

OR

RAILROAD CROSSING No. 2

CONCRETE PLAN

SCALE: 1" = 30'

ISOLATION JOINT BOTH SIDES

Edge of Pavement

BASELINE

TYPE "A"

12" CONCRETE SLAB

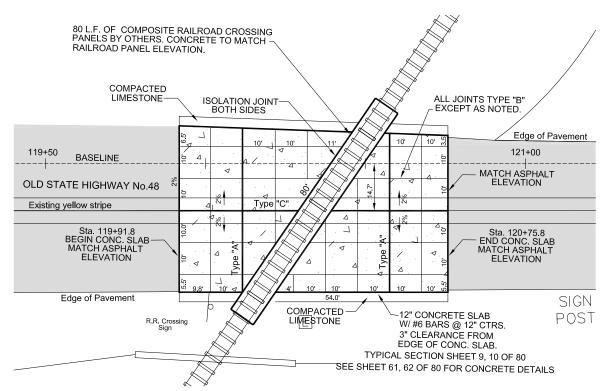
W/ #6 BARS @ 12" CTRS. 3" CLEARANCE FROM EDGE OF CONC. SLAB TYPICAL SECTION SHEET 9, 10 OF 80 SEE SHEET 61, 62 OF 80FOR CONCRETE DETAILS

Sta. 116+21.8 - END CONC. SLAB MATCH ASPHALT ELEVATION

116+50

80 L.F. OF COMPOSITE RAILROAD CROSSING PANELS BY OTHERS. CONCRETE TO MATCH RAILROAD PANEL ELEVATION. ISOLATION JOINT BOTH SIDES COMPACTED LIMESTONE-Edge of Pavement ALL JOINTS TYPE "B" EXCEPT AS NOTED. Sta. 106+52.2 END CONC. SLAB MATCH ASPHALT ELEVATION OLD STATE HIGHWAY No.48 Existing yellow stripe Sta. 105+92.2 BEGIN CONC. SLAB MATCH ASPHALT 105+50 ELEVATION 107+00 BASELINE Edge of Pavement COMPACTED -12" CONCRETE SLAB W/ #6 BARS @ 12" CTRS. 3" CLEARANCE FROM ANCHOR ROAD EDGE OF CONC. SLAB. TYPICAL SECTION SHEET 9, 10 OF 80 SEE SHEET 61, 62 OF 80 FOR CONCRETE DETAILS

RAILROAD CROSSING No. 1 CONCRETE PLAN SCALE: 1" = 30'



RAILROAD CROSSING No. 3 **CONCRETE PLAN**

SCALE: 1" = 30'

NOTE:

80 L.F. OF COMPOSITE RAILROAD CROSSING PANELS BY OTHERS. CONCRETE TO MATCH ~ RAILROAD PANEL ELEVATION.

ALL JOINTS TYPE "B" EXCEPT AS NOTED. -

Existing yellow stripe

Sta. 115+56.6 BEGIN CONC. Slab MATCH ASPHALT

ELEVATION

COMPACTED

LIMESTONE

OLD STATE HIGHWAY No.48

Edge of Pavement

COMPACTED LIMESTONE-

115+50

CONC PVMT (CONT-REINF JRCP) (12") with fibermesh at 3 lbs. per c.y. Min 5,000 PSI compressive strength at 28 days. Slump 4-6 inches. All exposed concrete surfaces shall be treated with curing compound resin in base ASTM 309 with pigmented tint of Fugitice Dye. See sheet 70 of 133

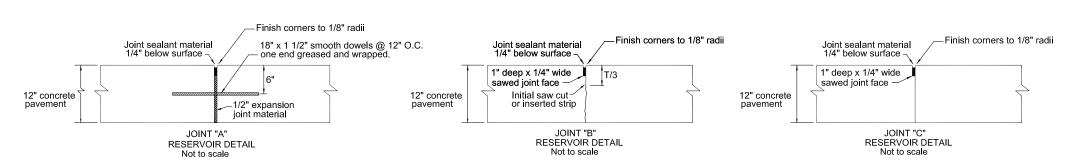
ARIEL CHAVEZ II

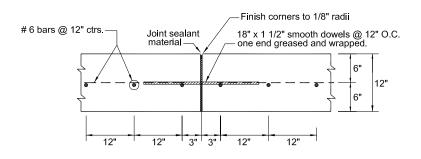
BROWNSVILLE NAVIGATION DISTRICT 1000 CAPT. D.L. FOUST ROAD BROWNSVILLE, TEXAS 78521 FAX (956) 831-6153

PHONE (956) 831-4592 1-800-378-5395 EMAIL achavez@portofbrownsville.com

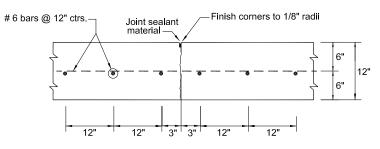
12/01/17



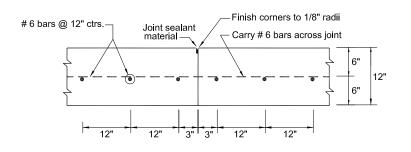




EXPANSION - JOINT TYPE "A" Not to Scale



CONTRACTION JOINT - JOINT TYPE "B" Not to Scale



LONGITUDINAL TIED CONSTRUCTION JOINT - JOINT TYPE "C" Not to scale



During the planning phase of project development developed during coordination with resource agent orders and/or deviations from the final design ractivities as additional environmental clearances	ncies, local governmental entities and th must be reported to the Engineer prior	ie general public. Any change	II. Clean Water Act, Sections 401 and 404 4. The Contractor's designated and question project site daily to ensue compliar shall be provided to TxDOT within 4.	Compliance — Continued: alified Contractor Responsible Person Environment- nce with SW3P and TPDES General Permit TXR 150 8 hours, in accordance with Item 506.3.1.	al (CRPe) will monitor the 2000. Daily Monitoring Reports
I. Clean Water Act, Section 402; Stormwater Polls	ution Prevention		5. Other Project Specific Actions:		
Action Items Required :	☐ No Action Required		1.		
1. X The contractor must implement the SW3P plans and maintained appropriately through The SW3P may need to be revised as nece	out construction. BMPs must be in pla	(BMPs) as indicated in the construction ce prior to the start of construction.	2.		
2. X For all construction PSL's off the ROW, the regulations pertaining to the preservation of	e contractor must certify compliance wit of cultural resources, natural resources o	h all applicable laws, rules and and the environment.	III. O Horal Dayson		
3. 🛮 Based on the acreage of impact, select th	e appropriate box below:		III. Cultural Resources		
This project will disturb less than 1 ace therefore, a NOI and TPDES Site Notice or This project will disturb equal to or many required but a TPDES Site Notice is rethe construction site in a publicly acceptor.	e are not required for this project.	acres: therefore a NOI is not	Bridges, Item 7.7.1., in the event h	No Action Required Specifications For Construction And Maintenance (istorical issues or archeological artifacts are found facts (bones, burnt rock, flint, pottery, etc.) ceas ediately.	d during construction.
☐ This project will disturb equal to or m	ore than 5 acres of soil and will require to be posted at the construction site in	a NOI and TPDES Site Notice. a publicly accessible location.	1.		
4. X Need to address MS4 requirements (Cameron & Hidalgo Counties only)	MS4 requirements not i	needed	2.		
			IV. Vegetation Resources		
II. Clean Water Act, Sections 401 and 404 Complia			Action Items Required :	☐ No Action Required	
Action Items Rquired :	☐ No Action Required		1. X In accordance with the 2014 TxDOT	Standard Specifications; Item 164 — Seeding For	Erosion Control; provide and
1. X Filling, dredging or excavating in any water unless specified in the USACE permit and a mitigation plans, and BMPs required by the	approved by the Engineer. The contract	s or wet areas is prohibited or shall adhere to all agreements,	install temporary or permanent see for all seeding and replanting of rig	ding for erosion control as shown on the plans or tht of way where possible. (Required for Urban S	r as directed by the Engineer lettings)
The Contractor must adhere to all of the	,	e following permit(s):	2. In accordance with Executive Order scaping, native species of plants she for rural roadways. (Required for F	13112 on invasive species and the Executive Mem nall be used for all seeding and replanting of right Rural Settings)	orandum on Beneficial Land— t of way where possible
X No Permit Required			3. X Preserve vegetation where possible	throughout the project and minimize clearing, gru	bbing and excavation within
Nationwide Permit 14 — PCN not Requ	,	,	stream banks, bed and approach so	ections.	•
☐ Nationwide Permit 14 — PCN Required	(1/10th to <1/2 acre, 1/3 in tidal wa	ters)	4. Other Project Specific Actions:		
Individual 404 Permit Required			1.		
Other Nationwide Permit Required: NW	"				
2. X The contractor is responsible for obtaining construction methods that change Impacts the water quality of the State will be main	new or revised Section 404 permit(s) for To Waters Of The U.S., including wetlar stained and not degraded.	or Contractor initiated changes in lds. The Contractor will ensure that	2.		
3. 🛛 Best Management Practices for applicable S	Section 401 General Conditions:				
General Condition 12 — Categories I and II Category I (Erosion Control)	BMPs required				
☐ Temporary Vegetation☐ Blankets, Matting☐ Mulch☐ Sodding	☐ Interceptor Swale ☐ Diversion Dike ☐ Erosion Control Compost	✗ Mulch Filter Berms and/or Socks☐ Compost Filter Berms and/or Socks☐ Compost Blankets			Texas Department of Transportation PHARR DISTRICT
Category II (Sedimentation Control)	_				ENVIRONMENTAL PERMITS,
☐ Silt Fence	☐ Hay (Straw) Bale Dike	Mulch Filter Berms and/or Socks	Pharr District Contact No. 956-702-6100	Revised 08/16/2016	ISSUES AND COMMITMENTS
☐ Rock Berm☐ Triangular Filter Dike	□ Brush Berms□ Sediment Basins	☐ Compost Filter Berms and/or Socks☐ Stone Outlet Sediment Traps		bbreviations	
Sand Bag Berm	☐ Erosion Control Compost	•	BMP: Best Management Practice CGP: Construction General Permit	NWP: Nationwide Permit PCN: Pre-Construction Notification PSI: Periot: Specific Legation	(EPIC)
General Condition 21 — Category III BMPs r Category III (Post—Construction TSS Contro	required		CRPe: Contractor Responsible Person Environmental DSHS: Texas Department of State Health Services FFMA: Federal Emergency Management Agency	PSL: Project Specific Location SPCC: Spill Prevention Control and Countermeasure SW3P: Storm Water Pollution Prevention Plan	SHEET 1 OF 2
Vegetative Filter Strips	□ Wet Basins	☐ Mulch Filter Berms and/or Socks	FEMA: Federal Emergency Management Agency FHWA: Federal Highway Administration MOA: Memorandum of Agreement	TCEO: Texas Commission on Environmental Quality	FED.RD. PROJECT NO. HIGHWAY NO.
Retention/Irrigation	Grassy Swales	Compost Filter Berms and/or Socks	MOU: Memorandum of Understanding MS4: Municipal Separate Stormwater Sewer System	THC: Texas Historical Commission TPDES: Texas Pollutant Discharge Elimination System TPWD: Texas Parks and Wildlife Department	STATE DISTRICT COUNTY PORT ROADS
Extended Detention BasinConstructed Wetlands	☐ Vegetation—Lined Ditches☐ Erosion Control Compost	☐ Sand Filter Systems☐ Sedimentation Chambers	MSAT: Mobile Source Air Toxic MBTA: Migratory Bird Treaty Act	TxDOT: Texas Department of Transportation T&E: Threatened and Endangered Species	TEXAS PHR CAMERON SHEET NO.
	-··· r	•	NOI: Notice of Intent NOT: Notice of Termination	USACE:U.S. Army Corp of Engineers USFWS:U.S. Fish and Wildlife Service	0921 06 275 77 OF 133

V. Federal Listed, and Proposed Threatened and Endangered Species, (State Listed Species, Candidate Species and Migratory Birds	Critical Habitat,	VI. Hazardous Materials on Contamination Issues -
	Action Required	2. Does the project involve any bridge class st not including box culverts)?
1. X Under the Migratory Bird Treaty Act of 1918 (MBTA), codified of the proposed construction work will not remove active nests from migratory bird nesting season, (February 15th. through October within right of way during nesting season, a qualified Biologist spresent. If present, Contractor shall maintain a buffer zone of biologist until the young have fledged or the nest is not occupi	m bridges, trees, ground and other structures during 1st.). If the Contractor needs to perform work shall conduct a survey to determine if nests are vegetation ground the nest as determined by the	Yes X No If "No", then no further action required. If "Yes", then TxDOT is responsible for com 3. Are the results of the asbestos inspection p
2. X There is the potential for the presence of state—listed species law prohibits the taking (incidental or otherwise) of state—listed hooking, hunting, netting, shooting, or share by any means or a work in the immediate area, do not disturb species or habitat or	species. Taking is defined as the collection, levices. If any listed species are observed, cease	Yes No If "Yes", then TxDOT must retain a Texas C consultant to assist with the notification, d
3. X Other Project Specific Actions:		activities as necessary. The notification for prior to scheduled abatement activities and
1. State listed species include: Black—Spotted Newt, Mexican Tro	ee Frog, South Texas Siren, White—Lipped Frog, and Texas Horned Lizard.	If "No", then TxDOT is still required to notif
		4. The Contractor is responsible for providing careful coordination between the Engineer a delays and subsequent claims.
2.		
		VII. Other Environmental Issues
3.		Action Items Required :
.		1. Noise
		Contractor shall make every reasonable effo as work hour controls and proper maintena
		2.
		Contractor shall practice common dust con unpaved road surfaces and vehicle speed roduring construction.
VI. Hazardous Materials on Contamination Issues		Contractor should minimize MSAT by utilizin limits on idling, increase use of cleaner bur
Action Items Required :	Action Required	as appropriate.
General (applies to all projects):		
Comply with the Hazard Communication Act (HCA) for personnel who safety meetings prior to beginning construction and making workers that all workers are provided with personal protective equipment app	aware of potential hazards in the workplace. Ensure	
Obtain and keep on—site Material Safety Data Sheets (MSDS) for all include but are not limited to the following categories: Paints, acids, fuels and concrete curing compounds or additives. Provide protected which may be hazardous. Maintain product labelling as required by the	solvents, asphalt products, chemical additives, storage, off bare ground and covered, for products	
Maintain an adequate supply of on—site spill response materials as in immediate action to mitigate the spill as indicated in the MSDS and the TxDOT Pharr District Spill Coordinator immediately. The Contract and cleanup of all product spills.	in accordance with safe work practices. Contact	
Contact the Engineer if any of the following are detected:		
 Dead or distressed vegetation (identified as not normal) Trash piles, drums, canisters, barrels, etc. Undesirable smells or odors Evidence of leaching or seepage of contaminant substances 		
Any other evidence indicating possible hazardous materials or contam	nination discovered on site.	Pharr District Contact No. 956-702-6100
If potentially hazardous material and/or contaminated media (i. building materials) are unexpectedly encountered during construnation are handled according to applicable federal and state recontact the Engineer immediately.	ction, assure that such materials and contami—	List of Abbreviation BMP: Best Management Practice CGP: Construction General Permit CRPe: Contractor Responsible Person Environmental DSHS: Texas Department of State Health Services FEMA: Federal Emergency Management Agency FHWA: Federal Highway Administration MOA: Memorandum of Agreement MOU: Memorandum of Inderstanding MS4: Municipal Separate Stormwater Sewer System MSAT: Mobile Source Air Toxic MBTA: Migratory Bird Treaty Act MSC: Construction AMPTA: Migratory Bird Treaty Act
		NOI: Notice of Intent 'USAC USFW NOT: Notice of Termination USFW

1	Does the project involve any bridge cla not including box culverts)?	ss structure rehabilitation or replacements (br	idge class str	ructures		
	Yes X No					
	If "No", then no further action required If "Yes", then TxDOT is responsible for	d. completing an asbestos assessment/inspectic	on.			
	Are the results of the asbestos inspec	tion positive (is asbestos present)?				
	Yes No					
	consultant to assist with the notification	xas Department of State Health Services (DSH on, develop abatement/mitigation procedures, on form to DSHS must be postmarked at leas a and/or demolition.	and perform	manageme	ent	
	If "No", then TxDOT is still required to	notify DSHS 15 working days prior to any sch	neduled demo	lition.		
	The Contractor is responsible for provious careful coordination between the Engine delays and subsequent claims.	ding the date(s) for abatement activities and/ eer and an Asbestos Consultant in order to n	or demolition ninimize const	with truction		
Otl	ner Environmental Issues					
tio	n Items Required :	X No Action Required				
	Noise					
	Contractor shall make every reasonable as work hour controls and proper main	e effort to minimize construction noise throug ntenance of equipment mufflers.	h abatement	measures	such	
	Air					
		t control techniques such as surface chemical eed reduction shall be implemented to minimiz				
	Contractor should minimize MSAT by u limits on idling, increase use of cleane as appropriate.	tilizing measures to encourage use of EPA re er burning diesel engines, and other emission l	quired cleaner imitation tech	diesel fue nniques,	els,	
					partment of Trans	sportation
			© 20°	¹⁶ PHA	RR DISTRICT	
			FNVIF	RONME	ENTAL PERMI	TS.
Pho	rr District Contact No. 956-702-6100	Revised 08/16/2016			ID COMMITME	-
	List of Abbre					
Γ_{Λ}	st Management Practice nstruction General Permit	NWP: Nationwide Permit PCN: Pre-Construction Notification PSI: Project Specific Legation		(-	PIC)	
Te Fe	ntractor Responsible Person Environmental kas Department of State Health Services deral Emergency Management Agency deral Highway Administration morandum of Agreement	PSL: Project Specific Location SPCC: Spill Prevention Control and Countermeasure SW3P: Storm Water Pollution Prevention Plan TCEQ: Texas Commission on Environmental Quality	FED.RD.		SHEET 2	OF 2
Fe	deral Highway Ádministration	TCEQ: Texas Commission on Environmental Quality THC: Texas Historical Commission	FED.RD. DIV.NO.		PROJECT NO.	NO.
Me	morandum of Agreement	TDDECT DILLIPLI ST. C.				INTERNAL
Mu	morandum of Agreement morandum of Understanding nicipal Separate Stormwater Sewer System hile Squree Air Toylo	TPDES: Texas Pollutant Discharge Elimination System TPWD: Texas Parks and Wildlife Department TYDOT: Texas Penartment of Transportation	STATE	DISTRICT	COUNTY	PORT ROADS
Mi	emorandum of Agreement morandum of Understanding nicipal Separate Stormwater Sewer System bile Source Air Toxic gratory Bird Treaty Act ice of Intent	THC: Texas Historical Commission TPDES: Texas Pollutant Discharge Elimination System TPWD: Texas Parks and Wildlife Department TXDOT: Texas Department of Transportation T&E: Threatened and Endangered Species USACE:U.S. Army Corp of Engineers USFWS:U.S. Fish and Wildlife Service	STATE TEXAS CONTROL	DISTRICT PHR SECTION	COUNTY CAMERON JOB	

Continued:

TPWD BMPs

The Programmatic Agreement defines Best Management Practices (BMPs) to be implemented by Texas Department of Transportation (TxDOT) per §2.213 (Programmatic Agreements) of the 2017 Memorandum of Understanding (MOU) between TxDOT and Texas Parks and Wildlife Department (TPWD). These BMPs are measures that TxDOT and TPWD garee will result in avoidance and minimization of potential impacts to natural resources and in some cases apply to particular types of TxDOT projects.

The purpose of this section is to provide BMPs to minimize impacts to species or groups of species. Implementation of these BMPs by TxDOT eliminates the need for coordination under §2.206(1) of the MOU. except as noted.

Due diligence should be used to avoid killing or harming any wildlife species in the implementation of TxDOT projects.

X Bird BMPs (Required)

In addition to complying with the Migratory Bird Treaty Act (MBTA) perform the following BMPs:

- f X Prior to construction, perform daytime surveys for nests including under bridges and in culverts to determine if they are active before removal. Nests that are active should not be disturbed.
- Do not disturb, destroy, or remove active nests, including
- ground nesting birds, during the nesting season.
 Avoid the removal of unoccupied, inactive nests, as practi-
- Prevent the establishment of active nests during the nesting season on TxDOT owned and operated facilities and structures proposed for replacement or repair.
- Do not collect, capture, relocate, or transport birds, eggs, young, or active nests without a permit.
- ☐ Bald Eagle (Haliaeetus leucocephalus)
 - ☐ Bird BMPs and Bald and Golden Eagle Protection Act compliance
- Reddish Egret (Egretta rufescens) or ☐ White-faced Ibis (Plegadis chihi)
 - ☐ Bird BMPs unless project is within 300 meters (984 feet) of a known colonial water bird rookery then coordinate with TPWD.
- ☐ Rookeries (Recommendations)

In general, nesting dates for herons and egrets range from early February to late August in Texas, depending on the species. Great Blue Herons (GBHE) are usually the first to nest. When GBHE get disrupted from the nest and abandon nesting, then the other species of herons and egrets may not attempt to nest at the colony that year. Breeding dates for rookery species are approximately as follows:

Species	Dates
Cattle Egret	Early April to late October
Little Blue Heron	Late March to late July
Snowy Egret	Late March to early August
Great Egret	Early March to early August
Black-crowned Night Heron	Early February to late July
Great Blue Heron	February to late August

☐ Rookeries (Recommendations) (Continued)	☐ Bat BMPs (Required)(Continued)
 Vegetation clearing in a primary buffer area of 300 meters (984 feet) from a heronry periphery should be avoided. Utilizing areas that have already been cleared within this buffer area may be acceptable depending on site-specific characteristics. Additionally, human foot-traffic or machinery use should not occur within this buffer area during the nesting season. □ Clearing activities or construction using heavy machinery in a secondary buffer area of 1,000 meters (3,281 feet) from the heronry periphery should be avoided during the breeding season (courting and nesting). 	Avoid unnecessary removal of dead fronds on native and ornamental palm trees in south Texas (Cameron, Hidalgo, Willacy, Kenedy, Brooks, Kleberg, Nueces, and San Patricio counties) from April 1st through October 31st. If removal of dead fronds is necessary at other times of the year, limit frond removal to extended warm periods (nighttime temperatures: 55°F for at least two consecutive nights), so bats can move away from the disturbance and find new roosts. Large hollow trees, snags (dead standing trees), and trees with shaggy bark should be surveyed for colonies and, if found, should not be disturbed until the bats are no longer occupying
☐ <u>Bat BMPs (Required)</u>	these features. Post-occupancy surveys should be conducted by a qualified biologist prior to tree removal from the landscape. Retain mature, large diameter hardwood forest species and
To determine the appropriate BMP to avoid or minimize impacts to bats, review the habitat description for the species of interest on the TPWD Rare, Threatened, and Endangered Species of Texas by County List or other trusted resources. All bat surveys and other activities that include direct contact with bats shall comply with TPWD' recommended white-nose syndrome protocols located on the TPWD Wildlife Habitat	native/ornamental palm trees where feasible. In all instances, avoid harm or death to bats. Bats should only be handled as a last resort and after communication with TPWD. Mexican Long-tongues Bat (Choeronycteris mexicana)
Assessment Program website under "Project Design and Construction".	\square Avoid unnecessary impacts to cacti and agave species.
The following survey and exclusion protocols should be followed prior to commencement of construction activities. For the purposes of this decument, estructures are defined as bridges, surveyers (congrete or	□ Ba† BMPs.
document, structures are defined as bridges, culverts (concrete or metal), wells, and buildings.	☐ Additional Bat BMPs (Recommendations)
□ For activities that have the potential to impact structures, cliffs or caves, or trees; a qualified biologist will perform a habitat assessment and occupancy survey of the feature(s) with roost potential as early in the planning process as possible or within one year before project letting. □ For roosts where occupancy is strongly suspected but unconfirmed during the initial survey, revisit feature(s) at most four weeks prior to scheduled disturbance to confirm absence of bats. □ If bats are present or recent signs of occupation (i.e., piles of guano, distinct musky odor, or staining and rub marks at potential entry points) are observed, take appropriate measures to ensure that bats are not harmed, such as implementing nonlethal exclusion activities or timing or phasing of construction. □ Exclusion devices can be installed by a qualified individual between September 1 and March 31. Exclusion devices should be used for a minimum of seven days when minimum nighttime temperatures are above 50°F and minimum daytime temperatures are over 10°F. Prior to exclusion, ensure that alternate roosting habitat is available in the immediate area. If no suitable roosting habitat is available, installation of alternate roosts is recommended to replace the loss of an occupied roost. If alternate roost sites are not provided, bats may seek shelter in other inappropriate sites, such as buildings, in the surrounding area. See Additional Bat BMPs (Recommendations) for recommended acceptable methods for excluding bats from structures. □ If feature(s) used by bats are removed as a result of construction, replacement structures should be constructed to replace these features, as practicable. □ Conversion of property containing cave or cliff features to transportation purposes should be avoided where feasible.	Bat surveys of structures should include visual inspections of structural fissures (cracked or spalled concrete, damaged or split beams, split or damaged timber railings), crevices (expansion joints, space between parallel beams, spaces above supports piers), and alternative structures (drainage pipes, bolt cavities, open sections between support beams, swallow nests) for the presence of bats. Before excluding bats from any occupied structure, bat species, weather, temperature, season, and geographic location must be incorporated into any exclusion plans to avoid unnecessary harm or death to bats. Winter exclusion must entail a survey to confirm either, 1) bats are absent or 2) present but active (i.e. continuously active - not intermittently active due to arousals from hibernation). Avoid using materials that degrade quickly, like paper, steel wool or rags, to close holes. Avoid using products or making structural modifications that may block natural ventilation, like hanging plastic sheeting over an active roost entrance, thereby altering roost microclimate. Avoid using chemical and ultrasonic repellents. Avoid use of silicone, polyurethane or similar non-water-based caulk products. Avoid use of expandable foam products at occupied sites. Avoid the use of flexible netting attached with duct tape.
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	EPIC SHEET SUPPLEMENT
Pharr District Contact No. 956-702-6100	Revised 07/12/2017

Texas Department of Transportation

EPIC SHEET SUPPLEMENTALS

SHEET 1 OF 3

List of Abbreviations Best Management Practice CCP: Construction General Permit CRPe: Contractor Responsible Person Environmental

Texas Department of State Health Services

FEMA: Federal Emergency Management Agency FHWA: Federal Highway Administration MOA: Memorandum of Agreement

Memorandum of Understanding Municipal Separate Stormwater Sewer System

MSAT: Mobile Source Air Toxic MBTA: Migratory Bird Treaty Act NOI: Notice of Intent

Notice of Termination Nationwide Permit Pre-Construction Notification

Project Specific Location Spill Prevention Control and Countermeasure SW3P: Storm Water Pollution Prevention Plan

TCEQ: Texas Commission on Environmental Quality THC: Texas Historical Commission
TPDES: Texas Pollutant Discharge Elimination System TPWD: Texas Parks and Wildlife Department TxDOT: Texas Department of Transportation T&E: Threatened and Endangered Species
USACE:U.S. Army Corp of Engineers
USFWS:U.S. Fish and Wildlife Service

HIGHWAY PROJECT NO. INTERNAL DISTRICT COUNTY STATE CAMERON PHR TEXAS SHEET NO. CONTROL SECTION JOB 0921 06 275 78A OF 133

DSHS: Texas Department of State Neurin Ser FEMA: Federal Emergency Management Agency FHWA: Federal Highway Administration MOA: Memorandum of Agreement

Texas Department of State Health Services

Municipal Separate Stormwater Sewer System

NOT: Notice of Termination.

NMP: Notionwide Permit

PCN: Pre-Construction Notification
PSL: Project Specific Location

Call Prevention Control and

PSL: Project Specific Location SPCC: Spill Prevention Control and Counterme SW3P: Storm Water Pollution Prevention Plan

Spill Prevention Control and Countermeasure

TPWD: Texas Parks and Wildlife Department

TXDOT: Texas Department of Transportation
T&E: Threatened and Endangered Species
USACE:U.S. Army Corp of Engineers
USFWS:U.S. Fish and Wildlife Service

INTERNAL

SHEET NO.

78B OF 133

DISTRICT

PHR

SECTION

06

COUNTY

CAMERON

JOB

275

STATE

TEXAS

CONTROL

0921

☐ Sheep Frog (Hypopachus variolosus)	☐ <u>Stream Crossings (Recommendations)</u>	☐ <u>Invasive Species BMPs (Recommen</u>	<u>dations)</u>
Minimize disturbance to burrows or downed woody debris. Water Quality BMPs. Amphibian BMPs. X	Use spanning bridges rather than culverts when feasible. If using a culvert, staggered culverts that concentrate low flows but provide conveyance of higher flows through staggered culverts placed at higher elevations is recommended. Bottomless culverts are recommended to allow for fish and other aquatic wildlife passage in the low flow channel. If bottomless culverts are not feasible, making a low flow channel for fish passage is recommended. Avoid placing ripray across stream channels and instead use alternative stabilization such as biotechnical stream bank stabilization methods including live native vegetation or a combination of vegetative and structural materials. When ripray or other bank stabilization devices are necessary, their placement should not impede the movement of aquatic and terrestrial wildlife underneath the bridge. In some instances, ripray may be buried, back-filled with topsoil and planted with native vegetation. Incorporate bat-friendly design into bridges and culverts. Design bridges for adequate vertical and horizontal clearances under the roadway to allow for terrestrial wildlife to safely pass under the road. A span wide enough to cross the stream and allow for dry ground and an antural surface path under the roadway is encouraged. For culverts, incorporation of an artificial ledge inside the culvert on one or both sides for use by terrestrial wildlife is recommended. Riparian buffer zones should remain undisturbed where possible. Vegetation BMPs (Recommendations) Minimize the amount of vegetation cleared. Removal of native vegetation, particularly mature native trees and shrubs should be avoided to the greatest extent practicable. Wherever practicable, impacted vegetation should be replaced with in-kind on-site replacement/restoration of native vegetation. To minimize adverse effects, activities should be planned to preserve mature trees, particularly acorn, nut or berry producing varieties. These types of vegetation have high value to wildlife as food and cover. It is st	mussels on http://texasin specified in 31 TAC \$57.9 regarding prevention of the machinery, equipment, or waters should follow cled potential spread of invasional care should be taken to a plants (such as Giant Sal foil, Water Lettuce, and bodies into areas not cur ment/vehicles coming in a invasive plant species shat o prevent the potential Colonization by invasive disturbed sites in terres should include removing while allowing the existing disturbed areas. If using locally grown weed-free in species. Leave the hay be down, as this acts as multiple will be sign roadways on new lowings, particularly in area or seasonal movement rout Consider using cable medi	void the spread of aquatic invasive vinia, Hydrilla, Hyacinth, Watermil-Alligatorweed) from infested water rently infested. All machinery/equipmentact with waters containing aquatic would follow clean/drain/dry protocols spread of invasive plants. plants should be actively prevented on trial habitats. Vegetation management any asive species as soon as practical and native plants to revegetate the lay bales for sediment control, use way to prevent the spread of invasive ales in place and allow them to break ch assisting in revegetation. ions) cation to incorporate wildlife crossas that bisect wildlife travel corridors
☐ In-kind compensatory mitigation should be considered for all unavoidable impacts to aquatic resources including, but not limited to streams, wetlands, oysters, seagrass and mudflats, regardless of their jurisdictional status.			Texas Department of Transportation PHARR DISTRICT
regardless of their jurisdictional status. Compensatory mitigation plans should be developed in consultation with TPWD Transportation Conservation Coordinator.			EPIC SHEET SUPPLEMENTALS
•			
	Pharr District Contact No. 956-702-6100	Revised 07/12/2017	TPWD BMPs
	List of Abbreviations		SHEET 3 OF 3
	BMP: Best Management Practice CGP: Construction General Permit CRPe: Contractor Responsible Person Environmental DSHS: Texas Department of State Health Services FFMA: Federal Emergency Management Agency MSAT: Mobile Source Air Toxic MBTA: Migratory Bird Treaty Act NOI: Notice of Intent NOT: Notice of Termination NVIII Notice of Permit	TCEQ: Texas Commission on Environmental Quality THC: Texas Historical Commission TPDES:Texas Pollutant Discharge Elimination System TPWD: Texas Parks and Wildlife Department TXDOT:Texas Department of Transportation	FED. RD. PROJECT NO. HIGHWAY NO. 6 INTERNA STATE DISTRICT COUNTY PORT ROAL

FEMA: Federal Emergency Management Agency
FHWA: Federal Highway Administration
MOA: Memorandum of Agreement
MOU: Memorandum of Understanding
MS4: Municipal Separate Stormwater Sewer System

NWP: Nationwide Permit
PCN: Pre-Construction Notification
PSL: Project Specific Location
SPCC: Spill Prevention Control and Countermeasure
SW3P: Storm Water Pollution Prevention Plan

TXDOT: Texas Department of Transportation T&E: Threatened and Endangered Species USACE:U.S. Army Corp of Engineers USFWS:U.S. Fish and Wildlife Service

PHR CAMERON TEXAS

SHEET NO. CONTROL SECTION JOB 0921 06 275 78C OF 133

SITE DESCRIPTION

	JECT LIMITS:Callaway Drive, Capt. D.L. Foust Road, Milo Road, Old S.H. No. 48,
	& S.H. No. 48 / S.H. 550
000	FOT OUT HADO
PROL	ECT SITE MAPS:* *Project Location Map: Title Sheet (Sheet 1)
	*Drainage Patterns: See Drainage area maps
	*Approx. Slopes Anticipated After Major Gradings and Areas of Soil
	Distrubance: Typ Sects (Sheets 4—10)
	*Major Controls and Locations of Stabilization Practices: SW3P Site Map
	Sheet (Sheet 79) *Project Specific Locations: To be specified by Project Field Office and
	located in the Project SW3P File
	*Surface Waters and Discharge Locations: N/A
DDO	JECT DESCRIPTION:
FRU	Overlay or Reconstruct existing roadways consisting of grading, limestone
	asphalt concrete pavement, reinforced concrete pavement, pothole repair.
MΑ	JOR SOIL DISTURBING ACTIVITIES:
	See EPIC Sheet
	47.0 4
ГОТА	L PROJECT AREA: 17.8 Acres
TOTA	L AREA TO BE DISTURBED: 0 Acres (0%)
WEI	CHTED RUNOFF COEFFICIENT:
	Before Construction: N/A After Construction: N/A
	After Construction. N/A
	LM/Lomalta Clay at Foust Road & S.H. 48/Windhause SU/Sejita — Urban Land Complex at Callaway Drive.
	OF RECEIVING WATERS: Browsnville Ship Channel and all runoff drains into the Gulf of Mexico
	Bronontino ding ondinio dia di ration di dino di di di monio
	IGERED SPECIES, DESIGNATED CRITICAL HABITAT
ND H	IISTORICAL PROPERTY:
ND H	IISTORICAL PROPERTY: A. No Endangered Species. Designated Critical Habitat or Historic Property
ND H	IISTORICAL PROPERTY:
ND H	IISTORICAL PROPERTY: A. No Endangered Species. Designated Critical Habitat or Historic Property
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ND H	The documentation satisfying TPDES Construction General Permit eligibility pertaining to the existence or of any protective action taken with regards to endangered species or designated critical habitat or historical property in this project area is contained in the project's Environmental Impact Study and can be viewed under the State Open Records Act at the address shown below: TEXAS DEPARTMENT OF TRANSPORTATION PHARR DISTRICT HEADQUARTERS ATTN: ENVIRONMENTAL COORDINATOR 600 W. EXPRESSWAY 83
ND H	The documentation satisfying TPDES Construction General Permit eligibility pertaining to the existence or of any protective action taken with regards to endangered species or designated critical habitat or historical property in this project area is contained in the project's Environmental Impact Study and can be viewed under the State Open Records Act at the address shown below: TEXAS DEPARTMENT OF TRANSPORTATION PHARR DISTRICT HEADQUARTERS ATTN: ENVIRONMENTAL COORDINATOR

EROSION AND SEDIMENT CONTROLS

	TEMPORARY SEEDING	PRESERVATION OF NATURAL RESOURCES
		FLEXIBLE CHANNEL LINER
	BUFFER ZONES	RIGID CHANNEL LINER
	PLANTING SEEDING	SOIL RETENTION BLANKET COMPOST MANUFACTURED COMPOST
	SODDING	BIODEGRADABLE EROSION
	OTHER: (Specify Practice)	CONTROL SOCKS
TURAL	_ PRACTICES: (Select T = Temporary	or P = Permanent, as applicable)
	SILT FENCES	
	BIODEGRADABLE EROSION CONTROL S	SOCKS
	HAY BALES ROCK FILTER DAMS	
	DIVERSION, INTERCEPTOR, OR PERIME	TER DIKES
	DIVERSION, INTERCEPTOR, OR PERIME	TER SWALES
	DIVERSION DIKE AND SWALE COMBINA	ATIONS
	PIPE SLOPE DRAINS	
	PAVED FLUMES ROCK BEDDING AT CONSTRUCTION EX	ZIT
	TIMBER MATTING AT CONSTRUCTION	
	PIPE MATTING OR EQUAL AT CONSTR	
	CHANNEL LINERS	
	SEDIMENT TRAPS	
	SEDIMENT BASINS	
	STORM INLET SEDIMENT TRAP STONE OUTLET STRUCTURES	
	CURBS AND GUTTERS	
	STORM SEWERS	
	VELOCITY CONTROL DEVICES	
$\overline{\mathbf{T}}$	OTHER: (Specify Practice)	
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T	OTHER: (Specify Practice)	
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WATE Storm carry the outform the 1. In 2. C 3. O	OTHER: (Specify Practice) Biodegradable logs. ER MANAGEMENT: m water drainage will be provide y drainage within the R.O.W. to system where cross drainage m all. ER MANAGEMENT ACTIVITIES: order of activities will be as fol istall sediment control devices. onstruct proposed roadway as s nce all construction activity is of material construction activity is of the water water discharms, before being allowed to mix ist of non-polluted ground water in water; and water used for dus	lows: Independent of the designate of t
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OTHER REQUIREMENTS & PRACTICES

OTHER EROSION AND SEDIMENT CONTROLS:

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

INSPECTION: For areas of the construction site that have not been finally stabilized, area used for storage of materials, structural control measures, and locations where vehicles enter or exit the site, personnel provided by the permittee and familiar with the SW3P must inspect disturbed areas at least once every fourteen (14) calendar days and within twenty—four (24) hours of the end of a storm event 0.5 inches or greater.

WASTE MATERIALS: All waste materials will be collected and stored in a securely lidded dumpster. All trash and construction debris from the site will be deposited as necessary at a local dump. No construction waste material will be buried on site.

HAZARDOUS WASTE (INCLUDING SPILL REPORTING): At a minimum, any products in the following categories to be hazardous: Paints, Acids for cleaning masonry surfaces, Cleaning Solvents, Asphalt products, Chemical additives for soil stabilization, or Concrete curing compounds and additives. In the event of a spill which may be hazardous, the spill Coordinator should be contacted immediately. Emptying of excess concrete should not be allowed on site. Likewise, washout of concrete trucks should not be performed on site. These discharges are considered non—allowable non—storm water discharges. Concrete trucks should never be allowed to dump into storm drains or sanitary sewers.

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

OFFSITE VEHICLE TRACKING: The Contractor shall be rquired, on a regular basis or as may be directed by the Engineer, to dampen haul roads for dust control, stabilize construction entrances and to remove excess dirt from the roadway.

MANAGEMENT PRACTICES:

1. Disposal areas, stockpiles, and haul roads shall be constructed in a manner that will minimize and control the amount of sediment that may enter receiving waters. Disposal areas shall not be located in any wetland, water body or stream bed.

Construction staging areas and vehicle maintenance areas shall be constructed by the Contractor in a manner to minimize the runoff of pollutants.
 All waterways shall be cleared as soon as practicable of temporary embankment, temporary bridges, matting, falsework, piling, or debris or other obstructions placed during construction operations that are not a part of the finished work.

THER:

Construction materials stored on site to be provided by Project Field Office.
 The project SW3P File at the project field office shall contain the N.O.I., CGP Coverage Notice, EPA NPDES Form, Signature Authorization,

Certification/Qualification Statements, Inspection Reports, Required Maps, and the TPDES Permit, Part II.





POLLUTION PREVENTION
PLAN (SW3P)

l	REV. 2-	-20-14			SW3P.DGN
	FED.RD. DIV.NO.		PROJECT NO.		SHEET NO.
	6				79
	STATE	DIST.		COUNTY	
	TEXAS	PHARR	С	AMERO	N
ĺ	CONT.	SECT.	JOB	HIC	GHWAY NO.
	0921	06	275	INTERNA	L PORT ROADS

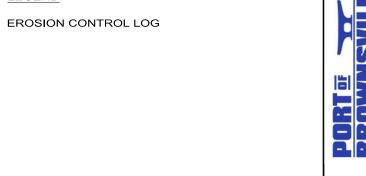
BMP INSTALL/REMOVE DATES

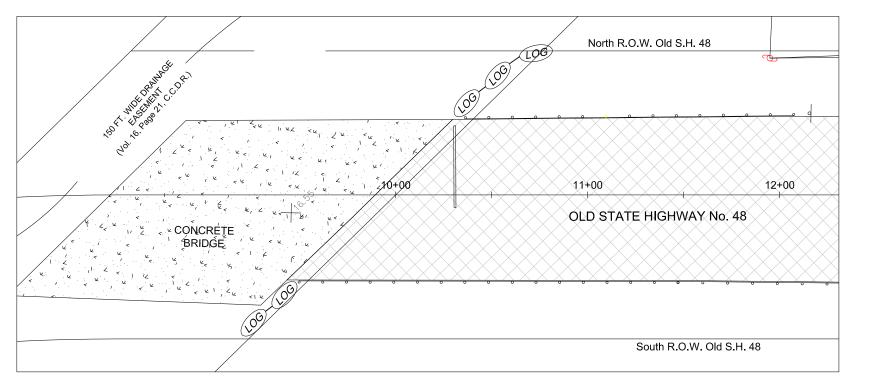
BMP#	INSTALL DATE	REMOVE DATE
ECL - 12		
FCL - 12		

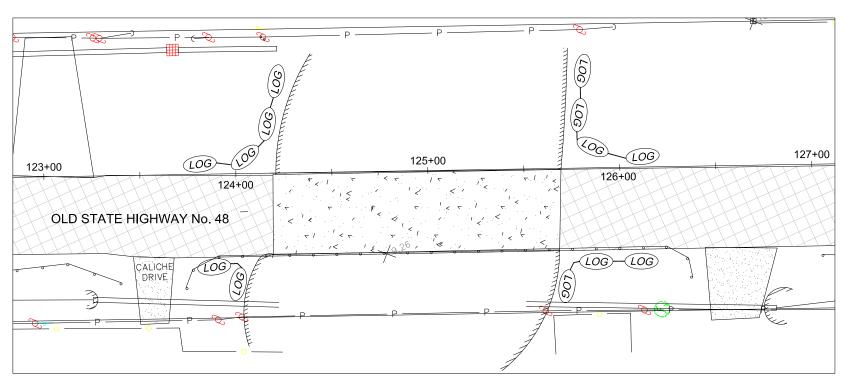
DATE DISTURBED	DATE STABILIZED

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ARIEL CHAVEZ H	William A State of the State of
Chinkhaire T.	12/01/1
ARIEL CHAVEZ II P.E.	DATE

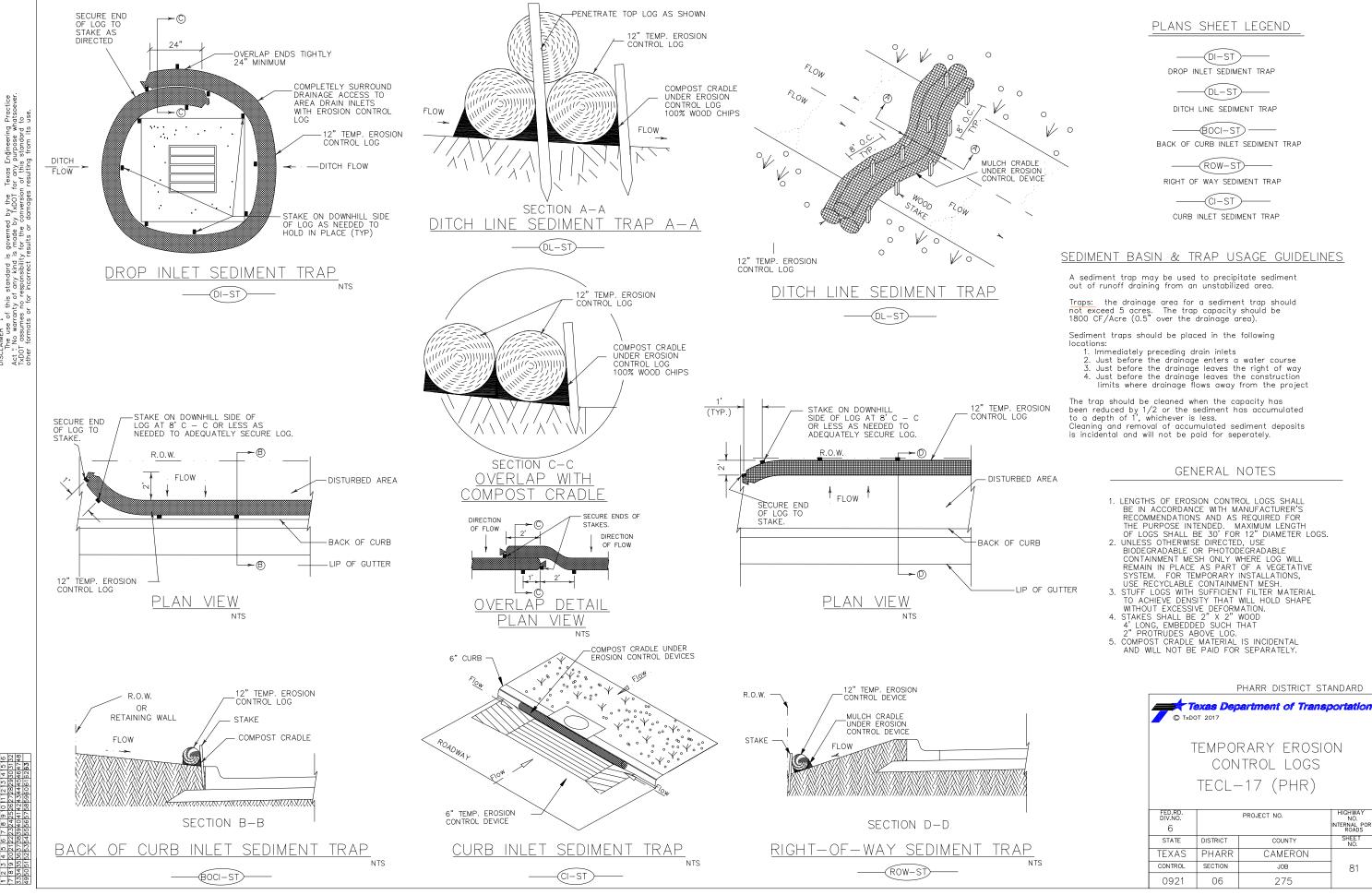
ECT NUMBER	COUNTY	JOB NO.	SHEET NO.
FEDERAL AID PROJECT NUMBER XXXXXX	DISTRICT PHARR	SECTION NO.	DATE: OCTOBER 2017
FHWA TEXAS DIVISION	STATE	CONTROL NO.	HIGHWAY NO. DATE: INTERNAL PORT ROADS OCTOBER 2017

E:\Documents\MY DRAWINGS\56roads\2016 ROAD RESURFACING PROJECT\REVISIONS AUGUST 2017\EPIC,SW3P\SW3P LAYOUT PHASE 1.dwg

50

BROWNSVILLE NAVIGATION DISTRICT 1000 CAPT. D.L. FOUST ROAD BROWNSVILLE, TEXAS 78521 PHONE (956) 831-4592 1-800-378-5395 FAX (956) 831-6153 EMAIL achavez@portofbrownsville.com





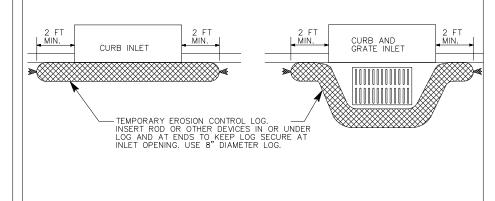
HIGHWAY NO. TERNAL POF ROADS

SHEET NO.

81

CURB INLETS DIAMETER LOGS

ITEM 506-6040 BIODEG EROSN CONT LOGS (INSTL) (8")



MATERIAL REQUIREMENTS

||FILL:

Use 100% shredded mulch or other non-compost biodegradable material as fill for logs. No compost or fines.

DO NOT USE MATERIAL WHICH PROHIBITS WATER INFILTRATION.

LOG MESH:

Use mesh with 1/4" openings or larger. Mesh must allow water infiltration but also hold fill material in place.

SEDIMENT BASIN & TRAP USAGE GUIDELINES

A sediment trap (erosion control log) may be used to filter sediment out of runoff draining from an unstabilized area.

 $\underline{\text{Traps:}}$ The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Sediment traps should be placed in the following locations:

- 1. Within drainage ditches spaced as needed or min. 500' on center
- 2. Immediately preceding ditch inlets
- 3. Just before the drainage enters a water course 4. Just before the drainage leaves the right of way

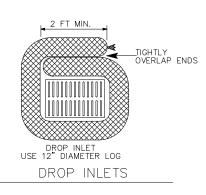
The trap should be cleaned when the capacity has been reduced by 1/2 or the sediment has accumulated to a depth of 1', whichever is less.

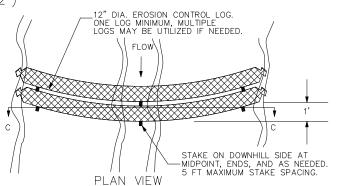
REQUIRED ITEMS:

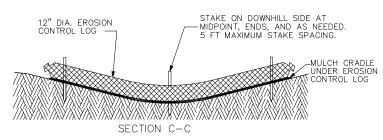
- ITEM 506-6040 BIODEG EROSN CONT LOGS (INSTL) (8") LF
- ITEM 506-6041 BIODEG EROSN CONT LOGS (INSTL) (12") LF
- ITEM 506-6043 BIODEG EROSN CONT LOGS (REMOVE)

DROP INLETS AND OTHER LOCATIONS 12" DIAMETER LOGS

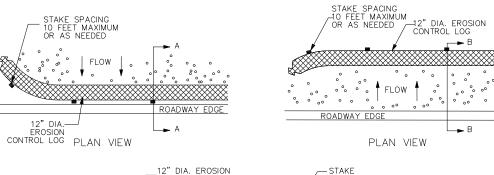
ITEM 506-6041 BIODEG EROSN CONT LOGS (INSTL)(12")

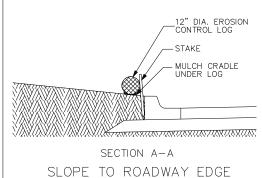


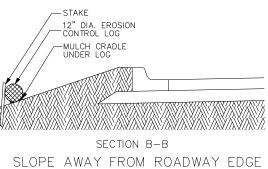


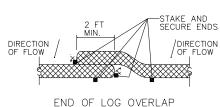


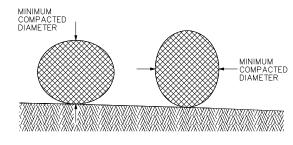
DRAINAGE SWALE OR DITCH











DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

Texas Department of Transportation Houston District

EROSION CONTROL LOG

ECL-12

ILE: STDG4a.DGN	DN: TxDo	t	CK:	TxDot	DW:	TxDot	CK:	TxDot
CTxDOT 2014	DISTRICT	FED	REG	PROJECT NUMBER			SHEET	
REVISIONS	HOU	Γ,	6				82	
1/15 MINOR CORRECTIONS	COUNTY				CONTROL	SECT	JOB	HIGHWAY
	CAMERON			0921	06	275	INTERNAL PORT ROADS	

BND 2016 INTERNAL ROADS REHABILITATION PROJECT

SHEET 82 OF 133

SH 48 & SH 550 INTERSECTION IMPROVEMENTS CSJ 0220-07-090

N. T. S.

TEXAS DEPARTMENT OF TRANSPORTATION

SH 48 & SH 550

COVER SHEET

© -2018

	P(B. RD. DIV. 40.		•	MOJECT HO.					
-	6								83
	STATE	:	STATE DIST. NO.	COMITY	CONT.	SECT.	J09	нзсн	WAY 40.
	TEXA	S	21	CAMERON	0220	07	060	SH487	SH550
_					1.				

		SUN	MARY OF PA	VEMENT MAR	RKING ITEMS			
	666 6036	666 6300	666 6303	666 6315	668 6077	668 6085	672 6007	672 6009
LOCATION	REFL PAV MRK TY I (W)8"(SLD)(100MI L)	RE PM W/RET REQ TY I (W)4"(BRK)(100M IL)	RE PM W/RET REQ TY I (W)4"(SLD)(100MI L)	RE PM W/RET REQ TY I (Y)4"(SLD)(100MI L)	PREFAB PAV MRK TY C (W) (ARROW)	PREFAB PAV MRK TY C (W) (WORD)	REFL PAV MRKR TY I-C	REFL PAV MRKR TY II-A-A
	LF	LF	LF	LF	EA	EA	EA	EA
SH 48 / SH 550	460	115	460	460	4	4	12	6
PROJECT TOTALS	460	115	460	460	4	4	12	6

SUMMARY OF WORKZ	ONE TRAFFIC	CONTROL	ITEMS
	662 6063	662 6095	677 6001
LOCATION	WK ZN PAV MRK REMOV (W)4"(SLD)	WK ZN PAV MRK REMOV (Y)4"(SLD)	ELIM EXT PAV MRK 8 MRKS (4")
	LF	LF	LF
SH 48 / SH 550	200	210	200
SH48 / SH 550 TOTAL	200	210	200



SH 48 & SH 550 INTERSECTION © -*YEAR* SUMMARY TABLES

PER. IID. 917, 90.	,	MOJECT NO.		SHEET 1 OF 3			
6							84
STATE	STATE DIST, MD.	COUNTY	CONT.	ster.		Hjeres	17 RES.
TEXAS	21	CAMERON	0220	07	060	SH48/SI	H550

GENERAL NOTES AND SPECIFICATIONS DATA:

USE A POWER-BROOM WHEN CLEANING THE ROADWAY AS NEEDED.

REMOVE & DISPOSE ALL MATERIAL NOT DEEMED SALVAGEABLE BY THE ENGINEER, UNLESS OTHERWISE SHOWN ON THE PLANS.

ON EXISTING PAVEMENT THAT WILL REMAIN IN PLACE, SAND BLAST OR SURFACE TREAT IN ORDER TO REMOVE EXISTING STRIPING.

DO NOT BLOCK DRAINAGE WHEN HANDLING & STOCKPILING EXCAVATED MATERIAL.

MAINTAIN ACCESS TO DRIVEWAYS AND INTERSECTIONS THROUGH ALL PHASES OF CONSTRUCTION.

MAINTAIN POSITIVE DRAINAGE DURING ALL PHASES OF CONSTRUCTION.

TRAFFIC CONTROL DEVICES:

AT THE COMMENCEMENT OF THE PROJECT, ALL TRAFFIC CONTROL DEVICES SHALL BE IN ACCEPTABLE CONDITION, AND MAINTAINED THROUGHOUT THE DURATION OF THE PROJECT, AS PER GUIDELINES FOR TEMPORARY TRAFFIC CONTROL DEVICES AND FEATURES.

NOTIFY THE AREA ENGINEER (AE) IN WRITING (E-MAIL IS ACCEPTABLE) ONCE THE TRAFFIC CONTROL PLAN (TCP) AND ALL TRAFFIC CONTROL DEVICES HAVE BEEN INSTALLED AS PER PLANS ON THE PROJECT SO THAT THE DEPARTMENT'S RESPONSIBLE PERSON ACCOMPANIED BY THE CONTRACTOR'S RESPONSIBLE PERSON CAN CONDUCT A NIGHT INSPECTION ON THE SAID TCP AND TRAFFIC CONTROL DEVICES. COMMENCEMENT OF WORK WILL NOT BE AUTHORIZED NOR ALLOWED UNTIL THE AE NOTIFIES THE CONTRACTOR IN WRITING (E-MAIL IS ACCEPTABLE) TO PROCEED WITH THE WORK.

CONTRACTOR SHALL HAVE A SUFFICIENT AMOUNT OF TRAFFIC CONTROL DEVICES IN ACCEPTABLE CONDITION TO REPLACE ANY DAMAGED TRAFFIC CONTROL DEVICE WITHIN 24 HOURS OF NOTIFICATION.

PROVIDE ADDITIONAL SIGNS AND BARRICADES AS NECESSARY TO ADDRESS FIELD CONSTRUCTIBILITY & VISIBILITY. THESE ADDITIONAL SIGNS WILL BE CONSIDERED SUBSIDIARY TO ITEM 502.

REMOVE OR COMPLETELY COVER ALL EXISTING SIGNS WHICH ARE IN CONFLICT WITH THE TRAFFIC CONTROL PLAN.

ADJUST STOP SIGNS AS NEEDED ON INTERSECTING STREETS DURING THE VARIOUS CONSTRUCTION PHASES. DO NOT REMOVE ANY EXISTING STOP SIGNS UNTIL TEMPORARY SIGNS ARE IN PLACE.

COORDINATE THE TRAFFIC CONTROL PLAN AND THE VARIOUS SEQUENCES OF CONSTRUCTION WITH ADJACENT CONSTRUCTION PROJECTS IF APPLICABLE, TO ENSURE THE UNINTERRUPTED AND SAFE FLOW OF TRAFFIC.

NOTIFY THE ENGINEER IN WRITING WHEN MAJOR TRAFFIC CHANGES ARE TO BE MADE. NOTIFICATIONS MUST BE GIVEN A MINIMUM OF THREE WORKING DAYS PRIOR TO THE CHANGE.

ALL WORK ZONE PAVEMENT MARKINGS FOR THIS PROJECT SHALL BE 0.100 INCHES (100 MIL) THICK THERMOPLASTIC.

SAFETY:

PROTECT EXPOSED PITS THAT MUST REMAIN OPEN DURING NON-WORKING HOURS AS PER OSHA REQUIREMENTS.

PROJECT SPECIFIC NOTES:

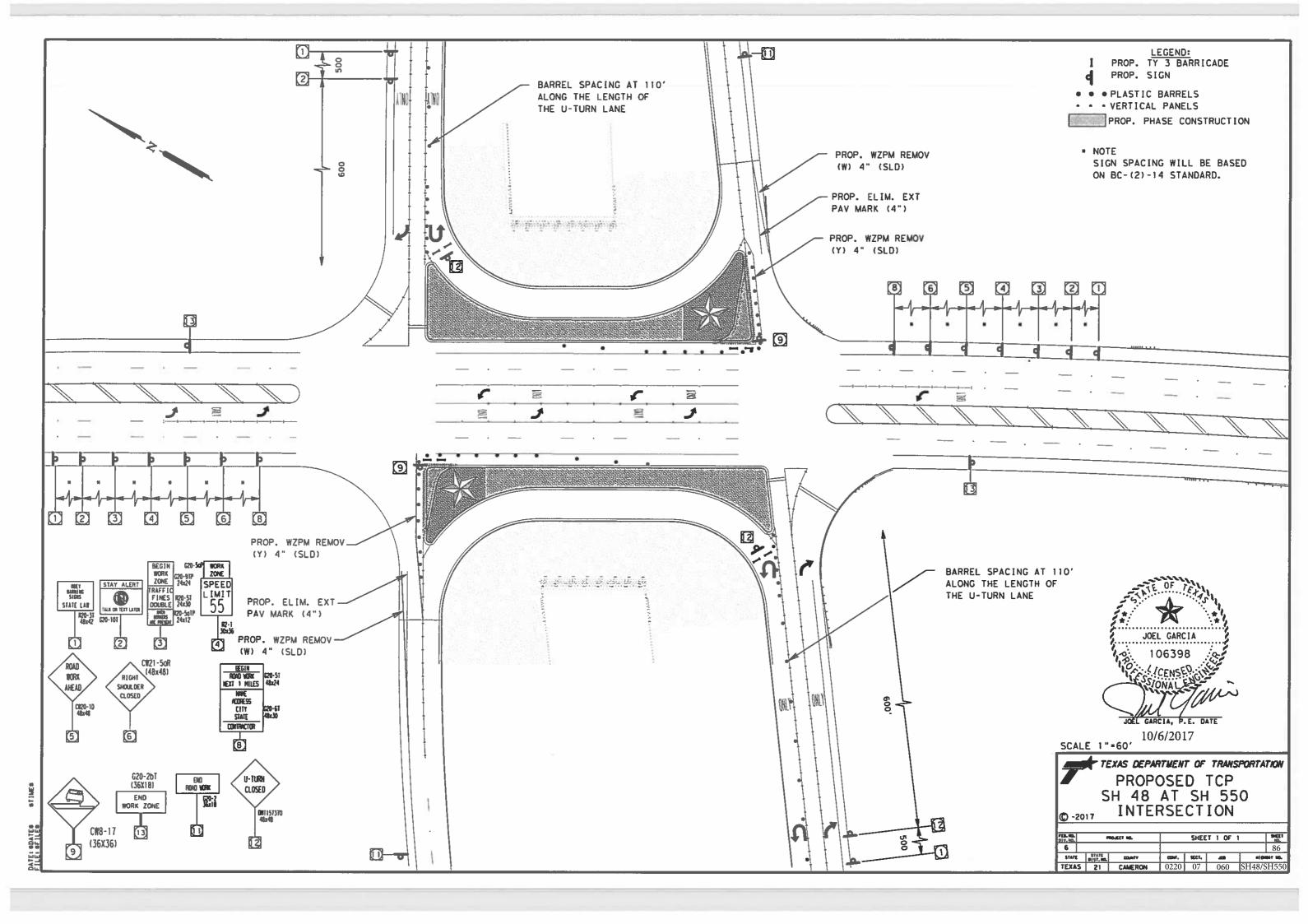
FOR WORK AT SH 48 & SH 550

- 1. WORK MUST BE CONTINOUS.
- 2. ANY DAY TIME LANE CLOSURES, UTILIZE TCP (1-4) -12

PHARR DISTRICT STANDARD

Texas Department of Transportation ©T×DOT 2015 Rev 05/08/2015 FED. RD. FEDERAL AID PROJECT NO. SHEET STATE TEXAS 85 6 CONT. SECT. HIGHWAY NO. DIST COUNTY JOB CAMERON 0220 PHR 060 SH48/SH550 07

TRAFFIC CONTROL
PLAN NOTES
SHEET 1 OF 1 SHEETS

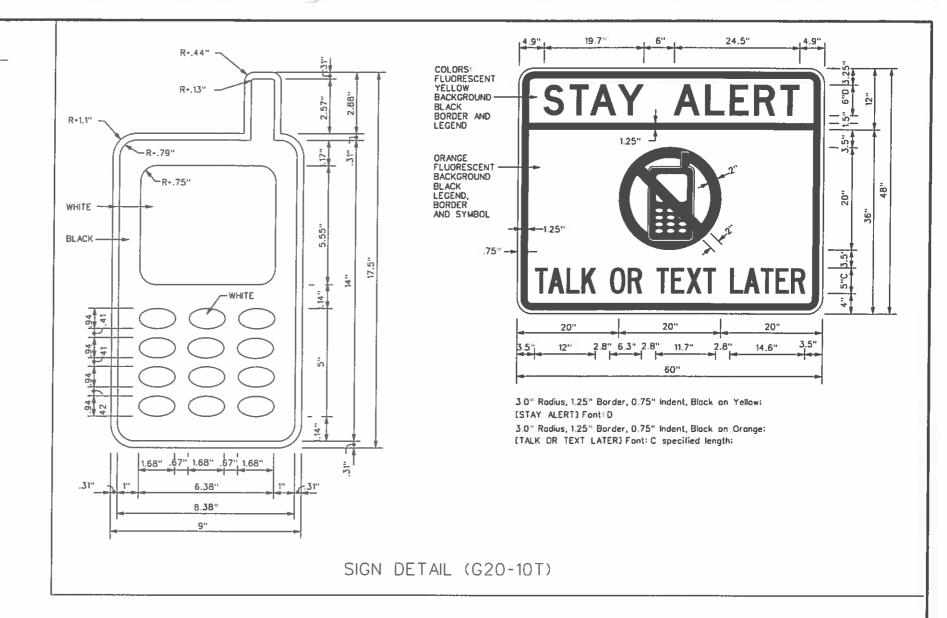


BARRICADE AND CONSTRUCTION (BC) STANDARD SHEFTS GENERAL NOTES:

- 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.
- 4. The Contractor is responsible for installing and maintaining the traffic control devices as shown in the plans. The Contractor may not move or change the approximate location of any device without the approval of the Engineer.
- 5. Geometric design of lane shifts and detours should, when possible, meet the applicable design criteria contained in manuals such as the American Association of State Highway and Transportation Officials (AASHTO), "A Policy on Geometric Design of Highways and Streets," the TxDOT "Roadway Design Manual" or engineering judgment.
- 6. When projects abut, the Engineer(s) may omit the END ROAD WORK, TRAFFIC FINES DOUBLE, and other advance warning signs if the signing would be redundant and the work areas appear continuous to the motorists. If the adjacent project is completed first, the Contractor shall erect the necessary warning signs as shown on these sheets, the TCP sheets or as directed by the Engineer. The BEGIN ROAD WORK NEXT X MILES sign shall be revised to show appropriate work zone distance.
- The Engineer may require duplicate warning signs on the median side of divided highways where median width will permit and traffic volumes justify the signing.
- 8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.
- The temporary traffic control devices shown in the illustrations of the BC sheets are examples. As necessary, the Engineer will determine the most appropriate traffic control devices to be used.
- 10. As shown on BC(2), the OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER (see Sign Detail G20-10T) and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. However, the TRAFFIC FINES DOUBLE sign will not be required on projects consisting solely of mobile operation work, such as striping or milling edgeline rumble strips. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits.
- Except for devices required by Note 10, 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.
- 13. Inactive equipment and work vehicles, including workers' private vehicles must be parked away from travellanes. 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.

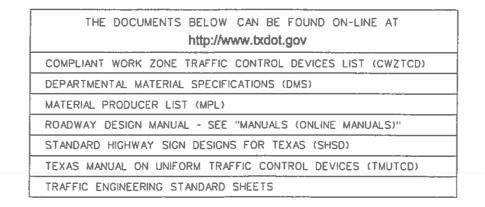
WORKER SAFETY APPAREL NOTES:

 Warkers 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.



Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found on-line at the web address given below or by contacting:

Texas Department of Transportation Traffic Operations Division - TE Phone (512) 416-3118



SHEET 1 OF 12

Texas Department of Transportation

BARRICADE AND CONSTRUCTION
GENERAL NOTES
AND REQUIREMENTS

BC(1)-14

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-07 7-13	PHR		HIDALGO			87
5						

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

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

T-INTERSECTION ROAD WORK ROAD WORK NEXT X MLES

G20-1bTR \Diamond 1000"-1500" - Hwy INTERSECTED 1 Block - City 1 Block - City 1000"-1500" - Hwy ROADWAY WORK ZONE 80' G20-5oP WORK G20-5oP ZONE RAFFIC TRAFFIC G20-5T ROAD WORK R20-5T FINES R20-5T FINES DOUBLE DOUBL R20-5aTP G20-61 R20-5aTF END ROAD WORK G20-2

CSJ LIMITS AT T-INTERSECTION

1. The Engineer will determine the types and location of any additional traffic control devices, such as a flagger and accompanying signs, or other signs, that should be used when work is being performed at ar near an intersection.

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

2. If construction clases the road at a T-intersection the Contractor shall place the "CONTRACTOR NAME"(G20-61) sign behind the Type 3 Barricades for the road closure (see BC(10) also). The "ROAD WORK NEXT X MILES" left grrow(G20-1bTL) and "ROAD WORK NEXT X MILES" right orrow (G20-1bTR)" signs shall be replaced by the detour signing called for in the plans.

TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING

SIZE

2122								
Sign Number or Series	Conventional Road	Expressway/ Freeway						
CW20 ⁴ CW21 CW22 CW23 CW25	48" × 48"	48" × 48"						
CW1, CW2, CW7, CW8, CW9, CW11, CW14	6" x 36" 48'	× 48"						
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	8" × 48" 48'	' × 48"						

Sign osted Speed Spacina "X" Feet MPH pprx.) 30 120 35 160 240 40 45 320 50 400 55 500² 60 600 ² 65 700 ²

800 ²

900 ²

1000 2

*

70

75

80

SPACING

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

GENERAL NOTES

- 1. Special or larger size signs may be used as necessary.
- 2. Distance between signs should be increased as required to have 1500 feet advance warning.
- 3. Distance between signs should be increased as required to have 1/2 mile
- 4.36" x 36" "ROAD WORK AHEAD" (CW20-10) signs may be used on low volume crossroads at the discretion of the Engineer. See Note 2 under "Typical Location of Crossrood Signs".
- 5. Only diamond shaped warning sign sizes are indicated
- 6. See sign size listing in "TMUTCD", Sign Appendix or the "Standard Highway Sign Designs for Texas" manual for complete list of available sign design

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS SPEED STAY ALERT DO NOT PASS ROAD WORK LIMIT OBEY TRAFFIC R20-51x x FNES WARNING x x G20-51 AHE AD SIGNS ROAD WORK STATE LAW HAME ADDRESS CITY STATE R20-5a1Px 1 TALK OR TEXT LATER ROAD WORK CW13-1P x x R7-1 x x G20-6T R20-31* * (*) G20-10T × XX MPH CW13-1P AHEAD Type 3 Borricode or CW20-1D channelizing devices \Leftrightarrow \Diamond \Diamond ⟨⇒ \Rightarrow \Rightarrow \Rightarrow Beainnina of SPEED ➾ (E) END NO-PASSING R2-1 LIMIT WORK ZONE G20-261 x x Channelizing Devices line should 3X CSJ Limit \bullet XX ROAD WORK When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional with sign "ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still G20-2 × × NOTES within the project limits. See the applicable TCP sheets for exact location and spacing of signs and The Contractor shall determine the appropriate distance to be placed on the G20-1 series signs and "BEGIN ROAD SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING DOWNSTREAM OF THE CSJ LIMITS WORK NEXT X MILES"(G20-5T)sign for each specific project. This distance shall replace the "X" and shall be rounded x G20-5aP ZONE STAY ALERT

OBEY SPEED TRAFFIC ROAD WORK ROAD CLOSED R11-2 LIMIT ROAD ROAD x R20-5T SIGNS WORK WORK DOUBLE STATE LAW /2 MILE TALK OR TEXT LATER AHEAD × × R20-5a1P G20-61 R20-31 x x R2-G20-10T Barricade or channelizion devices \Diamond -CSJ Limit \Rightarrow Channelizing Devices SPEED END ROAD WORK LIMIT G20-2 x x

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 workers are present.
- Required CSJ Limit signing. See Note 10 on BC(1). TRAFFIC FINES DOUBLE signs will not be required on projects consisting solely of mobile operations work.
- Area for placement of "ROAD WORK AHEAD" (CW20-1D)sign and other signs or devices as called for on the Traffic
- Contractor willinstalia 103-the end of the work zone. Contractor will install a regulatory speed limit sign at

L	LEGEND					
⊢	Type 3 Barricade					
000	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

BC(2)-14

ı	bc-14.dgn	DN: T:	DOT	CX: TxDOT DW:	TxDQ	I CX: TxDOI
TxDOT	November 2002	CONT	SEC1	JOB		HIGHWAY
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TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

Reduced speeds should only be posted in the vicinity of work activity and not throughout the entire project. Regulatory work zone speed signs (R2-1) shall be removed or covered during periods when they are not needed.

Signing shown for one direction only. See BC(2) for additional advance signing.

WORK ZONE

SPEED

G20-5oF

See General

WORK

ZONE

SPEED

G20-5₀P

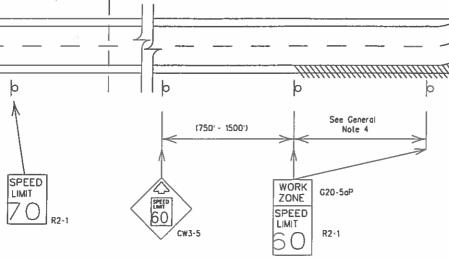
Note 4

(750' - 1500')

LIMITS

SPEED

0



GUIDANCE FOR USE:

Signing shown for

See BC(2) for

signing.

additional advance

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

WORK ZONE

SPEED LIMIT

G20-5oP

1, Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.

See General Nate 4

- 2. Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
- 3. Speed zone signs are illustrated for one direction of traveland are normally posted for each direction of travel.
- 4. Frequency of work zone speed limit signs should be:

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

SHEET 3 OF 12

Texas Department of Transportation

Traffic

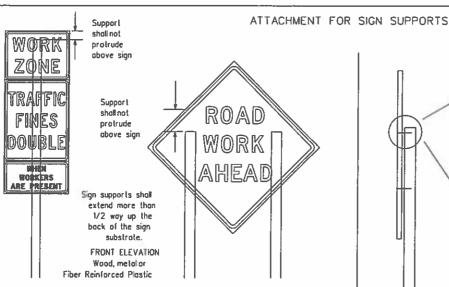
BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

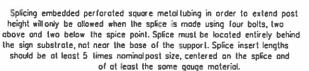
BC(3)-14

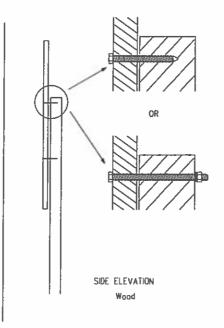
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67						

TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS 12' min. ROAD ROAD ROAD ROAD MORK WORK MORK WORK from AKEAD AHEAD AMEAD curb AHEAD min. XX MPH 7.0' min. 5 7.0° min. 9.0" max 0'-6' 6' or 7.0 min. 9.0' max. 6.0' min 9.0' max areater 10/11/11/11 4 AMINIMIA A THINK MENTAL MENTAL Paved Poved 11511187 shoulder shoulder

- * 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 travellane. Supplemental plaques (advisory or distance) should not cover the surface of the parent sign,





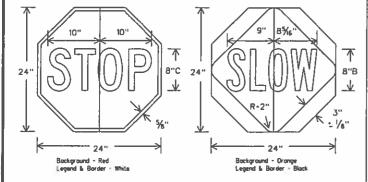


Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sian supports

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

STOP/SLOW PADDLES

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



CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

- t. Permonent 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, or cultural information Drivers proceeding through a work zone need the same, if not better route guidance as normally installed on a roadway without construction.
- 2. When permanent regulatory or warning signs conflict with work zone conditions, remove or cover the permonent signs until the permonent sign message matches the roadway condition.
- 3. When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
- 4. If existing signs are to be relocated on their original supports, they shall be installed on crashworthy bases as shown on the SMD Standard sheets. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards. This work should be paid for under the appropriate pay item for relocating existing signs.
- If permanent signs are to be removed and relocated using temporary supports. the Contractor shall use croshworthy supports as shown on the BC sheets or the CWZTCD. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards during construction. This work should be paid for under the appropriate pay item for relocating existing signs.
- 6. Any sign or traffic control device that is struck or damaged by the Contractor or his/her construction equipment shall be replaced as soon as possible by the Contractor to ensure proper quidance for the motorists. This will be subsidiary

GENERAL NOTES FOR WORK ZONE SIGNS

- 1. Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer,
- Wooden sign posts shall be pointed white.
- 3. Barricodes shall NOT be used as sign supports.
- 4. All signs shall be installed in accordance with the plans or as directed by the Engineer. Signs shall be used to regulate, worn, and guide the traveling public safely through the work zone.
- 5. The Contractor may furnish either the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD). The Engineer/Inspector may require the Contractor to furnish other work zone signs that are shown in the TMUTCD but may have been amitted 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 dary and having both the Inspector and Contractor initial and date the agreed upon changes.
- 6. The Contractor shall furnish sign supports listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD). 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 con verify the correct procedures are being followed.
- 7. The Contractor is responsible for installing signs on approved supports and replacing signs with damaged or cracked substrates and/or damaged or marred reflective sheeting as directed by the Engineer/Inspector.
- B. Identification markings may be shown only on the back of the sign substrate. The maximum height of letters and/or company logos used for identification shall be 1 inch.
- 9. The Contractor shall replace damaged wood posts. New or damaged wood sign posts shall not be spliced.

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

- 1. The types of sign supports, sign mounting height, the size of signs, and the type of sign substrates can vary based on the type of work being performed. The Engineer is responsible for selecting the appropriate size sign for the type of work being performed. The Contractor is responsible for ensuring the sign support, sign mounting height and substrate meets manufacturer's recommendations in regard to crashworthiness and duration of work requirements.
- a. Long-term stationary work that occupies a location more than 3 days.
 b. Intermediate-term stationary work that occupies a location more than one daylight period up to 3 days, or nightlime work lasting more than one hour.
- c. Short-term stationary daylime work that occupies a localion for more than 1 hour in a single daylight period.
- d. Short duration work that accupies a location up to 1 hour.
- e. 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.
- 2. The bottom of Short-term/Short Duration signs shall be a minimum of 1 foot above the pavement surface but no more than 2 feet above the ground.
- 3. Long-term/Intermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
- 4. Short-term/Short Duration signs shall be used only during daylight and shall be removed at the end of the workdoy or raised to appropriate Long-term/Intermediate sign height.
- 5. Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the poved surface regardless of work duration. SIZE OF SIGNS
- 1. The Contractor shall furnish the sign sizes shown on BC (2) unless otherwise shown in the plans or as directed by the Engineer.

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

- 1. Al 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 sheeling, meeting the requirements of DMS-8300 Type A shallbe used for signs with a white background.
- 3. Orange sheeting, meeting the requirements of DMS-8300 Type B or Type GL , shall be used for rigid signs with orange backgrounds. SIGN LETTERS
- 1. All sign letters and numbers shall be clear, and open rounded type uppercase alphabet letters as approved by the Federal Highway Administration (FHWA) and as published in the "Standard Highway Sign Design for Texas" manual. Signs, letters and numbers shallbe of first class workmanship in accordance with Department Standards and Specifications.

REMOVING OR COVERING

- 1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
- Long-term stationary or intermediate stationary signs installed an 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 an wooden skids shall not be lurned 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.
- 5. Burlop shall NOT be used to cover signs.
 6. Duct tope or other adhesive material shall NOT be affixed to a sign face.
- 7. Signs and anchor slubs shall be removed and holes backfilled upon completion of work,

SIGN SUPPORT WEIGHTS

- 1. Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cahesionless sand should be used.
- 2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
- 3. Rock, concrete, iron, steel or other solid objects shall not be permitted for use as sign support weights. 4. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs.
- 5. Sandbags shall be made of a durable material that tears upon vehicular
- impact. Rubber (such as tire inner tubes) shall NOT be used. 6. Rubber ballasts designed for channelizing devices should not be used for ballost on portable sign supports. Sign supports designed and manufactured
- with rubber bases may be used when shown on the CWZTCD list. 7. Sandbaas 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.
- B. 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 arange or fluorescent red-orange in color. Flags shall not be allowed to cover any portion of the sign face.

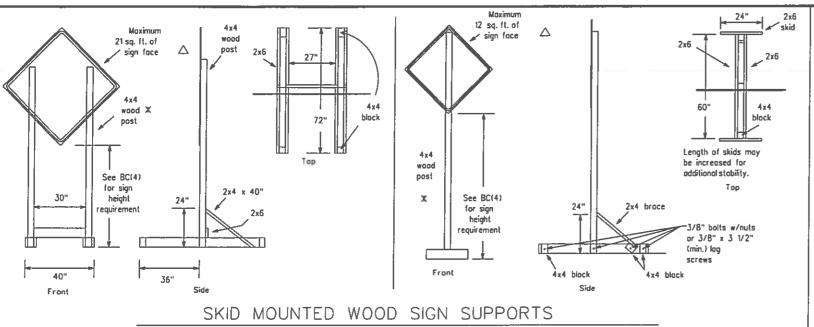
SHEET 4 OF 12



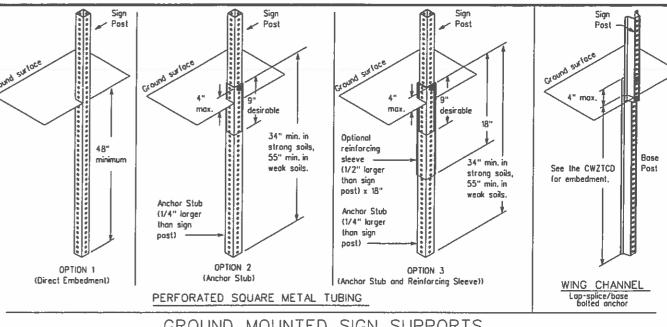
BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-14

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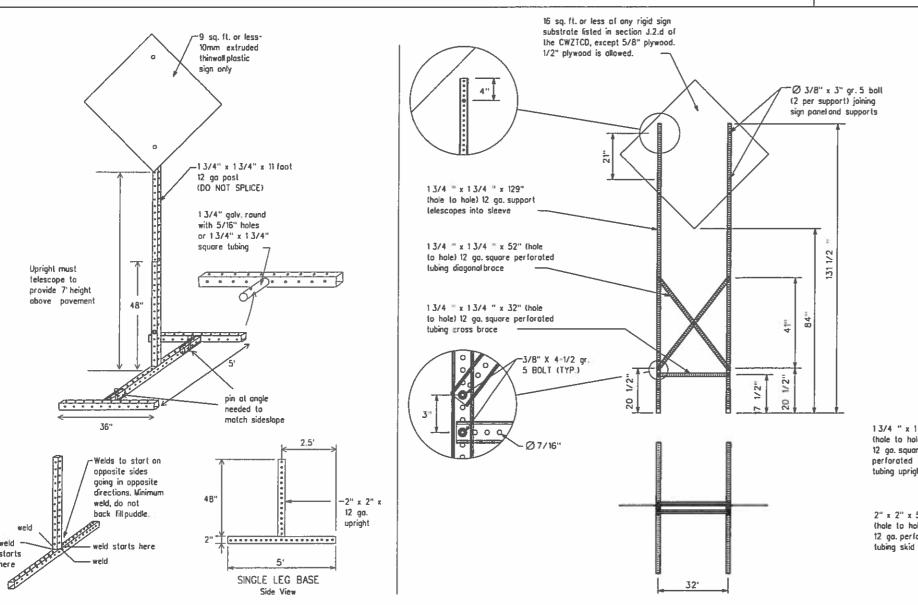
LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS



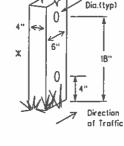
GROUND MOUNTED SIGN SUPPORTS

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

11/2"

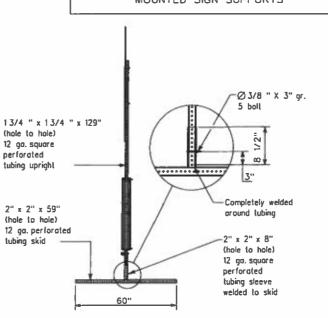


SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS



Nominal	Number	Max imum	Minimum	Orilled	
Post	of	Sq. feet of	Soil	Hole(s)	
Size	Posts	Sign Face Embedment		Required	
4 x 4	1	12	36"	NO	
4 x 4	2	21	36"	NO	
4 x 6	1	21	36"	YES	
4 v 6	2	36	36"	YEC.	

WOOD POST SYSTEM FOR GROUND MOUNTED SIGN SUPPORTS



WEDGE ANCHORS

Both steeland 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()) FOR WEBSITE LOCATION.

GENERAL NOTES

- I. Nails may be used in the assembly of wooden sign supports, but 3/8" bolts with nuts or 3/8" x 3 1/2" log screws must be used on every joint for final
- 2. 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 Δ that can be used for each approved sign support.

SHEET 5 OF 12



7-DOT | --- 1-DOT |--- 1-DOT |--- 1-DO

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-14

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©1x001	November 2002	CONT	SECT	408		HIGHWAY	
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99							•

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

PORTABLE CHANGEABLE MESSAGE SIGNS

- 1. The Engineer/Inspector shall approve all messages used on portable changeable message signs (PCMS).
- 2. Messages on PCMS should contain no more than 8 words (about four to eight characters per word), not including simple words such as "TO," "FOR," "AT," etc.
- 3. Messages should consist of a single phase, or two phases that alternate. Three-phase messages are not allowed. Each phase of the message should convey a single thought, and must be understood by
- 4. Use the word "EXIT" to refer to an exit ramp on a freeway: i.e., "EXIT CLOSED." Do not use the term "RAMP."
- 5. Always use the route or interstate designation (IH, US, SH, FM) along with the number when referring to a roadway.
- 6. When in use the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible.
- 7. The message term "WEEKEND" should be used only if the work is to start on Salurday morning and end by Sunday evening at midnight. Actual days and hours of work should be displayed on the PCMS if work is to begin on Friday evening and/or continue into Monday morning.
- 8. The Engineer/Inspector may select one of two options which are avail oble for displaying a two-phase message on a PCMS. Each phase may be displayed for either four seconds each or for three seconds each.
- 9. Do not "flash" messages or words included in a message. The message should be steady burn or continuous while displayed.
- 10. Do not present redundant information on a two-phase message; i.e., keeping two lines of the message the same and changing the third line.
- 11. Do not use the word "Danger" in message.

 12. Do not display the message "LANES SHIFT LEFT" or "LANES SHIFT RIGHT" on a PCMS. Drivers do not understand the message.
- 13. Do not display messages that scroll horizontally or vertically across the face of the sign.
- 14. The following table lists abbreviated words and two-word phrases that are acceptable for use on a PCMS. Both words in a phrase must be displayed together. Words or phrases not on this list should not be abbreviated, unless shown in the TMUTCD.
- 15. PCMS character height should be at least 18 inches for trailer mounted units. They should be visible from at least 1/2 (.5) mile and the text should be legible from at least 600 feet at night and 800 feet in daylight. Truck mounted units must have a character height of 10 inches and must be legible from at least 400 feet.
- 16. Each line of text should be centered on the message board rather than
- If disabled, the PCMS should default to an illegible display that will not olarm materists and willouly be used to alert workers that the PCMS has malfunctioned. A pattern such as a series of horizontal solid bars is appropriate:

WORD OR PHRASE	ABBREVIATION	WORD OR PHRASE	ABBREVIATION
Access Road /	CCS RD	Major MAJ	1
Alternate	ALT	Miles	MI
Avenue	AVE	Miles Per Hour	MPH
Best Route	BEST RTE	Minor	MINR
Boulevard	BLVD	Monday	MON
Bridge	BRDG	Normal	NORM
Cannot	CANT	North	N
Center	CTR	Northbound	(route) N
Construction Ahead	CONST AHD	Parking	PK1NG
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	SL IP
Emergency Vehicle		South	\$
Entrance, Enter	FNT	Southbound	(route) S
Express Lone	EXP LN	Speed	SPD
Expressway	EXPWY	Street	ST
XXXX Feet	XXXX FT	Sunday	SUN
Fog Aheod	FOG AHD	Te l'ephone	PHONE
Freeway	FRWY, FWY	Temporary	THURS
Freewoy Blocked	FWY BLKD	Thursday	TO DWNTN
Friday	FRI	To Downtown	TRAF
Hazardous Driving		1	
Hazardous Material		Trovelers	TRVLRS
High-Occupancy	HOV	Tuesday	TUES
Vehicle		Time Minutes	TIME MIN
Highway	HWY	Upper Level	UPR LEVEL
Hour (s)	HR. HRS	Vehicles (s)	VEH, VEHS
Information	INFO	Warning	WARN
It Is	115	Wednesday	WED
Junction	JCT	Weight Limit	WT LIMIT
Left	LFT	West	W
Left Lone	LFT LN	Westbound	(route) W
Lone Closed	LN CLOSED	Wet Povement	WET PVMT
Lower Level	LWR LEVEL	Will Not	WONT

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES (The Engineer may approve other messages not specifically covered here.)

Phase 1: Condition Lists

Road/Lane/Ramp	Closure List	Other Condition List			
FREEWAY CLOSED X MILE	FRONTAGE ROAD CLOSED		ROADWORK XXX FT		ROAD REPAIRS XXXX FT
ROAD CLOSED AT SH XXX	SHOULDER CLOSED XXX FT		FLAGGER XXXX FT		LANE NARROWS XXXX FT
ROAD CLSD AT FM XXXX	RIGHT LN CLOSED XXX FT		RIGHT LN NARROWS XXXX FT		TWO-WAY TRAFFIC XX MILE
RIGHT X LANES CLOSED	RIGHT X LANES OPEN		MÉRGING TRAFFIC XXXX FT		CONST TRAFFIC XXX FT
CENTER LANE CLOSED	DAYTIME LANE CLOSURES		LOOSE GRAVEL XXXX FT		UNEVEN LANES XXXX FT
NIGHT LANE CLOSURES	I-XX SOUTH EXIT CLOSED		DETOUR X MILE		ROUGH ROAD XXXX FT
VARIOUS LANES CLOSED	EXIT XXX CLOSED X MILE		ROADWORK PAST SH XXXX		ROADWORK NEXT FRI-SUN

XXXXXXXX BLVD CLOSED

CLOSED

MALL

DRIVEWAY

CLOSED

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

XXXX FT

TRAFFIC

SIGNAL

XXXX FT

APPLICATION GUIDELINES

RIGHT LN

TO BE

CLOSED

X LANES

CLOSED

TUE - FRI

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

Phase 2: Possible Component Lists

Action to Take/Effe		Location List	Warning List	** Advance Notice List
MERGE RIGHT	FORM X LINES RIGHT	AT FM XXXX	SPEED LIMIT XX MPH	TUE-FRI XX AM- X PM
DETOUR NEXT X EXITS	USE XXXXX RD EXIT	BEFORE RAILROAD CROSSING	MAXIMUM SPEED XX MPH	APR XX- XX X PM-X AM
USE EXIT XXX	USÉ EXIT I-XX NORTH	NEXT X MILES	MINIMUM SPEED XX MPH	BEGINS MONDAY
STAY ON US XXX SOUTH	USE !-XX E TO I-XX N	PAST US XXX EXIT	ADVISORY SPEED XX MPH	BEGINS MAY XX
TRUCKS USE US XXX N	WATCH FOR TRUCKS	XXXXXXX TO XXXXXXX	RIGHT LANE EXIT	MAY X-X XX PM - XX AM
WATCH FOR TRUCKS	EXPECT DELAYS	US XXX TO FM XXXX	USE CAUTION	NEXT FRI-SUN
EXPECT DELAYS	PREPARE TO STOP		DRIVE SAFELY	XX AM TO XX PM
REDUCE SPEED XXX FT	END SHOULDER USE		DRIVE WITH CARE	NEXT TUE AUG XX
USE OTHER ROUTES	WATCH FOR WORKERS			TONIGHT XX PM- XX AM
STAY IN LANE		жж	See Application Guidelines Nate	6.

WORDING ALTERNATIVES

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

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

US XXX

EXIT

X MILES

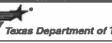
LANES

SHIFT

FULL MATRIX PCMS SIGNS

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

SHEET 6 OF 12



Texas Department of Transportation

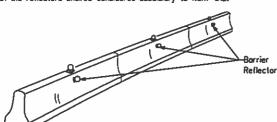
Traffic

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-14

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100x1	November 2002	CONT	SECT	108	HIGHWAY		HWAY
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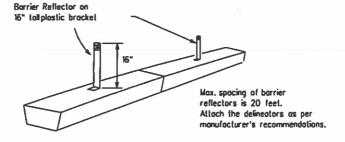
- 1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequoified Borrier Reflectors can be found at the Material Producer List web address shown on BC(1).
- 2. Color of Borrier Reflectors shall be as specified in the TMUTCD. The cost of the reflectors shall be considered subsidiary to Item 512.

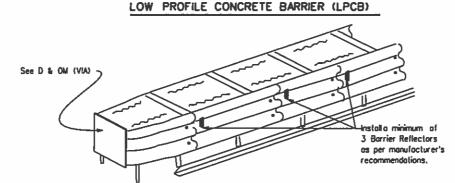


CONCRETE TRAFFIC BARRIER (CTB)

- 3. Where traffic is on one side of the CTB, two (2) Barrier Reflectors shall be mounted in approximately the midsection of each section of CTB.

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



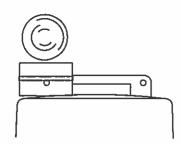


DELINEATION OF END TREATMENTS

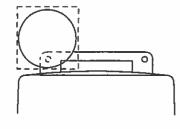
END TREATMENTS FOR CTB'S USED IN WORK ZONES

End treatments used on CTB's in work zones shall meet crashworthy standards as defined in the National Cooperative Highway Research Report 350. Refer to the CWZTCD List for approved end treatments and manufacturers.

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



Type C Worning Light pr approved substitute mounted on a drum adjacent to the travelway.



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

WARNING LIGHTS

- 1. Worning lights shall meet the requirements of the TMUTCD.
- 2. Warning lights shall NOT be installed on barricodes.
- 3. Type A-Low Intensity Flashing Worning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous orea. 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 or C Sheeting 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 defineation 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.
- 6. When required by the Engineer, the Contractor shall turnish a copy of the warning lights certification. The warning lights monufacturer will certify the warning lights meet the requirements of the latest ITE Purchase Specifications for Floshing and Steady-Burn Worning Lights.
 7. When used to define to curves, Type-C and Type D Steady Burn Lights should only be placed on the outside of the curve, not the inside.
- 8. The location of warning lights and warning reflectors on drums shall be as shown elsewhere in the plans.

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

- 1. Type A floshing worning lights are intended to warn drivers that they are approaching or ore in a potentially hazardous area.
- Type A random flashing warning lights are not intended for defineation 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 defineation. If used, the successive flashing of the sequential warning lights should accur from the beginning of the taper to the end of the merging taper in order to identify the desired vehicle path. The rate of flashing for each light shall be 65 flashes per minute, plus or minus 10 flashes.
- 4. Type C and D steady-burn worning lights are intended to be used in a series to delineate the edge of the travellane on detaurs, on lone changes, on lone clasures, and an other similar conditions.
- 5. Type A Type C and Type D warning lights shall be installed at locations as detailed on other sheets in the plans.
- 6. Warning lights shall not be installed on a drum that has a sign, chevron or vertical panel.
- 7. The maximum specing for worning lights on drums should be identical to the channelizing device specing.

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

- 1. A worning reflector or approved substitute may be mounted on a plastic drum as a substitute for a Type C, steady burn worning light at the
- discretion of the Contractor unless atherwise noted in the plans.

 2. The warning reflector shall be yellow in color and shall be manufactured using a sign substrate approved for use with plastic drums listed
- 3. The worning reflector shall have a minimum retroreflective surface area (one-side) of 30 square inches.
- 4. Round reflectors shall be fully reflectorized, including the area where attached to the drum.
- 5. Square substrates must have a minimum of 30 square inches of reflectorized sheeting. They do not have to be reflectorized where it attaches to the drum.
- 6. The side of the worning reflector facing approaching traffic shallhave sheeting meeting the color and retrareflectivity requirements for DMS 8300-Type B or Type C.
- 7. When used near two-way traffic, both sides of the worning reflector shall be reflectorized.

 B. The worning reflector should be mounted on the side of the handle nearest approaching traffic.
- 9. The maximum spacing for worning reflectors should be identical to the channelizing device spacing requirements.

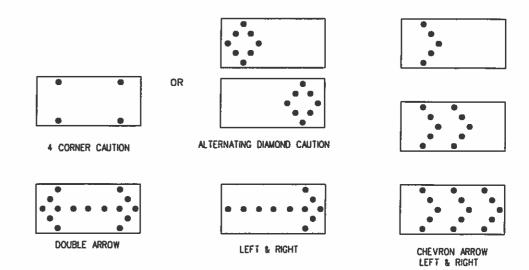
Arrow Boards may be located behind channelizing devices in place for a shoulder taper or merging taper, otherwise they shall be defineated with four (4) channelizing devices placed perpendicular to traffic on the upstream side of traffic.

- 1. The Floshing Arraw Board should be used for all lone closures on multi-fone roodways, or slow moving maintenance or construction activities on the travellanes.
- making maintenance or construction octivities on the travelones.

 2. Flashing Arrow Boards should not be used on two-lone, two-way roadways, detours, diversions or work on shoulders unless the "CAUTION" display (see detail below) is used.

 3. The Engineer/Inspector shall choose all appropriate signs, barricades and/or other traffic control devices that should be used in conjunction with the Flashing Arrow Board.

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



- 5. The "CAUTION" display consists of four corner lamps flashing simultaneously, or the Alternating Diamond Caution mode as shown.
- The straight line caution display is NOT ALLOWED.
 The flashing Arrow Board shallbe copoble 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 floshing arrow and equal intervals of 25 percent for each sequential phase of the floshing chevron.

- intervals of 25 percent for each sequential phase of the flashing chevron.

 9. The sequential arrow display is NOT ALLOWED.

 10. The flashing arrow display is the TxDOT standard; however, the sequential Chevron display may be used during daylight operations.

 11. The Flashing Arrow Board shall be mounted on a vehicle, trailer or other suitable support.

 12. A Flashing Arrow Board SHALL NOT BE USED to laterally shift traffic.

 13. A full matrix PCMS may be used to simulate a Flashing Arrow Board provided it meets visibility, flash rate and dimming requirements on this sheet for the same size arrow.

 14. Minimum mounting height of trailer mounted Arrow Boards should be 7 feet from roadway to baltom of none! to bottom of gonel.

	REQUIREMENTS									
	TYPE	MINIMUM SIZE	MINIMUM HUMBER OF PANEL LAMPS	VISIBILITY DISTANCE						
İ	8	30 x 60	រេ	3/4 mile						
ı	C	48 x 96	15	1 mile						

ATTENTION							
Flashing Arrow Boards shollbe equipped with							
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.

Traffic

FLASHING ARROW BOARDS

SHEET 7 OF 12

TRUCK-MOUNTED ATTENUATORS

1. Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the National Cooperative Highway Research Report No. 350 (NCHRP 350) or the Manual for Assessing Safety Hardware (MASH).

- Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
- 3. Refer to the CWZTCD for a fist of approved TMAs. 4. TMAs are required on freeways unless otherwise noted
- in the plans.
 5. A TMA should be used anytime that it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the work performance.

 5. The only reason a TMA should not be required is when a work
- orea is spread down the roadway and the work crew is or extended distance from the TMA.



Texas Department of Transportation

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

BC(7)-14

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GENERAL NOTES

- For long term stationary work zones on freeways, drums shall be used as the primary channelizing device.
- 2. For intermediate term stationary work zones on freeways, drums should be used as the primary channelizing device but may be replaced in tangent sections by vertical panels, or 42" two-piece cones. In tangent sections one-piece cones may be used with the approval of the Engineer but only if personnel are present on the project at all times to maintain the cones in proper position and location.
- 3. For short term stationary work zones on freeways, drums are the preferred channelizing device but may be replaced in topers, 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 Manuation 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 offect 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.
- 2. The body and base shall lock tagether 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 possing 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.
- 4. Drums shall present a profile that is a minimum of 18 inches in width at the 36 inch height when viewed from any direction. The height of drum unit (bady installed on base) shall be a minimum of 36 inches and a maximum of 42 inches.
- 5. The top of the drum shall have a built-in handle for easy pickup and shall be designed to drain water and not collect debris. The handle shall have a minimum of two widely spaced 9/15 inch diameter holes to allow attachment of a warning light, warning reflector unit or approved compliant sign.
- 6. The exterior of the drum body shall have a minimum of four alternating arange and white retroreflective circumferential stripes not less than 4 inches nor greater than 8 inches in width. Any non-reflectorized space between any two adjacent stripes shall not exceed 2 inches in width.
- 7. Bases shallhave a maximum width of 36 inches, a maximum height of 4 inches, and a minimum of two footholds of sufficient size to allow base to be held down while separating the drum body from the base.
- 8. Plastic drums shall be constructed of ultra-violet stabilized, orange, high-density polyethylene (HDPE) or other approved material.

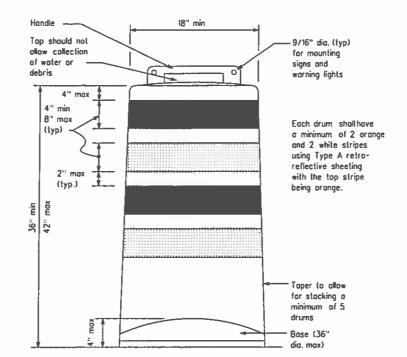
 9. Drum body shall have a maximum unballasted weight of 11 lbs.
- 10.Drum and base shall be marked with manufacturer's name and model number.

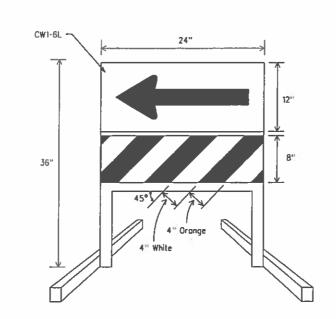
RETROREFLECTIVE SHEETING

- The stripes used on drums shall be constructed of sheeting meeting the cotor and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A reflective sheeting shall be supplied unless otherwise specified in the plans.
- 2. The sheeting shall be suitable for use an 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

BALLAST

- 1. Unballasted bases shall be large enough to hold up to 50 lbs. of sand. This base, when filled with the ballast material, should weigh between 35 lbs (minimum) and 50 lbs (maximum). The ballast may be sand in one to three sandbags separate from the base, sand in a sand-filled plastic base, or other ballasting devices as approved by the Engineer. Stacking of sandbags will be allowed, however height of sandbags above povement 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 integratorumb rubber base or a solid rubber base.
- Recycled truck tire sidewalls may be used for bollast an drums approved for this type of ballast on the CWZTCD list.
- 4. The ballast shallnot 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.
- 6. Ballast shall not be placed on lop of drums.
- 7. Adhesives may be used to secure base of drums to povement.



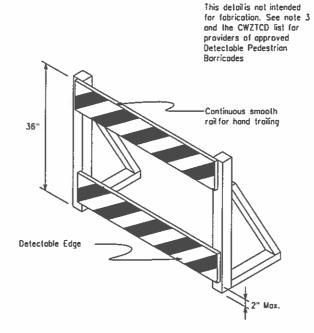


DIRECTION INDICATOR BARRICADE

- The Direction Indicator Barricade may be used in tapers, transitions, and other areas where specific directional and the control of the
- guidance to drivers is necessary.

 2. If used, the Direction Indicator Barricade should be used in series to direct the driver through the transition and into the intended travellane.

 3. The Direction Indicator Barricade shall consist of One-Direction.
- 3. The Direction Indicator Barricode shall consist of One-Direction Large Arrow (CW1-6) sign in the size shown with a black arrow on a background of Type B optType C Orpage retroreflective sheeting above a rail with Type A retroreflective sheeting in alternating 4" white and orange stripes sloping downward at an angle of 45 degrees in the direction road users are to pass. Sheeting types shall be as per DMS 8300.
- 4. Double arrows on the Direction Indicator Barricade will not be
- Approved manufacturers are shown on the CWZTCD List.
 Ballast shallbe as approved by the manufacturers instructions.



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.
- the features present in the existing pedestrian facility.

 2. Where pedestrians with visual disabilities normally use the closed sidewalk, a device that is detectable by a person with a visual disability traveling with the aid of a long cane shall be placed across the full width of the closed sidewalk.
- 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 definedte a pedestrian path.
- 4. Tape, rope, or plastic chain strung between devices are not detectable, do not comply with the design standards in the "Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)" and should not be used as a control far pedestrian movements.
- Warning lights shall not be attached to detectable pedestrian barricades.
- 6. Detectable pedestrian barricades may use 8" nominal barricade rais 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-B, 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

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

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 or Type C Orange, sheeling meeting the color and retroreflectivity requirements of DMS-B300, "Sign Face Material," unless otherwise specified in the plans.
- Vertical Ponels shall be manufactured with arange and white sheeting meeting the requirements of DMS-8300 Type A Diagonal stripes on Vertical Panels shall slope down toward the intended traveled lone.
- 4. Other sign messages (text or symbolic) may be used as approved by the Engineer. Sign dimensions shall not exceed 18 inches in width or 24 inches in height, except for the R9 series signs discussed in note 8 below.
- Signs shall be installed using a 1/2 inch balt (nominal) and nut, two washers, and one locking washer for each connection.
- Mounting boils and nuts shollbe fully engaged and adequately largued. Boils should not extend more than 1/2 inch beyond nuts.
- 7. Chevrons may be placed on drums on the outside of curves, on merging topers or on shifting topers. 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 Clased signs which are 24 inches wide may be mounted on plastic drums, with approval of the Engineer.

SHEET 8 OF 12



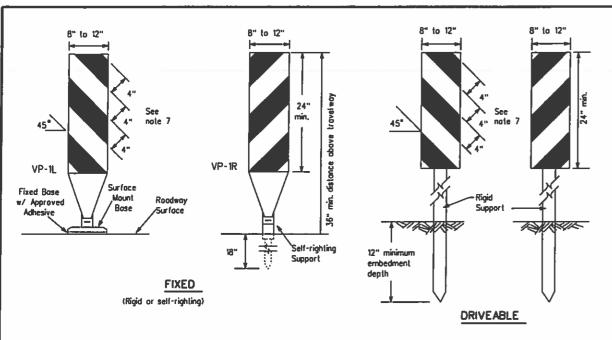
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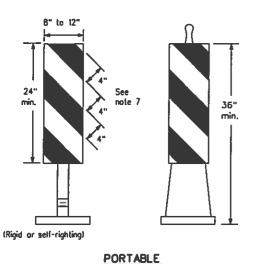
Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-14

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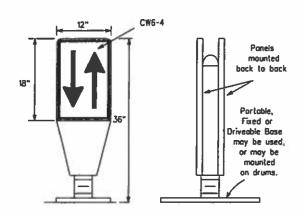




1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.

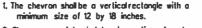
- 2. VP's may be used in daytime or nighttime situations They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is required. The Engineer/Inspector shall refer to the Roadway Design Monual Appendix B "Treatment of Povement Drop-offs in Work Zones" for additional guidelines on the use of VP's for drop-offs.
- 3, VP's should be mounted back to back if used at the edge of cuts adjacent to two-way two lane roadways. Stripes ore to be reflective aronge and reflective white and should always slope downward toward the travellane.
- 4. VP's used on expressways and freeways or other high speed roadways, may have more than 270 square inches of retroreflective area tacing traffic.
- Self-righting supports are available with partable base.
 See "Compliant Work Zone Traffic Control Devices List" (CWZTCD)
- 6. Sheeting for the VP's shall be retroreflective Type A conforming to Departmental Material Specification DMS-8300,
- 7. Where the height of reflective material on the vertical panel is 36 inches or greater, a panel stripe of

VERTICAL PANELS (VPs)



- 1. Opposing Traffic Lane Dividers (OTLD) are delineation devices designed to convert a normal one-way roadway section to twa-way operation. OTLD's are used on temporary centerfines. 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 povement with an adhesive or rubber weight to minimize movement caused by a vehicle impact or wind gust.
- 2. The OTLD may be used in combination with 42" cones or VPs.
- 3. Spacing between the OTLD shall not exceed 500 feet. 42" cones or VPs placed between the OTLD's should not exceed 100 foot specing
- 4. The OTLD shall be arange with a black nonreflective legend. Sheeting for the OTLD shall be retrareflective Type B or Type C conferming to Departmental Material Specification, DMS-8300. unless noted otherwise. The legend shall meet the requirements of DMS-8300.

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

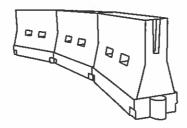


- 2. Chevrons are intended to give notice of a shorp change of alignment with the direction of travel and provide additional emphasis and guidance for vehicle operators with regard to changes in horizontal planment of the roadway.
- 3. Chevrons, when used, shall be erected on the outside of a sharp curve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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

36"

Fixed Bose w/ Approved Adhesive

Support con be used)

(Driveable Base, or Flexible

- 1. LCDs are crashworthy, lightweight, deformable devices that are highly visible, have good target value and can be connected together. They are not designed to contain or redirect a vehicle on impact.
- 2. LCDs may be used instead of a line of cones or drums.
- 3.1CDs shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
 4. LCDs should not be used to provide positive protection for abstacles, pedestrions or workers.
- 5. LCDs shall be supplemented with retroreflective delineation as required for temporary barriers
- on BC(7) when placed roughly parallel to the travellanes.
- 6. LCDs used as barricades placed perpendicular to traffic should have at least one raw of reflective sheeting meeting the requirements for borricode roils as shown on BC(10) placed near the top of the LCD along the full length of the device.

WATER BALLASTED SYSTEMS USED AS BARRIERS

- 1. Water ballasted systems used as barriers shall not be used solely to channelize rood users, but also to protect the work space per the appropriate MCHRP 350 crashworthiness requirements based on roadway speed and barrier application.

 2. Water ballosted systems used to channelize vehicular traffic shall be supplemented with retrareflective defineation
- or channelizing devices to improve daytime/nighttime visibility. They may also be supplemented with povement markings.
- 3. Water ballosted systems used as barriers shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list. 4. Water ballasted systems used as barriers should not be used for a merging toper 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 defineated and the taper length should be designed to optimize road user operations considering the available geometric conditions.
- 5. When water ballasted systems used as barriers have blunt ends exposed to traffic, they should be attenuated as per manufacturer recommendations or flored to a point outside the clear zone.

If used to channelize pedestrions, longitudinal channelizing devices or water ballosted ystems must have a continuous detectable bottom for users of long cones and the top I the unit shall not be less than 32 inches in height.

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

Posted Speed	Formula	D	esirable er Lengl x x		Suggested Maximum Spacing of Channelizing Devices			
		10' Offset O		12' Offset	On a Toper	On a Tangent		
30	ws ²	150'	165'	180'	30'	60'		
35	L- WS	2051	225'	245'	35'	70'		
40	80	265'	295'	320'	40'	80'		
45		450'	495'	540'	45'	90'		
50		500'	550'	600'	50'	100'		
55	L-WS	550'	605'	660'	55'	110'		
60	[600'	6601	720'	60'	120'		
65		650'	715'	780'	65'	130		
70		700'	770'	840'	70'	140'		
75		750'	8251	900'	75'	150'		
80		8001	880'	960'	80'	160'		

* * Toper lengths have been rounded off.
L-Length of Toper (FT.) W-Width of Offset (FT.)

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12



BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

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TYPE 3 BARRICADES 1. Refer to the Compliant Work Zone Traffic Control Devices List (CWZTCD) for details of the Type 3 Barricades and a list of altmaterials used in the construction of Type 3 Borricodes. 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 loward 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. 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. Worning lights shall NOT be installed on barricodes. . Where borricades 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 manne that covers any portion of a barricade rails reflective sheeting. Rock, concrete, iron, steelor other solid objects will NOT be 50 lbs. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as lire 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

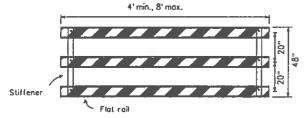
permitted, Sandbags should weigh a minimum of 35 lbs and a maximum of or hung with rope, wire, chains or other fasteners.

9. Sheeting for barricades shall be retroreflective Type A conforming to Departmental Material Specification DMS-8300 unless otherwise noted.

> Barricades shall NOT be used as a sign support.

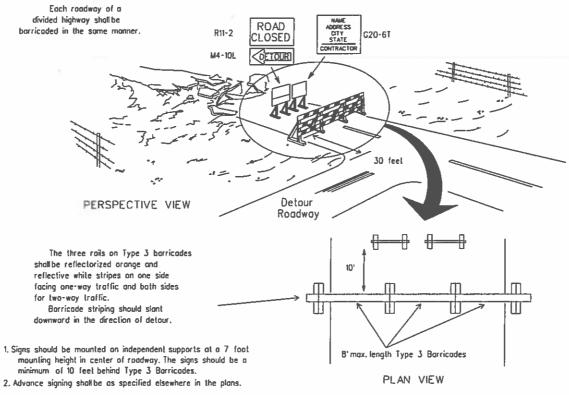


TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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



TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION

Typical Plastic Drum

PERSPECTIVE VIEW

These drums are not required on one-way roadway drums of two d ninimum used ocr Increase number of plastic drums on the side of approaching traffic if the crown width makes it necessary. (minimum of 2

PLAN VIEW

1. Where positive redirectional copobility 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.

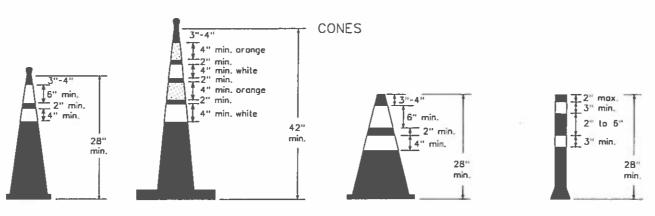
4. When the shoulder width is greater than 12 feet, steady-burn lights may be omitted if drums are used.

5. Drums must extend the length of the culvert widening.

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

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS

and maximum of 4 drums)



Two-Piece cones

One-Piece cones

Tubular Marker

Alternale \bigcirc Alternate ф ф Drums, vertical panels or 42" cones Approx. Approx at 50' maximum spacing 50' 50' Min. 2 drums Min. 2 drums or 1 Type 3 or 1 Type 3 \bigcirc barricade barricade STOCKPILE \Box ₽ On one-way roads Desirable downstream drums stockpile location Channelizing devices parallel to traffic or barricade may be is outside should be used when stockpile is omitted here clear zone. within 301 from Iravellane. \Leftrightarrow

TRAFFIC CONTROL FOR MATERIAL STOCKPILES

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 arange, and meet the height and weight requirements shown above.

2. One-piece canes have the body and base of the cone molded in one consolidated unit. Two-piece comes 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 used at night 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.

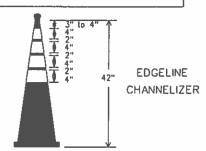
5. 28" cones and tubular markers are generally suitable for short duration and short-term stationary work as defined on BC(4). These should not be used for intermediate-term or long-term stationary work unless personnel is on-site

to maintain them in their proper upright position.

6. 42" two-piece cones, vertical panels or drums are suitable for all work zone

7. Cones or tubular markers used on each project should be of the same size and shape

THIS DEVICE SHALL NOT BE USED ON PROJECTS LET AFTER MARCH 2014.



1. This device is intended only for use in place of a vertical panel to channelize traffic by indicating the edge of the travellane. It is not intended to be used in transitions or tapers.

2. This device shall not be used to separate lanes of traffic (apposing or otherwise) or warn of objects.

3. This device is based on a 42 inch, two-piece cone with an alternate striping pattern: four 4 inch retrareflective bands, with an approximate 2 inch gap between bands. The color of the band should correspond to the color of the edgeline (yellow for left edgeline, white for right edgeline) for which the device is substituted or for which it supplements. The reflectorized bands shall be retroreflective Type A conforming to Departmental Material Specification DMS-8300. unless otherwise noted.

4. The base must weigh a minimum of 30 lbs.

SHEET 10 OF 12

Texas Department of Transportation

Traffic

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-14

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WORK ZONE PAVEMENT MARKINGS

GENERAL

- The Contractor shall be responsible for maintaining work zone and existing powement markings, in accordance with the standard specifications and special provisions, on all roadways open to traffic within the CSJ limits unless atherwise 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.
- Povement 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).
- 6. When standard povement 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 povement markings shall be installed in occordance with Item 662, "Work Zone Povement Markings."

RAISED PAVEMENT MARKERS

- Roised pavement markers are to be placed according to the patterns on BC(12).
- Altroised povement morkers 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

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

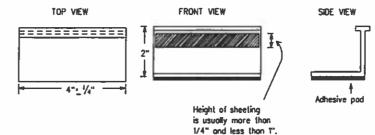
MAINTAINING WORK ZONE PAVEMENT MARKINGS

- The Contractor will be responsible for maintaining work zone povement markings within the work limits.
- Work zone povement markings shall be inspected in accordance with the frequency and reporting requirements of work zone traffic control device inspections as required by Farm 599.
- 3. The markings should provide a visible reference for a minimum distance of 300 feet during normal daylight hours and 160 feet when illuminated by automobile low-beam headlights at night, unless sight distance is restricted by roadway geometrics.
- 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 langer applicable, could create confusion or direct a material 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 autline the detour route.
- Pavement morkings 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 povement markings may require resurfacing or seal coating partions 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.
- 7. Over-pointing of the markings SHALL NOT BE permitted.
- 8. Removal of raised povement markers shall be as directed by the France.
- Removal of existing povement markings and markers will be poid for directly in accordance with Item 677, "ELIMINATING EXISTING PAVEMENT MARKINGS AND MARKERS," unless otherwise stated in the plans.
- 10.Black-out marking tope 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 roodway marker tabs used as guidemarks shall meet the requirements of DMS-8242.
- 2. Tobs detailed on this sheet are to be inspected and accepted by the Engineer or designated representative. Sampling and testing is not normally required, however at the option of the Engineer, either "A" or "B" below may be imposed to assure quality before placement on the roadway.
 - A. Select five (5) or more tobs at random from each lot or shipment and submit to the Construction Division, Materials and Pavement Section to determine specification compliance.
 - B. Select five (5) tabs and perform the following test. Affix five (5) tabs at 24 inch intervals an an asphaltic povement in a straight line. Using a medium size passenger vehicle or pickup, run over the markers with the front and rear tires at a speed of 35 to 40 miles per hour, four (4) times in each direction. No more than one (1) out of the five (5) reflective surfaces shall be lost or displaced as a result of this test.
- $3.\,\mbox{Small}\,\mbox{design}$ variances may be noted between too monufocturers.
- See Standard Sheet WZ(STPM) for tob placement on new povements. See Standard Sheet TCP(7-1) for tob 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 povement markers provided on a project shall be of the same manufacturer.
- Adhesive for guidemarks shall be bituminous material hat 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).
WHTE - (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, roodway marker tabs and other pavement markings can be found at the Material Producer List web address shown on BC(1).

SHEET 11 OF 12



Texas Department of Transportation

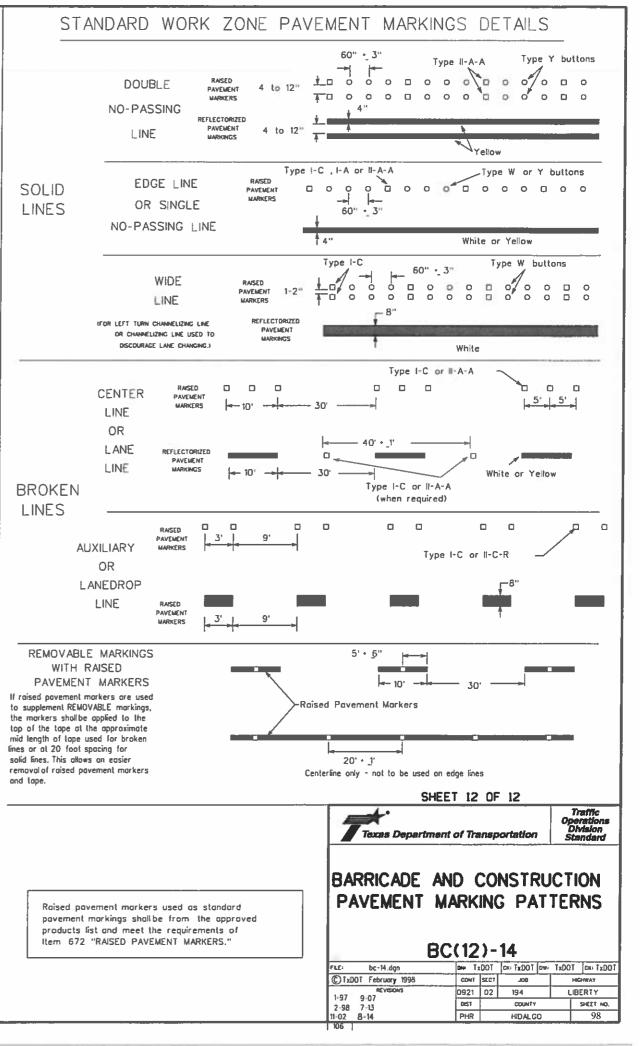
Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

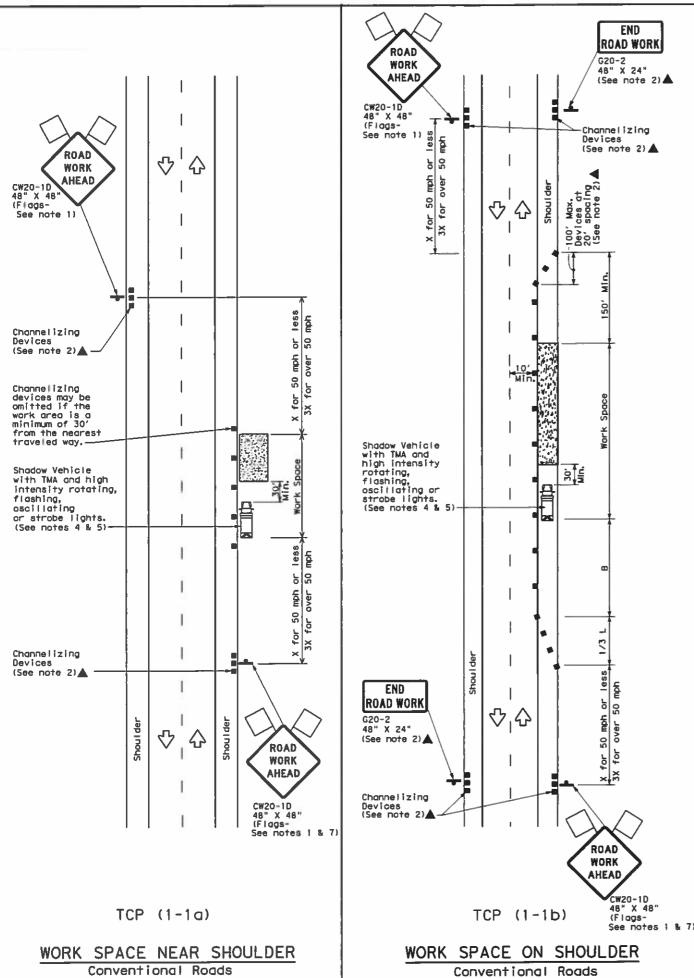
BC(11)-14

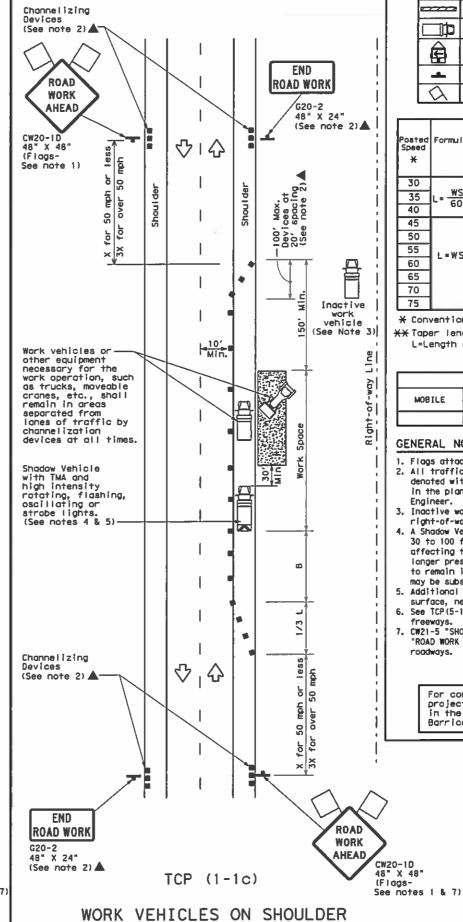
	* 111					
T&E: bc:14.dgn	DH= T1	DOT	cx: TxDOT	DW:	TxDOT	CKI TXDOT
© TxDOT February 1998	CDNT	SECT	JOB		14001	MAY
7:98 9:07	0921	02	194	RTY		
2-98 9-07 1-02 7-13	DIST		COUNTY		1	PEET NO.
11-02 8-14	PHR	HIDALGO				97
105						

PAVEMENT MARKING PATTERNS Type II-A-A 10 to 12" 10 to 12" Type II-A-A 1000000 000000 000 Yellow ♦ Yellow Type II-A-A Type Y buttons REFLECTORIZED PAVEMENT MARKINGS - PATTERN A RAISED PAVEMENT MARKERS - PATTERN A Type II-A-A 0000000000 4 10 8" Type Y buttons Type II-A-A RAISED PAVEMENT MARKERS - PATTERN B 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. CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO-LANE, TWO-WAY HIGHWAYS Type I-C Type W buttons Type I-C or II-C-R White 000 000 000 000 Type I-A Type Y buttons Type I-A Type I-A Yellow \$ 000 000 000 000 Type W buttons Type I-C or II-C-R REFLECTORIZED PAVEMENT MARKINGS RAISED PAVEMENT MARKERS Prefabricated markings may be substituted for reflectorized povement markings. EDGE & LANE LINES FOR DIVIDED HIGHWAY Type I-C 000 000 000 000 000 000 White / 4 Type II-A-A Type Y buttons ♦ $\langle \rangle$ 4 000 000 nnn 000 000 Type I-C REFLECTORIZED PAVEMENT MARKINGS RAISED PAVEMENT MARKERS Prefabricated markings may be substituted for reflectorized povement markings. LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS **₩** Type I-C 000 000 000 000 عمم \Diamond 000 Type Y buttons \Leftrightarrow $\stackrel{\leftarrow}{\sim}$ 000 000 000 000 ♦ Type I-C REFLECTORIZED PAVEMENT MARKINGS RAISED PAVEMENT MARKERS Prefabricated markings may be substituted for reflectorized pavement markings. TWO-WAY LEFT TURN LANE



DATE





Conventional Roads

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

Posted Speed	Formula	** Devices			ng of Hizing	Minimum Sign Spacing "X"	Suggested Longitudinal Buffer Space		
 *		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	Distance	"B"	
30	2	150'	165'	1801	301	60'	1201	901	
35	L= WS2	2051	225'	245'	35′	701	160'	120'	
40	90	265'	2951	3201	401	80'	2401	1551	
45		450'	4951	540'	45'	901	3201	195'	
50		500'	550"	6001	50′	1001	4001	240′	
55	L=WS	550'	6051	660'	55′	110'	5001	295'	
60	2-43	6001	660′	7201	60′	120'	6001	350′	
65		650'	715"	7801	65′	130'	700'	410'	
70		700'	7701	8401	70′	1401	8001	475′	
75	2	750'	825"	9001	75′	150'	9001	5401	

* 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				
	1	1						

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.

2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the

Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.

4. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.

5. Additional Shadow Vehicles with TMAs may be positioned off the paved

surface, next to those shown in order to protect wider work spaces.

6. See TCP(5-1) for shoulder work on divided highways, expressways and

7. CW21-5 "SHOULDER WORK" signs may be used in place of CW20-10 "ROAD WORK AHEAD" signs for shoulder work on conventional

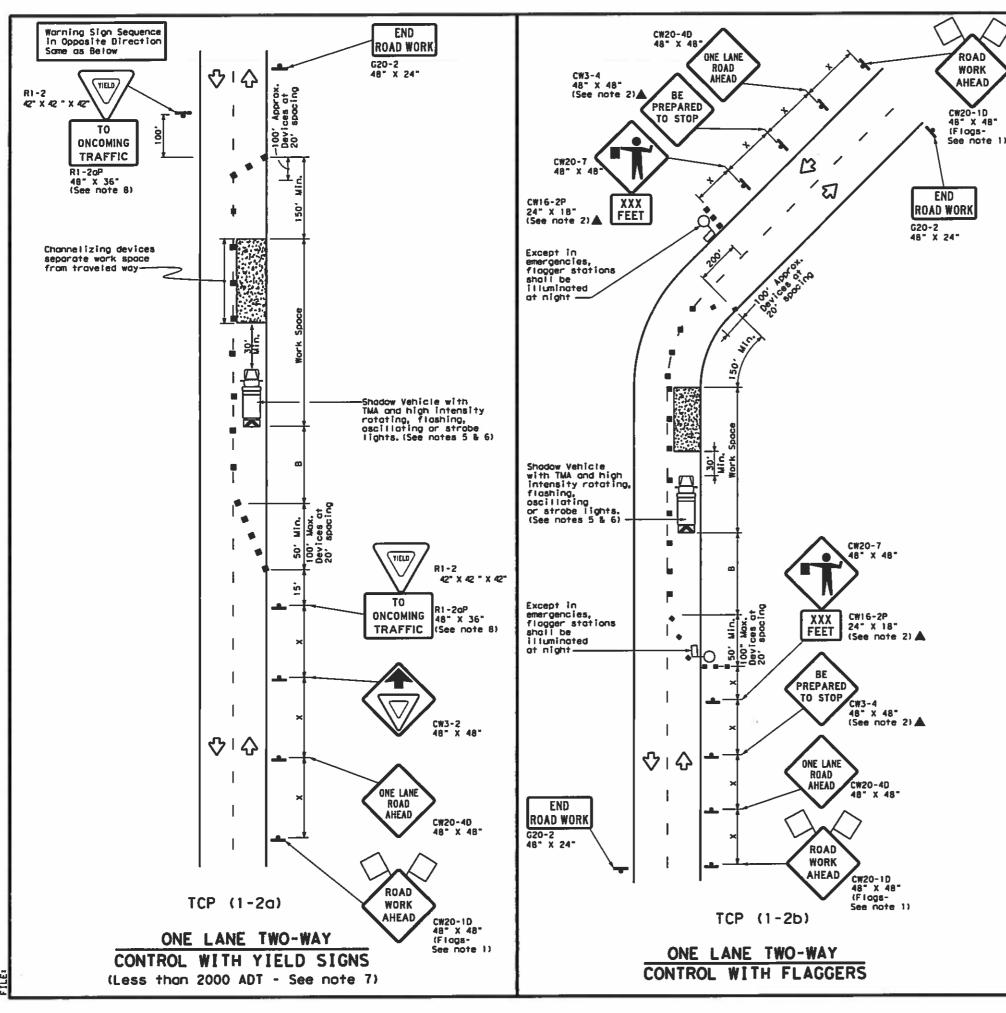
For construction or maintenance contract work, specific project requirements for shadow vehicles can be found in the project GENERAL NOTES for Item 502, Barricades, Signs and Traffic Handling.

Texas Department of Transportation Traffic Operations Division

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(1-1)-12

© TxDOT December	er 1985	Des 1x	100	CEL THOOT	0111	TXDOT	CK: TXDOT
REVISIONS		CONT	SECT	JOB		н	[CHWAY
-94 2-12 -95		0220	07	060		SH48	8/SH550
-97		DIST		COUNTY			SHEET NO.
-98		21		CAMER	ON		99
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		LEGE	ND	
		Type 3 Borricade	••	Channelizing Devices
-	B	Heavy Work Vehicle	2	Truck Mounted Attenuator (TMA)
	£	Trailer Mounted Flashing Arrow Board		Portable Changeable Message Sign (PCMS)
	-	Sign	4	Traffic Flow
	Q	Flog	PO	Flagger

Speed	Formula	Toper Lengths Channelizing ## Devices		Minimum Sign Specing "X"		Stopping Sight Distance			
*		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	Distance	-6.	
30	2	1501	1651	180'	30'	601	120'	901	200'
35	L= WS ²	2051	225'	245'	35'	70'	160'	120'	250'
40	60	265'	295'	320"	40'	80,	240'	155'	305'
45		4501	495'	540"	451	90'	320'	195'	360'
50		5001	550'	6001	501	1001	400'	240'	425'
55	L=WS	550'	605'	6601	55′	110*	500'	295'	4951
60	L-#3	6001	660'	720'	60'	120'	600'	3501	570'
65		650'	715'	7801	651	130'	7001	410'	6451
70		7001	770'	8401	70'	1401	800'	475'	730'
75		7501	825'	9001	75'	1501	900'	540'	8201

* Conventional Roads Only

** Toper 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					
	1	1							

GENERAL NOTES

1. Flogs ottoched to signs where shown are REQUIRED.

2. All traffic control devices illustrated are REQUIRED, except those denoted with the triongle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.

3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4D "ONE LANE

ROAD AHEAD" sign, but proper sign specing shall be maintained.
4. Sign specing may be increased or on additional CW20-1D "ROAD WORK AHEAD" sign may be used if advance warning cheed 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.

6. 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)

7. 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.

8. R1-2 "YIELD" sign with R1-20P "TO ONCOMING TRAFFIC" plaque shall be placed on a support

at a 7 foot minimum mounting height.

TCP (1-2b)

9. Flaggers should use two-way radios or other methods of communication to control traffic. 10. Length of work space should be based on the ability of flaggers to communicate.

If the work space is located near a harizontal 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.

13. Flaggers should use 24" STOP/SLOW poddles to control traffic. Flags should be

limited to emergency situations.

For construction or maintenance contract work, specific project requirements for shodow vehicles con be found in the project GENERAL NOTES for Item 502, Borricades, Signs and

Traffic Handling

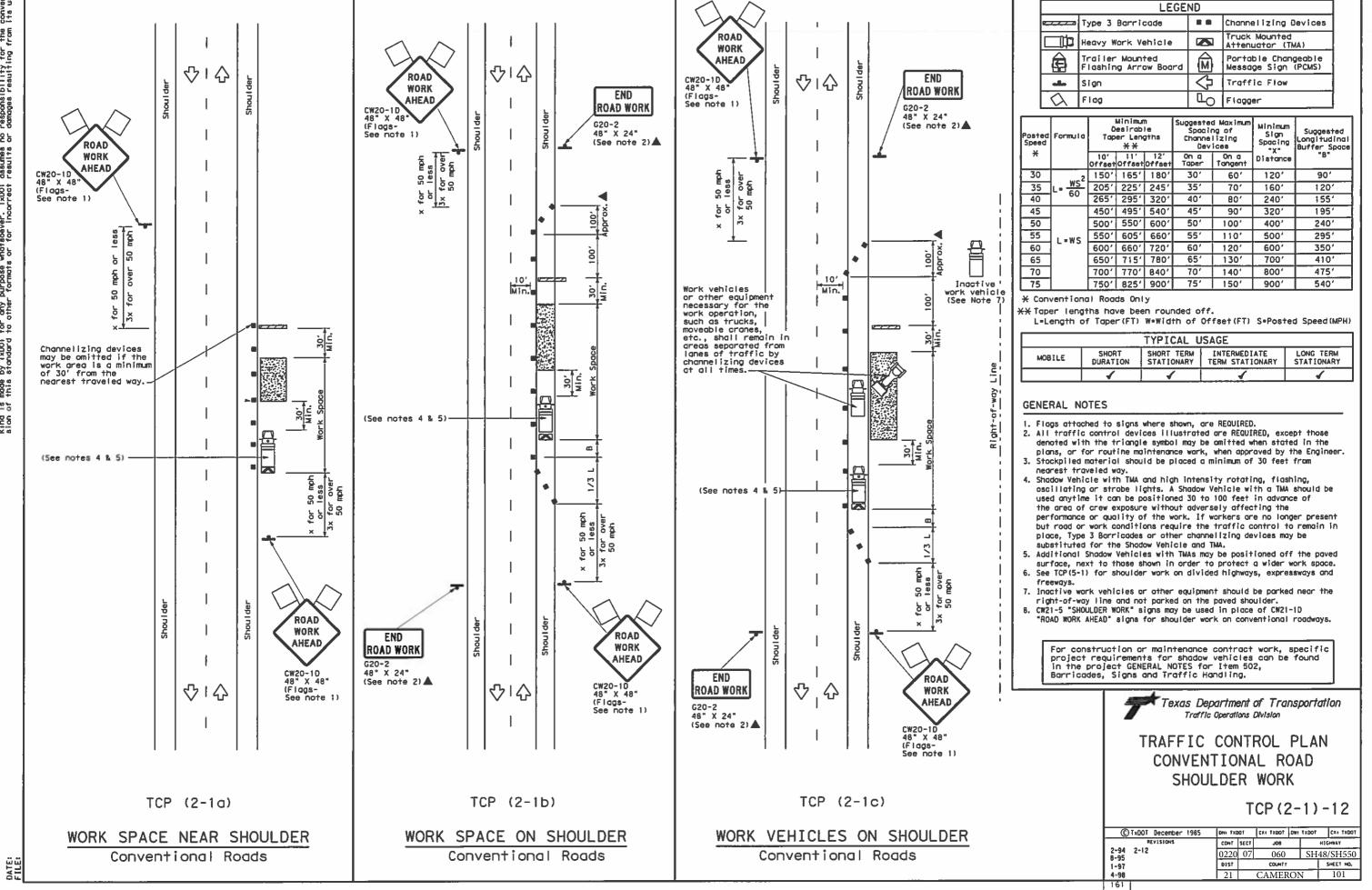
Texas Department of Transportation Traffic Operations Division

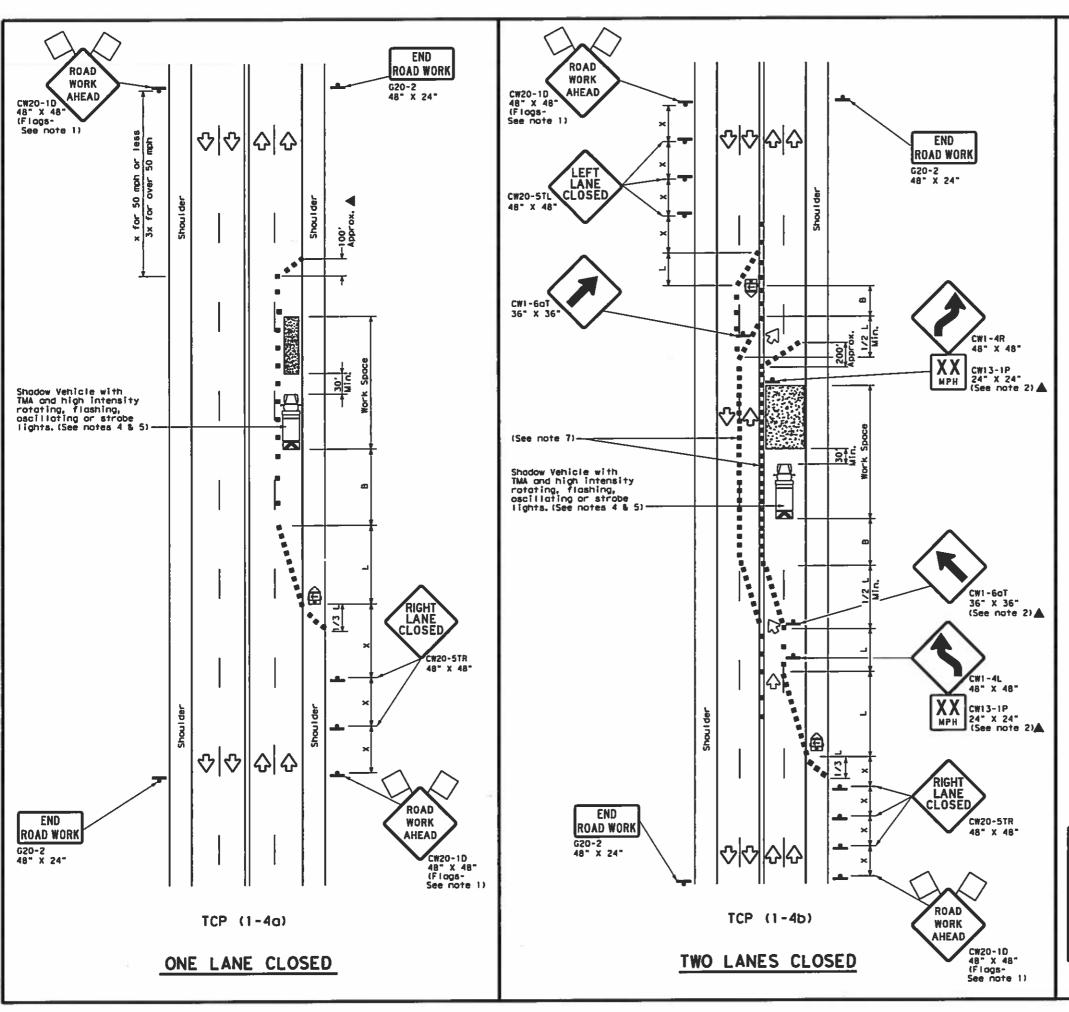
TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(1-2)-12

©TxDOT December 1985	ON: TX	TOT	CE: TXDOT	(W)	7100E	CRA THOOT
4-90 2-12	CONT	SECT	JOE		H	CHREA
2-94	0220	07	060		SH48	/SH550
1-97	DIST		COUNTY			SHEET NO.
4-96	21		CAMER	ON.	1	100
152						







	LEGEND						
	Type 3 Barricade	••	Channelizing Devices				
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)				
Ê	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)				
-	Sign	♦	Traffic Flow				
a	Flog	Ф	Flagger				

Speed	Formula	D	Winimur esirab er Len **	le	Spac 1		Minimum Sign Specing "x"	Suggested Longitudinal Buffer Space	
*		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	Distance	-8-	
30	2	1501	1651	1801	30'	60'	1201	90'	
35	L= WS2	2051	2251	245'	35'	70'	1601	120'	
40	r . 60	265'	2951	3201	401	801	240'	1551	
45		450'	4951	540'	45′	90′_	350,	195'	
50		5001	550'	6001	50'	1001	400'	240'	
55	L=WS	5501	605'	660'	551	110'	500'	2951	
60	- "3	600'	6601	7201	60,	120'	600'	350'	
65		6501	7151	7801	65'	1301	700'	410'	
70		700'	770'	8401	701	140'	800'	475'	
75		7501	825'	9001	751	150'	9001	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		
	1	4				

GENERAL NOTES

1. Flogs attached to signs where shown are REQUIRED.

2. All troffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be amitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.

3. The CW20-1D "ROAD WORK AHEAD" sign may be repeated if the

visibility of the work zone is less than 1500 feet.

- 4. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but rood or work conditions require the traffic control to remain i place, Type 3 Barricades or other channelizing devices may be substituted for the Shodow Vehicle and TMA.
- 5. Additional Shodow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.

6. If this TCP is used for a teft tone 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.

 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 1/25 where S is the speed in mph. This tighter device spacing is intended for the areas of conflicting markings, not the entire work zone.

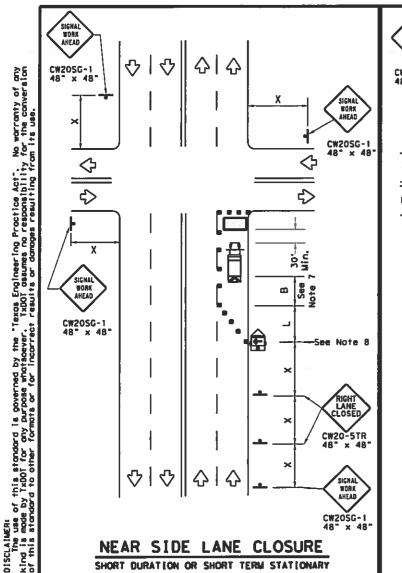
For construction contract work. specific project requirements for shodow vehicles can be found in the project GENERAL NOTES for Item 502, Barricodes, Signs and Traffic Handling.



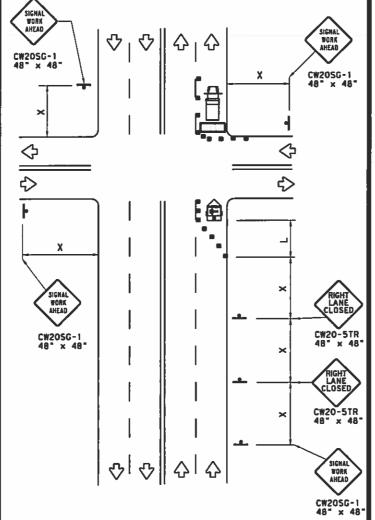
TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

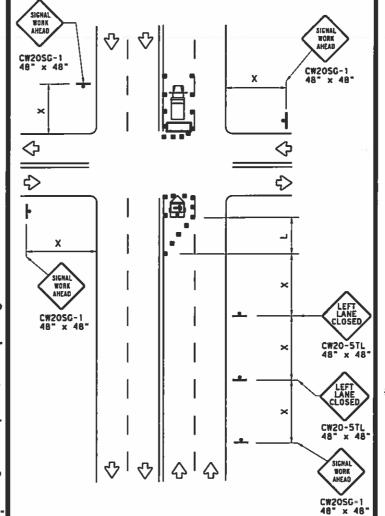
TCP(1-4)-12

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REVESTORS	CONT	SECT	J06		ME	HE CHIEAY	
2-94 2-12 8-95	0220	07	060		SH48/SH550		
1-97	DIST		COUNTY			SHEET NO.	
4-98	21	CAMERON			1	102	
154	7.0						



SHORT DURATION OR SHORT TERM STATIONARY





	LEGEND						
	Type 3 Borricode		Channelizing Devices				
中	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)				
£	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)				
-	Sign	♦	Traffic Flow				
Q	Flog	PO	Flogger				

Speed	Formula Toper Lengths Chann		Spaci: Channe		Minimum Sign Specing	Suggested Longitudinal Buffer Space		
*		10' Offset	Il' Offset	12' Offset	On a Taper	On a Tangent	Distance	-8-
30	2	150'	1651	1801	30'	60'	120'	90'
35	L= WS2	2051	225'	2451	35'	701	1601	120'
40	60	265'	2951	320'	40'	80'	240'	1551
45		450'	4951	540'	45'	90'	3201	195'
50		500'	5501	600,	50'	1001	400'	240'
55	L-WS	550'	6051	660'	55'	110'	5001	2951
60	L-#3	600'	6601	720'	60'	120'	6001	3501
65		6501	7151	780'	65′	1301	700'	4101
70		7001	770'	840'	70'	140'	800,	475'
75		750'	8251	900'	75′	150'	9001	540'

* Conventional Roads Only

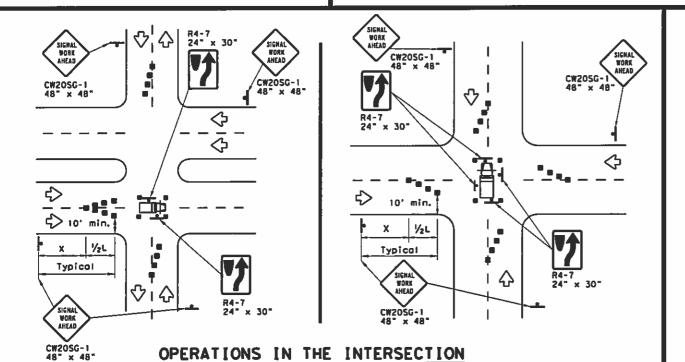
** Toper lengths have been rounded off.

L=Length of Toper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

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

FAR SIDE RIGHT LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY



SHORT DURATION

GENERAL NOTES

1. The minimum size channelizing device is the 28" cone. 42" Two-piece cones, drums, vertical panels or barricades will be required when the device must be left unattended at night.

FAR SIDE LEFT LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY

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

SHEET 1 OF 2

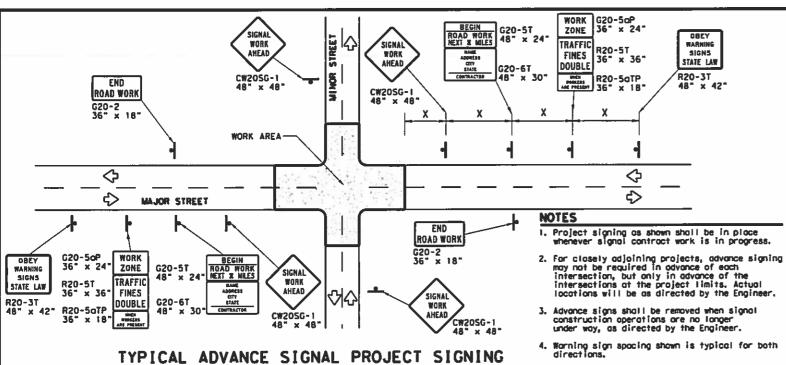
Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC SIGNAL WORK TYPICAL DETAILS

WZ(BTS-1)-13

DHE TXDOT CRETXDOT DWE TXDOT CRETXDO wzbis-13.dgn ☼ Tx00T April 1992 CONT SECT JOB HIGHWAY 0220 07 060 SH48/SH55 2-98 10-99 7-13 4-98 3-03 COUNTY SHEET NO. 103 21 CAMERON 114



FOR LONG TERM and INTERMEDIATE-TERM STATIONARY WORK OPERATIONS

REFLECTIVE SHEETING

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

G20-5cP 36" x 24"

R20-5T

36" × 36"

❖

See the Toble on sheet I of 2 for Typical warning sign spacing.

DBEY

STATE LAW

R20-3T 48" x 42"

SIGN SUPPORT WEIGHTS

- Weights used to keep signs from turning over should be sandbags filled with dry, cohesionless material.
- 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 will not be permitted for use as sign support weights.
- 4. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs.
- 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
- Sandbogs shall only be placed along or laid over the base supports of the traffic control device and shall not be suspended above ground level or hung with rope, wire, chains or other fastners. Sandbags shall be placed along the length of the skids to weigh down the
- Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

LEGEND					
4	Sign				
	Channelizing Devices				
	Type 3 Barricade				

SIGN MOUNTING HEIGHT

DURATION OF WORK

directed by the Engineer.

GENERAL NOTES FOR WORK ZONE SIGNS

Wooden sign posts shall be painted white.

Barricades shall NOT be used as sign supports.

Nails shall NOT be used to attach signs to any support.

Signs shall be installed and maintained in a straight and plumb condition.

Temporary signs that have damaged or cracked substrates and/or damaged or marred reflective sheeting shall be replaced as

Damaged wood posts shall be replaced. Splicing wood posts will not be allowed.

The Contractor shall furnish the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SMSD).

The Contractor shall furnish sign supports and substrates listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD), installed as per the manufacturer's recommendations.

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".

Sign height of Long-term/Intermediate-term warning signs shall be as shown on Figure 6F-1 of the TMUTCD.

Work zone durations are defined in Part 6, Section 66.02 of the Texas Manual on Uniform Traffic Control Devices (TMUTCD).

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

REMOVING OR COVERING

- Then sign messages may be confusing or do not apply, the signs shall be removed or completely covered, unless otherwise approved by the Engineer.
- 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 outomobile headlights at night without damaging the sign sheeting. Burlap, or heavy materials such as plywood or aluminum 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 back filled upon completion of the work.

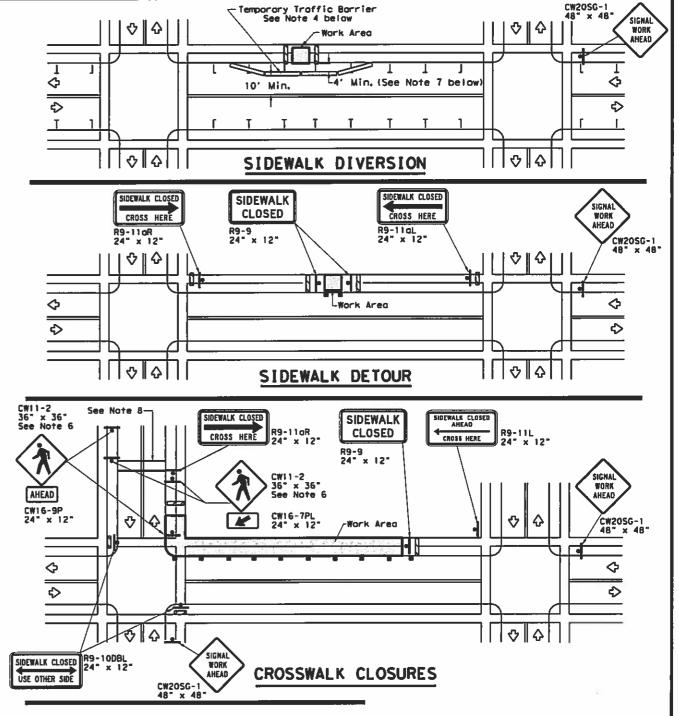
DEPARTMENTAL MATERIAL SPECIFICATIONS

SIGN FACE MATERIALS	DM5-8300
FLEXIBLE ROLL-UP REFLECTIVE SIGNS	DMS-8310

COLOR	USAGE	SHEETING MATERIAL
ORANGE	BACKGROUND	TYPE BFL OR TYPE CFL SHEETING
WHITE	BACKGROUND	TYPE A SHEETING
BLACK	LEGEND & BORDERS	ACRYLIC NON-REFLECTIVE SHEETING

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

http://www.txdot.gov/txdot_library/publications/construction.htm



PEDESTRIAN CONTROL

Holes, trenches or other hazards shall be adequately protected by covering, delineating or surrounding the hazard with arange plastic pedestrian fencing or longitudinal channelizing devices, or as directed by the Engineer.

"CROSSWALK CLOSURES" as detailed above will require the Engineer's approval prior to installation.

R9 series signs shown may be placed on supports detailed on the BC standards or CWZTCD list, or when fabricated from approved lightweight plastic substrates, they may be mounted on top of a plastic drum at or near the location shown.

for speeds less than 45 mph longitudinal channelizing devices may be used instead of traffic barriers when approved by the Engineer. Attenuation of blunt ends and installation of water filled devices shall be as per BC(9) and manufacturer's recommendations.

Location of devices are for general guidance. Actual device spacing and location must be field adjusted to meet actual conditions.

there pedestrians with visual disabilities normally use the closed sidewalk Detectable Pedestrian Barricades should be used instead of the Type 3

The width of existing sidework should be maintained if practical.

Povement markings for mid-block crosswalks shall be paid for under the oppropriate bid items.

when crosswalks or other pedestrian facilities are closed or relocated, temporary facilities shall be detectable and shall include accessibility features consistent with the features present in the existing pedestrian

SHEET 2 OF 2

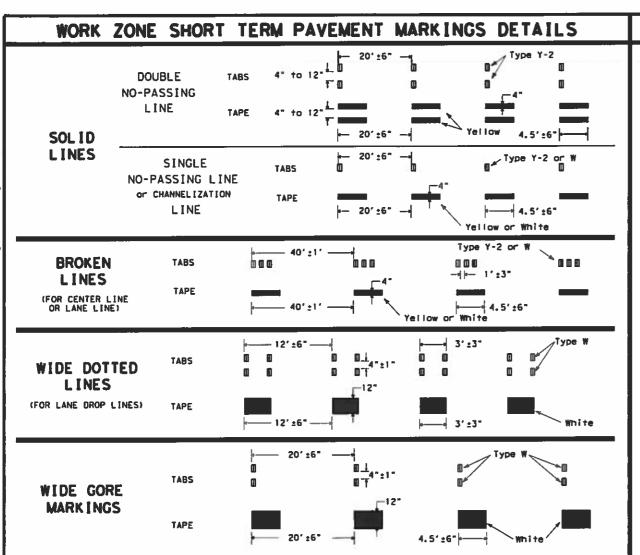
Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC SIGNAL WORK BARRICADES AND SIGNS

WZ (BTS-2) - 13

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© Tx001	April 1992	CONT	SECT	109		HIGHWAY
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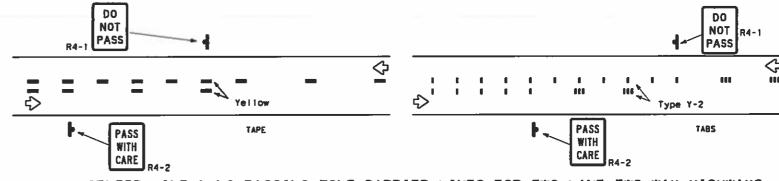
NOTES:

- Short term povement markings may be prefabricated markings (stick down tape) or temporary flexiblereflective roadway marker tabs unless otherwise specified elsewhere in plans.
- Short term payement markings shall NOT be used to simulate edge lines.
- 3. Dimensions indicated on this sheet are typical and approximate. Variations in size and height may occur between markers or devices made by manufacturers, by as much as 1/4 inch, unless otherwise noted.
- 4. Temporary flexible-reflective raggway marker tabs will require normal maintenance replacement when used on roadways with an ADT per lane of up to 7500 vehicles with no more than 10% truck mix. When roadways exceed these values, additional maintenance replacement of devices should be planned.
- 5. No segment of roadway open to traffic shall remain without permanent pavement markings for a period greater than 14 calendar days. The Contractor will be responsible for maintaining short term povement markings until permonent pavement markings are in place. When the Contractor is responsible for placement of permonent pavement markings, no segment of roadway shall remain without permanent pavement markings for a period greater than 14 calendar days unless weather conditions prohibit placement. Permanent pavement markings shall be placed as soon as weather permits.
- 6. For two lane, two-way roodways, DO NOT PASS signs shall be erected to mark the beginning of sections where passing is prohibited and PASS WITH CARE signs shall be erected to mark the beginning of sections where passing is permitted. Signs shall be in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) and may be used to indicate the limits of no-passing zones for up to 14 calendar days. Permanent povement markings should then be placed.
- 7. For low volume two lone, two-way roadways of 4000 ADT or less, no-possing lines may be amitted when approved by the Engineer. DO NOT PASS and PASS WITH CARE signs shall be erected (see note 6).
- 8. For exit gores where a lane is being dropped place wide gore markings or retroreflective channelizing devices to guide motorist through the exit. If channelizing devices are to be used it should be noted elsewhere in the plans. One piece cones are not allowed for this purpose.

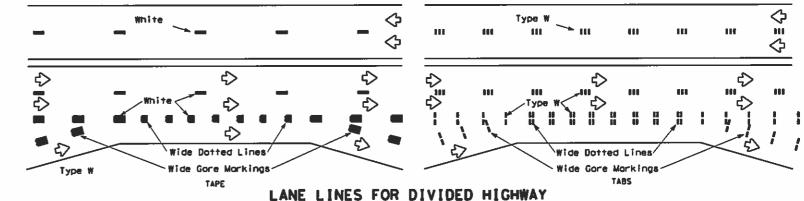
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

- 1. Temporary flexible-reflective roadway marker tabs detailed on this sheet will be designated Type Y-2 (two amber reflective surfaces with yellow body); Type Y (one amber reflective surface with yellow body); and Type W (one white or silver reflective surface with white body). Additional details may be found on BC(11).
- 2. Tabs shall meet requirements of Departmental Material Specification DMS-8242.
- 3. When dry, tabs shall be visible for a minimum distance of 200 feet during normal daylight hours and when illuminated by automobile low-beam head light at night, unless sight distance is restricted by roadway
- No two consecutive tabs nor four tabs per 1000 feet of line shall be missing or fail to meet the visual performance requirements of Note 3.

WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS

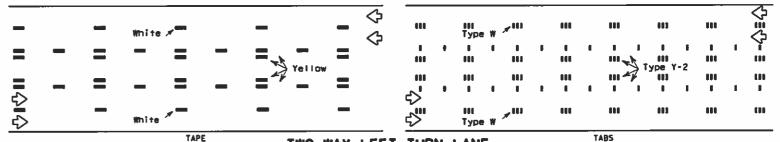


CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS

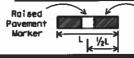


₩ ♦ Type Type Y-2 Yellow Type W TARS

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



Short Term Marking (Tape)

If raised pavement markers are used to supplement REMOVABLE short term markings, the markers shall be applied to the top of the tape at the approximate mid length of the tape. This allows on easier removal of raised markers and tope.

PREFABRICATED PAVEMENT MARKINGS

- 1. Temporary Removable Prefabricated Povement Markings shall meet the requirements of DMS-8241.
- Non-remayable Prefabricated Povement Markings shall meet the requirements of either DMS-8240
 "Permanent Prefabricated Pavement Markings" or DMS-8243 "Temporary Castruction-Grade
 Prefabricated Pavement Markings."

RAISED PAVEMENT MARKERS

1. All raised pavement markers used for work zone markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and DMS-4200.

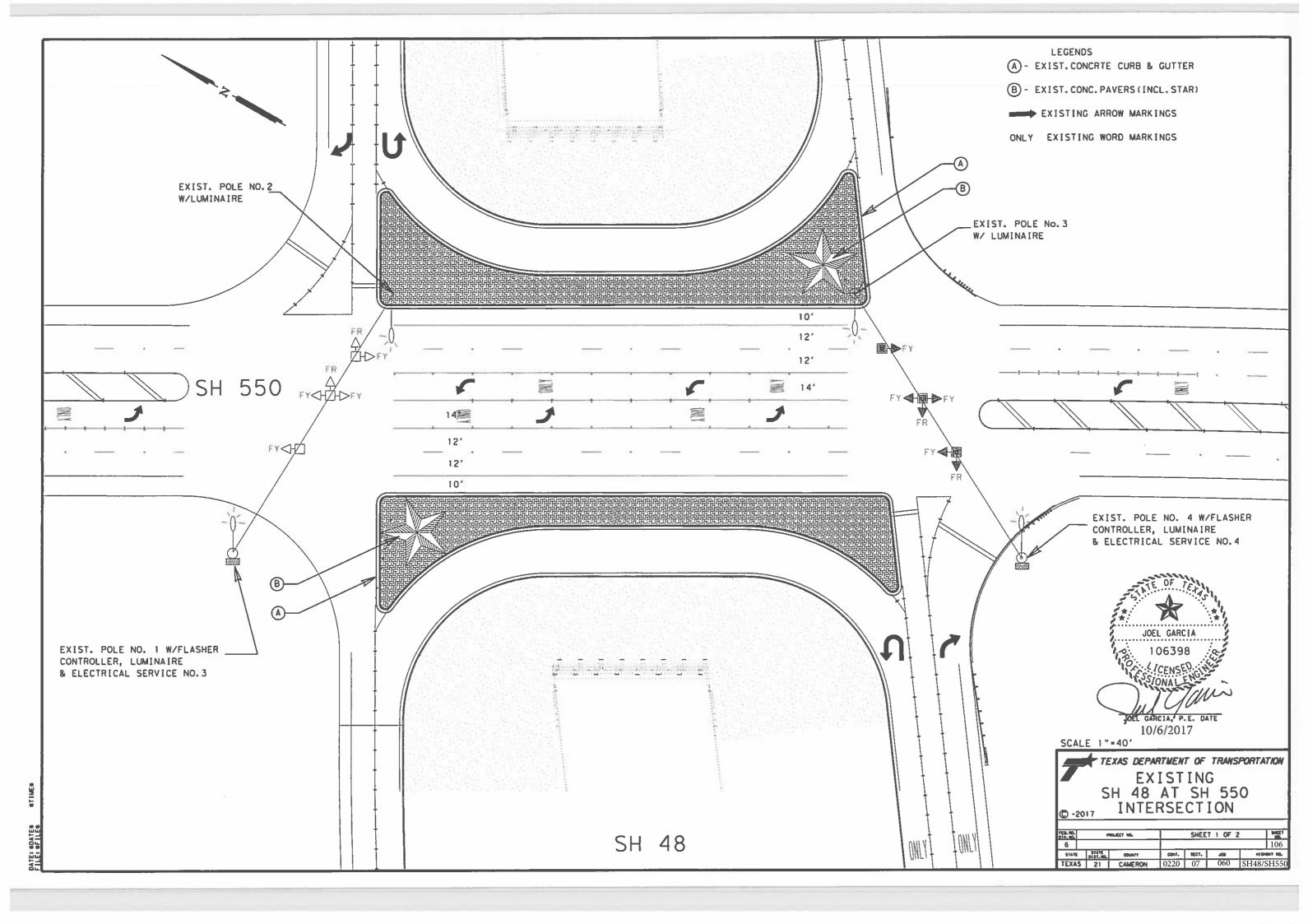
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS) & MATERIAL PRODUCER LISTS (MPL)

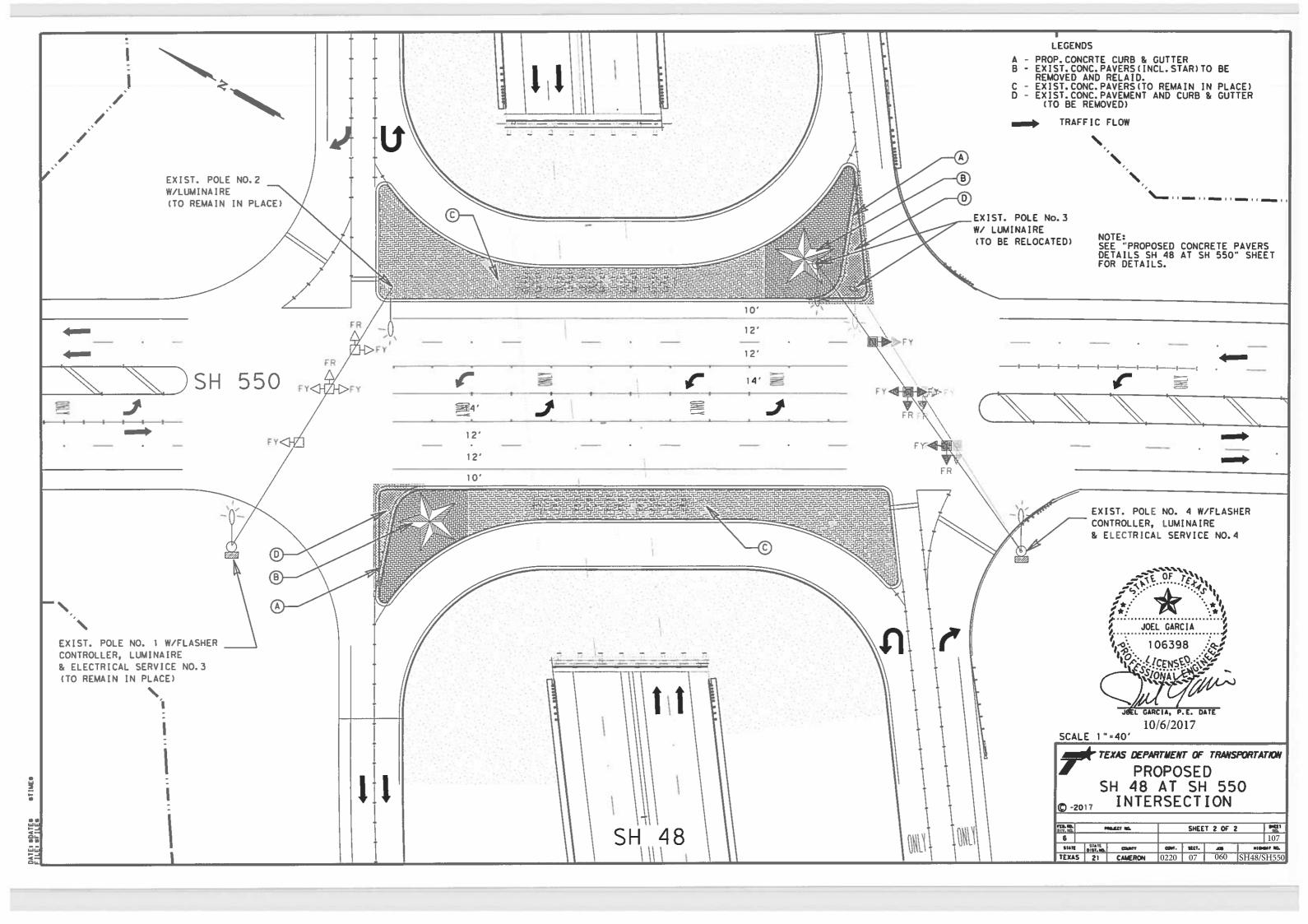
1. DMSs referenced above can be found along with embedded links to their respective MPLs at the following website: http://www.bxdot.gov/business/contractors_consultants/material_specifications/default.htm Texas Department of Transportation

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ (STPM) -13

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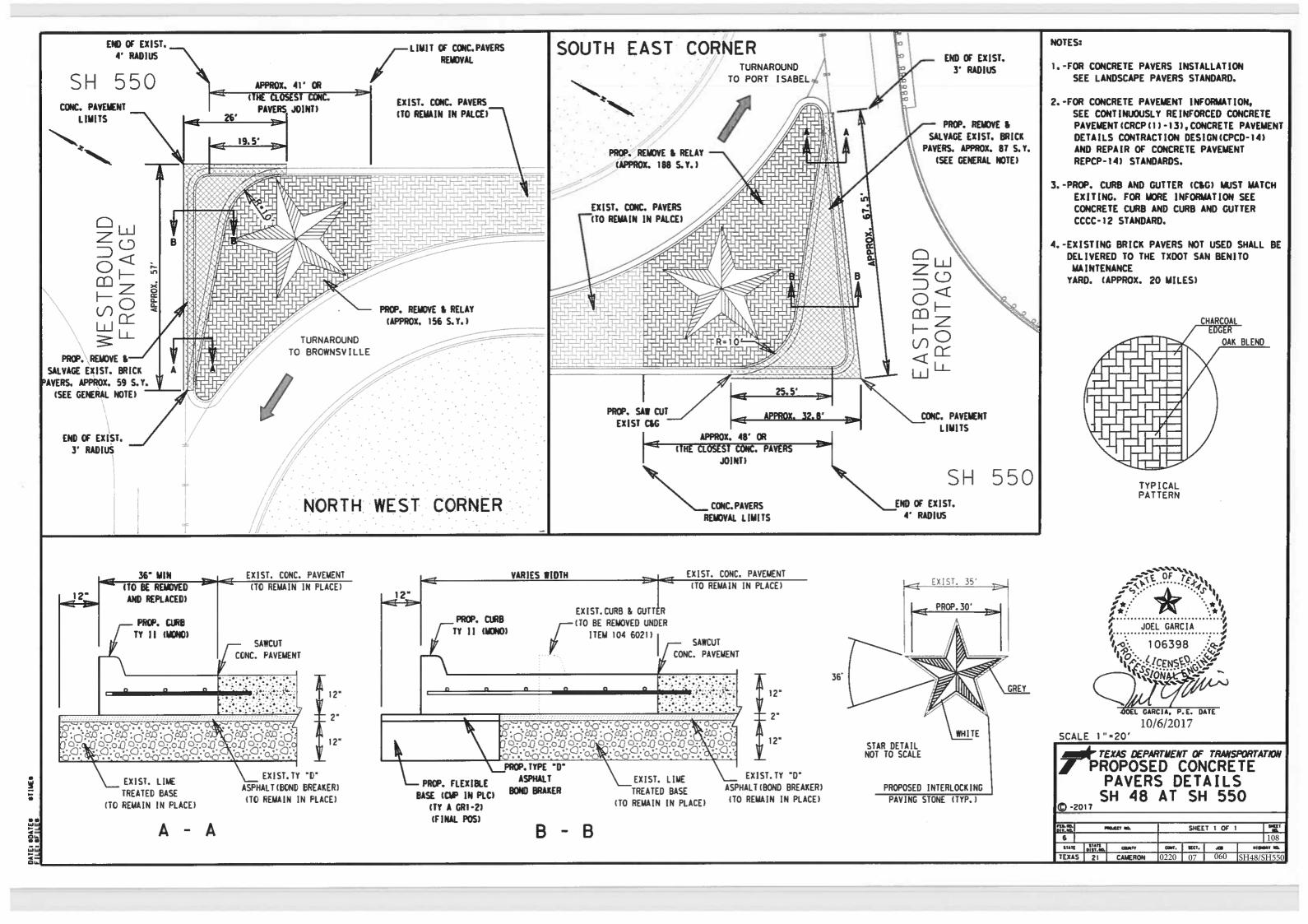
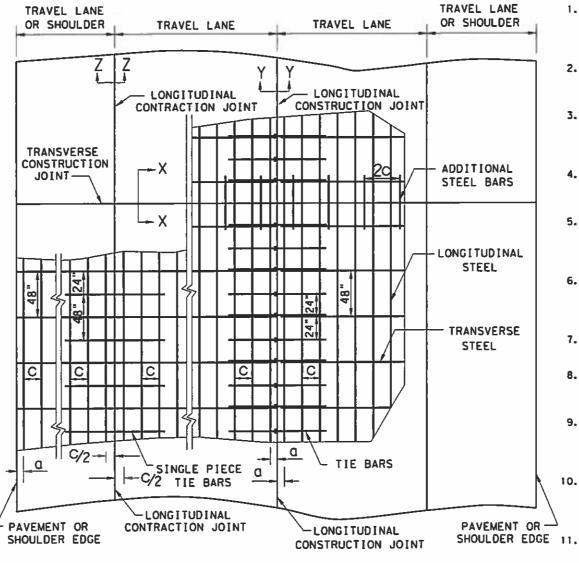


TABLE NO. 1 LONGITUDINAL STEEL FIRST ADDITIONAL STEEL SLAB THICKNESS SPACING BARS AT TRANSVERSE REGULAR AND BAR SIZE AT EDGE CONSTRUCTION JOINT STEEL BARS (SECTION X-X) OR JOINT SPACING SPACING SPACING **LENGTH** 2 x c (IN.) (IN.) SIZE (IN.) (IN.) #5 3 TO 4 50 7. 0 6.5 7.5 #5 6.0 3 TO 4 50 12 50 8.0 #6 9.0 3 TO 4 18 8.5 3 TO 4 50 #6 8.5 17 8.0 3 TO 4 50 9.0 #6 16 9.5 #6 7.5 3 TO 4 50 7.0 3 TO 4 50 10.0 #6 14 10.5 #6 6.75 3 TO 4 50 13.5 11.0 #6 3 TO 4 6.5 13 50 11.5 #6 6.25 50 3 TO 4 12.5 12.0 #6 3 TO 4 50 6.0 12 12.5 #6 5.75 3 TO 4 50 11.5 13.0 #6 5.5 3 TO 4 50 11

TABLE NO. 2 TRANSVERSE STEEL AND TIE BARS									
SLAB THICKNESS (IN.)	TRANSVERSE STEEL		AT LON	E BARS GITUDINAL TION JOINT 'ION Z-Z)	TIE BARS AT LONGITUDINAL CONSTRUCTION JOINT (SECTION Y-Y)				
	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)			
7.0 - 7.5	# 5	48	#5	48	#5	24			
8.0 - 13.0	* 5	48	#6	48	, # 6	24			

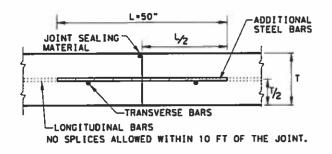


TYPICAL PAVEMENT LAYOUT

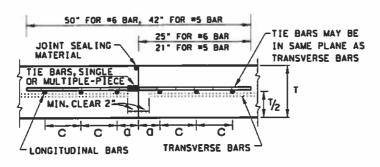
PLAN VIEW (NOT TO SCALE)

GENERAL NOTES

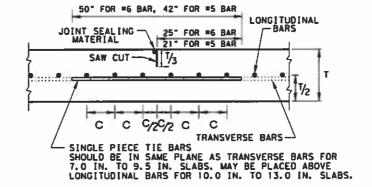
- DETAILS FOR PAVEMENT WIDTH, PAVEMENT THICKNESS AND THE CROWN CROSS-SLOPE SHALL BE SHOWN ELSEWHERE IN THE PLANS. PAVEMENTS WIDER THAN 100 FT. WITHOUT A FREE LONGITUDINAL JOINT ARE NOT COVERED BY THIS STANDARD.
- 2. USE COARSE AGGREGATES WITH A RATED COEFFICIENT OF THERMAL EXPANSION (COTE) OF NOT MORE THAN 5.5 X 10⁻⁶ IN/IN/ °F AS LISTED IN THE CONCRETE RATED SOURCE QUALITY CATALOG (CRSQC).
- 3. ALL THE REINFORCING STEEL AND TIE BARS SHALL BE DEFORMED STEEL BARS CONFORMING TO ASTM A 615 (GRADE 60) OR ASTM A 996 (GRADE 60) OR ABOVE. STEEL BAR SIZES AND SPACINGS SHALL CONFORM TO TABLE NO. 1 AND TABLE NO. 2.
- 4. WHEN COARSE AGGREGATE WITH A RATED COTE OF NOT MORE THAN 4.3 X 10⁻⁶ IN/IN/ *f IS USED, TABLE NO.1A MAY BE USED FOR LONGITUDINAL STEEL AS APPROVED BY THE ENGINEER.
- 5. STEEL BAR PLACEMENT TOLERANCE SHALL BE +/- 1 IN. HORIZONTALLY AND +/- 0.5 IN. VERTICALLY. CALCULATED AVERAGE BAR SPACING (CONCRETE PLACEMENT WIDTH / NUMBER OF LONGITUDINAL BARS) SHALL CONFORM TO TABLE NO.1 OR TABLE NO.1A.
- 6. PAVEMENT WIDTHS OF MORE THAN 15 FT. SHALL HAVE A LONGITUDINAL JOINT (SECTION Z-Z OR SECTION Y-Y). THESE JOINTS SHALL BE LOCATED WITHIN 6 IN. OF THE LANE LINE UNLESS THE JOINT LOCATION IS SHOWN ELSEWHERE ON THE PLANS.
- 7. THE SAW CUT DEPTH FOR THE LONGITUDINAL CONTRACTION JOINT (SECTION Z-Z) SHALL BE ONE THIRD OF THE SLAB THICKNESS (T/3).
- 8. WHEN TYING CONCRETE GUTTER AT A LONGITUDINAL JOINT, THE TIE BAR LENGTH OR POSITION MAY BE ADJUSTED. PROVIDE 3 IN. OF CONCRETE COVER FROM THE BACK OF GUTTER TO THE END OF TIE BAR.
- 9. REPLACE MISSING OR DAMAGED TIE BARS WITHOUT ADDITIONAL COMPENSATION BY DRILLING MIN. 10 IN. DEEP AND GROUTING TIE BARS WITH TYPE III, CLASS C EPOXY. MEET THE PULL-OUT TEST REQUIREMENTS IN ITEM 361.
- 10. OMIT TIE BARS LOCATED WITHIN 18-IN. OF THE TRANSVERSE CONSTRUCTION JOINTS (SECTION X-X). USE HAND-OPERATED IMMERSION VIBRATORS TO CONSOLIDATE THE CONCRETE ADJACENT TO ALL FORMED JOINTS.
- LONGITUDINAL REINFORCING STEEL SPLICES SHALL BE A MINIMUM OF 25 IN. STAGGER THE LAP LOCATIONS SO THAT NO MORE THAN 1/3 OF THE LONGITUDINAL STEEL IS SPLICED IN ANY GIVEN 12-FT. WIDTH AND 2-FT. LENGTH OF THE PAVEMENT.
- 12. THE DETAIL FOR THE JOINT SEALANT AND RESERVOIR IS SHOWN ON STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."



TRANSVERSE CONSTRUCTION JOINT SECTION X - X



LONGITUDINAL CONSTRUCTION JOINT
SECTION Y - Y



LONGITUDINAL CONTRACTION JOINT
SECTION Z - Z

SHEET 1 OF 2



Design Division Standard

CONTINUOUSLY REINFORCED
CONCRETE PAVEMENT
ONE LAYER STEEL BAR PLACEMENT
T - 7 to 13 INCHES

CRCP(1)-17

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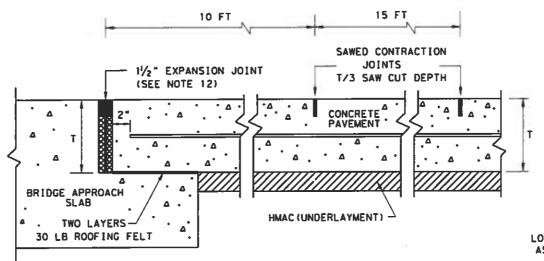
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SLAB THICKNESS AND BAR SIZE		REGULAR STEEL BARS	FIRST SPACING AT EDGE OR JOINT	ADDITIONAL STEEL BARS AT TRANSVERSE CONSTRUCTION JOINT (SECTION X-X)		
T (IN.)	BAR SIZE	SPACING C (IN.)	SPACING Q (IN.)	SPACING 2 x c (IN.)	LENGTH L ([N.)	
7.0	#5	7.5	3 TO 4	15	50	
7.5	* 5	7.0	3 TO 4	14	50	
8.0	#6	10.0	3 TO 4	20	50	
8.5	# 6	9. 5	3 TO 4	19	50	
9.0	#6	9. 0	3 TO 4	18	50	
9.5	#6	8.5	3 TO 4	17	50	
10.0	#6	8.0	3 TO 4	16	50	
10.5	#6	7.5	3 TO 4	15	50	
11.0	#6	7.0	3 TO 4	14	50	
11.5	#6	6.75	3 TO 4	13.5	50	
12.0	# 6	6.50	3 TO 4	13	50	
12.5	#6	6. 25	3 TO 4	12.5	50	
13.0	#6	6.0	3 TO 4	12	50	

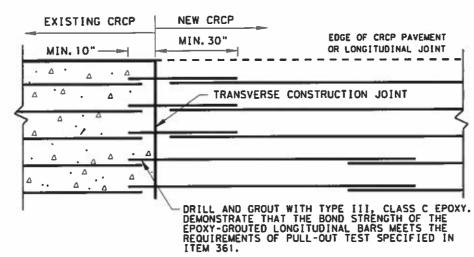
LONGITUDINAL REINFORCING STEEL **SPLICES** EDGE OF CRCP PAVEMENT OR LONGITUDINAL JOINT ∠12-FT WIDTH BY 2-FT LENGTH ∠ 12-FT WIDTH BY 2-FT LENGTH

STAGGER THE LAP LOCATIONS SO THAT NO MORE THAN 1/3 OF THE LONGITUDINAL STEEL IS SPLICED IN ANY GIVEN 12-FT. WIDTH AND 2-FT. LENGTH OF THE PAVEMENT. ANY OTHER LAP CONFIGURATION MEETING THIS REQUIREMENT WILL BE ALLOWED.

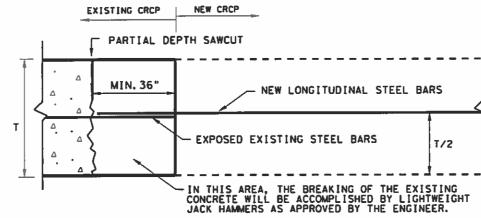
EXAMPLES OF LAP CONFIGURATION PLAN VIEW (NOT TO SCALE)



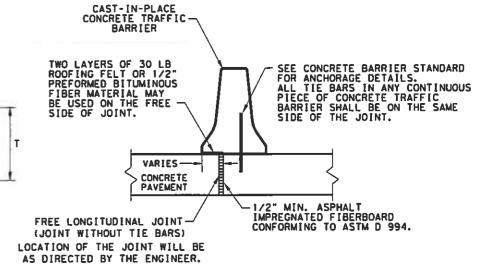
TRANSVERSE EXPANSION JOINT DETAIL AT BRIDGE APPROACH



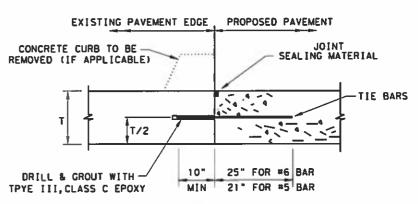
OPTION A: DRILL AND EPOXY PLAN VIEW (NOT TO SCALE)



TRANSVERSE TIE JOINT DETAIL EXISTING CRCP TO NEW CRCP



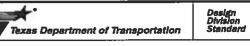
FREE LONGITUDINAL JOINT DETAIL



1. BEFORE WIDENING WORK, DEMONSTRATE THAT THE BOND STRENGTH OF THE EPOXY-GROUTED TIE BARS MEETS THE REQURIMENTS OF PULL-OUT TEST SPECIFIED IN ITEM 361.
2. SPACE TIE BARS AT 24" SPACING. USE *6 TIE BARS FOR 8" AND THICKER SLABS, USE *5 TIE BARS FOR LESS THAN 8" THICK SLABS.

LONGITUDINAL WIDENING JOINT DETAIL





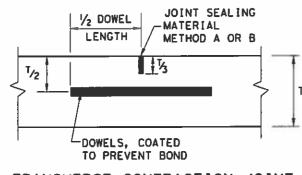
CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

ONE LAYER STEEL BAR PLACEMENT T - 7 to 13 INCHES

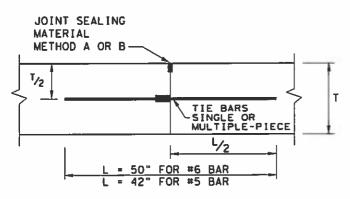
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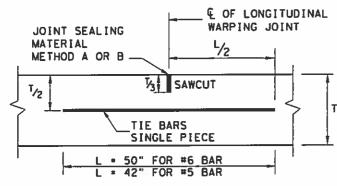
OPTION B: BREAKBACK AND LAP



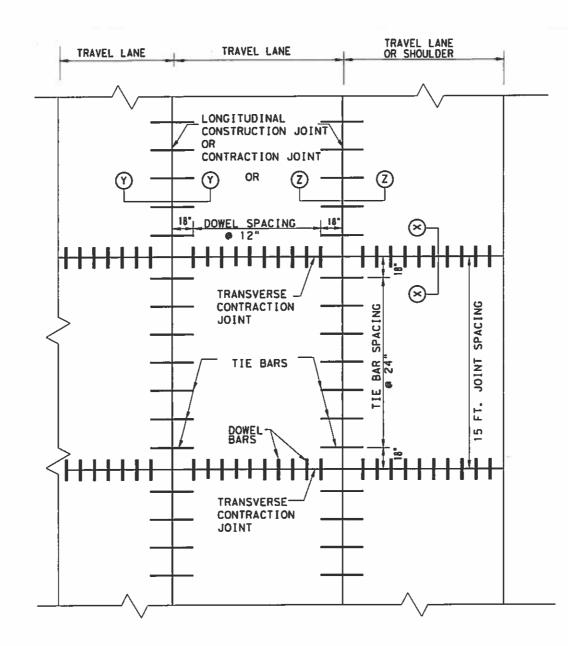
TRANSVERSE CONTRACTION JOINT SECTION X-X



LONGITUDINAL CONSTRUCTION JOINT SECTION Y-Y



LONGITUDINAL CONTRACTION JOINT SECTION Z-Z



PLAN VIEW (NOT TO SCALE)

TABLE NO. 1 DOWELS (SMOOTH BARS)							
SLAB THICKNESS T (IN.)	BAR DIA. AND LENGTH	AVERAGE SPACING (IN.)					
6 to 7.5	1" X 18"	12					
8 to 10	1 ¼" X 18"	12					
>= 10.5	1 ½" X 18"	12					

TABLE NO. 2 TIE BARS (DEFORMED BARS)								
SLAB THICKNESS T (IN.)	BAR SIZE	AVERAGE SPACING (IN.)						
6 to 7.5	#5	24						
>= 8	#6	24						

GENERAL NOTES

- DETAILS FOR PAVEMENT WIDTH, PAVEMENT THICKNESS AND THE CROWN CROSS-SLOPE SHALL BE SHOWN ELSEWHERE IN THE PLANS. PAVEMENTS WIDER THAN 100 FT. WITHOUT A FREE LONGITUDINAL JOINT ARE NOT COVERED BY THIS STANDARD.
- P. FOR FURTHER INFORMATION REGARDING THE PLACEMENT OF CONCRETE AND LOAD TRANSFER DEVICES REFER TO THE GOVERNING SPECIFICATION FOR "CONCRETE PAVEMENT".
- THE SPACING BETWEEN TRANSVERSE CONTRACTION JOINTS SHALL BE 15 FT. UNLESS OTHERWISE SHOWN IN THE PLANS.
- 4. TRANSVERSE CONSTRUCTION JOINTS MAY BE FORMED BY USE OF METAL OR WOOD FORMS EQUAL IN DEPTH TO THE DEPTH OF PAVEMENT, OR BY METHODS APPROVED BY THE ENGINEER.
- USE HAND-OPERATED IMMERSION VIBRATORS TO CONSOLIDATE THE CONCRETE ADJACENT TO ALL THE FORMED JOINTS.
- 5. PAVEMENT WIDTHS OF MORE THAN 15 FT. SHALL HAVE A LONGITUDINAL JOINT (SECTION Z-Z OR SECTION Y-Y). THESE JOINTS SHALL BE LOCATED WITHIN 6 IN. OF THE LANE LINE UNLESS THE JOINT LOCATION IS SHOWN ELSEWHERE ON THE PLANS.
- 7. THE JOINT BETWEEN OUTSIDE LANE AND SHOULDER SHALL BE A LONGITUDINAL CONTRACTION JOINT (SECTION Z-Z) UNLESS OTHERWISE SHOWN IN THE PLANS. THE SAW CUT DEPTH FOR THE LONGITUDIANL CONTRACTION JOINT (SECTION Z-Z) SHALL BE ONE THIRD OF THE SLABTHICKNESS (T/3).
- 8. WHEN TYING CONCRETE GUTTER AT A LONGITUDINAL JOINT, THE TIE BAR LENGTH OR POSITION MAY BE ADJUSTED. PROVIDE 3 IN. OF CONCRETE COVER FROM THE BACK OF GUTTER TO THE END OF TIE BAR.
- 9. REPLACE MISSING OR DAMAGED TIE BARS WITHOUT ADDITIONAL COMPENSATION BY DRILLING MIN. 10 IN. DEEP AND GROUTING TIE BARS WITH TYPE III, CLASS C EPOXY. MEET THE PULL-OUT TEST REQUIREMENTS IN ITEM 361.
- 10. WHEN AN MONOLITHIIC CURB IS SPECIFIED, THE JOINT IN THE CURB SHALL COINCIDE WITH PAVEMENT JOINTS AND MAY BE FORMED BY ANY MEANS APPROVED BY THE ENGINEER.
- 11. DOWEL BAR PLACEMENT TOLERANCE SHALL BE +/- 1/4 IN. HORIZONTALLY AND VERTICALLY UNLESS OTHERWISE SPECIFIED. WHERE DOWEL BAR BASKETS ARE USED, REMOVE THE SHIPPING WIRES.
- 12. THE DETAIL FOR JOINT SEALANT AND RESERVOIR IS SHOWN ON STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."

SHEET 1 OF 2

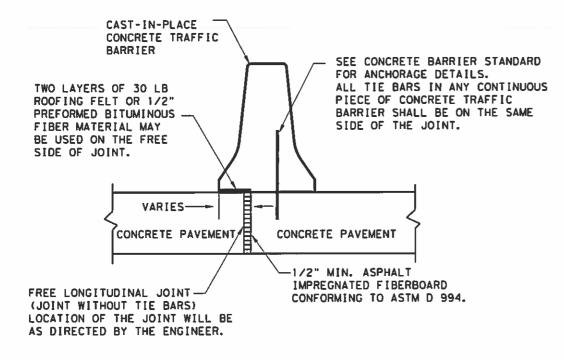
Texas Department of Transportation

CONCRETE PAVEMENT DETAILS CONTRACTION DESIGN T-6 to 12 INCHES

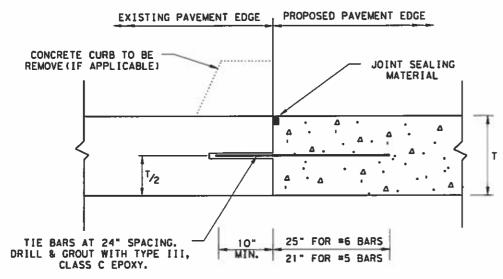
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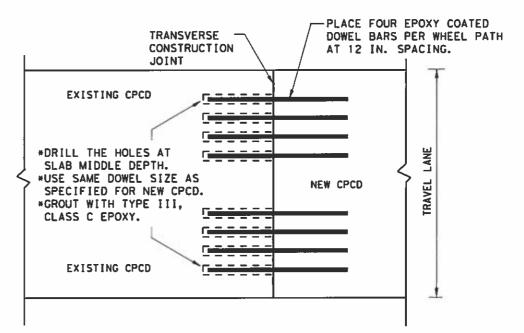


FREE LONGITUDINAL JOINT DETAIL



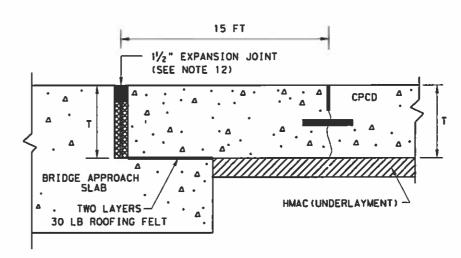
- BEFORE WIDENING WORK, DEMONSTRATE THAT THE BOND STRENGTH OF THE EPOXY-GROUTED TIE BARS MEETS THE REQUIREMENTS OF PULL-OUT TEST SPECIFIED IN ITEM 361.
- SPACE TIE BARS AT 24" SPACING. USE #6 BARS FOR 8" AND THICKER SLABS, USE #5 BARS FOR LESS THAN 8" THICK SLABS.
- 3. THE TRANSVERSE JOINTS OF PROPOSED PAVEMENT SHALL COINCIDE WITH EXISTING PAVEMENT JOINTS UNLESS OTHERWISE SHOWN ON THE PLANS.

LONGITUDINAL WIDENING JOINT DETAIL



TRANSVERSE JOINT DETAIL

EXISTING CPCD TO NEW CPCD
PLAN VIEW (NOT TO SCALE)



TRANSVERSE EXPANSION JOINT DETAIL
AT BRIDGE APPROACH

SHEET 2 OF 2

Texas Department of Transportation

Design Division Standar

CONCRETE PAVEMENT DETAILS

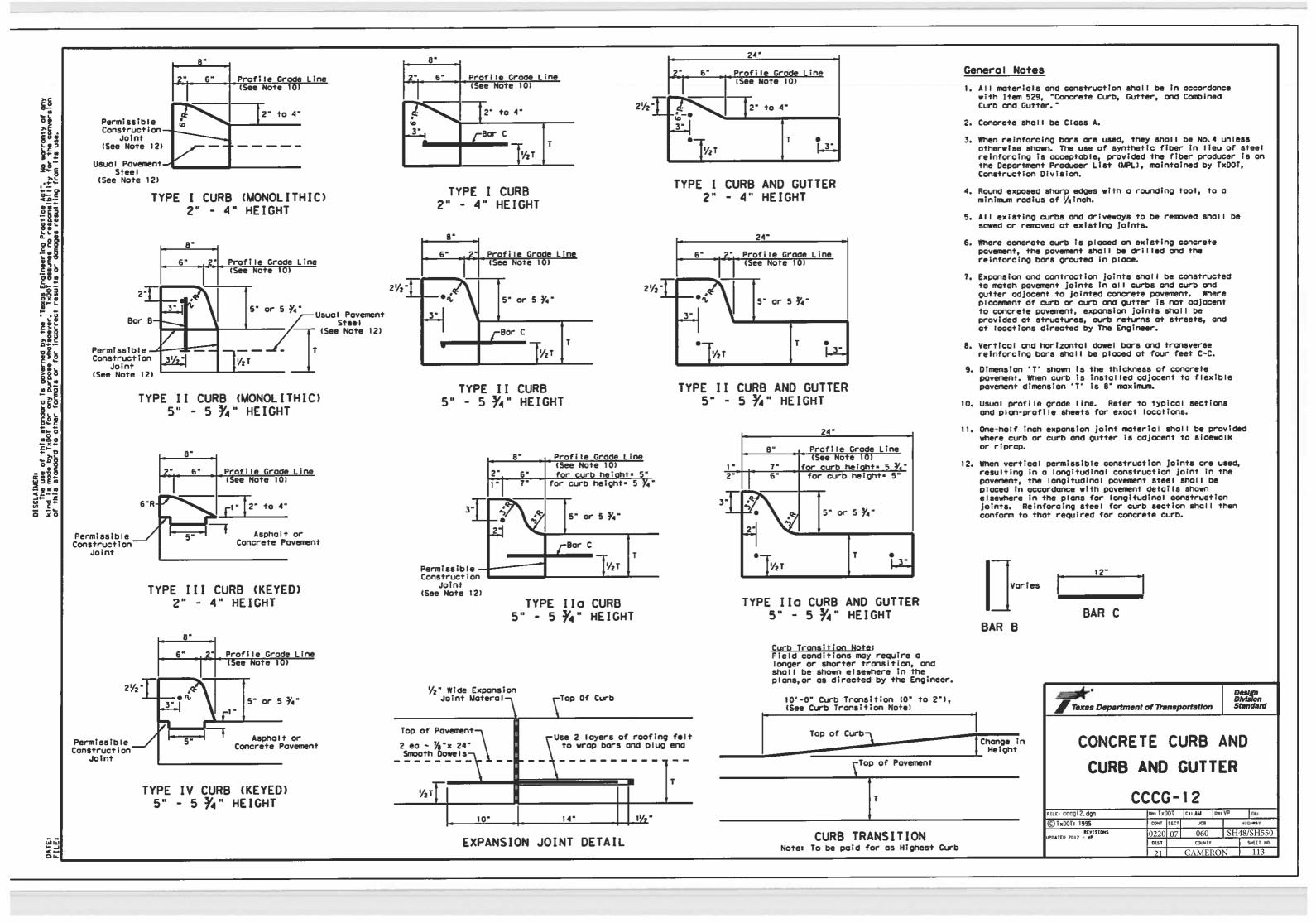
CONTRACTION DESIGN

T-6 to 12 INCHES

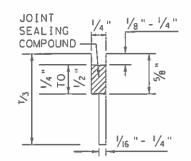
CPCD-14

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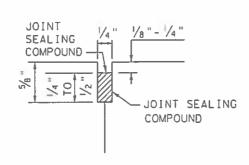
DATE



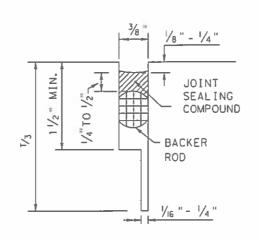
METHOD B: JOINT SEALING COMPOUND



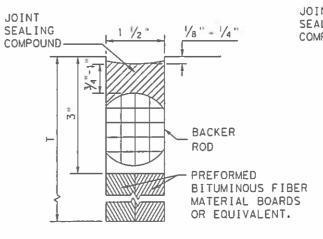
LONGITUDINAL SAWED CONTRACTION JOINT



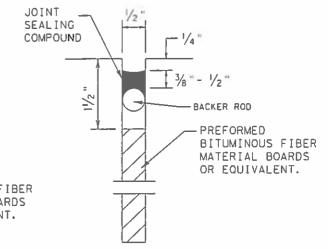
LONGITUDINAL OR TRANSVERSE CONSTRUCTION JOINT



TRANSVERSE SAWED CONTRACTION JOINT

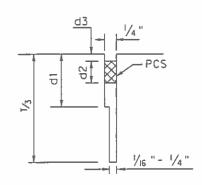


TRANSVERSE FORMED EXPANSION JOINT

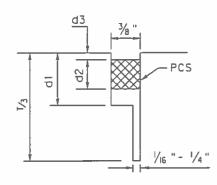


FORMED ISOLATION JOINT

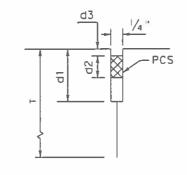
METHOD A: PREFORMED COMPRESSION SEALS (PCS) (DMS-6310 CLASS 6)



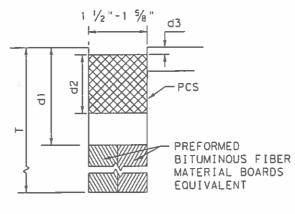
LONGITUDINAL SAWED CONTRACTION JOINT



TRANSVERSE SAWED CONTRACTION JOINT



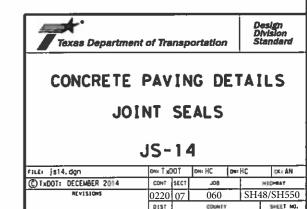
LONGITUDINAL CONSTRUCTION JOINT



TRANSVERSE FORMED EXPANSION JOINT

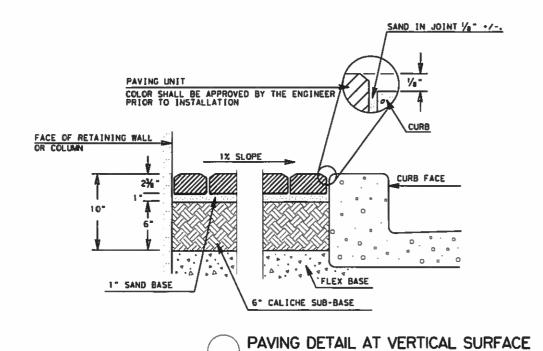
GENERAL NOTES

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

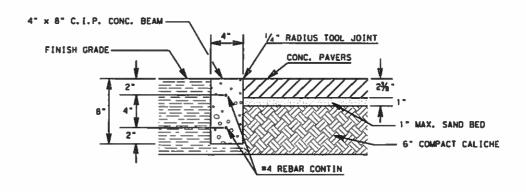


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N. T. S.



CONC EDGE & PAVER DETAIL

LANDSCAPE PAVERS DETAILS

NOTES:

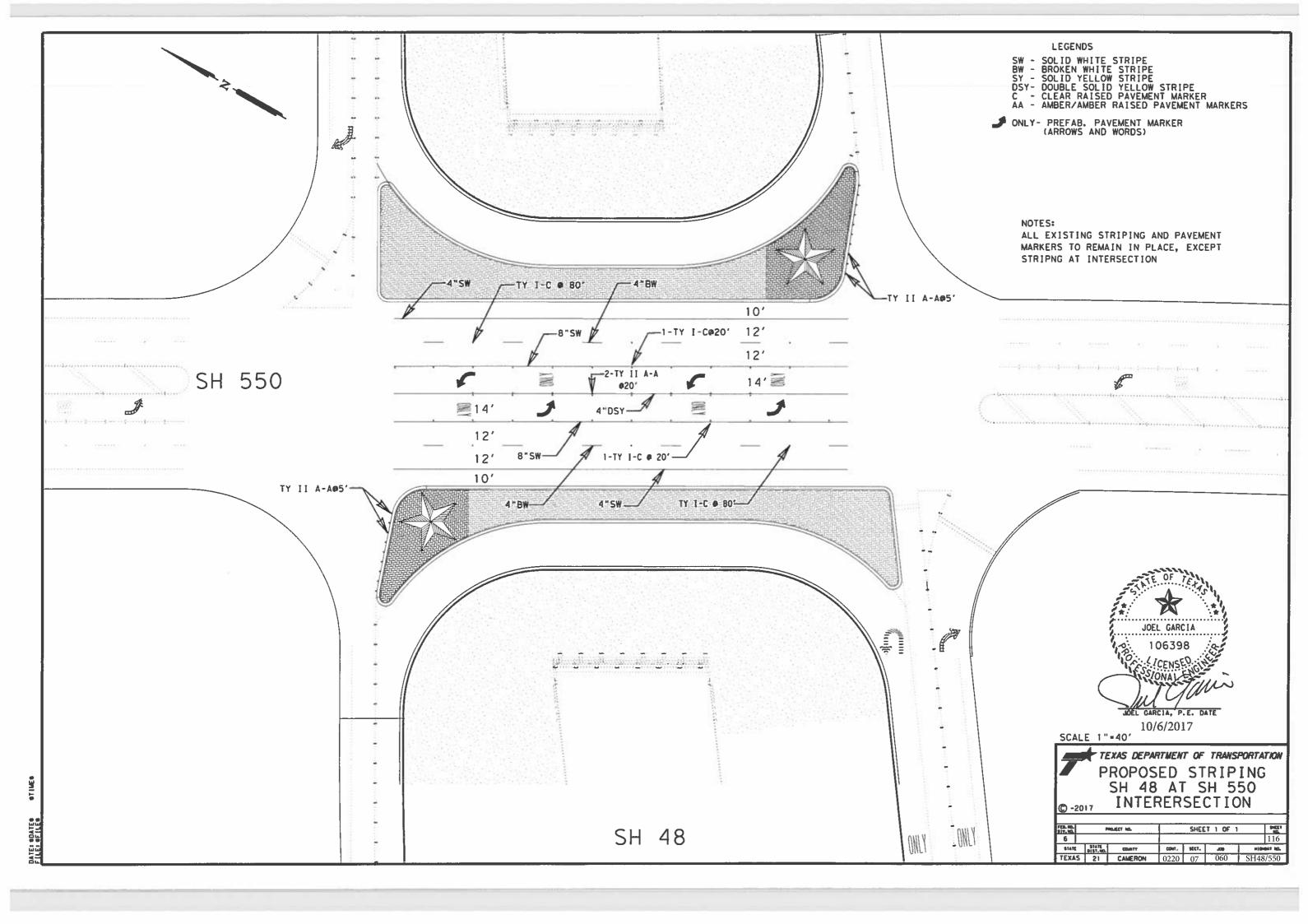
1. EDGE TREATMENT SHOULD BE AS STRAIGHT AS POSSIBLE TO COMPLIMENT THE ALIGNMENT OF PAVING STONES. 2. ALL EDGE TREATMENT MUST BE VERTICAL TO ALLOW CLOSE FIT OF PAVERS. 3. RELIEF TOOL FOR PAVER SIDE SHALL BE AS SMALL AS POSSIBLE (1/8").

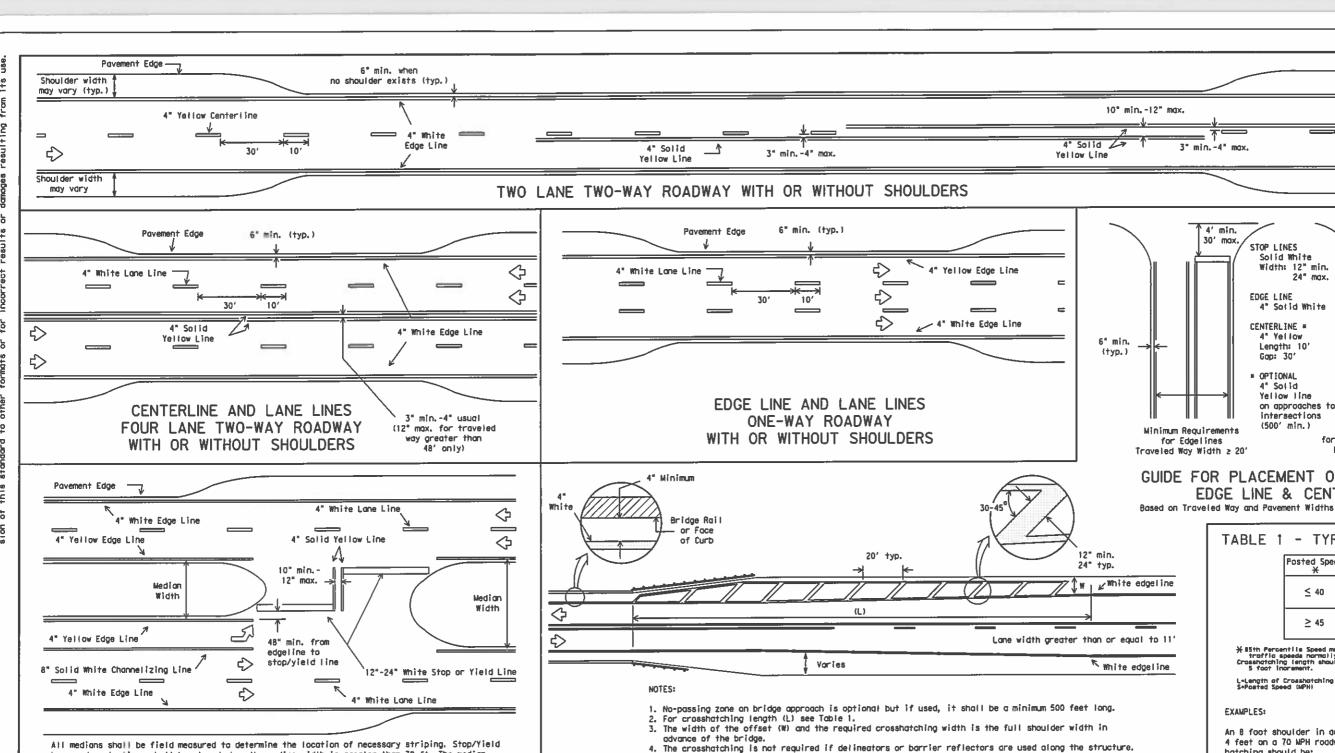
CALICHE SHALL MEET REQUIREMENTS AS SPECIFIED IN ITEMS 247 AND / OR 251.
ALL MATERAILS AND LABOR SHALL BE CONSIDERED SUBSIDIARY TO THE ITEM "LANDSCAPE PAVERS".



DISTRICT STANDARD LANDSCAPE PAVERS

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6						115
STATE	STATE DIST.NO.	COUNTY	CONT. SEC1	·	1	FY NO.
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All medians shall be field measured to determine the location of necessary striping. Stop/Yield bars and centerlines shall be placed when the median width is greater than 30 ft. The median width is defined as the area between two roadways of a divided highway measured from edge of traveled way to edge of traveled way. The median excludes turn lanes. The median width might be different between intersections, interchanges and of apposite approaches of the same intersection. The narrow median width will be the controlling width to determine if markings are required.

FOUR LANE DIVIDED ROADWAY INTERSECTIONS

GENERAL NOTES

- 1. Edgeline striping shall be as shown in the plans or as directed by the Engineer. The edgeline should typically be placed a minimum of 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edgelines are not required in ourb and gutter sections of roadways.
- 2. The traveled way includes only that portion of the roadway used for vehicular travel and not the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the inside of edgeline to inside of edgeline af a two lane roadway.

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

5. For guard fence details, refer elsewhere in the plans.

ROADWAYS WITH REDUCED SHOULDER

WIDTHS ACROSS BRIDGE OR CULVERT

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

3 to 12" FOR POSTED SPEED ON ROAD BEING MARKED EQUAL TO OR GREATER THAN 45 MPH

18. I \(\sum \) \(\s FOR POSTED SPEED ON ROAD BEING MARKED EQUAL TO OR LESS THAN 40 MPH

GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

24" max.

Based on Traveled Way and Pavement Widths for Undivided Highways

TABLE 1 - TYPICAL LENGTH (L)

♦

4' min.

30' max.

Minimum Requirements

for Centerlines without Edgelines

Pavement Width 16' ≤ W < 20'

Posted Speed *	Formula
≤ 40	L= WS 2
≥ 45	L=WS

L-Length of Crosshotching (FT.) W-Width of Offset (FT.)

- An 8 foot shoulder in advance of a bridge reduces to 4 feet on a 70 MPH roadway. The length of the cross-
- hatching should be: L = 8 x 70 = 560 ft.
- A 4 foot shoulder in advance of a bridge reduces to 2 feet on a 40 MPH roadway. The length of the crosshatching should be:
 - $L = 4(40)^2 / 60 = 106.67$ ft. rounded to 110 ft.



Texas Department of Transportation Traffic Operations Division

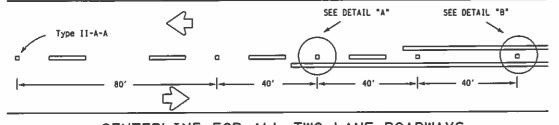
TYPICAL STANDARD PAVEMENT MARKINGS

PM(1) - 12

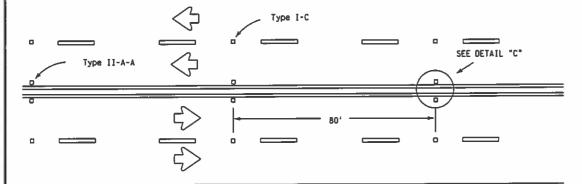
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YIELD LINES

REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

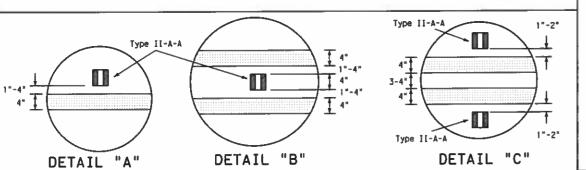


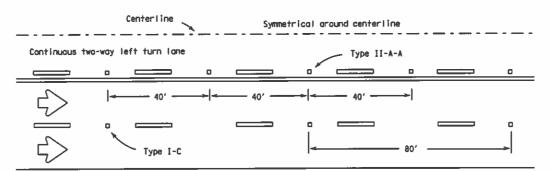
CENTERLINE FOR ALL TWO LANE ROADWAYS



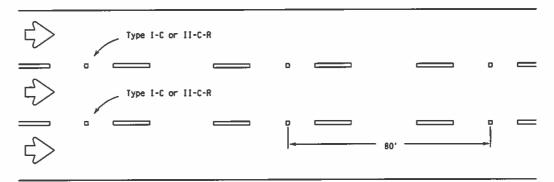
CENTERLINE & LANE LINES
FOR FOUR LANE TWO-WAY HIGHWAYS

Raised pavement marker Type I-C, clear face toward normal traffic, shall be placed on 80-foot centers.



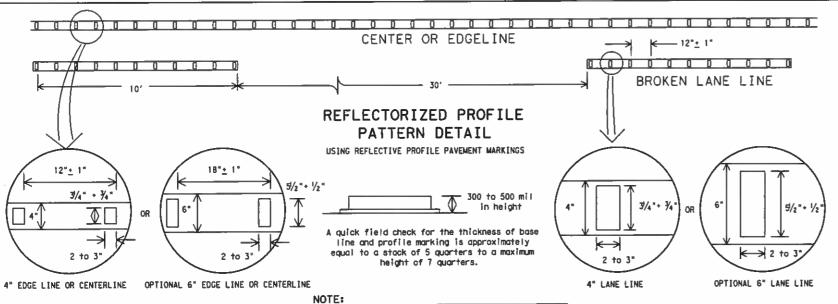


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



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

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



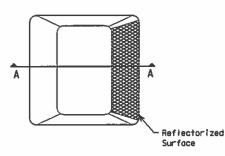
Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

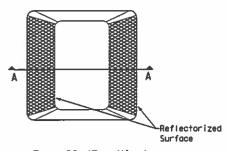
- All raised povement markers placed in broken lines shall be placed in line with and midway between the strines.
- On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

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

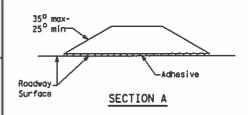
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



RAISED PAVEMENT MARKERS



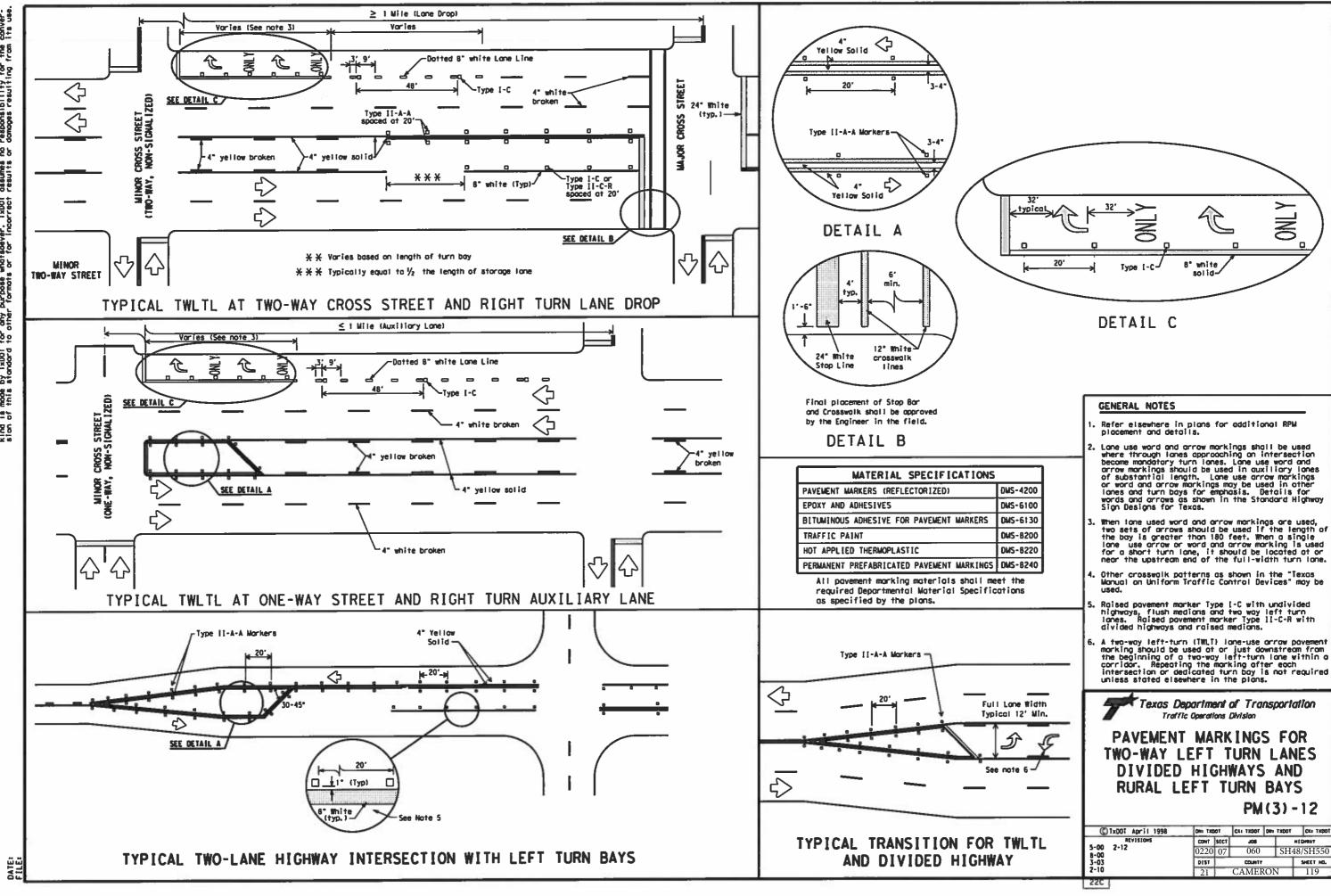
Texas Department of Transportation
Traffic Operations Division

POSITION GUIDANCE USING RAISED MARKERS REFLECTORIZED PROFILE MARKINGS

PM(2)-12

© TxDOT April 1977	DNS TXDOT		CRI TXDOT	DW: TXDOT		CK: TXDUT		
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PROPOSED

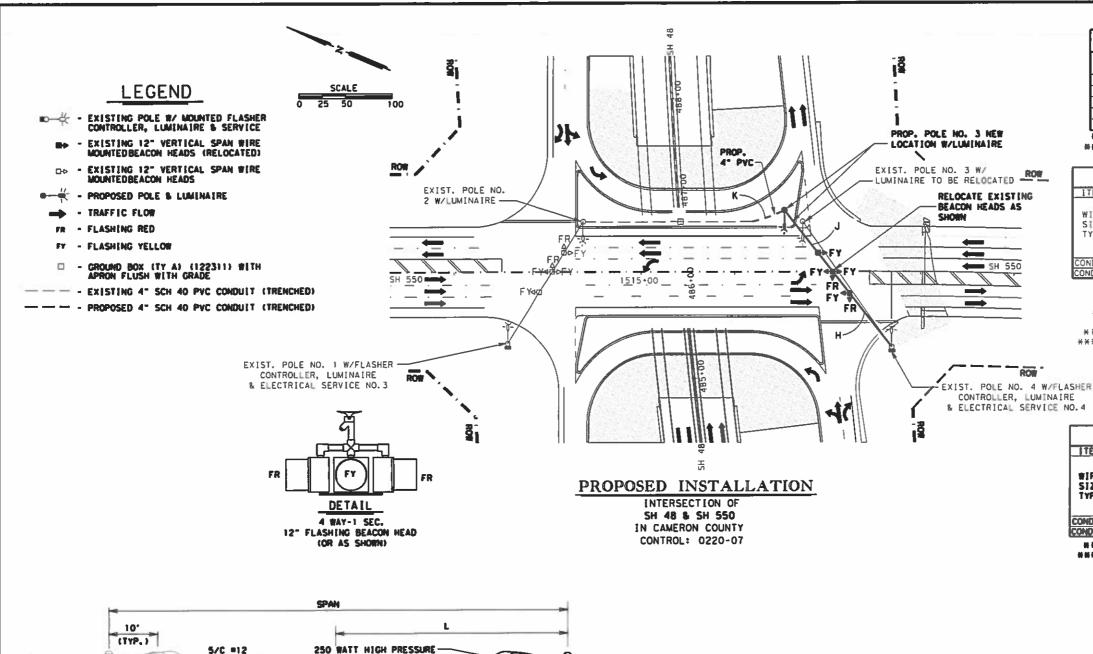
ITEM		SUMMARY OF TRAFFIC SIGNAL ITEMS CONTROL: 0220-07		SH 48 AT SH 550	TOTALS
		ITEM DESCRIPTION	UNIT		EST.
			\bot		
416	6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	15,2	15.2
618	6033	CONDT (PVC) (SCHD 40) (4")	LF	25	25
621	6005	TRAY CABLE (4 CONDR) (12 AWG)	LF	250	250
625	6003	ZINC-COAT STL WIRE STRAND 3/8"	LF	220	220
680	6001	INSTALL HWY TRF SIG (FLASH BEACON)	EA	1	1
684	6010T	RF SIG CBL (TY A) (12 AWG) (5 CONDR)	LF	155	155
686	6283	RELOC TRF SG PL AM (S) (STRAIN POLE)	EA	1	1



TEXAS DEPARTMENT OF TRANSPORTATION
TRAFFIC SIGNAL
ESTIMATES AND QUANTITIES

11/30/2017

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Den	06			STATE DIST. NO.	COUNTY CHERT SECTION AND		1404	er.			
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	STEEL STRAIN POLES									
POLE	QUANT [TY	POLE DESIGNATION	FOUNDATION TYPE	FOUNDATION DEPTH						
# 1	1	SPL 34 D-100	36-B							
# 2	1	SPL 34 D-100	36-B							
**3	1	SPL 34 D-100	36-B	15.2"						
# 4	1	SPL 34 D-100	36-B							
TOTAL										

EXISTING POLES TO REMAIN

** TO BE RELOCATED

E	EXISTING ELECTRICAL CHART									
ITEM	TOTAL	RUN NU	IMBER	Δ	В	C	0	E	F	G
	QTY.	RUN LENG		74'	1351	471	761	144'	47'	2351
WIRE	*24'	¤6 XHH₩_	INSUL							
SIZE	617'	4/C #12	TRAY	1	1	2	1	1	2	
TYPE	**20'	#8 BARE								
	3731	5/C #12_	Ţ		1 .	1		1	1	
	100	10								
CONDUIT		4 PVC								1
CONDUIT	***16°	4" PVC								

QUANTITIES SHOWN INCLUDE QUANTITIES IN POLES & SPAN WIRE. * LOAD CENTER/CONTROLLER SERVICE INTERCONNECT
** GROUND CONDUCTOR

*** 4" PVC IN FOUNDATION

PROPOSED ELECTRICAL CHART

CONDUIT ###4' 4" PVC

GROUND CONDUCTOR *** 4" PVC IN FOUNDATION

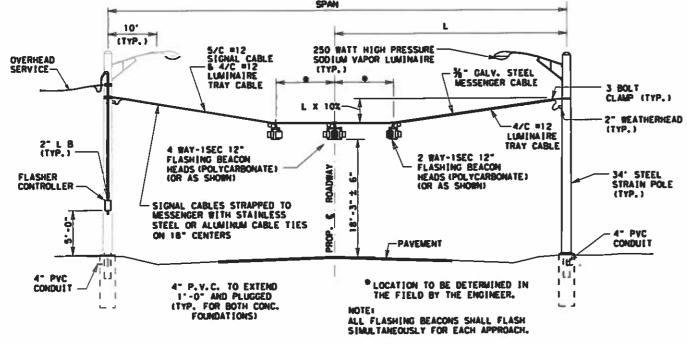


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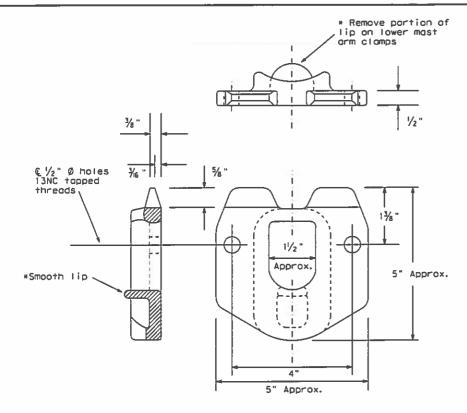
TEXAS DEPARTMENT OF TRANSPORTATION TRAFFIC SIGNAL SH 48 & SH 550 (MODIFICATIONS)

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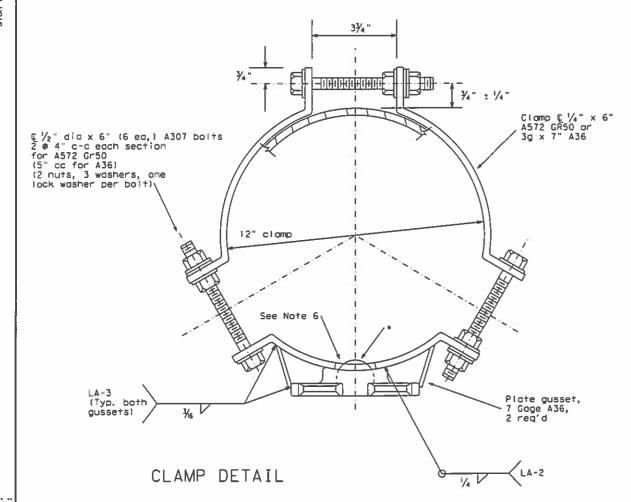
- 1. THE CONTRACTOR SHALL FURNISH & INSTALL LUMINAIRES, FLASHING BEACON HEADS, SIGNAL CABLES AND SPAN WIRE
- 2. THE CONTRACTOR SHALL INSTALL A NEW 34' STEEL STRAIN POLE.
- 3. THE LOCATIONS SHOWN FOR THE STEEL STRAIN POLE IS APPROXIMATE. THE EXACT LOCATION WILL BE DETERMINED IN THE FIELD BY THE ENGINEER IN COORDINATION WITH THE PHARR DISTRICT SIGNAL SHOP.
- 4. THE EXACT LOCATION OF ALL KNOWN UNDER-GROUND
 UTILITIES IS NOT CERTAIN. THE CONTRACTOR SHALL
 VERIFY THE LOCATION OF ANY UNDERGROUND UTILITIES
 BEFORE DRILLING FOR STEEL POLE FOUNDATIONS AND SERVICE POLES.
- 5. SIGNAL CABLE SHALL BE #12 AND AND SERVICE CABLE SHALL BE "6 ANG.
- 6. THE LUMINAIRES SHALL BE EQUIPPED WITH PHOTO ELECTRIC CELLS FOR THEIR OPERATION.



TYPICAL FLASHING BEACON INSTALLATION NOT TO SCALE



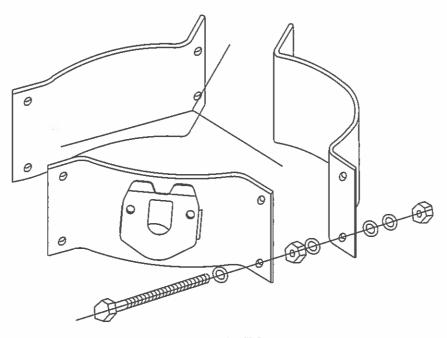
POLE SIMPLEX DETAILS



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

GENERAL NOTES:

- 1. Materials and fabrication shall be in accordance with Standard Sheet "MA-C" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. In the absence of specified fabrication tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.
- All parts shall be galvanized after fabrication in accordance with Item 445, "Galvanizing". The throat of the Simplex shall be made free of all rough or sharp edges resulting from the galvanizing process.
- 3. Each simplex fitting shall be supplied with 2 ASTM A325 bolts, ½in. X 1½in. and 2 lock washers. The bolts and lock washers shall be secured to the clamp with the other hardware items. The Fabricator shall ship clamp assembly together in a single package, including all bolts, nuts, and washers required for the clamp and simplex fitting.
- 4. Design conforms to 1994 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals" and interim revisions thereto. Design Wind Speed equals 80 mph plus a 1.3 gust factor. Clamps are designed to support a 60 lb. Luminaire having an effective projected area (actual area times drag coefficient) of 1.6 sq.ft.,12 ft. maximum arm length.
- Each assembly shall consist of one upper piece simplex fitting having a smooth lip and one lower piece simplex fitting with the lip removed.
- 6. Approximately 2 in. diameter hale in upper mast arm clamp.



PROJECTION

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



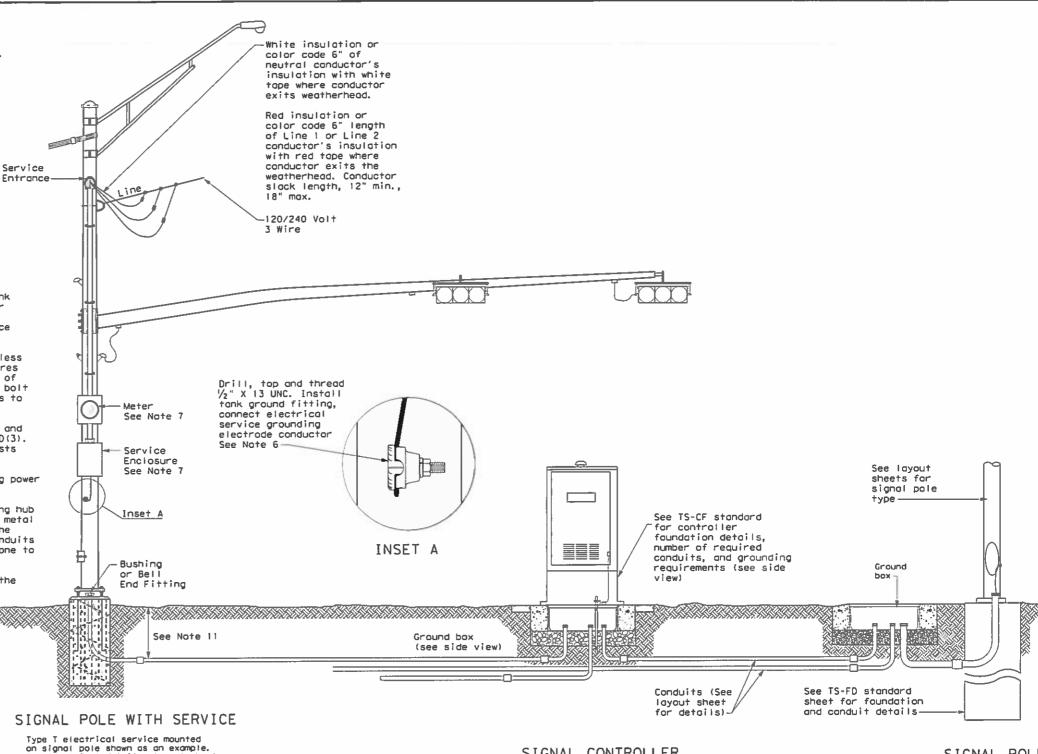
CLAMP ON FITTING ASSEMBLY FOR LUMINAIRE MAST ARM

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TRAFFIC SIGNAL NOTES

- 1. Do not pass luminaire conductors through the signal controller cabinet.
- Include an equipment grounding conductor in all conduits throughout the electrical system. Bond all exposed metal parts to the grounding conductor.
- Provide roadway luminaires, when required, in accordance with the material and construction sections of Item 610, "Roadway Illumination Assemblies," except for performance testing of luminaires. Test installed roadway luminaires for proper operation as a part of the associated traffic signal system test.
- 4. If internally illuminated street name signs are approved for use, ground the fixture to the pole with a 12 AWG green XHHW conductor.
- 5. Bond anchor bolts to rebar cage in two locations using #3 bars or 6 AWG stranded copper conductors. Use listed mechanical connectors rated for embedment in concrete. See TXDOT standard TS-FD for further
- 6. Drill and tap signal poles for ½ in, X 13 UNC tank ground fitting. Provide and install tank ground fitting 4 in, to 6 in, directly below electrical service enclosure. Provide properly sized hole through the bottom of the enclosure for the service grounding electrode conductor. Connect the electrical service grounding electrode conductor to the tank ground fitting. Ensure electrical service grounding electrode conductor is as short and straight as possible from the enclasure to the tank ground fitting. See Inset A detail for further information. Size service entrance conduit and branch circuit conduit as shown in the plans.
- Mount electrical service enclosure and meter to signal pole with stainless steel bands. Ensure bands are a minimum width of Y_4 in. Secure enclosures to bands using two-bolt brackets. Install brackets near top and bottom of each enclosure. Install properly sized stainless steel washers on each bolt in the enclosure. Band or drill and tap properly sized stand-off straps to signal pale for attaching conduit.
- Conduct pull tests and insulation resistance tests on all illumination and power conductors as required in Item 620 "Electrical Conductors" and ED(3). To prevent electronics damage, do not conduct insulation resistance tests on traffic signal cables after termination.
- 9. Lock all enclosures and bolt down all around box covers before applying power to the signal installation.
- Terminate conduits entering the top of enclosures with a conduit-sealing hub or threaded boss such as meter hub. Install a grounding bushing on all metal conduits not connected to conduit-sealing hub or threaded boss. Bond the grounding bushing to the ground bus with a bonding jumper. Seal all conduits entering enclosures with duct seal or expanding foam. Do not use silicone to seal conduit ends.
- 11. For all conduits, ensure the burial depth is a minimum of 18". Ensure the minimum burial depth for conduit placed under a roadway is 24".



See electrical details, layout sheets, and electrical service data chart for additional details.

SIGNAL CONTROLLER FRONT VIEW

SIGNAL POLE

Texas Department of Transportation

ELECTRICAL DETAILS TYPICAL TRAFFIC SIGNAL SYSTEM DETAILS

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SIGNAL CONTROLLER SIDE VIEW

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

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.
- 2. Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC), TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA), and are listed by Underwriters Edboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association (CSA), Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Where reference is made to NEMA listed devices, International Electrotechnical Commission (IEC) listed devices will not be considered an acceptable equal to a NEMA listed device. Acceptable devices may have both a NEMA and IEC listing. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection. Replace or reinstall rejected material or equipment at no additional cost to the Department.
- 3. Miscellaneous nuts, bolts and hardware, except for high strength bolts, may be stainless steel when plans specify galvanized, provided the balt size is $\frac{1}{2}$ in. or less in diameter.
- 4. Provide the following test equipment as required by the Engineer to confirm compliance with the contract and the NEC: voltmeter, ammeter, megahm meter (1000 volt DC), ground resistance tester, torque wrenches, and torque screwdrivers. Ensure all equipment has been properly calibrated within the last year. Provide calibration certification to the Engineer upon request. Operate test equipment during inspection as requested by the Engineer.
- 5. Install grounding as shown on the plans and in accordance with the NEC. Ensure all metallic conduits; metal poles; luminaires; and metal enclosures are bonded to the equipment grounding conductor. Provide stranded bare copper or green insulated grounding conductors. Ground rods, connectors, and bonding jumpers are subsidiary to the various bid items.
- 6. When required by the Engineer, notify the Department in writing of materials from the Material Producers List (MPL) intended for use on each project. Prequalified materials are listed on the MPL on TxDOT's website under "Roadway Illumination and Electrical Supplies." No substitutions will be allowed for materials on this list.

CONDUIT

A. MATERIALS

- 1. Provide conduit, junction boxes, fittings, and hardware as per TxDOT Departmental Material Specification (DMS) 11030 "Conduit" and Item 618 "Conduit" of TxDOT's "Standard Specifications For Construction And Maintenance Of Highways, Streets, And Bridges," latest edition. Provide conduits listed under Item 618 on the MPL under "Roadway Illumination and Electrical Supplies." Provide conduit types according to the descriptive code or as shown on the plans. Do not substitute other types of conduits for those shown. Provide liquidtight flexible metal conduit (LFMC) when flexible conduit is called for an galvanized steel rigid metallic conduit (RMC) systems. Provide liquidtight flexible nonmetallic conduit (LFNC) when flexible conduit is called for an polyvinyl chloride (PVC) systems.
- Provide galvanized steel RMC for all exposed conduits, unless otherwise shown on the plans. Properly bond all metal conduits.
- 3. Unless otherwise shown on the plans, provide junction boxes with a minimum size as shown in the following table, which applies to the greatest number of conductors entering the box through one conduit with na 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" × 8" × 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" × 8" × 4"	8" x 8" x 4"	10" × 10" × 4"
#8	8" x 8" x 4"	8" × 8" × 4"	8" × 8" × 4"

- 4. Junction boxes with an internal volume of less than 100 cu. in. and supported by entering raceways must have threaded entries or hubs identified for the intended purpose and supported by connection of two or more rigid metal conduits. Secure conduit within 3 ft. of the enclosure or within 18 in. of the enclosure if all conduit entries are on the same side. Mechanically secure all junction boxes with an internal volume greater than 100 cu. inches.
- Provide hat dipped galvanized cast iron or sand cast aluminum outlet boxes for junction boxes containing only 10 AWG or 12 AWG conductors. Do not use die cast aluminum boxes. Size outlet boxes according to the NEC.
- 6. Do not use intermediate metal conduit (IMC) or electrical metallic tubing (EMT) unless specifically required by the plan sheets. When EMT is called for, provide junction boxes made from galvanized stee! sheeting, listed and approved for outdoor use, unless otherwise noted on the plans. Size all galvanized steel junction boxes in accordance with the NEC. Provide junction boxes for IMC conduit systems that meet the same requirements for junction boxes used with RMC systems.
- 7. Provide PVC junction boxes intended for outdoor use on PVC conduit systems, unless otherwise noted on the plans.

- 8. Provide PVC elbows in PVC conduit systems, unless otherwise shown on the plans. Use only a flot, high tensile strength polyester fiber pull tape for pulling conductors through the PVC conduit system. When galvanized steel RMC elbows are specifically called for in the plans and any portion of the RMC elbow is buried less than 18 in., ground the RMC elbow by means of a grounding bushing on a rigid metal extension. Grounding of the rigid metal elbow is not required if the entire RMC elbow is encased in a minimum of 2 in. of concrete. PVC extensions are allowed on these concrete encased rigid metal elbows. RMC or PVC elbows are subsidiary to various bid items.
- 9. When required, provide High-Density Polyethylene (HDPE) conduit with factory installed internal conductors according to Item 622 "Duct Cable." At the Contractor's request and with approval by the Engineer, substitute HDPE conduit with no conductors for bared schedule 40 or schedule 80 PVC conduit bid under Item 618. Ensure bared 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 canduit to PVC (or RMC elbow when required) at the bare pit. Provide conduit of the size and schedule as shown on the plans. Do not extend substituted conduit into ground boxes or foundations. Provide PVC or galvanized steel RMC elbows as called for at all ground boxes and foundations.
- 10. Use two-hole straps when supporting 2 in. and larger conduits. On electrical service poles, properly sized stainless steel or hot dipped galvanized one-hole standoff straps are allowed on the service riser conduit.

B. CONSTRUCTION METHODS

- 1. Provide and install expansion joint conduit fittings on all structure-mounted conduits at the structure's expansion joints to allow for movement of the conduit. In addition, provide and install expansion joint fittings on all continuous runs of galvanized steel RMC conduit externally exposed on structures such as bridges at maximum intervals of 150 ft. When requested by the project Engineer, supply manufacturer's specification sheet for expansion joint conduit fittings. Repair or replace expansion joint fittings that do not allow for movement at no additional cost to the Department. Provide the method of determining the amount of expansion to the Engineer upon request. Do not use LFMC or LFNC as a substitute for the required expansion conduit fittings.
- 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.
- 4. Unless otherwise shown on the plans, jack or bore conduit placed beneath existing roadways, driveways, sidewalks, or after the base or surfacing operation has begun. Backfill and compact the bore pits below the conduit per Item 476 "Jacking, Boring, or Tunneling Pipe or Box" prior to installing conduit or duct cable to prevent bending of the connections.
- 5. When placing conduit in the sub-grade of new roadways, backfill all trenches with excavated material unless otherwise noted on the plans. When placing conduit in the sub-base of new roadways, backfill all trenches with cement-stabilized base as per requirements of Items 110 "Excavation", 400 "Excavation and Backfill for Structures", 401 "Flowable Backfill", 402 "Trench Excavation Protection", and 403 "Temporary Special Sharing."
- 6. Provide and place warning tape approximately 10 in. above all trenched conduit as per Item 618.
- 7. During construction, temporarily cap or plug open ends of all conduit and raceways immediately after installation to prevent entry of dirt, debris and animals. Temporary caps constructed of durable duct tape are allowed. Tightly fix the tape to the conduit opening. Clean out the conduit and prove it clear in accordance with Item 618 prior to installing any conductors.
- 8. Ensure conduit entry into the top of any enclosure is waterproof by installing conduit sealing hubs or using boxes with threaded bosses. This includes surface mounted safety switches, meter cans, service enclosures, auxiliary enclosures and junction boxes. Grounding bushings on water tight sealing hubs are not required.
- Fit the ends of all PVC conduit terminations with bushings or bell end fittings. Provide and install a grounding type bushing on all metal conduit terminations.
- 10. Install a bonding jumper from each grounding bushing to the nearest ground rod, grounding lug, or equipment grounding conductor. Ensure all bonding jumpers are the same size as the equipment grounding conductor. Bonding of conduit used as a casing under roadways for duct cable is not required, if the duct extends the full length through the casing.
- 11. At all electrical services, install a 6 AWG solid copper grounding electrode conductor.
- 12. Place conduits entering ground boxes so that the conduit openings are between 3 in. and 6 in. from the bottom of the box. See the ground box detail on sheet ED(4).
- 13. Seal ends of all conduits with duct seal, expandable foom, or by other methods approved by the Engineer. Seal conduit immediately after completion of conductor installation and pull tests. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a conduit sealant.
- 14. File smooth the cut ends of all mounting strut and conduit. Before installing, paint the field cut ends of all mounting strut and RMC (threaded or non-threaded) with zinc rich paint (94% or more zinc content) to alleviate overspray. Use zinc rich paint to touch up galvanized material as allowed under Item 445 "Galvanizing." Do not paint non-galvanized material with a zinc rich paint as an alternative for materials required to be galvanized.

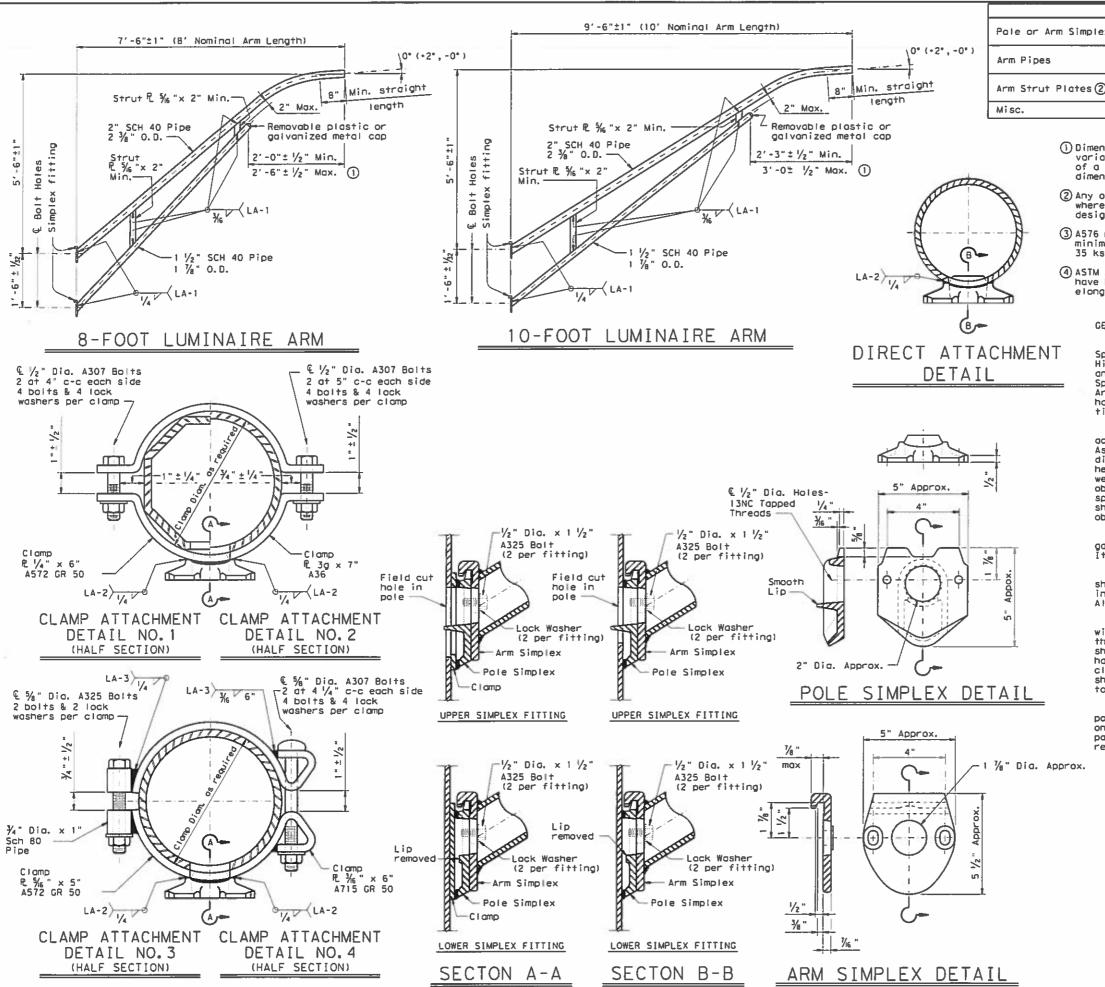


ELECTRICAL DETAILS CONDUITS & NOTES

Traffic

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- (1) Dimensional limits are given to show acceptable variation in design. All of a Fabricator's production of a particular arm length shall have the same dimensions within specified tolerances.
- ② Any of the materials listed for plates may be used where the drawings do not specify a particular ASTM designation.
- 3 A576 must be suitable for forging and also meet minimum tensile strength of 65 ksi, minimum yield of 35 ksi, and elongation in 2 inches of 22 percent.
- (4) ASTM A572, A1008 HSLAS-F, and A1011 HSLAS-F may have higher yield strengths but shall not have less elongation than the grade indicated.

GENERAL NOTES:

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

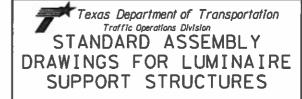
Materials and fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. In the absense of specified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

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

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

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

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



ARM DETAILS

LUM-A-12

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ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

- 1. Provide Type XHHW insulated conductors in accordance with Departmental Material Specification (DMS)11040 "Conductors" and Item 620 "Electrical Conductors." Provide conductors as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies" Item 620. Color cade 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 (hat) 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. Cannect 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.
- Leave 2 ft. minimum, 3 ft. maximum length for each conductor up to the splice in ground baxes. Leave 3 ft. minimum, 4 ft. maximum length of conductor in ground baxes 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.
- Size and install gel-filled insulating splice covers according to monufacturer's specifications when used in place of heat shrink tubing.
- Wire nuts with factory applied waterproof sealant may be used for 8 AWG or smaller conductors in above ground junction baxes, but not in pole bases or ground baxes. 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.
- 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.
- Replace conductors and cables that are damaged beyond repair or that fail an insulation resistance test at no additional cost to the department.
- 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 canductors 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 cannectors 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

- 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.
- 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 lawest paint. Ground messenger wires that support power conductors in conformance with the NEC.
- Protect and when necessary repair any existing electrical conduits uncovered during the construction process in a timely manner and in conformance with the NEC.

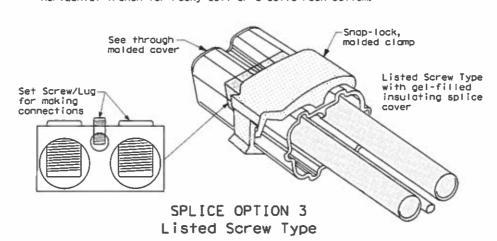
GROUND RODS & GROUNDING ELECTRODES

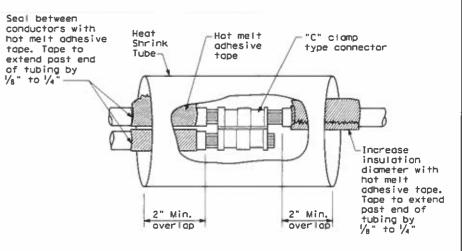
A. MATERIAL INFORMATION

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.

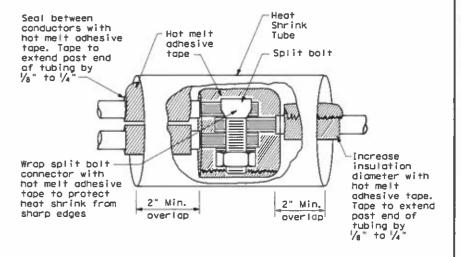
B. CONSTRUCTION METHODS

- Furnish auxiliary ground rads for lightning protection and install in soil, concrete, or both, as called for in the plans. Far ground rads installed in concrete, ensure the connection of the conductor to the ground rad is readily accessible for inspection or repairs. Far ground rads 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 hale as a timber pole.
- Install ground rods so the imprinted part number is at the upper end of the rod.
- Remove all non-conductive coatings such as concrete splatter from the rod at the clamp location.
- 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.
- Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.

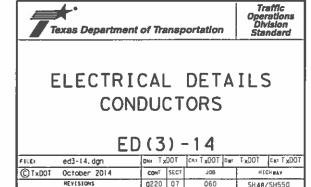




SPLICE OPTION 1 Compression Type



SPLICE OPTION 2 Split Bolt Type



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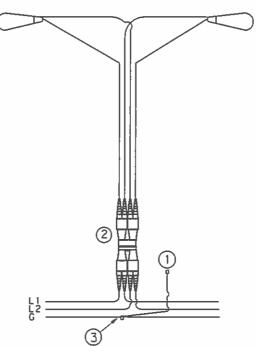
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ROADWAY ILLUMINATION ASSEMBLY NOTES

- Details apply to roadway lighting installations bid or referenced under Item 610, "Roadway Illumination Assemblies."
 Provide, furnish, and install all other materials not shown on the plans which may be necessary for complete and proper
 construction. Where manufacturers provide warranties or guarantees as a customary trade practice, furnish to the State
 such warranties or guarantees.
- 2. The locations of poles and fixtures may be shifted by the Engineer to accommodate local conditions. Install or remove poles and luminaires located near overhead electrical lines using established industry and utility safety practices and in accordance with laws governing such work. Consult with the appropriate utility company prior to beginning such work.
- 3. 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 Laborataries (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association, Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection.
- 4. Provide Roadway Illumination Light Fixtures as per TxDOT Departmental Material Specification (DMS) 11010, Item 610, and as shown on the Material Producers List (MPL) for Roadway Illumination and Electrical Supplies.
- 5. Fabricate steel roadway illumination poles in accordance with Roadway Illumination Poles (RIP) standards and Item 610. Poles fabricated according to RIP standards do not require shop drawing submittals.
 - a. Alternate designs to RIP standards or the use of aluminum to fabricate poles will require the submission of shop drawings electronically. For instructions on submitting shop drawings electronically see "Guide to Electronic Shop Drawing Submittal" on the TxDOT web site.
 - b. Limitations on use of the RIP standard: The RIP standard details were developed for installations in locations where the 3-second gu5t basic maximum wind speed is 110 mph, and where the elevation of the base of the pole is less than (i.e. not more than) 25' above the elevation of the surrounding terrain, in accordance with the "AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals," 4th Edition (2001) (AASHTO Design Specifications). For poles to be installed in regions where the maximum basic wind speed exceeds 110 mph or to be mounted more than 25' above the surrounding terrain, provide poles meeting the following requirements:
 - i. Submittals. Following the electronic shop drawing submittal process (see Guide to Electronic Shop Drawing Submittal on the TxDOT web site), submit to the Engineer for approval fabrication drawings and calculations for the pales, sealed by a Texas licensed professional engineer (P.E.).
 - ii. Luminaire Structural Support Requirements. Provide light poles, arms, and anchor bolt assemblies with a 25 year design life to safely resist dead loads, ice loads and the required basic wind speeds at the location of installation in accordance with the 6th edition (2013) of the AASHTO Design Specifications. For transformer base poles, include transformer base and connecting hardware in calculations and shop drawing submittals. Structurally test all transformer bases to resist the theoretical plastic moment capacity of the pole. Submit certification of the plastic moment load test and FHWA breakaway requirement test of the model of base being furnished with the shop drawings. Show breakaway base model number, manufacturer's name, and logo on shop drawings. Include on manufacturer's shop drawings the ASTM designations for all materials to be used.
- 6. For both transformer and shoe-base type illumination poles, provide and install double-pole breakaway fuse holders as specified by DMS-11040. Breakaway fuse holders are listed on the MPL for Roadway Illumination and Electrical Supplies under Items 610 & 620. Provide 10 amp time delay fuses for breakaway connectors in light poles, or inside the light fixture for underposs luminaires. In each pole, connect luminaires to the breakaway connector with continuous stranded 12 AWG capper conductors as listed on the MPL. Bond all equipment grounding conductors together and to the ground lug in the transformer base or hand hole.
- 7. Tighten anchor bolts for shoe base, concrete traffic barrier base, and bridge mount roadway illumination poles, in accordance with Item 449.
- 8. Install T-Base with following procedure:
 - a. Anchor Bolt Tightening.
 - i. Coat the threads of the anchor bolts with electrically conductive lubricant.
 - ii. Place the T-base over the anchor bolts. Foundation must be level and flat. The maximum permissible gap under any one corner of the t-base is 1/8" before nuts are tightened.
 - iii.Coat the bearing surfaces of the nuts and washers with electrically conductive lubricant. Install (1) 1/2" hold down washer, (1) lock washer, and (1) nut on each anchor bolt. Turn the nuts onto the bolts so that each is hand-tight against the washer.
 - iv. Using a tarque wrench, tighten each nut to 150 ft-1b. Uniform contact is required between the foundation and the T-base in the corner regions of the T-base, and all corner gaps must be closed after applying torque. If a gap still exists after torquing to 150 ft-1bs, continue torquing each bolt incrementally until gap is closed or maximum allowable torque of 250 ft. pound is reached, whichever comes first. If 250 ft-1bs is not enough to close the gap the foundation must be leveled. Gaps along the straight sides of the T-bases and the foundation are permissible. Ensure that no high point of contact occurs between the straight sides of the T-base and the foundation.
 - v. Check top of T-base for level. If not level then foundation must be leveled.
 - b. Top Bolt Procedure
 - Erect pole over T-base with crane. Coat bolts, nuts, washers, and lock washers with electrically conductive lubricant.

- ii. Install bolts and 1/2" connecting washers from the inside of the T-base, thread up through the pale base. Install flat washers, lock washers and nuts snug tight according to Item 447, "Structural Boltina."
- iii. Tighten each nut to 150 ft-1b. using a torque wrench.
- c. Level and Plumb
 - Ensure pole is plumb and most arm is perpendicular to the roadway according to plans to within 5 degrees.
- 9. Construct luminaire pole foundations in accordance with Item 416, "Drilled Shaft Foundations," and TxDOT standard sheet RID(2).
- Provide and install underpass luminaires in accordance with Item 610, DMS-11010, and TxDOT standard sheet RID(3). Typical luminaire size for underpass luminaires is 150W HPS or 150W EQ LED.
- 11. Mount luminaires on arms level as shown by the luminaire level indicator.
- 12. Orient luminaires perpendicular to the roadway intended to be lit unless otherwise shown on the plans.



L1, L2 = Hot Conductors G = Grounding Conductor

TYPICAL WIRING DIAGRAM

LUMINAIRES SERVED AT 480V ON 240/480 VOLT SERVICE OR LUMINAIRES SERVED AT 240V FOR 120/240 VOLT SERVICE.

NOTES:

- Use 1/2 in.-13 UNC threaded, copper or tin-plated copper, pole bonding connector, sized appropriately for conductors, bonded to T-base, or use ground lug in handhole as available.
- Use pre-qualified two-pole breakaway connectors for all luminaire pole installations. For luminaires fed by a circuit with a neutral conductor, use double pole breakaway connectors with the neutral side unfused and marked white.
- (3) Split Bolt or other connector.

Texas Department of Transportation

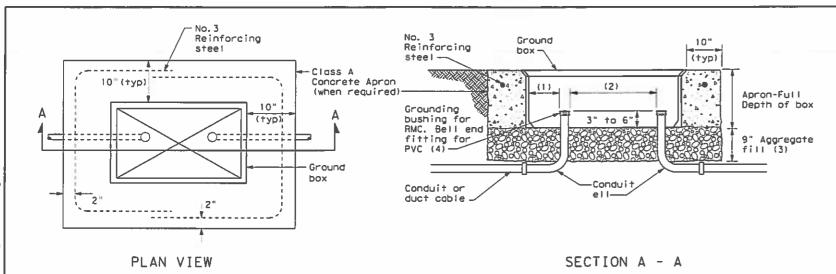
Traffic Operations Division Standard

ROADWAY
ILLUMINATION
DETAILS

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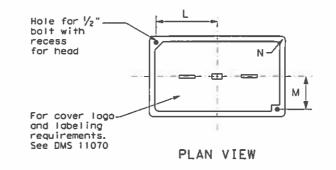


APRON FOR GROUND BOX

- (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 bax, 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.

GROL	GROUND BOX DIMENSIONS										
TYPE	OUTSIDE DIMENSIONS (INCHES) (Width x Length X Depth)										
Α	12 X 23 X 11										
В	12 X 23 X 22										
С	16 X 29 X 11										
D	16 X 29 X 22										
E	12 X 23 X 17										

	GROL	JND B	ох со	VER D	IMENS	IONS		
TYPE DIMENSIONS (INCHES)								
l life	Н	I	J	К	L	М	N	₽
A, B & E	23 1/4	23	13 ¾	13 1/2	9 %	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 ¾	1 3/8	2

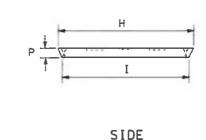


GROUND BOX COVER

END

GROUND BOXES A. MATERIALS

- 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
- 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 bax. Ground box aprons, including concrete and reinforcing steel, are subsidiary to ground boxes when called for by descriptive code.
- 3. Keep bolt hales in the box clear of dirt. Balt covers down when not working in ground
- 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 coulk 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 hale 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.



ELECTRICAL DETAILS GROUND BOXES

Texas Department of Transportation

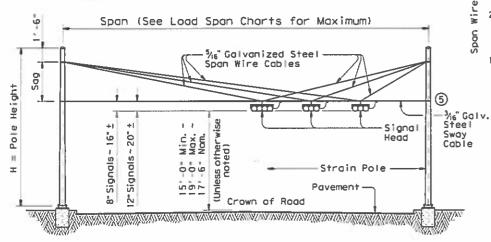
Traffic Operations Division Standard

ED(4) - 14

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	+		
STRAIN POLE DESCRIPTION	Pole Type	Found- ation Type	Maximum Permissible Span Wire Load (1bs.)
26' Pole	A	36-A	4900
30' Pole	8	36-A	4300
30' Pole with Lum.	В	36-A	4000
30' Pole with 20' Most Arm	С	36-8	4400
30' Pole with 24' Most Arm	С	36-B	4000
30' Pole with 28' Most Arm	С	36-B	3600
30' Pole with 32' Most Arm	С	36-B	3300
30' Pole with 36' Mast Arm	С	36-B	2900
30' Pole with 20' Most Arm & Lum.	С	36-B	4100
30' Pole with 24' Mast Arm & Lum.	C	36-B	3800
30' Pole with 28' Mast Arm & Lum.	С	36-B	3400
30' Pole with 32' Mast Arm & Lum.	C	36-B	3000
30' Pole with 36' Mast Arm & Lum.	С	36-B	2500
34' Pole	D	36-B	5200
34' Pole with Lum.	D	36-B	4900

2 Numbers on Load Span Charts indicate the number of signal heads on the span. The total span wire design load is based on one 5-section head and one or more additional 3-section head(s). Design wind pressures on cables are assumed as 1.6 lb/ft. Weight of span wire cables (one per signal head) is assumed as 0.65 lb/ft which includes an allowance for conductor cables and miscellaneous hardware. The effect of the sway cable on load distribution is ignored as it is assumed to break at design wind conditions. When a pole supports 2 spans, the span wire design loads for both spans should be added vectorially to determine the design load for that pale.



STRAIN POLE ELEVATIONS HORIZONTAL SIGNALS

Max. Span = 130' (8" or 12" Lens) 3

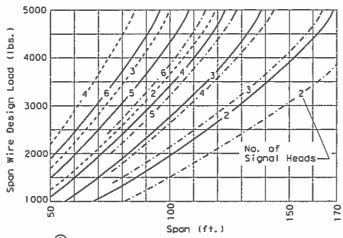
Max. Span = 90' (8" or 12" Lens) 3 Pole B Min. Sag = 6'-0" % Galvanized Steel Spon Wire Cobles 3 Load Span Charts do not apply Steel Sway Vertical Signal Signals ~ 4' Max. Nom. Heads ~ 8 Total Sway Cable is to be snugly Strain Pole 000 tightened after all signal heads Sign Pavement: are adjusted

Crown of Road to height with

STRAIN POLE ELEVATIONS VERTICAL SIGNALS

5000 4000 g 3000 Signal Heads 1000 50 Span (ft.)

SIGNALS WITH 12-INCH LENS



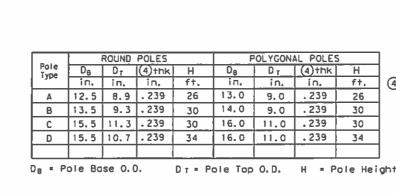
©SIGNALS WITH 8-INCH LENS

Signal Head Type	Wt. Per Head	Wind Area �
5-Section, 12" Lens	125 lbs	9.6 sq. ft.
5-Section, 8° Lens	70 lbs	4.8 sq. ft.
3-Section, 12" Lens	75 lbs	5.64 sq. ft.
3-Section, 8" Lens	45 lbs	3.0 sq. ft.

♠ Effective projected design wind area (actual area times drag coefficient)

------Sag = 4'-6" (26' or 30' Pole) — Sag = 8'-0" (30' or 34' Pole)

Pole D Min. Sag = 9'-0"



ft. 4 Thickness shown are minimum, 26 thicker materials 30 may be used. 30

Anchor Bolt Assemblies (1 per pole)

Bolt.

Length

3'-10"

4'-3"

34

Templates may be removed

Quantity

for shipment.

SHIPPING PARTS LIST (Without Traffic Signal Arm) Strain pales with Luminaire Strain poles without Luminaire Ship each pole with the following Ship each pole with the following hardware attached: hardware attached: handhale at base, pole cap and handhole at base, pole cap, 2 clamp-on Type simplex and I pipe plug. Description Designation Quantity Description Designation Quantity A 26' Stroin Pole SP 26 A-100 SP 30 B-100 ₿ 30' Strain Pole SPL 30 B-100 30' Strain Pale D SPL 34 D-100 SP 34 D-100 34' Strain Pole 34' Strain Pole

ш	. 1					<u>!</u>				
ľ	Poles	(With Traffic Si	gnal Arm)							
		Strain poles v	with Luminaire		Strain poles without Luminaire					
	Pole Type	hardware attached	, pole cap, clamp		Ship each pole with the following hardware attached: handhale at base, pole cap and 3 pipe plugs.					
		Description	Designation	Quantity	Description	Designation	Quantity			
							27			
	С	30' SPw/TS Arm	SPL 30 C-100		30' SPw/TS Arm	SP 30 C-100				
						1				

Traff	ic Signal Arı	ns (For Type	C poles)					
	Type [Arm (1 Signal)	Type II Arm	(2 Signals)	Type III Arm (3 Signals)			
Nominal Arm Length	Ship each Typ the following attached: 2 CGB Connect with bolts ar	nardware	Ship each Type the following attached: I Bracket Asse Cannectors and with bolts and	mbly, 3 CGB	Ship each Type I the following ho attached: 2 Brocket Assemb Connectors and I with bolts and w	rdware (1) lies , 4 CGB clamp		
ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity		
20	20 I-100							
24	241-100		24 ∏ -100					
28	28 [-100		28 Ⅱ -100					
32			32 П -100		32 III - 100			
36			36 Π -100		36 TT - 100			

Luminaire Arms Nominal Arm Length Quantity 8' Arm

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

(1) See Sheet "DMA-100"

Anchor

Bolt

1 1/4"

2"

Diameter

SHEET 1 OF 2

Texas Department of Transportation Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES STRAIN POLE ASSEMBLIES

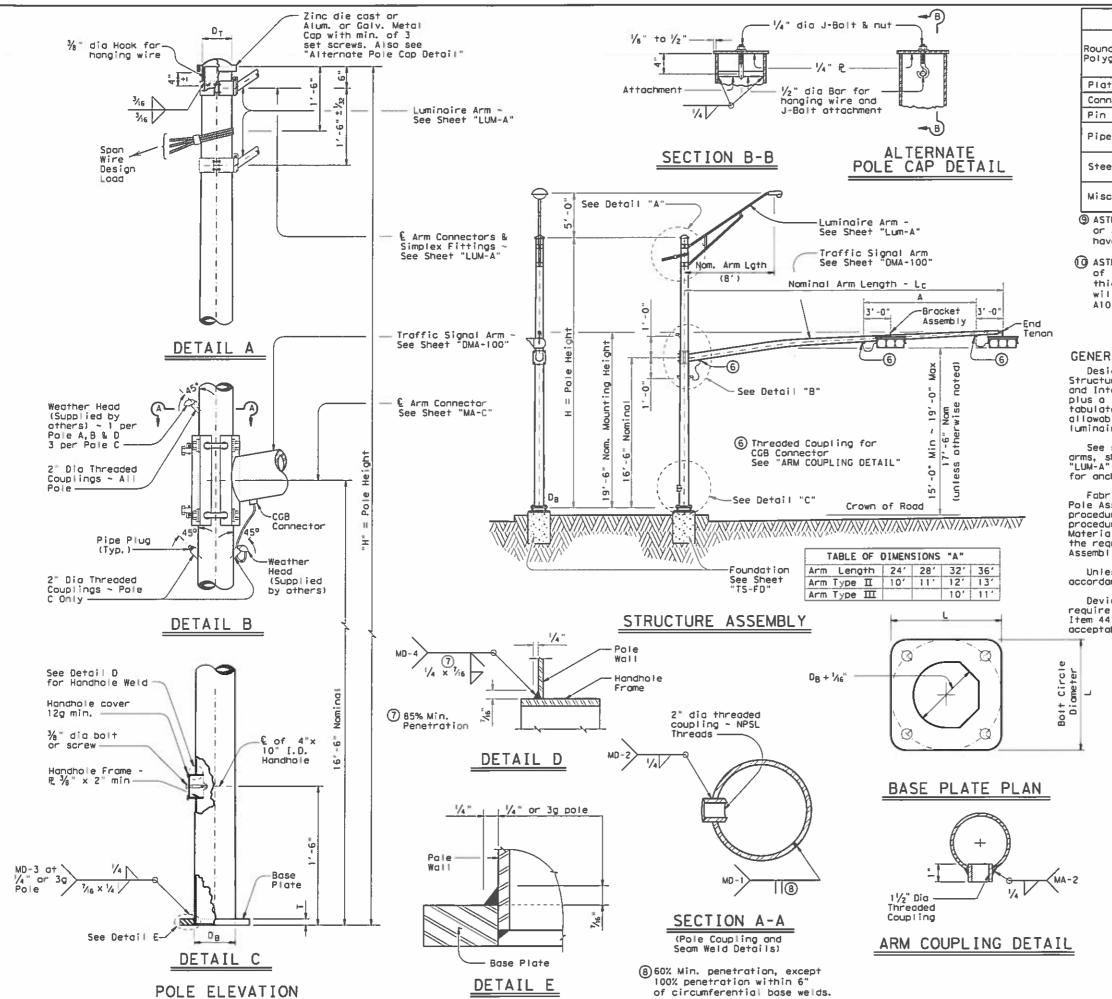
(100 MPH WIND ZONE)

SP-100(1)-12

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(Most arms are not used with vertical signals)



MATERIALS ASTM A595 Gr.A, A588, A1008 HSLAS Gr.50 Class 2, A1011 HSLAS Gr.50 Class 2, A572 Gr.50 or A1011 SS Gr.50 Round Shafts or Polygonal Shafts® Plates 9 ASTM A36, A588, or A572 Gr.50 ASTM A325 except where noted Connection Bolts Pin Bolts ASTM A325 ASTM A53 Gr. B, A501, A1008 HSLAS-F Gr. 50, A1011 HSLAS-F Gr. 50 Pipe ③ ASTM A475, 7 Wire Utilities Grade Steel Coble Galvanized steel or stainless steel Misc. Hardware

- ASTM A572, A1008 HSLAS, A1011 HSLAS, A1008 HSLAS-F, A1011 HSLAS-F, or A1011 SS may have higher yield strengths but shall not have less elongation than the grade indicated.
- (1) ASTM A1011 SS Gr.50 shall also have a minimum elongation of 18 percent in 8 inches or 23 percent in 2 inches. Material thickness in excess of those stipulated under A1011 SS will be acceptable providing the material meets all ather A1011 SS requirements and the requirements of this item.

GENERAL NOTES

Design conforms: to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design Wind Speed equals 100 mph plus a 1.3 gust factor. The maximum permissible span wire design loads tabulated are calculated at a stress load of 1.4 times the basic allowable stress. A simultaneous wind on the pole, mast arm, and luminaire is also included.

See standard sheet "DMA-100" for details of clamp-on traffic signal arms, sheet "MA-C" for traffic signal arm connection details, sheet "LUM-A" for luminaire arm and connection details, and sheet "TS-FD" for anchor bolt and foundation details.

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

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

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

Foundation Type	BOIT	Bolt Hole Diameter	Bolt Circle Diameter	Base RL Dim. L x T
36-A	1 3/4"	2"	19"	19" x 1 ¾"
36-B	2"	2 1/4"	21"	21" x 2"

SHEET 2 OF 2



TRAFFIC SIGNAL
SUPPORT STRUCTURES
STRAIN POLE ASSEMBLIES

(100 MPH WIND ZONE)

SP-100(2)-12

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ELECTRICAL SERVICES NOTES

- 1.Provide new materials. Ensure installation and materials comply with the applicable provisions of the National Electrical Code (NEC) and National Electrical Manufacturers Association (NEMA) standards. Ensure material is Underwriters Laboratories (UL) listed. Provide and install electrical service conduits, conductors, disconnects, contactors, circuit breaker panels, and branch circuit breakers as shown on the Electrical Service Data chart in the plans. Faulty fabrication or poor workmanship in material, equipment, or installation is justification for rejection. Where manufacturers provide warranties and guarantees as a customary trade practice, furnish these to the State.
- 2. Provide electrical services in accordance with Electrical Details standard sheets, Departmental Material Specification (DMS) 11080 "Electrical Services," DMS 11081 "Electrical Services-Type A," DMS 11082 "Electrical Services-Type C," DMS 11083 "Electrical Services-Type D," DMS 11084 "Electrical Services-Type T," DMS 11085 "Electrical Services-Pedestal (PS)", and Item 628 "Electrical Services" of the Standard Specifications. Provide electrical service types A, C, and D, as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," [tem 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.
- 4. Coordinate with the Engineer and the utility provider for metering and compliance with utility requirements. Primary line extensions, connection charges, meter charges, and other charges by the utility company to provide power to the location are paid for in accordance with Item 628. Get approval for the costs associated with these charges prior to engaging the utility company to do the work. Consult with the utility provider to determine costs and requirements, and coordinate the work as approved.
- 5. The enclosure manufacturer will provide Master Lock Type 2 with brass tumblers keyed #2195 for all custom electrical enclosures. Installing Contractor is to provide Master Lock #2195 Type 2 with brass tumblers for "off the shelf" enclosures. Master Lock #2195 keys and locks become property of the State. Unless otherwise approved, do not energize electrical service equipment until locks are installed.
- 6. Enclosures with external disconnects that de-energize all equipment inside the enclosure do not need a dead front trim. Protect incoming line terminations from incidental contact as required by the NEC.
- When galvanized is specified for nuts, screws, bolts or miscellaneous hardware, stainless steel may be used.
- 8. Provide wiring and electrical components rated for 75°C. Provide red, black, and white colored XHHW service entrance conductors of minimum size 6 American Wire Gauge (AWG). Identify size 6 AWG conductors by continuous color jacket. Identify electrical conductors sized 4 AWG and larger by continuous color jacket or by colored tape. Mark at least 6 inches of the conductor's insulation with half laps of colored tape, when identifying conductors. Ensure each service entrance conductor exits through a separately bushed non-metallic opening in the weatherhead. The lengths of the conductors outside the weatherhead are to be 12 inches minimum, 18 inches maximum, or as required by utility.
- 9. All electrical service conduit and conductors attached to the electrical service including the riser or the elbow below ground are subsidiary to the electrical service. For an underground utility feed, all service conduit and conductors after the elbow, including service conduit and conductors for the utility pole riser when furnished by the Contractor, will be paid for separately.
- 10. Provide rigid metal conduit (RMC) for all conduits on service, except for the Y_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.
- 11. Use of liquidtight flexible metal conduit (LFMC) is allowed between the meter and service enclosure when they are mounted 90 to 180 degrees to each other. Size the LFMC the same size as service entrance conduit. LFMC must not exceed 3 feet in length. Strap LFMC within 1 foot of each end. LFMC less than 12 inches in length need not be strapped. Each end of LFMC must have a grounding bushing or be terminated with a grounding fitting. The LFMC must contain a grounded (neutral) conductor. Ensure any bend in LFMC never exceeds 180 degrees. A pull test is required on all installed conductors, with at least six inches of free conductor movement demonstrated to the satisfaction of the Engineer.
- 12. Ensure all mounting hardware and installation details of services conform to utility company specifications.
- 13. For all electrical service enclosures listed under Item 628 on the MPL, the UL 508 enclosure manufacturers will prepare and submit a schematic drawing unique to each service. Before shipment to the job site, place the applicable laminated schematic drawings and the laminated plan sheet showing the electrical service data chart used to build the enclosure in the enclosure's data pocket. The installing contractor will copy and laminate the actual project plan sheets detailing all equipment and branch circuits supplied by that service. The laminated plan sheets are to be placed in the service enclosure's dacument pocket. Reduce 11 in. x 17 in. plan sheets to 8 ½ in. x 11 in. before laminating. If the installation differs from the plan sheets, the installing contractor is to redline plan sheets before laminating.
- 14. When providing an "Off The Shelf" Type D or Type T service, provide laminated plan sheets detailing equipment and branch circuits supplied by that service. Reduce 11 in. x 17 in. plan sheets to 8 $\frac{1}{2}$ 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.
- 15.Do not install conduit in the back wall of a service enclosure where it would penetrate the equipment mounting panel inside the enclosure. Provide grounding bushings on all metal conduits, and terminate bonding jumpers to grounding bus. Grounding bushings are not required when the end of the metal conduit is fitted with a conduit sealing hub or threaded boss, such as a meter base hub.

SERVICE ASSEMBLY ENCLOSURE

- 1. Provide threaded hub for all conduit entries into the top of enclosure.
- Type galvanized steel (GS) enclosures may be used for Type C panelboards and for Type D and T services that do not use an enclosure mounted photocell or lighting contactor. Provide GS enclosures in accordance with DMS 11080, 11082, 11083, and 11084.
- 3. Provide aluminum (AL) and stainless steel (SS) enclosures for Types A, C, and D in accordance with DMS 11080, 11081, 11082, 11083, and 11084. Do not paint stainless steel.
- 4. Provide pedestal service (PS) enclosures in accordance with ED(9) and DMS 11080 and 11085. Do not provide GS pedestal services. If GS is shown in the PS descriptive code, provide an AL enclosure.

MAIN DISCONNECT & BRANCH CIRCUIT BREAKERS

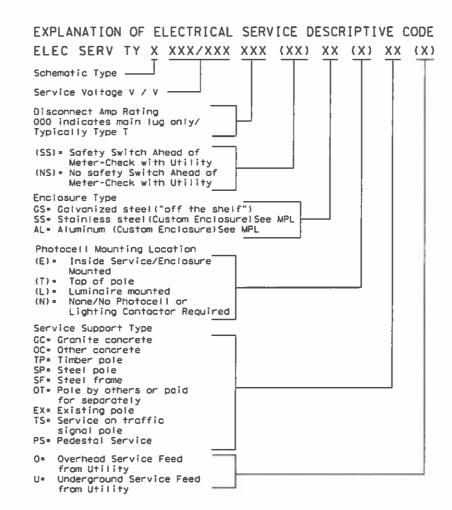
- 1. Field drill flange-mounted remote operator handle if needed, to ensure handle is lockable in both the "On" and "Off" positions.
- 2. When the utility company provides a transformer larger than 50 KVA, verify that the available fault current is less than the circuit breaker's ampere interrupting capacity (AIC) rating and provide documentation from the electric utility provider to the Engineer.

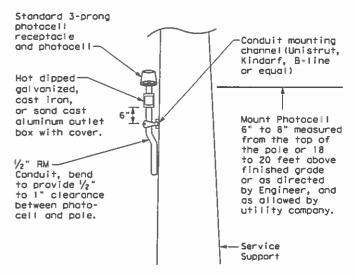
PHOTOELECTRIC CONTROL

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

	* ELECTRICAL SERVICE DATA											
Elec. Service ID	Plan Sheet Number	Electrical Service Description	Service Conduit **Size	Service Conductors No./Size	Safety Switch Amps	Main Ckt. Bkr. Pole/Amps	Two-Pole Contractor Amps	Panelbd/ Loadcenter Amp Rating	Branch Circuit ID	Branch Ckt. Bkr. Pole/Amps	Branch Circuit Amps	KVA Load
SB 183	289	ELC SRV TY A 240/480 100(SS) AL (E) SF (U)	2"	3/#2	100	2P/100	100	N/A	Lighting NB	2P/40	26	28. 1
	T								Lighting SB	2P/40	25	
			ļ						Underpass	1P/20	15	
NB Access	30	ELC SRV TY D 120/240 060 (NS) SS (E) TS (0)	1 1/4"	3/#6	N/A	2P/60		100	Sig. Controller	1P/30	23	5.3
			1				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	19/20	4	1.0
									Flashing Beacon 2	1P/20	4	

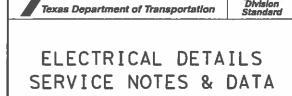
- * Example only, not for construction. All new electrical services must have electrical service data chart specific to that service as shown in the plans.
- ** Verify service conduit size with utility. Size may change due to utility meter requirements. Ensure conduit size meets the National Electrical Code.





TOP MOUNTED PHOTOCELL

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



Traffic

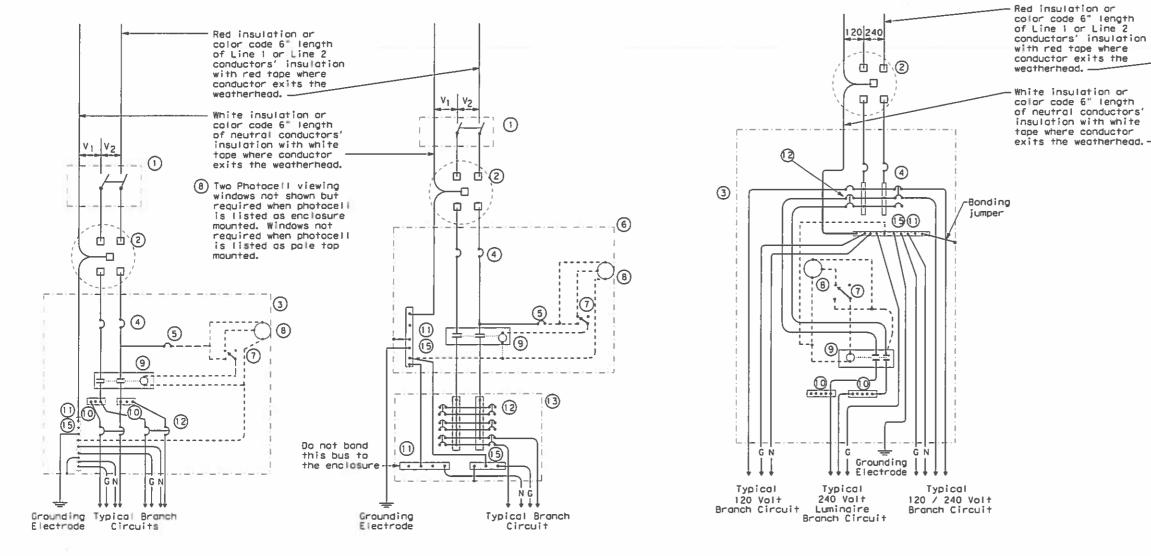
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SCHEMATIC TYPE A

THREE WIRE



SCHEMATIC TYPE C

THREE WIRE

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

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

	SCHEMATIC LEGEND							
1	Safety Switch (when required)							
2	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							



120 240

山

(3 (1)

Electrode

SCHEMATIC TYPE T

120/240 VOLTS - THREE WIRE

Galvanized steel-"Buy Off The Shelf" only. When required install photocell top of the pole or on luminaire only,

no lighting contractor will be installed.

G N

Typical

120 Volt Branch Circuit 2

(2)

Typical

120 / 240 Volt

Branch Circuit

(4)

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE ENCLOSURE AND NOTES

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	FOUNDATION DESIGN TABLE											┚		
FON DRILLED			FORCING TEEL	LENGT	D DRILLE H-f†(4),	(9, 6)	<u> </u>	HOR BO	LT DES	IGN	FOUND!	TION IGN 0		1
TYPE			SPIRAL & PITCH	l N	ONE PENET blows/f 15	TROMETER + 40	ANCHOR BOLT DIA	Fy (ksi)	BOLT CIR DIA	ANCHOR TYPE	MOMENT	SHEAR Kips	TYPICAL APPLICATION	
24-A	24"	4-#5	#2 at 12"	5. 7	5.3	4.5	¾"	36	12 ¾"	1	10	1	Pedestal pole, pedestal mounted controller.]
30-A	30"	8-#9	#3 at 6"	11.3	10.3	8.0	1 1/2"	55	17"	2	87	3	Mast arm assembly. (see Selection Table)]
36-A	36"	10-#9	#3 at 6"	13.2	12.0	9.4	1 ¾"	55	19"	2	131	5	Most orm assembly, (see Selection Table) 30' strain pole with or without luminaire	
36-B	36"	12-#9	#3 at 6"	15. 2	13.6	10.4	2"	55	21 "	2	190	7	Most arm assembly. (see Selection Table) Strain pole taller than 30' & strain pole with most arm	
42-A	42"	14- #9	#3 at 6"	17.4	15.6	11,9	2 1/4"	55	23"	2	271	9	Mast arm assembly. (see Selection Toble)]

FDN 36-B

44' X 36'

44'

32' X 32' 36' X 36'

40' x24'

FDN 42-A

40' X 36'

44' x 36'

Sway Cable

Span Wires

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

FDN 36-A

32' X 32'

36' X 36'

40' X 36'

44' X 28

361

24' X 24'

28, X 58,

32' X 24'

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

For 100mph design wind speed, foundation 36-A can support a single 36' mast arm.

Type 2

NUT ANCHOR

(TYPE 2)

-Thickness =

<2_Sides

(Typ)

48'

FDN 30-A

32'

24' X 24'

28' X 28'

32' X 28'

-Heovy Hex Nut (Typ)

MAX SINGLE ARM LENGTH

MAXIMUM DOUBLE ARM

LENGTH COMBINATIONS

MAX SINGLE ARM LENGTH

MAXIMUM DOUBLE ARM LENGTH COMBINATIONS

¼" thk. min. Circular Steel

Top Template

Z Z

<u>-</u>

Z do su

Type 1

Red

1 1/2" Min

Circular Steel Bottom Template (Omit bottom template

HOOKED ANCHOR

(TYPE 1)

ANCHOR BOLT ASSEMBLY

8)Orient anchor bolts orthogonal with the fixed arm direction to

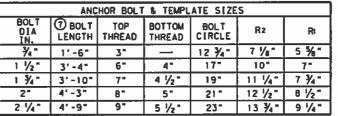
ensure that two bolts are in tension under dead load.

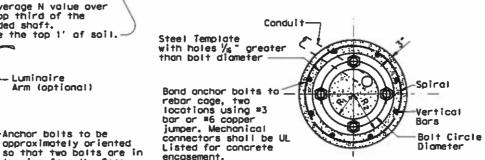
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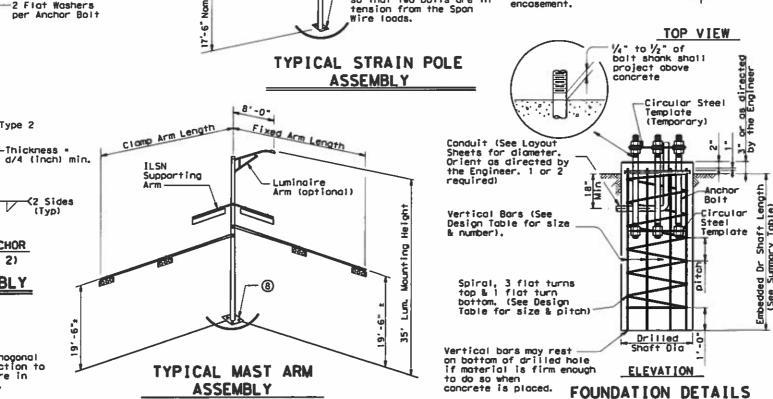
NOTES:

- (1) Anchor bolt design develops the foundation capacity given under Foundation Design Loads.
- 2) Foundation Design Loads are the allowable moments and shears at the base of the structure.
- 3 Foundations may be listed separately or grouped according to similarity of location and type. Quantities are for the Contractor's information only.
- Field Penetrometer readings at a depth of approximately 3 to 5 feet may be used to adjust shaft lengths.
- (5) If rock is encountered, the Drilled Shoft shall extend a minimum of two diameters into solid rock.
- (6) Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

7 Min dimensions given, longer bolts are acceptable.







Traffic Signal Pole-

Use average N value over the top third of the

Ignore the top 1' of soil.

Luminaire

Arm (optional)

Anchor bolts to be

embedded shaft.

Drilled

YXXX

1 15 TOTAL DRILLED SHAFT LENGTHS

FOUNDATION SUMMARY TABLE

EA

DRILLED SHAFT LENGTH 6

15

(FEET)

24-A 30-A 36-A 36-B 42-A

GENERAL NOTES:

LOCATION

DENTIFICATION

NO.

N BLOW

/ft.

FDN

TYPE

10 36-B 1

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

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

Concrete shall be Class "C".

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

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

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



TRAFFIC SIGNAL POLE FOUNDATION

TS-FD-12

	© TxDOT August_1995	DN: MS		CK1 JSY	DWs	MAD/MAF	CK: JSY/TEB	
3-86	REVISIONS	CONT SE		JCB		HIGHWAY		
3-16 11-16 11-12		0220	07	060		SH 40		
		DIST	COUNTY			SHEET NO.		
0		PHR		CAMERO	N		133	
12	8							