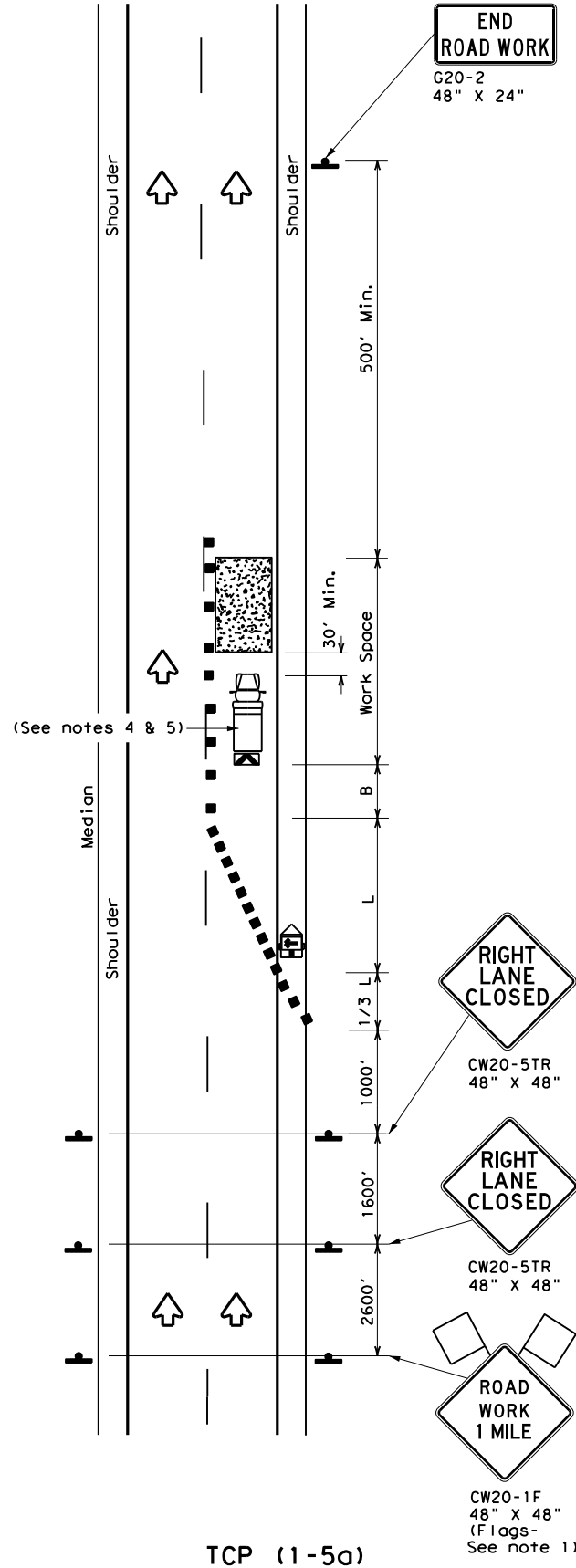
TCP (1-4b)

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.

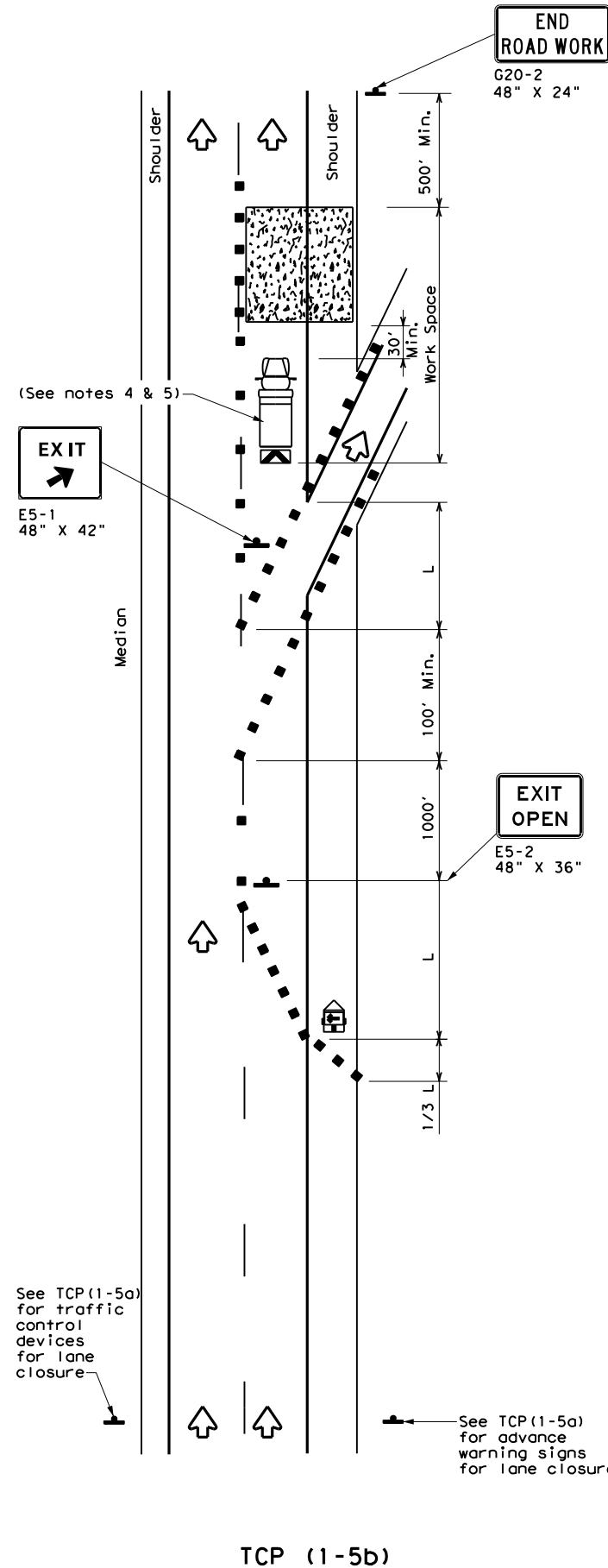
		Traffic Operations Division Standard	
TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS			
TCP (1-4) - 18			
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1-97	2-18	DIST	COUNTY
		ABL	TAYLOR
			SHEET NO.
			24

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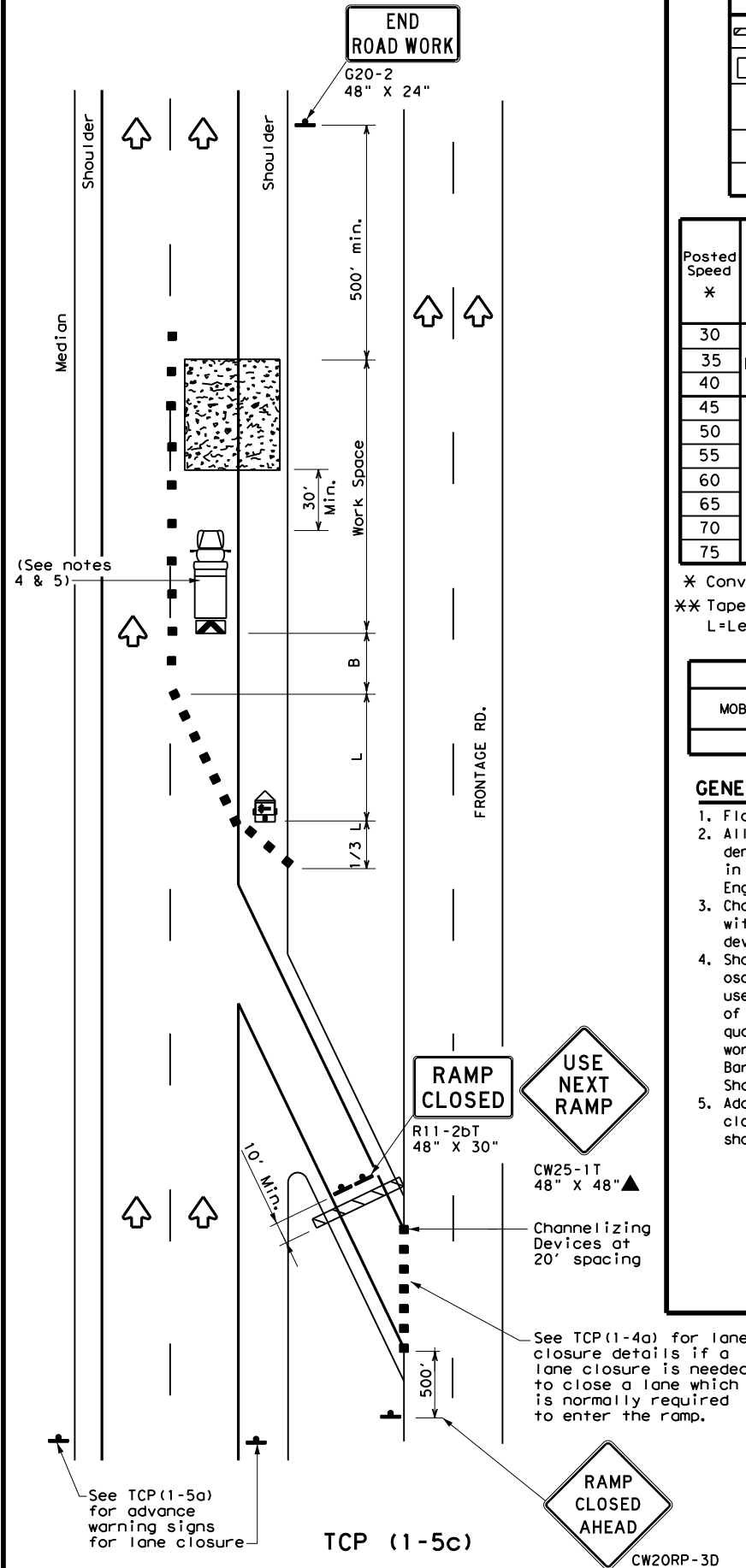
DATE: 4/3/2024 9:27:43 AM
 FILE: C:\Users\KMUeller\Desktop\RYAN CAP\lan Set\2. TCP\TCP(1-5)-18.dgn



ONE LANE CLOSURE



LANE CLOSURE NEAR EXIT RAMP



LANE CLOSURE NEAR ENTRANCE RAMP

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

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

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

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

GENERAL NOTES

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

Texas Department of Transportation
 Traffic Operations Division Standard

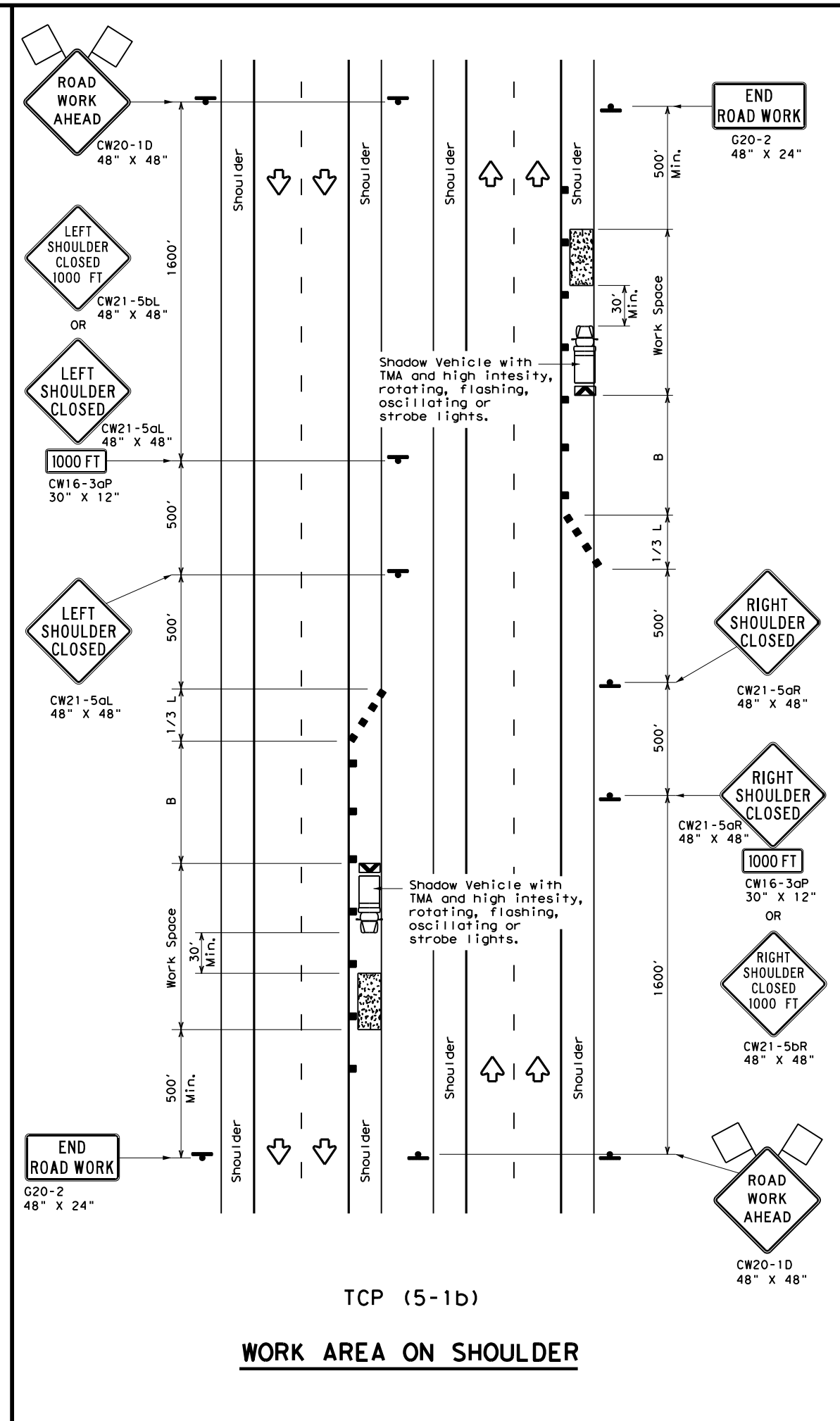
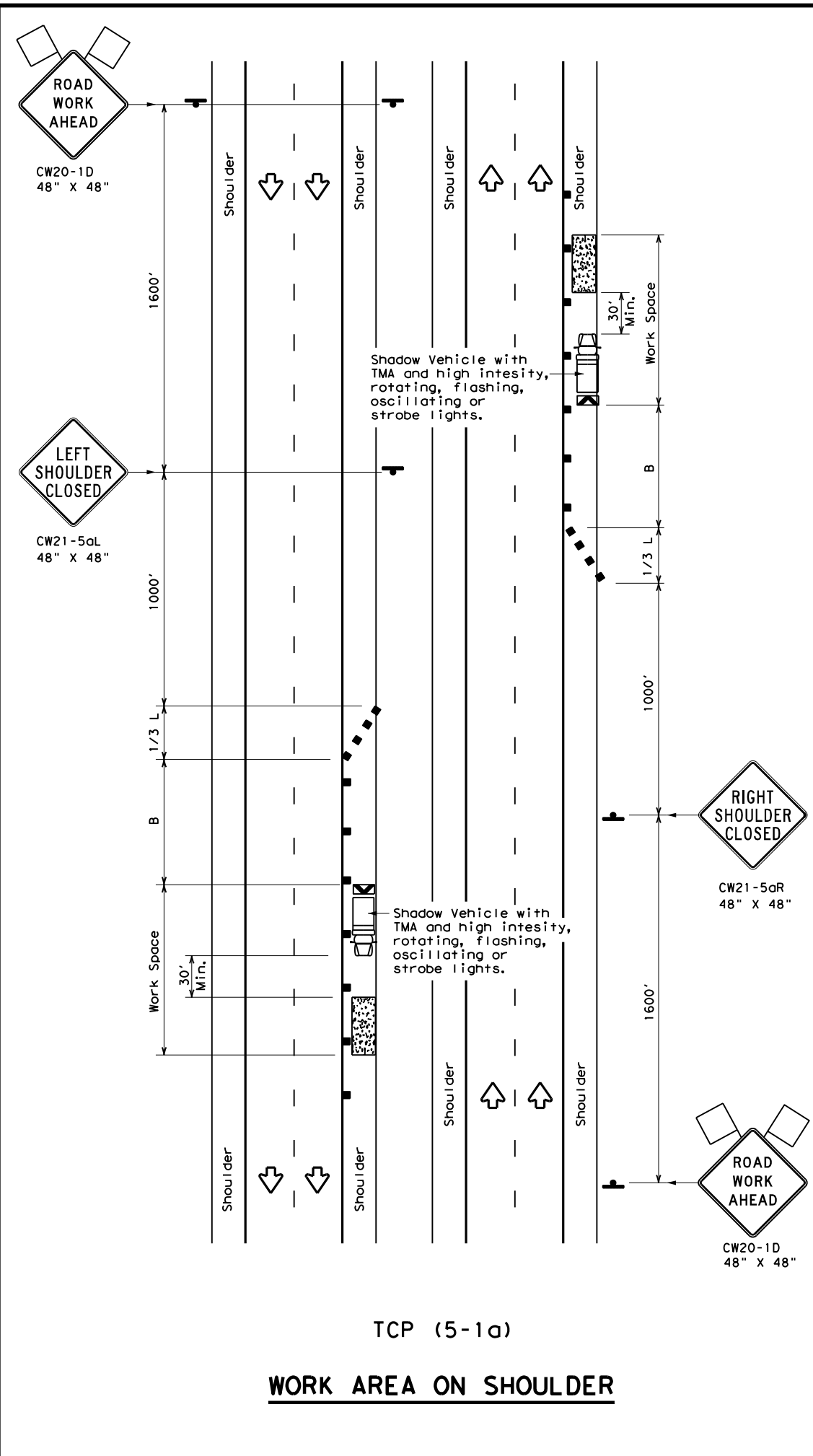
TRAFFIC CONTROL PLAN LANE CLOSURES FOR DIVIDED HIGHWAYS

TCP (1-5) - 18

FILE: tcp1-5-18.dgn	DN:	CK:	DW:	CK:
© TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
2-18	REVISIONS	0908 00	130	SL 322
	DIST	COUNTY	SHEET NO.	
	ABL	TAYLOR	25	

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DATE: 4/3/2024 9:27:52 AM
 FILE: C:\Users\KMUeller\Desktop\RYAN CAPlan Set\2_TCP\TCP(5-1)-18.dgn



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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	
30	L = WS ² / 60	150'	165'	180'	30'	60'	90'
35		205'	225'	245'	35'	70'	120'
40		265'	295'	320'	40'	80'	155'
45	L = WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

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

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	TCP (5-1a)	TCP (5-1b)	TCP (5-1b)	

- GENERAL NOTES**
- A Shadow Vehicle with a TMA should be used anytime it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the performance or quality of the work. Type 3 barricades or drums may be substituted when workers on foot are no longer present when approved by the Engineer.
 - 28" tall or taller one-piece cones will be allowed only for Short Duration or Short Term stationary operations when workers are present to maintain the devices upright and in proper location. Intermediate Term stationary work areas should use Drums, Vertical Panels or 42" tall two-piece cones.

Texas Department of Transportation
 Traffic Operations Division Standard

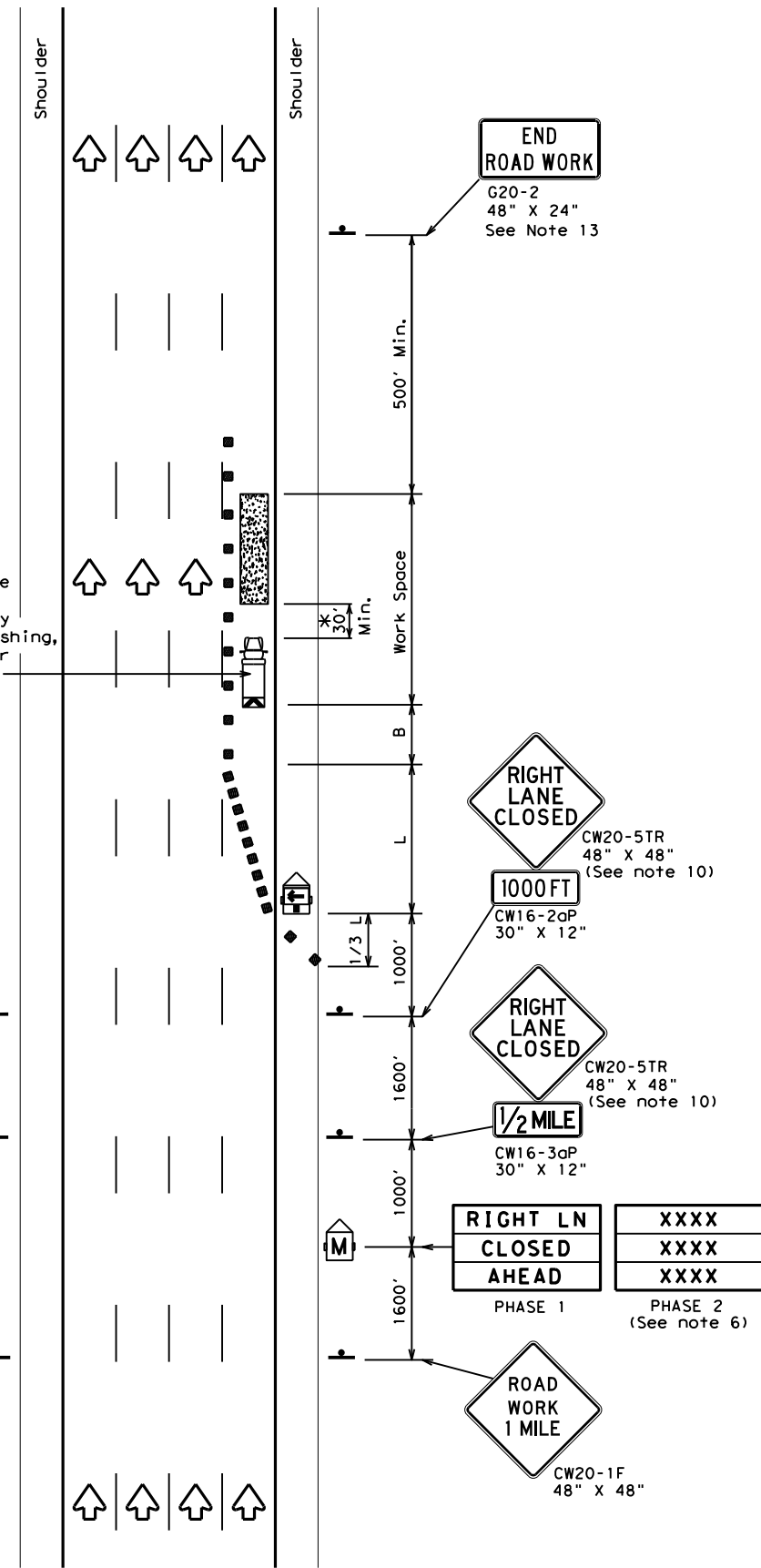
**TRAFFIC CONTROL PLAN
 SHOULDER WORK FOR
 FREEWAYS / EXPRESSWAYS**

TCP (5-1) - 18

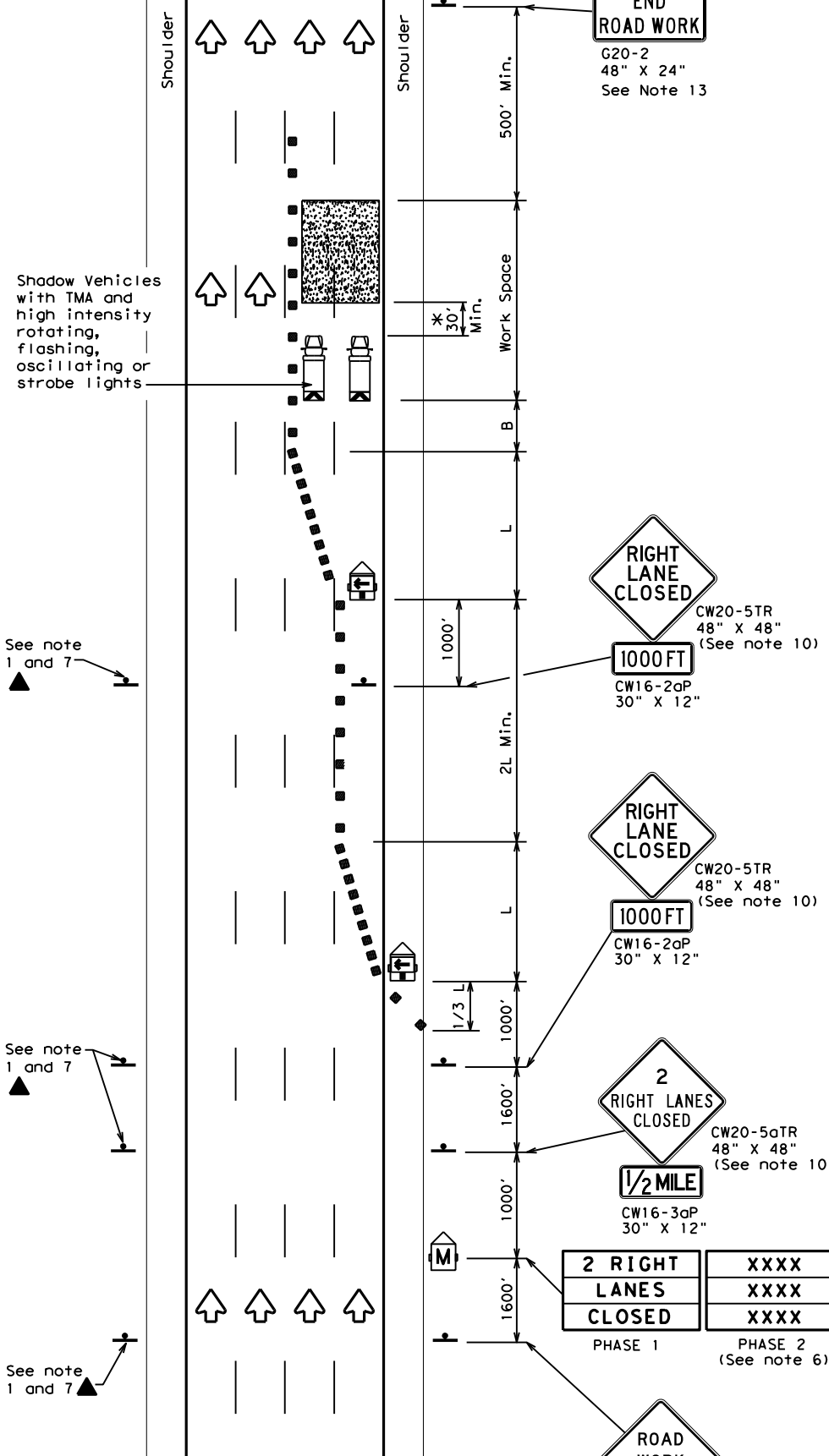
FILE: tcp5-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
2-18	REVISIONS	0908 00	130	SL 322
	DIST	COUNTY	SHEET NO.	
	ABL	TAYLOR	26	

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DATE: 4/3/2024 9:28:01 AM
 FILE: C:\Users\KMUeller\Desktop\RYAN_CAPIan Set\2_TCP\TCP(6-1)-12.dgn



TCP (6-1a)
**TYPICAL FREEWAY
 ONE LANE CLOSURE**



TCP (6-1b)
**TYPICAL FREEWAY
 TWO LANE CLOSURE**

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

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

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

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

GENERAL NOTES

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

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

Texas Department of Transportation
 Traffic Operations Division Standard

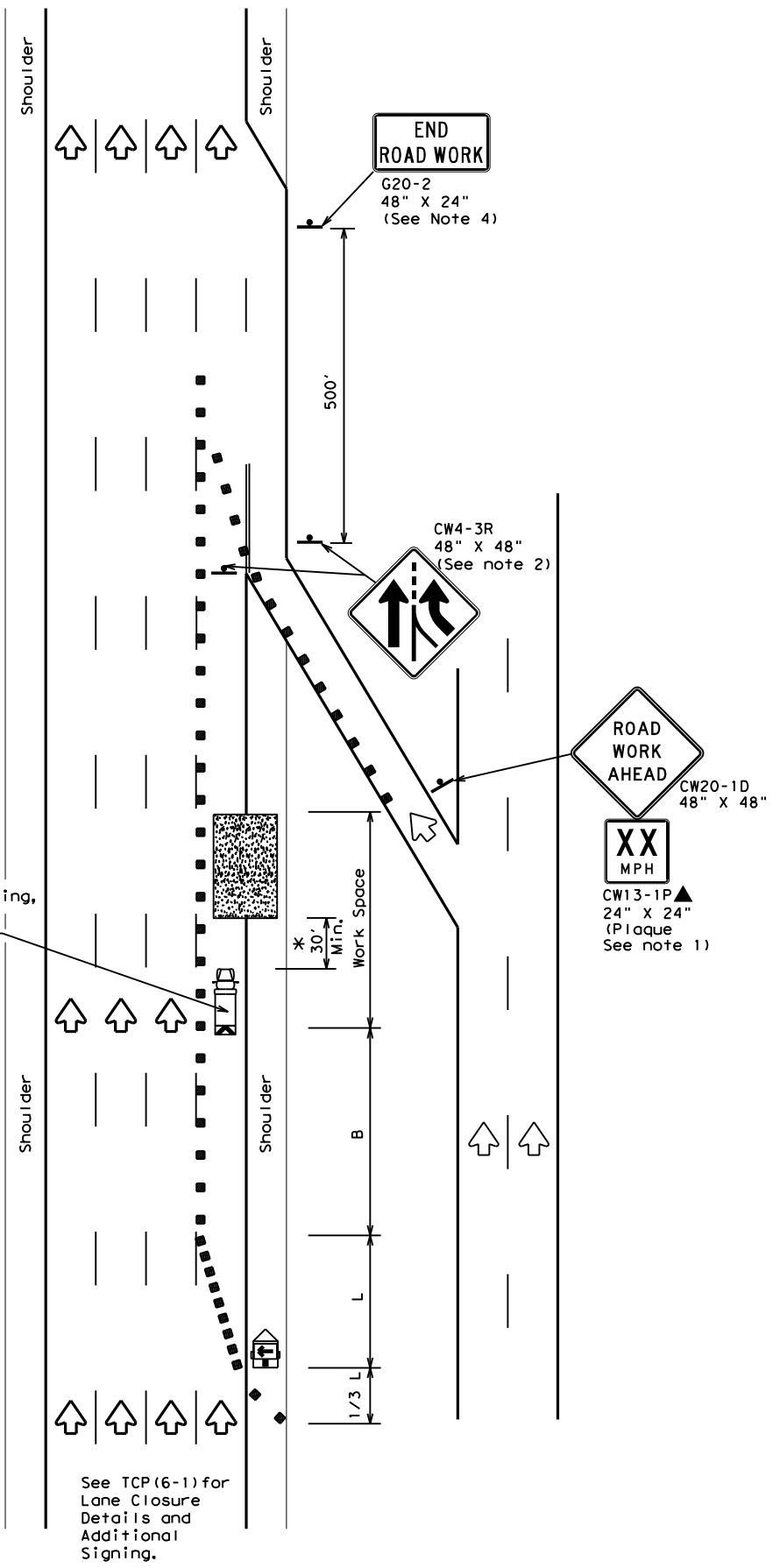
**TRAFFIC CONTROL PLAN
 FREEWAY LANE CLOSURES**

TCP (6-1) - 12

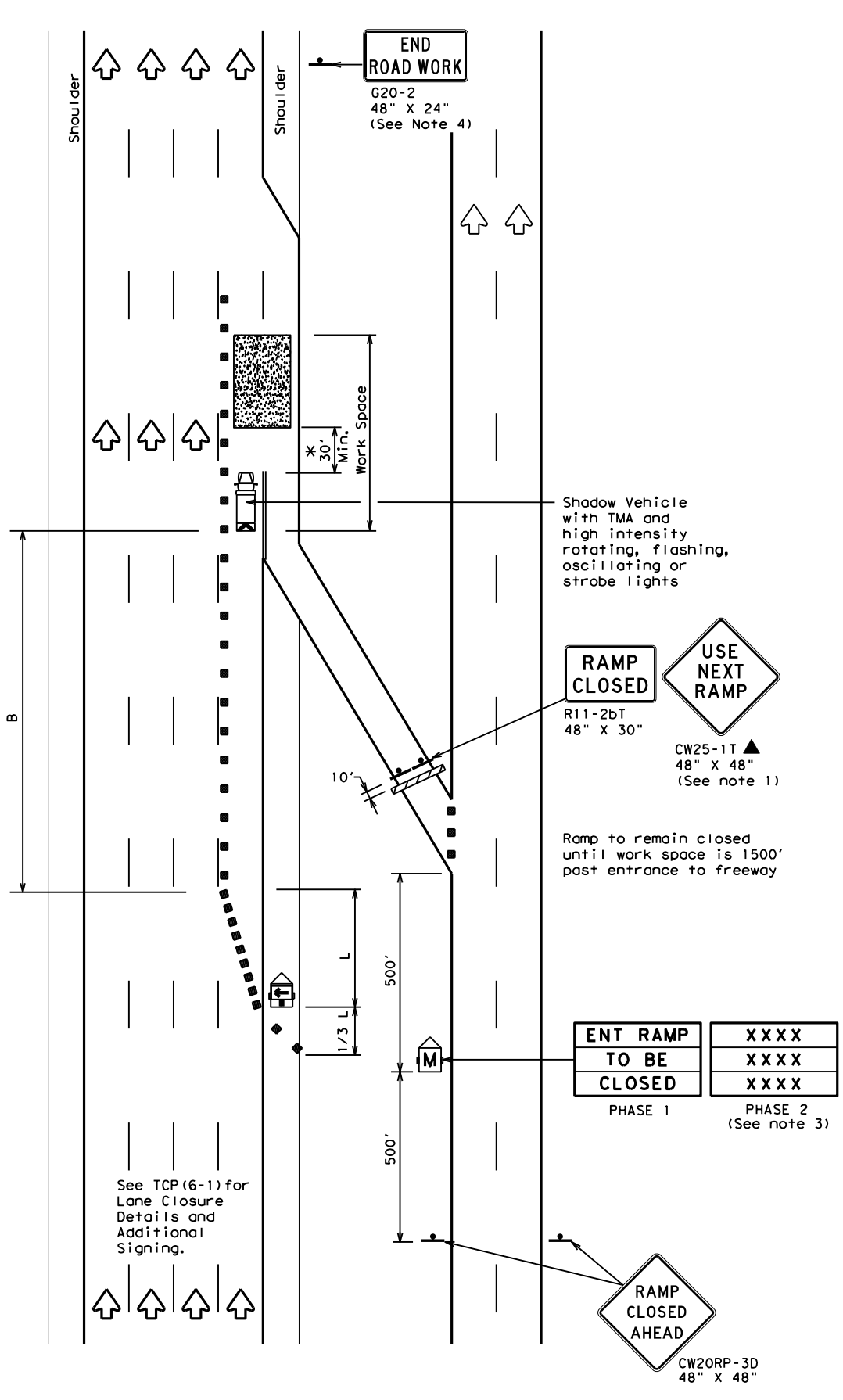
FILE:	tcp6-1.dgn	DN:	TxDOT	CK:	TxDOT	DW:	TxDOT	CK:	TxDOT
© TxDOT	February 1998	CONT	SECT	JOB	HIGHWAY				
8-12	REVISIONS	0908	00	130	SL 322				
	DIST	COUNTY		SHEET NO.					
	ABL	TAYLOR		27					

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DATE: 4/3/2024 9:28:10 AM
 FILE: C:\Users\KMUJELLER\Desktop\RYAN_CAPIan Set\2_TCP\TCP(6-2)-12.dgn



TCP (6-2a)
ENTRANCE RAMP OPEN
WORK WITHIN 500' OF RAMP



TCP (6-2b)
ENTRANCE RAMP CLOSED

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

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

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

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

GENERAL NOTES

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

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

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



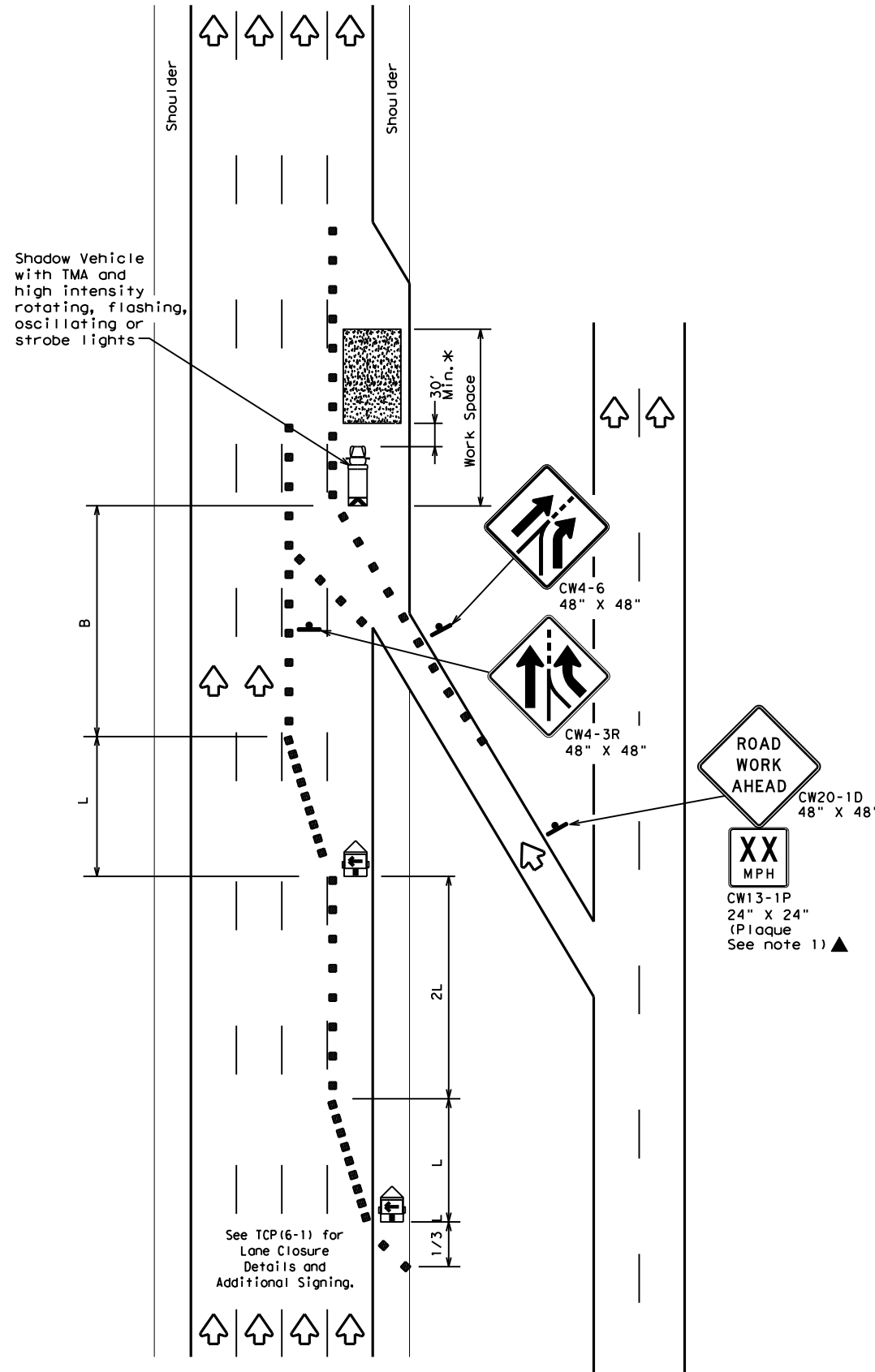
TRAFFIC CONTROL PLAN
WORK AREA NEAR RAMP

TCP (6-2) - 12

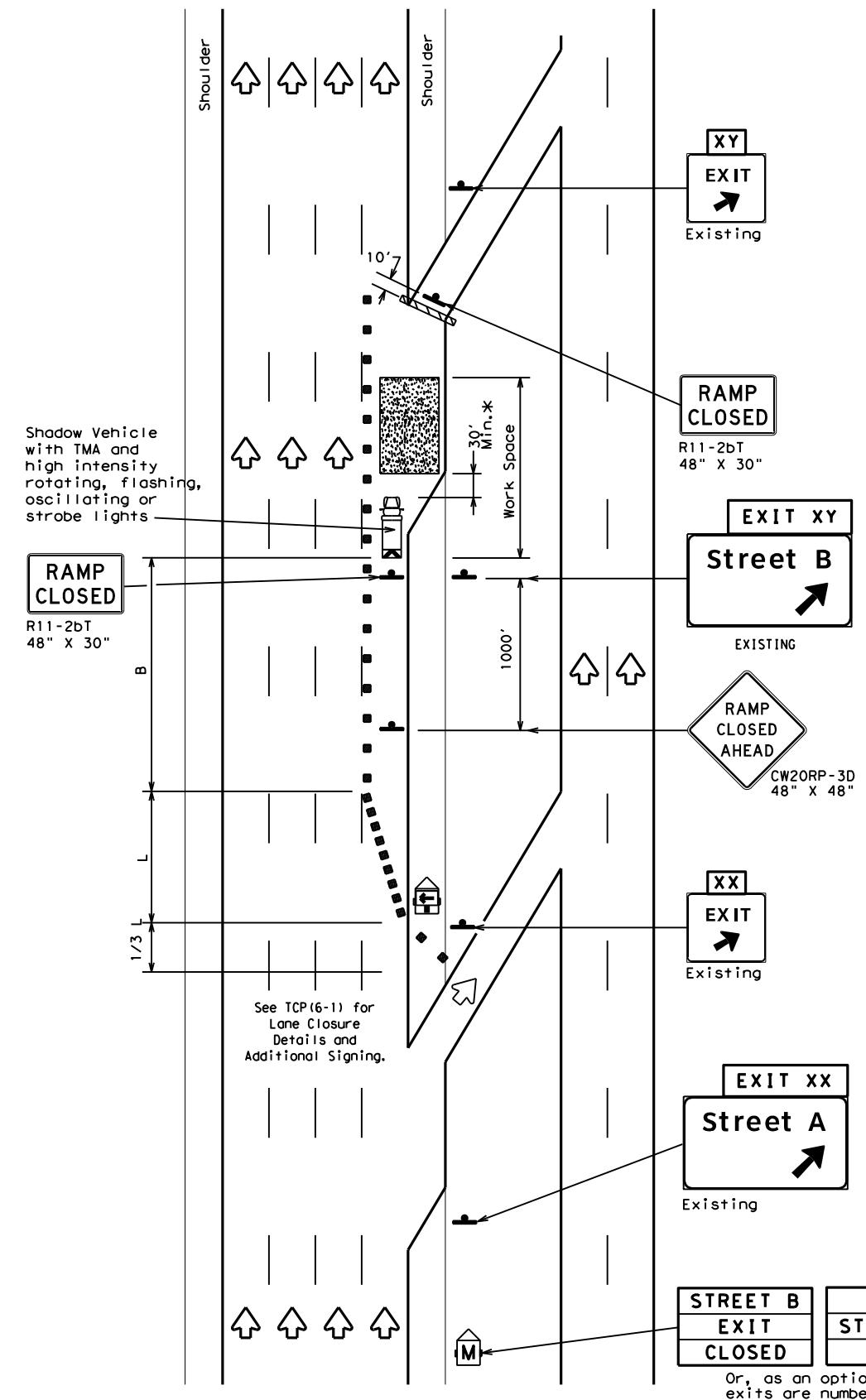
FILE:	tcp6-2.dgn	DN:	TxDOT	CK:	TxDOT	DW:	TxDOT	CK:	TxDOT
©TxDOT	February 1994	CONT	SECT	JOB	HIGHWAY				
REVISIONS		0908 00	130	SL 322					
1-97	8-98	DIST	COUNTY	SHEET NO.					
4-98	8-12	ABL	TAYLOR	28					

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DATE: 4/3/2024 9:28:18 AM
 FILE: C:\Users\KMUeller\Desktop\RYAN_CAP\lan Set\2_TCP\TCP(6-3)-12.dgn



TCP (6-3a)
ENTRANCE RAMP OPEN



TCP (6-3b)
EXIT RAMP CLOSED
TRAFFIC EXITS PRIOR TO CLOSED RAMP

STREET B
 EXIT
 CLOSED

USE
 STREET A
 EXIT

Or, as an option when
 exits are numbered

EXIT XY
 CLOSED

USE
 EXIT XX

Place 1 mile (approx.)
 in advance of Street A
 exit.

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

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

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

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

GENERAL NOTES:
 1. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.

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

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

Texas Department of Transportation
 Traffic Operations Division Standard

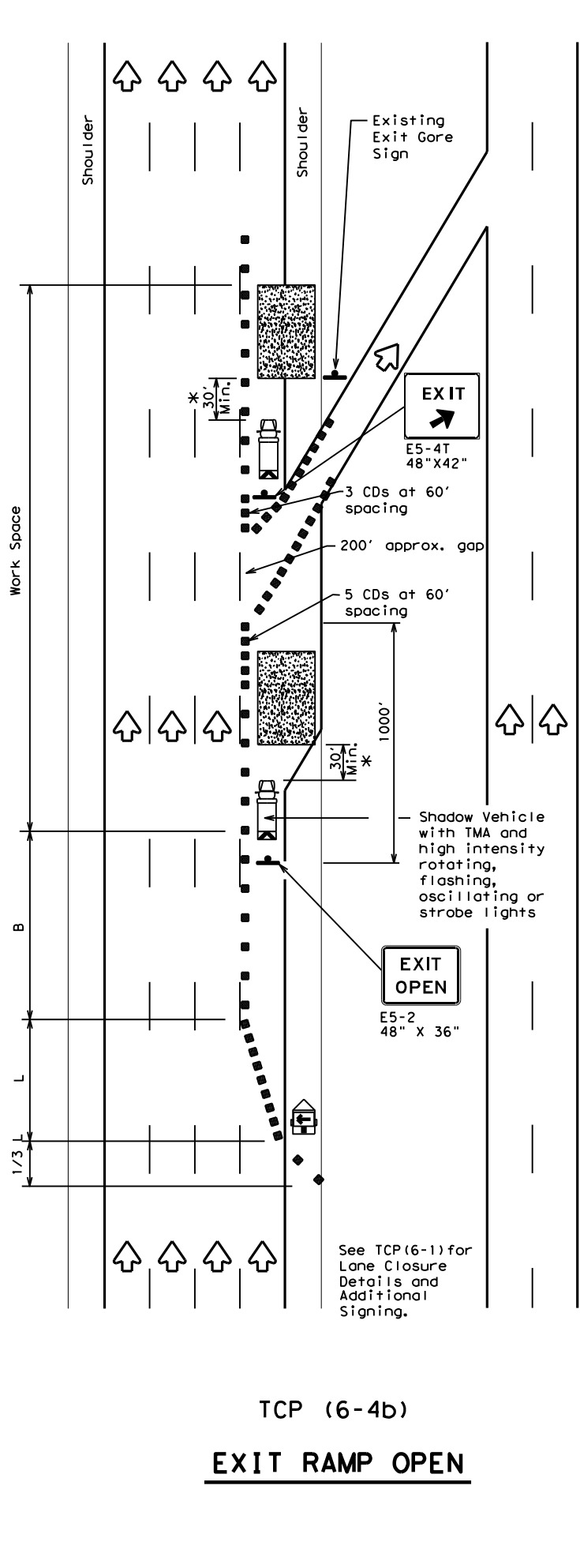
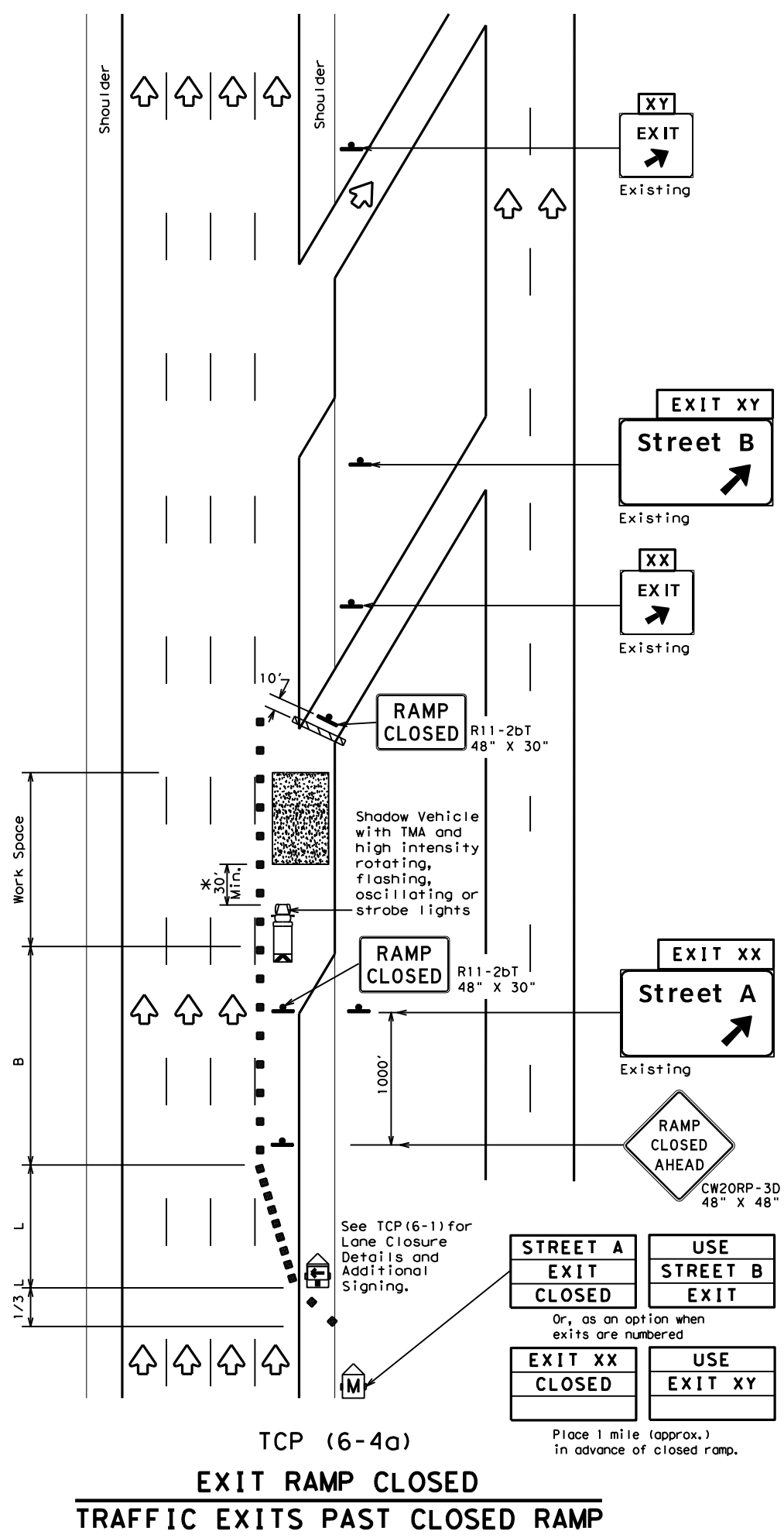
**TRAFFIC CONTROL PLAN
 WORK AREA BEYOND RAMP**

TCP (6-3) - 12

FILE: tcp6-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0908 00		130	SL 322
1-97 8-98	DIST	COUNTY	SHEET NO.	
4-98 8-12	ABL	TAYLOR	29	

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DATE: 4/3/2024 9:28:27 AM
 FILE: C:\Users\KMUJELLER\Desktop\RYAN_CAP\Plan Set\2_TCP\TCP(6-4)-12.dgn



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

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

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

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

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

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

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

Texas Department of Transportation
 Traffic Operations Division Standard

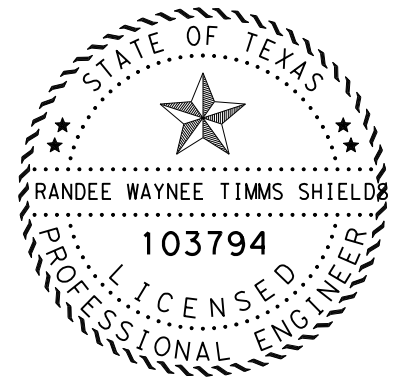
TRAFFIC CONTROL PLAN
WORK AREA AT EXIT RAMP

TCP (6-4) - 12

FILE: tcp6-4.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0908 00		130	SL 322
1-97 8-98	DIST	COUNTY	SHEET NO.	
4-98 8-12	ABL	TAYLOR	30	

ELEC. SERVICE NO.	SHEET NO.	ELECTRIC SERVICE DESCRIPTION -14	SEE ED (5)	SERVICE CONDUIT SIZE	SERVICE CONDUCTOR NO./SIZE	SAFETY SWITCH AMPS	MAIN CKT. BKR. POLE/ AMPS	TWO-POLE CONTACTOR AMPS	PANELBD/ LOADCENTER AMP RATING	CIRCUIT USE	BRANCH CKT. BKR. POLE/ AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
1	1	ELEC SERV TY D(120/240)060(NS)AL(N)SP(O)		1 1/2"	3/#6	N/A	2P/60	N/A	70	CCTV	1P/20	10	1.2
2	2	ELEC SERV TY D(120/240)060(NS)AL(N)SP(O)		1 1/2"	3/#6	N/A	2P/60	N/A	70	CCTV	1P/20	10	1.2
3	3	ELEC SERV TY D(120/240)060(NS)AL(N)SP(O)		1 1/2"	3/#6	N/A	2P/60	N/A	70	CCTV	1P/20	10	1.2
4 (EX.)	4	ELEC SERV TY D(120/240)060(NS)SAL(N)SP(O)		1 1/2"	3/#6	N/A	2P/60	N/A	70	CCTV	1P/20	10	1.2
5	5	ELEC SERV TY D(120/240)060(NS)AL(N)SP(O)		1 1/2"	3/#6	N/A	2P/60	N/A	70	CCTV	1P/20	10	1.2
6	6	ELEC SERV TY D(120/240)060(NS)AL(N)SP(O)		1 1/2"	3/#6	N/A	2P/60	N/A	70	CCTV	1P/20	10	1.2
7	7	ELEC SERV TY D(120/240)060(NS)AL(N)SP(O)		1 1/2"	3/#6	N/A	2P/60	N/A	70	CCTV	1P/20	10	1.2
8	8	ELEC SERV TY D(120/240)060(NS)AL(N)SP(O)		1 1/2"	3/#6	N/A	2P/60	N/A	70	CCTV	1P/20	10	1.2
9	9	ELEC SERV TY D(120/240)060(NS)AL(N)SP(O)		1 1/2"	3/#6	N/A	2P/60	N/A	70	CCTV	1P/20	10	1.2
10	10	ELEC SERV TY D(120/240)060(NS)AL(N)SP(O)		1 1/2"	3/#6	N/A	2P/60	N/A	70	CCTV	1P/20	10	1.2
11	11	ELEC SERV TY D(120/240)060(NS)AL(N)PS(O)		1 1/2"	3/#6	N/A	2P/60	N/A	70	DMS	2P/20	10	1.2
12	12	ELEC SERV TY D(120/240)060(NS)SS(N)SP(O)		1 1/2"	3/#6	N/A	2P/60	N/A	70	DMS	2P/20	10	1.2

FILE: C:\Users\KMJELLER\Desktop\RYAN C\Pion Set\1. General\ELECTRIC SERVICE SUMMARY.dgn
 DATE: 4/3/2024 9:28:36 AM



4/3/2024

DocuSigned by:
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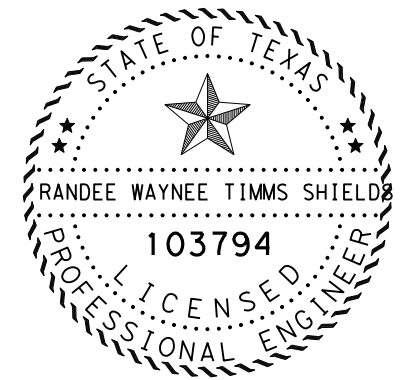
ELECTRIC SERVICE SUMMARY



FHWA DIVISION	PROJECT NO.		HIGHWAY NO.	
6	SEE TITLE SHEET		SL 322	
STATE	COUNTY			SHEET NO.
TEXAS	TAYLOR			31
DISTRICT	CONTROL	SECTION	JOB	
ABL	0908	00	130	

FILE: C:\Users\KMUELLER\Desktop\RYAN C\Pion Set\1. General\CONDUCTOR SUMMARY.dgn
 DATE: 4/3/2024 9:28:44 AM

CONDUIT AND CONDUCTOR SUMMARY								
SITE NUMBER	RUN NUMBER	RUN LENGTH (FT)	618		620		620	
			CONDT (PVC) (SCH 80) (2")	CONDT (PVC) (SCH 80) (2") (BORE)	ELEC CONDR (NO. 8) BARE		ELEC CONDR (NO. 8) INSULATED	
			LENGTH (FT)	LENGTH (FT)	CONDUCTOR LENGTH (FT)	SLACK LENGTH (FT)	CONDUCTOR LENGTH (FT)	SLACK LENGTH (FT)
1	1	10	10		10	4	20	8
	2	47		47	47	4	94	8
	3	10	10		10	4	20	8
	SITE SUBTOTAL		20	47	67	12	134	24
2	1	10	10		10	4	20	8
	2	77	77		77	4	154	8
	3	72		72	72	4	144	8
	4	183	183		183	4	366	8
	1	10	10		10	4	20	8
	SITE SUBTOTAL		280	72	352	20	704	40
3	1	10	10		10	4	20	8
	2	155	155		155	4	310	8
	3	46		46	46	4	92	8
	4	54	54		54	4	108	8
	5	110	110		110	4	220	8
	6	10	10		10	4	20	8
	SITE SUBTOTAL		339	46	385	24	770	48
4	1	EXISTING			20	4	40	8
	2	EXISTING			132	4	264	8
	3	96		96	96	4	192	8
	4	92	92		92	4	184	8
	5	10	10		10	4	20	8
	SITE SUBTOTAL		102	96	350	20	700	40
5	1	10	10		10	4	20	8
	2	50		50	50	4	100	8
	3	100	100		100	4	200	8
	4	10	10		10	4	20	8
	SITE SUBTOTAL		120	50	170	16	340	32
6	1	10	10		10	4	20	8
	2	30	30		30	4	60	8
	3	47		47	47	4	94	8
	4	30	30		30	4	60	8
	5	10	10		10	4	20	8
	SITE SUBTOTAL		80	47	127	20	254	40
7	1	40	40		40	4	80	8
	SITE SUBTOTAL		40		40	4	80	8
8	1	10	10		10	4	20	8
	2	42		42	42	4	84	8
	3	120	120		120	4	240	8
	4	22	22		22	4	44	8
	5	10	10		10	4	20	8
	SITE SUBTOTAL		162	42	204	20	408	40
9	1	10	10		10	4	20	8
	2	55		55	55	4	110	8
	3	122	122		122	4	244	8
	4	10	10		10	4	20	8
	SITE SUBTOTAL		142	55	197	16	394	32
10	1	10	10		10	4	20	8
	2	70	70		70	4	140	8
	3	47		47	47	4	94	8
	4	30	30		30	4	60	8
	5	10	10		10	4	20	8
	SITE SUBTOTAL		120	47	167	20	334	40
11	1	10	10		10	4	20	8
	2	55		55	55	4	110	8
	3	170	170		170	4	340	8
	4	200	200		200	4	400	8
	5	120	120		120	4	240	8
	6	10	10		10	4	20	8
	SITE SUBTOTAL		510	55	685	24	1370	48
12	1	10	10		10	4	20	8
	2	100	100		100	4	200	8
	3	10	10		10	4	20	8
	SITE SUBTOTAL		120		120	12	240	24



4/3/2024

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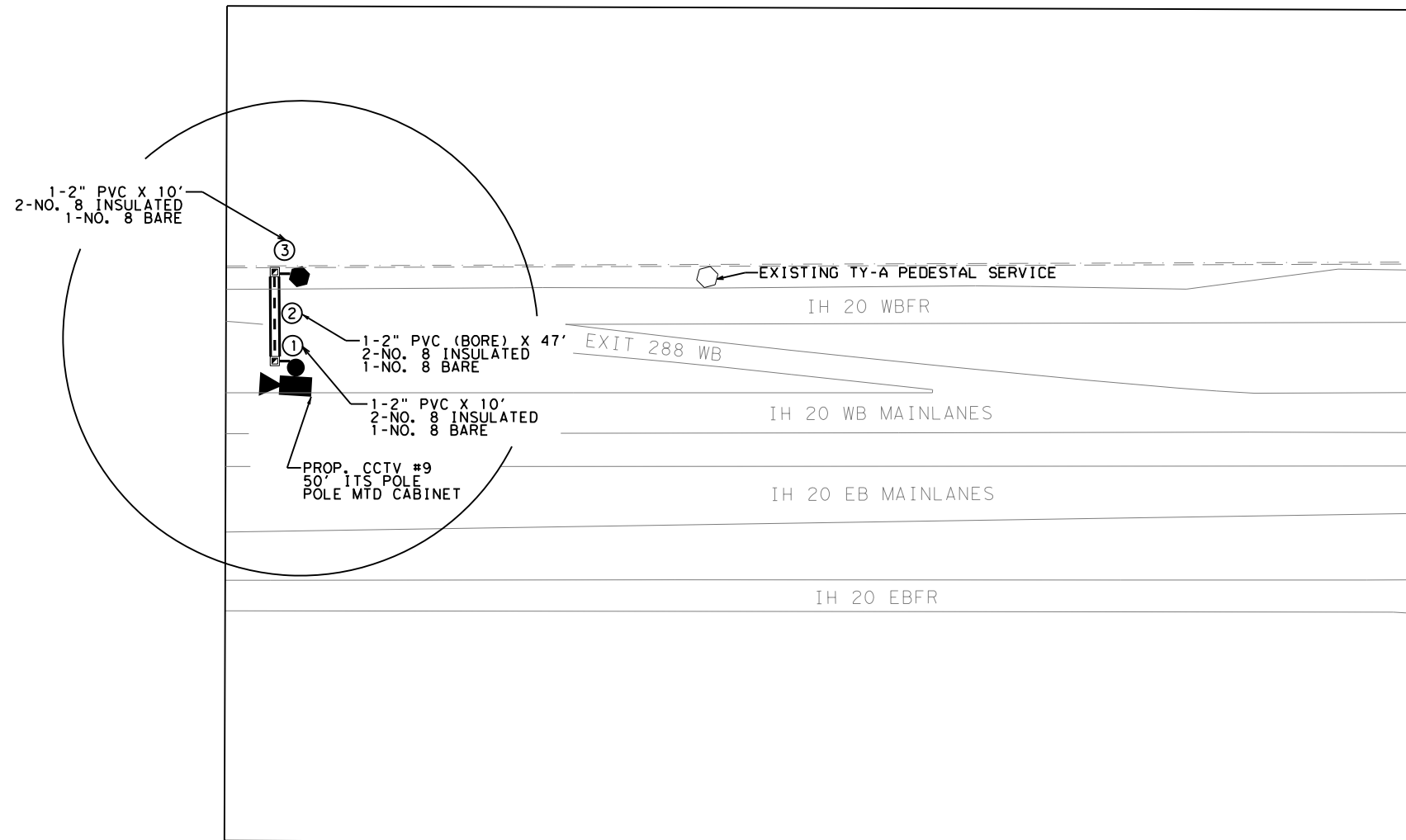
CONDUCTOR SUMMARY



SHEET 1 OF 1

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.	
6	SEE TITLE SHEET		SL 322	
STATE	COUNTY			SHEET NO.
TEXAS	TAYLOR			32
DISTRICT	CONTROL	SECTION	JOB	
ABL	0908	00	130	

FILE: C:\Users\KMUELLER\Desktop\RYAN C\Pion Set\1. General\PROPOSED ITS LAYOUTS.dgn
 DATE: 4/3/2024 9:28:53 AM



LEGEND

- PROP. CCTV
- PROP. DMS
- PROP. ELEC SERVICE
- EXIST. ELEC SERVICE
- PROP. TYD GROUND BOX W/ APRON
- PROP. ITS CONDUIT
- PROP. ITS CONDUIT (BORE)
- CONDUIT RUN NUMBER
- OVERHEAD ELECTRIC
- R.O.W. LINE

NOTES:

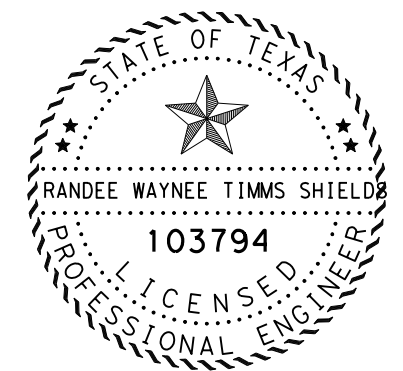
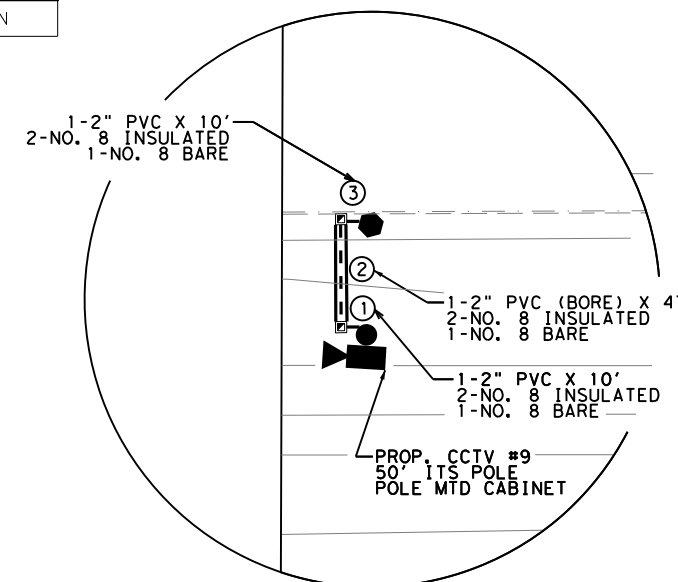
1. THE PROPOSED CCTV LOCATION IS APPROXIMATE.
2. THERE ARE EXISTING POWER POLES ALONG THE EAST R.O.W. ENGINEER TO COORDINATE WITH WITH SERVICE PROVIDER FOR FINAL LOCATION.
3. WIRELESS COMMUNICATION IS PROPOSED FOR THIS SITE.
4. ALL DEVICES ARE PROPOSED WITHIN STATE R.O.W.

EQUIPMENT PROVIDED BY THE STATE		
DESCRIPTION	UNIT	QUANTITY
CCTV AND FIELD EQUIPMENT	EA	1
CELLULAR MODEM	EA	1

SITE LOCATION	DEVICE TYPE	DEVICE NUMBER	HIGHWAY	COUNTY	CONTROL SECTION	NEAREST MM	LATITUDE	LONGITUDE	DIRECTION OF TRAVEL	OFFSET TO TRAVEL LANE	SUPPORT	GUARD FENCE REQUIRED
11	CCTV	4	US 277	TAYLOR	0006-04	282	32° 28' 15.07"N	99° 48' 15.27"W	EB	30'	50' POLE	N

SHEET QUANTITIES			
ITEM	DESCRIPTION	UNIT	QUANTITY
416	DRILL SHAFT (42 IN)	LF	19
432	RIPRAP (CONC) (4 IN)	CY	1.25
618	CONDT (PVC) (SCH 80) (2")	LF	20
618	CONDT (PVC) (SCH 80) (2") (BORE)	LF	47
620	ELEC CONDR (NO. 8) BARE	LF	79
620	ELEC CONDR (NO. 8) INSULATED	LF	158
624	GROUND BOX TY D (162922) W/ APRON	EA	2
628	ELC SRV TY D 120/240 060(NS)AL(N)SP(O)	EA	1
6010	CCTV MOUNT	EA	1
6064	ITS POLE (50FT)(90 MPH)	EA	1
6064	ITS POLE MNT CAB (TY 1)(CONF 1)	EA	1
6367	INSTALLATION OF CELLULAR MODEM	EA	1

DETAIL A



4/3/2024

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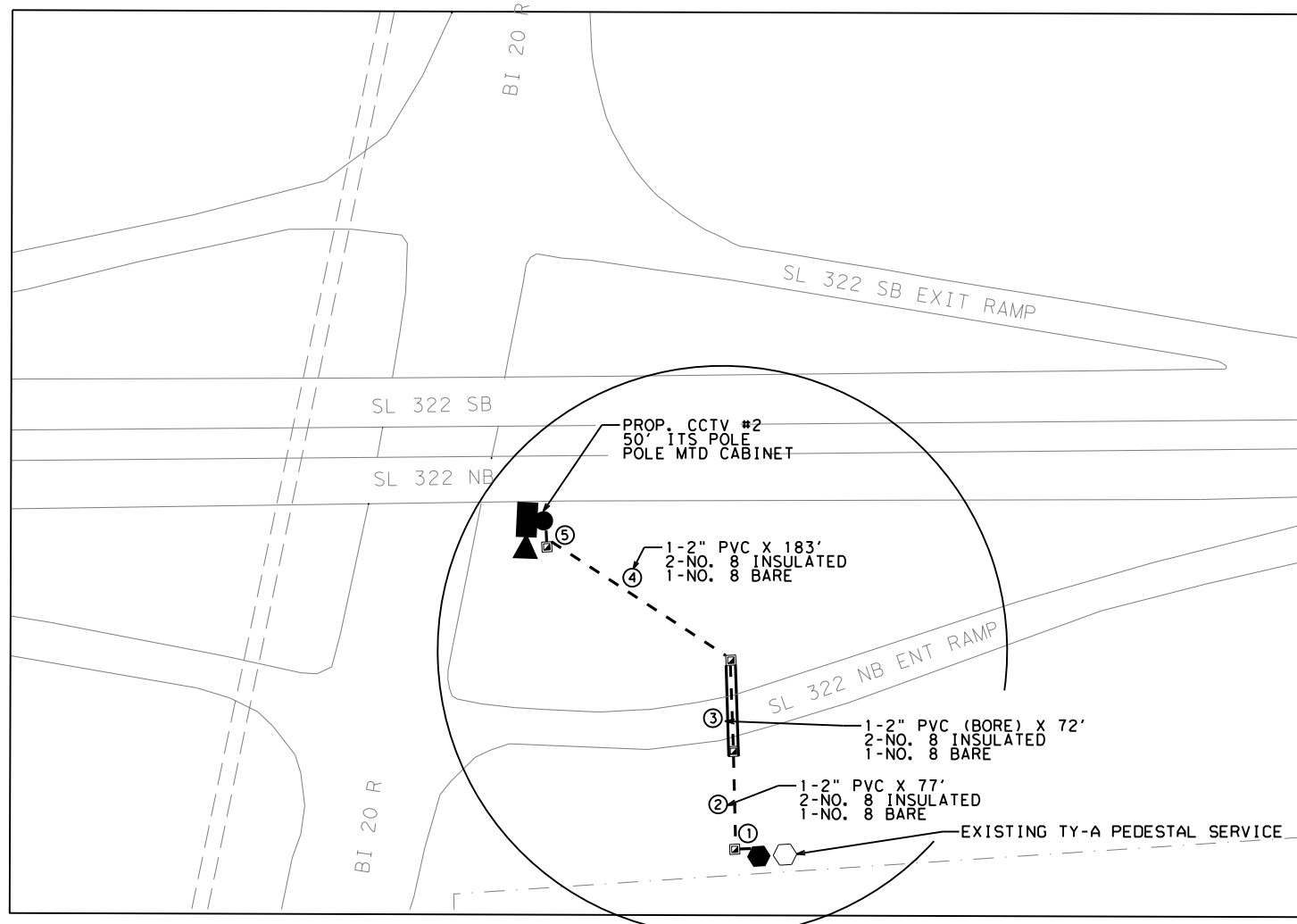
**PROPOSED ITS LAYOUTS
 SITE 1**



SCALE: 1" = 150'

FHWA DIVISION	PROJECT NO.	HIGHWAY NO.	
6	SEE TITLE SHEET	SL 322	
STATE	COUNTY	SHEET NO.	
TEXAS	TAYLOR	33	
DISTRICT	CONTROL SECTION		JOB
ABL	0908 00		130

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LEGEND

- PROP. CCTV
- PROP. DMS
- PROP. ELEC SERVICE
- EXIST. ELEC SERVICE
- PROP. TYD GROUND BOX W/ APRON
- PROP. ITS CONDUIT
- PROP. ITS CONDUIT (BORE)
- CONDUIT RUN NUMBER
- OVERHEAD ELECTRIC
- R.O.W. LINE

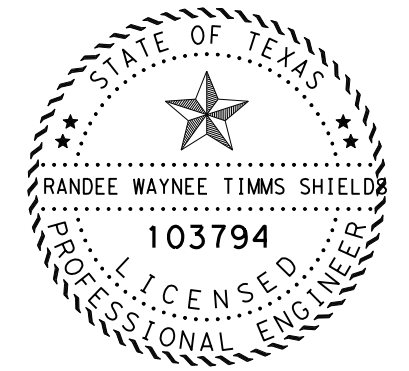
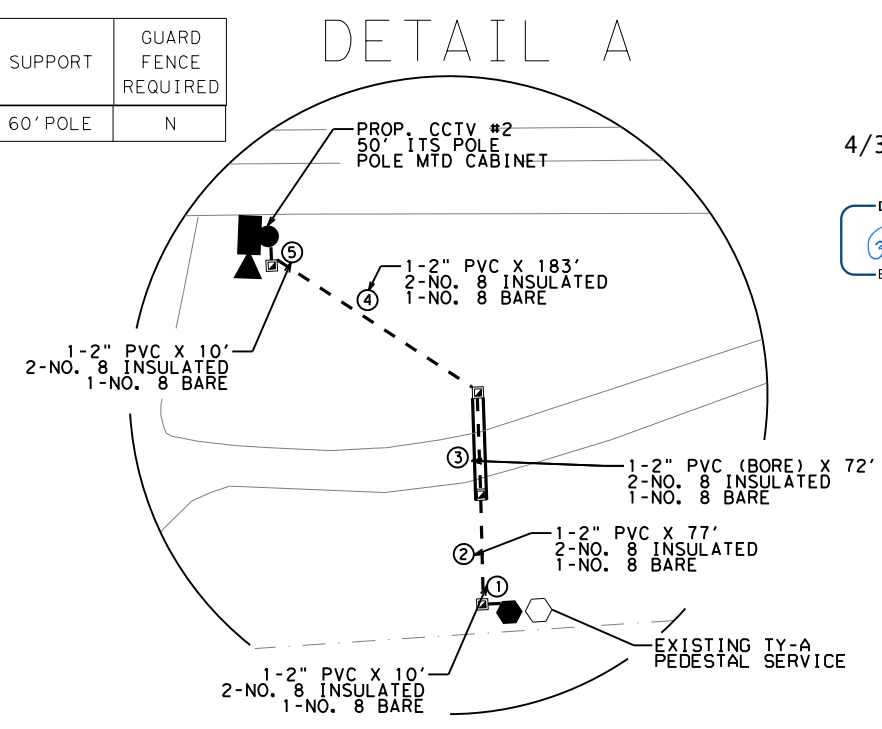
NOTES:

1. THE PROPOSED CCTV LOCATION IS APPROXIMATE.
2. THERE ARE EXISTING POWER POLES ADJACENT TO THE EAST R.O.W. ENGINEER TO COORDINATE WITH WITH SERVICE PROVIDER FOR FINAL LOCATION.
3. WIRELESS COMMUNICATION IS PROPOSED FOR THIS SITE.
4. ALL DEVICES ARE PROPOSED WITHIN STATE R.O.W.

EQUIPMENT PROVIDED BY THE STATE		
DESCRIPTION	UNIT	QUANTITY
CCTV AND FIELD EQUIPMENT	EA	1
CELLULAR MODEM	EA	1

SITE LOCATION	DEVICE TYPE	DEVICE NUMBER	HIGHWAY	COUNTY	CONTROL SECTION	NEAREST MM	LATITUDE	LONGITUDE	DIRECTION OF TRAVEL	OFFSET TO TRAVEL LANE	SUPPORT	GUARD FENCE REQUIRED
2	CCTV	2	SL 322	TAYLOR	2398-01	292	32° 26' 48.85"N	99° 40' 55.26"W	NB	26'	60' POLE	N

SHEET QUANTITIES			
ITEM	DESCRIPTION	UNIT	QUANTITY
416	DRILL SHAFT (42 IN)	LF	29
432	RIPRAP (CONC) (4 IN)	CY	1.25
618	CONDT (PVC) (SCH 80) (2")	LF	280
618	CONDT (PVC) (SCH 80) (2") (BORE)	LF	72
620	ELEC CONDR (NO. 8) BARE	LF	372
620	ELEC CONDR (NO. 8) INSULATED	LF	744
624	GROUND BOX TY D (162922) W/ APRON	EA	4
628	ELC SRV TY D 120/240 060(NS)AL(N)SP(O)	EA	1
6010	CCTV MOUNT	EA	1
6064	ITS POLE (50FT)(90 MPH)	EA	1
6064	ITS POLE MNT CAB (TY 1)(CONF 1)	EA	1
6367	INSTALLATION OF CELLULAR MODEM	EA	1



4/3/2024

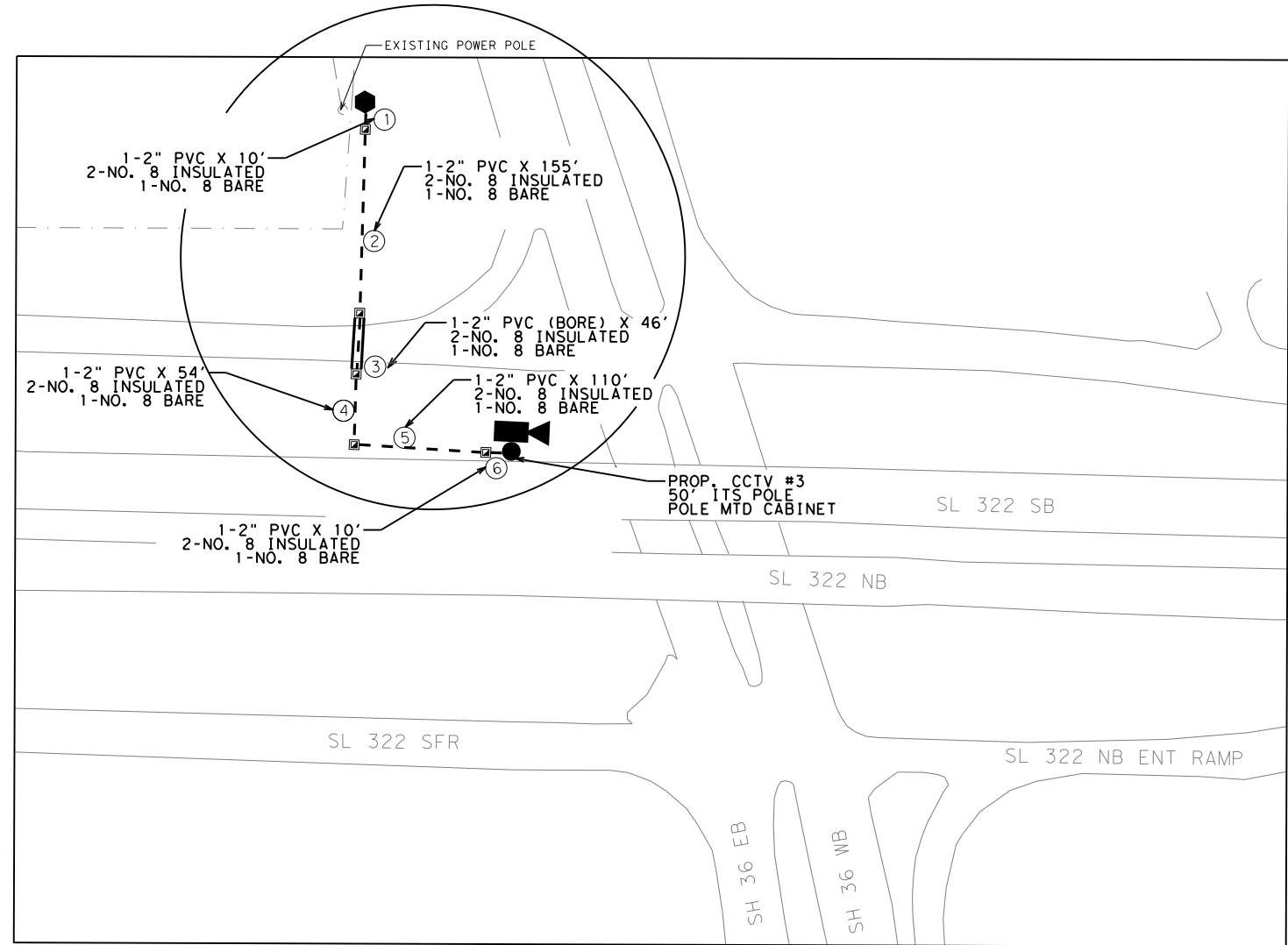
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**PROPOSED ITS LAYOUTS
 SITE 2**



SCALE: 1" = 150'

FHWA DIVISION	PROJECT NO.	HIGHWAY NO.	
6	SEE TITLE SHEET	SL 322	
STATE	COUNTY	SHEET NO.	
TEXAS	TAYLOR	34	
DISTRICT	CONTROL	SECTION	JOB
ABL	0908	00	130



LEGEND

- PROP. CCTV
- PROP. DMS
- PROP. ELEC SERVICE
- PROP. TYD GROUND BOX W/ APRON
- PROP. ITS CONDUIT
- PROP. ITS CONDUIT (BORE)
- CONDUIT RUN NUMBER
- OVERHEAD ELECTRIC
- R.O.W. LINE

NOTES:

- THE PROPOSED CCTV LOCATION IS APPROXIMATE.
- THERE ARE EXISTING POWER POLES ALONG THE SOUTHWEST R.O.W. ENGINEER TO COORDINATE WITH WITH SERVICE PROVIDER FOR FINAL LOCATION.
- WIRELESS COMMUNICATION IS PROPOSED FOR THIS SITE.
- ALL DEVICES ARE PROPOSED WITHIN STATE R.O.W.

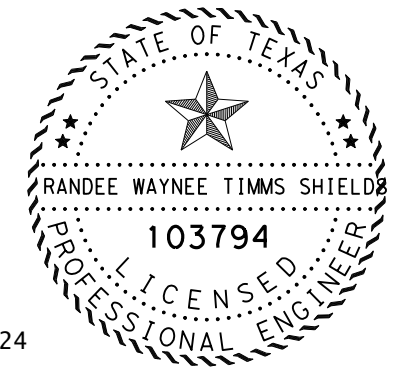
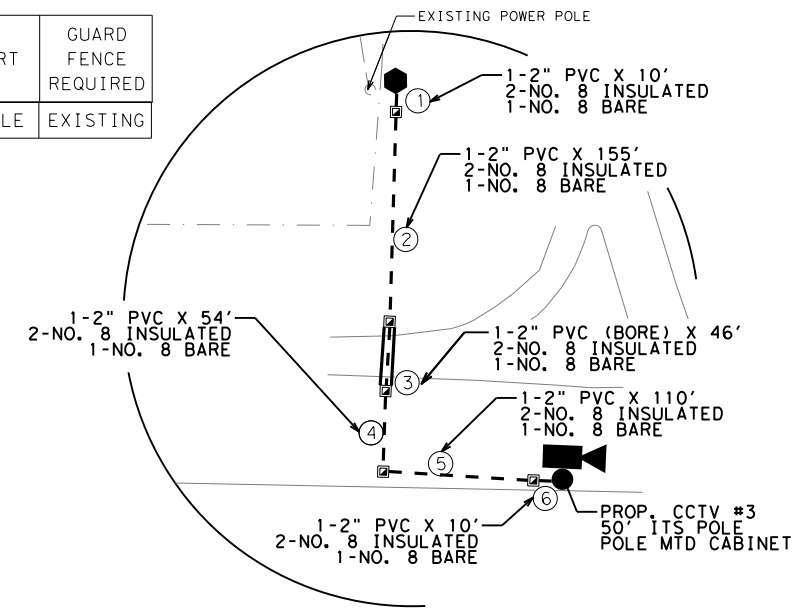
EQUIPMENT PROVIDED BY THE STATE		
DESCRIPTION	UNIT	QUANTITY
CCTV AND FIELD EQUIPMENT	EA	1
CELLULAR MODEM	EA	1

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SITE LOCATION	DEVICE TYPE	DEVICE NUMBER	HIGHWAY	COUNTY	CONTROL SECTION	NEAREST MM	LATITUDE	LONGITUDE	DIRECTION OF TRAVEL	OFFSET TO TRAVEL LANE	SUPPORT	GUARD FENCE REQUIRED
3	CCTV	3	SL 322	TAYLOR	2398-01	292	32° 26' 3.90"N	99° 41' 16.13"W	SB	7'	50' POLE	EXISTING

SHEET QUANTITIES			
ITEM	DESCRIPTION	UNIT	QUANTITY
416	DRILL SHAFT (42 IN)	LF	29
432	RIPRAP (CONC) (4 IN)	CY	1.25
618	CONDT (PVC) (SCH 80) (2")	LF	339
618	CONDT (PVC) (SCH 80) (2") (BORE)	LF	46
620	ELEC CONDR (NO. 8) BARE	LF	409
620	ELEC CONDR (NO. 8) INSULATED	LF	818
624	GROUND BOX TY D (162922) W/ APRON	EA	5
628	ELC SRV TY D 120/240 060(NS)AL(N)SP(O)	EA	1
6010	CCTV MOUNT	EA	1
6064	ITS POLE (50FT)(90 MPH)	EA	1
6064	ITS POLE MNT CAB (TY 1)(CONF 1)	EA	1
6367	INSTALLATION OF CELLULAR MODEM	EA	1

DETAIL A



4/3/2024

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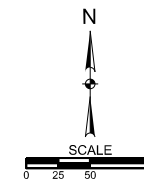
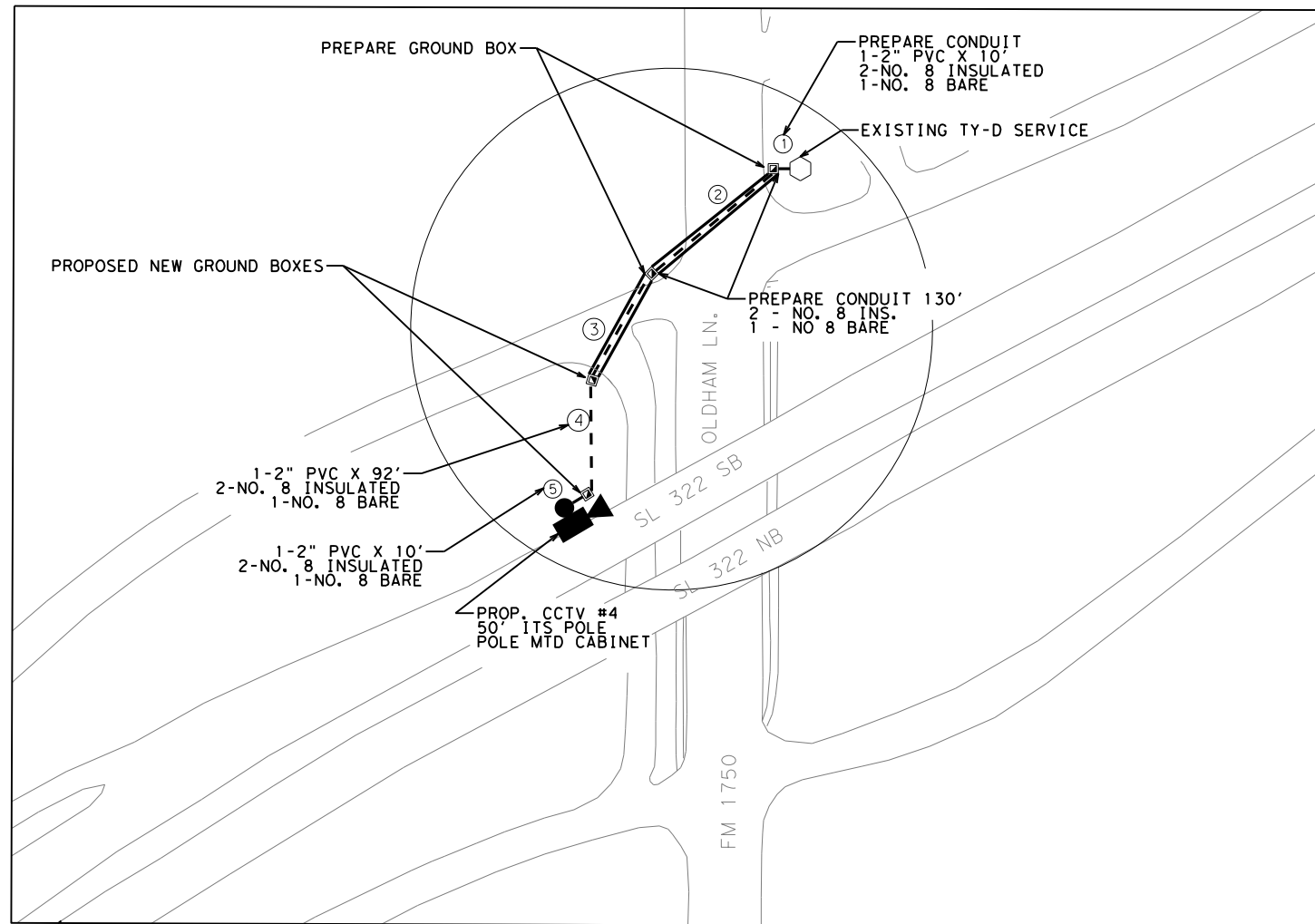
**PROPOSED ITS LAYOUTS
SITE 3**



SCALE: 1" = 150'

FHWA DIVISION	PROJECT NO.	HIGHWAY NO.
6	SEE TITLE SHEET	SL 322
STATE	COUNTY	SHEET NO.
TEXAS	TAYLOR	35
DISTRICT	CONTROL SECTION	JOB
ABL	0908 00	130

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 DATE: 4/3/2024 9:29:02 AM



LEGEND

- PROP. CCTV
- PROP. DMS
- PROP. ELEC SERVICE
- EXIST. ELEC SERVICE
- PROP. TYD GROUND BOX W/ APRON
- PROP. ITS CONDUIT
- PROP. ITS CONDUIT (BORE)
- CONDUIT RUN NUMBER
- OVERHEAD ELECTRIC
- R.O.W. LINE

NOTES:

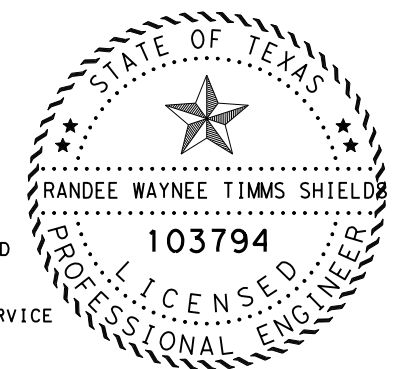
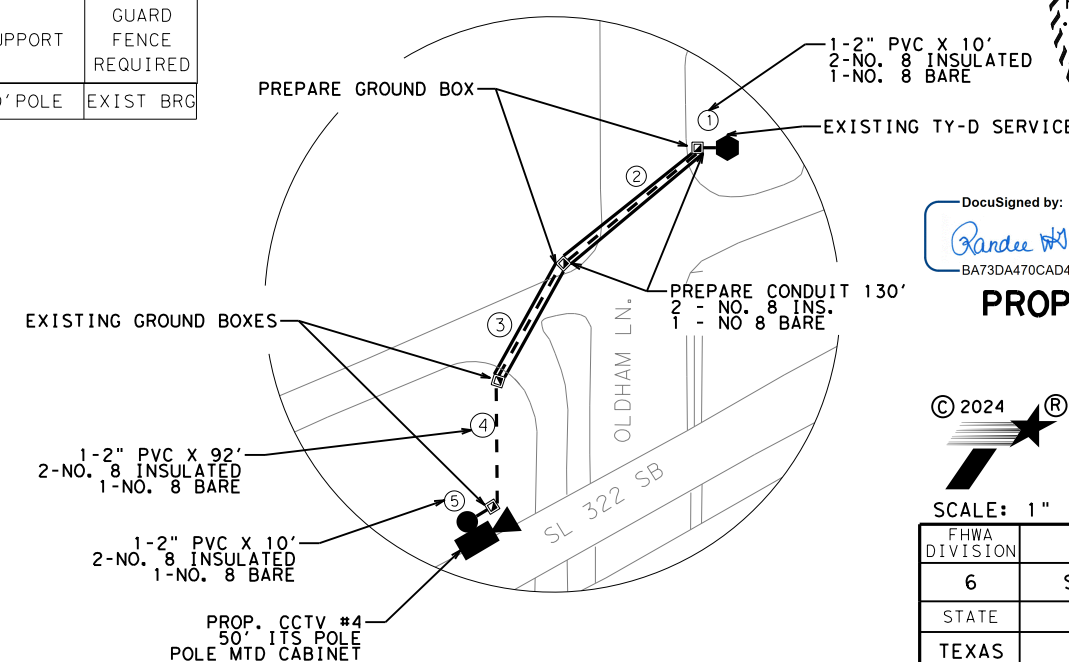
1. THE PROPOSED CCTV LOCATION IS APPROXIMATE.
2. CCTV CIRCUIT TO BE TIED INTO EXISTING SERVICE. CONDUIT AND GROUND BOXES FROM NW CORNER OF INTERSECTION TO EXISTING SERVICE POLE TO BE PREPARED AND REUSED FOR NEW CCTV CIRCUIT CONDUCTORS.
3. WIRELESS COMMUNICATION IS PROPOSED FOR THIS SITE.
4. ALL DEVICES ARE PROPOSED WITHIN STATE R.O.W.

EQUIPMENT PROVIDED BY THE STATE		
DESCRIPTION	UNIT	QUANTITY
CCTV AND FIELD EQUIPMENT	EA	1
CELLULAR MODEM	EA	1

SITE LOCATION	DEVICE TYPE	DEVICE NUMBER	HIGHWAY	COUNTY	CONTROL SECTION	NEAREST MM	LATITUDE	LONGITUDE	DIRECTION OF TRAVEL	OFFSET TO TRAVEL LANE	SUPPORT	GUARD FENCE REQUIRED
4	CCTV	4	SL 322	TAYLOR	2398-01	294	32° 24' 41.14"N	99° 42' 30.43"W	SB	20'	50' POLE	EXIST BRG

SHEET QUANTITIES			
ITEM	DESCRIPTION	UNIT	QUANTITY
416	DRILL SHAFT (42 IN)	LF	29
432	RIPRAP (CONC) (4 IN)	CY	1.25
618	CONDT (PVC) (SCH 80) (2")	LF	102
618	CONDT (PVC) (SCH 80) (2") (BORE)	LF	96
620	ELEC CONDR (NO. 8) BARE	LF	370
620	ELEC CONDR (NO. 8) INSULATED	LF	740
624	GROUND BOX TY D (162922) W/ APRON	EA	2
6010	CCTV MOUNT	EA	1
6027	GROUND BOX (PREPARE)	EA	2
6027	CONDUIT (PREPARE)	LF	130
6064	ITS POLE (50FT)(90 MPH)	EA	1
6064	ITS POLE MNT CAB (TY 1)(CONF 1)	EA	1
6367	INSTALLATION OF CELLULAR MODEM	EA	1

DETAIL A



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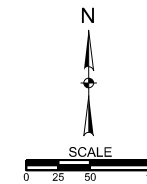
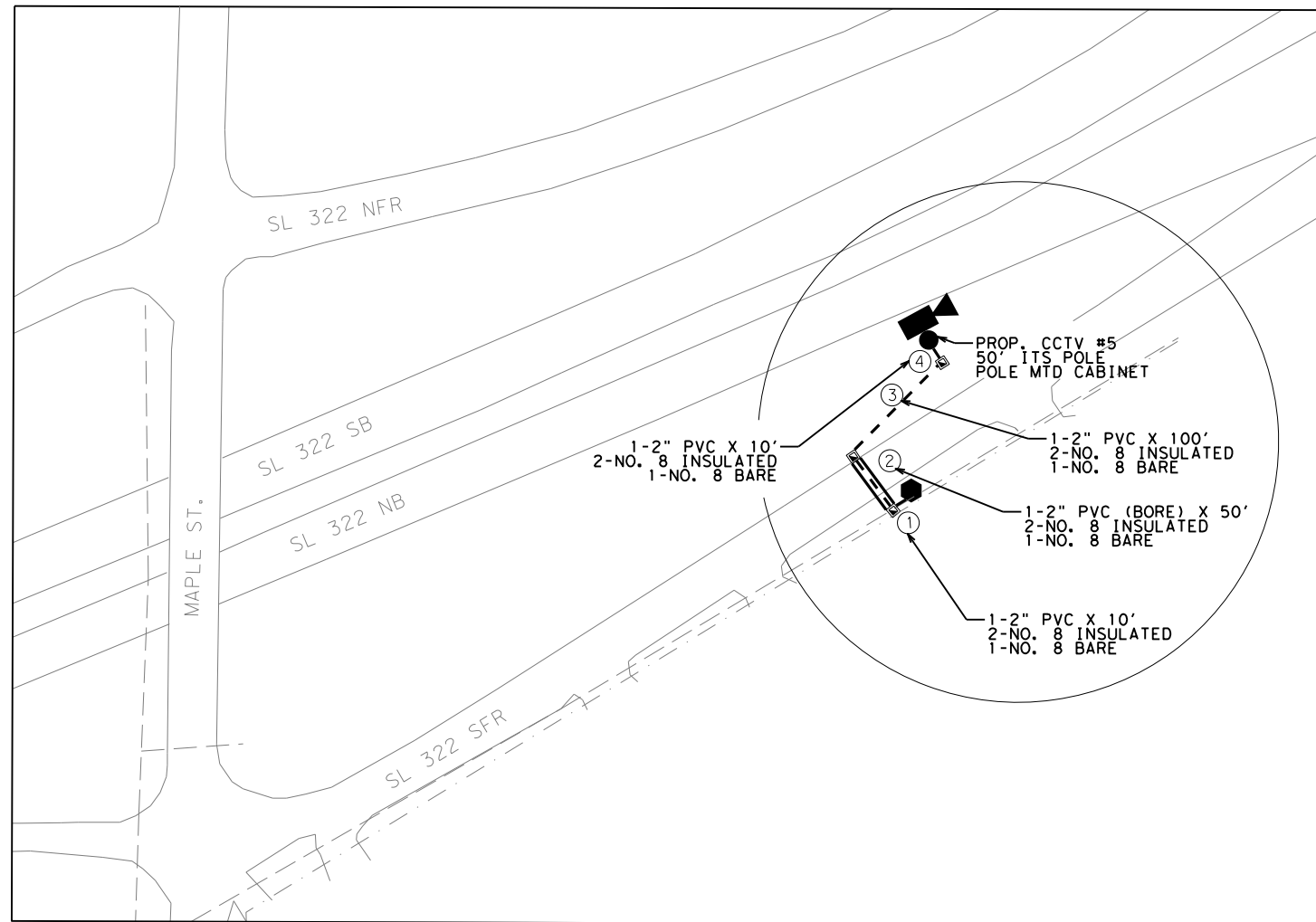
PROPOSED ITS LAYOUTS
 SITE 4



SCALE: 1" = 150'

FHWA DIVISION	PROJECT NO.	HIGHWAY NO.
6	SEE TITLE SHEET	SL 322
STATE	COUNTY	SHEET NO.
TEXAS	TAYLOR	36
DISTRICT	CONTROL SECTION	JOB
ABL	0908 00	130

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 DATE: 4/3/2024 9:29:05 AM



- LEGEND**
- PROP. CCTV
 - PROP. DMS
 - PROP. ELEC SERVICE
 - PROP. TYD GROUND BOX W/ APRON
 - PROP. ITS CONDUIT
 - PROP. ITS CONDUIT (BORE)
 - CONDUIT RUN NUMBER
 - OVERHEAD ELECTRIC
 - R.O.W. LINE

NOTES:

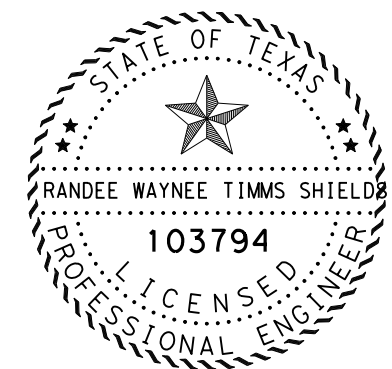
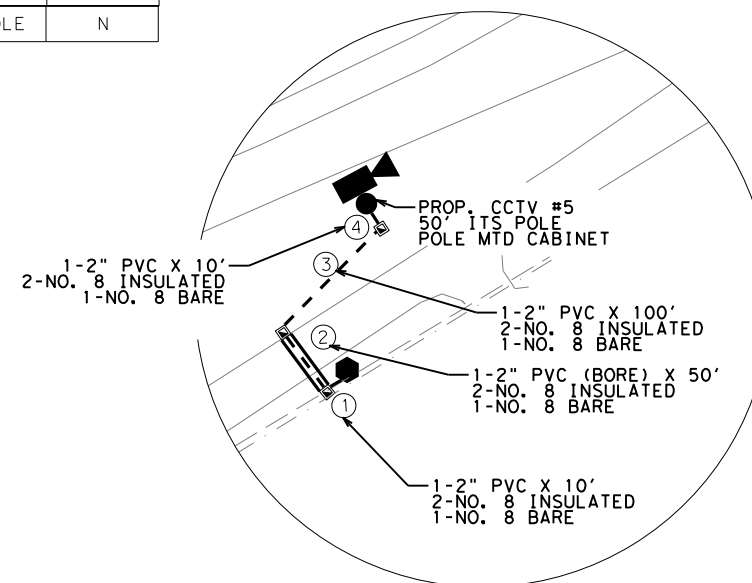
1. THE PROPOSED CCTV LOCATION IS APPROXIMATE.
2. THERE ARE EXISTING POWER POLES ALONG THE SOUTH R.O.W. ENGINEER TO COORDINATE WITH WITH SERVICE PROVIDER FOR FINAL LOCATION.
3. WIRELESS COMMUNICATION IS PROPOSED FOR THIS SITE.
4. ALL DEVICES ARE PROPOSED WITHIN STATE R.O.W.

EQUIPMENT PROVIDED BY THE STATE		
DESCRIPTION	UNIT	QUANTITY
CCTV AND FIELD EQUIPMENT	EA	1
CELLULAR MODEM	EA	1

SITE LOCATION	DEVICE TYPE	DEVICE NUMBER	HIGHWAY	COUNTY	CONTROL SECTION	NEAREST MM	LATITUDE	LONGITUDE	DIRECTION OF TRAVEL	OFFSET TO TRAVEL LANE	SUPPORT	GUARD FENCE REQUIRED
5	CCTV	5	SL 322	TAYLOR	2398-01	296	32° 23' 28.92"N	99° 43' 22.74"W	NB	39'	50' POLE	N

SHEET QUANTITIES			
ITEM	DESCRIPTION	UNIT	QUANTITY
416	DRILL SHAFT (42 IN)	LF	19
432	RIPRAP (CONC) (4 IN)	CY	1.25
618	CONDT (PVC) (SCH 80) (2")	LF	120
618	CONDT (PVC) (SCH 80) (2") (BORE)	LF	50
620	ELEC CONDR (NO. 8) BARE	LF	186
620	ELEC CONDR (NO. 8) INSULATED	LF	372
624	GROUND BOX TY D (162922) W/ APRON	EA	3
628	ELC SRV TY D 120/240 060(NS)AL(N)SP(O)	EA	1
6010	CCTV MOUNT	EA	1
6064	ITS POLE (50FT)(90 MPH)	EA	1
6064	ITS POLE MNT CAB (TY 1)(CONF 1)	EA	1
6367	INSTALLATION OF CELLULAR MODEM	EA	1

DETAIL A



4/3/2024

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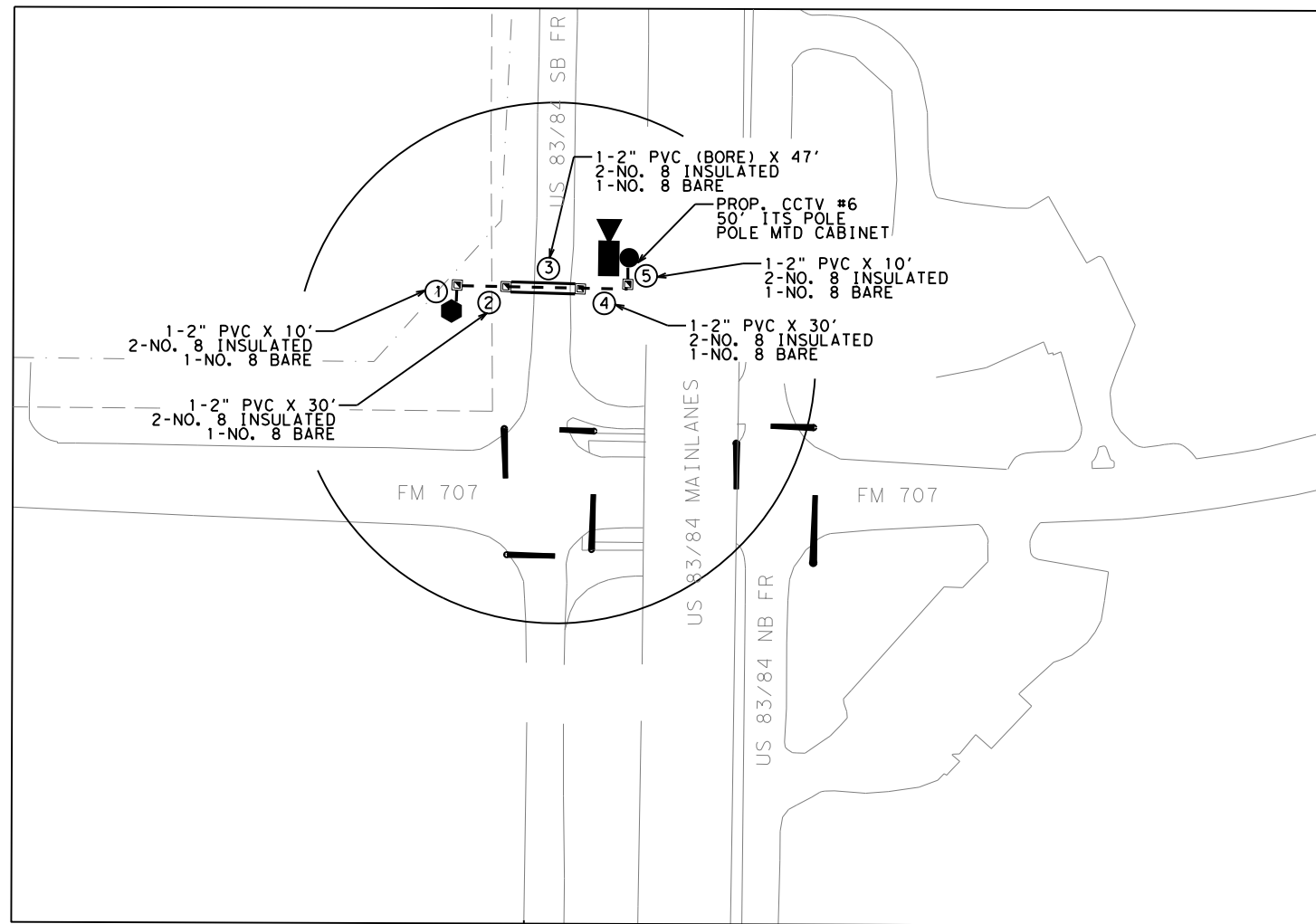
**PROPOSED ITS LAYOUTS
 SITE 5**



SCALE: 1" = 150'

FHWA DIVISION	PROJECT NO.	HIGHWAY NO.
6	SEE TITLE SHEET	SL 322
STATE	COUNTY	SHEET NO.
TEXAS	TAYLOR	37
DISTRICT	CONTROL SECTION	JOB
ABL	0908 00	130

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 DATE: 4/3/2024 9:29:08 AM



LEGEND

- PROP. CCTV
- PROP. DMS
- PROP. ELEC SERVICE
- PROP. TYD GROUND BOX W/ APRON
- PROP. ITS CONDUIT
- PROP. ITS CONDUIT (BORE)
- CONDUIT RUN NUMBER
- OVERHEAD ELECTRIC
- R.O.W. LINE

NOTES:

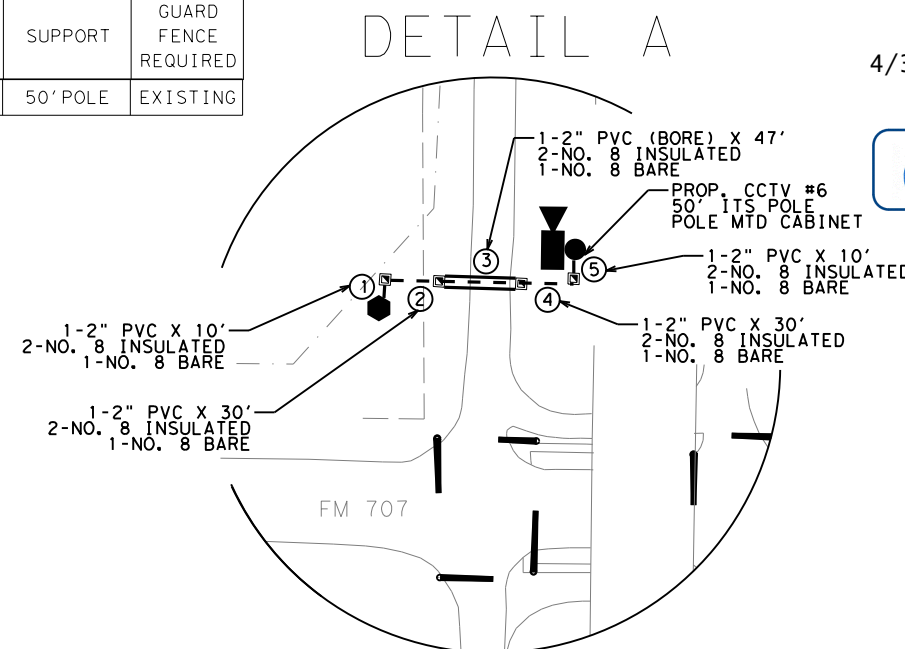
1. THE PROPOSED CCTV LOCATION IS APPROXIMATE.
2. THERE ARE EXISTING POWER POLES ALONG THE WEST R.O.W. ENGINEER TO COORDINATE WITH WITH SERVICE PROVIDER FOR FINAL LOCATION.
3. WIRELESS COMMUNICATION IS PROPOSED FOR THIS SITE.
4. ALL DEVICES ARE PROPOSED WITHIN STATE R.O.W.

- NOTES:**
1. THE PROPOSED CCTV LOCATION IS APPROXIMATE.
 2. THERE ARE EXISTING POWER POLES ALONG THE WEST R.O.W. ENGINEER TO COORDINATE WITH WITH SERVICE PROVIDER FOR FINAL LOCATION.
 3. WIRELESS COMMUNICATION IS PROPOSED FOR THIS SITE.
 4. ALL DEVICES ARE PROPOSED WITHIN STATE R.O.W.

EQUIPMENT PROVIDED BY THE STATE		
DESCRIPTION	UNIT	QUANTITY
CCTV AND FIELD EQUIPMENT	EA	1
CELLULAR MODEM	EA	1

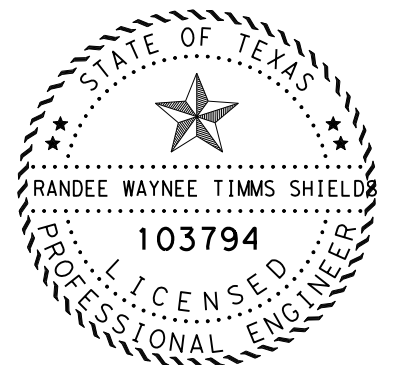
SITE LOCATION	DEVICE TYPE	DEVICE NUMBER	HIGHWAY	COUNTY	CONTROL SECTION	NEAREST MM	LATITUDE	LONGITUDE	DIRECTION OF TRAVEL	OFFSET TO TRAVEL LANE	SUPPORT	GUARD FENCE REQUIRED
6	CCTV	6	US 83	TAYLOR	0034-01	334	32° 21' 8.25"N	99° 44' 33.15"W	SB	17'	50' POLE	EXISTING

SHEET QUANTITIES			
ITEM	DESCRIPTION	UNIT	QUANTITY
104	REMOVING CONC (RIPRAP)	SY	10
416	DRILL SHAFT (42 IN)	LF	29
432	RIPRAP (CONC) (4 IN)	CY	1.25
618	CONDT (PVC) (SCH 80) (2")	LF	80
618	CONDT (PVC) (SCH 80) (2") (BORE)	LF	47
620	ELEC CONDR (NO. 8) BARE	LF	147
620	ELEC CONDR (NO. 8) INSULATED	LF	294
624	GROUND BOX TY D (162922) W/ APRON	EA	4
628	ELC SRV TY D 120/240 060(NS)AL(N)SP(O)	EA	1
6010	CCTV MOUNT	EA	1
6064	ITS POLE (50FT)(90 MPH)	EA	1
6064	ITS POLE MNT CAB (TY 1)(CONF 1)	EA	1
6367	INSTALLATION OF CELLULAR MODEM	EA	1



4/3/2024

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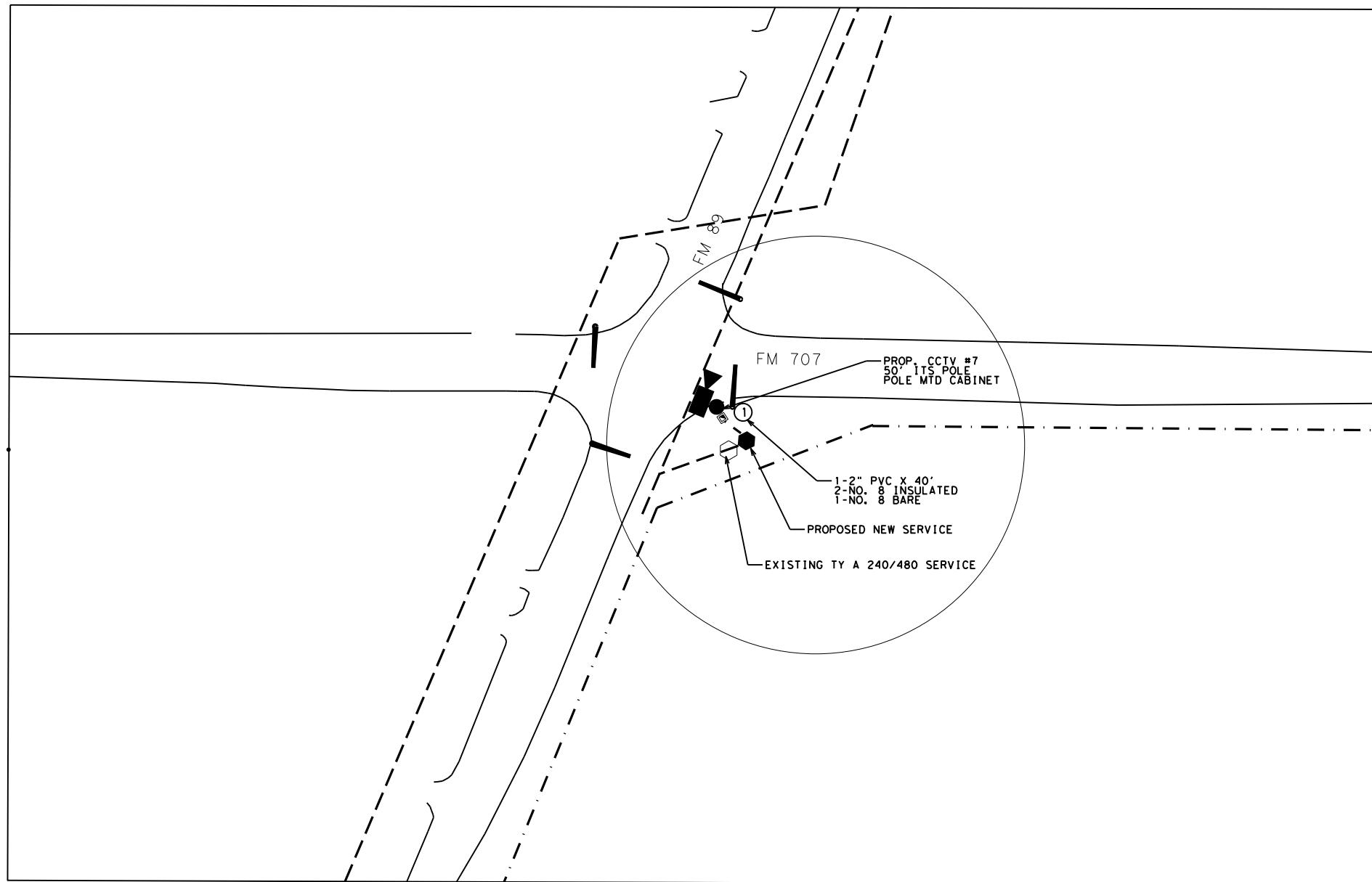
**PROPOSED ITS LAYOUTS
 SITE 6**

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SCALE: 1" = 150'

FHWA DIVISION	PROJECT NO.	HIGHWAY NO.	
6	SEE TITLE SHEET	SL 322	
STATE	COUNTY	SHEET NO.	
TEXAS	TAYLOR	38	
DISTRICT	CONTROL	SECTION	JOB
ABL	0908	00	130

FILE: C:\Users\KMUELLER\Desktop\RYAN C\Plan Set\1. General\PROPOSED ITS LAYOUTS.dgn
 DATE: 4/3/2024 9:29:11 AM



LEGEND

- PROP. CCTV
- PROP. DMS
- PROP. ELEC SERVICE
- EXIST. ELEC SERVICE
- PROP. TYD GROUND BOX W/ APRON
- PROP. ITS CONDUIT
- PROP. ITS CONDUIT (BORE)
- CONDUIT RUN NUMBER
- OVERHEAD ELECTRIC
- R.O.W. LINE

SCALE: 0 25 50 100

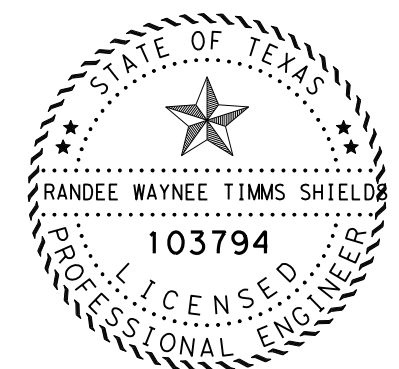
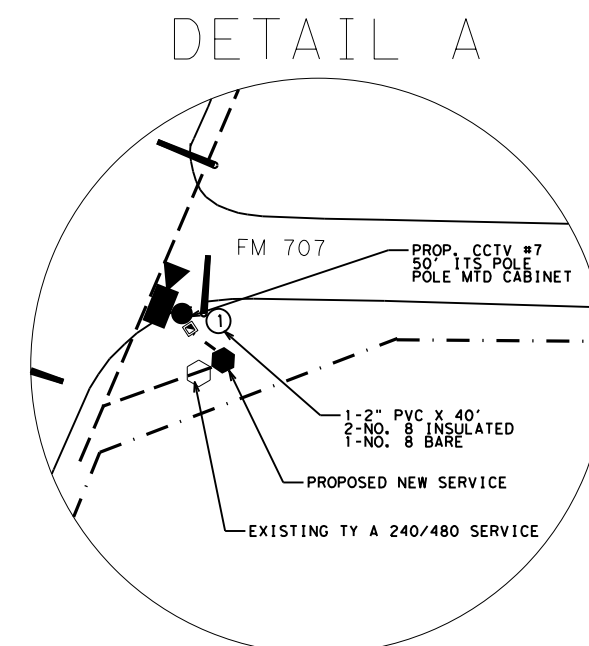
NOTES:

1. THE PROPOSED CCTV LOCATION IS APPROXIMATE.
2. THERE ARE EXISTING POWER POLES ALONG THE SOUTH R.O.W. ENGINEER TO COORDINATE WITH WITH SERVICE PROVIDER FOR FINAL LOCATION.
3. WIRELESS COMMUNICATION IS PROPOSED FOR THIS SITE.
4. ALL DEVICES ARE PROPOSED WITHIN STATE R.O.W.

EQUIPMENT PROVIDED BY THE STATE		
DESCRIPTION	UNIT	QUANTITY
CCTV AND FIELD EQUIPMENT	EA	1
CELLULAR MODEM	EA	1

SITE LOCATION	DEVICE TYPE	DEVICE NUMBER	HIGHWAY	COUNTY	CONTROL SECTION	NEAREST MM	LATITUDE	LONGITUDE	DIRECTION OF TRAVEL	OFFSET TO TRAVEL LANE	SUPPORT	GUARD FENCE REQUIRED
7	CCTV	7	FM 707	TAYLOR	0663-01	304	32° 21' 8.0748"N	99° 47' 12.27"W	EB	10'	50' POLE	N

SHEET QUANTITIES			
ITEM	DESCRIPTION	UNIT	QUANTITY
416	DRILL SHAFT (42 IN)	LF	19
432	RIPRAP (CONC) (4 IN)	CY	1.25
618	CONDT (PVC) (SCH 80) (2")	LF	36
620	ELEC CONDR (NO. 8) BARE	LF	40
620	ELEC CONDR (NO. 8) INSULATED	LF	80
624	GROUND BOX TY D (162922) W/ APRON	EA	1
628	ELC SRV TY D 120/240 060(NS)AL(N)SP(O)	EA	1
6010	CCTV FIELD CONTROLLER	EA	1
6010	CCTV MOUNT	EA	1
6064	ITS POLE (50FT)(90 MPH)	EA	1
6064	ITS POLE MNT CAB (TY 1)(CONF 1)	EA	1
6367	INSTALLATION OF CELLULAR MODEM	EA	1



4/3/2024

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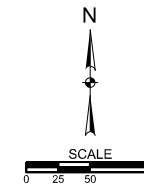
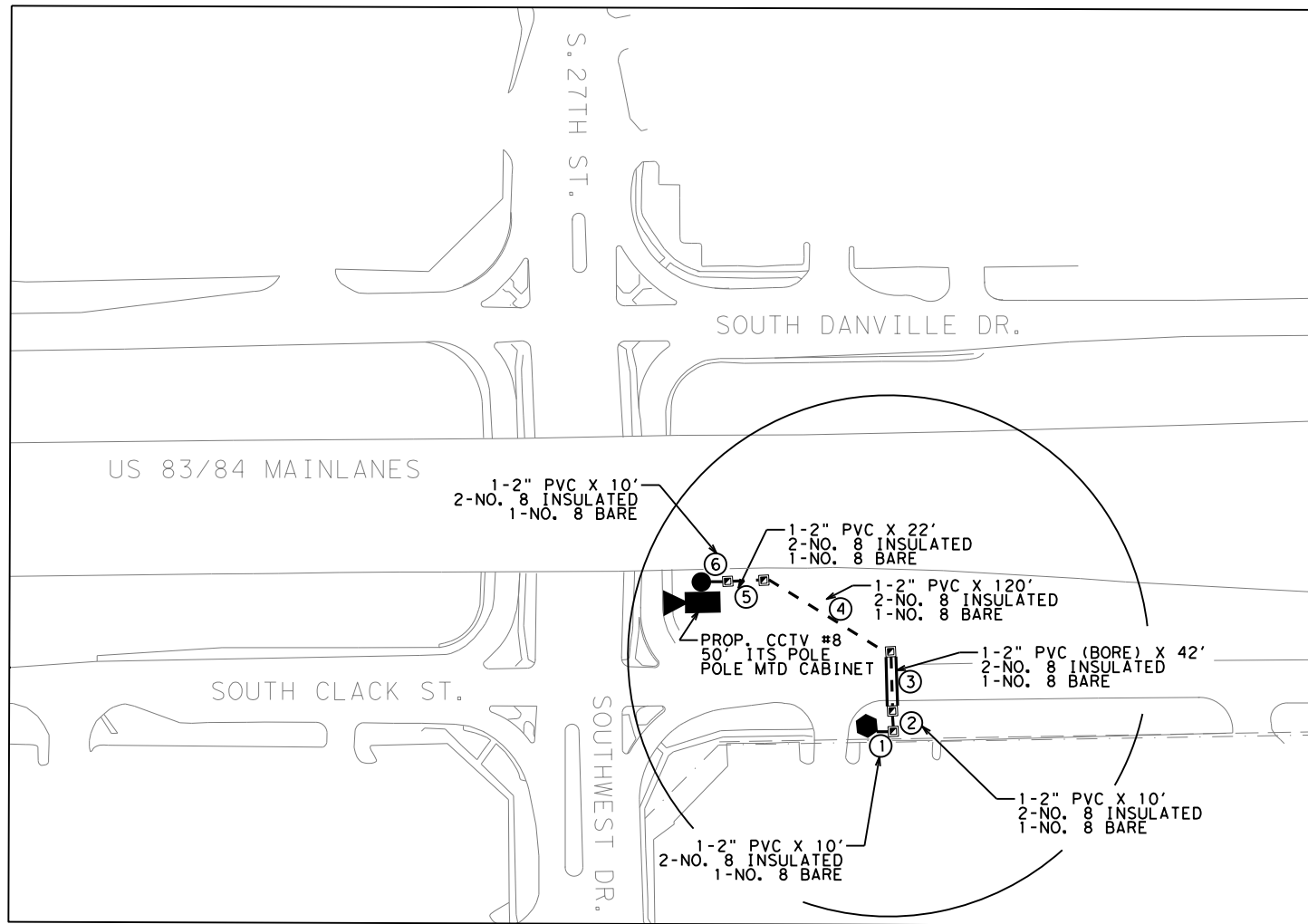
**PROPOSED ITS LAYOUTS
 SITE 7**



SCALE: 1" = 100'

FHWA DIVISION	PROJECT NO.	HIGHWAY NO.
6	SEE TITLE SHEET	SL 322
STATE	COUNTY	SHEET NO.
TEXAS	TAYLOR	39
DISTRICT	CONTROL SECTION JOB	
ABL	0908 00 130	

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 DATE: 4/3/2024 9:29:13 AM



- LEGEND**
- PROP. CCTV
 - PROP. DMS
 - PROP. ELEC SERVICE
 - PROP. TYD GROUND BOX W/ APRON
 - PROP. ITS CONDUIT
 - PROP. ITS CONDUIT (BORE)
 - CONDUIT RUN NUMBER
 - OVERHEAD ELECTRIC
 - R.O.W. LINE

NOTES:

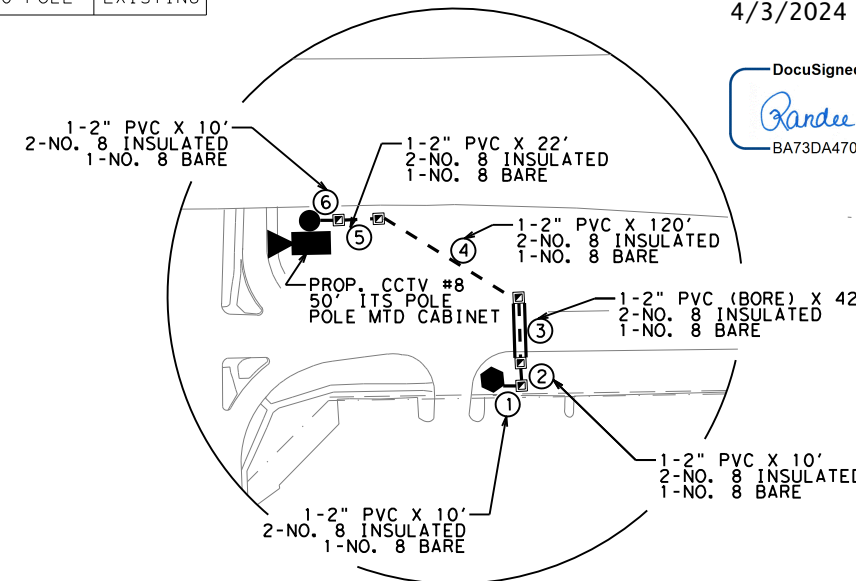
1. THE PROPOSED CCTV LOCATION IS APPROXIMATE.
2. THERE ARE EXISTING POWER POLES ALONG THE WEST R.O.W. ENGINEER TO COORDINATE WITH WITH SERVICE PROVIDER FOR FINAL LOCATION.
3. WIRELESS COMMUNICATION IS PROPOSED FOR THIS SITE.
4. ALL DEVICES ARE PROPOSED WITHIN STATE R.O.W.

EQUIPMENT PROVIDED BY THE STATE		
DESCRIPTION	UNIT	QUANTITY
CCTV AND FIELD EQUIPMENT	EA	1
CELLULAR MODEM	EA	1

SITE LOCATION	DEVICE TYPE	DEVICE NUMBER	HIGHWAY	COUNTY	CONTROL SECTION	NEAREST MM	LATITUDE	LONGITUDE	DIRECTION OF TRAVEL	OFFSET TO TRAVEL LANE	SUPPORT	GUARD FENCE REQUIRED
8	CCTV	8	US 83	TAYLOR	0034-01	330	32° 24' 44.77"N	99° 46' 28.60"W	SB	11'	50' POLE	EXISTING

SHEET QUANTITIES			
ITEM	DESCRIPTION	UNIT	QUANTITY
416	DRILL SHAFT (42 IN)	LF	29
432	RIPRAP (CONC) (4 IN)	CY	1.25
618	CONDT (PVC) (SCH 80) (2")	LF	162
618	CONDT (PVC) (SCH 80) (2") (BORE)	LF	42
620	ELEC CONDR (NO. 8) BARE	LF	224
620	ELEC CONDR (NO. 8) INSULATED	LF	448
624	GROUND BOX TY D (162922) W/ APRON	EA	5
628	ELC SRV TY D 120/240 060(NS)AL(N)SP(O)	EA	1
6010	CCTV MOUNT	EA	1
6064	ITS POLE (50FT)(90 MPH)	EA	1
6064	ITS POLE MNT CAB (TY 1)(CONF 1)	EA	1
6367	INSTALLATION OF CELLULAR MODEM	EA	1

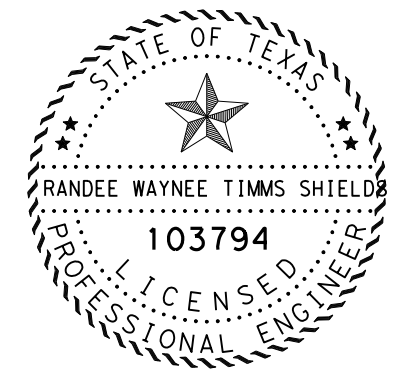
DETAIL A



4/3/2024

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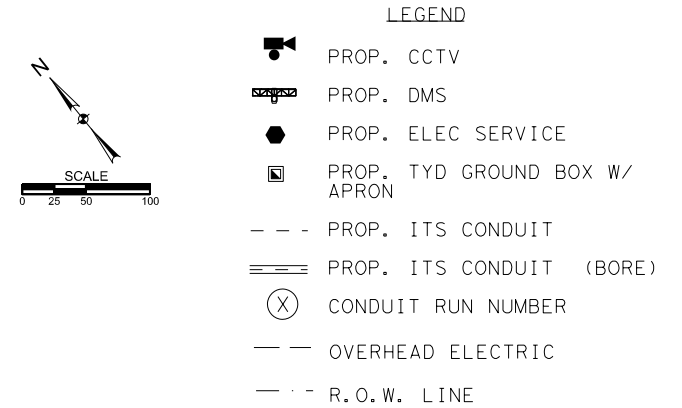
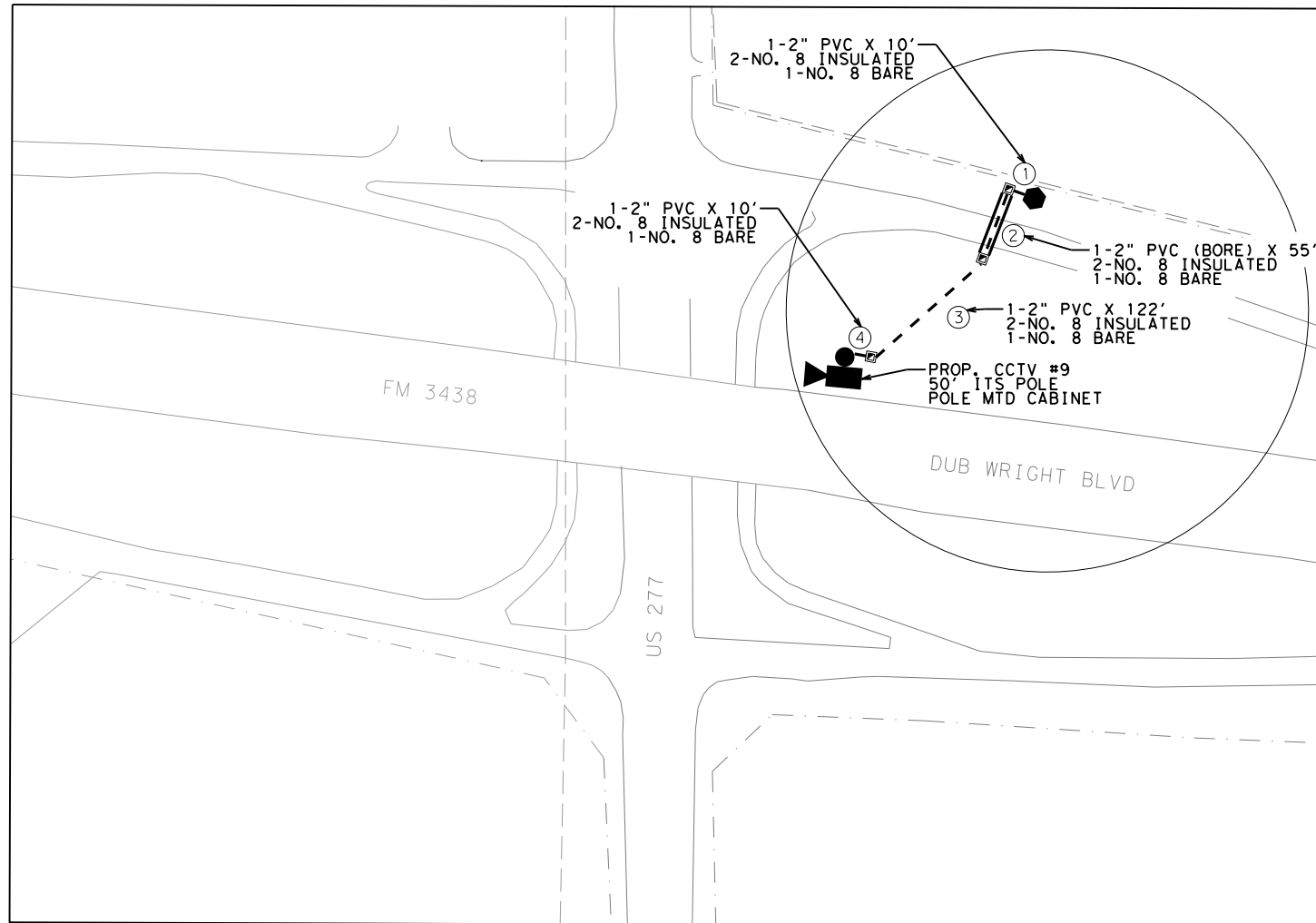
**PROPOSED ITS LAYOUTS
 SITE 8**



SCALE: 1" = 150'

FHWA DIVISION	PROJECT NO.	HIGHWAY NO.
6	SEE TITLE SHEET	SL 322
STATE	COUNTY	SHEET NO.
TEXAS	TAYLOR	40
DISTRICT	CONTROL SECTION	JOB
ABL	0908 00	130

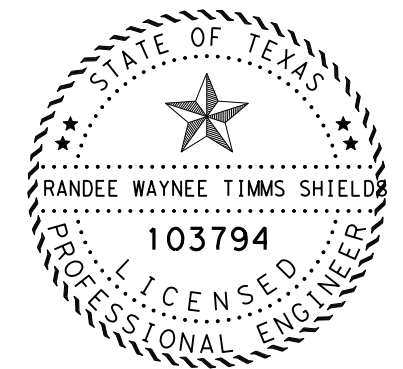
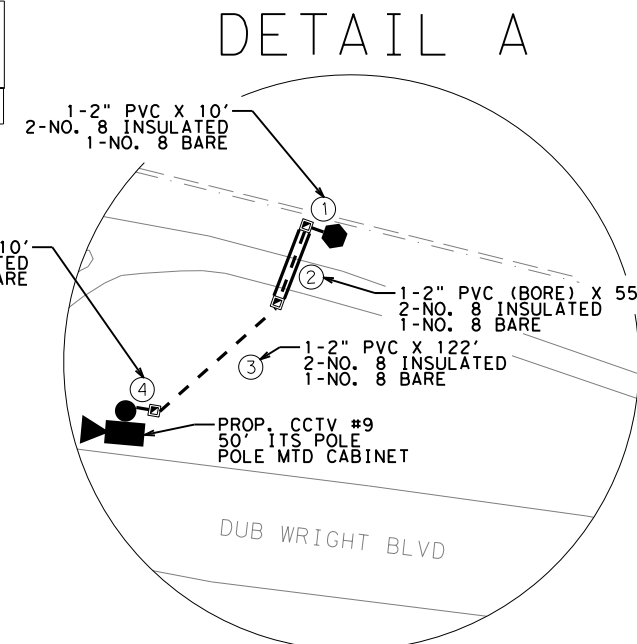
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- NOTES:**
1. THE PROPOSED CCTV LOCATION IS APPROXIMATE.
 2. THERE ARE EXISTING POWER POLES ALONG THE EAST R.O.W. ENGINEER TO COORDINATE WITH WITH SERVICE PROVIDER FOR FINAL LOCATION.
 3. WIRELESS COMMUNICATION IS PROPOSED FOR THIS SITE.
 4. ALL DEVICES ARE PROPOSED WITHIN STATE R.O.W.

SITE LOCATION	DEVICE TYPE	DEVICE NUMBER	HIGHWAY	COUNTY	CONTROL SECTION	NEAREST MM	LATITUDE	LONGITUDE	DIRECTION OF TRAVEL	OFFSET TO TRAVEL LANE	SUPPORT	GUARD FENCE REQUIRED
9	CCTV	9	FM 3438	TAYLOR	2270-01	294	32° 24' 20.88"N	99° 48' 16.17"W	NB	38'	50' POLE	EXISTING

SHEET QUANTITIES			
ITEM	DESCRIPTION	UNIT	QUANTITY
416	DRILL SHAFT (42 IN)	LF	29
432	RIPRAP (CONC) (4 IN)	CY	1.25
618	CONDT (PVC) (SCH 80) (2")	LF	122
618	CONDT (PVC) (SCH 80) (2") (BORE)	LF	55
620	ELEC CONDR (NO. 8) BARE	LF	213
620	ELEC CONDR (NO. 8) INSULATED	LF	426
624	GROUND BOX TY D (162922) W/ APRON	EA	3
628	ELC SRV TY D 120/240 060(NS)AL(N)SP(O)	EA	1
6010	CCTV MOUNT	EA	1
6064	ITS POLE (50FT)(90 MPH)	EA	1
6064	ITS POLE MNT CAB (TY 1)(CONF 1)	EA	1
6367	INSTALLATION OF CELLULAR MODEM	EA	1



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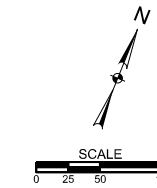
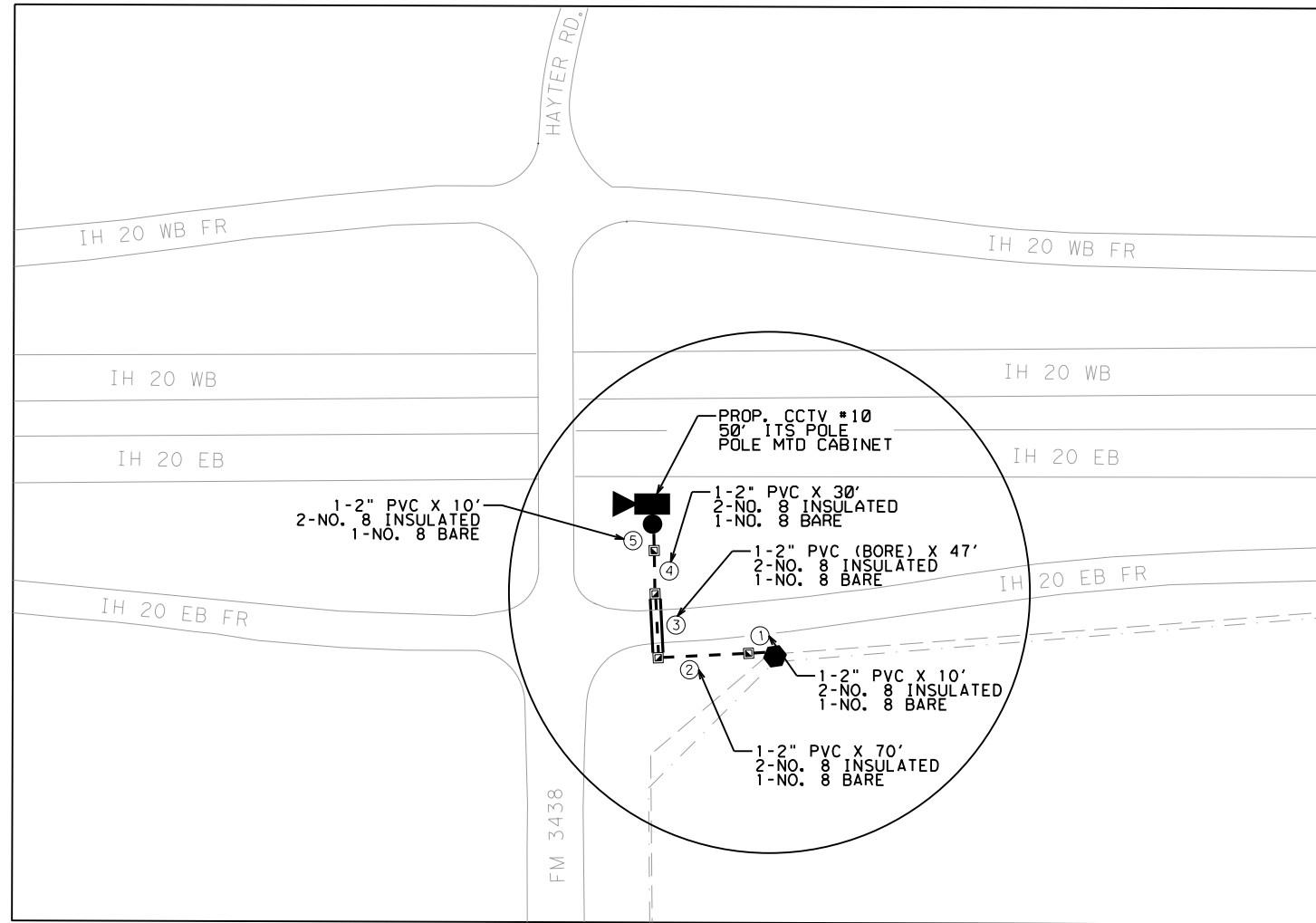
**PROPOSED ITS LAYOUTS
 SITE 9**



SCALE: 1" = 150'

FHWA DIVISION	PROJECT NO.	HIGHWAY NO.	
6	SEE TITLE SHEET	SL 322	
STATE	COUNTY	SHEET NO.	
TEXAS	TAYLOR	41	
DISTRICT	CONTROL SECTION		JOB
ABL	0908 00		130

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 DATE: 4/3/2024 9:29:19 AM



- LEGEND**
- PROP. CCTV
 - PROP. DMS
 - PROP. ELEC SERVICE
 - PROP. TYD GROUND BOX W/ APRON
 - PROP. ITS CONDUIT
 - PROP. ITS CONDUIT (BORE)
 - CONDUIT RUN NUMBER
 - OVERHEAD ELECTRIC
 - R.O.W. LINE

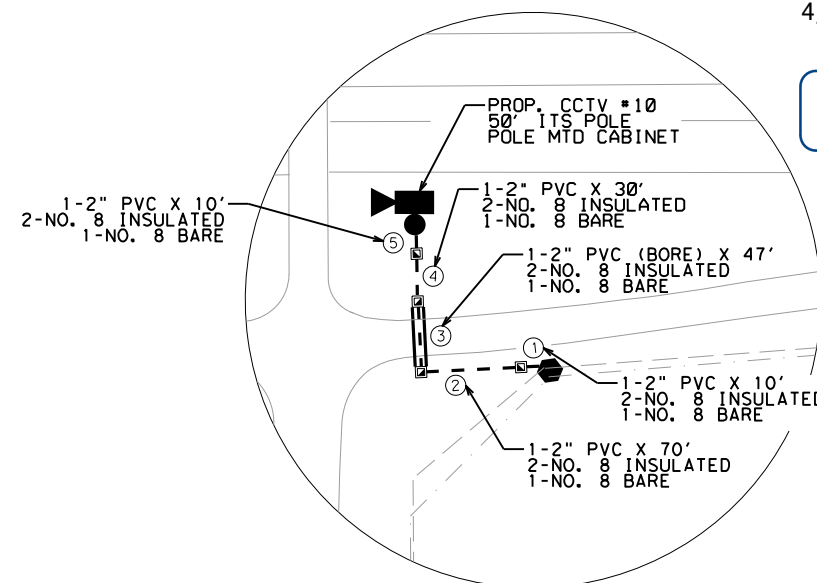
- NOTES:**
1. THE PROPOSED CCTV LOCATION IS APPROXIMATE.
 2. THERE ARE EXISTING POWER POLES ALONG THE SOUTH R.O.W. ENGINEER TO COORDINATE WITH WITH SERVICE PROVIDER FOR FINAL LOCATION.
 3. WIRELESS COMMUNICATION IS PROPOSED FOR THIS SITE.
 4. ALL DEVICES ARE PROPOSED WITHIN STATE R.O.W.

EQUIPMENT PROVIDED BY THE STATE		
DESCRIPTION	UNIT	QUANTITY
CCTV AND FIELD EQUIPMENT	EA	1
CELLULAR MODEM	EA	1

SITE LOCATION	DEVICE TYPE	DEVICE NUMBER	HIGHWAY	COUNTY	CONTROL SECTION	NEAREST MM	LATITUDE	LONGITUDE	DIRECTION OF TRAVEL	OFFSET TO TRAVEL LANE	SUPPORT	GUARD FENCE REQUIRED
10	CCTV	10	IH-20	TAYLOR	0006-04	282	32° 28' 15.07"N	99° 48' 15.27"W	EB	49'	50' POLE	N

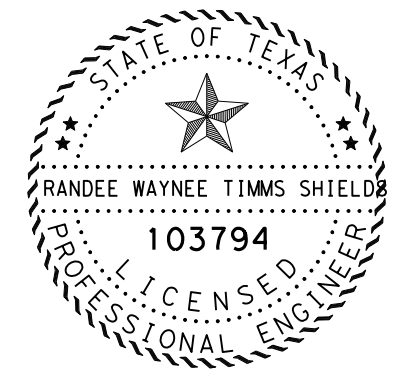
SHEET QUANTITIES			
ITEM	DESCRIPTION	UNIT	QUANTITY
416	DRILL SHAFT (42 IN)	LF	29
432	RIPRAP (CONC) (4 IN)	CY	1.25
618	CONDT (PVC) (SCH 80) (2")	LF	120
618	CONDT (PVC) (SCH 80) (2") (BORE)	LF	47
620	ELEC CONDR (NO. 8) BARE	LF	187
620	ELEC CONDR (NO. 8) INSULATED	LF	374
624	GROUND BOX TY D (162922) W/ APRON	EA	4
628	ELC SRV TY D 120/240 060(NS)AL(N)SP(O)	EA	1
6010	CCTV MOUNT	EA	1
6064	ITS POLE (50FT)(90 MPH)	EA	1
6064	ITS POLE MNT CAB (TY 1)(CONF 1)	EA	1
6367	INSTALLATION OF CELLULAR MODEM	EA	1

DETAIL A



4/3/2024

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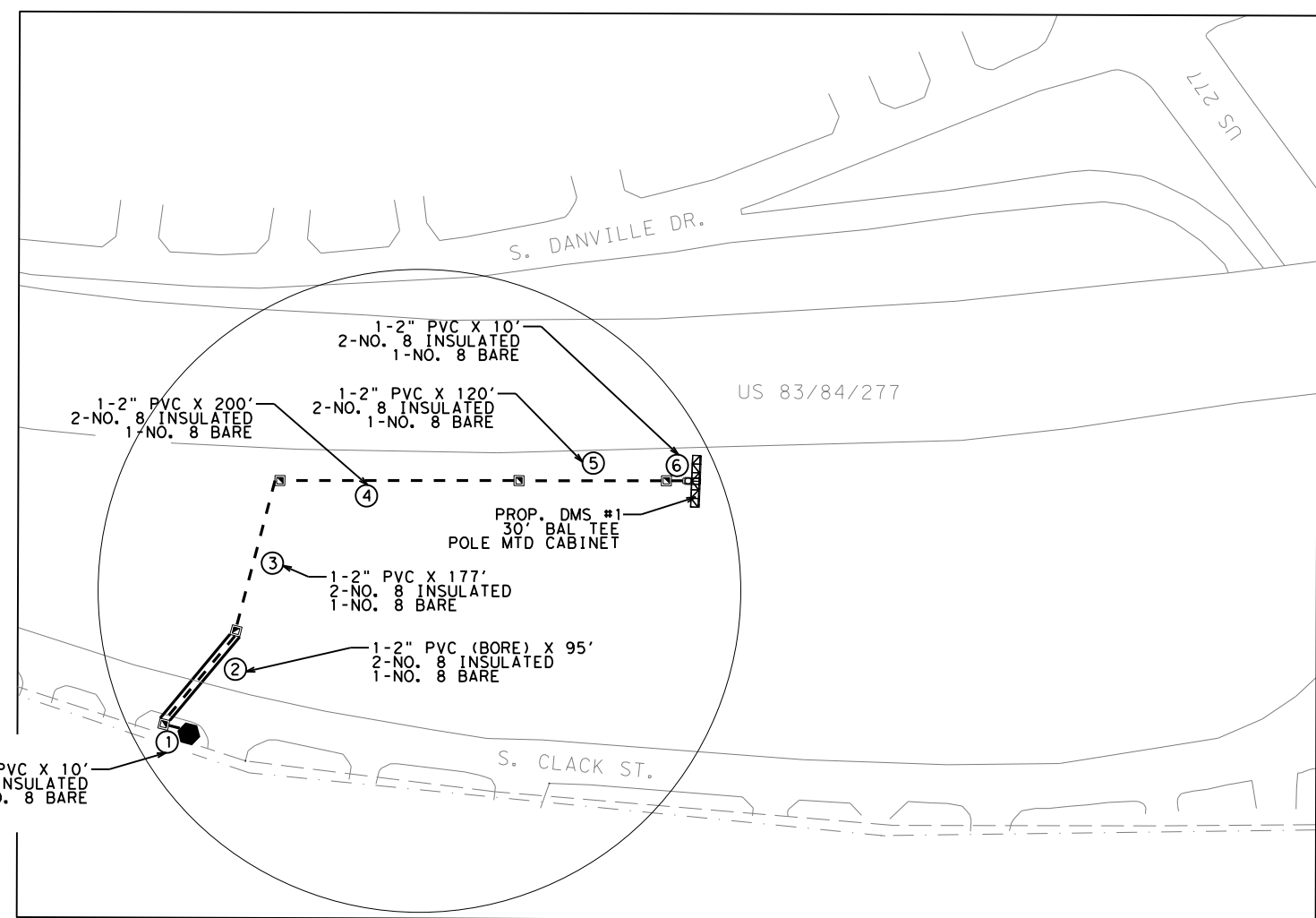
**PROPOSED ITS LAYOUTS
 SITE 10**



SCALE: 1" = 150'

FHWA DIVISION	PROJECT NO.	HIGHWAY NO.
6	SEE TITLE SHEET	SL 322
STATE	COUNTY	SHEET NO.
TEXAS	TAYLOR	42
DISTRICT	CONTROL SECTION JOB	
ABL	0908 00 130	

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 DATE: 4/3/2024 9:29:22 AM



LEGEND

- PROP. CCTV
- PROP. DMS
- PROP. ELEC SERVICE
- PROP. TYD GROUND BOX W/ APRON
- PROP. ITS CONDUIT
- PROP. ITS CONDUIT (BORE)
- CONDUIT RUN NUMBER
- OVERHEAD ELECTRIC
- R.O.W. LINE

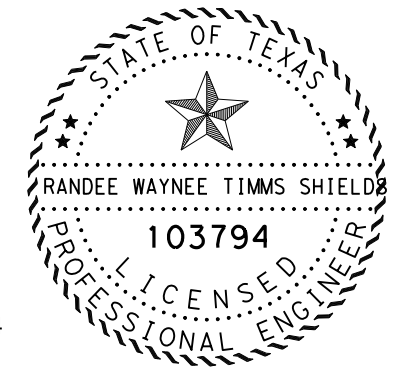
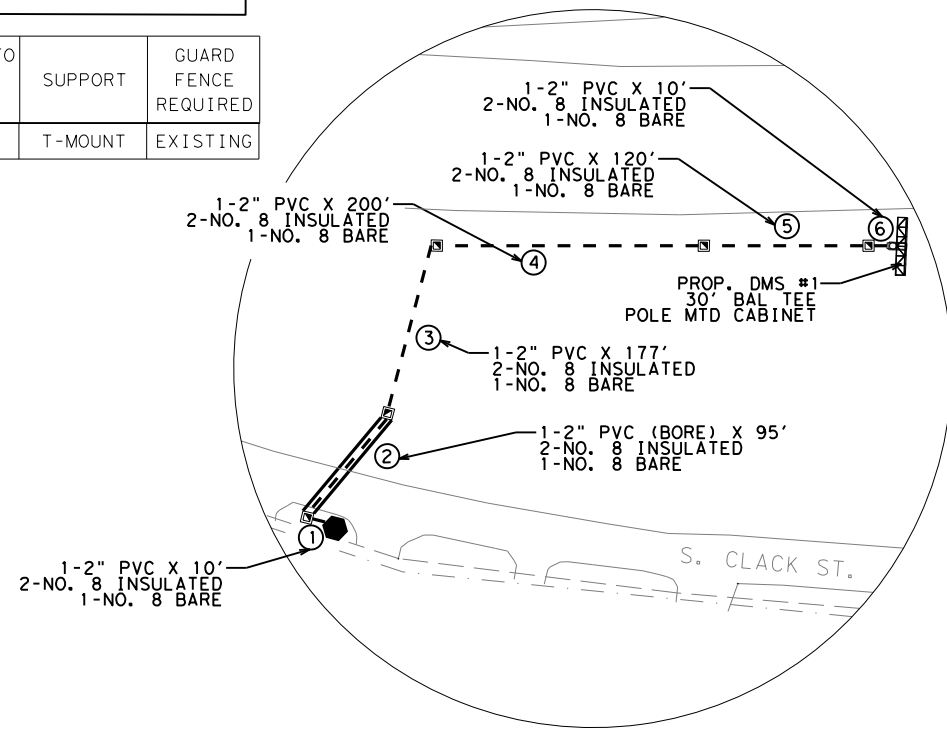
- NOTES:**
1. THE PROPOSED DMS IS SHOWN FOR THE SOUTHBOUND TRAVEL DIRECTION. THE LOCATION IS APPROXIMATE.
 2. THERE ARE EXISTING POWER POLES ALONG THE WEST R.O.W. ENGINEER TO COORDINATE WITH WITH SERVICE PROVIDER FOR FINAL LOCATION.
 3. WIRELESS COMMUNICATION IS PROPOSED FOR THIS SITE.
 4. ALL DEVICES ARE PROPOSED WITHIN STATE R.O.W.

SITE LOCATION	DEVICE TYPE	DEVICE NUMBER	HIGHWAY	COUNTY	CONTROL SECTION	NEAREST MM	LATITUDE	LONGITUDE	DIRECTION OF TRAVEL	OFFSET TO TRAVEL LANE	SUPPORT	GUARD FENCE REQUIRED
11	DMS	11	US 83	TAYLOR	0033-06	329	32° 25' 42.66"N	99° 47' 12.44"W	SB	30'	T-MOUNT	EXISTING

SHEET QUANTITIES

ITEM	DESCRIPTION	UNIT	QUANTITY
416	DRILL SHAFT (SIGN MTS) (48 IN)	LF	27
432	RIPRAP (CONC) (4 IN)	CY	1.25
618	CONDT (PVC) (SCH 80) (PVC)	LF	510
618	CONDT (PVC) (SCH 80) (2") (BORE)	LF	55
620	ELEC CONDR (NO. 8) BARE	LF	709
620	ELEC CONDR (NO. 8) INSULATED	LF	1418
624	GROUND BOX TY D (162922) W/ APRON	EA	5
628	ELC SRV TY D 120/240 060(NS)AL(N)SP(O)	EA	1
650	INS OH SN SUP (30 FT BAL TEE)	EA	1
6028	INSTALL DMS (POLE MTD CABINET)	EA	1
6367	INSTALLATION OF CELLULAR MODEM	EA	1

DETAIL A



4/3/2024

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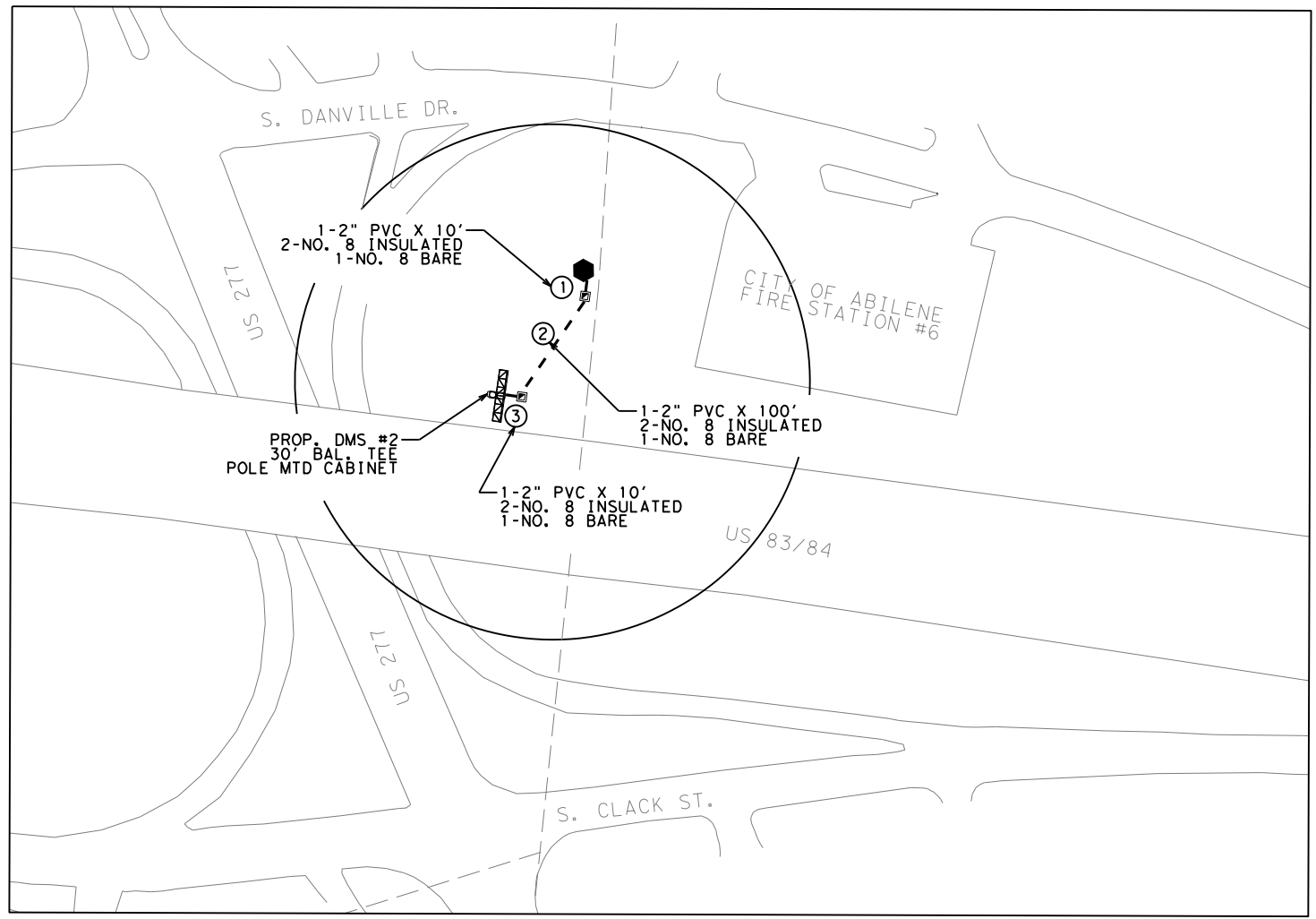
**PROPOSED ITS LAYOUTS
 SITE 11**



SCALE: 1" = 150'

FHWA DIVISION	PROJECT NO.	HIGHWAY NO.
6	SEE TITLE SHEET	SL 322
STATE	COUNTY	SHEET NO.
TEXAS	TAYLOR	43
DISTRICT	CONTROL SECTION JOB	
ABL	0908 00 130	

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 DATE: 4/3/2024 9:29:25 AM



LEGEND

- PROP. CCTV
- PROP. DMS
- PROP. ELEC SERVICE
- PROP. TYD GROUND BOX W/ APRON
- PROP. ITS CONDUIT
- PROP. ITS CONDUIT (BORE)
- CONDUIT RUN NUMBER
- OVERHEAD ELECTRIC
- R.O.W. LINE

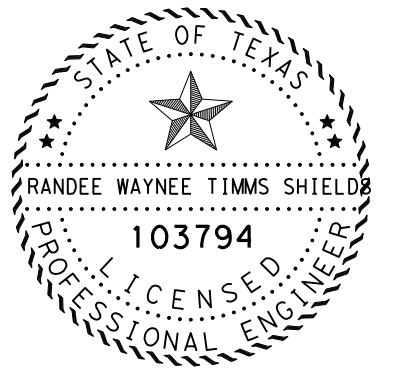
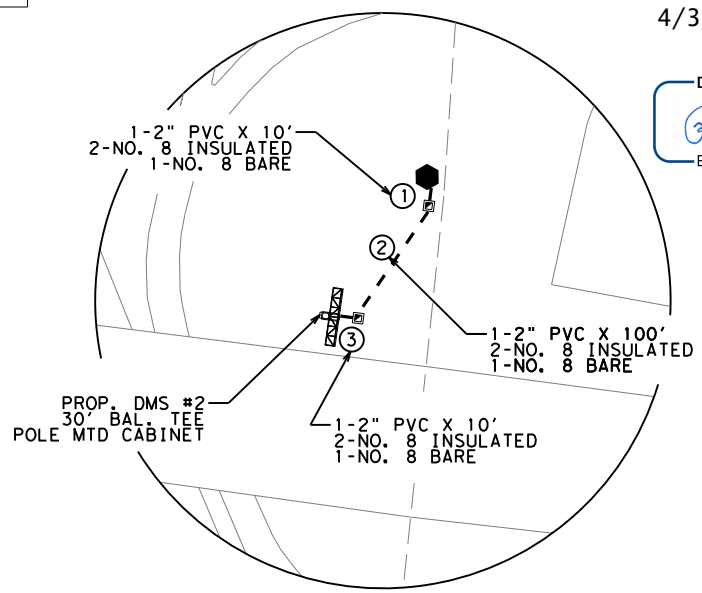
- NOTES:**
1. THE PROPOSED DMS IS SHOWN FOR THE NORTHBOUND TRAVEL DIRECTION. THE LOCATION IS APPROXIMATE.
 2. THERE ARE EXISTING POWER POLES NORTH OF THE FIRE STATION. ENGINEER TO COORDINATE WITH WITH SERVICE PROVIDER FOR FINAL LOCATION.
 3. WIRELESS COMMUNICATION IS PROPOSED FOR THIS SITE.
 4. ALL DEVICES ARE PROPOSED WITHIN STATE R.O.W.

EQUIPMENT PROVIDED BY THE STATE		
DESCRIPTION	UNIT	QUANTITY
DMS SYSTEM AND FIELD EQUIPMENT	EA	1
CELLULAR MODEM	EA	1

SITE LOCATION	DEVICE TYPE	DEVICE NUMBER	HIGHWAY	COUNTY	CONTROL SECTION	NEAREST MM	LATITUDE	LONGITUDE	DIRECTION OF TRAVEL	OFFSET TO TRAVEL LANE	SUPPORT	GUARD FENCE REQUIRED
12	DMS	12	US 83	TAYLOR	0033-06	329	32° 25' 35.61"N	99° 47' 7.64"W	NB	30'	T-MOUNT	EXISTING

SHEET QUANTITIES			
ITEM	DESCRIPTION	UNIT	QUANTITY
416	DRILL SHAFT (SIGN MTS) (48 IN)	LF	27
432	RIPRAP (CONC) (4 IN)	CY	1.25
618	CONDT (PVC) (SCH 80) (PVC)	LF	100
620	ELEC CONDR (NO. 8) BARE	LF	104
620	ELEC CONDR (NO. 8) INSULATED	LF	208
624	GROUND BOX TY D (162922) W/ APRON	EA	2
628	ELC SRV TY D 120/240 060(NS)AL(N)SP(O)	EA	1
650	INS OH SN SUP (30 FT BAL TEE)	EA	1
6028	INSTALL DMS (POLE MTD CABINET)	EA	1
6367	INSTALLATION OF CELLULAR MODEM	EA	1

DETAIL A



4/3/2024

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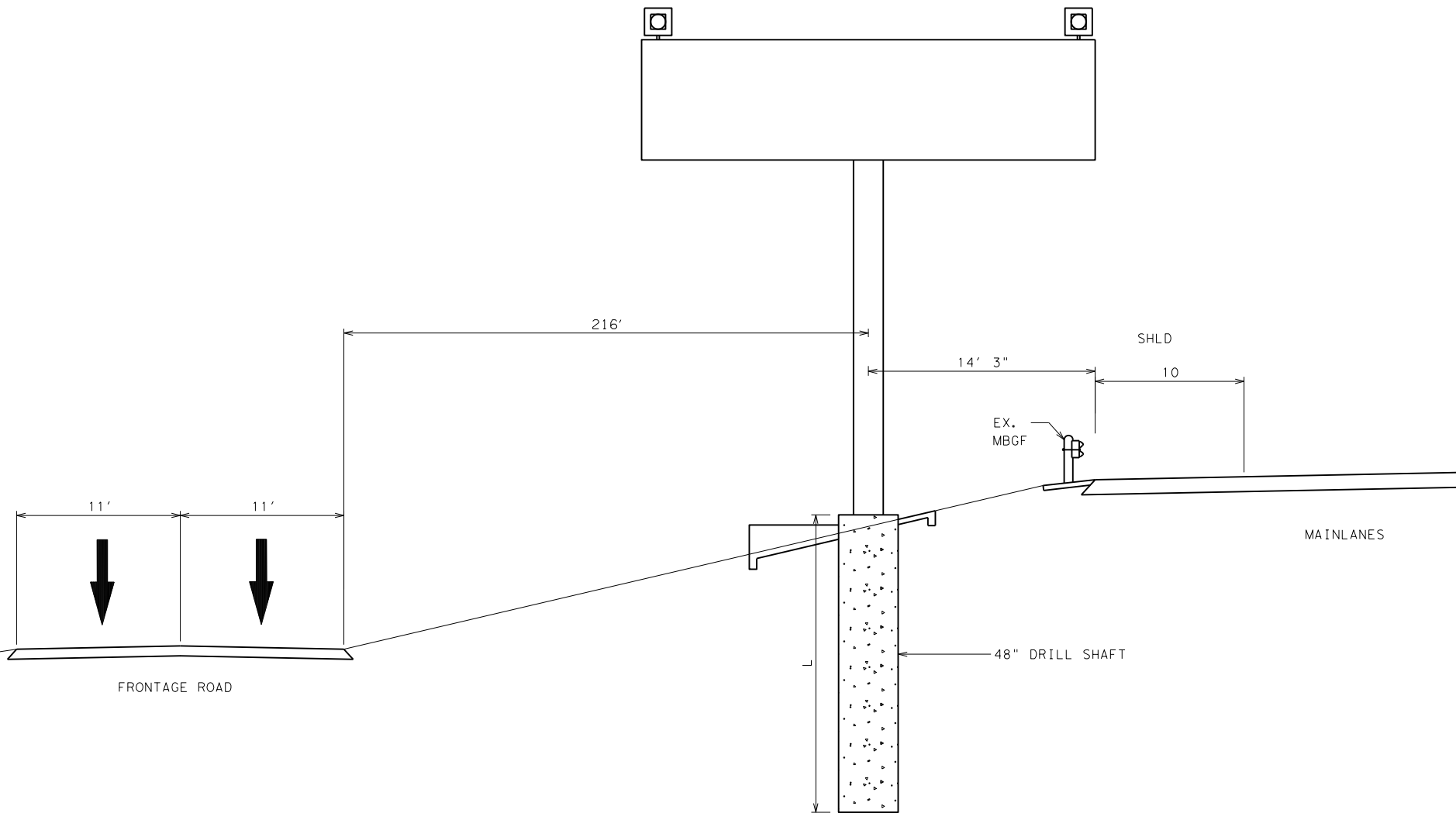
PROPOSED ITS LAYOUTS
 SITE 12



SCALE: 1" = 150'

FHWA DIVISION	PROJECT NO.	HIGHWAY NO.
6	SEE TITLE SHEET	SL 322
STATE	COUNTY	SHEET NO.
TEXAS	TAYLOR	44
DISTRICT	CONTROL SECTION	JOB
ABL	0908 00	130

FILE: C:\Users\KMJELLER\Desktop\RYAN C\Pion Set\1. General\DMS Typical Details.dgn
 DATE: 4/3/2024 9:29:34 AM



GENERAL NOTES:

1. DMS TYPICAL DETAILS SHALL APPLY TO ALL PROPOSED CANTILEVER OVERHEAD SIGN SUPPORTS (COSS). EXISTING COSS SHALL REMAIN IN PLACE.
2. SEE SITE LAYOUT SHEETS FOR SITE SPECIFIC DESIGN DETAILS. REFERENCE MARKER + OFFSET AND CLEAR DISTANCES (C1,C2) ARE FOR INFORMATION ONLY. FINAL DRILL SHAFT LOCATIONS SHALL BE APPROVED BY THE ENGINEER.
3. FIELD ADJUSTMENTS TO THE DRILL SHAFT ELEVATION WILL BE ALLOWED WITH THE APPROVAL OF THE ENGINEER.
4. THE CONTRACTOR SHALL VERIFY THAT THE VERTICAL CLEAR DISTANCE ABOVE THE EDGE OF LANE COMPLIES WITH THE 21' 6" MINIMUM. BOTH THE MAINLANES AND FRONTAGE ROAD, IF APPLICABLE, SHALL BE CHECKED.
5. CONSTRUCT RIPRAP AT DMS SITES ACCORDING TO ITS(7) - 15.

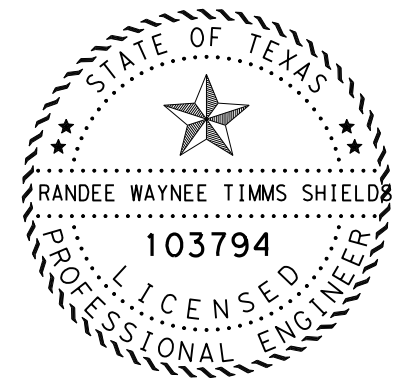
DMS TYPICAL APPLICATION A

SITE 11

① CLEAR DISTANCES "C1" AND "C2" ARE MEASURED FROM THE EDGE OF OBSTRUCTION TO THE TRAVEL LANE.

4/3/2024

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DMS TYPICAL DETAILS

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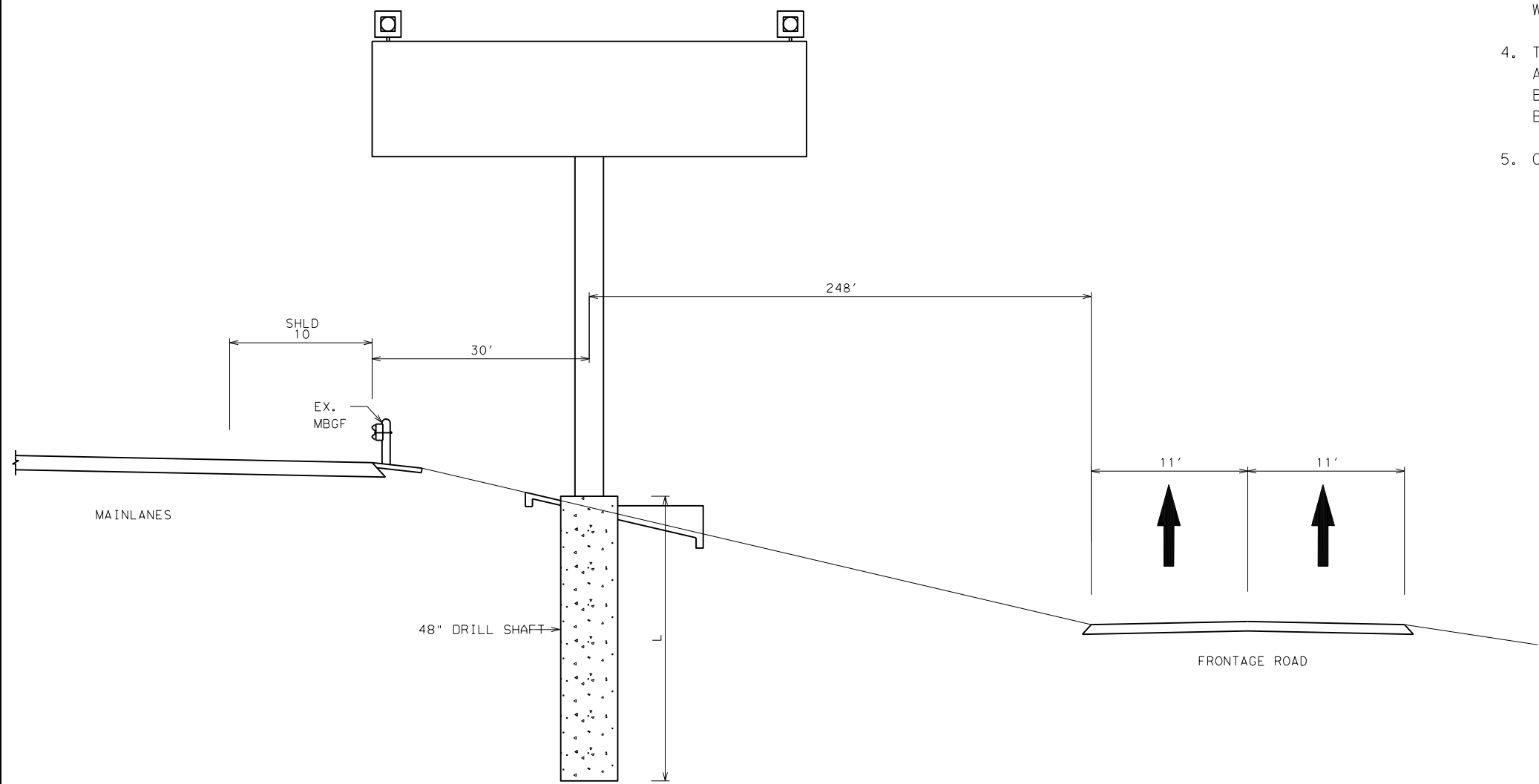
SCALE: 1" = 10' SHEET 1 OF 2

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.	
6	SEE TITLE SHEET		SL 322	
STATE	COUNTY		SHEET NO.	
TEXAS	TAYLOR		45	
DISTRICT	CONTROL	SECTION		JOB
ABL	0908	00		130

FILE: C:\Users\KMUELLER\Desktop\RYAN C\Plan Set\1. General\DMS Typical Details.dgn
 DATE: 4/3/2024 9:29:37 AM

GENERAL NOTES:

1. DMS TYPICAL DETAILS SHALL APPLY TO ALL PROPOSED CANTILEVER OVERHEAD SIGN SUPPORTS (COSS). EXISTING COSS ARE TO REMAIN IN PLACE.
2. SEE SITE LAYOUT SHEETS FOR SITE SPECIFIC DESIGN DETAILS. REFERENCE MARKER + OFFSET AND CLEAR DISTANCES (C1,C2) ARE FOR INFORMATION ONLY. FINAL DRILL SHAFT LOCATIONS SHALL BE APPROVED BY THE ENGINEER.
3. FIELD ADJUSTMENTS TO THE DRILL SHAFT ELEVATION WILL BE ALLOWED WITH THE APPROVAL OF THE ENGINEER.
4. THE CONTRACTOR SHALL VERIFY THAT THE VERTICAL CLEAR DISTANCE ABOVE THE EDGE OF LANE COMPLIES WITH THE 21' 6" MINIMUM. BOTH THE MAINLANES AND FRONTAGE ROAD, IF APPLICABLE, SHALL BE CHECKED.
5. CONSTRUCT RIPRAP AT DMS SITES ACCORDING TO ITS(7) - 15.



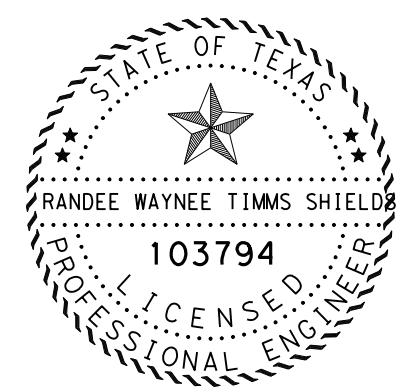
DMS TYPICAL APPLICATION B

SITE 12

- ① CLEAR DISTANCES "C1" AND "C2" ARE MEASURED FROM THE EDGE OF OBSTRUCTION TO THE TRAVEL LANE.
- ② SEE PROPOSED ITS LAYOUT SHEETS FOR MBGF DETAILS.

4/3/2024

DocuSigned by:
Randee W Shields P.E.
 BA73DA470CAD492...

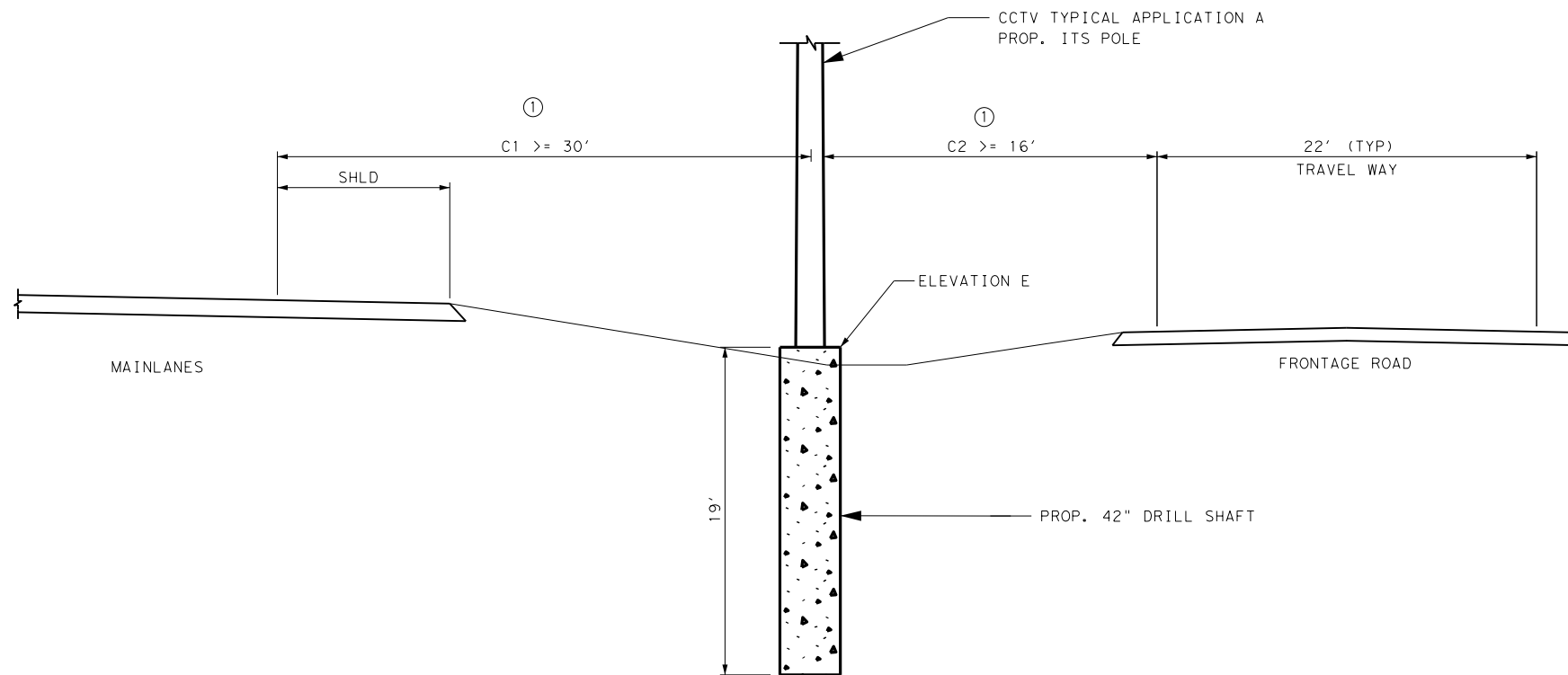


DMS TYPICAL DETAILS

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SCALE: 1" = 10' SHEET 2 OF 2

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.	
6	SEE TITLE SHEET		SL 322	
STATE	COUNTY			SHEET NO.
TEXAS	TAYLOR			46
DISTRICT	CONTROL	SECTION	JOB	
ABL	0908	00	130	



CCTV TYPICAL APPLICATION A

SITE 1, SITE 5

① CLEAR DISTANCES "C1" AND "C2" ARE MEASURED FROM THE EDGE OF OBSTRUCTION TO THE TRAVEL LANE.

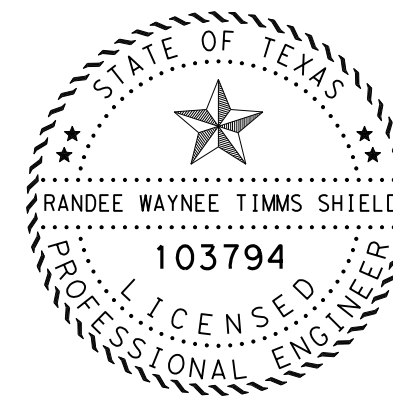
GENERAL NOTES:

1. CCTV TYPICAL DETAILS SHALL APPLY TO ALL PROPOSED CCTV INSTALLATIONS, UNLESS OTHERWISE SHOWN IN THE PLANS.
2. SEE PROPOSED ITS LAYOUT SHEETS FOR SITE SPECIFIC DESIGN DETAILS.
3. FIELD ADJUSTMENTS TO THE DRILL SHAFT ELEVATION WILL BE ALLOWED WITH THE APPROVAL OF THE ENGINEER.
4. CONSTRUCT RIPRAP AT CCTV SITES ACORDING TO ITS(7) - 15.

* VARIABLES A AND Q ARE DEFINED BY ITS(1) - 16 AND ITS(3) - 16 RESPECTIVELY. Q, THE DRILL SHAFT DEPTH, IS ALSO SHOWN ON THIS SHEET.

4/3/2024

DocuSigned by:
Randee W Shields P.E.
 BA73DA470CAD492...



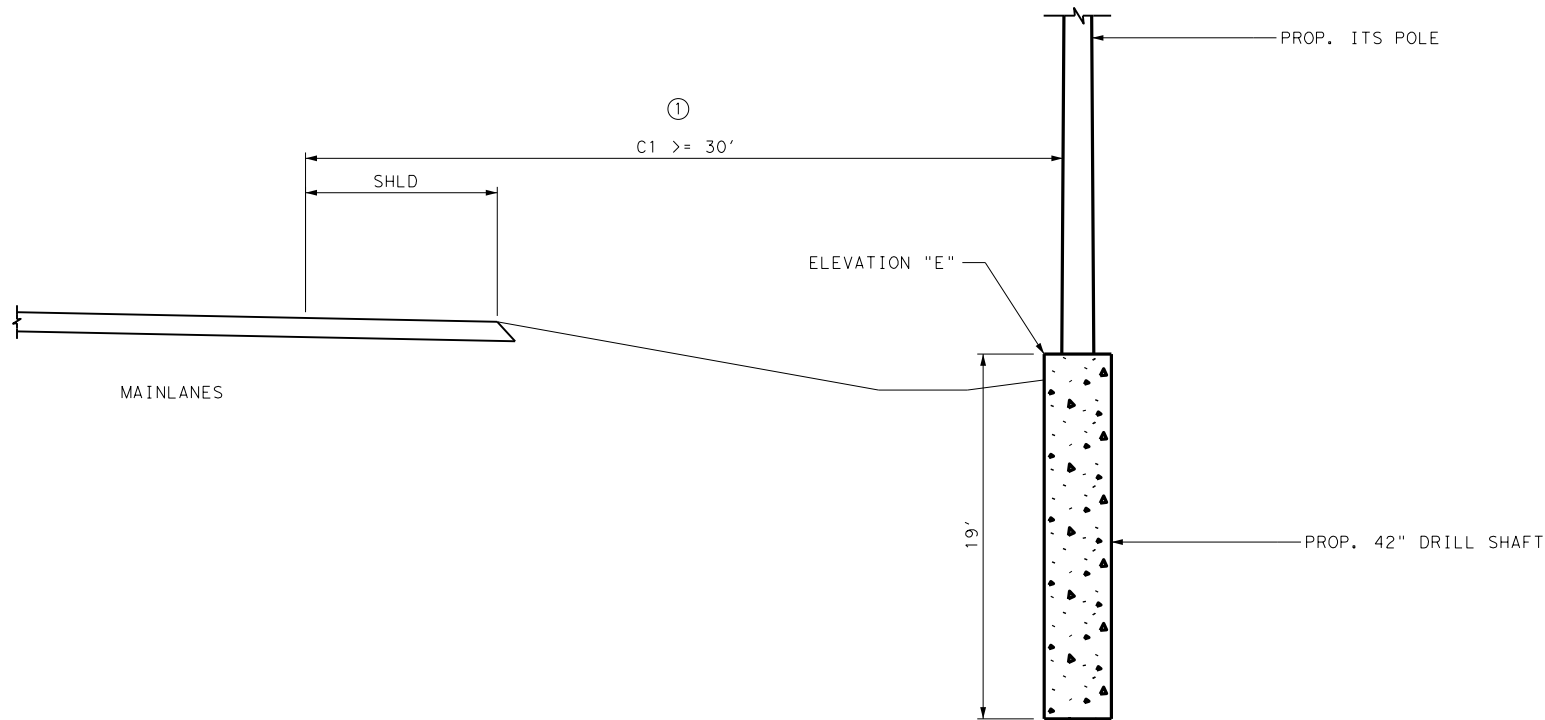
CCTV TYPICAL DETAILS



SCALE: 1" = 10' SHEET 1 OF 3

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SL 322
STATE	COUNTY		SHEET NO.
TEXAS	TAYLOR		47
DISTRICT	CONTROL	SECTION	
ABL	0908	00	130

FILE: C:\Users\KMJELLER\Desktop\RYAN C\Pion Set\1. General\CCTV Typical Details.dgn
 DATE: 4/3/2024 9:29:45 AM



CCTV TYPICAL APPLICATION C

SITE 7

① SEE PROPOSED ITS LAYOUT SHEETS FOR PROP. MBGF DETAILS.

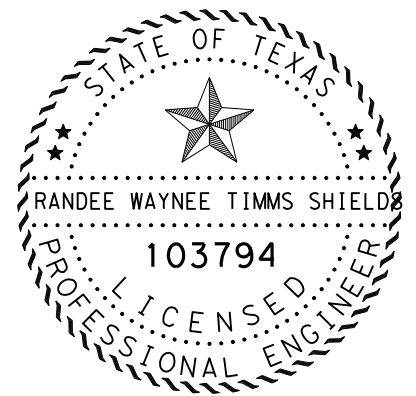
GENERAL NOTES:

1. CCTV TYPICAL DETAILS SHALL APPLY TO ALL PROPOSED CCTV INSTALLATIONS, UNLESS OTHERWISE SHOWN IN THE PLANS.
2. SEE PROPOSED ITS LAYOUT SHEETS FOR SITE SPECIFIC DESIGN DETAILS.
3. FIELD ADJUSTMENTS TO THE DRILL SHAFT ELEVATION WILL BE ALLOWED WITH THE APPROVAL OF THE ENGINEER.
4. CONSTRUCT RIPRAP AT CCTV SITES ACORDING TO ITS(7) - 15.

* VARIABLES A AND Q ARE DEFINED BY ITS(1) - 16 AND ITS(3) - 16 RESPECTIVELY. Q, THE DRILL SHAFT DEPTH, IS ALSO SHOWN ON THIS SHEET.

4/3/2024

DocuSigned by:
Randee W Shields P.E.
 BA73DA470CAD492...



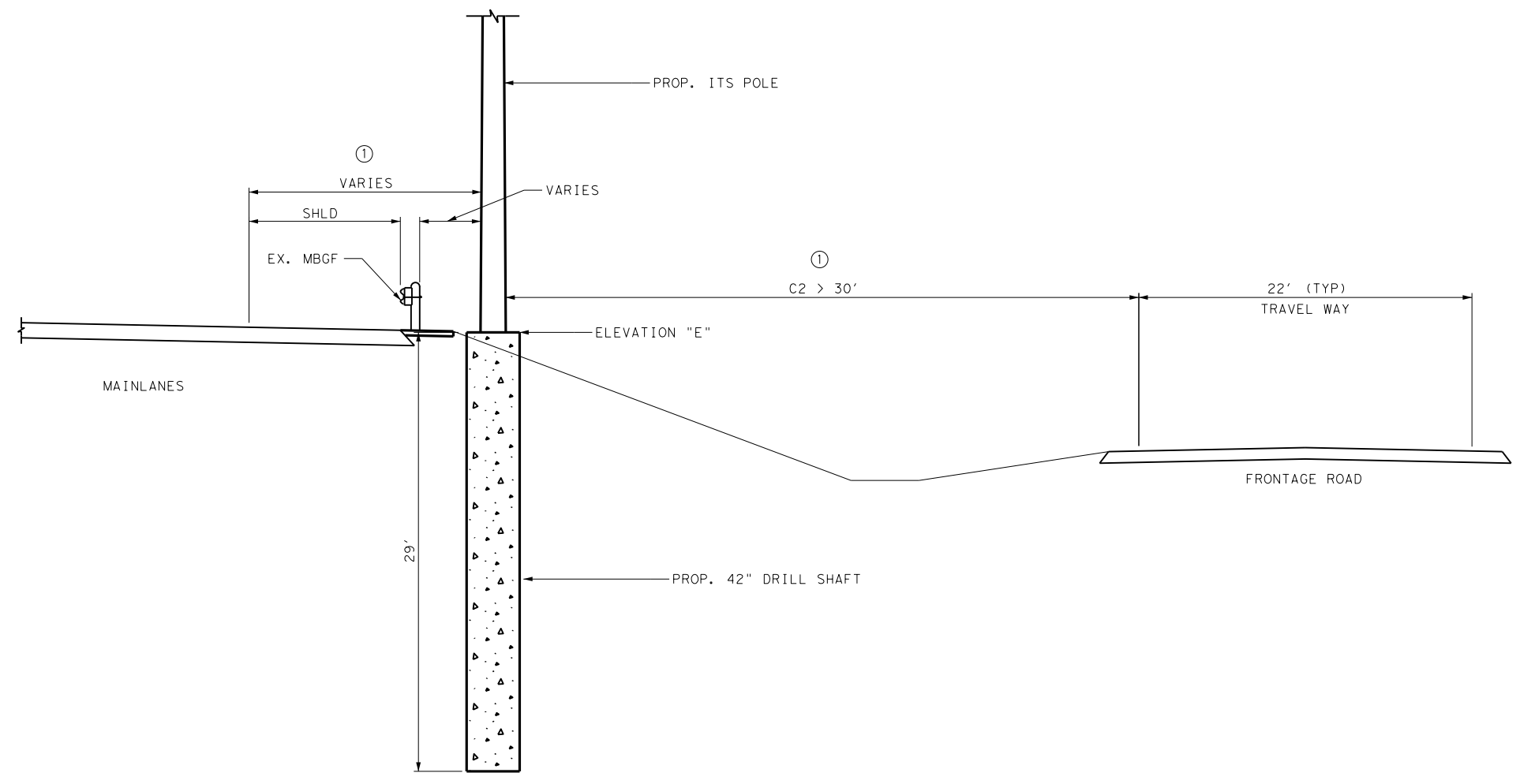
CCTV TYPICAL DETAILS



SCALE: 1" = 10' SHEET 2 OF 3

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SL 322
STATE	COUNTY		SHEET NO.
TEXAS	TAYLOR		48
DISTRICT	CONTROL	SECTION	
ABL	0908	00	130

FILE: C:\Users\KMUELLER\Desktop\RYAN C\Pion Set\1. General\CCTV Typical Details.dgn
 DATE: 4/3/2024 9:29:51 AM



CCTV TYPICAL APPLICATION E

SITE 2, SITE 3, SITE 4, SITE 6, SITE 8, SITE 9, SITE 10

① CLEAR DISTANCES "C1" AND "C2" ARE MEASURED FROM THE EDGE OF OBSTRUCTION TO THE TRAVEL LANE.

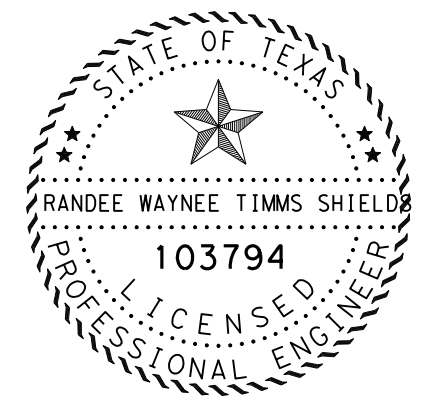
GENERAL NOTES:

1. CCTV TYPICAL DETAILS SHALL APPLY TO ALL PROPOSED CCTV INSTALLATIONS, UNLESS OTHERWISE SHOWN IN THE PLANS.
2. SEE PROPOSED ITS LAYOUT SHEETS FOR SITE SPECIFIC DESIGN DETAILS.
3. FIELD ADJUSTMENTS TO THE DRILL SHAFT ELEVATION WILL BE ALLOWED WITH THE APPROVAL OF THE ENGINEER.
4. CONSTRUCT RIPRAP AT CCTV SITES ACORDING TO ITS(7) - 15.

* VARIABLES A AND Q ARE DEFINED BY ITS(1) - 16 AND ITS(3) - 16 RESPECTIVELY. Q, THE DRILL SHAFT DEPTH, IS ALSO SHOWN ON THIS SHEET.

4/3/2024

DocuSigned by:
Randee W Shields P.E.
 BA73DA470CAD492...



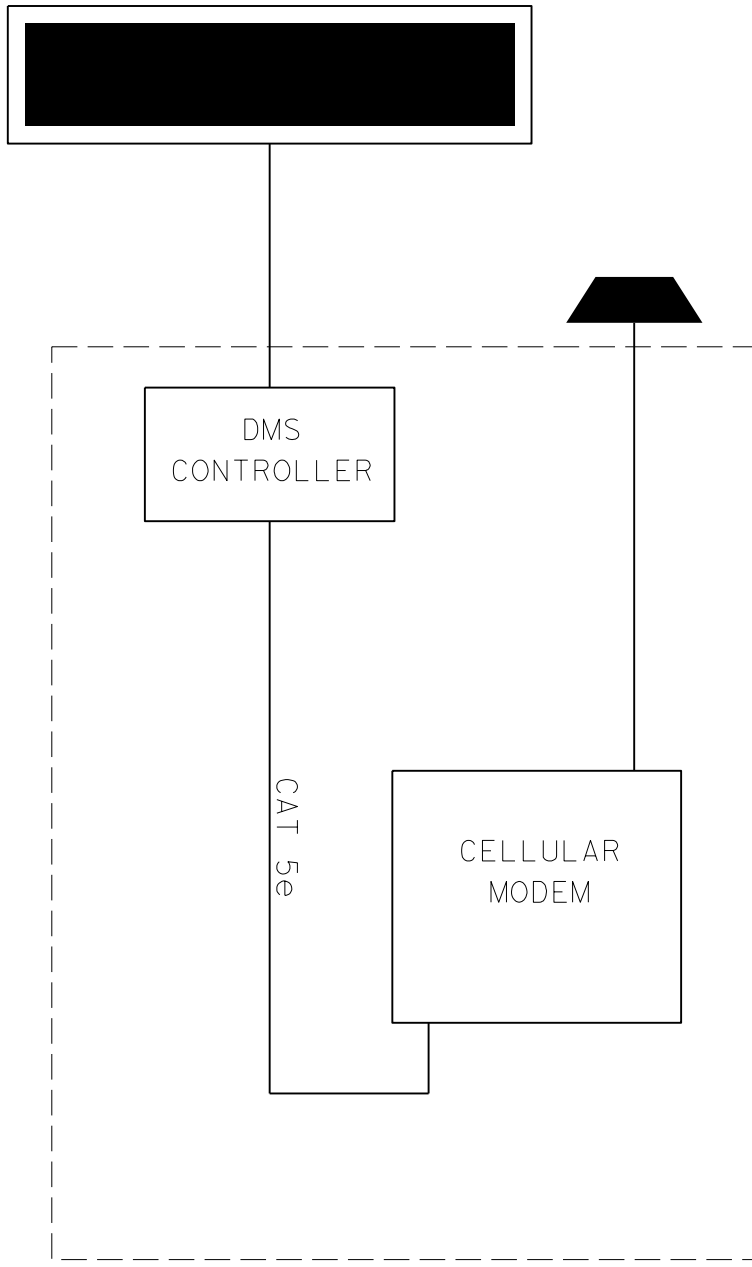
CCTV TYPICAL DETAILS



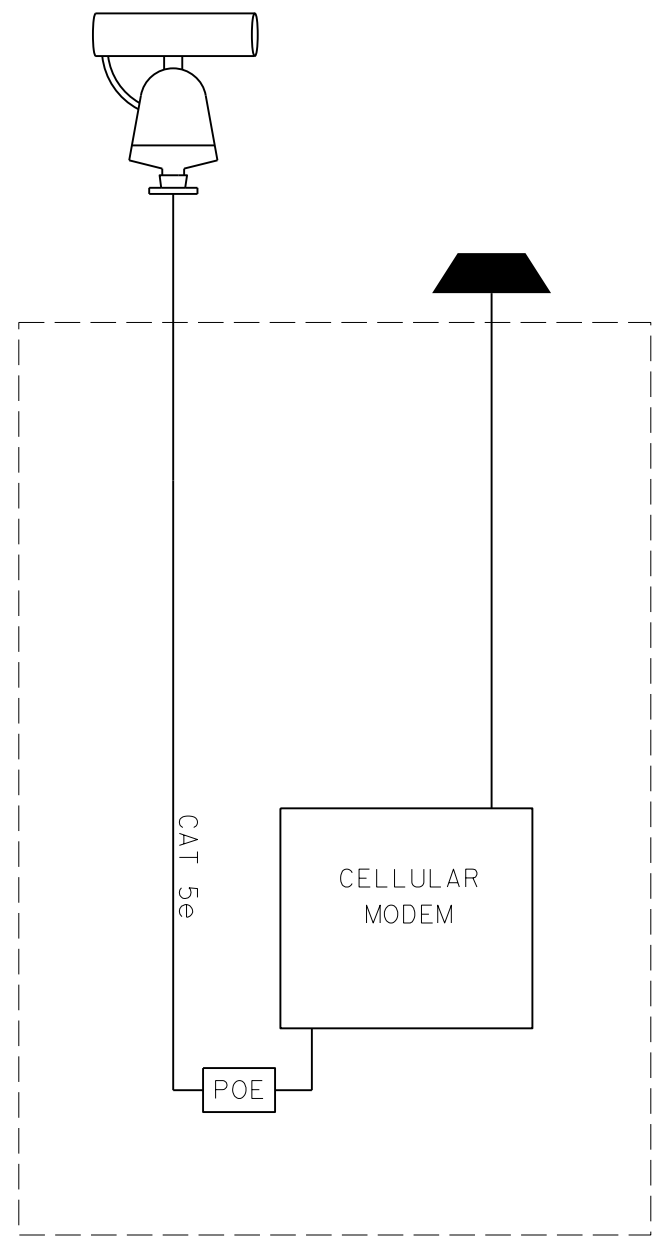
SCALE: 1" = 10' SHEET 3 OF 3

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SL 322
STATE	COUNTY		SHEET NO.
TEXAS	TAYLOR		49
DISTRICT	CONTROL	SECTION	
ABL	0908	00	130

FILE: C:\Users\KMJELLER\Desktop\RYAN C\Pion Set\1. General\Block Diagrams.dgn
 DATE: 4/3/2024 9:29:59 AM


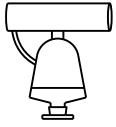



SITE 11, 12



SITE 1-10

LEGEND

-  PROPOSED DMS
-  PROPOSED CCTV CAMERA
-  PROPOSED POWER OVER ETHERNET INJECTOR

DS



DocuSigned by:
Randee W Shields P.E.
 BA73DA470CAD492

PROPOSED ITS
 BLOCK DIAGRAMS



SHEET 1 OF 1

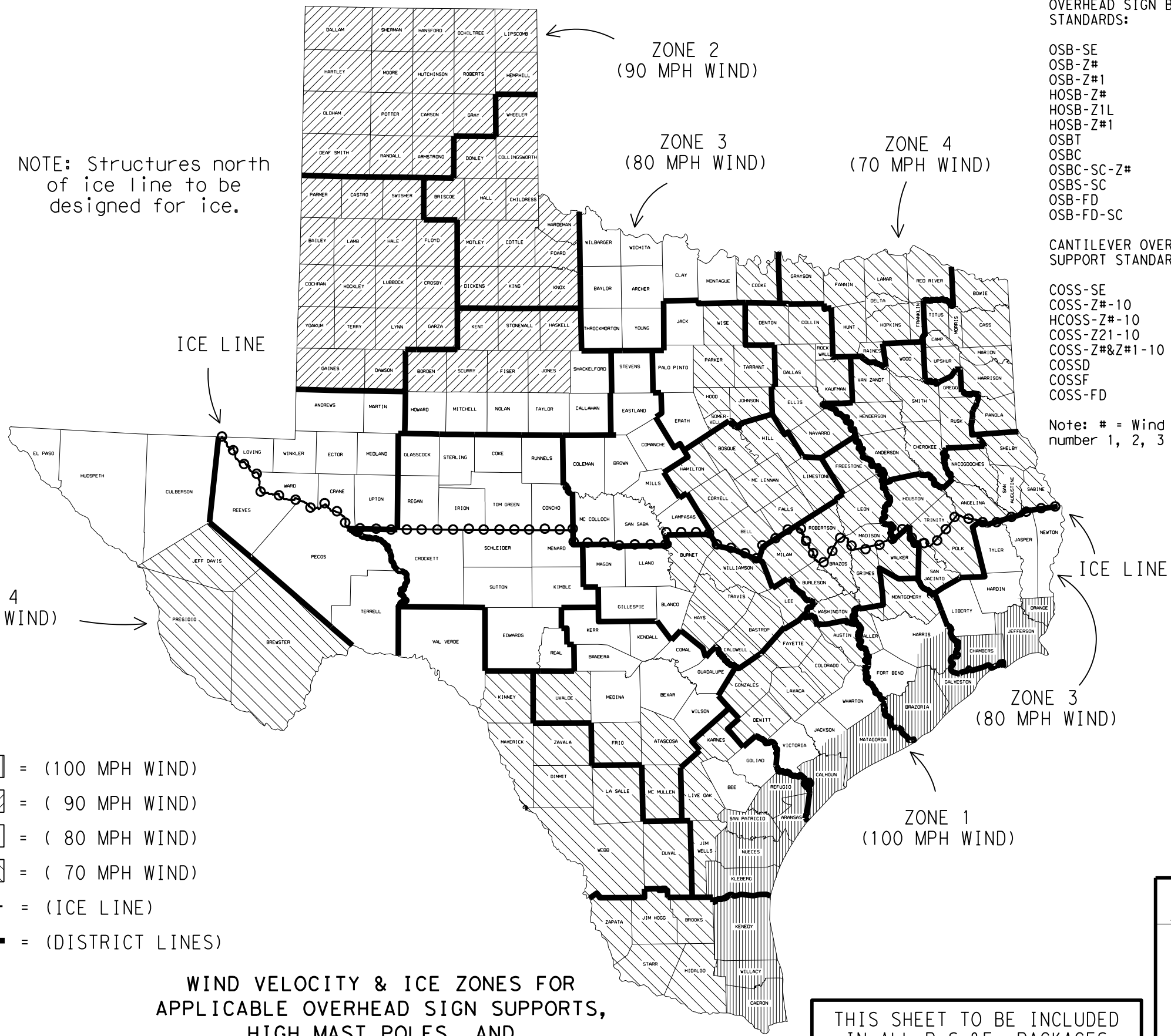
FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SL 322
STATE	COUNTY		SHEET NO.
TEXAS	TAYLOR		50
DISTRICT	CONTROL	SECTION	
ABL	0908	00	130

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DATE: 4/3/2024 9:30:07 AM
 FILE: C:\Users\KMUeller\Desktop\RYAN CAPlan Set\2_TCP.WV & IZ-14.dgn

APPLICABLE STANDARDS SHEETS

- OVERHEAD SIGN BRIDGE STANDARDS:
 OSB-SE
 OSB-Z#
 OSB-Z#1
 OSB-Z#
 HOSB-Z#
 HOSB-Z1L
 HOSB-Z#1
 OSBT
 OSBC
 OSBC-SC-Z#
 OSBS-SC
 OSB-FD
 OSB-FD-SC
- HIGH MAST ILLUMINATION POLE STANDARDS:
 HMIP-98
 HMIF-98
- WALKWAYS AND BRACKETS STANDARDS:
 SWW
 SB(SWL-1)
- TRAFFIC SIGNAL POLE STANDARDS:
 SP-80
 SP-100
 SMA-80
 SMA-100
 DMA-80
 DMA-100
 MA-C
 MAC (ILSN)
 MAD-D
 TS-FD
 LUM-A
 CFA
 LMA
 TS-C
 MA-DPD
- CANTILEVER OVERHEAD SIGN SUPPORT STANDARDS:
 COSS-SE
 COSS-Z#-10
 HCOSS-Z#-10
 COSS-Z21-10
 COSS-Z#&Z#1-10
 COSSD
 COSSF
 COSS-FD
- Note: # = Wind Zone number 1, 2, 3 or 4



NOTE: Structures north of ice line to be designed for ice.

LEGEND

- ZONE 1 - [diagonal lines] = (100 MPH WIND)
- ZONE 2 - [diagonal lines] = (90 MPH WIND)
- ZONE 3 - [white box] = (80 MPH WIND)
- ZONE 4 - [diagonal lines] = (70 MPH WIND)
- [dashed line with circles] = (ICE LINE)
- [thick black line] = (DISTRICT LINES)

WIND VELOCITY & ICE ZONES FOR APPLICABLE OVERHEAD SIGN SUPPORTS, HIGH MAST POLES, AND TRAFFIC SIGNAL POLES
 Based on 50 Year Mean Recurrence Interval of Fastest Mile Wind Velocity at 33 feet height.

THIS SHEET TO BE INCLUDED IN ALL P.S.&E. PACKAGES CONTAINING ONE OR MORE OF THE APPLICABLE STANDARD SHEETS LISTED HEREON

FOR HARRIS CO. ONLY
 Zone line is just North of US 90, around on the North, West and South sides of IH 610 and down the West side of SH 288.

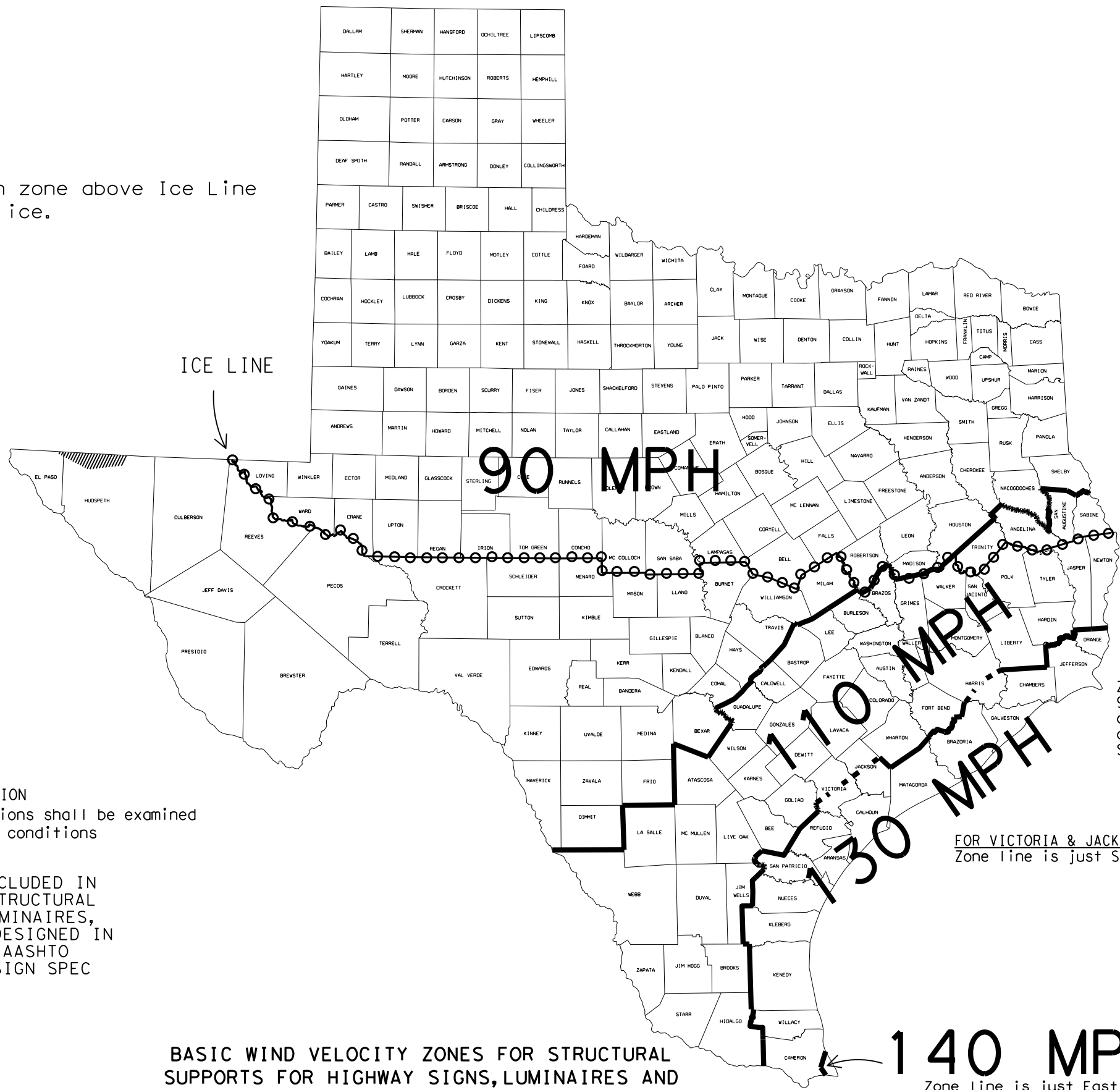
FOR JACKSON CO. ONLY
 Zone line is just North of SH 616.

		Traffic Operations Division Standard	
<h2>WIND VELOCITY AND ICE ZONES</h2> <h3>WV & IZ-14</h3>			
FILE:	windice.dgn	DN: TxDOT	CK: TxDOT
© TxDOT	April 1996	CONT	SECT
REVISIONS	0908 00	JOB	130
8-14-Added list of applicable standards, restricting use to structures designed for Fastest Mile wind speeds.		SHEET NO.	51
DIST	ABL	COUNTY	TAYLOR

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DATE: 4/3/2024 9:30:15 AM
 FILE: C:\Users\KMUJELLER\Desktop\RYAN_CAP\lan Set\2_TCP_WV & IZ(LTS2013)-14.dgn

NOTE: Structures in zone above Ice Line to be designed for ice.



FOR HARRIS CO. ONLY
 Zone line is just North of US 90, around on the North, West and South sides of IH 610 and down the West side of SH 288.

FOR VICTORIA & JACKSON COUNTIES ONLY
 Zone line is just South of US 59.

 SPECIAL WIND REGION
 Special wind regions shall be examined for unusual wind conditions


THIS SHEET IS TO BE INCLUDED IN ALL P.S.&E.'s HAVING STRUCTURAL SUPPORTS FOR SIGNS, LUMINAIRES, AND/OR TRAFFIC SIGNALS DESIGNED IN ACCORDANCE WITH THE AASHTO 2001 THRU 2013 LTS DESIGN SPEC

BASIC WIND VELOCITY ZONES FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS DESIGNED IN ACCORDANCE WITH THE AASHTO 2001 THRU 2013 LTS DESIGN SPEC

140 MPH
 Zone line is just East of both CO 1847 & FM 511

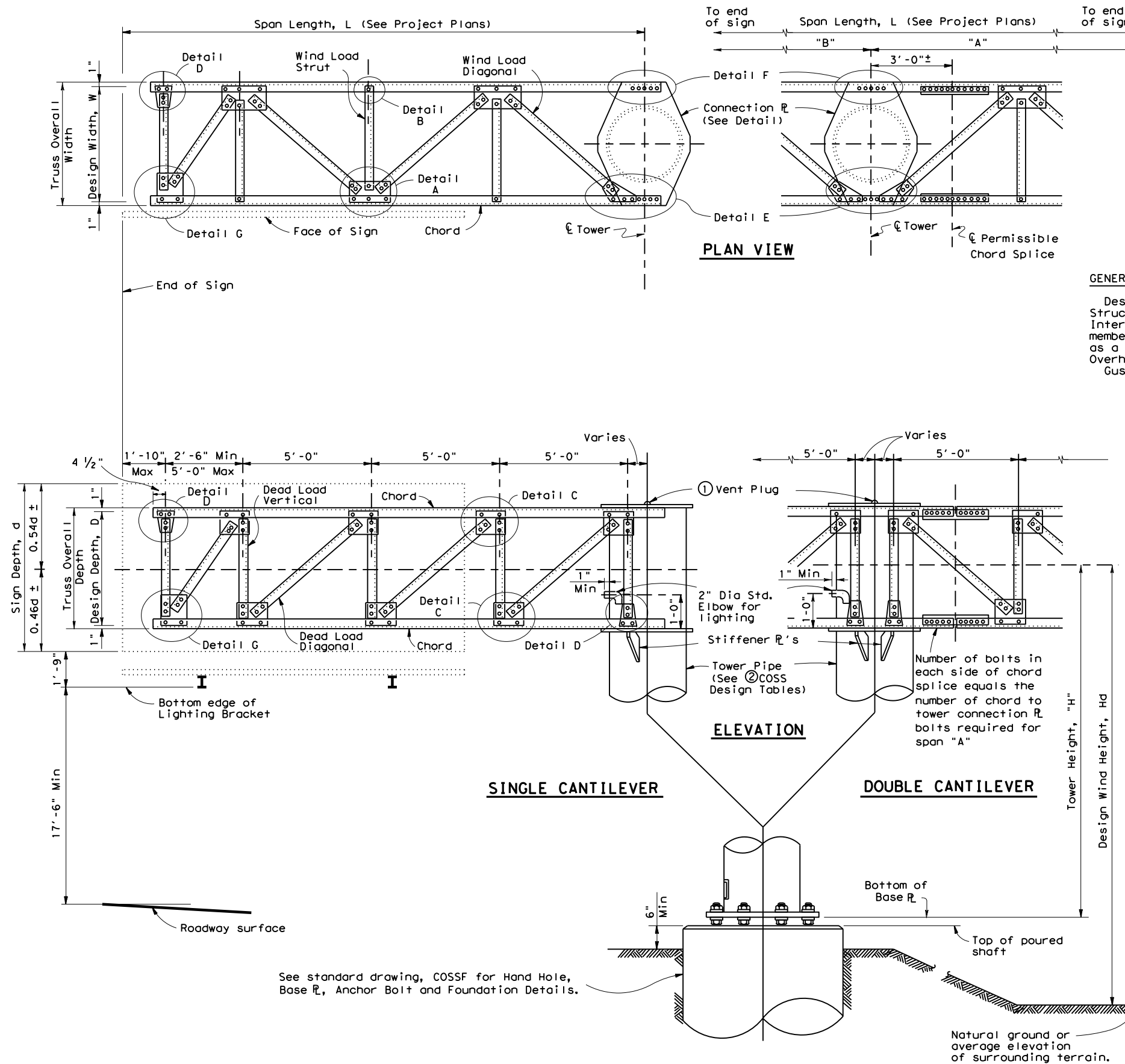
NOTE: AASHTO 2001 THRU 2013 LTS DESIGN SPEC = AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 4th thru 6th Edition

Values are nominal design 3-sec gust wind speeds in mph at 33 ft above ground for Exposure C category. (50-year mean recurrence interval)

				Traffic Operations Division Standard	
WIND VELOCITY AND ICE ZONES (AASHTO 2001-2013 LTS DESIGN SPEC) WV & IZ(LTS2013)-14					
FILE:	I1s2013.dgn	DN:	TxDOT	CK:	TxDOT
© TxDOT	August 2014	CONT:	0908	SECT:	00
REVISIONS:		JOB:	130	HIGHWAY:	SL 322
		DIST:	ABL	COUNTY:	TAYLOR
				SHEET NO.:	52

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DATE: 4/3/2024 9:30:41 AM
 FILE: C:\Users\KMUELLER\Desktop\RYAN_C\Plan Set\2_TCP\COSSD.dgn



GENERAL NOTES:

Design conforms to 1975 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals and Interim revisions thereto. Connection details are typical only. Actual size of member and number of bolts will vary. The details on this sheet are intended as a guide only. See "Cantilever Overhead Sign Supports" or "High Level Cantilever Overhead Sign Supports" sheets for number of bolts and size of members. Gusset plates to be same thickness as thickest web member in connection.

- ① Note: Cap shall be solid steel sheet $\frac{3}{8}$ " nominal thickness. Drill, tap and plug galvanizing vent. Weld plate to pipe with $\frac{3}{8}$ " weld all around.
- ② For COSS design tables see standard drawing, "Cantilever Overhead Sign Supports" or "High Level Cantilever Overhead Sign Supports".

SHEET 1 OF 2



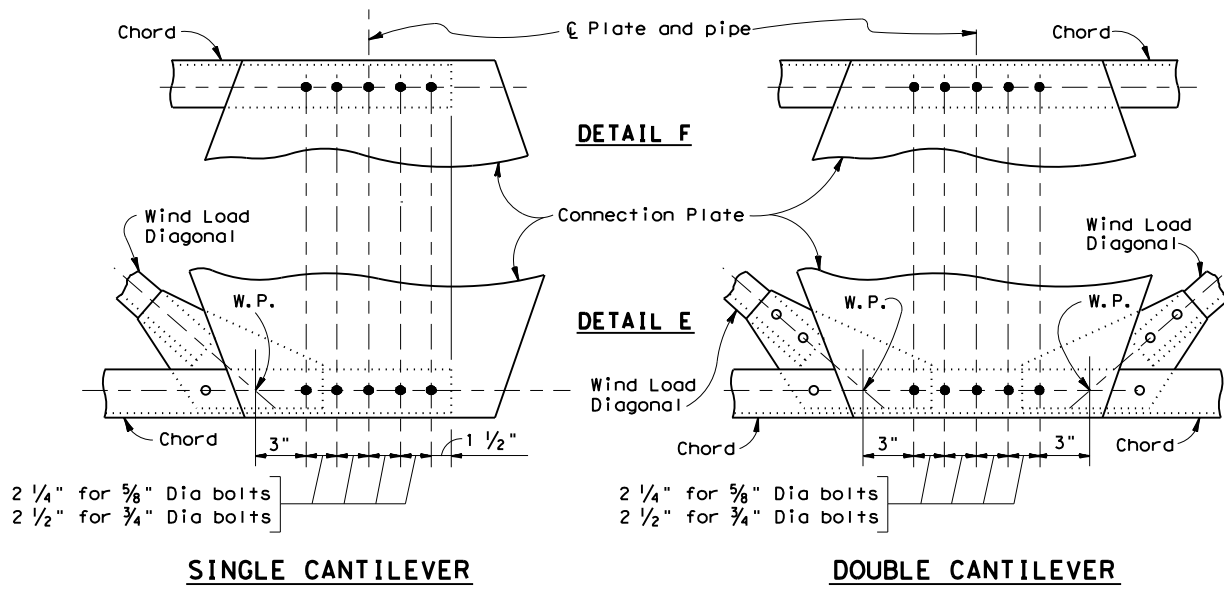
CANTILEVER OVERHEAD SIGN SUPPORT DETAILS

COSSD

© TxDOT November 2007		DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
REVISIONS					
CONTRACT	SECTION	JOB	HIGHWAY		
0908	00	130	SL 322		
DISTRICT	COUNTY	SHEET NO.			
ABL	TAYLOR	55			

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DATE: 4/3/2024 9:30:45 AM
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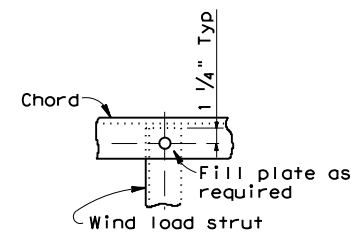


2 1/4" for 5/8" Dia bolts
 2 1/2" for 3/4" Dia bolts

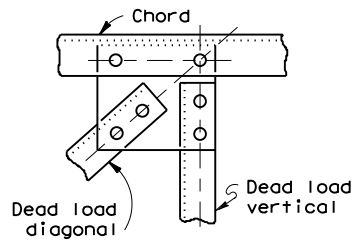
SINGLE CANTILEVER

DOUBLE CANTILEVER

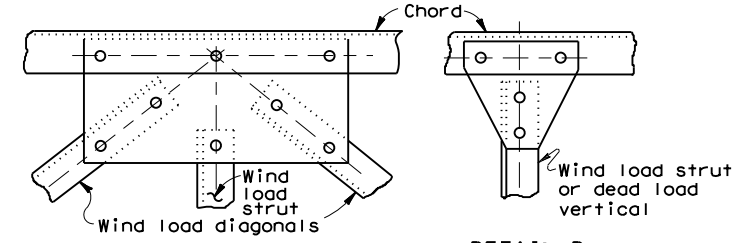
CONNECTION DETAILS



DETAIL B

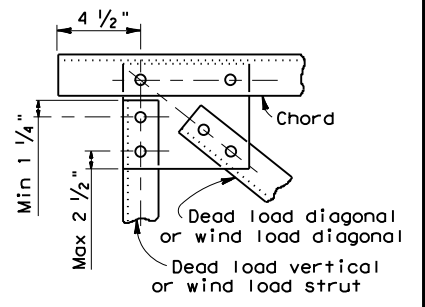


DETAIL C



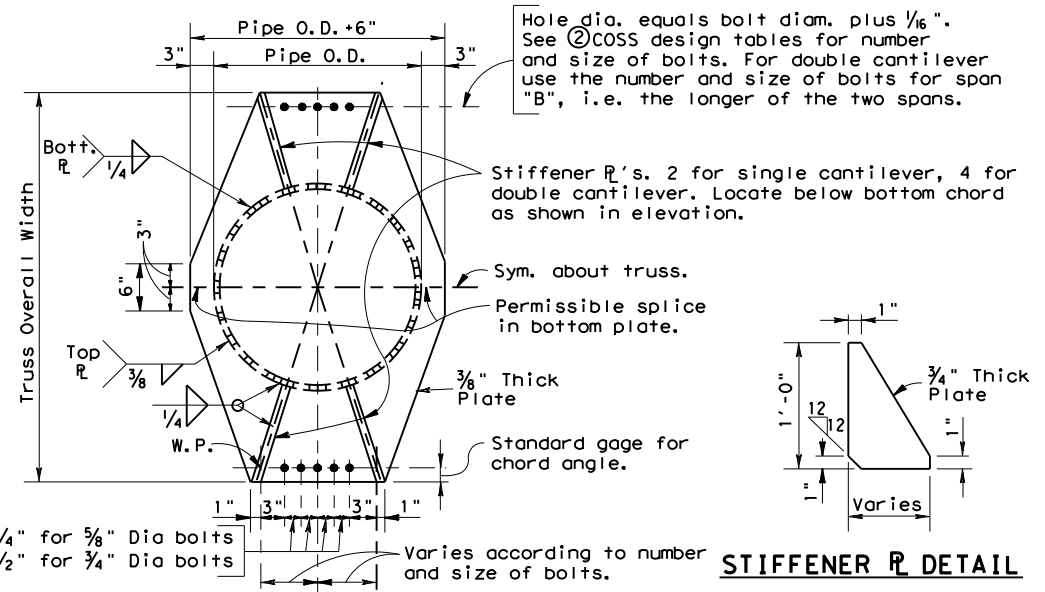
DETAIL A

DETAIL D



DETAIL G

NUMBER OF BOLTS REQD. IN GUSSET PLATE TO CHORD CONNECTION	
TOTAL NO. OF BOLTS IN DIAG'S. IN JOINT	
0	2
2	2
3	3
4	3
5	4
6	4
8	5
10	6



Hole dia. equals bolt diam. plus 1/16". See COSS design tables for number and size of bolts. For double cantilever use the number and size of bolts for span "B", i.e. the longer of the two spans.

Stiffener P's. 2 for single cantilever, 4 for double cantilever. Locate below bottom chord as shown in elevation.

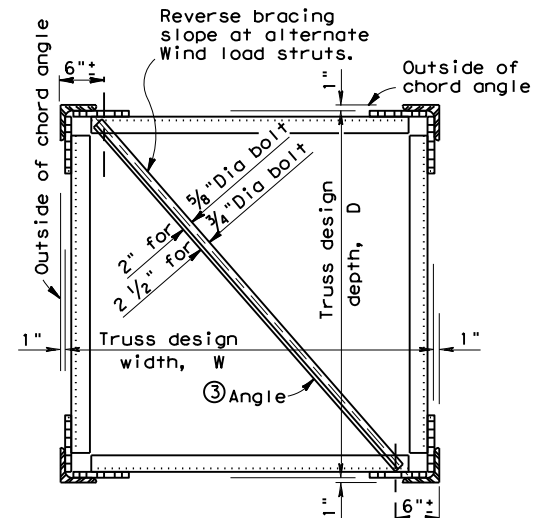
Sym. about truss.
 Permissible splice in bottom plate.

3/8" Thick Plate
 Standard gage for chord angle.

2 1/4" for 5/8" Dia bolts
 2 1/2" for 3/4" Dia bolts

Varies according to number and size of bolts.

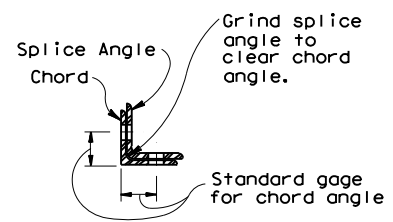
STIFFENER PLATE DETAIL



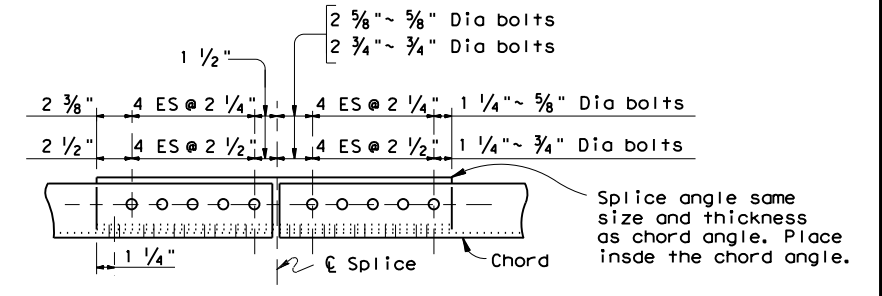
③ 2" x 2" x 3/16" angle for 5/8" Dia bolts [1]
 2 1/2" x 2" x 3/16" angle for 3/4" Dia bolts [1]

TRUSS SECTION

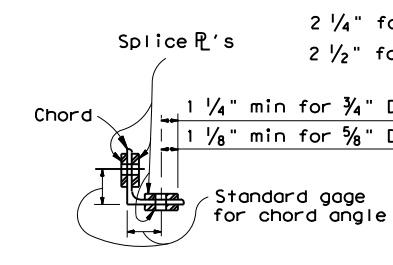
(DIAGONALS NOT SHOWN)



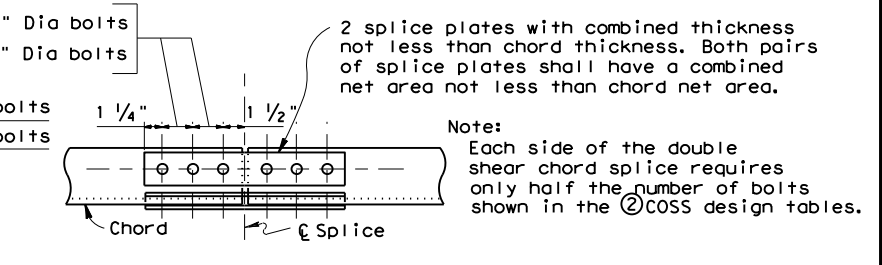
SECTION ON CHORD SPLICE



SINGLE SHEAR CHORD SPLICE



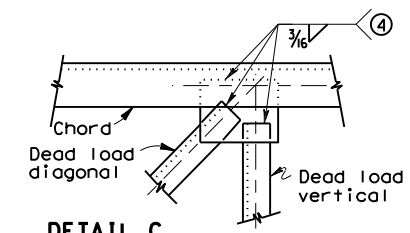
SECTION ON CHORD SPLICE



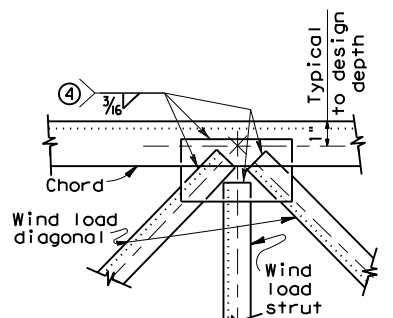
DOUBLE SHEAR CHORD SPLICE

SPLICE DETAILS

CONNECTION PLATE DETAIL



DETAIL C
 (Gusset plates in other details to be similar)



DETAIL A

ALTERNATE WELDED CONNECTION DETAILS

④ MINIMUM LENGTH OF 3/16" FILLET WELD REQUIRED		
NUMBER OF BOLTS	TO REPLACE 5/8" DIA BOLTS	TO REPLACE 3/4" DIA BOLTS
1	2"	3"
2	4"	6"
3	6"	9"
4	8"	11 1/2"
5	10"	14 1/2"
6	12"	17 1/2"
7	14"	20"

CANTILEVER OVERHEAD SIGN SUPPORT DETAILS

COSSD

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REVISIONS					
CONT	SECT	JOB		HIGHWAY	
0908	00	130		SL 322	
DIST	COUNTY		SHEET NO.		
ABL	TAYLOR		56		

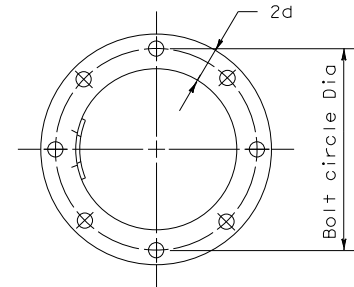
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Washers shall conform to ASTM F436.

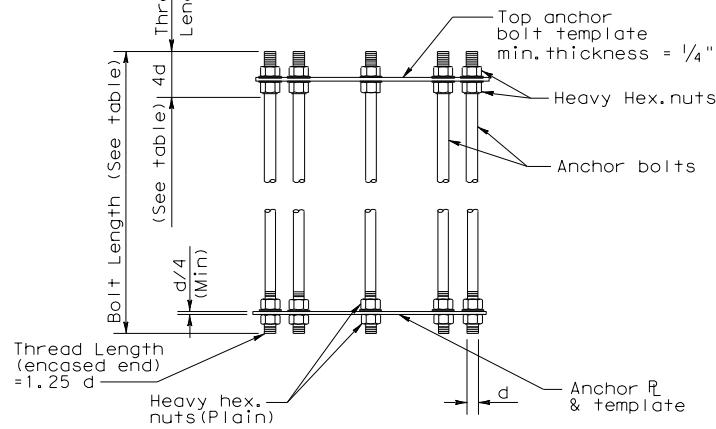
ANCHOR BOLT DIA.	WASHER DIMENSIONS			HOLE IN BASE PLATE	
	OUTSIDE DIAMETER	HOLE DIAMETER	THICKNESS		
			MIN.		MAX.
d	2d	d + 1/8"	0.136"	0.177"	d + 1/4"
1 1/2" or less	2d	d + 1/8"	0.136"	0.177"	d + 1/4"
1 3/4"	2d - 1/8"	d + 1/8"	0.178"	0.280"	d + 5/16"
2"	2d - 1/4"	d + 1/8"	0.178"	0.280"	d + 5/16"
Over 2"	2d - 1/2"	d + 1/8"	0.240"	0.340"	d + 5/16"

ANCHOR BOLT SIZE				
DIA	BOLT LENGTH	THREAD LENGTH	PROJECTION LENGTH	GALVAN. LENGTH
1 1/4"	2'-11"	5"	5 1/4"	11 1/4"
1 3/8"	3'-1"	5 1/2"	5 3/4"	11 3/4"
1 1/2"	3'-4"	6"	6 1/4"	1'-0 1/4"
1 3/4"	3'-10"	7"	7 1/4"	1'-1 1/4"
2"	4'-3"	8"	8 1/4"	1'-2 1/4"
2 1/4"	4'-9"	9"	9 1/4"	1'-3 1/4"
2 1/2"	5'-2"	10"	10 1/4"	1'-4 1/4"
2 3/4"	5'-8"	11"	11 1/4"	1'-5 1/4"
3"	6'-1"	1'-0"	1'-0 1/4"	1'-6 1/4"

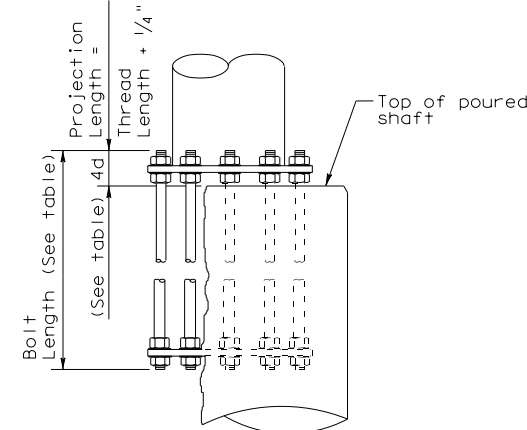
- Anchor Bolt Fabrication Tolerances:
 Bolt Length ~ ±1/2"
 Thread Length ~ ±1/2"
 Galvanized Length ~ -1/4"
- Thread length applies to upper and lower threads



TOP VIEW OF TOP & BOTTOM TEMPLATES

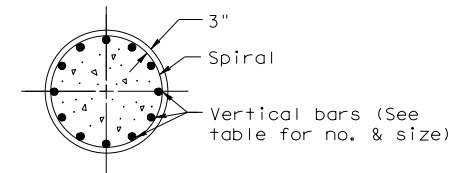


ANCHOR BOLT ASSEMBLY (PRIOR TO INSTALLATION)

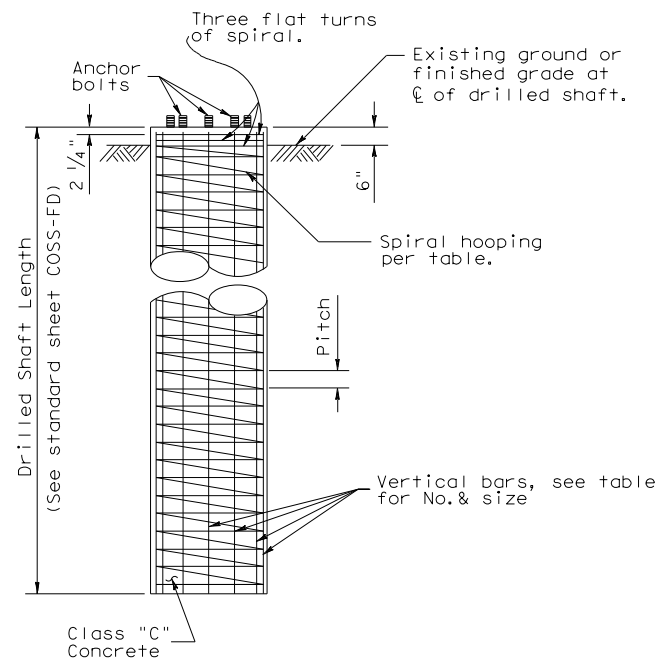


BEARING SEAT ELEVATION

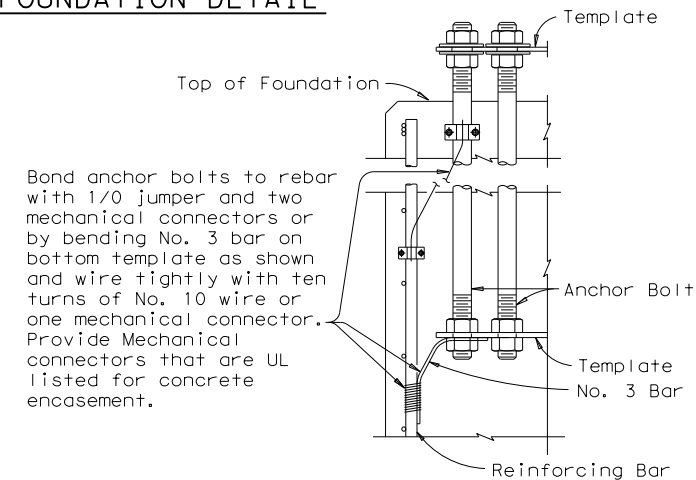
ANCHOR BOLT SIZE	PIPE OUTSIDE DIAMETER											
	16"			20"			24"			30"		
	BOLT CIRCLE DIA	DRILLED SHAFT SIZE	DRILLED SHAFT REINF	BOLT CIRCLE DIA	DRILLED SHAFT SIZE	DRILLED SHAFT REINF	BOLT CIRCLE DIA	DRILLED SHAFT SIZE	DRILLED SHAFT REINF	BOLT CIRCLE DIA	DRILLED SHAFT SIZE	DRILLED SHAFT REINF
1 1/4" Dia x 2'-11"	20 1/2"	36" Dia	14-#8 (A)	24 1/2"	36" Dia	14-#8 (A)						
1 3/8" Dia x 3'-1"	20 3/4"	36" Dia	12-#9 (A)	24 3/4"	42" Dia	14-#9 (A)						
1 1/2" Dia x 3'-4"	21"	36" Dia	12-#9 (A)	25"	42" Dia	14-#9 (A)	29"	42" Dia	14-#9 (C)			
1 3/4" Dia x 3'-10"	21 1/2"	36" Dia	10-#10 (A)	25 3/8"	42" Dia	12-#10 (B)	29 3/8"	48" Dia	16-#10 (C)	35 3/8"	54" Dia	18-#10 (C)
2" Dia x 4'-3"	22"	36" Dia	12-#10 (A)	25 3/4"	42" Dia	12-#10 (B)	29 3/4"	48" Dia	16-#10 (C)	35 3/4"	54" Dia	18-#10 (C)
2 1/4" Dia x 4'-9"	22 1/2"	42" Dia	12-#11 (A)	26"	42" Dia	10-#11 (B)	30"	48" Dia	14-#11 (C)	36"	54" Dia	14-#11 (D)
2 1/2" Dia x 5'-2"				26 1/2"	42" Dia	12-#11 (B)	30 1/2"	48" Dia	16-#11 (C)	36 1/2"	54" Dia	16-#11 (D)
2 3/4" Dia x 5'-8"							31 1/2"	48" Dia	18-#11 (D)	37"	54" Dia	20-#11 (D)
3" Dia x 6'-1"										37 1/2"	54" Dia	24-#11 (D)



SECTION



FOUNDATION DETAIL

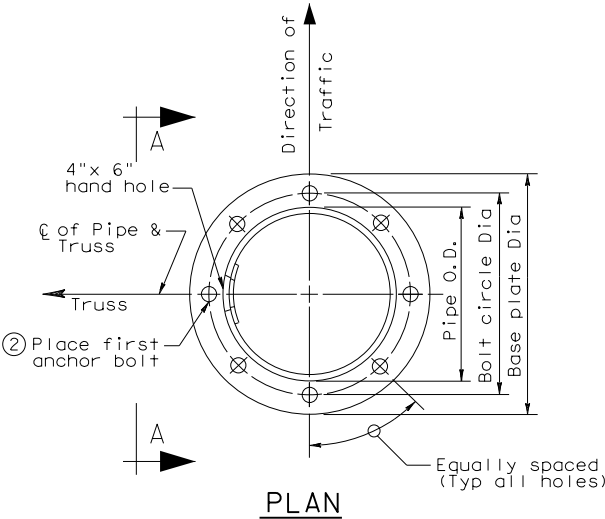


LIGHTNING PROTECTION SYSTEM

- A = #3 Plain spiral at 6" pitch (Grade 40)
- B = #4 Plain spiral at 6" pitch (Grade 40)
- C = #4 Plain spiral at 6" pitch (Grade 60)
- D = #4 Plain spiral at 3 1/2" pitch (Grade 60)

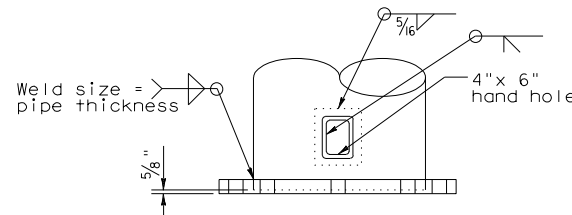
GENERAL NOTES

- Concrete shall be Class "C".
- Reinforcing shall conform to Item 440, "Reinforcing Steel".
- Anchor bolts and nuts for anchor bolts shall be "Alloy Steel" per Item 449, "Anchor Bolts".
- Anchor bolts shall be rigidly held in position during concrete placement using steel templates at the top and bottom. The top templates shall be removed after the concrete has set.
- Lubricate and tighten anchor bolts when erecting the structure per Item 449, "Anchor Bolts". After the structure has been aligned in its final position and the anchor bolts have been properly tightened, tack weld anchor bolt nuts to washer, and tack weld washers to base plate. Galvanizing in tack welded areas shall be repaired in accordance with Item 445, "Galvanizing".
- All vertical reinforcing shall be carried to the bottom of the Drilled Shaft.



PLAN

- See "Cantilever Overhead Sign Support" or "High Lever Cantilever Overhead Sign Support" sheets for number and size.



VIEW A-A

BASE PLATE & HANDHOLE DETAILS

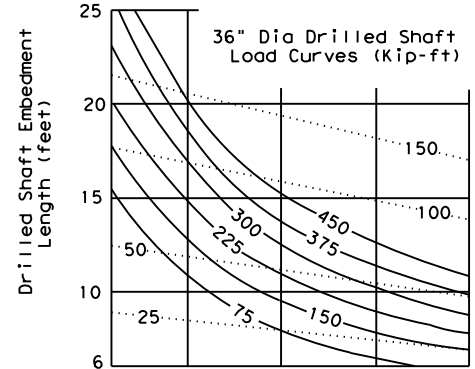
- See "Cantilever Overhead Sign Support" or "High Level Cantilever Overhead Sign Support" sheets for Diameter and thickness of base plate.

Cut 5" x 7" hole in pipe. Center 4" x 6" hand hole in 3/8" x 8" x 10" back up plate. Provide attachable cover made from section cut from pipe.

				Traffic Safety Division Standard	
<h2>CANTILEVER OVERHEAD SIGN SUPPORT FOUNDATION</h2> <h3>COSSF-21</h3>					
FILE:	cosssf-21.dgn	DN:	CK:	DW:	CK:
© TxDOT	November 2007	CONT	SECT	JOB	HIGHWAY
8-21	REVISIONS	090800	130	SL 322	
	DIST	COUNTY	SHEET NO.		
	ABL	TAYLOR	57		

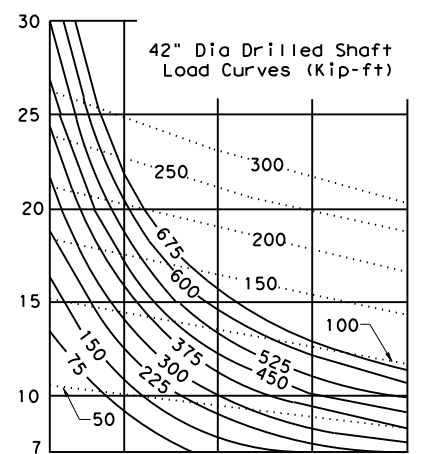
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DATE: _____
 FILE: _____



①	28.5°	30°	32°	34°	36°
②	12	21	35	50	65

- ① ϕ = Angle of internal friction of soil (degrees)
- ② N = Texas cone penetrometer value (blows per ft)
- ④ C(psi) = Cohesive shear strength of soil (psi)
- ⑤ C(psf) = Cohesive shear strength of soil (psf)

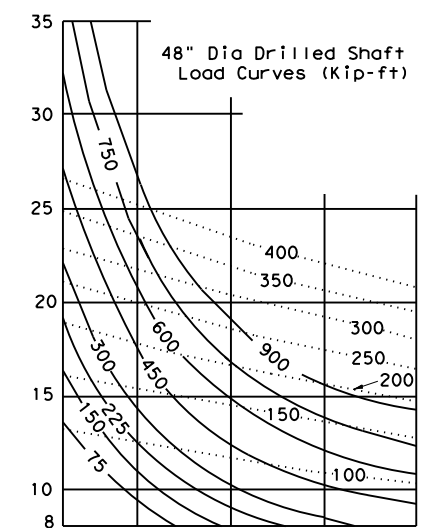


①	28.5°	30°	32°	34°	36°
②	12	21	35	50	65

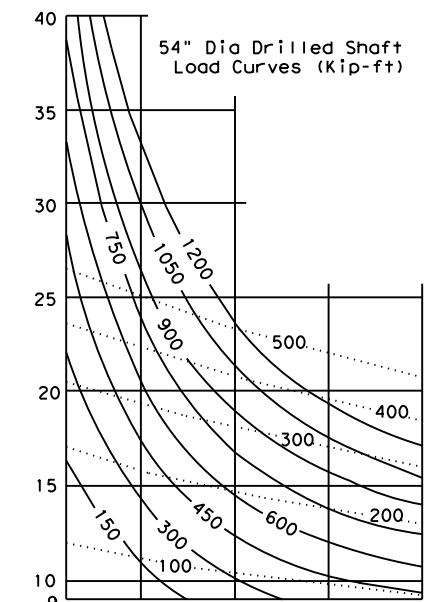
③ SUBMERGED SAND SOIL (COHESIONLESS)

Moment _____
 Torsion

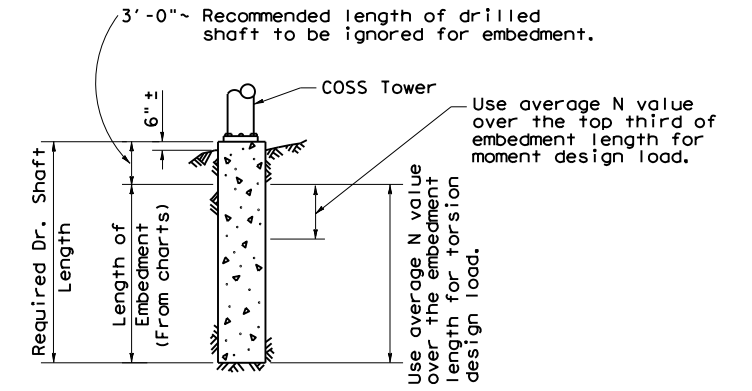
③ Note:
 For unsubmerged sands and clayey sands the charts for clay soil will give a conservative foundation design.



①	28.5°	30°	32°	34°	36°
②	12	21	35	50	65



①	28.5°	30°	32°	34°	36°
②	12	21	35	50	65

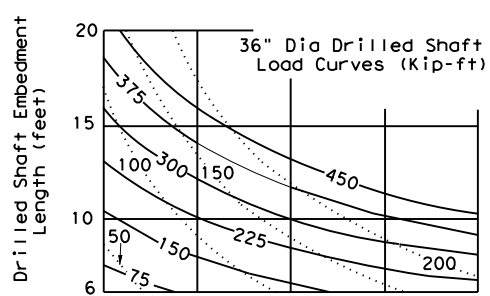


PROCEDURE:

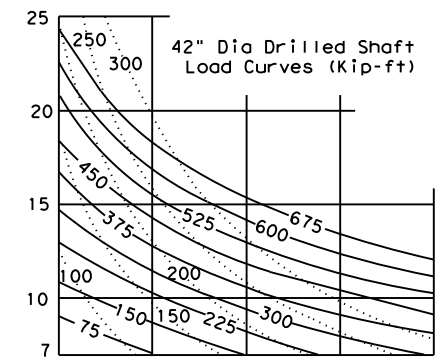
1. Determine design moment and torsion, and the required drilled shaft diameter as outlined in the selection example sheet COSS-SE.
2. Make an initial estimate of the required embedment length.
3. From soil exploration data determine type of soil and average N value or soil property along the upper third of the drilled shaft.
4. Enter chart (for the correct shaft diameter and soil type) from the bottom at the average N value or soil property determined in step 3.
5. Proceed vertically into chart and locate intersection with design moment. Interpolate between moment curves (solid lines) as needed.
6. From intersection point turn 90° to left and read embedment length along vertical scale.
7. If embedment length differs significantly from estimated value return to step 3 with the embedment length determined in step 6.
8. From soil exploration data determine average N value or soil property over the entire length of the embedment.
9. Enter chart (for correct shaft diameter and soil type) from the bottom at the average N value or soil property determined in step 8.
10. Proceed vertically into chart and locate intersection with design torsion. Interpolate between torsion curves (dashed lines) as needed.
11. From intersection point turn 90° to left and read embedment length along vertical scale.
12. Compute the required length of drilled shaft by adding 3'-0" to longer embedment length required for moment or torsion.

GENERAL NOTES:

These charts are for use with Cantilever Overhead Sign Supports with one shaft per tower.
 Solid curves are base moment in Kip-ft.
 Dash curves are base torsion in Kip-ft.
 Minimum embedment of drilled shaft is two diameters.
 Add 3'-0" to the required embedment length to determine the required length of drilled shaft.



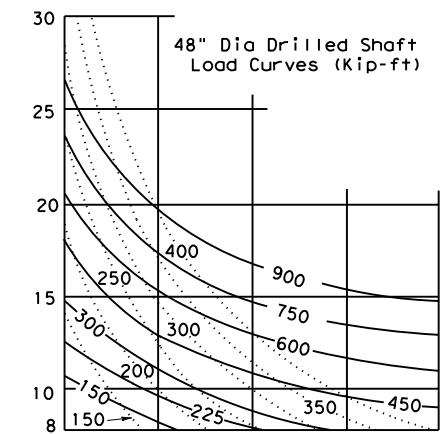
④	4	8	12	16	20
⑤	576	1152	1728	2304	2880
②	10	20	30	40	50



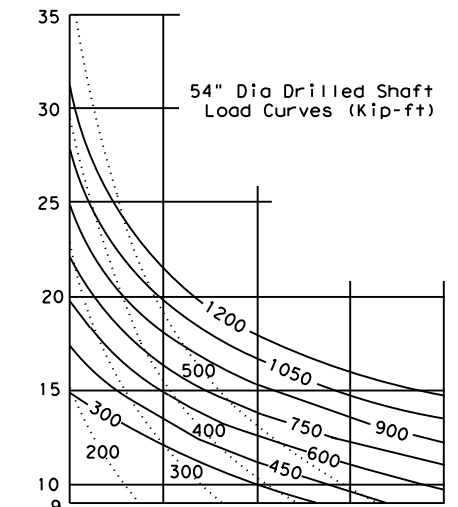
④	4	8	12	16	20
⑤	576	1152	1728	2304	2880
②	10	20	30	40	50

CLAY SOIL (COHESIVE)

Moment _____
 Torsion



④	4	8	12	16	20
⑤	576	1152	1728	2304	2880
②	10	20	30	40	50



④	4	8	12	16	20
⑤	576	1152	1728	2304	2880
②	10	20	30	40	50



FOUNDATION EMBEDMENT SELECTION CHARTS

COSS-FD

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REVISIONS		CONT	SECT	JOB	HIGHWAY
		090800		130	SL 322
		DIST	COUNTY	SHEET NO.	
		ABL	TAYLOR	58	

DATE: 4/3/2024 9:31:10 AM
 FILE: C:\Users\KMUELLER\Desktop\RYAN_CAP\Plan Set\2_TCP\ED(1)-14.dgn
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GENERAL NOTES FOR ALL ELECTRICAL WORK

- The location of all conduits, junction boxes, ground boxes, and electrical services is diagrammatic and may be shifted to accommodate field conditions.
- 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.
- Miscellaneous nuts, bolts and hardware, except for high strength bolts, may be stainless steel when plans specify galvanized, provided the bolt size is 1/2 in. or less in diameter.
- 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.
- 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.
- 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

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

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

- 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.
- 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.
- 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

- 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.
- 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.
- Do not attach conduit supports directly to pre-stressed concrete beams except as shown specifically in the plans or as approved by the Engineer.
- 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.
- 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."
- Provide and place warning tape approximately 10 in. above all trenched conduit as per Item 618.
- 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.
- 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.
- 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.
- 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.
- At all electrical services, install a 6 AWG solid copper grounding electrode conductor.
- 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).
- 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.
- 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.

				Traffic Operations Division Standard	
<h1>ELECTRICAL DETAILS CONDUITS & NOTES</h1>					
<h2>ED(1) - 14</h2>					
FILE:	ed1-14.dgn	DWG:	CK:	DW:	CK:
© TxDOT	October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS		0908	00	130	SL 322
		DIST	COUNTY		SHEET NO.
		ABL	TAYLOR		59

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.

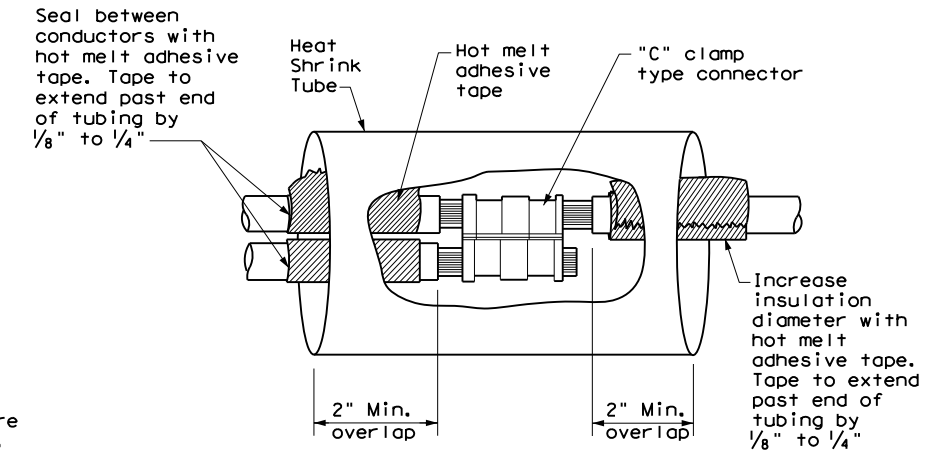
B. CONSTRUCTION METHODS

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.



**SPLICE OPTION 1
Compression Type**

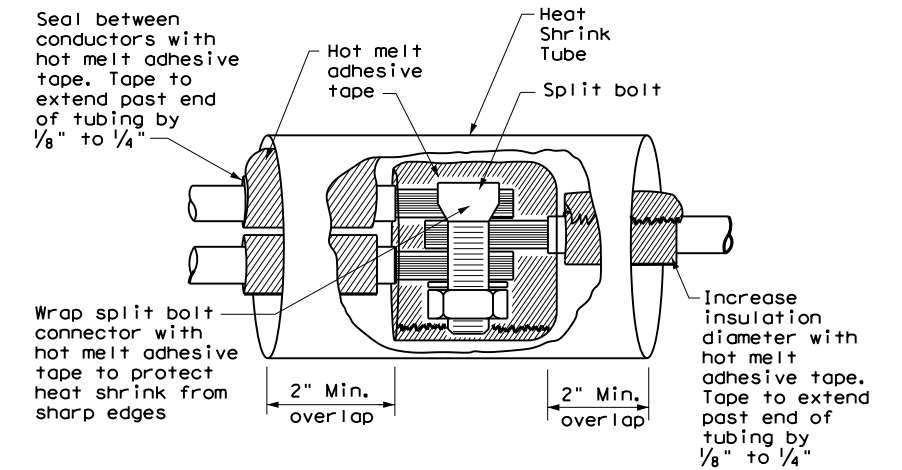
GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

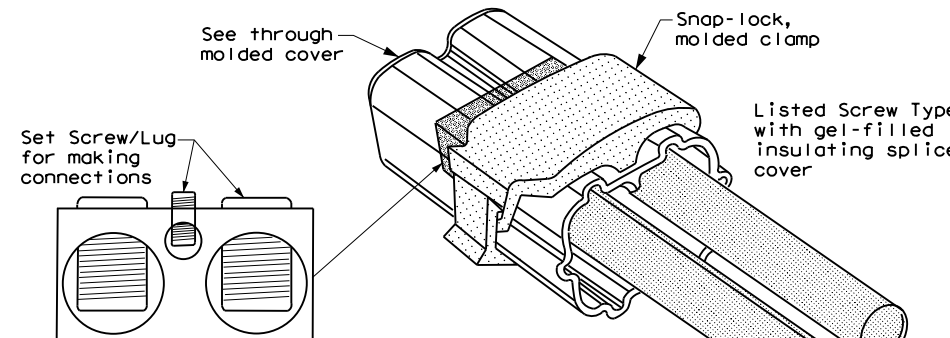
1. Provide and install a grounding electrode at electrical services. Provide ground rods according to DMS 11040 and the plans. Larger diameter or longer length rods may be called for in some specific locations, see the individual plans sheets. Concrete encased grounding electrodes may be called for in 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 2
Split Bolt Type**



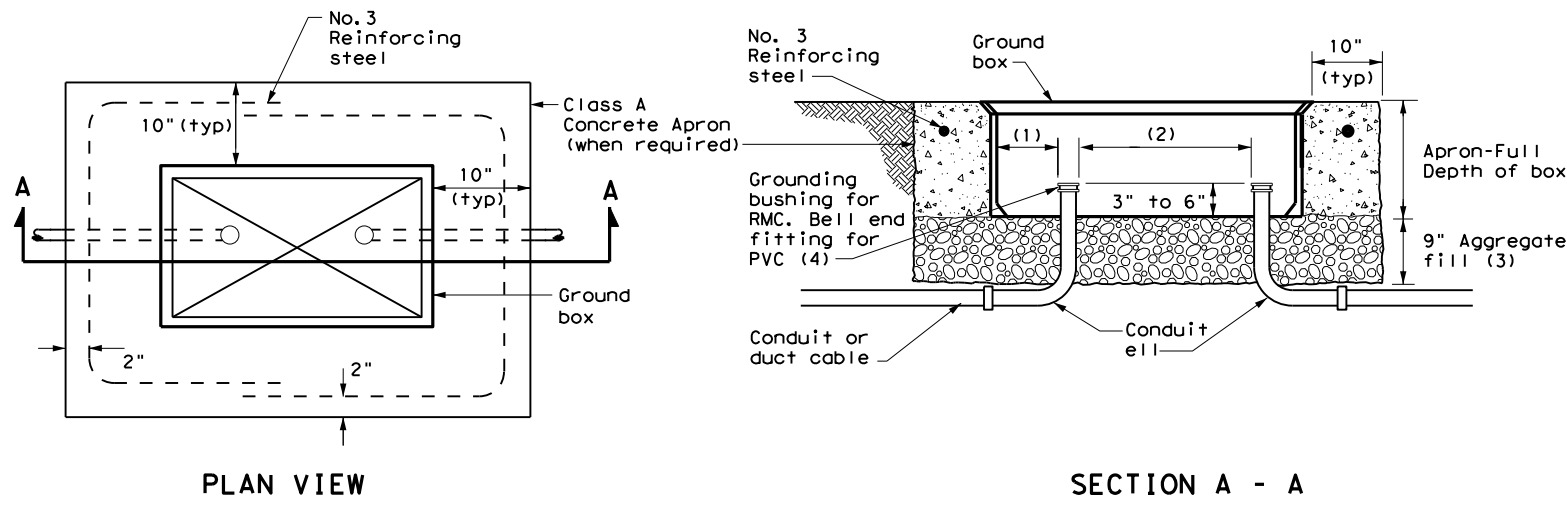
**SPLICE OPTION 3
Listed Screw Type**

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		Traffic Operations Division Standard	
<h1>ELECTRICAL DETAILS CONDUCTORS</h1>			
<h2>ED(3) - 14</h2>			
FILE: ed3-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
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REVISIONS	0908 00	130	SL 322
	DIST	COUNTY	SHEET NO.
	ABL	TAYLOR	60

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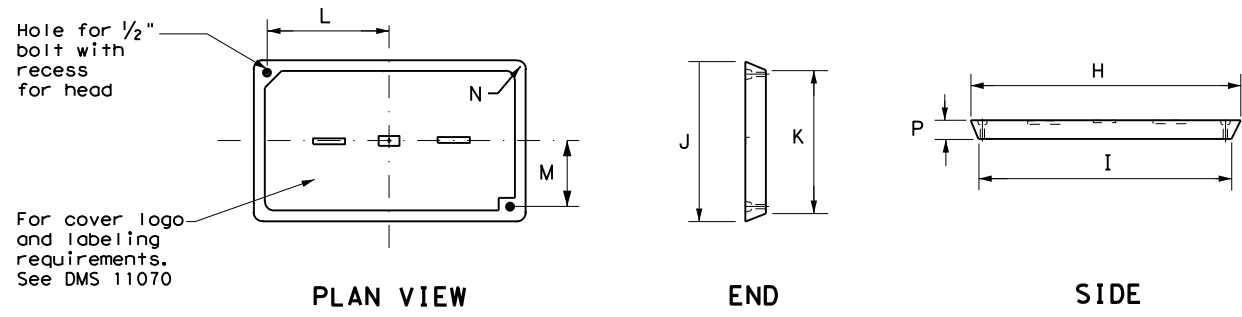


APRON FOR GROUND BOX

- (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



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.

				Traffic Operations Division Standard	
<h2>ELECTRICAL DETAILS</h2> <h3>GROUND BOXES</h3> <h4>ED(4) - 14</h4>					
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ABL	TAYLOR	61			

ELECTRICAL SERVICES NOTES

- 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.
- 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.
- Provide all work, materials, services, and any incidentals needed to install a complete electrical service as specified in the plans.
- 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.
- 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.
- 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.
- When galvanized is specified for nuts, screws, bolts or miscellaneous hardware, stainless steel may be used.
- 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.
- 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.
- Provide rigid metal conduit (RMC) for all conduits on service, except for the 1/2 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.
- 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.
- Ensure all mounting hardware and installation details of services conform to utility company specifications.
- 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 1/2 in. x 11 in. before laminating. If the installation differs from the plan sheets, the installing contractor is to redline plan sheets before laminating.
- 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 1/2 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.
- 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

- Provide threaded hub for all conduit entries into the top of enclosure.
- 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 photoceII or lighting contactor. Provide GS enclosures in accordance with DMS 11080, 11082, 11083, and 11084.
- 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.
- 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

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

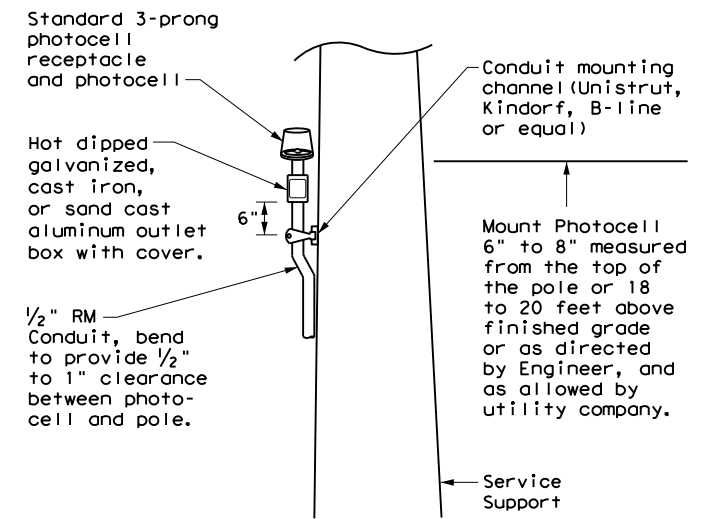
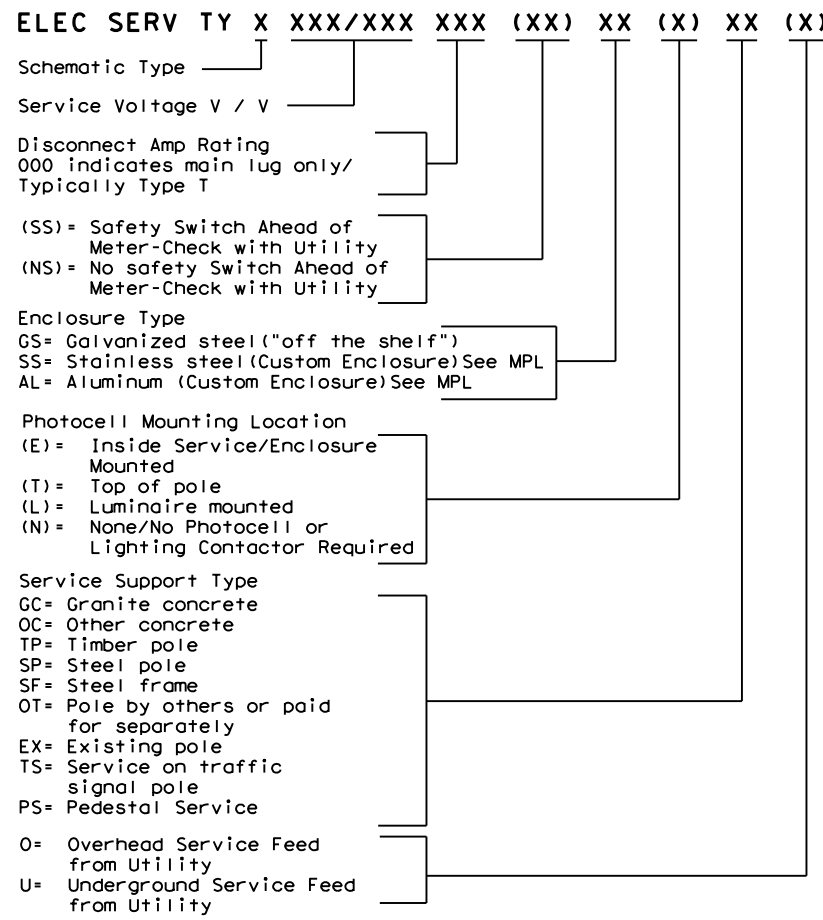
PHOTOELECTRIC CONTROL

- 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 *xSize	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 1/4"	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 1/4"	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



TOP MOUNTED PHOTOCELL

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

Texas Department of Transportation Traffic Operations Division Standard

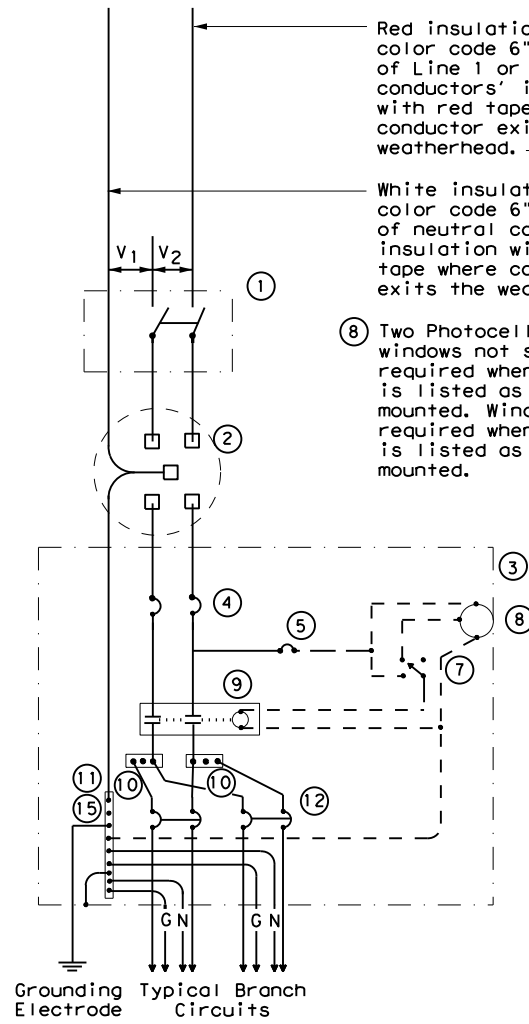
ELECTRICAL DETAILS SERVICE NOTES & DATA

ED(5) - 14

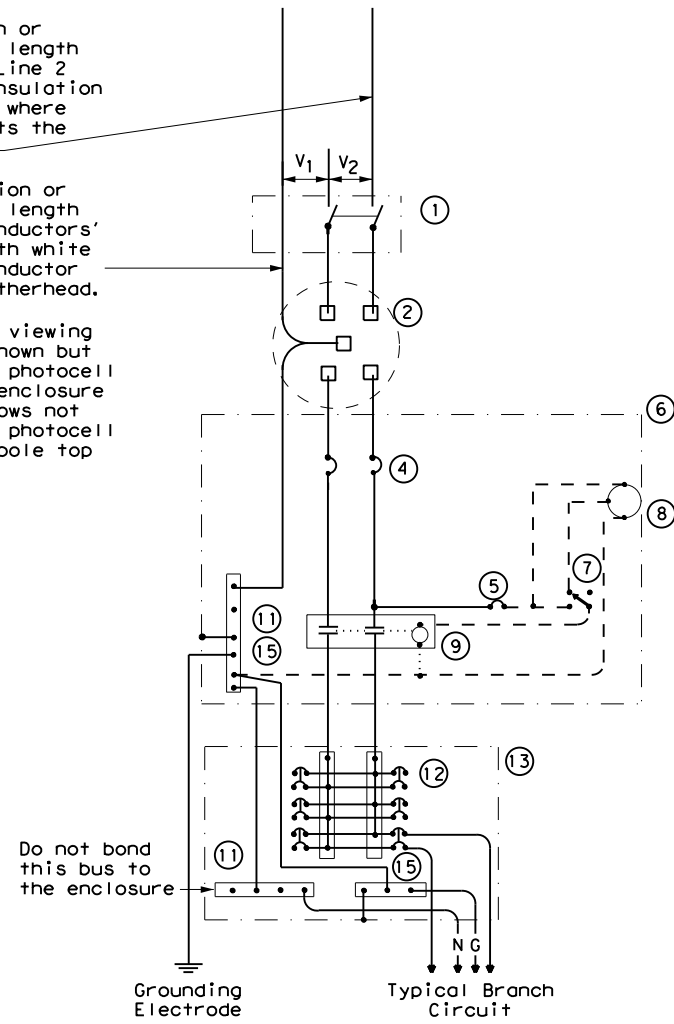
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	ABL	TAYLOR	62	

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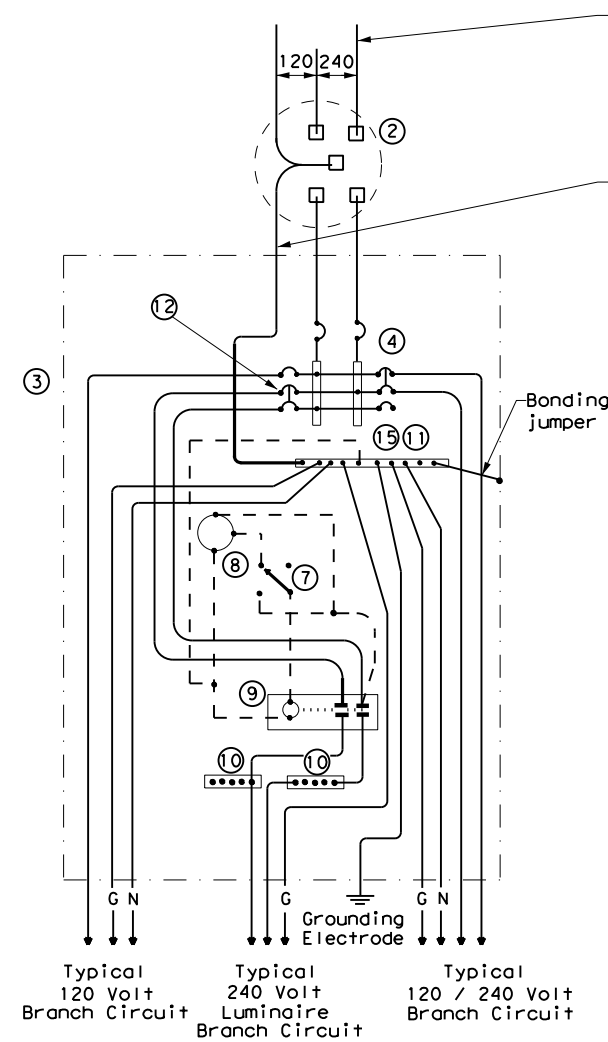
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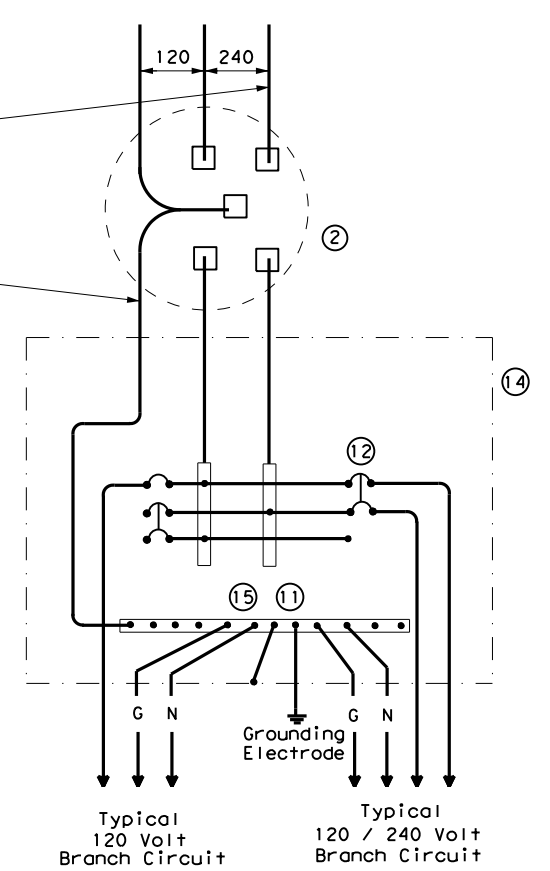
**SCHEMATIC TYPE A
THREE WIRE**



**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 photo cell 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

				Traffic Operations Division Standard	
ELECTRICAL DETAILS SERVICE ENCLOSURE AND NOTES					
ED(6) - 14					
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SUPPORT TYPE STEEL POLE (SP) AND STEEL FRAME (SF)

1. Provide steel pole and steel frame supports as per TxDOT Departmental Material Specification (DMS)11080 "Electrical Services." Mount all equipment and conduit on 12 gauge galvanized steel or stainless steel channel strut, 1 1/2 in. or 1 3/8 in. wide by 1 in. up to 3 3/4 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 3/4 in. x 18 in. x 4 in. (dia. x length x hook length) anchor bolts for underground service supports. Provide and install galvanized 3/4 in. x 56 in. x 4 in. anchor bolts for overhead service supports. Ensure anchor bolts have 3 in. of thread, with 3 1/4 in. to 3 1/2 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 ellis 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 1/2 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 1/4" - 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.

White insulation or color code 6" of neutral conductor's insulation with white tape where conductor exits weatherhead.

Red insulation or color code 6" length of Line 1 or Line 2 conductor's insulation with red tape where conductor exits the weatherhead. Conductor slack length, 12" min., 18" max.

2" to 6" 4" (typ.)

RMC

Service Enclosure

Inset A

Channel bracket or other arrangement approved by the Engineer. (Kindorf, Unistrut, B-line or equal.)

Inset A

Inset B

60" TYP.

2"

Class "C" concrete

RMC

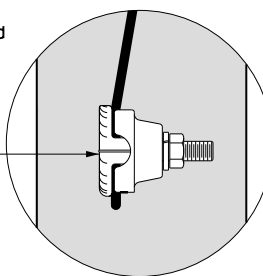
PVC

18" Min.

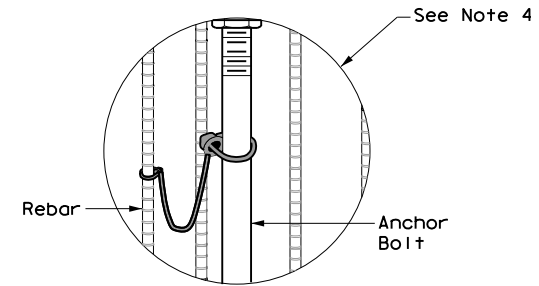
24 Dia. x 60" depth foundation 4-#5 reinforcing bars and #2 spiral (typ.) at 6" pitch

WITH SAFETY SWITCH
WITHOUT SAFETY SWITCH
SERVICE SUPPORT TYPE SP (O) - OVERHEAD SERVICE

Drill, tap, and thread 1/2" X 13 UNC. Install tank ground fitting, connect electrical service grounding electrode conductor. See Note 7.



FRONT VIEW
INSET A



INSET B

Safety switch (when required)

3' max.

2"

60" (typ.)

18" Min.

RMC to utility

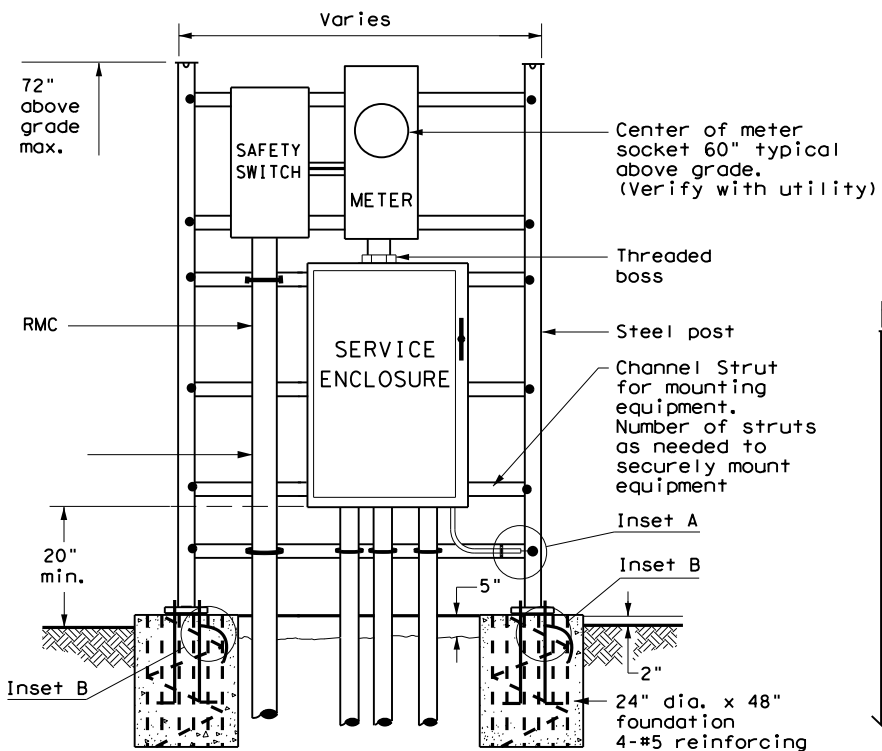
24" dia. x 36" depth foundation 4-#5 reinforcing bars and #2 spiral (typ.) at 6" pitch

RMC

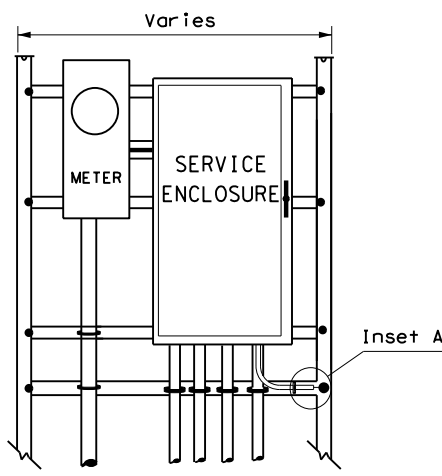
PVC

18" Min.

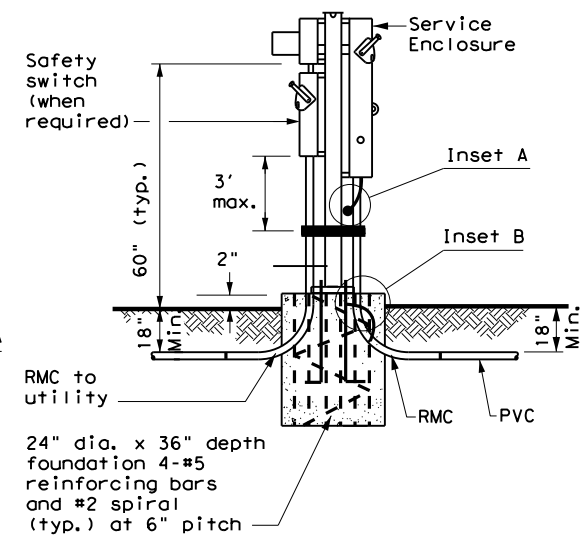
WITH SAFETY SWITCH
WITHOUT SAFETY SWITCH
SERVICE SUPPORT TYPE SP (U) - UNDERGROUND SERVICE



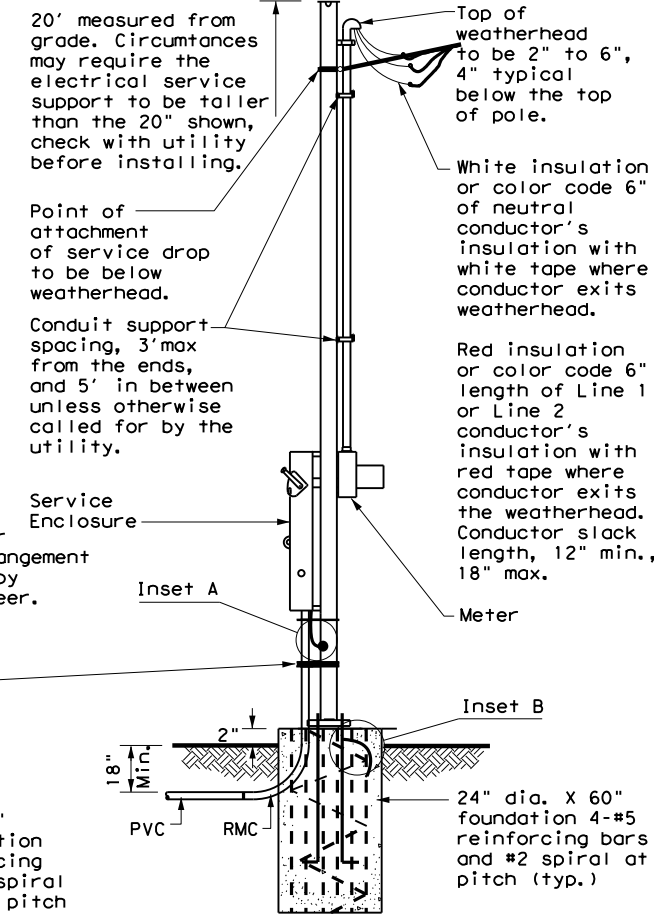
WITH SAFETY SWITCH
FRONT VIEW
SERVICE SUPPORT TYPE SF (U) - UNDERGROUND SERVICE



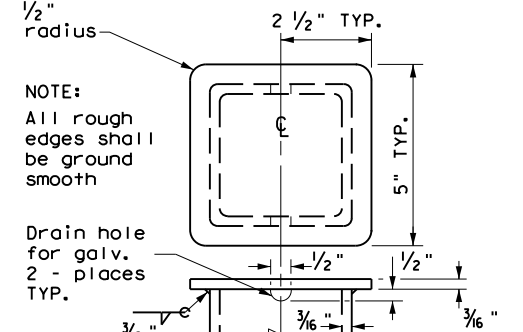
WITHOUT SAFETY SWITCH
SERVICE SUPPORT TYPE SF (U) - UNDERGROUND SERVICE



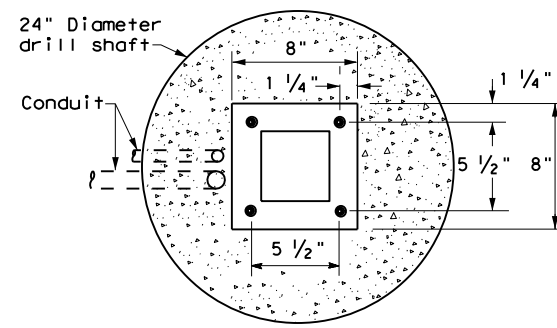
HOOKED ANCHOR DETAIL



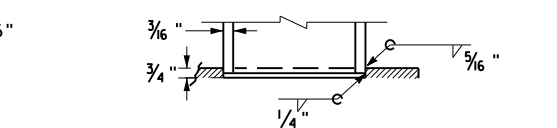
WITHOUT SAFETY SWITCH
SERVICE SUPPORT TYPE SP (O) - OVERHEAD SERVICE



POLE TOP PLATE

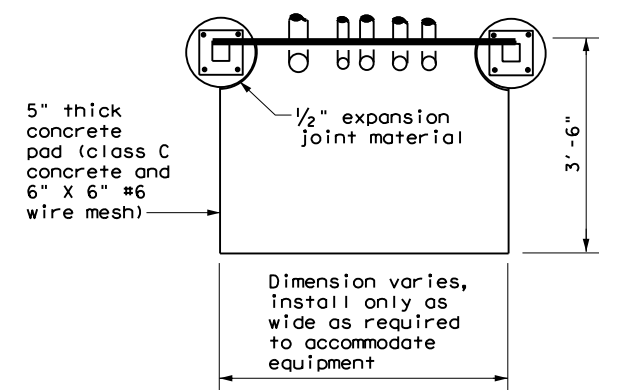


BASE PLATE DETAIL



BOTTOM OF POLE

SERVICE SUPPORT TYPE SF & SP

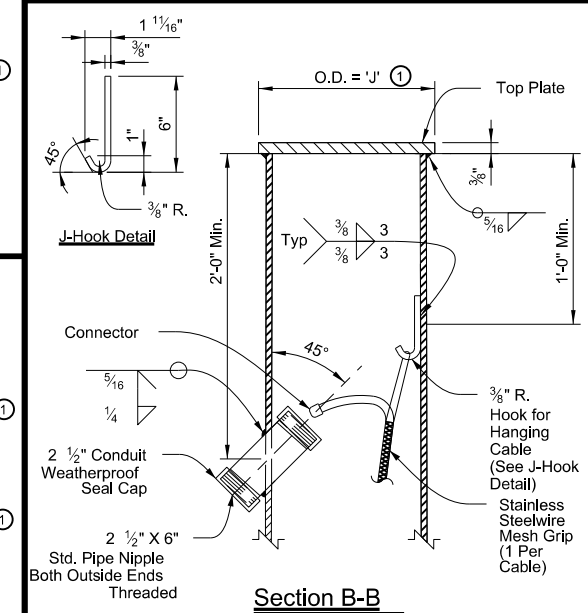
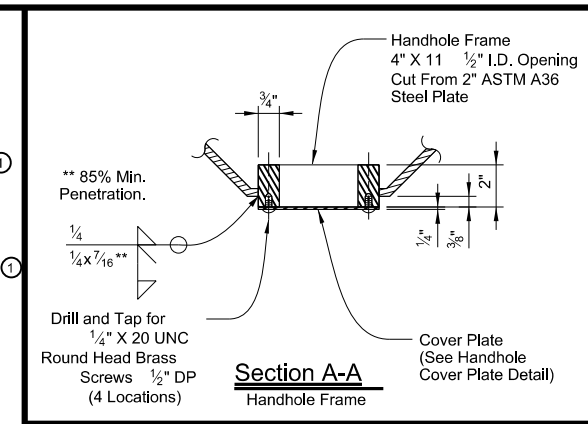
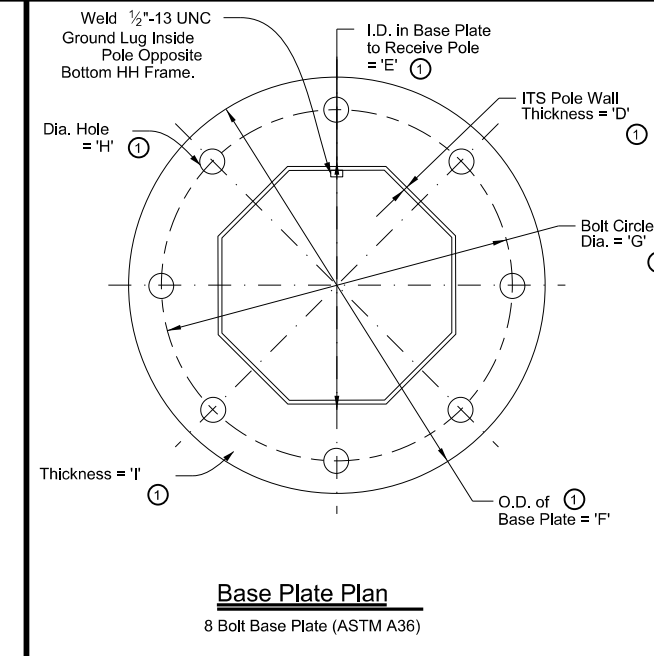
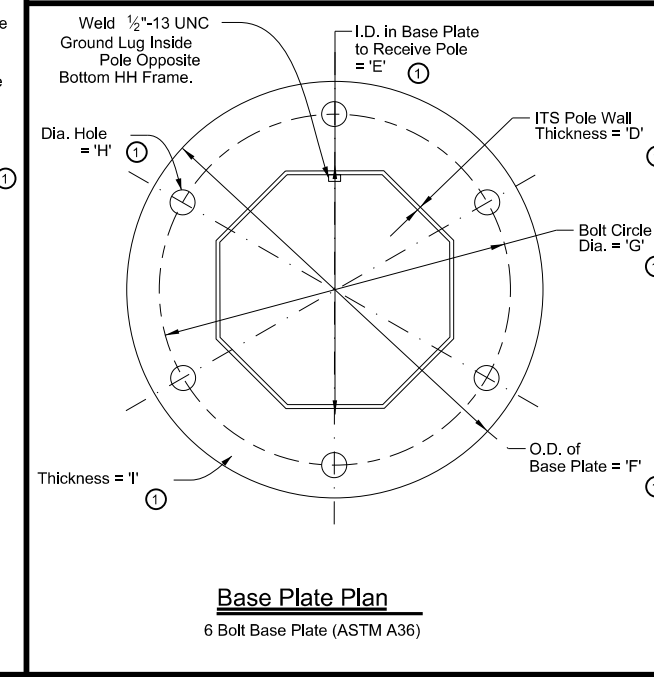
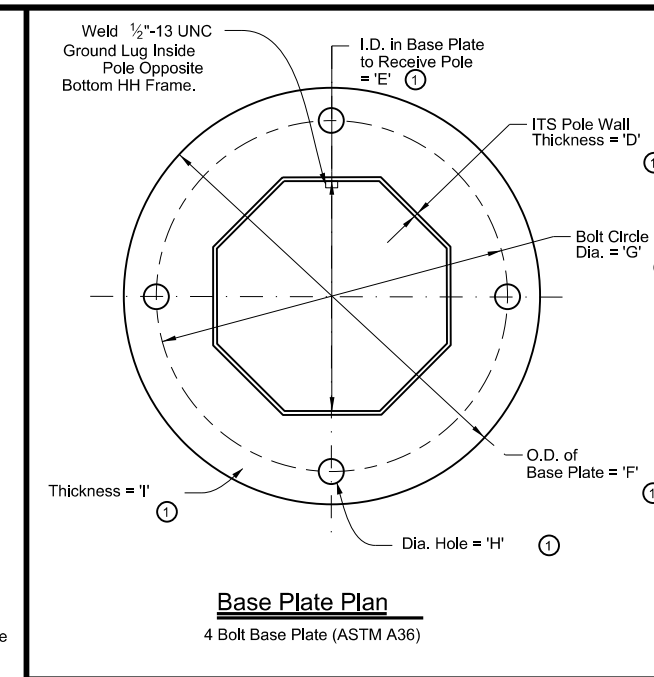
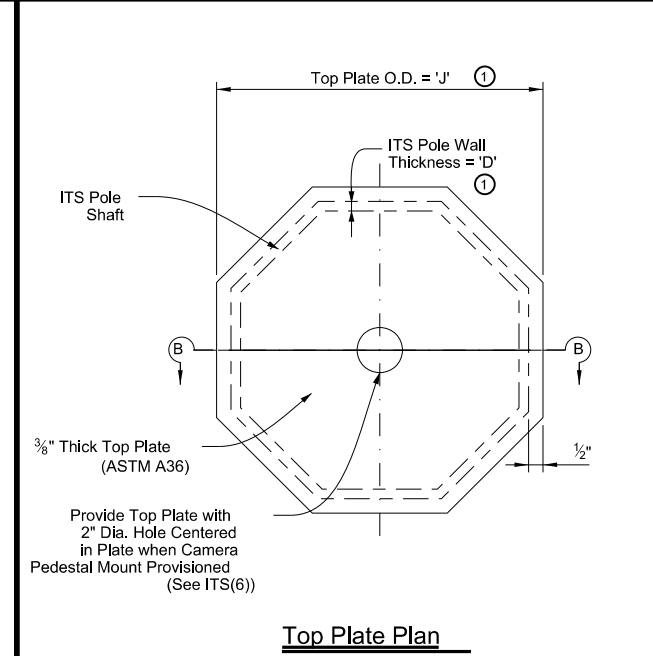
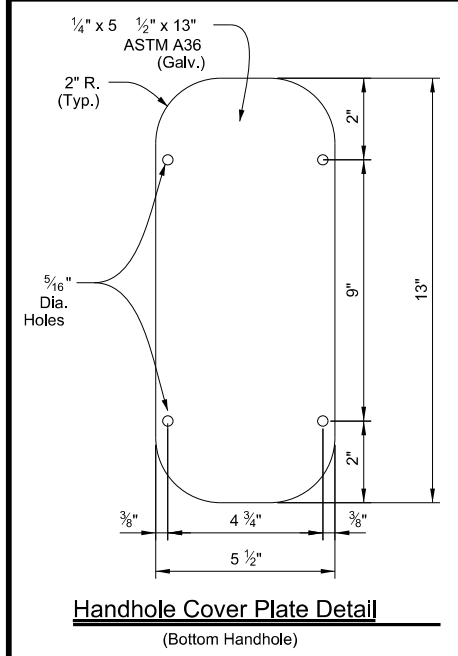
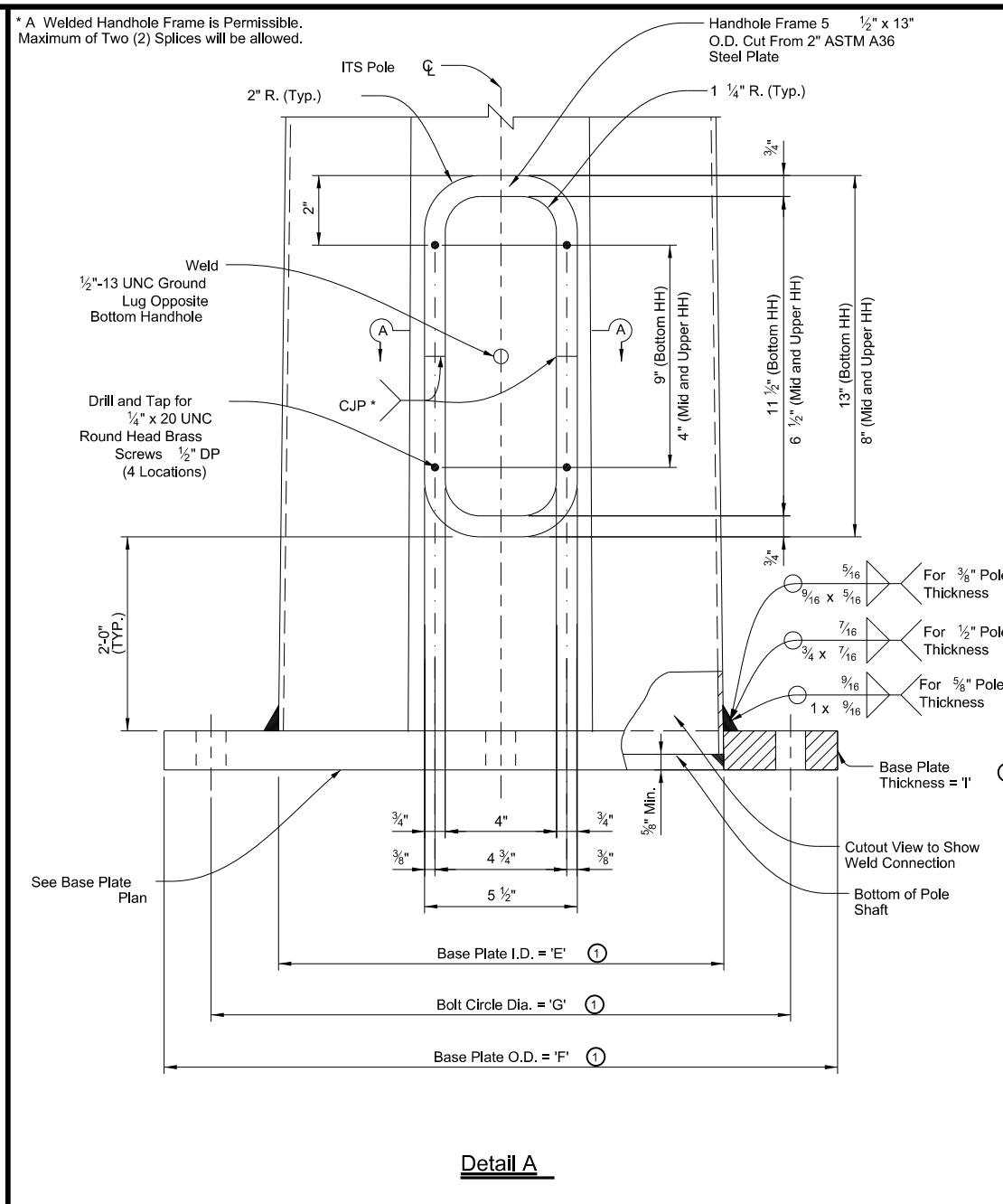
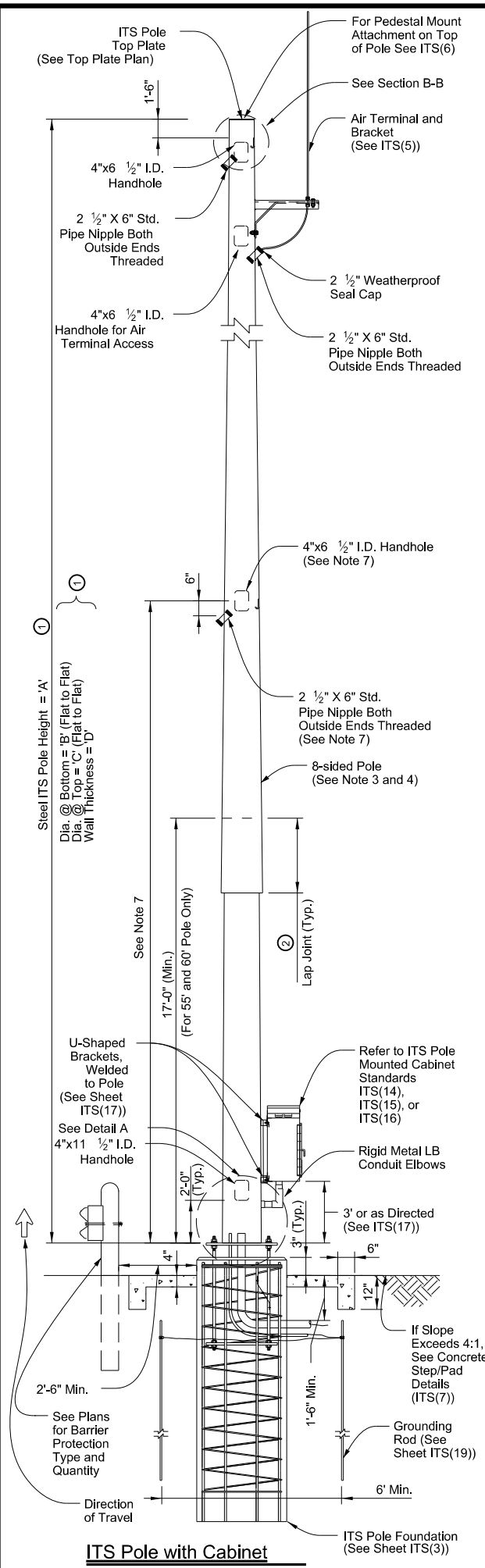


TOP VIEW
SERVICE SUPPORT TYPE SF (O) & SF (U)

		Traffic Operations Division Standard	
ELECTRICAL DETAILS SERVICE SUPPORT TYPES SF & SP ED(7)-14			
FILE: ed7-14.dgn	DW: TxDOT	CK: TxDOT	DW: TxDOT
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- General Notes**
1. Designed according to Sixth Edition 2013 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications.
 2. Unless otherwise noted, all parts shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."
 3. Deviation from the design criteria, values, and dimensions shown herein and on ITS(4), constitutes an alternative design and will require submission of shop drawings and calculations for approval, sealed by a Texas Professional Engineer.
 4. Direct substitution of twelve sided or round poles, matching the design criteria, values, and dimensions shown herein, require submission of shop drawings for approval to confirm design criteria and values on ITS(4) is met.
 5. Locate handholes opposite of the direction of travel.
 6. Appropriate number of anchor bolts for base plate determined by height of pole. See 'L' on sheet ITS(4).
 7. Location for ITS equipment mount may vary by device. Locate mid span handhole and pipe nipple to accommodate location for ITS equipment as identified in the plans or per manufacturer recommendations. Identify location for mid span handhole and pipe nipple on shop drawings for approval.
- Reference Notes:**
- 1 See tables on Sheet ITS(4) for values of dimension variables.
 - 2 See lap joint note for 55' and 60' pole heights on ITS(4) at the bottom of each table.

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Traffic Operations Division Standard

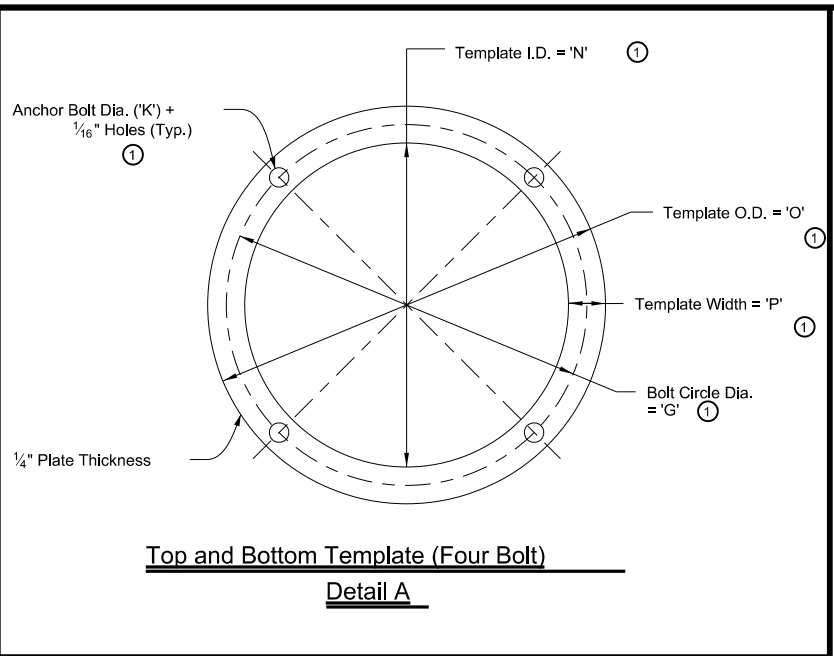
ITS POLE DETAILS OCTAGONAL POLE (EIGHT SIDED POLE)

ITS(1)-15

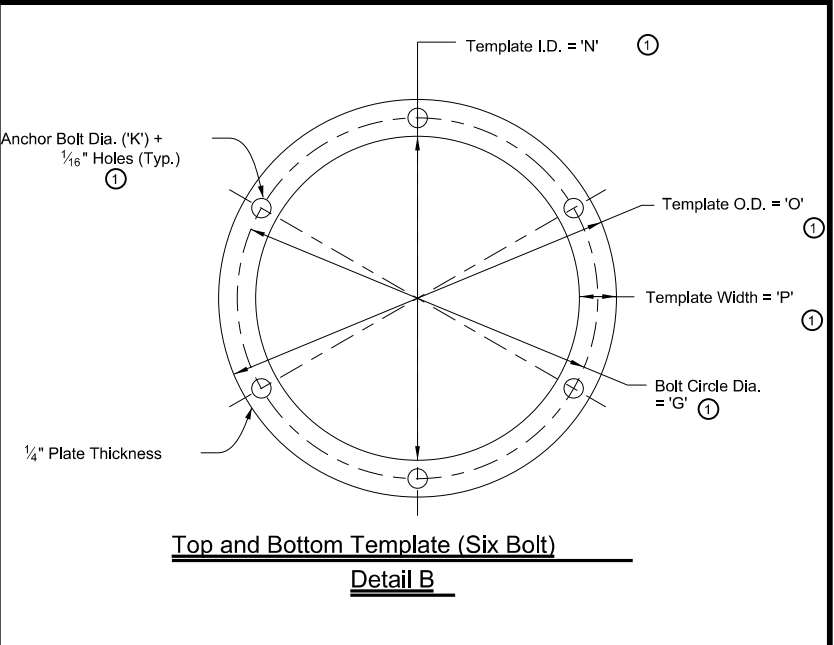
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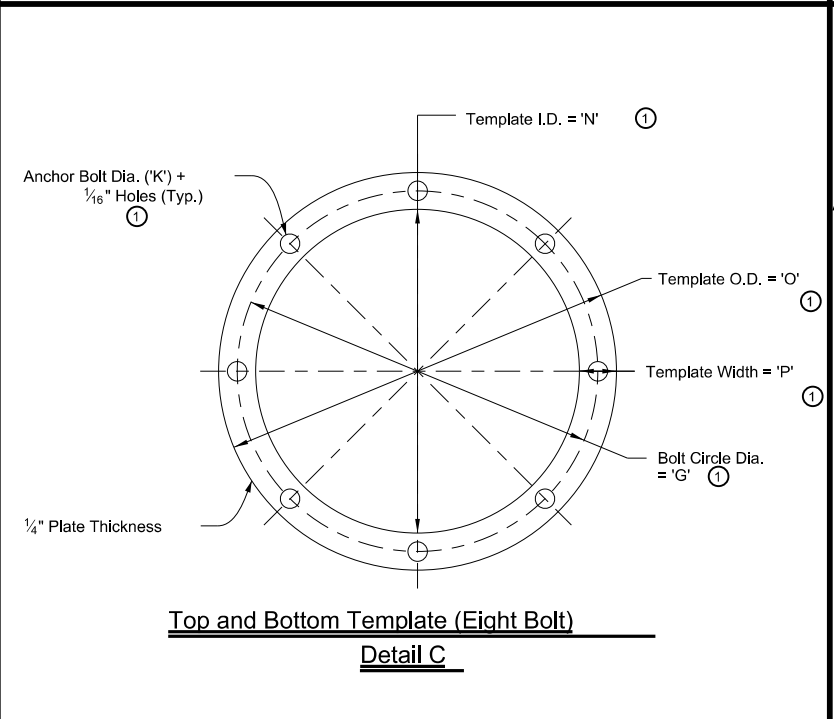
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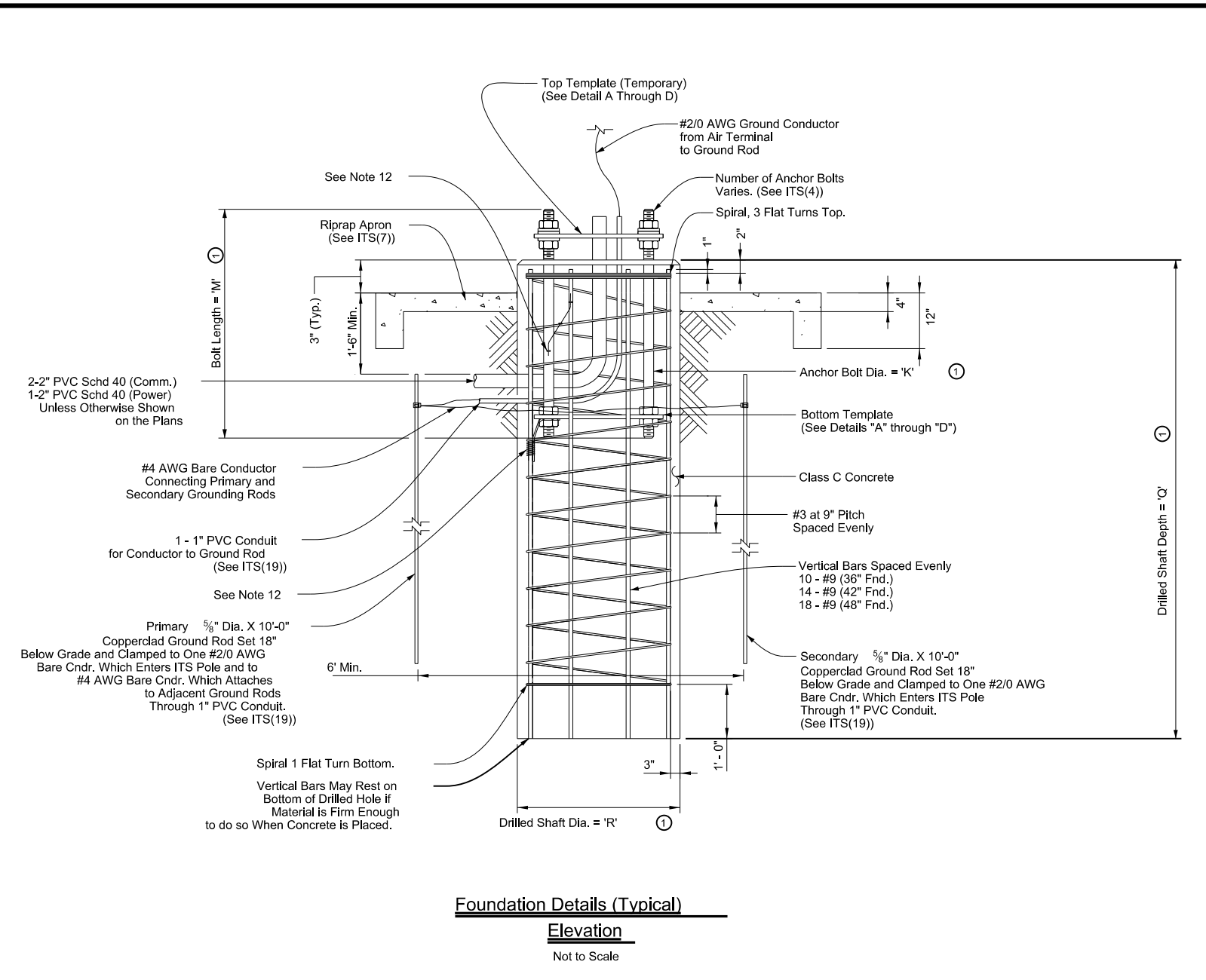
Top and Bottom Template (Four Bolt)
Detail A



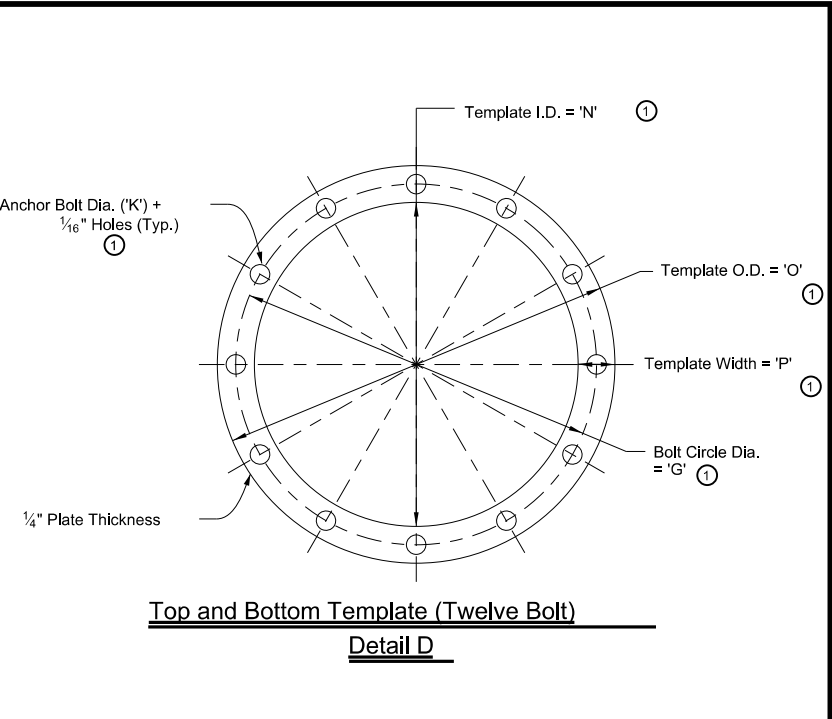
Top and Bottom Template (Six Bolt)
Detail B



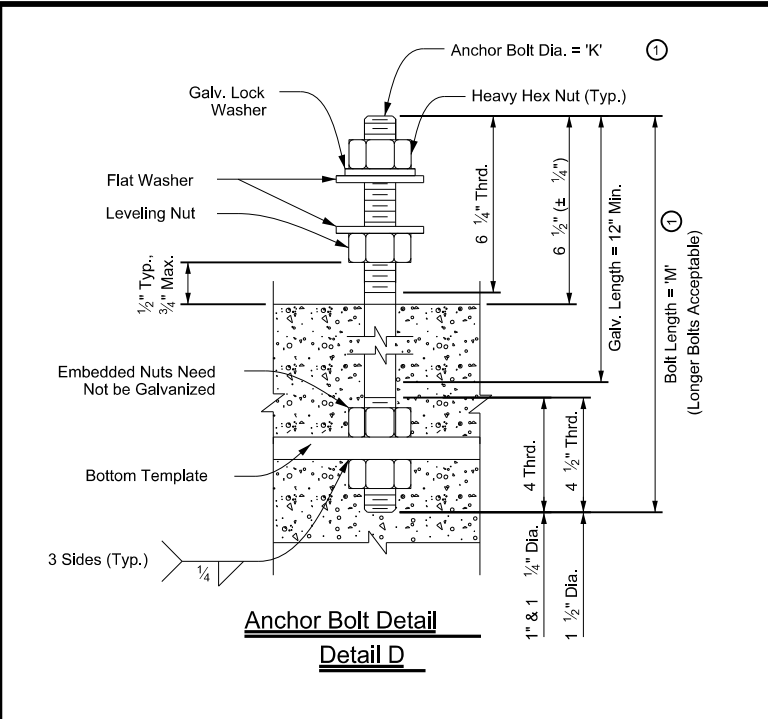
Top and Bottom Template (Eight Bolt)
Detail C



Foundation Details (Typical)
Elevation
 Not to Scale



Top and Bottom Template (Twelve Bolt)
Detail D



Anchor Bolt Detail
Detail D

- General Notes:**
1. Drilled shaft concrete shall be Class "C" (f_c = 3,600 PSI) in accordance with Item 416, "Drilled Shaft Foundations."
 2. Reinforcing bars shall be Grade 60 (F_y = 60 KSI) and conform to ASTM A-615. All reinforcing shall conform to Item 440, "Reinforcing Steel."
 3. Provide ASTM A-36 steel for templates. Top and bottom templates need not be galvanized.
 4. Anchor bolts shall be rigidly held in position during concrete placement using steel templates at the top and bottom. Top templates shall remain in place until the concrete has cured in place beyond initial set time.
 5. Lubricate and tighten anchor bolts, when erecting pole, in accordance with Item 449, "Anchor Bolts."
 6. Anchor bolts shall conform to ASTM F1554 Grade 55, or ASTM A193 B7 with ASTM A194 Grade 2H or A563 heavy hex nuts with F436 washers. Galvanize a minimum of the top end thread length plus 6 inches 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."
 7. All vertical reinforcement shall be carried to the bottom of the drilled shaft.
 8. Place three flat turns of the spiral bar at the top and one flat turn at the bottom of the drilled shaft.
 9. Drilled shaft shall be measured by the linear foot and paid under Item 416, "Drill Shaft Foundations."
 10. If rock is encountered, the drilled shaft to extend a minimum of two diameters into solid rock.
 11. Location for conduit entering foundation may vary. Orient conduit entering foundation to coincide with location of ground boxes and primary ground rod.
 12. Bond anchor bolts to rebar with #2/0 AWG jumper and two mechanical connectors or by bending No. 3 bar on bottom template as shown and wire tightly with ten turns of No. 10 wire or one mechanical connector. Mechanical connectors shall be UL Listed for concrete encasement.

Reference Notes:

1. See tables on Sheet ITS(4) for values of dimension variables.

Texas Department of Transportation Traffic Operations Division Standard

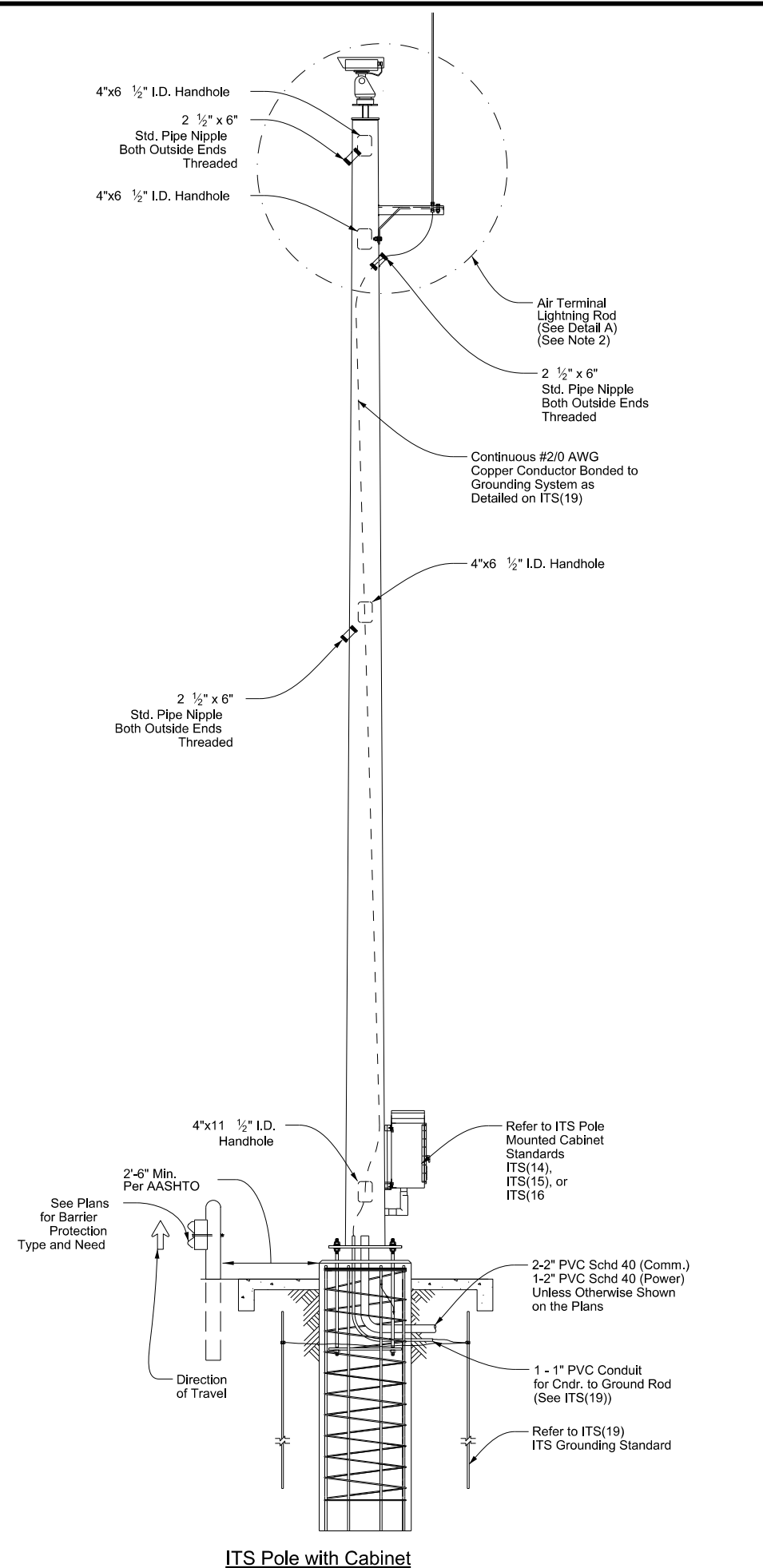
ITS POLE FOUNDATION DETAILS

ITS(3) - 16

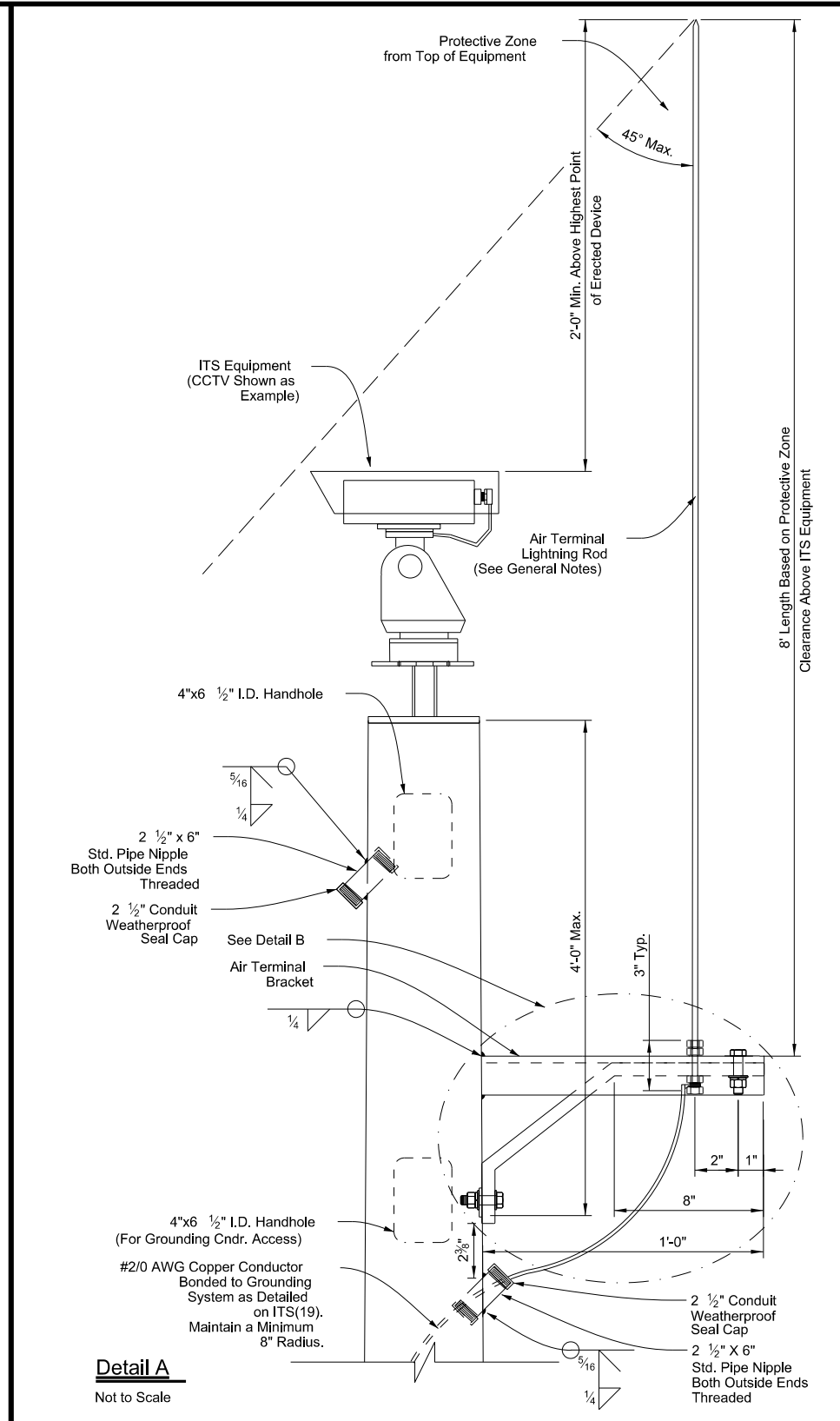
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ITS Pole with Cabinet

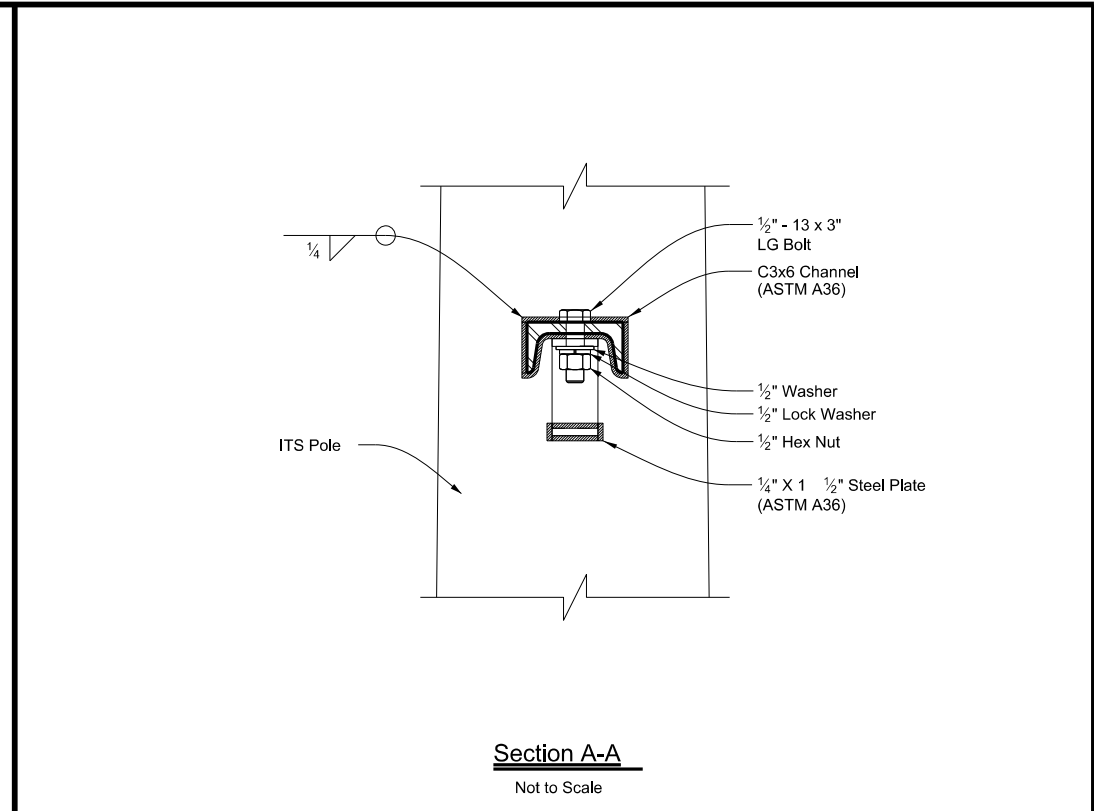


Detail A

Not to Scale

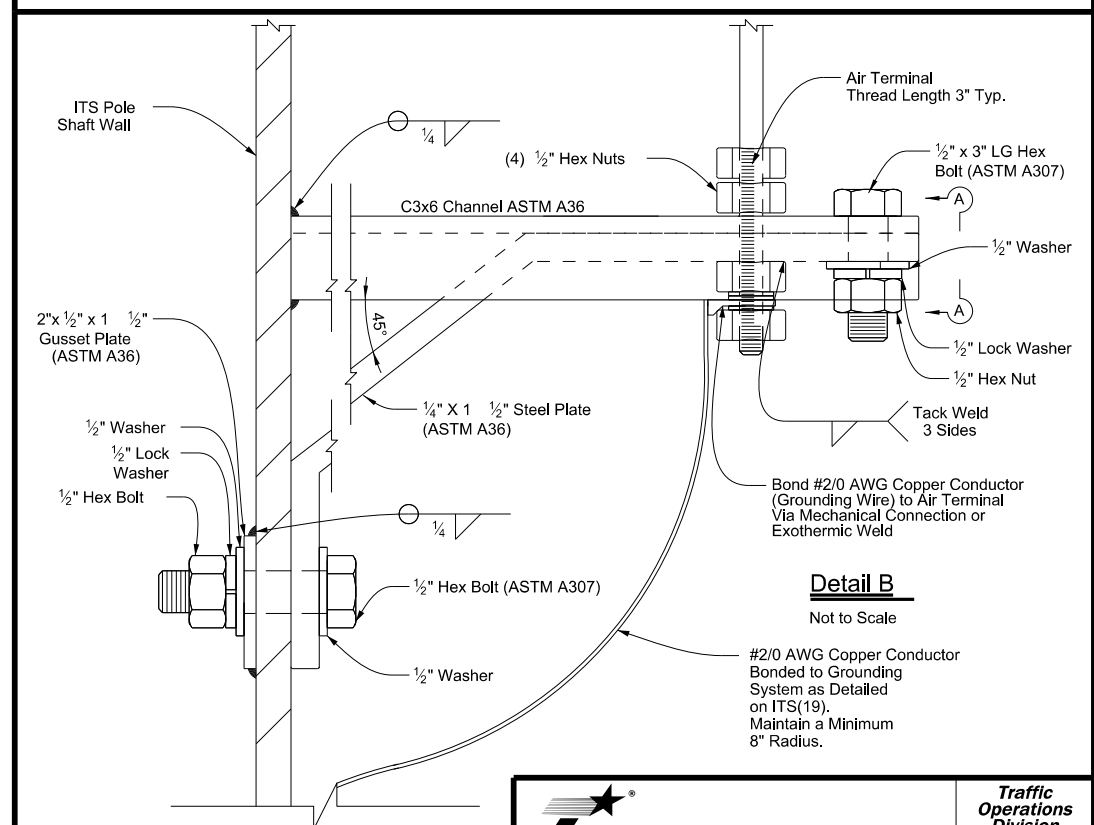
General Notes:

- Provide lightning protection using air terminals on structures utilizing the rolling sphere method. Provide lightning protection system consisting of air terminals, down conductor, and grounding system installed in accordance with NFPA 780 and tested in accordance with IEEE 142. Meet the following requirements:
 - Position - in center of least utilized field of view.
 - Height - camera equipment to be within 45 degree protective zone of air terminal.
 - Material - 1/2" ETP alloy 110 copper air terminal (Class II)
 - Clearance - 24" minimum height above highest point of ITS equipment.
 - Bonding - attach air terminal to bracket by exothermic weld or with approved clamping.
 - Structure wind rating in accordance with TxDOT WV & IZ (LTS2013).
 - Galvanize air terminal bracket in accordance with Item 445, "Galvanizing."
- Alternative orientation for air terminal and pole mounted cabinet due to project specific needs to be indicated on the plans and detailed in shop drawing submittal for approval.
- Weld air terminal bracket to ITS pole in accordance with Item 448 "Structural Field Welding." Bracket may be welded by the fabricator in the shop prior to delivery. A bolted connection for the air terminal bracket is acceptable in lieu of a welded connection with approval by the Engineer and detailed in the shop drawings.



Section A-A

Not to Scale



Detail B

Not to Scale

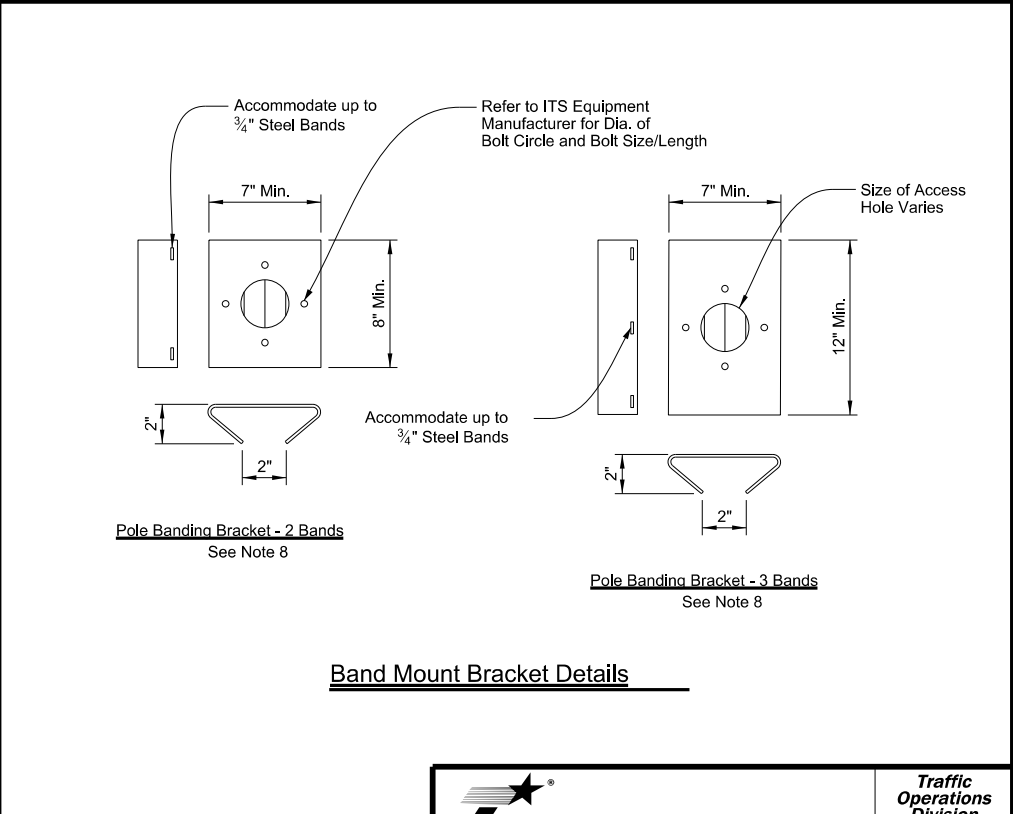
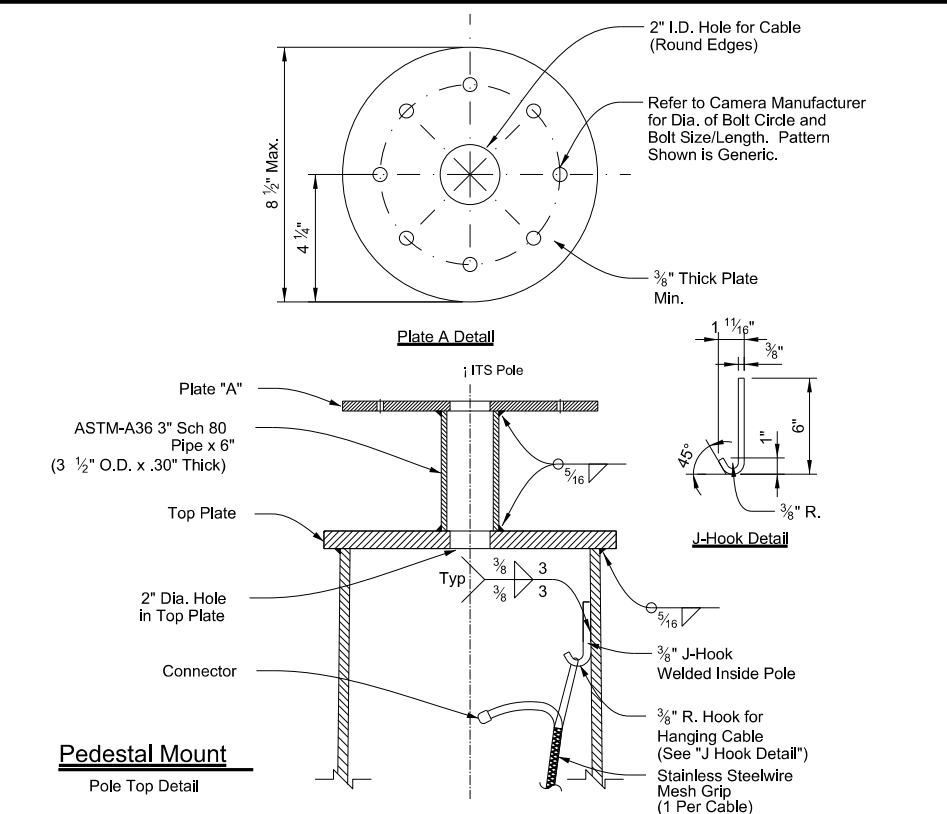
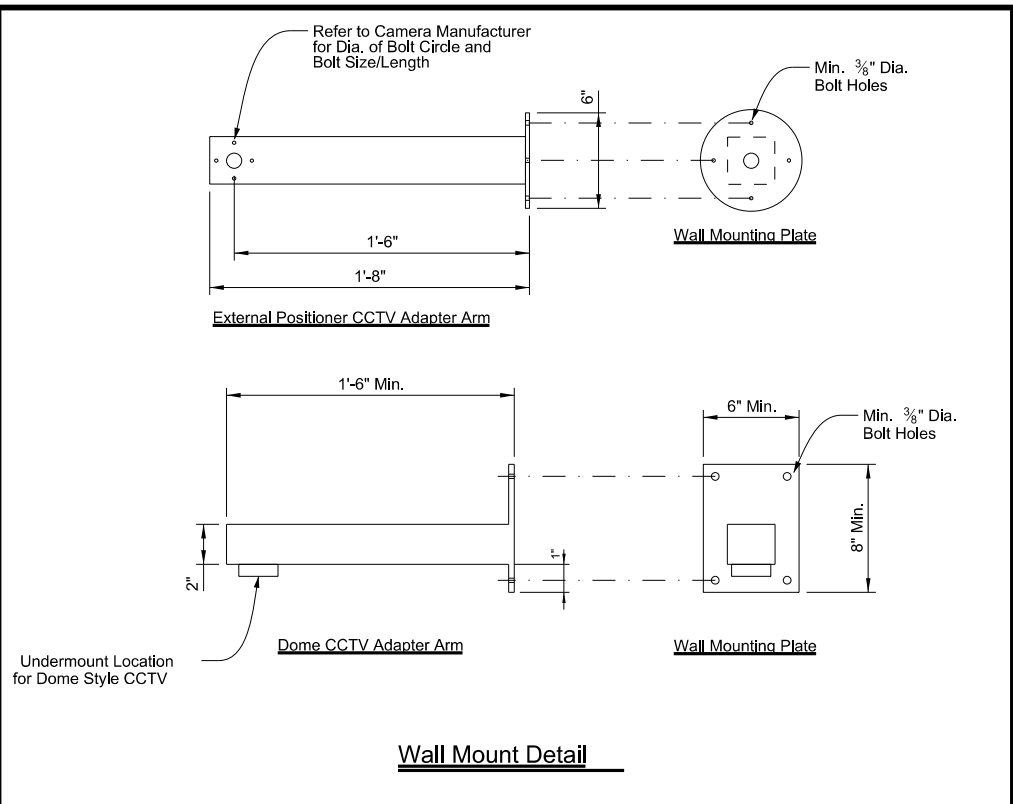
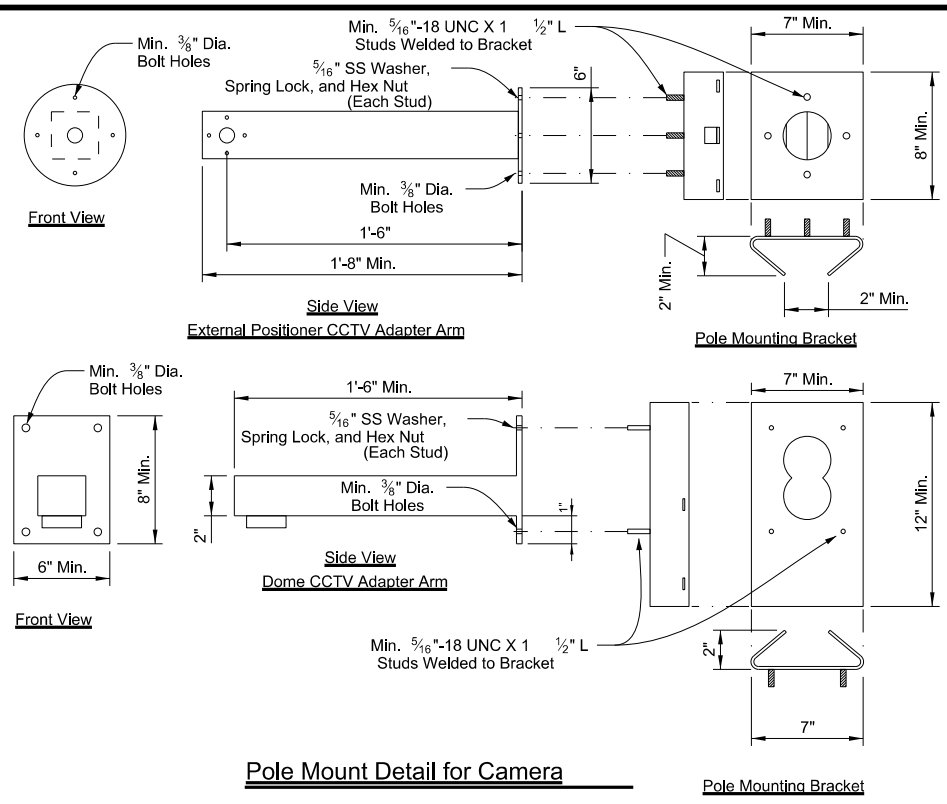
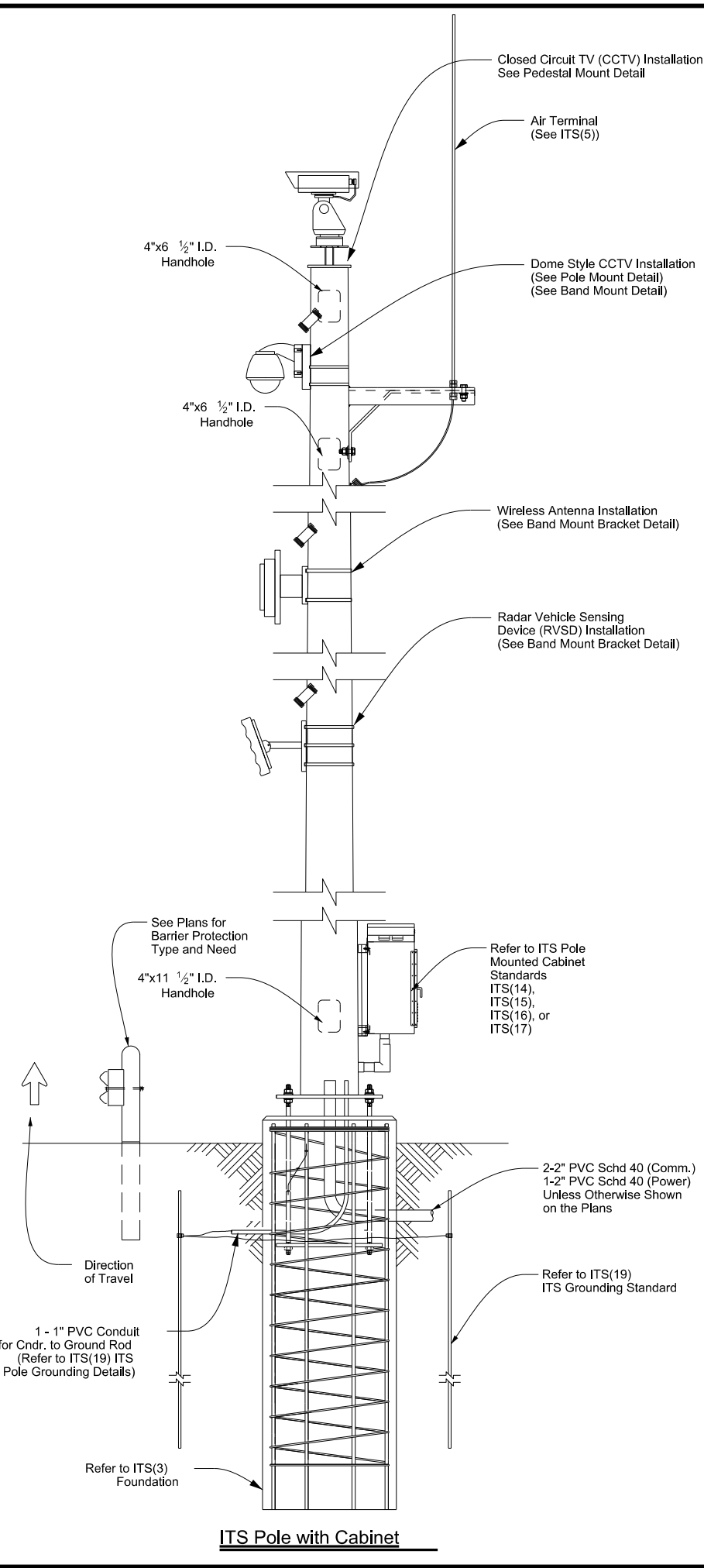
ITS POLE AIR TERMINAL DETAILS

ITS(5) - 15

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General Notes:

1. Designed according to Sixth Edition AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications.
2. Hang all cabling inside ITS pole structure with stainless steel wire mesh grips.
3. Bolt positioning in the pedestal top plate (Plate "A") for the pan/tilt base must be determined in the field per camera manufacturers recommendations. This will allow positioning of the camera to maximize coverage area. The Engineer will determine the camera's blind zone at each location.
4. Provide pedestal top plate and Plate "A" that conform to ASTM A36.
5. Make all welds conform to Item 441 and AWS D1.1 (Structural Welding). Repair damaged galvanized coating per Item 445, "Galvanizing."
6. Galvanize parts in accordance with Item 445, "Galvanizing" unless otherwise noted.
7. The type of ITS equipment shown to be mounted to the ITS pole is intended to represent the most common ITS equipment applications and should not be treated as all inclusive. Other ITS equipment applications may exist that are project specific.
8. Mounting brackets are intended to be diagrammatic and for information only, and are not all inclusive. Contractor responsible for submitting mounting bracket design for approval by the Engineer prior to fabrication. Mounting bracket designed to support a maximum 35 Lbs. Off-the-shelf mounting brackets are acceptable and shall be submitted by shop drawing for approval.
9. Mounting heights to be determined in the field based on manufacturer recommendations.

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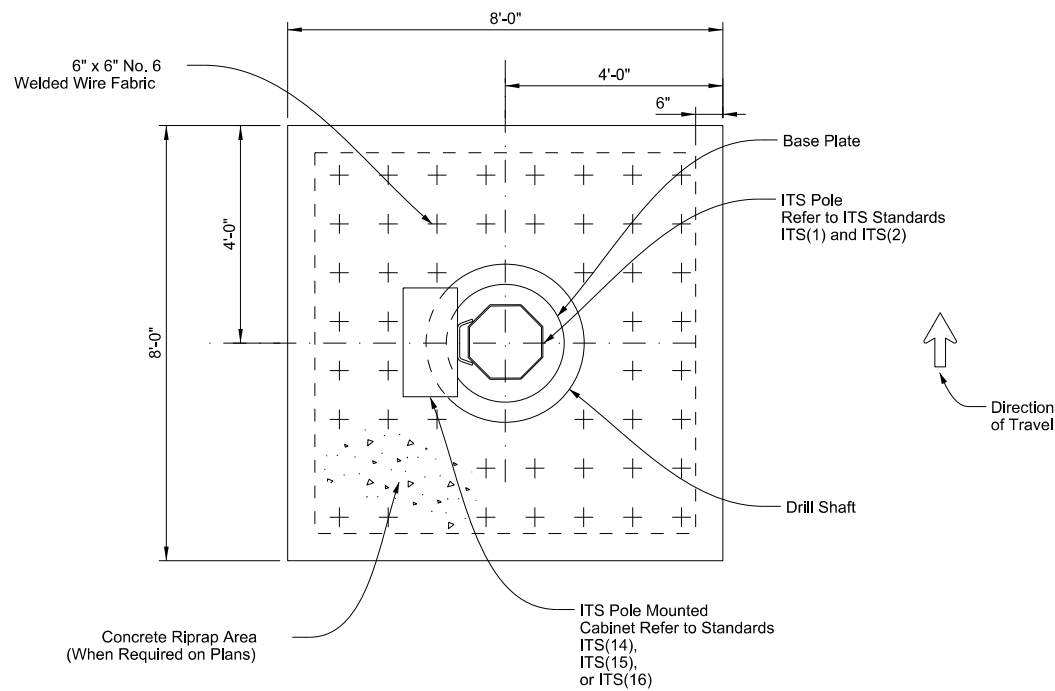
ITS POLE EQUIPMENT MOUNTING DETAILS

ITS(6) - 15

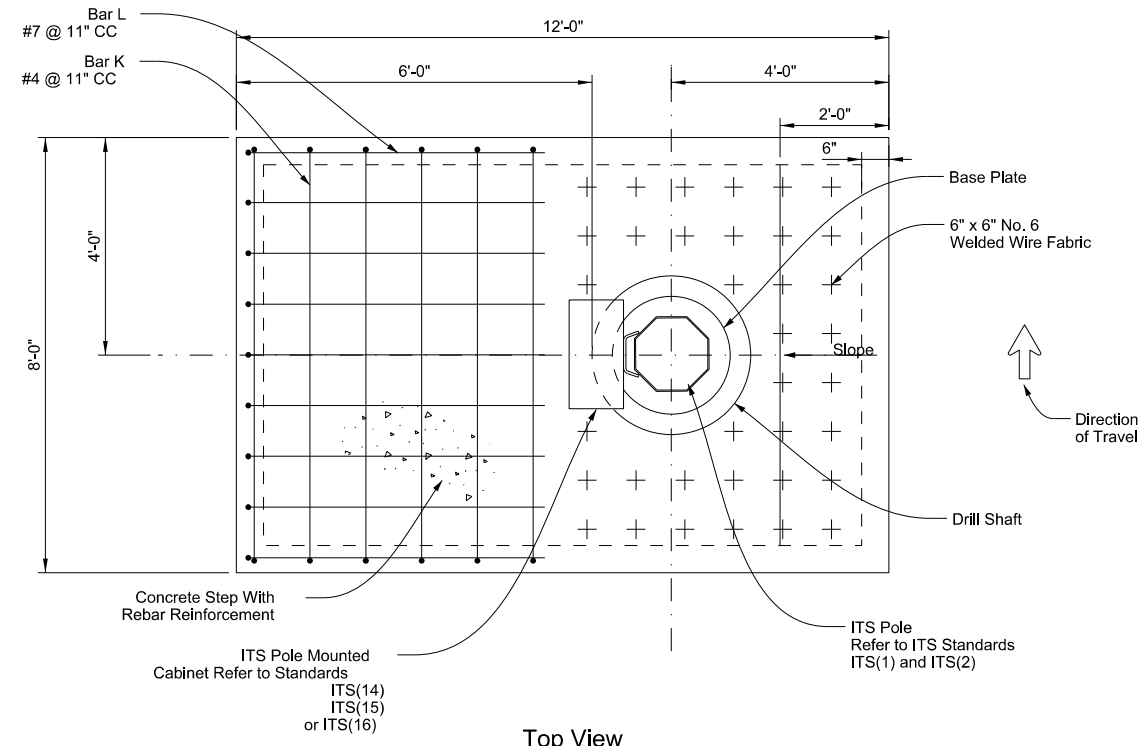
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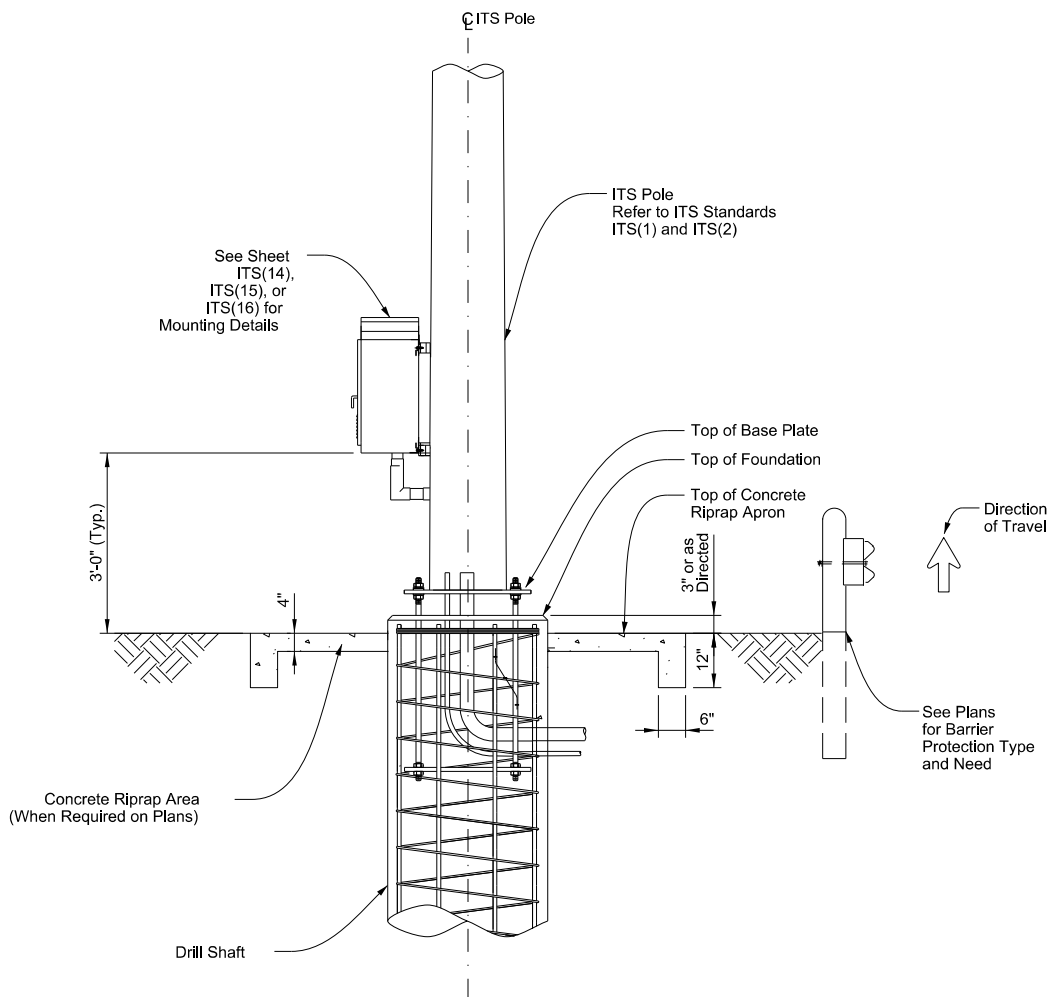
Top View
 Riprap - Non-Sloped Conditions



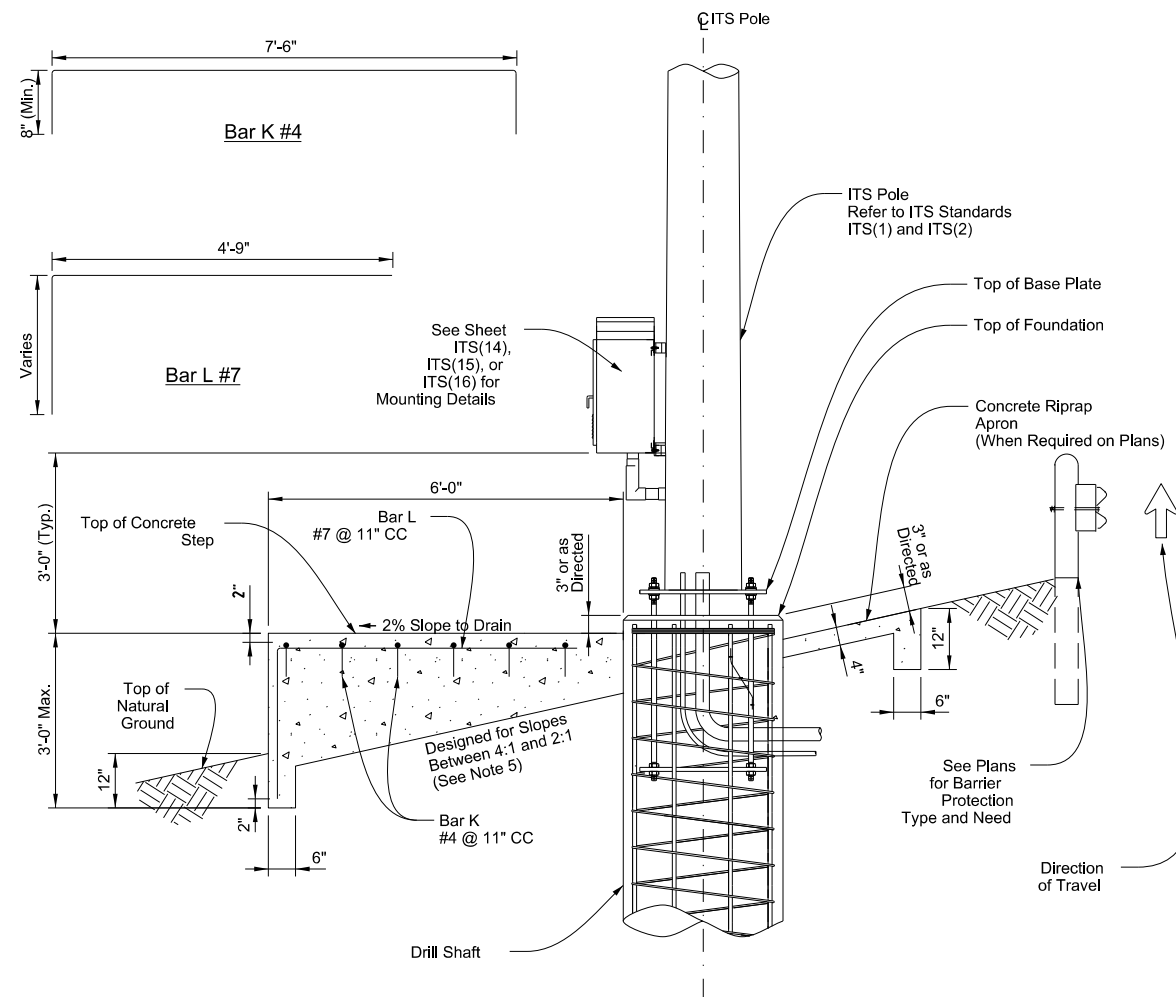
Top View
 Step and Riprap - Sloped Conditions

General Notes:

- For non-sloped grassy areas, an 8' x 8' concrete riprap apron shall be poured around ITS pole foundations (see detail on this sheet), estimated at 1.25 CY per site, paid for under Item 432 "Riprap."
- For sloped grassy areas, a concrete "step" (for maintenance personnel to access cabinet) shall be poured as part of the riprap apron. The step shall vary in height depending on slope, but shall extend 6' horizontally from ITS pole drilled shaft foundation and be the same width as riprap apron (8'). Step shall be poured at same time as riprap apron (see detail on this sheet). Any additional concrete necessary to fabricate step (over and above the 1.25 CY) shall be considered subsidiary to the various bid items and no direct payment shall be made.
- For sloped areas where riprap exists, a 6' (horizontal from drilled shaft foundation) x 4' wide step shall be installed (see detail this sheet). Concrete for step shall be considered subsidiary to the various bid items and no direct payment shall be made.
- Cabinet orientation may vary depending on field conditions or project constraints. Accommodate configuration of platform according to cabinet orientation.
- Slopes greater than a 2:1 or when 3'-0" Max. step wall height is exceeded, an alternative design with safety railing is required and shall be detailed in the shop drawings for approval.



Elevation View
 Riprap Apron Detail - Non-Sloped Conditions



Elevation View
 Riprap Apron/Step Detail - Sloped Conditions
 (Slopes Exceeding 4:1)



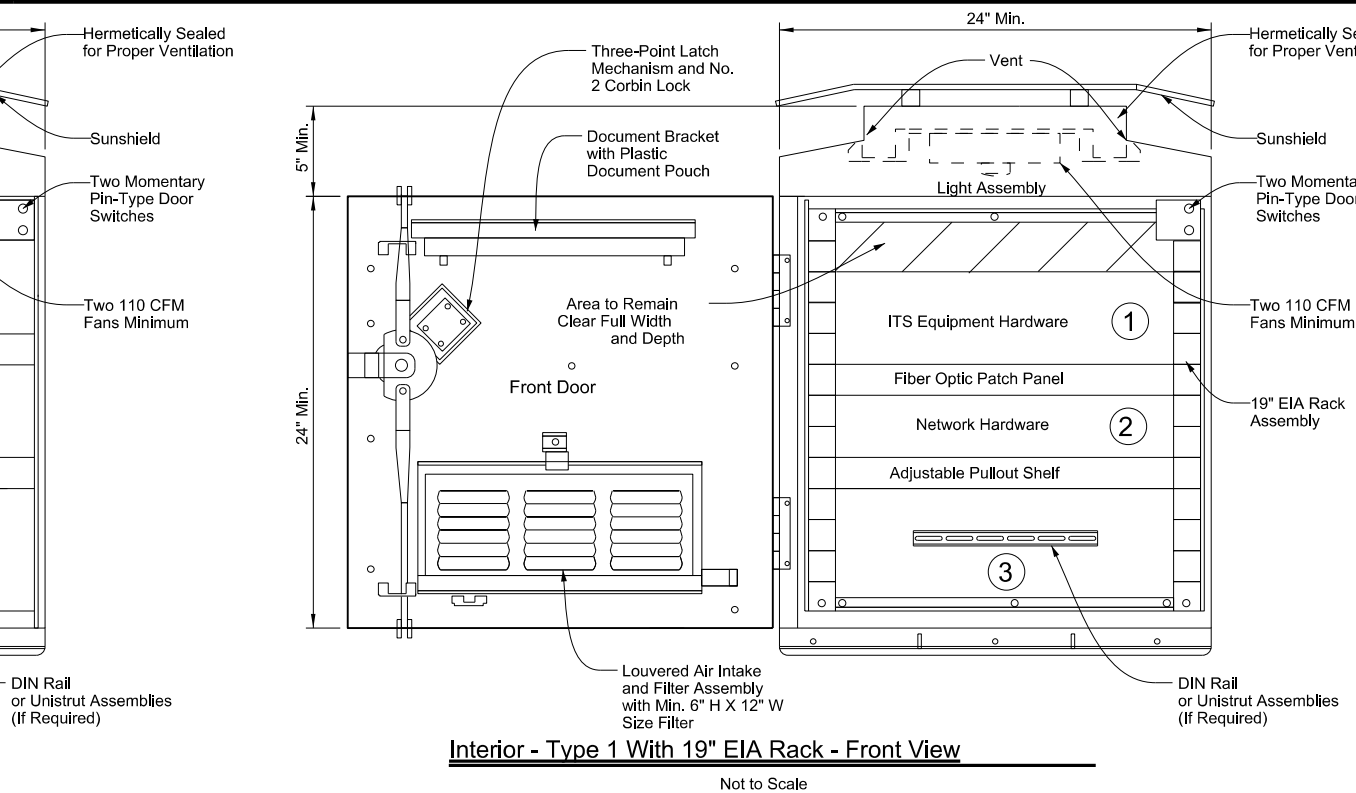
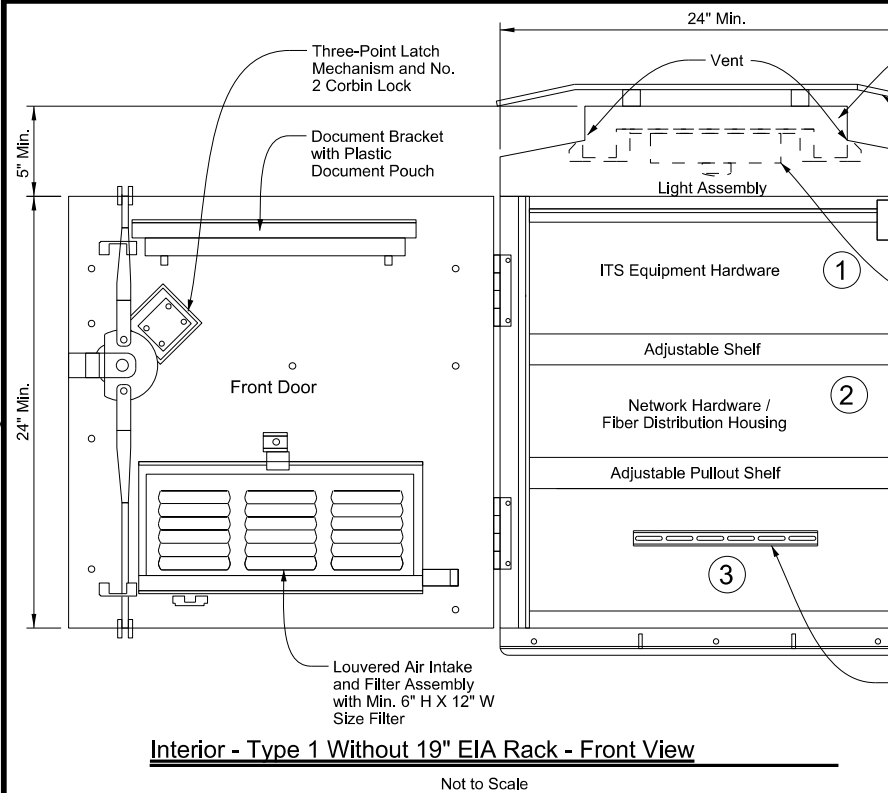
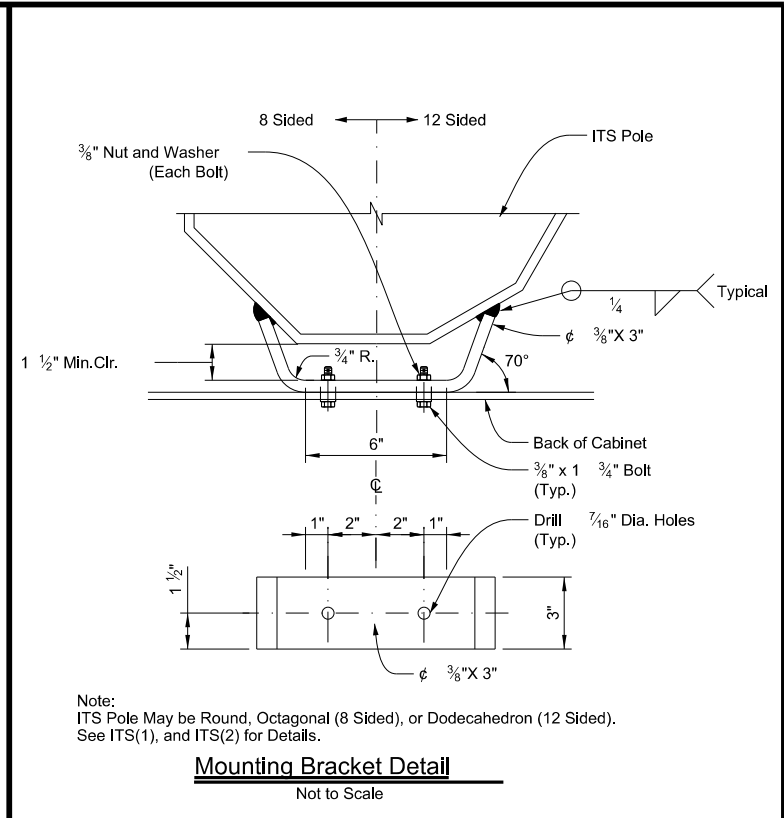
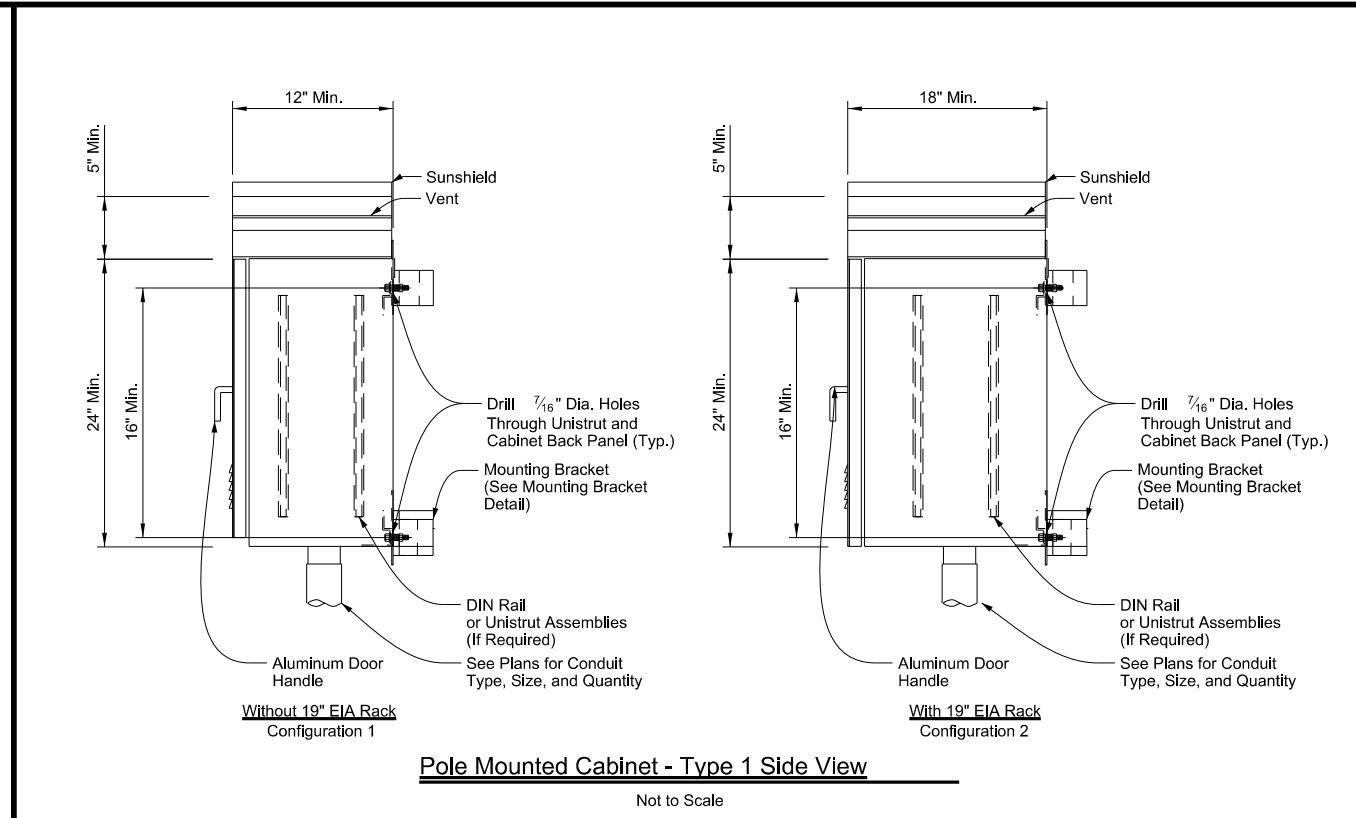
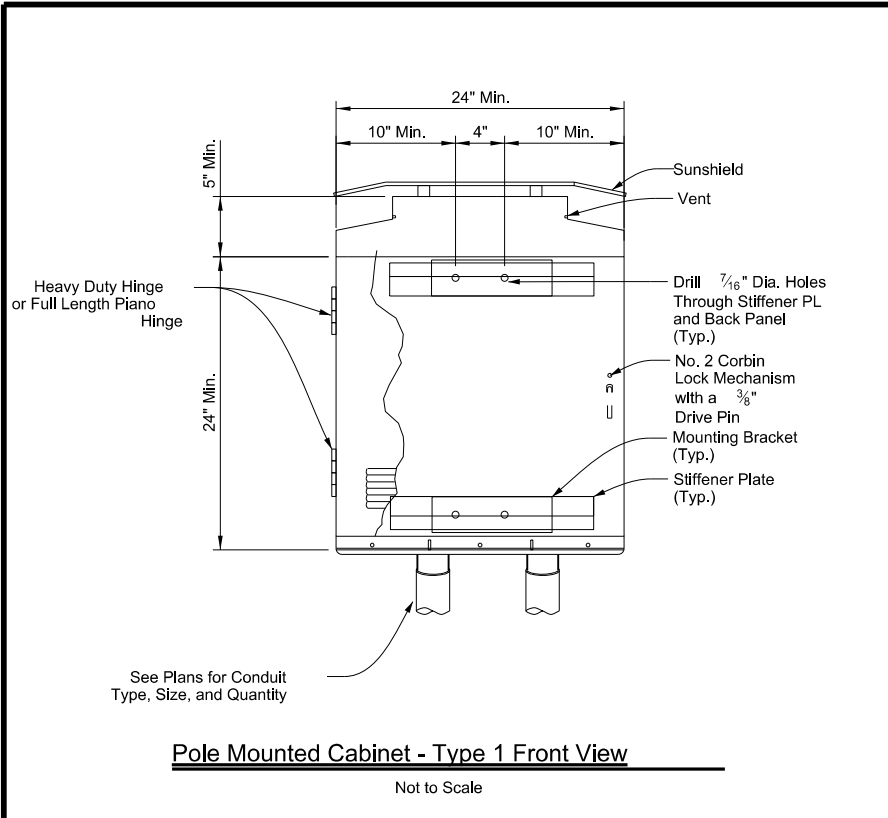
**ITS POLE
 RIPRAP DETAILS**

ITS(7)-15

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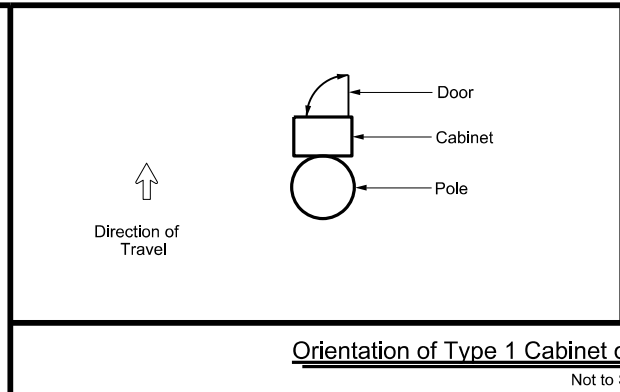
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Typical Equipment Layout Legend	
Example Equipment	
①	CCTV Interface Panel, Radar Vehicle Sensing Device (RVSD) Equipment, Environmental Sensor Station (ESS) Equipment, Bluetooth Equipment, or ITS Radio Equipment (See General Note 1)
②	Ethernet Switch, Video Encoder, Terminal Server, Fiber Optic Transceivers, or Media Conversion Equipment (See General Note 1)
③	Power Distribution Assembly, Service Entrance Breakers, Primary AC Power, Auxiliary Power Strip, Ground Bus Bar Surge Protection Equipment

General Notes:

- Layout of hardware equipment and configuration shown is diagrammatic in nature and intended to represent a preferred Type 1 pole mounted cabinet setup. Hardware needed for each Type 1 cabinet varies and not all cabinet equipment may be shown. The contractor will be responsible for configuring cabinets with all appropriate ITS hardware and power supplies in accordance with the plans and specifications. The contractor may alter the cabinet configuration shown to maximize space and ensure easy access for maintenance.
- Mount cabinet as detailed on ITS(14) or ITS(17). Orientation of cabinet on ITS pole may vary depending on field conditions. Mount the pole mounted cabinet to the backside of the ITS pole, to allow maintenance personnel to access the cabinet while being able to view oncoming traffic.
- For ITS pole sites located on slopes greater than 4H:1V, mount the cabinet to the backside of the ITS pole as detailed on ITS(7). Mounting height to accommodate maintenance pad for easy access.
- All dimensions are approximate and represent minimum cabinet dimensions.
- Provide conduit entrances at the bottom of the cabinet.
- Paid under Special Specification "ITS Pole with Cabinet" (Configuration 1) without 19" EIA rack.
 Paid under Special Specification "ITS Pole with Cabinet" (Configuration 2) with 19" EIA rack.



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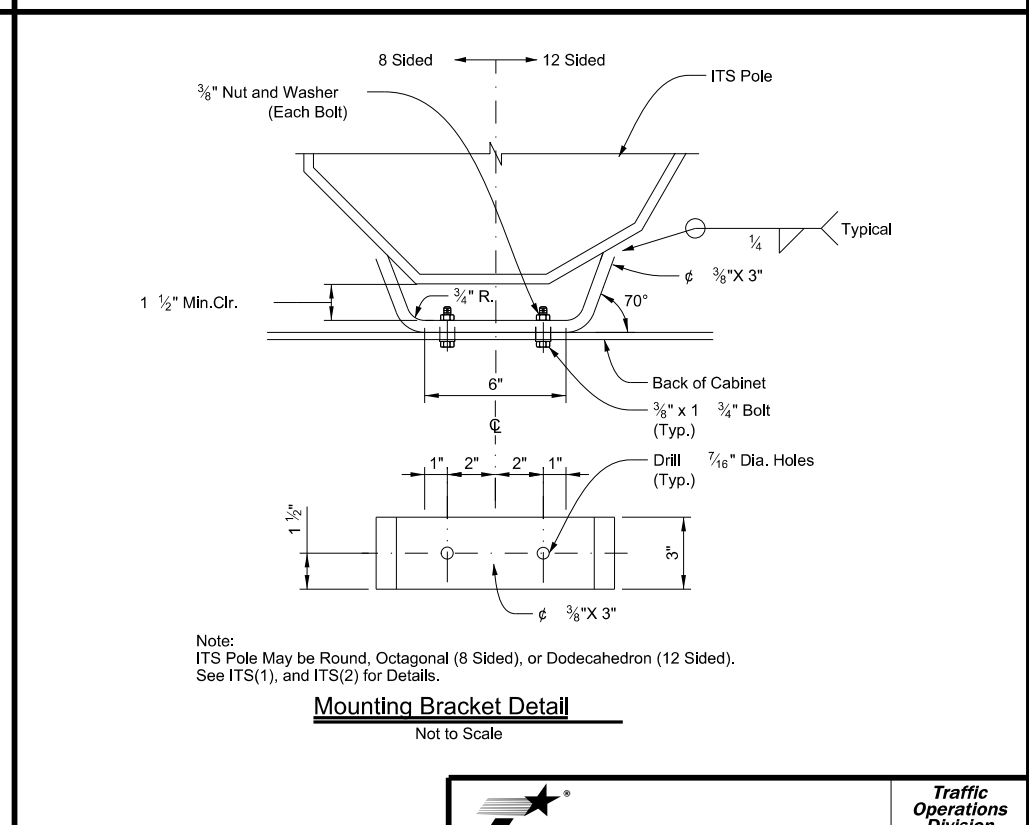
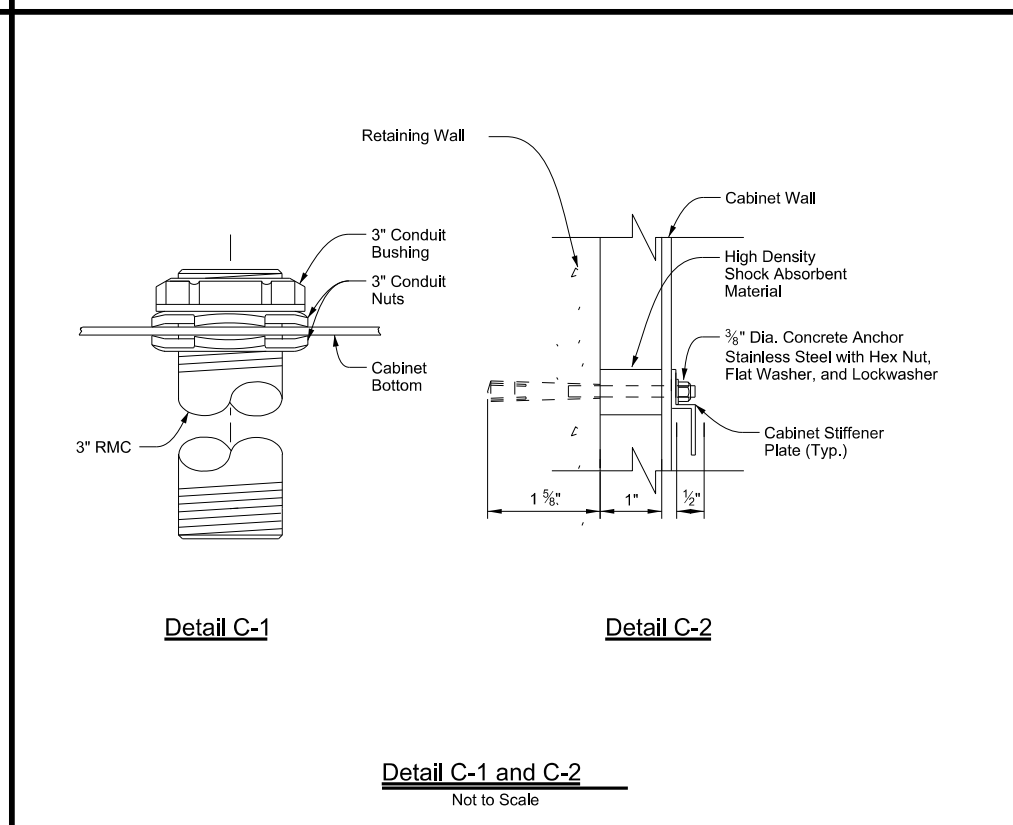
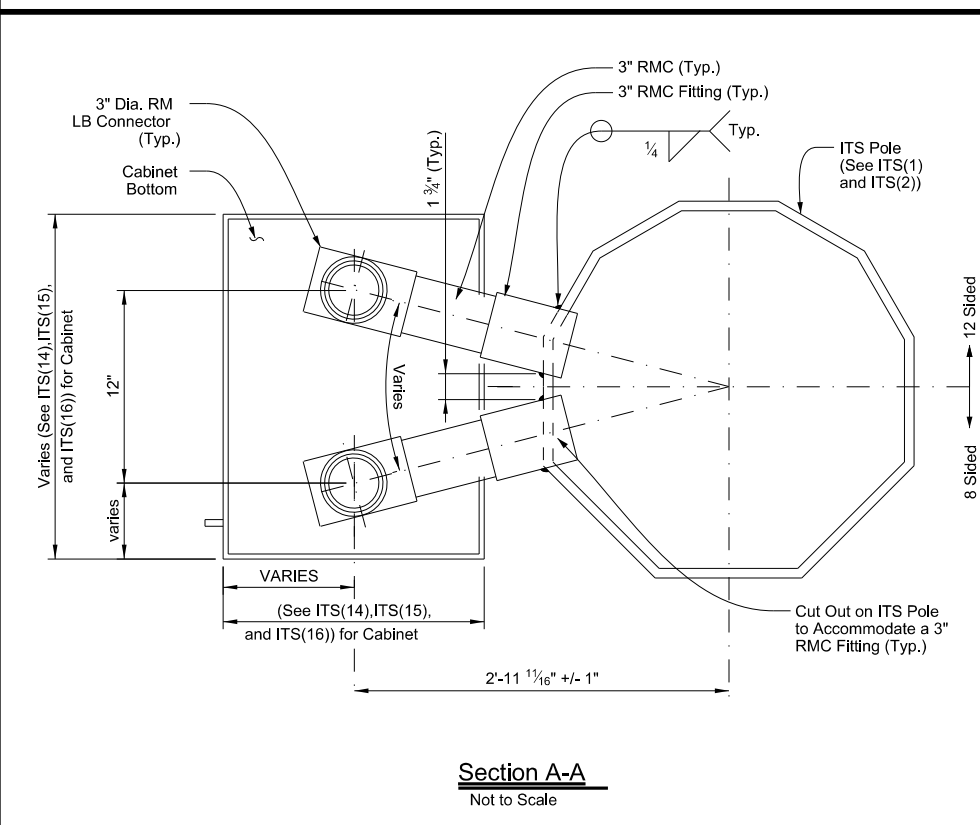
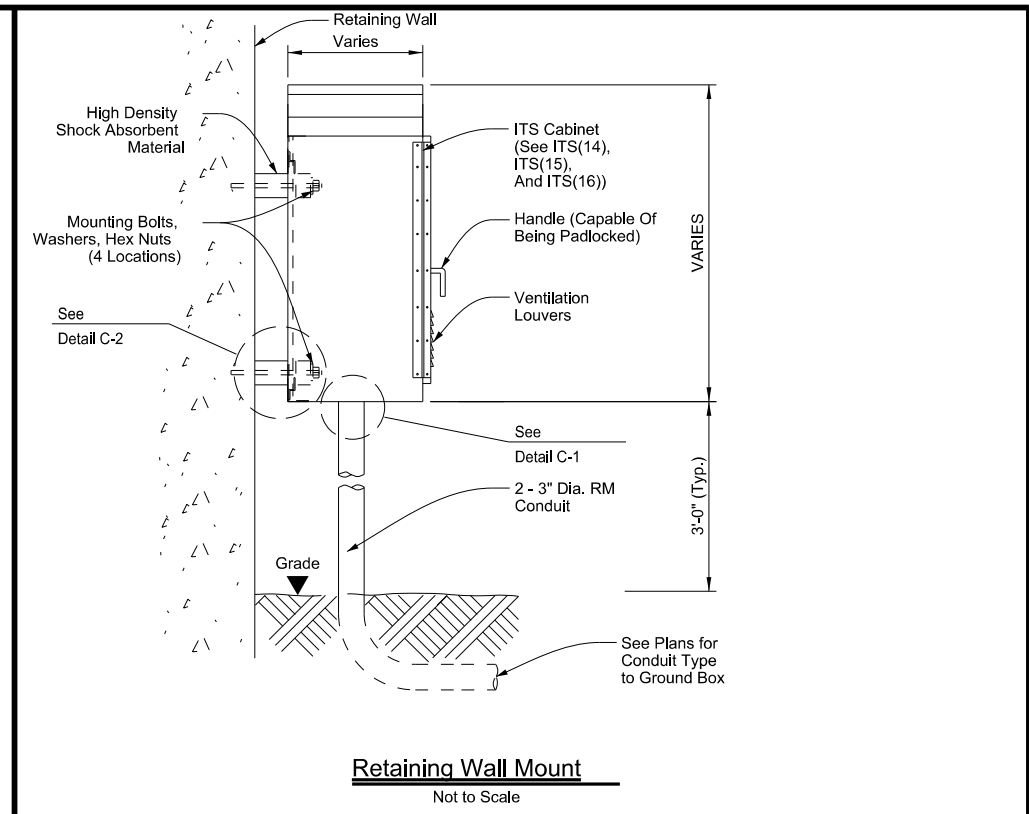
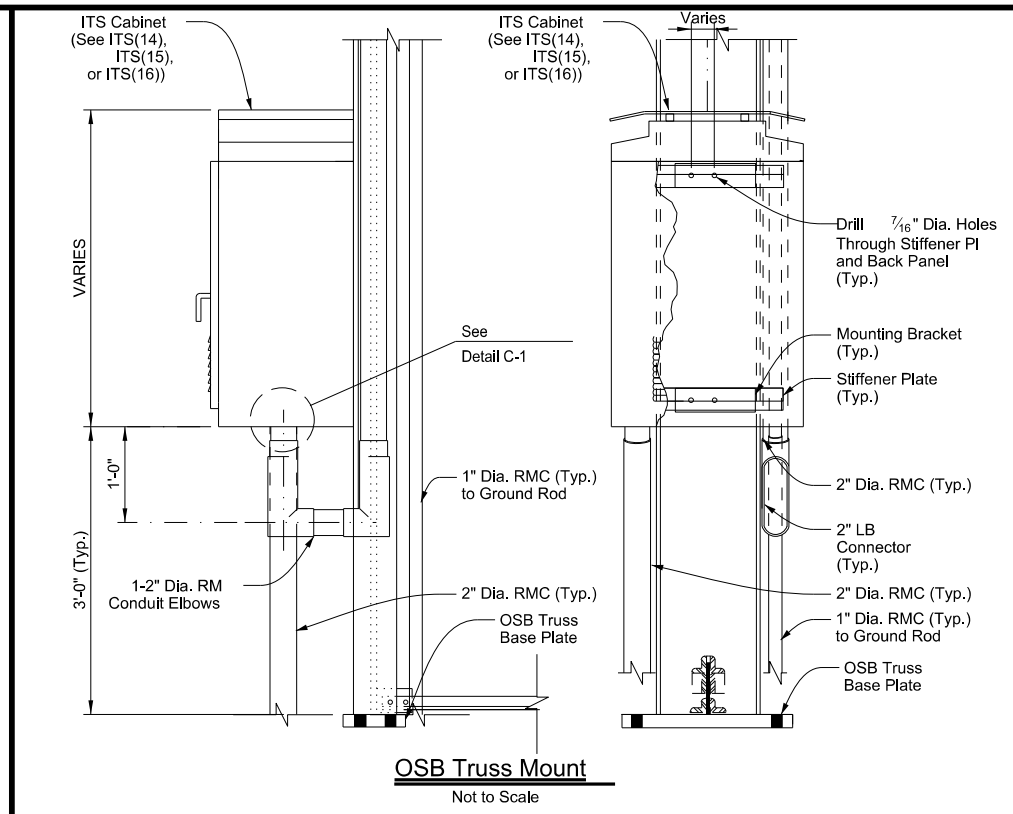
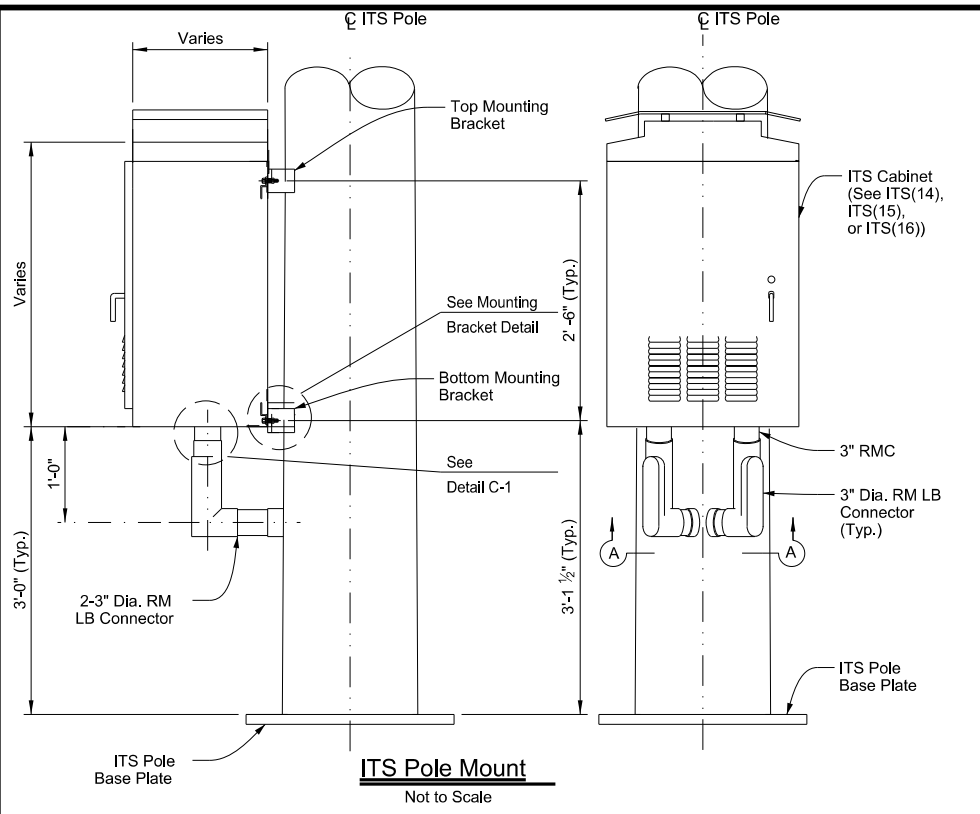
ITS POLE MOUNTED CABINET TYPE 1 DETAILS

ITS(14)-15

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- General Notes:**
1. Mount cabinet as detailed on ITS(14), ITS(15), ITS(16), or ITS(17). Orientation of cabinet on ITS pole may vary depending on field conditions. Mount the pole mounted cabinet to the backside of the ITS pole, to allow maintenance personnel to access the cabinet while being able to view oncoming traffic.
 2. For ITS pole sites located on slopes greater than 4V:1H, mount the cabinet to the backside of the ITS pole as detailed on ITS(7). Mounting height to accommodate maintenance pad for easy access.
 3. All dimensions are approximate and represent minimum dimensions.
 4. Provide conduit entrances at the bottom of the cabinet.

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ITS POLE MOUNTED CABINET MISC. MOUNTING DETAILS

ITS(17)-15

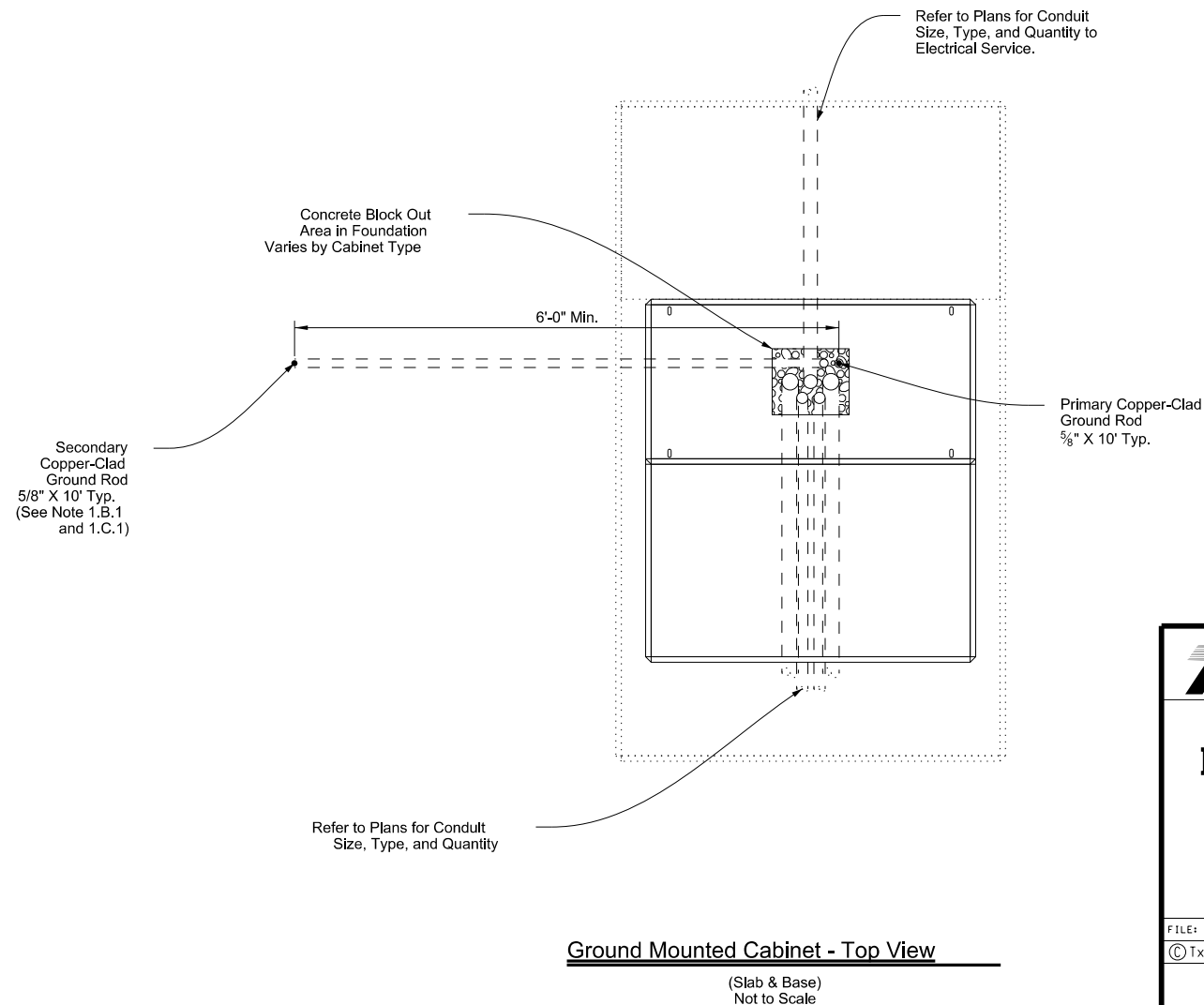
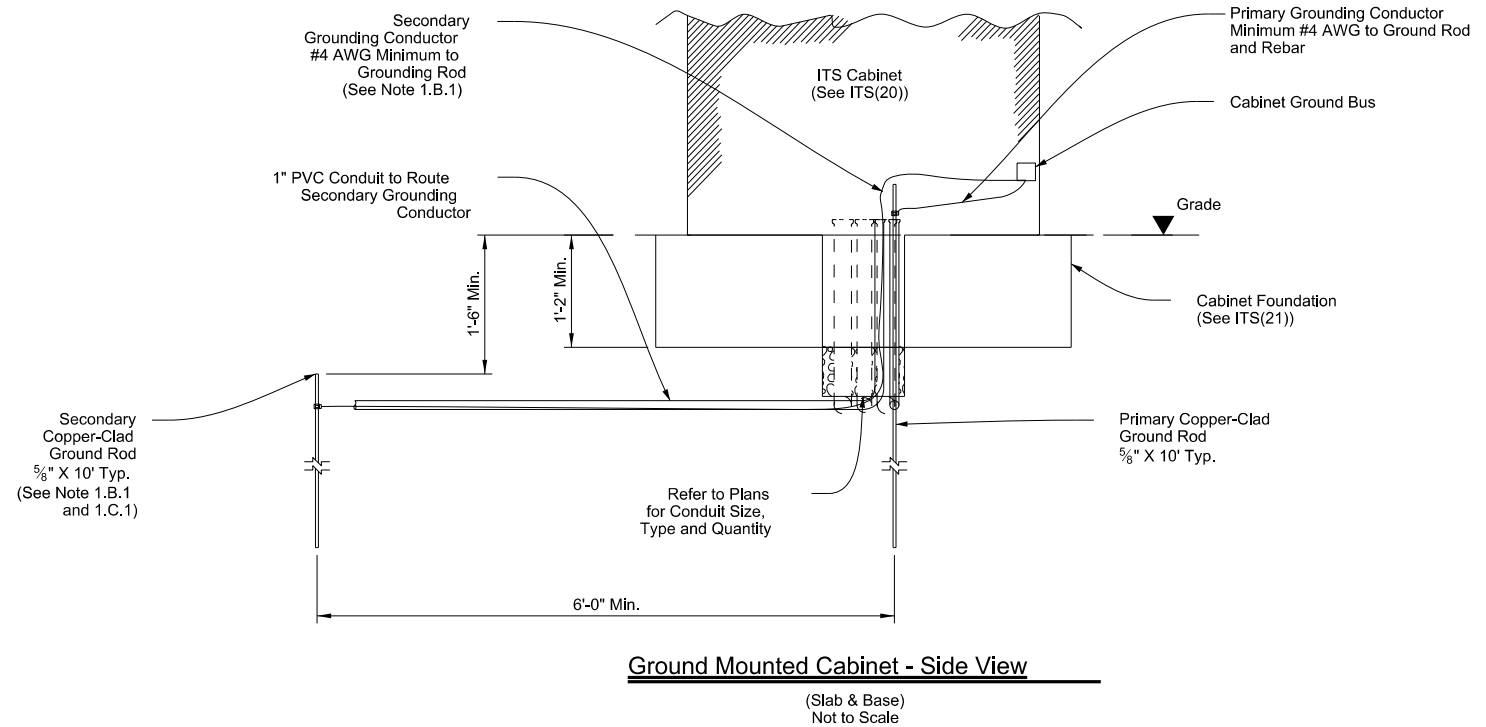
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General Notes:

1. Grounding System:
 - A. Description:
 1. Provide ground system consisting of copper wires, ground rods, and concrete-encased grounding electrodes (Ufers), of the configuration shown to minimize potential gradient irregularities, drain leakage, and fault currents to earth.
 - B. Performance:
 1. Provide a grounding system, consisting of a minimum one ground rod, having a resistance not greater than 5 Ohms to ground. Additional ground rods may be added to the system to achieve less than 5 Ohms resistance.
 - C. Design Criteria:
 1. The combined ground resistance of separate systems bonded together below grade may be used to meet the specified ground resistance, but the minimum number of rods indicated shall still be provided.
 2. Measure the resistance of systems requiring separate ground resistance separately before bonding below grade.
 3. Only provide UL-approved materials listed for grounding systems.
 4. Do not combine materials that can form an electrolytic couple that will accelerate corrosion in the presence of moisture, unless moisture is permanently excluded from the junction of such materials.
 5. Submit product data for the materials and products used to perform the work of this section.
 - D. Materials:
 1. Conductors:
 - a. Bare Ground Conductor:
 - 1) For No. 8 AWG or larger bare ground wire sizes, provide soft drawn copper, Class A or Class B, stranded wire meeting the requirements of ASTM B 8.
 2. Ground Compression Connectors:
 - a. Provide molds, thermite packages, and other material for ground compression connectors that are full-rated to carry 100% of the cable rating and which meet IEEE 837.
 - 1) Provide the compression materials from a single manufacturer throughout the project.
 2. Provide the items necessary for connecting cable to ground rods.
 3. Ground Rods:
 - a. Provide copper-clad steel ground rods conforming to the requirements specified in UL 467.
 - 1) Diameter: 5/8 in.
 - 2) Length: 10 Ft.
2. Installation:
 - A. Install grounding components and systems in accordance with the requirements specified in UL 467, IEEE 81, and IEEE 142.
 - B. System Grounding:
 1. Ground Rods:
 - a. Drive ground rods into the ground until the tops of the rods are approximately 18 in. below finished grade.
 - b. If multiple ground rods are needed to meet the minimum resistance of 5 Ohms, space ground rods as evenly as possible, at least 6 feet apart, and so conductors will be connected below grade.
 2. Conductors:
 - a. Provide minimum No. 4 AWG ground wire for system and equipment grounding.
 - b. Using suitable fasteners, securely attach exposed ground wires to structural supports at not more than 2 ft. intervals, where applicable.
 - c. Bends in ground wires greater than 45 degrees are unacceptable.
 3. Cable Connections:
 - a. Use approved exothermic-welded connections for conductor splices and connections between conductors and other components.
3. Testing:
 - A. Resistance Test:
 1. Test Procedure:
 - a. The ground-resistance measurements of each ground Rod shall be taken.
 - 1) The resistance to ground shall be measured in accordance with the fall-of-potential method specified in IEEE 81 and IEEE 142.
 - 2) Ground-resistance measurements shall be made in normally dry weather, not less than 48 hours after rainfall, and with the ground under test isolated from other grounds.
 - b. Test reports shall be prepared that indicate the location of the ground rod, the grounding system, and the resistance and soil conditions at the time the test was performed.
 2. Acceptance Criteria:
 - a. The grounding system must have a resistance not greater than 5 Ohms.
 - b. Do not energize any part of the electrical distribution system prior to the resistance testing of that system's ground rods and grounding system, and submission of the test results for approval.
 3. Inspections:
 - a. Prepare and submit as-built record drawings of the grounding system as installed and test reports for approval.



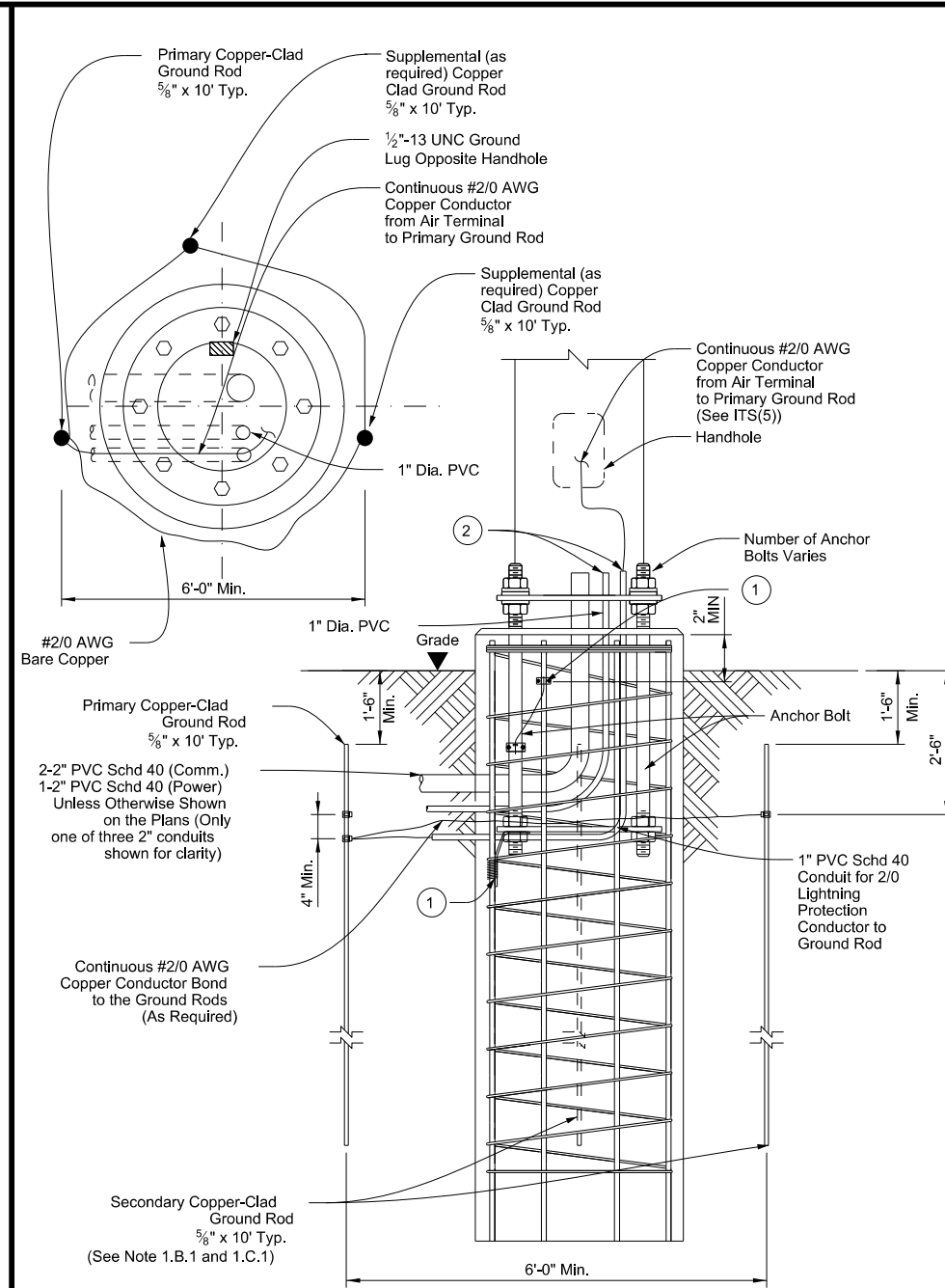
		Traffic Operations Division Standard	
<h2>ITS CABINET GROUNDING DETAILS</h2>			
<h3>ITS(18)-15</h3>			
FILE: its(18)-15.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
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ABL	TAYLOR		73

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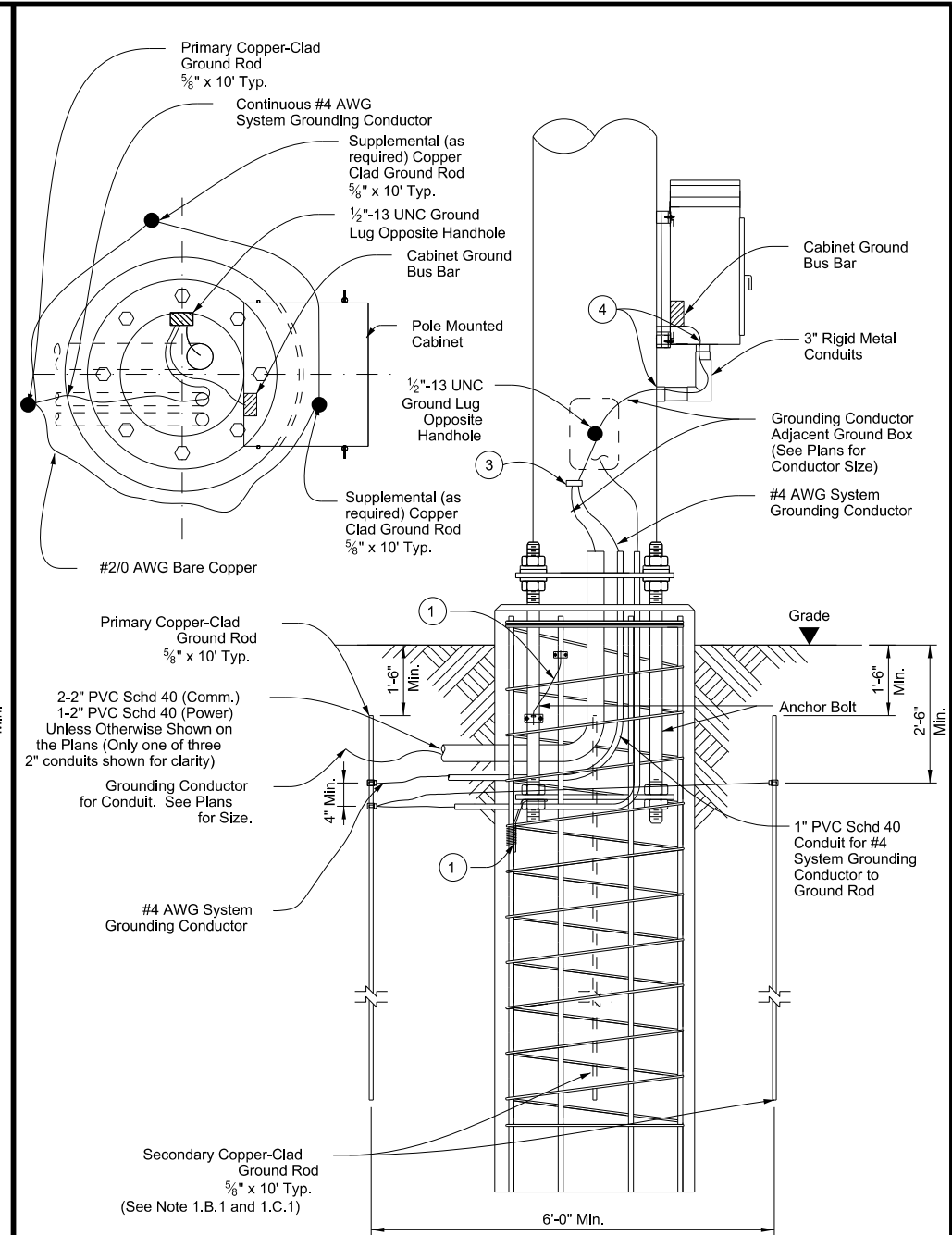
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General Notes:

1. Grounding System:
 - A. Description:
 1. Provide ground system consisting of copper wires, ground rods, and concrete-encased grounding electrodes (Ufers), of the configuration shown to minimize potential gradient irregularities, drain leakage, and fault currents to earth.
 - B. Performance:
 1. Provide a grounding system, consisting of a minimum one ground rod, having a resistance not greater than 5 Ohms to ground. Provide up to 2 additional supplemental ground rods if necessary to achieve a resistance not greater than 5 Ohms to ground. If a total of 3 ground rods is needed then install as part of a ground ring.
 2. If a ground ring is required, provide a minimum conductor length of 20 ft. placed at a minimum depth of 30 in..
 - C. Design Criteria:
 1. The grounding system of the ITS pole may be bonded below grade to the grounding systems of other nearby equipment to meet the specified grounding resistance. A minimum of one ground rod for the ITS pole is still required.
 2. Separately measure the grounding resistance of each system before bonding together below grade.
 3. Only provide UL-approved materials listed for grounding systems.
 4. Do not combine materials that can form an electrolytic couple that will accelerate corrosion in the presence of moisture, unless moisture is permanently excluded from the junction of such materials.
 5. Submit product data for the materials and products used to perform the work of this section.
 - D. Materials:
 1. Conductors:
 - a. Bare Ground Conductor:
 - 1) Provide prequalified copper conductors appearing on the Material Producers List according to Item 618.
 - b. Ground Compression Connectors:
 - a. Provide molds, thermite packages, and other material for exothermic welding of grounding connections.
 - b. Provide listed compression connectors fully rated to carry 100% of the cable rating and that meet IEEE 837. Provide compression materials from a single manufacturer throughout the project.
 - c. Ground Rods:
 - a. Provide copper-clad steel ground rods conforming to the requirements specified in DMS 11040.
 - 1) Diameter: 5/8 in.
 - 2) Length: 10 ft.
2. Installation:
 - A. Install grounding components and systems in accordance with the requirements specified in IEEE 142.
 - B. System Grounding:
 1. Ground Rods:
 - a. Drive ground rods into the ground until the tops of the rods are a minimum of 18 in. below finished grade.
 - b. If multiple ground rods are needed to meet the minimum resistance of 5 Ohms, space ground rods as evenly as possible, at least 6 feet apart, so conductors will be connected below grade.
 2. Conductors:
 - a. Provide minimum No. 2/0 AWG ground wire for lightning protection from air terminal.
 - b. Provide minimum No. 4 AWG ground wire for system and equipment grounding.
 - c. Using suitable fasteners, securely attach exposed ground wires to structural supports at not more than 2 ft. intervals, where applicable.
 - d. Bends in ground wires greater than 45 degrees are unacceptable.
 3. Cable Connections:
 - a. Use exothermic-welded connections or listed compression connectors for conductor splices and connections between conductors and other components.
3. Testing:
 - A. Resistance Test:
 1. Test Procedure:
 - a. The ground-resistance measurements of each ground Rod shall be taken.
 - 1) The resistance to ground shall be measured in accordance with the fall-of-potential method specified in IEEE 81 and IEEE 142.
 - 2) Ground-resistance measurements shall be made in normally dry weather, not less than 48 hours after rainfall, and with the ground under test isolated from other grounds.
 - b. Test reports shall be prepared that indicate the location of the ground rod, the grounding system, and the resistance and soil conditions at the time the test was performed.
 2. Acceptance Criteria:
 - a. The grounding system must have a resistance not greater than 5 Ohms.
 - b. Do not energize any part of the electrical distribution system prior to the resistance testing of that system's ground rods and grounding system, and submission of the test results for approval.
 3. Inspections:
 - a. Prepare and submit as-built record drawings of the grounding system as installed and test reports for approval.



Grounding System
Not to Scale



Grounding System with Pole Mounted Cabinet
Not to Scale

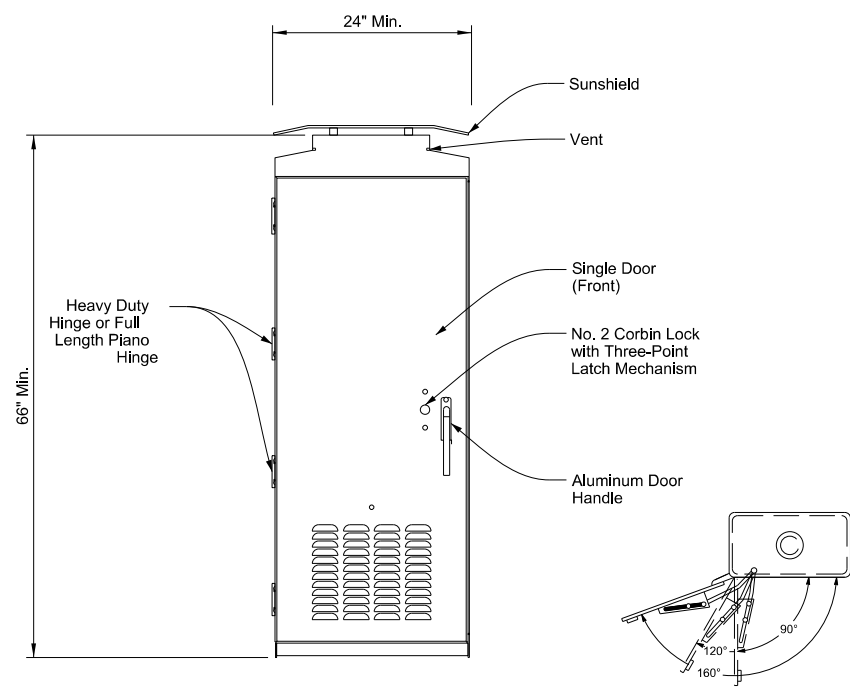
Reference Notes:

- ① Bond anchor bolts to rebar with #2/0 AWG jumper and two mechanical connectors or by bending No. 3 bar on bottom template as shown and wire tightly with ten turns of No. 10 wire or one mechanical connector. Mechanical connectors shall be UL Listed for concrete encasement.
- ② Cut PVC approximately 1 in. above concrete and install bell or bushing. Align conduit as close as possible to point of attachment to base plate to minimize bends in #2/0 wire.
- ③ Bond grounding conductors via cadweld or mechanical connector, rated for size and number of conductors.
- ④ Provide and install a grounding type bushing on metal conduit terminations. 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.

		Traffic Operations Division Standard	
<h2>ITS POLE GROUNDING DETAILS</h2>			
<h3>ITS(19)-17</h3>			
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7-17	REVISIONS	SL: 322	HIGHWAY
	DIST: ABL	COUNTY: TAYLOR	SHEET NO.: 74

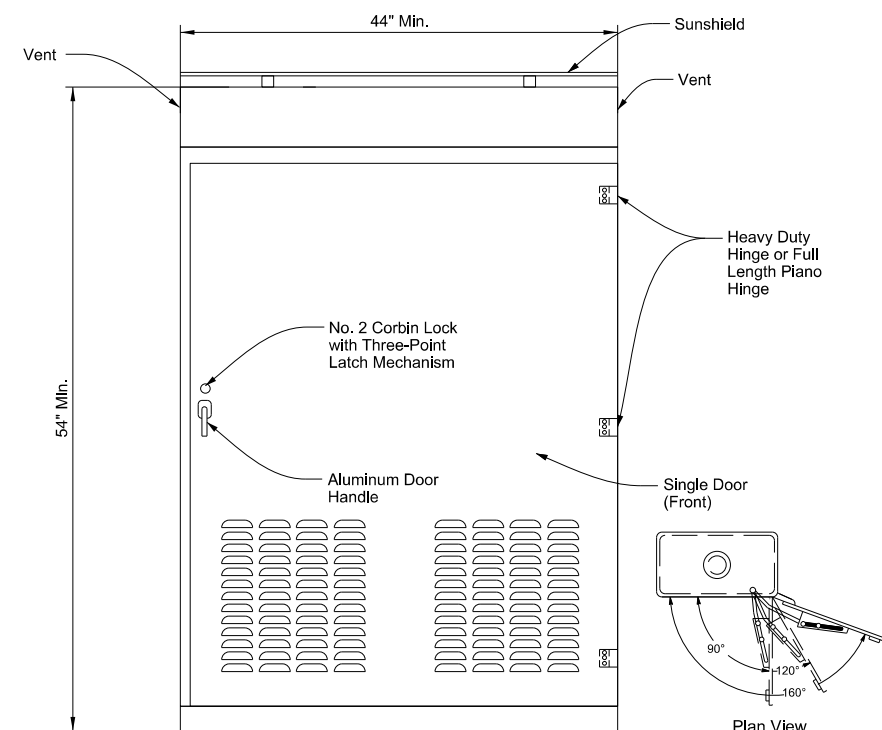
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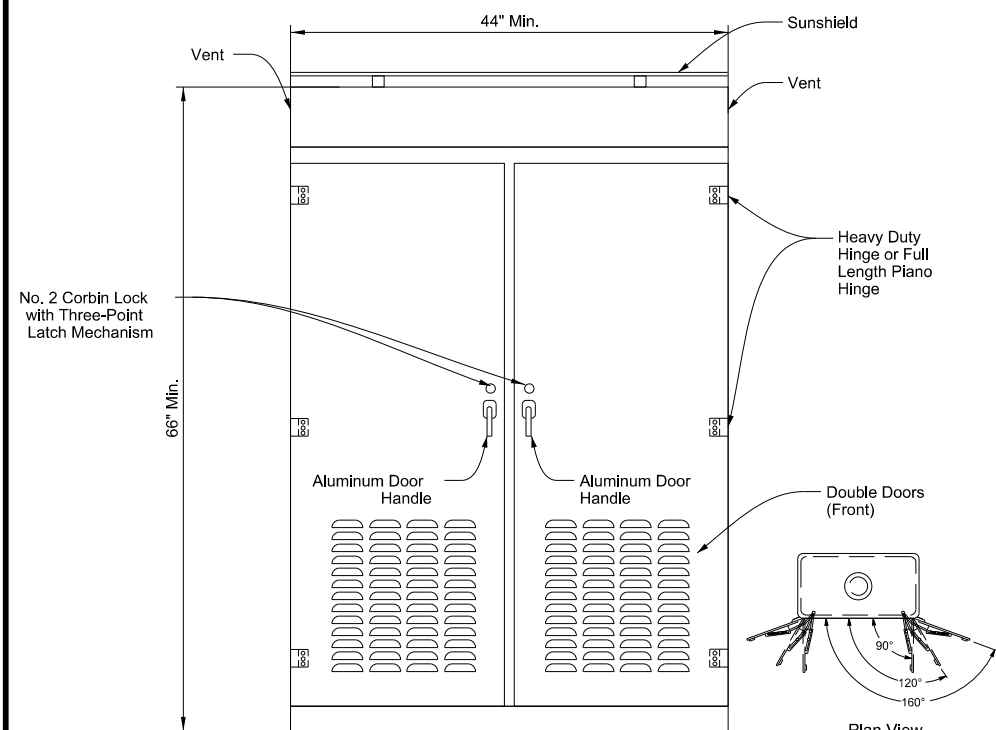
Type 4 (Small) Cabinet
Front View

Plan View
Door Stop Detail
(3 Positions)



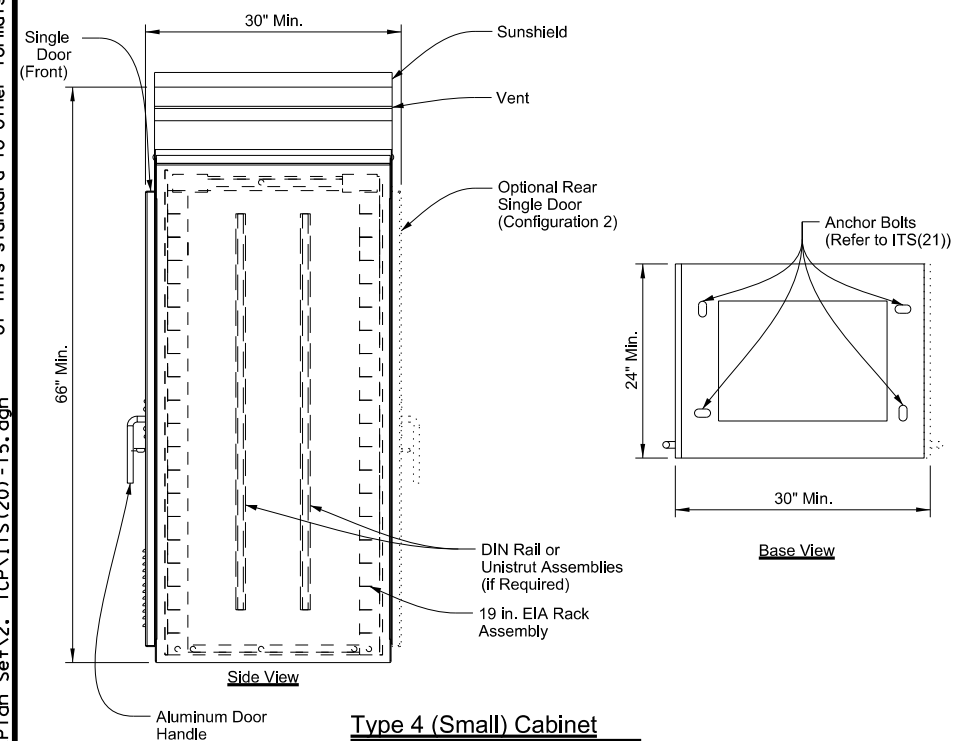
Type 5 (Medium) Cabinet
Front View

Plan View
Door Stop Detail
(3 Positions)



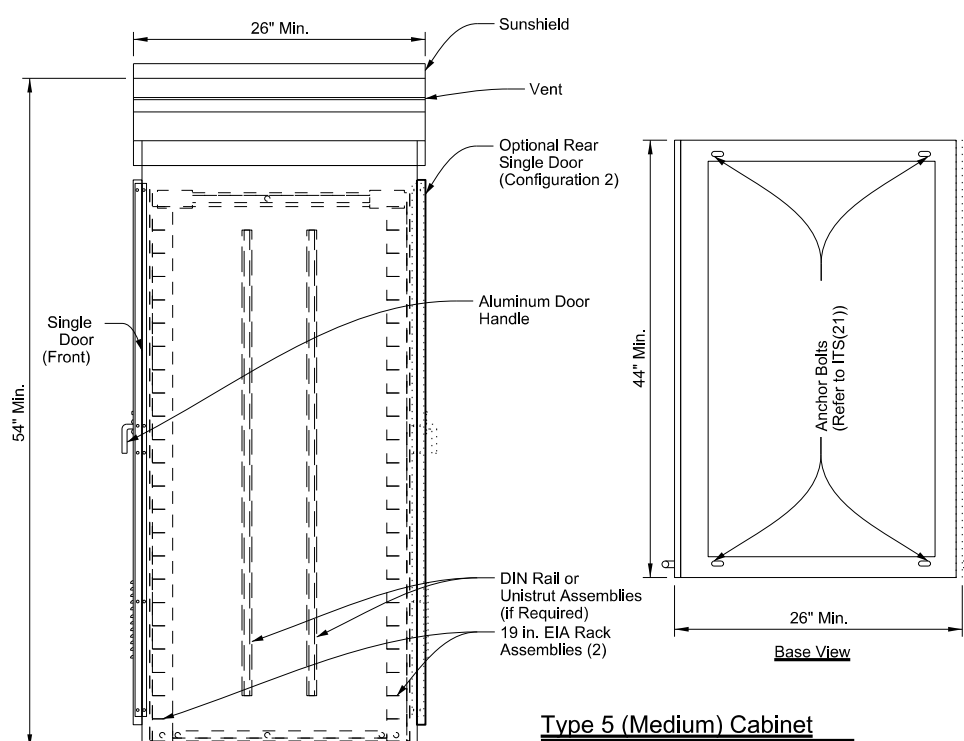
Type 6 (Large) Cabinet
Front View

Plan View
Door Stop Detail
(3 Positions)



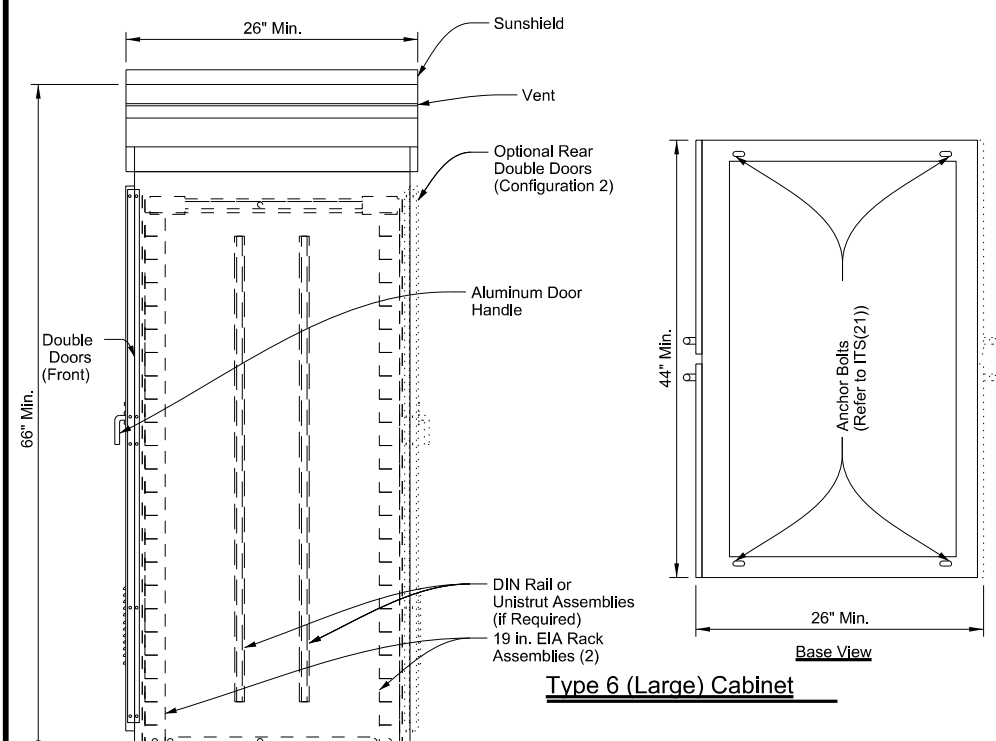
Type 4 (Small) Cabinet
Side View

Base View



Type 5 (Medium) Cabinet
Side View

Base View



Type 6 (Large) Cabinet
Side View

Base View

General Notes:

1. Cabinet hardware equipment and door configuration shown is diagrammatic in nature and intended to represent a preferred ground mounted cabinet setup. Door orientation may vary and will be noted in the plans. The contractor will be responsible for configuring cabinets with all appropriate ITS hardware and power supplies in accordance with the plans and specifications. The contractor may alter the cabinet configuration shown to maximize space and ensure easy access for maintenance.
2. All dimensions are approximate and represent minimum dimensions.
3. Provide conduit entrances at the bottom of the cabinet.
4. Paid under Special Specification "ITS Ground Mounted Cabinet" (Configuration 1) with single door. Paid under Special Specification "ITS Ground Mounted Cabinet" (Configuration 2) for rear door option.
5. Sunshield to be mounted to cabinet using nuts, bolts, and spacers. Water proof sealant to be used at cabinet surface/bolt contact points.



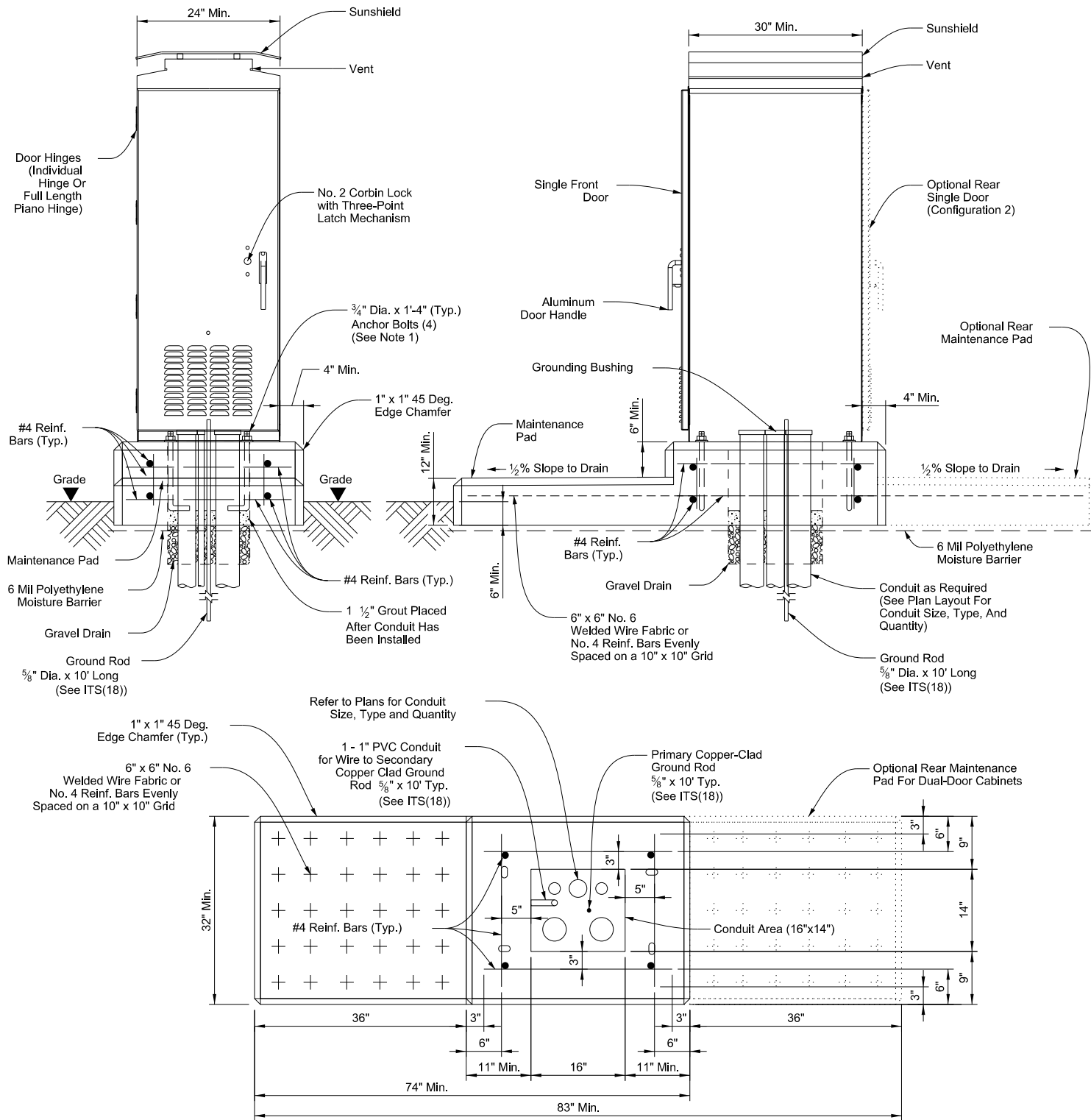
ITS GROUND MOUNTED CABINET ELEVATION DETAILS

ITS(20)-15

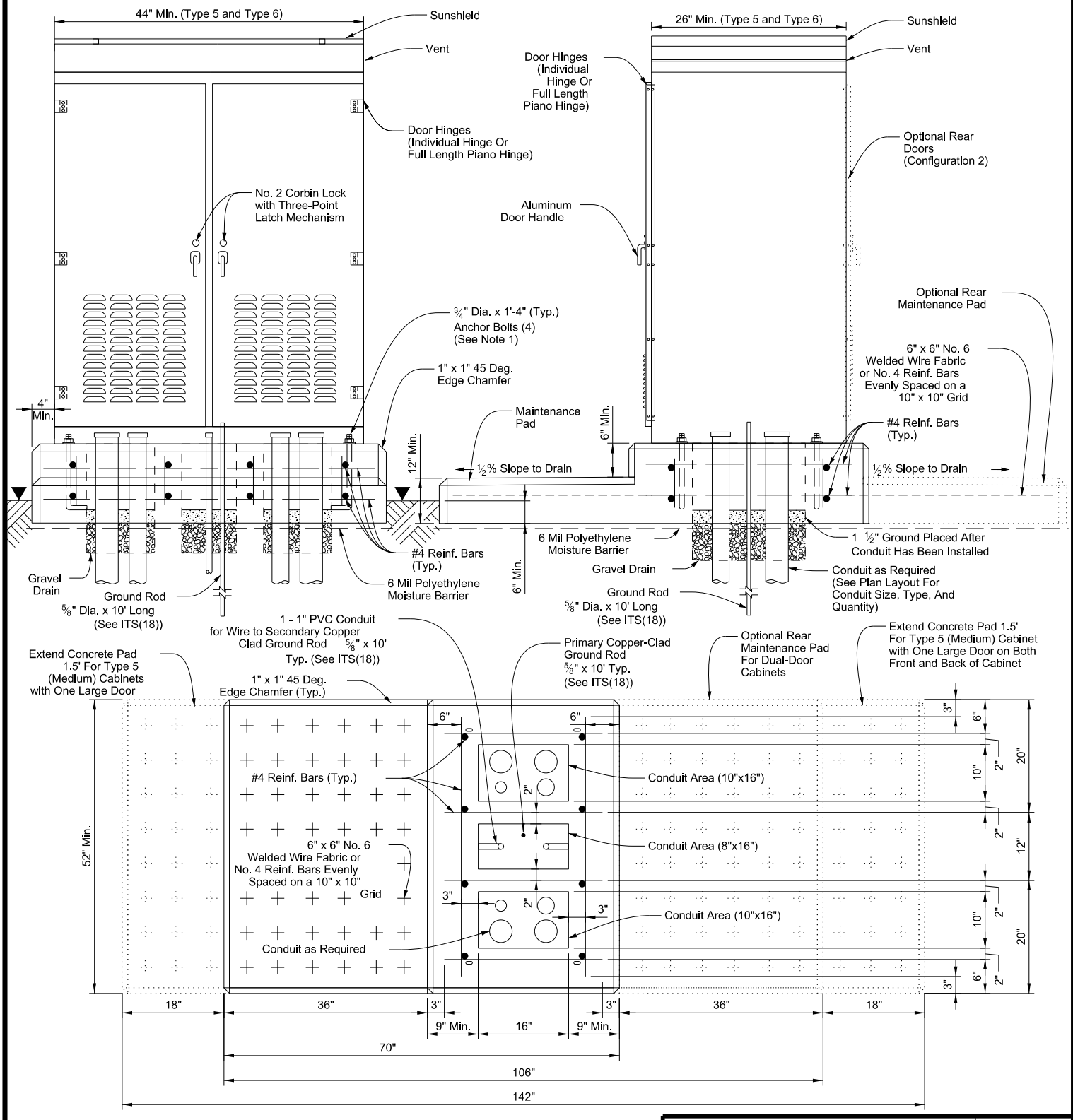
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Type 4 (Small) Cabinet



Type 5 (Medium) & Type 6 (Large) Cabinet

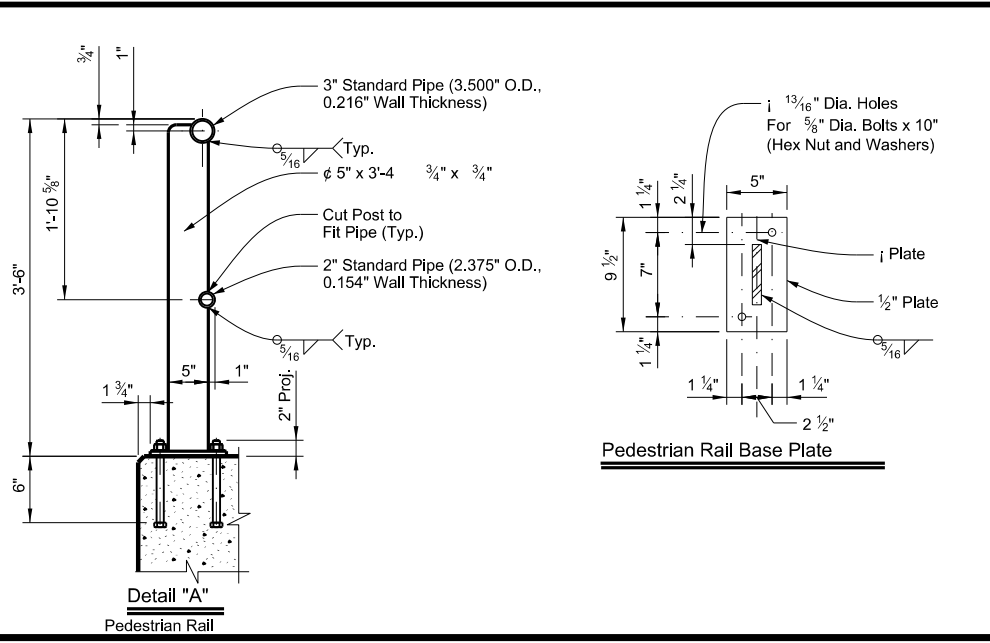
General Notes:

- Details of anchor bolt location to be furnished by the cabinet manufacturer. Size and length of anchor bolts shown in details may vary by manufacturer.
- Modify concrete base dimensions to fit required cabinet type.
- Ensure conduit area has gravel drain, 12" depth, coarse aggregate, grade No. 1.
- All concrete to be Class "A" in accordance with Item 421.
- Set the cabinet foundation level with the pavement surface, in unpaved area. The foundation shall be a minimum of 4" above surrounding grade, or as approved by the Engineer.
- Furnish any additional concrete which may be necessary to stabilize foundation at unusual locations.
- Foundation will be subsidiary to Special Specification "ITS Ground Mounted Cabinet."
- Ground cabinet as required in cabinet specifications and as detailed on ITS(18) in accordance with the National Electric Code (NEC).
- Treat cabinet foundation with moisture sealant.
- Type 5 cabinet foundation will have a slightly larger foundation than Type 6. See foundation notes on details.
- Drain pipe shall be screened for drainage portion below foundation in gravel.

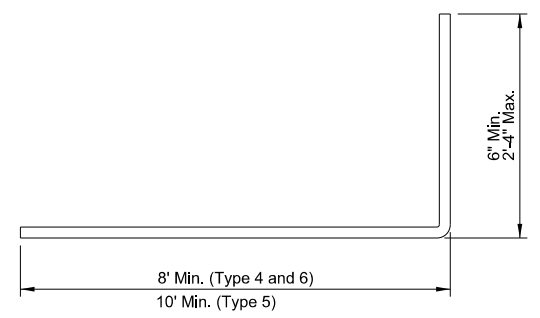
		Traffic Operations Division Standard	
<h2>ITS GROUND MOUNTED CABINET FOUNDATION DETAILS</h2>			
<h3>ITS(21)-15</h3>			
FILE: its(21)-15.dgn	DW: TxDOT	CK: TxDOT	CR: TxDOT
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ABL	TAYLOR	76	

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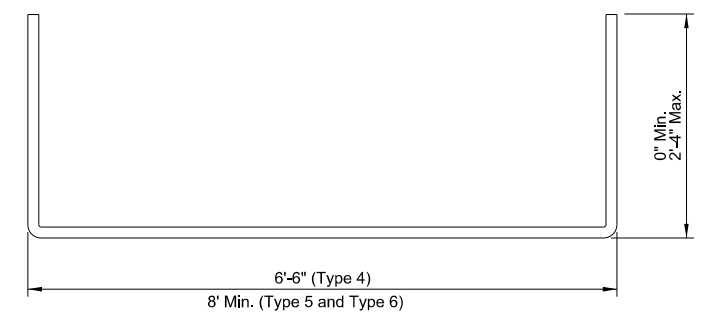
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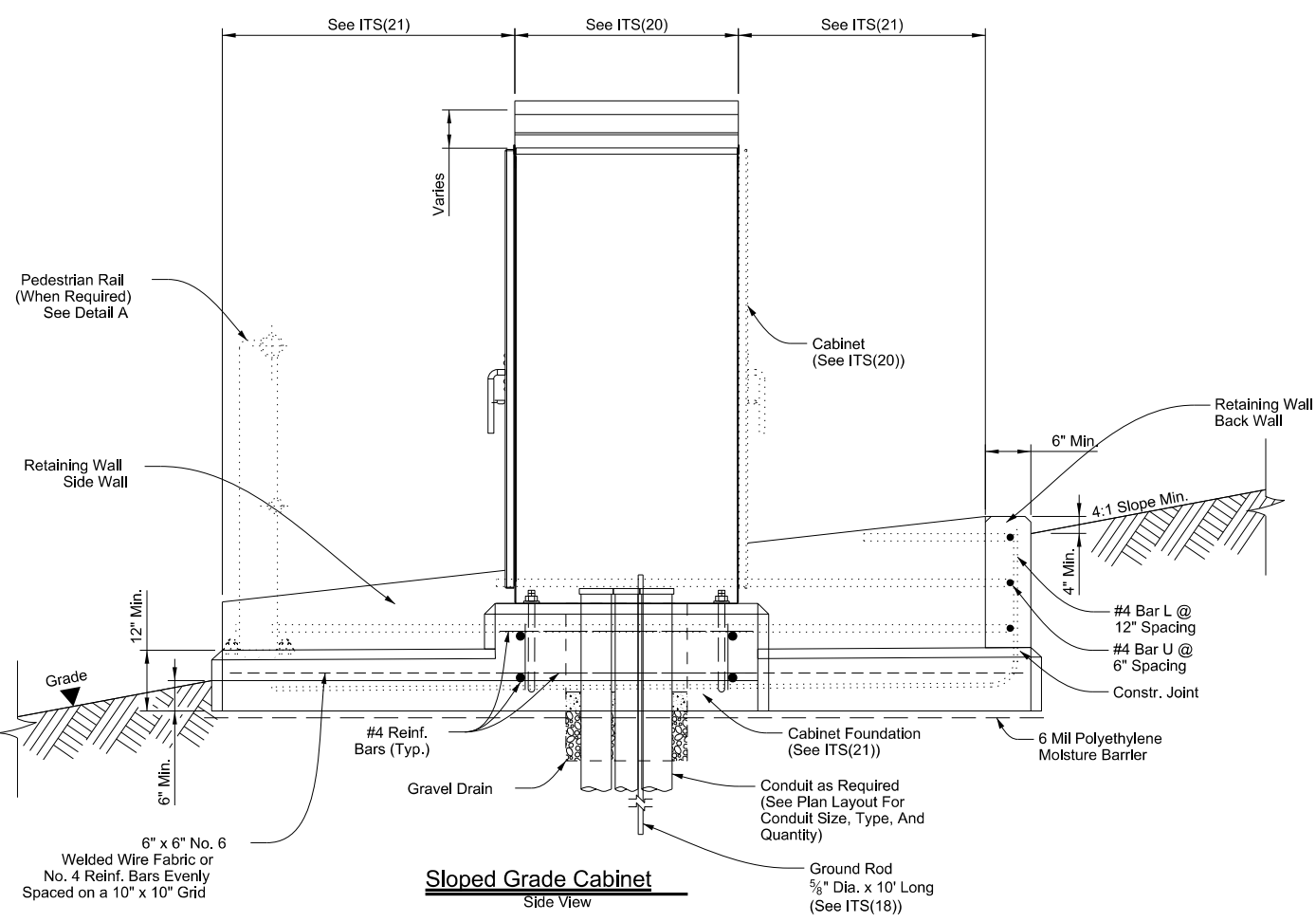
Pedestrian Rail Base Plate



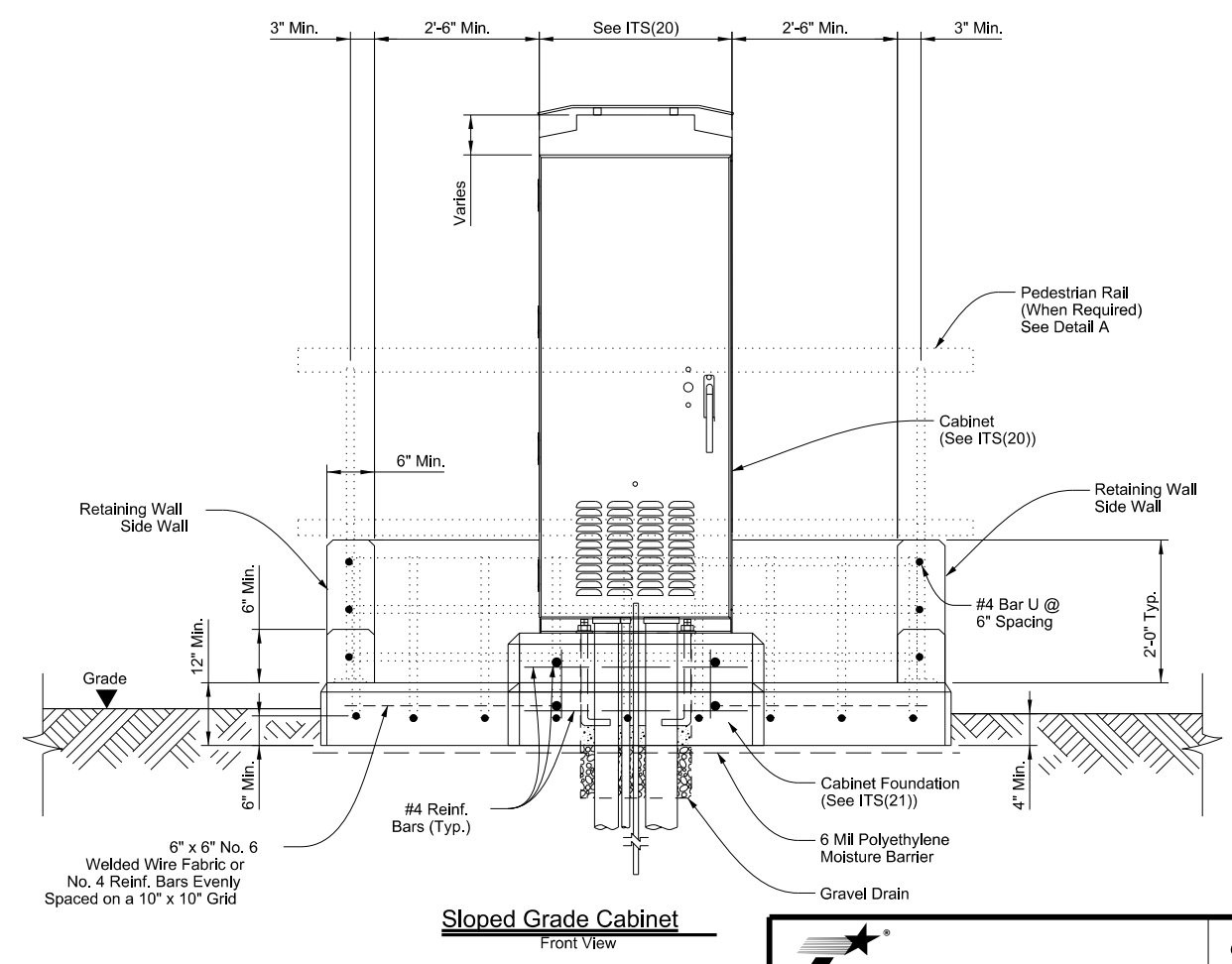
Reinforcement Bar L
 #4 Bar @ 12" Spacing



Reinforcement Bar U
 #4 Bar @ 6" Spacing



Sloped Grade Cabinet
 Side View



Sloped Grade Cabinet
 Front View

General Notes:

- Details of anchor bolt location to be furnished by the cabinet manufacturer. See ITS(21) for size and type of anchor bolts. May vary by manufacturer.
- Modify concrete base dimensions to fit required cabinet type.
- Ensure conduit area has gravel drain, 12" depth, coarse aggregate, Grade No. 1.
- All concrete to be Class "A" in accordance with Item 421.
- Set the cabinet foundation level with the pavement surface, in unpaved area. The foundation shall be a minimum of 6" above surrounding grade, or as approved by the Engineer.
- Furnish any additional concrete which may be necessary to stabilize foundation at unusual locations.
- Foundation will be considered subsidiary to Special Specification "ITS Ground Mounted Cabinet."
- Ground cable as required in cabinet specifications and as per National Electric Code (NEC).
- Treat cabinet foundation with moisture sealant.
- Type 5 cabinet foundation will have a slightly larger foundation than Type 6. See foundation notes on details.
- Drain pipe shall be screened for drainage portion below foundation in gravel.
- Pipe for pipe rail must conform to ASTM A53 GR B, or A500 GR B. Posts and plates must be ASTM A36. All steel components to be galvanized unless otherwise shown in plans.
- Pedestrian rail anchor bolts must be 5/8" diameter 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. Threaded rods may be 0.557" minimum diameter with rolled threads. Nuts must conform to A563 requirements.
- Exposed edges of pipe rail and pipe rail posts must be rounded or chamfered to approximately 1/16" by grinding. Provide an end cap at either end of pipe railing.
- Welded wire mesh not required in maintenance pad area when retaining wall rebar is integrated into maintenance pad.

Texas Department of Transportation
 Traffic Operations Division Standard

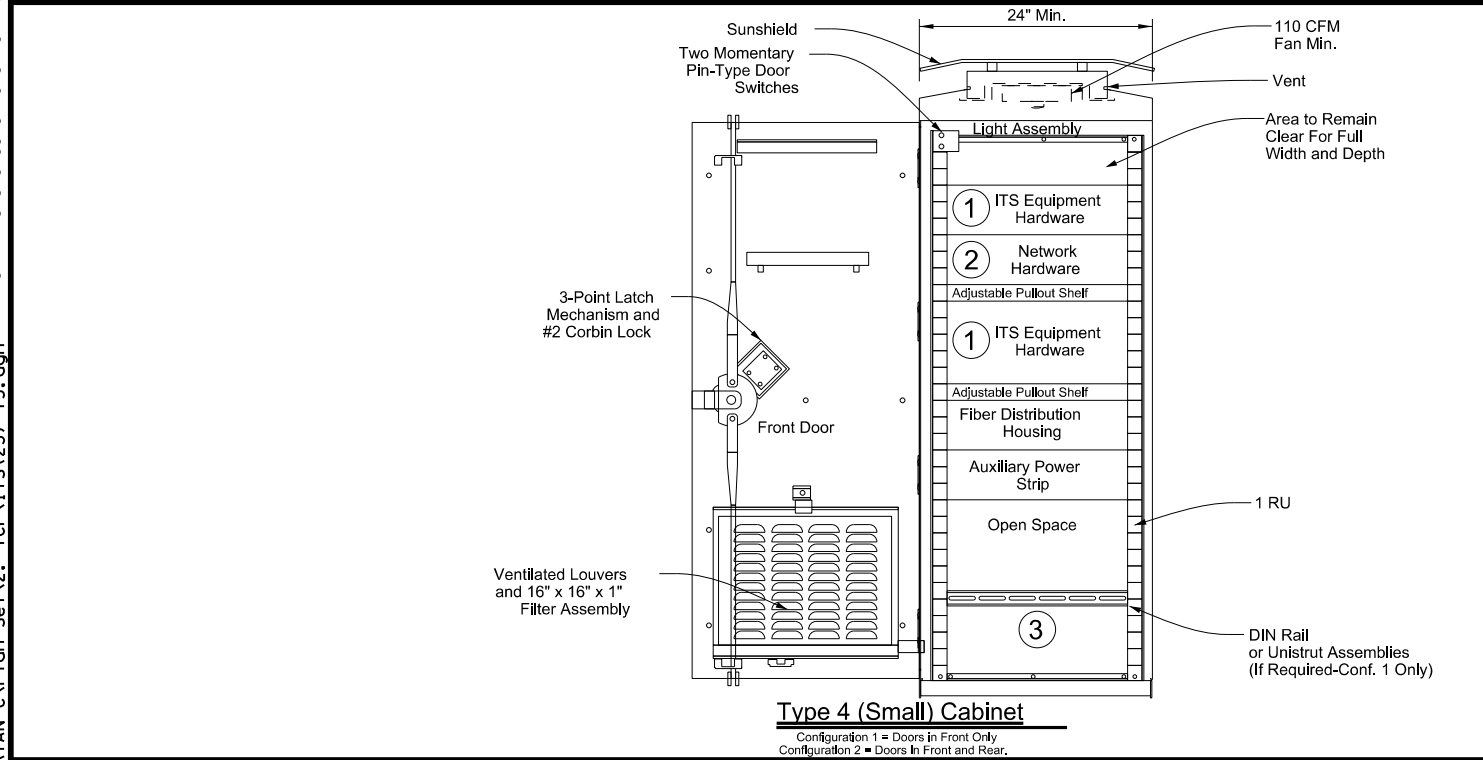
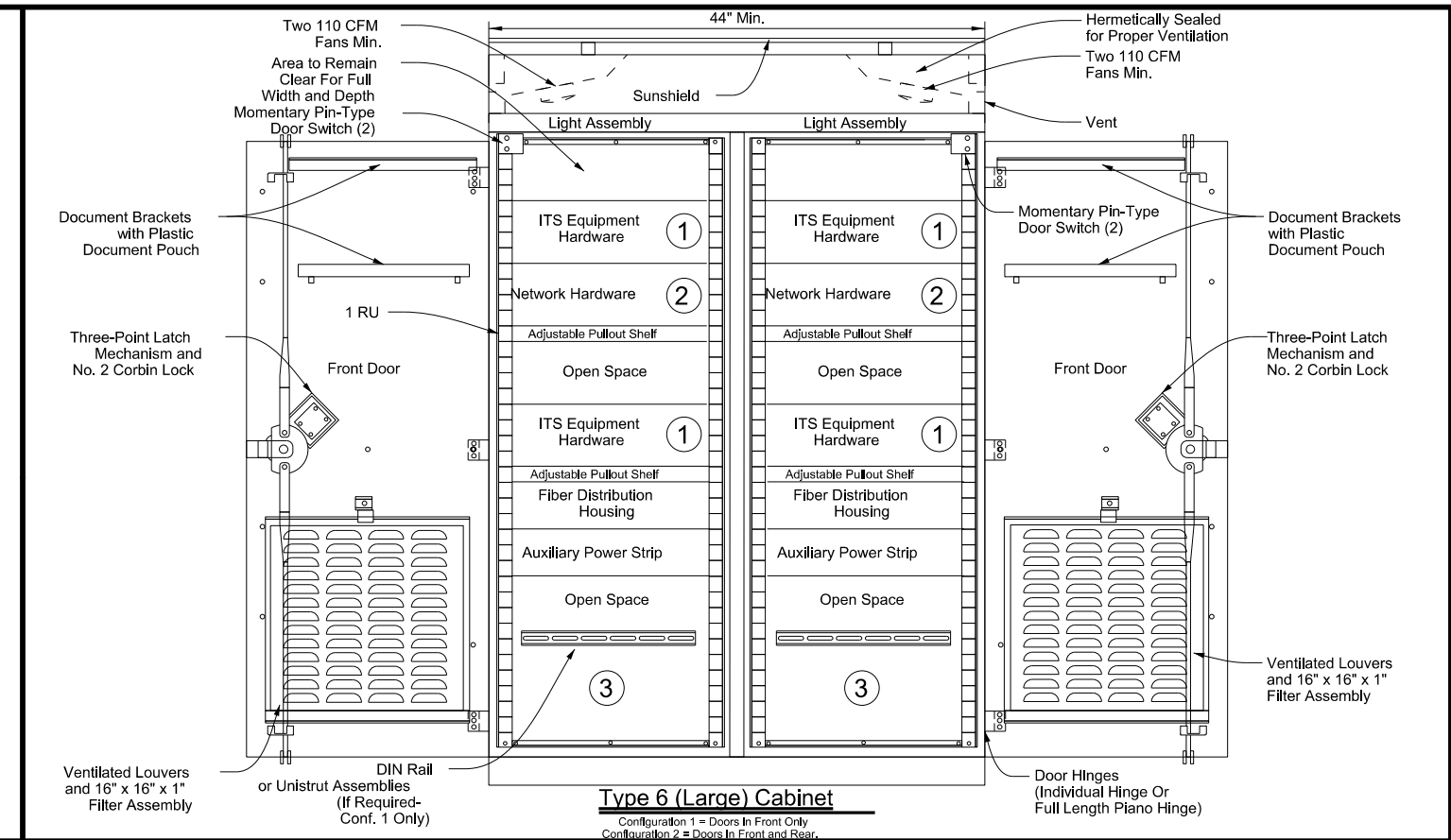
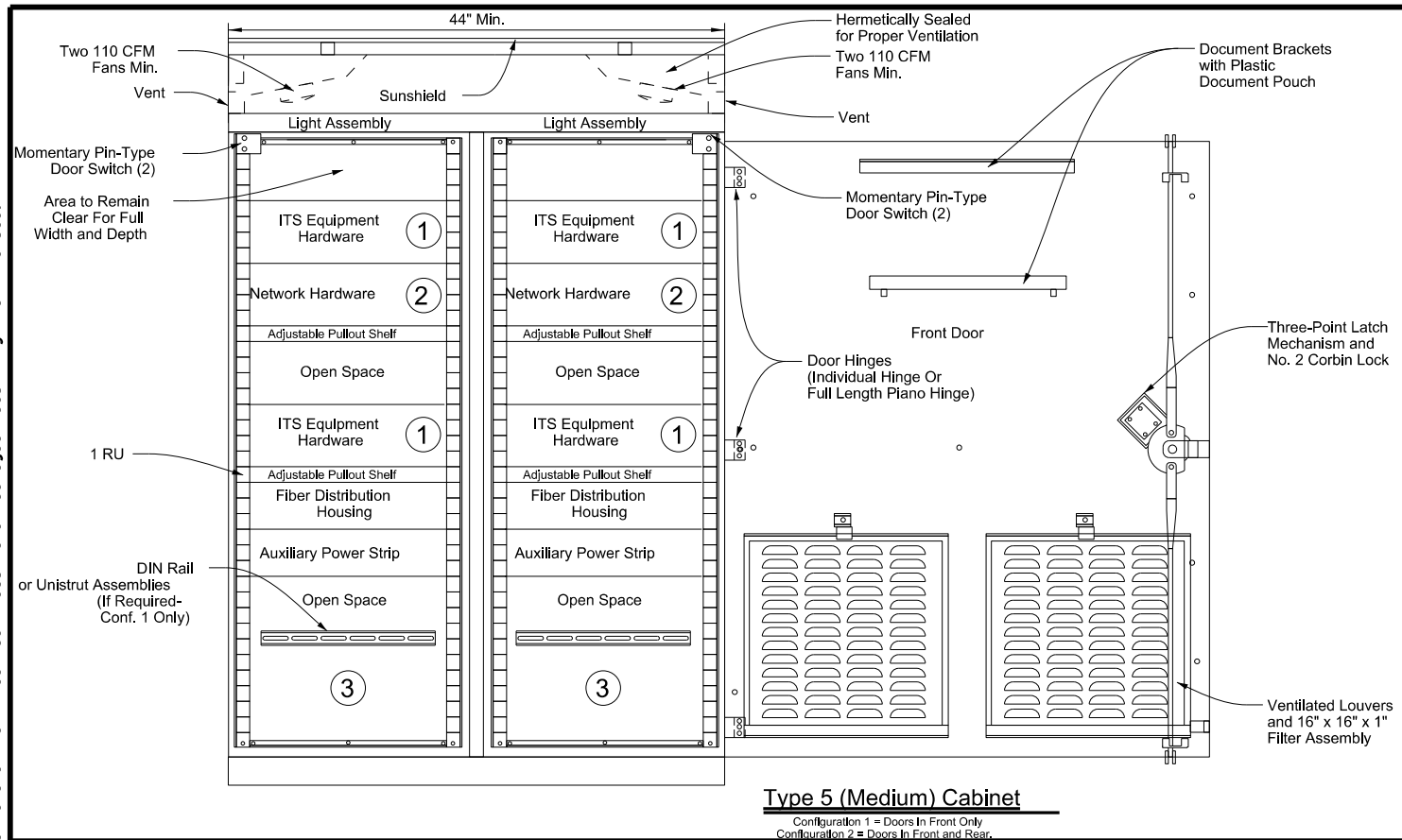
ITS GROUND MOUNTED CABINET FOUNDATION ON SLOPE DETAILS

ITS(22)-15

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Typical Equipment Layout Legend	
	Example Equipment
①	CCTV Interface Panel, Radar Vehicle Sensing Device (RVSD) Equipment, DMS/LCS Controller, Environmental Sensor Station (ESS) Equipment, Bluetooth Equipment, Highway Advisory Radio (HAR), Ramp Meter or Inductive Loop Card Rack, Automatic Vehicle Identification (AVI) Equipment, or ITS Radio Equipment (See General Note 1)
②	Ethernet Switch, Video Encoder, Terminal Server, Fiber Optic Transceivers, or Media Conversion Equipment (See General Note 1)
③	Power Distribution Assembly, Service Entrance Breakers, Primary AC Power, Auxiliary Power Strip, Ground Bus Bar, Surge Protection Equipment, Solar Power System (If Required)

General Notes:

- Layout of hardware equipment and configuration shown is diagrammatic in nature and intended to represent a preferred ground mounted cabinet setup. Hardware needed for each cabinet varies and not all cabinet equipment may be shown. The contractor will be responsible for configuring cabinets with all appropriate ITS hardware and power supplies in accordance with the plans and specifications. The contractor may alter the cabinet configuration shown to maximize space and ensure easy access for maintenance.
- All dimensions are approximate and represent minimum dimensions.
- Provide conduit entrances at the bottom of the cabinet.
- Paid under Special Specification "ITS Ground Mounted Cabinet" (Configuration 1) with single door. Paid under Special Specification "ITS Ground Mounted Cabinet" (Configuration 2) for rear door option.
- RU = rack unit.
- Contractor to remove the cabinet removable center support, which ensures cabinet rigidity during shipping, during installation.

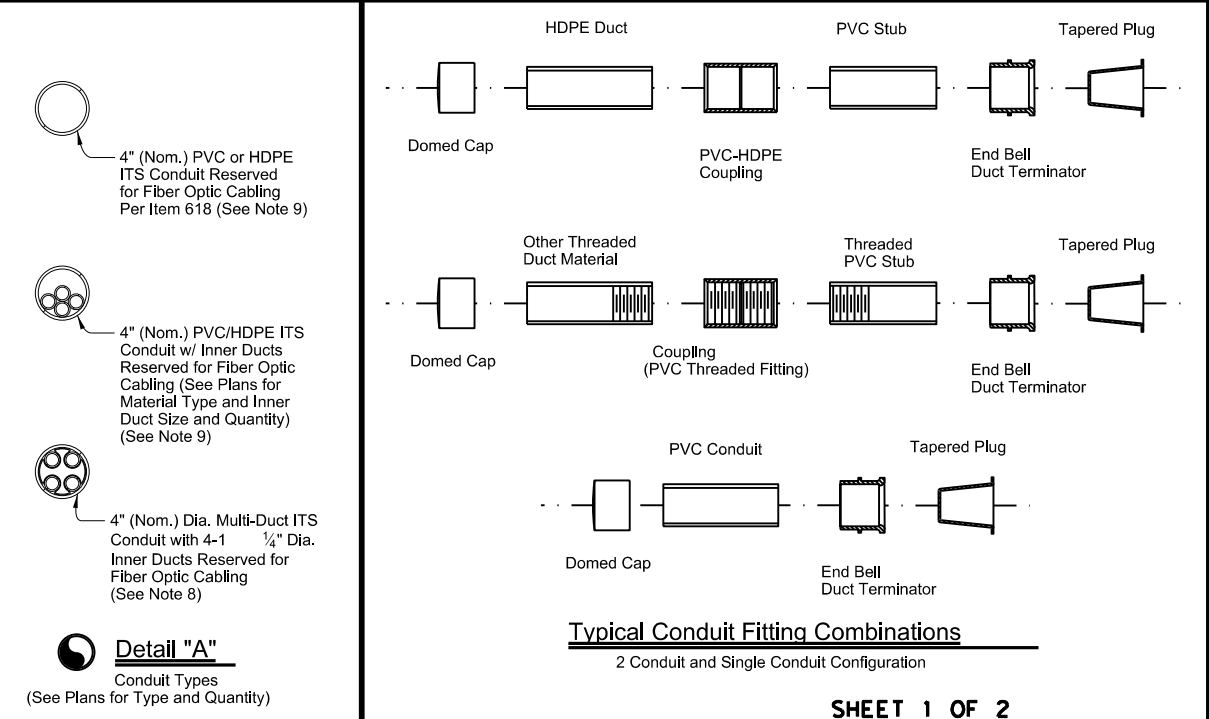
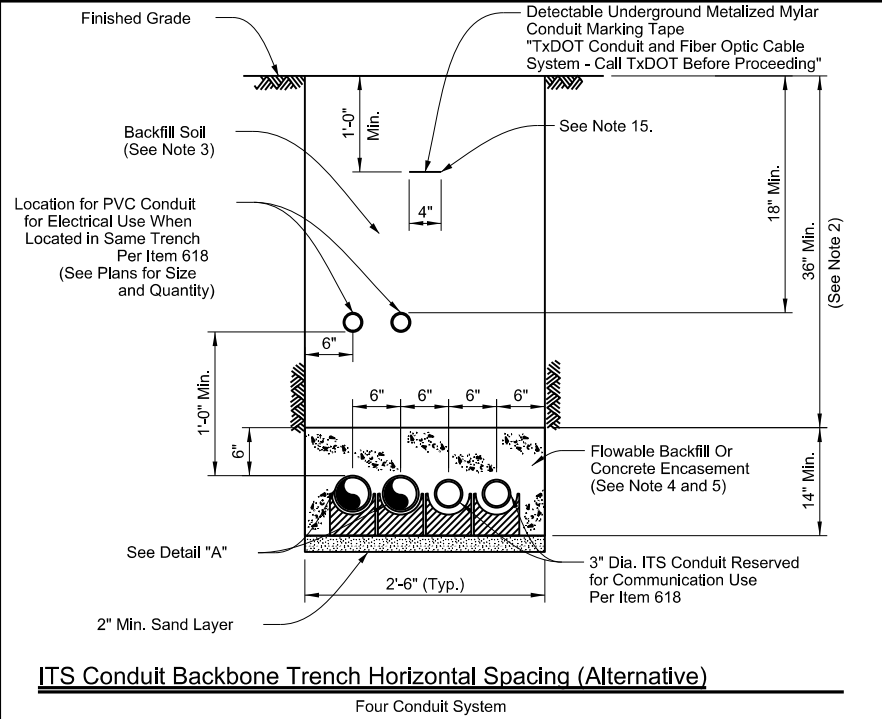
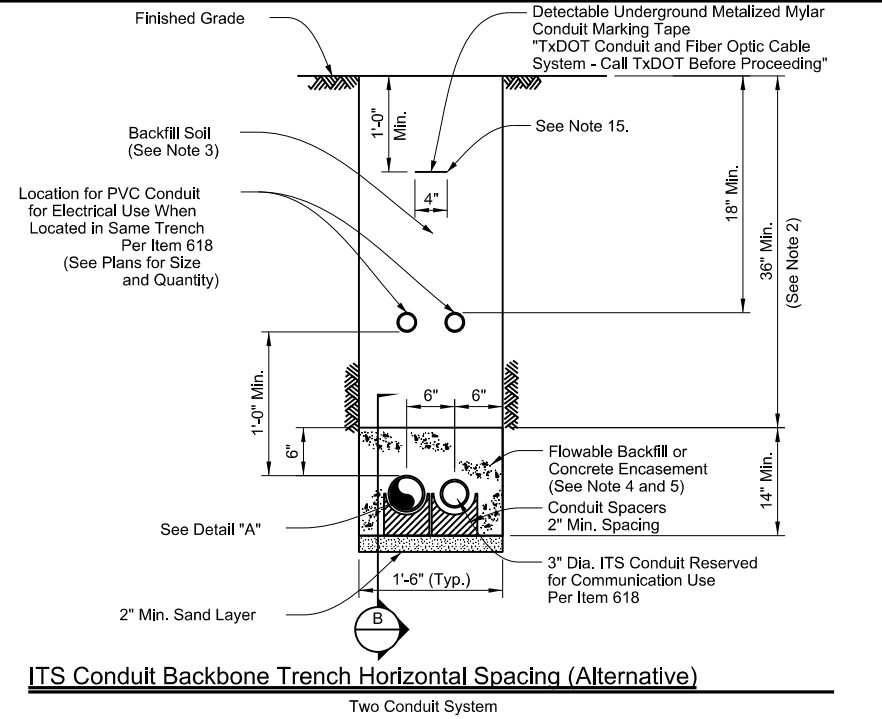
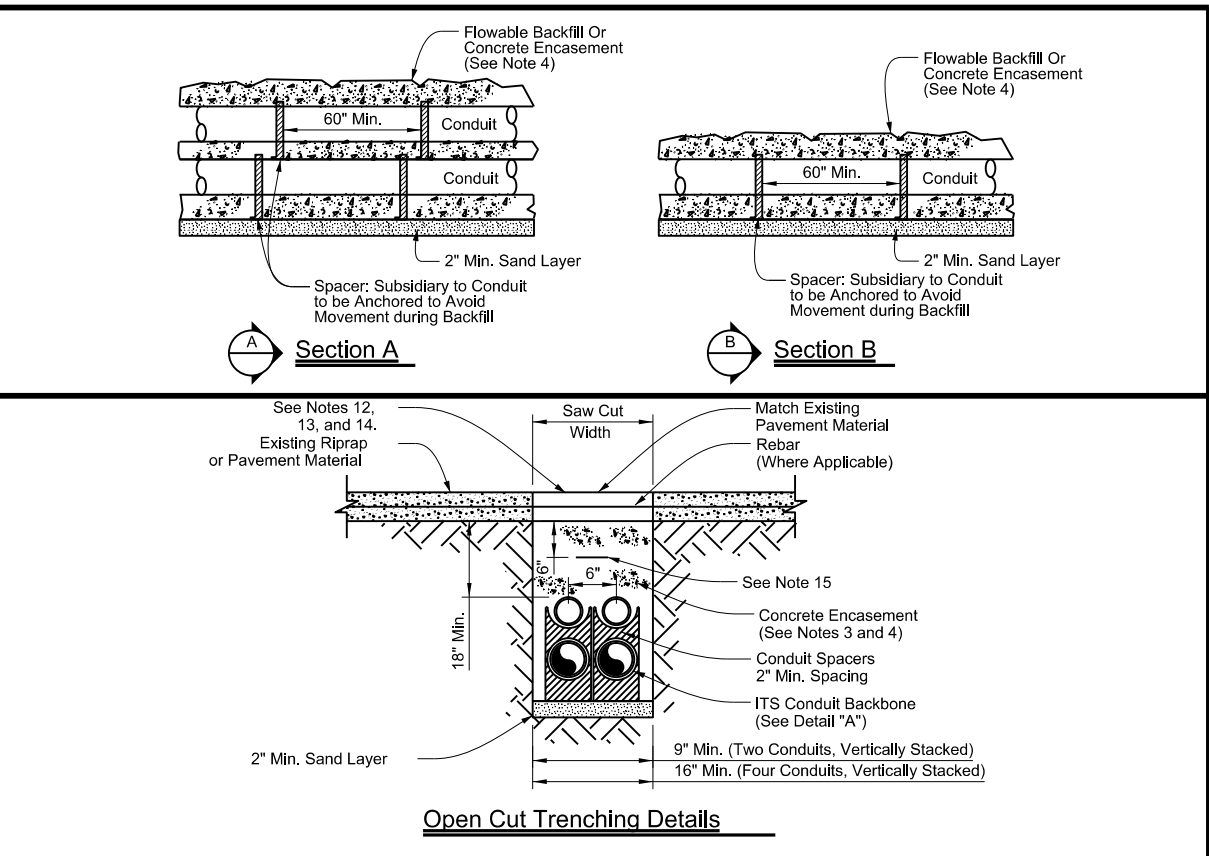
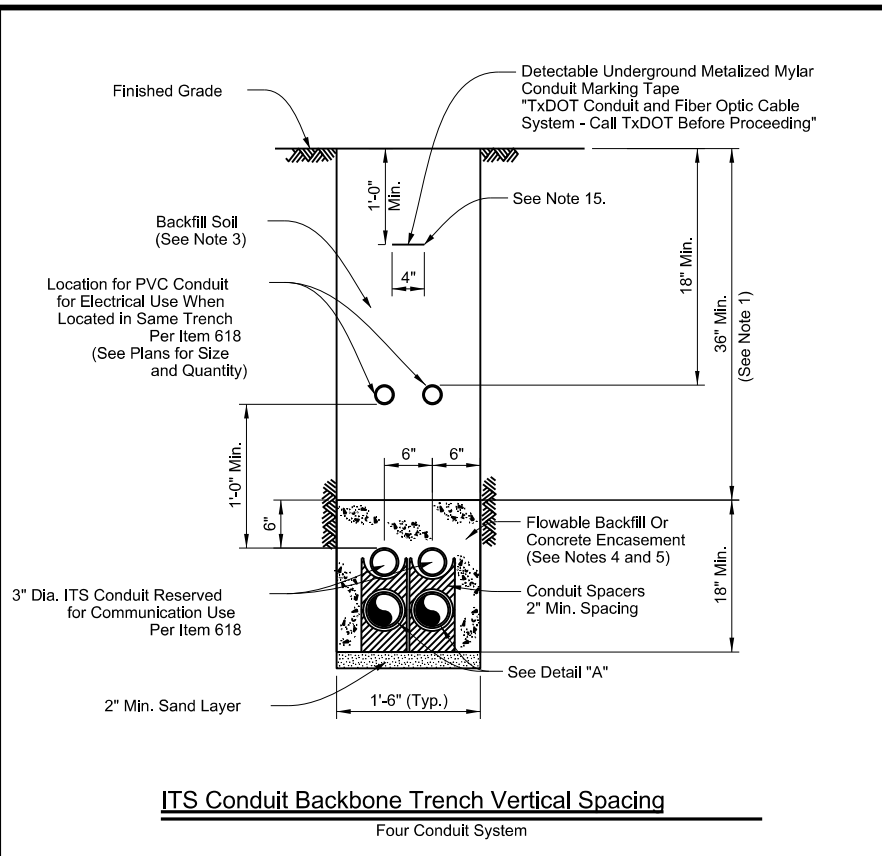
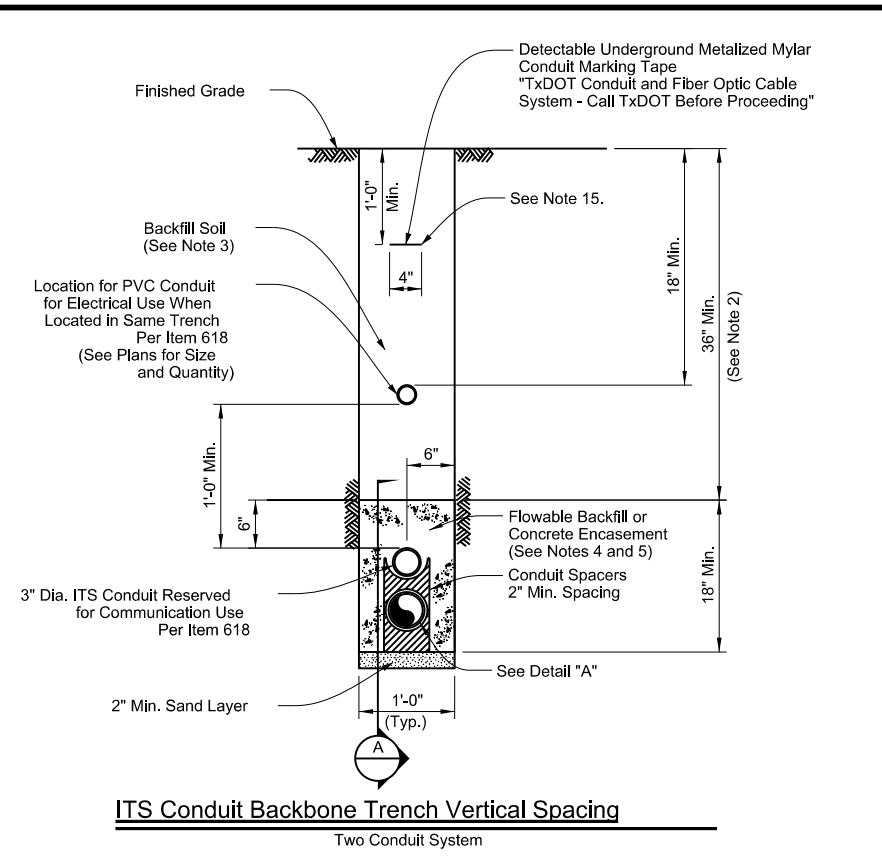
Texas Department of Transportation Traffic Operations Division Standard

ITS GROUND MOUNTED CABINET INTERIOR DETAILS

ITS(23)-15

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- General Notes:**
- Construct the ITS conduit backbone system by vertically spacing conduit, unless field constraints, obstructions, or utility conflicts require horizontal spacing of conduits. Both vertical and horizontal spacing configurations have been detailed for contractor information for construction.
 - Install ITS conduit backbone system a minimum of 42 inches from finished grade to the top of the conduit unless otherwise directed or to avoid conflicts or field conditions such as utilities or obstructions. Vary depth of the trench in order to pass over/under any existing utilities. Refer to ITS Conduit Obstruction Crossing Standard ITS(35) for further detail.
 - Perform trench excavation and backfilling in accordance with Item 400, "Excavation and Backfill for Structures."
 - When a trench depth greater than 24 inches can be achieved from the finished grade to the top of ITS conduit, encase the conduits with flowable backfill in accordance with Item 401, "Flowable Backfill." Use Class B concrete as a substitute in accordance with Item 421, "Hydraulic Cement Concrete" at the discretion of the Engineer.
 - When a trench depth of less than 24 inches is required due to field conditions, encase the conduits in Class B concrete in accordance with Item 421, "Hydraulic Cement Concrete."
 - Concrete encasement will be paid for under Special Specification "ITS Multi-Duct Conduit" or as shown on the plans.
 - Provide ITS PVC conduit identified for electrical and communication use in accordance with Item 618, "Conduit."
 - Provide ITS multi-duct conduit identified for fiber optic communication use in accordance with Special Specification "ITS Multi-Duct Conduit."

- Conduit per Item 618, "Conduit" (See Plans for Material Type and Quantity).
- Provide a single 1/C #14 insulated wire in conduit runs which have been identified in the plans to carry fiber optic cable. Provide UL listed solid copper wire with orange color low density polyethylene insulation suitable for conduit installation rated for temperature range -20 C to 60 C and a voltage rating of 600V. This wire will serve as a tracer, or locate, wire for locating underground conduit containing fiber optic cabling and will be paid for under Item 620, "Electrical Conductors."
- Provide a flat pull cord in all empty conduits and innerducts. Provide a pull cord with a tensile strength of 1,250 Lbs. minimum and have foot markings to determine length installed. Pull cord and installation to be subsidiary to various bid items.
- Remove saw cut width to accommodate conduit installation.
- Replace rebar as necessary, lapped and tied a minimum of 3 inches to existing rebar.
- Replace broken pavement materials with similar materials to exact shape, and thickness of existing.
- Place marking tape a minimum of 1 foot - 0 inches below grade when no other electrical marking tape required, or 8 inches below electrical marking tape when provisioned under Item 618.
- Provide a 1/C #8 insulated grounding conductor within one inner duct of a pre-assembled multi-duct when no other grounding conductor is provisioned for in the plans.

SHEET 1 OF 2

Texas Department of Transportation
 Traffic Operations Division Standard

ITS CONDUIT TRENCH DETAILS

ITS(27)-16

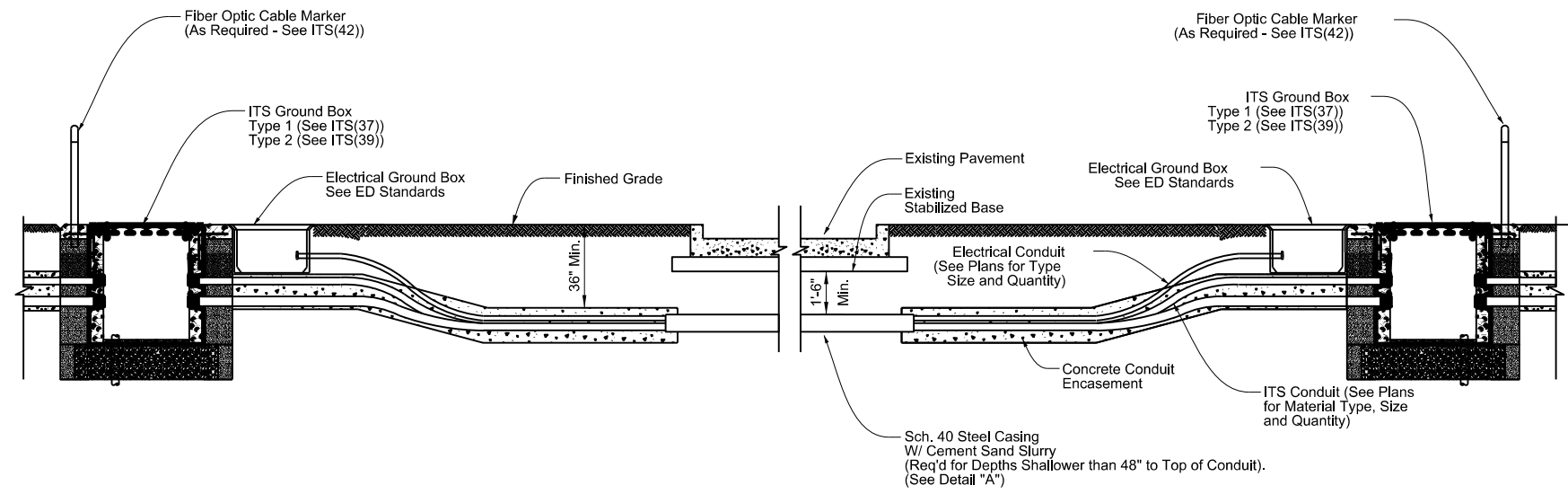
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Sheet Details
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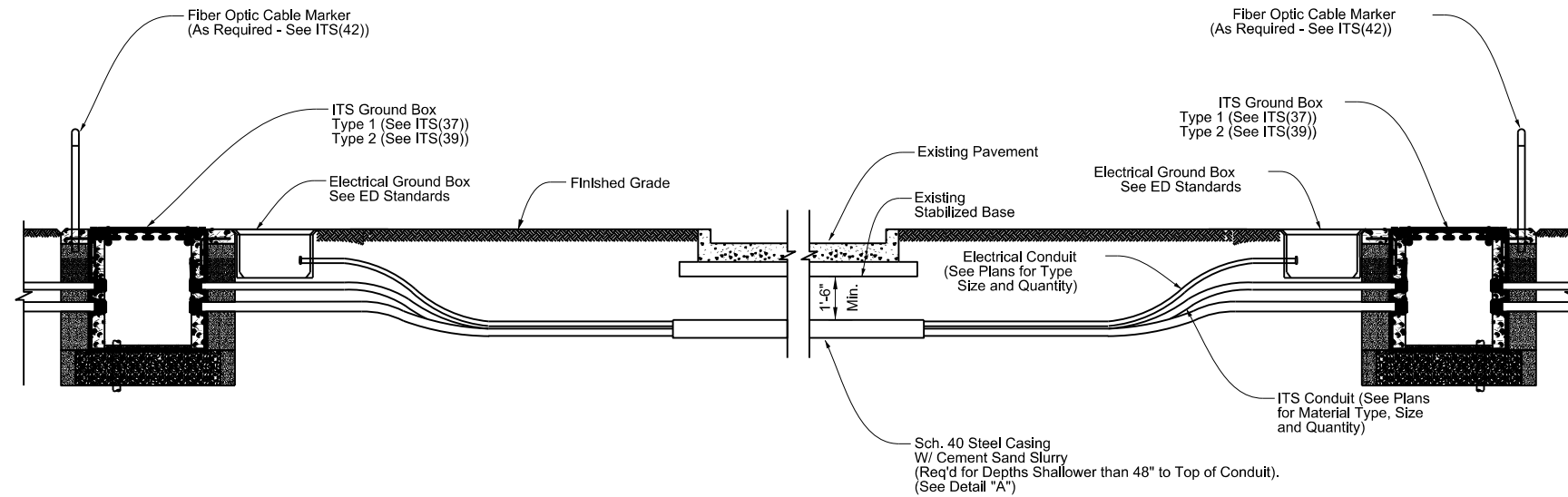
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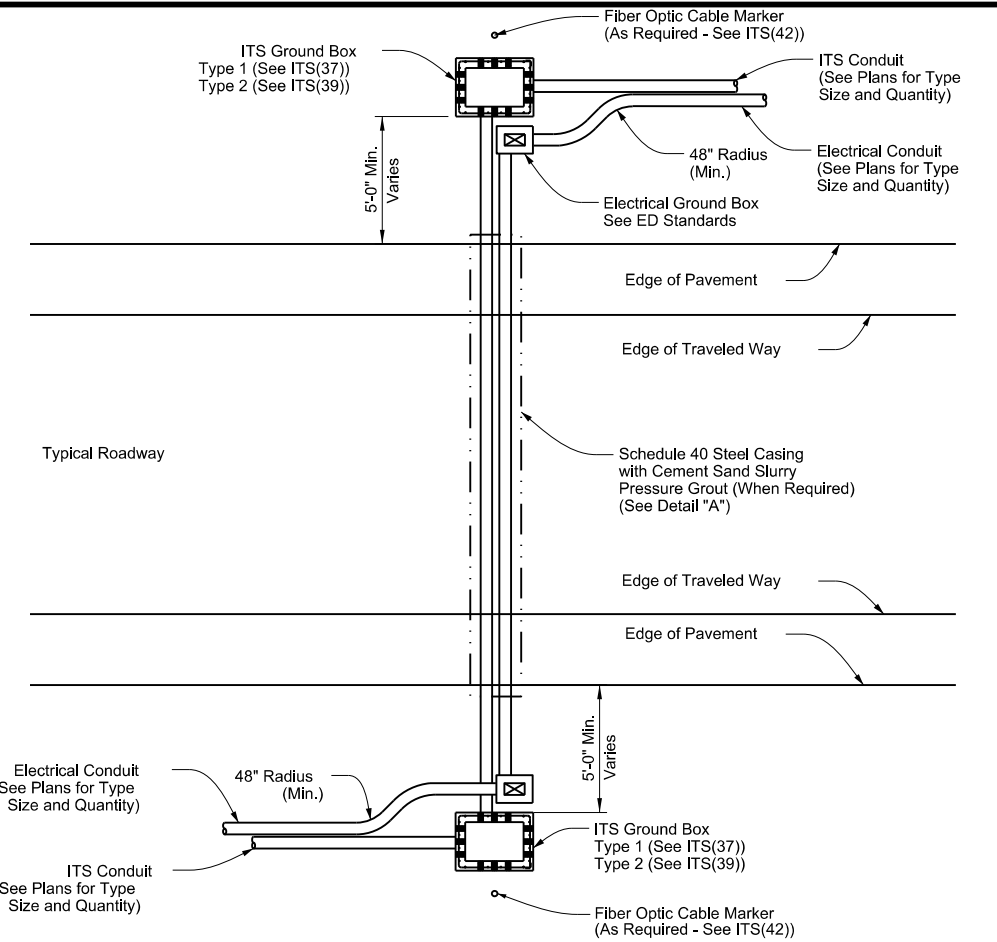
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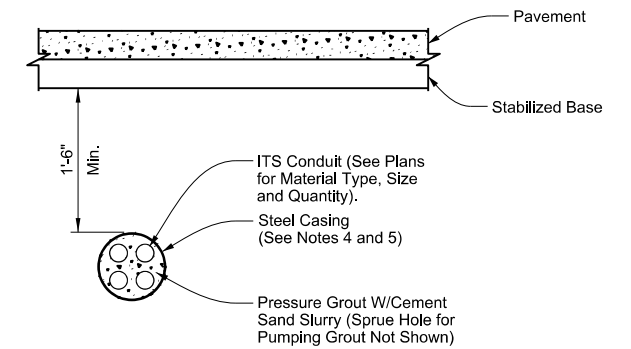
**Typical Conduit Installation Jacking
or Boring Beneath Existing Roadway**



**Typical Conduit Installation Jacking
or Boring Beneath Existing Roadway
(Where Concrete Encasement Not Required)**



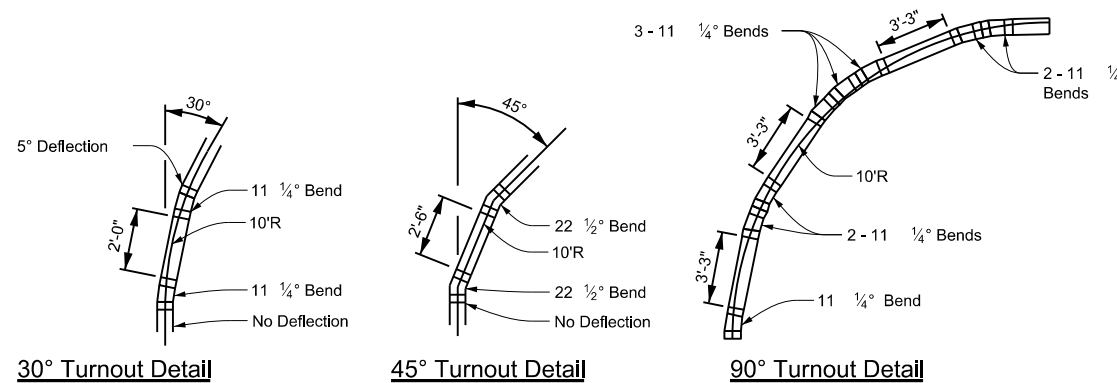
Bore Under Pavement



Steel Casing Detail "A"

General Notes:

1. Typical conduit installation details for jacking or boring beneath existing roadway is diagrammatic in nature. Roadway cross-slopes may vary for each crossing.
2. Jack or bore in accordance with Item 476, "Jacking, Boring, or Tunneling Pipe or Box" except for measurement and payment.
3. Furnishing and installation of pressure grouting will not be paid for directly but considered incidental to Special Specification "ITS Multi-Duct Conduit" or Item 618, "Conduit."
4. When boring under pavement shallower than 48 inches from finished grade to top of conduit, provide Schedule 40 steel casing under pavement to encase the conduit system. Provide steel casing of a size to accommodate ITS conduit and electrical conduit as shown in the plans. Provide a minimum 20 percent void space around all conduits. Steel casing will not be paid for directly but considered incidental to Special Specification, "ITS Multi-Duct Conduit" or Item 618, "Conduit."
5. When a depth greater than 48 inches can be achieved from finished grade to top of conduit, provide Schedule 80 PVC. No steel casing required unless otherwise directed.
6. Ensure all conduit bends are in conformance with the latest edition of the National Electrical Code.
7. Provide GPS coordinate points to the District for all ground boxes installed, and shifts or deviations of the conduit alignment from the plans required to avoid obstructions or utilities. Take GPS coordinate points at the start of the transition, at the point of curvature, and at the end of the transition at the point of tangency. Document the turnout radius and installed depth. Provide GPS coordinate points in NAD83 coordinate system and be accurate to 5 feet.



30° Turnout Detail

45° Turnout Detail

90° Turnout Detail

Provide this arrangement of conduit and fittings or approved equal at all 30°, 45°, and 90° bends, horizontal and vertical, to achieve a nominal 10' conduit radius for pre-assembled multi-duct conduit. See Note 7.

Sheet Details
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SHEET 2 OF 2



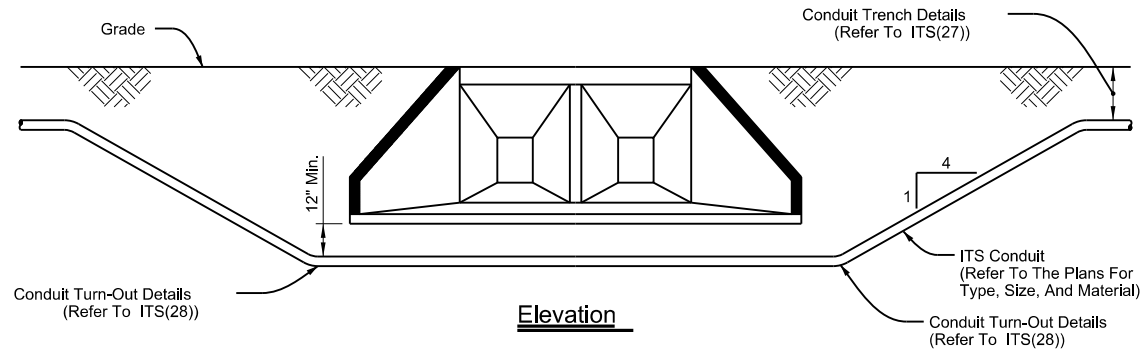
**ITS CONDUIT
BORE AND STEEL CASING
DETAILS**

ITS (28) - 16

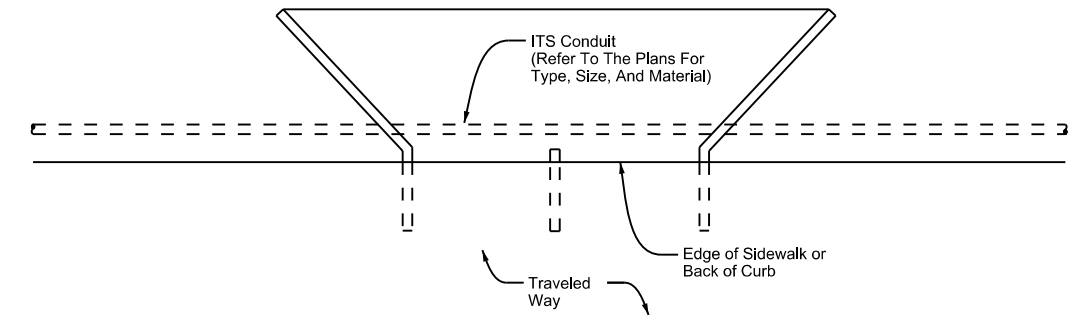
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	DIST	COUNTY	SHEET NO.	
	ABL	TAYLOR	80	

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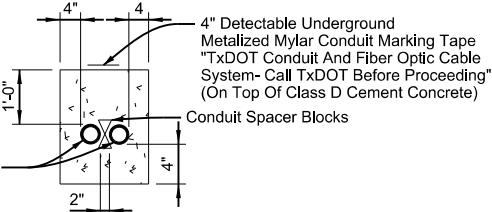
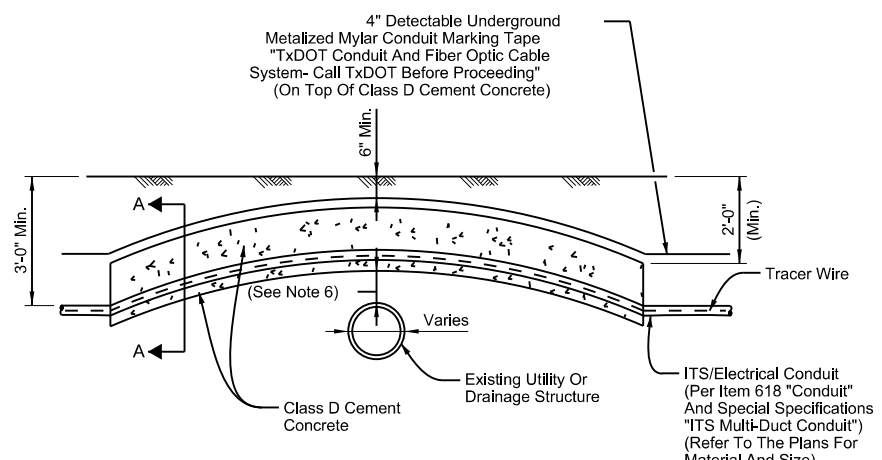


Elevation



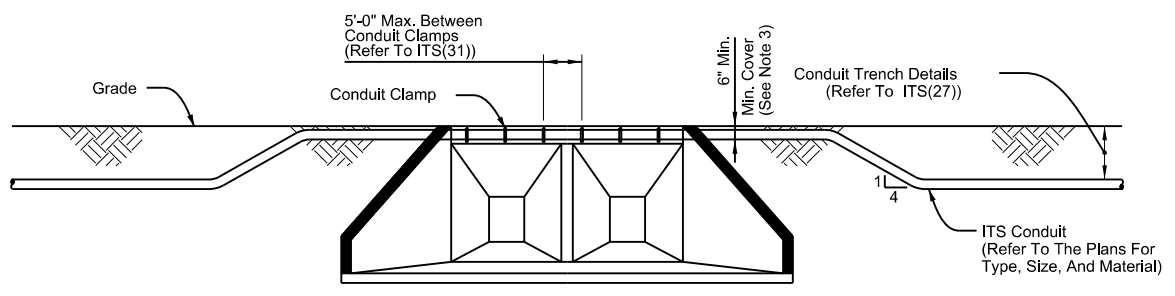
Plan View

Conduit Bored Under Culvert

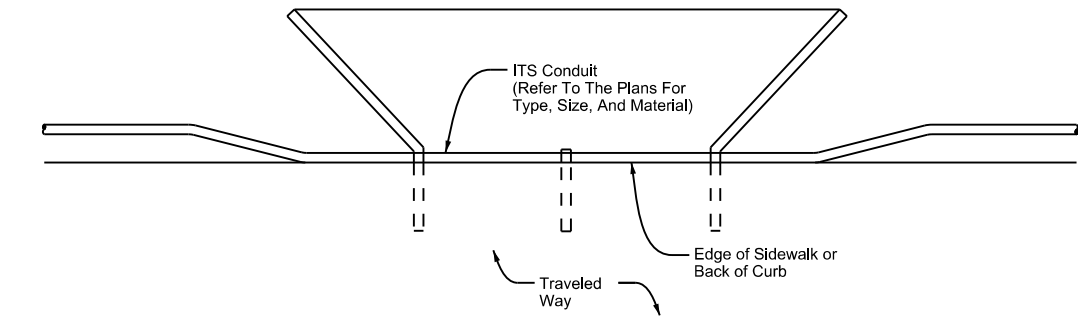


Section A-A

Conduit Installation Detail Above Existing Drain Pipes Or Utilities

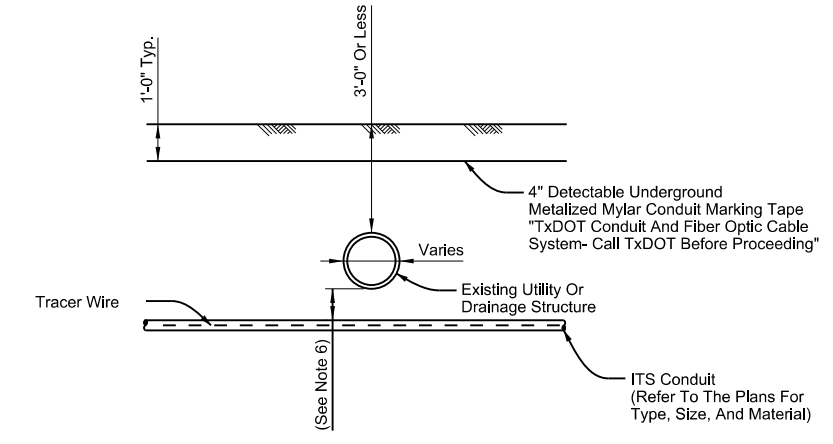


Elevation



Plan View

Conduit Attached To Culvert Headwall



Conduit Installation Detail Below Existing Drain Pipes Or Utilities

General Notes:

1. With approval from the field engineer adjust the final burial depth of conduit(s) in circumstances requiring traversal of non-movable object conflicts.
2. Where conduits are to be installed over existing underground infrastructure (i.e., existing utility or drainage structure) which are less than 3'-0" deep, encase conduit in Class D cement concrete in accordance with Item 421, "Hydraulic Cement Concrete", for the entire length of the conduit that is installed at a depth of less than 3'-0".
3. If depth of cover over encasement is less than 6", install the conduit to pass beneath the underground infrastructure.
4. Refer to the plans for type, size and configuration of all conduits. Refer to ITS(27) and ITS(28) for further installation details.
5. It is the responsibility of the contractor to verify all existing underground infrastructure. The contractor is responsible for any damage to any underground infrastructure during construction. Verify all utility locations at least 100' in advance of trenches, plowing or boring, and make changes in conduit placement in the event of conflict.
6. If proposed conduit is crossing or in close proximity to an existing underground utility, maintain a minimum clearance of 1'-6" vertical, 1'-6" horizontal or a clearance dictated by municipal code and or utility owner.
7. Install underground warning tape directly above all conduits per ITS(27) standard.
8. Do not install communications and electric cables in the same conduit. Separate conduits installed within the same trench based on NFPA 70, National Electrical Code. Refer to ITS(27) for additional conduit installation details.
9. Ensure all work is in compliance with the latest edition of NFPA 70, National Electrical Code.
10. Utilize PVC conduit for all underground applications as required by design. Transition with a conduit coupling to RMC conduit or other as required by design that is approved for above ground applications.
11. Do not exceed a rise:run ratio of 1:4 for conduit sloped through increases or decreases in elevation.



ITS CONDUIT OBSTRUCTION CROSSING

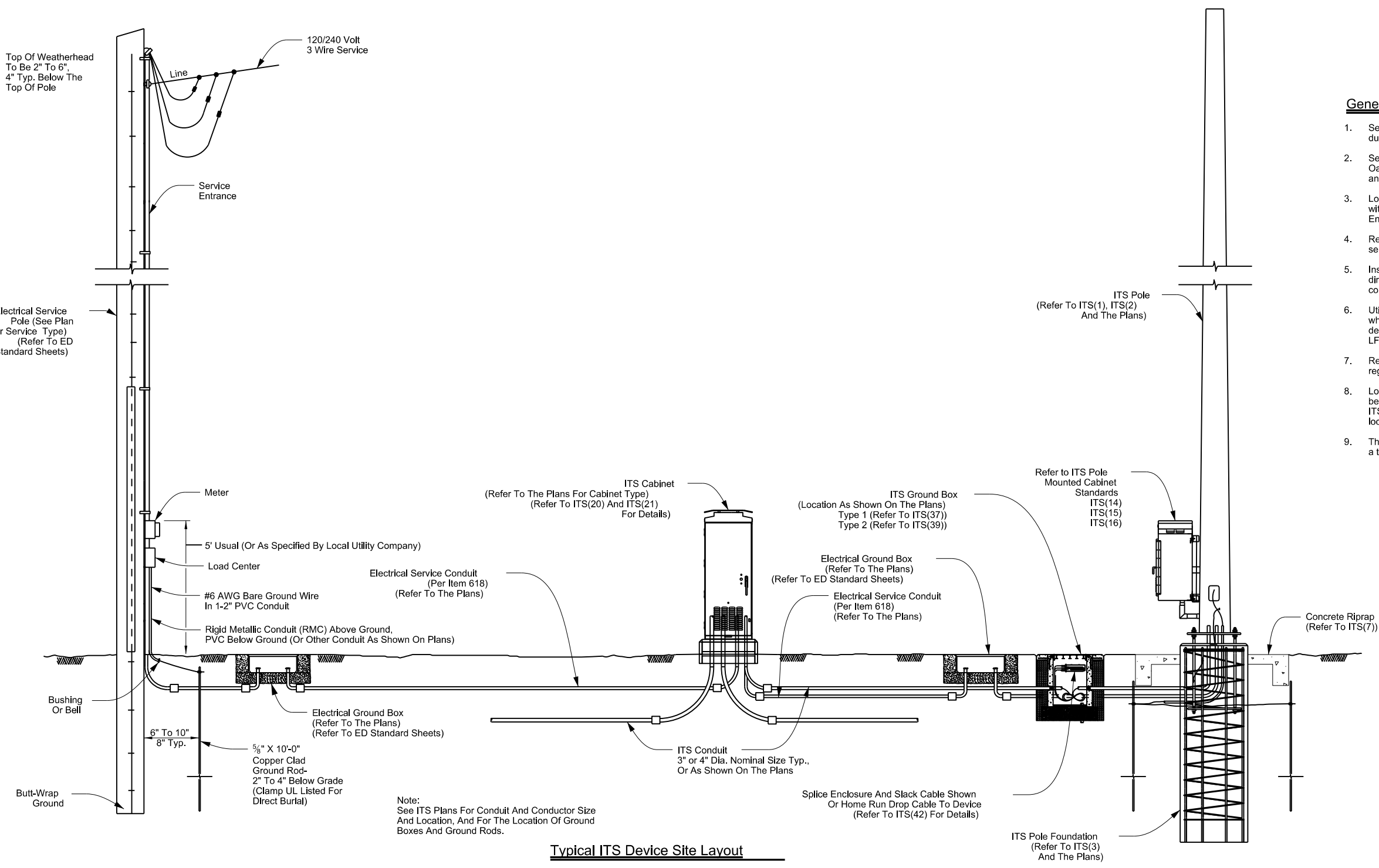
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Note:
 See ITS Plans For Conduit And Conductor Size
 And Location, And For The Location Of Ground
 Boxes And Ground Rods.

Typical ITS Device Site Layout

General Notes:

1. Seal all ITS communications conduits with waterproof duct plugs and seals.
2. Seal ends of all conduit entries into ITS cabinets with Oakum or other as approved by the District representative and pack with duct sealant.
3. Locate ground boxes for electrical and ITS communications within 5'-0" of cabinet enclosure, or as directed by the Engineer.
4. Refer to ED standard sheets for additional notes regarding electrical service.
5. Install service pole ground rod at alternate location when directed by the engineer. Maintain a minimum of 8'-0" in contact with the earth.
6. Utilize liquidtight flexible metal conduit (LFMC), as required when meter and service enclosure are mounted 90 to 180 degrees to each other. Refer to ED standard sheets for details on LFMC use.
7. Refer to ITS(21), ITS(37) and ITS(39) for details regarding conduit depth and entry into ITS ground boxes.
8. Lock all enclosures and bolt all ground box covers before power is applied to the circuit. Refer to the ITS cabinet references indicated on this sheet for cabinet lock requirements.
9. The detail shown is diagrammatic and is intended to represent a typical layout from electrical service to ITS devices.

		Traffic Operations Division Standard	
<h2>TYPICAL ITS DEVICE SITE LAYOUT</h2> <h3>ITS(36)-16</h3>			
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ABL	TAYLOR	82	

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PREPARED BY WILL BRAZZIL DATE: 4/3/2024 FILE: C:\Users\KMUELLER\Desktop\RYAN CV\Plan Set\1. General\EPIC\EPIC.dwg

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I. STORM WATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Storm water Discharge Permit or Construction General Permit 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.

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

1. No Action Required Required Action

Action No.

- 1. The project disturbs less than one acre of surface area. The contractor is responsible for the PSL as defined in the Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges (2014 Edition, Section 7.6., Page 44). The total disturbed acreage is the combined acreage to be disturbed on the project and the contractors PSL.
2. Prevent storm water pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
3. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
4. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
5. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

II. WORK IN OR NEAR STREAMS, WATER BODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

- No Permit Required
 Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)
 Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)
 Individual 404 Permit Required
 Other Nationwide Permit Required: NWP# _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

- 1.
2.

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices:

Table with 3 columns: Erosion, Sedimentation, Post-Construction TSS. Lists various BMPs like Temporary Vegetation, Silt Fence, Vegetative Filter Strips, etc.

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 immediate area and contact the Engineer immediately.

No Action Required Required Action

Action No.

- 1.
2.
3.
4.

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical. Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

No Action Required Required Action

Action No.

- 1. USE NATIVE VEGITATION - E.O. 13112
2.
3.
4.

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

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediate area, and contact the Engineer immediately.

No Action Required Required Action

Action No.

- 1. MIGRATORY BIRD TREATY ACT
2.
3.
4.

LIST OF ABBREVIATIONS

Table listing abbreviations and full names for various environmental and regulatory terms like BMP, SW3P, DSHS, etc.

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous.

- Contact the Engineer if any of the following are detected:
* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)? Yes No

If "No", then no further action is required. If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)? Yes No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

No Action Required Required Action

Action No.

- 1. All soil, water, and slurry removed from drilled shafts shall be captured and disposed of properly. No discharge of these materials into, or in close proximity to, the surrounding water will be allowed.
3.

VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

No Action Required Required Action

Action No.

- 1.
2.
3.

SL 322, ETC. ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS EPIC



NO SCALE SHEET 1 OF 1. Table with columns for FHWA Division (6), Project No. (SEE TITLE SHEET), Highway No. (SL 322), State (TEXAS), County (TAYLOR), District (ABL), Control (0908), Section (00), Job (130), and Sheet No. (83).