

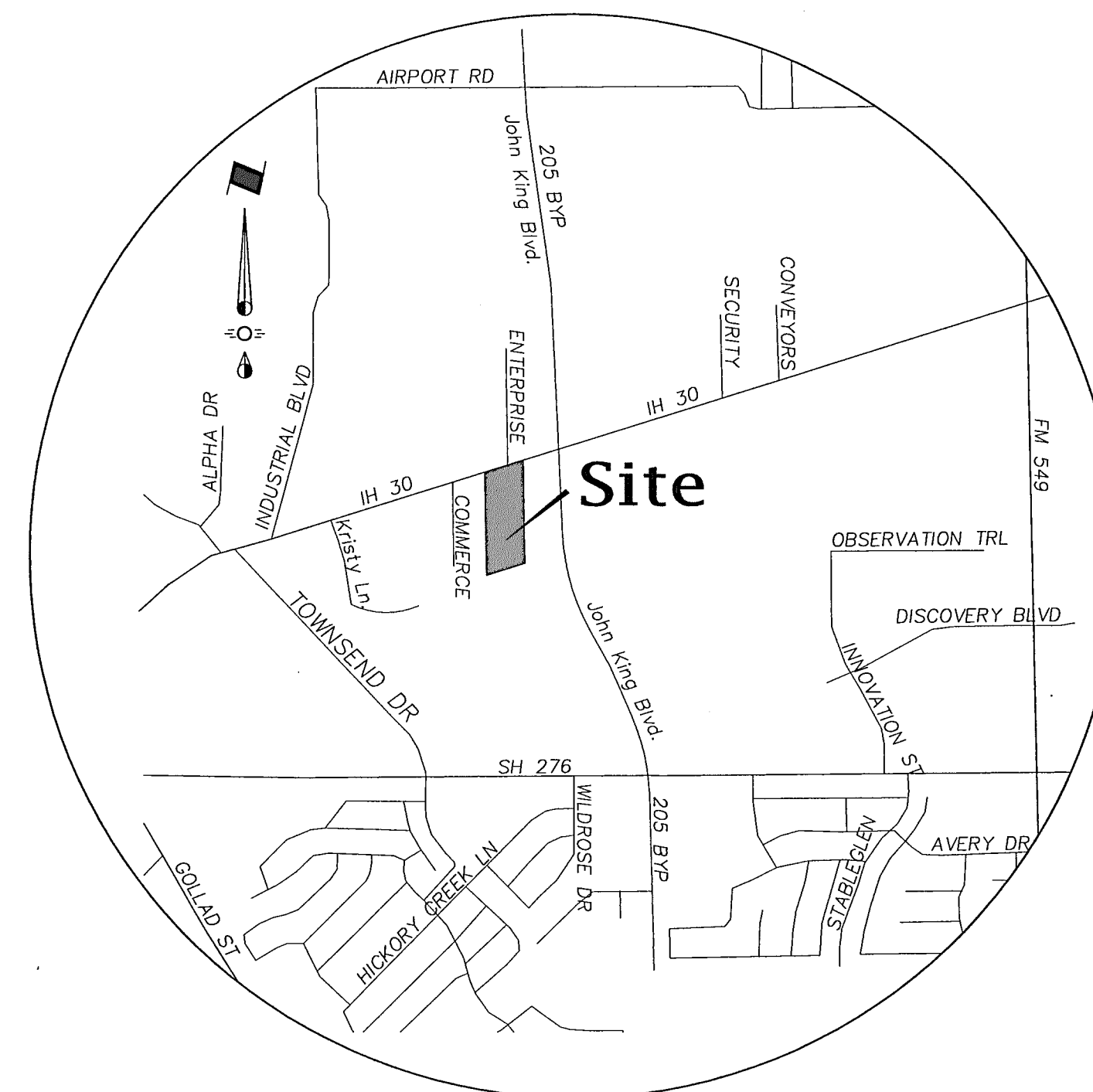
# Paving, Drainage and Utility Plans

## HONDA OF ROCKWALL ADDITION

### LOT 1, BLOCK 1

### City Of Rockwall, Texas

Note:  
Prior to beginning any construction or construction staking, it shall be the Contractor's responsibility to contact the civil engineer to insure that all parties are in possession of the most current set of CD's.



**Vicinity Map**

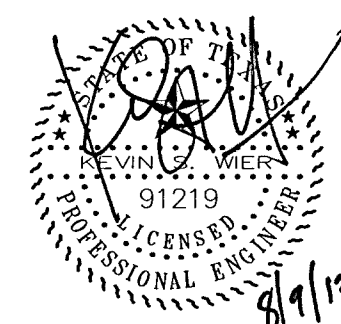
NTS

#### Index Of Drawings

	Cover Sheet
	Final Plat
C 1	Site Plan
C 2	PAVING PLAN
C 3A	TRAFFIC CONTROL PLAN
C 3	DECELERATION LANE PAVING PLAN
C 4	DECELERATION LANE GRADING & DRAINAGE PLAN
C 5	GRADING PLAN
C 6	DRAINAGE AREA MAP
C 7	DRAINAGE PLAN
C 8	STORM SEWER PROFILES
C 9	WATER AND SANITARY PLAN
C 10	EROSION CONTROL PLAN
C 11	STORMWATER POLLUTION PREVENTION GUIDELINES
C 12	SITE DETAILS
SP 1	Retaining Wall Site Plan
RW1-RW3	Retaining Wall Plans
	TXDOT Standard Details



765 Custer Road, Suite 100 • Plano, TX 75075 • (972) 422-0077 • TBPE No. F-2121



**RECORD DRAWINGS**

NOTE:  
To the best of our knowledge Spiaars Engineering, Inc. hereby states that this plan is a Record Drawing. The information provided is based on field surveying at the site and information provided by the contractor.

Prepared For:  
**Good Fulton & Farrell Architects**  
2808 Fairmount Street, Suite 300  
Dallas, Texas 75201  
Contact: Scott Sower  
Telephone: 214-303-1500

# FINAL PIAT

**Issue Dates:**

--	--

---

--	--

--

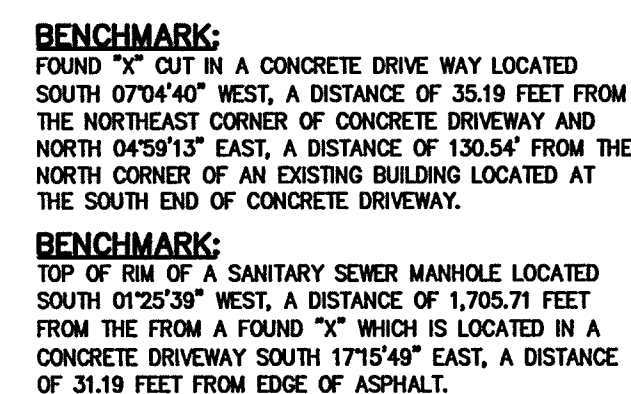
	1990	1991	1992	1993	1994
1990					
1991					
1992					
1993					
1994					

Drawn By: AO

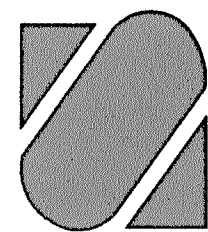
[illegible]

# Plat

SEI No. 11-112







LOT 1, BLOCK 1

# FINAL PLAT

**Issue Dates:**

**Scale: 1" = 40'**

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

## Abstract

---

STATE OF TEXAS  
COUNTY OF ROCKWALL

STATE OF TEXAS  
COUNTY OF ROCKWALL

6. No house dwelling unit, or other structure shall be constructed on any lot in the addition by the owner or any other person until the developer and/or owner has complied with all requirements of the Subdivision Regulation of the City of Rockwall regarding improvements with respect to the entire block on the street or streets on which property abuts, including the actual installation of streets with the required bases and paving, curb and gutter, water and sewer, drainage structures, storm structures, storm sewers, and dikes according to the specifications of the City of Rockwall; or

STATE OF (                    )  
COUNTY OF (                    )

Notary Public in and for  
the State of Texas

\_\_\_\_\_  
Mayor, City of Rockwall                      City Secretary                      City Engineer

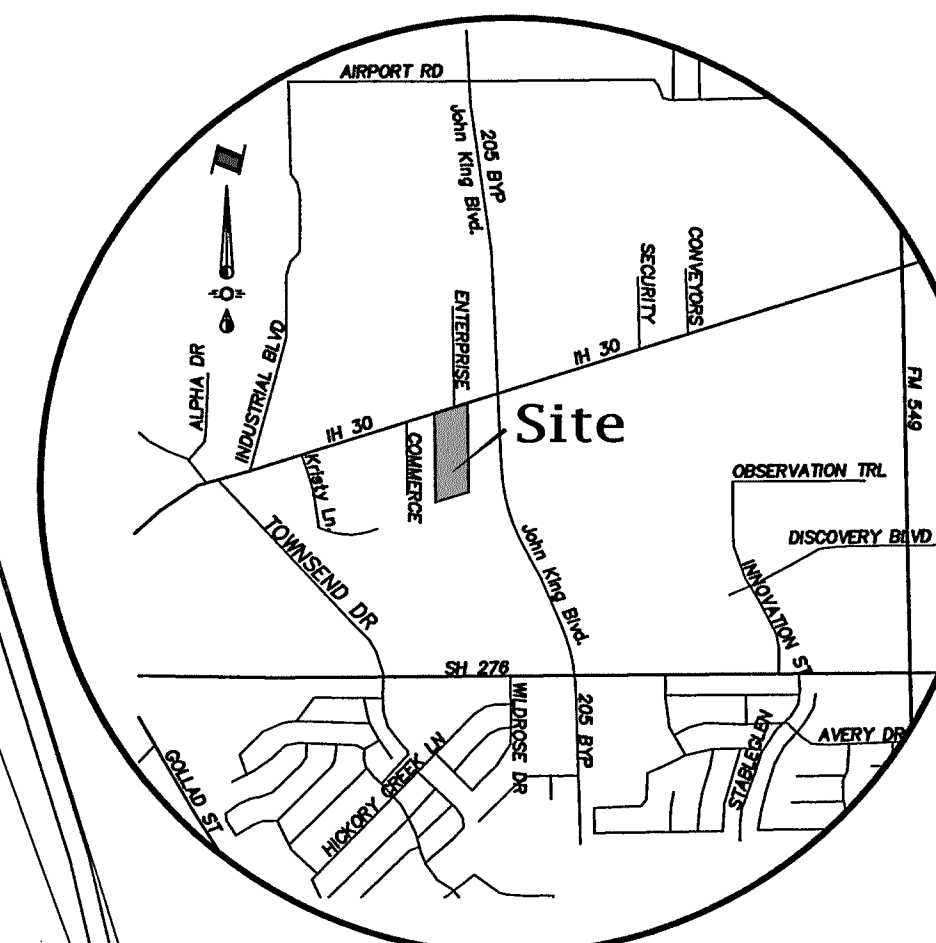
Owner

Engineer/Surveyor

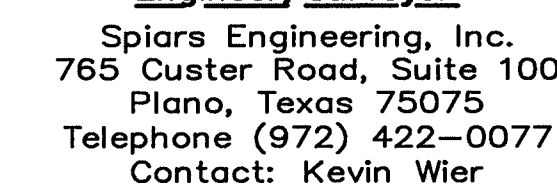
Scale 1"=60'      October, 2012      Sheet 2 of 2

**BENCHMARK:**  
TOP OF RIM OF A SANITARY SEWER MANHOLE LOCATED SOUTH 01°25'39" WEST, A DISTANCE OF 1,705.71 FEET FROM THE FROM A FOUND "X" WHICH IS LOCATED IN A CONCRETE DRIVEWAY SOUTH 17°15'49" EAST, A DISTANCE OF 31.19 FEET FROM EDGE OF ASPHALT.





**Note:**  
All work to be done within TxDOT  
Right-Of-Way shall conform to TxDOT  
Standards and Specifications. Any existing  
utilities shall be relocated clear of the  
proposed turn lane pavement.

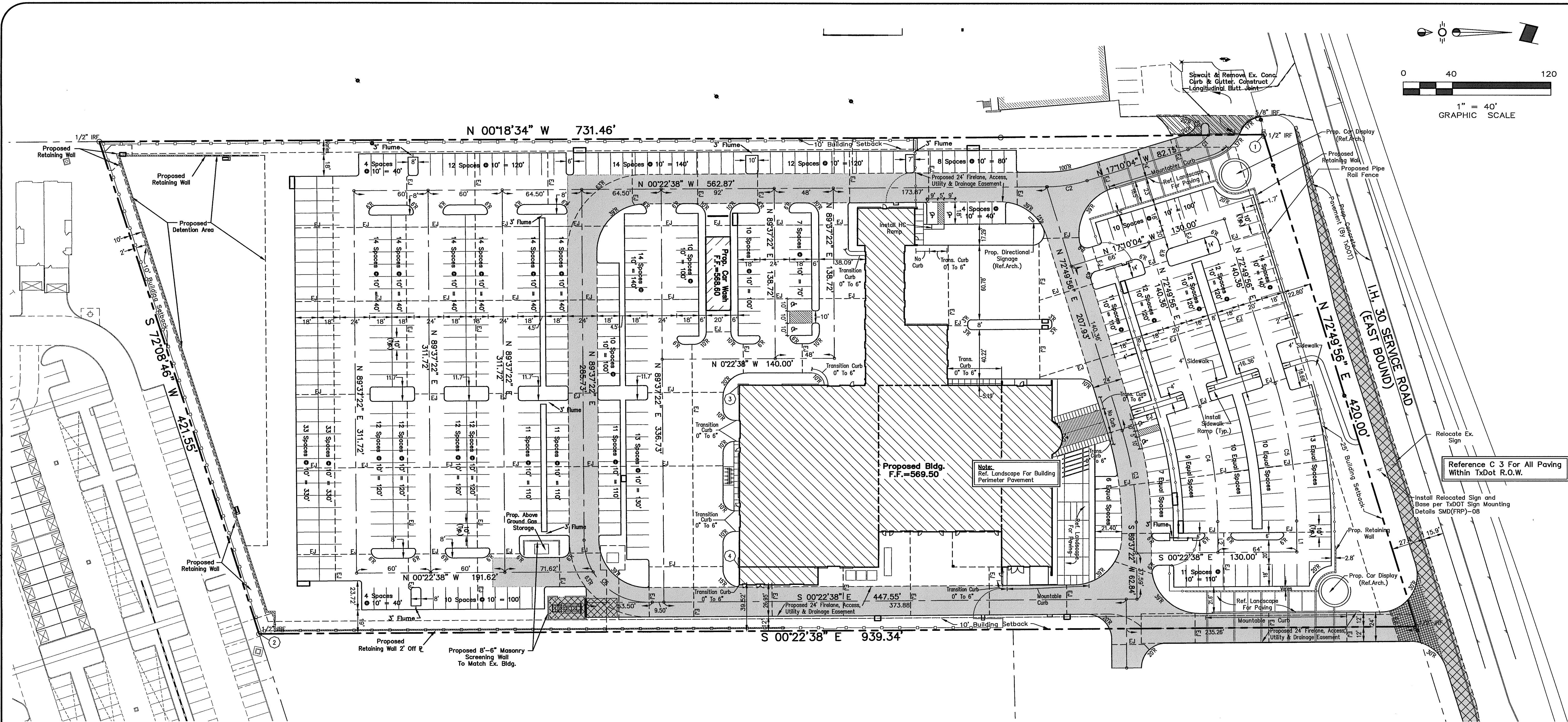


SEI No. 11-112



Plotted by: kvler Plot Date: 8/20/2013 8:49:34 AM

Drawn by: G2011-JCS/11-12 Honda of Rockwall 11-12-PAV.dwg Saved by: Manual Save Time: 8/20/2013 8:04:10 AM



#### COORDINATE TABLE

No.	NORTHING	EASTING
1	7021988.5030	2601780.4280
2	7021953.1553	2602167.8989
3	7021542.69	2601964.80
4	7021542.69	2602112.97

#### Centerline Table

Line	Length	Bearing
L1	25.25	S 89°37'22" W
L2	25.25	S 89°37'22" W

#### Centerline Curve Table

Curve	Radius	Length	Delta	Tangent	Chord	Chord Brng.
C1	32.00	20.58	36°51'8"	10.66	20.23	N 35°35'39" W
C2	112.00	32.82	16°47'26"	16.53	32.70	N 8°46'21" W
C3	259.00	75.90	16°47'26"	38.22	75.63	S 81°13'39" W
C4	325.00	95.24	16°47'26"	47.96	94.90	S 81°13'39" W
C5	389.00	114.00	16°47'26"	57.41	113.59	S 81°13'39" W
C6	51.00	80.11	90°0'0"	51.00	72.12	N 44°37'22" E

#### PAVING GENERAL NOTES

- All materials and construction shall conform to the City of Rockwall Standard Construction Details and Specifications and NCTCOG 3rd Edition.
- It shall be the responsibility of the Contractor to protect all public utilities in the construction of this project. All manholes, cleanouts, valve boxes, fire hydrants, etc. must be adjusted to proper line and grade by the Contractor prior to and after the placing of permanent paving. Utilities must be maintained to proper line and grade during construction of this project.
- The Contractor shall be responsible for coordinating with all the appropriate utility companies for the location of all utilities within the construction area.
- The Paving Contractor shall not place permanent pavement until all sleeving for irrigation, electric, gas, telephone, cable TV, site lighting, etc. has been installed. It shall be the Paving Contractor's responsibility to insure that all sleeving is in place prior to placing permanent paving.
- All paving and earthwork operations shall conform to the recommendations in the Geotechnical Investigation (Report No. 07-13278) and the City of Rockwall Standard Construction Details.
- All dimensions are to face of curb or edge of building unless otherwise noted.
- All curb return radii are 2' unless otherwise noted.
- Standard Parking spaces are 10'x20' or 10'x18' with 2' overhang.
- All dimensions are perpendicular to the drive centerlines and/or property lines.
- Firelanes shall be constructed in accordance with the City of Rockwall Engineering Standards.
- Firelanes shall be marked "NO PARKING FIRE LANE" every 25 feet with white 4-inch letters on a 6-inch red striped background.
- Gates crossing a firelane shall require a permit from the fire department.
- Refer to Architectural Plans for exact building and related sidewalk dimensions.
- 3,600 PSI paving design is minimum 6 sack for machine placed and minimum 6.5 sack for hand placed.

#### LEGEND

---	Expansion Joint
[Pattern]	4" 3,600 PSI Concrete Pavement Reinforced w/ #3 @ 18" O.C.E.W.
[Pattern]	6" 3,600 PSI Concrete Pavement Reinforced w/ #3 @ 18" O.C.E.W.
[Pattern]	7" 3,600 PSI Concrete Pavement Reinforced w/ #3 @ 18" O.C.E.W.
[Pattern]	10" 3,600 PSI Concrete Pavement Reinforced w/ #3 @ 18" O.C.E.W.
[Pattern]	12" 3,600 PSI Concrete Pavement Reinforced w/ #3 @ 18" O.C.E.W.
[Pattern]	Remove Ex. Pavement

RECORD DRAWINGS

NOTE: To the best of our knowledge Spars Engineering, Inc. hereby states that this plan is a Record Drawing. The information provided is based on field surveying at the site and information provided by the contractor.

**BENCHMARK:**  
TOP OF RM OF A SANITARY SEWER MANHOLE LOCATED SOUTH 07°04'00" WEST, A DISTANCE OF 35.19 FEET FROM THE NORTHEAST CORNER OF CONCRETE DRIVEWAY AND NORTH 04°59'13" EAST, A DISTANCE OF 130.54' FROM THE NORTH CORNER OF AN EXISTING BUILDING LOCATED AT THE SOUTH END OF CONCRETE DRIVEWAY.

**BENCHMARK:**  
TOP OF RM OF A SANITARY SEWER MANHOLE LOCATED SOUTH 01°25'39" WEST, A DISTANCE OF 1,705.71 FEET FROM THE FROM A FOUND "X" WHICH IS LOCATED IN A CONCRETE DRIVEWAY SOUTH 17°15'49" EAST, A DISTANCE OF 31.19 FEET FROM EDGE OF ASPHALT.

HONDA OF ROCKWALL ADDITION

LOT 1, BLOCK 1

ROCKWALL, TEXAS

PAVING PLAN

Revisions	Date
1	01/23/2009
2	
3	
4	
5	
6	
7	
8	
9	

Issue Dates:

Addendum 4 - Nov. 12, 2012

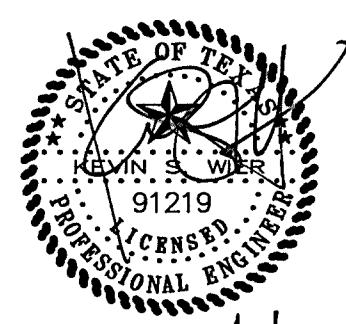
Scale: 1" = 40'

Drawn By: AO

Checked by: KSW

Sheet  
C 2  
12

SEI No. 11-112  
11-112-PAV



8/1/13

PAVING PLAN

LOT 1, BLOCK 1

ROCKWALL, TEXAS

HONDA OF ROCKWALL ADDITION

PAVING PLAN

LOT 1, BLOCK 1

ROCKWALL, TEXAS

HONDA OF ROCKWALL ADDITION

PAVING PLAN

LOT 1, BLOCK 1

ROCKWALL, TEXAS

HONDA OF ROCKWALL ADDITION

PAVING PLAN

LOT 1, BLOCK 1

ROCKWALL, TEXAS

HONDA OF ROCKWALL ADDITION

PAVING PLAN

LOT 1, BLOCK 1

ROCKWALL, TEXAS

HONDA OF ROCKWALL ADDITION

PAVING PLAN

LOT 1, BLOCK 1

ROCKWALL, TEXAS

HONDA OF ROCKWALL ADDITION

PAVING PLAN

LOT 1, BLOCK 1

ROCKWALL, TEXAS

HONDA OF ROCKWALL ADDITION

PAVING PLAN

LOT 1, BLOCK 1

ROCKWALL, TEXAS

HONDA OF ROCKWALL ADDITION

PAVING PLAN

LOT 1, BLOCK 1

ROCKWALL, TEXAS

HONDA OF ROCKWALL ADDITION

PAVING PLAN

LOT 1, BLOCK 1

ROCKWALL, TEXAS

HONDA OF ROCKWALL ADDITION

PAVING PLAN

LOT 1, BLOCK 1

ROCKWALL, TEXAS

HONDA OF ROCKWALL ADDITION

PAVING PLAN

LOT 1, BLOCK 1

ROCKWALL, TEXAS

HONDA OF ROCKWALL ADDITION

PAVING PLAN

LOT 1, BLOCK 1

ROCKWALL, TEXAS

HONDA OF ROCKWALL ADDITION

PAVING PLAN

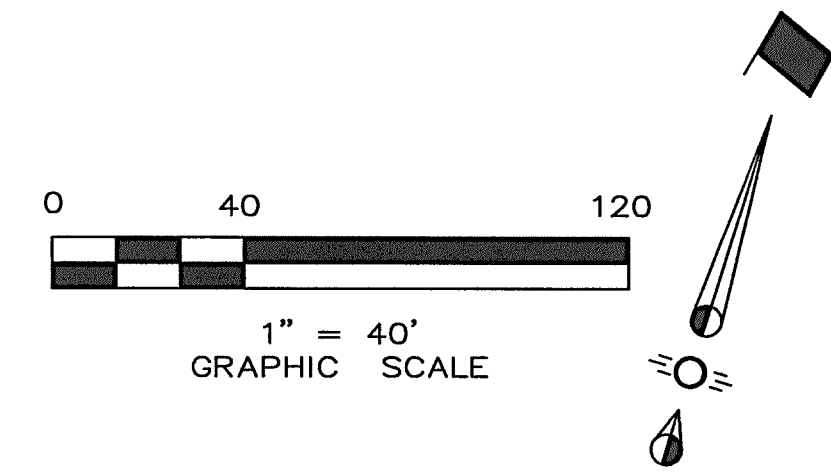
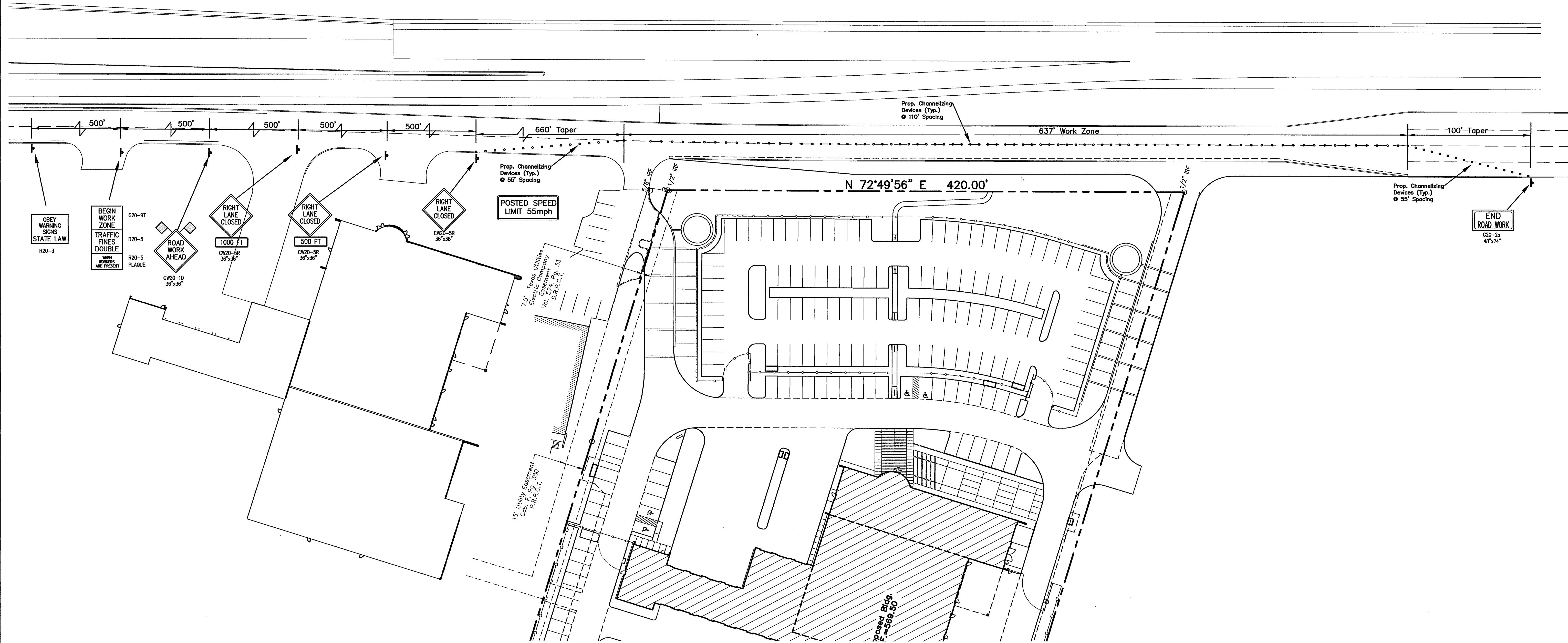
LOT 1, BLOCK 1

ROCKWALL, TEXAS



Plotted by: KSW Plot Date: 8/9/2013 8:49:44 AM

Drawing: G:\011-JOB\11-12 Honda of Rockwall\11-12-Traffic Control Plan.dwg Saved By: Bimont Save Time: 8/9/2013 8:05:29 AM

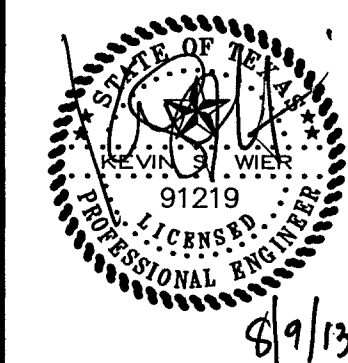


## RECORD DRAWINGS

NOTE:  
To the best of our knowledge Spars Engineering, Inc.  
hereby states that this plan is a Record Drawing.  
The information provided is based on field surveying at  
the site and information provided by the contractor.

**BENCHMARK:**  
FOUND "X" CUT IN A CONCRETE DRIVE WAY LOCATED  
SOUTH 07°04'40" WEST, A DISTANCE OF 35.19 FEET FROM  
THE NORTHEAST CORNER OF CONCRETE DRIVEWAY AND  
NORTH 04°59'13" EAST, A DISTANCE OF 130.54' FROM THE  
NORTH CORNER OF AN EXISTING BUILDING LOCATED AT  
THE SOUTH END OF CONCRETE DRIVEWAY.

**BENCHMARK:**  
TOP OF RM OF A SANITARY SEWER MANHOLE LOCATED  
SOUTH 07°22'39" WEST, A DISTANCE OF 1,705.71 FEET  
FROM THE FROM A FOUND "X" WHICH IS LOCATED IN A  
CONCRETE DRIVEWAY SOUTH 17°15'49" EAST, A DISTANCE  
OF 31.19 FEET FROM EDGE OF ASPHALT.



HONDA OF ROCKWALL ADDITION  
LOT 1, BLOCK 1  
ROCKWALL, TEXAS  
TRAFFIC CONTROL PLAN

Revisions	Date
1	
2	
3	
4	
5	
6	
7	
8	
9	

Issue Dates:

Addendum 4 - Nov. 12, 2012

Scale: 1" = 40'

Drawn By: AO

Checked by: KSW

Sheet  
of  
**C 3A**  
12

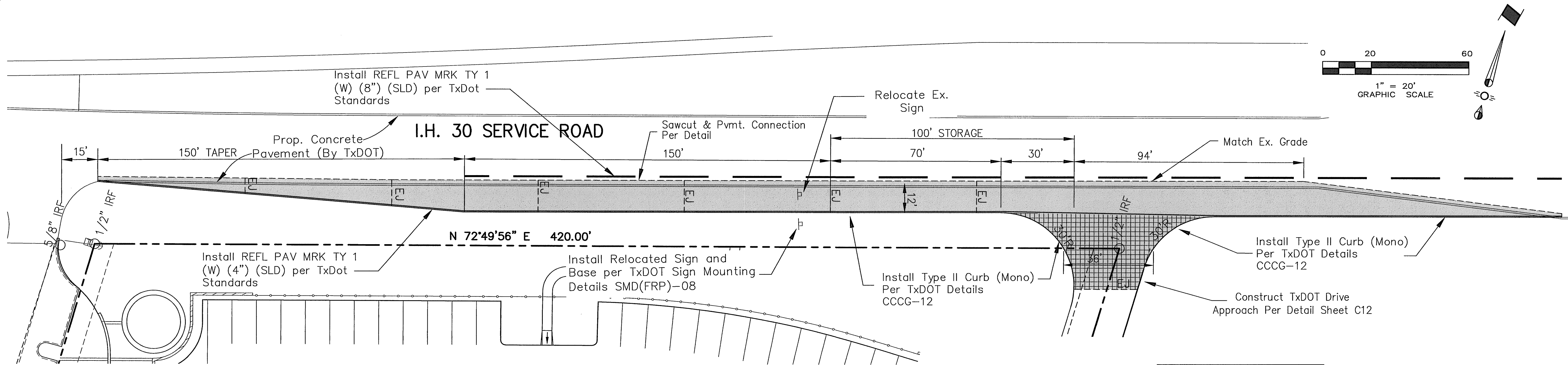
SEI No. 11-112  
11-112-Traffic Control Plan

**Spars**  
ENGINEERING  
765 Custer Road, Suite 100 • Plano, TX 75075 • (972) 422-0077 • TBPE No. F-2121



Plotted by: Kvaler, Pld Date: 8/9/2013 8:47:57 AM

Drawing: 03011\_C03S11-112 Honda of Rockwall 11-12 Decel-Paving.dwg Saved By: Bmurdal Save Time: 8/9/2013 8:04:59 AM



#### TXDOT GENERAL NOTES

- These notes shall apply to all work being performed within the TxDOT ROW.
- Install traffic marking signs prior to sealcoat application and remove within three days after placement of traffic markings.
- Leave all right of way areas undisturbed until actual construction is to be performed in said areas.
- For the project to be deemed complete, permanently stabilize all unpaved disturbed areas of the project with a vegetative cover at a minimum of 70% density for the control of erosion.
- Repair or replace any structures and utilities that might have been damaged by negligence or a failure to have utility located performed.
- Remove and replace existing roadway signs as shown on the plans, or as directed, during construction within the ROW.
- Earth embankment Type C2 is composed mainly of material other than shale. Furnish material that is free from vegetation or other objectionable material and that conforms to the requirements of Table 1. If necessary, add lime slurry in accordance with Item 260, "Lime Treatment (Road-Mixed)" in order to meet these requirements. Use Tex-121-E, figure 1, page 5 to calculate the amount of lime required. Furnish material containing sulfate at or below the threshold of 5000ppm. For material with sulfate levels greater than 3000ppm, allow the mixture to mellow for at least three days, or as directed. Test soil for sulfate levels in accordance with Tex-145-E. Use an approved laboratory to perform tests for sulfate and plasticity index and provide results on sources outside the ROW to the department. Contact the engineer for a list of approved laboratories. Notify the engineer 48 hours before sampling and testing material. Perform split-sample verification testing with the engineer when directed. The engineer will sample and test material produced by the construction project for specification requirements or material sources specified in the plans. The engineer will test material placed or excavated to a depth of one foot below and laterally to one foot outside the proposed treatment limit.
- Do not use shaley clays in embankment unless approved in writing.
- Provide liquid antistripping agents unless otherwise directed. Provide manufacturer's instruction for liquid antistripping agent.

Table 1: Soil Constants Requirements				
Item	Description	Plasticity Index		Note
		Max	Min	
132	Embk(Dens Cont) (Type C1)	40	8	1
132	Embk(Dens Cont) (Type C2)	25	10	2

Note 1: Material excavated from the project must meet the PI requirements when used in the top 10 feet of embankment that supports the pavement structure or other locations shown in the plans. Do not use shale and obtain approval to incorporate shaley clay produced by the construction project.

Note 2: Use as a non-select embankment backfill as defined under Item 423.2.C.1. Use as an embankment to backfill behind abutments to the extent of the approach slab or to backfill areas enclosed by an abutment and retaining walls or other locations as shown in the plans.

- Place hot mix asphalt when the roadway surface temperature is equal to or higher than the temperatures listed in Table 4 unless otherwise approved. Measure the roadway surface temperature with a handheld infrared thermometer. The Engineer may allow mixture placement to begin prior to the roadway surface reaching the required temperature requirements if conditions are such that the roadway surface will reach the required temperature within 2 hours of beginning placement operations. Unless otherwise shown on the plans, place mixtures only when weather conditions and moisture conditions of the roadway surface are suitable in the opinion of the Engineer.
- Use aggregate that meets the Surface Aggregate Classification (SAC) requirement of Class B.
- Provide the engineer the opportunity to witness all mixture design tests. The engineer may require a retest if not given the opportunity to witness.
- Provide PG binder 64-22 in Type B asphalt mixture.
- Hamburg Wheel Test requirements for mixes with PG 64-22 shall meet Table 4. The use of RAP is permitted to meet these requirements.
- Use of multiple piece tiebars will be required. Provide chairs for multiple piece tiebars, threaded connectors or other adequate devices, used in concrete paving, or tie them to the pavement reinforcing steel. If approved by the engineer for specific areas, in lieu of multiple piece tiebars, drill holes into the pavement and grout straight tiebars in place with epoxy. Use a non-impact, rotary core drill to prevent damage to the pavement unless otherwise directed. Clean the drill holes and then completely fill with epoxy before inserting the tiebar. Do not bend the tiebars or insert them into plastic concrete without the approval of the engineer.
- Provide curbs monolithically constructed with the concrete pavement. If continuous monolithic curb has to be temporarily omitted for any reason, provide dowelled curbs in the proposed areas, as detailed in the plans, and apply an approved epoxy resin to the pavement to receive the curb as directed.
- Provide pavement widening joints, as detailed in the plans, at all locations where concrete pavement is placed adjacent to existing concrete pavement.
- Provide tiebars in longitudinal joints but do not place them within 15 inches of transverse joints.

Table 4: Hamburg Wheel Test Requirements			
High-Temperature Binder Grade	Test Method	Laboratory Mixture Design or Trial Batch	Production and Placement Test <sup>1</sup>
		Minimum # of Passes @ 0.5" Rut Depth, Tested @122°F	Minimum # of Passes @ 0.5" Rut Depth, Tested @122°F
PG 64-22 or lower	Tex-242-F	7,000	7,000

- The Engineer may accept if no more than 1 of the 5 most recent Hamburg Wheel tests is below the specified number of passes and the failing test is no more than 2000 passes below the specified number of passes.

- Provide written proposed lane closure information by 1:00 pm on the business day prior to the proposed closures. Do not close lanes when this requirement is not met.
- When excavation is required next to a pavement lane carrying traffic and the widening is not completed by the end of the work day, backfill against the edge of the pavement with at least a 3:1 slope using an acceptable material to support vehicular traffic. Carefully remove and dispose of this material when work resumes.
- Erect a Type III barricade immediately in front of or at each end of all stockpiles that are less than 30 feet from the edge of any traveled lane. Place on Type 2 Object Marker (OM-2Y) alongside the stockpile for every 100 feet of stockpile length.
- Place barricades and signs in locations that do not obstruct the sight distance of drivers entering the highway from driveways or side streets.
- Do not commence work on the road before sunrise. Do not operate or park any equipment/machinery closer than 30 feet from the traveled roadway after sunset unless authorized by the engineer.
- When moving unlicensed equipment on or across any pavement or public highways, protect the pavement from all damage using an acceptable method.
- Saw joints in the same location as on the existing pavement.
- Furnish one type of post throughout the project except as specifically noted in the plans.
- Grinding of pavements is not allowed to eliminate pavement markings.
- Placement of paint or thermo is not allowed to eliminate markings.

#### Note:

All work within TxDOT ROW shall conform to TxDOT Standards and Specifications.

#### PAVING LEGEND

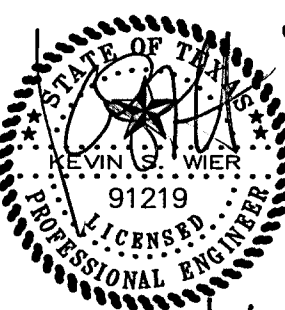
- 10" 3,600 PSI Concrete Pavement Reinforced w/ #3 @ 18" O.C.E.W.
- 3,600 PSI Conc Pav (Conc Rein - CRCP)(12") Over 4" D-CR HMA (METH) TY B PG64-22 Over LIME TRT (12") (7% Lime) Over Embankment (DENS CONT) (TY C2) (20")

## RECORD DRAWINGS

NOTE:  
To the best of our knowledge Spars Engineering, Inc. hereby states that this plan is a Record Drawing. The information provided is based on field surveying at the site and information provided by the contractor.

**BENCHMARK:**  
FOUND "X" CUT IN A CONCRETE DRIVE WAY LOCATED SOUTH 07°44'40" WEST, A DISTANCE OF 35.19 FEET FROM THE NORTHEAST CORNER OF CONCRETE DRIVEWAY AND NORTH 04°59'13" EAST, A DISTANCE OF 130.54' FROM THE NORTH CORNER OF AN EXISTING BUILDING LOCATED AT THE SOUTH END OF CONCRETE DRIVEWAY.

**BENCHMARK:**  
TOP OF RM OF A SANITARY SEWER MANHOLE LOCATED SOUTH 01°25'30" WEST, A DISTANCE OF 1,705.71 FEET FROM THE FROM A FOUND "X" WHICH IS LOCATED IN A CONCRETE DRIVEWAY SOUTH 17°15'49" EAST, A DISTANCE OF 31.19 FEET FROM EDGE OF ASPHALT.



HONDA OF ROCKWALL ADDITION  
LOT 1, BLOCK 1  
ROCKWALL, TEXAS  
DECELERATION LANE PAVING PLAN

Revisions	Date
1	
2	
3	
4	
5	
6	
7	
8	
9	

Issue Dates:

Addendum 4 - Nov. 12, 2012

Scale: 1" = 20'

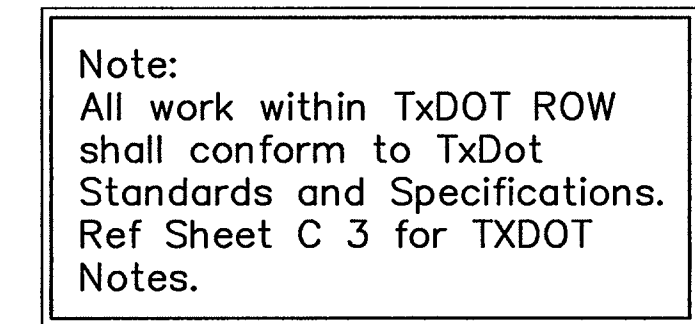
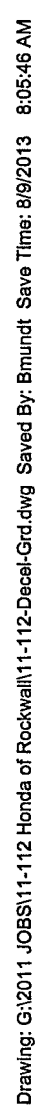
Drawn By: AO

Checked by: KSW

Sheet  
C 3  
of 12

SEI No. 11-112  
11-112-Decel-Pav





6. Drainage should be maintained away from the foundations, both during and after construction.
7. Backfill for utility lines should be carefully placed so that they will be stable. Where utility lines pass through the parking lot, the top 6" should be compacted similarly to the remainder of the lot. Utility ditches should be visually inspected during the excavation process to ensure that undesirable fill is not used.
8. Concrete for inlets and drainage structures shall be 4200 psi at 28 days.
9. If rock is encountered in the trench, rock spoil shall not be used in the upper 1.5 feet of the trench.
10. All earthwork operations, pavement installation, etc. shall conform to the Geotechnical Investigation.
11. Trees shall remain unless specified otherwise on the Landscape Plan or approved by the Owner.
12. Proposed spot elevations located at the curb are finished gutter elevations. Add 0.50 feet to elevation for proposed top of curb.
13. All fill to be compacted to a minimum 95% standard density using a sheep's foot roller.

The diagram illustrates the relationship between different elevation markers on a road cross-section. It features a horizontal line representing the ground surface. Above this line, there are four distinct markers:

- Proposed Gutter Spot Elevation:** Indicated by a callout bubble pointing to a specific point on the road surface, labeled with the value 75.6.
- Edge of Asphalt Elevation:** Indicated by a dashed line segment on the road surface, labeled with the value 75.64.
- Proposed Contour:** Indicated by a solid horizontal line segment below the road surface, labeled with the value 57.4.
- Existing Contour:** Indicated by a dashed horizontal line segment below the road surface, labeled with the value 57.6.

At the bottom of the diagram, a horizontal arrow points to the right, labeled "Direction Of Flow".

**NOTE:**  
To the best of our knowledge Spiars Engineering, Inc.  
hereby states that this plan is a Record Drawing.  
The information provided is based on field surveying at  
the site and information provided by the contractor.

**BENCHMARK:**  
FOUND "X" CUT IN A CONCRETE DRIVE WAY LOCATED SOUTH 07°04'40" WEST, A DISTANCE OF 35.19 FEET FROM THE NORTHEAST CORNER OF CONCRETE DRIVEWAY AND NORTH 45°59'13" EAST, A DISTANCE OF 130.54' FROM THE NORTH CORNER OF AN EXISTING BUILDING LOCATED AT THE SOUTH END OF CONCRETE DRIVEWAY.

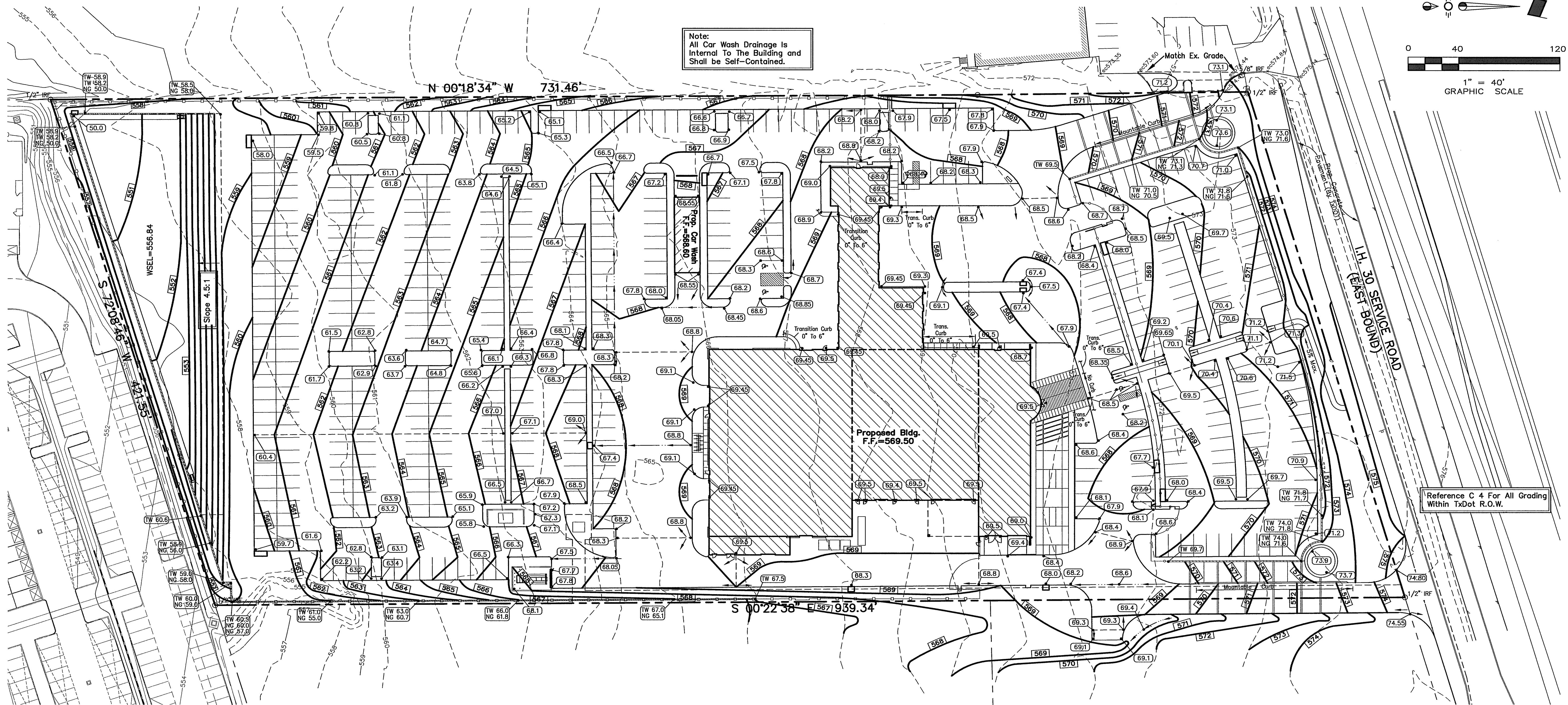
**BENCHMARK:**  
TOP OF RIM OF A SANITARY SEWER MANHOLE LOCATED SOUTH 01°25'39" WEST, A DISTANCE OF 1,705.71 FEET FROM THE FROM A FOUND "X" WHICH IS LOCATED IN A CONCRETE DRIVEWAY SOUTH 17°15'49" EAST, A DISTANCE OF 31.19 FEET FROM EDGE OF ASPHALT.

SEI No. 11-112  
11-112-Decel-Grd



Plotted by: KSW Pld Date: 8/2/2013 8:46:38 AM

Drawn by: KSW Pld Date: 8/2/2013 8:46:38 AM



#### GENERAL NOTES

- All materials and construction shall conform to the City of Rockwall Standard Construction Details and Specifications, except as noted herein and approved by the City.
- Contractor shall be responsible for maintaining trench safety requirements in accordance with City Standards, Texas State Law, and O.S.H.A. Standards for all excavation in excess of five feet in depth.
- The location of all utilities located on these plans are taken from existing public records. The exact location and elevation of all public utilities must be determined by the Contractor. It shall be the duty of the Contractor to ascertain whether any additional facilities other than those shown on the plans may be present.
- It shall be the responsibility of the Contractor to protect all public utilities in the construction of this project. All manholes, clean-outs, valve boxes, fire hydrants, etc. must be adjusted to proper line and grade by the Contractor prior to and after the placing of permanent paving. Utilities must be maintained to proper line and grade during construction of the paving for this development.
- Any utility installed outside of an easement shall be installed by a plumber and inspected by Code Enforcement.
- Drainage should be maintained away from the foundations, both during and after construction.
- Backfill for utility lines should be carefully placed so that they will be stable. Where utility lines pass through the parking lot, the top 6\"/>

#### LEGEND

- Proposed Spot Elevation
- Existing Spot Elevation
- Proposed Contour
- Existing Contour
- Direction Of Flow

RECORD DRAWINGS

NOTE:  
To the best of our knowledge Spars Engineering, Inc. hereby states that this plan is a Record Drawing. The information provided is based on field surveying at the site and information provided by the contractor.

**BENCHMARK:**  
FOUND 7\"/>



HONDA OF ROCKWALL ADDITION  
LOT 1, BLOCK 1  
ROCKWALL, TEXAS  
GRADING PLAN

Revisions	Date
1	
2	
3	
4	
5	
6	
7	
8	
9	

Issue Dates:

Scale: 1" = 40'

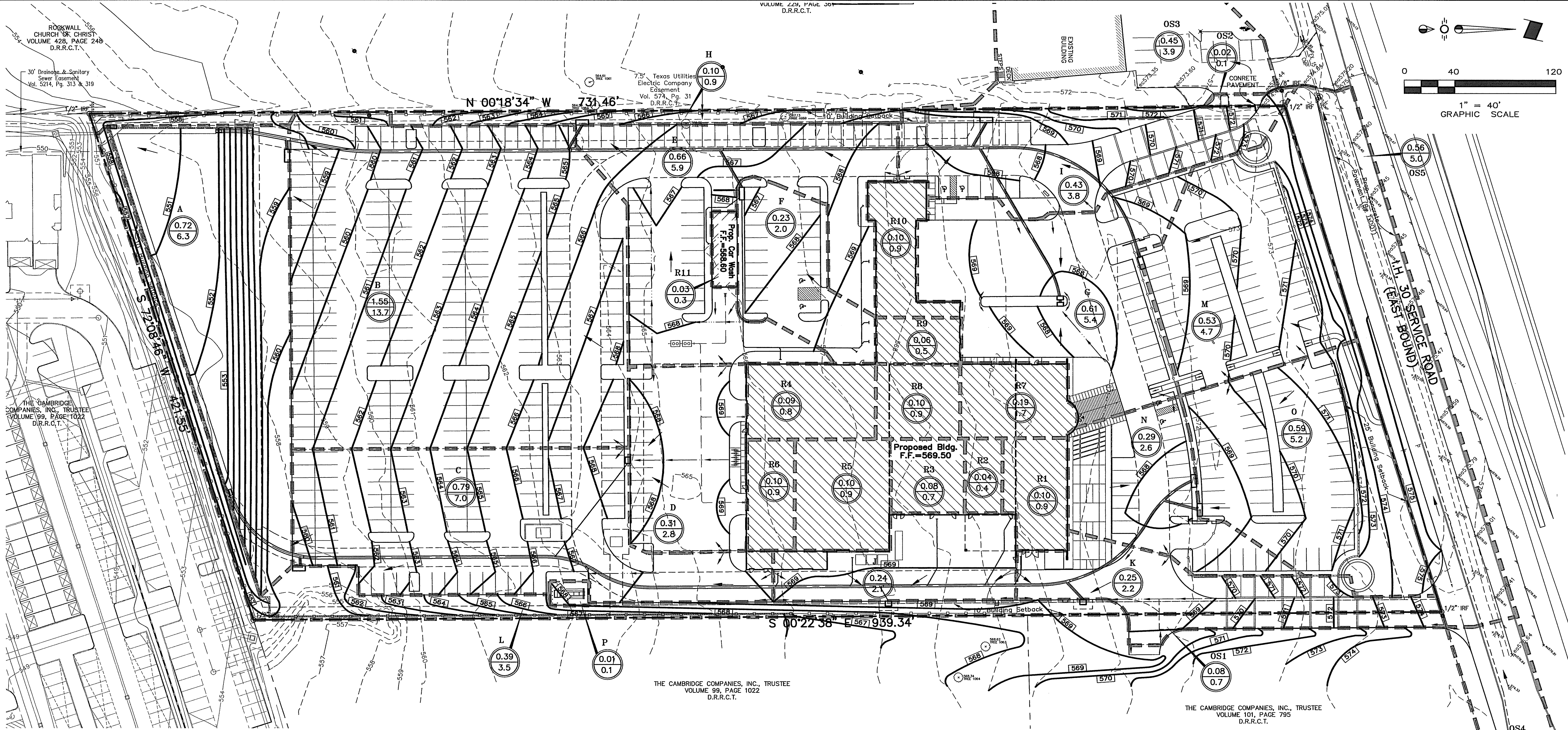
Drawn By: AO

Checked by: KSW

Sheet  
C 5  
of 12

SEI No. 11-112  
11-112-GRD





**piars**  
ENGINEERING

745 Custer Road, Suite 100 • Plano, TX 75075 • (972) 422-0077 • TPE No. F-212

**HONDA OF ROCKWALL ADDITION  
LOT 1, BLOCK 1  
ROCKWALL, TEXAS  
DRAINAGE AREA MAP**

### DRAINAGE SUMMARY

Drainage Area	Area (ac.)	C	t (min)	I <sub>100</sub> (in/hr)	Q <sub>100</sub> (cfs)	Remarks
A	0.72	0.90	10	9.80	6.3	To Detention Basin
B	1.55	0.90	10	9.80	13.7	To Prop. 10' Curb Inlet
C	0.80	0.90	10	9.80	7.1	To Prop. 10' Curb Inlet
D	0.31	0.90	10	9.80	2.8	To Prop. 5' Curb Inlet
E	0.66	0.90	10	9.80	5.9	To Prop. 10' Curb Inlet
F	0.23	0.90	10	9.80	2.0	To Prop. 10' Curb Inlet
G	0.61	0.90	10	9.80	5.4	To Two 5' Curb Inlets
H	0.10	0.90	10	9.80	0.9	Offsite
I	0.43	0.90	10	9.80	3.8	To Prop. 10' Curb Inlet
J	0.23	0.90	10	9.80	2.0	To Prop. 5' Curb Inlet
K	0.25	0.90	10	9.80	2.2	To Prop. 5' Curb Inlet
L	0.39	0.90	10	9.80	3.5	Offsite
M	0.53	0.90	10	9.80	4.7	To Prop. 10' Curb Inlet
N	0.29	0.90	10	9.80	2.6	To Prop. 10' Curb Inlet
O	0.59	0.90	10	9.80	5.2	To Prop. 10' Curb Inlet
P	0.01	0.90	10	9.80	0.1	To Prop. Trench Drain
R1	0.10	0.90	10	9.80	0.9	To Roof Drain
R2	0.04	0.90	10	9.80	0.4	To Roof Drain
R3	0.08	0.90	10	9.80	0.7	To Roof Drain
R4	0.09	0.90	10	9.80	0.8	To Roof Drain
R5	0.10	0.90	10	9.80	0.9	To Roof Drain
R6	0.10	0.90	10	9.80	0.9	To Roof Drain
R7	0.19	0.90	10	9.80	1.7	To Roof Drain
R8	0.10	0.90	10	9.80	0.9	To Roof Drain
R9	0.09	0.90	10	9.80	0.8	To Roof Drain
R10	0.10	0.90	10	9.80	0.9	To Roof Drain
R11	0.03	0.90	10	9.80	0.3	To Roof Drain
OS1	0.10	0.90	10	9.80	0.7	To Prop. 5' Curb Inlet
OS2	0.02	0.90	10	9.80	0.1	To Prop. 10' Curb Inlet
OS3	0.45	0.90	10	9.80	3.9	To Prop. 10' Curb Inlet
OS4	0.18	0.90	10	9.80	1.6	To DOT ROW
OS5	0.56	0.90	10	9.80	5.0	To DOT ROW

### DETENTION CALCULATIONS (100-Yr)

Total Site Area = 8.69 Acres  
 Total Area to Detention Pond = 8.75 Acres (Areas A Thru O Except H&L + R1 Thru R11 + OS1 + OS2 + OS3)  
 Flow to Detention Pond =  $0.90 \times 8.75 = 77.1$  cfs  
 Pass Thru Flow =  $0.90 \times 8.0 \times 0.55 = 4.8$  cfs (Areas OS1 + OS2 + OS3)  
 Total Undetained Area = 0.49 Acre (Areas H + L)  
 Undetained Flow =  $0.90 \times 8.0 \times 0.49 = 4.3$  cfs  
 Total Allowable Discharge From Site =  $0.35 \times 8.3 \times 8.69 = 25.2$  cfs  
 Allowable Release Rate From Detention Pond =  $(Q_{\text{Site}} - Q_{\text{Undetained}}) + Q_{\text{Pass Thru Flow}}$   
 $Q_{\text{Pond (flow)}} = (25.2 - 4.3) + 4.8 = 20.9 + 4.8 = 25.7$

### DETENTION VOLUMES

ELEV.	AREA (SQ. FT.)	AVG. AREA (SQ. FT.)	INCR. DEPTH (FT.)	INCR. VOL. (CU. FT.)	CUM. VOL. (CU. FT.)
550	0	0	0	0	0
551	3,326	1,663	1.0	1,663	1,663
552	9,920	6,623	1.0	6,623	8,286
553	13,006	11,463	1.0	11,463	19,749
554	14,730	13,868	1.0	13,868	33,617
555	16,260	15,495	1.0	15,495	49,112
556	17,795	17,027	1.0	17,027	66,139
557	19,281	18,538	1.0	18,538	84,677
558	20,739	20,010	1.0	20,010	104,687

100-Yr. WSEL = 556.84

Storm Event	WSEL	Vol. Prov.	Q Pond (flow)	Q Pond (actual)
100-Yr.	556.84	81,724	25.7	25.8
25-Yr.	555.98	65,786	20.5	20.4
10-Yr.	555.35	54,994	17.9	16.8
5-Yr.	554.71	44,630	15.4	15.7

### 100 YEAR DETENTION BASIN CALCULATIONS

Runoff Coefficient - C = 0.90  
 Drainage Area - A = 8.20 acres  
 Time of Concentration - tc = 10 minutes  
 Maximum Outflow Rate - Q = 20.9 cfs

DURATION (minutes)	INTENSITY (inches/hr)	DEPTH (inches)	INFLOW DISCHARGE Q=CIA	INFLOW VOLUME Cu. Ft.	OUTFLOW DURATION (minutes)	OUTFLOW VOLUME Cu. Ft.	STORAGE VOLUME Cu. Ft.
5	10.08	0.84	74.39	22,317	15	9,405	12,912
10	9.80	1.63	72.32	43,394	20	12,540	30,854
15	9.10	2.28	67.16	60,442	25	15,675	44,767
20	8.30	2.77	61.25	73,505	30	18,810	54,695
30	6.90	3.45	50.92	91,660	40	25,080	66,580
40	5.80	3.87	42.80	102,730	50	31,350	71,380
50	5.00	4.17	36.90	110,700	60	37,620	73,080
60	4.50	4.50	33.21	119,556	70	43,890	75,666
70	4.10	4.78	30.26	127,084	80	50,160	76,924
80	3.90	5.20	28.78	138,154	90	56,430	81,724
90	3.60	5.40	26.57	143,467	100	62,700	80,767
120	2.70	5.40	19.93	143,467	130	81,510	61,957
180	2.00	6.00	14.76	159,408	190	119,130	40,278
360	1.25	7.50	9.23	199,260	370	231,990	(32,730)
			Required Storage Volume		81,724 cubic feet		
					1.88 acre-feet		

### LEGEND

Q = C I A  
 C = 0.90  
 I<sub>100</sub> = 9.8 in/hr  
 tc = 10 minutes

A ← Drainage Area Number  
 (X.XX) ← Acres  
 (X.X) ← Q<sub>100</sub> (cfs)

--- Drainage Divide Line  
 → Direction Of Flow

## RECORD DRAWINGS

NOTE:  
 To the best of our knowledge Spiars Engineering, Inc. hereby states that this plan is a Record Drawing. The information provided is based on field surveying at the site and information provided by the contractor.

**BENCHMARK:**  
 FOUND "X" CUT IN A CONCRETE DRIVE WAY LOCATED SOUTH 07°04'40" WEST, A DISTANCE OF 35.19 FEET FROM THE NORTHEAST CORNER OF CONCRETE DRIVEWAY AND NORTH 04°59'13" EAST, A DISTANCE OF 130.54' FROM THE NORTH CORNER OF AN EXISTING BUILDING LOCATED AT THE SOUTH END OF CONCRETE DRIVEWAY.

**BENCHMARK:**  
 TOP OF RIM OF A SANITARY SEWER MANHOLE LOCATED SOUTH 01°25'39" WEST, A DISTANCE OF 1,705.71 FEET FROM THE FROM A FOUND "X" WHICH IS LOCATED IN A CONCRETE DRIVEWAY SOUTH 17°15'49" EAST, A DISTANCE OF 31.19 FEET FROM EDGE OF ASPHALT.

Revisions	Date
1	
2	
3	
4	
5	
6	
7	
8	
9	

Issue Dates:

Scale: 1" = 40'

Drawn By: AO

Checked by: KSW

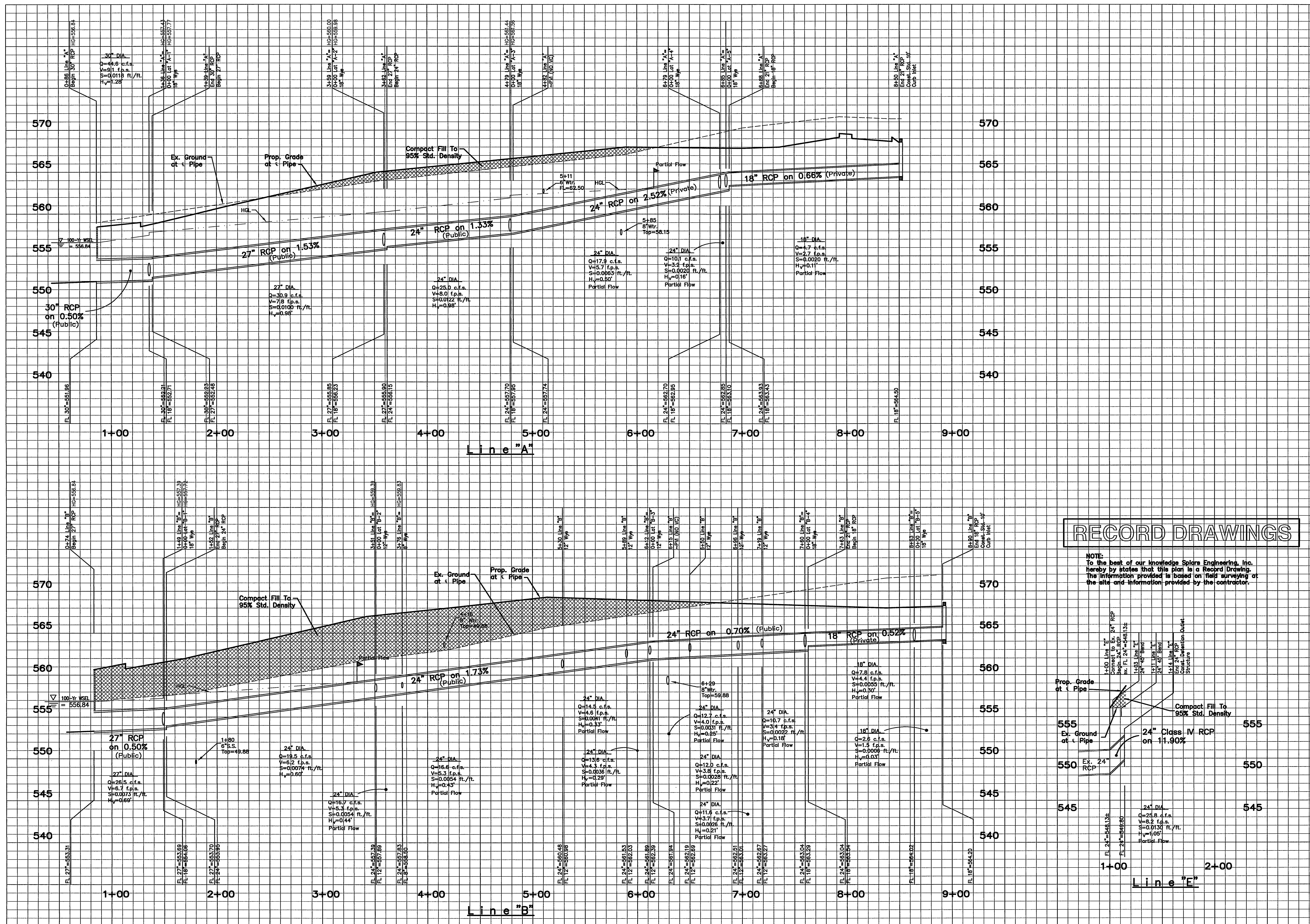
Sheet  
 of  
**C 6  
 12**

SEI No. 11-112  
 11-112-DMAP



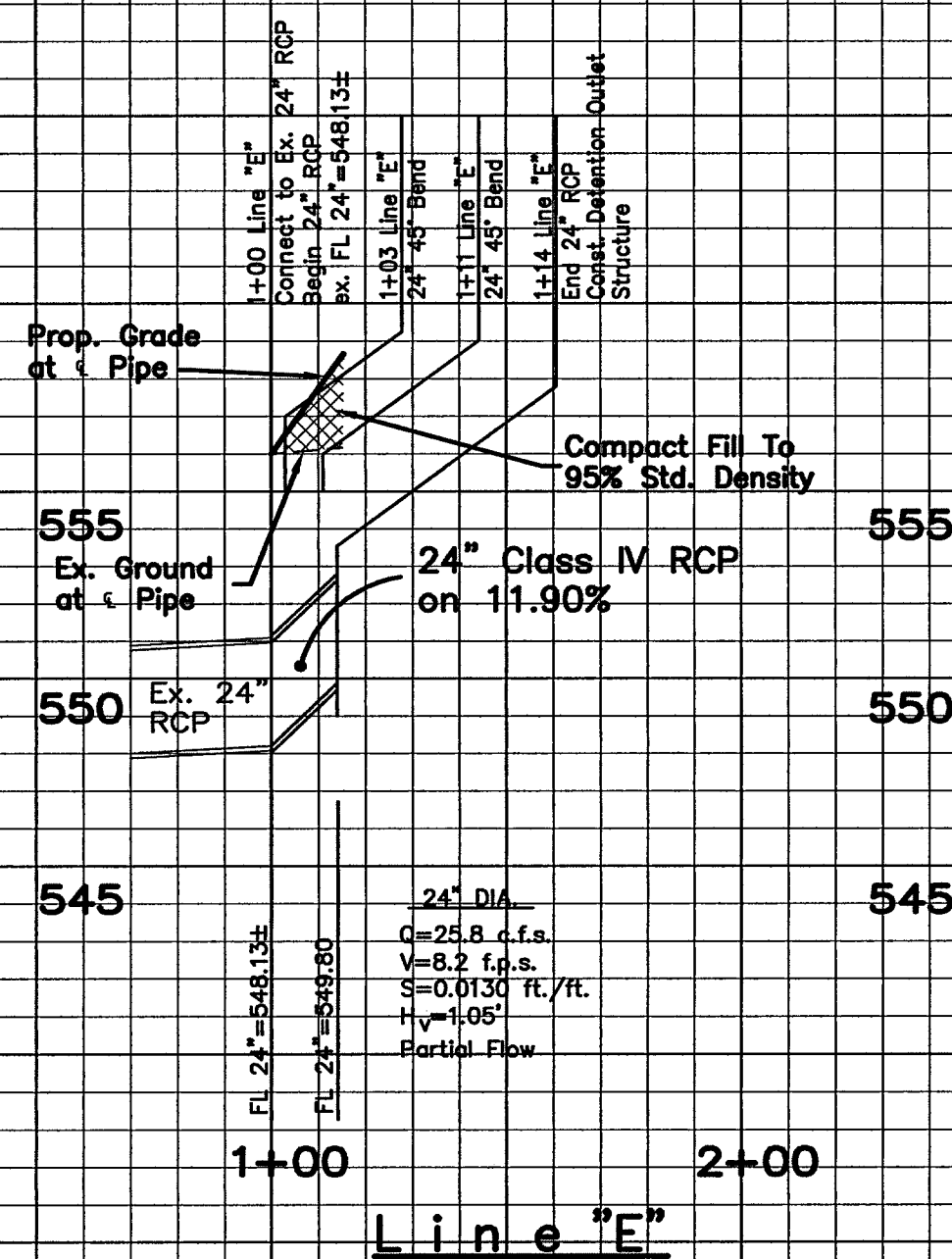






# RECORD DRAWINGS

NOTE:  
To the best of our knowledge Spars Engineering, Inc.  
hereby states that this plan is a Record Drawing.  
The information provided is based on field surveying at  
the site and information provided by the contractor.



HONDA OF ROCKWALL ADDITION  
LOT 1, BLOCK 1  
ROCKWALL, TEXAS  
STORM SEWER PROFILES

Revisions	Date
1	
2	
3	
4	
5	
6	
7	
8	
9	

Issue Dates:

Addendum 4 - Nov. 12, 2012

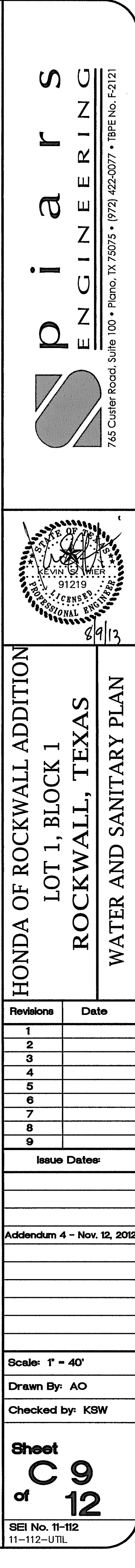
Scale: 1"=40'H 1"=5'V

Drawn By: AO

Checked by: KSW

Sheet  
of  
C 8  
12  
SEI No. 11-112  
11-112-Strmprf





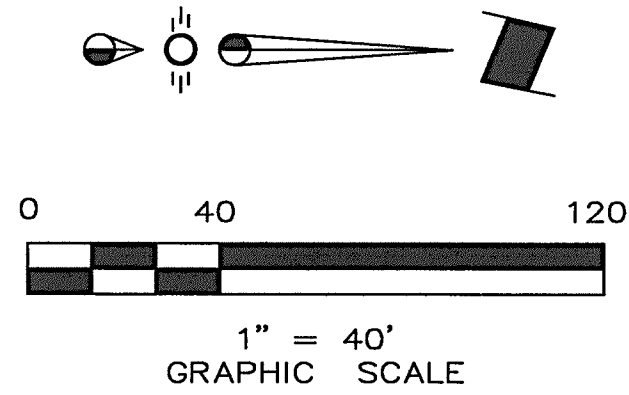
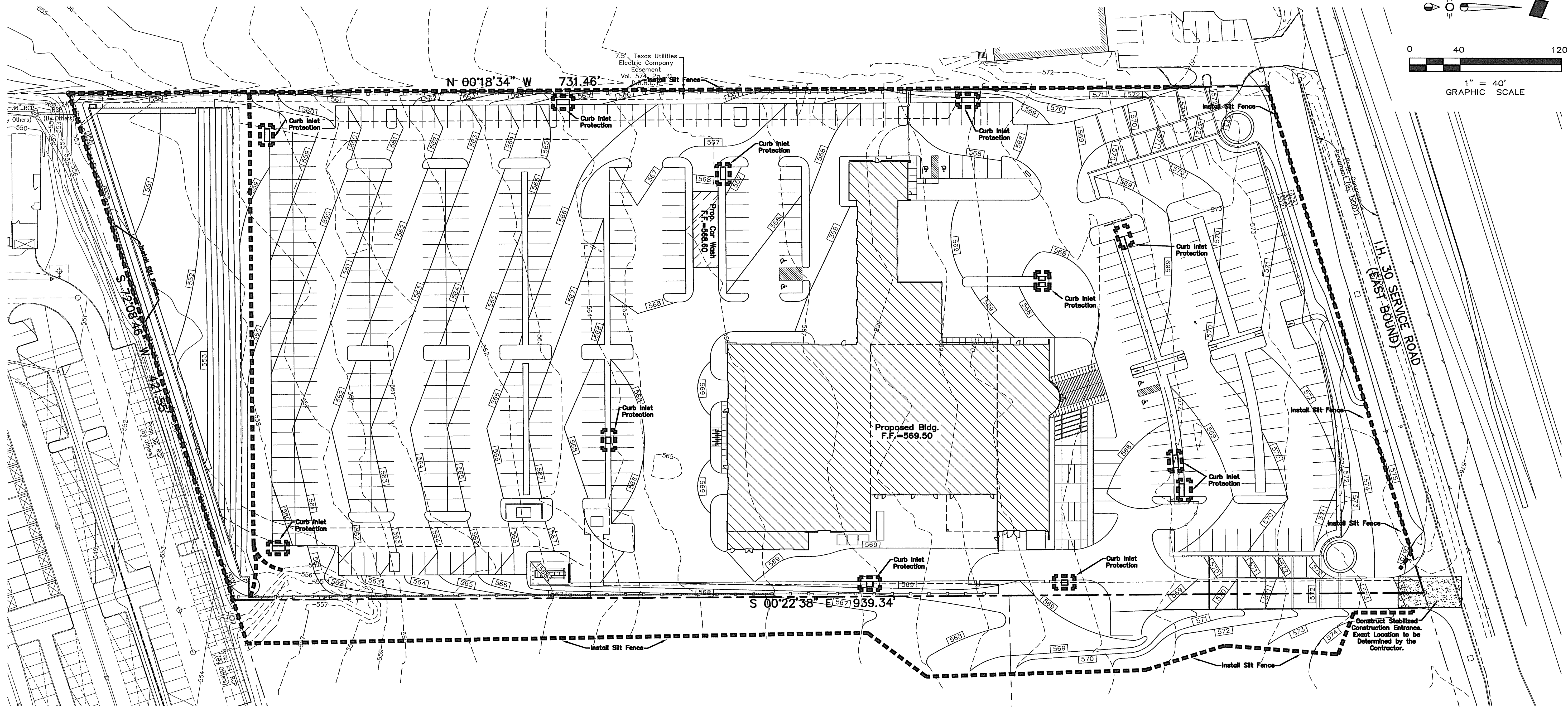
Revisions	Date
1	
2	
3	
4	
5	
6	
7	
8	
9	
<b>Issue Dates:</b>	
<b>Addendum 4 ~ Nov. 12, 2012</b>	
<b>Scale: 1" = 40'</b>	
<b>Drawn By: AO</b>	
<b>Checked by: KSW</b>	
<b>Sheet</b> <div style="display: flex; align-items: center; justify-content: center;"> <div style="font-size: 48pt; margin-right: 10px;">C</div> <div style="font-size: 48pt;">9</div> </div> <div style="display: flex; align-items: center; justify-content: center;"> <div style="font-size: 24pt; margin-right: 10px;">of</div> <div style="font-size: 48pt;">12</div> </div>	
<b>SEI No. 11-112</b> 11-112-UTIL	

- BENCHMARK:**  
FOUND "X" CUT IN A CONCRETE DRIVE WAY LOCATED SOUTH 07°44'40" WEST, A DISTANCE OF 35.18 FEET FROM THE NORTHEAST CORNER OF CONCRETE DRIVEWAY AND NORTH 40°59'13" EAST, A DISTANCE OF 130.54' FROM THE NORTH CORNER OF AN EXISTING BUILDING LOCATED AT THE SOUTH END OF CONCRETE DRIVEWAY.
- BENCHMARK:**  
TOP OF RIM OF A SANITARY SEWER MANHOLE LOCATED SOUTH 01°25'39" WEST, A DISTANCE OF 1,705.71 FEET FROM THE FROM A FOUND "X" WHICH IS LOCATED IN A CONCRETE DRIVEWAY SOUTH 17°15'49" EAST, A DISTANCE OF 31.19 FEET FROM EDGE OF ASPHALT.



Plotted by: kvaier Plot Date: 8/9/2013 8:50:24 AM

Drawing: G:\2011\JOBS\11-112 Honda of Rockwall\11-112 ECI.dwg Saved By: kvaier Save Time: 8/9/2013 8:50:28 AM



#### EROSION CONTROL GENERAL NOTES

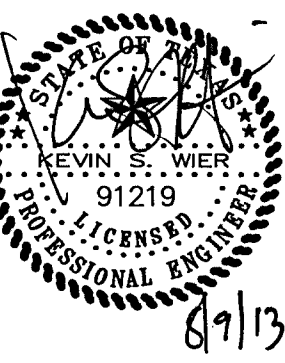
- Erosion control devices shown on these plans shall be installed prior to the start of land disturbing activities on the project.
- All erosion control devices are to be installed in accordance with the approved plans and specifications for this project. Changes are to be approved before construction by the design Engineer and the City of Rockwall Engineering Division.
- If the Erosion Control Plan as approved cannot control erosion and off-site sedimentation from the project the Erosion Control Plan will be required to be revised and/or additional erosion control devices will be required on site.
- Off-site soil borrow and spoil areas are considered part of the project site, and must also comply with the erosion control requirements for this project. This includes the installation of BMPs to control offsite sedimentation and the establishment of permanent ground cover on disturbed areas prior to final approval of the project.
- Inspections shall be made weekly and after rain storm events to insure that the devices are functioning properly. When sediment or mud has clogged the void spaces between stones or mud is being tracked onto a public roadway the aggregate pad must be washed down or replaced. Runoff from the washdown operation shall not be allowed to drain directly off the site without first flowing through another BMP to control off-site sedimentation. Periodic re-grading or the addition of new stone may be required to maintain the efficiency of the installation.
- Contractor shall have a copy of City of Rockwall Erosion and Sediment Control Manual on site at all times.
- Contractor shall be responsible for submittal of N.O.I., N.O.T. and any additional information required by T.C.E.Q. Contractor shall comply with all T.C.E.Q. stormwater pollution prevention requirements.
- Silt fence and construction entrances within TxDot ROW shall conform to TxDot standards EC(1)-09 and EC(3)-93.

## RECORD DRAWINGS

NOTE:  
To the best of our knowledge Spars Engineering, Inc.  
hereby states that this plan is a Record Drawing.  
The information provided is based on field surveying at  
the site and information provided by the contractor.

**BENCHMARK:**  
FOUND "X" CUT IN A CONCRETE DRIVE WAY LOCATED  
SOUTH 07°04'40" WEST, A DISTANCE OF 35.19 FEET FROM  
THE NORTHEAST CORNER OF CONCRETE DRIVEWAY AND  
NORTH 04°59'13" EAST, A DISTANCE OF 130.54' FROM THE  
NORTH CORNER OF AN EXISTING BUILDING LOCATED AT  
THE SOUTH END OF CONCRETE DRIVEWAY.

**BENCHMARK:**  
TOP OF RIM OF A SANITARY SEWER MANHOLE LOCATED  
SOUTH 01°25'39" WEST, A DISTANCE OF 1,705.71 FEET  
FROM THE FROM A FOUND "X" WHICH IS LOCATED IN A  
CONCRETE DRIVEWAY SOUTH 17°15'49" EAST, A DISTANCE  
OF 31.19 FEET FROM EDGE OF ASPHALT.



HONDA OF ROCKWALL ADDITION  
LOT 1, BLOCK 1  
ROCKWALL, TEXAS  
EROSION CONTROL PLAN

Revisions	Date
1	
2	
3	
4	
5	
6	
7	
8	
9	

Issue Dates:

Scale: 1" = 40'

Drawn By: AO

Checked by: KSW

Sheet  
C  
10  
12  
11-112-EC1



SANDBLASTING WASTE MANAGEMENT

DESCRIPTION

The objective of the management program is to minimize the potential of storm water quality degradation from sandblasting activities at construction sites. The key issues in this program are prudent handling and storage of sandblast media, dust suppression, and proper collection and disposal of spent media. It is not the intent of this program to outline all of the worker safety issues pertinent to this practice. Safety issues should be addressed by construction safety programs as well as local, state, and federal regulation. utilized at sites in which Sandblasting waste is present.

INSTALLATION/APPLICATION CRITERIA

Since the media consists of fine abrasive granules, it can be easily transported by running water. Sandblasting activities typically create a significant dust problem which must be contained and collected to prevent off-site migration problem which must be contained and collected to prevent off-site migration or fines.

Operational Procedures

Use only inert, non-degradable sandblast media.  
Use appropriate equipment for the job, do not over-blast.  
Wherever possible, blast in a downward direction.  
Install a wind sock or other wind direction instrument.  
Cease blasting activities in high winds or if wind direction could transport grit to drainage facilities.  
Install dust shielding around sandblasting areas.  
Collect and dispose of all spent sandblast grit, use dust containment fabrics and dust collection hoppers and barrels.  
Non-hazardous sandblast grit may be disposed in permitted construction debris landfills or permitted sanitary landfills.  
If sandblast media cannot be fully contained, construct sediment traps downstream from blasting area where appropriate.  
Use sand fencing where appropriate in areas where blast media cannot be fully contained.  
If necessary, install misting equipment to remove sandblast grit from the air - prevent runoff from misting operations from entering drainage systems.  
Use vacuum grit collection systems where possible.  
Keep records of sandblasting materials, procedures, and weather conditions on a daily basis.  
Take all reasonable precautions to ensure that sandblasting grit is contained and kept away from drainage structures.

Educational Issues

Educate all on-site employees of potential dangers to humans and the environment from sandblast grit.  
Instruct all on-site employees of the potential hazardous nature of sandblast grit and possible symptoms of overexposure to sandblast grit.  
Instruct operators of sandblasting equipment on safety procedures and personal protection equipment.  
Instruct operators on proper procedures regarding storage, handling, and containment of sandblast grit.  
Instruct operators to recognize unfavorable weather conditions regarding sandblasting activities.  
Instruct operators and supervisors on current local, state, and federal regulations regarding fugitive dust and hazardous waste from sandblast grit.  
Have weekly meetings with operators to discuss and reinforce proper operational procedures.  
Establish a continuing education program to indoctrinate new employees.

Material Handling Recommendations

Sandblast media should always be stored under cover away from drainage structures.  
Ensure that stored media or grit is not subject to transport by wind.  
Ensure that all sandblasting equipment as well as storage containers comply with local, state, and federal regulations.  
Refer to Hazardous Waste BMP fact sheet if sandblast grit is known or suspected to contain hazardous components.  
Capture and treat runoff which comes into contact with sandblasting material or waste.  
Foreman and/or construction supervisor should monitor all sandblasting activities and safety procedures.

Quality Assurance

Educate, and if necessary, discipline workers who violate procedures.  
Take all reasonable precautions to ensure that sandblast grit is not transported off-site or into drainage facilities.

Requirements

Education and awareness program for all employees regarding control of sandblasting and potential dangers to humans and the environment.  
Operator and supervisor education program for those directly involved in sandblasting activities - instructions on material handling, proper equipment operation, personal protective equipment, fugitive dust control, record keeping and reporting, fugitive dust control, record keeping and reporting.  
Proper sandblast equipment for the job.  
Site-specific fugitive dust control and containment equipment.  
Site-specific fugitive dust control procedure.  
Compliance by supervisors and workers.

Costs

Minimal cost for training and monitoring.  
Potential for significant cost for containment procedures on large jobs.  
Potential for significant costs associated with cleanup, correction and remediation if containment occurs.

LIMITATIONS

Site specific solutions to sandblasting problems may be required.  
Sandblasting operations on structures known to contain hazardous materials require special procedures not specifically outlined above including professional hazardous waste specialists.  
Where hazardous materials are known or suspected, a site assessment and remediation plan may be necessary.  
This management program is one part of a comprehensive construction site waste management program.

HAZARDOUS WASTE MANAGEMENT

DESCRIPTION

The hazardous waste management BMP addresses the problem of storm water Polluted with hazardous waste through spills or other forms of contact. The Objective of the Management Program is to minimize the potential of Storm water contamination from common construction site hazardous wastes Through appropriate recognition, handling, storage, and disposal practices.

It is not the intent of this Management Program to supersede or replace normal site assessment and remediation procedures. Significant spills and/or contamination warrant immediate response by trained professionals. Suspected job-site contamination should be immediately reported to regulatory Authorities and protective actions taken. The General Permit requires reporting Of significant spills to the National Response Center (NRC) at (800)424-8802.

PRIMARY USE

These management practices along with applicable OSHA and EPA guidelines Should be incorporated at all construction sites which use or generate Hazardous wastes. Many wastes such as fuel, oil, grease, fertilizer, and pesticide Are present at most construction sites.

INSTALLATION, APPLICATION AND DISPOSAL CRITERIA

The hazardous waste management techniques presented here are based on Proper recognition, handling, and disposal practices by construction workers And supervisors. Key elements of the management program are education, Proper disposal practices, as well as provisions for safe storage and disposal. Following are lists describing the targeted materials and recommended procedures:

Targeted Hazardous Waste Materials

Paints  
Solvents  
Stains  
Wood preservatives  
Cutting oils  
Greases  
Roofing tar  
Pesticides  
Fuel and lube oils  
Lead based paints (Demolition)

Storage Procedures

Wherever possible, minimize use of hazardous materials.  
Minimize generation of hazardous wastes on the job-site.  
Segregate potentially hazardous waste from non-hazardous  
Construction site debris.  
Designate a foreman or supervisor to oversee hazardous materials  
Handling procedures.  
Keep liquid or semi-liquid hazardous waste in appropriate containers (closed drums or similar) and under cover.  
Other enclosed trash container that limits contact with rain and.  
Store waste materials away from drainage ditches, swales, and catch basins.  
Use containment berms in fueling and maintenance areas and where the potential for spills is high.  
Ensure that adequate hazardous waste storage volume is available.  
Ensure that hazardous waste collection containers are conveniently located.  
Do not allow potentially hazardous waste materials to accumulate on the ground.  
Enforce Hazardous waste handling and storage procedures.  
Clearly mark on all hazardous waste containers which materials are acceptable for the container.

Disposal Procedures

Regularly schedule hazardous waste removal to minimize on-site storage.  
Use only reputable, licensed hazardous waste haulers.

Education

Instruct workers in identification of hazardous waste  
Educate workers of potential dangers to humans and the environment from hazardous wastes  
Instruct workers on safety procedures for common construction site hazardous wastes  
Educate all workers on hazardous waste storage and disposal procedures  
Have regular meetings to discuss and reinforce identification, handling and disposal procedures (incorporate in regular safety seminars).  
Establish a continuing education program to indoctrinate new employees

Quality Assurance

Foreman and/or construction supervisor shall monitor on-site hazardous waste storage and disposal procedures.  
Educate, and if necessary, discipline workers who violate procedures.  
Ensure that the hazardous waste disposal contractor is reputable and licensed.

Requirements

Job-site waste handling and disposal education and awareness program  
Commitment by management to implement hazardous waste management practices.  
Compliance by workers.  
Sufficient and appropriate hazardous waste storage containers.  
Timely removal of stored hazardous waste materials.

Costs

Possible modest cost impact for additional hazardous storage containers.  
Small cost impact for training and monitoring  
Potential cost impact for hazardous waste collection and disposal by licensed hauler - actual cost depends on type of material and volume.

LIMITATIONS

This practice is not intended to address site-assessments and pre-existing contamination.  
Major contamination, large spills and other serious hazardous waste incidents require immediate response from specialists.  
Demolition activities and potential pre-existing materials, such as asbestos, are not addressed by this program. Site specific information on plans is necessary.  
Contaminated soils are not addressed.  
One part of a comprehensive construction site waste management program.

SOLID WASTE MANAGEMENT

DESCRIPTION

Large volumes of solid waste are often generated at construction sites including: packaging, pallets, wood waste, concrete waste, soil, electrical wiring, cuttings, and a variety of other materials. The solid waste management practice lists techniques to minimize the potential of storm water contamination from solid waste through appropriate storage and disposal practices.

PRIMARY USE

These practices should be a part of all construction practices. By limiting the trash and debris on site, storm water quality is improved along with reduced clean up requirements at the completion of the project.

APPLICATIONS

The solid waste management practice for construction sites is based on proper storage and disposal practices by construction workers and supervisors. Key elements of the program are education and modification of improper disposal habits. Cooperation and vigilance is required on the part of supervisors and workers to ensure that the recommendations and procedures are followed. Following are lists describing the targeted materials and recommended procedures:

Targeted Solid Waste Materials

Paper and cardboard containers  
Plastic packaging  
Styrofoam packing and forms  
Insulation materials (non-hazardous)  
Wood pallets  
Wood cuttings  
Pipe and electrical cuttings  
Concrete, brick, and mortar waste  
Shingle cuttings and waste  
Roofing tar  
Steel (cuttings, nails, rust residue)  
Gypsum board cuttings and waste  
Sheathing cuttings and waste  
Miscellaneous cutting and waste  
Food waste  
Demolition waste

Storage Procedures

Wherever possible, minimize production of solid waste materials.  
Designate a foreman or supervisor to oversee and enforce proper solid waste procedures.  
Instruct construction workers in proper solid waste procedures.  
Segregate potentially hazardous waste from non-hazardous construction site debris.  
Keep solid waste materials under cover in either a closed dumpster or other enclosed trash container that limits contact with rain and runoff.  
Store waste materials away from drainage ditches, swales and catch basins.  
Do not allow trash containers to overflow.  
Do not allow waste materials to accumulate on the ground.  
Prohibit littering by workers and visitors.  
Police site daily for litter and debris.  
Enforce solid waste handling and storage procedures.

Disposal Procedures

If feasible, segregate recyclable wastes from non-recyclable waste materials and dispose of properly.  
General construction debris may be hauled to a licensed construction debris landfill (typically less expensive than a sanitary landfill).  
Use waste facilities approved by local jurisdiction.  
Runoff which comes into contact with unprotected waste shall be directed into structural treatment such as silt fence to remove debris.

Education

Educate all workers on solid waste storage and disposal procedures.  
Instruct workers in identification of solid waste and hazardous waste.  
Have regular meetings to discuss and reinforce disposal procedures (incorporate in regular safety seminars).  
Clearly mark on all solid waste containers which materials are acceptable.

Quality Control

Foreman and/or construction supervisor shall monitor on-site solid waste storage and disposal procedures.  
Discipline workers who repeatedly violate procedures.

Requirements

Jobsite waste handling and disposal education and awareness program  
Commitment by management to implement and enforce Solid Waste Management Program.  
Compliance by workers.  
Sufficient and appropriate waste storage containers.  
Timely removal of stored solid waste materials.  
Possible modest cost impact for additional waste storage containers.  
Small cost impact for training and monitoring  
Minimal overall cost impact.

LIMITATIONS

Only addresses non-hazardous solid waste.  
One part of a comprehensive construction site management program.

CONCRETE WASTE MANAGEMENT

DESCRIPTION

Concrete waste at construction sites comes in two forms: 1) excess fresh concrete mix including truck and equipment washing, and 2) concrete dust and concrete debris resulting from demolition. Both forms have the potential to impact water quality through storm water runoff contact with the waste.

PRIMARY USE

Concrete waste is present at most construction sites. This BMP should be utilized at sites in which concrete waste is present

APPLICATIONS

A number of water quality parameters can be affected by introduction of concrete - especially fresh concrete. Concrete affects the pH of runoff, causing significant chemical changes in water bodies and harming aquatic life. Suspended solids in the form of both cement and aggregate dust are also Generated from both fresh and demolished concrete waste:

Current Unacceptable Waste Concrete Disposal Practices

Dumping in vacant areas on the job-site  
Illicit dumping off-jobsite  
Dumping into ditches or drainage facilities

Recommended Disposal Practices

Avoid unacceptable dumping practices listed above.  
Develop predetermined, safe concrete disposal areas  
Provide a washout area with a minimum of 6 cubic feet of containment area volume for every 10 cubic yards of concrete poured.  
Never dump waste concrete illicitly or without property owners knowledge and consent.  
Treat runoff from storage area through the use of structural controls as required.

Education

Drivers and equipment operators should be instructed on proper disposal and equipment washing practices (see above).  
Supervisors must be made aware of the potential environmental consequences of improperly handling concrete waste.

Enforcement

The construction site manager or foreman must ensure that employees and pre-mix companies follow proper procedures for concrete disposal and equipment washing.  
Employees violating disposal or equipment cleaning directives must be reeducated or disciplined if necessary.

Demolition Practices

Monitor weather and wind direction to ensure concrete dust is not entering drainage structures and surface waters.  
Where appropriate, construct sediment traps or other types of sediment detention devices downstream of demolition activities.

Requirements

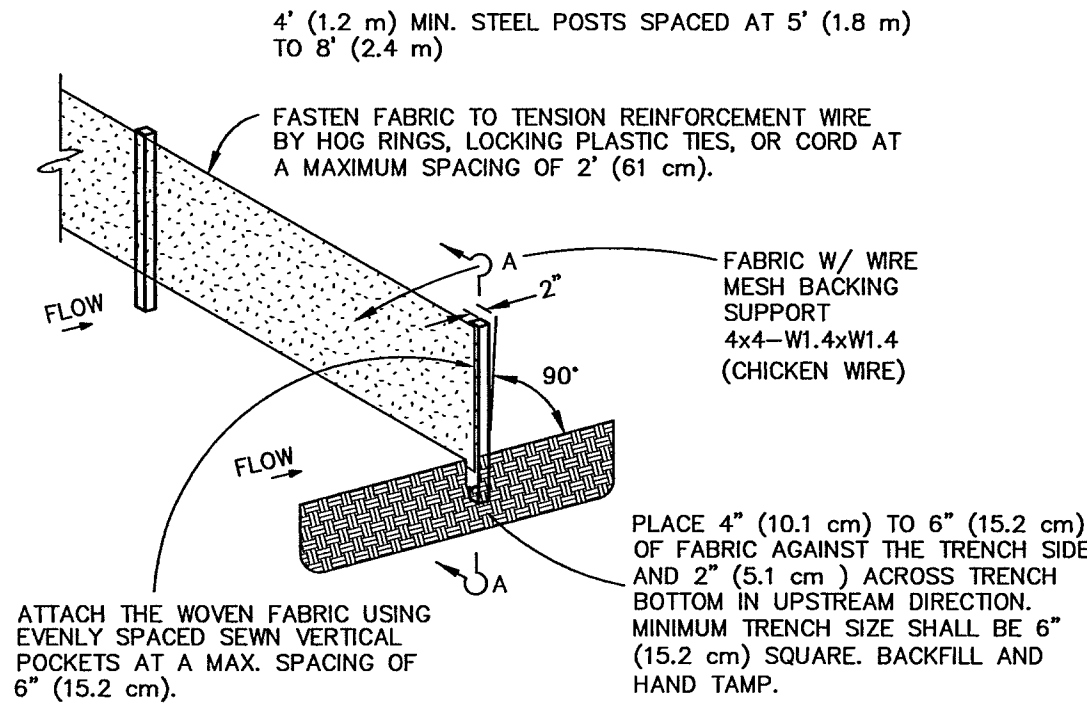
Use predetermined disposal for waste concrete.  
Prohibit dumping waste concrete anywhere but predetermined areas.  
Assign predetermined truck and equipment washing areas.  
Educate drivers and operators on proper disposal and equipment cleaning procedures.

Costs

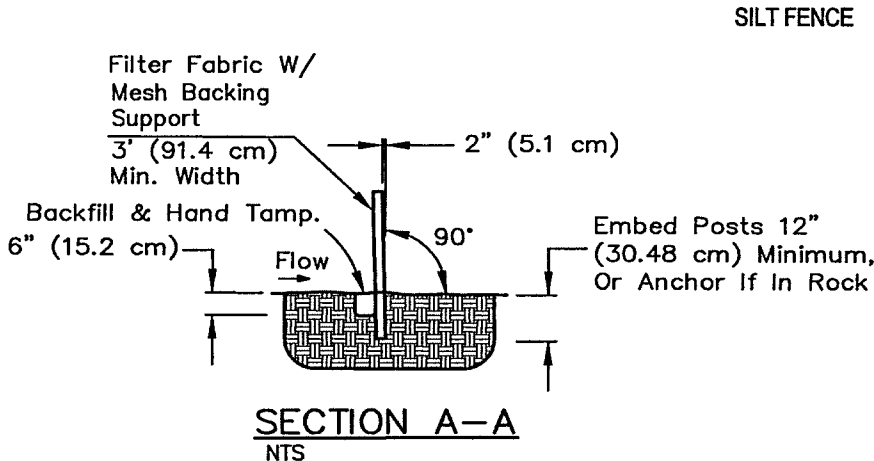
Minimal cost impact for training and monitoring.  
Concrete disposal cost depends on availability and distance to suitable disposal areas.  
Additional costs involved in equipment washing could be significant.

LIMITATIONS

This concrete waste management program is one part of a comprehensive construction site management program.



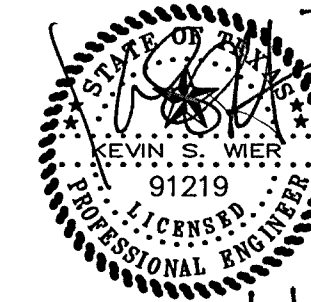
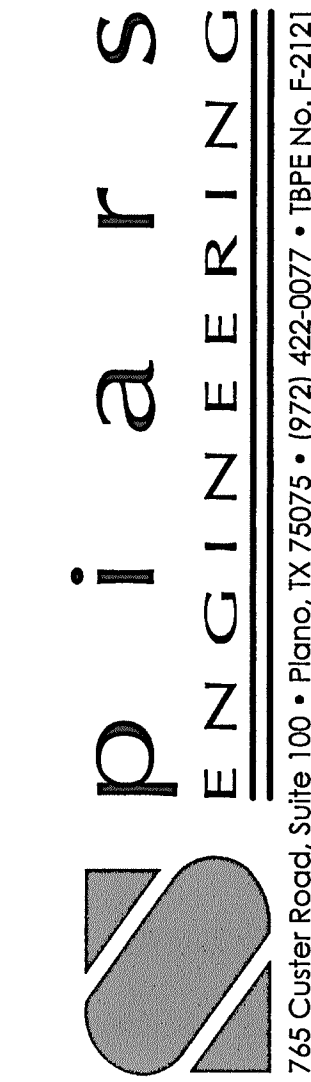
SILT FENCE  
NTS



RECORD DRAWINGS

NOTE:  
To the best of our knowledge Spars Engineering, Inc. hereby by states that this plan is a Record Drawing. The information provided is based on field surveying at the site and information provided by the contractor.

1. STEEL POSTS WHICH SUPPORT THE SILT FENCE SHALL BE INSTALLED ON A SLIGHT ANGLE TOWARD THE ANTICIPATED RUNOFF SOURCE. POST MUST BE EMBEDDED A MINIMUM OF 1 FOOT.
2. THE TOE OF THE SILT FENCE SHALL BE TRENCHED IN WITH A SPADE OR MECHANICAL TRENCHER, SO THAT THE DOWN/DOWNSIDE FACE OF THE TRENCH IS FLAT AND PERPENDICULAR TO THE LINE OF FLOW. WHERE FENCE CANNOT BE TRENCHED (e.g. PAVEMENT), WEIGHT FABRIC FLAP WITH WASHED GRAVEL ON UPHILL SIDE TO PREVENT FLOW UNDER FENCE.
3. THE TRENCH MUST BE A MINIMUM OF 6 INCHES DEEP AND 6 INCHES WIDE TO ALLOW FOR THE SILT FENCE FABRIC TO BE LAID IN THE GROUND AND BACKFILLED WITH COMPACTED MATERIAL.
4. SILT FENCE SHOULD BE SECURELY FASTENED TO EACH STEEL SUPPORT POST OR TO WOVEN WIRE, WHICH IS IN TURN ATTACHED TO THE STEEL FENCE POST. THERE SHALL BE A 6 INCH DOUBLE OVERLAP, SECURELY FASTENED WHERE ENDS OF FABRIC MEET.
5. INSPECTION SHALL BE MADE WEEKLY OR AFTER EACH RAINFALL. REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
6. SILT FENCE SHALL BE REMOVED WHEN THE SITE IS COMPLETELY STABILIZED SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.
7. ACCUMULATED SILT SHALL BE REMOVED WHEN IT REACHES A DEPTH OF 6 INCHES. THE SILT SHALL BE DISPOSED OF IN AN APPROVED SITE AND IN SUCH A MANNER AS TO NOT CONTRIBUTE TO ADDITIONAL SILTATION.
8. REFER TO TxDOT STANDARD EC3-49 FOR ALL SILT FENCE PLACED WITHIN TxDOT ROW.



HONDA OF ROCKWALL ADDITION  
LOT 1, BLOCK 1  
ROCKWALL, TEXAS  
STORMWATER POLLUTION  
PREVENTION GUIDELINES

Revisions	Date
1	
2	
3	
4	
5	
6	
7	
8	
9	

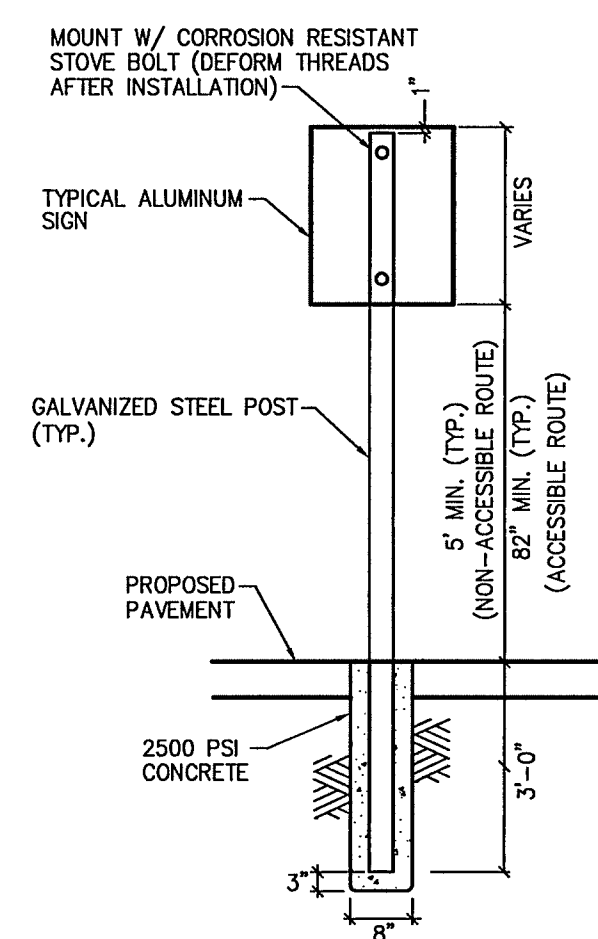
Issue Dates:

Scale: N.T.S.  
Drawn By: AO  
Checked by: KSW

Sheet  
of C 11  
12

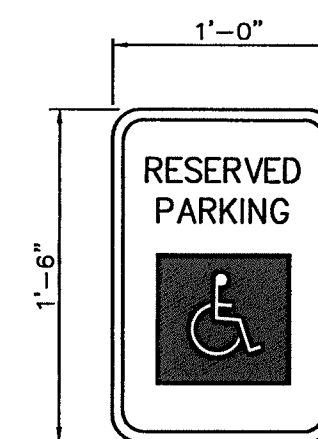
SEI No. 11-112  
11-112-EC2





TYPICAL SIGNAGE MOUNTING DETAIL

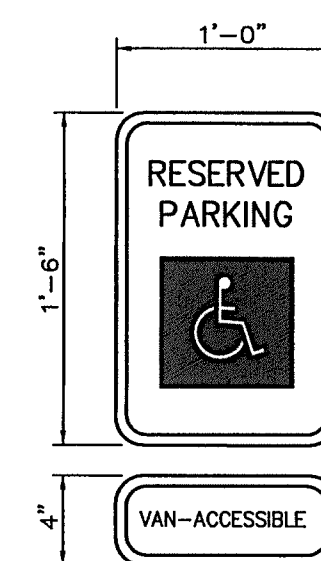
N.T.S.



COLORS:  
LETTERS AND BORDER - GREEN  
SYMBOL ON BLUE BACKGROUND  
SIGN BACKGROUND - WHITE

- NOTES:

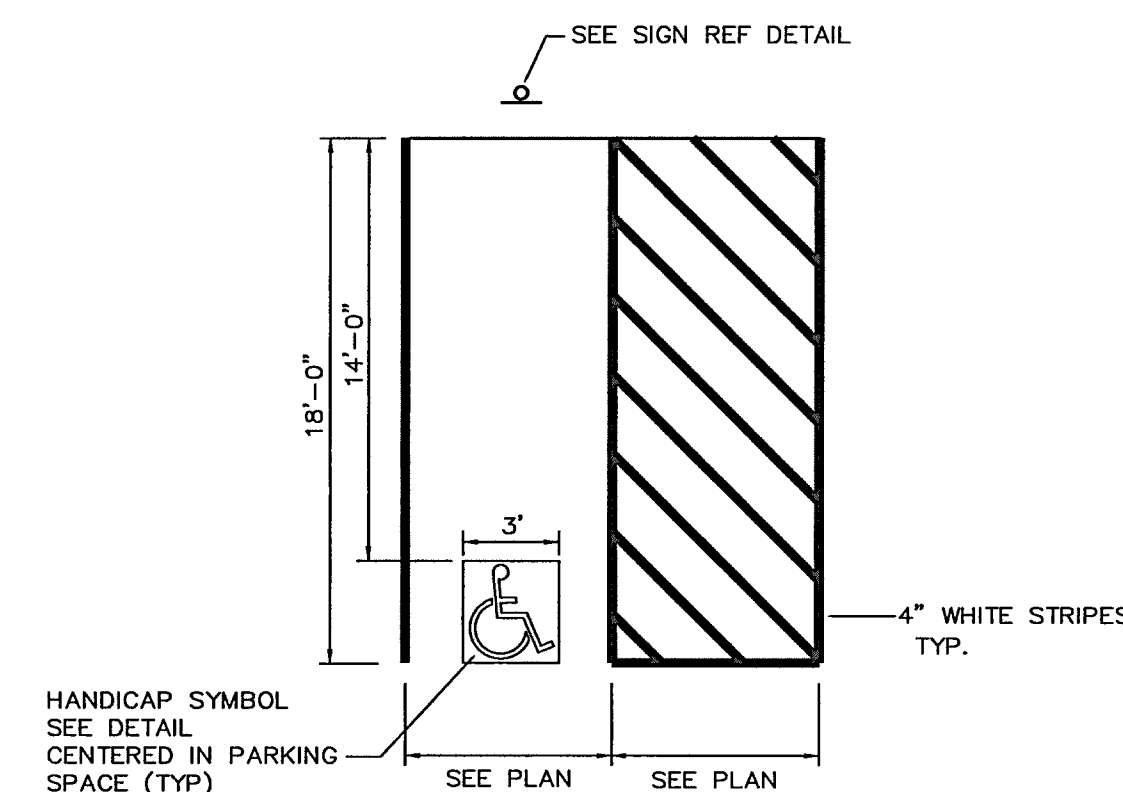
1. SPACING BETWEEN LETTERS, COLORS, AND PROCESSES SHALL CONFORM STANDARD HIGHWAY AND SIGN DESIGNS FOR TEXAS.
2. INSTALL WHERE INDICATED ON PLANS.
3. VAN—ACCESSIBLE SIGNAGE ON VAN SPACES ONLY.



COLORS:  
LETTERS AND BORDER - GREEN  
SYMBOL ON BLUE BACKGROUND  
SIGN BACKGROUND - WHITE

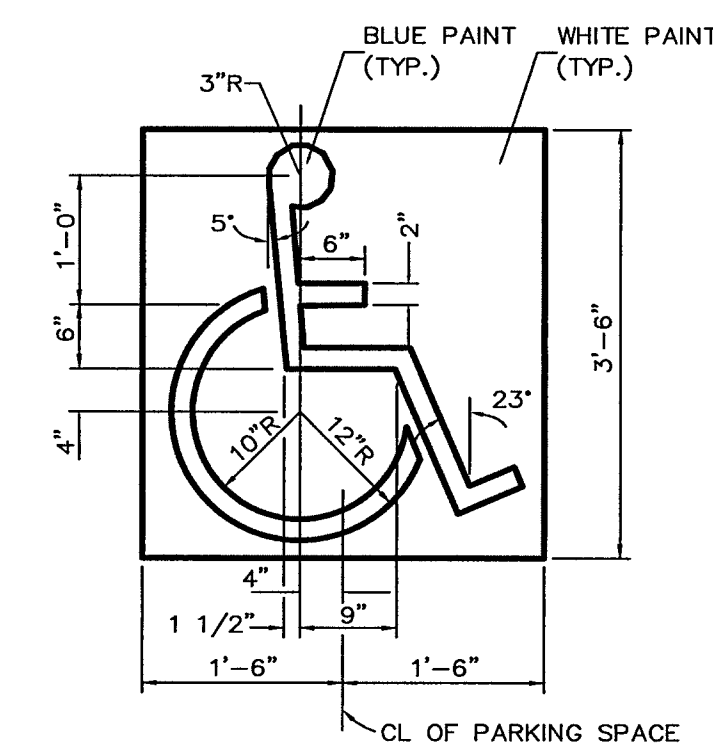
- NOTES:

1. SPACING BETWEEN LETTERS, COLORS, AND PROCESSES SHALL CONFORM STANDARD HIGHWAY AND SIGN DESIGNS FOR TEXAS.
2. INSTALL WHERE INDICATED ON PLANS.
3. VAN-ACCESSIBLE SIGNAGE ON VAN SPACES ONLY.



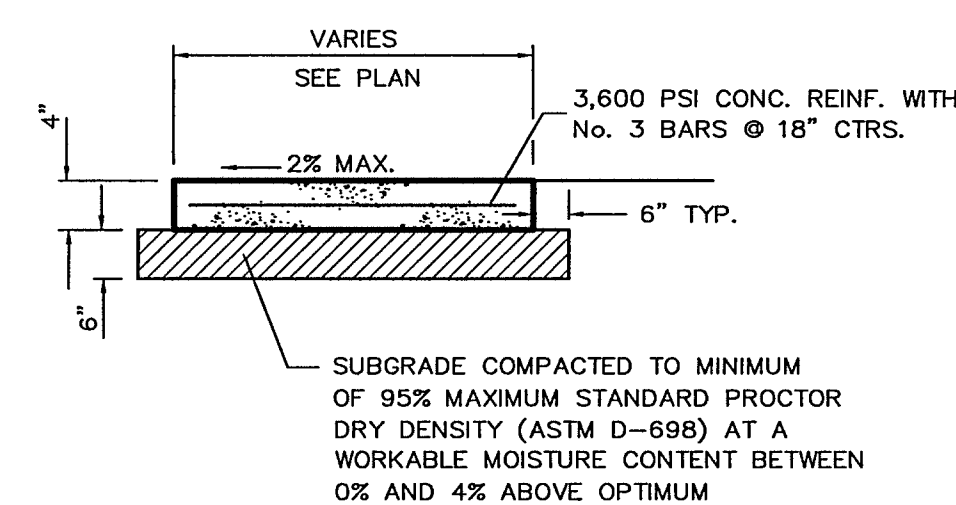
## HANDICAP STRIPING DETAIL

N.T.S.



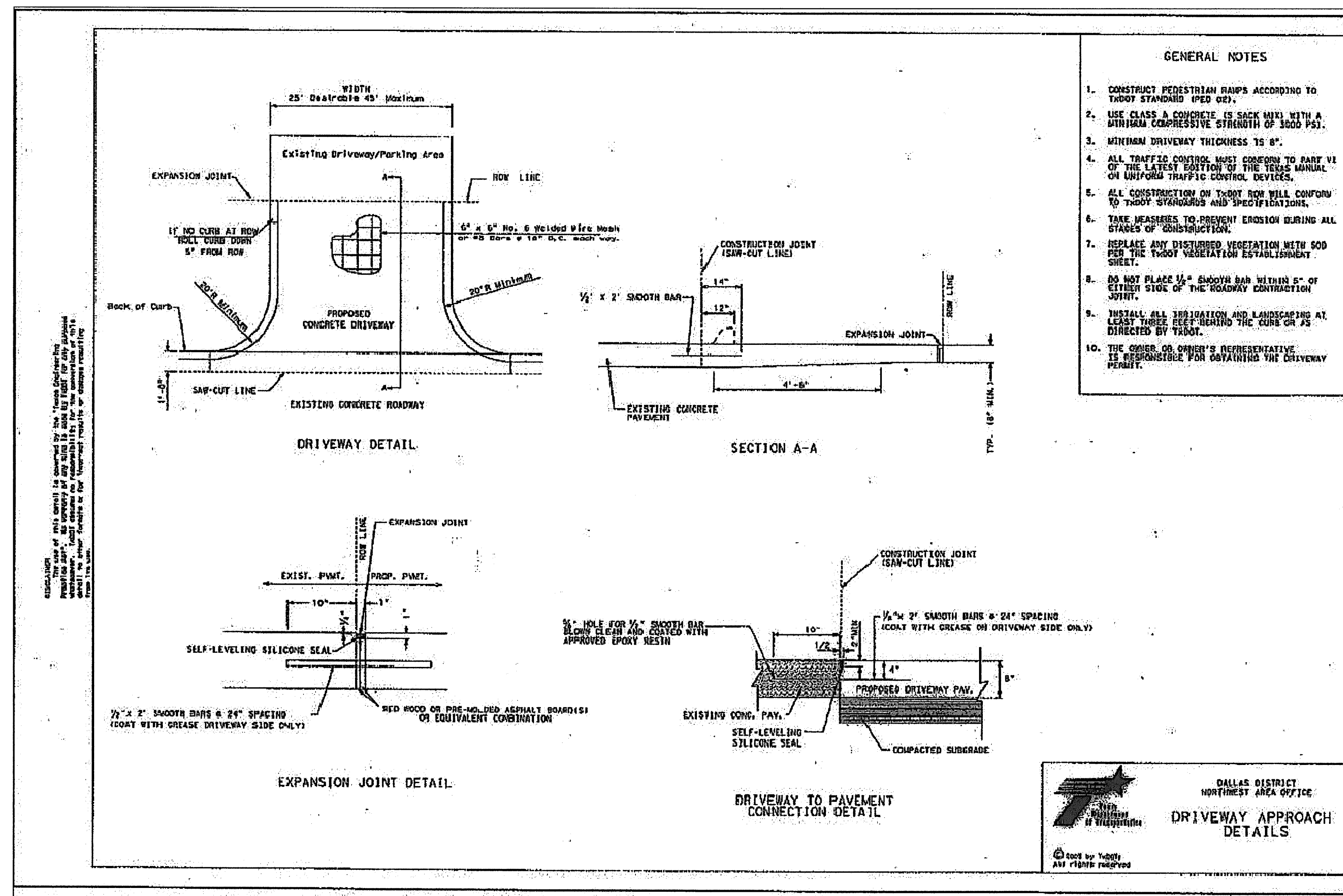
### HANDICAP SYMBOL DETAIL

NTS



### SITE SIDEWALK DETAIL

N.T.S.

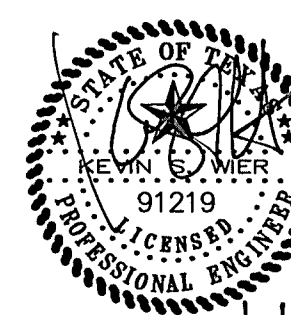


- ## GENERAL NOTES
1. CONSTRUCT STANDARD RAMPAS ACCORDING TO TxDOT PDETHAN (PED OZ).
  2. USE CLASS A CONCRETE IN SACK MIX WITH A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI.
  3. MINIMUM DRIVEWAY THICKNESS IS 8".
  4. ALL TRAFFIC CONTROL MUST CONFORM TO PART 5 OF THE LATEST TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
  5. ALL CONSTRUCTION ON TxDOT ROW MUST CONFORM TO THE STANDARD SPECIFICATIONS.
  6. TAKE MEASURES TO PREVENT EROSION DURING A STAGES OF CONSTRUCTION.
  7. REPLACE ANY DISTURBED VEGETATION WITH SOO PER THE TxDOT VEGETATION ESTABLISHMENT SPECIFICATIONS.
  8. DO NOT PLACE US-A SHOULDER BAR WITHIN 8' OF EITHER SIDE OF THE ROADWAY CONTRACTION.
  9. INSTALL ALL EROSION AND LANDSCAPING AT LEAST THREE FEET BEHIND THE CURB OR AS DIRECTED BY TxDOT.
  10. THE OWNER IS NOT REPRESENTATIVE. IT IS RESPONSIBLE FOR OBTAINING THE ALLOWANCE

# RECORD DRAWINGS

**NOTE:**  
To the best of our knowledge Splars Engineering, Inc. hereby states that this plan is a Record Drawing. The information provided is based on field surveying at the site and information provided by the contractor.

Note:  
All materials and construction shall conform to the City of  
Rockwall Standard Construction Details and Specifications  
and NCTCOG 3rd Edition.



## CKWALL, TEX SITE DETAILS

Revisions	Date
1	
2	
3	
4	
5	
6	
7	
8	
9	

**Issue Dates:**

Scale: N.T.S.

Drawn By: AO

Checked by: KSW

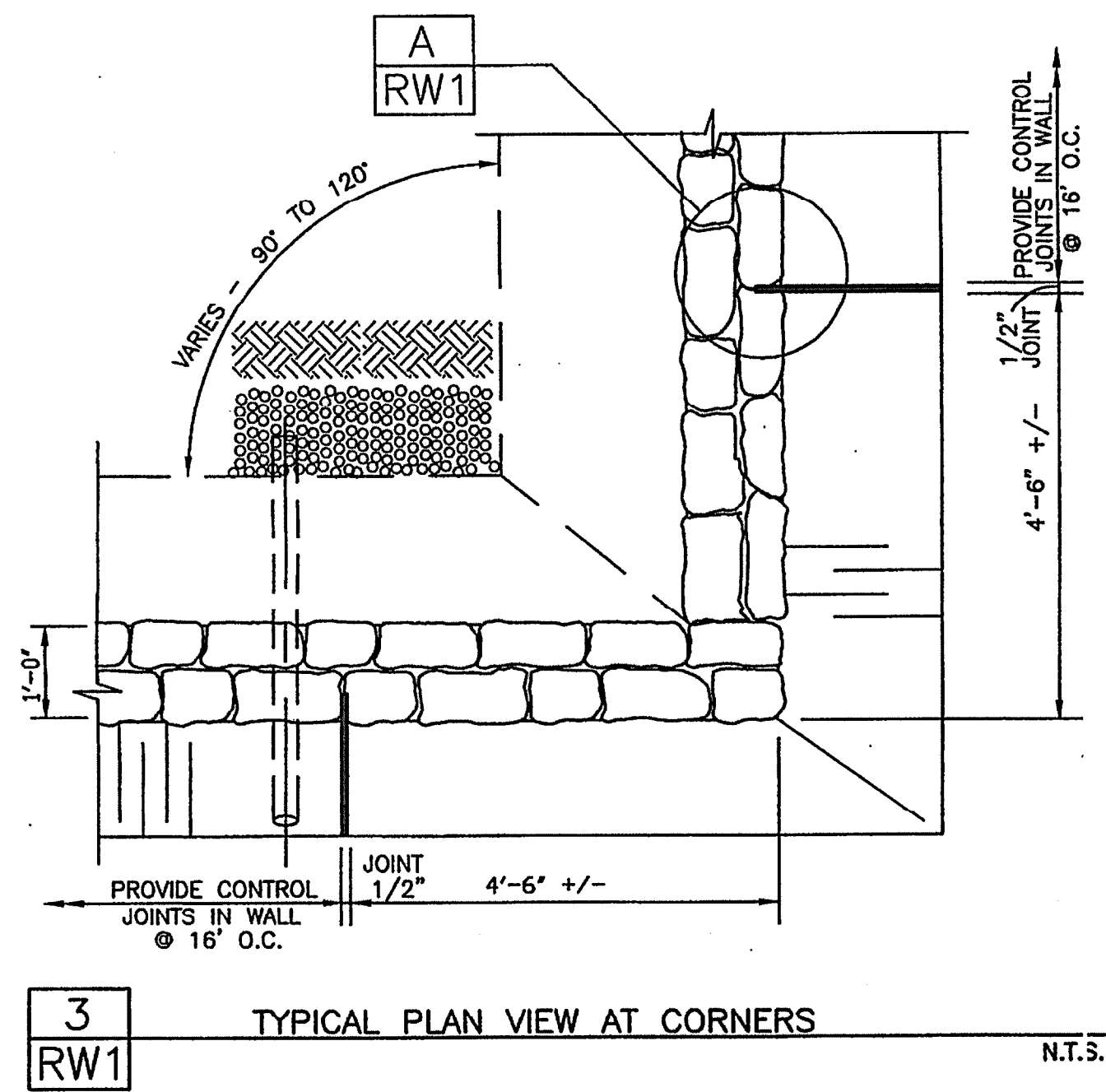
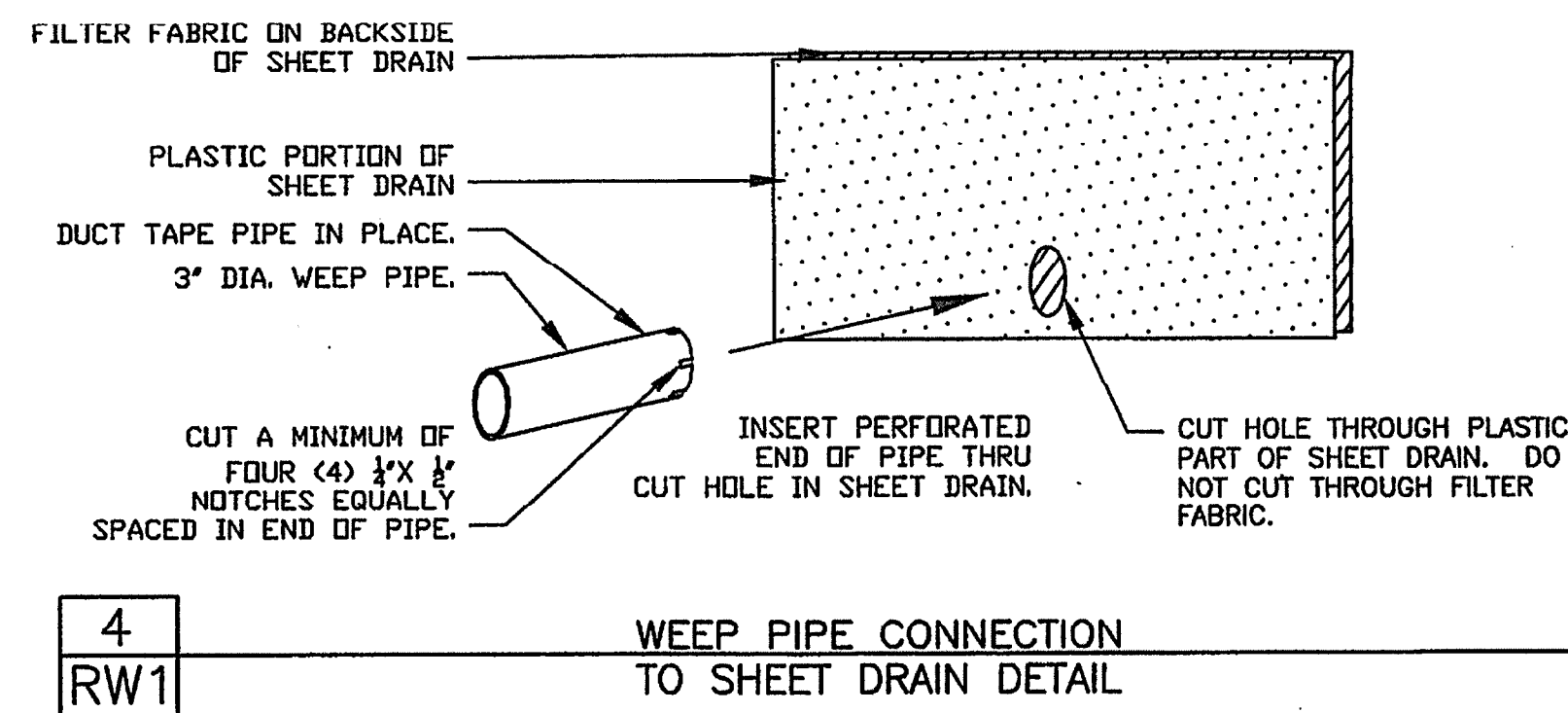
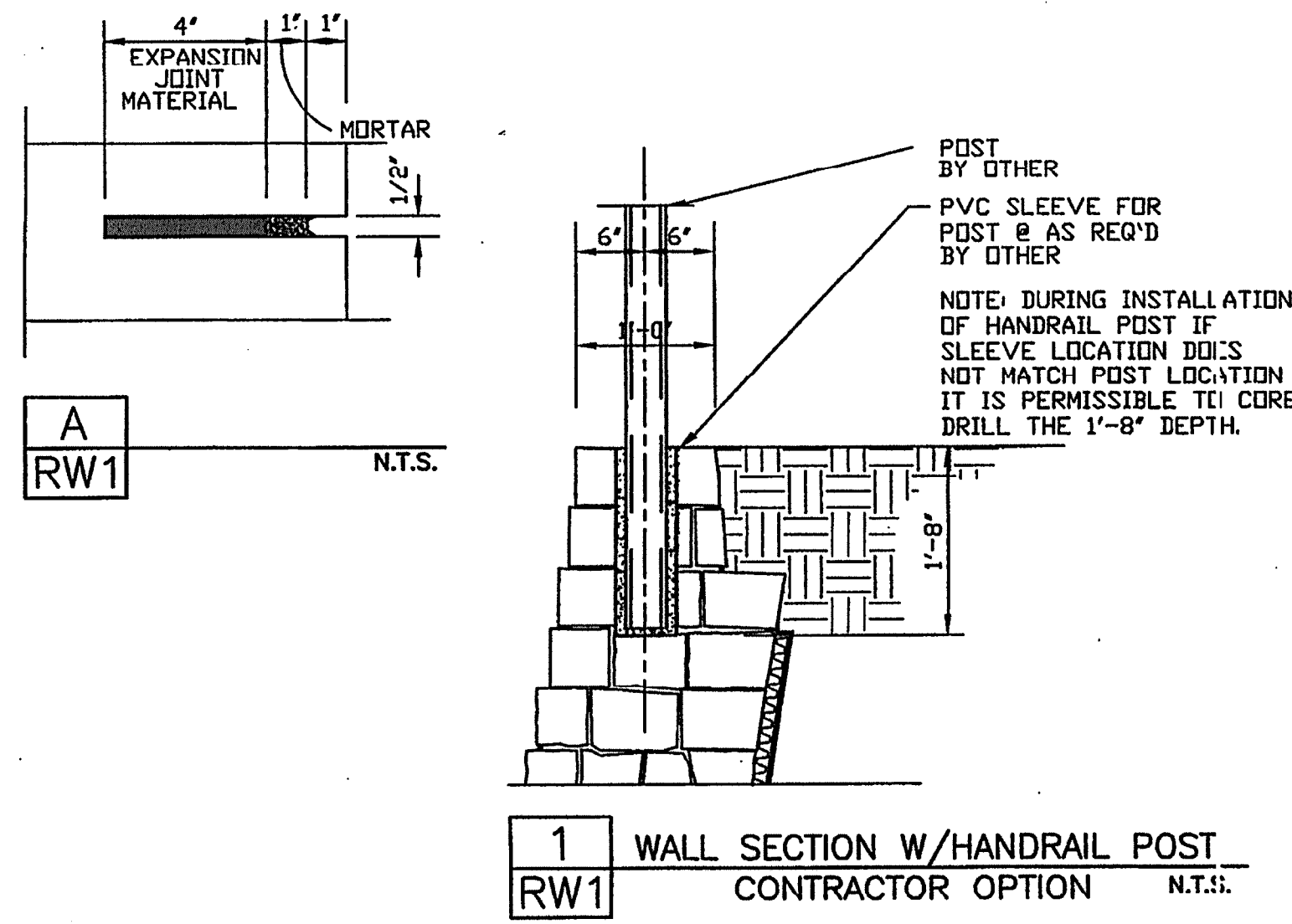
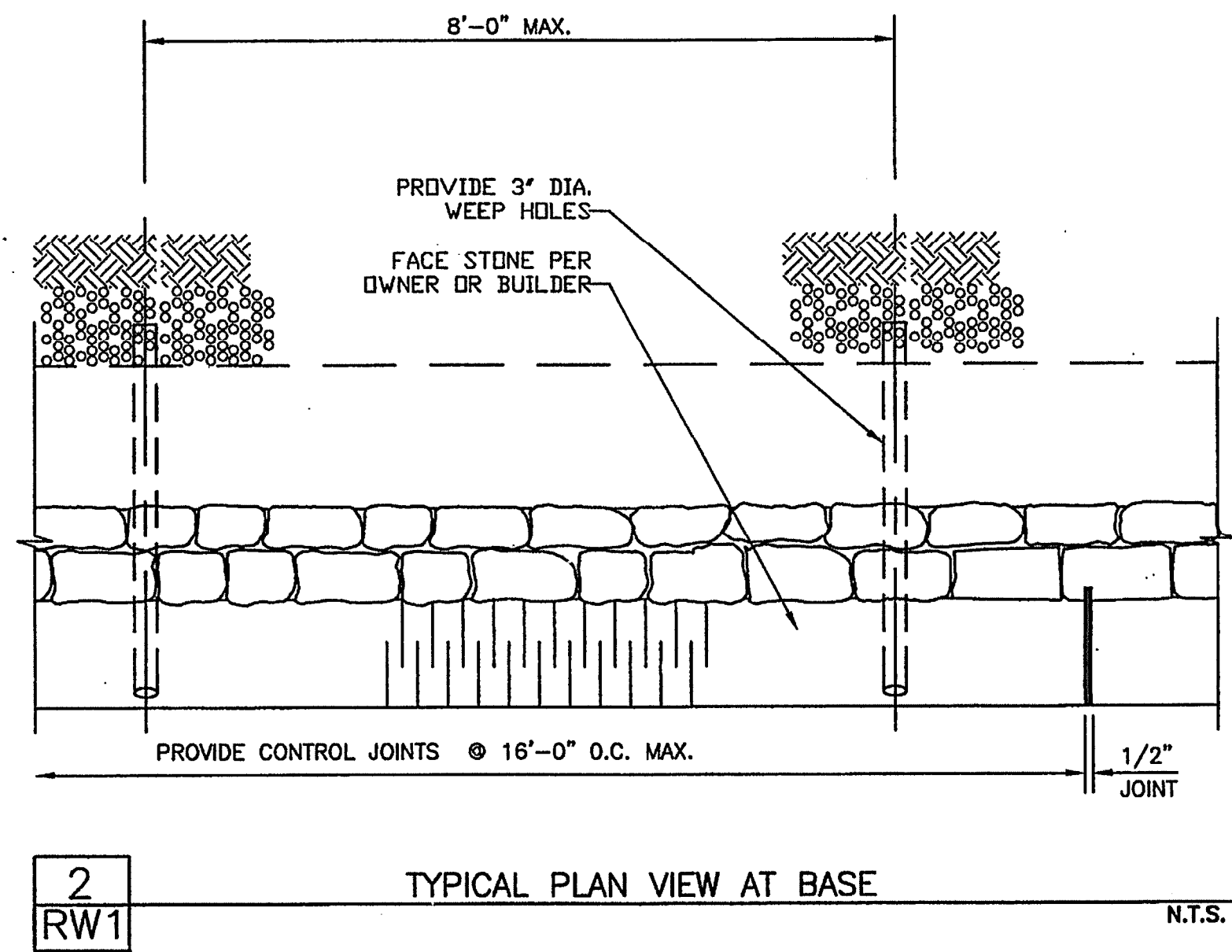
Sheet  
C of 12  
12

SEI No. 11-112  
11-112-Det









# 1. Design Building Code

International Building Code, 2006 Edition

# 2. Geotechnical Report

Firm: Rone Engineering, Inc.  
Report No. 07-13278  
Dated: August 9, 2007  
Allowable Bearing Capacity 1500 psf

Note:  
All of the above noted bearing capacities are anticipated throughout the site. Each wall section has a design for multiple bearing capacity options. It will be field verified which bearing condition to use based on the conditions of the soil at the base of the wall during excavation. If the bearing capacity changes along the length of the retaining wall it is permitted to change bearing capacity designs as needed.

# 3. Geotechnical Criteria

Bearing on Stiff Natural Undisturbed Clayey Soils or Compacted and Tested Soils

Allowable Bearing = 1500 psf, min.  
Friction Angle between Base of Wall and Soil = 17 deg

Backfill Soil Parameters:  
Backfill Soil - Natural Clays or Fill Soils  
Backfill Angle of Internal Friction  $\phi$  = 28 deg

Base Soil Parameters:  
Soil at Toe - Natural, Undisturbed or Fill Soils  
Angle of Internal Friction  $\phi$  = 28 deg

The backfill soil angle of internal friction referred to above is a composite angle of internal friction and includes both cohesion and angle of internal friction of the soils. The composite angle of internal friction is taken as 2 times the angle of internal friction of the soil in the fully softened condition. The fully softened angle of internal friction is taken as 13 degrees, resulting in a design backfill angle of internal friction of 26 degrees.

The use of very wet or very dry backfill soil should be avoided. The use of heavy equipment within 3'-0" of the wall could damage the wall and should be avoided.

Locate base of walls on undisturbed or properly compacted soil.

# 4. Materials

Average density of masonry stone wall varies from 135 pcf to 145 pcf.

Portland Cement Mortar for Retaining Wall Construction.

The portland cement mortar used for construction of the masonry stone retaining walls shall be provided with the following proportions per cubic yard of concrete. The portland cement mortar supplier shall provide "batch tickets" clearly indicating that the appropriate amount of materials are provided in each concrete mixer truck load. The batch tickets shall clearly indicate the amount batched, the date, the project name and shall be provided to Falkofse Engineering, Inc. for review, documentation, and file.

Contents	Amount per cubic yard
Type 1 Portland cement:	376 lbs
Type F Fly Ash	94 lbs
Fine Aggregate (sand):	3250 lbs
Potable Water	235 lbs
Admixture Eucon 100	48 oz average

Concrete retarders such as "Eucon 100 Retarder" may be used at the discretion of the masonry wall contractor. A greater amount of retarder (about 64 ounces) is typically used during hot periods and a less amount of retarder (about 32 ounces) is typically used during cool weather.

Please note that the above proportions will provide a portland cement mortar with a compressive strength of about  $f_c = 2500$  psi. Falkofse Engineering, Inc. does not require any concrete testing provided the above proportions are verified by way of the "batch tickets".

# 5. Construction Reviews

Falkofse Engineering, Inc. shall be called for construction review of masonry wall.

# 6. Retaining Wall Design Constraints

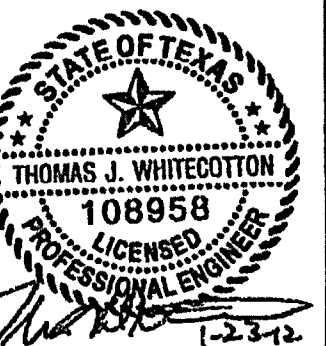
Retaining walls should not have solid fence placed on top of wall other than that shown on these plans. Retaining walls shall not have additional surcharge placed above wall other than that shown on these plans. Retaining walls shall not have slope at base or top of wall that exceed that which is shown on these plans. The retaining walls noted above require special design.

Minor variations in the construction of the retaining walls from these documents may be accepted at the discretion of the design engineer.

FALKOFSE ENGINEERING, INC.  
Structural Engineering Consultants  
Texas Registered Engineering Firm: # F-4038  
1414 West Randal Mill Road  
Suite 201  
Arlington, Texas 76012  
Metro (817) 261-8300

The use of these plans and specifications for any project shall be subject to the original design and specifications. Any reproduction, alteration, or modification of these plans and specifications without the written consent of Falkofse Engineering, Inc. is prohibited.

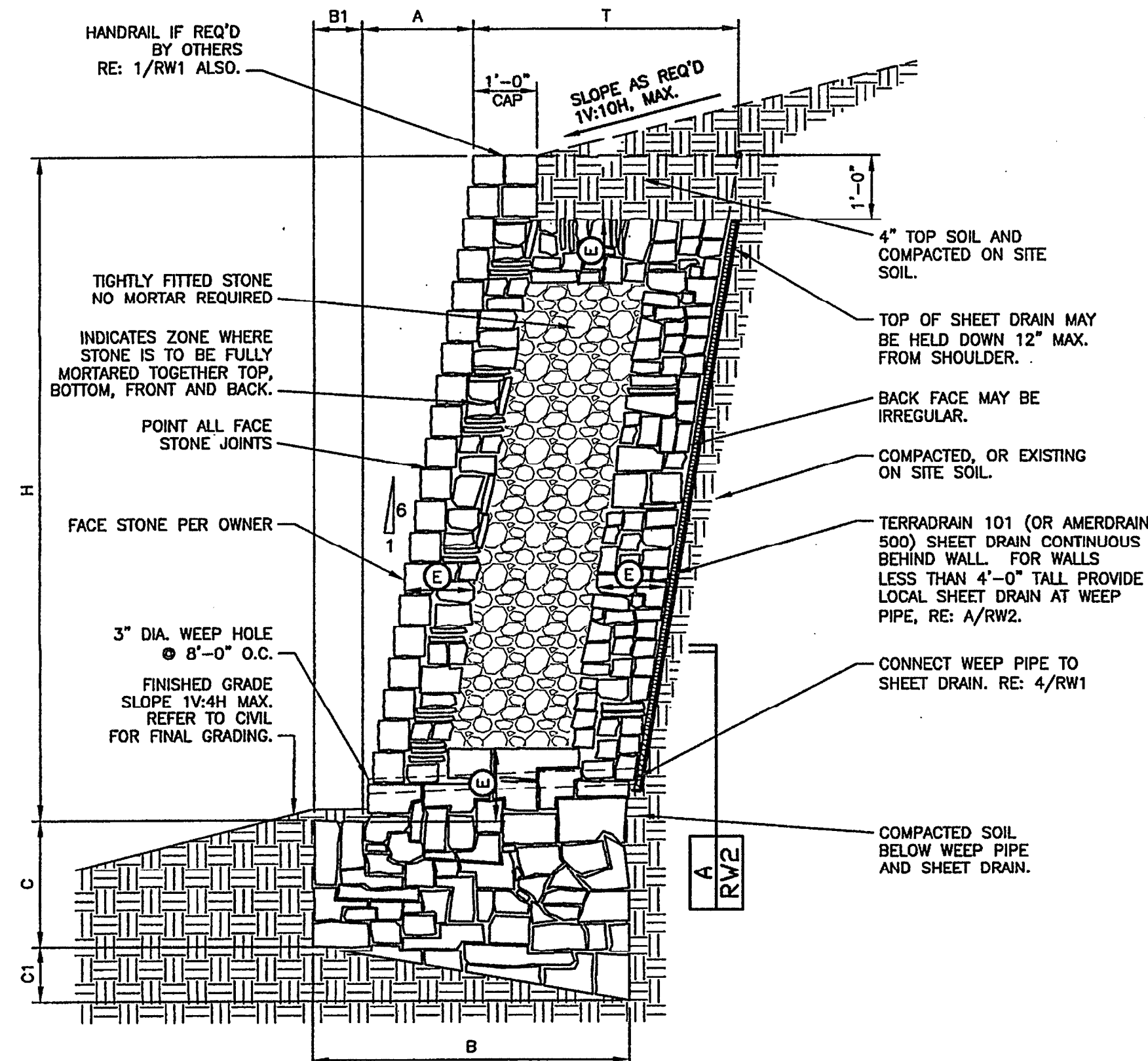
MASONRY RETAINING WALLS - NOTES & STANDARD DETAILS  
HONDA OF ROCKWALL ADDITION  
OFF IH30 NEAR TOWNSEND DRIVE  
ROCKWALL, TEXAS  
ERWS, INC.  
EULESS, TEXAS  
ERWS JOB NO. 110209



JOB NO. 459.11

RW1

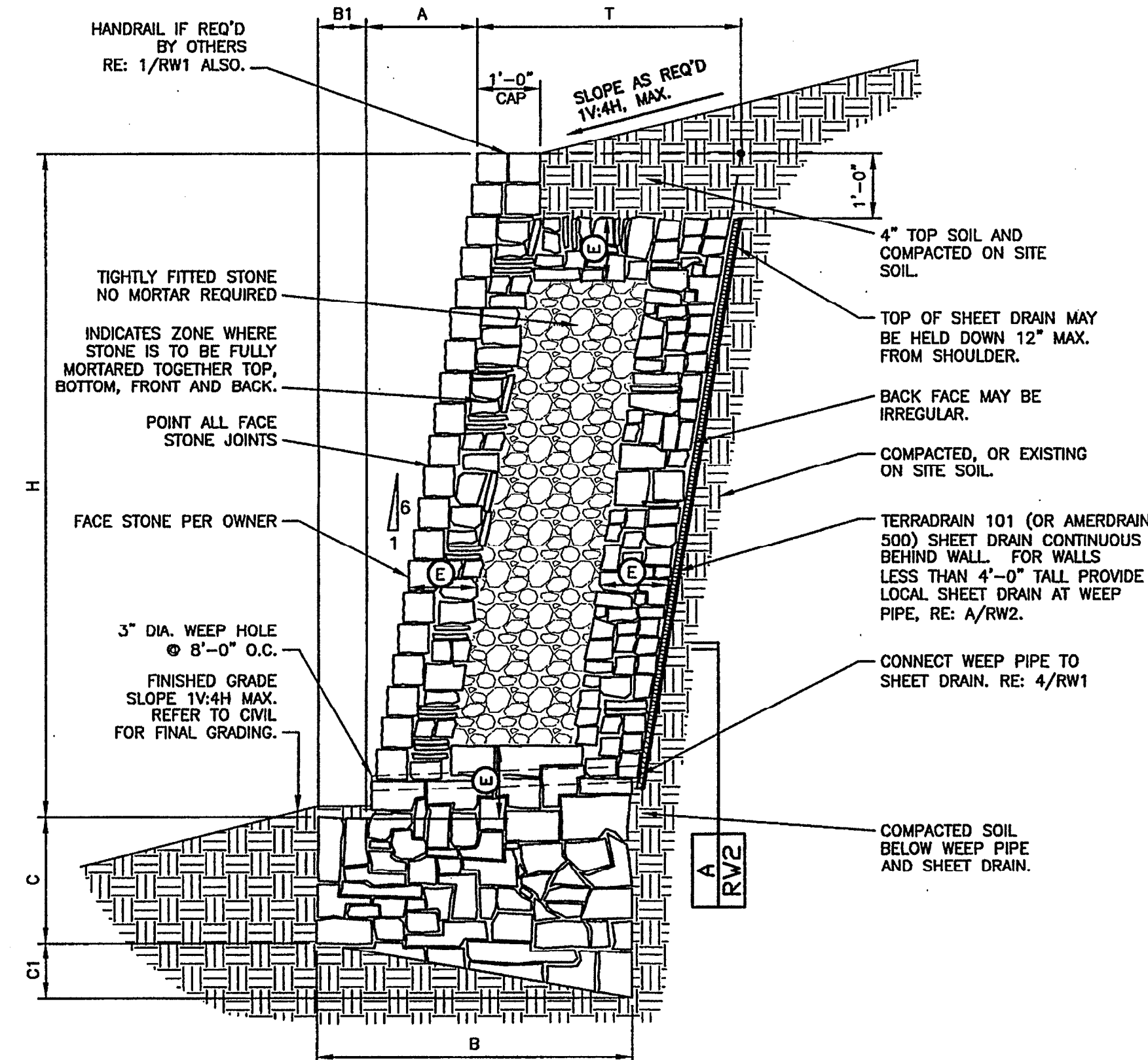




MASONRY WALL SCHEDULE								
1500 psf - BEARING CAPACITY (STIFF NATURAL UNDISTURBED SOILS OR COMPACTED AND TESTED SOILS SEE GENERAL NOTES SHEET RW1)								
WALL HEIGHT H	BASE WIDTH B	TOE B1	BASE DEPTH (TOE) C	BASE DEPTH (HEEL) C1	BATTER A	FULLY MORTARED ZONE E	THICKNESS OF WALL T	BEARING CAPACITY
1'-0"	1'-0"	0'-0"	0'-6"	0'-2"	0'-2"	FULLY MORTARED	1'-0"	1500 psf
2'-0"	1'-2"	0'-2"	0'-9"	0'-3"	0'-4"	FULLY MORTARED	1'-0"	
3'-0"	1'-8"	0'-2"	0'-9"	0'-4"	0'-6"	FULLY MORTARED	1'-6"	
4'-0"	2'-3"	0'-3"	1'-0"	0'-5"	0'-8"	FULLY MORTARED	2'-0"	
5'-0"	3'-0"	0'-4"	1'-3"	0'-7"	0'-10"	0'-8"	2'-8"	
6'-0"	3'-8"	0'-6"	1'-6"	0'-8"	1'-0"	0'-10"	3'-2"	
WALL DESIGN CRITERIA								
BEARING $q_a$	SLOPE TOP $\beta$	SLOPE BOT $\beta_1$	ACTIVE PRESSURE $p_a$	PASSIVE PRESSURE $p_p$	FRICTION ANGLE BASE $\delta$	SLOPE OF BACK OF WALL $\alpha$	SURCHARGE $q$	
1500PSF	5.71 deg	14 deg	26 deg	26 deg	17 deg	89.46 deg	0 psf	
USE THIS SCHEDULE FOR 3/RY2								

USE THIS SCHEDULE FOR 3/RW2

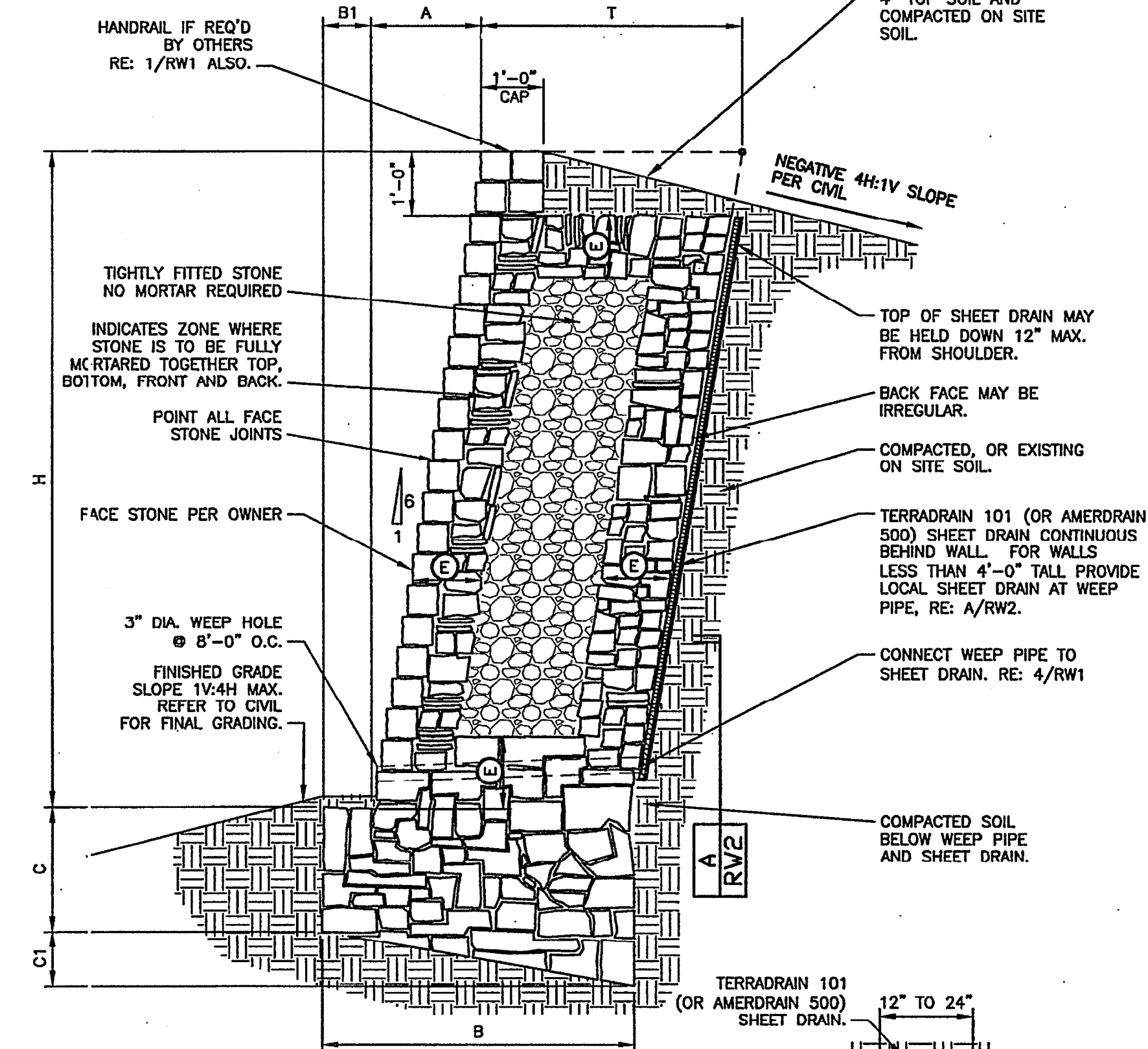
3  
RW2 TYPICAL WALL SECTION  
1V:1.0H MAX SLOPE ABOVE WALL  
BEARING IN CLAY SOILS 1/2" = 1'-0"



MASONRY WALL SCHEDULE								
1500 psf - BEARING CAPACITY (STIFF NATURAL UNDISTURBED SOILS OR COMPACTED AND TESTED SOILS SEE GENERAL NOTES SHEET RW1)								
WALL HEIGHT H	BASE WIDTH B	TOE B1	BASE DEPTH (TOE) C	BASE DEPTH (HEEL) C1	BATTER A	FULLY MORTARED ZONE E	THICKNESS OF WALL T	BEARING CAPACITY
1'-0"	1'-0"	0'-0"	0'-6"	0'-2"	0'-2"	FULLY MORTARED	1'-0"	1500 psf
2'-0"	1'-4"	0'-2"	0'-9"	0'-3"	0'-4"	FULLY MORTARED	1'-2"	
3'-0"	1'-11"	0'-3"	0'-9"	0'-4"	0'-6"	FULLY MORTARED	1'-8"	
4'-0"	2'-9"	0'-4"	1'-0"	0'-6"	0'-8"	FULLY MORTARED	2'-5"	
5'-0"	3'-6"	0'-5"	1'-6"	0'-8"	0'-10"	0'-8"	3'-1"	
6'-0"	4'-3"	0'-7"	1'-9"	0'-9"	1'-0"	0'-10"	3'-8"	
WALL DESIGN CRITERIA								
BEARING $q_a$	SLOPE TOP $\beta$	SLOPE BOT $\beta_1$	ACTIVE PRESSURE $p_a$	PASSIVE PRESSURE $p_p$	FRICTION ANGLE BASE $\delta$	SLOPE OF BACK OF WALL $\alpha$	SURCHARGE $q$	
1500PSF	14 deg	14 deg	26 deg	26 deg	17 deg	89.46 deg	0 psf	

USE THIS SCHEDULE FOR 2/RW2

2  
RW2 TYPICAL WALL SECTION  
1V:4H MAX SLOPE ABOVE WALL  
BEARING IN CLAY SOILS 1/2" = 1'-0"



MASONRY WALL SCHEDULE								
1500 psf - BEARING CAPACITY (STIFF NATURAL UNDISTURBED SOILS OR COMPACTED AND TESTED SOILS SEE GENERAL NOTES SHEET RW1)								
WALL HEIGHT H	BASE WIDTH B	TOE B1	BASE DEPTH (TOE) C	BASE DEPTH (HEEL) C1	BATTER A	FULLY MORTARED ZONE E	THICKNESS OF WALL T	BEARING CAPACITY
1'-0"	1'-0"	0'-0"	1'-0"	0'-2"	0'-2"	FULLY MORTARED	1'-0"	1500 psf
2'-0"	1'-2"	0'-2"	1'-0"	0'-3"	0'-4"	FULLY MORTARED	1'-0"	
3'-0"	1'-5"	0'-2"	1'-0"	0'-4"	0'-6"	FULLY MORTARED	1'-3"	
4'-0"	2'-0"	0'-4"	1'-3"	0'-5"	0'-8"	FULLY MORTARED	1'-8"	
5'-0"	2'-6"	0'-6"	1'-6"	0'-8"	0'-10"	0'-8"	2'-0"	
6'-0"	3'-0"	0'-8"	1'-9"	0'-7"	1'-0"	0'-10"	2'-4"	
7'-0"	3'-10"	0'-10"	1'-9"	0'-9"	1'-2"	0'-10"	3'-0"	
8'-0"	4'-6"	1'-0"	2'-0"	0'-10"	1'-4"	1'-0"	3'-6"	
9'-0"	5'-2"	1'-2"	2'-3"	0'-11"	1'-6"	1'-0"	4'-0"	
WALL DESIGN CRITERIA								
BEARING $q_a$	SLOPE TOP $\beta$	SLOPE BOT $\beta_1$	ACTIVE PRESSURE $p_a$	PASSIVE PRESSURE $p_p$	FRICTION ANGLE BASE $\delta$	SLOPE OF BACK OF WALL $\alpha$	SURCHARGE $q$	
1500PSF	-14 deg	14 deg	26 deg	26 deg	17 deg	89.46 deg	0 psf	

USE THIS SCHEDULE FOR 1/RW2

1  
RW2 TYPICAL WALL SECTION - DETENTION POND  
NEGATIVE 1V:4H MAX SLOPE ABOVE WALL  
BEARING IN CLAY SOILS 1/2" = 1'-0"

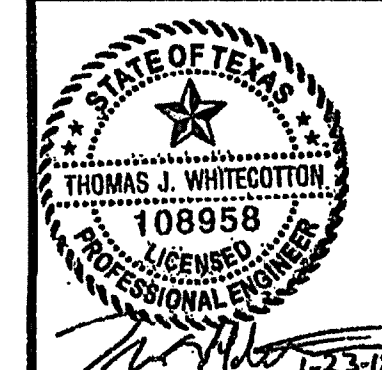
3" DIA. WEEP HOLES  
@ 8'-0" O.C.  
A  
RW2 DRAINAGE ZONE  
WALLS 4'-0" OR LESS

FALKOFSKE ENGINEERING, INC.  
Structural Engineering Consultants  
Texas Registered Engineering Firm: # F-4038  
1414 West Randal Mill Road  
Suite 201  
Arlington, Texas 76012  
Metro (817) 261-8300

The use of these plans and specifications is subject to the original design for which they were prepared. No representation is made by the engineer for any other representation, use, or modification of these plans, specifications, or drawings. The engineer assumes no responsibility for any errors or omissions in these plans, specifications, or drawings.

MASONRY RETAINING WALLS  
HONDA OF ROCKWALL ADDITION  
OFF I-30 NEAR TOWNSEND DRIVE  
ROCKWALL, TEXAS

ERWS, INC.  
EULESS, TEXAS  
ERWS JOB NO. 110209

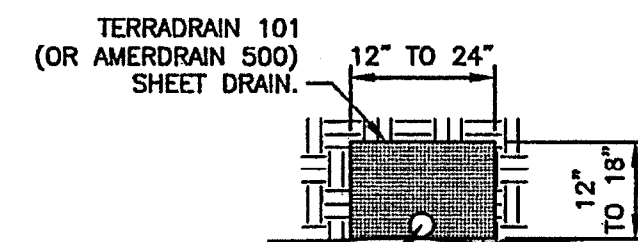


JOB NO. 459.11

RW2

DATE	BY	NO.	DATE	REVISION
01-23-12	TJW			
01-23-12	TJW			
01-23-12	TJF			





USE THIS SCHEDULE FOR 1/RW3

$$\frac{1}{2}'' = 1'-0''$$

**FALKOFSKE ENGINEERING, INC.**  
Structural Engineering Consultants  
Texas Registered Engineering Firm: # F-4038  
1414 West Randal Mill Road  
Suite 201  
Arlington, Texas 76012  
Metro (817) 261-8300

--	--

RW3



DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the consequences of any use of this standard for other purposes or for incorrect results or damages resulting from its use.

DATE:  
FILE:

## 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 and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits.
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" labeled as ANSI 107-2004 standard performance for Class 2 or 3 risk exposure. Class 3 garments should be considered for high traffic volume work areas or night time work.

Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes prequalified 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) 416-3134

### WEB ADDRESSES FOR REFERENCED DOCUMENTS

Compliant Work Zone Traffic Control Devices List (CWZTCD)  
<http://www.txdot.gov/publications/traffic.htm>

Texas Manual on Uniform Traffic Control Devices (TMUTCD)  
<http://www.txdot.gov/publications/traffic.htm>

Standard Highway Sign Designs for Texas (SHSD)  
<http://www.txdot.gov/publications/traffic.htm>

Traffic Engineering Standard Sheets  
<http://www.txdot.gov/business/discclaim.htm>

Material Producer List  
[http://www.txdot.gov/business/producer\\*list.htm](http://www.txdot.gov/business/producer*list.htm)

Departmental Material Specifications (DMS)  
[http://www.txdot.gov/services/construction/material\\*specifications/](http://www.txdot.gov/services/construction/material*specifications/)

Roadway Design Manual  
[http://www.txdot.gov/services/general\\*services/manuals.htm](http://www.txdot.gov/services/general*services/manuals.htm)



## BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

1 of 12

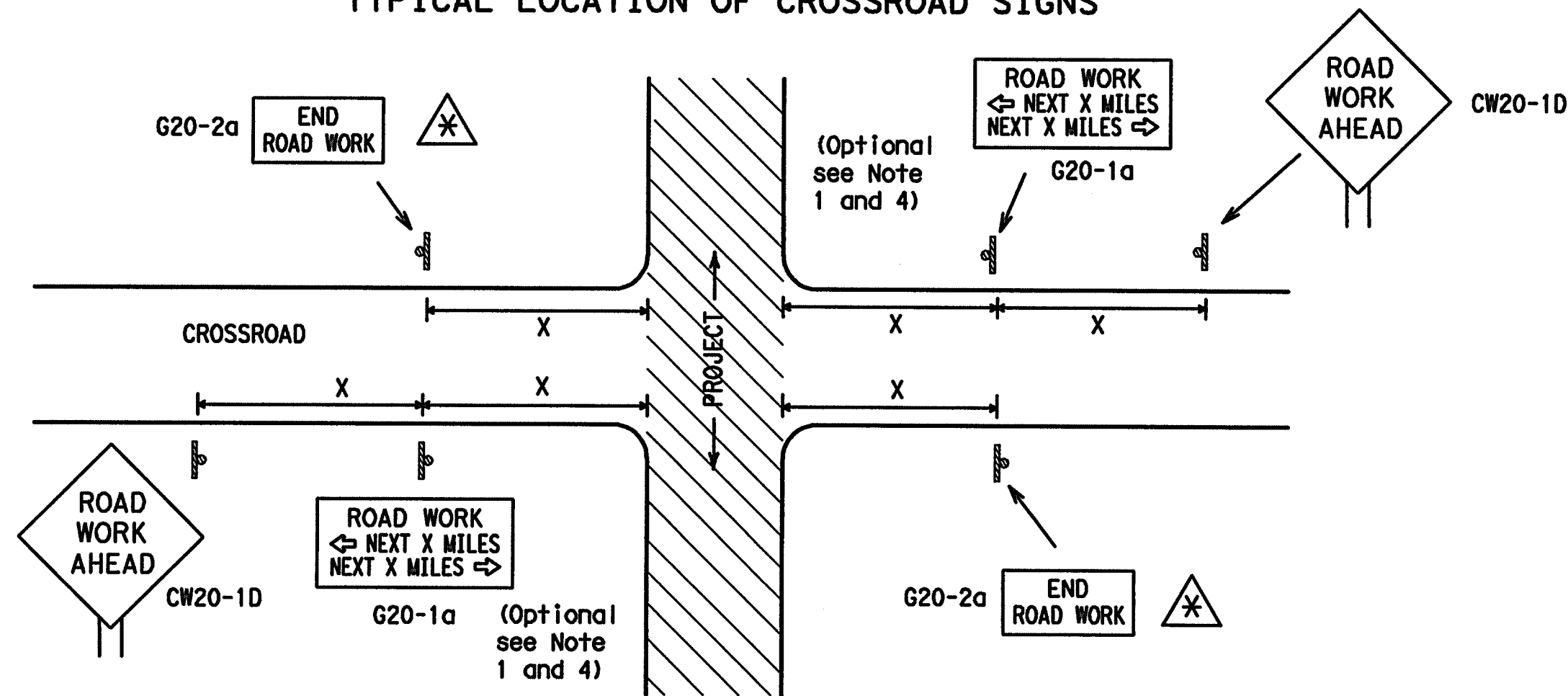
BC(1)-07

© TxDOT 11-4-02		DATE TxDOT	DATE TxDOT	DATE TxDOT	DATE TxDOT
4-03 9-07	REVISIONS		COUNT	SECT	HIGHWAY
	DIST		COUNTY		SHEET NO.



DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

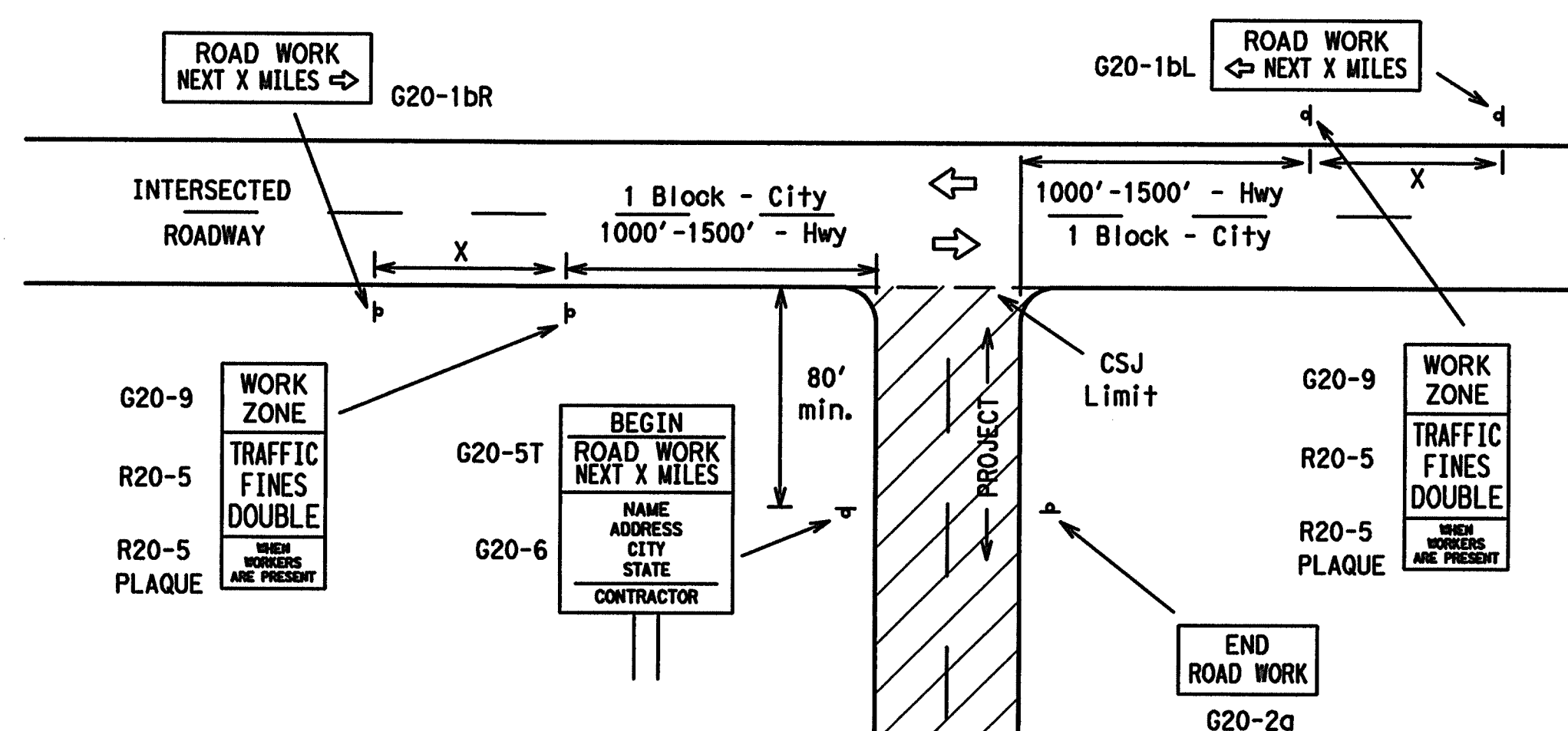
### TYPICAL LOCATION OF CROSSROAD SIGNS



May be mounted on back of CW20-1D sign with approval of engineer. (See note 2 below)

1. The typical minimum signing on a crossroad approach should be a CW20-1D ROAD WORK AHEAD sign and a G20-2a 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 (G20-2a) 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 G20-1a 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 G20-6 "Contractor Name" sign behind the Type III Barricades for the road closure (see BC(10) also). The G20-1bL and G20-1bR signs shall be replaced by the detour signing called for in the plans.

### TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING<sup>1,5,6</sup>

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

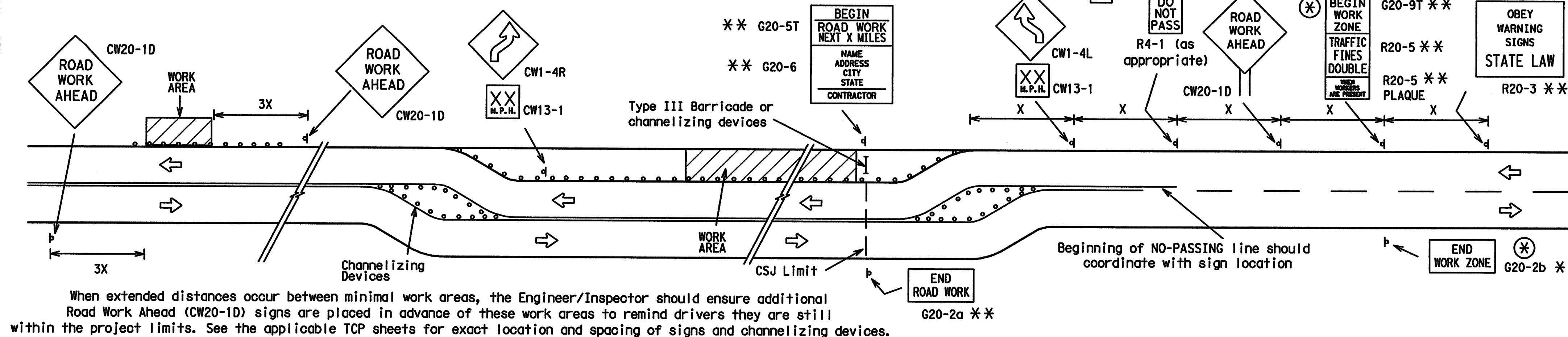
\* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

#### General Notes:

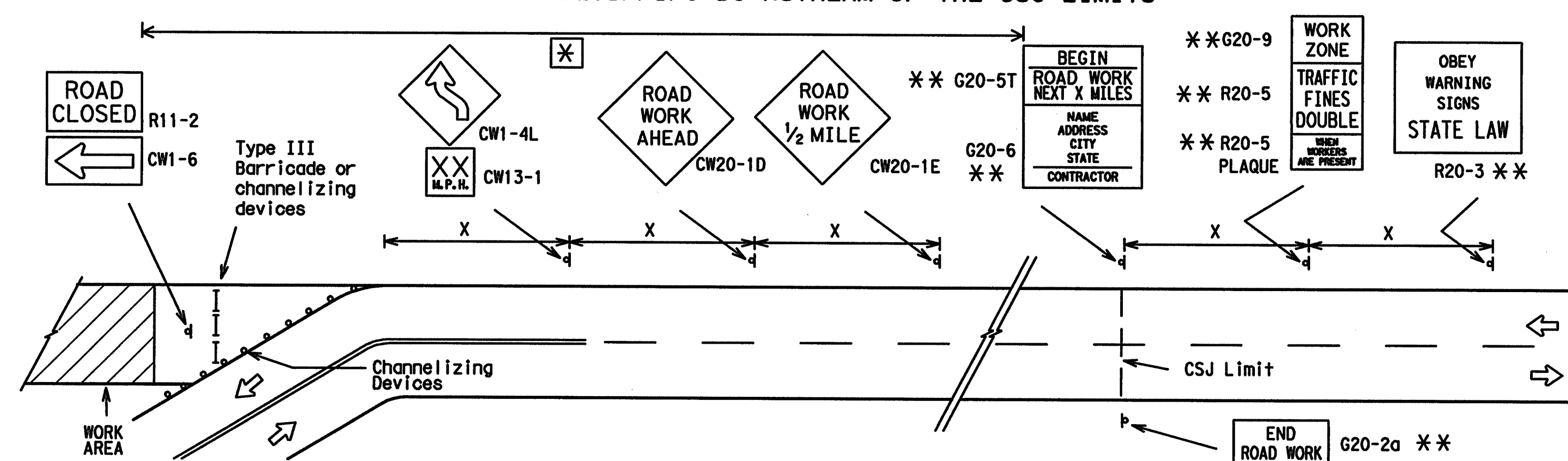
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" ROAD WORK AHEAD (CW20-1D) signs may be 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



When extended distances occur between minimal work areas, 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 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 G20-9T and G20-2b shall be used when advance signs are required outside the CSJ Limits. They inform the motorist of entering or leaving a work zone where traffic fines may double if workers are present.

\*\* Required CSJ Limit signing. See Note 10 on BC(1).

⊗ Area for placement of "ROAD WORK AHEAD" sign and other signs or devices as called for on the Traffic Control Plan.

#### LEGEND

- ⊙ Sign
- Channelizing Devices
- I Type III Barricade
- X See Typical Construction Warning Sign Size and Spacing chart or the TMUTCD for sign spacing requirements.



R20-3  
Legend/Border - Black  
Background - White

Texas Department of Transportation  
Traffic Operations Division

### BARRICADE AND CONSTRUCTION PROJECT LIMIT STANDARD

2 of 12

BC(2)-07

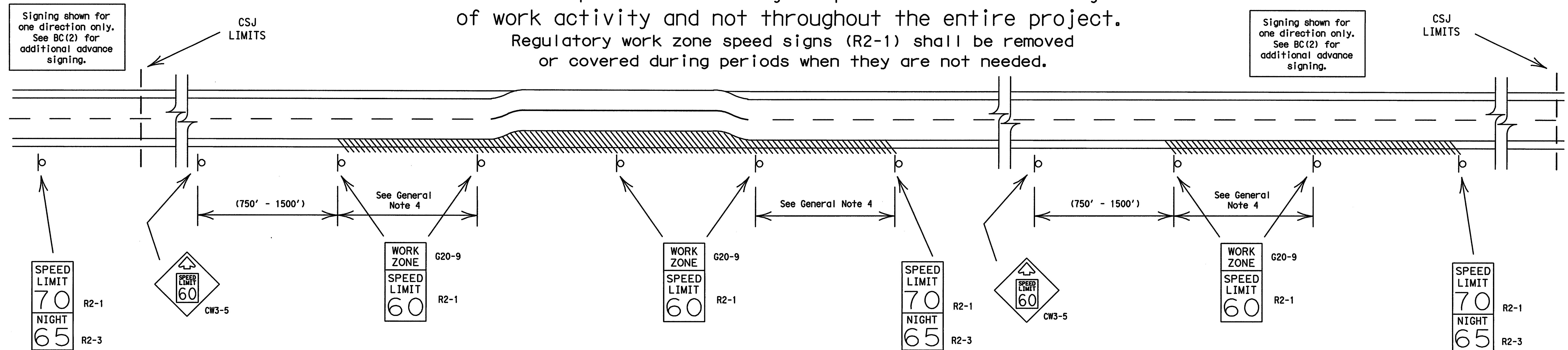
© TxDOT 11-4-02	TXDOT	TXDOT	TXDOT	TXDOT
9-07	REVISIONS	CULT	SECT	HIGHWAY
		DIST	COUNTY	SHEET NO.



# TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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



## GUIDANCE FOR USE:

### LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

- rough road or damaged pavement surface
- substantial alteration of roadway geometrics (diversions)
- construction detours
- grade
- width
- other conditions readily apparent to the driver

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

### SHORT TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit should be included on the design of the traffic control plans when workers or equipment are not behind concrete barrier, when work activity is within 15 feet of pavement edge or actually on the pavement.

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

## GENERAL NOTES:

- Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
- Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
- Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
- Frequency of work zone speed limit signs should be:
  - 40 mph and greater 0.2 to 2 miles
  - 35 mph and less 0.2 to 1 mile
- Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
- Fabrication, erection and maintenance of the CW3-5 sign, G20-9 plaque and the R2-1 and R2-3 signs shall not be paid for directly, but shall be considered subsidiary to Item 502.
- Turning signs from view, laying signs over or down will not be allowed, unless otherwise noted.
- 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.
- Speeds shown on details above are for illustration only. Work Zone Speed Limits should only be posted as approved for each project.



## BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT STANDARD

3 of 12

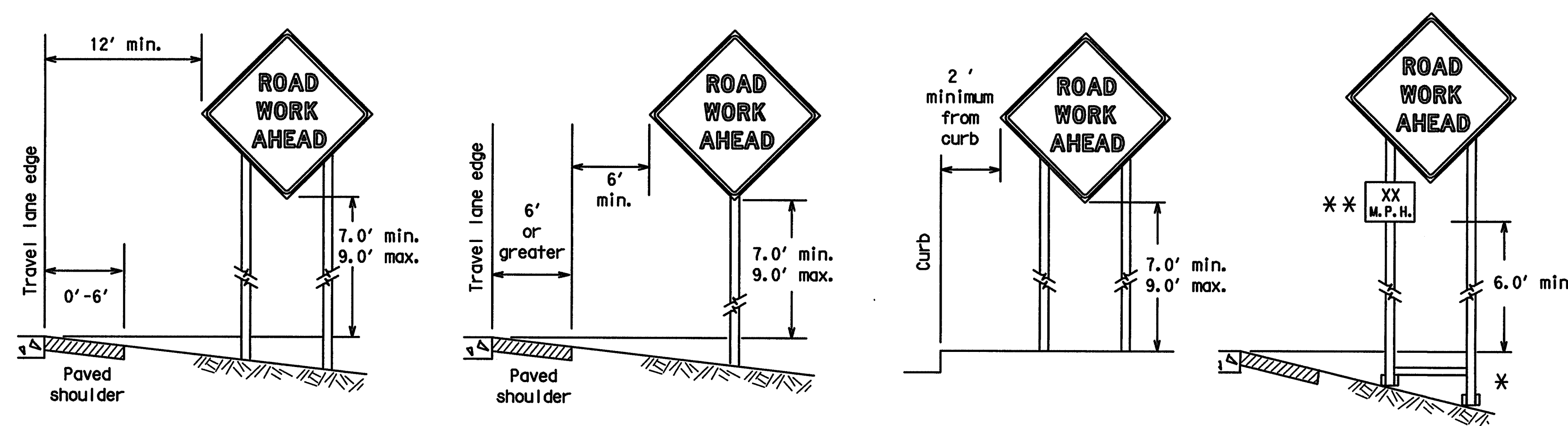
BC(3)-07

© TXDOT 11-4-02	DATE	TXDOT	DATE	TXDOT	DATE	TXDOT
9-07	REVISIONS	COUNT	SECT	JUN	HIGHWAY	



DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

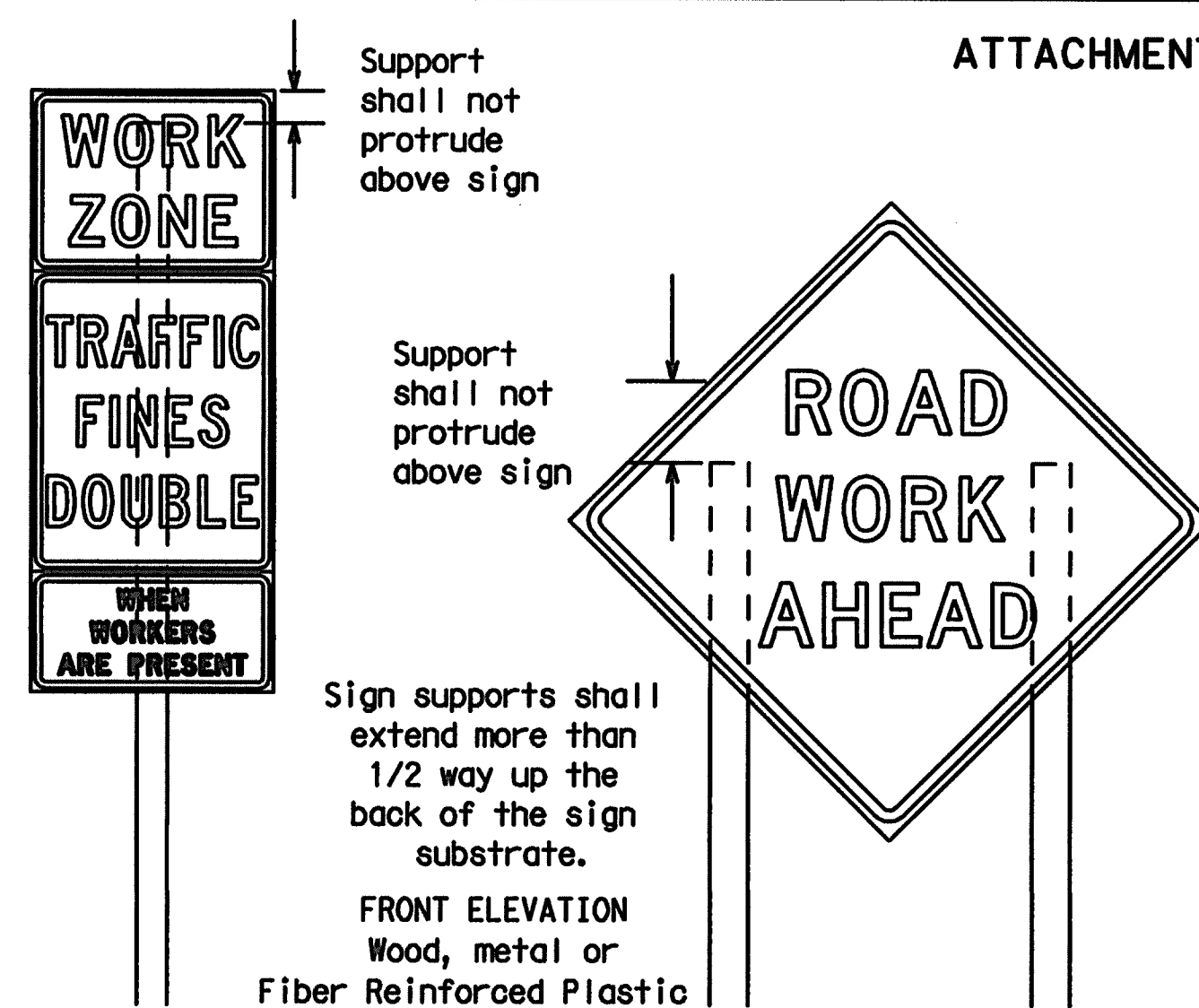
## TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



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

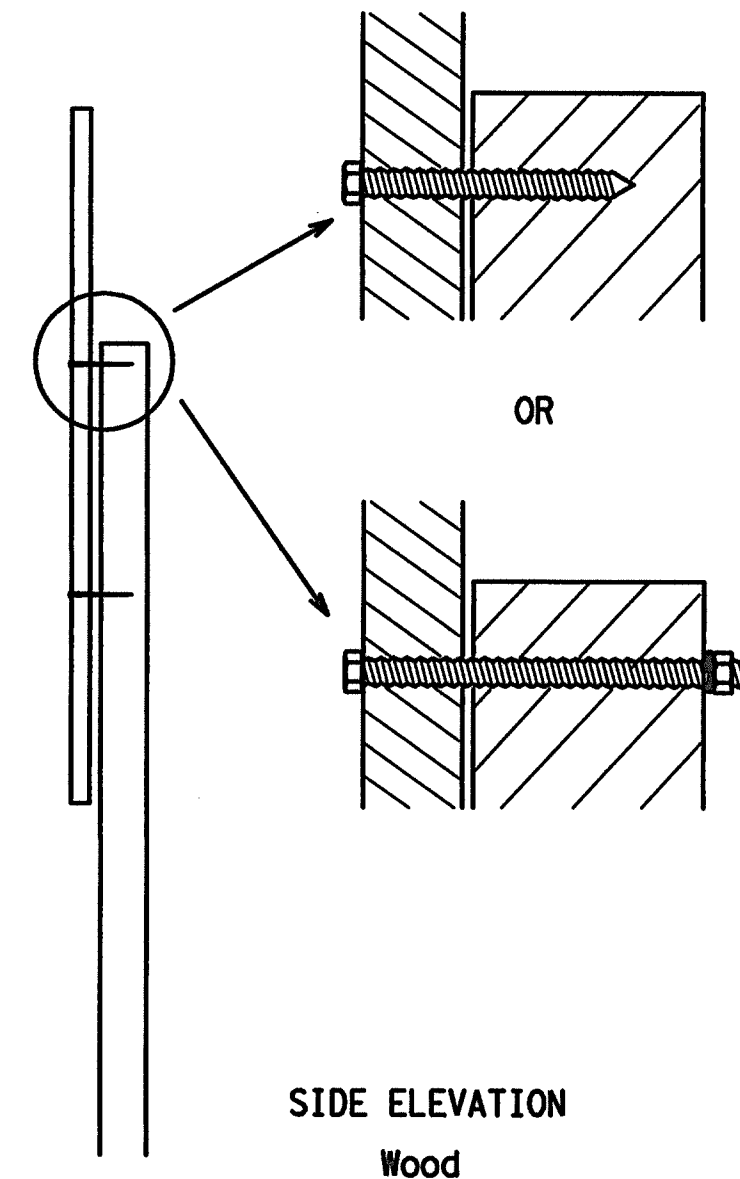
\*\* When plaques are placed on dual-leg supports, they should be attached to the upright nearest the travel lane. Supplemental plaques (advisory or distance) should not cover the surface of the parent sign.

## ATTACHMENT FOR SIGN SUPPORTS



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

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



Nails will 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.

## GENERAL NOTES FOR WORK ZONE SIGNS

- Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
  - Wooden sign posts shall be painted white.
  - Barriades shall NOT be used as sign supports.
  - Nails shall NOT be used to attach signs to any support.
  - All signs shall be installed in accordance with the plans or as directed by the Engineer. Signs shall be used to regulate, warn, and guide the traveling public safely through the work zone.
  - The Contractor may furnish either the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD). The Engineer/Inspector may require the Contractor to furnish other work zone signs that are shown in the TMUTCD but may have been omitted from the plans. Any variation in the plans shall be documented by written agreement between the Engineer and the Contractor's Responsible Person. All changes must be documented in writing before being implemented. This can include documenting the changes in the Inspector's TxDOT diary and having both the Inspector and Contractor initial and date the agreed upon changes.
  - The Contractor shall furnish sign supports listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD). The Contractor shall install the sign support in accordance with the manufacturer's recommendations. If there is a question regarding installation procedures, the Contractor shall furnish the Engineer a copy of the manufacturer's installation recommendations so the Engineer can verify the correct procedures are being followed.
  - The Contractor is responsible for installing signs on approved supports and replacing signs with damaged or cracked substrates and/or damaged or marred reflective sheeting as directed by the Engineer/Inspector.
  - Identification markings may be shown only on the back of the sign substrate. The maximum height of letters and/or company logos used for identification shall be 1 inch.
  - The Contractor shall replace damaged wood posts. New or damaged wood sign posts shall not be spliced.
- DURATION OF WORK** (as defined by the "Texas Manual on Uniform Traffic Control Devices" Part 6)
- The types of sign supports, sign mounting height, the size of signs, and the type of sign substrates can vary based on the type of work being performed. The Engineer is responsible for selecting the appropriate size sign for the type of work being performed. The Contractor is responsible for ensuring the sign support, sign mounting height and substrate meets manufacturer's recommendations in regard to crashworthiness and duration of work requirements.
  - Long-term stationary - work that occupies a location more than 3 days.
  - Intermediate-term stationary - work that occupies a location more than one daylight period up to 3 days, or nighttime work lasting more than one hour.
  - Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
  - Short, duration - work that occupies a location up to 1 hour.
  - Mobile - work that moves continuously or intermittently (stopping for up to approximately 15 minutes.)

## SIGN MOUNTING HEIGHT

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

## SIZE OF SIGNS

- The Engineer may allow the use of smaller size construction warning signs on secondary roads or city streets where speeds are low if the sign size is listed as an option on the "Typical Construction Warning Sign Size and Spacing" chart shown on BC(2).
- The Contractor shall furnish the sign sizes shown in plans, the BC Sheets, the TCP sheets or as directed by the Engineer.

## SIGN SUBSTRATES

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

## REFLECTIVE SHEETING

- All signs shall be retroreflective and constructed of sheeting meeting the color and retro-reflectivity requirements of DMS-8300 for rigid signs or DMS-8310 for roll-up signs. The web address for DMS specifications is shown on BC(1).
- White sheeting, meeting the requirements of DMS-8300 Type C (High Specific Intensity), shall be used for signs with a white background.
- Orange sheeting, meeting the requirements of DMS-8300 Type E (Fluorescent Prismatic), shall be used for rigid signs with orange backgrounds.

## SIGN LETTERS

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

## REMOVING OR COVERING

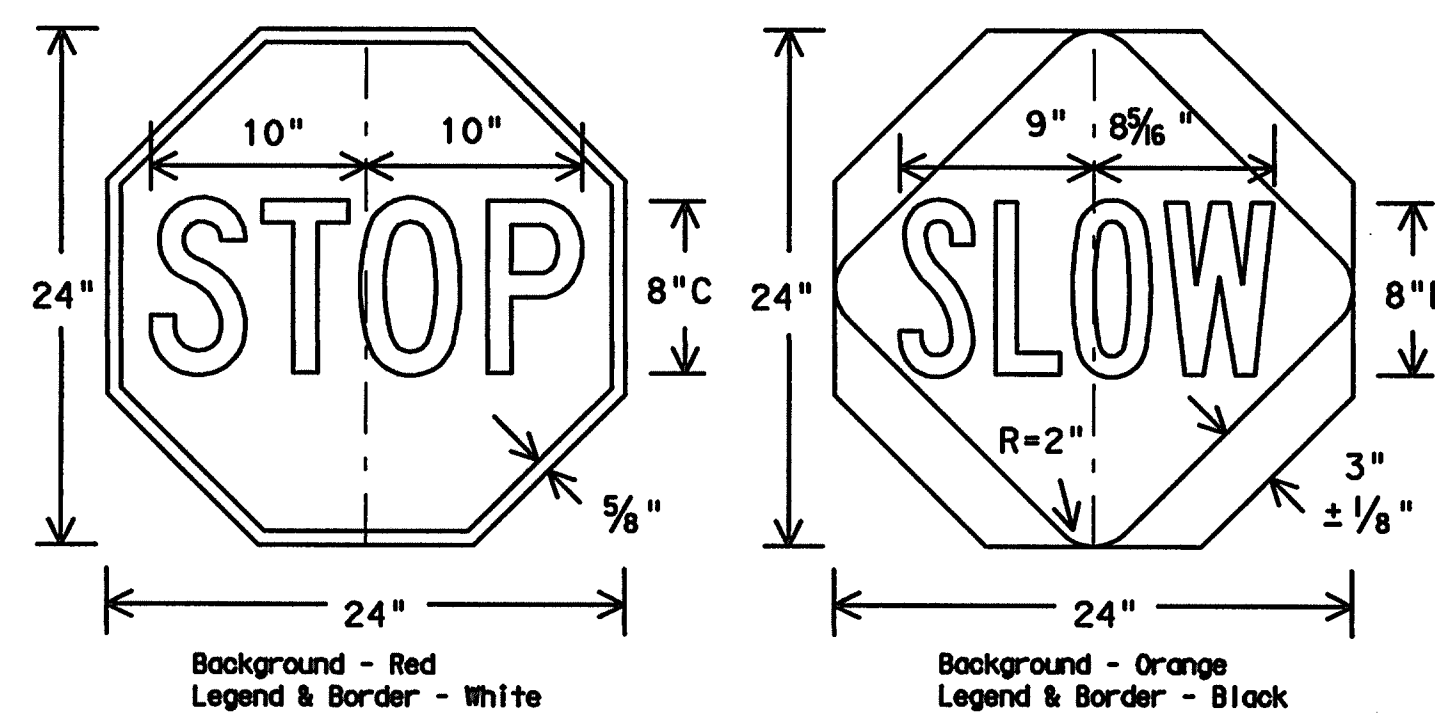
- When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
- Long-term stationary or intermediate stationary signs installed on square metal tubing may be turned away from traffic 90 degrees when the sign message is not applicable. This type of sign support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

## SIGN SUPPORT WEIGHTS

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

## STOP/SLOW PADDLES

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



## CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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



## BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES STANDARD

4 of 12

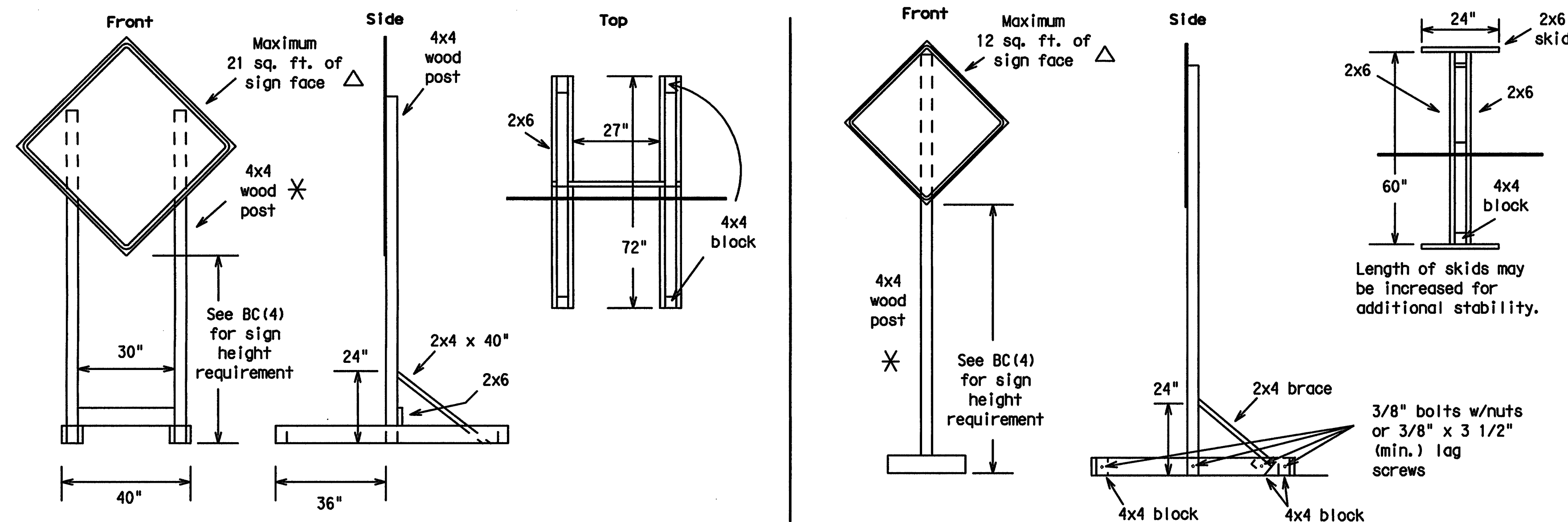
BC(4)-07

© TxDOT 11-4-02		DATE	REVISIONS	BY	CHKD	DATE	BY	CHKD	DATE
9-07									



**DISCLAIMER:**

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



**6 - 5/16" bolt x 2 1/4" grade 5 bolts,  
6 - 1 1/2" plastic washer,  
12 - 5/16" flat washers,  
6 - nuts per sign**

**48 x 48"-10mm extruded  
thinwall plastic sign**

**1 3/4" x 1 3/4" x 11 foot  
12 ga post  
(DO NOT SPLICE)**

**3/8" x 4 1/4"  
grade 5 bolt  
wingnut and washer**

**Weld bolt thru  
tubing at 1" off  
top of skid**

**1 3/4" x 1 3/4" x 14 ga  
cross brace**

**2" x 2" x  
12 ga. skids**

**Upright must  
telescope to  
provide 7' height  
above pavement.**

**48"**

**18" max.**

**5'**

**2.5'**

**48"**

**2"**

**5'**

**SINGLE LEG BASE  
Side View**

**2" x 2" x  
12 ga. upright**

**2" x 2" x  
12 ga. uprights**

**48"**

**2"**

**34"**

**DUAL LEG BASE  
Front View**

**Welds to start on  
opposite sides going  
in opposite directions.  
Minimum weld, do not  
back fill puddle.**

**weld starts here**

**weld starts here**

**Weld**

**Weld**

**36" x 36"-10mm  
extruded  
thinwall plastic sign**

**1 3/4" x 1 3/4" x 11 foot  
12 ga post  
(DO NOT SPLICE)**

**1 3/4" galv. round  
with 5/16" holes  
or 1 3/4" x 1 3/4"  
square tubing**

**Upright must  
telescope to  
provide 7' height  
above pavement**

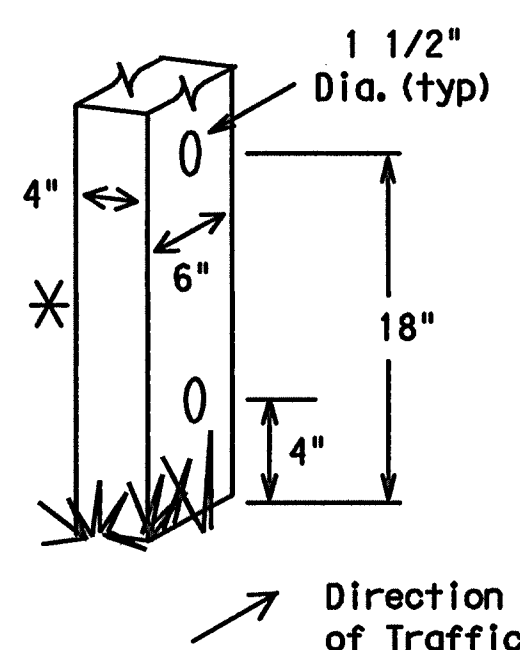
**48"**

**5'**

**36"**

**pin at angle  
needed to  
match sideslope**

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)).



Nominal Post Size	No. of Posts	Maximum Sq. feet of Sign Face	Minimum Soil Embedment	Drilled Hole(s) Require
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

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.

Diagram 1: A sign post is set into a hole in the ground. The ground surface is indicated. The post is labeled "Sign Post". The depth of the hole is labeled "48" minimum".

Diagram 2: A sign post is set into a hole in the ground. The ground surface is indicated. The post is labeled "Sign Post". The depth of the hole is labeled "4" max." and "9" desirable". The anchor stub is labeled "Anchor Stub (1/4" larger than sign post)". The depth of the hole is also labeled "34" min. in strong soils, 55" min. in weak soils."

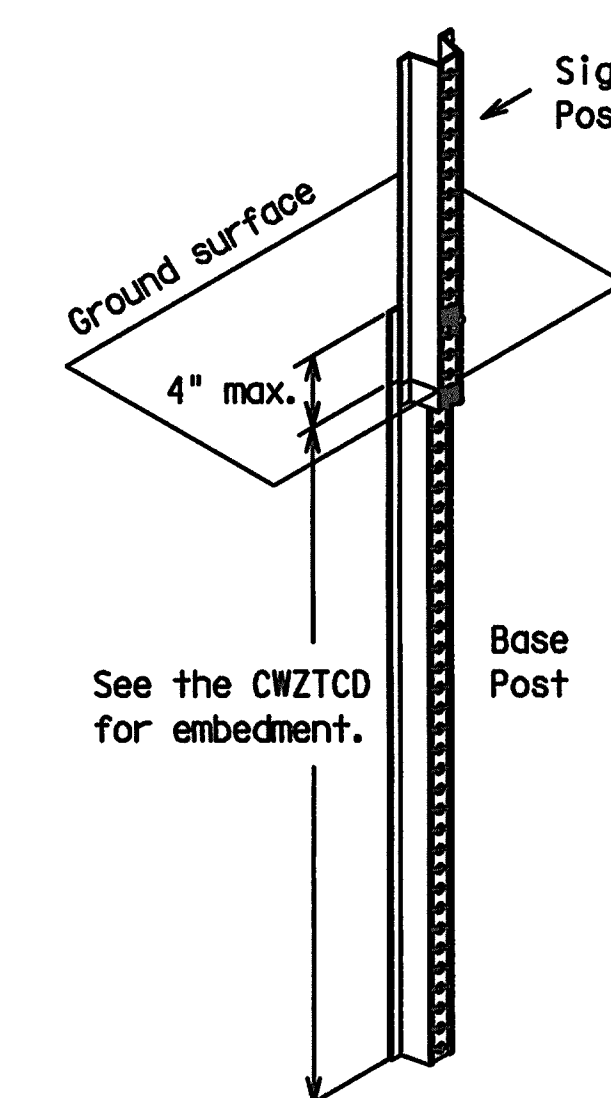
Diagram 3: A sign post is set into a hole in the ground. The ground surface is indicated. The post is labeled "Sign Post". The depth of the hole is labeled "4" max." and "9" desirable". The anchor stub is labeled "Anchor Stub (1/4" larger than sign post)". The depth of the hole is also labeled "34" min. in strong soils, 55" min. in weak soils." An optional reinforcing sleeve is shown, labeled "Optional reinforcing sleeve (1/2" larger than sign post) x 18"."

OPTION 1  
(Direct Embedment)

OPTION 2  
(Anchor Stub)

OPTION 3  
(Anchor Stub and Reinforcing Sleeve)

## Lap-splice/base bolted anchor



### 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. More details of approved Long/Intermediate and Short Term supports can be found on the CWZTCD list. See BC(1) for website location.
3. No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
4. When project is completed, all sign supports and foundations shall be removed from the project site. This will be considered subsidiary to Item 502.

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

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

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



# BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT STANDARD

5 of 12

BC (5) -07

© TXDOT 11-4-02		P# TXDOT		CK# TXDOT		P# TXDOT		CK# TXDOT	
9-07	REVISIONS		CU#T	SECT	JUG			HIGHWAY	
			DIST		COUNTRY			SHEET NO.	

DATE: \_\_\_\_\_  
FILE: \_\_\_\_\_



**DISCLAIMER:**

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.
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 720 feet. 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.

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

DATE: \_\_\_\_\_  
FILE: \_\_\_\_\_

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

## Phase 2: Possible Component Lists

## Other Condition List

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

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.

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 CW20-7a Flagger Symbol, 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 panel provided it meets the visibility, flash rate and dimming requirements on BC(7), for the same size arrow.

\*\* Advance  
Notice List

**\*\* See Application Guidelines Note 6.**

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 phrase is used.

BARRICADE AND CONSTRUCTION  
PORTABLE CHANGEABLE  
MESSAGE SIGN (PCMS)  
STANDARD

© TXDOT 11-4-02		IN TXDOT		CK TXDOT		IN TXDOT		CK TXDOT	
9-07	REVISONS		CUA	SECT	JUG		HIGHWAY		
			DIST				COUNTY		SHEET NO.

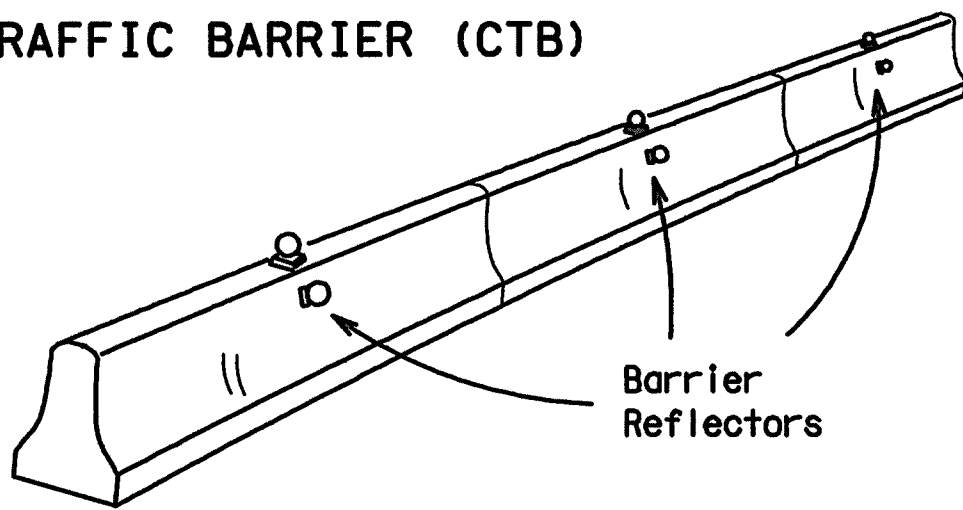


DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

## BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS

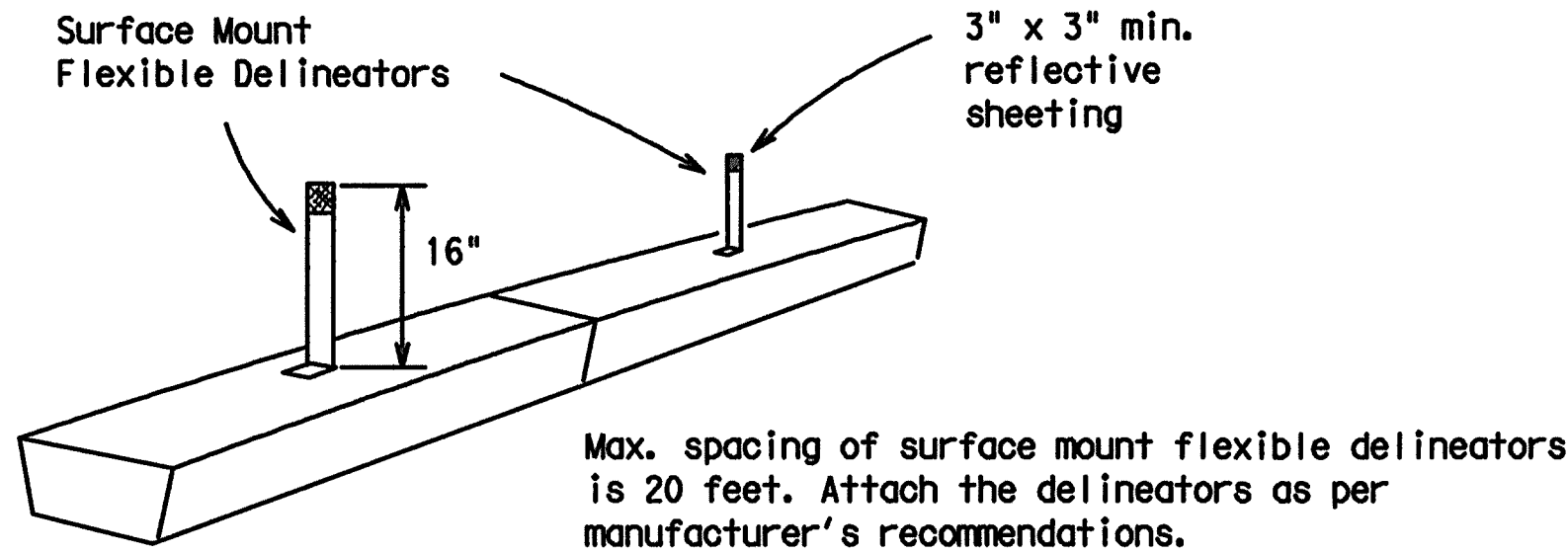
- Barrier Reflectors shall be prequalified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors (Type C Delineators) can be found at the Material Producer List web address shown on BC(1).
- Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost of the reflectors shall be considered subsidiary to Item 502.

### CONCRETE TRAFFIC BARRIER (CTB)

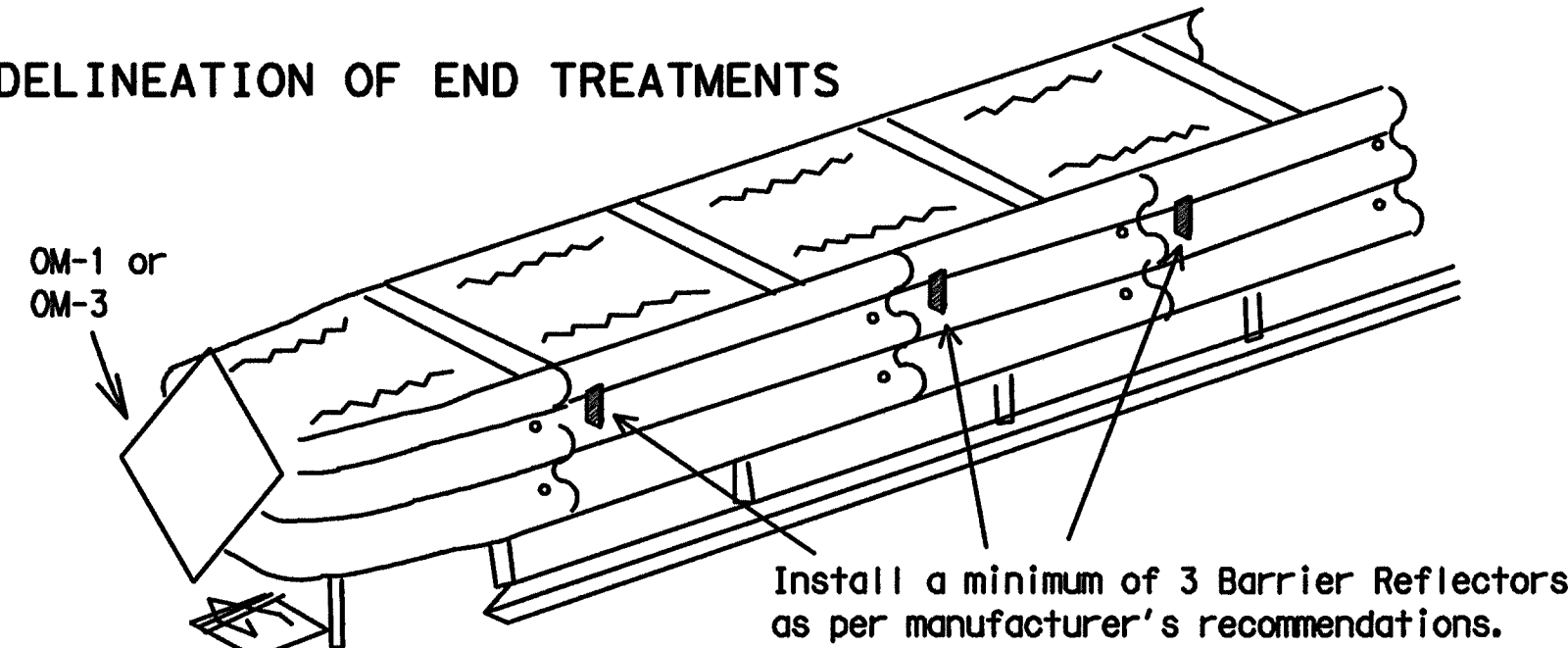


- Where traffic is on one side of the CTB, two (2) Barrier Reflectors shall be mounted in approximately the midsection of each section of CTB. An alternate mounting location is uniformly spaced at one end of each CTB. This will allow for attachment of a barrier grapple without damaging the reflector.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

### LOW PROFILE CONCRETE BARRIER (LPCB)



### DELINEATION OF END TREATMENTS



DELINEATION	APPROACHING TRAFFIC	
	BOTH SIDES	ONE SIDE
	OM-1	OM-3 or Vertical Panel

### 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.

### WARNING LIGHTS

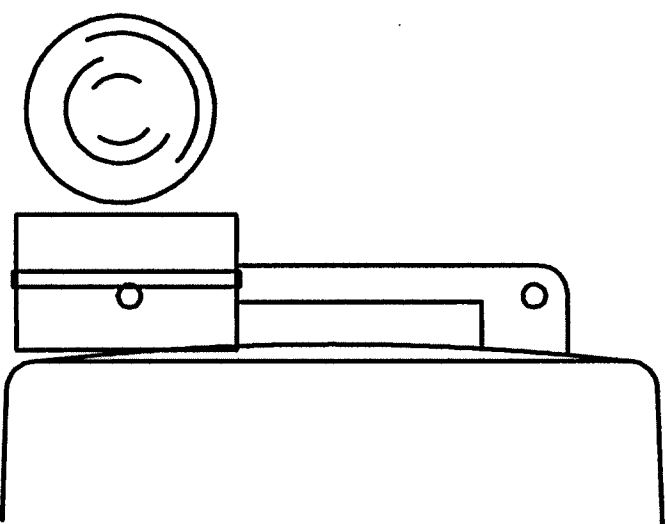
- Warning lights shall meet the requirements of the TMUTCD.
- Warning lights shall NOT be installed on barricades.
- Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet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

### WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

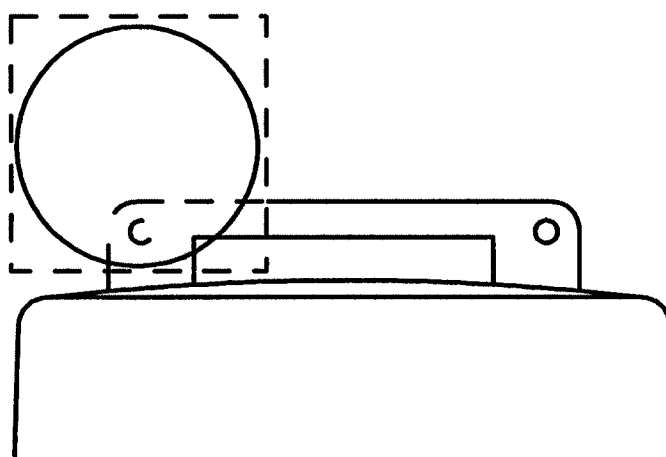
- Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
- Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
- A series of sequential flashing warning lights placed on channelizing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

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

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



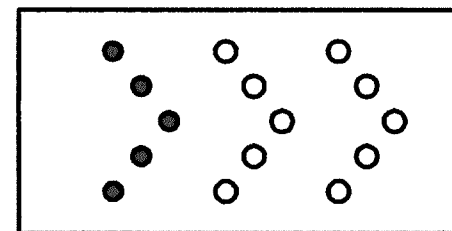
Type C Warning Light or approved substitute mounted adjacent to the travel way.



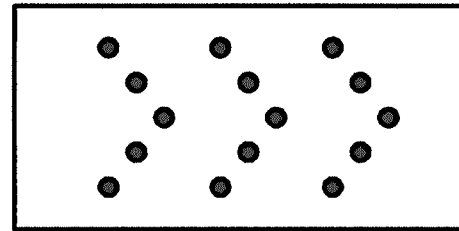
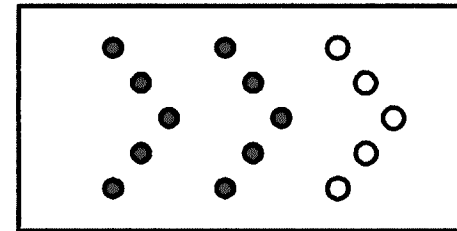
Warning reflector may be round or square. Must have a reflective surface area of at least 30 square inches

## TYPICAL FLASHING ARROW PANEL

Arrow Panels 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.

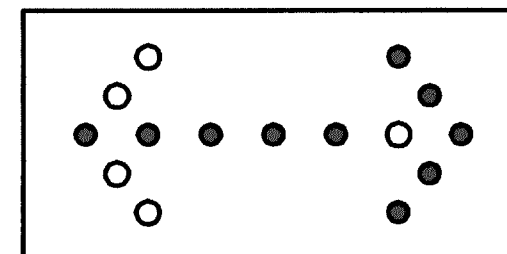


Sequential Chevron

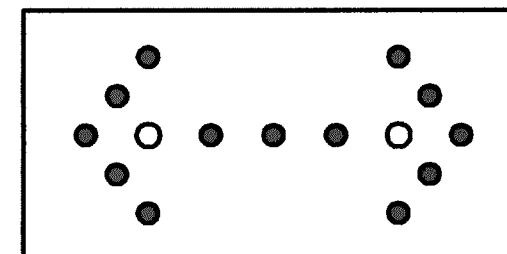


- The Flashing Arrow Panel should be used for all lane closures on multi-lane roadways, or slow moving maintenance or construction activities on the travel lanes.
- Flashing Arrow Panels should not be used on two-lane, two-way roadways, detours, diversions or work on shoulders unless the "CAUTION" display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

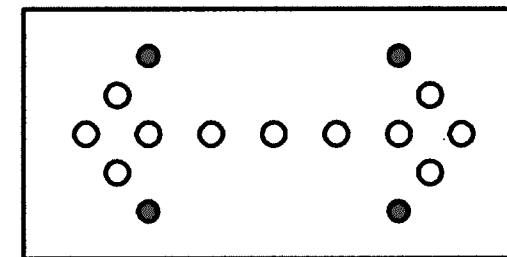
Flashing RIGHT (LEFT) ARROW



Flashing DOUBLE ARROW



Flashing CAUTION



### 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 Panels shall be equipped with automatic dimming devices.

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

- The "CAUTION" display consists of four corner lamps flashing simultaneously.
- The straight line caution display is NOT ALLOWED.
- The Flashing Arrow Panel shall be capable of minimum 50 percent dimming from rated lamp voltage. The flashing rate of the lamps shall not be less than 25 nor more than 40 flashes per minute.
- Minimum lamp "on time" shall be approximately 50 percent for the flashing arrow and equal intervals of 25 percent for each sequential phase of the flashing chevron.
- The sequential arrow display is NOT ALLOWED.
- The flashing arrow display is the TxDOT standard; however, the sequential Chevron display may be used during daylight operations.

- The Flashing Arrow Panel shall be mounted on a vehicle, trailer or other suitable support.
- A Flashing Arrow Panel SHALL NOT BE USED to laterally shift traffic.
- A full matrix PCMS may be used to simulate a Flashing Arrow Panel provided it meets visibility, flash rate and dimming requirements on this sheet for the same size arrow.
- Minimum mounting height of trailer mounted arrow panels should be 7 feet from roadway to bottom of panel.

## TRUCK-MOUNTED ATTENUATORS

- Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the National Cooperative Highway Research Report No. 350 (NCHRP 350).
- Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
- Refer to the dates shown in the CWZTCD to ensure that the TMA meets the age requirements and the crashworthiness criteria established by the Federal Highway Administration (FHWA) for TMAs.
- Refer to the CWZTCD for a list of approved TMAs.
- TMAs are required on freeways unless otherwise noted in the plans.
- A TMA should be used anytime that it can be positioned approximately 30 to 100 feet in advance of the area of crew exposure without adversely affecting the work performance.
- The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is an extended distance from the TMA.



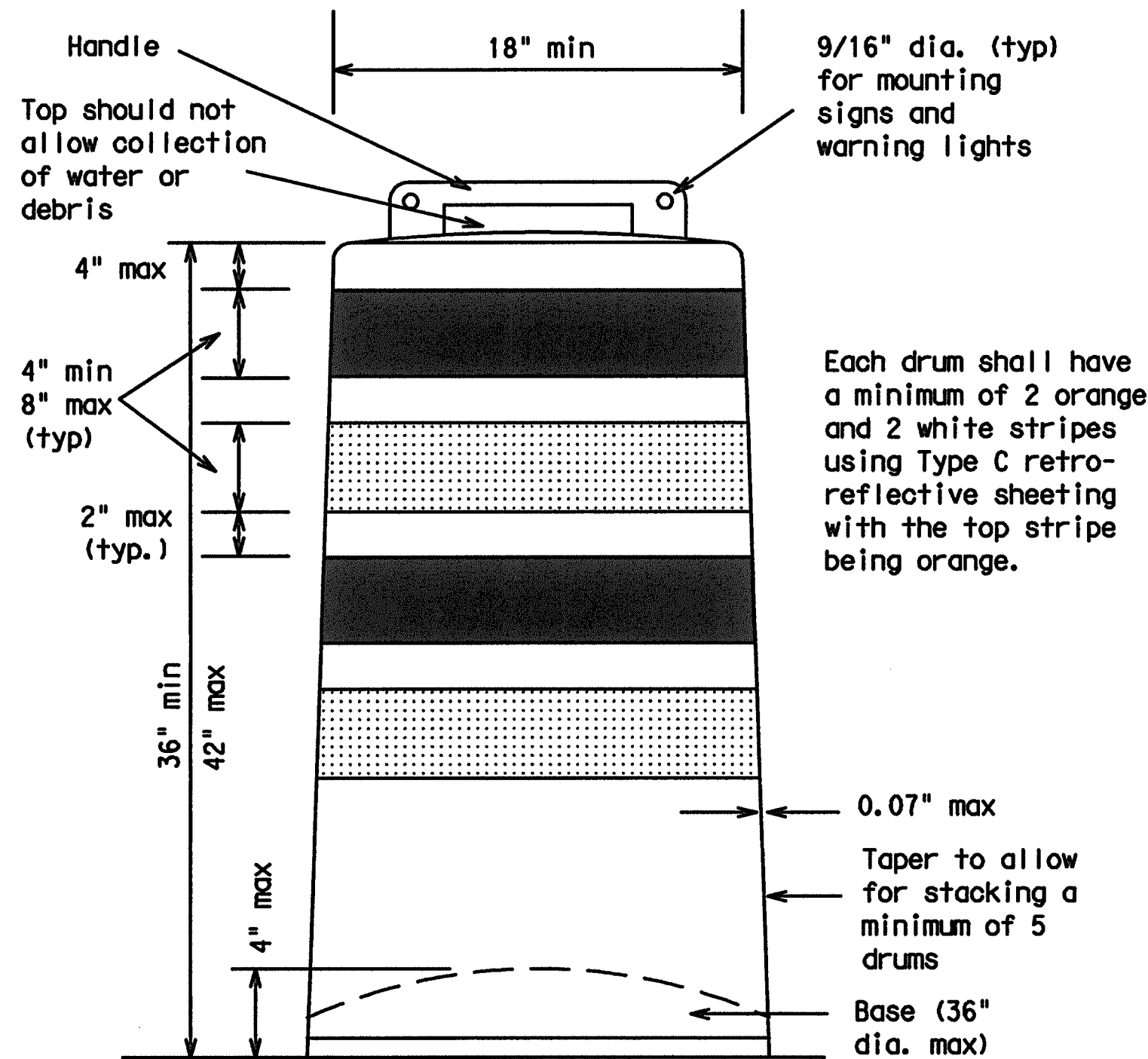
## BARRICADE AND CONSTRUCTION ARROW PANEL, REFLECTORS, WARNING LIGHTS & ATTENUATOR STANDARD

7 of 12

BC(7)-07

© TxDOT 11-4-02		PKT TxDOT	CKT TxDOT	DWT TxDOT	CKT TxDOT
9-07	REVISIONS	COUNT	SECT	JOB	HIGHWAY
		LIST	COUNTY		SHEET NO.





#### GENERAL NOTES

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

#### GENERAL DESIGN REQUIREMENTS

Prequalified plastic drums shall meet the following requirements:

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

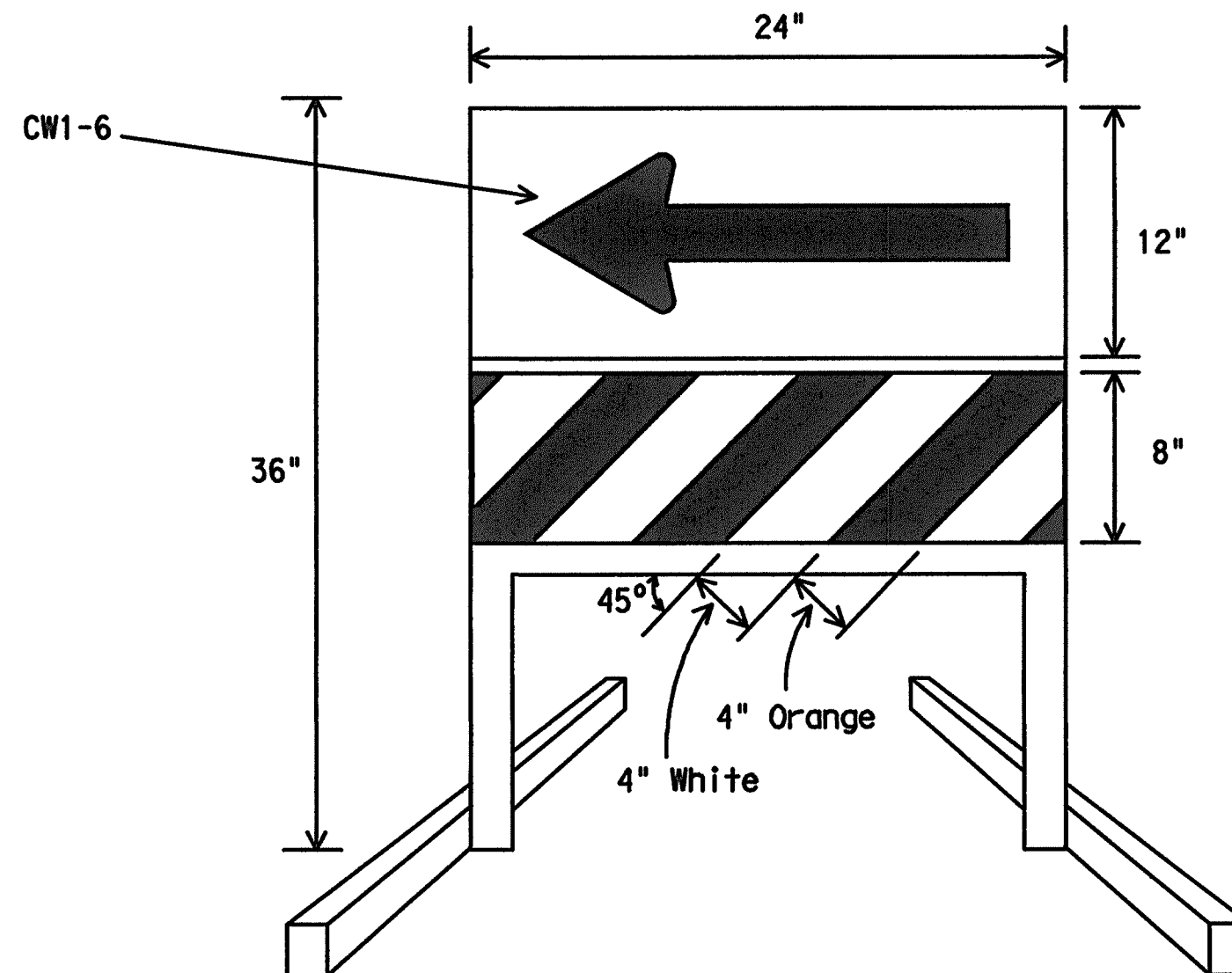
- Drum body shall have a minimum unballasted weight of 7.7 lbs. and maximum unballasted weight of 11 lbs. The wall of the drum body shall be a minimum of 0.07 inch in thickness. Weight of any drum supplied shall not vary more than 0.5 lb. from that of the prequalified sample.
- Drum and base shall be marked with manufacturer's name and model number.

#### RETROREFLECTIVE SHEETING

- The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Flat Surface Reflective Sheeting." High Specific Intensity (Type C) retroreflective sheeting shall be supplied unless otherwise specified in the plans.
- The sheeting shall be suitable for use on and shall adhere to the drum surface such that, upon vehicular impact, the sheeting shall remain adhered in-place and exhibit no delaminating, cracking, or loss of retroreflectivity other than that loss due to abrasion of the sheeting surface.

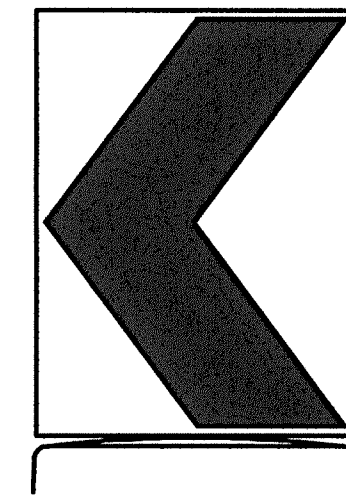
#### BALLAST

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

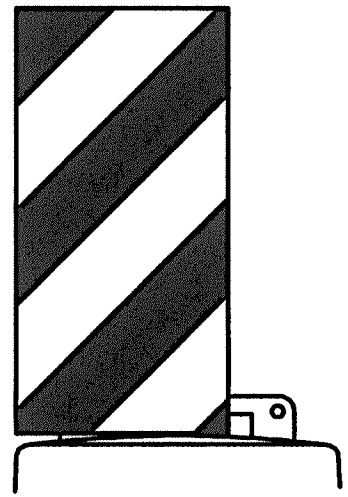


#### DIRECTION INDICATOR BARRICADE

- The Direction Indicator Barricade may be used in tapers, transitions, and other areas where specific directional guidance to drivers is necessary.
- If used, the Direction Indicator Barricade should be used in series to direct the driver through the transition and into the intended travel lane.
- 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 E Fluorescent Prismatic Orange above a rail with Type C High Specific Intensity retroreflective sheeting in alternation 4" white and orange stripes sloping downward at an angle of 45 degrees in the direction road users are to pass.
- Double arrows on the Direction Indicator Barricade will not be allowed.
- Approved manufacturers are shown on the CWZTCD List. Ballast shall be as approved by the manufacturers instructions.



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



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

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

#### SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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



## BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES STANDARD

8 of 12

BC(8)-07

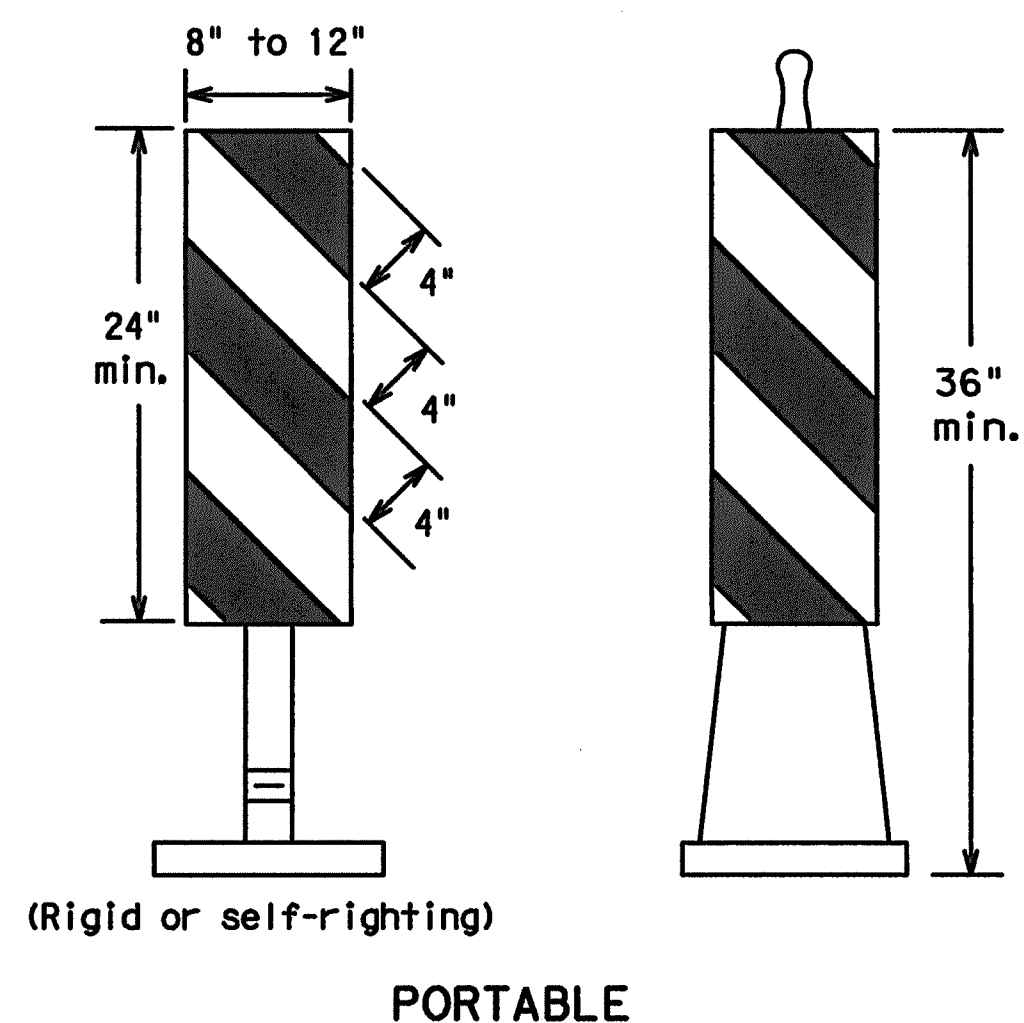
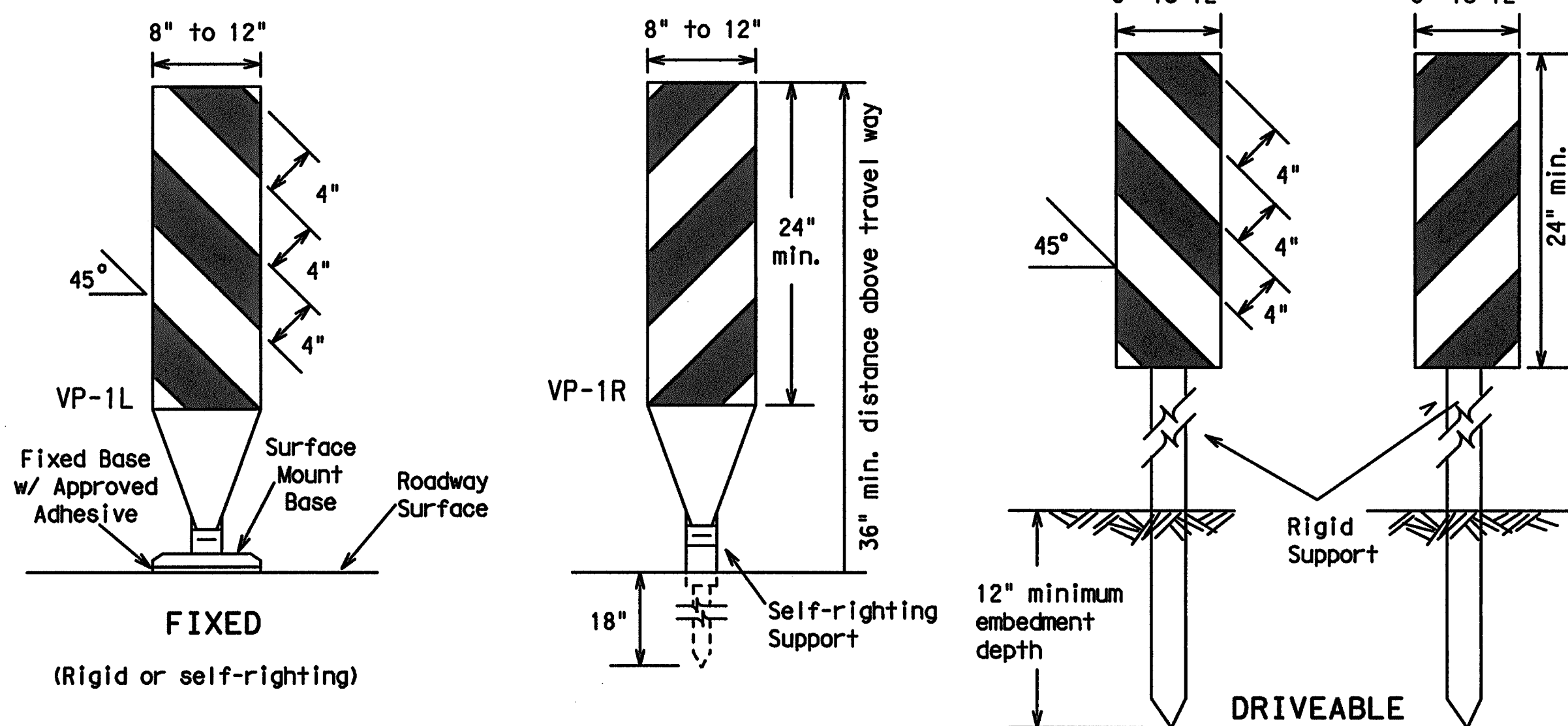
© TxDOT 11-4-02	REVISED	DATE	SECTION	DATE	SECTION	DATE	SECTION
4-03	9-07						



DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

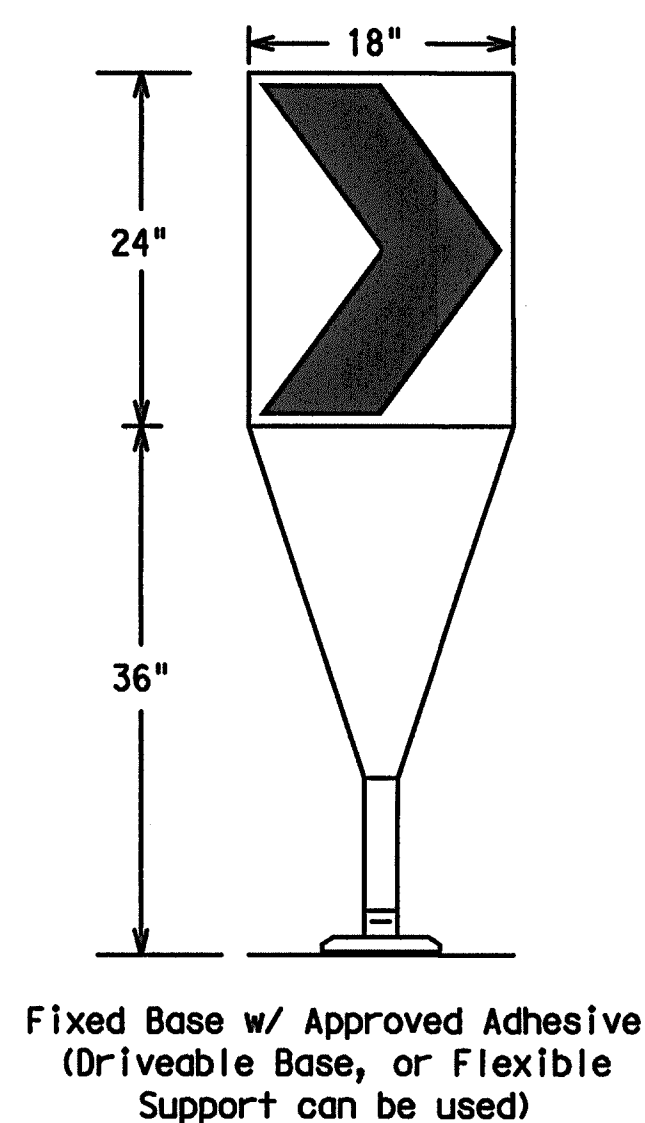
## CHANNELIZING DEVICES

### VERTICAL PANELS (VPs)



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

### CHEVRONS

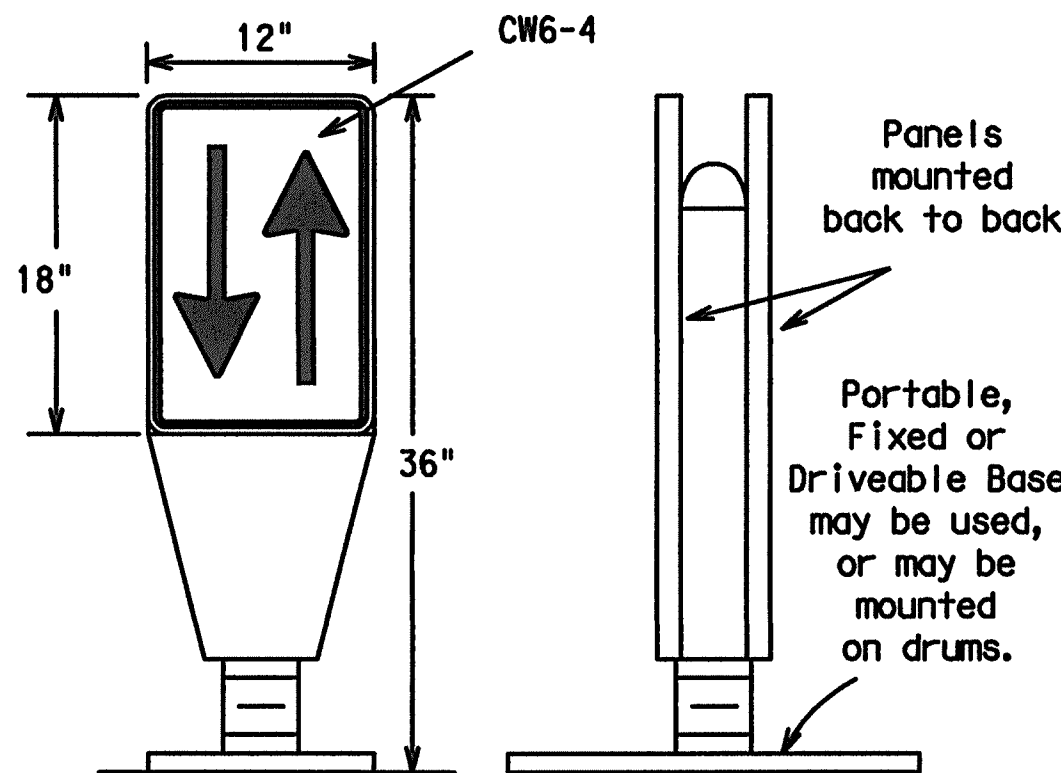


- The chevron shall be a vertical rectangle with a minimum size of 12 by 18 inches.
- Chevrons are intended to give notice of a sharp change of alignment with the direction of travel and provide additional emphasis and guidance for vehicle operators with regard to changes in horizontal alignment of the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

### GENERAL NOTES:

- Work Zone channelizing devices illustrated on this sheet may be installed in close proximity to traffic and are suitable for use on high or low speed roadways. The Engineer/Inspector shall ensure that spacing and placement is uniform and in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
- Channelizing devices shown on this sheet may have a driveable, fixed or portable base. The requirement for self-righting channelizing devices must be specified in the General Notes or other plan sheets.
- Channelizing devices on self-righting supports should be used in work zone areas where channelizing devices are frequently impacted by errant vehicles or vehicle related wind gusts making alignment of the channelizing devices difficult to maintain. Locations for these devices shall be detailed elsewhere in the plans. These devices shall conform to the TMUTCD and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
- The Contractor shall maintain devices in a clean condition and replace damaged, nonreflective, faded, or broken devices and bases as required by the Engineer/Inspector. The Contractor shall be required to maintain proper device spacing and alignment.
- Portable bases shall be fabricated from virgin and/or recycled rubber. The portable bases shall weigh approximately 35 lbs.
- Pavement surfaces shall be prepared in a manner that ensures proper bonding between the adhesives, the fixed mount bases and the pavement surface. Adhesives shall be prepared and applied according to the manufacturer's recommendations.
- The installation and removal of channelizing devices shall not cause detrimental effects to the final pavement surfaces, including pavement surface discoloration or surface integrity. Driveable bases shall not be permitted on final pavement surfaces. The Engineer/Inspector shall approve all application and removal procedures of fixed bases.
- Examples on this sheet are commonly used channelizing devices in work zones. For other devices, refer to the CWZTCD.

### OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

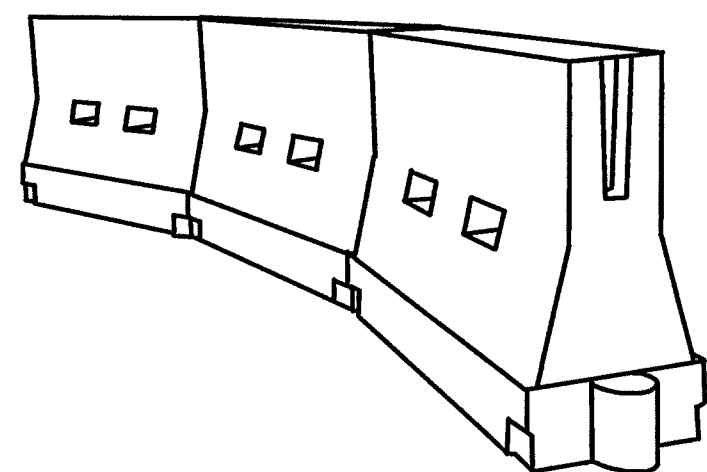


- Opposing Traffic Lane Dividers (OTLD) are delineation devices designed to convert a normal one-way roadway section to two-way operation. OTLD's are used on temporary centerlines. The upward and downward arrows on the sign's face indicate the direction of traffic on either side of the divider. The base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

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' - 75'
35		205'	225'	245'	35'	70' - 90'
40		265'	295'	320'	40'	80' - 100'
45	L = WS	450'	495'	540'	45'	90' - 110'
50		500'	550'	600'	50'	100' - 125'
55		550'	605'	660'	55'	110' - 140'
60		600'	660'	720'	60'	120' - 150'
65		650'	715'	780'	65'	130' - 165'
70		700'	770'	840'	70'	140' - 175'
75		750'	825'	900'	75'	150' - 185'
80		800'	880'	960'	80'	160' - 195'

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

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



#### LONGITUDINAL CHANNELIZING DEVICES

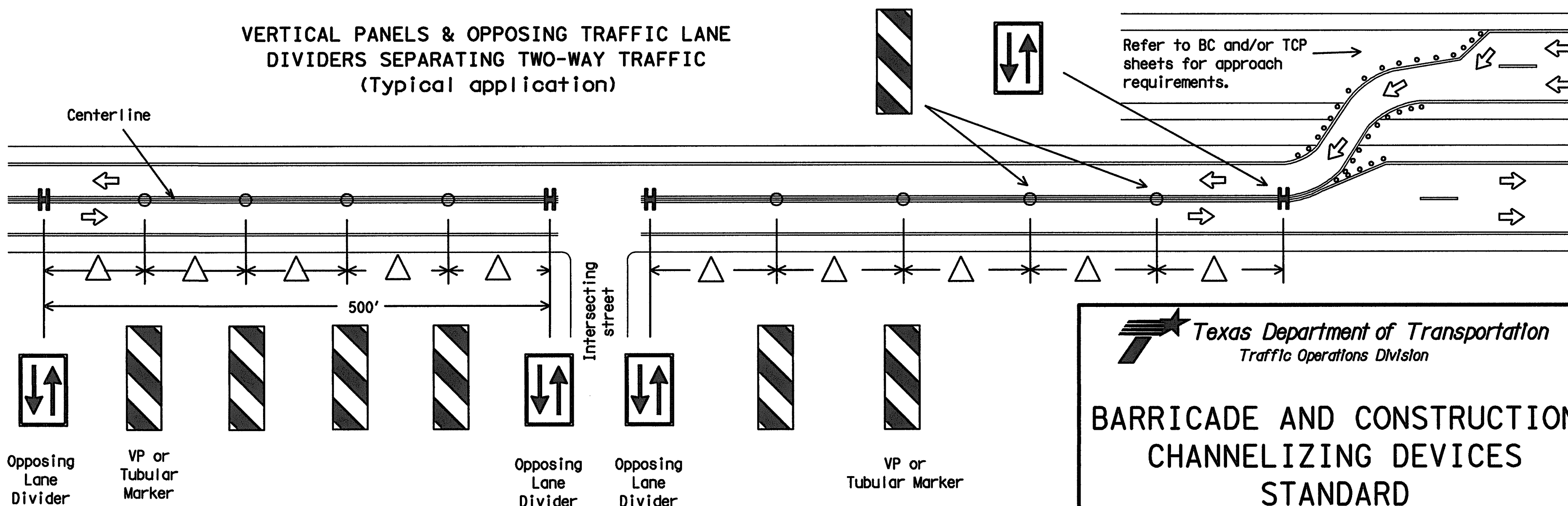
- Longitudinal channelizing devices are crashworthy, lightweight, deformable devices that are highly visible, have good target value and can be connected together. They are not designed to contain or redirect a vehicle on impact.
- Longitudinal channelizing devices may be used instead of a line of cones or drums.
- Longitudinal channelizing devices shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
- Longitudinal channelizing devices should not be used to provide positive protection for obstacles, pedestrians or workers.
- Longitudinal channelizing devices shall be retroreflective, or supplemented with retroreflective delineation as required for temporary barriers on BC(7)-07.

#### WATER BALLASTED SYSTEMS USED AS BARRIERS

- Water ballasted systems used as barriers shall not be used solely to channelize road users, but also to protect the work space per the appropriate NCHRP 350 crashworthiness requirements based on roadway speed and barrier application.
- Water ballasted systems used to channelize vehicular traffic shall be supplemented with retroreflective delineation or channelizing devices to improve daytime/nighttime visibility. They may also be supplemented with pavement markings.
- Water ballasted systems used as barriers shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
- Water ballasted systems used as barriers should not be used for a merging taper except in low speed (less than 45 MPH) urban areas. When used on a taper in a low speed urban area, the taper shall be delineated and the taper length should be designed to optimize road user operations considering the available geometric conditions.
- When water ballasted systems used as barriers have blunt ends exposed to traffic, they should be attenuated as per manufacturer recommendations or flared to 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 be not less than 32 inches in height.

### VERTICAL PANELS & OPPOSING TRAFFIC LANE DIVIDERS SEPARATING TWO-WAY TRAFFIC (Typical application)



Texas Department of Transportation  
Traffic Operations Division

### BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES STANDARD

9 of 12 BC(9)-07

© TxDOT 11-4-02		PLAN TxDOT	CROSS TxDOT	SECTION TxDOT	CITY TxDOT
9-07	REVISIONS	CULT	SECT	JUN	HIGHWAY
		LIST		COUNTY	SHEET NO.



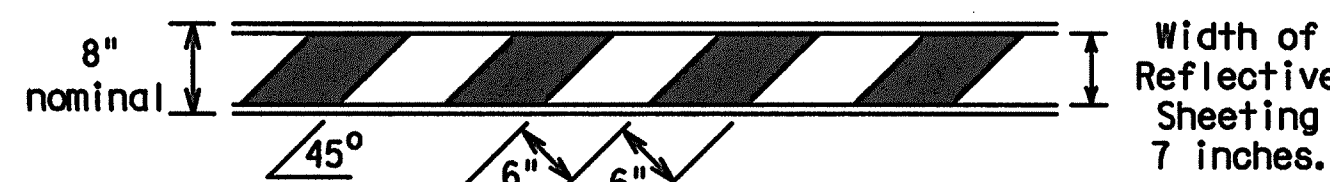
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

## TYPE III BARRICADES

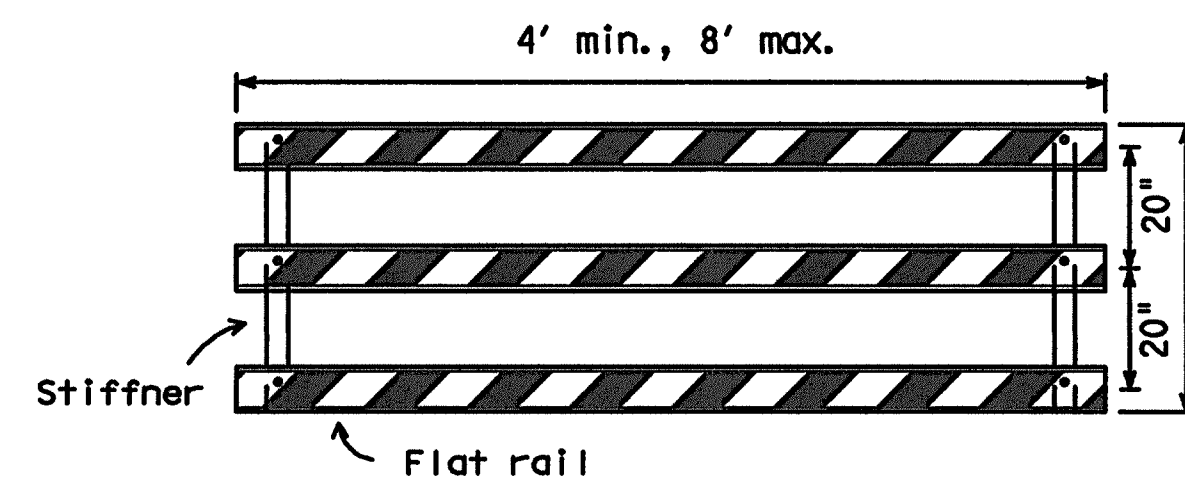
1. Refer to the Compliant Work Zone Traffic Control Devices List (CWZTCD) for details of the Type III Barricades and a list of all materials used in the construction of Type III Barricades.
2. Type III Barricades shall be used at each end of construction projects closed to all traffic.
3. Barricades 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 C (High Specific Intensity) 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

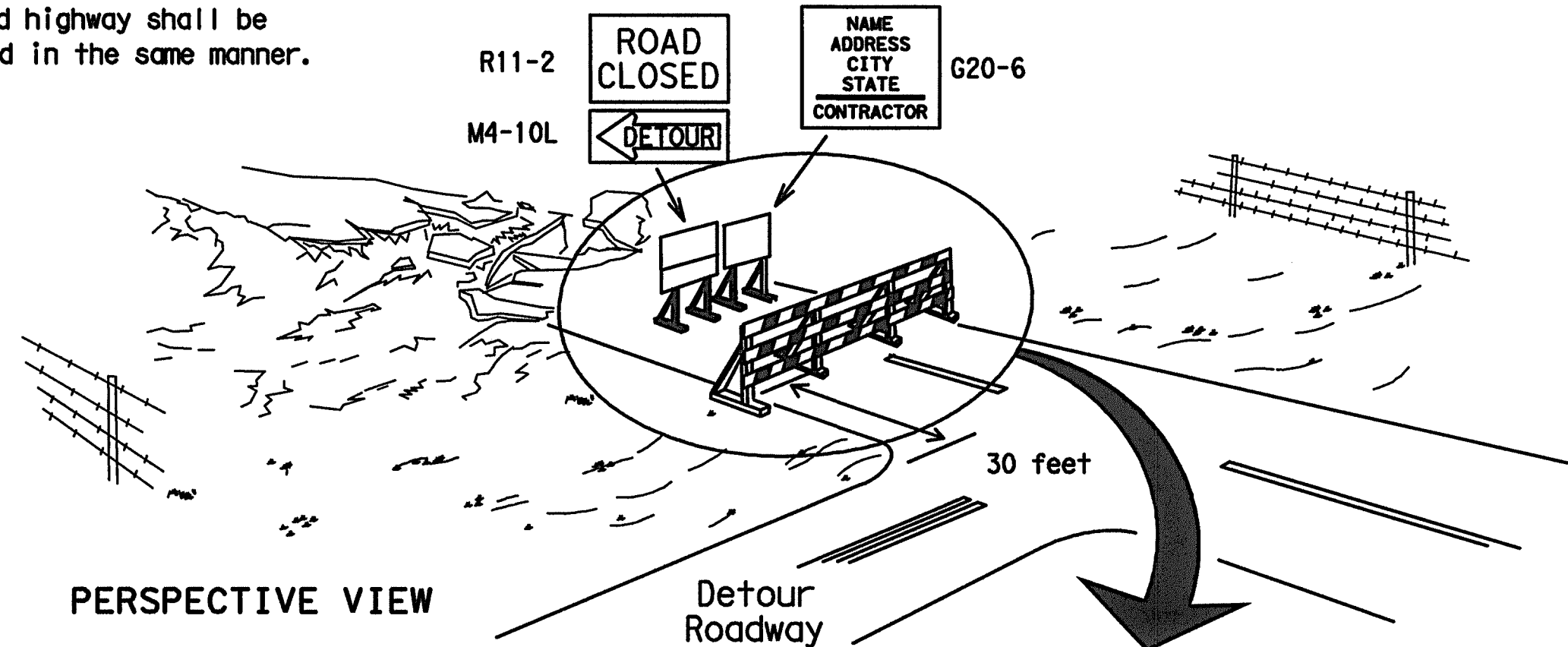


### TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES



## TYPE III BARRICADE (POST AND SKID) TYPICAL APPLICATION

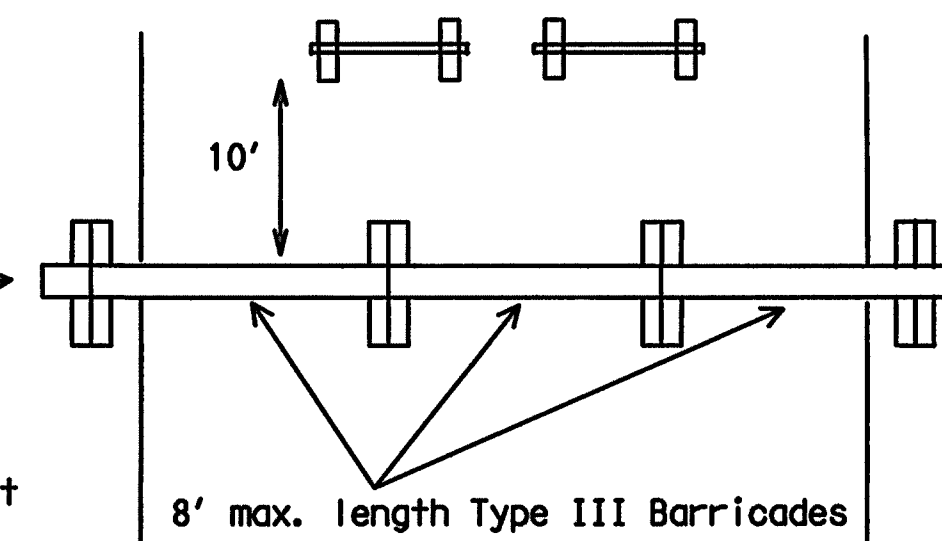
Each roadway of a divided highway shall be barricaded in the same manner.



### PERSPECTIVE VIEW

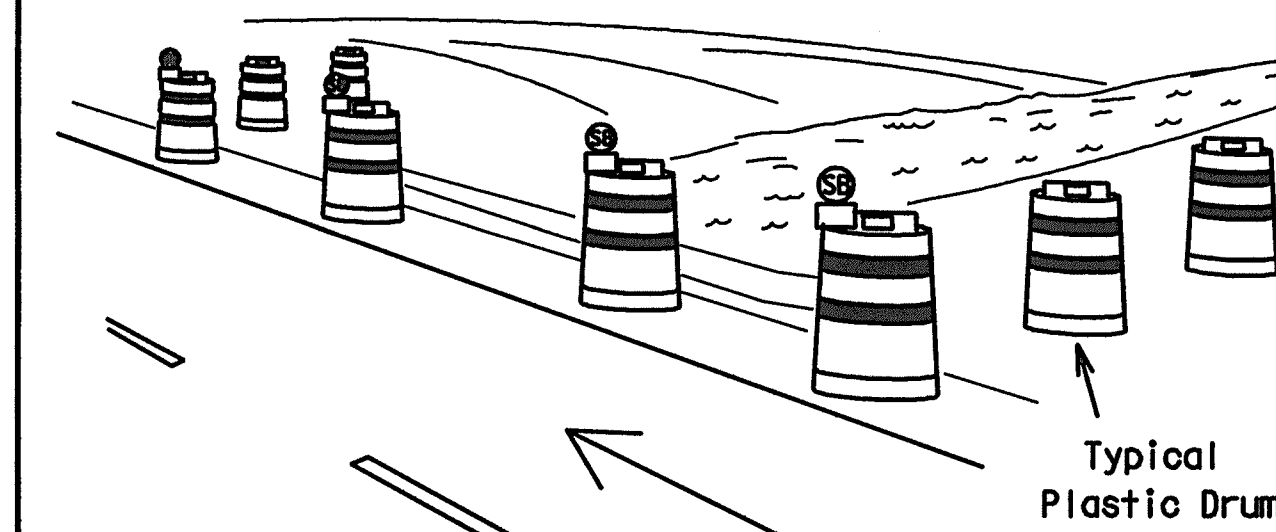
The three rails on Type III barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic. Barricade striping should slant downward in the direction of detour.

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 III Barricades.
2. Advance signing shall be as specified elsewhere in the plans.



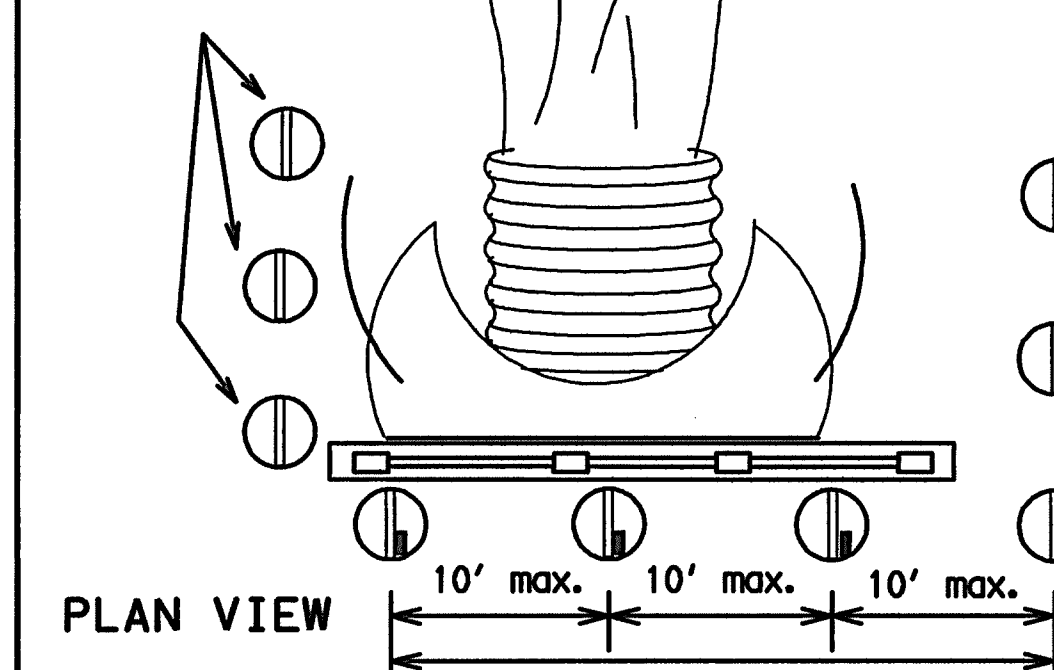
### PLAN VIEW

## CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



### PERSPECTIVE VIEW

These drums are not required on one-way roadway

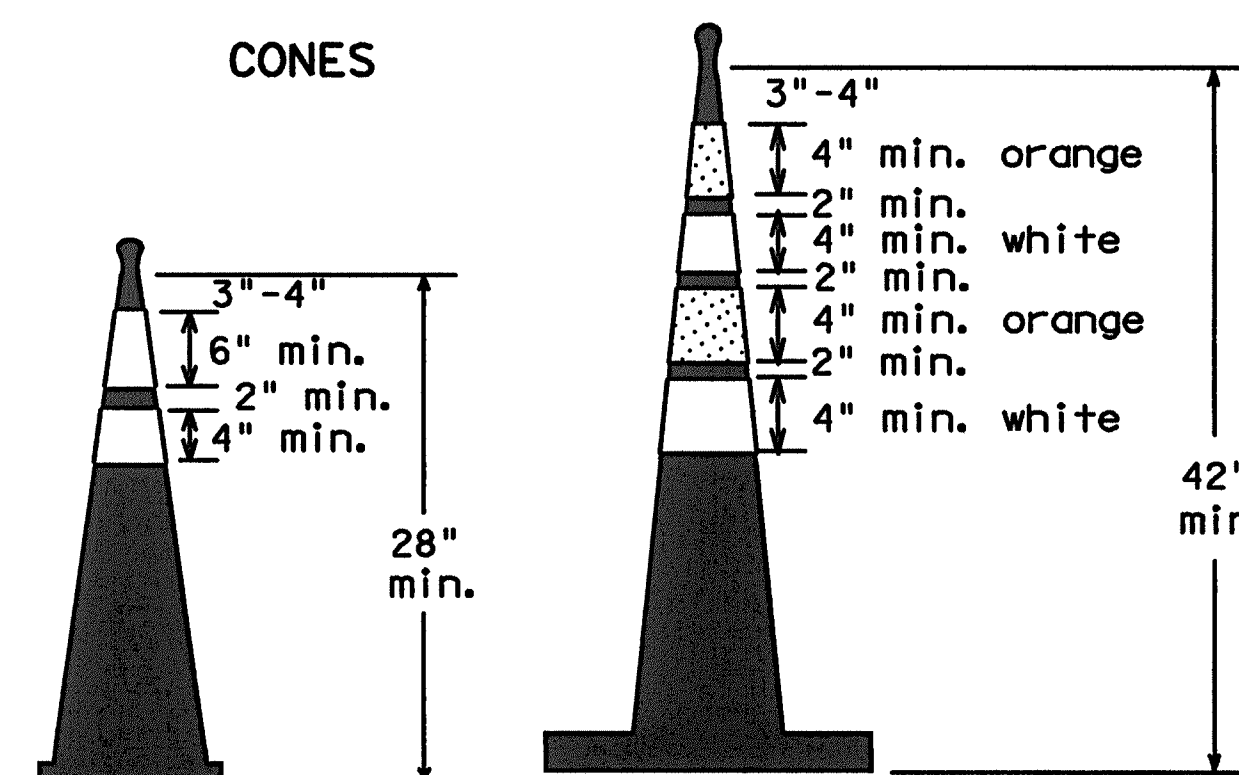


Increase number of plastic drums on the side of approaching traffic if the crown width makes it necessary. (minimum of 2 and maximum of 4 drums)

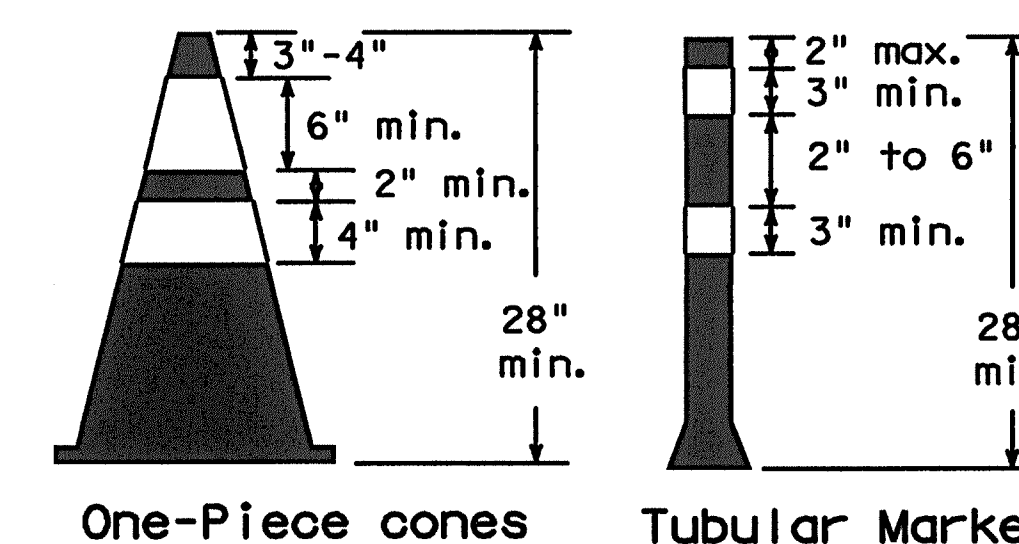
### Legend

- Plastic drum
- Plastic drum with steady burn light or yellow warning reflector
- Steady burn warning light or yellow warning reflector

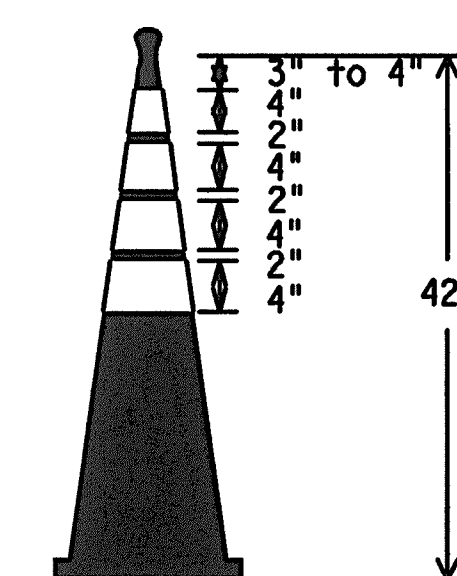
## CONES



### Two-Piece cones



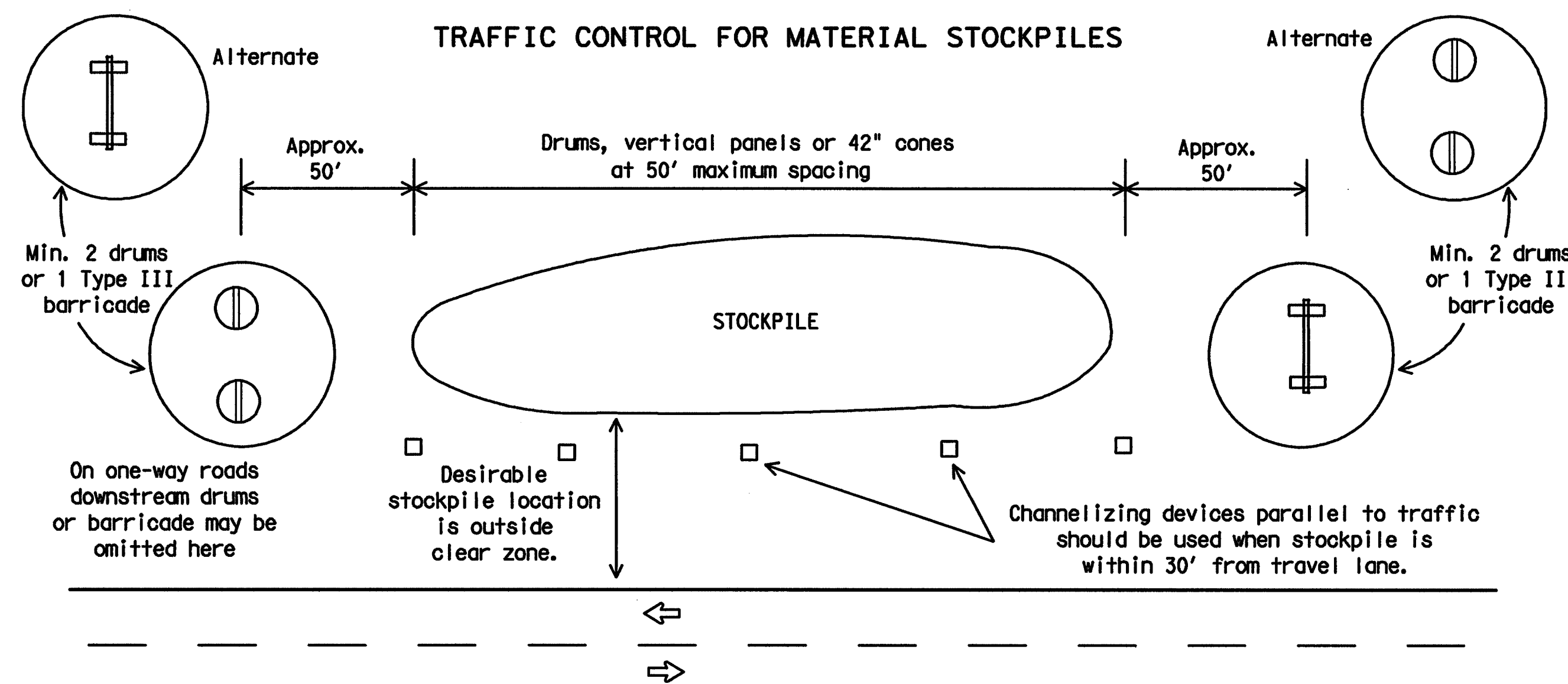
- 28" Cones shall have a minimum weight of 9 1/2 lbs.
- 42" 2-piece cones shall have a minimum weight of 30 lbs. including base.



### 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 C encapsulated bead (High Specific Intensity) 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



1. Traffic cones and tubular markers shall be a minimum of 28 inches in height when used either on freeways or at nighttime.
2. Cones or tubular markers shall be predominantly orange, fluorescent red-orange, or fluorescent yellow-orange. They should be kept clean and bright for maximum visibility.
3. Cones used only for daytime operations do not require the reflectorized bands.
4. Cones and tubular markers used for nighttime operations shall be reflectorized. Reflectorized material shall have a smooth, sealed outer surface that displays the same approximate color during the day and night. The reflectorized bands shall be retroreflective Type C (High Specific Intensity) conforming to Departmental Material Specification DMS-8300, unless otherwise noted.
5. When used at night, appropriate personnel shall ensure that cones and tubular markers remain in their proper location and in an upright position.
6. Reflectorization of 28" cones shall consist of a minimum 6 inch band placed at least 3 inches but not more than 4 inches from the top, supplemented by a minimum 4 inch band spaced a minimum of 2 inches below the 6 inch band.
7. Reflectorization of 42" cones shall be provided by alternating 4 to 6" orange and white stripes with orange on top.
8. Reflectorization of tubular markers shall be a minimum of two 3 inch bands placed a maximum of 2 inches from the top with a maximum of 6 inches between bands.
9. One-piece cones or tubular markers are generally suitable for temporary usage (up to 8 hours) with other channelization devices such as vertical panels, drums or two-piece cones for long term usage. Care should be taken to ensure they remain in their proper location and in an upright position.
10. Cones or tubular markers used on each project shall be of the same size and shape.
11. The handle may be designed as a hook or other shape, fabricated from non-rigid materials similar to the cone material, and may extend up to a maximum of 8 inches above the top of cone. Length of the handle shall not be considered with regard to the overall height of the cone.

Texas Department of Transportation  
Traffic Operations Division

## BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES STANDARD

10 of 12

BC(10)-07

© TxDOT 11-4-02	DATE	REVISED	BY	CHKD	DATE	BY	CHKD	DATE
9-07	REVISIONS							

109A



DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:  
FILE:

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.

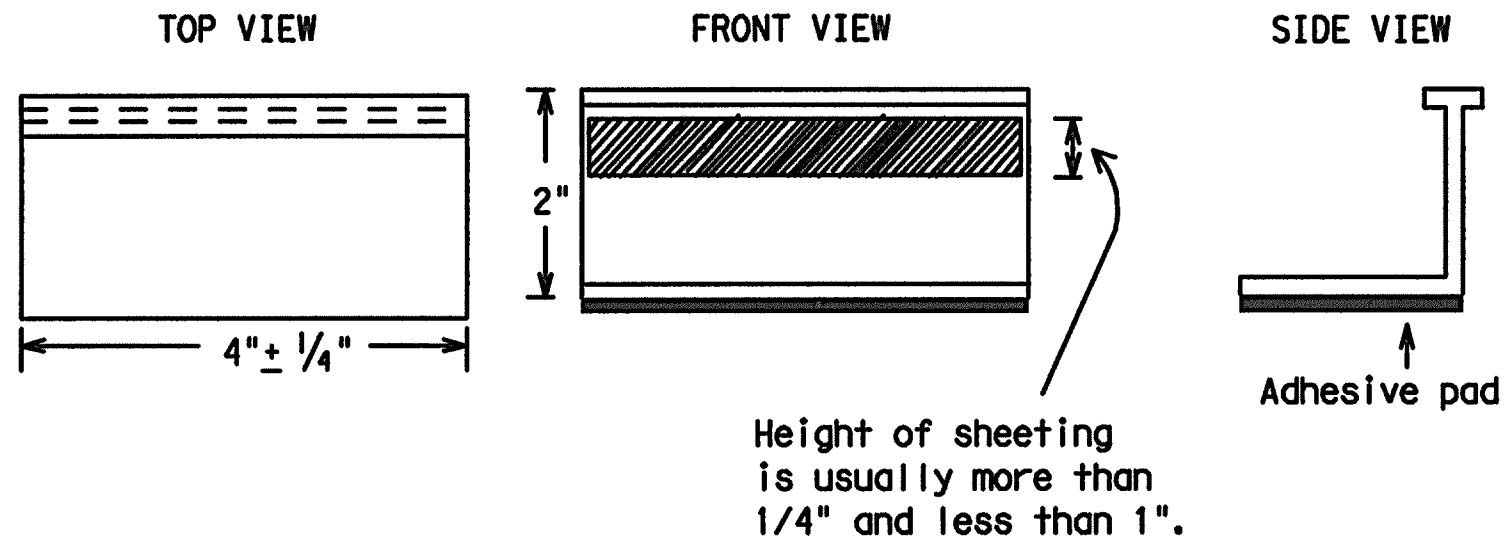
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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 two weeks, 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.
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
PREFABRICATED PAVEMENT MARKINGS-PERMANENT	DMS-8240
PREFABRICATED PAVEMENT MARKINGS-REMOVABLE	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).



BARRICADE AND CONSTRUCTION  
PAVEMENT MARKINGS  
STANDARD

11 of 12 BC(11)-07

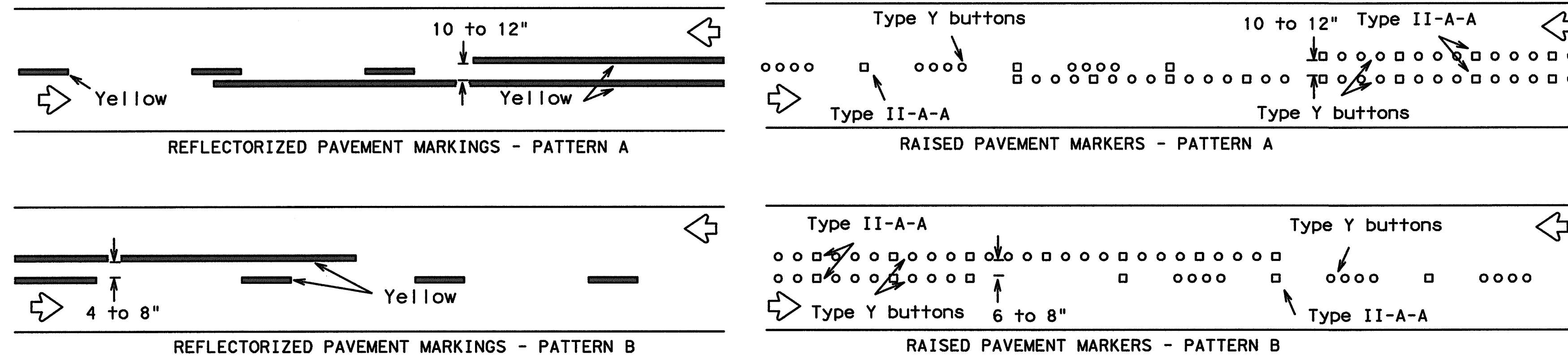
© TxDOT February 1998		DATE	BY	CHKD	DATE	BY	CHKD
REVISIONS		DATE	BY	CHKD	HIGHWAY		
2-98							
1-02							
11-02							
9-07							



DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

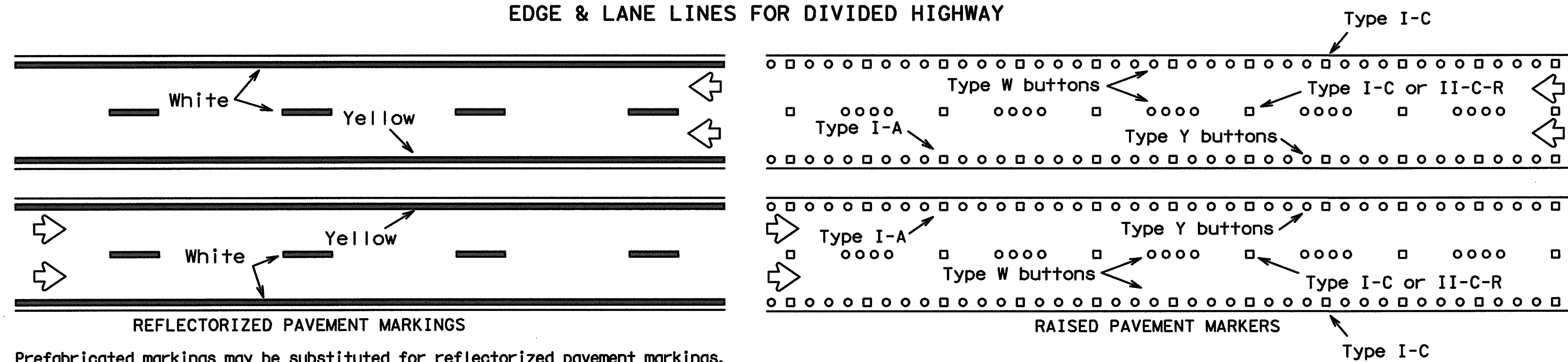
## PAVEMENT MARKING PATTERNS

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



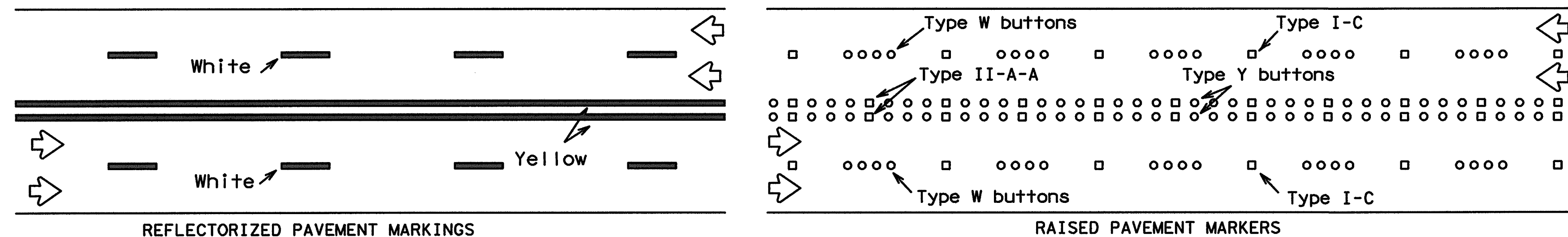
Pattern A is the TxDOT Standard, however Pattern B may be used if approved by the Engineer. Prefabricated markings may be substituted for reflectorized pavement markings.

### EDGE & LANE LINES FOR DIVIDED HIGHWAY



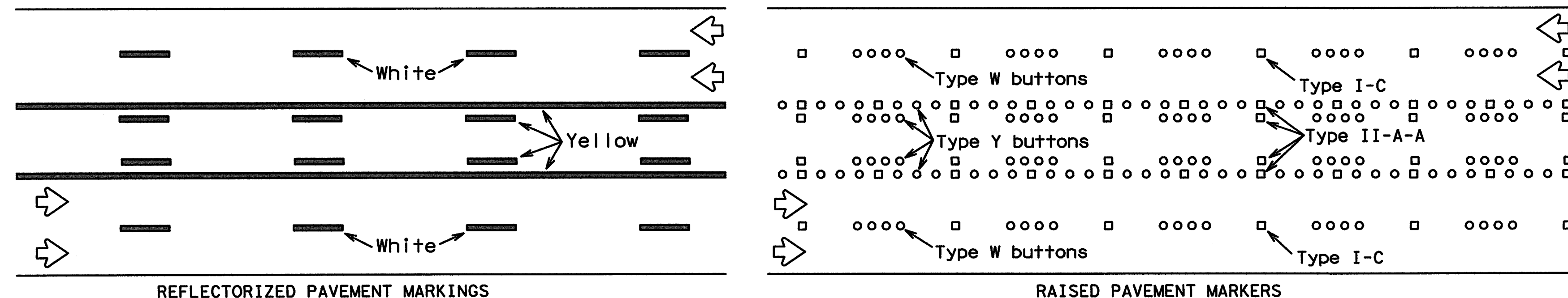
Prefabricated markings may be substituted for reflectorized pavement markings.

### LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



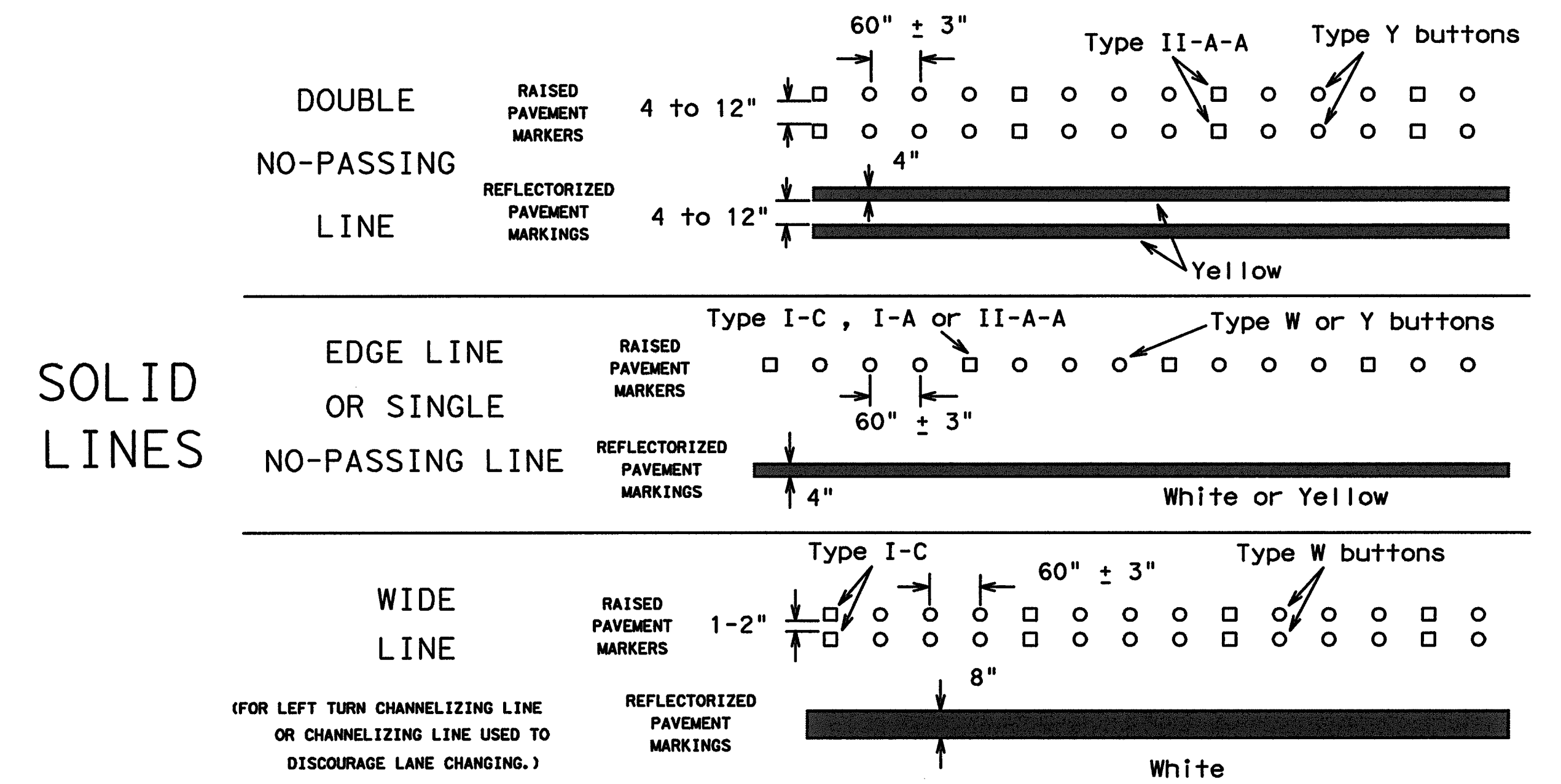
Prefabricated markings may be substituted for reflectorized pavement markings.

### TWO-WAY LEFT TURN LANE



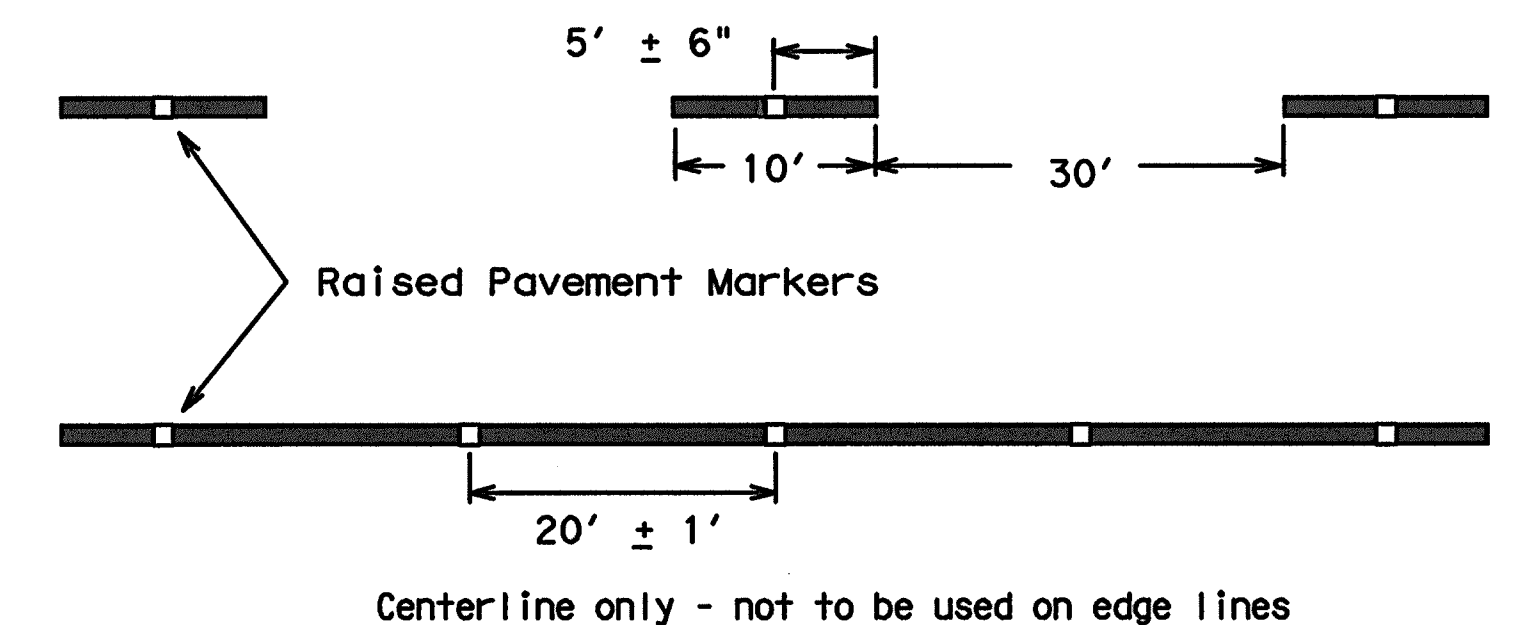
Prefabricated markings may be substituted for reflectorized pavement markings.

## STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



### REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



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

## BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS STANDARD

12 of 12 BC(12)-07

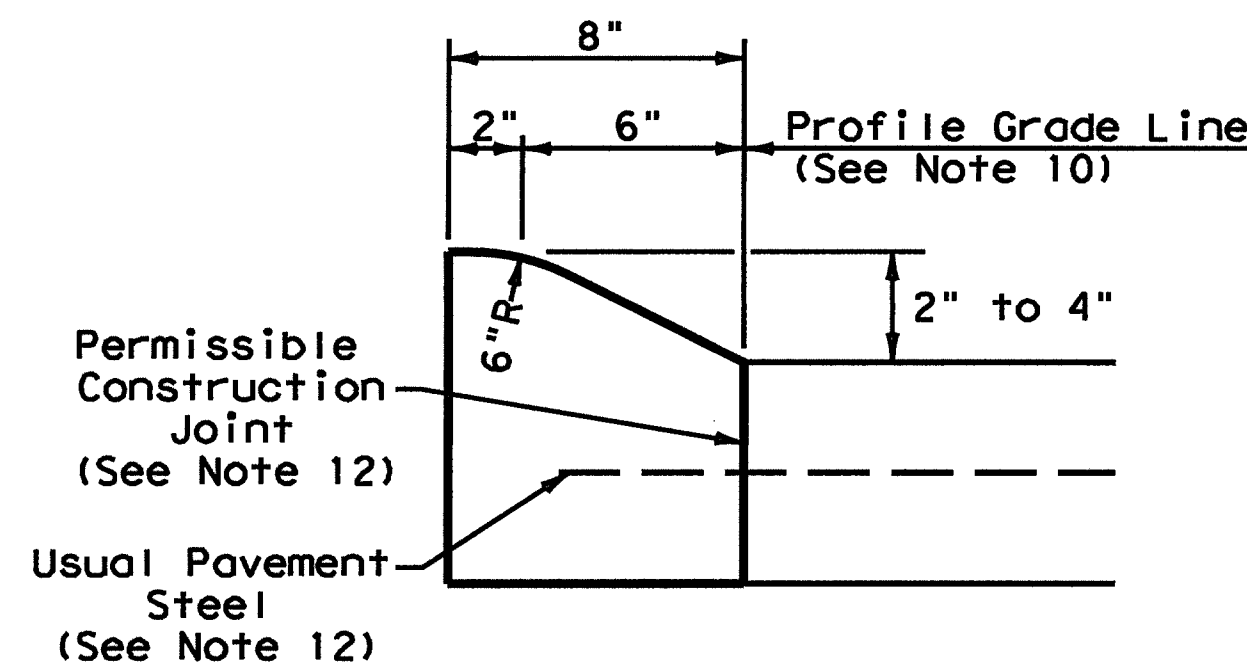
© TxDOT February 1998		DATE	SECTION	DATE	SECTION	DATE	SECTION
1-97	2-98	11-02	9-07	DATE	SECTION	DATE	SECTION
1-97	2-98	11-02	9-07	DATE	SECTION	DATE	SECTION

109C

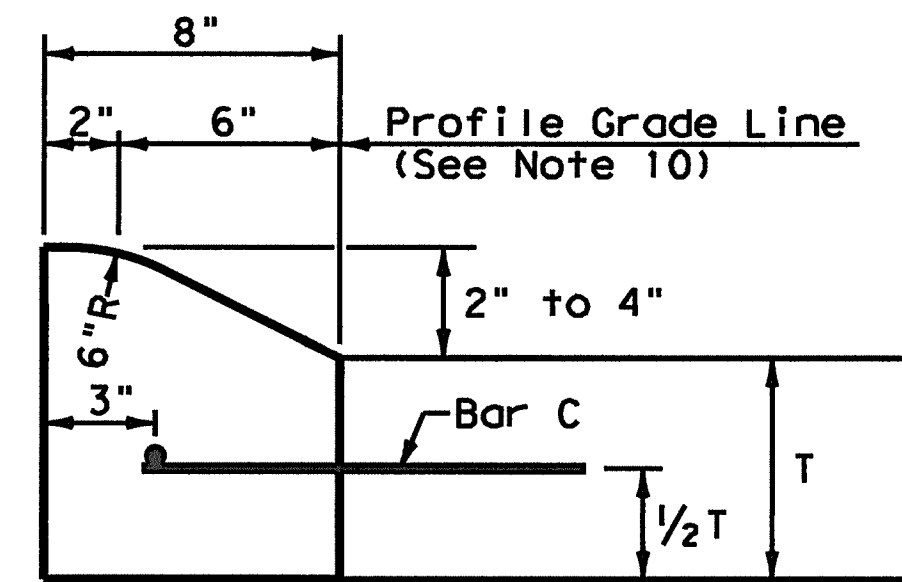


DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

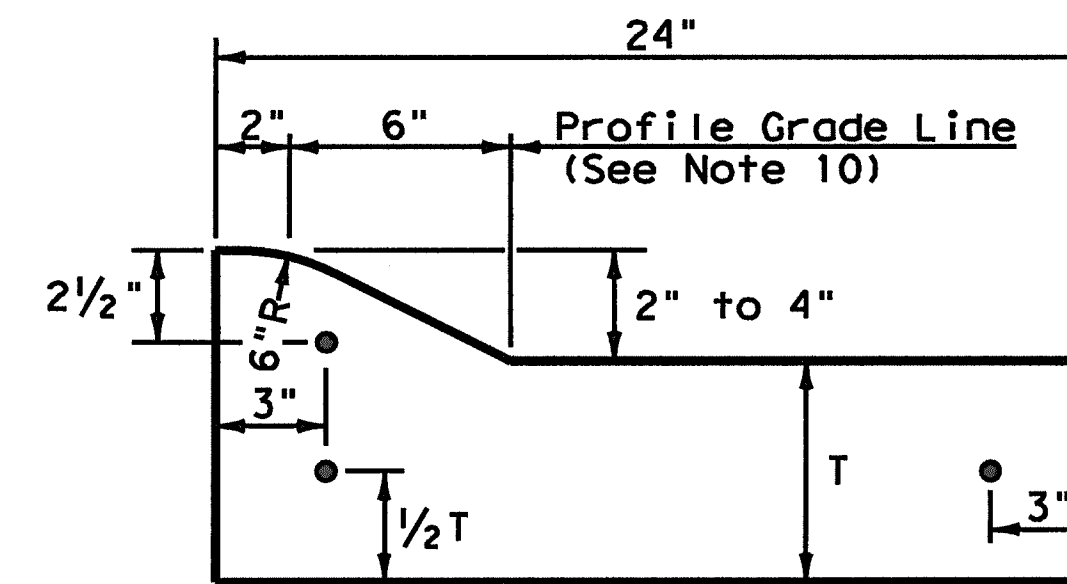
DATE: FILE:



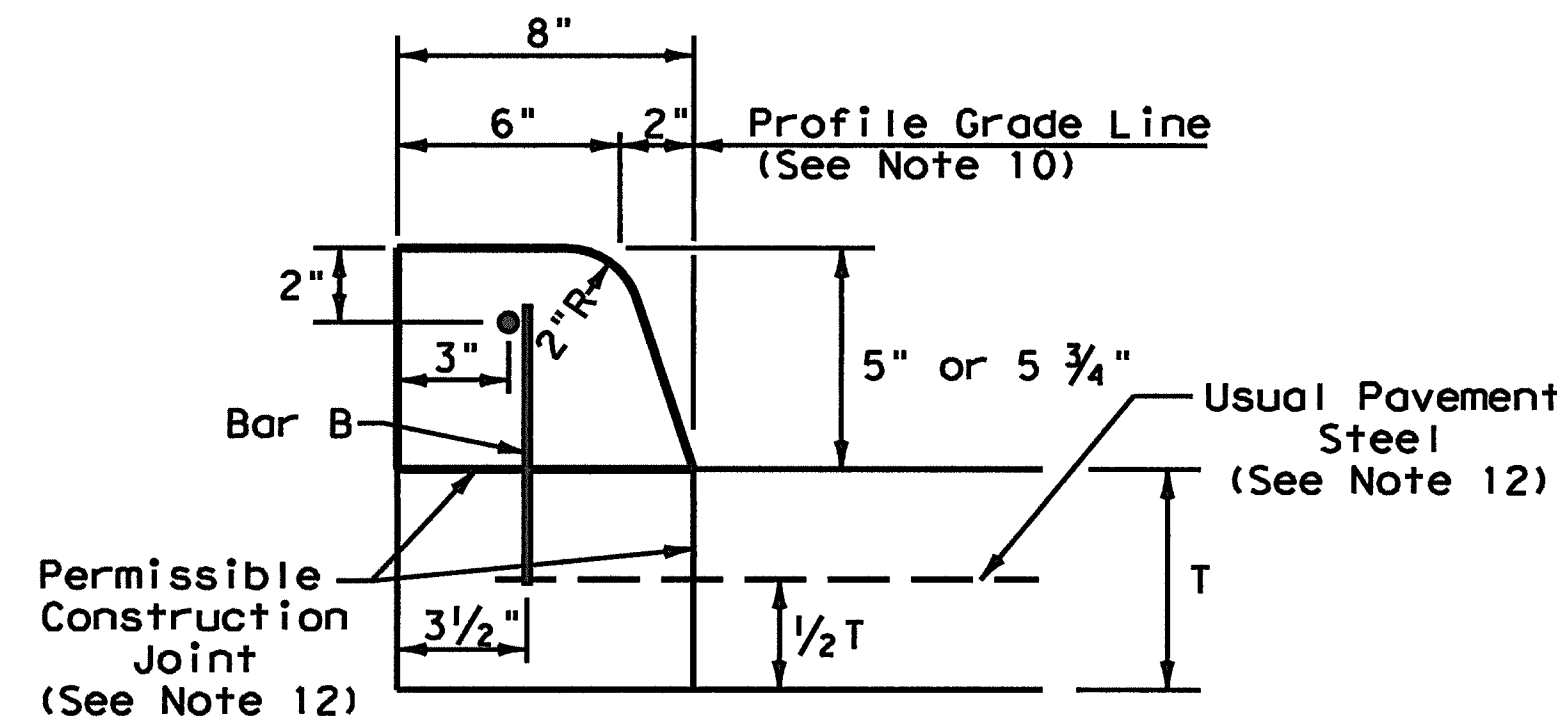
TYPE I CURB (MONOLITHIC)  
2" - 4" HEIGHT



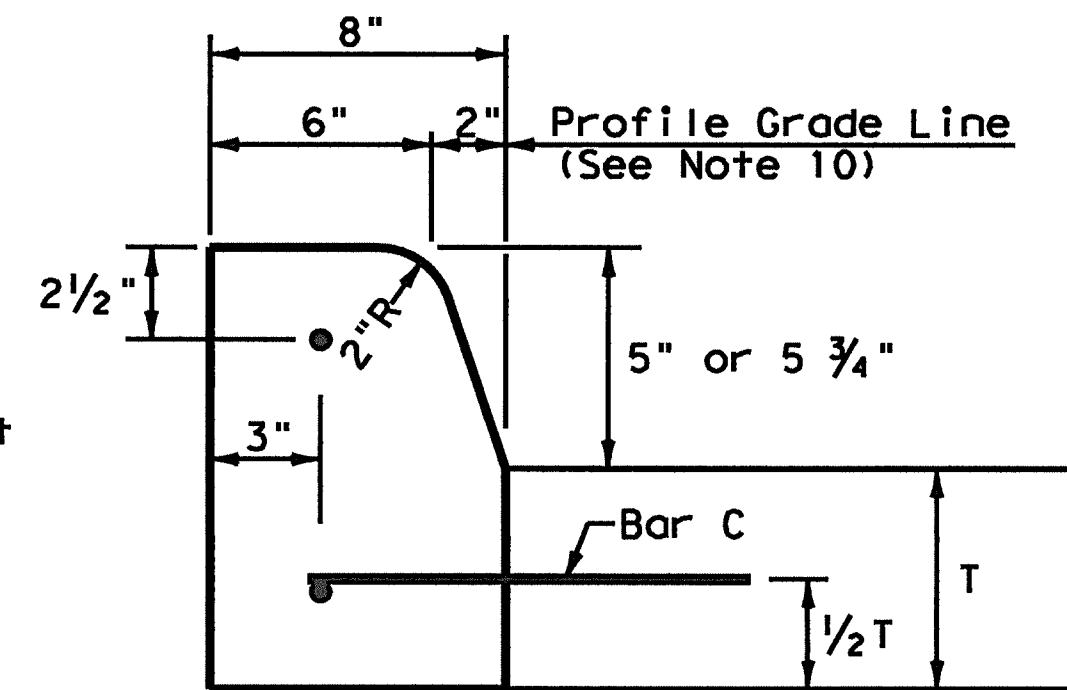
TYPE I CURB  
2" - 4" HEIGHT



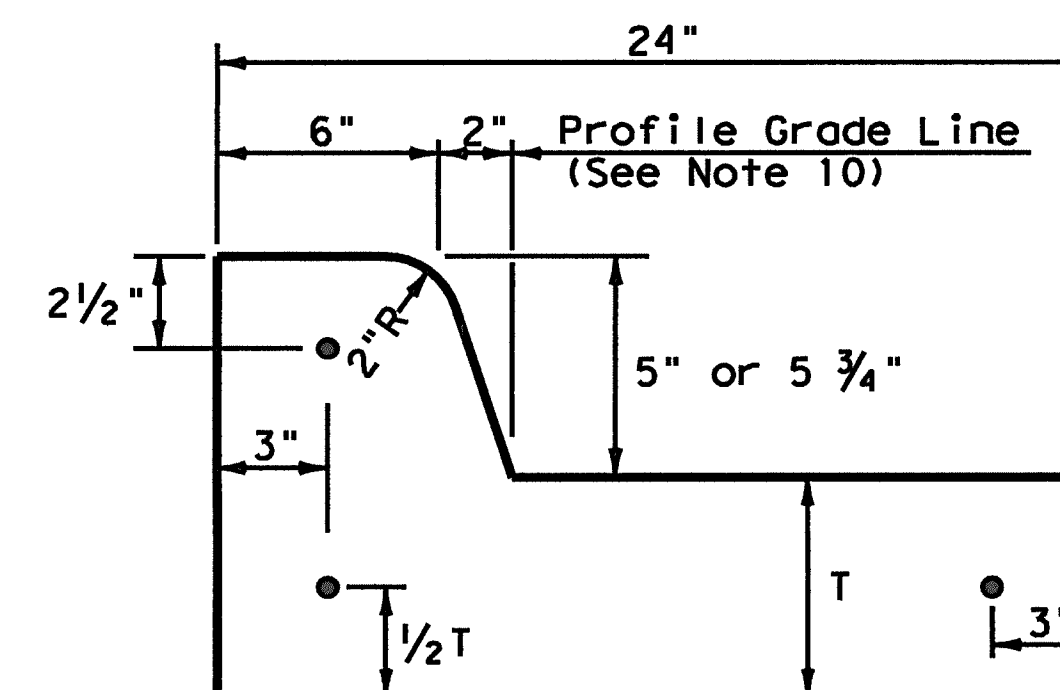
TYPE I CURB AND GUTTER  
2" - 4" HEIGHT



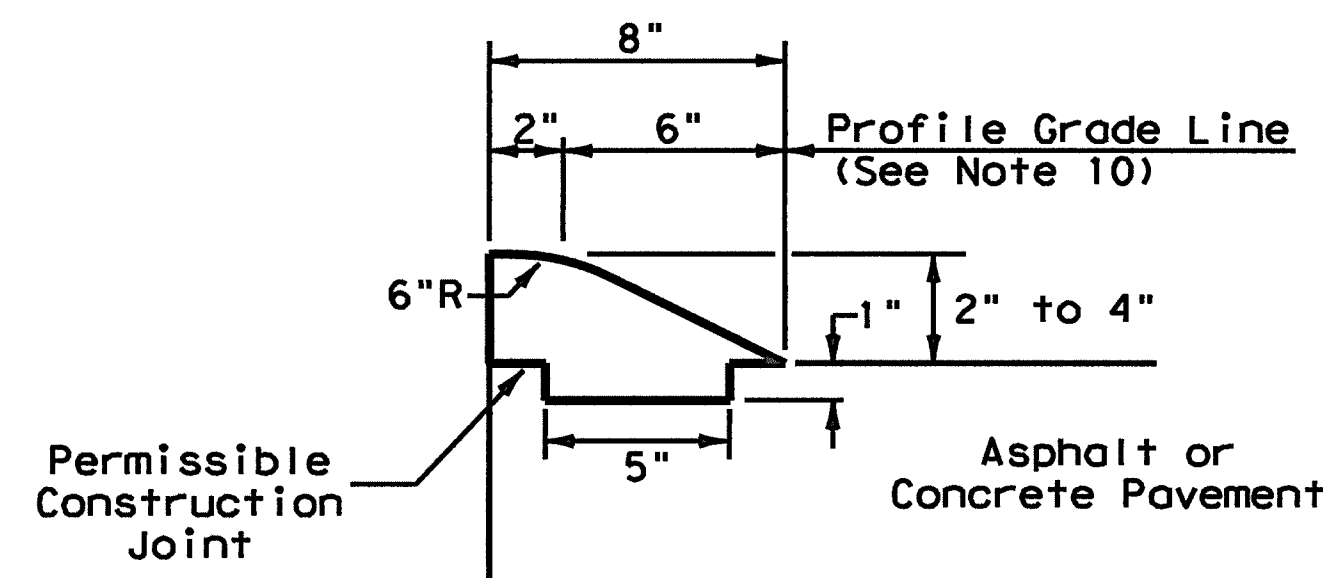
TYPE II CURB (MONOLITHIC)  
5" - 5 3/4" HEIGHT



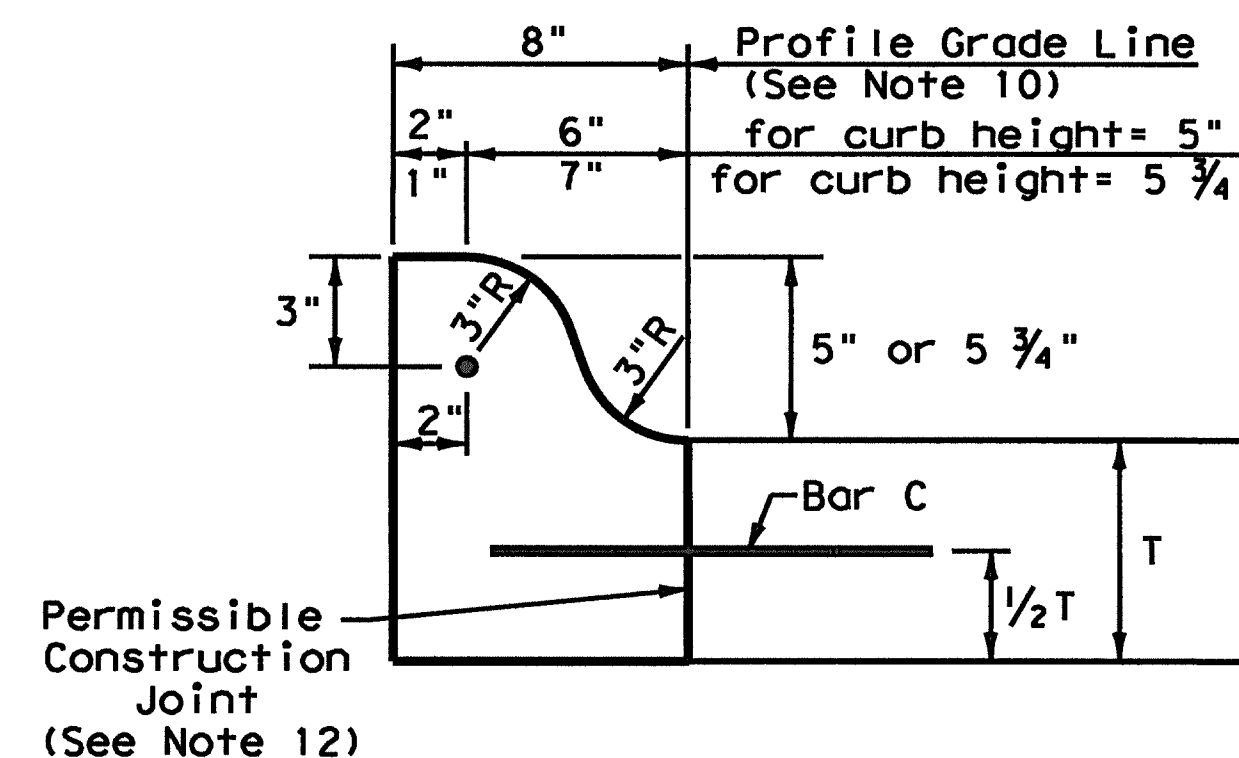
TYPE II CURB  
5" - 5 3/4" HEIGHT



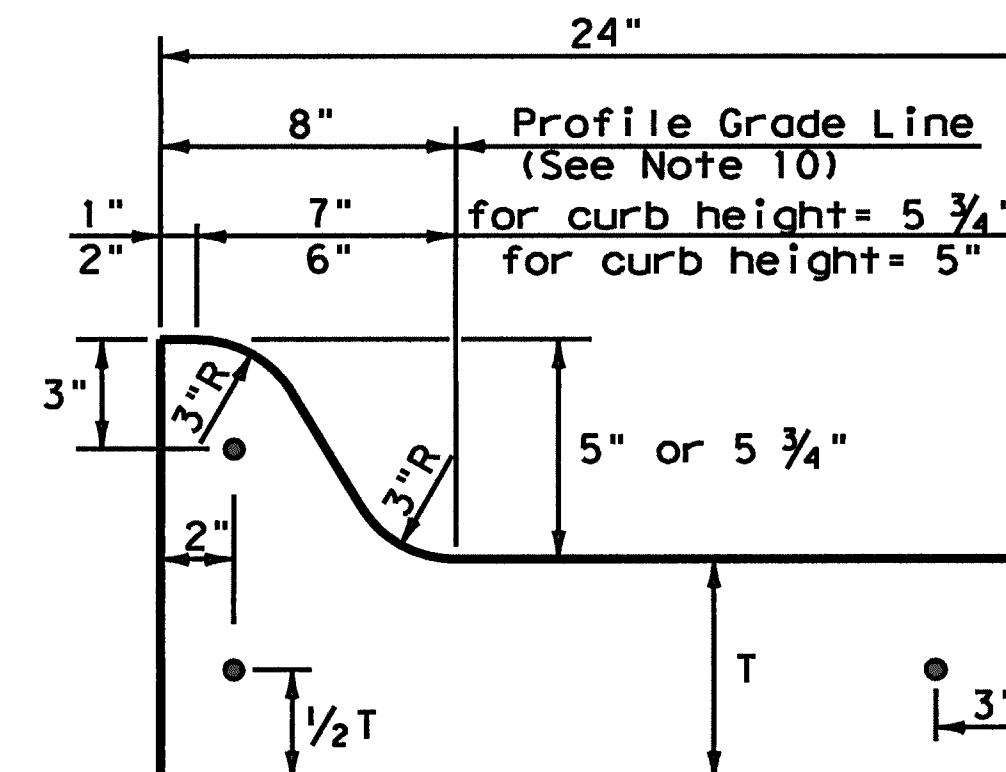
TYPE II CURB AND GUTTER  
5" - 5 3/4" HEIGHT



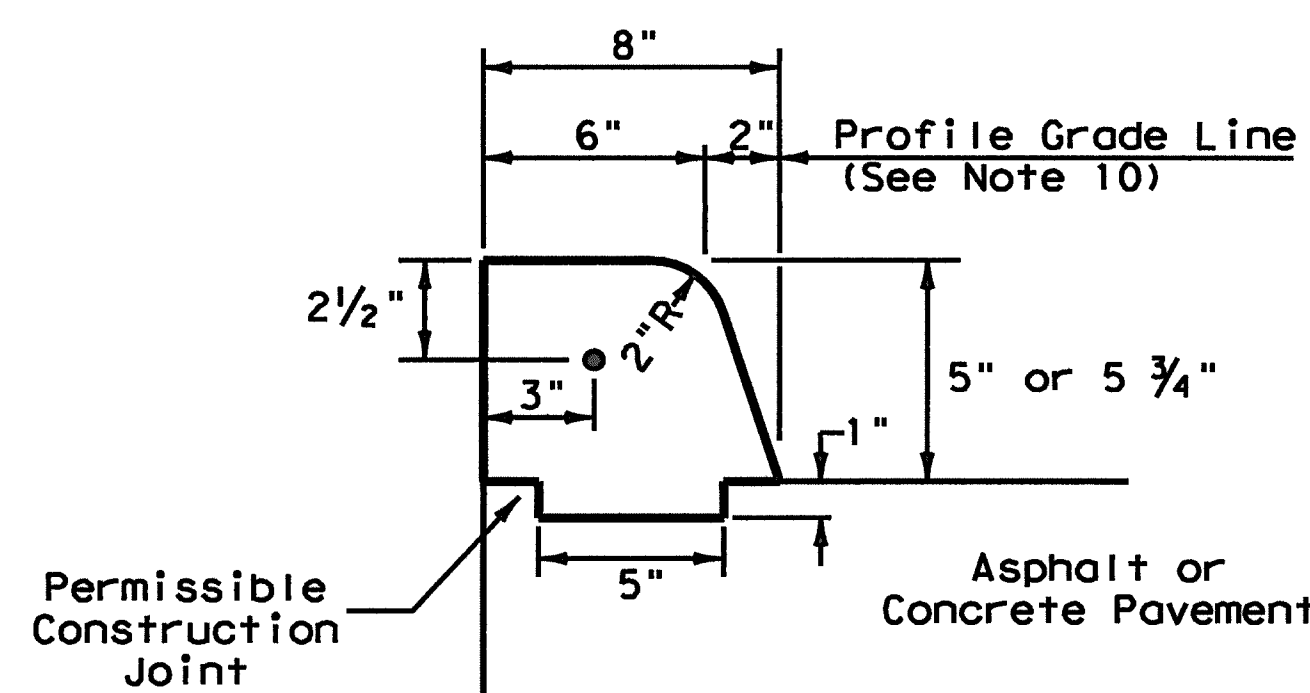
TYPE III CURB (KEYED)  
2" - 4" HEIGHT



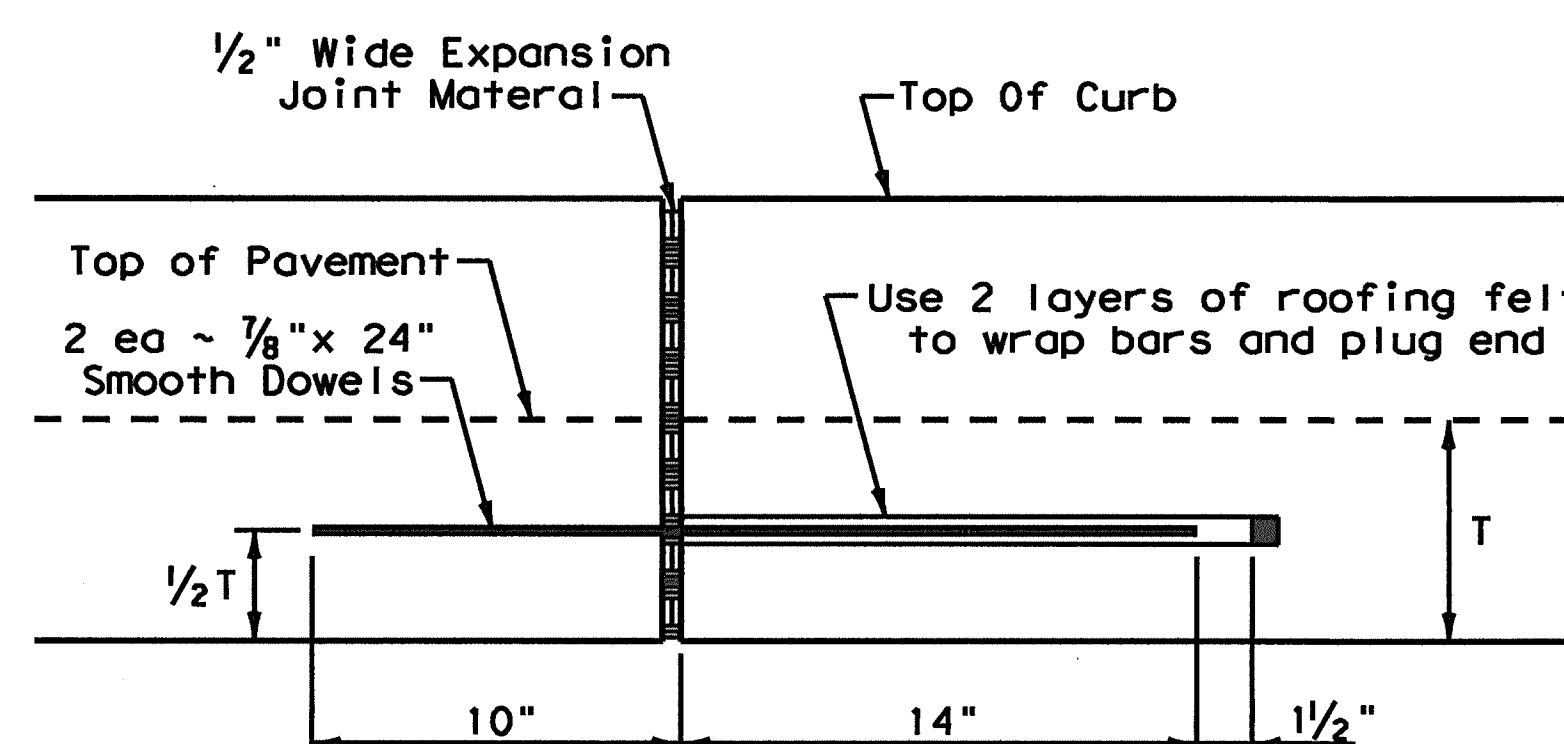
TYPE IIa CURB  
5" - 5 3/4" HEIGHT



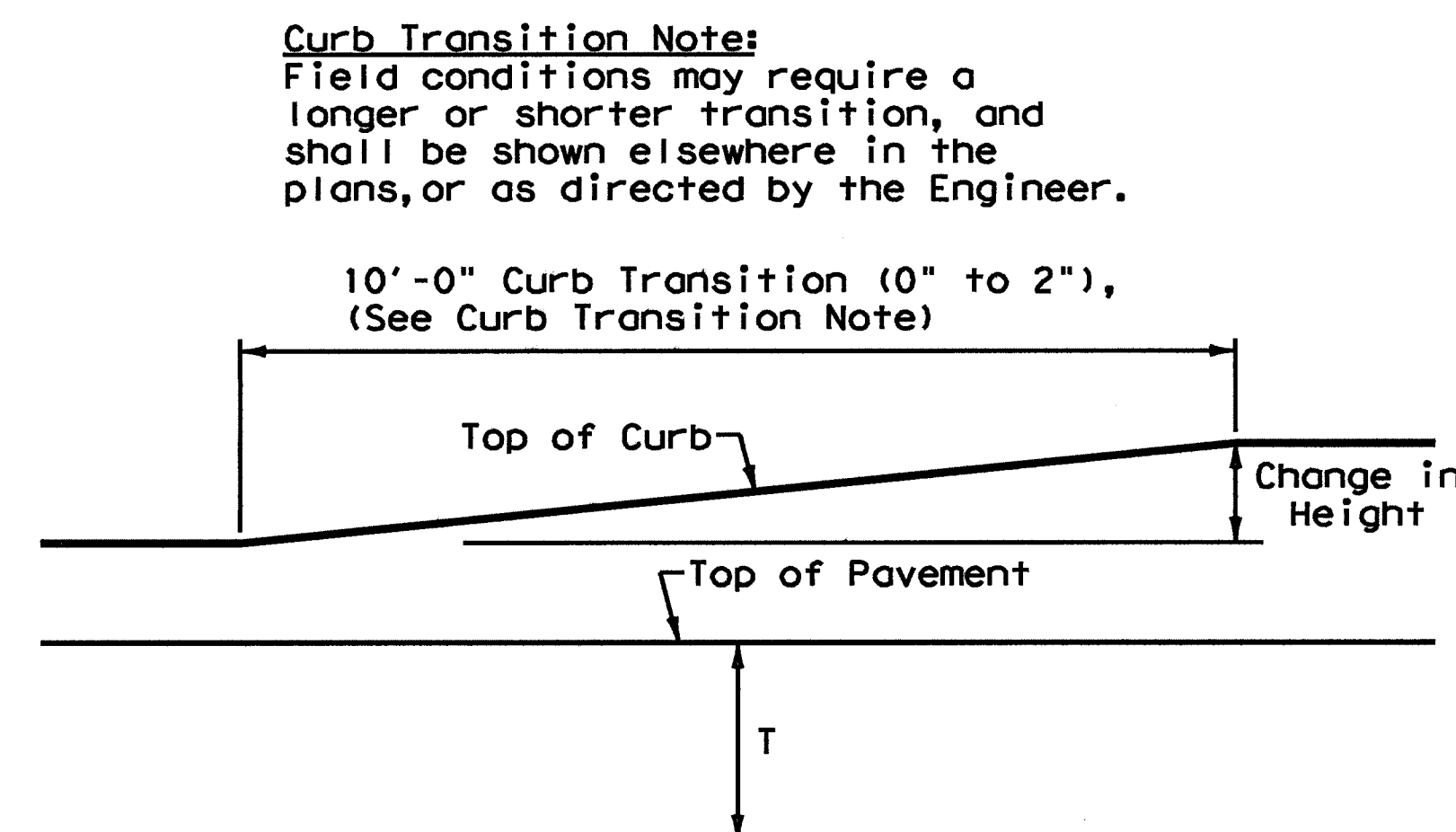
TYPE IIa CURB AND GUTTER  
5" - 5 3/4" HEIGHT



TYPE IV CURB (KEYED)  
5" - 5 3/4" HEIGHT



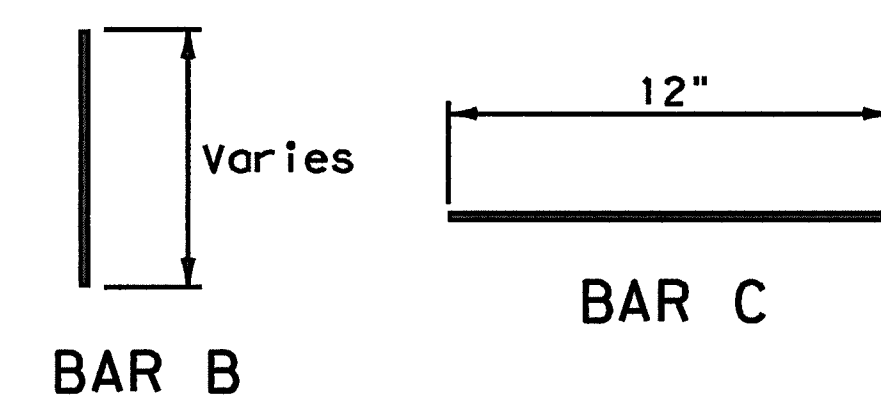
EXPANSION JOINT DETAIL



CURB TRANSITION  
Note: To be paid for as Highest Curb

### General Notes

1. All materials and construction shall be in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."
2. Concrete shall be Class A.
3. When reinforcing bars are used, they shall be No.4 unless otherwise shown. The use of synthetic fiber in lieu of steel reinforcing is acceptable, provided the fiber producer is on the Department Producer List (MPL), maintained by TxDOT, Construction Division.
4. Round exposed sharp edges with a rounding tool, to a minimum radius of 1/4 inch.
5. All existing curbs and driveways to be removed shall be sawed or removed at existing joints.
6. Where concrete curb is placed on existing concrete pavement, the pavement shall be drilled and the reinforcing bars grouted in place.
7. Expansion and contraction joints shall be constructed to match pavement joints in all curbs and curb and gutter adjacent to jointed concrete pavement. Where placement of curb or curb and gutter is not adjacent to concrete pavement, expansion joints shall be provided at structures, curb returns at streets, and at locations directed by The Engineer.
8. Vertical and horizontal dowel bars and transverse reinforcing bars shall be placed at four feet C-C.
9. Dimension 'T' shown is the thickness of concrete pavement. When curb is installed adjacent to flexible pavement dimension 'T' is 8" maximum.
10. Usual profile grade line. Refer to typical sections and plan-profile sheets for exact locations.
11. One-half inch expansion joint material shall be provided where curb or curb and gutter is adjacent to sidewalk or riprap.
12. When vertical permissible construction joints are used, resulting in a longitudinal construction joint in the pavement, the longitudinal pavement steel shall be placed in accordance with pavement details shown elsewhere in the plans for longitudinal construction joints. Reinforcing steel for curb section shall then conform to that required for concrete curb.



**Curb Transition Note:**  
Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans, or as directed by the Engineer.

 **Texas Department of Transportation**  
Design Division Standard

## CONCRETE CURB AND CURB AND GUTTER

CCCG-12

FILE#	CCCG12	DW#	TxDOT	CK#	AM	DW#	VP	CK#
©	TxDOT	1995	CONT	SECT	JOB			HIGHWAY
REVISIONS								
			DIST		COUNTY			SHEET NO.



DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: FILE:

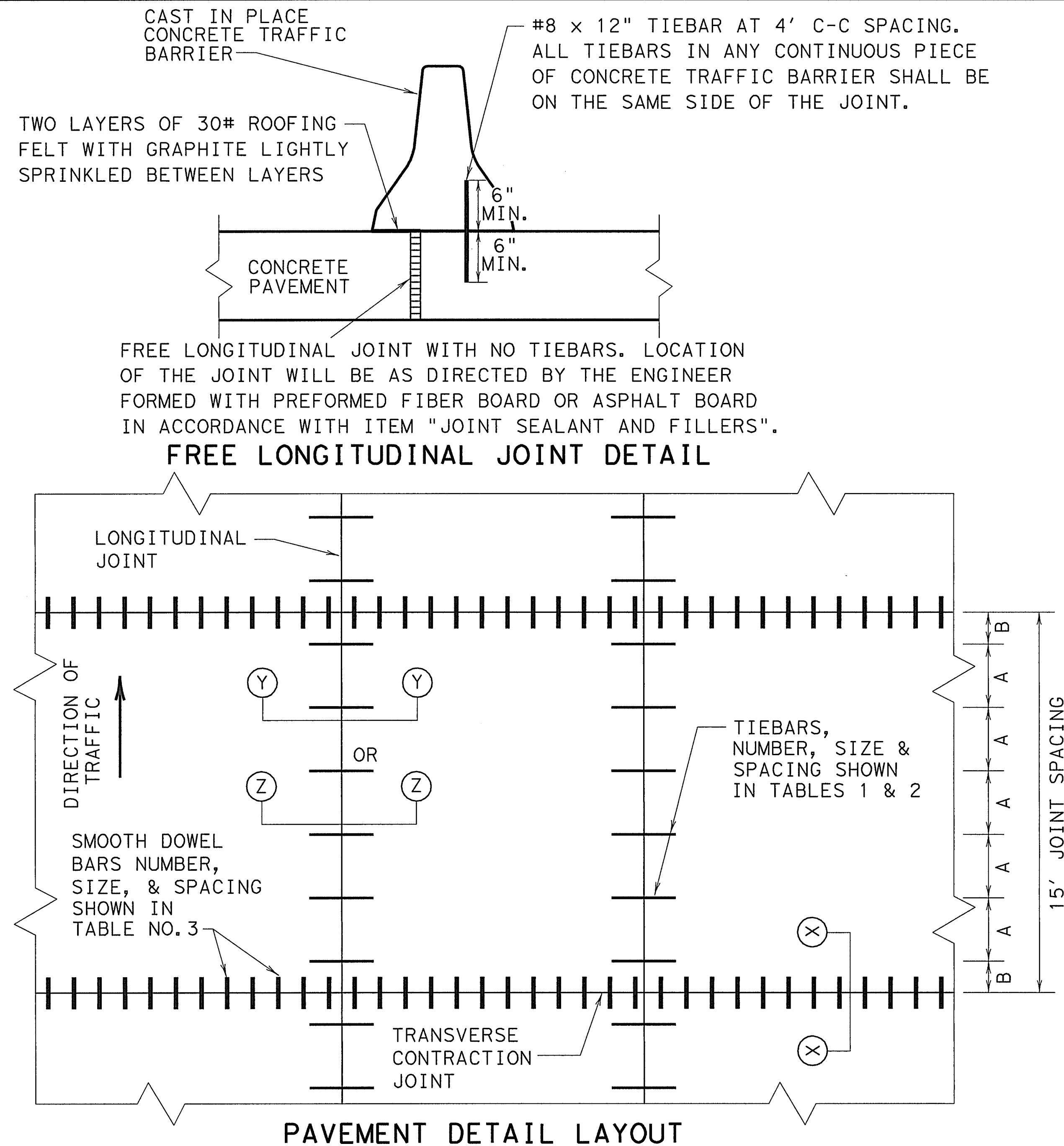
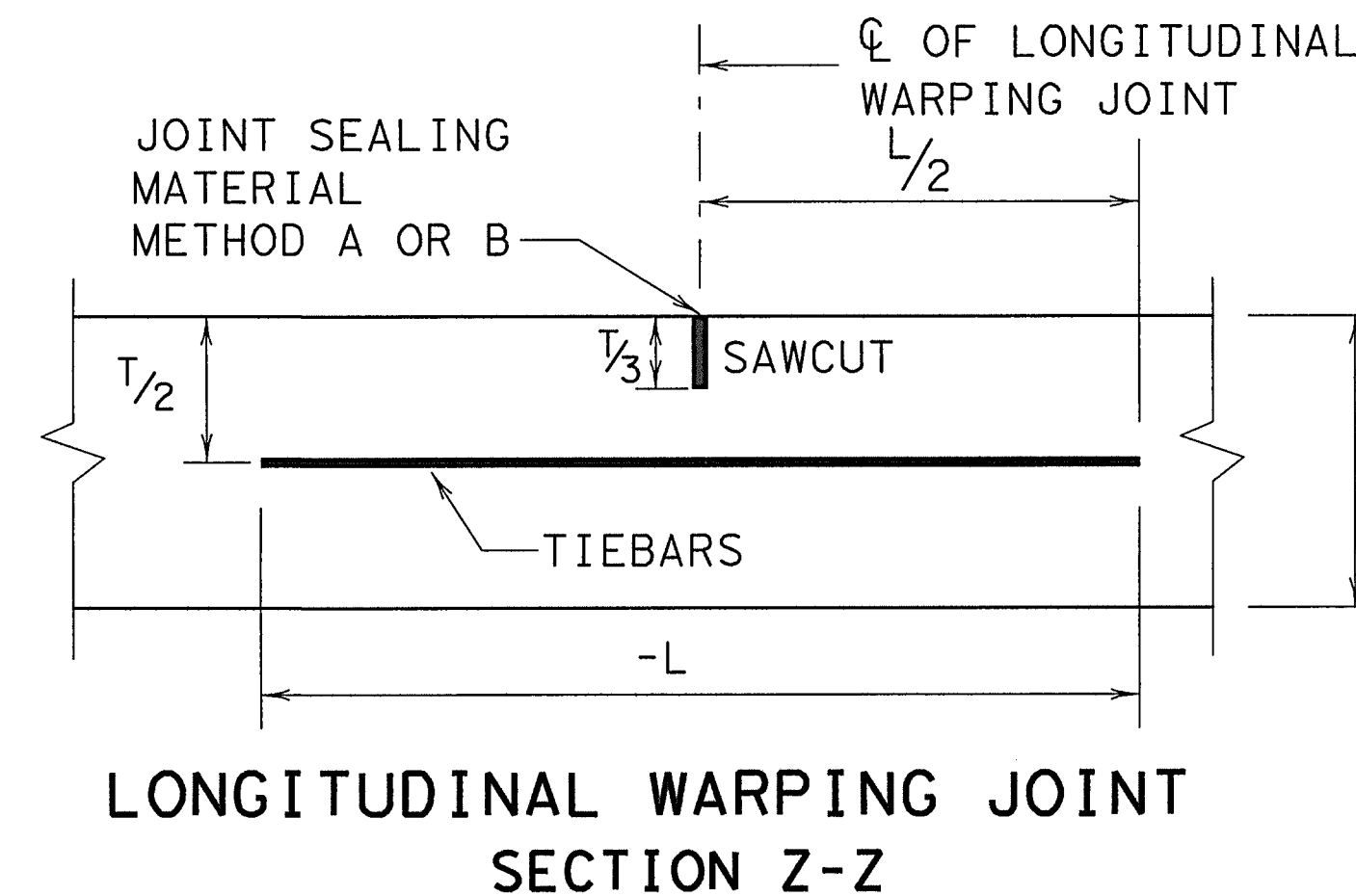
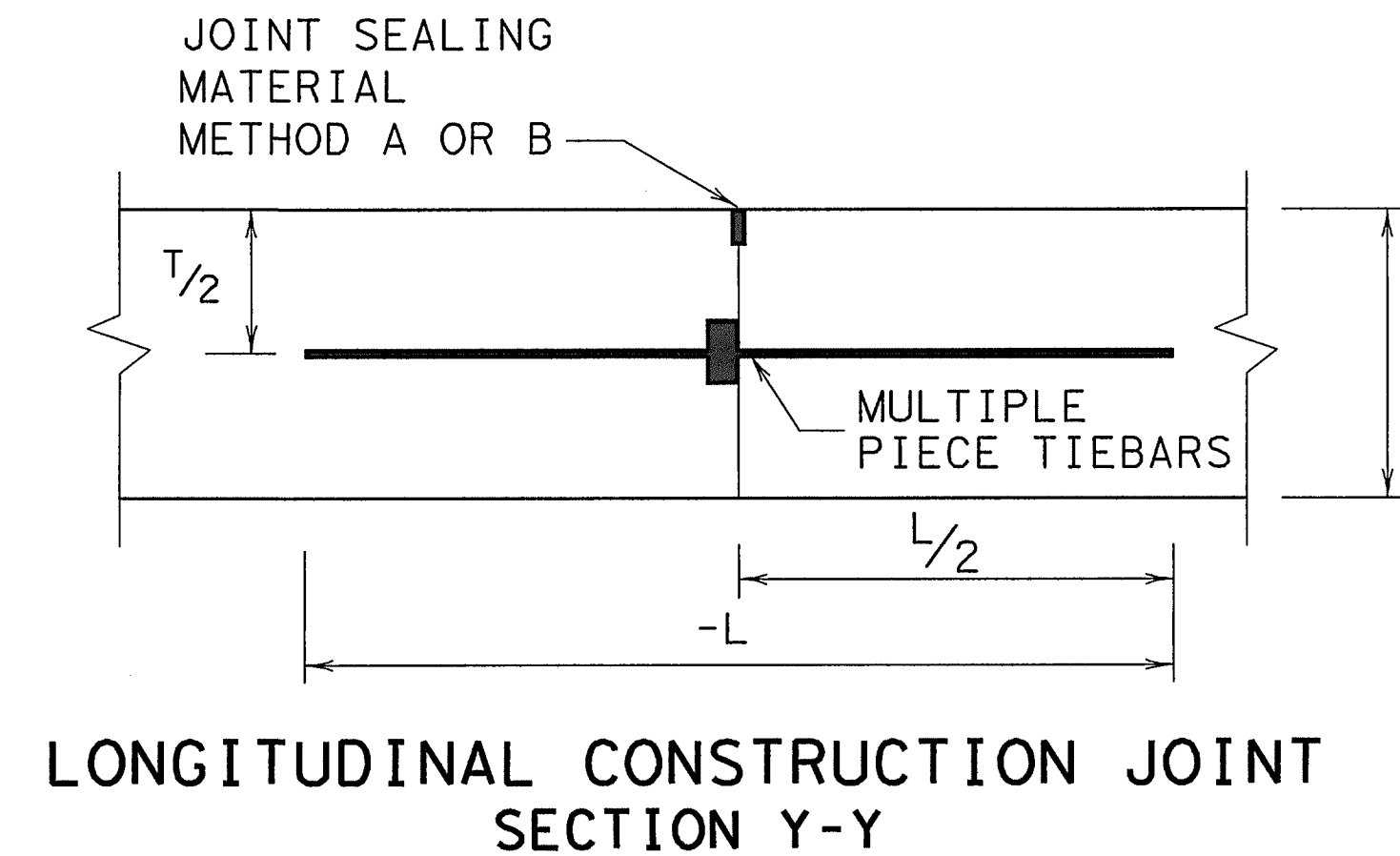
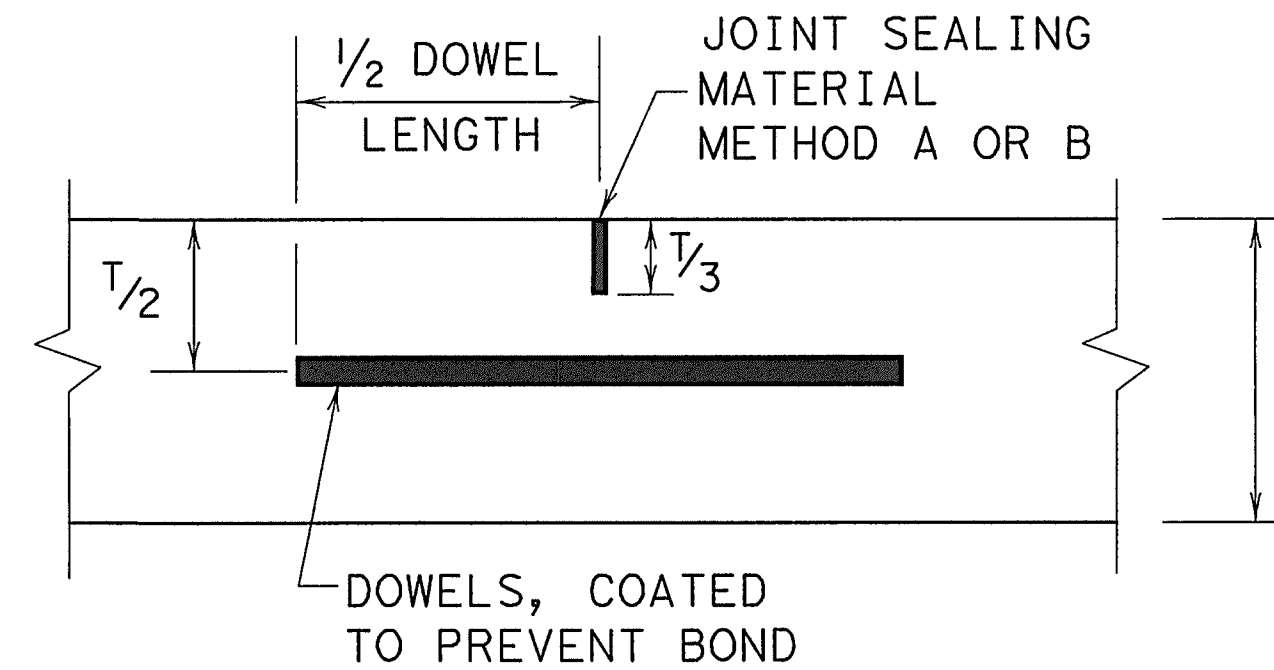


TABLE NO.1 TIEBARS REQUIRED FOR LONGITUDINAL JOINT JOINTS FOR EACH 15' SLAB						
ASTM A-616 OR A-615 (GRADE 60) STRAIGHT OR MULTIPLE PIECE REINFORCING TIEBARS		CONCRETE SLAB THICKNESS	DISTANCE FROM THE LONGITUDINAL JOINT TO THE NEAREST LONGITUDINAL FREE EDGE			
BAR LENGTH, "L" INCHES	BAR SIZE	"T" INCHES	< OR =16'	< OR =24'	< OR =34'	< OR =50'
42	#5 (5/8")	8	5	5	6	9
		9	5	5	7	10
		10	5	5	7	11
		11	5	6	8	12
		12	5	6	9	13
		13	5	7	9	13
50	#6 (3/4")	14	6	7	10	NA
		15	6	8	11	NA
		8	5	5	5	6
		9	5	5	5	7
		10	5	5	5	8
		11	5	5	6	8
		12	5	5	6	9
		13	5	5	7	10
		14	5	5	7	10
		15	5	6	8	11

THE DISTANCE TO THE FREE EDGE WILL BE DETERMINED BY THE ENGINEER AND THE DISTANCE WILL BE BASED ON THE NOMINAL WIDTHS OF THE LANES AND SHOULDERS PLUS ANY TIED RAMPS OR CONNECTING ROADWAYS.

TABLE NO.2 TIEBAR SPACINGS		
SPACING REQUIREMENT FOR 15' SLAB FOR REQUIRED NUMBER OF BARS		
REQUIRED NO. OF BARS	REGULAR SPACING "A" INCHES	FIRST AT JOINT "B" INCHES
5	36	18
6	30	15
7	25	15
8	21	16.5
9	18	18
10	16	18
11	15	15
12	13	18.5
13	12	18

TABLE NO.3 DOWELS REQUIREMENTS		
T, IN.	DOWELS (SMOOTH BARS)	
	SIZE AND LENGTH	AVERAGE SPACING (INCHES)
8	1" X 18"	12
9	1 1/8" X 18"	12
10	1 1/4" X 18"	12
11	1 3/8" X 18"	12
12	1 1/2" X 18"	12
13	1 5/8" X 18"	12
14	1 3/4" X 18"	12
15	1 7/8" X 18"	12



## GENERAL NOTES

- CONCRETE SLABS WIDER THAN 100' WITHOUT A FREE JOINT, ARE NOT COVERED BY THIS STANDARD.
- FOR FURTHER INFORMATION REGARDING THE PLACEMENT OF CONCRETE AND LOAD TRANSFER DEVICES REFER TO THE GOVERNING SPECIFICATIONS FOR "CONCRETE PAVEMENT" AND "REINFORCING STEEL."
- DETAILS FOR PAVEMENT WIDTH, PAVEMENT THICKNESS, AND CROWN SLOPE SHALL BE AS SHOWN ELSEWHERE IN THE PLANS.
- THE DETAIL FOR THE JOINT SEALANT AND RESERVOIR WILL BE SHOWN IN CONCRETE PAVEMENT DETAIL, JOINT SEALANT STANDARD (JS-94).
- PAVEMENT WIDTHS IN EXCESS OF 16' SHALL BE PROVIDED WITH A LONGITUDINAL JOINT (SECTION Z-Z OR Y-Y). THESE JOINTS SHALL BE LOCATED WITHIN 6" OF THE LANE LINES UNLESS SHOWN ELSEWHERE ON THE PLANS.
- THE JOINT BETWEEN OUTSIDE LANE AND SHOULDER SHALL BE A LONGITUDINAL WARPING JOINT (SECTION Z-Z) UNLESS OTHERWISE SHOWN IN THE PLANS.
- THE SPACING BETWEEN TRANSVERSE JOINTS SHALL BE 15 FEET UNLESS OTHERWISE SHOWN IN THE PLANS.
- WHERE A MONOLITHIC CURB IS SPECIFIED, THE JOINT IN THE CURB SHALL COINCIDE WITH PAVEMENT JOINTS AND MAY BE FORMED BY ANY MEANS APPROVED BY THE ENGINEER.
- TRANSVERSE CONSTRUCTION JOINTS MAY BE FORMED BY USE OF METAL OR WOOD FORMS EQUAL IN DEPTH TO THE NOMINAL DEPTH OF THE PAVEMENT, OR BY METHODS APPROVED BY THE ENGINEER.
- THE ENGINEER WILL ADJUST THE REQUIRED NUMBER OF TIEBARS FOR SLABS SHORTER OR LONGER THAN 15'. SPACING "B" WILL BE ADJUSTED TO MAINTAIN A MINIMUM CLEARANCE OF 2" BETWEEN THE TIEBAR AND THE DOWEL BARS AT THE TRANSVERSE JOINT AND THE "A" SPACING WILL REMAIN AS REQUIRED FOR THE PAVEMENT SLAB WIDTH.
- MULTIPLE PIECE TIEBARS SHALL BE USED AT LONGITUDINAL CONSTRUCTION JOINTS UNLESS OTHERWISE SPECIFIED IN THE PLANS.
- THE SAW CUT FOR LONGITUDINAL WARPING AND THE TRANSVERSE CONSTRUCTION JOINTS MAY BE ONE FOURTH THE SLAB THICKNESS WHEN CRUSHED LIMESTONE IS USED AS THE COARSE AGGREGATE.

 **Texas Department of Transportation**  
Design Division Standard

## CONCRETE PAVEMENT DETAILS

### CONTRACTION DESIGN

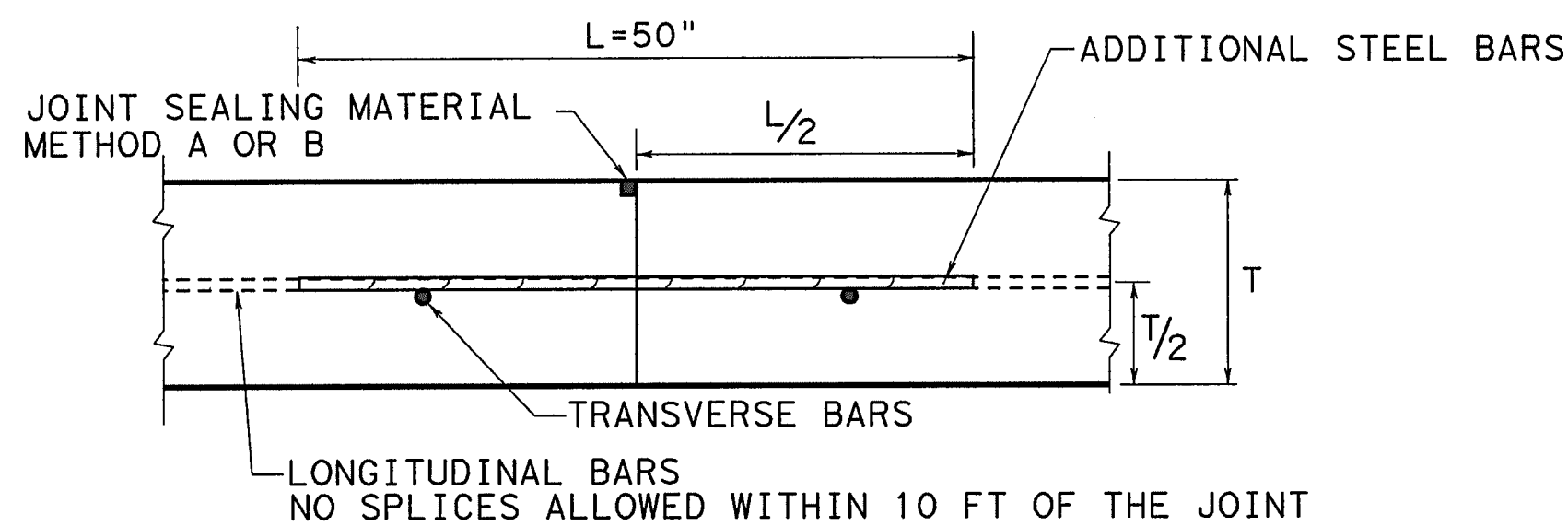
### T-8 THROUGH 15 INCHES

### CPCD-94

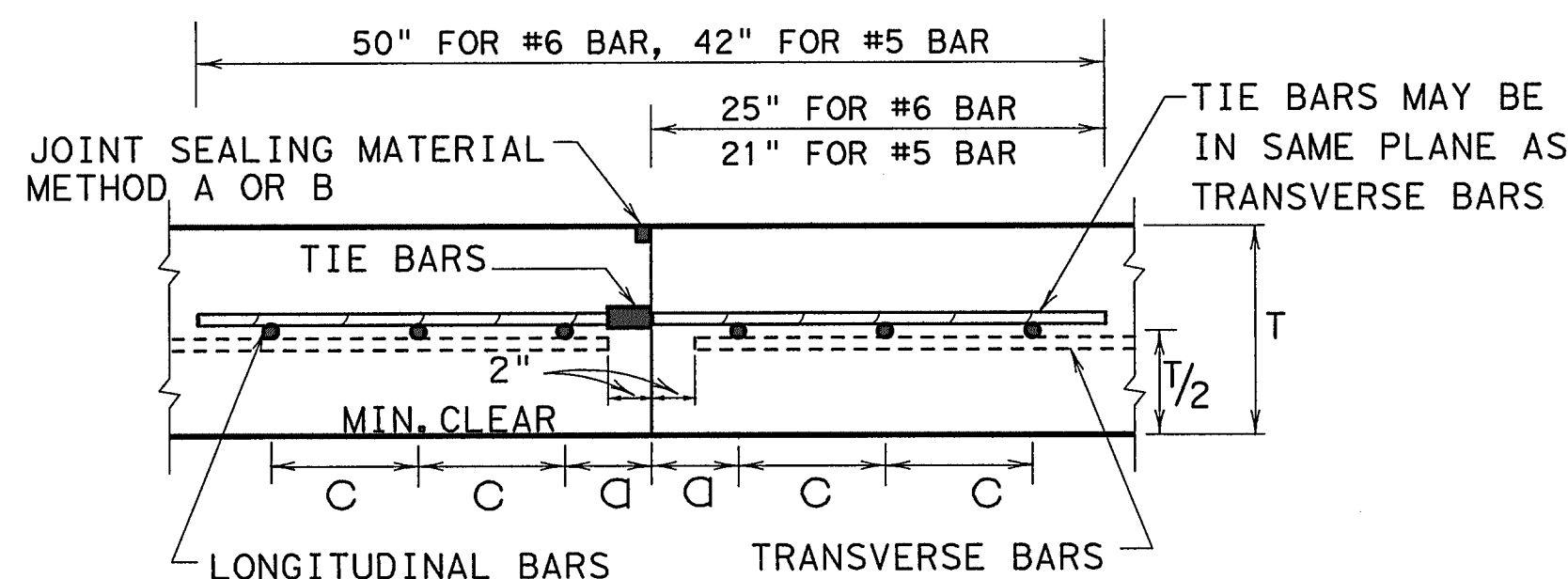
FILE# cpcd94.dgn	DN# TxDOT	CK# LJB	DW# BD	CK# GLG
© TxDOT September 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	DIST	COUNTY	SHEET NO.	



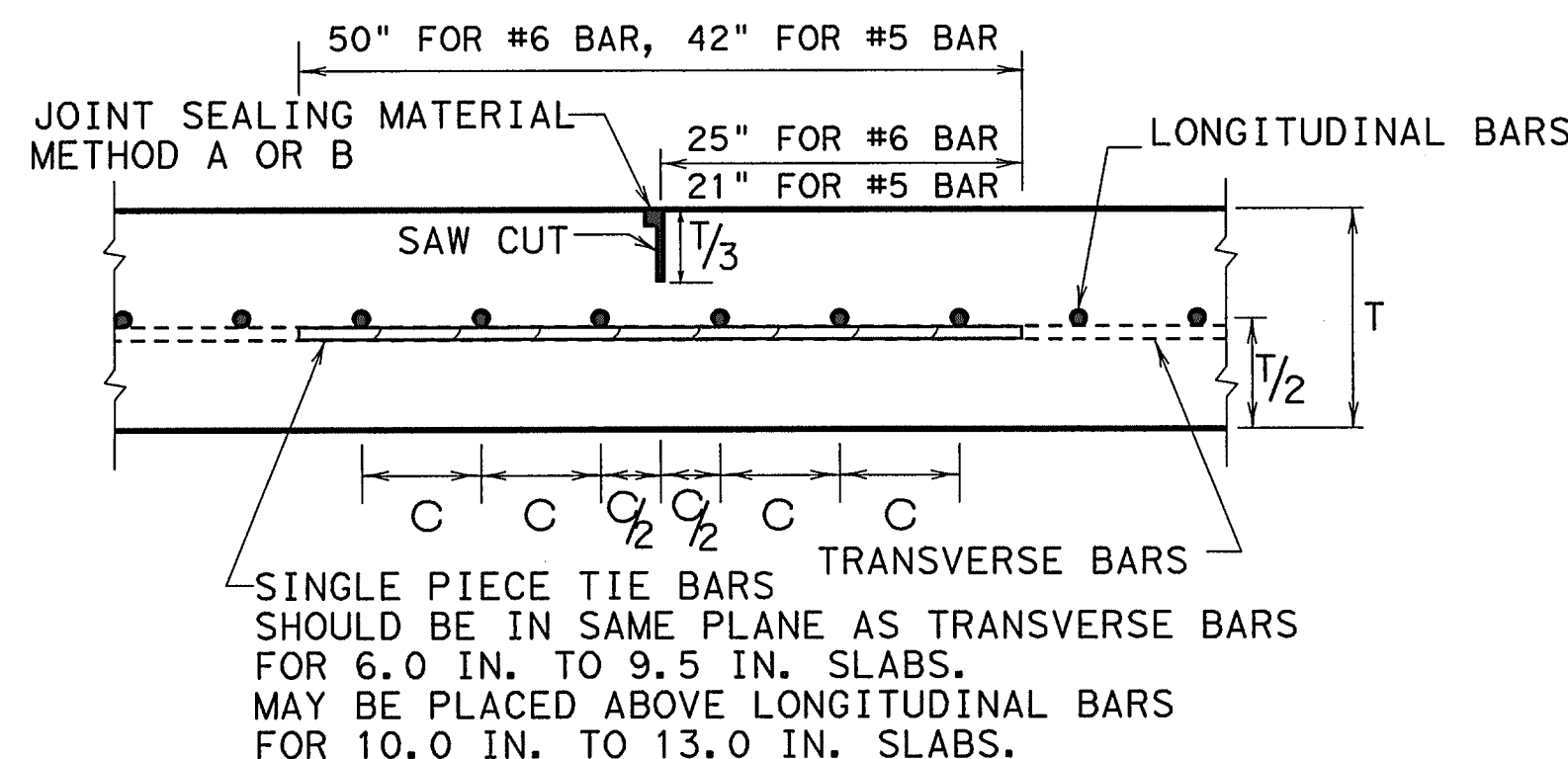
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.



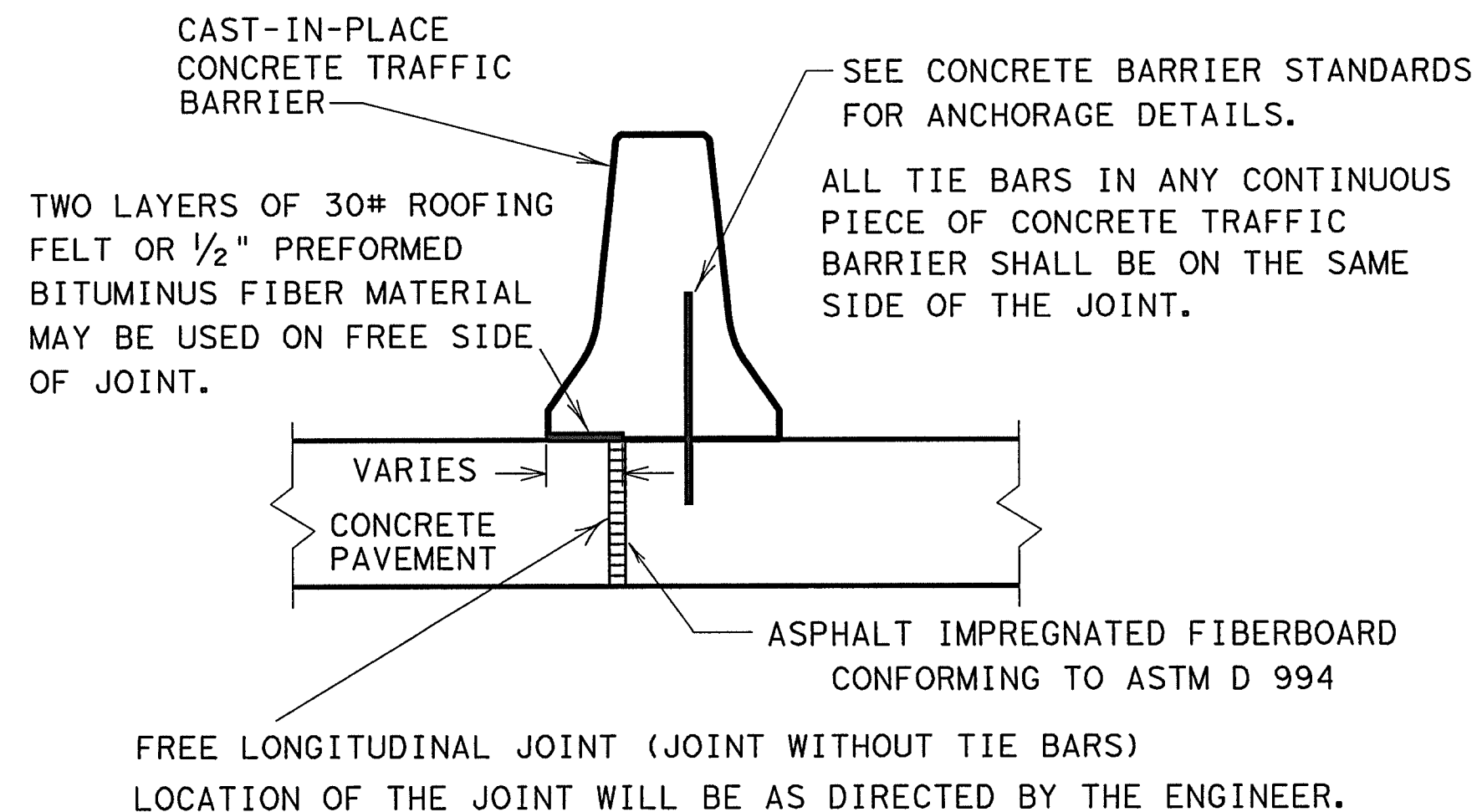
TRANSVERSE CONSTRUCTION JOINT  
SECTION X - X



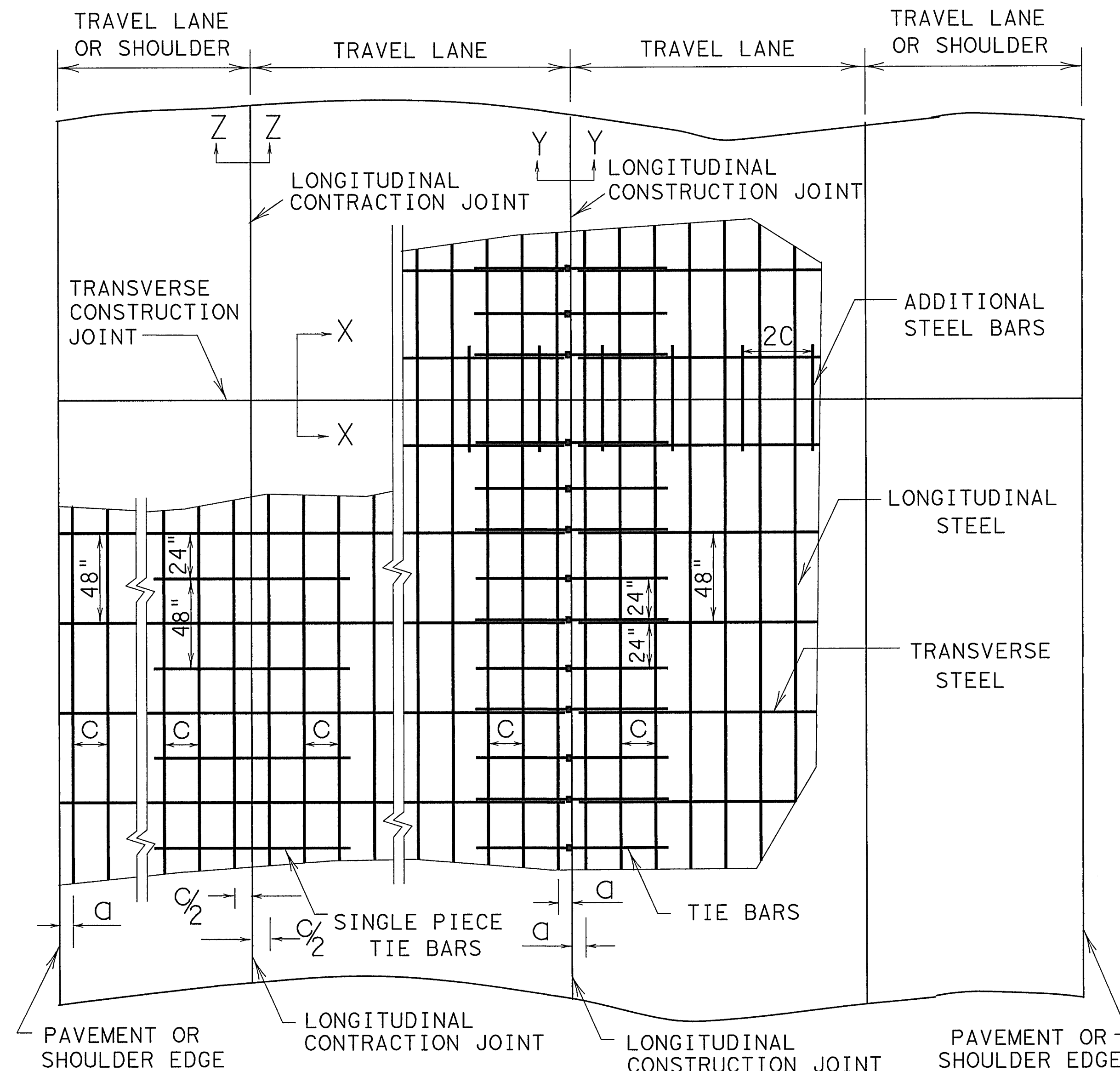
LONGITUDINAL CONSTRUCTION JOINT  
SECTION Y - Y



LONGITUDINAL CONTRACTION JOINT  
SECTION Z - Z



FREE LONGITUDINAL JOINT DETAIL



TYPICAL PAVEMENT LAYOUT

PLAN VIEW (NOT TO SCALE)

TABLE NO.1 LONGITUDINAL STEEL					
SLAB THICKNESS AND BAR SIZE		REGULAR STEEL BARS	FIRST SPACING AT EDGE OR JOINT	ADDITIONAL STEEL BARS AT TRANSVERSE CONSTRUCTION JOINT	
T (IN.)	BAR SIZE	SPACING C (IN.)	SPACING a (IN.)	SPACING 2 x c (IN.)	LENGTH L (IN.)
6.0	#5	7.5	3 TO 4	15	50
6.5	#5	7.0	3 TO 4	14	50
7.0	#5	6.5	3 TO 4	13	50
7.5	#5	6.0	3 TO 4	12	50
8.0	#6	9.0	3 TO 4	18	50
8.5	#6	8.5	3 TO 4	17	50
9.0	#6	8.0	3 TO 4	16	50
9.5	#6	7.5	3 TO 4	15	50

TABLE NO.1 LONGITUDINAL STEEL (Cont.)					
SLAB THICKNESS AND BAR SIZE		REGULAR STEEL BARS	FIRST SPACING AT EDGE OR JOINT	ADDITIONAL STEEL BARS AT TRANSVERSE CONSTRUCTION JOINT	
T (IN.)	BAR SIZE	SPACING C (IN.)	SPACING a (IN.)	SPACING 2 x c (IN.)	LENGTH L (IN.)
10.0	#6	7.0	3 TO 4	14	50
10.5	#6	6.75	3 TO 4	13.5	50
11.0	#6	6.5	3 TO 4	13	50
11.5	#6	6.25	3 TO 4	12.5	50
12.0	#6	6.0	3 TO 4	12	50
12.5	#6	5.75	3 TO 4	11.5	50
13.0	#6	5.5	3 TO 4	11	50

## GENERAL NOTES

- DETAILS FOR PAVEMENT WIDTH, PAVEMENT THICKNESS AND THE CROWN CROSS-SLOPE SHALL BE SHOWN ELSEWHERE IN THE PLANS. PAVEMENTS WIDER THAN 100 FT. WITHOUT A FREE LONGITUDINAL JOINT, ARE NOT COVERED BY THIS STANDARD.
- THE DETAIL FOR THE JOINT SEALANT AND RESERVOIR IS SHOWN ON STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."
- ALL THE REINFORCING STEEL AND TIE BARS SHALL BE DEFORMED STEEL BARS CONFORMING TO ASTM A 615 (GRADE 60) OR ASTM A 996 (GRADE 60). STEEL BAR SIZES SHALL CONFORM TO TABLE NO. 1 & 2.
- STEEL BAR PLACEMENT TOLERANCE SHALL BE +/- 1 IN. HORIZONTALLY AND +/- 0.5 IN. VERTICALLY. CALCULATED AVERAGE BAR SPACING (CONCRETE PLACEMENT WIDTH / NUMBER OF LONGITUDINAL BARS) SHALL CONFORM TO TABLE NO.1 AND AS SPECIFIED.
- PAVEMENT WIDTHS OF MORE THAN 15 FT. SHALL HAVE A LONGITUDINAL JOINT (SECTION Z-Z OR SECTION Y-Y). THESE JOINTS SHALL BE LOCATED WITHIN 6 IN. OF THE LANE LINE UNLESS THE JOINT LOCATION IS SHOWN ELSEWHERE ON THE PLANS.
- THE SAW CUT DEPTH FOR THE LONGITUDINAL CONTRACTION JOINT SHALL BE ONE THIRD OF THE SLAB THICKNESS.
- WHEN APPROVED BY THE ENGINEER, SINGLE PIECE TIE BARS MAY BE USED BY INSERTING INTO PLASTIC CONCRETE AT LONGITUDINAL CONSTRUCTION JOINTS.
- WHEN TYING CONCRETE GUTTER AT A LONGITUDINAL JOINT, THE TIE BAR LENGTH OR POSITION MAY BE ADJUSTED. PROVIDE 3 IN. OF CONCRETE COVER FROM THE BACK OF GUTTER TO THE END OF TIE BAR.
- MISSING OR DAMAGED TIE BARS SHALL BE REPLACED BY DRILLING AND EPOXY GROUTING AT THE CONTRACTOR'S EXPENSE.
- OMIT TIE BARS LOCATED WITHIN 18 IN. OF THE TRANSVERSE CONSTRUCTION JOINTS. USE HAND-OPERATED IMMERSION VIBRATORS TO CONSOLIDATE THE CONCRETE ADJACENT TO ALL FORMED JOINTS.
- OBTAIN THE ENGINEER'S WRITTEN APPROVAL, IF THE CONCRETE MIX DESIGN USES MORE THAN 5.5 SACKS/CY.
- LONGITUDINAL REINFORCING STEEL SPLICES SHALL BE A MINIMUM OF 25 IN.

TABLE NO.2 TRANSVERSE STEEL AND TIE BARS

SLAB THICKNESS (IN.)	TRANSVERSE STEEL		TIE BARS AT LONGITUDINAL CONTRACTION JOINT		TIE BARS AT LONGITUDINAL CONSTRUCTION JOINT	
	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
6.0 - 7.5	#5	48	#5	48	#5	24
8.0 - 13.0	#5	48	#6	48	#6	24

 **Texas Department of Transportation**  
Design Division Standard

**CONTINUOUSLY REINFORCED  
CONCRETE PAVEMENT**  
ONE LAYER STEEL BAR PLACEMENT  
T - 6 to 13 INCHES

**CRCP(1)-11**

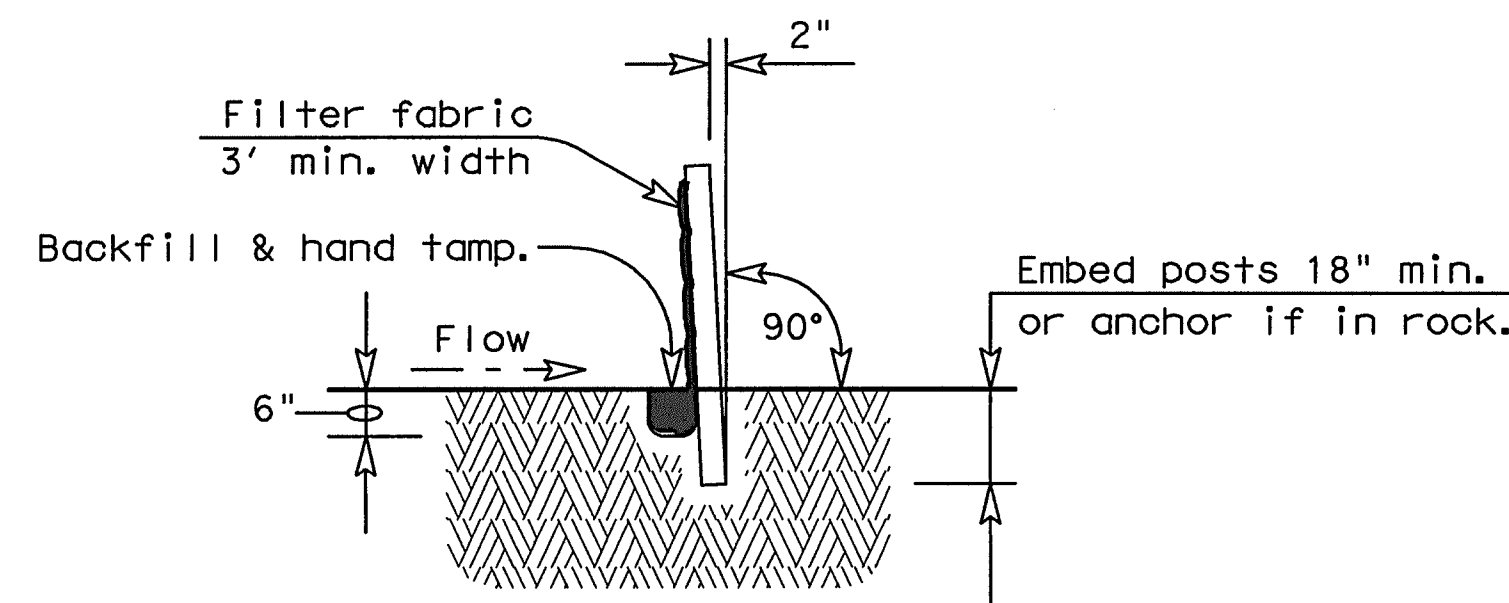
FILE: crcp111.dgn	DN: TxDOT	CK: LL	DW: HC	CK:
© TxDOT November 2009	CONT	SECT	JOB	HIGHWAY
REVISIONS				
10/10/2011 ADD GN #12	DIST		COUNTY	SHEET NO.

DATE:  
FILE:



DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: FILE:



SECTION A-A

GENERAL NOTES

1. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

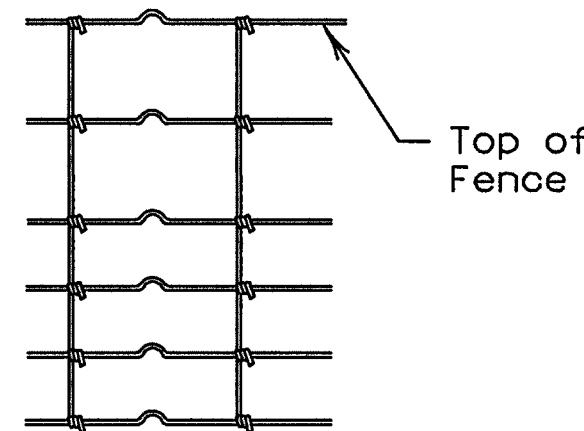
Sediment Control Fence — SCF —

SEDIMENT CONTROL FENCE USAGE GUIDELINES

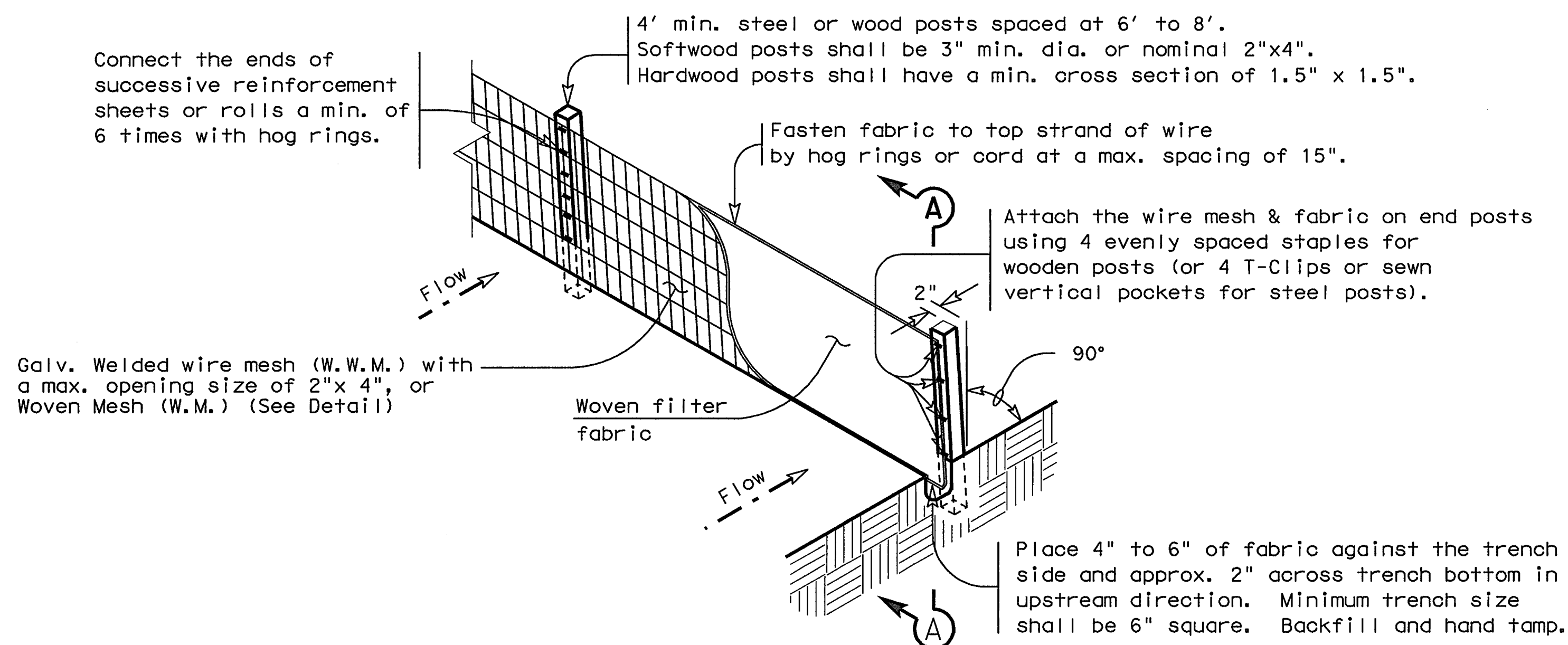
A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a max. flow through rate of 100 GPM/FT<sup>2</sup>. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

Galv. Hinge joint knot woven mesh (12.5 Ga. Min.) requires a minimum of five horizontal wires spaced at a max. 12 inches apart and all vertical wires spaced at a max. 12 inches apart.

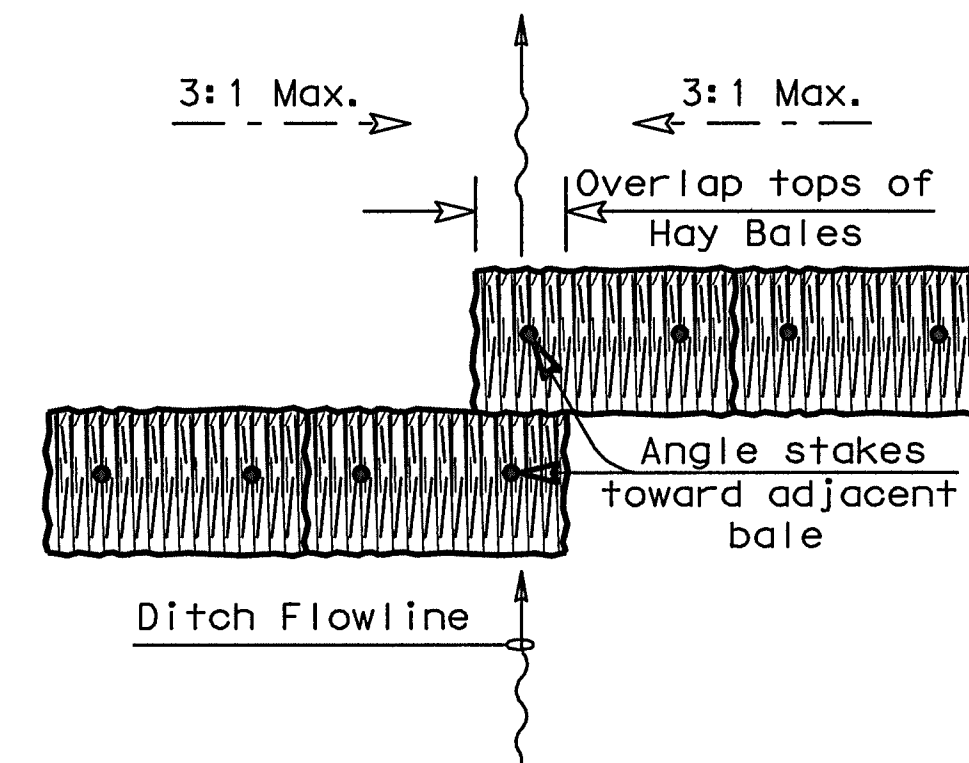


Hinge Joint Knot Woven Mesh (Option)

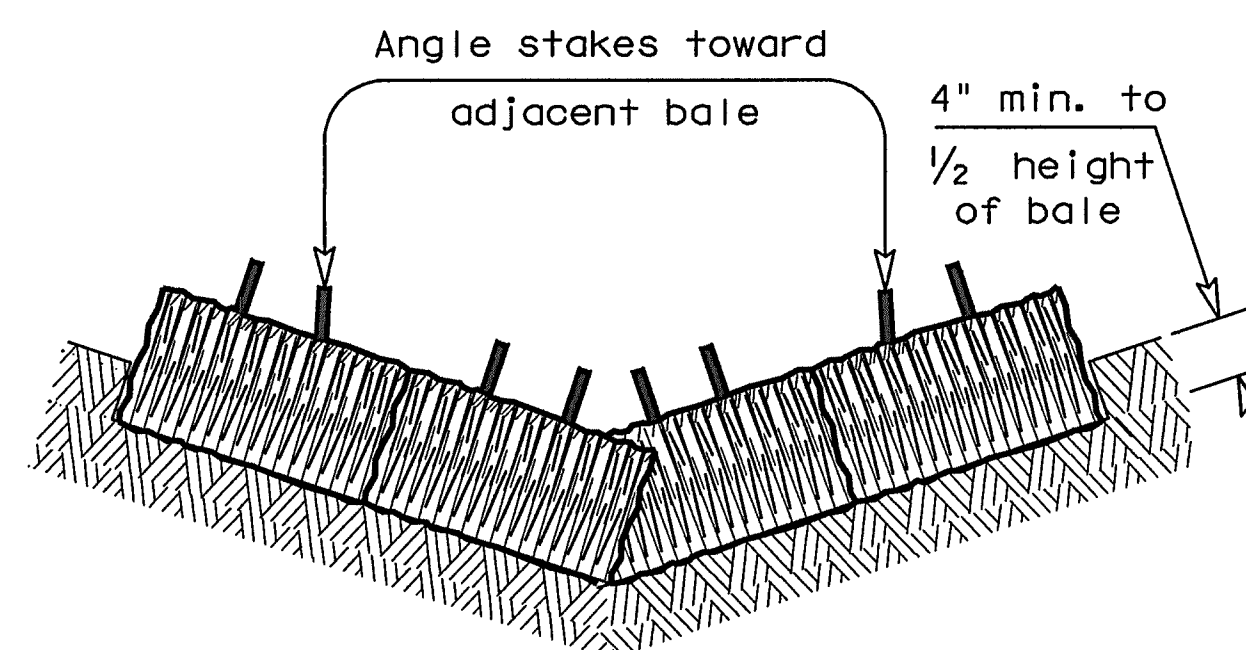


TEMPORARY SEDIMENT CONTROL FENCE

SCF



PLAN VIEW



PROFILE VIEW

PLANS SHEET LEGEND

Baled Hay — BH —

BALED HAY USAGE GUIDELINES

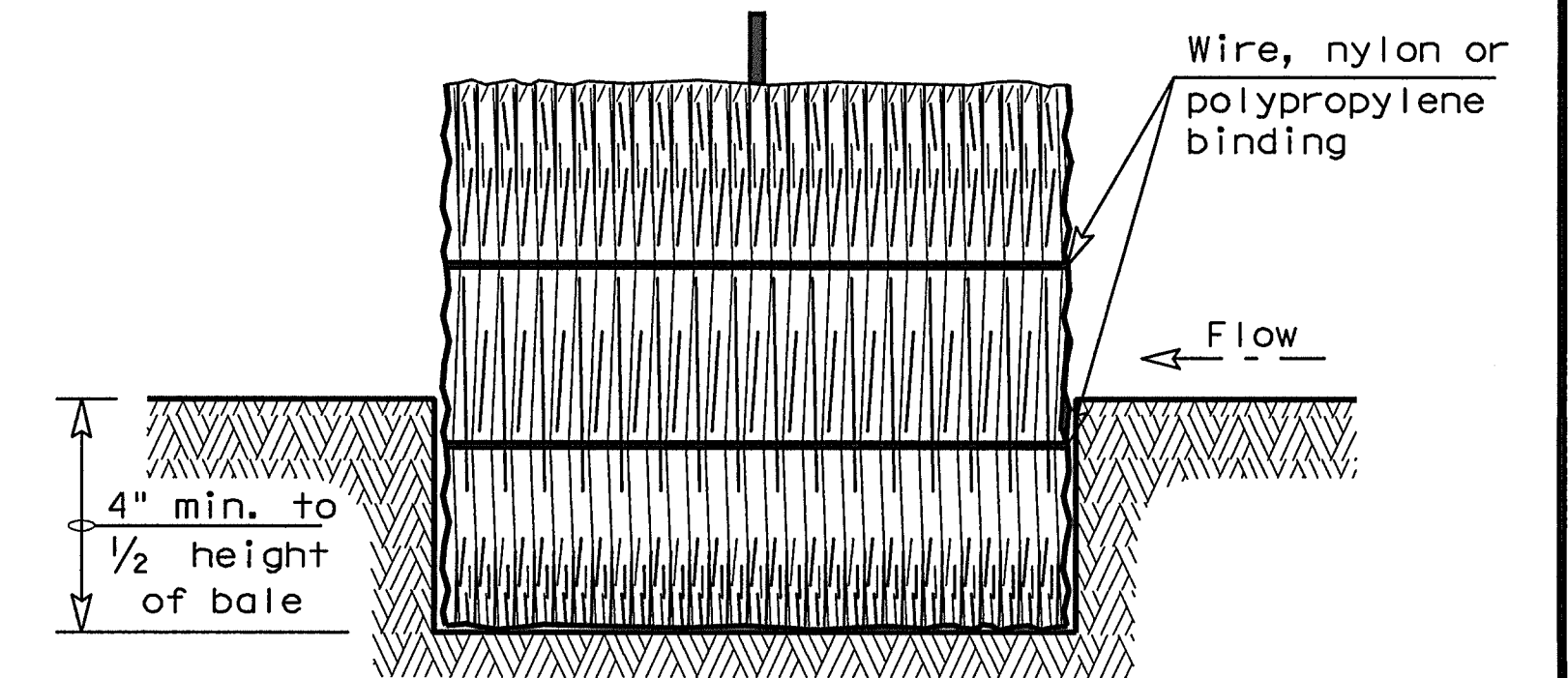
A Baled Hay installation may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A two year storm frequency may be used to calculate the flow rate to be filtered. The installation should be sized to filter a maximum flow thru rate of 5 GPM/FT<sup>2</sup> of cross sectional area. Baled hay may be used at the following locations:

1. Where the runoff approaching the baled hay flows over disturbed soil for less than 100'. If the slope of the disturbed soil exceeds 10%, the length of slope upstream the baled hay should be less than 50'.
2. Where the installation will be required for less than 3 months.
3. Where the contributing drainage area is less than 1/2 acre.

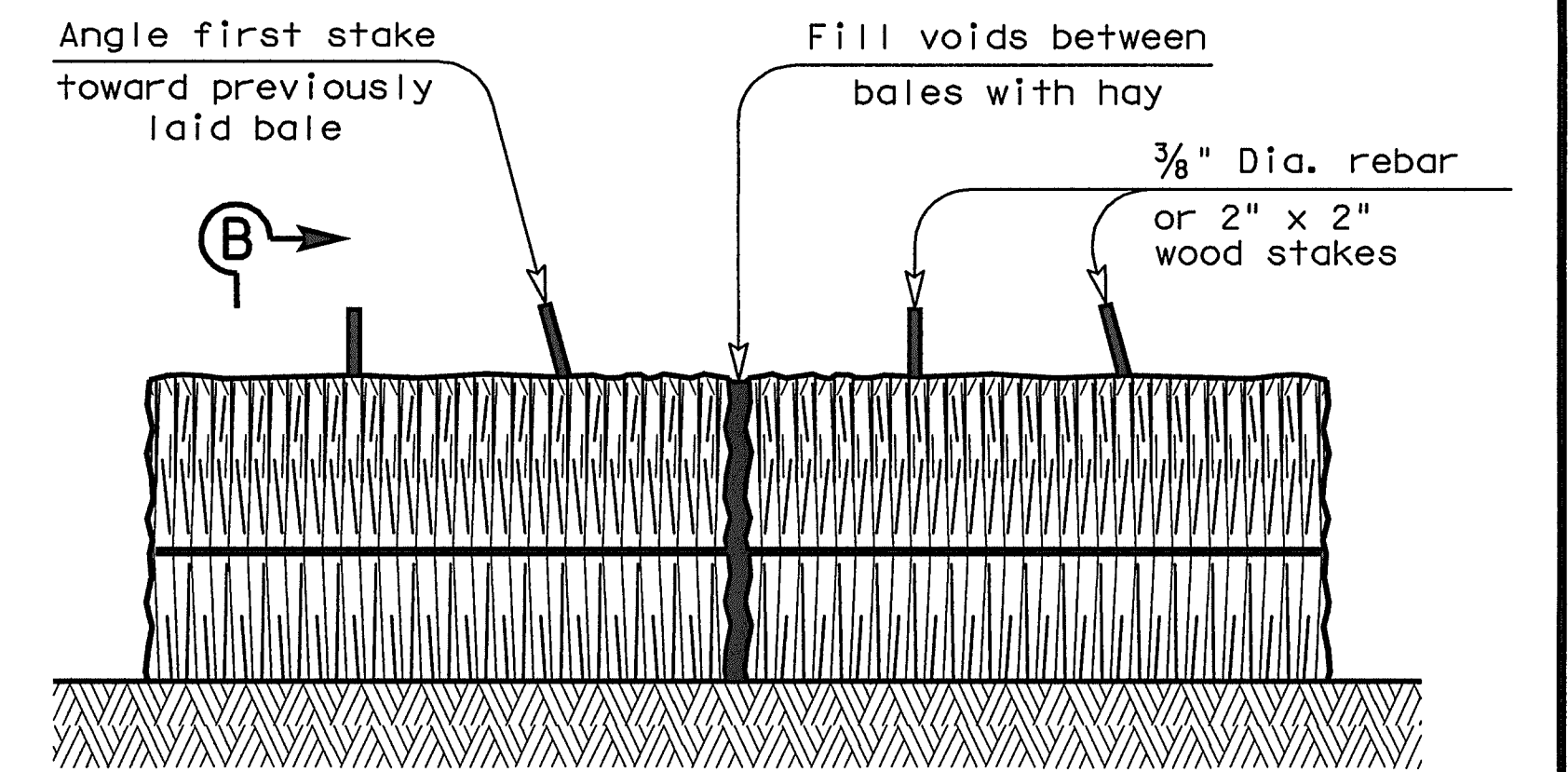
For Baled Hay installations in small ditches, the additional following considerations apply:

1. The ditch sideslopes should be graded as flat as possible to maximize the drainage flowrate thru the hay.
2. The ditch should be graded large enough to contain the overtopping drainage when sediment has filled to the top of the baled hay.

Bales should be replaced usually every 2 months or more often during wet weather when loss of structural integrity is accelerated.



SECTION B-B



BALED HAY FOR EROSION CONTROL

BH

GENERAL NOTES

1. Hay bales shall be a minimum of 30" in length and weigh a minimum of 50 Lbs.
2. Hay bales shall be bound by either wire or nylon or polypropylene string. The bales shall be composed entirely of vegetative matter.
3. Hay bales shall be embedded in the soil a minimum of 4" and where possible 1/2 the height of the bale.
4. Hay bales shall be placed in a row with ends tightly abutting the adjacent bales. The bales shall be placed with bindings parallel to the ground.
5. Hay bales shall be securely anchored in place with 3/8" Dia. rebar or 2" x 2" wood stakes, driven through the bales. The first stake shall be angled towards the previously laid bale to force the bales together.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation  
Design Division Standard

TEMPORARY EROSION,  
SEDIMENT AND WATER  
POLLUTION CONTROL MEASURES

FENCE & BALED HAY

EC(1)-09

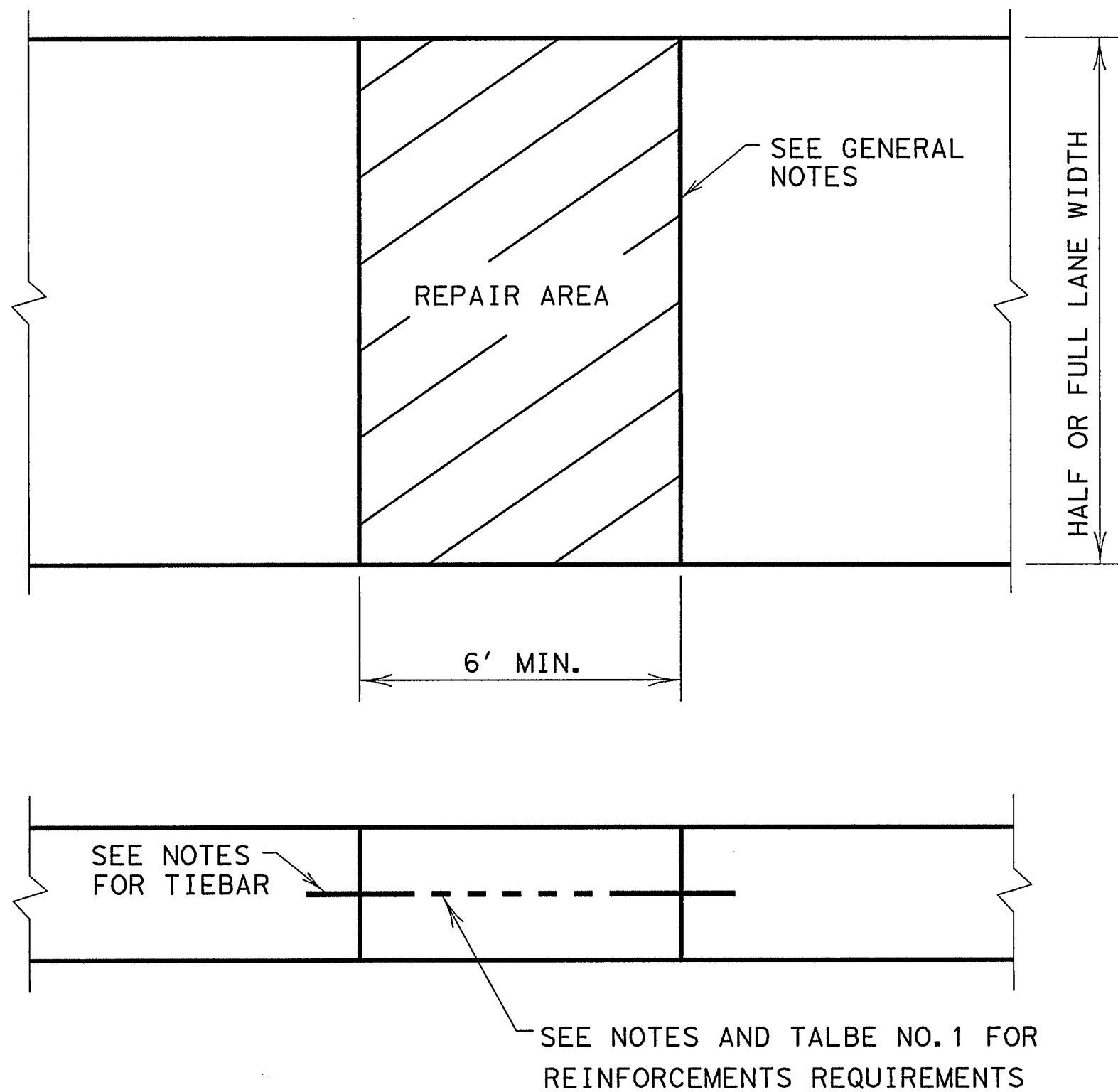
FILE#	ec109.dgn	DN: TxDOT	CK: AM	OW: TV	CK: BD
© TxDOT	June 1993	CONT	SECT	JOB	HIGHWAY
REVISIONS					
		DIST	COUNTY		SHEET NO.



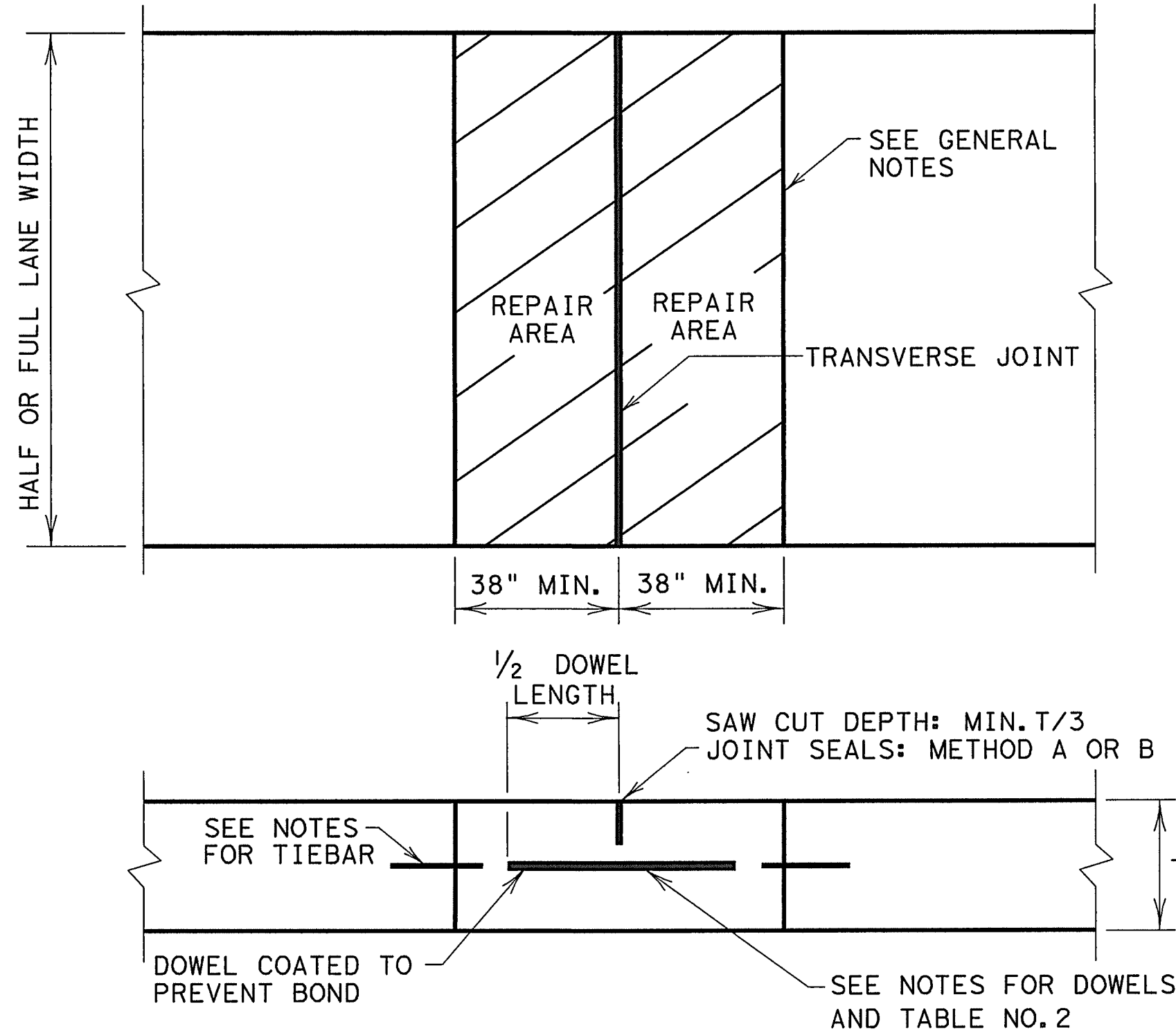
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: FILE:

FULL DEPTH REPAIR



FULL DEPTH TRANSVERSE JOINT REPAIR



TRANSVERSE CONTRACTION JOINT

GENERAL NOTES:

- ITEM 361, "FULL-DEPTH REPAIR OF CONCRETE PAVEMENT," SHALL GOVERN FOR THIS WORK. THE FOLLOWING SPECIFICATIONS ARE REFERENCED IN ITEM 361.
  - \* ITEM 360, " CONCRETE PAVEMENT "
  - \* ITEM 421, " HYDRAULIC CEMENT CONCRETE "
  - \* ITEM 438, " CLEANING AND SEALING JOINTS AND CRACKS (RIGID PAVEMENT AND BRIDGE DECKS) "
  - \* ITEM 440, " REINFORCING STEEL "
  - \* DMS-4650, " HYDRAULIC CEMENT CONCRETE CURING MATERIALS AND EVAPORATION RETARDANTS "
  - \* DMS-6100, " EPOXIES AND ADHESIVES "
  - \* DMS-6310, " JOINT SEALANTS AND FILLERS "
- FULL DEPTH SAW CUTS SHALL BE MADE AROUND THE PERIMETER OF THE AREA TO BE REPAIRED. THE CUT SHALL BE MADE AT A RIGHT ANGLE TO THE PAVEMENT EDGE AND TO THE CENTER LINE OF THE PAVEMENT.
- LONGITUDINAL FULL DEPTH SAW CUTS SHALL BE AT EXISTING LONGITUDINAL JOINTS.
- ADDITIONAL SAW CUTS MAY BE REQUIRED WITHIN THE AREA OF THE REPAIR TO FACILITATE REMOVAL OF THE CONCRETE OR TO ALLEVIATE BINDING OF THE FULL DEPTH SAW CUT AT THE REPAIR EDGE.
- THE SAW CUTS WHICH EXTEND OUTSIDE THE AREA OF THE REPAIR WILL BE CLEANED AND FILLED WITH A GROUT APPROVED BY THE ENGINEER.
- EXISTING LONGITUDINAL AND TRANSVERSE JOINTS REMOVED DUE TO REPAIR OPERATION SHOULD BE RESTORED IN ACCORDANCE WITH STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."

REINFORCEMENTS REQUIREMENTS

REINFORCING STEEL SHALL BE #6 DEFORMED STEEL BARS CONFORMING TO ASTM A 615 (GRADE 60) OR ASTM A 996 (GRADE 60).

- R1. THE STEEL SPACING FOR CONTINUOUSLY REINFORCED CONCRETE PAVEMENT (CRCP) AND JOINTED REINFORCED CONCRETE PAVEMENT (JRCP) SHALL BE REINFORCED AS SHOWN IN TABLE NO.1.
- R2. REINFORCING BARS SHALL BE PLACED IN ONE LAYER AND SHALL BE TIED TO THE TIEBARS.
- R3. THE LENGTH OF THE REINFORCING BAR SHALL BE THE LENGTH OR WIDTH OF THE REPAIR AREA MINUS 2 INCHES. THE END OF THE BAR SHALL BE PLACED WITHIN 1 INCH FROM THE REPAIR EDGE.

TIEBARS FOR REPAIR AREAS

- T1. TIEBARS SHALL BE PLACED AT APPROXIMATELY THE MID-DEPTH OF SLAB. THE BOTTOM OF THE HOLE DRILLED FOR THE LONGITUDINAL BARS SHALL BE AT MID-DEPTH AND THE TOP OF THE HOLES DRILLED FOR THE TRANSVERSE BARS SHALL BE AT MID-DEPTH. MID-DEPTH WILL BE ESTABLISHED BY MEASURING FROM THE TOP OF THE SLAB DOWN. THE THICKNESS OF THE CONCRETE SLAB WILL BE DEFINED BY THE PLANS OR THE ENGINEER.
- T2. THE BAR SIZE AND SPACING OF TIEBARS ARE SHOWN IN TABLE NO. 1.
- T3. THE MINIMUM LENGTH OF TIEBARS EXTENDED INTO THE REPAIR AREA SHOULD BE 25 INCHES FOR A #6 BAR.
- T4. THE TIEBAR SHALL BE GROUTED INTO THE EXISTING CONCRETE A MINIMUM OF 12 INCHES. BEFORE REPAIR WORK, DEMONSTRATE THAT THE BOND STRENGTH OF THE EPOXY-GROUTED TIEBARS MEETS THE REQUIREMENTS OF PULL-OUT TEST SPECIFIED IN ITEM 361.
- T5. MULTIPLE PIECE TIEBARS SHALL BE USED WHEN THE REPAIR AREA MUST BE PLACED IN TWO STAGES DUE TO SEQUENCE OF CONSTRUCTION.

DOWELS FOR TRANSVERSE JOINT REPAIRS

- D1. SMOOTH DOWEL BARS SHALL BE DELIVERED TO THE JOBS SITE IN PREFABRICATED DOWEL ASSEMBLIES. THE ENTIRE DOWEL BAR SHALL BE COATED WITH A MATERIAL WHICH WILL PREVENT BONDING TO THE CONCRETE.
- D2. THE SIZE AND SPACING OF DOWEL BARS SHALL BE AS SHOWN IN TABLE NO.2.
- D3. PLACEMENT OF TIEBARS AND OTHER REINFORCING STEEL SHALL BE STOPPED APPROXIMATELY 4" FROM THE DOWEL BAR ASSEMBLY.
- D4. DOWEL BAR PLACEMENT SHALL MEET THE REQUIREMENTS OF ITEM 360, "CONCRETE PAVEMENT."

TABLE NO. 2 DOWELS (SMOOTH BARS)			
PAVEMENT THICKNESS (INCHES)	SIZE AND DIA.	LENGTH (INCHES)	SPACING (INCHES)
8	#8 (1 IN.)	18	12
9	#9 (1 1/8 IN.)		
≥10	#10 (1 1/4 IN.)		

TABLE NO. 1 STEEL BARS SIZE AND SPACING							
TYPE OF REINFORCEMENTS	TYPE PAVEMENT	PAVEMENT THICKNESS (INCHES)	TIEBARS		REGULAR REBARS		ALL BARS
			SIZE BAR (BAR NO.)	BAR SPACING (INCHES)	SIZE BAR (BAR NO.)	SPACING (INCHES)	
TRANSVERSE BARS	CRCP	ALL	#6	24	#6	24	12
	JRCP (CPCD)	ALL	#6	24	NONE	NONE	12
LONGITUDINAL BARS	CRCP	8	#6	9	#6	9	12
		9	#6	8	#6	8	12
		10	#6	7	#6	7	12
		11	#6	6.5	#6	6.5	12
		≥ 12	#6	6	#6	6	12
	JRCP	ALL	#6	12	#6	24	12
	JCP (CPCD)	ALL	#6	12	NONE	NONE	12



FULL DEPTH REPAIR  
FOR  
CONCRETE PAVEMENT

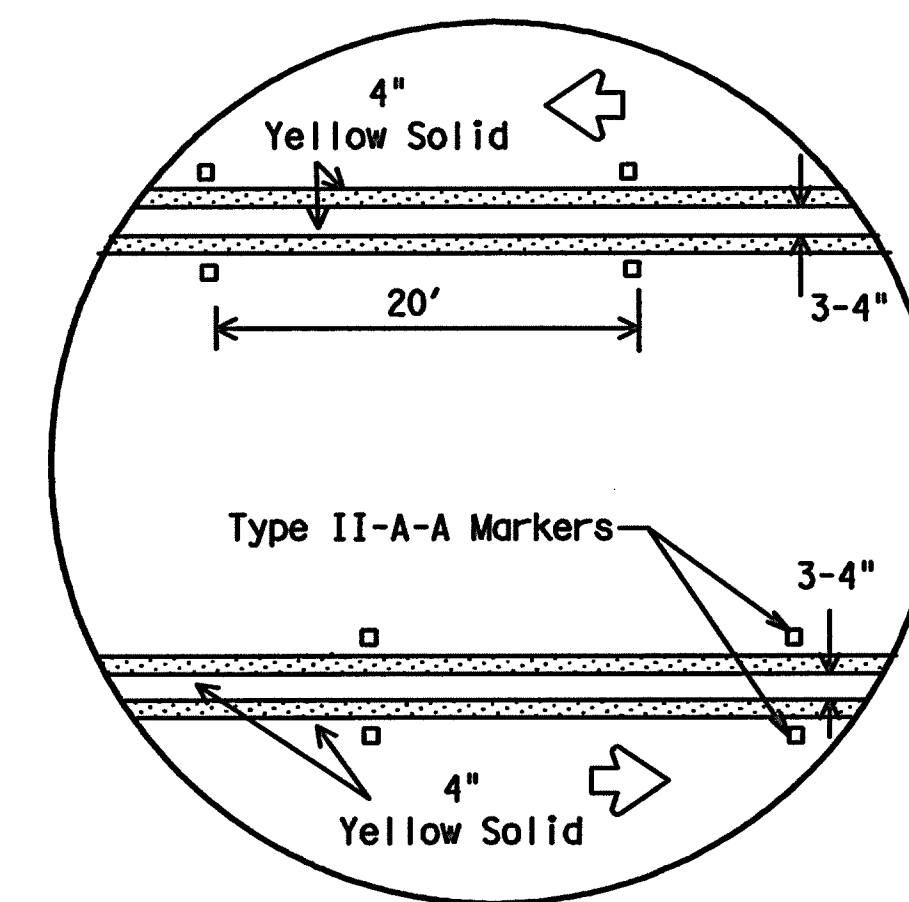
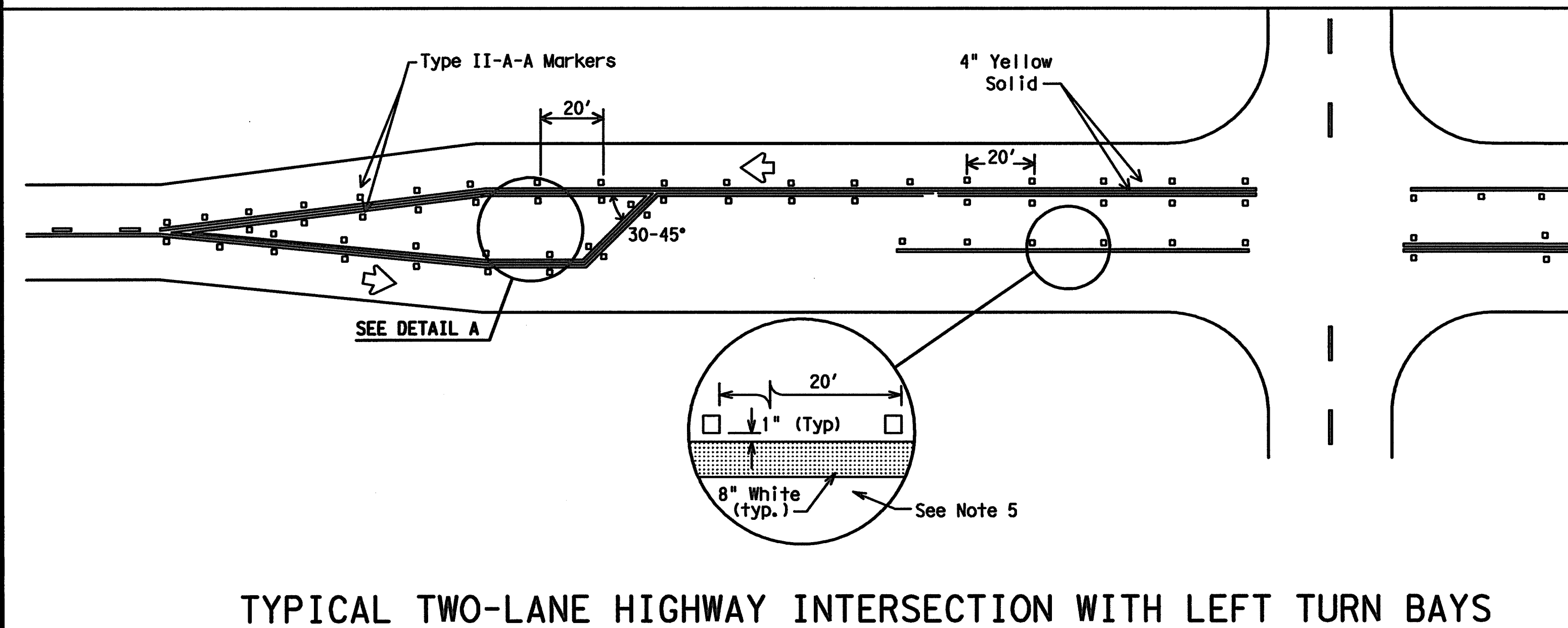
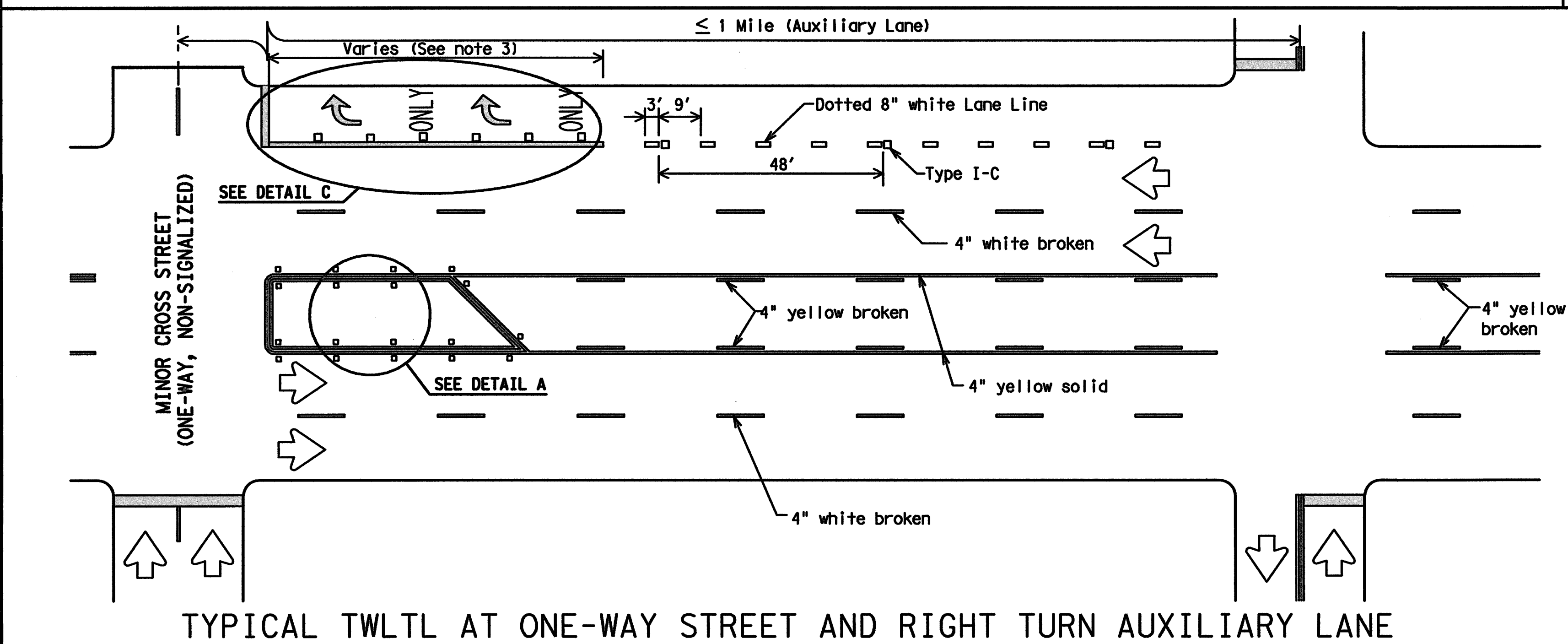
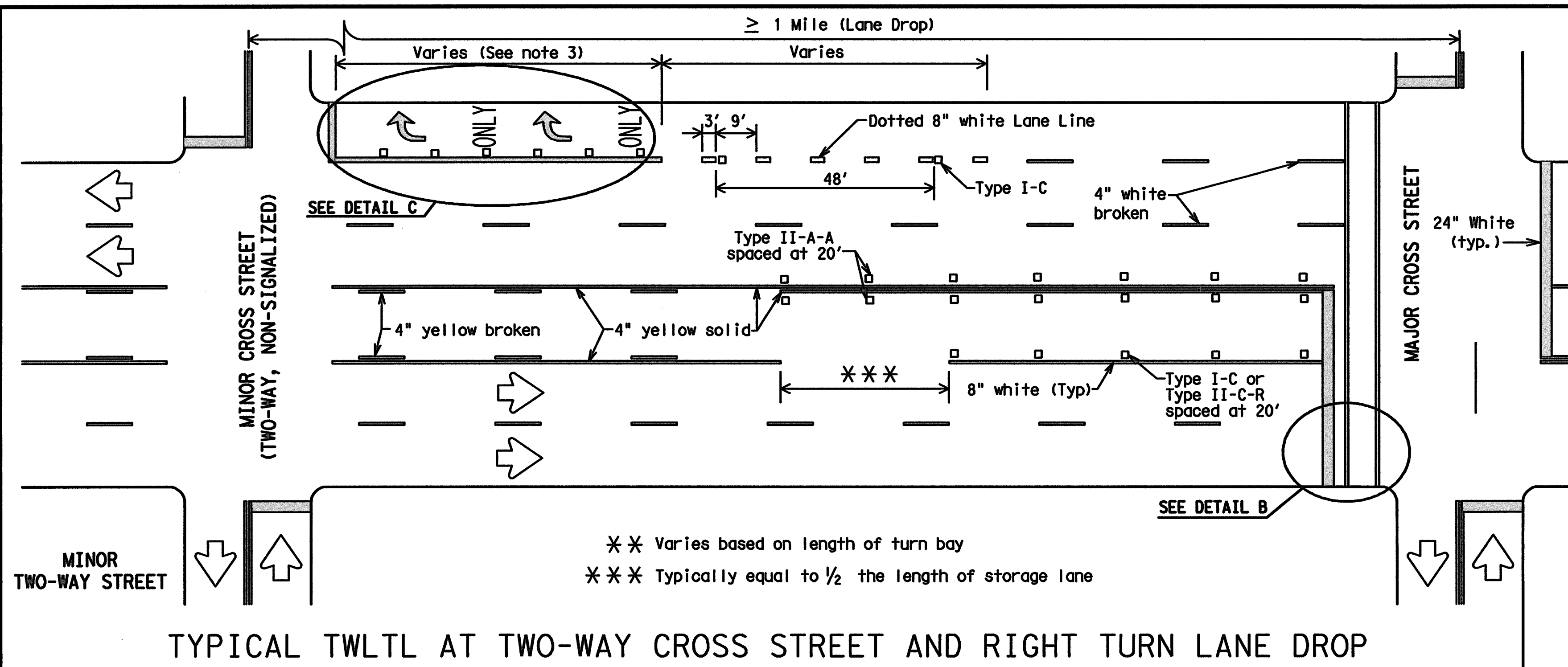
FDR (CP) -05

FILE: fdrp05.dgn	DW: TxDOT	CK: LL	DW: HC	CK:
© TxDOT September 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS				
DIST		COUNTY		SHEET NO.

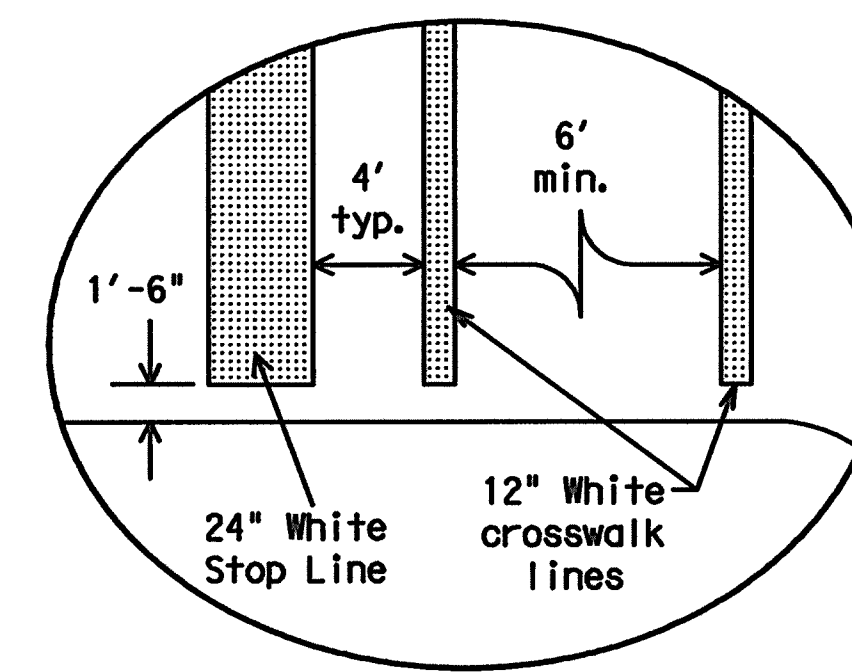


DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:  
FILE:

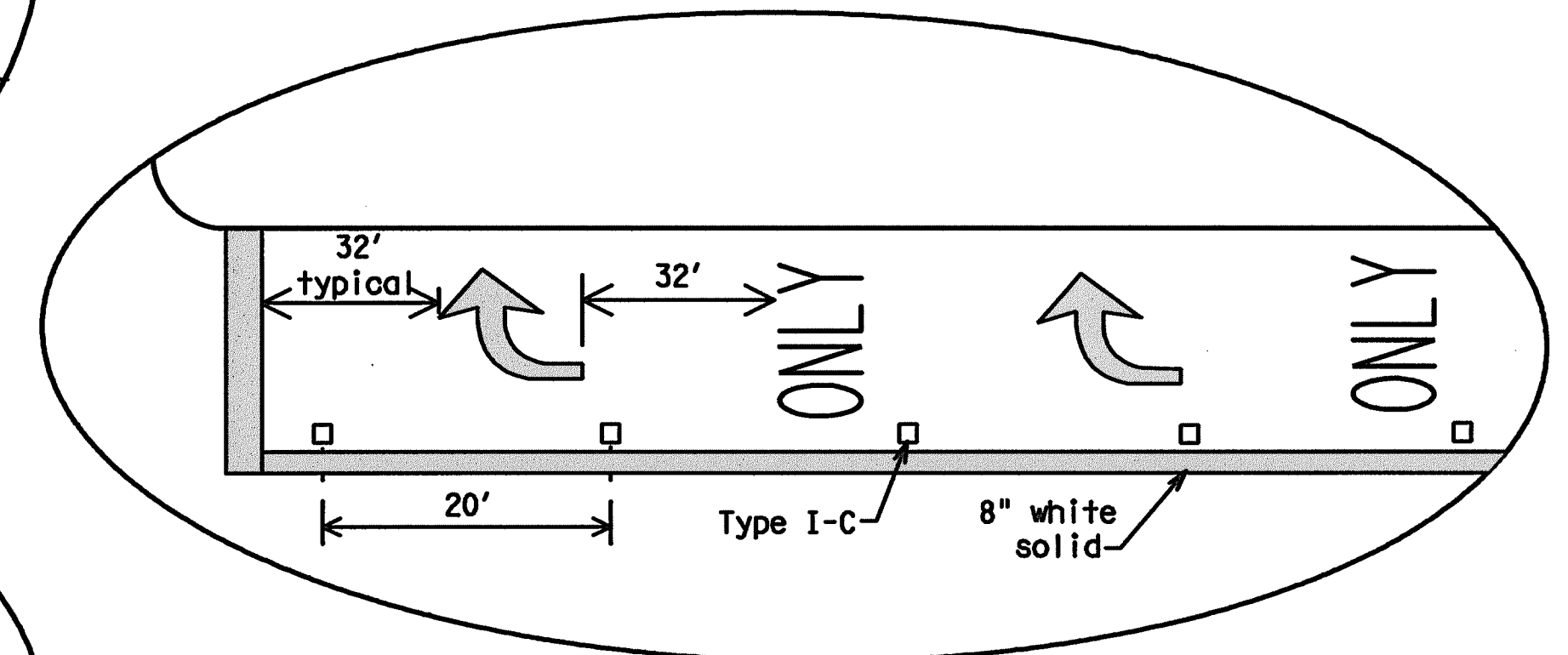


DETAIL A



Final placement of Stop Bar and Crosswalk shall be approved by the Engineer in the field.

DETAIL B



DETAIL C

#### GENERAL NOTES

- Refer elsewhere in plans for additional RPM placement and details.
- Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows as shown in the Standard Highway Sign Designs for Texas.
- When lane used word and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow or word and arrow marking is used for a short turn lane, it should be located at or near the upstream end of the full-width turn lane.
- Other crosswalk patterns as shown in the "Texas Manual on Uniform Traffic Control Devices" may be used.
- Raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Raised pavement marker Type II-C-R with divided highways and raised medians.
- A two-way left-turn (TWLT) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

Texas Department of Transportation  
Traffic Operations Division

#### PAVEMENT MARKINGS FOR TWO-WAY LEFT TURN LANES DIVIDED HIGHWAYS AND RURAL LEFT TURN BAYS

PM(3)-12

© TxDOT April 1998		DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
REVISIONS		CONT	SECT	JOB	HIGHWAY
5-00	2-12				
8-00					
3-03					
2-10					
		DIST	COUNTY		SHEET NO.

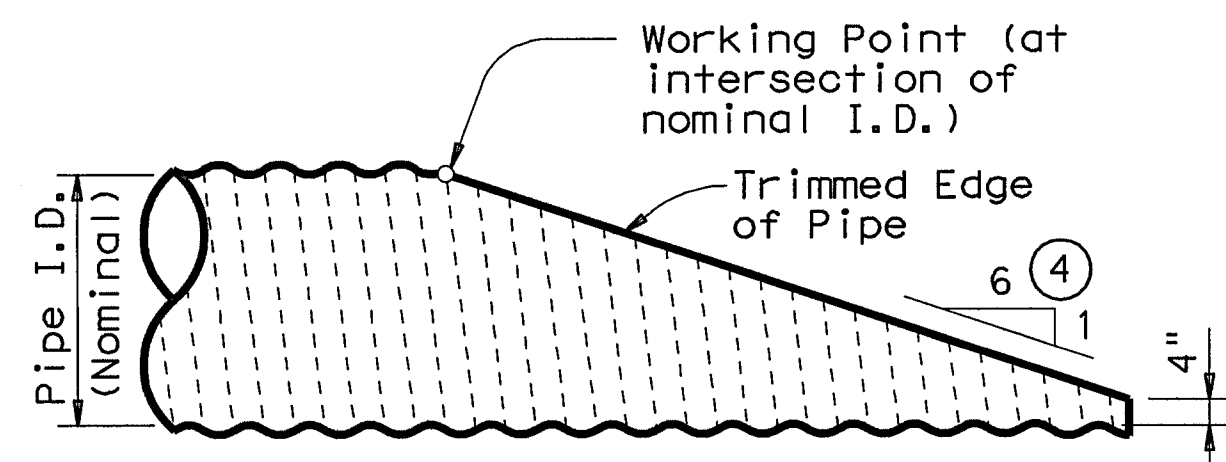
22C

#### TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY



DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

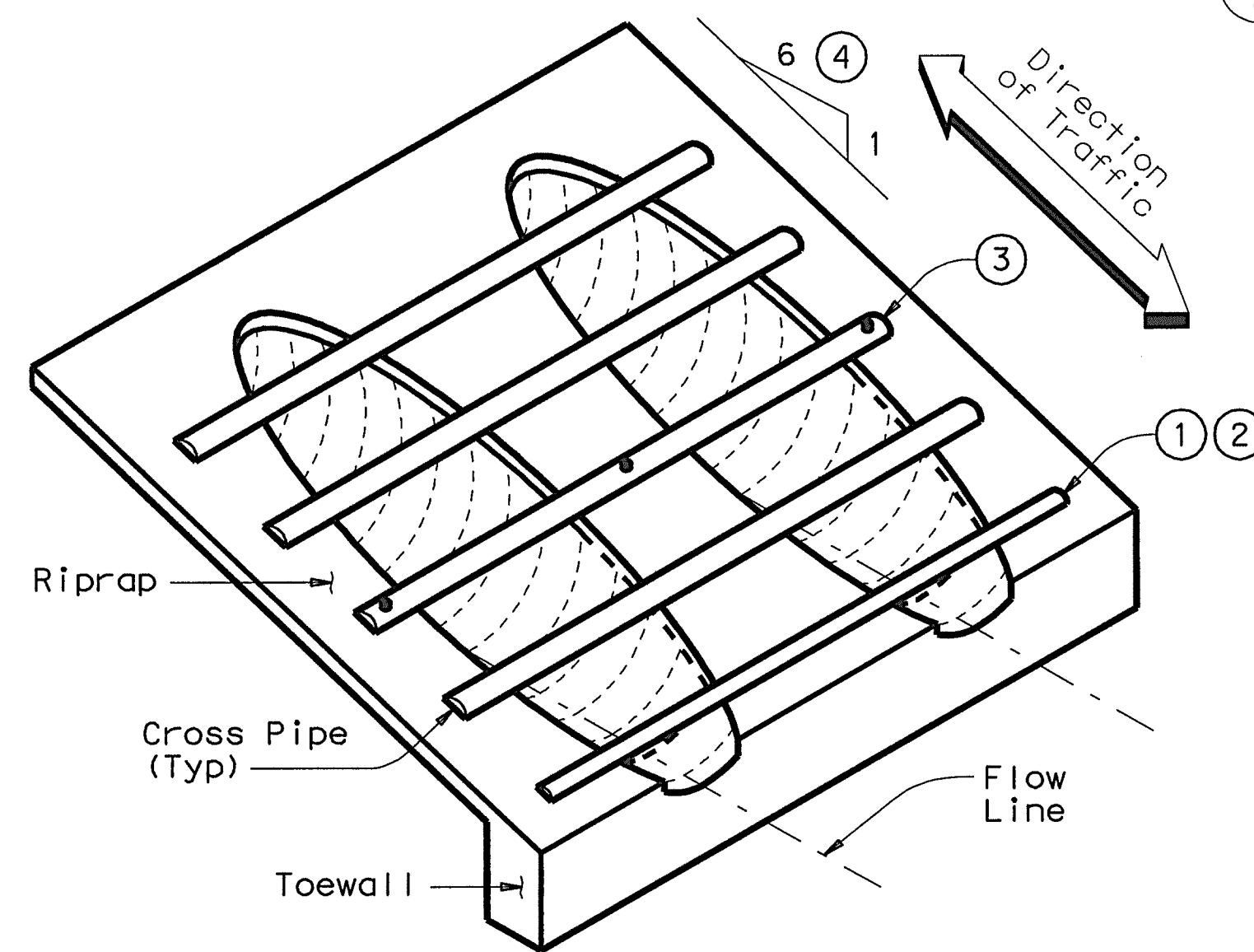
LEVELS DISPLAYED  
ACC:



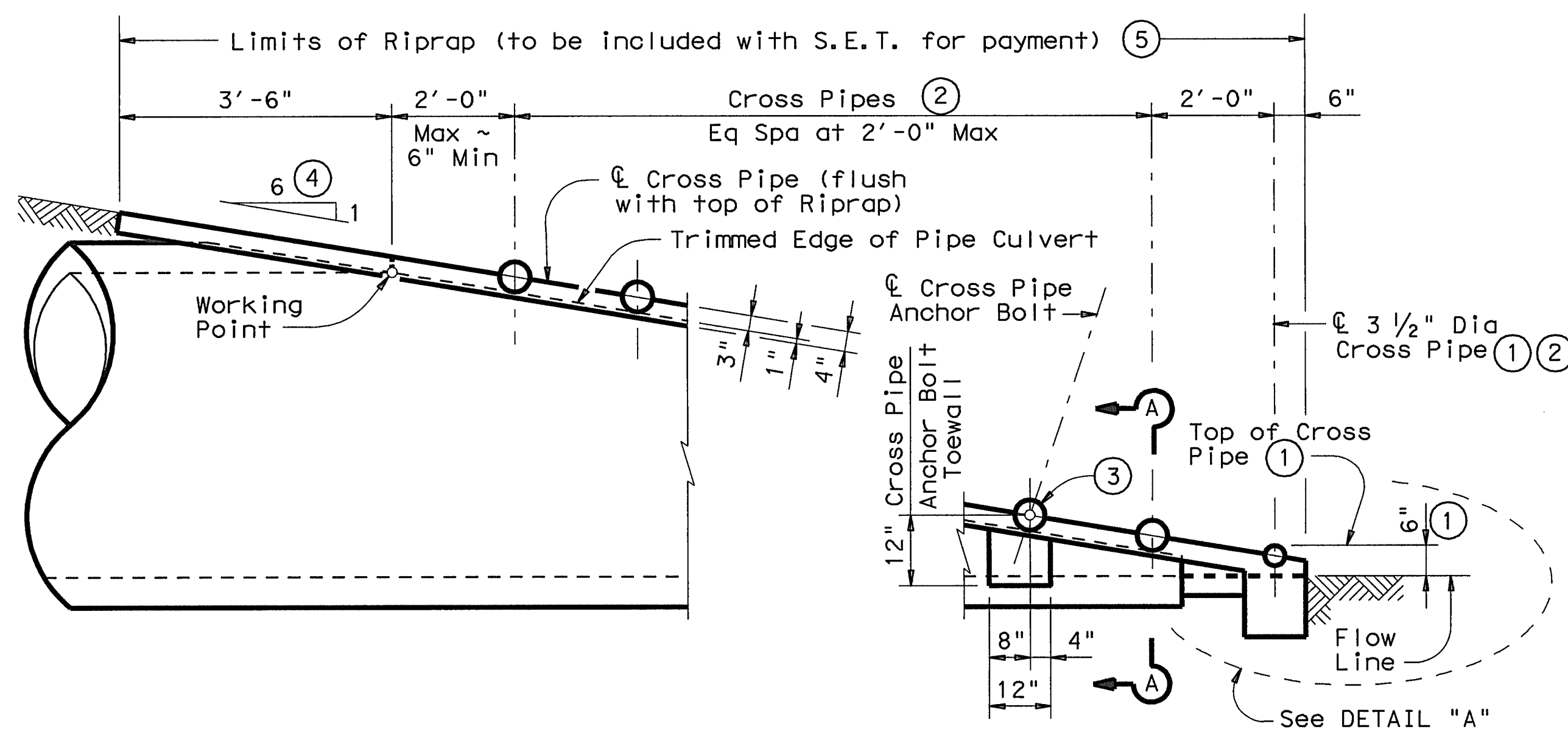
NOTE: All Cross Pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

### SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

(Showing Corrugated Metal Pipe Culvert.)  
(Details at Concrete Pipe Culvert are similar.)

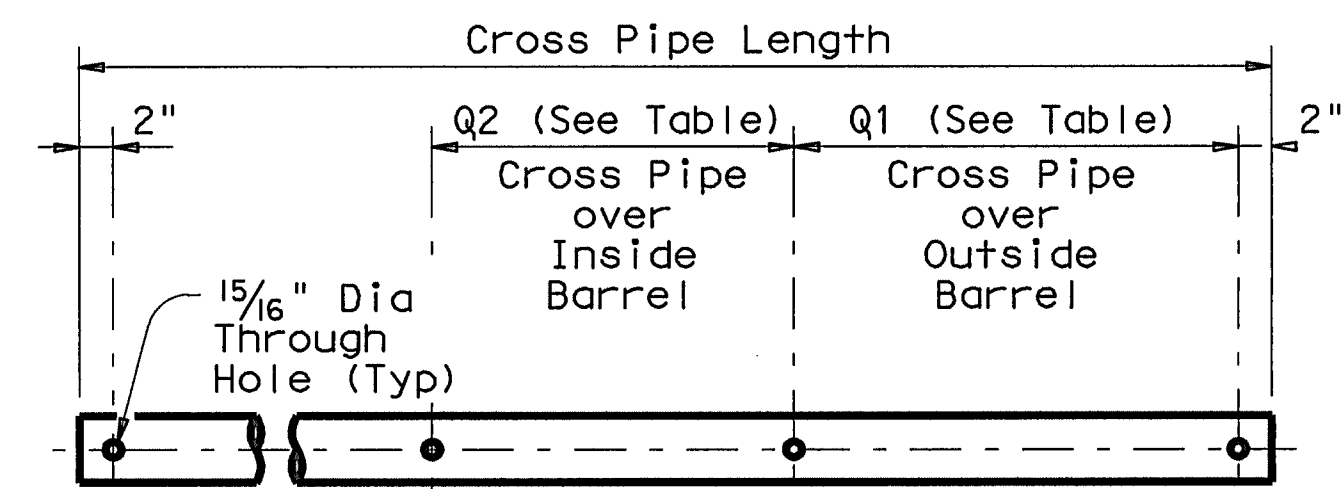


### ISOMETRIC VIEW OF TYPICAL INSTALLATION

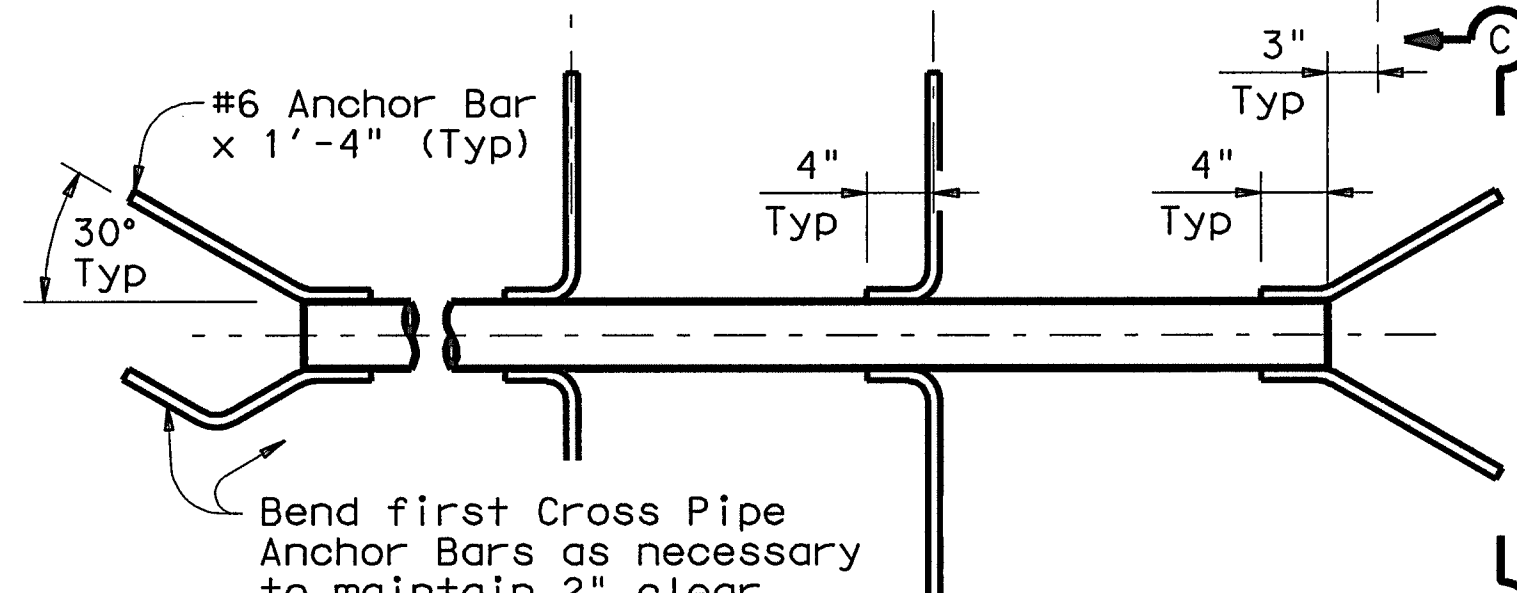


### SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

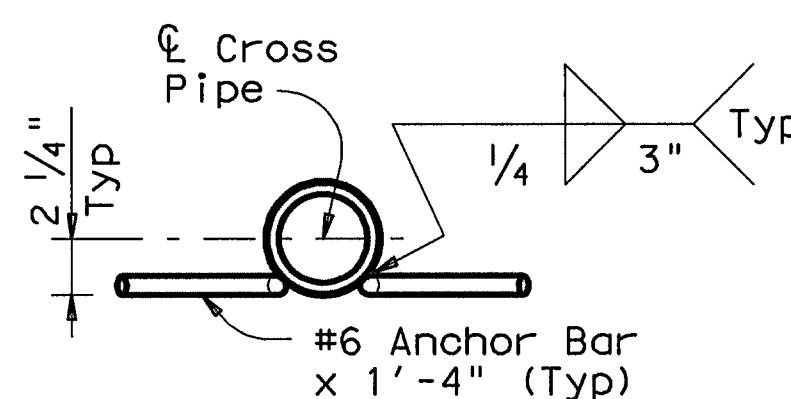
(Showing Concrete Pipe Culvert.)  
(Details at Corrugated Metal Pipe Culvert are similar.)



### PIPE W/ BOLTED ANCHOR

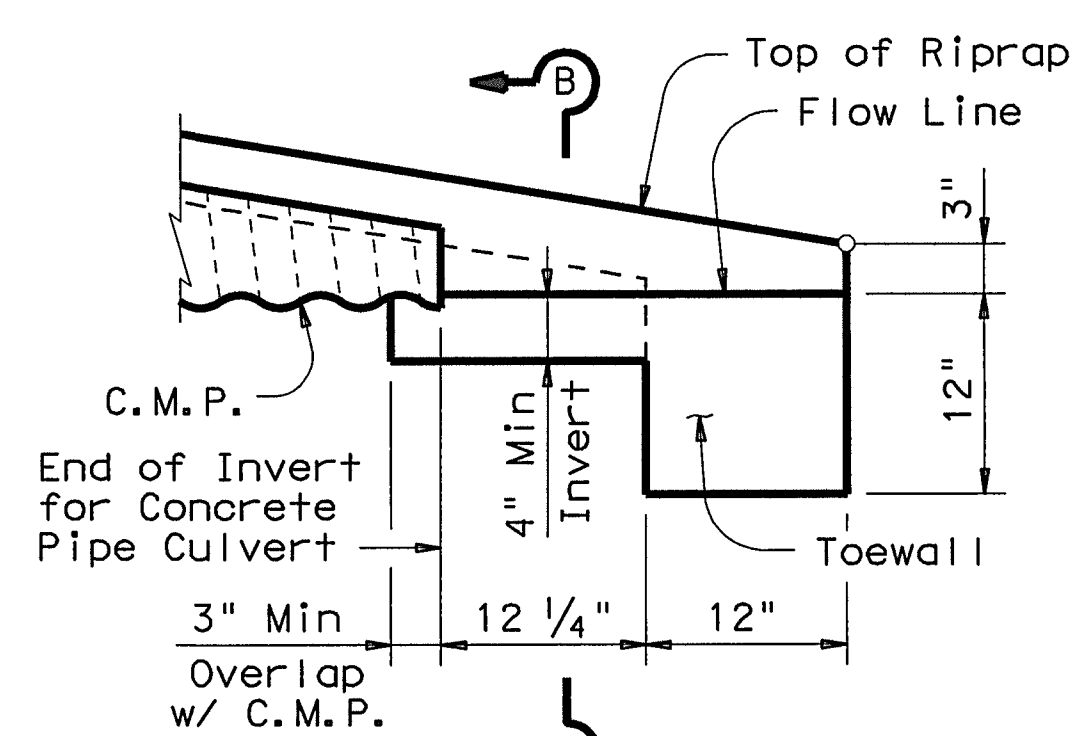


### PIPE W/ ANCHOR BARS



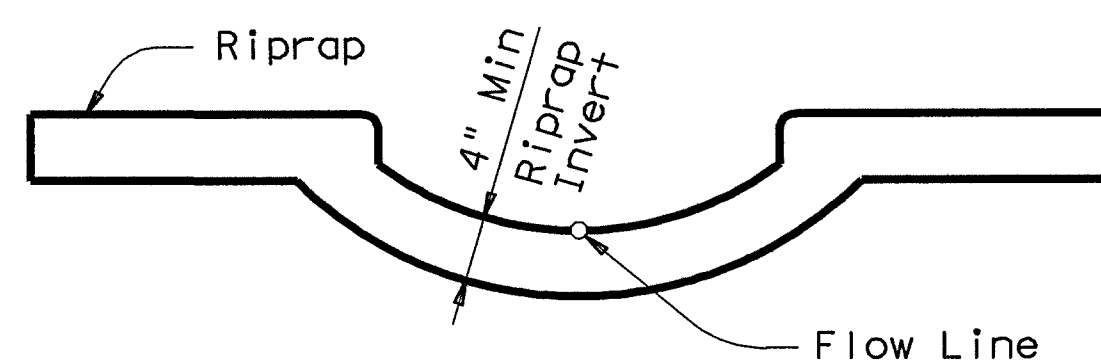
### SECTION C-C

### CROSS PIPE DETAILS



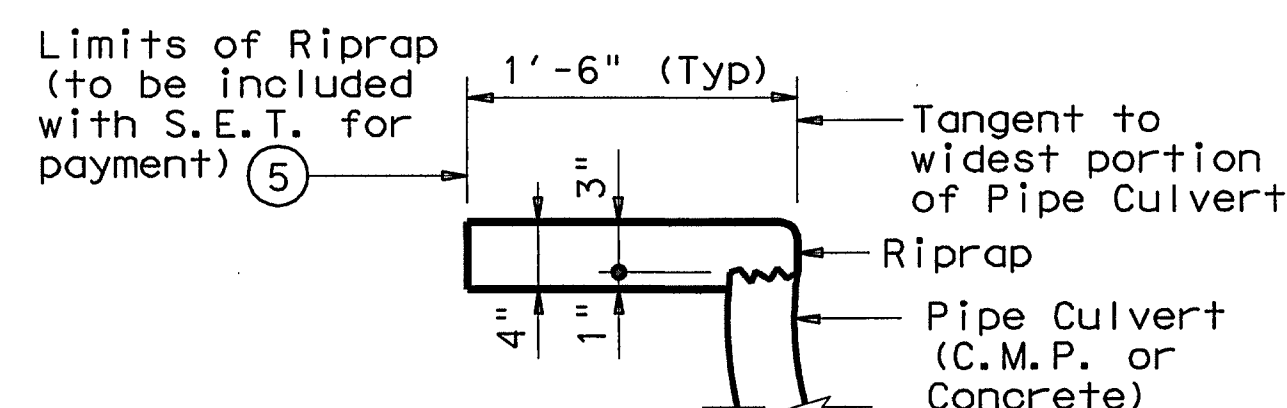
### DETAIL "A"

(Showing Invert with Corrugated Metal Pipe Culvert. Concrete Pipe Culvert details are similar. Cross Pipes not shown for clarity.)

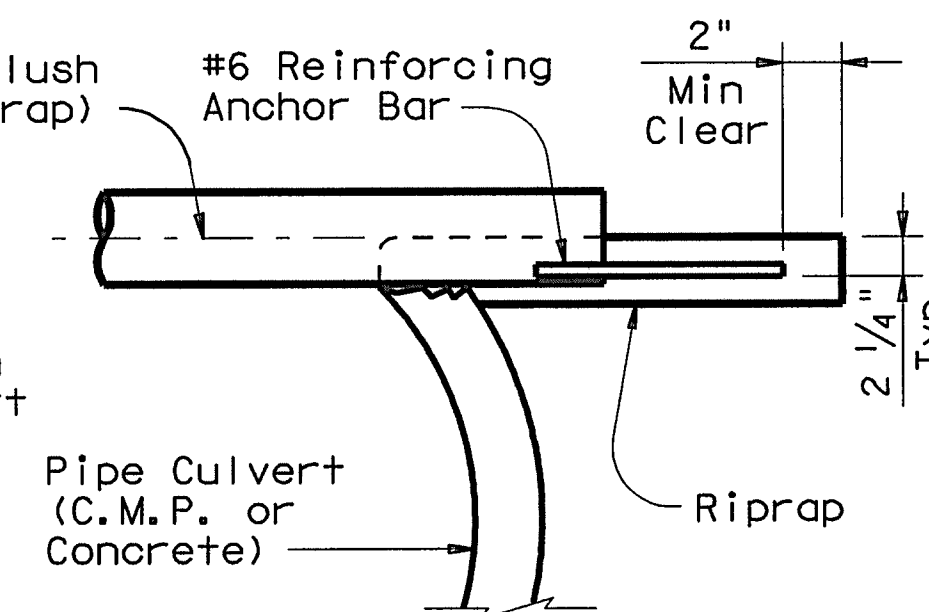


### SECTION B-B

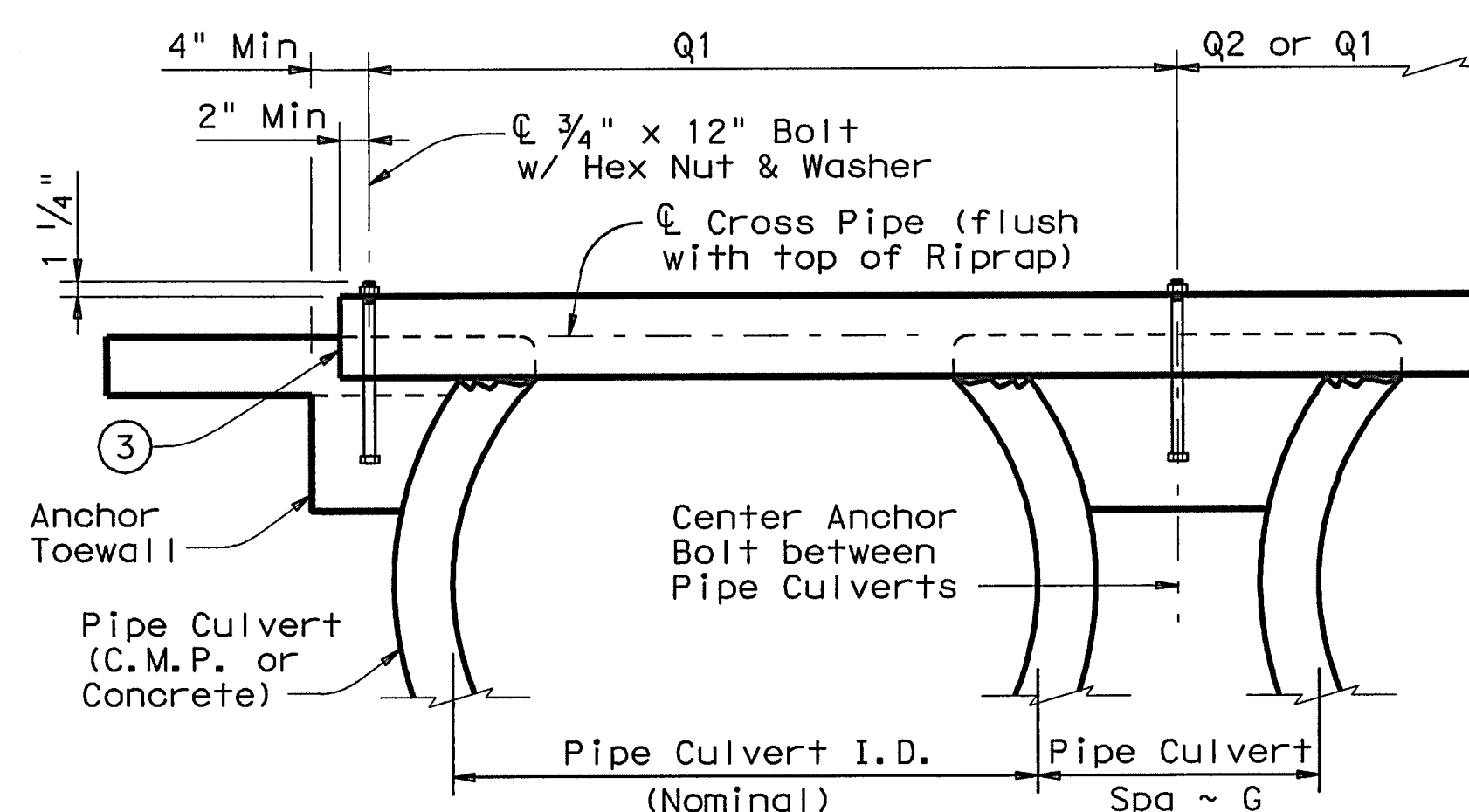
(Cross Pipes not shown for clarity.)



### SHOWING TYPICAL PIPE CULVERT & RIPRAP



### SHOWING CROSS PIPE WITH ANCHOR BAR



### SHOWING CROSS PIPE WITH BOLTED ANCHOR

### SECTION A-A

### CROSS PIPE LENGTHS, REQUIRED PIPE SIZES, & RIPRAP QUANTITIES ②

Nominal Culvert I.D.	Conc Riprap (CY) ⑥	Pipe Culvert Spa ~ G	Single Barrel ~ Q1	Multi-Barrel ~ Q1	Q2	Conditions for use of Cross Pipes	Cross Pipe Size
12"	0.6	9"	N/A	2'-1"	1'-9"	3 or more Pipe Culverts	3" Std (3,500" O.D.)
15"	0.7	11"	N/A	2'-5"	2'-2"		
18"	0.8	1'-2"	N/A	2'-10"	2'-8"		
21"	0.9	1'-4"	N/A	3'-2"	3'-1"		
24"	0.9	1'-7"	N/A	3'-6"	3'-7"	3 or more Pipe Culverts	3 1/2" Std (4,000" O.D.)
27"	1.0	1'-8"	N/A	3'-10"	3'-11"		
30"	1.1	1'-10"	N/A	4'-2"	4'-4"		
33"	1.2	1'-11"	4'-2"	4'-5"	4'-8"		
36"	1.3	2'-1"	4'-5"	4'-9"	5'-1"	All Pipe Culverts	4" Std (4,500" O.D.)
42"	1.5	2'-4"	4'-11"	5'-5"	5'-10"		
48"	1.7	2'-7"	5'-5"	6'-0"	6'-7"		
54"	2.0	3'-0"	5'-11"	6'-9"	7'-6"		
60"	2.2	3'-3"	6'-5"	7'-4"	8'-3"	All Pipe Culverts	5" Std (5,563" O.D.)
66"	2.4	3'-3"	6'-11"	7'-10"	8'-9"		
72"	2.7	3'-4"	7'-5"	8'-5"	9'-4"		

- ① The proper installation of the first Cross Pipe is critical for vehicle safety. The top of the first Cross Pipe must be placed at no more than 6" above the flow line.
- ② Size of Cross Pipes, except the first bottom pipe, shall be as shown in the PIPE SIZE table. The first bottom pipe shall be 3 1/2" Standard Pipe (4" O.D.).
- ③ The third Cross Pipe from the bottom of the Culvert shall always be installed using a bolted connection. Care shall be taken to ensure that Riprap concrete does not flow into the Cross Pipe so as to permit disassembly of the bolted connection to allow cleanout access. At the Contractor's option, all other Cross Pipes may also be installed using the bolted connection details.
- ④ Match Cross Slope as shown elsewhere in the plans. Cross Slope of 6:1 or flatter is required for vehicle safety.
- ⑤ Riprap placed beyond the limits shown will be paid as Concrete Riprap in accordance with Item 432, "Riprap".
- ⑥ Quantities shown are for one end of one reinforced Concrete Pipe Culvert. For multiple pipe culverts or for Corrugated Metal Pipe Culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only.

### GENERAL NOTES:

Cross Pipes are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

Safety End Treatments shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the Cross Pipes.

Riprap and all necessary inverts shall be Concrete Riprap conforming to the requirements of Item 432, "Riprap".

Payment for riprap and toewall is included in the Price Bid for each Safety End Treatment.

Cross Pipes shall conform to the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

Bolts and nuts shall conform to ASTM A307.

All steel components, except concrete reinforcing, shall be galvanized after fabrication. Galvanizing damaged during transport or construction shall be repaired in accordance with the specifications.

Texas Department of Transportation  
Bridge Division

### SAFETY END TREATMENT FOR 12" DIA TO 72" DIA PIPE CULVERTS TYPE II ~ PARALLEL DRAINAGE

### SETP-PD

FILE: setppdse.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
© TxDOT May 2005	DISTRICT	FEDERAL AID PROJECT	SHEET	
REVISIONS	COUNTY	CONTROL	SECT	JOB
				HIGHWAY



DATE:  
FILE:

GENERAL NOTES:

1. FRP sign supports for a single type sign support may be used for signs up to and including 16 square feet. Dual post installation may be used for signs up to and including 32 square feet.
2. All nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing."
3. See the Traffic Operations Division website for detailed drawings of sign clamps. The website address is:  
<http://www.txdot.gov/publications/traffic.htm>

## FRP POST REQUIREMENTS

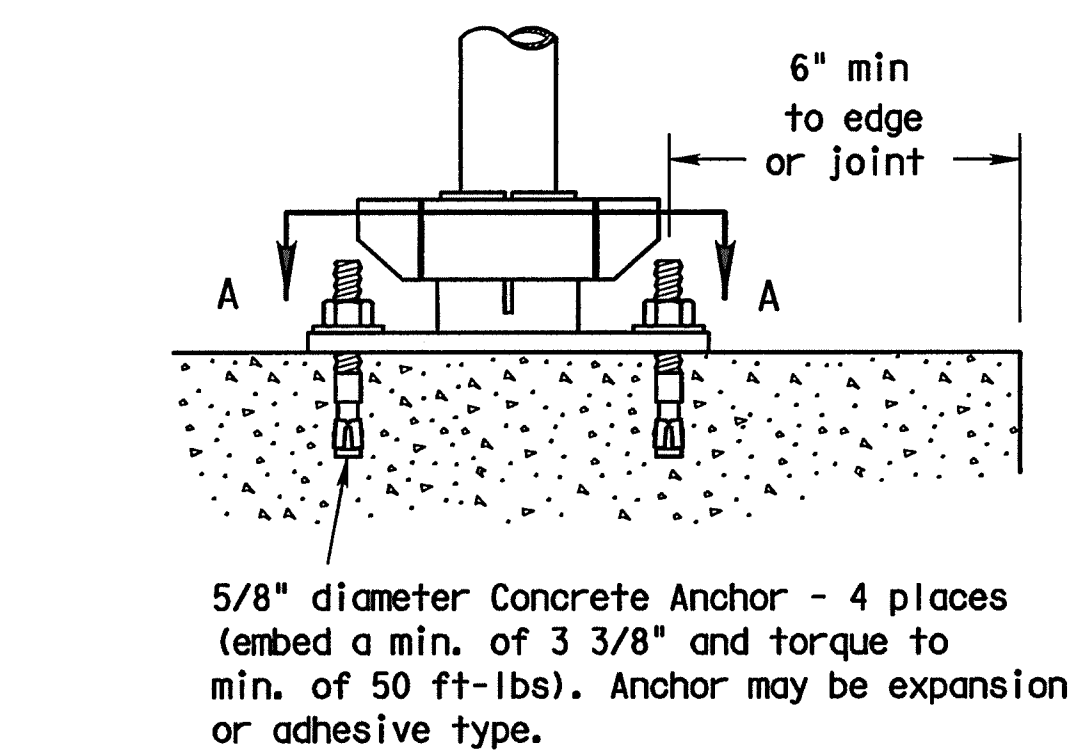
1. Materials shall conform to the requirements of Departmental Material Specification DMS-4410 and will be furnished in a yellow or gray color as specified elsewhere in the plans.
2. Thickness of FRP sign support is  $0.125" + 0.031"$ , - 0.0".
3. FRP sign supports are prequalified by the Traffic Operations Division.  
Prequalification procedures are obtained by writing:  
Texas Department of Transportation  
Traffic Operations Division  
125 East 11th Street  
Austin, Texas 78701-2483

## UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURES

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD (GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Insert base post in foundation hole to depths shown and fill hole with concrete. Cut base post from bottom and ensure a minimum of 18" embedment if installed in solid rock.
4. Level and plumb the base post with coupler using a torpedo level and let concrete set a minimum of 4 days, unless otherwise directed by Engineer. Bottom of base post slots shall be above the concrete footing.
5. Attach sign to FRP post.
6. Insert sign post into base post. Lower until the post comes to rest on the steel rod.
7. Use hammer to ensure the coupler is firmly seated. Top of coupler should be level with top of base post in most instances.
8. Check sign to ensure there is no twist. If loose, increase the tightening of coupler.

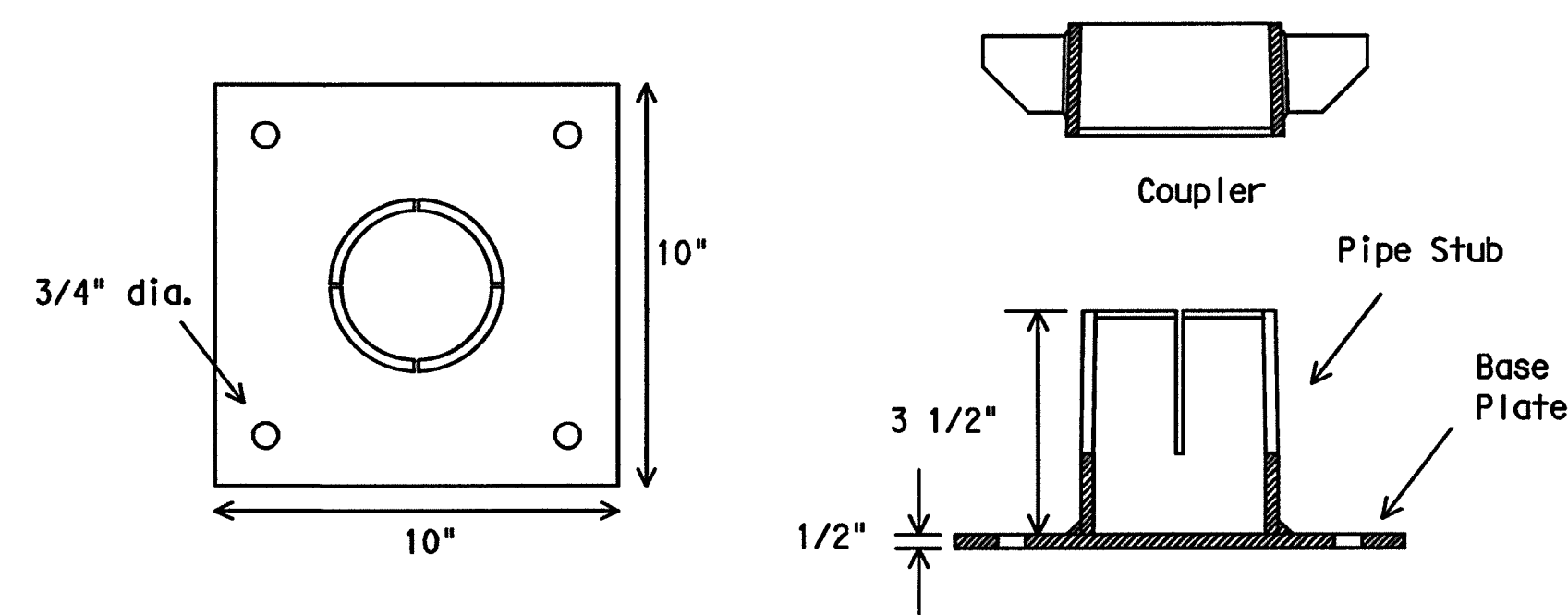
BOLT DOWN SIGN SUPPORT

1. Position base plate with coupler on existing concrete.
2. Drill holes into concrete and insert the 5/8" diameter bolts with wedge anchors, and tighten nuts.
3. Attach sign to FRP post.
4. Insert bottom of sign post into pipe stub.
5. Use hammer to ensure the coupler is firmly seated. Top of coupler should be level with top of base post in most instances.
6. Check sign to ensure there is no twist. If loose, increase the tightening of coupler.



Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Top of bolt shall extend at least flush with top of nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 3 3/8" minimum embedment, shall have a minimum allowable tension and shear of 2450 and 1525 psi, respectively. Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxy and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations.

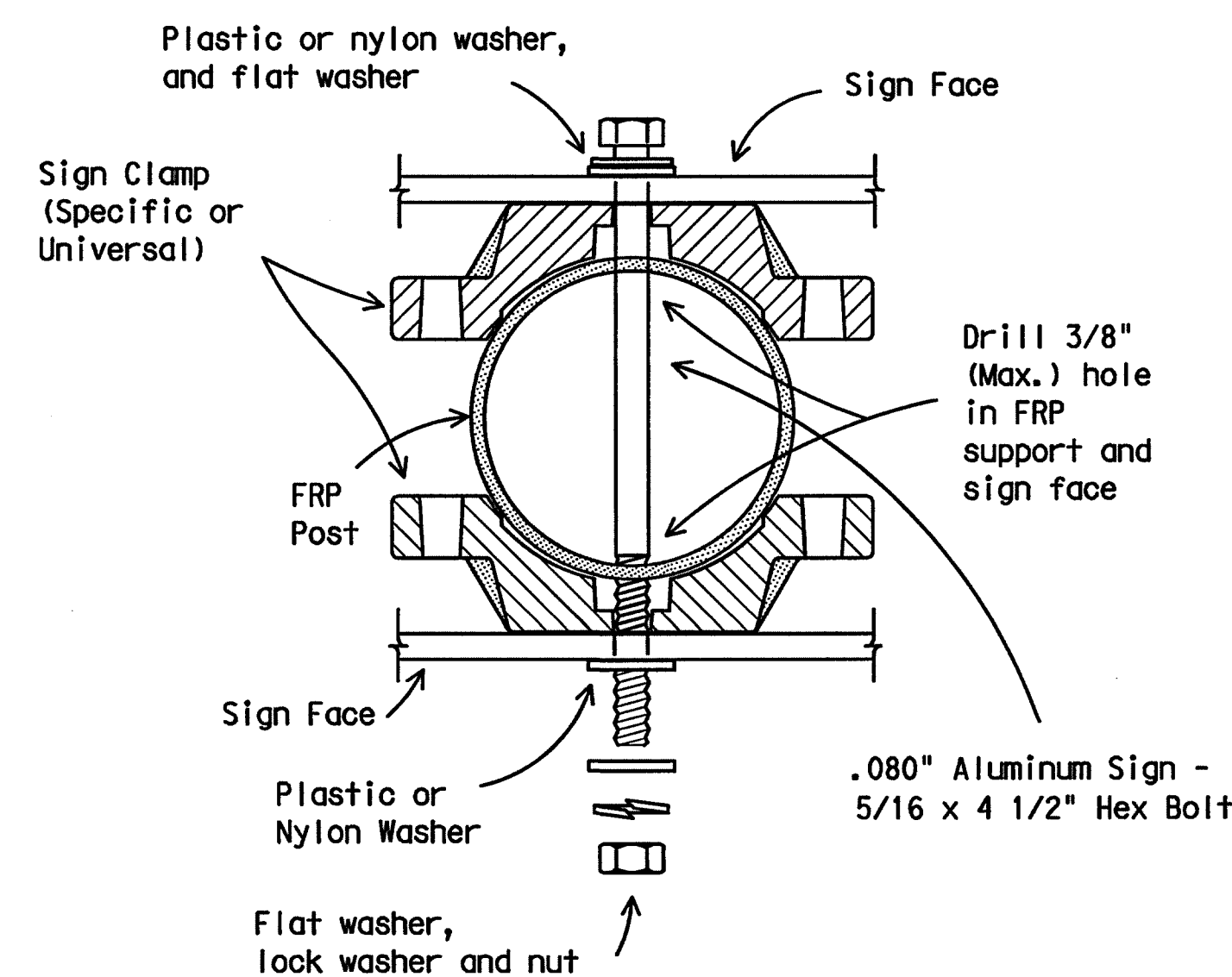
## BOLT-DOWN DETAILS



SM RD SGN ASSM TY FRP (X) UA (P)

SM RD SGN ASSM TY FRP (X) UB (P)

Typical Sign Mounting Detail  
for FRP Support with Back-to-Back Signs



# SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS UNIVERSAL ANCHOR SYSTEM WITH FRP POST

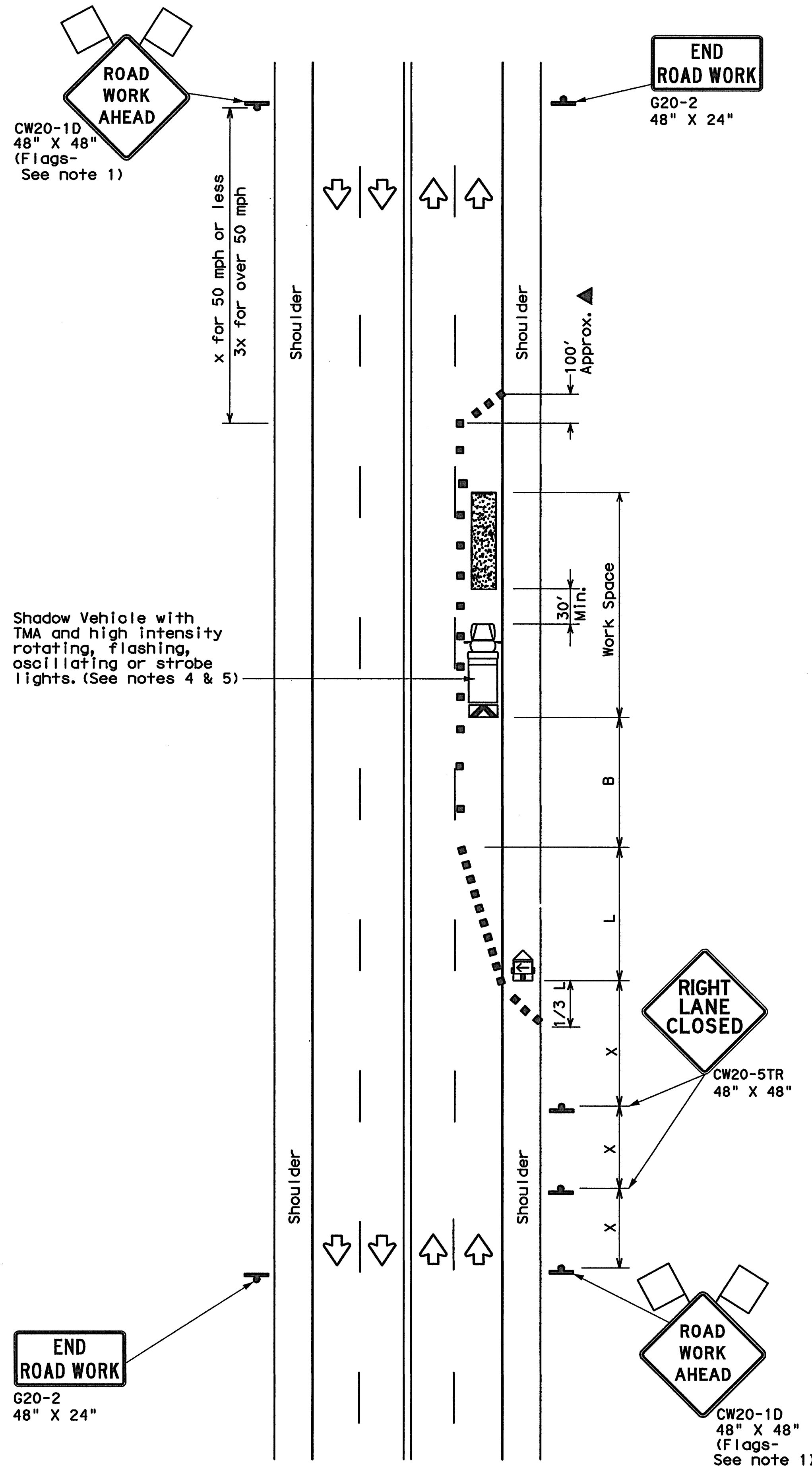
SMD (FRP) -08

© TxDOT July 2002		TH: TxDOT	CK: TxDOT	HW: TxDOT	CK: TxDOT
9-08	REVISIONS	CUA	SECT	JOB	HIGHWAY
		QIST	COUNTRY		SHEET NO.



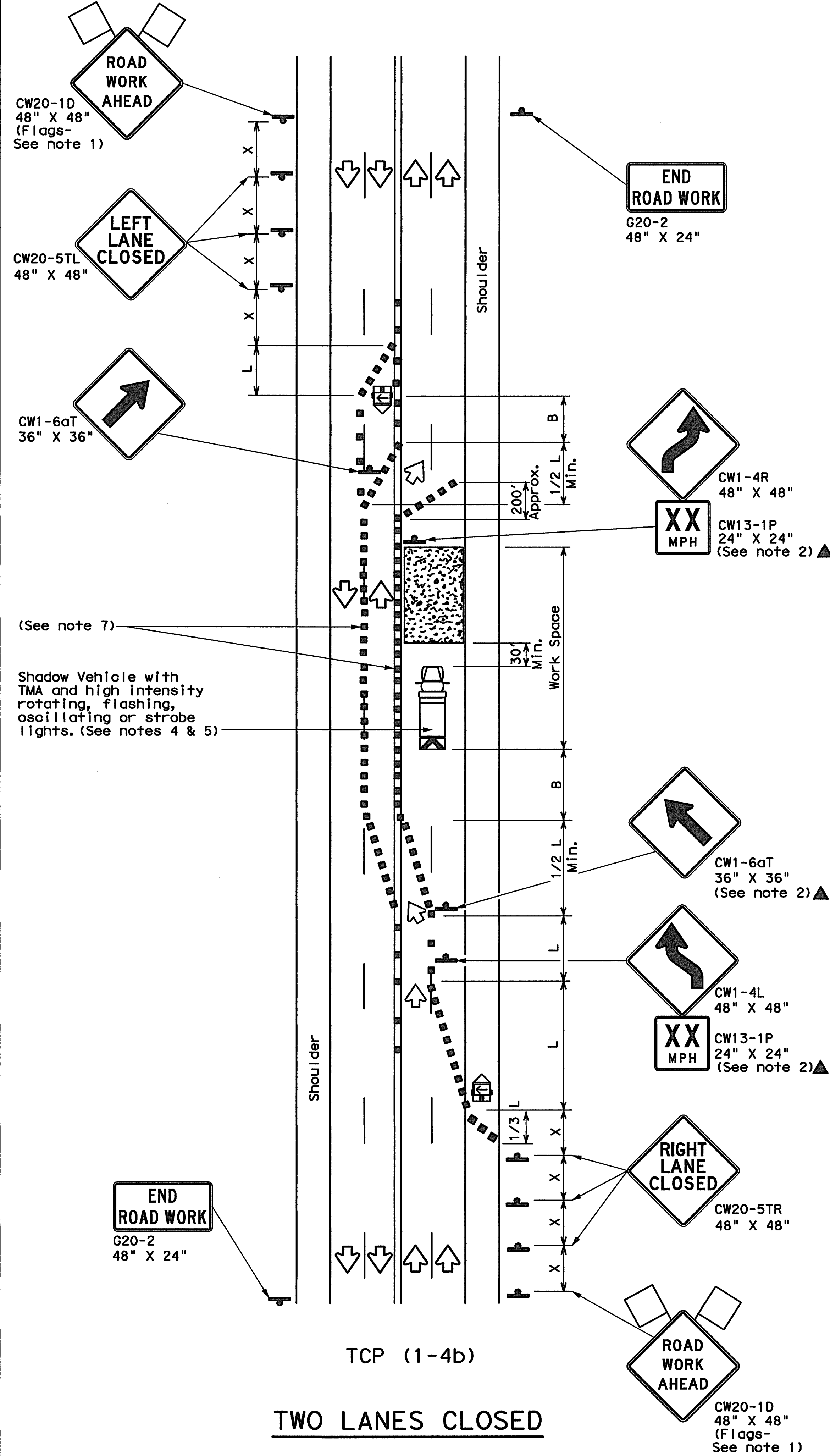
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: FILE:



TCP (1-4a)

ONE LANE CLOSED



TCP (1-4b)

TWO LANES CLOSED

#### LEGEND

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

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

\* Conventional Roads Only

\*\* Taper lengths have been rounded off.

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

#### TYPICAL USAGE

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

#### GENERAL NOTES

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

#### TCP (1-4a)

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

#### TCP (1-4b)

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

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

Texas Department of Transportation  
Traffic Operations Division

## TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP (1-4) - 12

© TxDOT December 1985		DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
REVISIONS		CONT	SECT	JOB	HIGHWAY
2-94	2-12				
8-95					
1-97					
4-98					
154		DIST	COUNTY		SHEET NO.