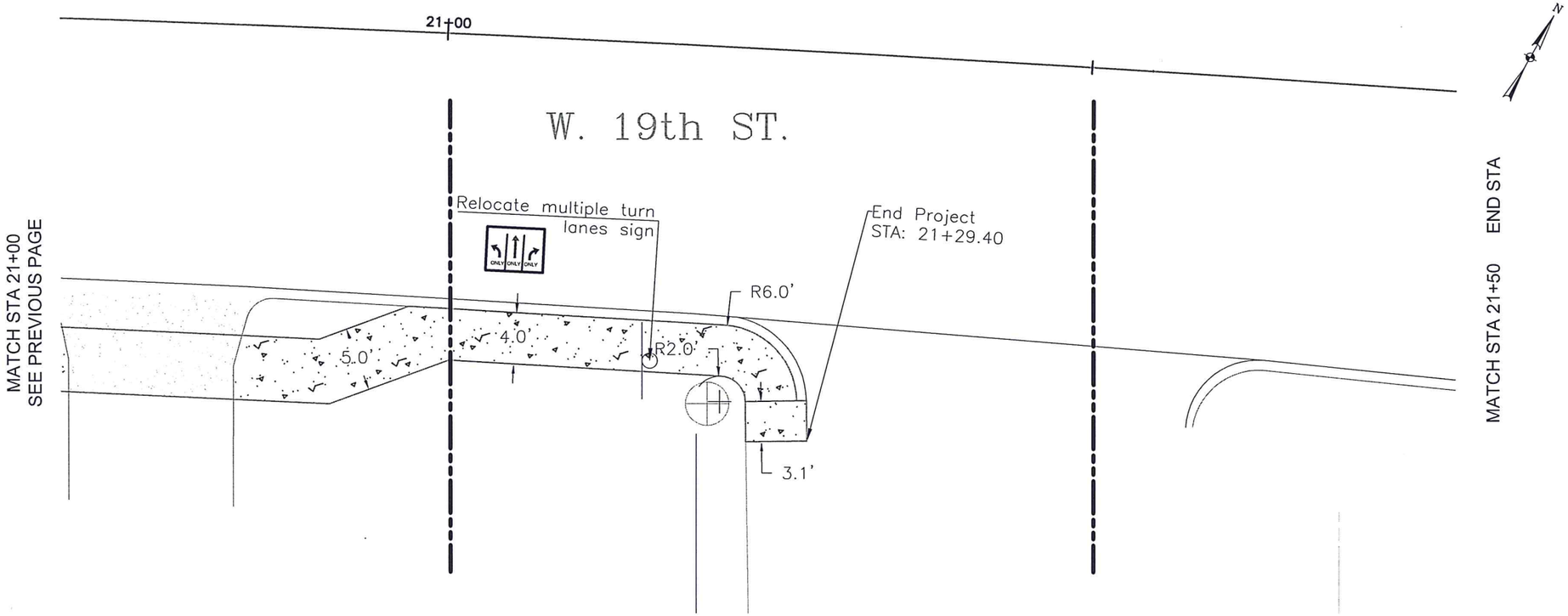
		SHEET TOTALS	
EST.	ITEM	DESCRIPTION	UNIT
15	0531 2015	CONC SIDEWALKS (4")	SY
13	0530 2010	DRIVEWAYS (CONC)	SY

LEGEND	
	PROPOSED 4" SIDEWALK
	PROPOSED TRUNCATED DOME
18.3% 6 in	PROPOSED CONCRETE DRIVEWAY
	EXISTING SIDEWALK TO BE REMOVED
	SIGN
	MAILBOX
	UTILITY POLE



DRAWN BY:	KDC
CHECKED BY:	KJB
HORIZONTAL SCALE:	1"=10'
VERTICAL SCALE:	N/A
JOB NUMBER:	ES-5-14
DATE:	NOVEMBER, 2014

SIDEWALK PROJECT
WEST 19TH STREET FROM LILLIE ST. TO BRYANT BLVD. (U.S. HWY. 87)

STA 21+00 TO STA 21+50

ENGINEERING SERVICES
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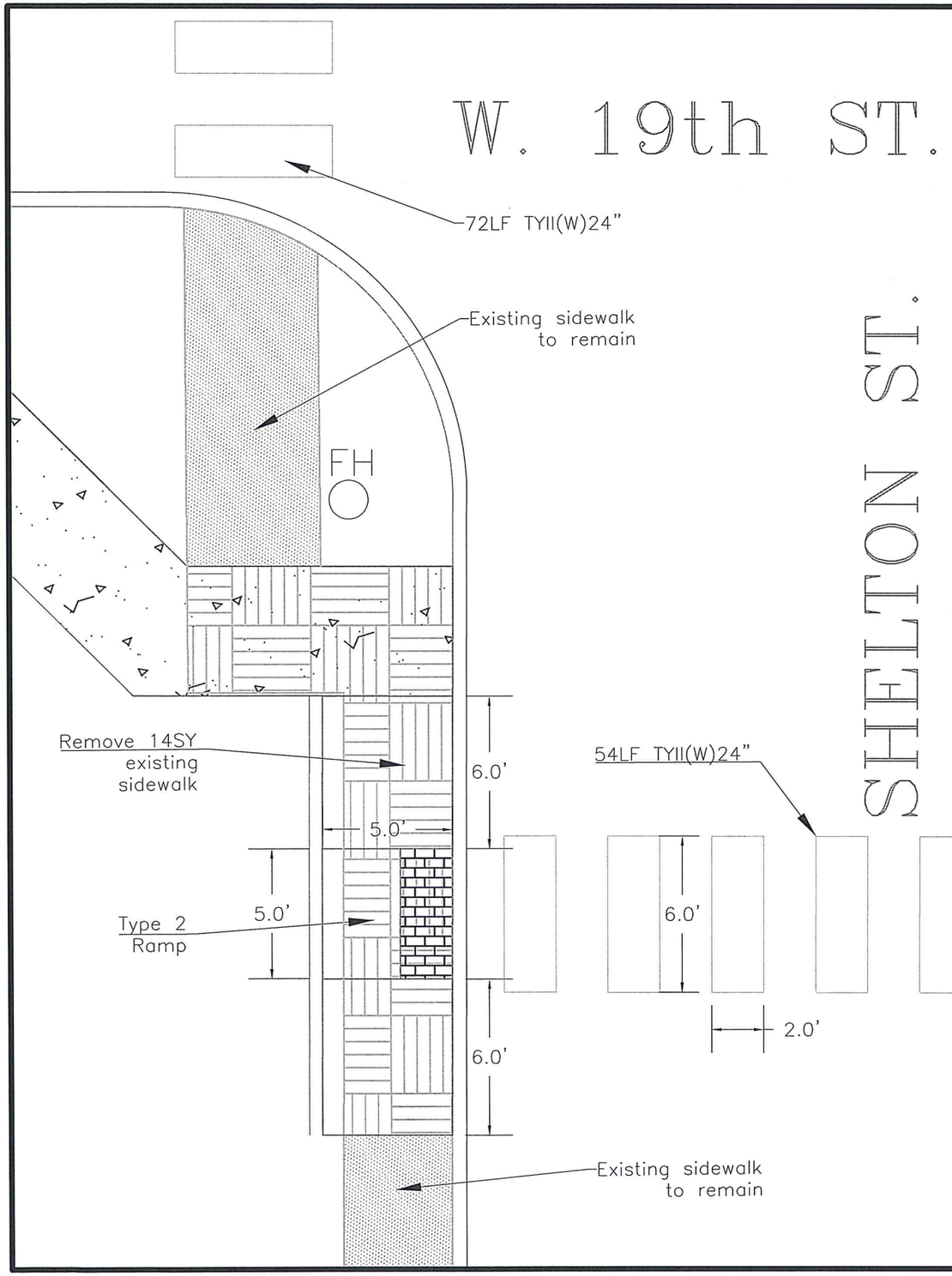
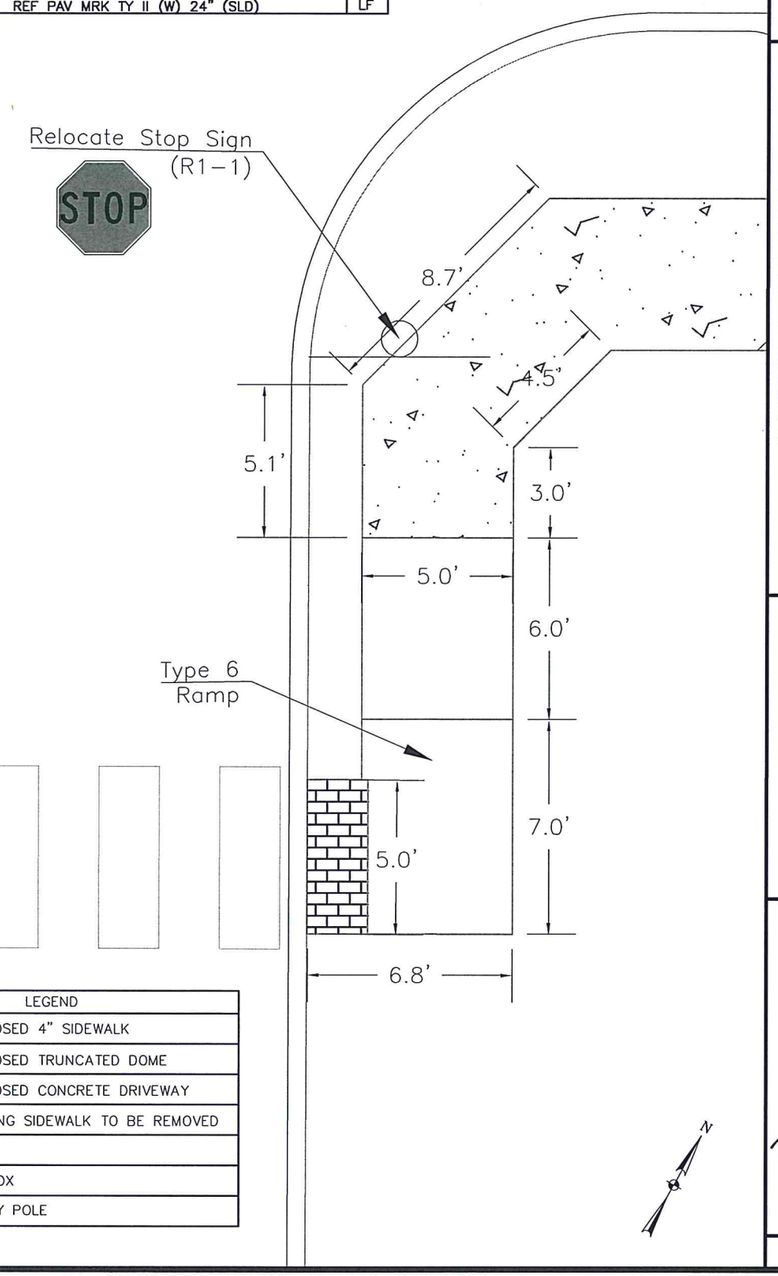
STATE OF TEXAS
KARL J. BEDNARZ
62697
LICENSED PROFESSIONAL ENGINEER
2/25/15

W. 19th ST.

SHELTON ST.

		SHEET TOTALS	
EST.	ITEM	DESCRIPTION	UNIT
14	0104 2036	REMOVING CONC (SIDEWALK OR RAMP)	SY
1	0531 2006	CURB RAMPS (TY 2)	EA
1	0531 2009	CURB RAMPS (TY 6)	EA
1	0644 2056	RELOCATE SM RD SN SUP&AM TY10BWG	EA
126	0666 2157	REF PAV MRK TY II (W) 24" (SLD)	LF





LEGEND
PROPOSED 4" SIDEWALK
PROPOSED TRUNCATED DOME
PROPOSED CONCRETE DRIVEWAY
EXISTING SIDEWALK TO BE REMOVED
SIGN
MAILBOX
UTILITY POLE

DRAWN BY: KDC
CHECKED BY: KJB
HORIZONTAL SCALE: 1"=5'
VERTICAL SCALE: N/A
JOB NUMBER: ES-5-14
DATE: NOVEMBER, 2014

SIDEWALK PROJECT
WEST 19TH STREET FROM LILLIE ST. TO BRYANT BLVD. (U.S. HWY. 87)
DETAIL A

Type 2 and Type 6 Ramp: South corners of West 19th Street and Shelton Street

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62697
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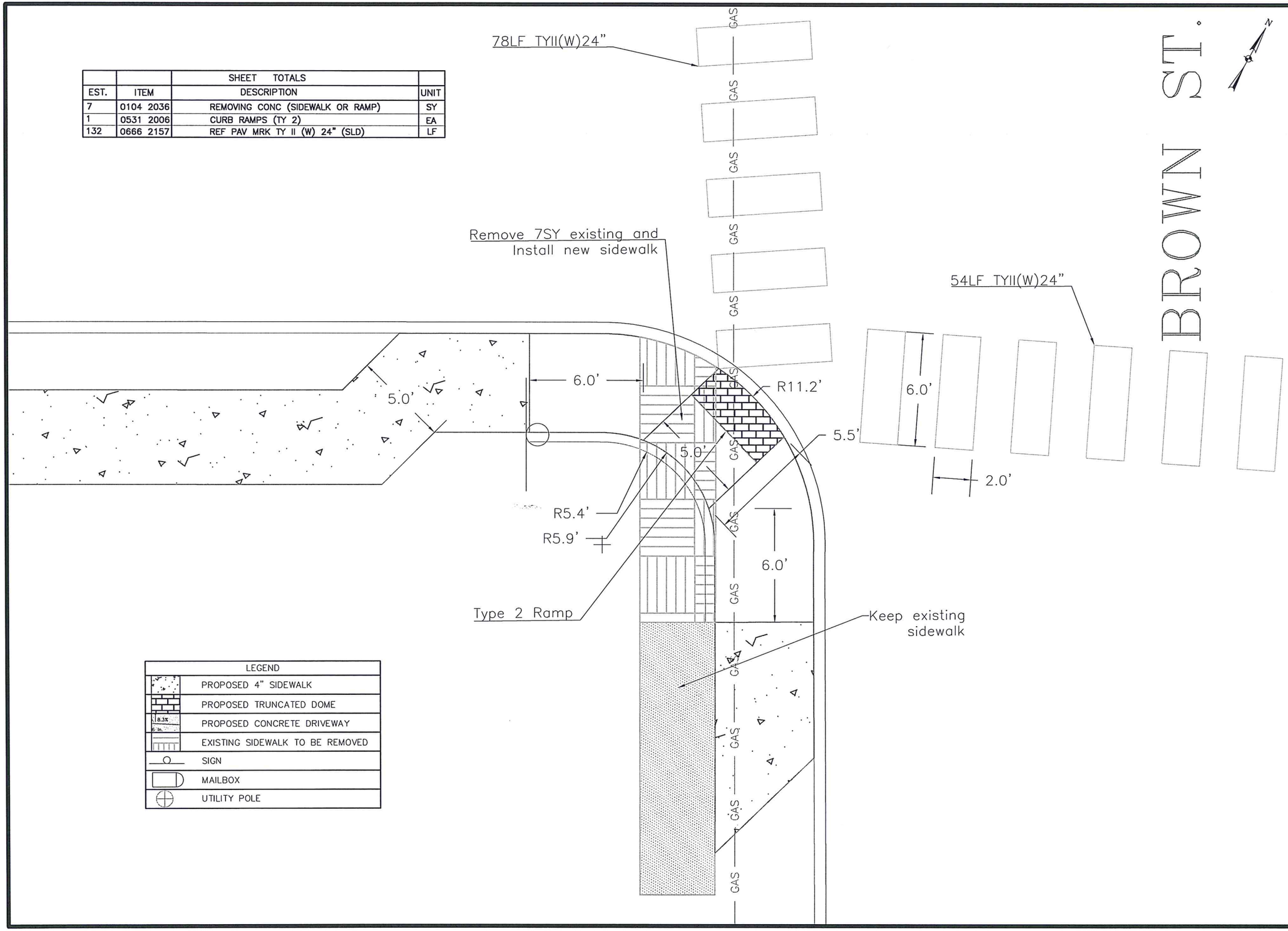
Karl J. Bednarz P.E.
2/25/15

SHEET 12 OF 13

R-1858

		SHEET TOTALS	
EST.	ITEM	DESCRIPTION	UNIT
7	0104 2036	REMOVING CONC (SIDEWALK OR RAMP)	SY
1	0531 2006	CURB RAMPS (TY 2)	EA
132	0666 2157	REF PAV MRK TY II (W) 24" (SLD)	LF



LEGEND	
	PROPOSED 4" SIDEWALK
	PROPOSED TRUNCATED DOME
8.3% 6 in.	PROPOSED CONCRETE DRIVEWAY
	EXISTING SIDEWALK TO BE REMOVED
	SIGN
	MAILBOX
	UTILITY POLE

DRAWN BY:	KDC
CHECKED BY:	KJB
HORIZONTAL SCALE:	1"=7'
VERTICAL SCALE:	N/A
JOB NUMBER:	ES-5-14
DATE:	NOVEMBER, 2014

SIDEWALK PROJECT
WEST 19TH STREET FROM LILLIE ST. TO BRYANT BLVD. (U.S. HWY. 87)
DETAIL B

Type 2 Ramp: South corner of
West 19th Street and Brown Street

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STATE OF TEXAS
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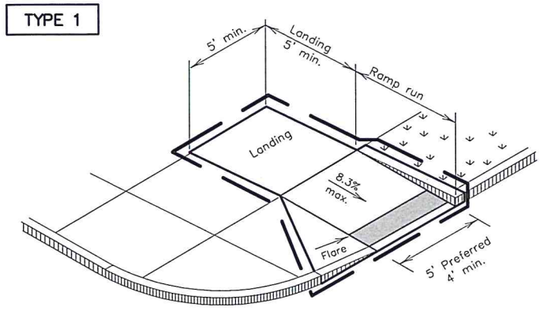
62697
LICENSED PROFESSIONAL ENGINEER

Karl J. Bednarz P.E.
9/25/15

SHEET 13 OF 13

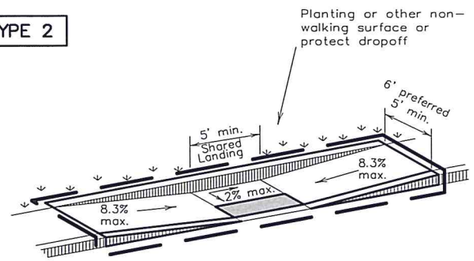
R-1859

TYPE 1



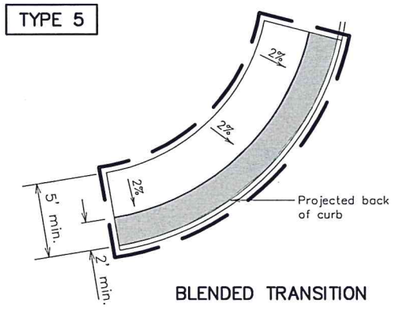
PERPENDICULAR CURB RAMP

TYPE 2



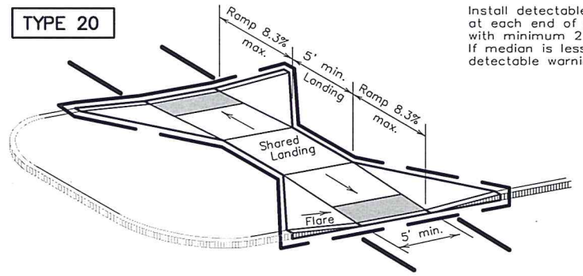
PARALLEL CURB RAMP
(Use only where water will not pond in the landing.)

TYPE 5



BLENDED TRANSITION

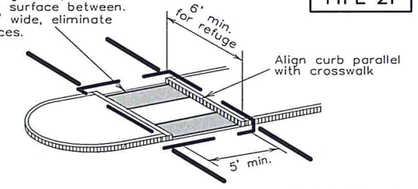
TYPE 20



Install detectable warning surface at each end of cut-through ramp with minimum 2' smooth surface between. If median is less than 6' wide, eliminate detectable warning surfaces.

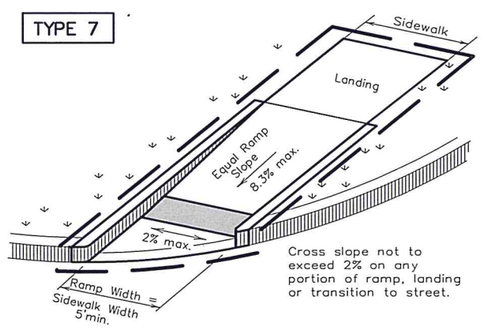
CURB RAMPS AT MEDIAN ISLANDS

TYPE 21



Curb details are shown elsewhere in the plans.

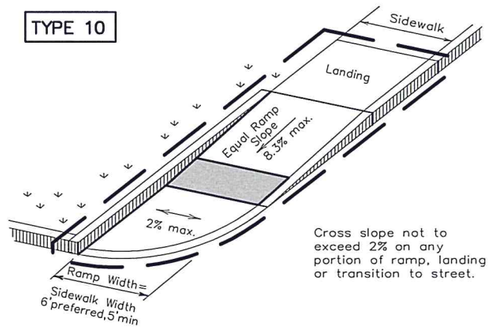
TYPE 7



Cross slope not to exceed 2% on any portion of ramp, landing or transition to street.

(Sidewalk set back from curb)

TYPE 10

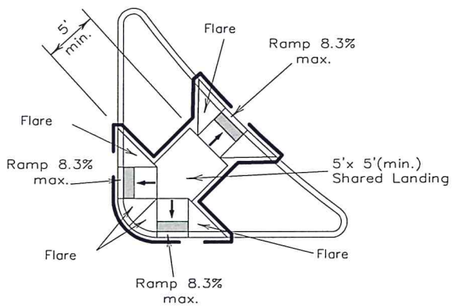


Cross slope not to exceed 2% on any portion of ramp, landing or transition to street.

(Sidewalk adjacent to curb)

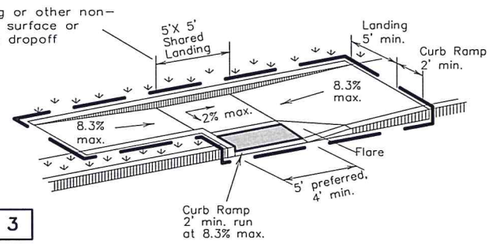
DIRECTIONAL RAMPS WITHIN RADIUS

TYPE 22

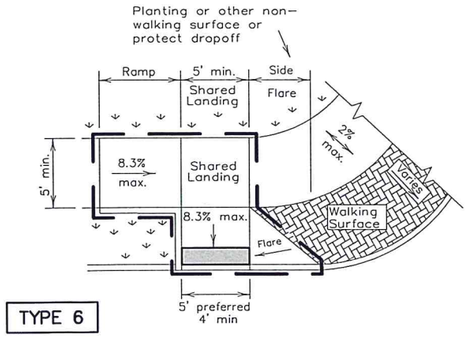


COMBINATION ISLAND RAMPS

TYPE 3

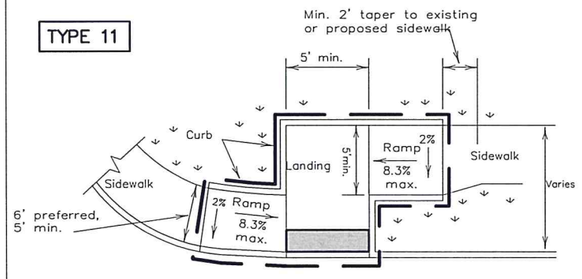


TYPE 6



COMBINATION CURB RAMPS

TYPE 11



OFFSET PARALLEL CURB RAMP

NOTES / LEGEND:

See General Notes on sheet 2 of 4 for more information.

Denotes planting or non-walking surface not part of pedestrian circulation path.

Ramp Limits of Payment

Detectable Warning Surface

DRAWN BY:	KDC
CHECKED BY:	KJB
HORIZONTAL SCALE:	N/A
VERTICAL SCALE:	N/A
JOB NUMBER:	ES-5-14
DATE:	NOVEMBER, 2014

Pedestrian Facilities Curb Ramps

PED-12A

Sheet 1 of 4

THE CITY OF SAN ANGELO, TEXAS

ENGINEERING SERVICES
72 W. COLLEGE AVE.
SAN ANGELO, TX 76903

M-879A

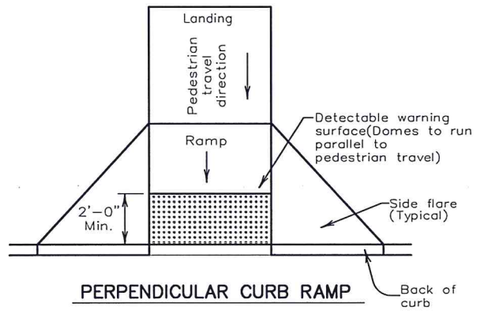
General Notes

Curb Ramps

1. Install a curb ramp or blended transition at each pedestrian street crossing.
2. All slopes shown are maximum allowable. Lesser slopes that will still drain properly should be used. Adjust curb ramp length or grade of approach sidewalks as directed.
3. The minimum sidewalk width is 5'. Where the sidewalk is adjacent to the back of curb, a 6' sidewalk width is desirable. Where a 5' sidewalk cannot be provided due to site constraints, sidewalk width may be reduced to 4' for short distances. 5'x 5' passing areas at intervals not to exceed 200' are required.
4. Landings shall be 5'x 5' minimum with a maximum 2% slope in any direction.
5. Maneuvering space at the bottom of curb ramps shall be a minimum of 4'x 4' wholly contained within the crosswalk and wholly outside the parallel vehicular travel path.
6. Maximum allowable cross slope on sidewalk and curb ramp surfaces is 2%.
7. Provide flared sides where the pedestrian circulation path crosses the curb ramp. Flared sides shall be sloped at 10% maximum, measured parallel to the curb. Returned curbs may be used only where pedestrians would not normally walk across the ramp, either because the adjacent surface is planted, substantially obstructed, or otherwise protected.
8. Additional information on curb ramp location, design, light reflective value and texture may be found in the current edition of the Texas Accessibility Standards (TAS) and 16 TAC 68.102.
9. To serve as a pedestrian refuge area, the median should be a minimum of 6' wide, measured from back of curbs. Medians should be designed to provide accessible passage over or through them.
10. Small channelization islands, which do not provide a minimum 5'x 5' landing at the top of curb ramps, shall be cut through level with the surface of the street.
11. Crosswalk dimensions, crosswalk markings and stop bar locations shall be as shown elsewhere in the plans. At intersections where crosswalk markings are not required, curb ramps shall align with theoretical crosswalks unless otherwise directed.
12. Handrails are not required on curb ramps. Provide curb ramps wherever on accessible route crosses (penetrates) a curb.
13. Curb ramps and landings shall be constructed and paid for in accordance with Item 531 "Sidewalks".
14. Place concrete at a minimum depth of 5" for ramps, flares and landings, unless otherwise directed.
15. Provide a smooth transition where the curb ramps connect to the street.
16. Curbs shown on sheet 1 within the limits of payment are considered part of the curb ramp for payment, whether it is concrete curb, gutter, or combined curb and gutter.
17. Existing features that comply with TAS may remain in place unless otherwise shown on the plans.

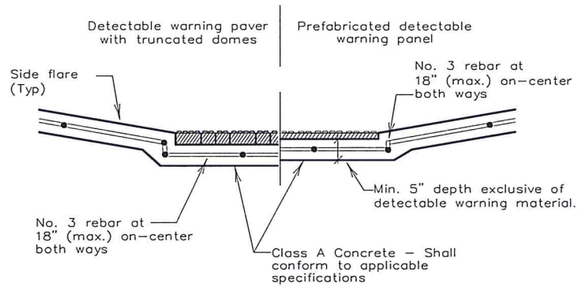
Detectable Warning Material

18. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with Section 705 of the TAS. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material adjacent to uncolored concrete, unless specified elsewhere in the plans.
19. Detectable Warning Materials must meet TxDOT Departmental Materials Specification DMS 4350 and be listed on the Material Producer List. Install products in accordance with manufacturer's specifications.
20. Detectable warning surfaces must be slip resistant and not allow water to accumulate.
21. Detectable warning surfaces shall be a minimum of 24" in depth in the direction of pedestrian travel, and extend the full width of the curb ramp or landing where the pedestrian access route enters the street.
22. Detectable warning surfaces shall be located so that the edge nearest the curb line is at the back of curb. Align the rows of domes to be perpendicular to the grade break between the ramp run and the street. Detectable warning surfaces may be curved along the corner radius.
23. Shaded areas on Sheet 1 of 4 indicate the approximate location for the detectable warning surface for each curb ramp type.

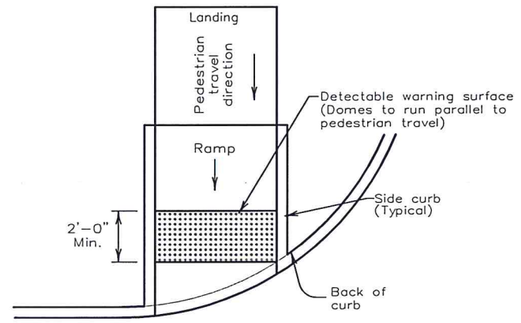


PERPENDICULAR CURB RAMP

Typical placement of detectable warning surface on sloping ramp run.

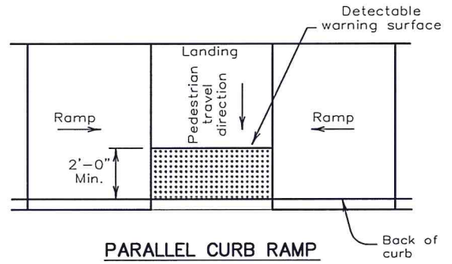


SECTION: CURB RAMP AT DETECTABLE WARNING



DIRECTIONAL CURB RAMP

Typical placement of detectable warning surface on sloping ramp run.



PARALLEL CURB RAMP

Typical placement of detectable warning surface on landing at street edge.

DETECTABLE WARNINGS

Detectable Warning Pavers

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

Sidewalks

26. Provide clear ground space at operable parts, including pedestrian push buttons. Operable parts shall be placed within one or more reach ranges specified in TAS 308.
27. Place traffic signal or illumination poles, ground boxes, controller boxes, signs, drainage facilities and other items so as not to obstruct the pedestrian access route or clear ground space.
28. Street grades and cross slopes shall be as shown elsewhere in the plans.
29. Changes in level greater than 1/4 inch are not permitted.
30. The least possible grade should be used to maximize accessibility. The running slope of sidewalks and crosswalks within the public right of way may follow the grade of the parallel roadway. Where a continuous grade greater than 5% must be provided, handrails may be desirable to improve accessibility. Handrails may also be needed to protect pedestrians from potentially hazardous conditions. If provided, handrails shall comply with TAS 505.
31. Handrail extensions shall not protrude into the usable landing area or into intersecting pedestrian routes.
32. Driveways and turnouts shall be constructed and paid for in accordance with Item "Intersections, Driveways and Turnouts". Sidewalks shall be constructed and paid for in accordance with Item, "Sidewalks".
33. Sidewalk details are shown elsewhere in the plans.

DRAWN BY:	KDC
CHECKED BY:	KJB
HORIZONTAL SCALE:	N/A
VERTICAL SCALE:	N/A
JOB NUMBER:	ES-5-14
DATE:	NOVEMBER, 2014

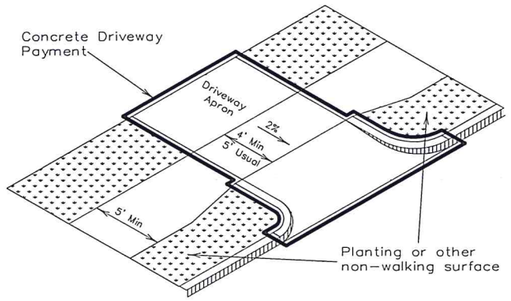
Pedestrian Facilities Curb Ramps

PED-12A

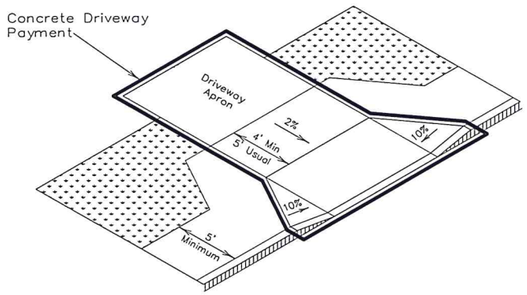
Sheet 2 of 4

THE CITY OF SAN ANGELO TEXAS

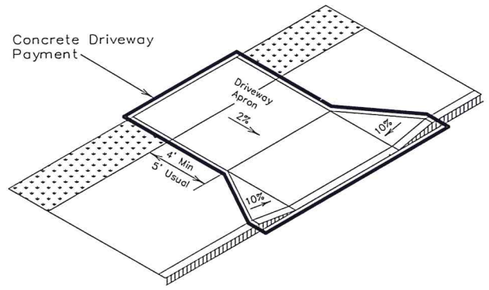
ENGINEERING SERVICES
72 W. COLLEGE AVE.
SAN ANGELO, TX 76903



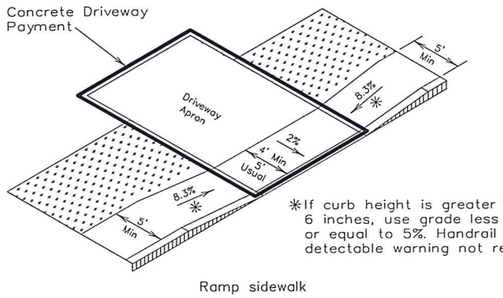
Setback sidewalk



Apron offset sidewalk



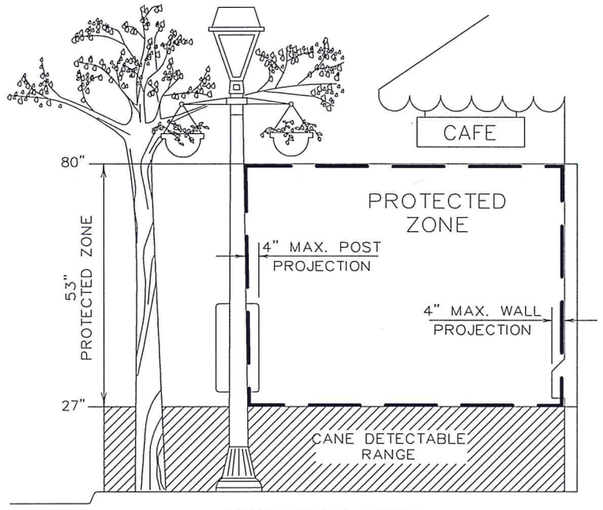
Wide sidewalk



*If curb height is greater than 6 inches, use grade less than or equal to 5%. Handrail and detectable warning not required.

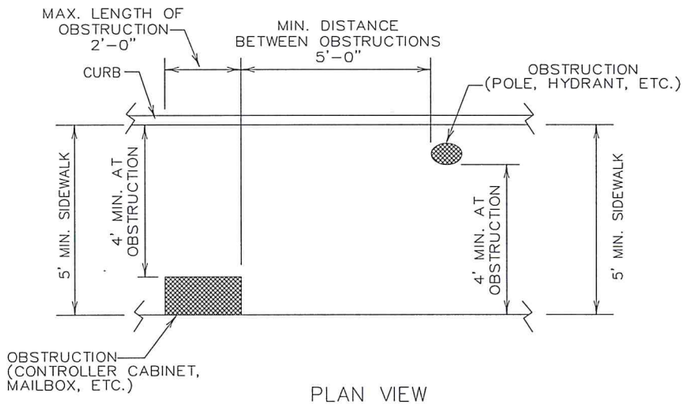
Ramp sidewalk

SIDEWALK TREATMENT AT DRIVEWAYS



PROTECTED ZONE

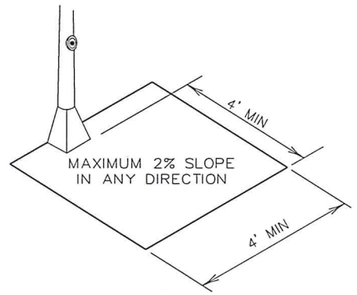
In pedestrian circulation area, maximum 4" projection for post or wall mounted objects between 27"and 80" above the surface.



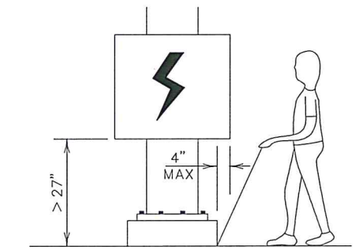
PLAN VIEW

PLACEMENT OF STREET FIXTURES

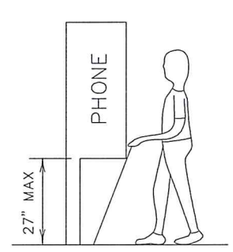
(ITEMS NOT INTENDED FOR PUBLIC USE. MINIMUM 4' x 4' CLEAR GROUND SPACE REQUIRED AT PUBLIC USE FIXTURES.)



CLEAR GROUND SPACE ADJACENT TO PEDESTRIAN PUSH BUTTON



When an obstruction of a height greater than 27" from the surface would create a protrusion of more than 4" into the pedestrian circulation area, construct additional curb or foundation at the bottom to provide a maximum 4" overhang.



Protruding objects of a height ≤ 27" are detectable by cane and do not require additional treatment.

DETECTION BARRIER FOR VERTICAL CLEARANCE < 80"

DRAWN BY:	KDC
CHECKED BY:	KJB
HORIZONTAL SCALE:	N/A
VERTICAL SCALE:	N/A
JOB NUMBER:	ES-5-14
DATE:	NOVEMBER, 2014

Pedestrian Facilities Curb Ramps

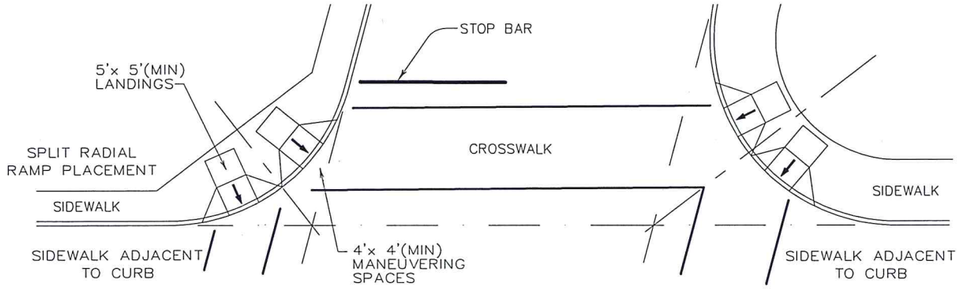
PED-12A

Sheet 3 of 4

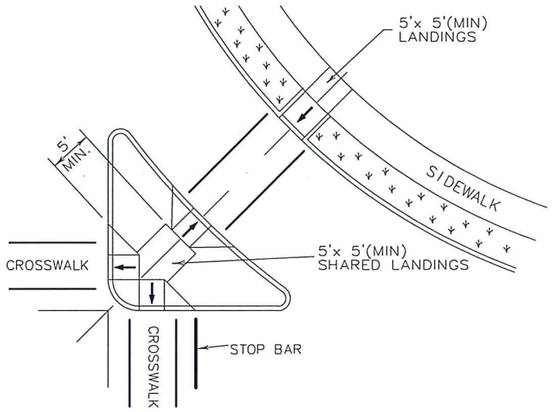
THE CITY OF SAN ANGELO • TEXAS •

ENGINEERING SERVICES
72 W. COLLEGE AVE.
SAN ANGELO, TX 76903

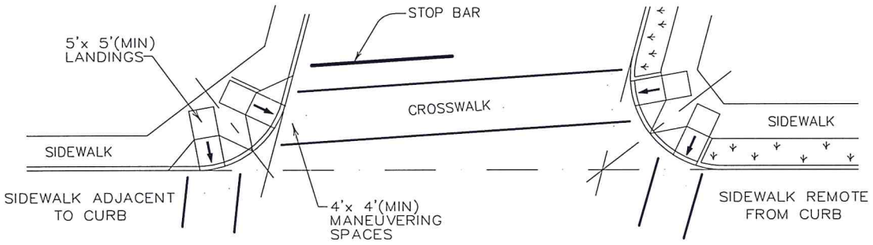
M-879C



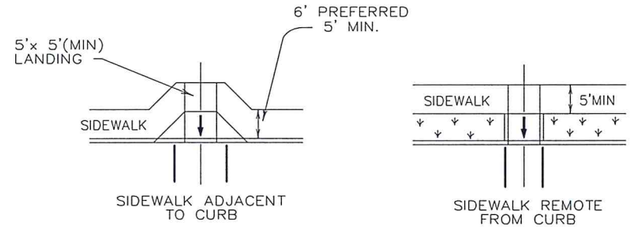
SKEWED INTERSECTION WITH "LARGE" RADIUS



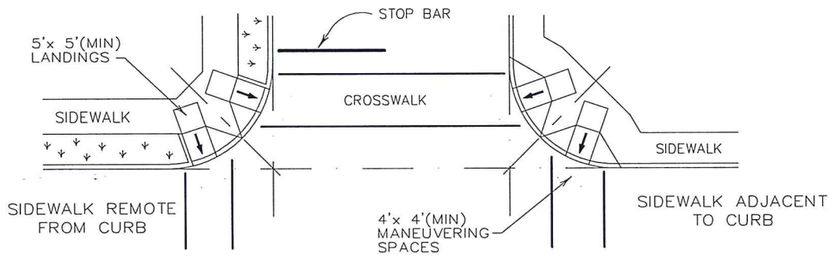
AT INTERSECTION
W/FREE RIGHT TURN & ISLAND



SKEWED INTERSECTION WITH "SMALL" RADIUS



MID-BLOCK PLACEMENT
PERPENDICULAR RAMPS



NORMAL INTERSECTION WITH "SMALL" RADIUS

TYPICAL CROSSING LAYOUTS

DRAWN BY:	KDC
CHECKED BY:	KJB
HORIZONTAL SCALE:	N/A
VERTICAL SCALE:	N/A
JOB NUMBER:	ES-5-14
DATE:	NOVEMBER, 2014

Pedestrian Facilities
Curb Ramps

PED-12A

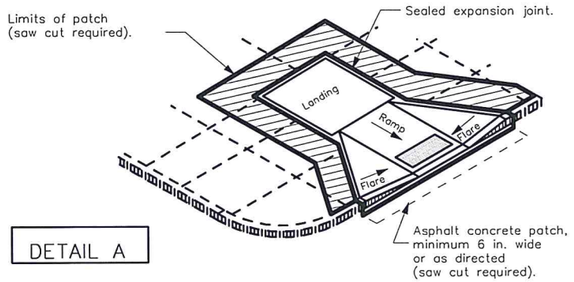
Sheet 4 of 4

ENGINEERING SERVICES
72 W. COLLEGE AVE.
SAN ANGELO, TX 76903

M-879D

NOTES

1. Limits and extent of patch vary. Some locations may not require patch. Construct a formed edge if placing new concrete adjacent to asphalt concrete pavement.
2. Slopes of new concrete and asphalt concrete pavement used to patch adjacent to new curb ramps shall be 2% or less, unless otherwise approved. Adjust patch as directed to avoid obstructions or to remain within right of way limits.
3. Mark and saw cut straight lines at the boundaries of patch. Do not saw cut until the lines are approved.
4. Changes in level greater than 1/4 inch are not permitted.
5. Construct sealed expansion joints and tooled joints in new concrete patch to match locations of existing adjacent joints.
6. Construct sealed expansion joint between curb ramp and concrete patch.
7. Where asphalt concrete pavement is used, place a minimum thickness of two inches on compacted subgrade.

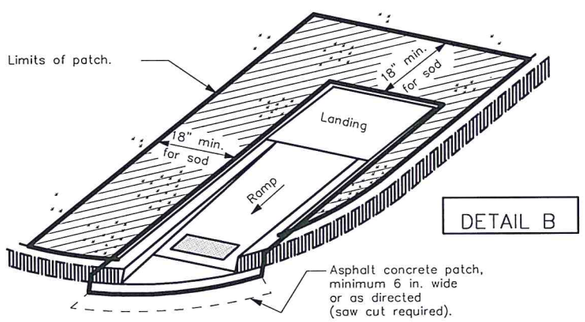


DETAIL A

CURB RAMP RETROFIT WITH ADJACENT CONCRETE OR ASPHALT CONCRETE PAVEMENT SURFACE

NOTES

1. Limits and extent of patch vary. If patch is less than four inches wide, backfill with topsoil, and do not place sod. If patch is more than four inches wide, provide a minimum sod width of 18 inches, unless obstructions exist. Do not create earth slopes steeper than 4:1 adjacent to new curb ramps unless otherwise approved. Adjust patch as directed to avoid obstructions or to remain within right of way limits.
2. Mark the limits of the proposed excavation, and do not excavate until the marks are approved.
3. Construct a formed edge at limits of new concrete.
4. Where earth backfill is required, place imported topsoil or suitable topsoil from adjacent excavations.
5. Where sodding is required, excavate or fill as necessary, then place two inches of imported topsoil. Place block Bermudagrass or St. Augustine sod as directed. Apply vegetative watering on all new sod. Furnish a minimum of ten daily applications of vegetative watering, all within two weeks of initial placement of sod, at a rate of 1/2 inch per application or three gallons per square yard. No vegetative watering is required on days when at least 1/2 inch of rainfall occurs. Place sod only between April 15 and September 15, unless otherwise directed. At all other times of the year, place cellulose fiber mulch seeding in lieu of sod.
6. Remove and/or relocate any existing irrigation system components and plant material that conflict with locations of proposed construction as directed.

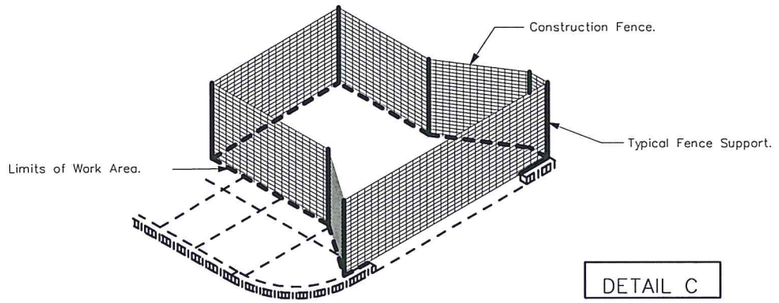


DETAIL B

CURB RAMP RETROFIT WITH ADJACENT GRASS OR UNPAVED SURFACE

NOTES

1. Furnish and install construction fence at end of work day around open excavations and uncured concrete in areas of sidewalk and curb ramp construction.
2. For those ramps that are complete with the exception of placement of pavers, furnish and install temporary compacted fill material in detectable warning area as approved.
3. Place other additional appropriate warning or protective devices as directed for pedestrian safety. Provide access for pedestrians through and around work areas.
4. As directed, furnish and install signs R9-8 "PEDESTRIAN CROSSWALK", R9-9 "SIDEWALK CLOSED", R9-10 "SIDEWALK CLOSED USE OTHER SIDE", R9-11 "SIDEWALK CLOSED AHEAD CROSS HERE", and R9-11a "SIDEWALK CLOSED CROSS HERE." Mount these signs on barricades or sign supports as directed.
5. Construction fence shall be orange plastic, highly visible, four feet high, and as approved.
6. Construction fence supports shall be steel t-posts with safety caps, wooden posts having minimum dimension of 1 1/2 inches, or plastic drums. Embed steel or wooden posts sufficiently as directed. Steel or wooden supports shall extend to top of construction fence. Attach construction fence to supports sufficiently as directed. Do not exceed eight feet between supports. Do not use steel reinforcing bars as supports for construction fence.

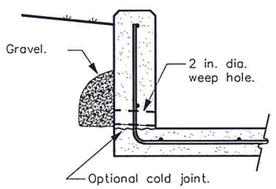


DETAIL C

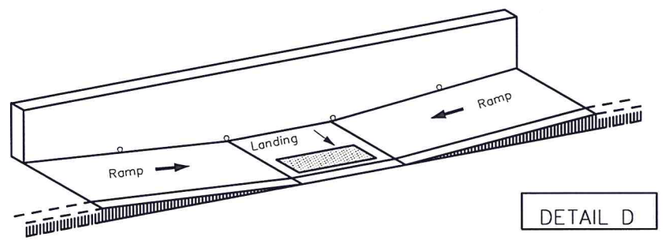
PEDESTRIAN PROTECTION FOR SIDEWALK AND CURB RAMP CONSTRUCTION

NOTES

1. No additional compensation will be made for the extended height wall.
2. Wall shall be 6" thick and shall have 3/4" chamfers. Length and height of wall shall be as shown on the plans or as directed. Maximum height for this wall design is 3 feet. Unless otherwise directed, provide a 2" reveal at top of wall.
3. Place 2" diameter weep holes through lowest exposed portion of wall at maximum 5' spacing. Form with PVC pipe and cut off flush. Place 1 CF of gravel and galvanized hardware cloth at each weep hole.
4. Reinforce wall with #3 uncoated deformed steel reinforcing bars placed 12" on center each way. Provide 2" clear cover for reinforcing. Lap lengths shall be 16" minimum and bends shall be 2.25" minimum inside diameter.
5. Obtain approval of forms before ordering concrete.
6. Place wall concrete in a single, uninterrupted pour. Consolidate thoroughly by the use of immersible vibrators.
7. Remove forms within 24 hours and immediately provide a rub finish to exposed surfaces of wall in accordance with Item 427, "Surface Finishes for Concrete".
8. Backfill the wall with excavated materials or other non-select backfill as approved. Compact as directed.



SECTION THRU WALL

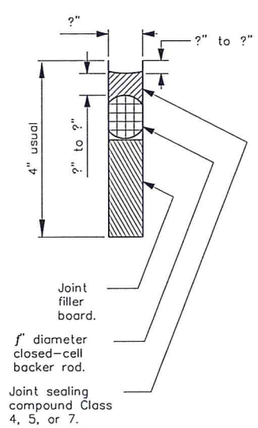


DETAIL D

EXTENDED HEIGHT WALL AT CURB RAMP
Parallel Curb Ramp shown – others similar

GENERAL NOTES

1. The work performed, materials furnished, equipment, labor, tools, and incidentals for patches and pedestrian protection (including all pertinent items described on this sheet) will not be measured or paid directly, but will be considered as included in payment for Item 531, "Sidewalks."
2. Walking surfaces include ramps, landings, flares, and sidewalk and will be denoted in the plans as "concrete" or "asphalt" and require treatment as shown on Detail A. Non-walking surfaces will be denoted in the plans as "sod," "seed," or "unpaved" and require treatment as shown on Detail B.
3. Furnish detectable warning materials that are listed on the Department's "Qualified Detectable Warning Material" list. Furnish only one type of detectable warning for each contract, unless otherwise approved. Engineer will select color of detectable warning materials from manufacturer's standard colors. Provide color samples upon request.
4. Concrete for patches adjacent to new curb ramps shall be four inches thick, non-reinforced, and shall conform to the requirements of Item 421, "Hydraulic Cement Concrete," Class A.
5. Asphalt concrete for patches adjacent to new curb ramps shall be two inches thick and shall conform to the requirements of the following:
   a. Item 330, "Limestone Rock Asphalt Pavement," Type I, Grade C,
   b. Item 334, "Hot-Mix Cold-Laid Asphalt Concrete Pavement," Type D,
   c. Item 340, "Dense-Graded Hot-Mix Asphalt (Method)," Type D,
   d. Item 3224, "Dense-Graded Hot-Mix Asphalt (QC/QA)," Type D, or
   e. Other material as approved.
6. Imported topsoil for patches adjacent to new curb ramps and beneath new sod or seeding shall conform to the requirements of Item 160, "Topsoil."
7. Block sod for patches adjacent to new curb ramps shall conform to the requirements of Item 162, "Sodding for Erosion Control."
8. Cellulose fiber mulch seeding for patches adjacent to new curb ramps shall conform to the requirements of Item 164, "Seeding For Erosion Control." Seed mix shall conform to Table 1, Table 2, Table 3, or Table 4 as directed by the Engineer.
9. Vegetative watering shall conform to the requirements of Item 168, "Vegetative Watering."
10. Acceptable joint sealing compounds are listed on the Department's "Prequalified Joint Sealers" Material/Producer List.
11. Joint filler boards shall conform to the requirements of DMS-6310, "Joint Sealants and Fillers."
12. Furnish and install 4 in. of flexible base under new sidewalks and curb ramps. Flexible base shall conform to the requirements of Item 247, "Flexible Base," Type A, Grade 2 (without minimum strengths or classification). Flexible base used as a foundation for sidewalks and curb ramps will not be measured and paid for separately, but will be considered as included in payment for the pertinent items.
13. Reinforcing steel shall conform to the requirements of Item 440, "Reinforcing Steel."
14. Plastic drums shall conform to the requirements of Standard Sheet BC(8).
15. Compact soils beneath new patch materials as directed.
16. Prior to final inspection by TDLR, remove accumulated sediment at ramps and clean detectable warning surfaces.
17. If approved, perform planing in front of new curb ramp as an alternative to asphalt concrete patch.



SEALED EXPANSION JOINT

DRAWN BY:	KJC
CHECKED BY:	KJE
HORIZONTAL SCALE:	N/A
VERTICAL SCALE:	N/A
FOR THE DIRECTOR:	ES-5-14
DATE:	NOVEMBER, 2014

Curb Ramps Supplementary Information

THE CITY OF SAN ANGELO · TEXAS ·
ENGINEERING SERVICES
72 W. COLLEGE AVE.
SAN ANGELO, TX 76903

SUMMARY OF SMALL SIGNS

SM RD SGN ASSM TY XXXXX(X)XX(X-XXXX)

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN TEXT	DIMENSIONS	ALUMINUM TYPE A	ALUMINUM TYPE G	Post Type: FRP = Fiberglass, TWT = Thin-Wall, 10BWG = 10 BWG, S80 = Sch 80	Posts (1 or 2)	Anchor Type: UA=Univer-Conc, UB=Univer-Bolt, SA=Slip-Conc, SB=Slip-Bolt, WS=Wedge Steel, WP=Wedge Plastic	Mounting Designation: P = Prefab. "Plain", T = Prefab. "T", U = Prefab. "U"	1EXT or 2EXT = # of Ext. BM = Extruded Wind Beam WC = 1.12 #/ft Wing Chan. EXAL= Extruded Aluminum
R-1857B	1	W8-2	DIP	30X30			10BWG	1	SA	T	
R-1857H	2	MS1-1	SCHOOL CROSSWALK (SYMBOL)	30X30			10BWG	1	SA	T	
R-1857I	3	R2-1	SPEED LIMIT 35 (RELOCATE)	24X30			10BWG	1	SA	P	
R-1857K	4	W3-3	SIGNAL LIGHT (SYMBOL)	36X36			10BWG	1	SA	T	
R-1858	5	ER1-1	STOP (RELOCATE)	36X36			10BWG	1	SA	T	
R-1858	6		LANE DESIGNATIONS (RELOCATE)				10BWG	1	SA	T	

ALUMINUM SIGN BLANKS (TYPE A)

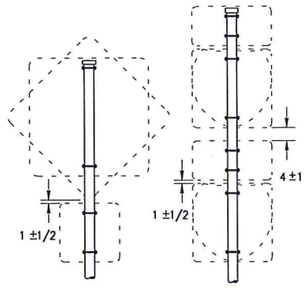
Square Ft.	Min. Thickness
Less than 7.5	0.080"
7.5 to 15	0.100"
Greater than 15	0.125"

Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.

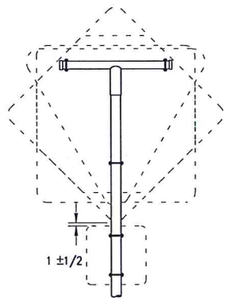
THE CITY OF SAN ANGELO
TEXAS
ENGINEERING SERVICES
72 W. COLLEGE AVE.
SAN ANGELO, TX 76903

Summary of Small Signs

DRAWN BY:	KDC
CHECKED BY:	KJB
HORIZONTAL SCALE:	N/A
VERTICAL SCALE:	N/A
JOB NUMBER:	ES-5-14
DATE:	NOVEMBER, 2014



SM RD SGN ASSM TY XXXXX(1)XX(P)



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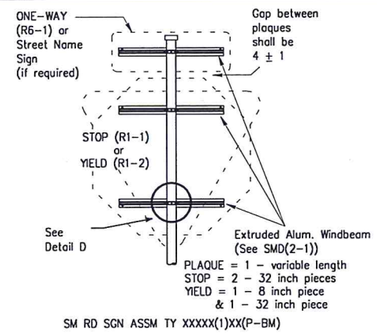
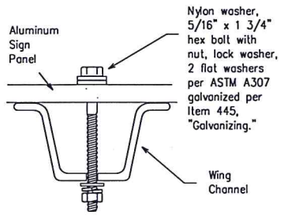
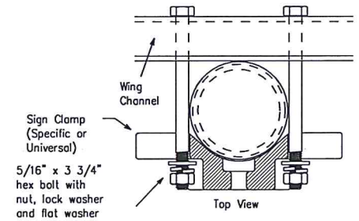


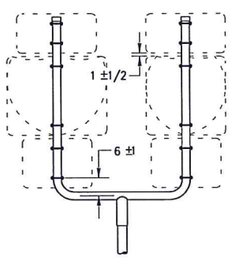
SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



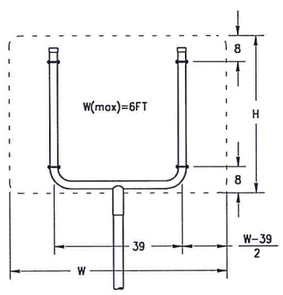
Detail A



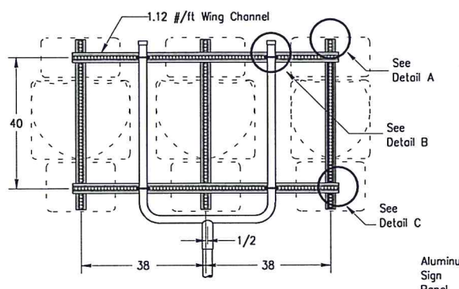
Detail B



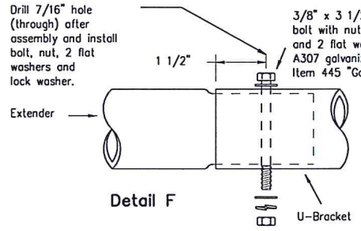
SM RD SGN ASSM TY XXXXX(1)XX(U)



SM RD SGN ASSM TY XXXXX(1)XX(U)

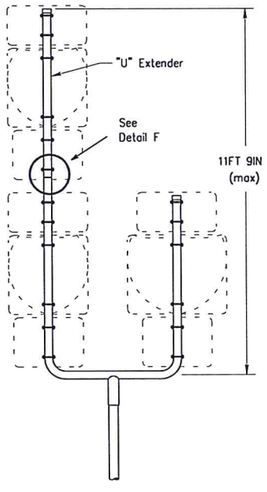


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

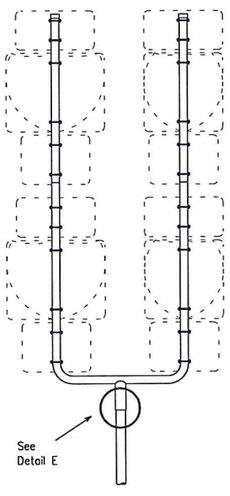


Detail F

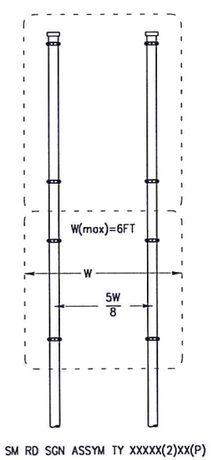
Splices shall only be allowed behind the sign substrate.



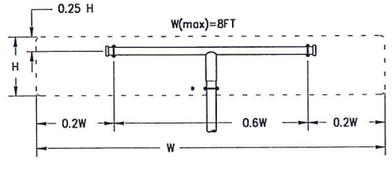
SM RD SGN ASSM TY S80(1)XX(U-1EXT)



SM RD SGN ASSM TY S80(1)XX(U-2EXT)

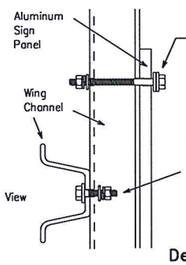


SM RD SGN ASSYM TY XXXXX(2)XX(P)



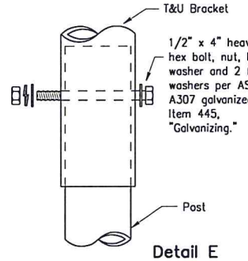
All dimensions are in english unless detailed otherwise.

SM RD SGN ASSM TY XXXXX(1)XX(T)
(* – See Note 12)

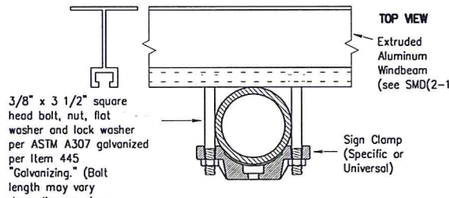


SIDE VIEW

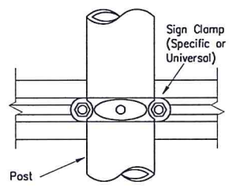
Detail C



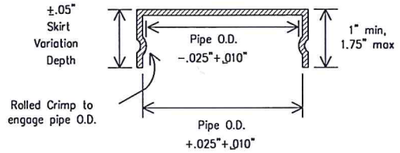
Detail E



Detail D



FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

GENERAL NOTES:

1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

DRAWN BY: KDC
CHECKED BY: KJB
HORIZONTAL SCALE: N/A
VERTICAL SCALE: N/A
JOB NUMBER: ES-5-14
DATE: NOVEMBER, 2014

Sign Mounting Details
Small Roadside Signs
Triangular Slipbase System

SMD(SLIP-2)-08

THE CITY OF SAN ANGELO TEXAS
ENGINEERING SERVICES
72 W. COLLEGE AVE.
SAN ANGELO, TX 76903

M-882A

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.

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

SM RD SGN ASSM TY XXXXX(X)XX(X-XXXX)

Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
TWT = Thin-Walled Tubing (see SMD(TWT))
10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

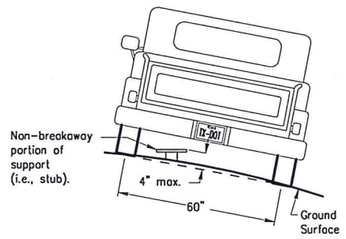
Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
WS = Wedge Anchor Steel - (see SMD(TWT))
WP = Wedge Anchor Plastic (see SMD(TWT))
SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

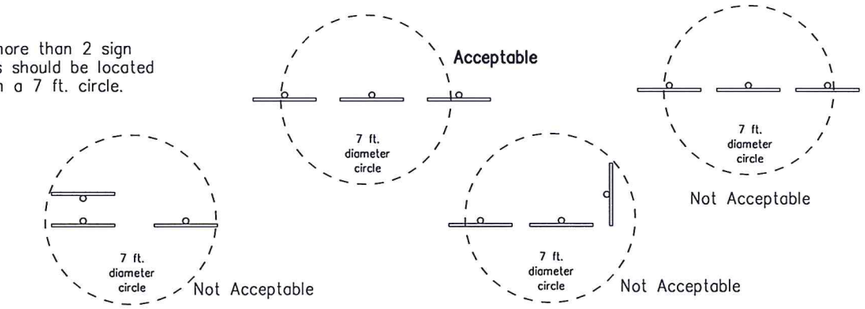
P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-3))

REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



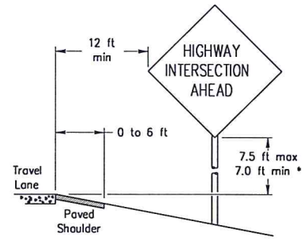
To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

No more than 2 sign posts should be located within a 7 ft. circle.



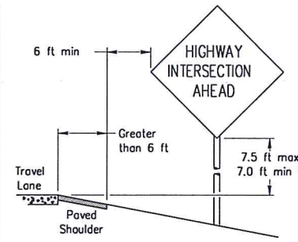
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

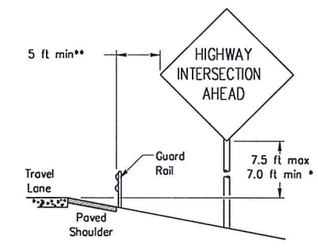
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



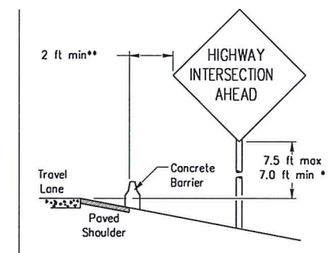
GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

BEHIND BARRIER



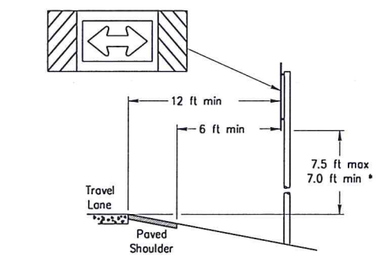
BEHIND GUARDRAIL



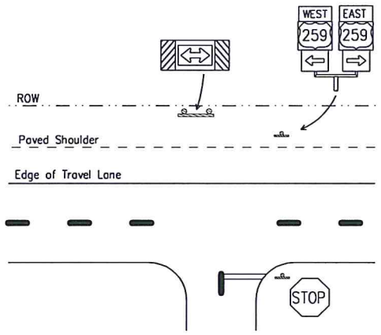
BEHIND CONCRETE BARRIER

**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

T-INTERSECTION



When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

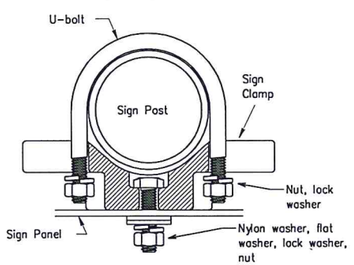
The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

The website address is:
http://www.txdot.gov/publications/traffic.htm

TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

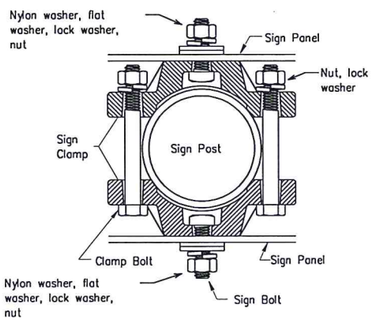


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

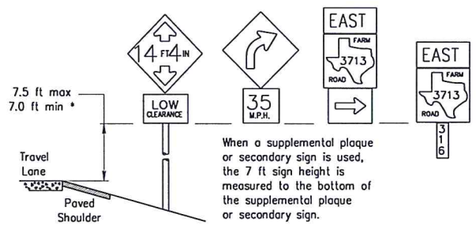
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



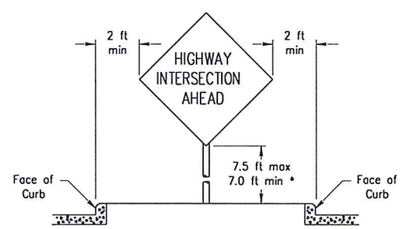
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



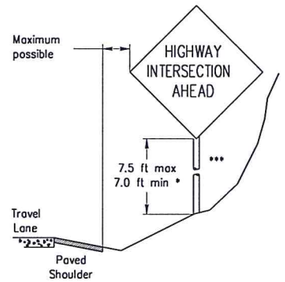
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

DRAWN BY: KDC
CHECKED BY: KJB
HORIZONTAL SCALE: N/A
VERTICAL SCALE: N/A
JOB NUMBER: ES-5-14
DATE: NOVEMBER, 2014

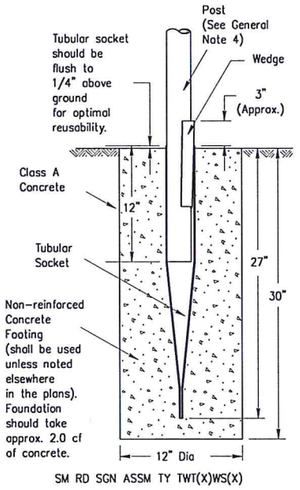
Sign Mounting Details
Small Roadside Signs
General Notes & Details

SMD(GEN)-08

THE CITY OF SAN ANGELO TEXAS
ENGINEERING SERVICES
72 W. COLLEGE AVE.
SAN ANGELO, TX 76903

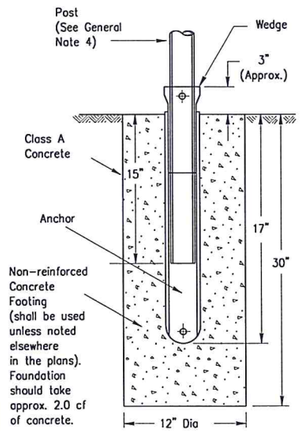
M-882B

Wedge Anchor Steel System



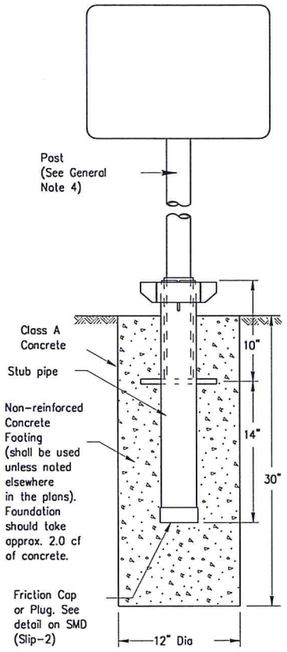
SM RD SGN ASSM TY TWT(X)WS(X)

Wedge Anchor High Density Polyethylene (HDPE) System

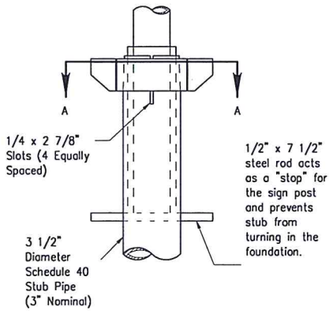


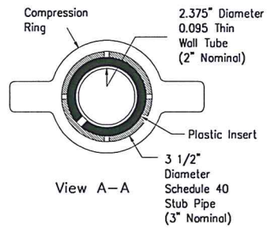
SMD RD SGN ASSM TY TWT(X)WP(X)

Universal Anchor System with Thin-Walled Tubing Post



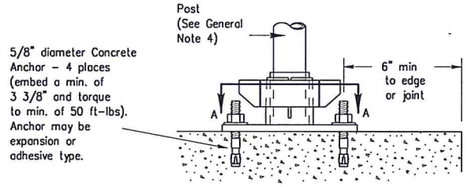
SM RD SGN ASSM TY TWT(X)UA(P)



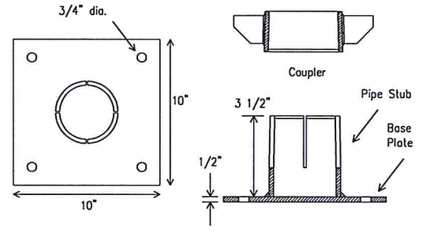


View A-A

Plastic insert must be used when using the TWT with either the Universal Anchor System or the Bolt Down Universal Anchor System. The insert should be approx. 10" long and cover the tubing from just above the top of the stub pipe to the bottom of the sign post when using the Universal Anchor System. The insert should be cut to approx. 4 1/2" when used with the Bolt Down Universal Anchor System.

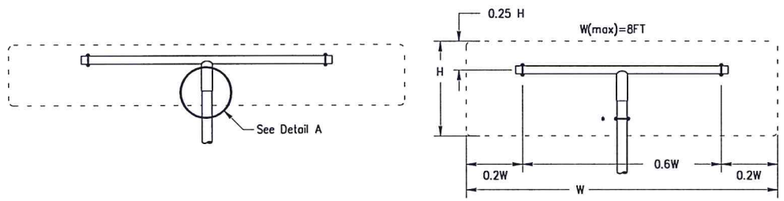


Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized 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, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations.

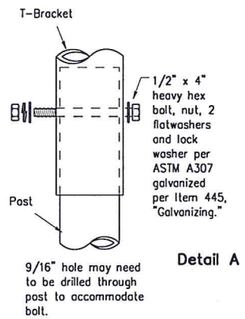


SM RD SGN ASSM TY TWT(X)UB(P)

Sign Installation Using a Prefabricated T-Bracket for Thin-Wall Tubing Post



SM RD SGN ASSM TY TWT(X)XX(T)
(* - See General Note 6)



9/16" hole may need to be drilled through post to accommodate bolt.

Detail A

NOTE

The devices shall be installed per manufacturer's recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. The Wedge Anchor System and the Universal Anchor System with thin wall tubing post may be used to support up to 10 square feet of sign area.
2. The tubular socket, wedge and prefabricated T-bracket shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to the approval of the TxDOT Traffic Standards Engineer.
3. Except for posts (13 BWG Tubing), clamps, nuts and bolts, all components shall be prequalified. A list of prequalified vendors may be obtained from the Material Producer List web page. The website address is: http://www.txdot.gov/business/producer list.htm
4. Material used as post with this system shall conform to the following specifications:
   13 BWG Tubing (2.375" outside diameter) (TWT)
   0.095" nominal wall thickness
   Seamless or electric-resistance welded steel tubing
   Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   Other steels may be used if they meet the following:
   55,000 PSI minimum yield strength
   70,000 PSI minimum tensile strength
   18% minimum elongation in 2"
   Wall thickness (uncoated) shall be within the range of .083" to .099"
   Outside diameter (uncoated) shall be within the range of 2.369" to 2.381"
   Galvanization per ASTM 123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.
5. Sign blanks shall be the sizes and shapes shown on the plans.
6. Additional sign clamp required on the "T-bracket" post for 24" high signs. Place clamp at least 3" above bottom of sign when possible.
7. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
8. See the Traffic Operations Division website for detailed drawings of sign clamps and Wedge Anchor System components. The website address is: http://www.txdot.gov/publications/traffic.htm

WEDGE ANCHOR SYSTEM INSTALLATION PROCEDURE

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. Place concrete into hole until it is approximately flush with the ground. Concrete shall be Class A.
3. Insert tubular socket into concrete until top of socket is approximaely 1/4 " above the concrete fooling.
4. Plumb the socket. Allow a minimum 4 days for concrete to set, unless otherwise directed by Engineer..
5. Attach the sign to the sign post.
6. Insert the sign post into socket and align sign face with roadway.
7. Drive the wedge into the socket to secure post. This will leave approximately 3 inches of the wedge exposed.

UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURE

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. Insert base post in hole to depths shown and backfill hole with concrete.
3. Level and plumb the base post using a torpedo level and allow concrete adequate time to set. The bottom of the slots provided in the stub pipe shall remain above the top of the concrete foundation.
4. Attach the sign to the sign post.
5. Install plastic insert around bottom of post.
6. Insert sign post into base post. Lower until the post comes to rest on steel rod.
7. Seat compression ring using a hammer. Typically, the top of compression ring will be approximately level with top of stub post when optimally installed.
8. Check sign post by hand to ensure it is unable to turn. If loose, increase the tightening of the compression ring.

DRAWN BY:	KDC
CHECKED BY:	KJB
HORIZONTAL SCALE:	N/A
VERTICAL SCALE:	N/A
JOB NUMBER:	ES-5-14
DATE:	NOVEMBER, 2014

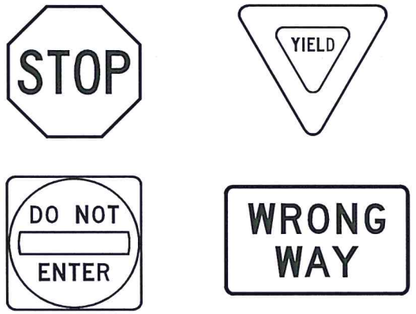
Sign Mounting Details
Small Roadside Signs
Wedge & Universal Anchor With Thin Wall Tubing Post

SMD(TWT)-08

THE CITY OF SAN ANGELO · TEXAS ·
ENGINEERING SERVICES
72 W. COLLEGE AVE.
SAN ANGELO, TX 76903

M-882C

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS
(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

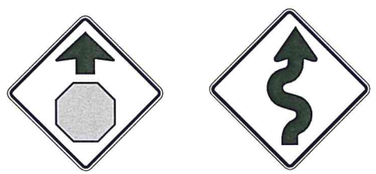
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS
(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND,BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND,BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B OR C SHEETING (FL)
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B OR C SHEETING (FL)
LEGEND,BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

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

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

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

http://www.txdot.gov/

DRAWN BY:	KDC
CHECKED BY:	KJB
HORIZONTAL SCALE:	N/A
VERTICAL SCALE:	N/A
JOB NUMBER:	ES-5-14
DATE:	NOVEMBER, 2014

Traffic Sign Requirements

TSR(4)-08

ENGINEERING SERVICES
72 W. COLLEGE AVE.
SAN ANGELO, TX 76903

M-883