FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	F 2021 (674)		1
STATE	STATE DIST.	COUNTY	
TEXAS	SAT	WILSON	
CONT.	SECT.	JOB	HIGHWAY NO.
0143	04	071	US 87

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

INDEX OF SHEETS

SEE SHEET 2 FOR INDEX OF SHEETS

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT
PROJECT NO. F 2021(674)
CSJ: 0143-04-071

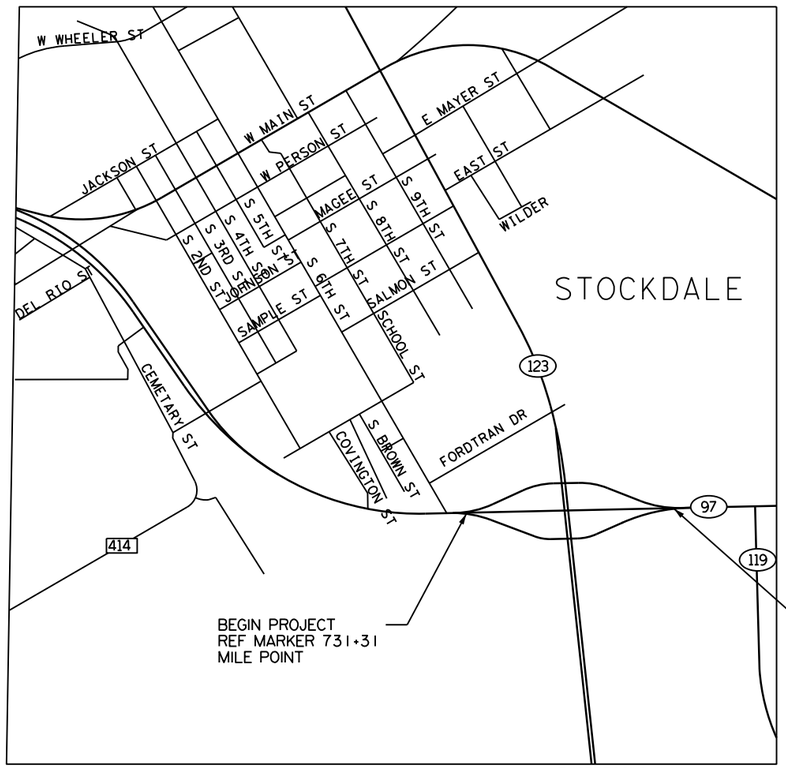
WILSON
US 87

LIMITS FROM: 0.25 Miles W of SH 123
TO: 0.25 Miles E of SH 123

NET LENGTH OF ROADWAY = 2434.81 FT = 0.461 MI
NET LENGTH OF BRIDGE = 0205.19 FT = 0.039 MI
NET LENGTH OF PROJECT = 2640.00 FT = 0.500 MI

FOR WORK CONSISTING OF LANDSCAPE PLANTING AND IRRIGATION

DESIGN SPEED = N/A
AREA OF DISTURBED SOIL = 3.28 ACRES
ADT: N/A



N. T. S.

EXCEPTIONS: N/A
EQUATIONS: N/A
R.R. CROSSINGS: N/A

FINAL PLANS

LETTING DATE: _____

DATE CONTRACTOR BEGAN WORK: _____

DATE WORK WAS ACCEPTED: _____

FINAL CONTRACT COST: $ _____

CONTRACTOR: _____

FINAL PLANS STATEMENT:

THE CONSTRUCTION WORK WAS PERFORMED
IN ACCORDANCE WITH THE PLANS.

_____ P.E. _____
AREA ENGINEER DATE

TEXAS DEPARTMENT OF TRANSPORTATION

SUBMITTED FOR LETTING

DISTRICT LANDSCAPE ARCHITECT

RECOMMENDED FOR LETTING 4/29/2021
DocuSigned by:
Gregg Granato, P.E.
0D08C713B58C45C...
DESIGN ENGINEER

RECOMMENDED FOR LETTING 4/29/2021
DocuSigned by:
Clayton Ripps, P.E.
74F59ACB883D4ER...
DIRECTOR OF TRANSPORTATION
PLANNING & DEVELOPMENT

APPROVED FOR LETTING 4/29/2021
DocuSigned by:
Gina E. Gallegos, P.E.
124372CCDF604F3...
DISTRICT ENGINEER

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, MAY, 2012)

FILE LOCATION AND NAME
T:\Engdata\Standards\Design\TITLESHEET-2014Specs.DGN

LEVELS DISPLAYED
1

COUNTY_____ PROJ. NO._____
HWY. NO._____ LETTING DATE_____
DATE ACCEPTED_____

INDEX OF SHEETS

SHEET NO. DESCRIPTION

STATE OF TEXAS
AARON GUTIERREZ
135540
LICENSED
PROFESSIONAL ENGINEER

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

04/26/2021
DATE

REGISTERED LANDSCAPE ARCHITECT
MARK A. BAKER
3402
STATE OF TEXAS

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

04/26/2021
DATE

Texas Department of Transportation

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CONT.	SECT.	JOB	HIGHWAY NO.
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PLANTING PLAN SHEET 1 OF 1
IRRIGATION PLAN SHEET 1 OF 1

END PROJECT
REF MARKER 731+31
MILE POINT

BEGIN PROJECT
REF MARKER 731+81
MILE POINT

SH 123

US 87

SH 123

US 87

0 100 200

SCALE: 1"=200'

Texas Department of Transportation

PROJECT LAYOUT

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT		SHEET NO.
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**********GENERAL NOTES**********
2014 Specification Book

--General--

Contact the Engineer or the City when construction operations are within 400 feet of a signalized intersection to determine/verify the location of loop detectors, conduit, ground-boxes, etc. Repair or replace any signal equipment damaged by construction operations. The method of repair or replacement shall be pre-approved and inspected. Depending on the type and extent of the damage, the Engineer reserves the right to perform the repair or replacement work and the Contractor will be billed for this work.

City of San Antonio: (210) 207-8642
City of New Braunfels: (830) 221-4049

If there are waste areas or material source areas, follow the Texas Aggregate Quarry and Pit Safety Act requirements.

Locate and reference all manholes and valves within the construction area with station and offset. Each manhole and valve shall be identified by its owner (SAWS, CPS, etc.). No roadwork will begin until this list has been submitted. All valves and manhole covers have to be accessible at all times, therefore; temp. CTB, material stock piles, etc. cannot be placed over these valves or covers.

Hurricane Evacuation

Hurricane Season is from June 1 thru November 30. As the closest metropolitan city inland from the Texas Coast, the City of San Antonio is a major shelter destination during mandatory hurricane evacuations. As such, planned work zone lane or road closures may be restricted and/or suspended during mandatory hurricane evacuation operations. The District will coordinate these restrictions at a minimum H-120 from any projected impact to the Texas Coast.

No time charges will be made if the Engineer determines that work on the project was impacted by the hurricane.

The Engineer may order changes in the Traffic Control Plan to accommodate evacuation traffic, and may suspend the work, all or in part, to ensure timely completion of this work. All work to implement changes in the Traffic Control Plan will be paid through existing bid prices or through Item 9.5, Force Account. However, the Department will not entertain any request for delay damages, loss of efficiency that may be attributed to the restriction or suspension of road or lane closures, or to changes in the Traffic Control Plan.

Contractor questions on this project are to be addressed to the following individual(s):
Will Lockett, Area Engineer, Will.Lockett@txdot.gov
Carlos Arcila, Assistant Area Engineer, Carlos.Arcila@txdot.gov

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

All contractor questions will be reviewed by the Engineer. Once a response is developed, it will be posted to TxDOT's Public FTP at the following Address:
https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting Responses/
All questions submitted that generate a response will be posted through this site. The site is organized by District, Project Type (Construction or Maintenance), Letting Date, CCSJ/Project Name.

When working near aerial electrical lines or utility poles, comply with Federal, State and local regulations. A horizontal boom or equivalent equipment is required for construction in the vicinity of the CPS Energy electric lines in order to provide vertical clearance of equipment during construction. Contact CPS Energy Utility Coordination Group sixteen (16) week in anticipation of pole bracing. The estimated duration for pole bracing is 6 to 10 weeks (or longer if temporary construction easements are required) after invoice is paid. For de-energizing or sleeving of the overhead electrical lines depicted on the plans, please contact CPS Energy Utility Coordination Group sixteen (16) week in anticipation of needed de-energization. The estimated duration for de-energizing is approximately 4 to 6 weeks (after invoice is paid) but could vary on system scenario and backfeed requirements. De-energizing may not be possible in all instances or may be restricted during specific periods of time due to load demand. Contractor will be reimbursed for the invoice cost for pole bracing and/or de-energizing or sleeving through force account.

Prevention of Migratory Bird Nesting

It is anticipated that migratory birds, a protected group of species, may try to nest on bridges, culverts, vegetation, or gravel substrate, at any time of the year. The preferred nesting season for migratory birds is from February 15 through October 1. When practicable, schedule construction operations outside of the preferred nesting season. Otherwise, nests containing migratory birds must be avoided and no work will be performed in the nesting areas until the young birds have fledged.

Structures

Bridge and culvert construction operations cannot begin until swallow nesting prevention is implemented, until after October 1 if it's determined that swallow nesting is actively occurring, or until it's determined swallow nests have been abandoned. If the State installed nesting deterrent on the bridges and culverts, maintain the existing nesting deterrent to prevent swallow

nesting until October 1 or completion of the bridge and culvert work, whichever occurs earlier. If new nests are built and occupied after the beginning of the work, do not perform work that can interfere with or discourage swallows from returning to their nests. Prevention of swallow nesting can be performed by one of the following methods:

1. By February 15 begin the removal of any existing mud nests and all other mud placed by swallows for the construction of nests on any portion of the bridge and culverts. The Engineer will inspect the bridges and culverts for nest building activity. If swallows begin nest building, scrape or wash down all nest sites. Perform these activities daily unless the Engineer determines the need to do this work more frequently. Remove nests and mud through October 1 or until bridge and culvert construction operations are completed.

2. By February 15 place a nesting deterrent (which prevents access to the bridge and culvert by swallows) on the entire bridge (except deck and railing) and culverts.

No extension of time or compensation payment will be granted for a delay or suspension of work caused by nesting swallows. This work is subsidiary to the various bid items.

--Item 6--
Show the stockpile lot and/or sub lot numbers on all tickets for all materials.

--Item 7--
The project's total disturbed area is 3.28 AC. The disturbed area in all project locations and Contractor project specific locations (PSL's), within 1/4 mile of the project limits, will further establish the authorization requirements for storm water discharges. The department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction activities shown on the plans. Obtain any required authorization from the TCEQ for any PSL's on or off the ROW. When the total area disturbed on the project and PSL's within 1/4 mile of the project exceeds 5 acres, provide a copy of the Contractor NOI for PSL's to the Engineer (to the appropriate MS4 operator when the project is on an off-state system route).

Notify the Engineer of the disturbed acreage within one (1) mile of the project limits. Obtain authorization from the TCEQ for Contractor PSL's for construction support activities on or off ROW.

No significant traffic generators events identified.

--Item 8--
Working days will be computed and charged in accordance with Article 8.3.1.4 Standard Workweek.

Create and maintain a Bar Chart schedule.

--Item 502--
Avoid placing stockpiles within the roadway's horizontal clear zone. If a stockpile is placed within the clear zone, address in accordance with the TMUTCD.

Do not place barricades, signs, or any other traffic control devices where they interfere with sight distance at driveways or side streets.

In addition to providing a Contractor's Responsible Person and a phone number for emergency contact, have an employee available to respond on the project for emergencies and for taking corrective measures within 2 hours or within a reasonable time frame as specified by the Engineer.

The Contractor Force Account "Safety Contingency" that has been established for this project is intended to be utilized for work zone enhancements, to improve the effectiveness of the Traffic Control Plan, that could not be foreseen in the project planning and design stage. These enhancements will be mutually agreed upon by the Engineer and the Contractor's Responsible Person based on weekly or more frequent traffic management reviews on the project. The Engineer may choose to use existing bid items if it does not slow the implementation of enhancement.

--Item 506--
An Inspector will perform a regularly scheduled SWP3 inspection every 7 calendar days.

Failure to address items noted on the SW3P inspection report within two report cycles may result in the Department stopping all construction operations, exclusive of time charges, or withholding that month's estimate until the SW3P deficiencies are corrected unless the Engineer determines that the area is too wet to correct SW3P deficiencies.

Failure to correctly maintain daily monitoring reports and submitting to TxDOT on a daily/weekly basis may result in the monthly estimate being withheld.

--Item 6185--
Shadow vehicles with TMA will be required for this project. The TMA's will be measured and paid for by the DAY for each TMA/TA set up and operational on the worksite. The contractor will be responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMA's needed for the project.

In accordance with the Underground Facility Damage Prevention Act (One Call Bill) the phone number for a utility locator is 1-800-545-6005. It is the Contractor's responsibility to make arrangements for utility locators as needed.

County: Wilson

Highway: US 87

Underground utilities owned by the Texas Department of Transportation may be present within the Right-Of-Way. Call the TxDOT offices listed below for locates a minimum of 48 hours in advance of excavation. If city or town owned irrigation facilities are present, call the appropriate department of the local city or town a minimum of 48 hours in advance of excavation. The Contractor is liable for all damages incurred to the above mentioned utilities when working without having the utilities located prior to excavation.

QUANTITY SHEET

CONTROLLING PROJECT ID 0143-04-071 **DISTRICT** San Antonio **COUNTY** Wilson
HIGHWAY US 87

							TOTAL EST.	TOTAL FINAL
			CONTROL SECTION JOB		**0143-04-071**			
			PROJECT ID		**A00133061**			
			COUNTY		**Wilson**			
			HIGHWAY		**US 87**			
ALT	**BID CODE**	**DESCRIPTION**		**UNIT**	EST.	FINAL		
	161-6012	GENERAL USE COMPOST		CY	851.000		851.000	
	170-6001	IRRIGATION SYSTEM		LS	1.000		1.000	
	192-6004	PLANT MATERIAL (5-GAL)		EA	143.000		143.000	
	192-6005	PLANT MATERIAL (15-GAL)		EA	450.000		450.000	
	192-6006	PLANT MATERIAL (30-GAL)		EA	197.000		197.000	
	192-6013	MULCH		SY	7,908.000		7,908.000	
	192-6049	PLANT MATERIAL (MIN 4' TRNK HT) (PALM)		EA	48.000		48.000	
	192-6063	PLANT BED PREP (TYPE I)		SY	7,628.000		7,628.000	
	192-6064	PLANT BED PREP (TYPE II)		SY	280.000		280.000	
	193-6001	PLANT MAINTENANCE		MO	36.000		36.000	
	193-6007	IRRIGATION SYSTEM OPER AND MAINT		MO	36.000		36.000	
	500-6001	MOBILIZATION		LS	100.00%		100.00%	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING		MO	5.000		5.000	
	506-6040	BIODEG EROSN CONT LOGS (INSTL) (8")		LF	100.000		100.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)		LF	100.000		100.000	
	6185-6002	TMA (STATIONARY)		DAY	12.000		12.000	
	18	OTHER: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)		LS	1.000		1.000	
		CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)		LS	1.000		1.000	

LOCATION	161 6012	170 6001	192 6004	192 6005	192 6006	192 6013	192 6049	192 6063	192 6064	193 6001	193 6007	506 6040	506 6043	6185 6002
	GENERAL USE COMPOST	IRRIGATION SYSTEM	PLANT MATERIAL (5-GAL)	PLANT MATERIAL (15-GAL)	PLANT MATERIAL (30-GAL)	MULCH	PLANT MATERIAL (MIN 4' TRNK HT) (PALM)	PLANT BED PREP (TYPE I)	PLANT BED PREP (TYPE II)	PLANT MAINTENANCE	IRRIGATION SYSTEM OPER AND MAINT	BIODEG EROSN CONT LOGS (INSTL) (8")	BIODEG EROSN CONT LOGS (REMOVE)	TMA (STATIONARY)
	CY	LS	EA	EA	EA	SY	EA	SY	SY	MO	MO	LF	LF	DAY
BED 1	190		32	102	44	1708	12	1708						
BED 2	268		46	144	63	2668	12	2388	280					
BED 3	280		38	120	53	2519	12	2519						
BED 4	113		27	84	37	1013	12	1013						
										36	36	100	100	12
	851	**1**	**143**	**450**	**197**	**7908**	**48**	**7628**	**280**	**36**	**36**	**100**	**100**	**12**

Texas Department of Transportation

QUANTITY SUMMARY

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DETOURS, BARRICADES, WARNING SIGNS, SEQUENCE OF WORK, ETC.

THE CONTRACTOR'S ATTENTION IS DIRECTED TO THE REQUIREMENTS OF ITEM 7, "LEGAL RELATIONS AND RESPONSIBILITIES TO THE PUBLIC", OF THE STANDARD SPECIFICATIONS. IN ADDITION TO THESE REQUIREMENTS, THE FOLLOWING PROVISIONS SHALL ALSO GOVERN ON THIS CONTRACT:

1. GENERAL

(1) TRAFFIC MUST BE HANDLED THROUGHOUT THE PROJECT DURING CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING A SAFE AND COMFORTABLE PASSAGE FOR VEHICULAR AND PEDESTRIAN TRAFFIC WITH MINIMAL INCONVENIENCE TO THE PUBLIC, AS SHOWN IN THE PLANS OR AS DIRECTED/APPROVED BY THE ENGINEER.

(2) THE CONTRACTOR MAY PROPOSE/RECOMMEND MODIFICATIONS TO THE SEQUENCE OF WORK FOR CONSIDERATION BY THE ENGINEER. ANY MAJOR RECOMMENDED MODIFICATION BY THE CONTRACTOR SHALL INCLUDE ANY CHANGES TO THE VARIOUS BID ITEMS, IMPACT TO TRAFFIC, EFFECT OF OVERALL PROJECT IN TIME AND COST, ETC. IF THIS PROPOSAL IS IMPLEMENTED, THE CONTRACTOR WILL BE RESPONSIBLE FOR DEVELOPING DETAILED PLAN SHEETS TO BE SEALED BY A LICENSED PROFESSIONAL ENGINEER FOR INCLUSION WITH THE CHANGE ORDER. THE CONTRACTOR CANNOT PROCEED WITH ANY CONSTRUCTION OPERATIONS BASED ON A REVISED PHASE/SEQUENCE UNTIL WRITTEN APPROVAL IS OBTAINED FROM THE ENGINEER. IF AT ANY TIME DURING CONSTRUCTION THE CONTRACTOR'S PROPOSED PLAN OF OPERATION FOR HANDLING TRAFFIC DOES NOT PROVIDE FOR SAFE AND COMFORTABLE MOVEMENT, THE CONTRACTOR WILL IMMEDIATELY CHANGE THEIR OPERATION TO CORRECT THE UNSATISFACTORY CONDITION.

(3) DO NOT STORE ANY CONSTRUCTION MATERIAL OR EQUIPMENT AT ANY LOCATION THAT WILL CONSTITUTE A HAZARD AND WILL ENDANGER TRAFFIC..

(4) THE CONTRACTOR WILL PROVIDE ADVANCE NOTIFICATION TO THE ENGINEER OF IMPENDING / UPCOMING LANE CLOSURES FOR ALL TEMPORARY AND / OR PERMANENT LANE, RAMP, CONNECTOR, FRONTAGE, SHOULDER, ETC. CLOSURES OR DETOURS. SEE GENERAL NOTES FOR NOTIFICATION REQUIREMENTS.

(5) ACCESS TO ADJOINING PROPERTY MUST BE MAINTAINED AT ALL TIMES.

(6) TEMPORARY DRAINAGE IS THE RESPONSIBILITY OF THE CONTRACTOR.

(7) AT NO TIME SHALL TWO CONSECUTIVE INTERSECTING ROADWAYS BE CLOSED AT ONE TIME DURING CONSTRUCTION.

(8) AT NO TIME SHALL TWO CONSECUTIVE RAMPS BE CLOSED AT ONE TIME DURING CONSTRUCTION OR OVERLAY OPERATIONS.

(9) FOR THIS PROJECT, NO MAINLANE CLOSURES, RAMP CLOSURES, AND ARTERIAL CLOSURES ARE ANTICIPATED, UNLESS OTHERWISE NOTED IN THE PLANS AND/OR AS DIRECTED BY THE ENGINEER.
SHOULDER CLOSURES ARE ALLOWED FOR THE COMPLETION OF THIS PROJECT. SHOULDER CLOSURES ARE LIMITED TO BETWEEN THE HOURS OF 9:30 AM AND 3:30 PM.
IF MAINLANE CLOSURES ARE NECESSARY AND APPROVED BY THE ENGINEER,MAINLANE CLOSURES SHALL BE LIMITED TO THE FOLLOWING RESTRICTIONS:
NIGHTTIME 9:00 PM TO 6:00 AM SUNDAY THROUGH THURSDAY (FRIDAY MORNING) (WITH UNIFORMED OFF DUTY LAW ENFORCEMENT OFFICERS)
NO WEEKEND CLOSURES (6:00 AM FRIDAY TO 9:00 PM SUNDAY) UNLESS OTHERWISE APPROVED BY THE ENGINEER
NO MAINLANE CLOSURES WILL BE PERMITTED FOR THE FOLLOWING DATES:
BETWEEN DECEMBER 15 AND JANUARY 1.
FIESTA WEEK AND TAX FREE WEEKEND. (BEXAR COUNTY ONLY)
WEDNESDAY BEFORE THANKSGIVING THRU THE SUNDAY AFTER THANKSGIVING
SATURDAY AND SUNDAY BEFORE MEMORIAL DAY AND LABOR DAY.
SATURDAY OR SUNDAY WHEN JULY 4 FALLS ON A FRIDAY OR MONDAY.
ELECTION DAYS (BEXAR COUNTY ONLY)
DURING MAJOR EVENTS AT THE AT&T CENTER (SPURS HOME GAMES, RODEO, CONCERTS, ETC.)

(10) REMOVAL AND DISPOSAL OF EXISTING ABANDONED UTILITIES (EITHER PREVIOUSLY ABANDONED OR ABANDONED DURING THIS PROJECT) REQUIRED TO SUPPORT THIS PROJECT'S CONSTRUCTION SHALL BE PERFORMED UNDER THE OVERALL PREPARE RIGHT-OF-WAY ITEM (ITEM 100).

(11)COORDINATE ALL TRAFFIC CONTROL WITH ADJACENT PROJECTS.

(12) COVER PERMANENT SIGNS IF NOT USED. THIS IS SUBSIDIARY TO ITEM 502.

(13) EXCAVATION WITHIN 5 FEET OF AN EXISTING CPS ENERGY POLE WILL REQUIRE POLE BRACING. CONTACT CPS ENERGY UTILTY COORDINATION TO REQUEST POLE BRACING (JOHN OFFER,JEOFFER@CPSENERGY.COM). THE ESTIMATED DURATION FOR THE POLE BRACING PROCESS IS APPROXIMATELY 6 TO 8 WEEKS.

(14) COORDINATE WITH THE CITY OF SAN ANTONIO OR TXDOT FOR SIGNAL TIMING REVISIONS, AS NECESSARY.

(15) FOR THIS PROJECT, NO DETOURS ARE ANTICIPATED. IF DETOURS ARE NECESSARY, THE CONTRACTOR WILL PROVIDE SIGNED AND SEALED DETOUR PLANS TO BE APPROVED BY THE ENGINEER.

2. SEQUENCE OF WORK

(1)THIS PROJECT WILL BE CONSTRUCTED IN 1 PHASE. BEFORE THE COMMENCEMENT OF ANY WORK, INSTALL ADVANCE WARNING SIGNS, TEMPORARY SIGNS AND BARRICADES AS SHOWN ON THE PLANS AND/OR AS DIRECTED/APPROVED BY THE ENGINEER. DAILY SHOULDER CLOSURES MAY BE USED IN ACCORDANCE WITH STATE TCP STANDARDS. DROP-OFF CONDITIONS OF GREATER THAN 2" MUST HAVE A 3:1 SLOPE AT THE END OF EACH DAY, AS WELL AS THROUGHOUT THE PROJECT WHERE ACCESS TO ADJACENT PROPERTIES IS ALLOWED TO DRIVEWAYS AND SIDE STREETS.

(2) PREPARING ROW / REMOVAL OF EXISTING ITEMS TO BE DONE ONLY IN AREAS WHERE WORK IS OCCURING, AS PER THE PHASES NOTED BELOW.

(3) INSTALL WARNING SIGNS AND TRAFFIC CONTROL DEVICES ACCORDING TO STANDARD TCP (2-1a)-18 FOR WORK WITHIN THE CLEAR ZONE. NO TRAFFIC CONTROL DEVICES OR SIGNS ARE REQUIRED FOR CONSTRUCTION ACTIVITIES OUTSIDE THE CLEAR ZONE. REFER TO TRAFFIC CONTROL PLAN FOR CLEAR ZONE LOCATION.

(4) FOR EACH PLANTING AREA, THE SHOULDER ADJACENT TO THE WORK AREA MAY BE CLOSED ACCORDING TO TCP (5-1)-18 UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

3. SAFETY

(1) THE CONTRACTOR WILL PROVIDE, CONSTRUCT AND MAINTAIN BARRICADES AND SIGNS IN ACCORDANCE WITH STATE STANDARDS BC (1 - 12)-14 . ANY SIGNS REQUIRED THAT ARE NOT DETAILED IN THE STANDARD SHEETS SHALL BE IN CONFORMANCE WITH THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS" AND THE "STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS."

(2) BARRICADES AND WARNING SIGNS SHALL BE PLACED AS INDICATED ON THE PLANS. THIS SHALL BE CONSIDERED THE MINIMUM REQUIRED TO PROVIDE FOR THE SAFETY OF TRAFFIC DURING CONSTRUCTION. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN OTHER SUCH BARRICADES AND SIGNS DEEMED NECESSARY BY THE ENGINEER OR AS DIRECTED BY FIELD CONDITIONS, TO PROVIDE FOR THE PASSAGE OF TRAFFIC IN SAFETY AT ALL TIMES.

(3) THE CONTRACTOR SHALL PROVIDE AND MAINTAIN FLAGGERS AS DIRECTED/APPROVED BY THE ENGINEER, AT SUCH POINTS, AND FOR SUCH PERIODS OF TIME AS MAY BE REQUIRED, TO PROVIDE FOR THE SAFETY OF THE TRAVELING PUBLIC AND THE CONTRACTOR'S PERSONNEL.

(4) THE CONTRACTOR SHALL KEEP THE ROADWAY CLEAN AND FREE OF DIRT OR OTHER MATERIALS DURING HAULING OPERATIONS. IF THE CONTRACTOR DOES NOT MAINTAIN A CLEAN ROADWAY, THEY SHALL CEASE ALL CONSTRUCTION OPERATIONS, WHEN DIRECTED BY THE ENGINEER, TO CLEAN THE ROADWAY TO THE SATISFACTION OF THE ENGINEER.

4. HAULING EQUIPMENT

(1) THE USE OF RUBBER-TIRED EQUIPMENT WILL BE REQUIRED FOR MOVING DIRT OR OTHER MATERIALS ALONG OR ACROSS PAVEMENTED SURFACES. WHERE THE CONTRACTOR DESIRES TO MOVE ANY EQUIPMENT NOT LICENSED FOR OPERATION ON PUBLIC HIGHWAYS, ON OR ACROSS PAVEMENT. THEY SHALL PROTECT THE PAVEMENT FROM DAMAGE AS DIRECTED / APPROVED BY THE ENGINEER.

(2) THROUGHOUT CONSTRUCTION OPERATIONS, THE CONTRACTOR WILL BE REQUIRED TO CONDUCT THEIR HAULING OPERATIONS IN A MANNER SUCH THAT VEHICLES WILL NOT HAUL OVER PREVIOUSLY RECOMPACTED SUBGRADE OR COMPACTED BASE MATERIAL, EXCEPT IN SHORT SECTIONS FOR DUMPING MANIPULATIONS.

5. FINAL CLEAN UP

UPON COMPLETION OF THE WORK AND BEFORE FINAL ACCEPTANCE AND FINAL PAYMENT IS MADE, THE CONTRACTOR SHALL CLEAR AND REMOVE FROM THE SITE ALL SURPLUS AND DISCARDED MATERIALS AND DEBRIS OF EVERY KIND AND LEAVE THE ENTIRE PROJECT IN A SMOOTH, NEAT AND SIGHTLY CONDITION.

6. PAYMENT

ALL BARRICADES, SIGNS, AND FLAGGERS SHALL BE SUBSIDIARY TO ITEM 502 BARRICADES, SIGNS AND TRAFFIC HANDLING. ALL EROSION AND SEDIMENT CONTROL DEVICES WILL BE PAID FOR UNDER ITEM 506 TEMPORARY EROSION, SEDIMENTATION, AND ENVIRONMENTAL CONTROLS. ALL WORK ZONE PAVEMENT MARKINGS WILL BE PAID FOR UNDER ITEM 662 WORK ZONE PAVEMENT MARKINGS. ALL OTHER WORK AND MATERIALS SHALL BE SUBSIDIARY TO THE VARIOUS BID ITEMS UNLESS OTHERWISE INDICATED IN THE PLANS.

STATE OF TEXAS
AARON GUTIERREZ
135540
LICENSED PROFESSIONAL ENGINEER

04/26/2021

Texas Department of Transportation

US 87

TCP NARRATIVE

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NOTES:

1. REFER TO BC (2)-14 AND TMUTCD FOR INSTALLATION OF ADVANCE WARNING AND PROJECT LIMIT SIGNS.

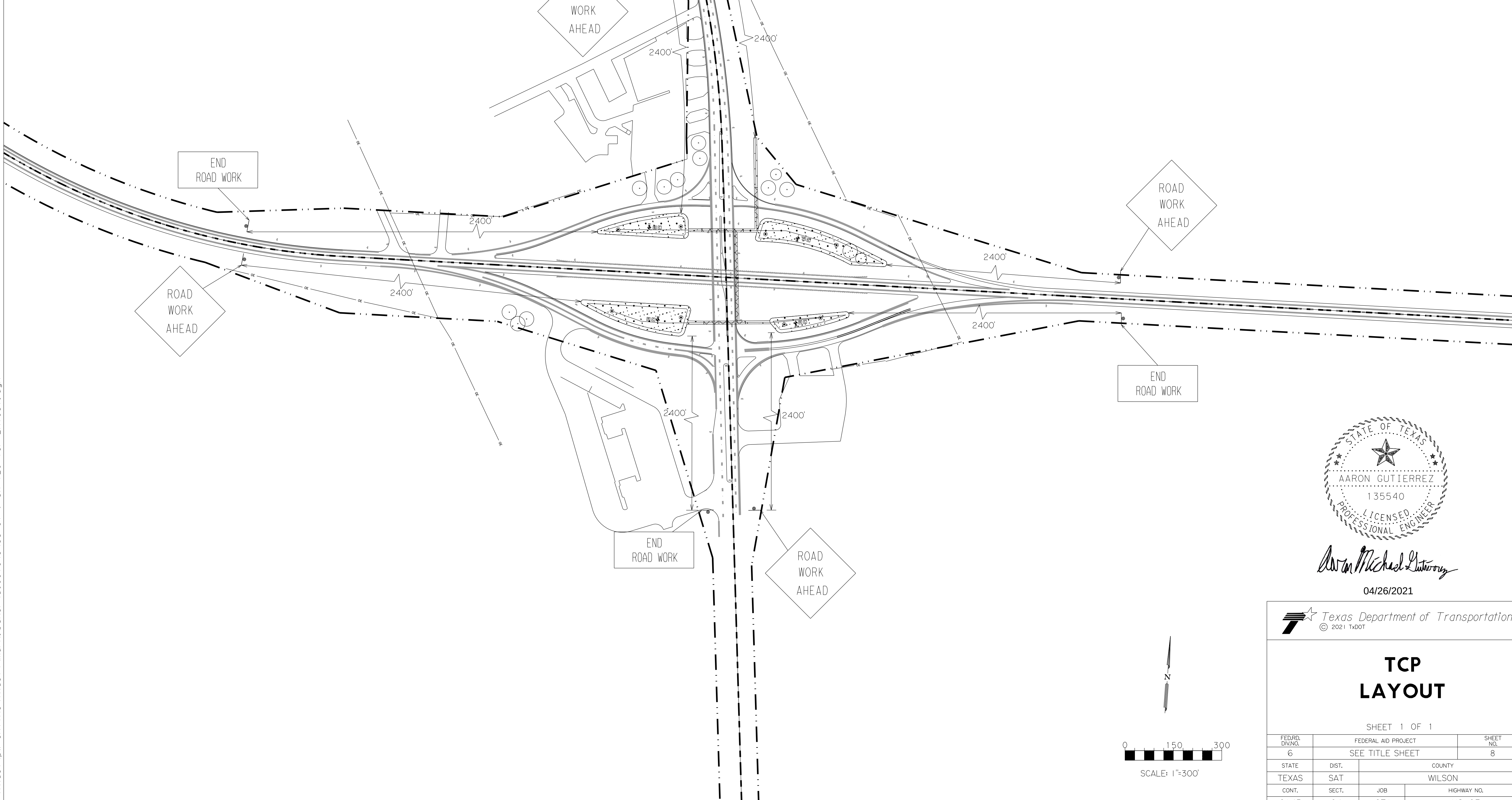
2. TRAFFIC CONTROL DEVICES NOTED OR SHOWN ON THIS SHEET ARE THE MINIMUM CONDITION. CONSTRUCTION ZONE SIGNING, ADDITIONAL BARRICADES, WARNING SIGNS, ARROW PANELS, CONES, ETC. REQUIRED IN ACCORDANCE WITH CURRENT BC STANDARDS AND THE TEXAS MUTCD MAY BE REQUIRED IN AREAS OF ACTUAL CONSTRUCTION.

3. SEE TXDOT STANDARD SPECIFICATIONS FOR ITEM 170 AND PLAN SHEET "IRRIGATION SPECIFICATIONS" FOR TRENCH AND BORING CONSTRUCTION METHODS AND PROTECTION REQUIREMENTS.

4. CLEAR ZONE WIDTH EXTENDS TO 30 FT OUTSIDE OF MAINLANE SOLID WHITE LANE STRIPE AND 10 FT OUTSIDE OF FRONTAGE ROAD EDGE OF PAVEMENT.

LEGEND:

- WORK AREA WITHIN CLEAR ZONE (SEE NOTE 4)
- WORK AREA OUTSIDE CLEAR ZONE (SEE NOTE 4)
- CONSTRUCTION SIGN



04/26/2021

Texas Department of Transportation

TCP LAYOUT

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		8
STATE	DIST.	COUNTY	
TEXAS	SAT	WILSON	
CONT.	SECT.	JOB	HIGHWAY NO.
0143	04	071	US 87

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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

10. 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.

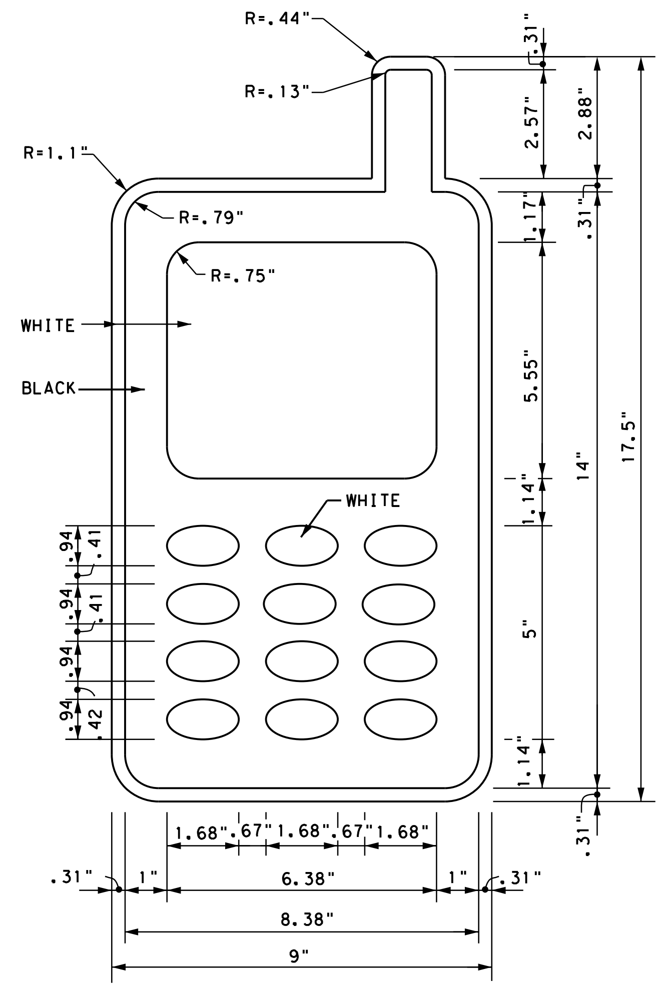
11. Except for devices required by Note 10, traffic control devices should be in place only while work is actually in progress or a definite need exists.

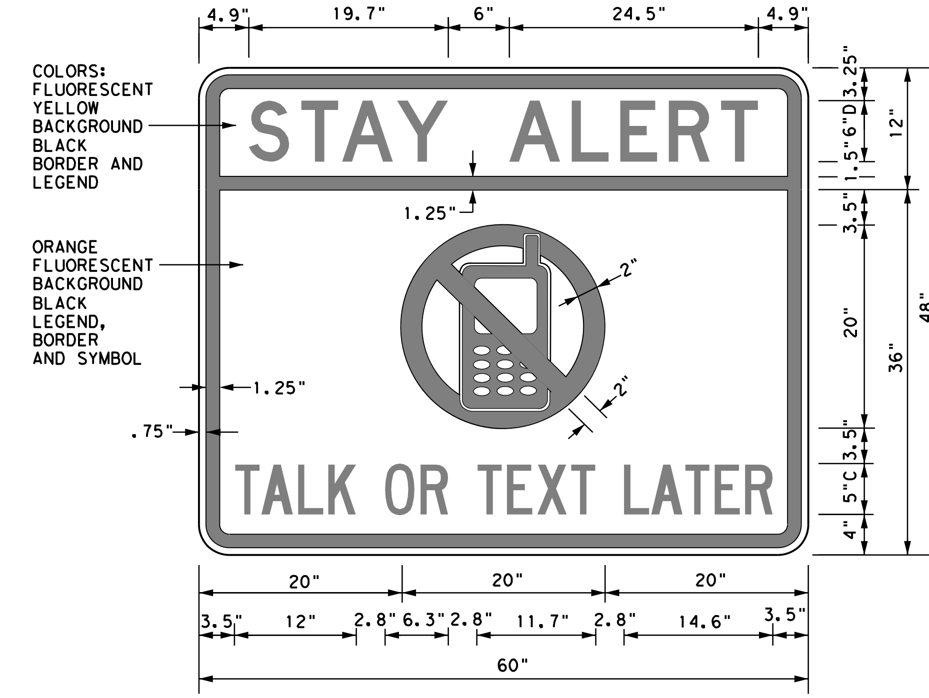
12. The Engineer has the final decision on the location of all traffic control devices.

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

WORKER SAFETY APPAREL NOTES:

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





3.0" Radius, 1.25" Border, 0.75" Indent, Black on Yellow;
[STAY ALERT] Font: D

3.0" Radius, 1.25" Border, 0.75" Indent, Black on Orange;
[TALK OR TEXT LATER] Font: C specified length;

SIGN DETAIL (G20-10T)

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

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

SHEET 1 OF 12

Texas Department of Transportation
Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT 0143	SECT 04	JOB 071	HIGHWAY US 87
REVISIONS 4-03 5-10 8-14 9-07 7-13	DIST SAT		COUNTY WILSON	SHEET NO. 9

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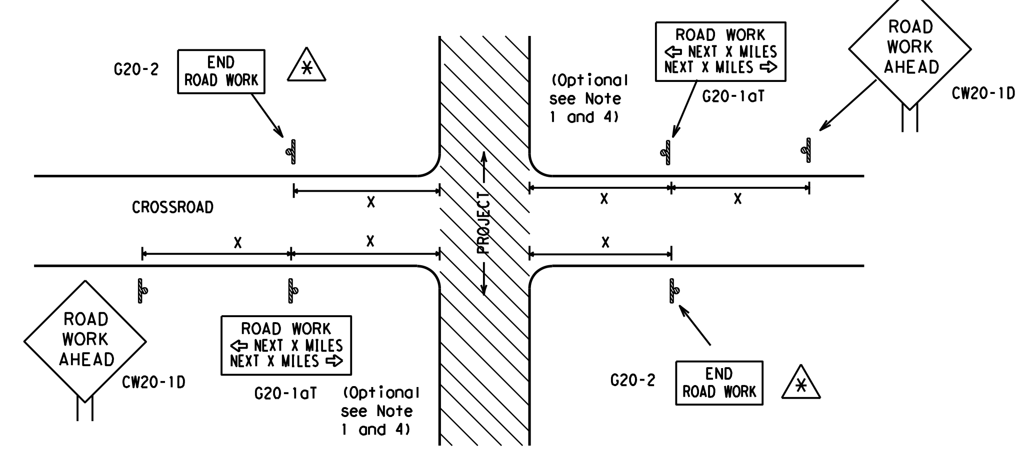
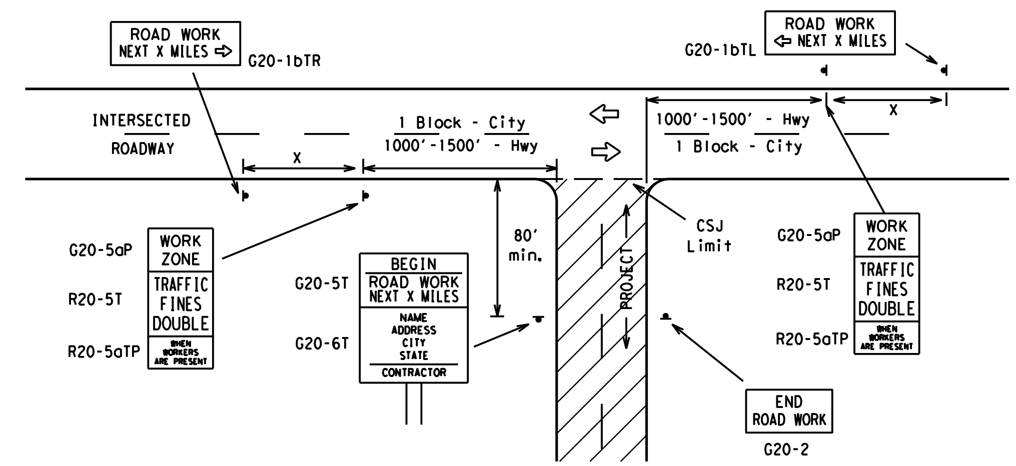
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

2. If construction closes the road at a T-intersection the Contractor shall place the "CONTRACTOR NAME"(G20-6T) sign behind the Type 3 Barricades for the road closure (see BC(10) also). The "ROAD WORK NEXT X MILES" left arrow(G20-1bTL) and "ROAD WORK NEXT X MILES" right arrow (G20-1bTR)" signs shall be replaced by the detour signing called for in the plans.

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

SIZE

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

SPACING

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

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

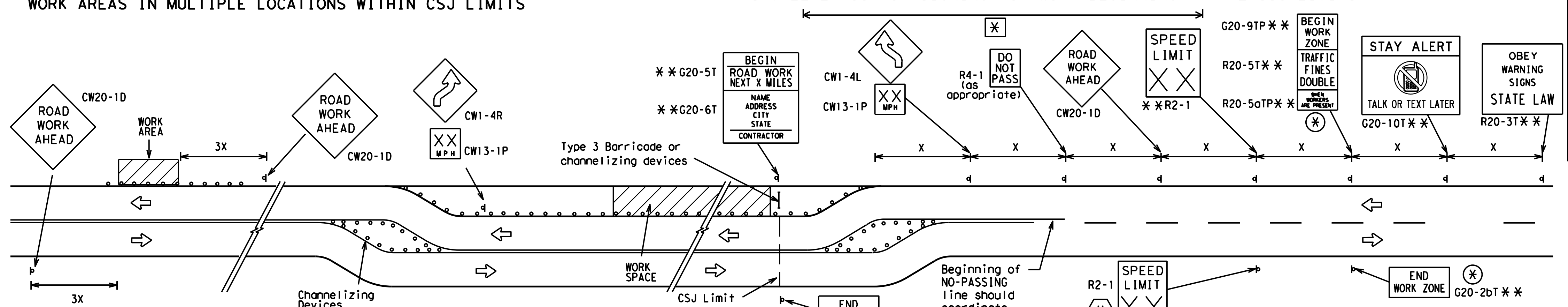
Δ Minimum distance from work area to first Advance Warning sign nearest the work area and/or distance between each additional sign.

GENERAL NOTES

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

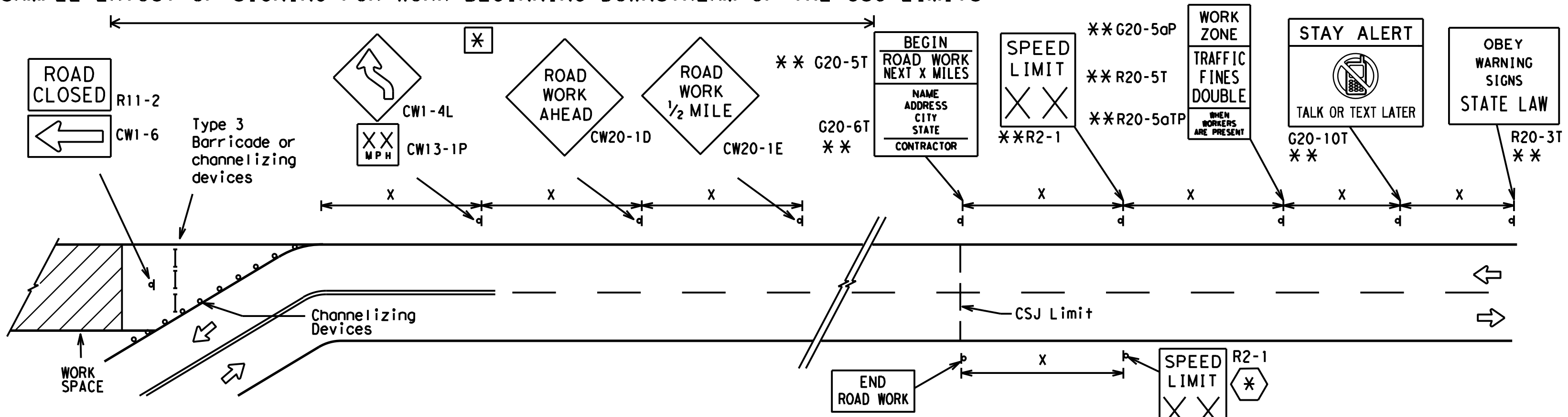
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



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

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



NOTES

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

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

** 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 Control Plan.

(*) Contractor will install a regulatory speed limit sign at the end of the work zone.

LEGEND

(Type 3 Barricade symbol)	Type 3 Barricade
○ ○ ○	Channelizing Devices
(Sign symbol)	Sign
X	See Typical Construction Warning Sign Size and Spacing chart or the TMUTCD for sign spacing requirements.

SHEET 2 OF 12

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	071	US 87
9-07 8-14 7-13	DIST		COUNTY	SHEET NO.
	SAT		WILSON	10

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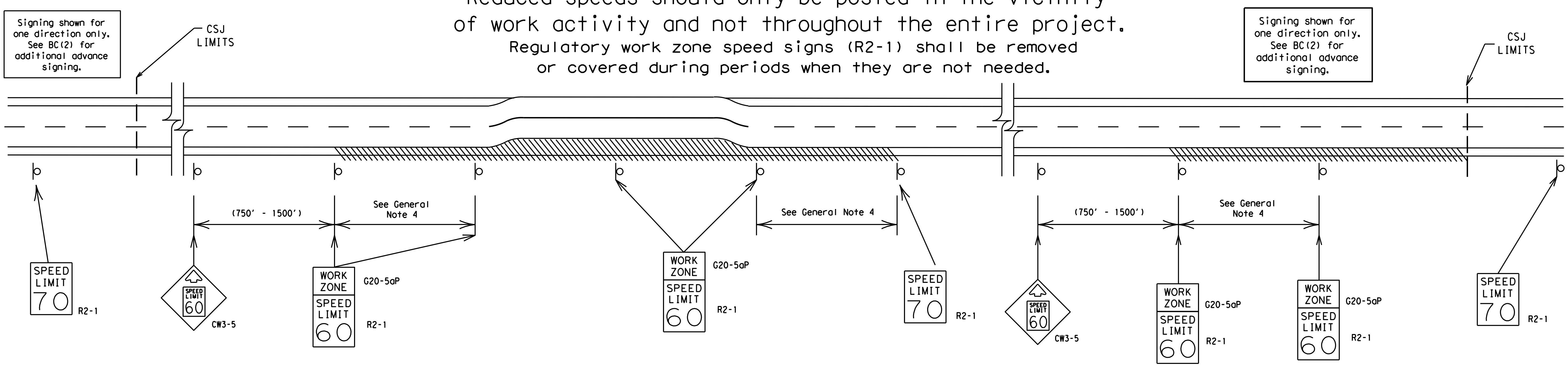
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

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Texas Department of Transportation — Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-14

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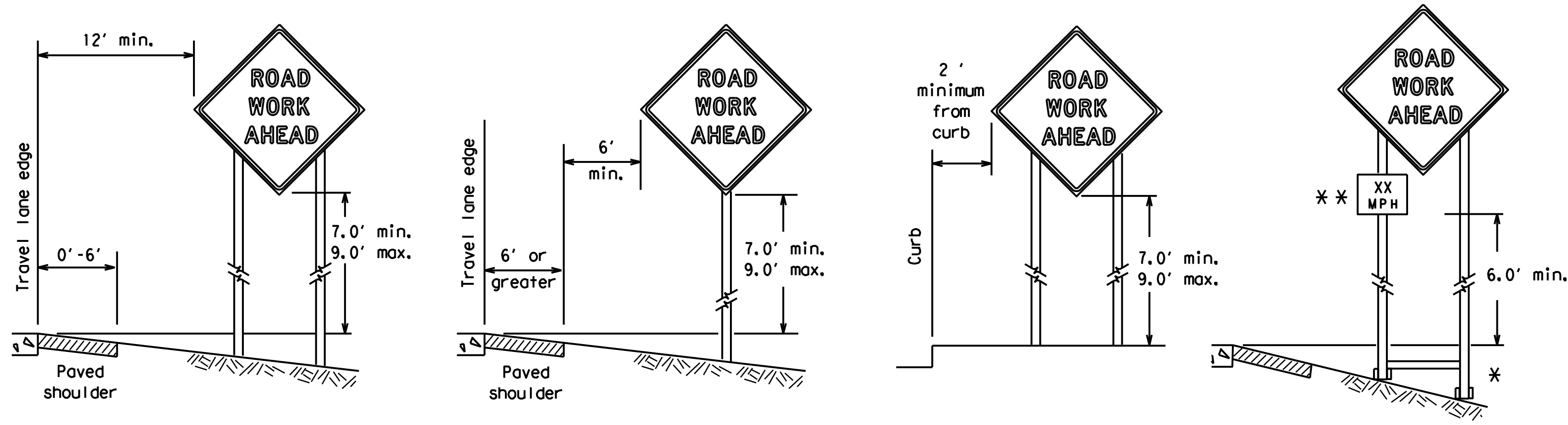
© TxDOT November 2002	CONT 0143	SECT 04	JOB 071	HIGHWAY US 87
REVISIONS 9-07 8-14 7-13	DIST SAT		COUNTY WILSON	SHEET NO. 11

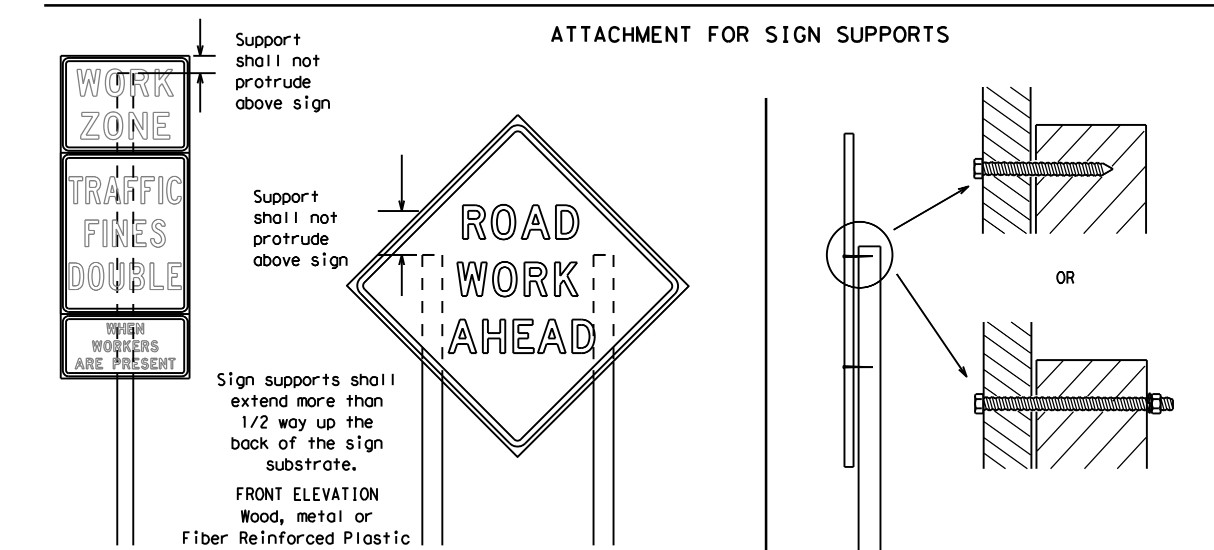
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



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

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

ATTACHMENT FOR SIGN SUPPORTS



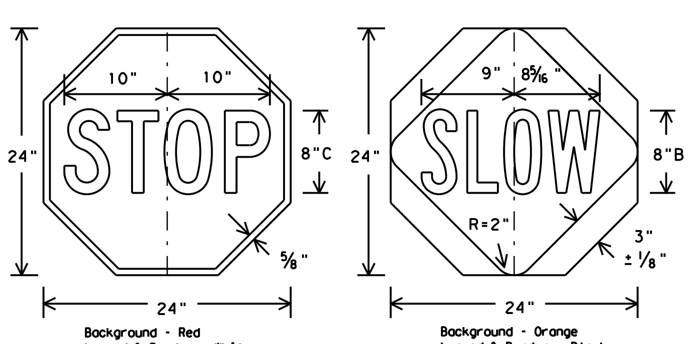
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

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" as detailed below.
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

1. Permanent signs are used to give notice of traffic laws or regulations, call attention to conditions that are potentially hazardous to traffic operations, show route designations, destinations, directions, distances, services, points of interest, and other geographical, recreational, or cultural information. Drivers proceeding through a work zone need the same, if not better route guidance as normally installed on a roadway without construction.
2. When permanent regulatory or warning signs conflict with work zone conditions, remove or cover the permanent signs until the permanent sign message matches the roadway condition.
3. When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
4. If existing signs are to be relocated on their original supports, they shall be installed on crashworthy bases as shown on the SMD Standard sheets. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards. This work should be paid for under the appropriate pay item for relocating existing signs.
5. If permanent signs are to be removed and relocated using temporary supports, the Contractor shall use crashworthy supports as shown on the BC 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 guidance for the motorists. This will be subsidiary to Item 502.

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

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BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-14

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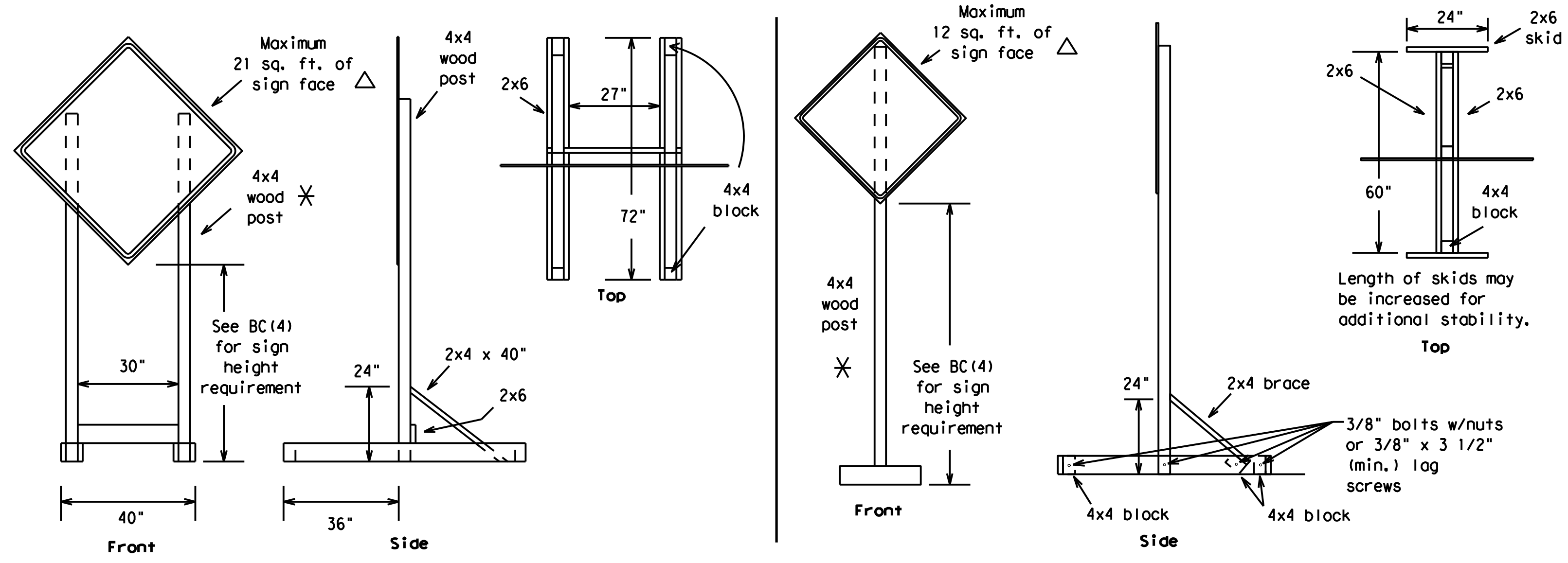
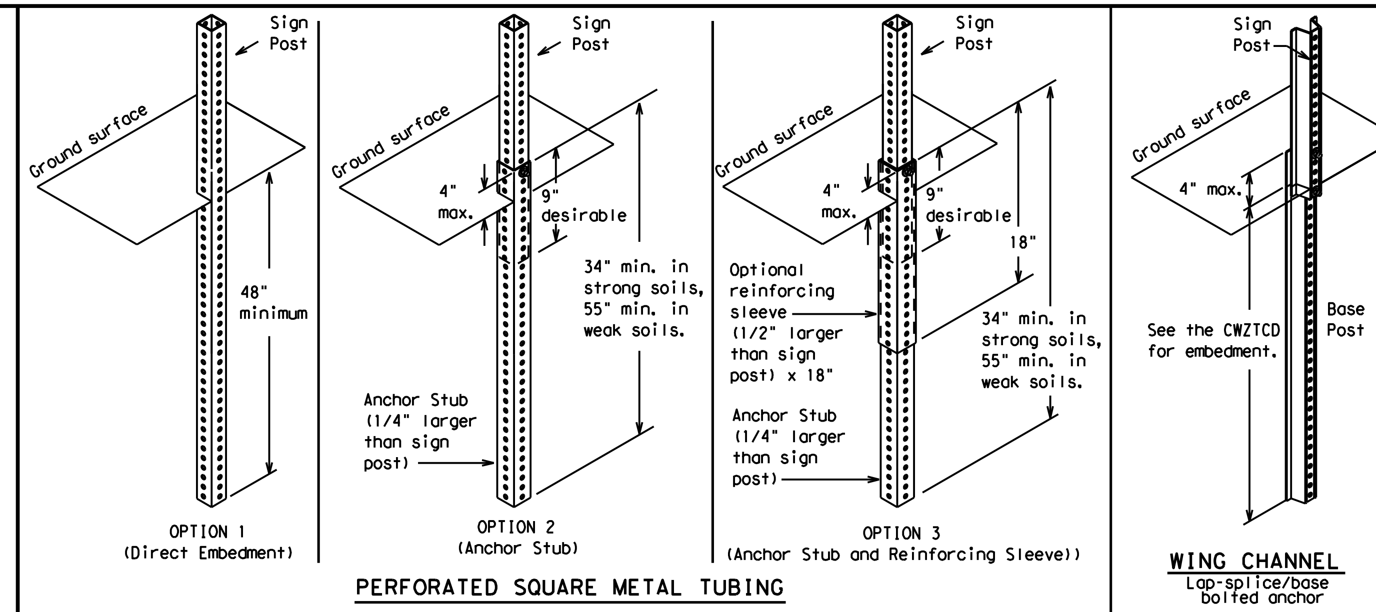


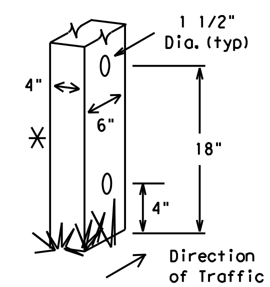
SKID MOUNTED WOOD SIGN SUPPORTS

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



GROUND MOUNTED SIGN SUPPORTS

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



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

WOOD POST SYSTEM FOR GROUND MOUNTED SIGN SUPPORTS

WEDGE ANCHORS

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

OTHER DESIGNS

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

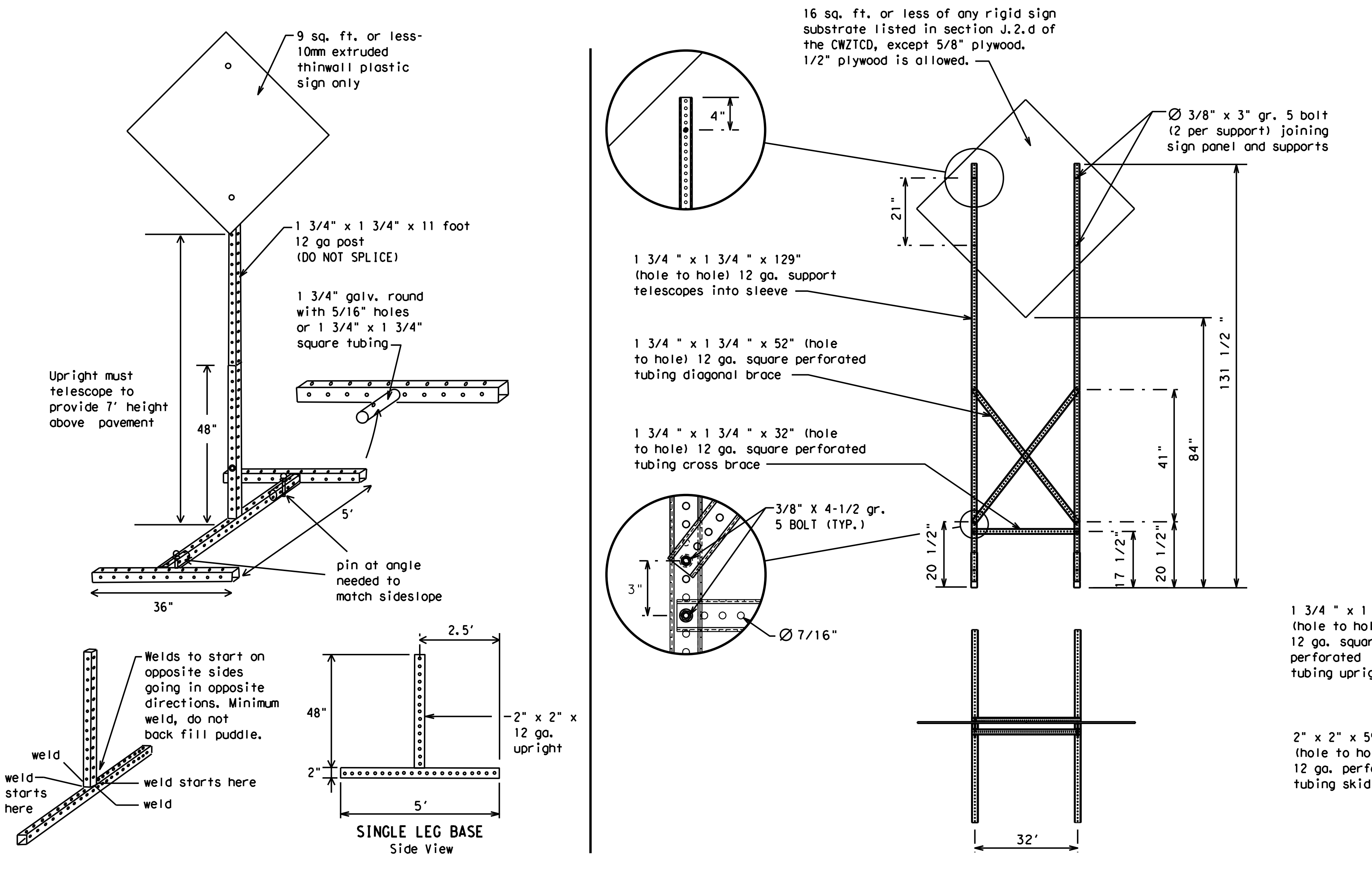
GENERAL NOTES

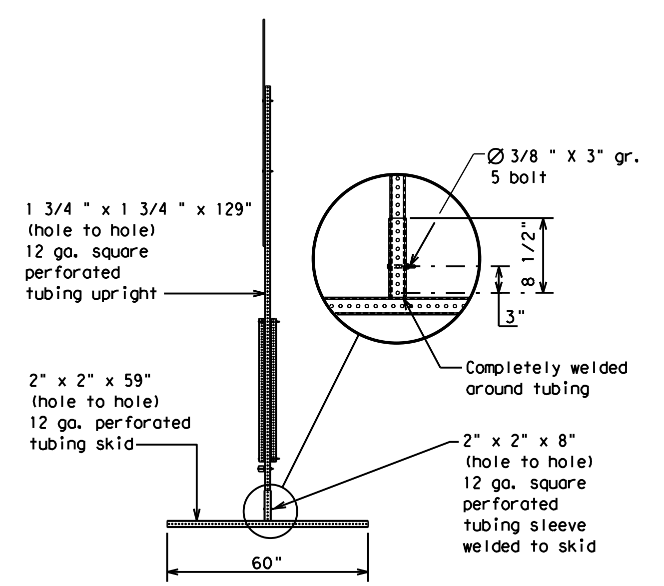
1. Nails may be used in the assembly of wooden sign supports, but 3/8" bolts with nuts or 3/8" x 3 1/2" lag screws must be used on every joint for final connection.
2. No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
3. When project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

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

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

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





SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-14

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD
Alternate	ALT
Avenue	AVE
Best Route	BEST RTE
Boulevard	BLVD
Bridge	BRDG
Cannot	CANT
Center	CTR
Construction Ahead	CONST AHD
CROSSING	XING
Detour Route	DETOUR RTE
Do Not	DONT
East	E
Eastbound	(route) E
Emergency	EMER
Emergency Vehicle	EMER VEH
Entrance, Enter	ENT
Express Lane	EXP LN
Expressway	EXPWY
XXXX Feet	XXXX FT
Fog Ahead	FOG AHD
Freeway	FRWY, FWY
Freeway Blocked	FWY BLKD
Friday	FRI
Hazardous Driving	HAZ DRIVING
Hazardous Material	HAZMAT
High-Occupancy	HOV
Vehicle Highway	HWY
Hour(s)	HR, HRS
Information	INFO
It Is	ITS
Junction	JCT
Left	LFT
Left Lane	LFT LN
Lane Closed	LN CLOSED
Lower Level	LWR LEVEL
Maintenance	MAINT

WORD OR PHRASE	ABBREVIATION
Major	MAJ
Miles	MI
Miles Per Hour	MPH
Minor	MNR
Monday	MON
Normal	NORM
North	N
Northbound	(route) N
Parking	PKING
Road	RD
Right Lane	RT LN
Saturday	SAT
Service Road	SERV RD
Shoulder	SHLDR
Slippery	SLIP
South	S
Southbound	(route) S
Speed	SPD
Street	ST
Sunday	SUN
Telephone	PHONE
Temporary	TEMP
Thursday	THURS
To Downtown	TO DWNTN
Traffic	TRAF
Travelers	TRVLRS
Tuesday	TUES
Time Minutes	TIME MIN
Upper Level	UPR LEVEL
Vehicles (s)	VEH, VEHS
Warning	WARN
Wednesday	WED
Weight Limit	WT LIMIT
West	W
Westbound	(route) W
Wet Pavement	WET PVMT
Will Not	WONT

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

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BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-14

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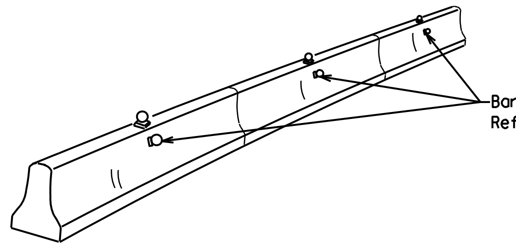
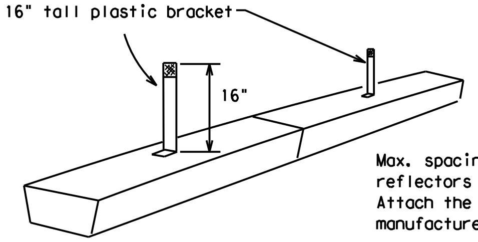
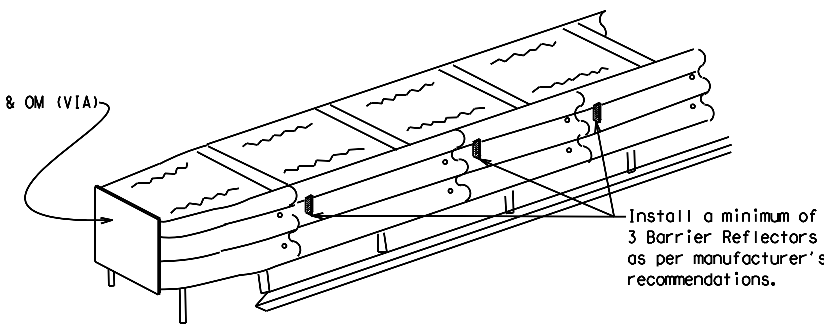
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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



CONCRETE TRAFFIC BARRIER (CTB)



LOW PROFILE CONCRETE BARRIER (LPCB)



DELINEATION OF END TREATMENTS

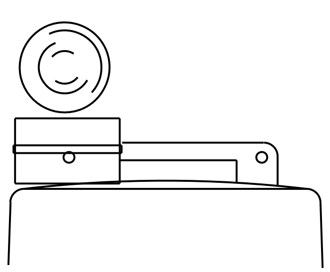
3. Where traffic is on one side of the CTB, two (2) Barrier Reflectors shall be mounted in approximately the midsection of each section of CTB. An alternate mounting location is uniformly spaced at one end of each CTB. This will allow for attachment of a barrier grapple without damaging the reflector.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

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

WARNING LIGHTS

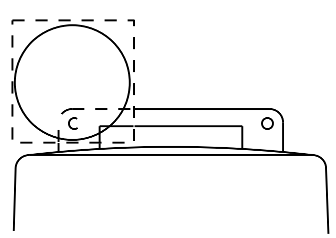


Type C Warning Light or approved substitute mounted on a drum adjacent to the travel way.

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

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



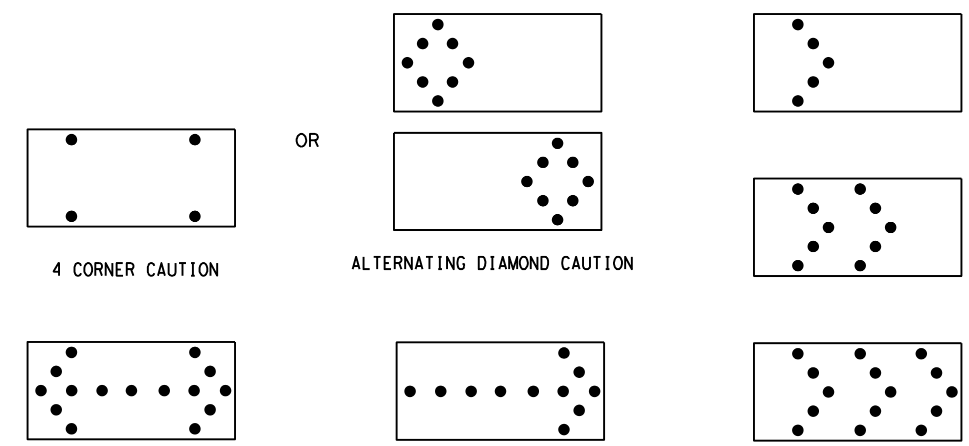
Warning reflector may be round or square.Must have a yellow reflective surface area of at least 30 square inches

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

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

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

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



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

REQUIREMENTS

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

1. Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the National Cooperative Highway Research Report No. 350 (NCHRP 350) or the Manual for Assessing Safety Hardware (MASH).
2. Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
3. Refer to the CWZTCD for a list of approved TMAs.
4. TMAs are required on freeways unless otherwise noted in the plans.
5. A TMA should be used anytime that it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the work performance.
6. The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is an extended distance from the TMA.

Texas Department of Transportation

Traffic Operations Division Standard

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

BC(7)-14

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

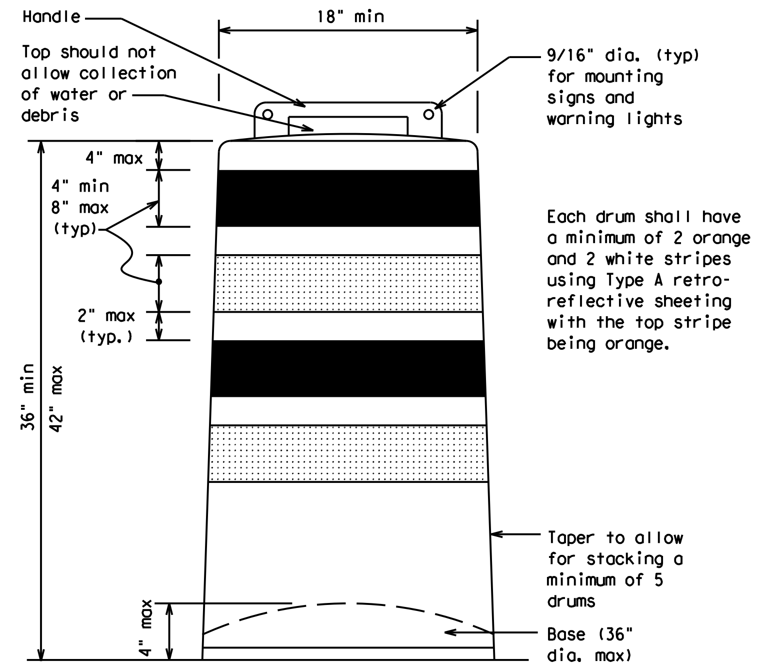
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

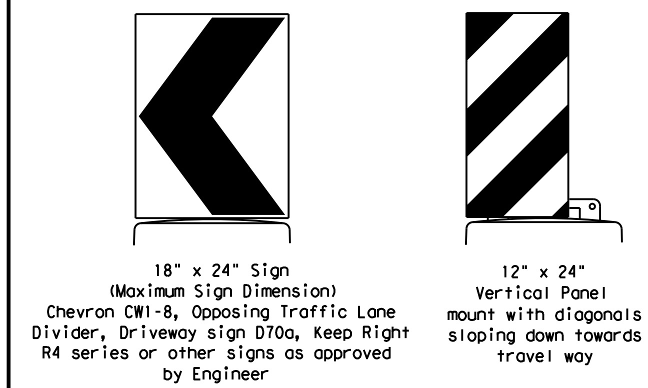
RETROREFLECTIVE SHEETING

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

BALLAST

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

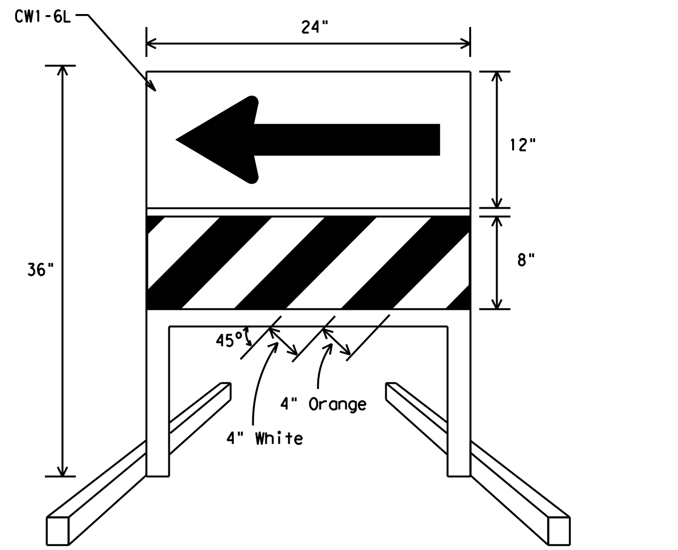




Plywood, Aluminum or Metal sign substrates shall NOT be used on plastic drums

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

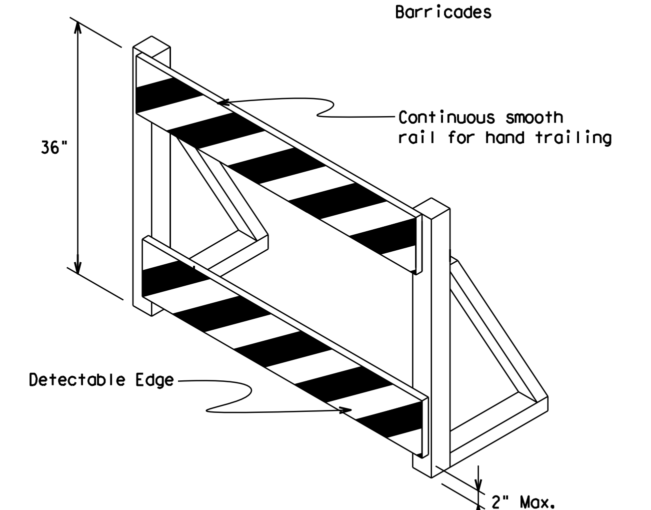
1. Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
2. Chevrons and other work zone signs with an orange background shall be manufactured with Type B_{FL} or Type C_{FL} Orange sheeting meeting the color and retroreflectivity requirements of DMS-8300, "Sign Face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



DIRECTION INDICATOR BARRICADE

1. The Direction Indicator Barricade may be used in tapers, transitions, and other areas where specific directional 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 travel lane.
3. The Direction Indicator Barricade shall consist of One-Direction Large Arrow (CW1-6) sign in the size shown with a black arrow on a background of Type B_{FL} or Type C_{FL} Orange 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 allowed.
5. Approved manufacturers are shown on the CWZTCD List. Ballast shall be as approved by the manufacturers instructions.

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



DETECTABLE PEDESTRIAN BARRICADES

1. When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, the temporary facilities shall be detectable and include accessibility features consistent with the features present in the existing pedestrian facility.
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.
3. Detectable pedestrian barricades similar to the one pictured above, longitudinal channelizing devices, some concrete barriers, and wood or chain link fencing with a continuous detectable edging can satisfactorily delineate a pedestrian path.
4. Tape, rope, or plastic chain strung between devices are not detectable, do not comply with the design standards in the "Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)" and should not be used as a control for pedestrian movements.
5. Warning lights shall not be attached to detectable pedestrian barricades.
6. Detectable pedestrian barricades may use 8" nominal barricade rails as shown on BC(10) provided that the top rail provides a smooth continuous rail suitable for hand trailing with no splinters, burrs, or sharp edges.

SHEET 8 OF 12

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-14

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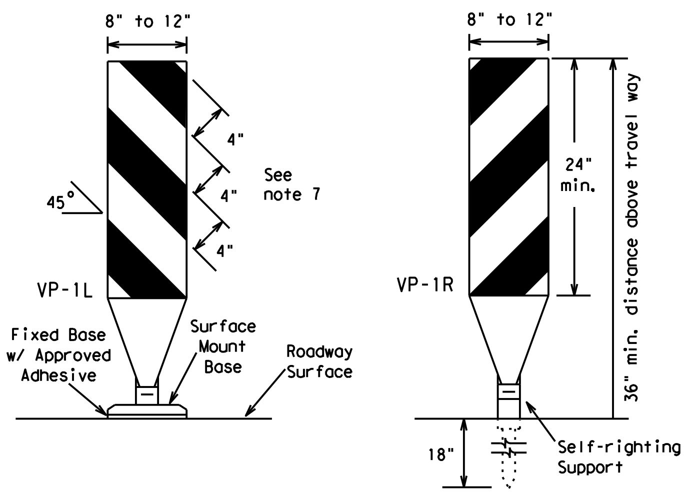
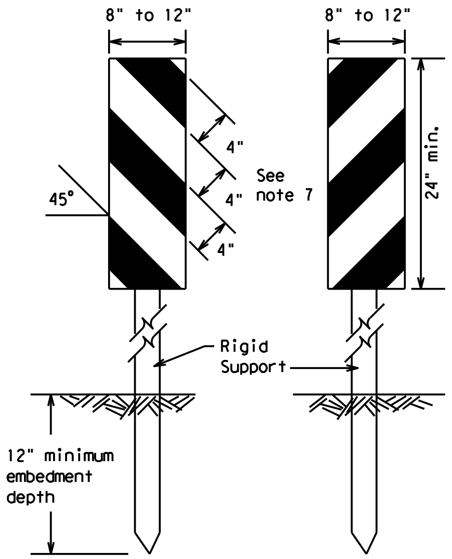
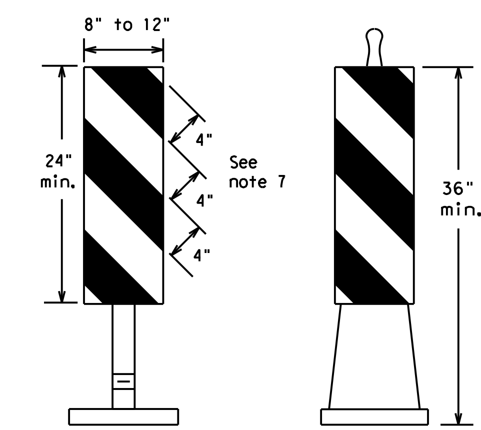


FIXED
(Rigid or self-righting)



DRIVEABLE

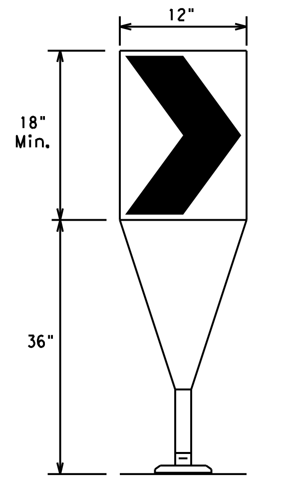


(Rigid or self-righting)

PORTABLE

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

VERTICAL PANELS (VPs)



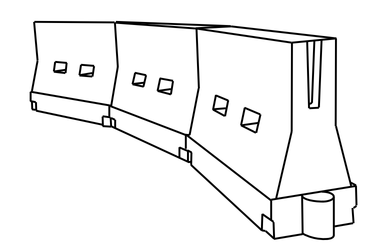
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

1. LCDs are crashworthy, lightweight, deformable devices that are highly visible, have good target value and can be connected together. They are not designed to contain or redirect a vehicle on impact.
2. LCDs may be used instead of a line of cones or drums.
3. LCDs shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. LCDs should not be used to provide positive protection for obstacles, pedestrians or workers.
5. LCDs shall be supplemented with retroreflective delineation as required for temporary barriers on BC(7) when placed roughly parallel to the travel lanes.
6. LCDs used as barricades placed perpendicular to traffic should have at least one row of reflective sheeting meeting the requirements for barricade rails as shown on BC(10) 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 road users, but also to protect the work space per the appropriate NCHRP 350 crashworthiness requirements based on roadway speed and barrier application.
2. Water ballasted systems used to channelize vehicular traffic shall be supplemented with retroreflective delineation or channelizing devices to improve daytime/nighttime visibility. They may also be supplemented with pavement markings.
3. Water ballasted systems used as barriers shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. Water ballasted systems used as barriers should not be used for a merging taper except in low speed (less than 45 MPH) urban areas. When used on a taper in a low speed urban area, the taper shall be delineated and the taper length should be designed to optimize road user operations considering the available geometric conditions.
5. When water ballasted systems used as barriers have blunt ends exposed to traffic, they should be attenuated as per manufacturer recommendations or flared to a point outside the clear zone.

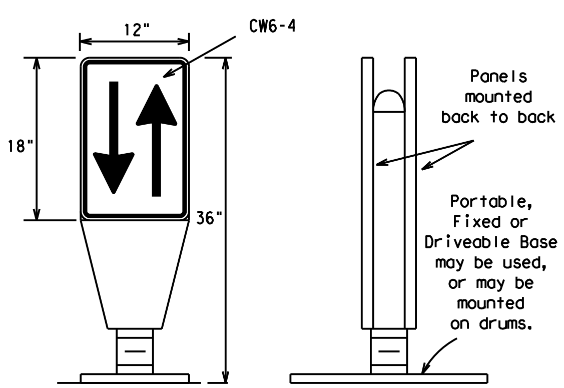
If used to channelize pedestrians, longitudinal channelizing devices or water ballasted systems must have a continuous detectable bottom for users of long canes and the top of the unit shall not be less than 32 inches in height.

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

Texas Department of Transportation — Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-14

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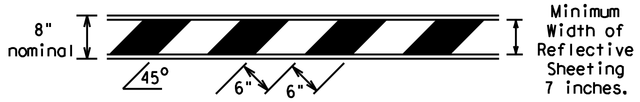
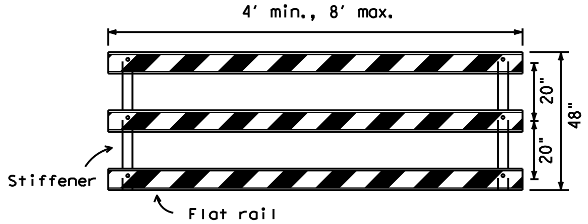
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



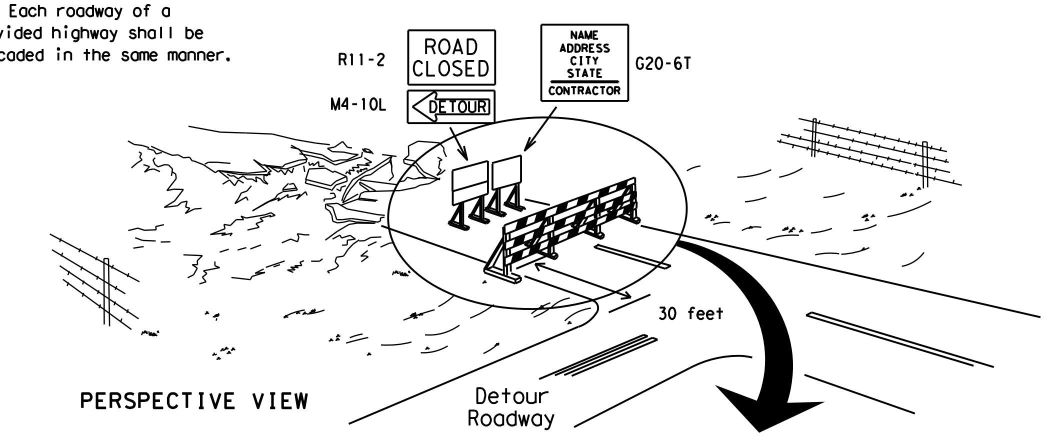
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



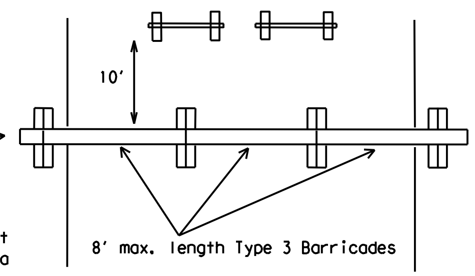
Stiffener may be inside or outside of support, but no more than 2 stiffeners shall be allowed on one barricade.

TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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

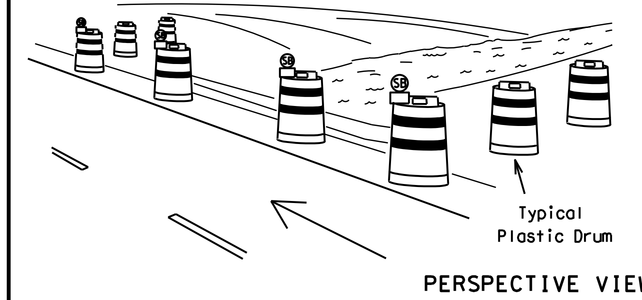


The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.

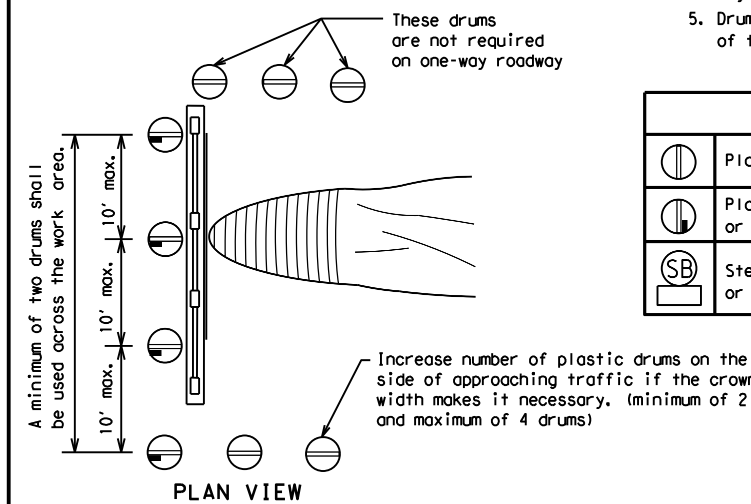


1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



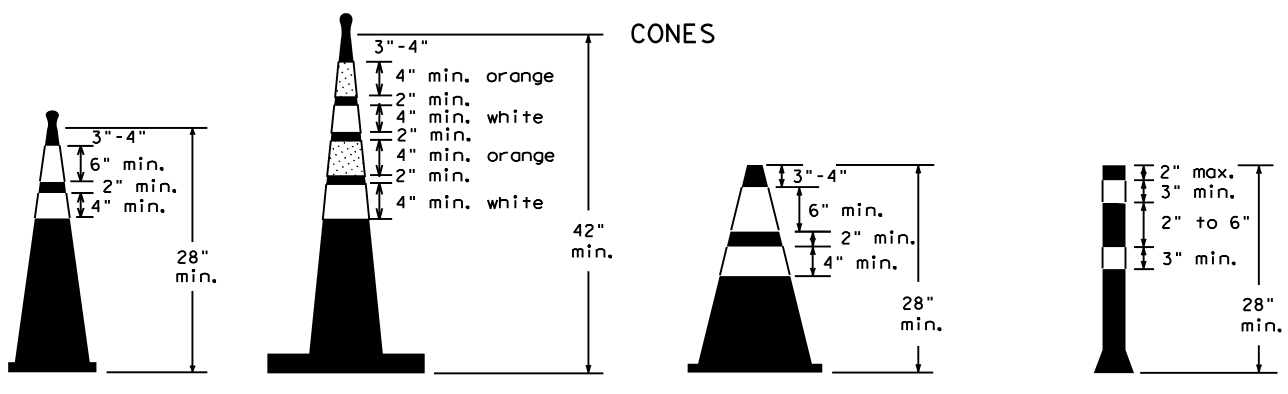
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



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

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS

CONES

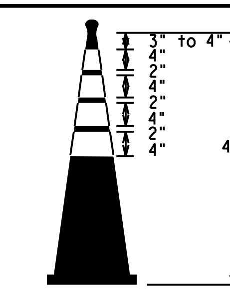


28" Cones shall have a minimum weight of 9 1/2 lbs.

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

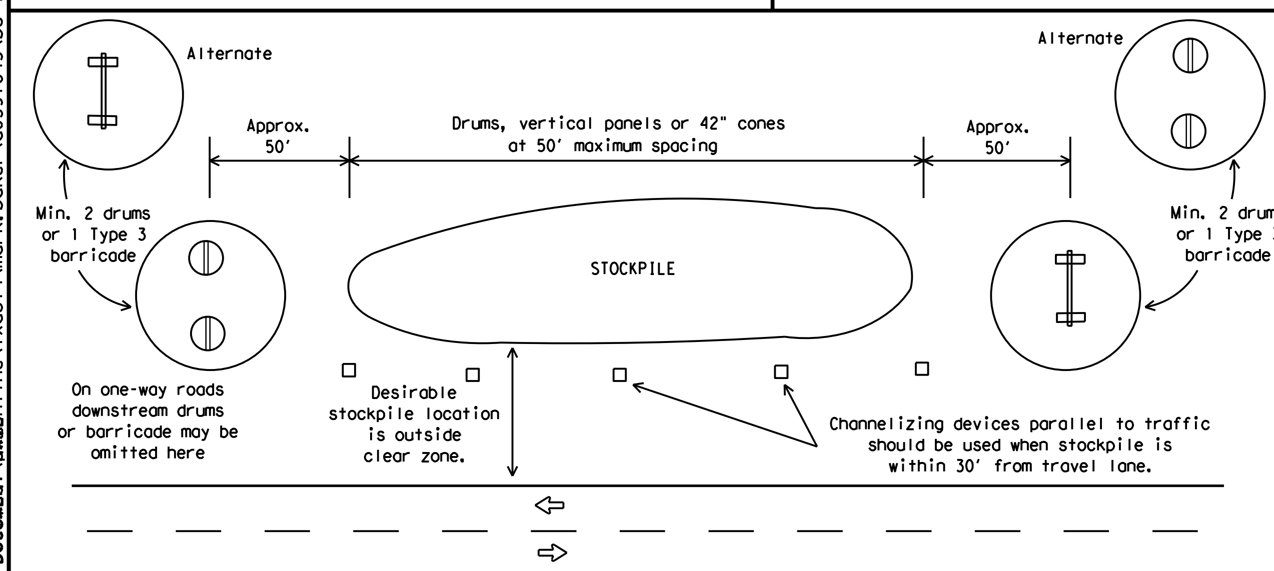
1. Traffic cones and tubular markers shall be predominantly orange, and meet the height and weight requirements shown above.
2. One-piece cones have the body and base of the cone molded in one consolidated unit. Two-piece cones have a cone shaped body and a separate rubber base, or ballast, that is added to keep the device upright and in place.
3. Two-piece cones may have a handle or loop extending up to 8" above the minimum height shown, in order to aid in retrieving the device.
4. Cones or tubular markers 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 durations.
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.



EDGELINE CHANNELIZER

1. This device is intended only for use in place of a vertical panel to channelize traffic by indicating the edge of the travel lane. It is not intended to be used in transitions or tapers.
2. This device shall not be used to separate lanes of traffic (opposing 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 retroreflective 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.



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

Texas Department of Transportation — Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-14

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© TxDOT November 2002		CONT	SECT	JOB	HIGHWAY
REVISIONS		0143	04	071	US 87
9-07 8-14		DIST		COUNTY	SHEET NO.
7-13		SAT		WILSON	18

DATE: FILE: ...\txdot4\mark.baker\d0397645\bc-14 (2).dgn

WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

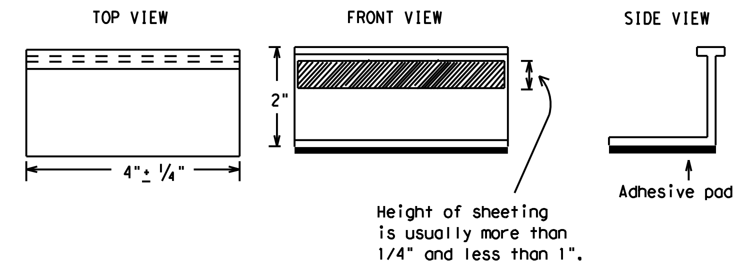
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

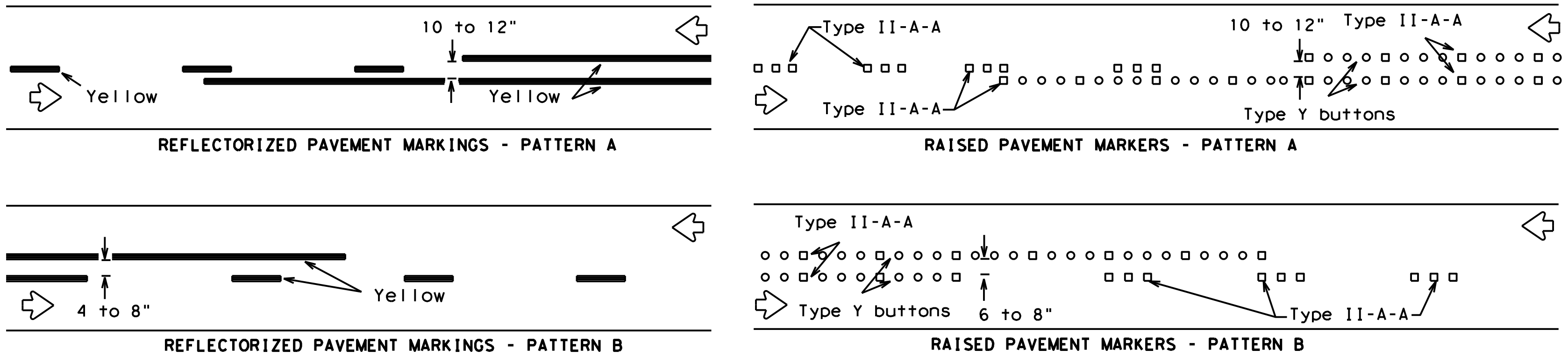
Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-14

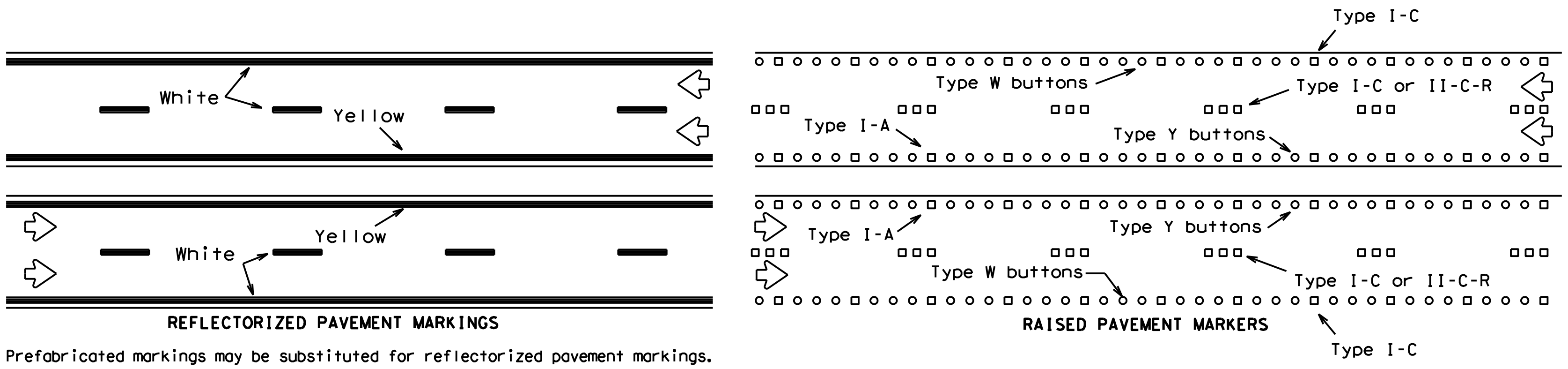
FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	071	US 87
2-98 9-07 / 1-02 7-13 / 11-02 8-14	DIST		COUNTY	SHEET NO.
	SAT		WILSON	19

PAVEMENT MARKING PATTERNS



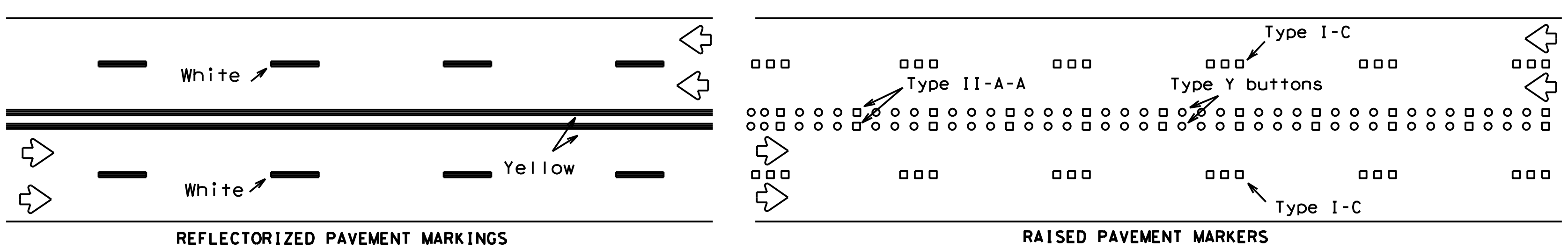
Pattern A is the TXDOT Standard, however Pattern B may be used if approved by the Engineer.
Prefabricated markings may be substituted for reflectorized pavement markings.

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



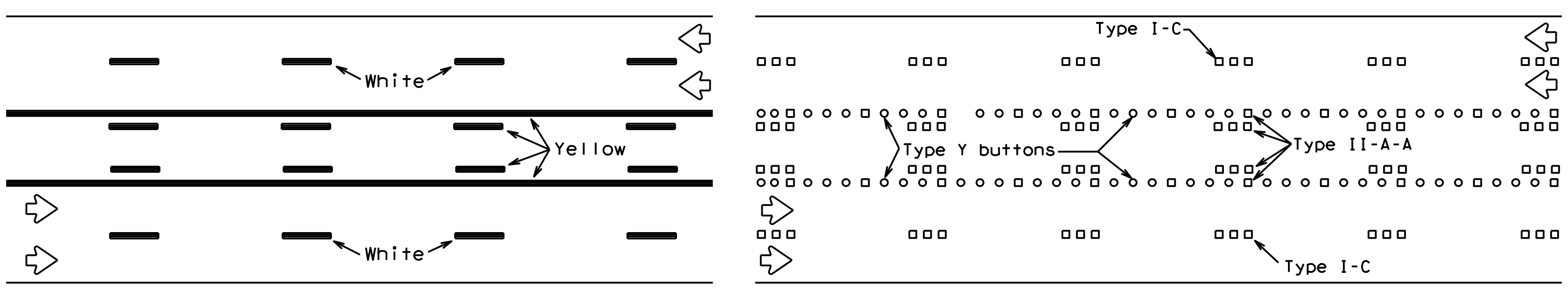
Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



Prefabricated markings may be substituted for reflectorized pavement markings.

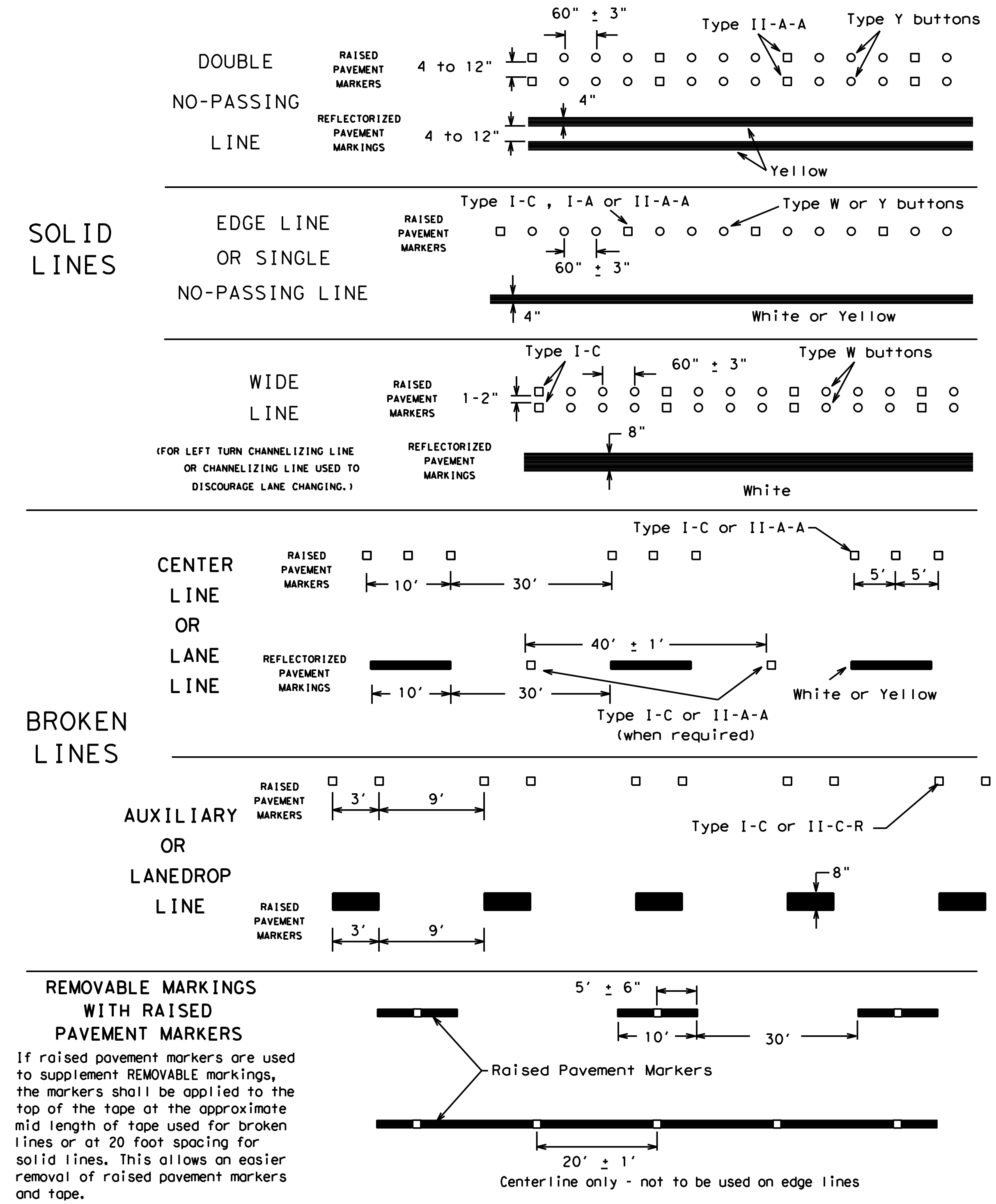
LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



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

SHEET 12 OF 12

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 2-98 7-13 11-02 8-14	0143	04	071	US 87
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	SAT		WILSON	20

106

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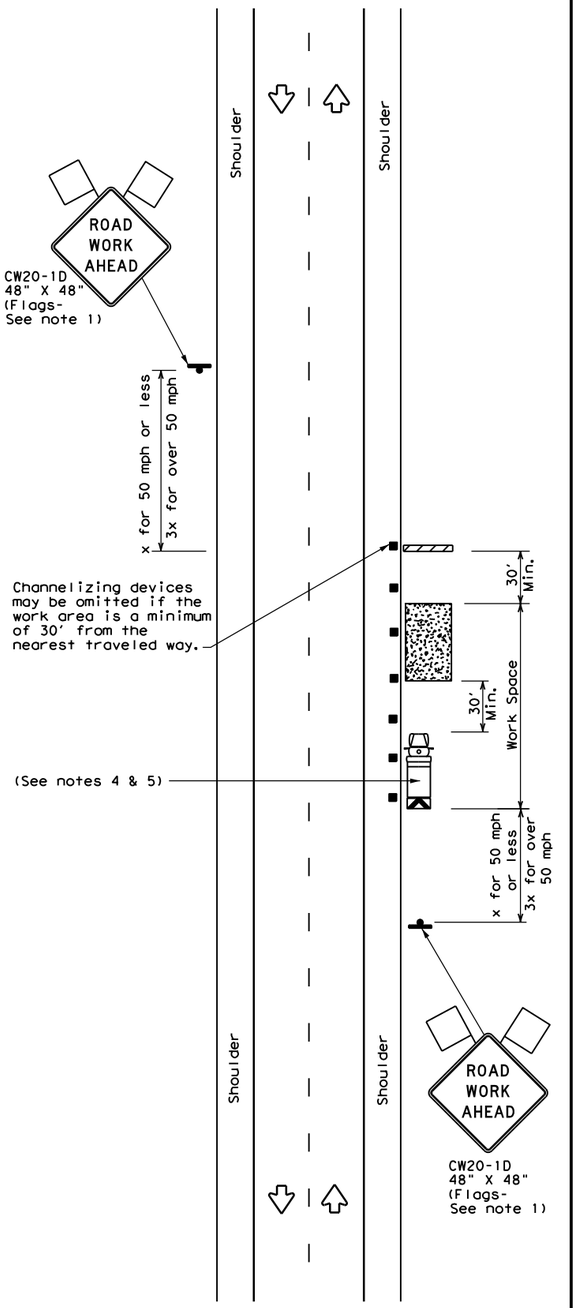
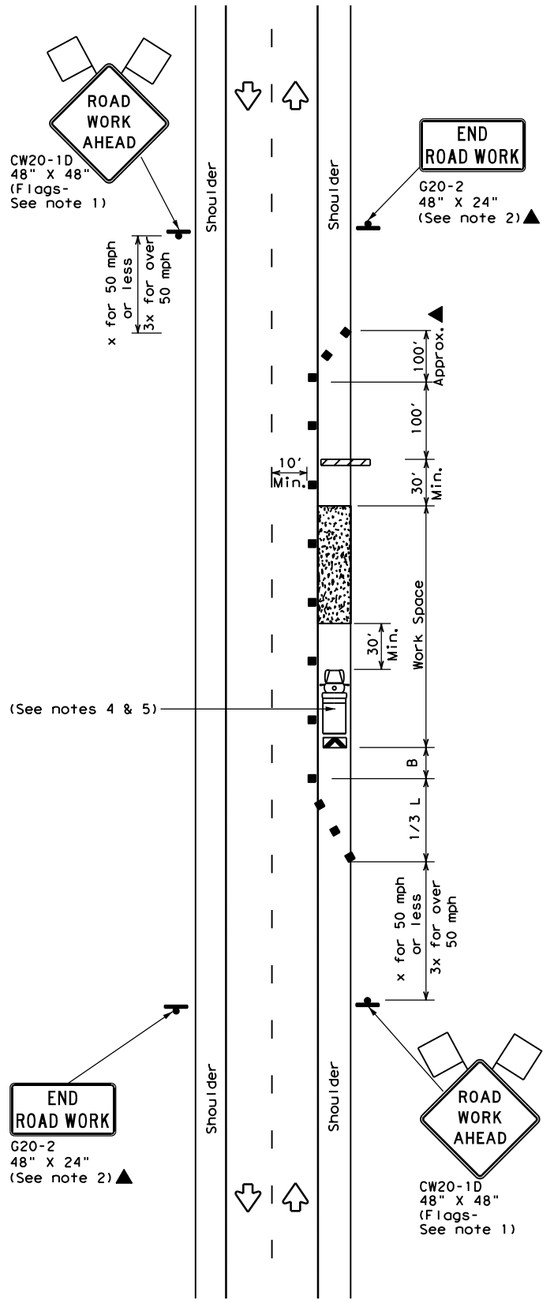


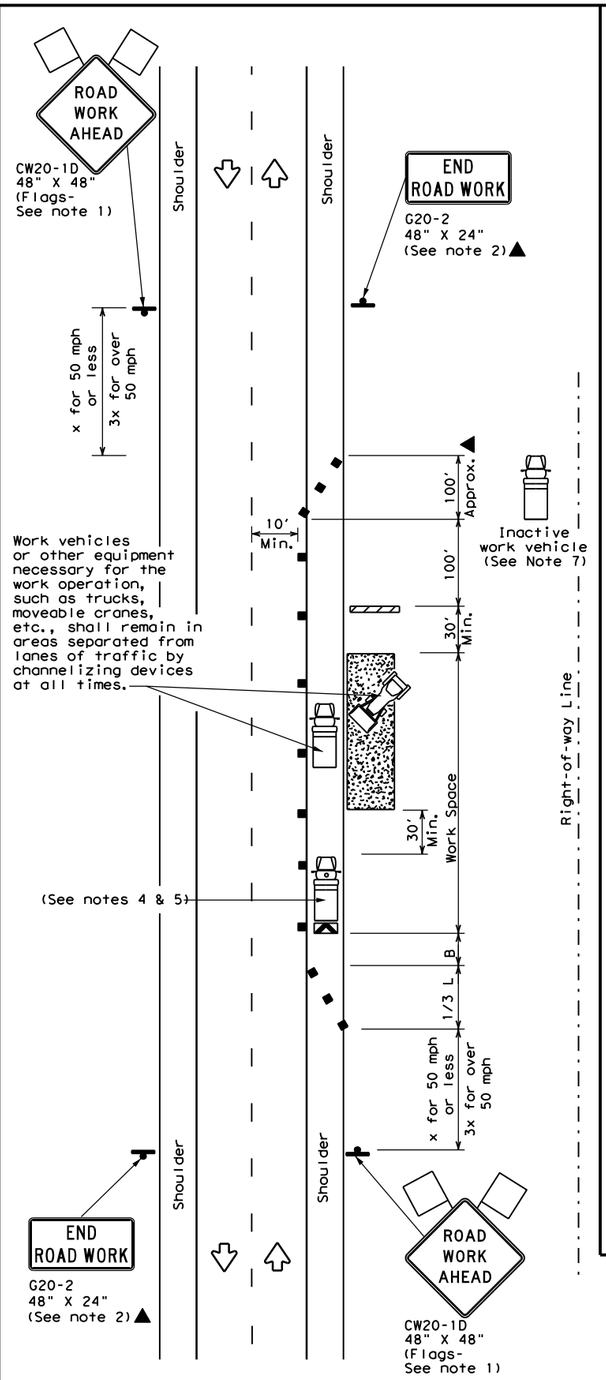
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-18

FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	071	US 87
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	SAT	WILSON		21
1-97 2-18				

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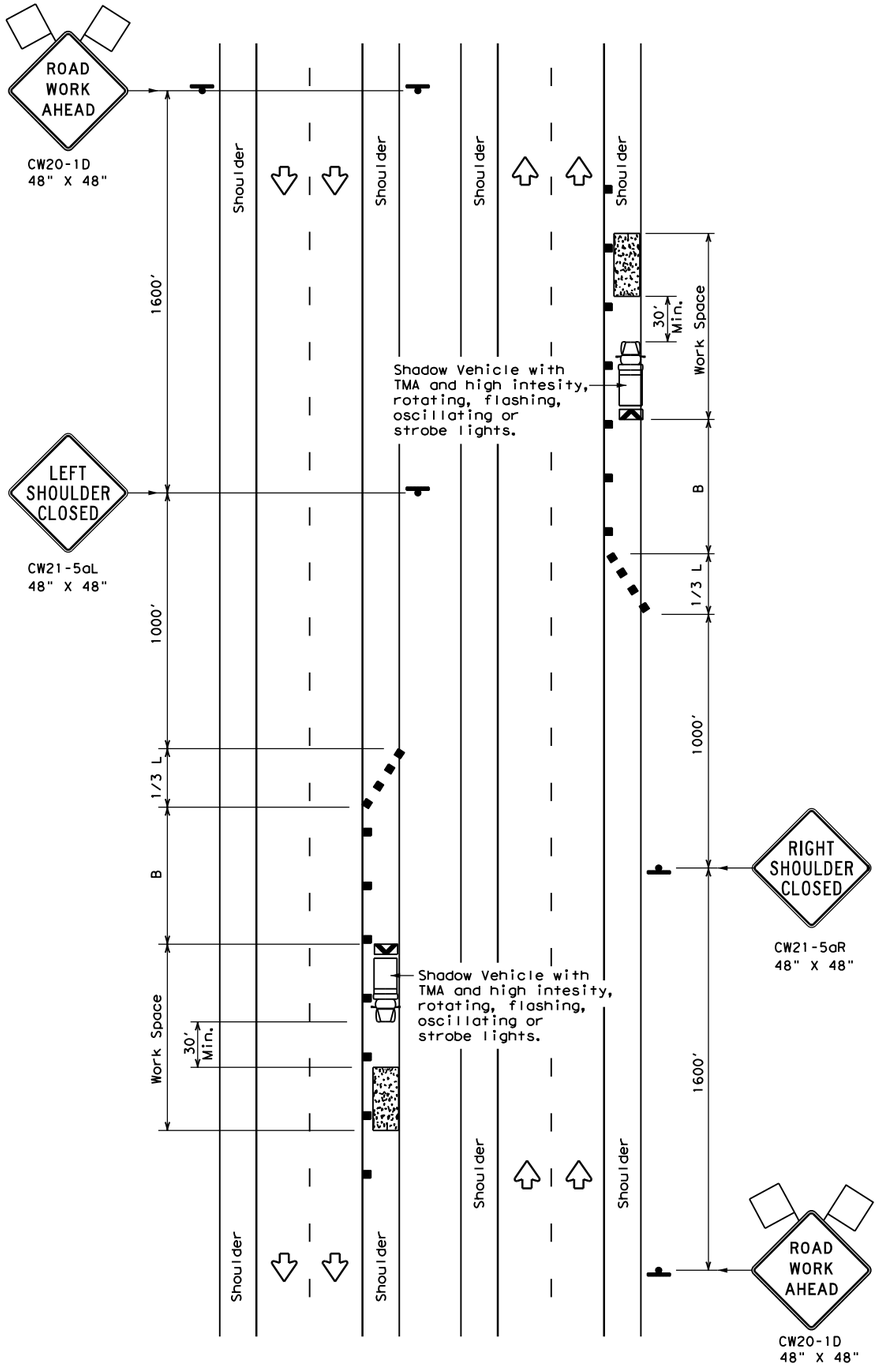
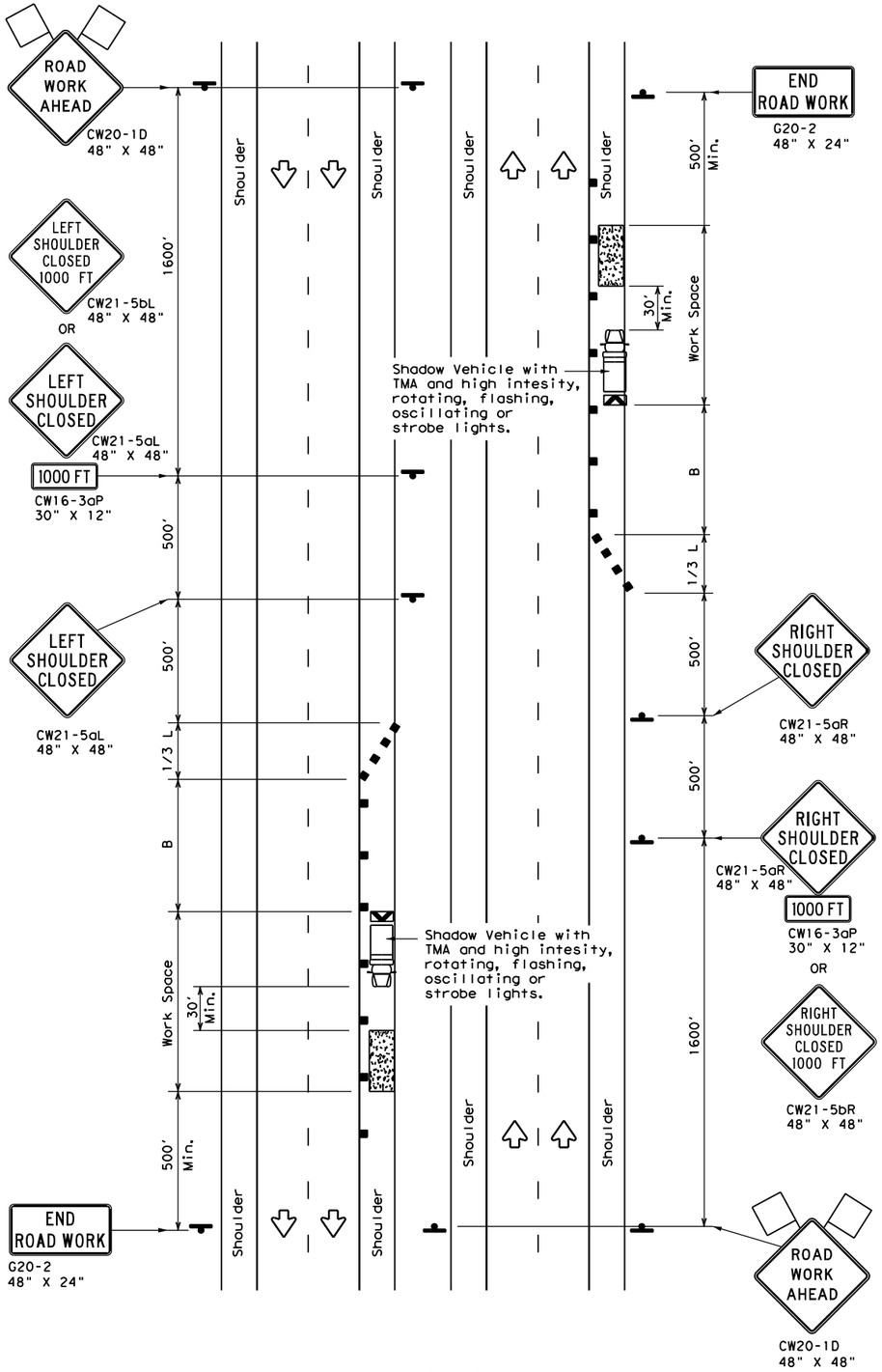


TCP (5-1a)

WORK AREA ON SHOULDER



TCP (5-1b)

WORK AREA ON SHOULDER

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

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

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

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

GENERAL NOTES

1. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30' to 100' in advance of the area of crew exposure without adversely effecting the performance or quality of the work. Type 3 barricades or drums may be substituted when workers on foot are no longer present when approved by the Engineer.
2. 28" tall or taller one-piece cones will be allowed only for Short Duration or Short Term stationary operations when workers are present to maintain the devices upright and in proper location. Intermediate Term stationary work areas should use Drums, Vertical Panels or 42" tall two-piece cones.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN SHOULDER WORK FOR FREEWAYS / EXPRESSWAYS

TCP(5-1)-18

FILE: tcp5-1-18.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-18	0143	04	071	US 87
	DIST	COUNTY		SHEET NO.
	SAT	WILSON		22

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NOTES:

EXISTING ELEMENTS ARE SHOWN GRAY.

VARY ACCESS ROUTES ONTO AND WITHIN THE SITE TO AVOID DAMAGE TO EXISTING VEGETATION.

PLACE PLANTING BEDS AS SHOWN AND ACCORDING TO THE SCALE OF THE DRAWING.

ENSURE TREES ARE PLACED A MINIMUM OF 16' FROM THE EDGE OF THE FRONTAGE ROAD OR RAMP, 30' FROM EDGE OF THE MAINLANE PAVEMENT, AND A MINIMUM OF 15' FROM THE EDGE OF A BRIDGE RAIL OR OVERHEAD POWER LINE.

LOCATE PALMS INDIVIDUALLY WITHIN THE UNDERSTORY ZONE IN COORDINATION WITH THE LANDSCAPE ARCHITECT.

ALL DIMENSIONS ARE TAKEN FROM THE EDGE OF PAVEMENT OR BACK OF CURB UNLESS OTHERWISE NOTED.

SEE PLANTING BED QUANTITIES TABLE ON PLANTING BED DETAILS SHEET FOR PLANT QUANTITIES OF INDIVIDUAL BEDS.

NO BED PREP IS TO BE PERFORMED WITHIN 10' OF EXISITING TREES.

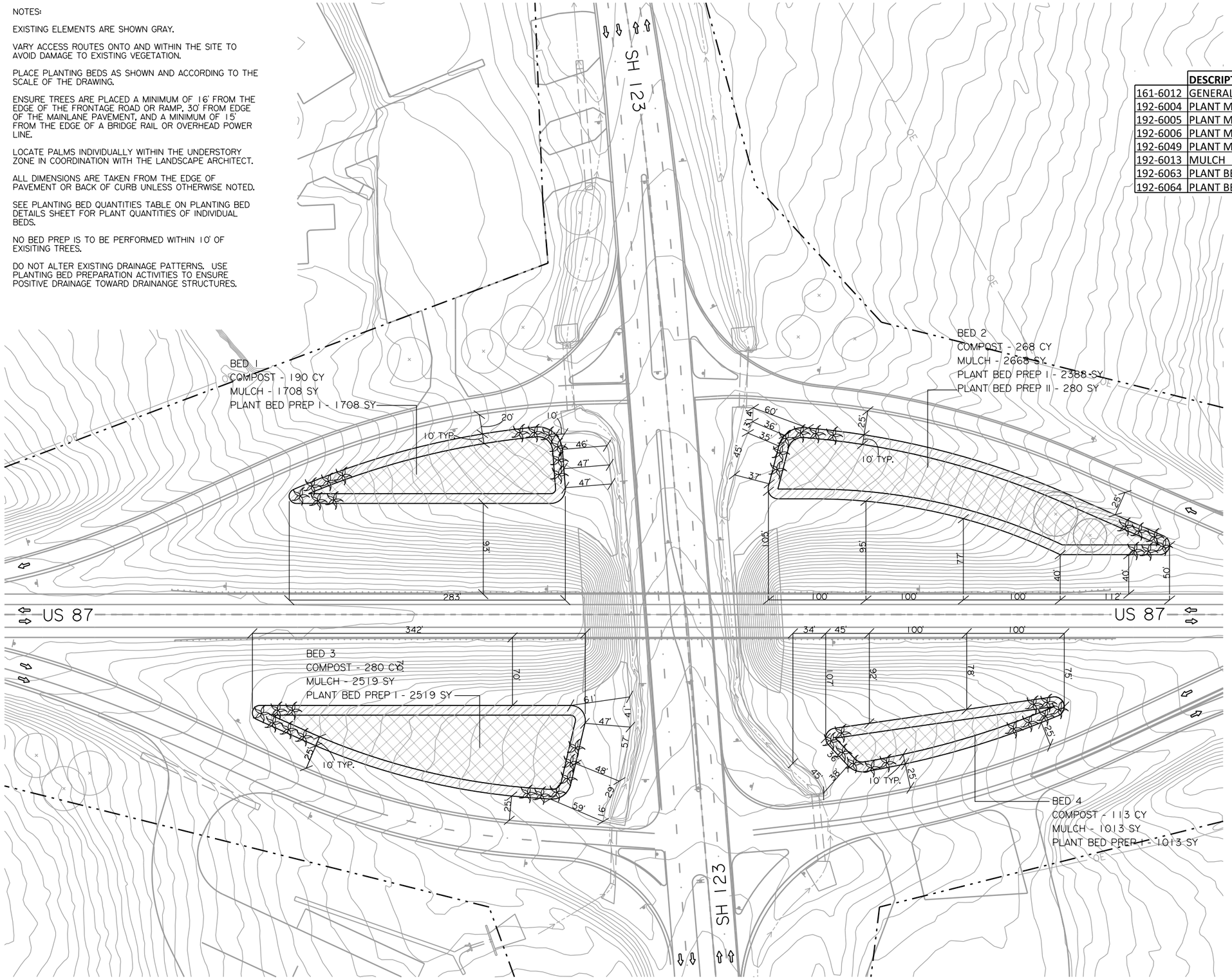
DO NOT ALTER EXISTING DRAINAGE PATTERNS. USE PLANTING BED PREPARATION ACTIVITIES TO ENSURE POSITIVE DRAINAGE TOWARD DRAINANGE STRUCTURES.

LEGEND

PALM

EXISTING TREES

	DESCRIPTION	UNITS	QUANTITY
161-6012	GENERAL USE COMPOST	CY	851
192-6004	PLANT MATERIAL (5-GAL)	EA	143
192-6005	PLANT MATERIAL (15-GAL)	EA	450
192-6006	PLANT MATERIAL (30-GAL)	EA	197
192-6049	PLANT MATERIAL (MIN 4' TRNK HT)(PALM)	EA	48
192-6013	MULCH	SY	7908
192-6063	PLANT BED PREPARATION (TYPE I)	SY	7628
192-6064	PLANT BED PREPARATION (TYPE II)	SY	280



OE OVERHEAD ELECTRIC

APPARENT ROW

THE EXISTENCE AND LOCATION OF ALL UTILITIES INDICATED ON THE PLANS IS TAKEN FROM THE BEST RECORDS AVAILABLE AND IS NOT GUARANTEED TO BE ACCURATE OR TOTALLY INCLUSIVE. COORDINATE WITH ALL UTILITY COMPANIES TO FIELD VERIFY UTILITIES PRIOR TO BEGINNING CONSTRUCTION.

REGISTERED LANDSCAPE ARCHITECT
MARK A. BAKER
3402
STATE OF TEXAS

0 20 40 60 80 100

SCALE: 1" = 100'-0"

Texas Department of Transportation

US 87

PLANTING PLAN

SHEET

FED.RD. DIV.NO.	FEDERAL AID PROJECT		SHEET NO.
6	SHOWN ON TITLE SHEET		23
STATE	DIST.	COUNTY	
TEXAS	SAT	WILSON	
CONT.	SECT.	JOB	HIGHWAY NO.
0143	04	071	US 87

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PLANTING NOTES:

1. REFERENCE ITEM 192 OF THE TEXAS STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MAINTENANCE OF HIGHWAYS, STREETS AND BRIDGES 2014 FOR SPECIFICATIONS, DIMENSIONS, VOLUMES AND MEASUREMENTS THAT HAVE BEEN MODIFIED OR ARE NOT SHOWN.

2. REJECTION OF PLANTS WILL BE IN ACCORDANCE WITH ITEM 192.2.2.

3. VERIFY THAT ALL PLANTING MEETS THE FOLOWING CLEAR ZONE MINIMUM STANDARDS UNLESS SPECIFIED ELSEWHERE ON PLANS:
   TREES: 30' FROM EDGE OF TRAVEL LANE UNLESS PROTECTED BY A BARRIER,
   SHRUBS: 15' FROM EDGE OF TRAVEL LANE UNLESS PROTECTED BY A BARRIER,
   VINES AND GROUNDCOVER: NO MINIMUM DISTANCE.
   MINIMUM DISTANCES WILL BE DETERMINED BY THE ENGINEER IF PROTECTED BY A BARRIER.

4. STAKE ALL LOCATIONS OF TREES, SHRUBS AND BEDS IN THE FIELD IN ACCORDANCE WITH ITEM 192.3.3.

5. IN PLANTING BED AREAS, USE SOIL EXCAVATED FROM THE PREPARED PLANT BEDS FOR BACKFILL.

6. FOR SURFACE APPLICATION, USE MULCH CONSISTING OF 100% SHREDDED WOOD CHIPS. WOOD CHIPS SHALL CONSIST OF SHREDDED NATIVE PLANT MATERIAL AND SHALL NOT HAVE VISIBLE GLASS, METAL, ROCK, PLASTIC, LARGE PIECES OF WOOD, OR OTHER DEBRIS THAT WOULD AFFECT THE POSITIVE AESTHETIC QUALITY OF THE MULCH.

7. APPLY 2 TIMES THE PLANT CONTAINER GALLON SIZE OF WATER TO PLANTS AT PLANTING. WATER ACCORDING TO SCHEDULE SHOWN ON IRRIGATION DETAILS SHEET THEREAFTER.

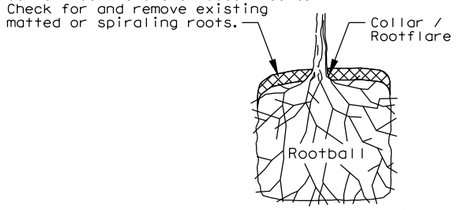
8. REFER TO ITEM 168.2 FOR WATER QUALITY INFORMATION.

9. DO NOT INSTALL PLANTS WHICH WILL HAVE AN AUTOMATIC IRRIGATION SYSTEM UNTIL APPROPRIATE IRRIGATION SECTION VALVE ASSEMBLY AND QUICK COUPLER DEVICES ARE OPERABLE.

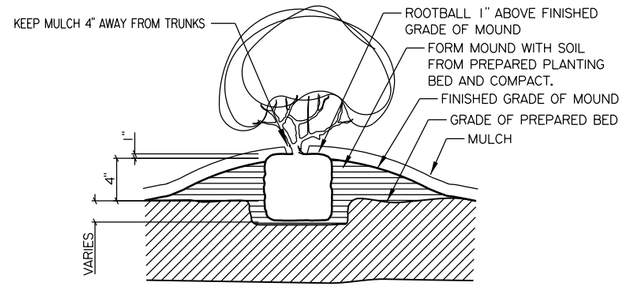
10. AT THE TIME OF INSTALLATION, MANUALLY WATER ALL PLANTS THE SAME DAY AS PLANTING AT A RATE AND FREQUENCY SHOWN ABOVE. INSTALL IRRIGATION EMISSION DEVICE IMMEDIATELY AFTER PLANT INSTALLATION. WATER DELIVERED THROUGH IRRIGATION SYSTEM WILL BE PAID FOR ACCORDING TO GENERAL IRRIGATION NOTES ON IRRIGATION SPECIFICATIONS SHEET. STRESSED PLANT MATERIAL WILL BE REJECTED ACCORDING TO ITEM 192.2.2. AND REPLACED AT CONTRACTOR'S EXPENSE.

11. PLACE MULCH OVER ENTIRE PLANTING BED AREAS SHOWN ON THE PLANS. (INCLUDES AREAS UNDER EXISTING TREES THAT DO NOT RECEIVE PLANTING BED PREPARATION)

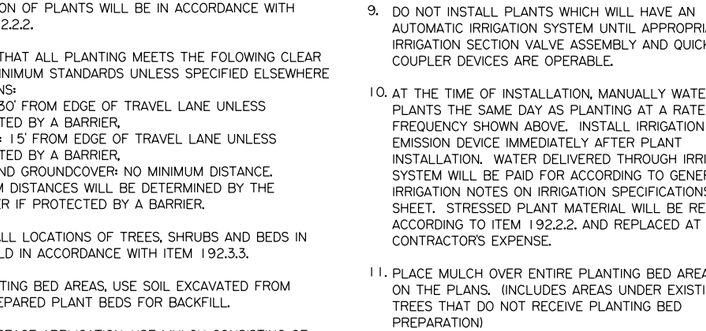
12. WHERE LOOSE AGGREGATE FOR GROUNDCOVER IS SPECIFIED ON THE PLANS USE IT INSTEAD OF MULCH.



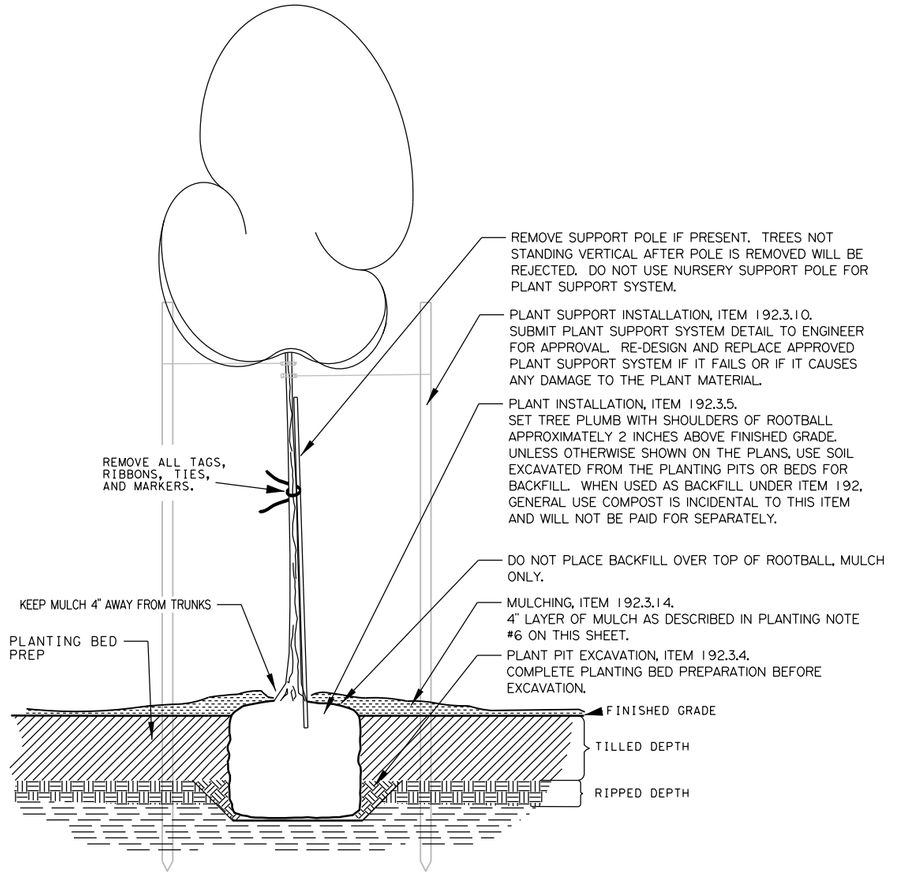
PRIOR TO PLACING ROOTBALL IN HOLE (NTS)



EVERGREEN SUMAC PLANTING DETAIL (NTS)



TREE AND SHRUB PLANTING ON SLOPE (NTS)



TREE AND SHRUB PLANTING DETAIL (NTS)

REGISTERED LANDSCAPE ARCHITECT
MARK A. BAKER
3402
STATE OF TEXAS

Texas Department of Transportation

US 87

PLANTING DETAILS

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		24
STATE	DIST.	COUNTY	
TEXAS	SAT	WILSON	
CONT.	SECT.	JOB	HIGHWAY NO.
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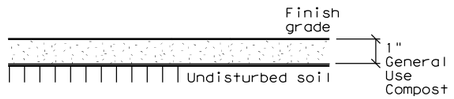
PLANTING BED PREPARATION TYPE II

USE TYPE II PLANTING BED PREPARATION WITHIN THE DRIPLINE OF EXISTING PLANTS.

Perform planting bed operations in the following order:

1. Stake bed preparation areas or otherwise designate the proper locations according to the plans. Obtain approval of final locations before continuing work under this Item.
2. Apply a glyphosate type herbicide to the bed preparation areas (two times, fifteen (15) days apart) to eradicate all existing vegetation. Obtain approval before application of herbicide. Fifteen (15) days after second herbicide application, scalp mow the bed preparation areas. Time charges will accrue during this period.
3. Apply general use compost as described in Standard Specification Item 161, Compost. Distribute compost evenly over bed preparation areas at a depth of one (1) inch. Compost will be paid for separately.

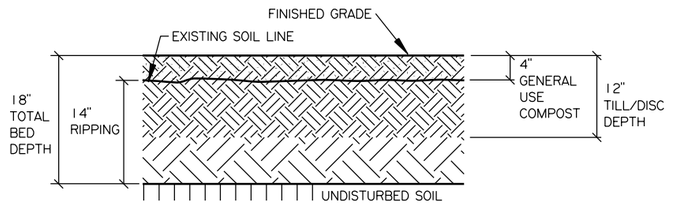


PLANTING BED PREPARATION TYPE II (NTS)

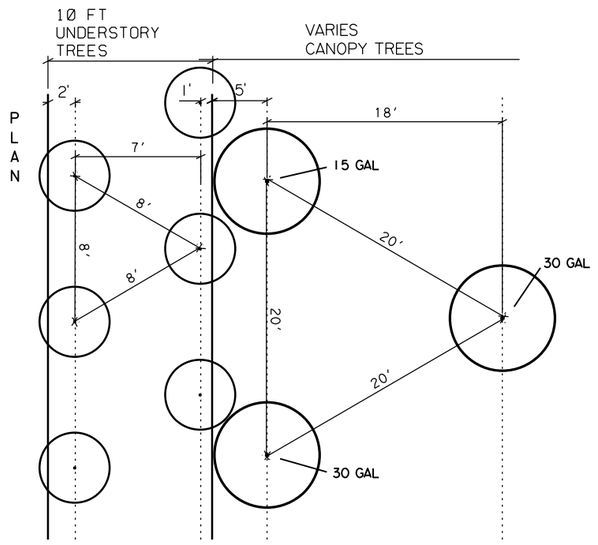
PLANTING BED PREPARATION TYPE I

PERFORM PLANTING BED OPERATIONS IN THE FOLLOWING ORDER:

1. TIME CHARGES WILL ACCRUE THROUGHOUT THE PLANTING BED PREPARATION OPERATIONS.
2. STAKE BED PREPARATION AREAS OR OTHERWISE DESIGNATE THE PROPER LOCATIONS ACCORDING TO THE PLANS. MOW AREA IF NECESSARY TO FACILITATE THE STAKING OF BED LOCATIONS. OBTAIN APPROVAL OF FINAL LOCATIONS BEFORE CONTINUING WORK UNDER THIS ITEM.
3. APPLY A GLYPHOSATE-TYPE HERBICIDE TO THE BED PREPARATION AREAS (TWO TIMES, FIFTEEN (15) DAYS APART) TO ERADICATE ALL EXISTING VEGETATION. OBTAIN APPROVAL BEFORE APPLICATION OF HERBICIDE.
4. FIFTEEN (15) DAYS AFTER SECOND HERBICIDE APPLICATION, SCALP MOW THE BED PREPARATION AREAS. TIME CHARGES WILL ACCRUE DURING THIS PERIOD.
5. RIP THE BED PREPARATION AREAS TO A DEPTH OF FOURTEEN (14) INCHES USING EQUIPMENT WITH A MAXIMUM TWENTY-FOUR (24) INCH SPACE BETWEEN RIPPING TINES. TAKE SPECIAL PRECAUTION TO AVOID ANY UNDERGROUND UTILITIES WITHIN THE PROJECT AREAS AND DO NOT ALTER EXISTING DRAINAGE PATTERNS.
6. APPLY GENERAL USE COMPOST AS DESCRIBED IN STANDARD SPECIFICATION ITEM 161, COMPOST. DISTRIBUTE COMPOST EVENLY OVER BED PREPARATION AREAS AT A DEPTH OF FOUR (4) INCHES. COMPOST WILL BE PAID FOR SEPARATELY FOR TYPE I PLANTING BED PREPARATION.
7. TILL/DISC SOIL TO A SMOOTH CONSISTENCY TO A DEPTH OF TWELVE (12) INCHES. TAKE SPECIAL PRECAUTIONS TO AVOID ANY UNDERGROUND UTILITIES WITHIN THE PROJECT AREAS AND DO NOT ALTER EXISTING DRAINAGE PATTERNS.



PLANTING BED PREPARATION TYPE I (NTS)

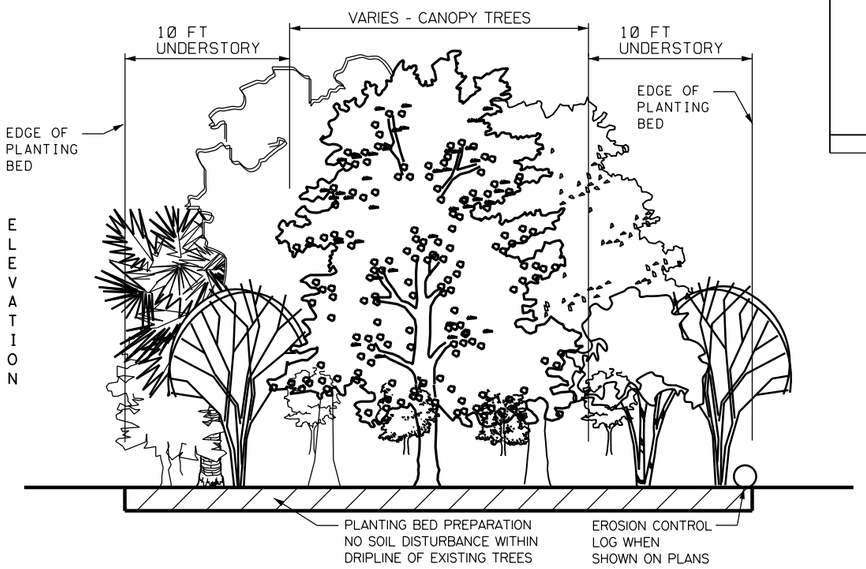


NOTES:

1. PLANT QUANTITIES ARE BASED ON A TRIANGULAR SPACING. USE THE FOLLOWING SPACINGS FOR EACH CORRESPONDING AREA: (O.C. = ON CENTER)

   CANOPY - 20' O.C.
   UNDERSTORY - 8' O.C.

2. PLACE LIKE SPECIES IN GROUPS SPACED THROUGHOUT THE PLANTING AREA WITH NO LESS THAN 6 (OR THE MINIMUM NUMBER PER BED) AND NO MORE THAN 10 PLANTS PER GROUP.
3. AS MUCH AS POSSIBLE, PLACE EACH GROUP OF PLANTS IN LOCATIONS SUITED TO THE GROWING CONDITIONS OF THAT PARTICULAR SPECIES.
4. DO NOT PERFORM PLANTING BED PREPARATION OR INSTALL PLANTS DIRECTLY UNDER THE CANOPY OF EXISTING TREES WITHIN PLANTING BEDS.
5. THE CANOPY TREE QUANTITIES ARE APPROXIMATELY SPECIFIED AT 70% 30 GAL AND 30% 15 GAL SIZES. VARY LAYOUT OF CANOPY TREES TO EVENLY DISTRIBUTE 30 GAL AND 15 GAL PLANTS THROUGHOUT THE PLANTING BEDS.
6. THE UNDERSTORY TREES QUANTITIES ARE APPROXIMATELY SPECIFIED AT 70% 15 GAL AND 30% 5 GAL SIZES. VARY LAYOUT OF UNDERSTORY TREES TO EVENLY DISTRIBUTE 5 GAL AND 15 GAL PLANTS THROUGHOUT THE PLANTING BEDS.



PLANTING BED LAYOUT (NTS)

LOCATION/SIZE	DESCRIPTION	PLANTING BED 1	2	3	4
Understory #30	Mexican Plum	4	7	5	4
	Desert Willow 'Bubba'	4	7	5	4
	Possumhaw	4	7	5	4
	Roughleaf Dogwood	5	6	5	4
	Southern Wax Myrtle	5	6	6	3
	Texas Mountain Laurel	5	7	6	4
	Mexican Redbud	5	6	6	4
		0	0	0	0
		0	0	0	0
		0	0	0	0
	TOTAL:	**32**	**46**	**38**	**27**
		32	**46**	**38**	**27**
Understory #15	Mexican Plum	13	19	16	11
	Desert Willow 'Bubba'	14	20	16	11
	Possumhaw	14	20	16	11
	Roughleaf Dogwood	14	20	16	11
	Southern Wax Myrtle	14	20	16	12
	Texas Mountain Laurel	14	19	17	12
	Mexican Redbud	14	19	17	12
		0	0	0	0
		0	0	0	0
		0	0	0	0
	TOTAL:	**97**	**137**	**114**	**80**
		97	**137**	**114**	**80**
Understory #5	Mexican Plum	4	6	5	3
	Desert Willow 'Bubba'	4	6	5	4
	Possumhaw	4	6	5	4
	Roughleaf Dogwood	5	7	5	4
	Southern Wax Myrtle	5	7	6	4
	Texas Mountain Laurel	5	7	6	4
	Mexican Redbud	5	7	6	4
		0	0	0	0
		0	0	0	0
		0	0	0	0
	TOTAL:	**32**	**46**	**38**	**27**

LOCATION/SIZE	DESCRIPTION	PLANTING BED 1	2	3	4
Canopy #15	Cedar Elm	1	1	1	1
	Mexican Sycamore	1	1	2	1
	Mexican White Oak	1	2	1	1
	Montezuma Cypress	1	2	1	0
	Texas Red Oak	1	1	1	1
		0	0	0	0
		0	0	0	0
	TOTAL:	**5**	**7**	**6**	**4**
		5	**7**	**6**	**4**
Canopy #30	Bald Cypress	1	2	2	1
	Bur Oak	1	3	2	1
	Cedar Elm	2	3	2	1
	Chinquapin Oak	2	3	2	2
	Mexican Sycamore	2	2	3	2
	Lacey Oak	2	2	2	2
	Live Oak	2	2	2	1
		0	0	0	0
		0	0	0	0
	TOTAL:	**12**	**17**	**15**	**10**
	Texas Sabal Palm	12	12	12	12

REGISTERED LANDSCAPE ARCHITECT
MARK A. BAKER
3402
STATE OF TEXAS

Texas Department of Transportation

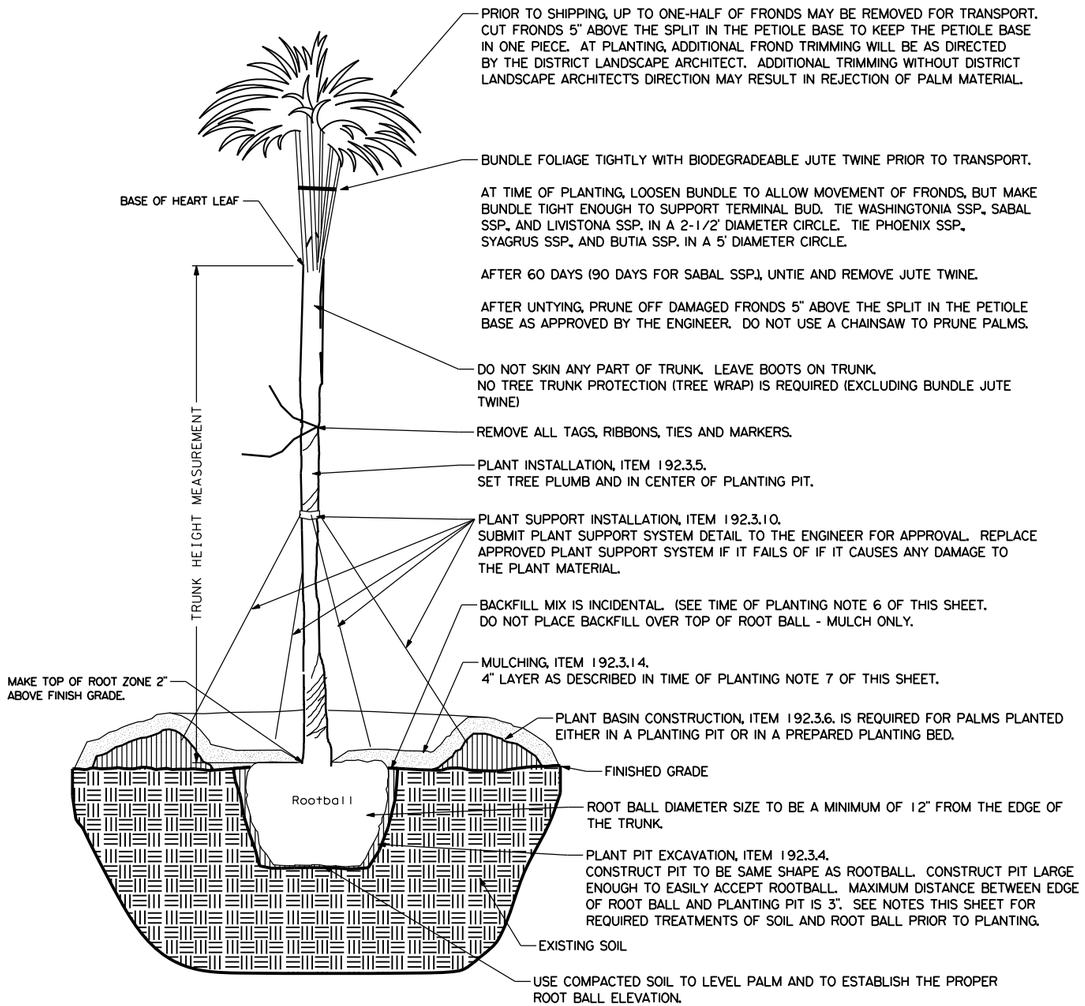
US 87
PLANTING BED DETAILS

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		25
STATE	DIST.	COUNTY	
TEXAS	SAT	WILSON	
CONT.	SECT.	JOB	HIGHWAY NO.
0143	04	071	US 87

IF PALM MATERIAL FALLS TO THE GROUND DURING DELIVERY, CONSTRUCTION, OR MAINTENANCE, IT IMMEDIATELY BECOMES THE PROPERTY OF THE CONTRACTOR AND MUST BE REPLACED.

COMPLETE WORK MARKED BY ✳ IN THE PRESENCE OF THE ENGINEER.



PALM TREE PLANTING

NOTES:
Monitor watering to maintain root ball and surrounding backfill evenly moist, but never saturated. Rate and frequency may be adjusted to meet site conditions and weather. Submit adjustments to engineer for approval. Daily inspection may be necessary when rootball is over-saturated by rain, run-off, watering or other events.

Apply water over the rootball within the tree well only. Adjust rate and frequency to meet site conditions and weather as approved or directed by engineer.

Plant material in poor condition due to the failure to apply the specified amount of water within the time allowed or overwatering, will be replaced at contractor's expense.

PALM TREATMENTS AND APPLICATION NOTES:

1. TREATMENTS TO PALMS TO ENSURE HEALTH AND QUALITY OF PLANTS ARE INCIDENTAL.
2. PALMS SHALL BE FREE FROM DISEASE, STRESS, INSECTS, OR OTHER DETRIMENTAL IMPACTS.
3. APPLICATIONS OF FERTILIZERS, VITAMINS AND HORMONES ARE INCIDENTAL.

PRE-PLANTING REQUIREMENTS

1. MAINTAIN ADEQUATE ROOT BALL, TRUNK, AND FROND MOISTURE CONDITIONS DURING TRANSPORTATION AND STORAGE.
2. AT THE TIME OF ARRIVAL AT THE PROJECT LOCATION:

   A. PROVIDE DOCUMENTATION VERIFYING PALM SPECIES, CONDITION AND HEALTH OF ALL PALM MATERIALS TO THE ENGINEER.

   ✳ B. SPRAY FOLIAGE WITH AN APPROVED ANTI-DESSICANT.

   ✳ C. APPLY AN APPROVED SOIL FUNGICIDE TO ENTIRE ROOTBALL.

✳TIME OF PLANTING REQUIREMENTS

1. APPLY AN APPROVED ALUMINUM-BASED FOLIAR FUNGICIDE TO TOPS AND BOTTOMS OF FRONDS AND BUD.
2. AFTER FUNGICIDE HAS DRIED, APPLY AN APPROVED INSECTICIDE TO THE FRONDS AND TRUNK.
3. INCORPORATE "PALM SAVER" OR AN APPROVED EQUAL PALM FERTILIZER INTO THE BACKFILL AROUND THE ROOTBALL ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS.
4. WHEN BACKFILLING AROUND ROOT BALL, WORK BACKFILL EQUALLY AROUND ROOT BALL IN 6" LIFTS TO ELIMINATE AIR POCKETS.
5. SOAK EACH LIFT UP TO FINISH GRADE USING AN APPROVED LIQUID FORM OF VITAMINS AND HORMONES SPECIFICALLY FOR PALMS DILUTED WITH WATER AT A RATIO RECOMMENDED BY THE MANUFACTURER. USE A LIQUID WHICH CONTAINS BUT IS NOT LIMITED TO Mg AND Mn.
6. USE BACKFILL CONSISTING OF THE FOLLOWING: 50% EXISTING SOIL REMOVED FROM THE PLANT PIT, 10% GENERAL USE COMPOST, 10% SHREDDED WOOD CHIPS AND 30% ROCK LIMITED TO 1" TO 1 1/2". WORK BACKFILL EQUALLY AROUND THE ROOT BALL AS DESCRIBED IN PREVIOUS NOTES ON THIS SHEET. COMPOST, WOOD CHIPS, AND ROCK ARE INCIDENTAL.
7. FOR SURFACE APPLICATION, USE MULCH CONSISTING OF SHREDDED WOOD CHIPS. WOOD CHIPS SHALL CONSIST OF SHREDDED NATIVE PLANT MATERIAL AND SHALL NOT HAVE VISIBLE GLASS, METAL, ROCK, PLASTIC, OR LARGE PIECES OF WOOD.

POST-PLANTING REQUIREMENTS:

1. MONITOR SOIL MOISTURE TO MAINTAIN ROOT BALL AND SURROUNDING BACKFILL EVENLY MOIST, BUT NEVER SATURATED. ADD OR REMOVE DRIP EMITTERS AS NEEDED. SUBMIT ADJUSTMENTS TO ENGINEER FOR APPROVAL. DAILY INSPECTION MAY BE NECESSARY WHEN ROOTBALL IS OVER-SATURATED BY RAIN, RUN-OFF, WATERING OR OTHER EVENTS.

✳2. FERTILIZE PALMS EVERY FOUR MONTHS WITH A COMBINATION OF "PALM SAVER," OR APPROVED EQUAL, K AND Mg IN LIQUID FORM WITH GRANULAR FORM OF K AND Mg SULFATES. THIS FERTILIZATION IS IN ADDITION TO FERTILIZATION OF PLANTING BEDS STATED ELSEWHERE IN THESE PLANS.

✳3. APPLY ALL GRANULAR PALM FERTILIZERS BY DRILLING 10"-DEEP HOLES INTO SOIL AROUND ROOT BALL.

4. APPLICATION OF FERTILIZERS AND MICRONUTRIENTS MAY BE ADJUSTED ACCORDING TO SOIL AND PALM CONDITIONS.

REGISTERED LANDSCAPE ARCHITECT
MARK A. BAKER
3402
STATE OF TEXAS

US 87
PALM PLANTING AND ESTABLISHMENT

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		26
STATE	DIST.	COUNTY	
TEXAS	SAT	WILSON	
CONT.	SECT.	JOB	HIGHWAY NO.
0143	04	071	US 87

Item	Common Name	Botanical Name	Container Size	Height	Spread	Caliper	Quantity	Notes
0192-6004	Mexican Plum	Prunus mexicana	5 gal.	4' min.			18	
	Desert Willow 'Bubba'	Chilopsis linearis 'Bubba'	5 gal.	4' min.			19	
	Possumhaw	Ilex decidua	5 gal.	4' min.			19	
	Roughleaf Dogwood	Cornus drummondii	5 gal.	4' min.			21	
	Southern Wax Myrtle	Morella cerifera	5 gal.	4' min.			22	
	Texas Mountain Laurel	Sophora secundiflora	5 gal.	4' min.			22	
	Mexican Redbud	Cercis canadensis var. mexicana	5 gal.	4' min.			22	
						TOTAL:	**143**	
0192-6005	Mexican Plum	Prunus mexicana	15 gal.	8' min.	3' min.	1" min.	59	
	Desert Willow 'Bubba'	Chilopsis linearis 'Bubba'	15 gal.	8' min.	3' min.	1" min.	61	Multi-trunk, min. 3 trunks
	Possumhaw	Ilex decidua	15 gal.	6' min.	3' min.	1" min.	61	Multi-trunk, min. 3 trunks
	Roughleaf Dogwood	Cornus drummondii	15 gal.	5' min.	2' min.	1" min.	61	
	Southern Wax Myrtle	Morella cerifera	15 gal.	5' min.	3' min.	1" min.	62	Multi-trunk, min. 3 trunks
	Texas Mountain Laurel	Sophora secundiflora	15 gal.	5' min.	3' min.	1" min.	62	Multi-trunk, min. 3 trunks
	Mexican Redbud	Cercis canadensis var. mexicana	15 gal.	5' min.	3' min.	1" min.	62	
	Cedar Elm	Ulmus crassifolia	15 gal.	8' min.	3' min.	1" min.	4	
	Mexican Sycamore	Platanus mexicana	15 gal.	8' min.	3' min.	1" min.	5	
	Mexican White Oak	Quercus polymorpha	15 gal.	8' min.	3' min.	1" min.	5	
	Montezuma Cypress	Taxodium mucronatum	15 gal.	7' min.	3' min.	1" min.	4	
	Texas Red Oak	Quercus buckleyi	15 gal.	8' min.	3' min.	1" min.	4	
						TOTAL:	**450**	
0192-6006	Mexican Plum	Prunus mexicana	30 gal.	8' min.	3' min.	2" min.	20	
	Desert Willow 'Bubba'	Chilopsis linearis 'Bubba'	30 gal.	8' min.	3' min.	2" min.	20	
	Possumhaw	Ilex decidua	30 gal.	8' min.	3' min.	2" min.	20	
	Roughleaf Dogwood	Cornus drummondii	30 gal.	8' min.	3' min.	2" min.	20	
	Southern Wax Myrtle	Morella cerifera	30 gal.	8' min.	3' min.	2" min.	20	
	Texas Mountain Laurel	Sophora secundiflora	30 gal.	8' min.	3' min.	2" min.	22	
	Mexican Redbud	Cercis canadensis var. mexicana	30 gal.	8' min.	3' min.	2" min.	21	
	Bald Cypress	Taxodium distichum	30 gal.	8' min.	3' min.	2" min.	6	
	Bur Oak	Quercus macrocarpa	30 gal.	8' min.	3' min.	2" min.	7	
	Cedar Elm	Ulmus crassifolia	30 gal.	8' min.	3' min.	2" min.	8	
	Chinquapin Oak	Quercus muehlenbergii	30 gal.	8' min.	3' min.	2" min.	9	
	Mexican Sycamore	Platanus mexicana	30 gal.	8' min.	3' min.	2" min.	9	
	Lacey Oak	Quercus Laceyi	30 gal.	8' min.	3' min.	2" min.	8	
	Live Oak	Quercus virginiana	30 gal.	8' min.	3' min.	2" min.	7	
						TOTAL:	**197**	
0192-6049	Texas Sabal Palm	Sabal texana	B&B	min. 4' trunk ht.		**TOTAL:**	**48**	B&B

NOTES:

1. REFERENCE ITEM 192 OF THE TEXAS STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MAINTENANCE OF HIGHWAYS, STREETS AND BRIDGES 2014 FOR SPECIFICATIONS, DIMENSIONS, VOLUMES, AND MEASUREMENTS THAT HAVE BEEN MODIFIED OR NOT SHOWN.
2. REJECTION OF PLANTS SHALL BE IN ACCORDANCE WITH ITEM 192.2.2.
3. BE RESPONSIBLE FOR THE SAFE TRANSPORTATION OF PLANTS TO THE PROJECT SITE, AND THEIR CONDITION UPON ARRIVAL.
4. DO NOT STORE PLANT MATERIALS ON HARD SURFACES OR LEAVE EXPOSED TO THE SUN. PROTECT THE ROOT BALLS AND WATER REGULARLY. PROVIDE A MEAN OF PERIODIC INSPECTION OF ANY PLANTS LEFT IN STORAGE OVER THE WEEKEND OR HOLIDAY.
5. PLANTS SHALL BE SOUND, HEALTHY AND VIGOROUS, WELL BRANCHED, AND DENSELY FOLIATED WHEN IN LEAF, AND SHALL HAVE HEALTHY, WELL DEVELOPED ROOT SYSTEMS.
6. ALL PLANTS SHALL BE NURSERY-GROWN IN CONTAINERS (OR CONTAINERIZED) UNLESS OTHERWISE SHOWN ON THE PLANS.
7. SEE PLANTING BED DETAIL SHEET FOR DISTINCTION BETWEEN CANOPY TREES AND UNDERSTORY TREES.

TREES THAT DO NOT STAND UPRIGHT WITHOUT EXTRA SUPPORT WILL BE REJECTED.

TREE STAKING AND GUYING IS FOR STABILIZATION OF THE PLANTS ONLY.

REGISTERED LANDSCAPE ARCHITECT
MARK A. BAKER
3402
STATE OF TEXAS

Texas Department of Transportation

US 87
PLANTING SPECIFICATIONS

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		27
STATE	DIST.	COUNTY	
TEXAS	SAT	WILSON	
CONT.	SECT.	JOB	HIGHWAY NO.
0143	04	071	US 87

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ITEM 193 LANDSCAPE ESTABLISHMENT

AFTER COMPLETION OF THE ITEM 192 MAINTENANCE PERIOD, AS SHOWN IN THE PLANS AND APPROVED BY THE ENGINEER, BEGIN ITEM 193 ESTABLISHMENT ACTIVITIES FOR THE PERIOD SHOWN ON THE PLANS.

REFERENCE ITEM 193 OF THE TEXAS STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MAINTENANCE OF HIGHWAYS, STREETS AND BRIDGES 2014 FOR SPECIFICATIONS, DIMENSIONS, VOLUMES AND MEASUREMENTS THAT ARE NOT SHOWN.

ALL ESTABLISHMENT WORK IS PAID FOR ACCORDING TO ITEM 193 AND AS SHOWN ON THE PLANS.

NOTIFY THE ENGINEER THREE DAYS PRIOR TO EACH SITE VISIT. DETERMINATION OF THE COMPLETENESS OF WORK FOR EACH SITE VISIT WILL BE DONE IN THE PRESENCE OF BOTH THE ENGINEER AND THE CONTRACTOR.

DESCRIPTION OF WORK					TIMELINE - REPEAT AS NECESSARY
					MONTH: 1 (WEEK 1 2 3 4) · 2 (1 2 3 4) · 3 (1 2 3 4) · 4 (1 2 3 4) · 5 (1 2 3 4) · 6 (1 2 3 4) · 7 (1 2 3 4) · 8 (1 2 3 4) · 9 (1 2 3 4) · 10 (1 2 3 4) · 11 (1 2 3 4) · 12 (1 2 3 4)
PLANT MAINTENANCE	193.3.1.1.	PRUNING		DO NOT PRUNE ANY PLANTS FOR VISUAL APPEAL (I.E. PRUNING FOR A PARTICULAR PLANT SHAPE). REFER TO ITEM 193.3.1.1. FOR WOUND DRESSING. DO NOT REMOVE DEAD PALM FRONDS - LEAVE ON THE PALM TO DEVELOP A "PETTICOAT".	✓ in weeks 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48
	193.3.1.2.	INSECT, DISEASE, AND ANIMAL CONTROL		NOTIFY THE ENGINEER AT FIRST SIGN OF DAMAGE FROM INSECTS, DISEASE, OR ANIMALS.	✓ in weeks 1, 3, 4, 5, 7, 8, 9, 11, 12, 13, 15, 16, 17, 19, 20, 21, 23, 24, 25, 27, 28, 29, 31, 32, 33, 35, 36, 37, 39, 40, 41, 43, 44, 45, 47, 48
	193.3.1.3.	FERTILIZATION		FERTILIZE ALL PLANTING BEDS WITH A BALANCED FERTILIZER (EX. NPK=10-10-10 OR 12-12-12) AT THE RATE OF FIVE POUNDS (5 LBS.) NITROGEN PER ACRE. FERTILIZER SHOULD CONTAIN MINIMUM 2% WATER SOLUBLE MAGNESIUM, MINIMUM 6% SULFUR, MINIMUM 2% IRON, AND MINIMUM 2% TOTAL MAGNESIUM. APPLY FERTILIZER UNIFORMLY OVER THE SURFACE OF THE PLANTED BED AREAS ONLY.	✓ in week 48
				SEE PALM PLANTING AND ESTABLISHMENT SHEET FOR POST-PLANTING FERTILIZER REQUIREMENTS.	✓ in weeks 16, 48
	193.3.1.4.	MULCHING, PLANT BASIN & PLANT BED MAINTENANCE	WEEDING	KEEP PLANTING BEDS FREE OF WEEDS, GRASSES, AND INVASIVE WOODY SPECIES. INVASIVE WOODY SPECIES INCLUDE, BUT ARE NOT LIMITED TO THE FOLLOWING: CHINABERRY, CHINESE TALLOW, BACCHARIS WILLOW, AND MESQUITE. USE A GLYPHOSATE TYPE OR SELECTIVE HERBICIDE IF APPROVED BY THE ENGINEER. REMOVE ALL DEAD WEEDS AND DEBRIS FROM WEEDING OPERATIONS. REMOVE AND DISPOSE OF DEAD WEEDS FROM HERBICIDE APPLICATION NO SOONER THAN TWO WEEKS AFTER THE APPLICATION AND NO LATER THAN THREE WEEKS AFTER THE APPLICATION. MAINTAIN CURB AND GUTTER DIRECTLY ADJACENT TO PLANTING BEDS FREE OF WEEDS AND SEDIMENT.	✓ in weeks 1, 3, 4, 5, 7, 8, 9, 11, 12, 13, 15, 16, 17, 19, 20, 21, 23, 24, 25, 27, 28, 29, 31, 32, 33, 35, 36, 37, 39, 40, 41, 43, 44, 45, 47, 48
			MULCHING	APPLY AN APPROVED MULCH LAYER TO MAINTAIN A SETTLED DEPTH SHOWN ON PLANTING DETAILS OVER THE ENTIRE PLANTING BED AREAS. KEEP MULCH LAYER A MINIMUM OF 4" AWAY FROM TRUNKS AND STEMS OF ALL PLANTS OR OUTSIDE OF MULCH SHIELDS (WHERE MULCH SHIELDS ARE PRESENT).	✓ in weeks 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48
			LITTER REMOVAL	REMOVE AND DISPOSE OF LITTER WITHIN THE PLANTING BEDS AND MOWED PLANT-BED PERIMETERS.	✓ in weeks 1, 3, 4, 5, 7, 8, 9, 11, 12, 13, 15, 16, 17, 19, 20, 21, 23, 24, 25, 27, 28, 29, 31, 32, 33, 35, 36, 37, 39, 40, 41, 43, 44, 45, 47, 48
	193.3.1.5.	MOWING, TRIMMING, AND EDGING		MOW A 5' BORDER AROUND PLANTING BEDS OR INDIVIDUAL PLANTS THAT ARE NOT IN A BED.	✓ in weeks 1, 3, 4, 5, 7, 8, 9, 11, 12, 13, 15, 16, 17, 19, 20, 21, 23, 24, 25, 27, 28, 29, 31, 32, 33, 35, 36, 37, 39, 40, 41, 43, 44, 45, 47, 48
	193.3.1.6.	STAKING, GUYING, AND BRACING OF PLANTS	INSPECTION AND REPAIR	INSPECT AND REPAIR / ADJUST PLANT STAKING, GUYING, AND BRACING TO ASSURE PROPER FUNCTION. REPLACE TREES THAT HAVE BEEN DAMAGED BY STAKING AND GUYING AT CONTRACTOR'S EXPENSE.	✓ in weeks 1, 3, 4, 5, 7, 8, 9, 11, 12, 13, 15, 16, 17, 19, 20, 21, 23, 24, 25, 27, 28, 29, 31, 32, 33, 35, 36, 37, 39, 40, 41, 43, 44, 45, 47, 48
			REMOVAL	REMOVE PLANT SUPPORT MATERIALS FROM PLANTS. REPLACE PLANT SUPPORT MATERIALS IF PLANTS FAIL TO REMAIN UPRIGHT.	WHEN ENGINEER AND CONTRACTOR MUTUALLY AGREE THAT PLANTS ARE STABLE AND WELL ROOTED
PLANT REPLACEMENT	193.3.2.	PLANT REPLACEMENT		PLANT REPLACEMENT FOR NORMAL PLANT MORTALITY WILL BE AT THE DISCRETION OF THE ENGINEER. REMOVE ANY MATERIALS DAMAGED BY ACTIONS DESCRIBED IN ITEM 7.17. REMOVAL AND DISPOSAL OF DAMAGAGED MATERIALS IS INCIDENTAL TO ITEM 192. CONTRACTOR MAY BE REIMBURSED FOR PLANT REPLACEMENT IN ACCORDANCE WITH ITEM 7.17. THEFT IS NOT A REIMBURSABLE REPAIR, BUT SHALL BE CONSIDERED "DAMAGE... BY ANY OTHER CAUSE" IN ACCORDANCE WITH ITEM 7.17. PLANTS DAMAGED OR LOST DUE TO ACTIVITIES OF THE CONTRACTOR OR BY THEFT WILL BE REPLACED AT THE CONTRACTOR'S EXPENSE WITH THE SAME SIZE AND TYPE SPECIFIED AT THE TIME OF THE ORIGINAL INSTALLATION. BE RESPONSIBLE FOR THEFT DETERRENT PRACTICES.	EVERY NOVEMBER OF THE CONTRACT PERIOD
IRRIGATION SYSTEM OPERATION AND MAINTENANCE	193.3.4.	IRRIGATION SYSTEM OPERATION AND MAINTENANCE		MAINTAIN ALL IRRIGATION SYSTEMS ACCORDING TO ITEM 193.3.4. AND NOTES ON THE IRRIGATION SPECIFICATIONS SHEET. RE-BURY ANY EXPOSED DRIPLINE OR PVC PIPE. REPLACE STRESSED, DAMAGED, OR DEAD PLANTS RESULTING FROM CONTRACTOR'S ACTIONS OR INADEQUATE MAINTENANCE AT THE CONTRACTOR'S EXPENSE AS NOTED IN 'PLANT REPLACEMENT' IN THIS CHART. IF DAMAGE TO THE IRRIGATION SYSTEM REQUIRES IMMEDIATE SHUT-DOWN OF THE SYSTEM, THE ENGINEER WILL SHUT THE SYSTEM OFF AT THE METER OR BACKFLOW PREVENTER AND NOTIFY THE CONTRACTOR. UPON NOTIFICATION OF SHUTDOWN, MAKE REPAIRS NO LATER THAN THE NEXT REGULARLY SCHEDULED MAINTENANCE VISIT. NOTIFY THE ENGINEER WHEN REPAIRS ARE COMPLETE AND SCHEDULE A DEMONSTRATION OF THE PROPERLY OPERATING IRRIGATION SYSTEM WITH THE ENGINEER.	✓ in weeks 1, 3, 4, 5, 7, 8, 9, 11, 12, 13, 15, 16, 17, 19, 20, 21, 23, 24, 25, 27, 28, 29, 31, 32, 33, 35, 36, 37, 39, 40, 41, 43, 44, 45, 47, 48

✓ = WORK REQUIRED DURING DEFINED PERIOD OF TIMELINE. ALL WORK MUST BE COMPLETED OVER ENTIRE PROJECT TO BE CONSIDERED COMPLETE.

REGISTERED LANDSCAPE ARCHITECT
MARK A. BAKER
3402
STATE OF TEXAS

Texas Department of Transportation

US 87

LANDSCAPE MAINTENANCE

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		28
STATE	DIST.	COUNTY	
TEXAS	SAT	WILSON	
CONT.	SECT.	JOB	HIGHWAY NO.
0143	04	071	US 87

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NOTES:

EXISTING ELEMENTS ARE SHOWN GRAY.

VARY ACCESS ROUTES ONTO AND WITHIN THE SITE TO AVOID DAMAGE TO EXISTING VEGETATION.

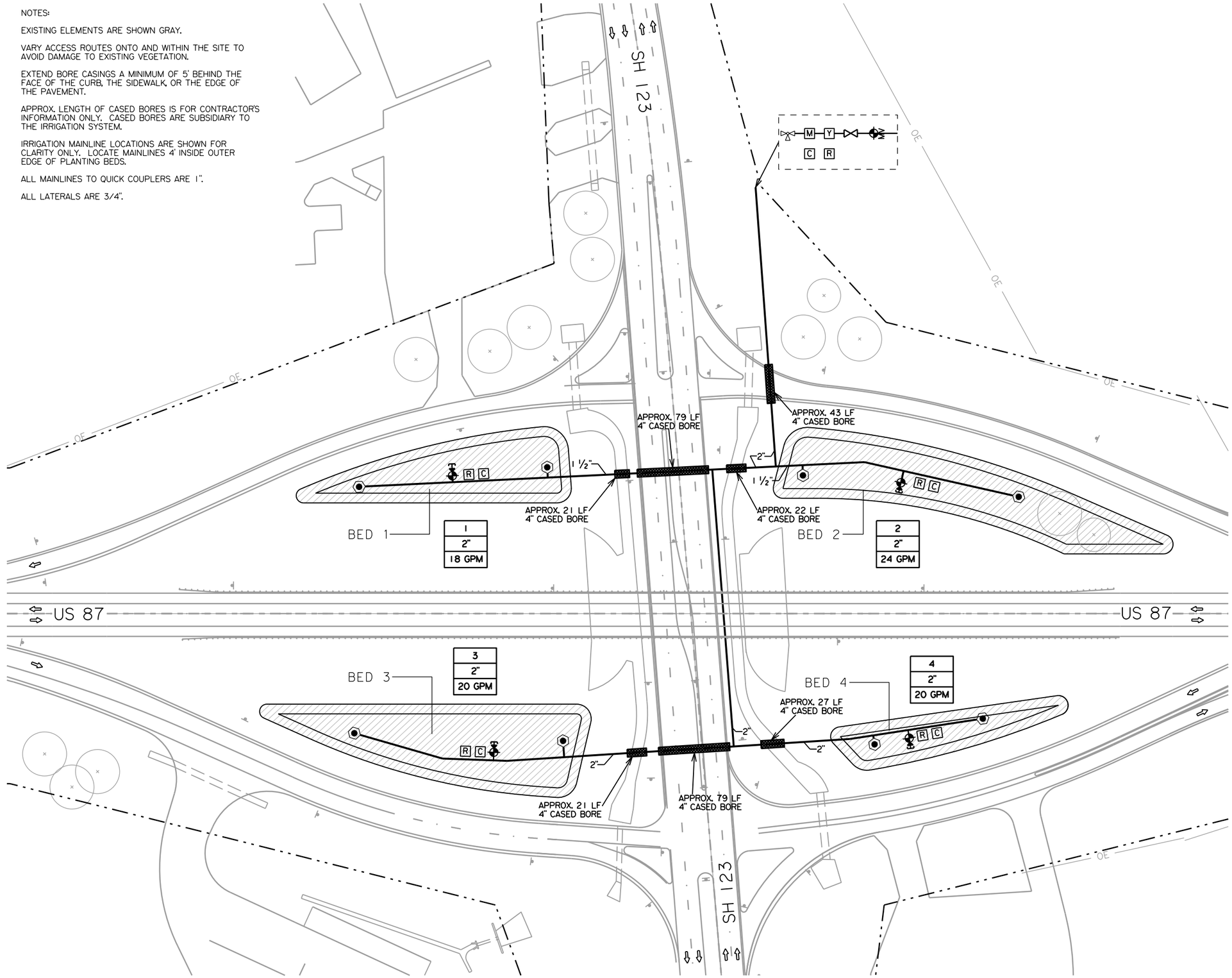
EXTEND BORE CASINGS A MINIMUM OF 5' BEHIND THE FACE OF THE CURB, THE SIDEWALK, OR THE EDGE OF THE PAVEMENT.

APPROX. LENGTH OF CASED BORES IS FOR CONTRACTOR'S INFORMATION ONLY. CASED BORES ARE SUBSIDIARY TO THE IRRIGATION SYSTEM.

IRRIGATION MAINLINE LOCATIONS ARE SHOWN FOR CLARITY ONLY. LOCATE MAINLINES 4' INSIDE OUTER EDGE OF PLANTING BEDS.

ALL MAINLINES TO QUICK COUPLERS ARE 1".

ALL LATERALS ARE 3/4".



LEGEND	
	PALM
	EXISTING TREES

LEGEND	
M	WATER METER
C	IRRIGATION CONTROLLER
R	RAIN/FREEZE
Y	WYE STRAINER
	BACKFLOW PREVENTOR
	FIRE HYDRANT
	MAIN LINE
	LATERAL LINE
	SECTION VALVE ASSEMBLY
MV	MASTER VALVE ASSEMBLY
	QUICK COUPLER VALVE
1	SECTION VALVE NUMBER
2"	VALVE SIZE
22 GPM	FLOW GALLONS PER MINUTE
	POSSIBLE UTILITY CONFLICTS
	CASED BORE
	IRRIGATED AREA (DRIP)
OE	OVERHEAD ELECTRIC
	APPARENT ROW

THE EXISTENCE AND LOCATION OF ALL UTILITIES INDICATED ON THE PLANS IS TAKEN FROM THE BEST RECORDS AVAILABLE AND IS NOT GUARANTEED TO BE ACCURATE OR TOTALLY INCLUSIVE. COORDINATE WITH ALL UTILITY COMPANIES TO FIELD VERIFY UTILITIES PRIOR TO BEGINNING CONSTRUCTION.

STATE OF TEXAS
MARK A. BAKER
21155
LICENSED IRRIGATOR

0 20 40 60 80 100
SCALE: 1" = 100'-0"

Texas Department of Transportation

US 87

IRRIGATION PLAN

SHEET

FED.RD. DIV.NO.	FEDERAL AID PROJECT		SHEET NO.
6	SHOWN ON TITLE SHEET		29
STATE	DIST.	COUNTY	
TEXAS	SAT	WILSON	
CONT.	SECT.	JOB	HIGHWAY NO.
0143	04	071	US 87

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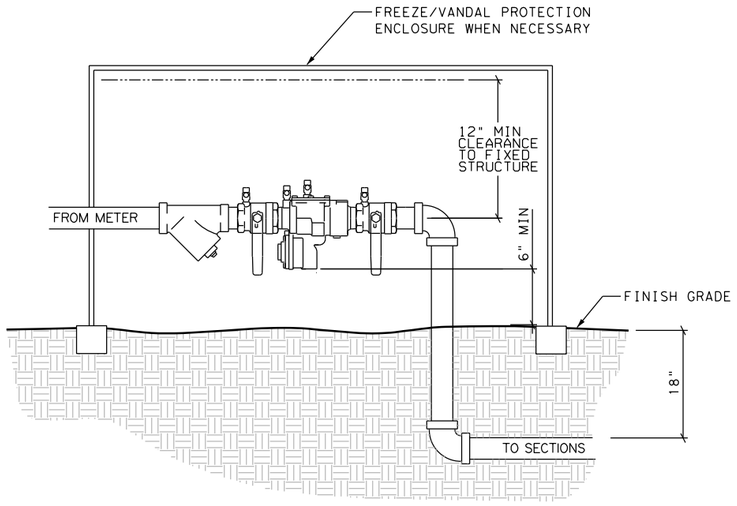
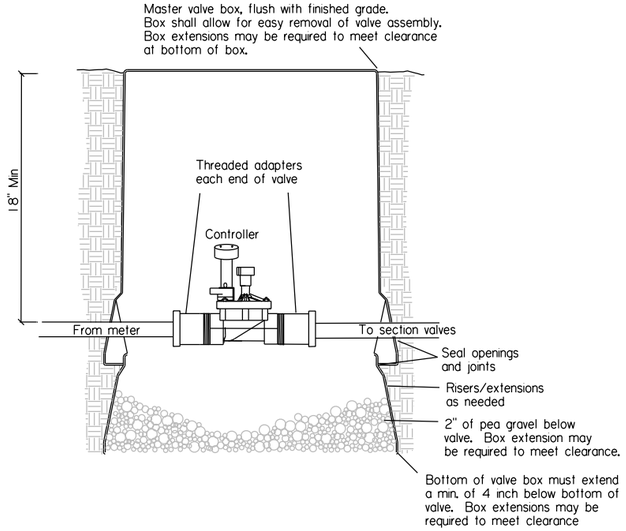


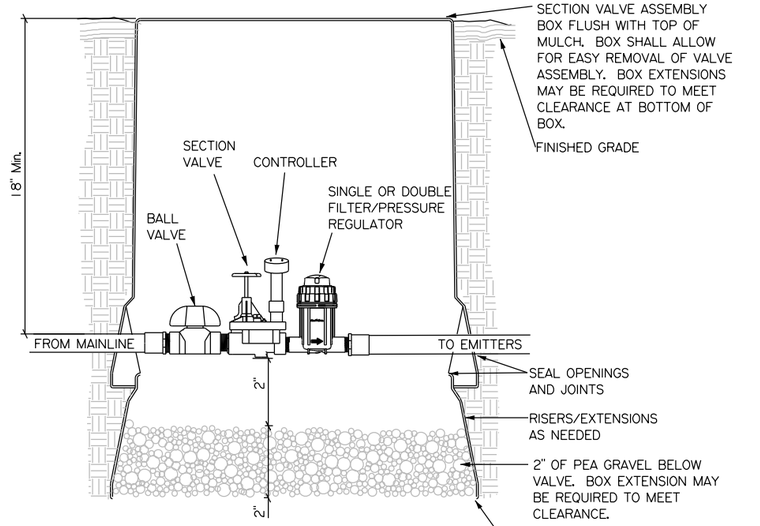
NOTE: TYPE OF BACKFLOW PREVENTER PER LOCAL CODE. LOCAL CODE SHALL HAVE PRECEDENT OVER THIS DETAIL.

BACKFLOW PREVENTER



MASTER VALVE ASSEMBLY

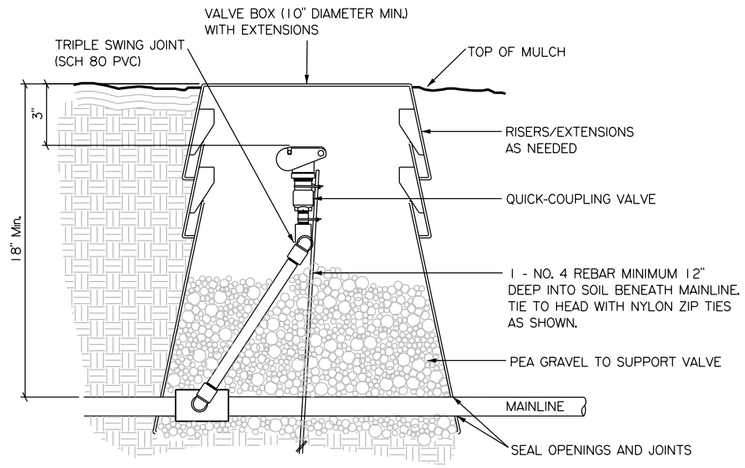
(NTS)



NOTE: LOCATE VALVE ASSEMBLY WITHIN THE DESIGNATED PLANTING BED AREA AS APPROVED BY ENGINEER.

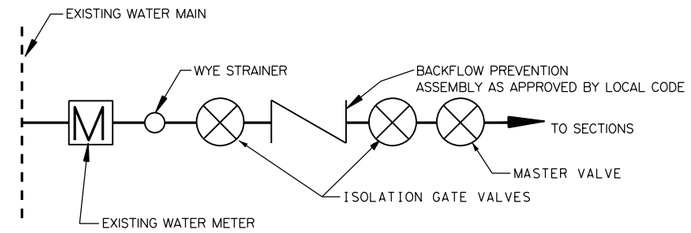
SECTION VALVE ASSEMBLY

Drip Zones (NTS)



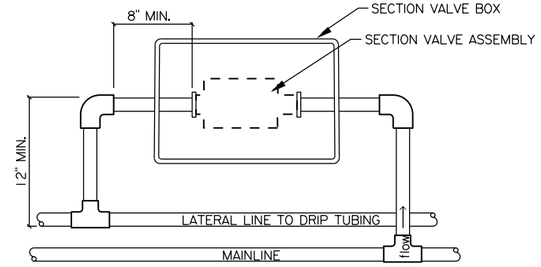
QUICK-COUPLING VALVE

(NTS)



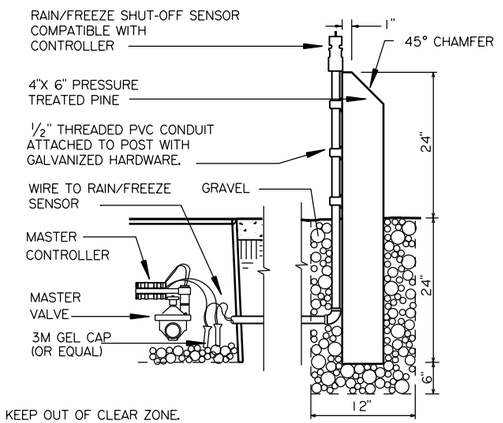
METER ASSEMBLY

(NTS)



PLAN OF PIPING TO SECTION VALVE ASSEMBLY

(NTS)



KEEP OUT OF CLEAR ZONE.
PLACE RAIN SENSOR POST AS DIRECTED. DO NOT EXCEED MAXIMUM WIRE DISTANCE LIMITS FROM CONTROLLER TO SENSOR.

RAIN/FREEZE SENSOR

REGISTERED LANDSCAPE ARCHITECT
MARK A. BAKER
3402
STATE OF TEXAS

Not to Scale

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US 87

IRRIGATION DETAILS

SHEET 1 OF 2

FED.RD. DIV.NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		30
STATE	DIST.	COUNTY	
TEXAS	SAT	WILSON	
CONT.	SECT.	JOB	HIGHWAY NO.
0143	04	071	US 87

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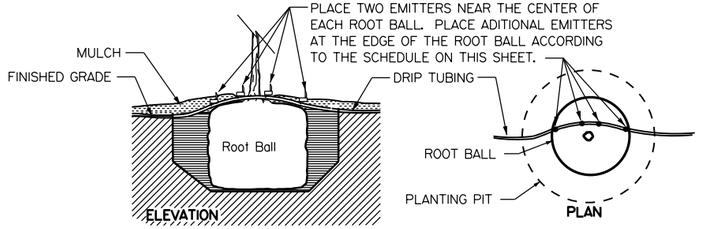
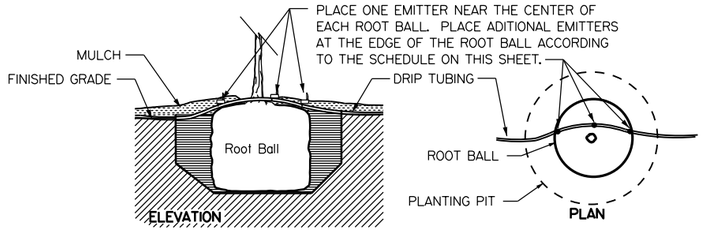
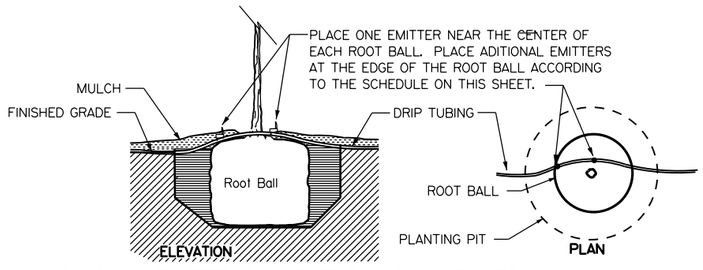


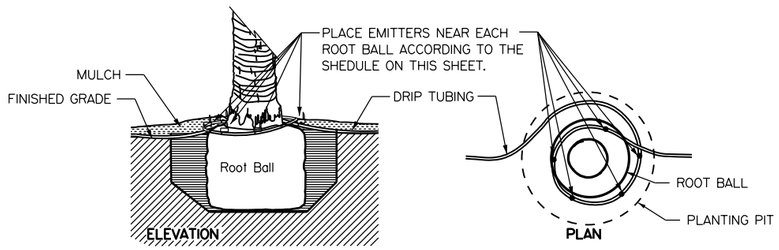
INDIVIDUAL EMITTER PLACEMENT - #30 CONTAINER



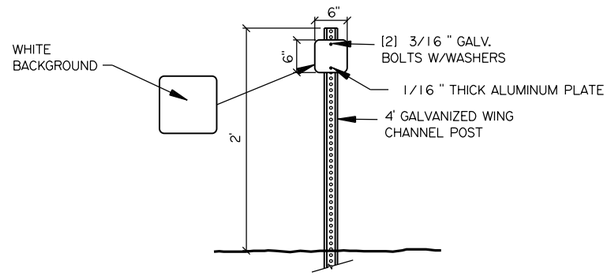
INDIVIDUAL EMITTER PLACEMENT - #15 CONTAINER



INDIVIDUAL EMITTER PLACEMENT - #5 CONTAINER

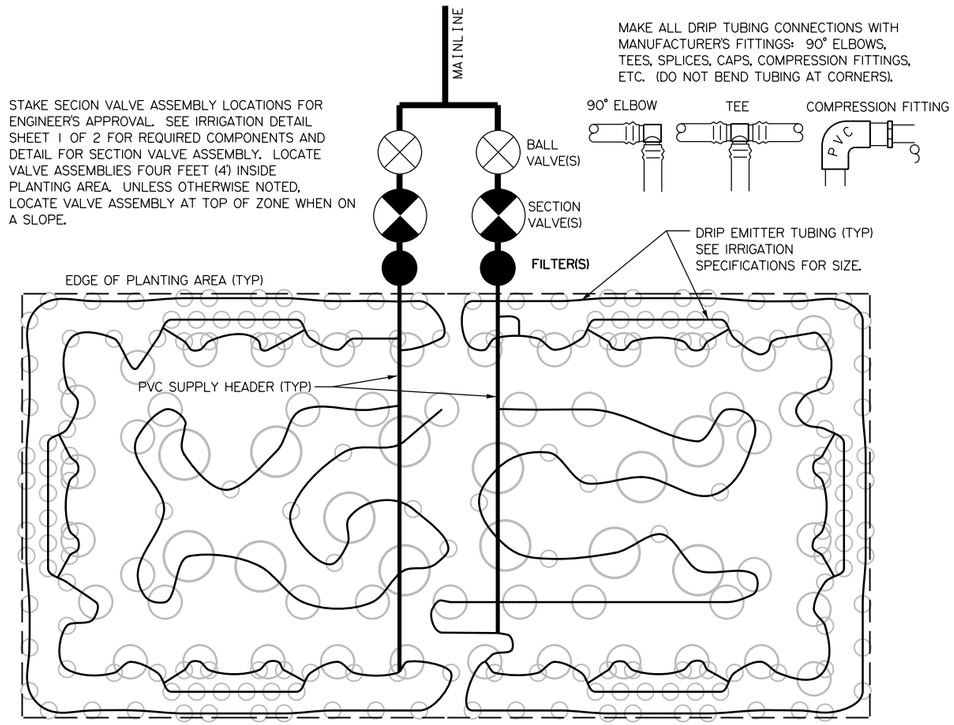


INDIVIDUAL EMITTER PLACEMENT - PALM



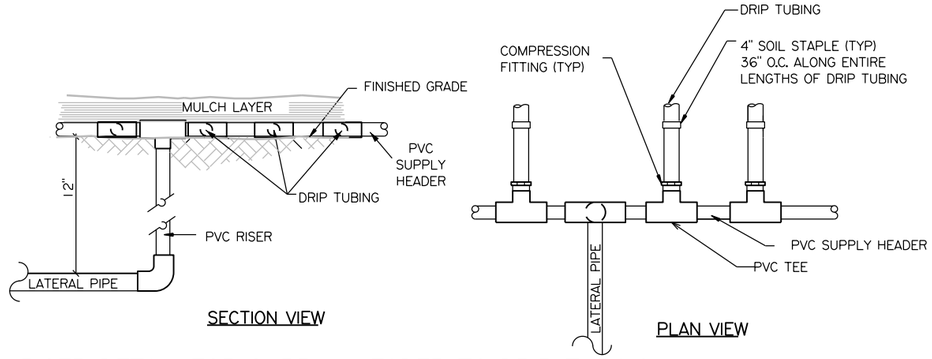
IRRIGATION VALVE DELINEATOR

ONE AT EACH SECTION VALVE AND QUICK COUPLER (NTS)



DRIP TUBING LAYOUT WITH SECTION VALVE ASSEMBLY

NOTE: TOTAL NUMBER OF EMITTERS AND LATERALS SHALL NOT ALLOW FOR GPM (GALLONS PER MINUTE) FLOWING THROUGH ONE FILTER TO EXCEED 20 GPM. TOTAL SECTION GPM SHALL NOT EXCEED 40 GPM.



RISER DETAIL FOR SUPPLY HEADER TO DRIP TUBING

EMITTER PLACEMENT SCHEDULE

PLANT CONTAINER SIZE	EMITTER	
	QTY	NOMINAL FLOW
#45 CONTAINER	5	2 GPH
#30 CONTAINER	4	2 GPH
#15 CONTAINER	3	2 GPH
#5 CONTAINER	2	2 GPH
PALM	5	2 GPH

IRRIGATION SCHEDULE *

WEEK AFTER PLANTING	IRRIGATION INTERVAL	RUN TIME
1 THRU 6	2 DAYS	45 MINUTES
7 THRU 12	3 DAYS	45 MINUTES
13 THRU 104	4 DAYS	45 MINUTES
105 THRU 156	AS NEEDED	AS NEEDED

* IRRIGATION SCHEDULE IS SUGGESTED BASELINE STARTING SCHEDULE. BE RESPONSIBLE FOR MONITORING PLANT MATERIAL TO ENSURE IT RECEIVES ADEQUATE MOISTURE FOR THRIVING GROWTH AND ADJUST SCHEDULE OR QUANTITY OF EMITTERS ACCORDINGLY.

REGISTERED LANDSCAPE ARCHITECT
MARK A. BAKER
3402
STATE OF TEXAS

Not to Scale

Texas Department of Transportation

US 87

IRRIGATION DETAILS

SHEET 2 OF 2

FED.RD. DIV.NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		31
STATE	DIST.	COUNTY	
TEXAS	SAT	WILSON	
CONT.	SECT.	JOB	HIGHWAY NO.
0143	04	071	US 87

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IRRIGATION MATERIALS SPECIFICATIONS

DESCRIPTION	• EXAMPLE OR EQUAL	SIZE	REMARKS
Tap/Meter	City of Stockdale water meter	1"	
Drip Tubing	Rainbird Blackstripe Tubing XBS	1/2"	See Rainbird Design Guide for appropriate fittings
Drip Emitter	Rainbird XB-20PC (Red) Barb inlet	2 GPH	
Tie-Down Stake	Rainbird TDS-050 (With bend)		Spaced 36" OC, and before and after every turn
Gate Valve	Nibco T113 threaded gate valve	2"	
Battery Operated Controller	Hunter NODE-100 or NODE-200	1 or 2 station	
Remote Control Valve (Master Valve)	Rainbird PEB	2"	
Drip Section Valve	Rainbird XCZ 150 PRB 150	See plans for valve sizes.	Includes 2 baskets and 1 ball valve.
Drip Section Valve	Rainbird XCZ 100 PRB-LC	See plans for valve sizes.	Includes 1 basket but 1 ball valve will need to be installed
Quick Coupling Valve, Keys, & Hose Swivel	Rainbird 33DRC, 33DK, SH-0	3/4"	Provide two(2) quick coupling keys and hose swivels to engineer
Backflow Preventor	Febco Series 825Y RPZ Assembly	2"	Or approved by Local Code. Include two Gate Valves.
Mainline	PVC SCH40	as shown on the plans	Pressure rated with twin gasket couplings and fittings or slip type solvent welded joints
Laterals and Headers	PVC CLASS 200	3/4"	
Casing Pipe (Bores)	PVC SCH80 OR HDPE SDR11	Minimum 4" Unless otherwise noted on plans	
Above ground pipe including buried risers and swing-joint components	PVC SCH80 pipe rated for direct sunlight exposure		
Fittings	All fittings incorporated into system shall be of the same type, size and class material as the pipe	Same as pipe.	
Solvent Cement	Solvent cement shall be the type recommended by the the pipe manufacturer		
Valve Boxes Boxes for section valves, below-ground backflow preventors, and quick coupling valves shall be as shown on detail sheet	MacLean Highline Access Box	Box size shall allow for easy removal of valve, etc.	Quantity as required for section valves, below ground backflow preventors, quick coupling valves and any accessories. Seal valve boxes to prevent soil migration into box.
Valve Box Risers	MacLean Highline Access Box	Box and risers shall extend below valves as shown on detail sheet	Seal joints between valve box & risers, or between risers, to prevent soil migration into box
Rain/Freeze Sensor	Hunter wired rain and freeze sensor RFC		

• Reference to Manufacturer's trade name or catalog number is for the purpose of identification only, contractor shall be permitted to furnish like materials of other manufacturers provided they are of equal quality and comply with specifications for this project and are approved by the Engineer.

GENERAL IRRIGATION NOTES:

1. Reference Item 170 of the Texas Standard specifications for Construction and Maintenance of Highways, Streets and Bridges 2014 for specifications, dimensions, volumes and measurements that have been modified or not shown.
2. Water supplier is City of Stockdale. Place the water meters in the name of the contractor. Obtain all permits, licenses, tests, and/or approvals, pay any fees and deposits for installation and operation as applicable. Provide any and all drawings, plans, and paperwork necessary to obtain permits and approvals. Deposits will not be refunded. Water meters shall remain operational and turned on through all phases of the contract to ensure plants receive required watering. Costs for water applied through the irrigation system will be paid for by the contractor.
3. Place backflow preventers in the name of the contractor. Be responsible for all charges, fees, tests, and coordination for any backflow preventor testing, at installation or annual inspection, required by local entity through all phases of the contract.
4. Water supplier is City of Stockdale. At the end of the project, disconnect water meter and remove backflow preventor and associated above-ground piping.
5. The drawings are diagrammatic of the work to be performed. Changes may be required due to varying conditions or as directed by the Engineer.
6. Verify location of any underground utilities with appropriate agencies. Underground utilities (if shown) on the plans are approximate.
7. See IRRIGATION MATERIALS SPECIFICATIONS chart for materials specifications, sizes, and requirements.
8. Ensure that the controller on the Master Valve is set to open when the section valve controllers are set to open.

CONSTRUCTION METHODS:

1. Investigate the site conditions affecting the work and furnish offsets, fittings, sleeves, and cased bores as may be required to meet site conditions.
2. All work to provide a complete and operational irrigation system is included in the Lump Sum bid price for Item 170. Items required but not included in the plans are considered incidental.
3. Locate all irrigation valves, mainlines, quick coupler valves, dripline, etc., for approval by the Engineer prior to installation.
4. Deviations in the piping as shown on the plans may be permitted with approval from the Engineer.
5. Exercise care when excavating near trees. No mechanical trenching shall be permitted below the canopy of existing trees. Adjust trench path and/or excavate by hand to avoid damage to existing tree root system.
6. Coordinate and verify location of signal wiring, traffic loop detector wiring, and TMS (Traffic Management) wiring prior to beginning any work. Damage to signal wiring, loop detector wiring, TMS System wiring, any utilities not listed, and structures shall be repaired at contractor's expense. Contact TxDOT signal shop, electrical shop, and transguide office for "TxDOT Locates".
7. Any underground utilities, high mast wiring, and TMS wiring shown on plans are approximate locations only and shall not relieve contractor's responsibility of coordinating with appropriate authorities to locate underground utilities, wiring and any structure.
8. Dig trenches straight and support pipe continuously on bottom of trench. Install pipe to an even grade. Trench bottom shall be clean and smooth with all organic debris and sharp objects removed. Snake pipe in trench, to allow for expansion and contraction. Protect open excavations for public safety.
9. Boring and sleeve requirements. Stake boring and sleeve locations for Engineer's approval. Boring depth shall be as described in Item 170.3.5. All borings and sleeves shall be continuous and shall extend the full width of the pavement and 5 feet on each side thereof. Boring and sleeves shall be incidental to irrigation system. Bore encasement pipe must be installed same day as boring.
10. PVC casing(s) for bores and sleeves shall consist of SCH 80 smooth wall pipe with solvent welded joints and seams, and shall be continuous. The size of bore shall not exceed the diameter of casing(s) required by Item 170 by more than 1 inch.
11. Do not install pipe when air temperature is below 40 degrees fahrenheit. Cut plastic pipe in a manner that will insure a square cut. Remove burrs and cuts at ends prior to installation so that a smooth unobstructed flow will be obtained.
12. Thoroughly flush all water lines, valves, and sprinkler bodies before installing dripline or sprinkler nozzles.
13. Control wire and wire connections shall be as described on IRRIGATION MATERIALS SPECIFICATIONS chart. Connect and splice all wire in ground boxes using water-proof connectors.
14. Compaction of the pipe trenches must be sufficient to limit short term settling of the backfill to no more than 1 inch. Correct settling greater than this without additional compensation.

GUARANTEE AND ACCEPTANCE:

1. Maintenance period. Inspect the irrigation system concurrently with, and subject to the same establishment/maintenance requirement periods under Items 192 and 193. During the installation, establishment, and maintenance, perform the following activities as a minimum and to the satisfaction of the engineer:

   A) Install and maintain the controller program to insure the proper distribution of water (includes replacement of any batteries).

   B) Inspect, repair, and/or replace any equipment that is found defective or may have become damaged by any means.

   C) Make any adjustments or repairs that may become necessary to ensure the proper delivery of water to the plant material.

   D) Winterize the system as necessary to prevent damage to the system or utility provider infrastructure.

2. As-built drawings. Upon completion of the required maintenance period under Item 192, the Engineer will make an inspection of the irrigation system.

   For this inspection, furnish the Engineer a set of as-built drawings on reproducible 11x17 film base sheets. The Engineer will check to be sure they are a true record of the project conditions and will direct the contractor to correct any errors that are found.

   On the drawings, show all valve locations, meter numbers and addresses, any change to sprinkler head location, and re-routing of main and lateral lines. (Obtain approval of the Engineer for changes of this nature prior to installation).

REGISTERED LANDSCAPE ARCHITECT
MARK A. BAKER
3402
STATE OF TEXAS

Texas Department of Transportation

US 87

IRRIGATION SPECIFICATIONS

SHEET 1 OF 1

FEDRD. DIV.NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		32
STATE	DIST.	COUNTY	
TEXAS	SAT	WILSON	
CONT.	SECT.	JOB	HIGHWAY NO.
0143	04	071	US 87

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A. GENERAL SITE DATA

1. PROJECT LIMITS: *FROM: 0.25 MILES W OF SH 123*
TO 0.25 MILES E OF SH 123

2. PROJECT SITE MAPS:
- *Project Latitude* 29.2265005 *Project Longitude* -97.9591435
- *Project Location Map: Shown on Title Sheet*
- *Drainage Patterns: Shown on Drainage Area Maps N/A*
- *Approx. Slopes Anticipated After Major Gradings and Areas of Soil Disturbance: Landscape Project No Major Grading*
- *Major Controls and Locations of Stabilization Practices: N/A*
- *Project Specific Locations: Off-site waste, borrow, or storage areas are not part of this SW3P.*
- *Surface Waters and Discharge Locations: N/A*

3. PROJECT DESCRIPTION: *LANDSCAPE DEVELOPMENT*

- *Joint-bid utilities are covered by this SW3P (N/A)*
Non-Joint Bid Utilities are not part of this SW3P. (N/A)

4. FOR MAJOR SOIL DISTURBING ACTIVITIES SEQUENCE OF EVENTS:

1. Install controls down-slope of work area and initiate inspection and maintenance activities.

2. Begin phased construction with interim stabilization practices. Adjust erosion and sedimentation controls during construction to meet requirements and changing conditions and as directed/approved by the Engineer.

3. Major soil disturbing activities may include but are not limited to: right-of-way preparation, cut and/or fill to improve roadway profile, final grading and placement of topsoil and the following (if marked):

___ *Placement of road base*
___ *Extensive ditch grading*
___ *Upgrading or replacing culverts or bridges*
___ *Temporary detour road(s)*
X *Other:* PLANTING BED PREPARATION

5. EXISTING AND PROPOSED CONDITIONS:

Description of existing vegetative cover: (Grasses mainly)
Percentage of existing vegetative cover: (90%)
Existing vegetative cover:(mark one)
X *Thick or uniformly established*
___ *Thin and Patchy*
___ *None or minimal cover*
Description of soils: Alum loamy fine sand, 1 to 3 percent slopes. Alum loamy fine sand, 3 to 5 percent slopes. Nocken stony soils and rock outcrop, 1 to 8 percent slopes.

Site Acreage: 20.19 acres *Acreage disturbed: 3.28 acres*
Site runoff coefficient (pre-construction): 0.30 *Site runoff coefficient (post-construction): 0.30*

6. RECEIVING WATERS:

X *A classified stream does not pass through project.*
___ *A classified stream passes through project. Name* _____ *Segment Number* _____
Name of receiving waters that will receive discharges from disturbed areas of the project: Clifton Branch Segment ID *1902C

Site is in a Municipal Separate Storm Sewer System (MS4).
MS4 Operator (name): TXDOT

B. BEST MANAGEMENT PRACTICES

General timing or sequence for implementation of BMPs shall be as required and/or as directed/approved by the Engineer to provide adequate controls. BMPs shown on plan sheets are to be considered "proposed" unless/until install date is shown. BMPs are to reduce sediments from road construction activities.

1. SOIL STABILIZATION PRACTICES: (Select T = Temporary or P = Permanent, as applicable)

___ SEEDING (Wildflower)
___ MULCHING (Hay or Straw)
___ BUFFER ZONES
P PLANTING
___ COMPOST/MULCH FILTER BERM
___ SODDING
P PRESERVATION OF NATURAL RESOURCES
___ FLEXIBLE CHANNEL LINER
___ RIGID CHANNEL LINER
___ SOIL RETENTION BLANKET
___ COMPOST MANUFACTURED TOPSOIL
P OTHER: LANDSCAPE MULCH

2. STRUCTURAL PARACTICES: (Select T = Temporary or P = Permanent, as applicable)

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

3. STORM WATER MANAGEMENT:

The proposed facility was designed in consideration of hydraulic design standards to convey stormwater in a manner that is protective of public safety and property. The control of erosion from the facility is inherent to the design. Additional factors affecting post-construction stormwater at the project location include:(mark all that apply)

X *Existing or new vegetation provides natural filtration.*
___ *The design includes provisions for permanent erosion controls provided by strategically placed pervious and impervious surfaces.*
___ *Project includes permanent sedimentation controls (other than grass).*
___ *Velocities do not require dissipation devices.*
___ *Velocity-dissipation devices included in the design.*
___ *Other :* _____
_____

4. NON-STORM WATER DISCHARGES:

Off-site discharges are prohibited except as follows:

1. *Discharges from fire fighting activities and/or fire hydrant flushings.*
2. *Vehicle, external building, and pavement wash water where detergents and soaps are not used and where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed).*
3. *Plain water used to control dust.*
4. *Plain water originating from potable water sources.*
5. *Uncontaminated groundwater, spring water or accumulated stormwater.*
6. *Foundation or footing drains where flows are not contaminated with process materials such as solvents.*
7. *Other:* _____

Concrete truck wash water discharges on the site should be prohibited or minimized. If allowed by the Engineer, they must be managed in a manner so as not to contaminate surface water. They must not be located in areas of concentrated flow. Concrete truck wash-out locations must be shown on the SW3P Layout and included in the inspections.

Hazardous material spill/leak shall be prevented or minimized. At a minimum, this includes asphalt products, fuels, oils, lubricants, solvents, paints, acids, concrete curing compounds and chemical additives for soil stabilization. BMPs shall be implemented to the storage areas of these products. All spills must be cleaned and disposed properly and reported to the Engineer. Report any release at or above the reportable quantity during a 24 hour period to the National Response Center at 1-800-424-8802.

C. OTHER REQUIREMENTS & PRACTICES

1. MAINTENANCE:
All erosion and sediment controls shall be maintained in good working order. If a repair is necessary, it shall be performed before the next anticipated storm event but no later than 7 calendar days after the surrounding exposed ground has dried sufficiently to prevent further damage from equipment. If maintenance prior to the next anticipated storm event is impracticable, maintenance must be scheduled and accomplished as soon as practicable. Disturbed areas on which construction activities have ceased, temporarily or permanently, shall be stabilized within 14 calendar days unless they are scheduled to and do resume within 21 calendar days. The areas adjacent to creeks and drainageways shall have priority followed by protecting storm sewer inlets.

2. INSPECTION:
For areas of the construction site that have not been finally stabilized, areas 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 of 0.5 inches or greater As an alternative to the above-described inspection schedule of once every fourteen (14) calendar days and within twenty four (24) hours of a storm of 0.5 inches or greater, the SW3P may be developed to require that these inspections will occur at least once every seven (7) calendar days. If this alternative schedule is developed, the inspection must occur on a specifically defined day, regardless of whether or not there has been rainfall since the previous inspectionAn inspection and Maintenance Report shall be prepared for each inspection and the controls shall be revised on the SW3P within seven (7) calendar days following the inspection.

3. WASTE MATERIALS:
All non-hazardous municipal waste materials such as litter, rubbish, trash and garbage located on or originating from the project shall be collected and stored in a securely lidded metal dumpster, provided by the Contractor. The dumpster shall be emptied as necessary or as required by local regulation and the trash shall be hauled to a permitted disposal facility. The burying of non-hazardous municipal waste on the project shall not be permitted. Construction material waste sites, stockpiles and haul roads shall be constructed to minimize and control the amount of sediment that may enter receiving waters. Construction material waste sites shall not be located in any wetland, water body or stream bed. Construction staging areas and vehicle maintenance areas shall be constructed in a manner to minimize the runoff of pollutants.

4. OFFSITE VEHICLE TRACKING:
Off-site vehicle tracking of sediments and the generation of dust must be minimized. Excess sediments on road shall be removed on a regular basis as directed/approved by the Engineer.

5. OTHER:
See the EPIC sheet for additional environmental information.

REGISTERED LANDSCAPE ARCHITECT
MARK A. BAKER
3402
STATE OF TEXAS

 Texas Department of Transportation

STORM WATER POLLUTION PREVENTION PLAN (SW3P)

FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		US 87
STATE	DISTRICT	COUNTY	
TEXAS	SAT	WILSON	
CONTROL	SECTION	JOB	SHEET NO.
0143	04	071	33

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

Texas Pollutant Discharge Elimination System (TPDES) TXR 150000: Stormwater Discharge Permit or Construction General Permit (CGP) required for projects with 1 or more acres distrubed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

☐ No Action Required ☑ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000.
2. Comply with the Storm Water Pollution Prevention Plan (SW3P) and revise when necessary to control pollution or required by the Engineer.
3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and Texas Commission on Environmental Quality (TCEQ), Environmental Protection Agency (EPA) or other inspectors.
4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, Contractor shall submit Notice of Intent (NOI) to TCEQ and the Engineer.
5. NOI required: ☐Yes ☑No

Note: If amount of soil disturbance changes, permit requirements may change.

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

US Army Corps of Engineers (USACE) Permit required for filling, dredging, excavating or other work in any potential USACE jurisdictional water, such as, rivers, creeks, streams, or wetlands.

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

☑ No Permit Required

☐ Nationwide Permit (NWP) 14 - Pre-construction Notice (PCN) not Required

☐ Nationwide Permit 14 - PCN Required

☐ Individual 404 Permit Required

☐ Other Nationwide Permit Required: NWP# _____

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

1.

2.

3.

4.

401 Best Management Practices: (Not applicable if no USACE permit)

Erosion	Sedimentation	Post-Construction TSS
☐ Temporary Vegetation	☐ Silt Fence	☐ Vegetative Filter Strips
☐ Blankets/Matting	☐ Rock Berm	☐ Retention/Irrigation Systems
☐ Mulch	☐ Triangular Filter Dike	☐ Extended Detention Basin
☐ Sodding	☐ Sand Bag Berm	☐ Constructed Wetlands
☐ Interceptor Swale	☐ Straw Bale Dike	☐ Wet Basin
☐ Diversion Dike	☐ Brush Berms	☐ Erosion Control Compost
☐ Erosion Control Compost	☐ Erosion Control Compost	☐ Mulch Filter Berm and Socks
☐ Mulch Filter Berm and Socks	☐ Mulch Filter Berm and Socks	☐ Compost Filter Berm and Socks
☐ Compost Filter Berm and Socks	☐ Compost Filter Berm and Socks	☐ Vegetation Lined Ditches
	☐ Stone Outlet Sediment Traps	☐ Sand Filter Systems
	☐ Sediment Basins	☐ Sedimentation Chambers
		☐ Grassy Swales

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

☑ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

IV. VEGETATION RESOURCES

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

☑ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

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

☐ No Action Required ☑ Required Action

Action No.

1. MIGRATORY BIRD NESTS: Schedule construction activities as needed to meet the following requirements:

   A. Do not remove or destroy any active migratory bird nests (nests containing eggs and/or flightless birds) at any time of year. If there are any active nests, they shall not be removed until the nests become inactive.

   B. On/in structures, if there are any active nests, they shall not be removed until all nests become inactive. After inactive nests are removed and/or before nest activity begins, deterrent materials may be applied to the structures to prevent future nest building.

2. See Item 5 in General Notes.

3.

4.

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

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the follwing are detected:

* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

Hazardous Materials or Contamination Issues Specific to this Project:

☑ No Action Required ☐ Required Action

Action No.

1.

2.

3.

Does the project involve the demolition of a span bridge?

☐ Yes ☑ No (No further action required)

If "Yes", a pre- demolition notification must be submitted to the Texas Department of State Health Services. The contractor shall contact TxDOT's Project Engineer 25 calendar days prior to the demolition of the bridges(s) on the project to assist with the notification.

VII. OTHER ENVIRONMENTAL ISSUES

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

☑ No Action Required ☐ Required Action

Action No.

1.

2.

3.

Texas Department of Transportation
San Antonio District Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic_2015-10-09_SAT.dgn	DN: TxDOT		CK: TxDOT	DW: BW		CK: GAG	
©TxDOT OCTOBER 2015	CONT	SECT	JOB		HIGHWAY		
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	SAT	WILSON				34	

DATE:
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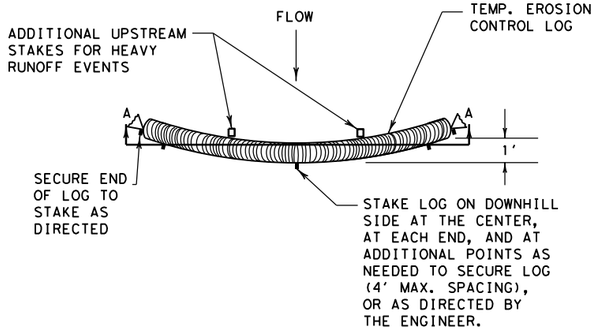
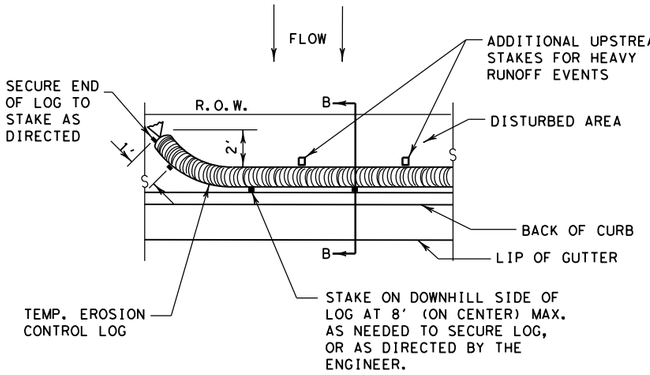


PLAN VIEW



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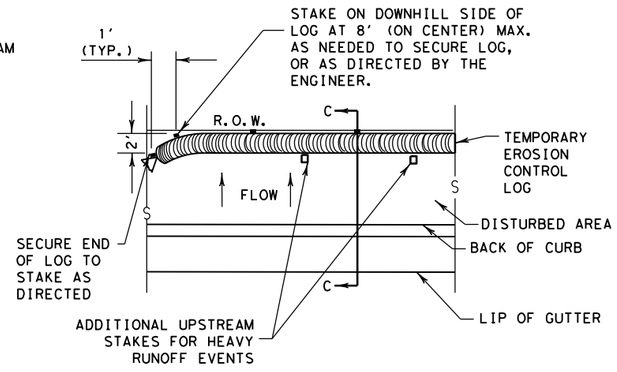

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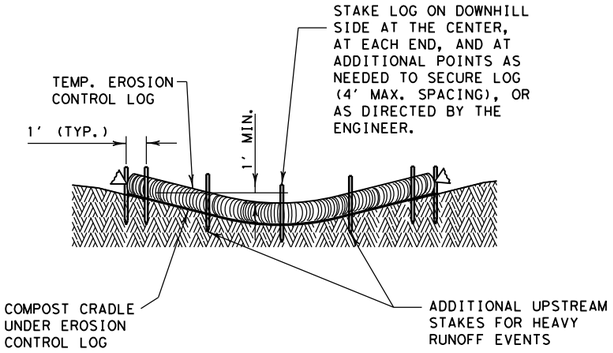
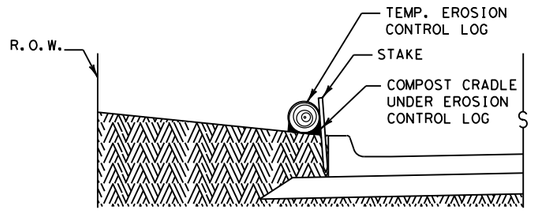


SECTION A-A

EROSION CONTROL LOG DAM

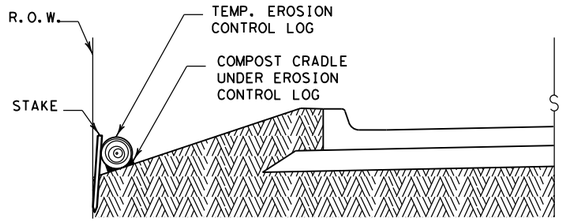
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

CL-BOC



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

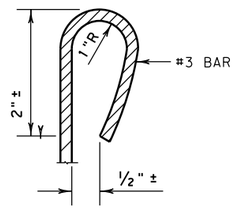
CL-ROW

GENERAL NOTES:

1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.

LEGEND

- CL-D — EROSION CONTROL LOG DAM
- CL-BOC — EROSION CONTROL LOG AT BACK OF CURB
- CL-ROW — EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
- CL-SST — EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
- CL-SSL — EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
- CL-DI — EROSION CONTROL LOG AT DROP INLET
- CL-CI — EROSION CONTROL LOG AT CURB INLET
- CL-GI — EROSION CONTROL LOG AT CURB & GRATE INLET



REBAR STAKE DETAIL

SEDIMENT BASIN & TRAP USAGE GUIDELINES

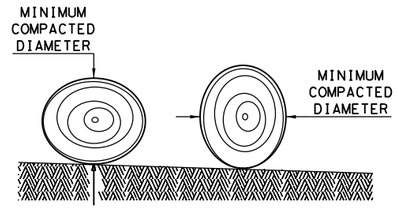
An erosion control log sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:
1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

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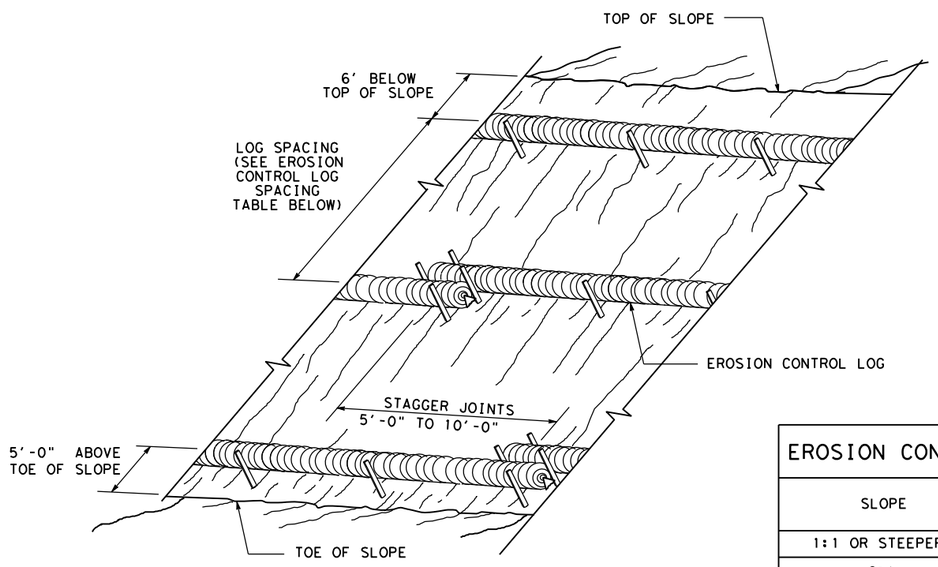
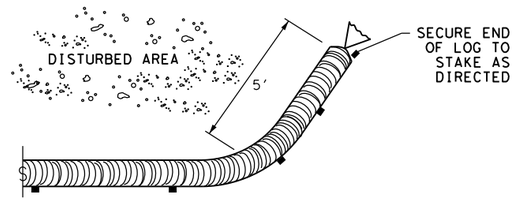


EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

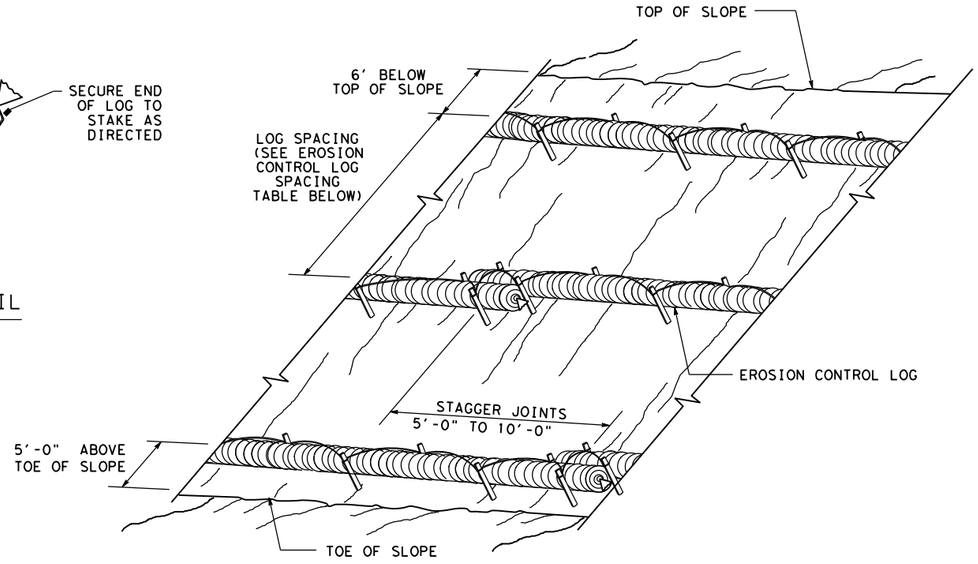
CL-SST



END SECTION RAP DETAIL

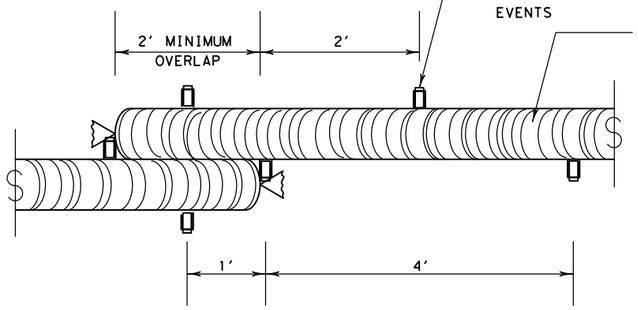
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

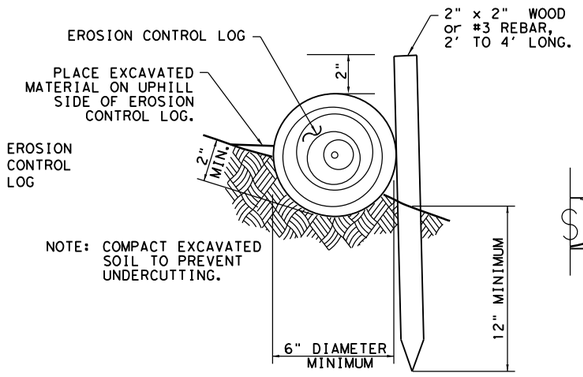
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

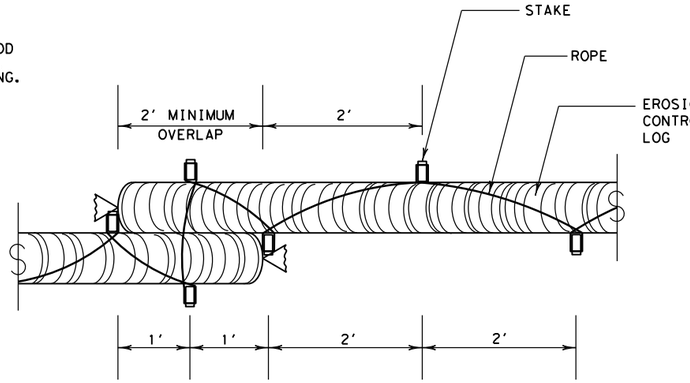


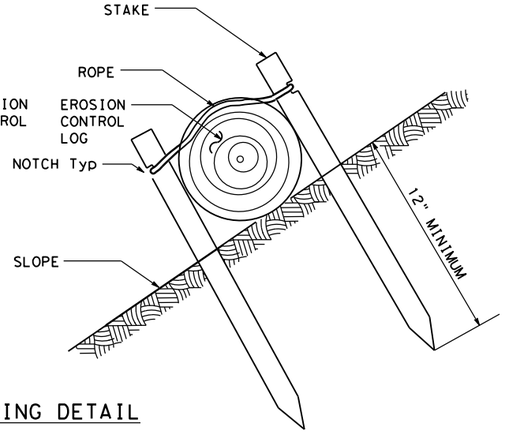


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

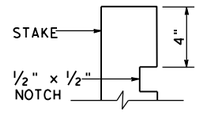
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

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	15	WILSON			36	

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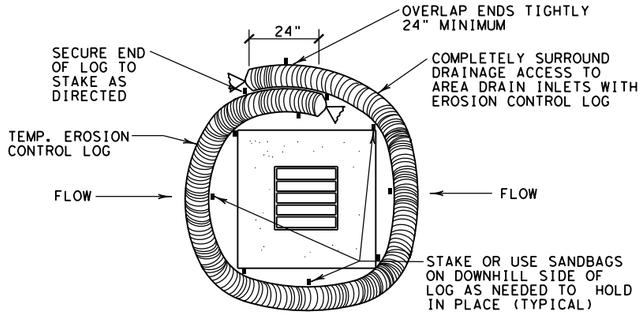
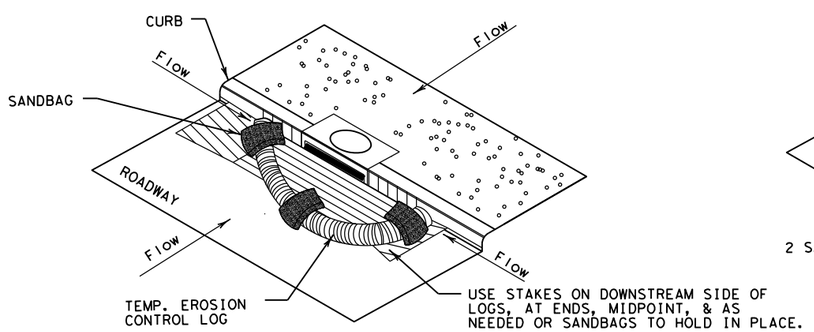


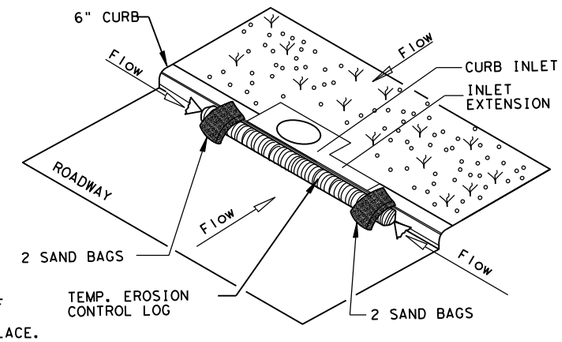
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

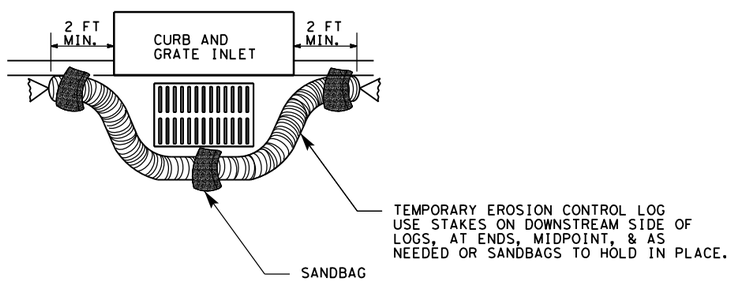
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

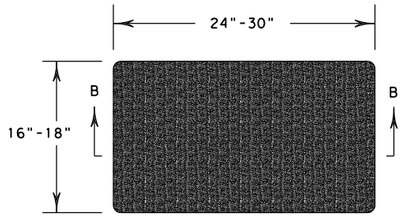
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

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