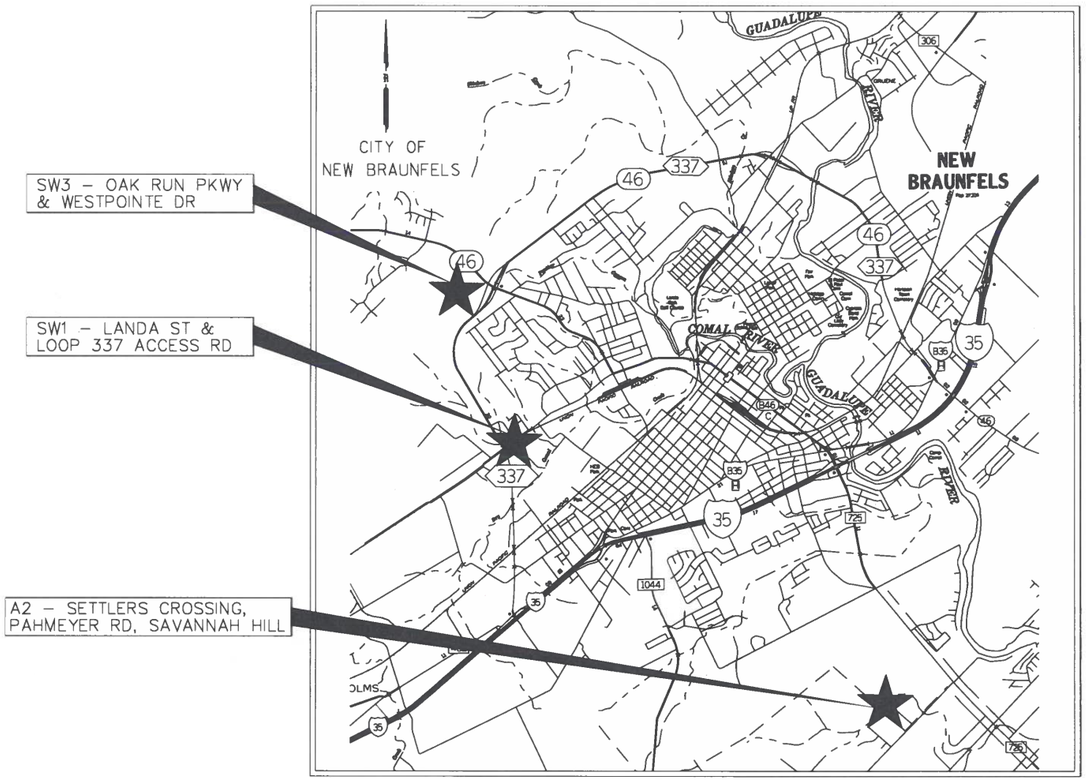
PROJECT NO.	SHEET NO.
NB 22-172	1

TRANSPORTATION AND CAPITAL IMPROVEMENTS

CITY OF NEW BRAUNFELS CITYWIDE PEDESTRIAN IMPROVEMENTS

NEW BRAUNFELS EDC

PACKAGE 2 - A2, SW1 & SW3
(FINAL BID SET)
JUNE 2024



Notes:

1. SIDEWALK PROJECTS THROUGH OUT THE CITY OF NEW BRAUNFELS

2. PROJECT LIMITS FOR PACKAGE 2:
   A. PROJECT SW1 - LANDA STREET AND LOOP 337 ACCESS RD
   B. PROJECT SW3 - OAK RUN PARKWAY AND WESTPOINTE DRIVE
   C. PROJECT A2 - SETTLERS CROSSING, PAHMEYER RD, SAVANNAH HILL CIRCLE

INDEX OF SHEETS

PREPARED FOR

City of New Braunfels

PREPARED BY

BAIN MEDINA BAIN, INC.
ENGINEERS & SURVEYORS
TBPE F-001712
7073 San Pedro
San Antonio, Texas 78216
210-494-7223

BMB PROJECT NO. C-1638.02

STATE OF TEXAS
CARL BAIN
56996
REGISTERED
PROFESSIONAL ENGINEER

7/2/2024

"REGISTERED ACCESSIBILITY SPECIALIST INSPECTION REQUIRED"
"TDLR NO. _____"

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City of New Braunfels
General Notes (revised March 2023)

General

1. All work shall conform to the Texas Department of Transportation (TxDOT) Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges, November 2014, and the City of New Braunfels details and standards.
2. All work shall be performed in accordance with all applicable federal, state, and local laws, regulations, and ordinances.
3. The contractor shall always maintain a copy of the latest contract construction plans and specifications on-site.
4. The contractor shall obtain all permits and inspections required to complete the work (no separate pay item).
5. The contractor shall provide an emergency telephone number for evenings, weekends, and holidays before construction. The contractor shall respond to the city within two hours of the initial contact.
6. The contractor's personnel, including subcontractors, shall always wear identifying clothing or hats on-site.
7. The contractor shall field verify and protect all existing utilities prior to construction. The contractor shall comply with Texas excavation laws, contact Texas-811 72 hours before any work in the area, and maintain current locates throughout the project. The contractor shall coordinate all work individually with adjacent utilities in the area, including but not limited to: CenterPoint Energy (gas), NBU electric, NBU water, AT&T communications, Spectrum cable, City Public Works Department, City Fire Department, and TxDOT.
8. The contractor shall preserve all survey monuments and site markings provided. The contractor shall be responsible for all construction staking required for the successful completion of the project.
9. The contractor shall verify project elevations. The term "match existing" shall signify both horizontal and vertical alignment.
10. The contractor shall prepare a construction phasing plan detailing limits of construction for each phase. The phasing plan shall be submitted to the city for approval prior to construction. The contractor will not be allowed to work out of phase unless written approval has been obtained from the city for the phase change. The phasing plan shall include traffic control and haul routes.
11. The contractor is responsible for all subsidiary work and the means and methods necessary to complete the project.
12. The contractor shall provide written notification to the city and design engineer of discrepancies between the construction plans and specifications. The more stringent requirements shall govern unless otherwise directed in writing by the city.
13. The contractor shall provide written notification to the city and design engineer of discrepancies between the site conditions and the construction plans prior to construction. The contractor shall assume full responsibility for all necessary revisions due to failure to give such notification.

Site:

1. The contractor shall assume sole and complete responsibility for job site conditions during the construction of the project, including the security and safety of all persons and property; this requirement shall apply continuously and not be limited to normal working hours.
2. The contractor shall keep all areas within and adjacent to construction areas free from overgrown vegetation and all construction debris and be safe for pedestrian and vehicle traffic before, during, and after construction.
3. The contractor shall implement best management practices regarding dust, dirt, and erosion control. Contractor may be responsible for additional mitigation upon request of owner. The street pavement, driveways, sidewalks, and walkways within and adjacent to the project shall be swept free of mud and all debris removed from the work area daily.
4. The contractor shall install and maintain the project sign in accordance with city standards and specifications.
5. The contractor shall remove, protect, relocate, or reinstall items requested by the city as directed by the owner.
6. The contractor shall repair any damage caused by the contractor outside of the designated work area. Any existing off-site improvements that are damaged or undercut by the contractor's operations shall be repaired or replaced as directed by the engineer and approved by the city the existing improvements at the contractor's expense (no separate pay item).
7. The contractor shall remove all waste materials. The city shall approve the location for the disposal of construction materials prior to construction. The contractor shall not place any waste material in the 100-year flood plain. No waste materials shall be placed in existing lows that will block or alter flow limits of existing or natural drainage.
8. Drainage improvements sufficient to mitigate the impact of construction shall be installed prior to adding impervious cover. All drainage improvements shall begin at the outfall to ensure positive drainage throughout construction.
9. The contractor shall maintain a safe, drivable surface free from potholes, rutting, and hazardous conditions throughout the project.

Erosion control:

1. The contractor shall develop and implement a Stormwater Pollution Prevention Plan (SW3P) and submit it to the city prior to construction. The SW3P shall include all disturbed areas by the construction, including borrow, staging, and storage areas. The SW3P with required inspection reports must be kept up to date and kept on the construction site at all times. The contractor shall prepare a Notice of Intent (NOI) and secure a permit from Texas Commission on Environmental Quality (TCEQ) for large construction sites of 5 or more acres of disturbed area with a copy of the NOI and the required construction site notice posted at the construction entrance in clear view of the public during the construction. For large construction sites, after the site is 70% or greater stabilized so that there is no further danger of erosion and sedimentation pollution from the site disturbed areas, the contractor must prepare and submit a Notice of Termination (NOT) to TCEQ. A copy of the NOI and not must be submitted to the city for each project. See TCEQ regulations for SW3P requirements.
2. All erosion control measures shall be in place prior to any construction activities. The erosion control measures shall remain in place and functional until after the proposed improvements are in place and vegetation is established. The contractor is ultimately responsible for effectively controlling erosion and sedimentation.
3. Adjustments and repairs to the erosion control devices shall be made as needed at the contractor's expense.
4. Stabilized construction area shall be constructed of 3 in x 5 in rock to be placed at a minimum length of 25 ft and maintained so that construction debris does not fall within the city right-of-way. The right-of-way must be cleared of mud, rocks, dust, etc., at all times.
5. Seed/sod shall be furnished to establish ground cover over all disturbed areas as required by the contract documents. The contractor shall not wait until the completion of the entire project before doing this work. The project shall not be considered for acceptance by the city unless the establishment of 80% ground cover is ensured. Seeding to establish vegetation within constructed earthen channels, basins and disturbed areas shall be conducted per Item 164 (seeding for erosion control of TxDOT's Standard Specifications). Only seed types and mixes specified for the San Antonio District (District 15) in tables 1 and 2 under Item 164 shall be utilized. During the cool season (Sept 1-Nov 30), cereal rye and seed species specified for the San Antonio District in table 3 may be used.
6. It may be deemed necessary to incorporate topsoil and soil amendments (i.e., compost/ fertilizer) into existing soil in order to facilitate vegetation growth. Topsoil, compost, and fertilizer additions shall be conducted according to Items 160, 161 and 166 of TxDOT's Standard Specifications.
7. Areas requiring permanent vegetation (earthen channels, ponds, etc.) are required to meet Item 160 of TxDOT's Standard Specifications. Testing per TEX-128-E may be required at the city's request.
8. Watering may be necessary to facilitate and expedite the sprouting and growth of vegetation. Item 168 of TxDOT's Standard Specifications shall be adhered to for vegetative watering.
9. If extended drought conditions exist that hinder or prohibit the growth and establishment of vegetation, the contractor shall provide a plan to the city describing the measures that will be taken to stabilize earthen drainage infrastructure until a time when growing conditions become more favorable.

Traffic:

1. The contractor shall be responsible for ensuring that all traffic control devices and barricades are properly installed and maintained in accordance with the plans, specifications, and Texas Manual on Uniform Traffic Control Devices (TXMUTCD).
2. These notes do not, in and of themselves, constitute a traffic control plan. In the event that these plans do not include traffic control, or that the contractor wishes to vary from traffic control included with the construction plans, the contractor shall submit a traffic control plan to the city for review and approval prior to construction. The city inspector and engineering representative will only be responsible to inspect the traffic control devices and barricades. If, in the opinion of the city inspector or engineering representative, the traffic control devices do not conform to established standards or are incorrectly placed or are insufficient in quantity to protect the general public, the city inspector shall have the option to stop construction operations at no expense to the city until such time as the conditions are corrected by the contractor.
3. The contractor shall notify the city immediately if there is any conflict between the TXMUTCD and traffic control requirements within the contract documents.
4. If the need arises, the city inspector or engineering representative may require the relocation and additional traffic control devices and barricades at the contractor's expense.
5. The contractor shall notify TxDOT, county, adjacent city, and private owner prior to working at their owned or maintained roadway and intersection.
6. For all road closure requests, the contractor shall submit and obtain City approval of a traffic control plan and work schedule at least two (2) weeks prior to commencing work associated with the road closure.
7. Work around schools shall be scheduled to minimize impacts to the school. Streets and access shall not be closed during the time students are being dropped off and picked up from school. Work within a school zone can only occur between the hours of 9 am and 3 pm as approved by the city.
8. The contractor shall provide access for the delivery of mail by the U.S. Postal Service, and collection of solid waste and recycling, whether public or private.
9. The contractor shall always maintain access to all commercial and residential driveways. The contractor shall provide a 48-hour minimum notice to property owners and the city before any driveway access modification.
10. During asphalt overlay, the contractor shall allow resident traffic access to the street with proper guidance, direction, flagger and traffic control and only at such time that damage will not occur to the new asphalt overlay or to the vehicles.
11. The contractor shall keep all traffic control devices, barricades, and reflective markings free from dust and debris. The contractor shall clean the devices monthly and at the direction of the city.

Utilities:

1. The existence and location of underground utilities indicated on the plans are taken from available records and are not guaranteed. The location and depth of existing utilities are approximate only and shall be investigated and verified by the contractor before starting work. The contractor shall be held responsible for any damage to and for the maintenance and protection of the existing utilities whether shown or noted on the plans, including but not limited to existing water, sanitary sewer, gas, storm sewers, electric and telecommunication lines, and services.
2. The contractor shall verify the location of all utilities three (3) weeks minimum in advance of all work activities.
3. In the event of damage to underground facilities, whether shown or not in the plans, the contractor shall make necessary repairs to restore the facility back in service and at no cost to the city. Repairs shall conform to the requirements of the utility or agency servicing the facility.
4. The contractor shall coordinate with and gain approval from the utility company owning the facility prior to relocation or adjustment as required for conformance to project alignment or grades. Adjustment of all existing manholes, that remain in service to project grades shall be the contractor's responsibility.
5. Occupational Safety and Health Administration (OSHA) regulations prohibit operations that will bring persons or equipment within an energized line. Where workers and/or equipment have to work close to an energized electrical line, the contractor shall notify the electrical power company involved and make whatever adjustments necessary to ensure the safety of those workmen.
6. Due to Federal Regulations, gas companies must always maintain access to gas valves. The contractor must protect and work around any gas valves that are in the project area.
7. The contractor will abide by all applicable federal, state, and local laws governing excavation. The contractor and the contractor's independently retained employee or safety consultant shall implement a trench safety program in accordance with OSHA standards governing the presence and activities of individuals working in and around trench excavation.
8. All utility trench fill material shall be placed in uniform layers not to exceed 12 in. loose outside of pavement and 6 in. loose under pavement. Determine the maximum lift thickness based on the ability of the compacting equipment to adequately meet the required density. Each layer of material shall be compacted to 95% density, ± 2% optimum moisture as determined by test methods TEX-113-E, TEX-114-E, TEX-115-E. Density tests shall be taken at a minimum of 100 linear feet intervals for each lift as determined by the city inspector.

STATE OF TEXAS
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City of New Braunfels

TRANSPORTATION AND CAPITAL IMPROVEMENTS

PACKAGE 2 - A2-SETTLERS XING, SW1-LANDA ST, SW3-OAK RUN PKWY
GENERAL NOTES

	PROJECT NO.	SHEET
	NB 22-172	2

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9. The contractor shall notify the city inspector 48 hours prior to the backfill of any utility trenches to schedule density tests as required.

Tree protection:

1. The contractor shall protect all trees within the project limits and trees outside the project limits that the project may impact.
2. No utility or street excavation work shall begin in areas where tree preservation and treatment measures have not been completed and approved.
3. Tree protection fencing shall be required, and tree protection fencing shall be installed, maintained, and repaired by the contractor during site construction.
4. Exposed roots shall be covered at the end of the day using techniques such as covering with soil, mulch or a root protection zone will be established around each tree or any vegetation to be preserved. A root protection zone shall be an area defined by the radius extending outward from the trunk of tree a distance of 1 ft per diameter inch of the tree radius at breast height of 4.5 ft. As an example, a 10 in diameter tree would have a 10 ft radius root protection zone around the tree.
5. No equipment, vehicles or materials shall operate or be stored within the root protection zone of any tree near the project. No clean-out areas shall be constructed so that the material will be in or adjacent to the root protection zone.
6. Roots or branches in conflict with the construction shall be cut cleanly according to TxDOT Roadside Vegetation Maintenance Manual. All oak wounds shall be painted over within 30 minutes to prevent oak wilt.
7. Trees must be maintained in good health throughout the construction process. Maintenance may include watering the root protection zone and or washing foliage.
8. No wires, nails or other materials may be attached to the protected trees.
9. Trees, which are damaged or lost due to the contractor's negligence during construction, shall be mitigated to the city's satisfaction.
10. Trees, tree limbs, bushes and shrubs located in the city street or alley right-of-way or permanent easements which interfere with the proposed construction activities may be neatly trimmed by the contractor only after approval from the city inspector. There shall be no separate pay for additional cost or effort incurred by the contractor where required to work around and/or under existing trees or for the removal of additional branches and shrubs.
11. Saplings, shrubs, or bushes to be cleared from the protected root zone area of a large tree shall be removed by hand as designated by the city inspector.

Roadway:

1. All roadway compaction tests shall be coordinated with the city inspector. Flexible base or fill material shall be placed in uniform layers not to exceed 6 in compacted. Each layer of material, inclusive of subgrade, shall be compacted as specified and tested for density and moisture in accordance with test methods TEX-113-E, TEX-114-E, TEX-115-E. The number and location of required tests shall be determined by the geotechnical engineer and approved by the city inspector. At a minimum, tests shall be taken every 100 linear feet for each lift. Upon completion of tests, the geotechnical engineer will provide the city inspector with all testing documentation and a certification stating that the placement of flexible base, fill material, and subgrade has been completed per the contract documents.
2. The contractor shall provide a 48-hour minimum notice to the city inspector prior to any work requiring material testing.
3. The contractor shall schedule a pre-pave inspection and coordination meeting 72 hours prior to placing asphalt.
4. Unless noted otherwise in the contract documents, asphaltic concrete pavement shall be Type "D" hot mix asphalt as defined in TxDOT's standard specifications.
5. The city will not accept the use of recycled asphalt pavement (RAP) or recycled asphalt shingles (RAS) in asphalt mixtures for new roadways. Any debris inclusions within new asphalt pavements will result in asphalt removal and replacement from curb to curb for limits to be determined by the city.
6. The asphaltic concrete surface course shall be plant mixed, hot laid Type "D" meeting the specification requirements of TxDOT Item 340. The mix shall be designed for stability of at least 35 and shall be compacted to between 92 and 97 percent of the maximum theoretical density as determined by TxDOT test method TEX-227-F. The asphalt cement content by percent of total mixture weight shall fall within a tolerance of +0.5 percent from a specific mix design.
7. A TxDOT Type II B-B blue reflective raised pavement marker shall be installed in the center of the roadway adjacent to all fire hydrants. In locations where hydrants are situated on corners, blue reflective raised pavement markers shall be installed on both approaches which front of the hydrant. The raised pavement marker shall meet TxDOT material, epoxy, and adhesive specifications.
8. All concrete for flatwork, including curb and gutter, sidewalks, and driveways, shall be Class A with a minimum compressive strength of 3,000 psi. Material testing methods and frequency shall be as described in Item 421 of the TxDOT standard specifications.

Groundwater:

1. It shall be the responsibility of the contractor to immediately notify the city if the presence of groundwater within the site is evident. Upon notification, the project engineer shall respond with plan revisions for the mitigation of the groundwater issue. The city shall respond within two (2) business days upon receipt of the mitigation plan. All construction activity impacted by the discovery of groundwater shall be suspended until the city grants written approval for the groundwater mitigation plan.

Development:

1. The engineer of record is responsible for the adequacy of the construction plans and meeting all professional practice requirements of applicable federal, state, and local statutes, codes, regulations, rules, ordinance, or standards for the project.
2. The contractor shall contact the City of New Braunfels to schedule a preconstruction meeting before construction.
3. For public infrastructure or grading permits:

a. The contractor shall coordinate material testing and inspections with the project inspector before 12 pm and a minimum of 48 hours before the requested inspection as outlined in the pre-construction meeting.

b. Each inspection request is allotted one (1) hour unless additional time is requested.

4. For commercial permits:

a. The contractor shall coordinate inspection requests with the Building Department as outlined by the approved permit.

b. Each inspection request is allotted one (1) hour unless additional time is requested.

5. Approval of the construction plans and associated permit is invalid if construction has not commenced within-one year of construction plan approval.
6. Stabilized construction area shall be constructed of 3 in x 5 in rock to be placed a minimum length of 25 ft and maintained so that construction debris does not fall within the city right-of-way. Right-of-way must be cleared from mud, rocks, etc. at all times.
7. The engineer of record is responsible for the erosion and stormwater control design to mitigate off-site impacts in all phases of construction.
8. The contractor is responsible for installing improvements sufficient to mitigate the impact of drainage and stormwater runoff during construction.
9. The elevation of the lowest floor shall be at least 10 in above the finished grade of the surrounding ground, which shall be sloped in a fashion so as to direct stormwater away from the structure. Properties adjacent to stormwater conveyance structures must have floor slab elevation or bottom of floor joists a minimum of one foot above the 100-year water flow elevation in the structure. Driveways serving houses on the downhill side of the street shall have a properly sized cross swale preventing runoff from entering the garage.
10. Proctors shall be sampled from on-site material (on-site is defined as limits of construction for the construction plans). The City inspector shall be present for material sampling and a copy of the proctor results shall be delivered to the city inspector prior to any density tests.
11. The contractor shall ensure that sidewalks, curb ramps, and driveways are built in accordance with Americans with Disabilities Act (ADA) standards.
12. No valves and hydrants shall be constructed within sidewalks, curbs, curb ramps, and driveways.
13. The contractor shall furnish and install all regulatory and warning signs, street name signs, and sign mounts in accordance with the construction plans.
14. The contractor shall install all pavement markings in accordance with the construction plans. The contractor shall notify the city inspector at least 48 hours before the installation of all sealer and final markings.

When all of the improvements are found to be constructed and completed in accordance with the approved plans and specifications, and upon receipt of one set of "Record Drawing" plans, and a digital copy of all plans (PDF copy) the city shall accept such improvements subject to the guaranty of material and workmanship provisions required by city code.

STATE OF TEXAS
CARL BAIN
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PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROV.

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City of New Braunfels

TRANSPORTATION AND CAPITAL IMPROVEMENTS

PACKAGE 2 - A2-SETTLERS XING, SW1-LANDA ST, SW3-OAK RUN PKWY

GENERAL NOTES

PROJECT NO.	SHEET
NB 22-172	2A

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SW1 - PROJECT QUANTITIES SUMMARY

Bid Item	Description	Unit	Sheet 9
0104 6009	REMOVING CONC (RIPRAP)	SY	5
0104 6015	REMOVING CONC (SIDEWALKS)	SY	28
0104 6021	REMOVING CONC (CURB)	LF	132
0160 6003	FURNISHING AND PLACING TOPSOIL (4")	SY	50
0162 6002	BLOCK SODDING	SY	50
0168 6001	VEGETATIVE WATERING	MG	1
3076 6001	D-GR HMA TY-B PG64-22 (5 IN)	TON	5
3076 6040	D-GR HMA TY-D PG70-22 (2 IN)	TON	2
0340 6272	TACK COAT	GAL	17
0432 6002	RIPRAP (CONC)(5 IN)	CY	1
0529 6001	CONC CURB (TY I)	LF	191
0529 6015	CONC CURB (TY C1)	LF	32
0531 6001	CONC SIDEWALKS (4")	SY	75
0531 6005	CURB RAMPS (TY 2)	EA	1
0531 6010	CURB RAMPS (TY 7)	EA	1
0531 6017	CURB RAMPS (TY 22)	EA	1
0644 6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	2
0658 6100	INSTL OM ASSM (OM-2Z)(WFLX)GND(BI)	EA	1
0666 6012	REFL PAV MRK TY I (W)4"(SLD)(100MIL)	LF	135
0666 6042	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	152
0666 6102	REFL PAV MRK TY I (W)(YLD TRI)(100MIL)	EA	5
0666 6126	REFL PAV MRK TY I (Y)4"(SLD)(100MIL)	LF	126
0666 6224	PAVEMENT SEALER 4"	LF	261
0666 6230	PAVEMENT SEALER 24"	LF	152
0666 6243	PAVEMENT SEALER (YLD TRI)	EA	5
0672 6009	REFL PAV MRKR TY II-A-A	EA	6
0677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	261
0677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	90
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	12
0678 6001	PAV SURF PREEP FOR MRK (4")	LF	261
0678 6008	PAV SURF PREP FOR MRK (24")	LF	152
0678 6023	PAV SURF PREP FOR MRK (36")(YLD TRI)	EA	5

SW3 - PROJECT QUANTITIES SUMMARY

Bid Item	Description	Unit	Sheet 10
0104 6015	REMOVING CONC (SIDEWALKS)	SY	64
0104 6021	REMOVING CONC (CURB)	LF	107
0160 6003	FURNISHING AND PLACING TOPSOIL (4")	SY	61
0162 6002	BLOCK SODDING	SY	61
0168 6001	VEGETATIVE WATERING	MG	1
3076 6001	D-GR HMA TY-B PG64-22 (5 IN)	TON	9
3076 6040	D-GR HMA TY-D PG70-22 (2 IN)	TON	4
0340 6272	TACK COAT	GAL	30
0529 6001	CONC CURB (TY I)	LF	7
0529 6007	CONC CURB & GUTTER (TY I)	LF	100
0531 6001	CONC SIDEWALKS (4")	SY	77
0531 6004	CURB RAMPS (TY 1)	EA	1
0531 6010	CURB RAMPS (TY 7)	EA	3
0644 6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	1
0666 6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	75
0666 6042	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	177
0666 6054	REFL PAV MRK TY I (W)(ARROW)(100MIL)	EA	2
0666 6226	PAVEMENT SEALER 8"	LF	75
0666 6230	PAVEMENT SEALER 24"	LF	177
0666 6231	PAVEMENT SEALER (ARROW)	EA	2
0672 6010	REFL PAV MRKR TY II-C-R	EA	18
0677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	75
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	177
0677 6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	1
0677 6012	ELIM EXT PAV MRK & MRKS (WORD)	EA	1
0678 6004	PAV SURF PREP FOR MRK (8")	LF	75
0678 6008	PAV SURF PREP FOR MRK (24")	LF	177
0678 6009	PAV SURF PREP FOR MRK (ARROW)	EA	2

City of New Braunfels

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CITY OF NEW BRAUNFELS
CITYWIDE PEDESTRIAN IMPROVEMENTS

PROJECT QUANTITIES SUMMARY

SW1-LANDA ST & LP 337 AND SW3-OAK RUN PKWY & WESTPOINTE DR

FINAL SUBMITTAL	PROJECT NO: NB 22-172		DATE: 8/13/2024
BMB NO. C-1638	DSGN BY: CB/CDA	CHKD BY: CB	SHEET: 3

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A2 - PROJECT QUANTITIES SUMMARY

Bid Item	Description	Unit	Sheet 11	Sheet 12	Sheet 13	Sheet 14	Sheet 15	Sheet 16	Sheet 17	Sheet 18	Sheet 19	Sheet 20	Sheet 21	Sheet 22	Quantity
0104 6009	REMOVING CONC (RIPRAP)	SY										13			13
0104 6015	REMOVING CONC (SIDEWALKS)	SY	23	10	117	6			8	5	10	2	9	7	198
0104 6017	REMOVING CONC (DRIVEWAYS)	SY	104		46				59	109	169	128	115	114	843
0104 6021	REMOVING CONC (CURB)	LF	540	18	191	15			146	260	413	442	275	305	2,605
0160 6003	FURNISHING AND PLACING TOPSOIL (4")	SY	360	60	45	5	28	39	145	170	174	245	212	192	1,676
0162 6002	BLOCK SODDING	SY	360	60	45	5	28	39	145	170	174	245	212	192	1,676
0168 6001	VEGETATIVE WATERING	MG	1	1	1	1	1	1	2	3	3	4	3	3	23
3076 6001	D-GR HMA TY-B PG64-22 (5 IN)	TON	17	1	2	1			4	8	12	8	8	9	72
3076 6040	D-GR HMA TY-D PG70-22 (2 IN)	TON	7	1	1	1			2	3	5	3	3	4	30
0340 6272	TACK COAT	GAL	56	1	8	2			15	26	39	27	28	30	230
0432 6002	RIPRAP (CONC)(5 IN)	CY										2			2
0450 6042	RAIL (TY PR1)(TY A)	LF										115			115
0529 6001	CONC CURB (TY I)	LF				250									250
0529 6007	CONC CURB & GUTTER (TY I)	LF	601	36	78	35			153	270	405	417	362	318	2,675
0529 6015	CONC CURB (TY C1)	LF			33						12				45
0529 6017	CONC CURB (TY F2)	LF										82			82
0530 6004	DRIVEWAYS (CONC)	SY	109						60	113	164	179	124	126	875
0531 6001	CONC SIDEWALKS (4")	SY	64	76	165	11	42	56	215	245	269	365	313	279	2,101
0531 6004	CURB RAMPS (TY 1)	EA			7	1									8
0531 6005	CURB RAMPS (TY 2)	EA	10												10
0531 6013	CURB RAMPS (TY 10)	EA		1											1
0531 6017	CURB RAMPS (TY 22)	EA			1										1
0531-	CONC SIDEWALK BRIDGE	SY										22			22
0560 6025	RELOCATE EXISTING MAILBOX	EA							3	7					10
0644 6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA			1										1
0644 6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	6		5										11
0666 6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF			170										170
0666 6042	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	414		356	239									1,009
0666 6102	REFL PAV MRK TY I (W)(YLD TRI)(100MIL)	EA			6										6
0666 6126	REFL PAV MRK TY I (Y)4"(SLD)(100MIL)	LF			600										600
0666 6224	PAVEMENT SEALER 4"	LF			600										600
0666 6226	PAVEMENT SEALER 8"	LF			170										170
0666 6230	PAVEMENT SEALER 24"	LF	414		356	239									1,009
0666 6243	PAVEMENT SEALER (YLD TRI)	EA			6										6
0672 6007	REFL PAV MRKR TY I-C	EA			6										6
0672 6009	REFL PAV MRKR TY II-A-A	EA			20										20
0677 6001	ELIM EXT PAV MRK & MRKS (4")	LF			454										454
0677 6003	ELIM EXT PAV MRK & MRKS (8")	LF			213										213
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	214		262										476
0678 6001	PAV SURF PREP FOR MRK (4")	LF			600										600
0678 6004	PAV SURF PREP FOR MRK (8")	LF			170										170
0678 6008	PAV SURF PREP FOR MRK (24")	LF	414		356	239									1,009
0678 6023	PAV SURF PREP FOR MRK (36")(YLD TRI)	EA			6										6
-	REMV, RELOC, & INSTL FENCE	LF									30				30
-	REMV, RELOC, & INSTL GATE	EA									1				1

City of New Braunfels

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CITY OF NEW BRAUNFELS
CITYWIDE PEDESTRIAN IMPROVEMENTS

PROJECT QUANTITIES SUMMARY

A2 - SETTLERS CROSSING, PAHMEYER RD, SAVANNAH HILL CIRCLE

FINAL SUBMITTAL	PROJECT NO: NB 22-172		DATE: 7/2/2024
BMB NO. C-1638	DSGN BY: CB/CDA	CHKD BY: CB	SHEET: 4

W:\Work\C-1605 CoNB Citywide Pedestrian Improvements\Design-Preliminary Phase\01 CAD\04 ROADWAY SHEETS\Design 2 - A2 SW1SW3\004 A2-QUANT SUM SHT01.dgn 7/22/2024 2:48:06 PM

A2 - DRIVEWAY SUMMARY

SHEET NO.	DRIVEWAY NO.	ROADWAY NAME	ROADWAY STATION	OFFSET (LT/RT)	DRIVEWAY WIDTH AT BACK	DRIVEWAY LENGTH	0530 6004 DRIVEWAYS (CONC)
			STA	LF	LF	LF	SY
11	1	SETTLERS CROSSING	14+74.64	18.5' RT	11.20	7.00	11
11	2	SETTLERS CROSSING	17+74.33	18.5' RT	28.70	7.00	26
11	3	SETTLERS CROSSING	18+06.91	18.5' LT	21.20	7.00	19
11	4	SETTLERS CROSSING	19+65.64	18.5' LT	15.70	7.00	15
11	5	SETTLERS CROSSING	20+88.96	18.5' RT	24.00	7.00	21
11	37	SAVANNAH HILL CIRCLE	214+48.31	18.5' RT	19.50	7.00	17
						SHEET 11 TOTAL =	**109**
17	6	PAHMEYER RD	124+36.95	18.5' RT	22.00	7.00	20
17	7	PAHMEYER RD	125+41.13	18.5' RT	19.60	7.00	17
17	8	PAHMEYER RD	126+34.23	18.5' RT	11.20	7.00	11
17	9	PAHMEYER RD	127+42.22	18.5' RT	13.20	7.00	12
						SHEET 17 TOTAL =	**60**
18	10	PAHMEYER RD	128+42.48	18.5' RT	18.70	7.00	17
18	11	PAHMEYER RD	128+75.73	18.5' RT	18.70	7.00	13
18	12	PAHMEYER RD	129+71.69	18.5' RT	18.80	7.00	14
18	13	PAHMEYER RD	131+43.55	18.5' RT	21.20	7.00	19
18	14	PAHMEYER RD	132+45.72	18.5' RT	15.20	7.00	14
18	15	PAHMEYER RD	133+46.37	18.5' RT	20.90	7.00	18
18	16	PAHMEYER RD	134+35.85	18.5' RT	20.50	7.00	18
						SHEET 18 TOTAL =	**113**
19	17	SAVANNAH HILL CIRCLE	200+52.32	18.5' RT	21.10	7.6 (Skew)	18
19	18	SAVANNAH HILL CIRCLE	201+12.50	18.5' RT	11.40	7.6 (Skew)	11
19	19	SAVANNAH HILL CIRCLE	201+32.08	18.5' RT	22.90	7.9 (Skew)	21
19	20	SAVANNAH HILL CIRCLE	200+40.88	18.5' RT	12.40	7.1 (Skew)	12
19	21	SAVANNAH HILL CIRCLE	200+53.90	18.5' RT	19.10	7.1 (Skew)	16
19	22	SAVANNAH HILL CIRCLE	200+97.73	18.5' RT	20.80	7.00	18
19	23	SAVANNAH HILL CIRCLE	202+03.69	18.5' RT	19.70	7.00	18
19	24	SAVANNAH HILL CIRCLE	202+90.73	18.5' RT	18.00	7.00	16
19	25	SAVANNAH HILL CIRCLE	204+49.68	18.5' RT	17.10	7.00	16
19	26	SAVANNAH HILL CIRCLE	205+57.22	18.5' RT	20.80	7.00	19
						SHEET 19 TOTAL =	**164**
20	27	SAVANNAH HILL CIRCLE	206+00.7	18.5' RT	17.20	7.00	16
20	28	SAVANNAH HILL CIRCLE	206+70.48	18.5' RT	13.20	7.00	13
20	29	SAVANNAH HILL CIRCLE	207+59.29	18.5' RT	15.90	7.00	15
20	30	SAVANNAH HILL CIRCLE	207+91.62	18.5' RT	16.00	7.00	15
20	31	SAVANNAH HILL CIRCLE	209+98.57	18.5' RT	13.30	7.00	13
20	32	SAVANNAH HILL CIRCLE	210+75.04	18.5' LT	20.50	7.00	19
20	33	SAVANNAH HILL CIRCLE	211+55.96	18.5' RT	20.60	7.00	18
20	34	SAVANNAH HILL CIRCLE	211+92.7	18.5' RT	20.90	7.00	19
20	35	SAVANNAH HILL CIRCLE	213+64.33	18.5' RT	19.80	7.00	18
20	36	SAVANNAH HILL CIRCLE	213+98.74	18.5' RT	20.20	7.00	18
11	37	SAVANNAH HILL CIRCLE	214+48.31	18.5' RT	19.50	7.00	17
						SHEET 20 TOTAL =	**179**

A2 - DRIVEWAY SUMMARY, CONT.

SHEET NO.	DRIVEWAY NO.	DRIVEWAY NO.	ROADWAY STATION	OFFSET LT/RT	DRIVEWAY WIDTH AT ROW	OVERALL DRIVEWAY LENGTH	0530 6004 PORTLAND CEMENT CONC DRIVEWAY (RESIDENTIAL)
				LF	LF	LF	SY
21	38	SAVANNAH HILL CIRCLE	217+08.19	18.5' RT	20.50	7.00	19
21	39	SAVANNAH HILL CIRCLE	218+14.81	18.5' RT	19.80	7.00	18
21	40	SAVANNAH HILL CIRCLE	218+97.61	18.5' RT	25.10	7.00	22
21	41	SAVANNAH HILL CIRCLE	220+17.74	18.5' RT	21.40	7.00	19
21	42	SAVANNAH HILL CIRCLE	221+19.00	18.5' RT	20.60	7.00	18
21	43	SAVANNAH HILL CIRCLE	222+17.18	18.5' RT	13.80	7.00	13
21	44	SAVANNAH HILL CIRCLE	223+21.99	18.5' RT	17.20	7.00	16
						SHEET 21 TOTAL =	**124**
22	45	SAVANNAH HILL CIRCLE	224+20.89	18.5' RT	20.80	7.00	19
22	46	SAVANNAH HILL CIRCLE	224+66.84	18.5' RT	15.10	7.00	14
22	47	SAVANNAH HILL CIRCLE	225+58.53	18.5' RT	11.80	7.00	14
22	48	SAVANNAH HILL CIRCLE	227+22.99	18.5' RT	12.20	7.00	12
22	49	SAVANNAH HILL CIRCLE	228+15.43	18.5' RT	18.00	7.00	12
22	50	SAVANNAH HILL CIRCLE	228+45.82	18.5' RT	10.40	7.00	16
22	51	SAVANNAH HILL CIRCLE	229+26.45	18.5' RT	11.90	7.00	10
22	52	SAVANNAH HILL CIRCLE	230+17.27	18.5' RT	14.90	7.00	12
22	53	SAVANNAH HILL CIRCLE	230+59.48	18.5' RT	19.50	7.00	17
						SHEET 22 TOTAL =	**126**
						PROJECT TOTAL =	**875**

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CITY OF NEW BRAUNFELS
CITYWIDE PEDESTRIAN IMPROVEMENTS

DRIVEWAY SUMMARY

A2 - SETTLERS CROSSING, PAHMEYER RD, SAVANNAH HILL CIRCLE

90% SUBMITTAL	PROJECT NO: NB 22-172		DATE: 6/20/2024
BMB NO. C-1638	DSGN BY: CB/CDA	CHKD BY: CB	SHEET: 5

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A2 - SETTLERS CROSSING

<* 1 Describe Chain BLSC

Chain BLSC contains:
2047 CUR BLSC1 CUR BLSC2 2048

Beginning chain BLSC description

Point 2047 X 2,249,461.78 Y 13,787,784.48 Sta 9+50.00

Course from 2047 to PC BLSC1 N 37° 03' 35.33" E Dist 2,003.17

Curve BLSC1		Curve Data		
P.I. Station	32+93.39	X 2,250,874.02	Y	13,789,654.52
Delta =	37° 55' 52.58" (RT)			
Degree =	5° 47' 14.83"			
Tangent =	340.22			
Length =	655.41			
Radius =	990.00			
External =	56.83			
Long Chord =	643.50			
Mid. Ord. =	53.74			
P.C. Station	29+53.17	X 2,250,668.99	Y	13,789,383.02
P.T. Station	36+08.58	X 2,251,202.64	Y	13,789,742.62
C.C.		X 2,251,459.02	Y	13,788,786.40
Back = N 37° 03' 35.33" E				
Ahead = N 74° 59' 27.91" E				
Chord Bear = N 56° 01' 31.62" E				

Course from PT BLSC1 to PC BLSC2 N 74° 59' 27.91" E Dist 97.25

Curve BLSC2		Curve Data		
P.I. Station	38+81.01	X 2,251,465.77	Y	13,789,813.18
Delta =	38° 15' 41.45" (LT)			
Degree =	11° 20' 44.52"			
Tangent =	175.18			
Length =	337.23			
Radius =	505.00			
External =	29.52			
Long Chord =	331.00			
Mid. Ord. =	27.89			
P.C. Station	37+05.83	X 2,251,296.57	Y	13,789,767.81
P.T. Station	40+43.07	X 2,251,570.54	Y	13,789,953.57
C.C.		X 2,251,165.80	Y	13,790,255.58
Back = N 74° 59' 27.91" E				
Ahead = N 36° 43' 46.46" E				
Chord Bear = N 55° 51' 37.19" E				

Course from PT BLSC2 to 2048 N 36° 43' 46.46" E Dist 192.65

Point 2048 X 2,251,685.75 Y 13,790,107.97 Sta 42+35.71

Ending chain BLSC description

A2 - PAHMEYER RD

<* 1 Describe Chain BLPM

Chain BLPM contains:
2043 CUR BLPM1 2044

Beginning chain BLPM description

Point 2043 X 2,248,209.08 Y 13,789,275.97 Sta 100+00.00

Course from 2043 to PC BLPM1 S 34° 29' 55.54" E Dist 51.36

Curve BLPM1		Curve Data		
P.I. Station	101+00.03	X 2,248,265.74	Y	13,789,193.53
Delta =	18° 25' 50.83" (LT)			
Degree =	19° 05' 54.94"			
Tangent =	48.67			
Length =	96.50			
Radius =	300.00			
External =	3.92			
Long Chord =	96.09			
Mid. Ord. =	3.87			
P.C. Station	100+51.36	X 2,248,238.17	Y	13,789,233.65
P.T. Station	101+47.86	X 2,248,304.57	Y	13,789,164.19
C.C.		X 2,248,485.41	Y	13,789,403.56
Back = S 34° 29' 55.54" E				
Ahead = S 52° 55' 46.37" E				
Chord Bear = S 43° 42' 50.96" E				

Course from PT BLPM1 to 2044 S 52° 55' 46.37" E Dist 3,380.38

Point 2044 X 2,251,001.76 Y 13,787,126.51 Sta 135+28.25

Ending chain BLPM description

A2 - SAVANNAH HILL CIRCLE

<* 2 Describe Chain BLSH

Chain BLSH contains:
2045 2046

Beginning chain BLSH description

Point 2045 X 2,248,815.70 Y 13,789,429.63 Sta 200+00.00

Course from 2045 to 2046 S 52° 55' 46.37" E Dist 3,195.36

Point 2046 X 2,251,365.26 Y 13,787,503.48 Sta 231+95.36

Ending chain BLSH description

A2 - KLEIN WAY

<* 4 Describe Chain BLKW

Chain BLKW contains:
2038 CUR BLKW1 CUR BLKW2 2039

Beginning chain BLKW description

Point 2038 X 2,250,637.36 Y 13,789,690.82 Sta 300+00.00

Course from 2038 to PC BLKW1 S 74° 37' 38.47" E Dist 96.84

Curve BLKW1		Curve Data		
P.I. Station	301+28.80	X 2,250,761.55	Y	13,789,656.68
Delta =	35° 26' 28.65" (RT)			
Degree =	57° 17' 44.81"			
Tangent =	31.95			
Length =	61.86			
Radius =	100.00			
External =	4.98			
Long Chord =	60.88			
Mid. Ord. =	4.74			
P.C. Station	300+96.84	X 2,250,730.74	Y	13,789,665.15
P.T. Station	301+58.70	X 2,250,781.74	Y	13,789,631.91
C.C.		X 2,250,704.23	Y	13,789,568.73
Back = S 74° 37' 38.47" E				
Ahead = S 39° 11' 09.82" E				
Chord Bear = S 56° 54' 24.15" E				

Course from PT BLKW1 to PC BLKW2 S 39° 11' 09.82" E Dist 201.57

Curve BLKW2		Curve Data		
P.I. Station	304+58.64	X 2,250,971.25	Y	13,789,399.43
Delta =	14° 01' 12.96" (LT)			
Degree =	7° 09' 43.10"			
Tangent =	98.37			
Length =	195.76			
Radius =	800.00			
External =	6.03			
Long Chord =	195.27			
Mid. Ord. =	5.98			
P.C. Station	303+60.27	X 2,250,909.09	Y	13,789,475.68
P.T. Station	305+56.03	X 2,251,050.02	Y	13,789,340.51
C.C.		X 2,251,529.17	Y	13,789,981.15
Back = S 39° 11' 09.82" E				
Ahead = S 53° 12' 22.79" E				
Chord Bear = S 46° 11' 46.30" E				

Course from PT BLKW2 to 2039 S 53° 12' 22.79" E Dist 243.97

Point 2039 X 2,251,245.40 Y 13,789,194.39 Sta 308+00.00

Ending chain BLKW description

A2 - S WALNUT AVE

<* 5 Describe Chain BLSW

Chain BLSW contains:
2041 CUR BLSW1 2042

Beginning chain BLSW description

Point 2041 X 2,251,159.40 Y 13,790,498.83 Sta 400+00.00

Course from 2041 to PC BLSW1 S 53° 24' 10.15" E Dist 983.16

Curve BLSW1		Curve Data		
P.I. Station	410+96.89	X 2,252,040.04	Y	13,789,844.88
Delta =	8° 07' 54.47" (RT)			
Degree =	3° 34' 51.55"			
Tangent =	113.73			
Length =	227.08			
Radius =	1,600.00			
External =	4.04			
Long Chord =	226.89			
Mid. Ord. =	4.03			
P.C. Station	409+83.16	X 2,251,948.73	Y	13,789,912.68
P.T. Station	412+10.24	X 2,252,120.84	Y	13,789,764.84
C.C.		X 2,250,994.83	Y	13,788,628.13
Back = S 53° 24' 10.15" E				
Ahead = S 45° 16' 15.68" E				
Chord Bear = S 49° 20' 12.91" E				

Course from PT BLSW1 to 2042 S 45° 16' 15.68" E Dist 289.76

Point 2042 X 2,252,326.70 Y 13,789,560.92 Sta 415+00.00

Ending chain BLSW description

STATE OF TEXAS
CARL BAIN
56996
REGISTERED
PROFESSIONAL ENGINEER

6/21/24

City of New Braunfels

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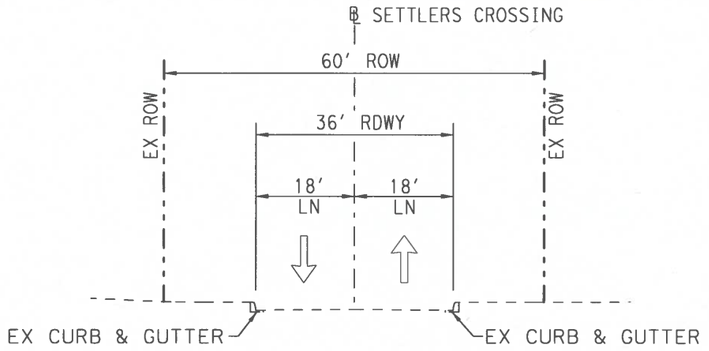
CITY OF NEW BRAUNFELS
CITYWIDE PEDESTRIAN IMPROVEMENTS

HORIZONTAL ALIGNMENT DATA

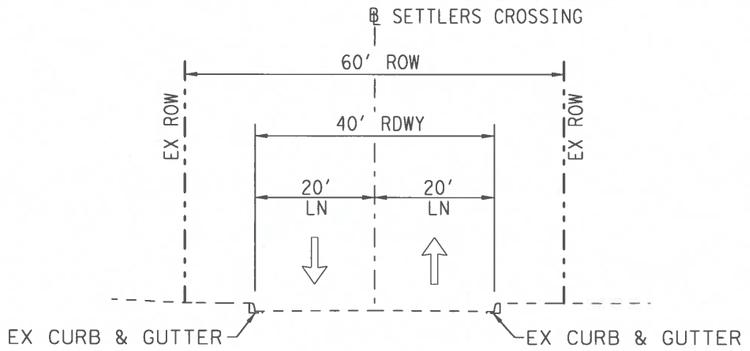
A2 - SETTLERS CROSSING, PAHMEYER RD, SAVANNAH HILL CIRCLE

90% SUBMITTAL	PROJECT NO: NB 22-172		DATE: 6/20/2024
BMB NO. C-1638	DSGN BY: CB/CDA	CHKD BY: CB	SHEET: 6



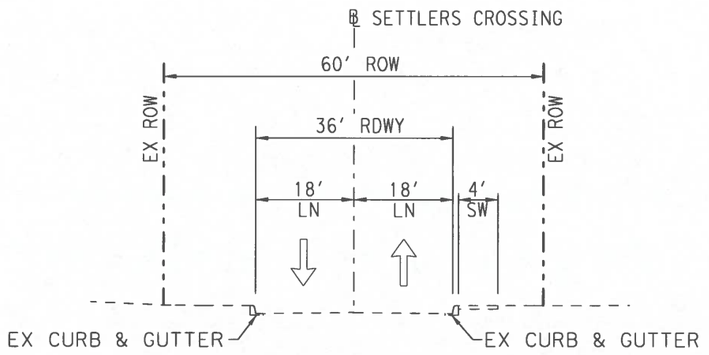
SETTLERS CROSSING - EXIST TYPICAL SECTION

STA 14+60 TO STA 15+37
STA 17+87 TO STA 21+14



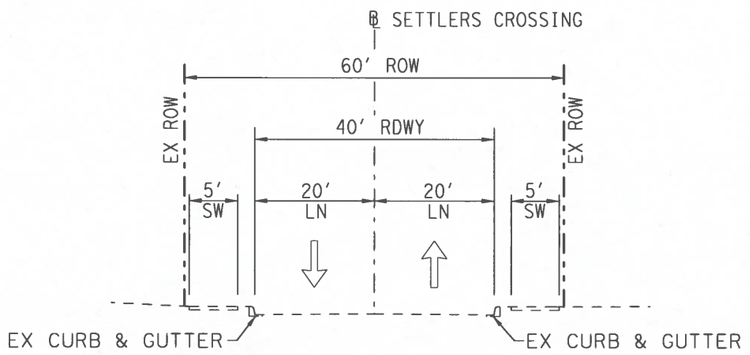
SETTLERS CROSSING - EXIST TYPICAL SECTION

STA 21+14 TO STA 21+55



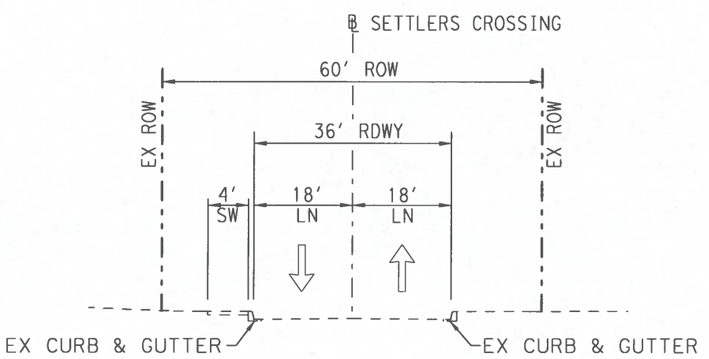
SETTLERS CROSSING - EXIST TYPICAL SECTION

STA 13+00 TO STA 13+50 (SDWLK BOTH SIDES)
STA 13+50 TO STA 14+60
STA 15+37 TO STA 16+13 (SDWLK BOTH SIDES)



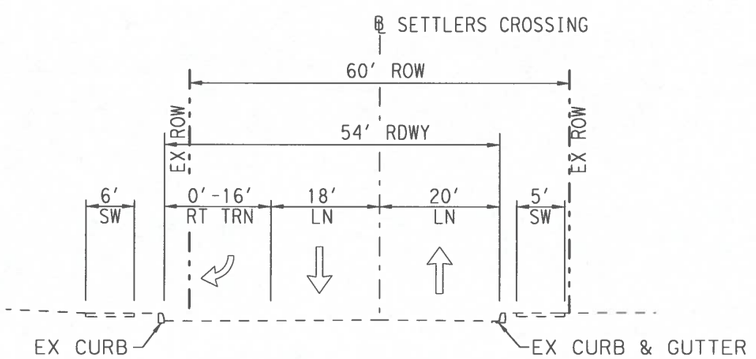
SETTLERS CROSSING - EXIST TYPICAL SECTION

STA 21+55 TO STA 32+00
STA 33+45 TO STA 42+00



SETTLERS CROSSING - EXIST TYPICAL SECTION

STA 16+13 TO STA 17+87



SETTLERS CROSSING - EXIST TYPICAL SECTION

STA 32+00 TO STA 33+45

LEGEND:
EXISTING GROUND

NOT TO SCALE

STATE OF TEXAS
CARL BAIN
56996
REGISTERED PROFESSIONAL ENGINEER
6/20/24

City of New Braunfels

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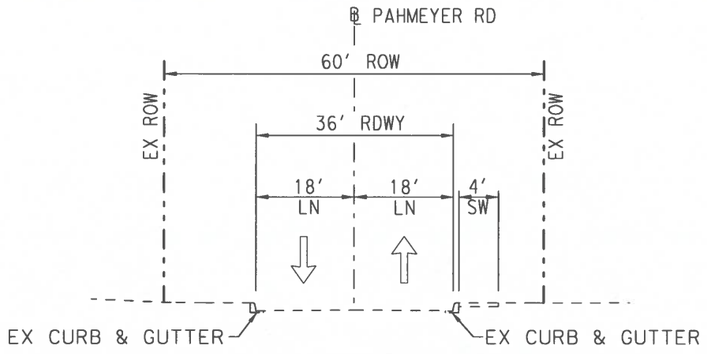
CITY OF NEW BRAUNFELS
CITYWIDE PEDESTRIAN IMPROVEMENTS

TYPICAL SECTIONS

A2 - SETTLERS CROSSING, PAHMEYER RD, SAVANNAH HILL CIRCLE

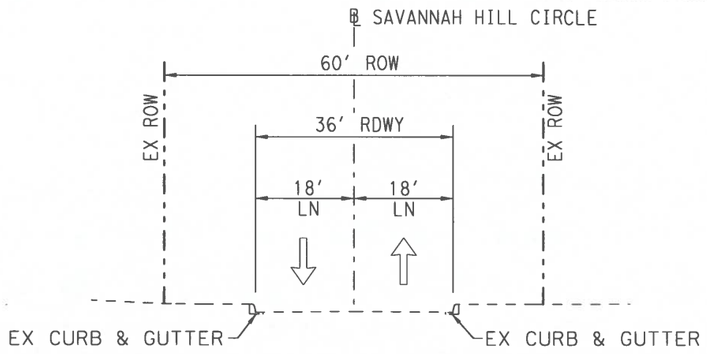
90% SUBMITTAL	PROJECT NO: NB 22-172		DATE: 6/20/2024
BMB NO. C-1638	DSGN BY: CB/CDA	CHKD BY: CB	SHEET: 7

W:\Work\C-1606 CoNB Citywide Pedestrian Improvements\Design-Preliminary Phase\01CAD\04 ROADWAY SHEETS\Package 2 - A2 SW\A2-SW-EXIST TYP SECT SHT01.dgn 6/20/2024 5:05:28 PM



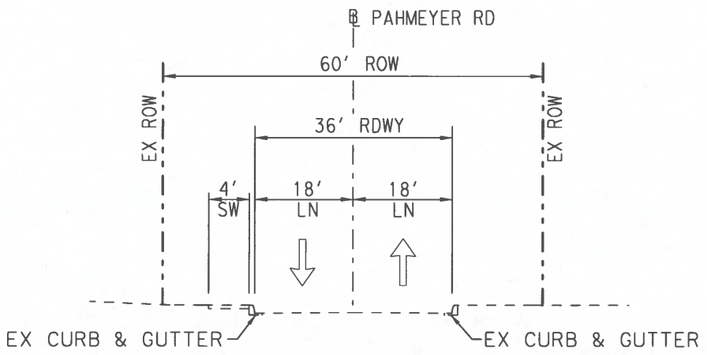
PAHMEYER RD - EXIST TYPICAL SECTION

STA 101+52 TO STA 102+29
STA 112+42 TO STA 117+43 (SDWLK BOTH SIDES)
STA 117+43 TO STA 119+00
STA 123+04 TO STA 123+69



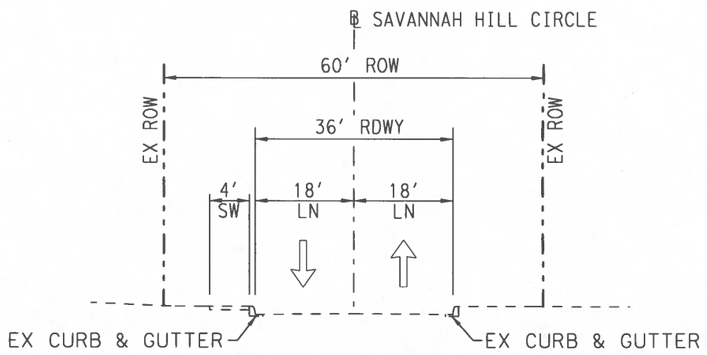
SAVANNAH HILL CIRCLE - EXIST TYPICAL SECTION

STA 209+89 TO STA 210+95
STA 213+79 TO STA 215+65



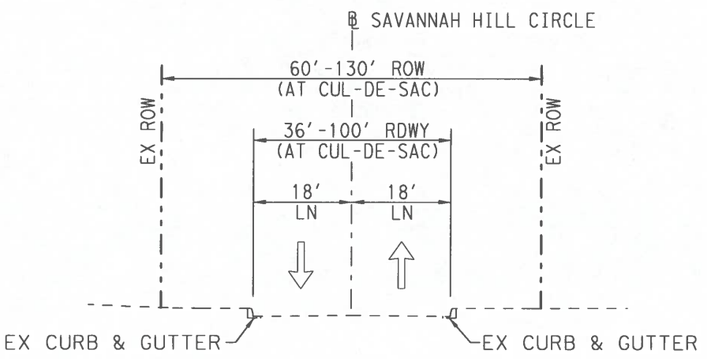
PAHMEYER RD - EXIST TYPICAL SECTION

STA 102+29 TO STA 111+83 (SDWLK BOTH SIDES)
STA 111+83 TO STA 112+42
STA 119+00 TO STA 123+04 (SDWLK BOTH SIDES)
STA 123+69 TO STA 134+53



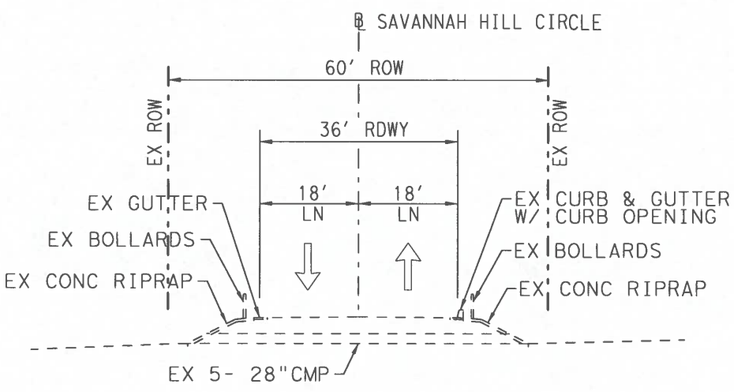
SAVANNAH HILL CIRCLE - EXIST TYPICAL SECTION

STA 201+65 TO STA 209+32
STA 210+95 TO STA 213+79
STA 215+65 TO STA 231+37



SAVANNAH HILL CIRCLE - EXIST TYPICAL SECTION

STA 200+40 TO STA 201+65



SAVANNAH HILL CIRCLE - EXIST TYPICAL SECTION

STA 209+32 TO STA 209+89

LEGEND:
EXISTING GROUND

NOT TO SCALE

STATE OF TEXAS
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City of New Braunfels

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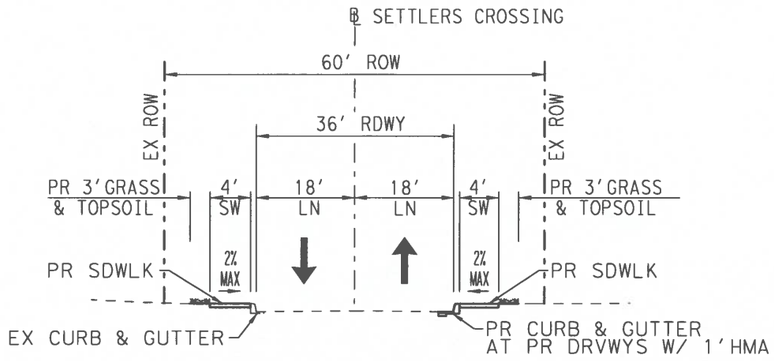
CITY OF NEW BRAUNFELS
CITYWIDE PEDESTRIAN IMPROVEMENTS

TYPICAL SECTIONS

A2 - SETTLERS CROSSING, PAHMEYER RD, SAVANNAH HILL CIRCLE

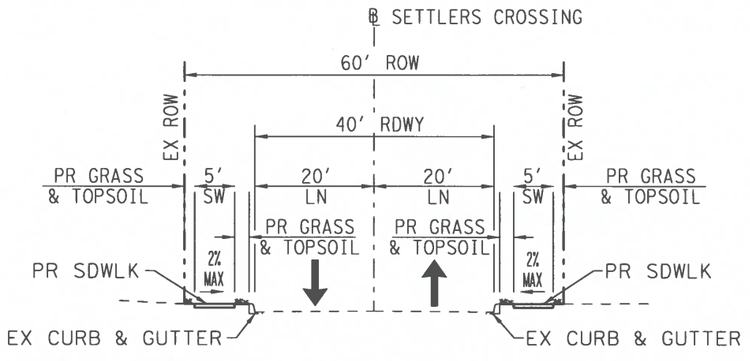
90% SUBMITTAL	PROJECT NO: NB 22-172		DATE: 6/20/2024
BMB NO. C-1638	DSGN BY: CB/CDA	CHKD BY: CB	SHEET: 7A

W:\Projects\C-605 CoNB Citywide Pedestrian Improvements\Design-Preliminary Phase\01 CAD\04 ROADWAY SHEETS\Package 2 - A2 SWLS\A2-EXIST TYP SECT SHT02.dgn 6/20/2024 5:13:35 PM



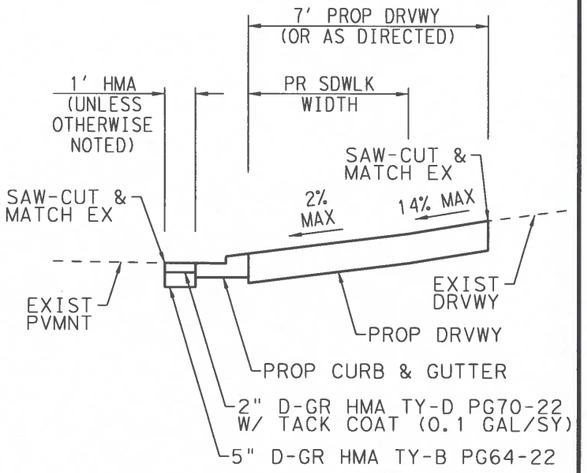
SETTLERS CROSSING - PROP TYPICAL SECTION

STA 14+60 TO STA 15+37
STA 17+87 TO STA 21+14



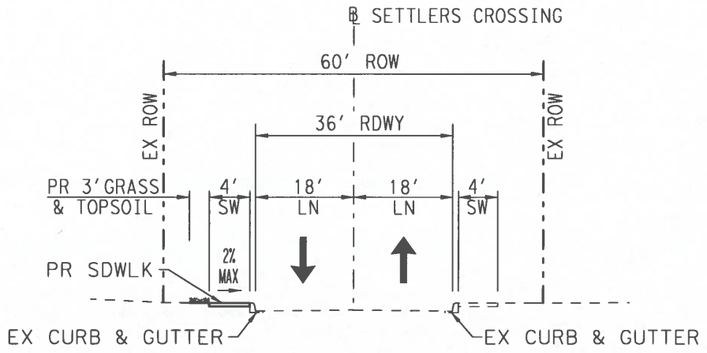
SETTLERS CROSSING - PROP TYPICAL SECTION

STA 21+14 TO STA 21+55



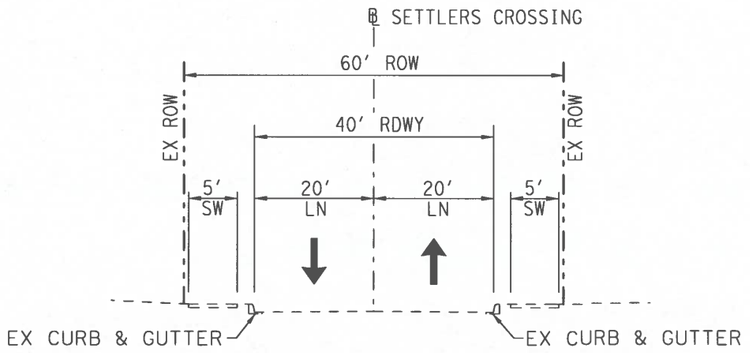
PROP CURB & GUTTER DETAIL

AT PROP DRIVEWAY AREAS
N.T.S.



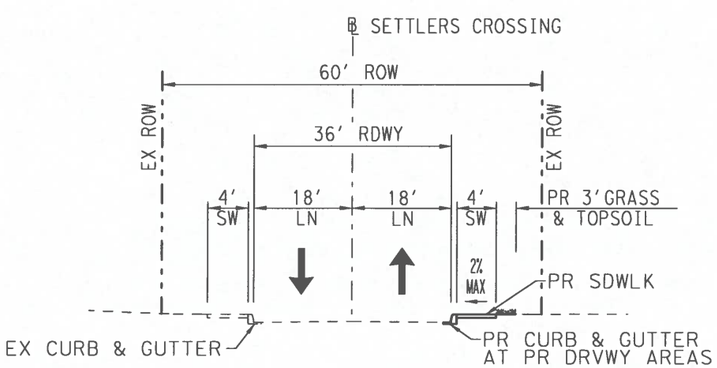
SETTLERS CROSSING - PROP TYPICAL SECTION

STA 13+00 TO STA 13+50 (SDWLK BOTH SIDES) NO WORK
STA 13+50 TO STA 14+60
STA 15+37 TO STA 16+13 (SDWLK BOTH SIDES) NO WORK



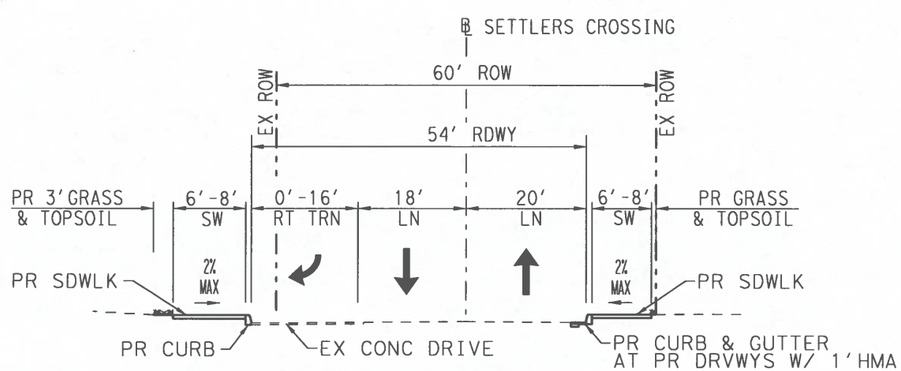
SETTLERS CROSSING - PROP TYPICAL SECTION

STA 21+55 TO STA 32+00 NO WORK
STA 33+45 TO STA 42+00 NO WORK



SETTLERS CROSSING - PROP TYPICAL SECTION

STA 16+13 TO STA 17+87



SETTLERS CROSSING - PROP TYPICAL SECTION

STA 32+00 TO STA 33+45

LEGEND:

PROPOSED GROUND
EXISTING GROUND

NOT TO SCALE

STATE OF TEXAS
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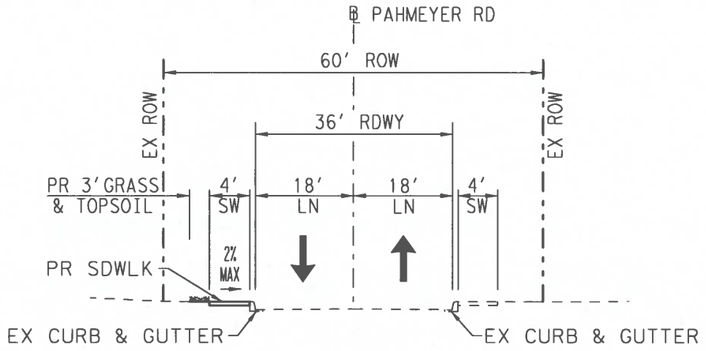
CITY OF NEW BRAUNFELS
CITYWIDE PEDESTRIAN IMPROVEMENTS

TYPICAL SECTIONS

A2 - SETTLERS CROSSING, PAHMEYER RD, SAVANNAH HILL CIRCLE

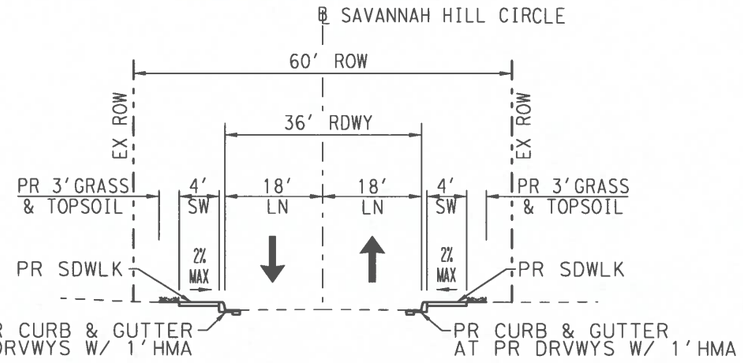
90% SUBMITTAL	PROJECT NO: NB 22-172		DATE: 6/20/2024
BMB NO. C-1638	DSGN BY: CB/CDA	CHKD BY: CB	SHEET: 8

W:\Work\C-1606 CONB Citywide Pedestrian Improvements\Design-Preliminary Phase\0 CAD\04 ROADWAY SHEETS\Package 2 - A2 SWI\SW3\008 A2-PROP TYP SECT SHT01.dgn 6/20/2024 5:41:04 PM



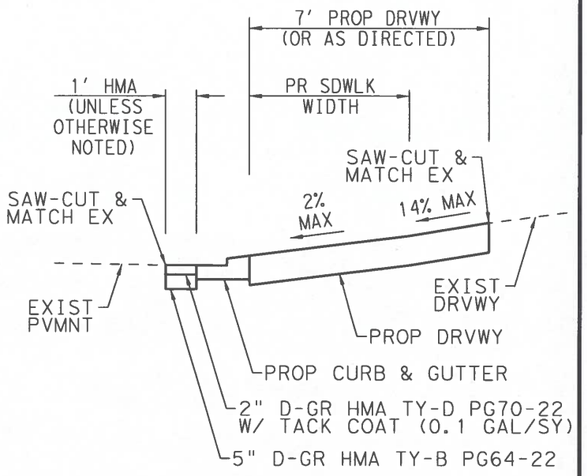
PAHMEYER RD - PROP TYPICAL SECTION

STA 101+52 TO STA 102+29
STA 112+42 TO STA 117+43 (SDWLK BOTH SIDES) NO WORK
STA 117+43 TO STA 119+00
STA 123+04 TO STA 123+69



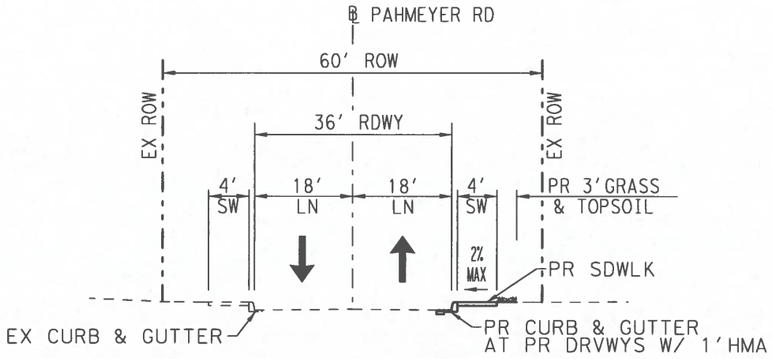
SAVANNAH HILL CIRCLE - PROP TYPICAL SECTION

STA 209+89 TO STA 210+95
STA 213+79 TO STA 215+65



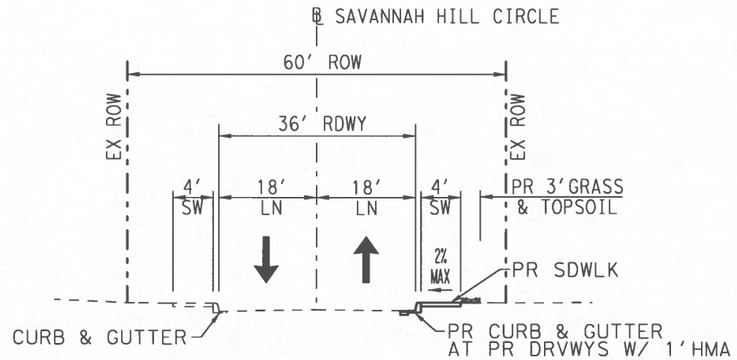
PROP CURB & GUTTER DETAIL

AT PROP DRIVEWAY AREAS
N.T.S.



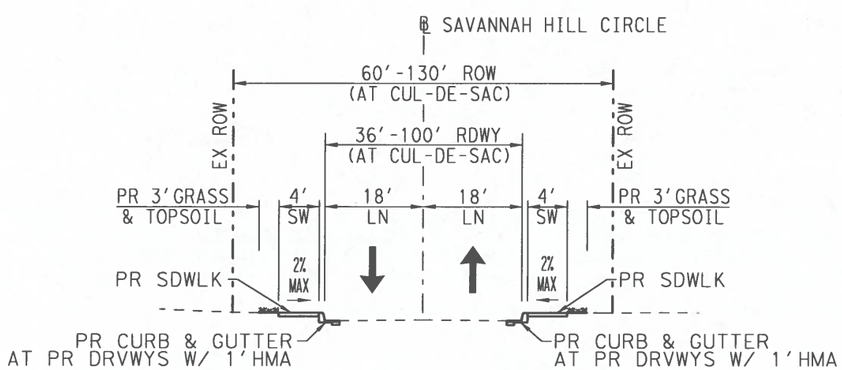
PAHMEYER RD - PROP TYPICAL SECTION

STA 102+29 TO STA 111+83 (SDWLK BOTH SIDES) NO WORK
STA 111+83 TO STA 112+42
STA 119+00 TO STA 123+04 (SDWLK BOTH SIDES) NO WORK
STA 123+69 TO STA 134+53



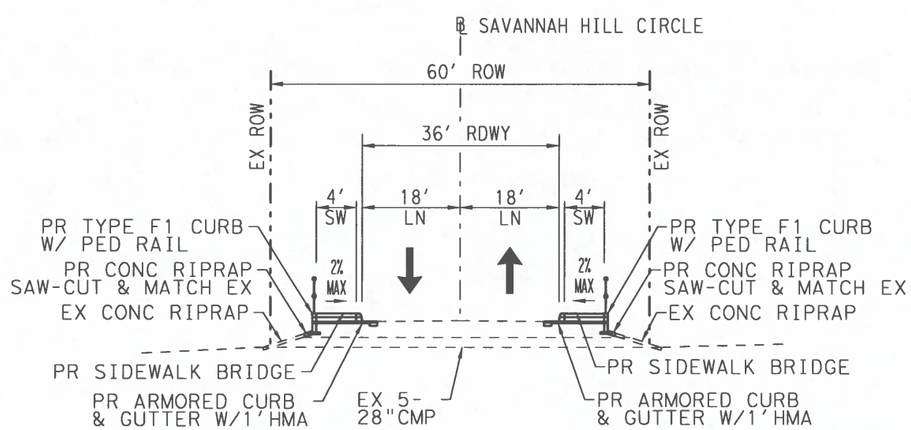
SAVANNAH HILL CIRCLE - PROP TYPICAL SECTION

STA 201+65 TO STA 209+32
STA 210+95 TO STA 213+79
STA 215+65 TO STA 231+37



SAVANNAH HILL CIRCLE - PROP TYPICAL SECTION

STA 200+40 TO STA 201+65



SAVANNAH HILL CIRCLE - PROP TYPICAL SECTION

STA 209+32 TO STA 209+89

LEGEND:
PROPOSED GROUND
EXISTING GROUND

NOT TO SCALE

STATE OF TEXAS
CARL BAIN
56996
REGISTERED PROFESSIONAL ENGINEER
6/21/24

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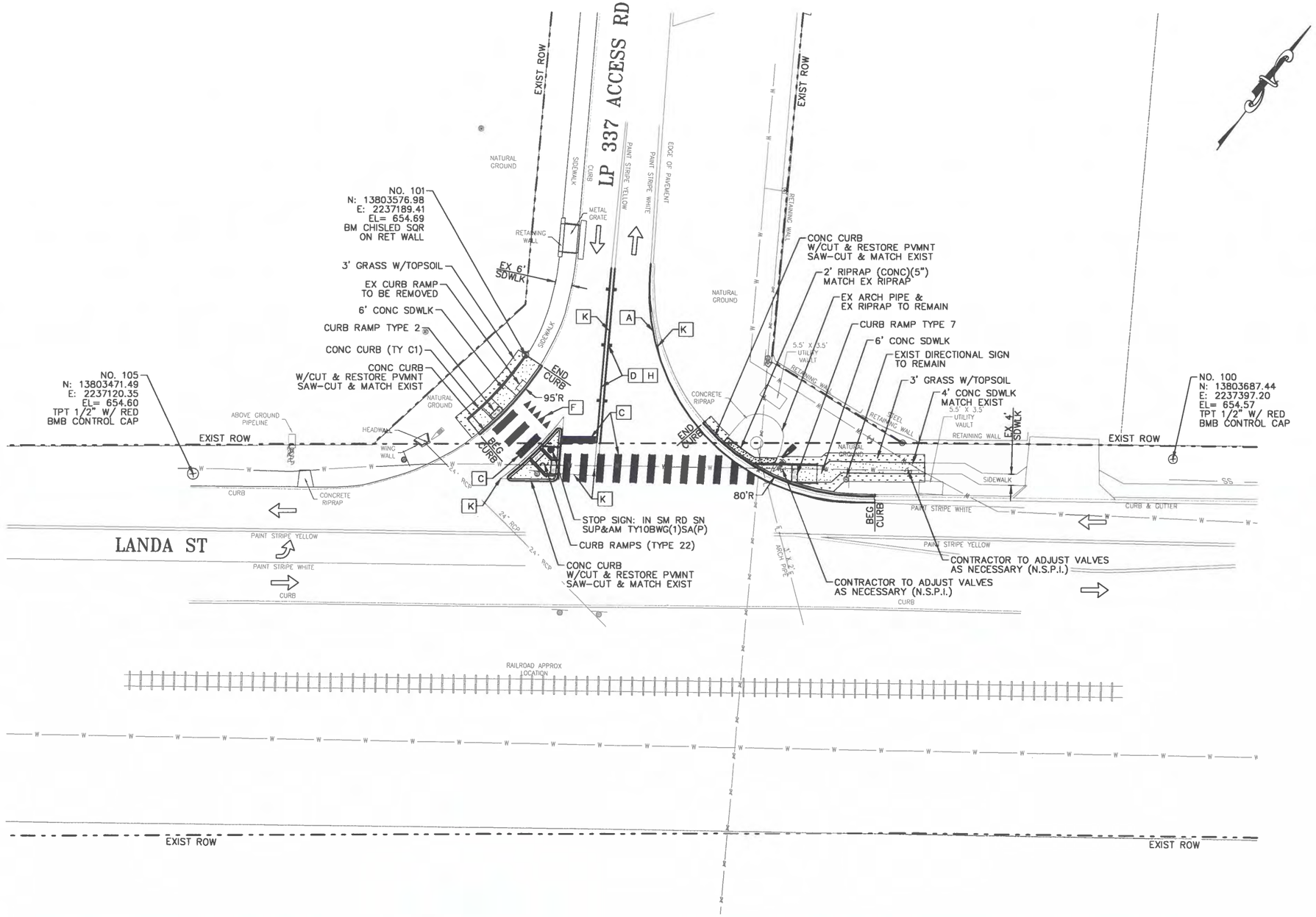
CITY OF NEW BRAUNFELS
CITYWIDE PEDESTRIAN IMPROVEMENTS

TYPICAL SECTIONS

A2 - SETTLERS CROSSING, PAHMEYER RD, SAVANNAH HILL CIRCLE

90% SUBMITTAL	PROJECT NO: NB 22-172		DATE: 6/20/2024
BMB NO. C-1638	DSGN BY: CB/CDA	CHKD BY: CB	SHEET: 8A

W:\Work\C-1605 CONB Citywide Pedestrian Improvements\Design-Preliminary Phase\01 CAD\04 ROADWAY SHEETS\Package 2 - A2 SW\SW3100BA A2-PROP TYP SECT SHT02.dgn 6/20/2024 5:14:30 PM



NOTE:

IT IS THE CONTRACTORS RESPONSIBILITY TO COORDINATE ALL ENCROACHMENT ISSUES WITH THE PROPERTY OWNER AND THE CITY, TO THE SATISFACTION OF THE ENGINEER.

LEGEND:

- EXIST CURB
- EXIST EDGE OF ROADWAY
- EXIST CHAINLINK FENCE
- EXIST MISCELLANOUS FENCE
- APPARENT EXIST RIGHT OF WAY
- PROP CURB
- PROP RETAINING WALL
- PROP CURB & GUTTER
- PROP DRIVEWAY / RIPRAP
- PROP TOPSOIL W/ GRASS
- PROP SIDEWALK
- PROP CUT & RESTORE ASPH PVMNT
- DIRECTION OF TRAFFIC
- DRIVEWAY NUMBER (16)
- SIGN POST
- [A] REFL PAV MRK TY I (W)4"(SLD)(100MIL)
- [B] REFL PAV MRK TY I (W)8"(SLD)(100MIL)
- [C] REFL PAV MRK TY I (W)24"(SLD)(100MIL)
- [D] REFL PAV MRK TY I (Y)4"(SLD)(100MIL)
- [E] REFL PAV MRK TY I (W)(ARROW)(100MIL)
- [F] REFL PAV MRK TY I (W)(YLD TRI)(100MIL)
- [G] REFL PAV MRKR TY I-C
- [H] REFL PAV MRKR TY II-A-A
- [I] REFL PAV MRKR TY II-C-R
- [J] INSTL OM ASSM (OM-2Z)(WFLX)GND(BI)
- [K] ELIM EXT PAV MRK & MRKS

20 0 40
HORIZ SCALE: 1"= 40'

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CITY OF NEW BRAUNFELS
CITYWIDE PEDESTRIAN IMPROVEMENTS

ROADWAY PLAN LAYOUT

SW1 - LANDA STREET AND LOOP 337

90% SUBMITTAL	PROJECT NO: NB 22-172		DATE: 6/20/2024
BMB NO. C-1638	DSGN BY: CB/CDA	CHKD BY: CB	SHEET: 9

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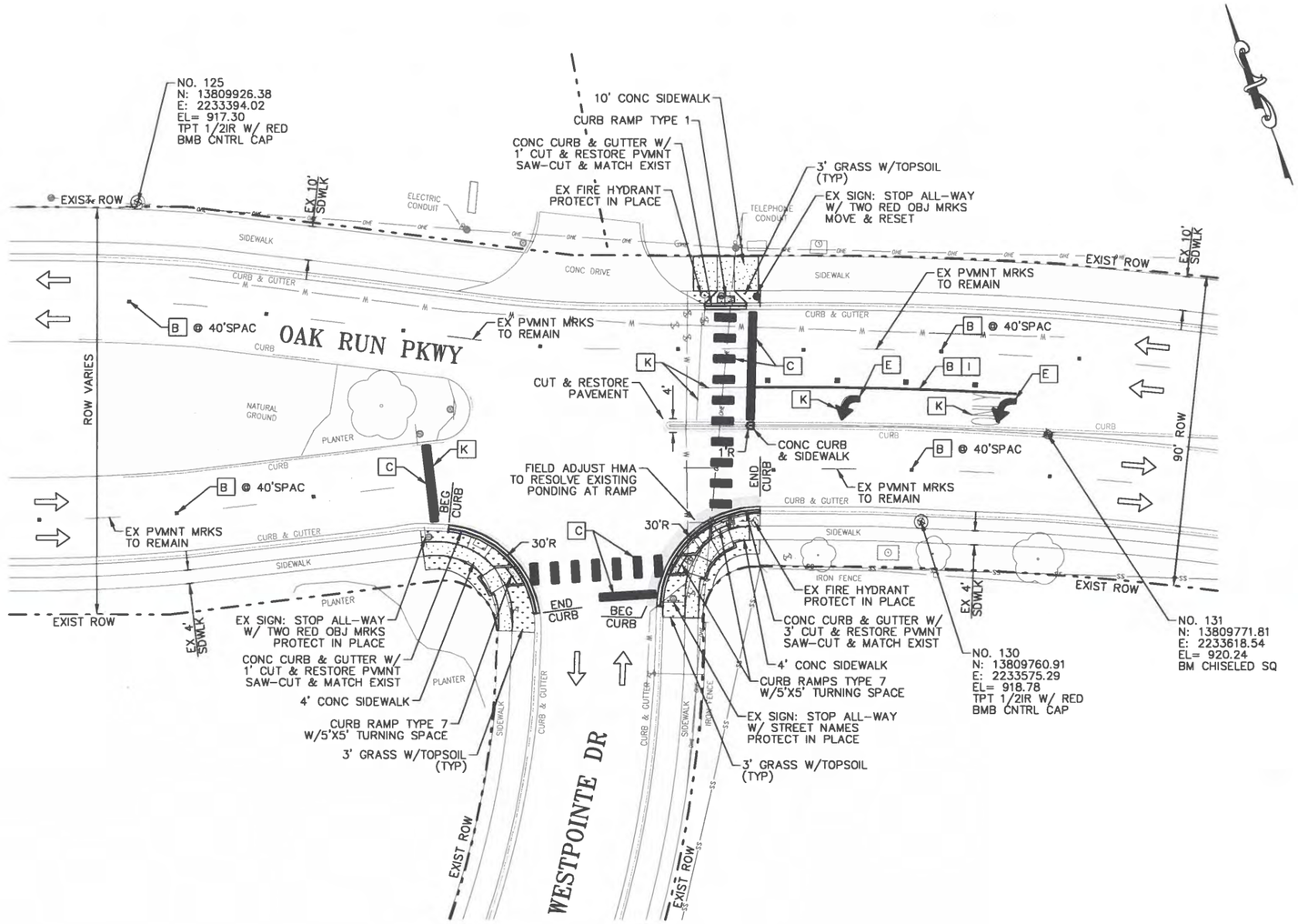

NOTE:

IT IS THE CONTRACTORS RESPONSIBILITY TO COORDINATE ALL ENCROACHMENT ISSUES WITH THE PROPERTY OWNER AND THE CITY, TO THE SATISFACTION OF THE ENGINEER.

LEGEND:

- EXIST CURB
- EXIST EDGE OF ROADWAY
- EXIST CHAINLINK FENCE
- EXIST MISCELLANOUS FENCE
- APPARENT EXIST RIGHT OF WAY
- PROP CURB
- PROP RETAINING WALL
- PROP CURB & GUTTER
- PROP DRIVEWAY / RIPRAP
- PROP TOPSOIL W/ GRASS
- PROP SIDEWALK
- PROP CUT & RESTORE ASPH PVMNT
- DIRECTION OF TRAFFIC
- DRIVEWAY NUMBER (16)
- SIGN POST

A	REFL PAV MRK TY I (W)4"(SLD)(100MIL)
B	REFL PAV MRK TY I (W)8"(SLD)(100MIL)
C	REFL PAV MRK TY I (W)24"(SLD)(100MIL)
D	REFL PAV MRK TY I (Y)4"(SLD)(100MIL)
E	REFL PAV MRK TY I (W)(ARROW)(100MIL)
F	REFL PAV MRK TY I (W)(YLD TRI)(100MIL)
G	REFL PAV MRKR TY I-C
H	REFL PAV MRKR TY II-A-A
I	REFL PAV MRKR TY II-C-R
J	INSTL OM ASSM (OM-2Z)(WFLX)GND(BI)
K	ELIM EXT PAV MRK & MRKS

20 0 40
HORIZ SCALE: 1"= 40'

STATE OF TEXAS
CARL BAIN
56996
REGISTERED PROFESSIONAL ENGINEER
6/21/24
PE

City of New Braunfels

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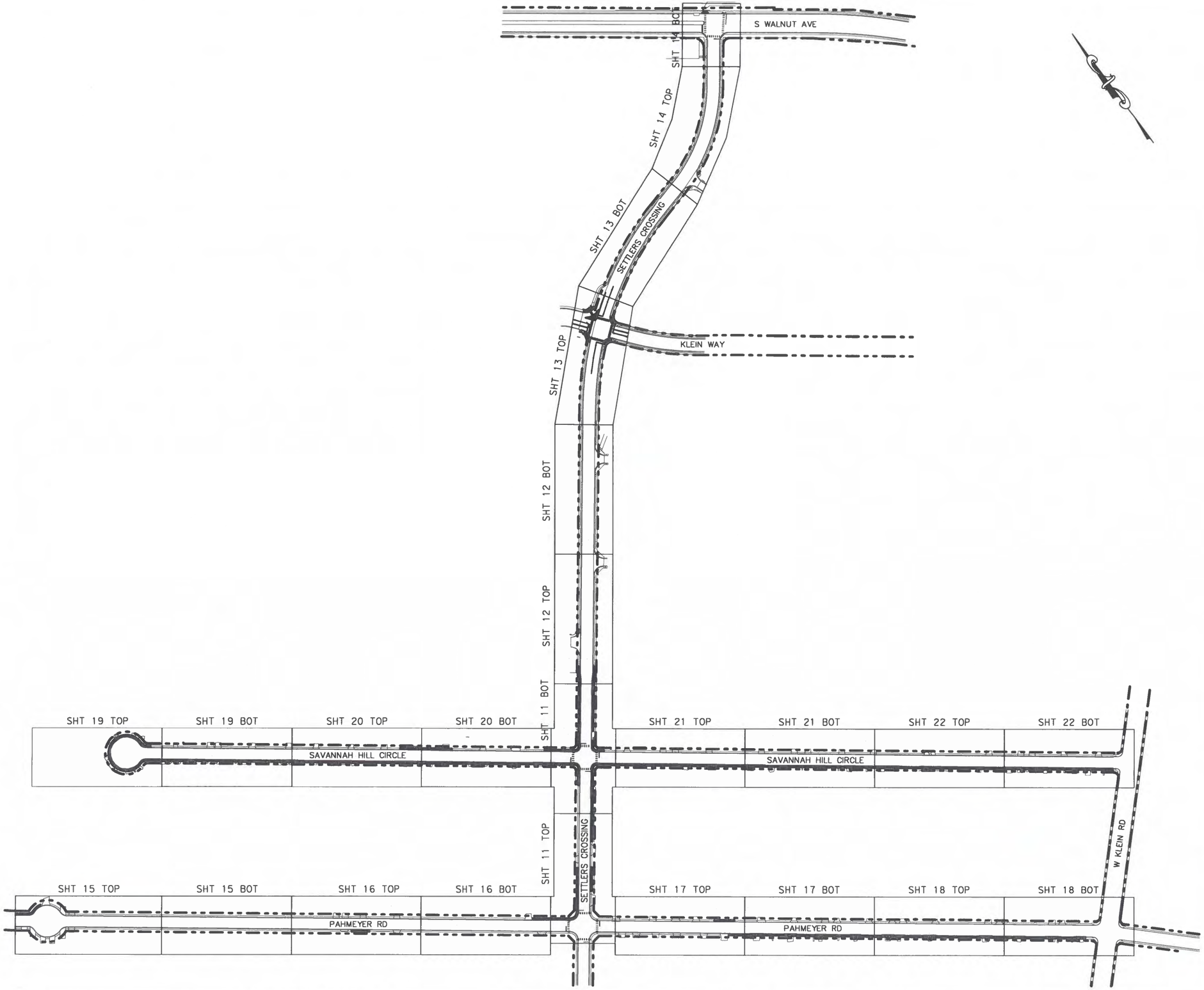
CITY OF NEW BRAUNFELS
CITYWIDE PEDESTRIAN IMPROVEMENTS

ROADWAY PLAN LAYOUT

SW3 - OAK RUN PARKWAY AND WESTPOINTE DRIVE

90% SUBMITTAL	PROJECT NO: NB 22-172		DATE: 6/20/2024
BMB NO. C-1638	DSGN BY: CB/CDA	CHKD BY: CB	SHEET: 10

W:\Work\C-1605 CONS Citywide Pedestrian Improvements\Design-Preliminary Phase\01 CAD\04 ROADWAY SHEETS\Package 2 - A2 SW1\SW3\01 SW3-ROWY PP01.dgn 6/20/2024 4:28:33 PM



PLAN VIEW LEGEND:

- EXISTING CURB
- EXISTING EDGE OF ROADWAY
- EXISTING CHAINLINK FENCE
- EXISTING MISC FENCE
- EXISTING RIGHT OF WAY
- PROPOSED CURB
- PROPOSED RETAINING WALL
- PROPOSED CURB & GUTTER
- PROPOSED DRIVEWAY/RIPRAP
- PROPOSED TOPSOIL W/ SOD
- PROPOSED SIDEWALK

NOT TO SCALE

STATE OF TEXAS
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CITY OF NEW BRAUNFELS
CITYWIDE PEDESTRIAN IMPROVEMENTS

PROJECT LAYOUT

A2 - SETTLERS CROSSING, PAHMEYER RD, SAVANNAH HILL CIRCLE

90% SUBMITTAL	PROJECT NO: NB 22-172		DATE: 6/20/2024
BMB NO. C-1638	DSGN BY: CB/CDA	CHKD BY: CB	SHEET: 10A

W:\Work\C-1605 CoNB Citywide Pedestrian Improvements\Design-Preliminary Phase\01 CAD\04 ROADWAY SHEETS\Package 2 - A2 SW\SW10\DA A2-PROJECT LAYOUT SHT01.dgn 6/20/2024 5:15:51 PM

MATCH LINE STA 118+00 (SEE SHT 16)

HALEY DAWN HOLDINGS LLC
2594 PAHMEYER RD
SHEPHERDS GLEN BLOCK 4 LOT 10 0.35 AC

CHANG PETER CHIEMING
2593 - 2595 PAHMEYER RD
SHEPHERDS GLEN BLOCK 3
LOT 10 0.2136 AC

BARRERA DAVID A & MARIA A
2492 SAVANNAH HILL CIR
LOT: 1 BLK: 3 ADDN: SAVANNAH HILL #2
0.5280 AC.

PAHMEYER RD

EXIST ROW
EX STOP SIGN TO REMAIN
EX CURB RAMPS TO REMAIN
NO. 350
N: 13788100.71
E: 2249663.71
EL= 684.27
TPT 1/2" IR W/ RED BMB CONTROL CAP
EX 4' SDWLK
SIDEWALK
CURB & GUTTER
WWL
@ BLPM
BEG CURB
3' GRASS W/TOPSOIL
4' CONC SDWLK
CURB RAMPS TYPE 2
RELOCATE SIGN: STOP W/ ALL-WAY PLQ & STREET NAMES
CONC CURB & GUTTER W/ 1' CUT & RESTORE PVMNT SAW-CUT & MATCH EXIST
25'R
C
END CURB
@ BLSC
13+00
14+00
15+00
16+00
N 37° 03' 35" E
SETTLERS CROSSING
60' EX ROW
36' RDWY
CONC DRIVE
CONC DRVWY
WOOD FENCE
CHAINLINK FENCE
WTR
NO. 351
N: 13788248.91
E: 2249835.71
EL= 681.70
BM CHISELED SQUARE ON BOC
MATCH LINE STA 17+00

SHELTON BRIAN & MICHELE
2636 PAHMEYER RD
SHEPHERDS GLEN BLOCK 1
LOT 15 0.32 AC

HUYNH NGOC DUY QUANG
2637 PAHMEYER RD
SHEPHERDS GLEN BLOCK 2
LOT 15 0.35 AC

KEAN SABEDIA MARY
2520 SAVANNAH HILL CIR
SAVANNAH HILL #2 BLK: 1
LOT: 16 0.5280AC
MH=NTA0737242/243

MATCH LINE STA 120+00 (SEE SHT 17)

MATCH LINE STA 214+00 (SEE SHT 20)

HEIMER FP LTD & HOLLMIG FP LTD
2493 SAVANNAH HILL CIR
LOT: 29 BLK: 3 ADDN: SAVANNAH HILL #2 0.5270AC

CONC CURB & GUTTER W/ 1' CUT & RESTORE PVMNT SAW-CUT & MATCH EXIST
CURB RAMPS TYPE 2
RELOCATE SIGN: STOP W/ ALL-WAY PLQ
RELOCATE SIGN: STOP W/ ALL-WAY PLQ & STREET NAMES
3' GRASS W/TOPSOIL
4' CONC SDWLK
CONC DRVWY
15'R
@ BLSC
18+00
19+00
20+00
N 37° 03' 35" E
SETTLERS CROSSING
CONCRETE MAILBOX PAD
EX CONC COMMUNITY MAILBOX PAD TO REMAIN
RELOCATE SIGN: SCHOOL SPEED LIMIT 20 MPH
CURB RAMP TYPE 2
NO. 355
N: 13788530.26
E: 2250051.64
EL= 676.79
TPT 1/2" IR W/ RED BMB CONTROL CAP
RELOCATE SIGN: STOP W/ ALL-WAY PLQ
SAVANNAH HILL CIR
MATCH LINE STA 17+00
MATCH LINE STA 21+00

KEAN SABEDIA MARY
2520 SAVANNAH HILL CIR
SAVANNAH HILL #2 BLK: 1
LOT: 16 0.5280AC
MH=NTA0737242/243

VASQUEZ JUAN JOHNNY JR & PATRICIA MARIE
2521 SAVANNAH HILL CIR
LOT: 16 BLK: 2 ADDN: SAVANNAH HILL #2 0.6370AC
MH=HWC0254871/872

MATCH LINE STA 216+00 (SEE SHT 21)

NOTE:

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LEGEND:

- EXIST CURB
- EXIST EDGE OF ROADWAY
- EXIST CHAINLINK FENCE
- EXIST MISCELLANOUS FENCE
- APPARENT EXIST RIGHT OF WAY
- PROP CURB
- PROP RETAINING WALL
- PROP CURB & GUTTER
- PROP DRIVEWAY / RIPRAP
- PROP TOPSOIL W/ GRASS
- PROP SIDEWALK
- PROP CUT & RESTORE ASPH PVMNT
- DIRECTION OF TRAFFIC
- DRIVEWAY NUMBER
- SIGN POST

A	REFL PAV MRK TY I (W) 4" (SLD) (100MIL)
B	REFL PAV MRK TY I (W) 8" (SLD) (100MIL)
C	REFL PAV MRK TY I (W) 24" (SLD) (100MIL)
D	REFL PAV MRK TY I (Y) 4" (SLD) (100MIL)
E	REFL PAV MRK TY I (W) (ARROW) (100MIL)
F	REFL PAV MRK TY I (W) (YLD TRI) (100MIL)
G	REFL PAV MRKR TY I-C
H	REFL PAV MRKR TY II-A-A
I	REFL PAV MRKR TY II-C-R
J	INSTL OM ASSM (OM-2Z) (WFLX) GND (BI)
K	ELIM EXT PAV MRK & MRKS

20 0 40
HORIZ SCALE: 1"= 40'

STATE OF TEXAS
CARL BAIN
56996
REGISTERED PROFESSIONAL ENGINEER
6/20/24

City of New Braunfels

BAIN MEDINA BAIN, INC.
ENGINEERS & SURVEYORS
TBPE F-001712 TBPLS 10020900
7073 San Pedro, San Antonio, Texas, 78216
Phone: 210-494-7223 Fax: 210-490-5120 WWW.BMBI.COM

CITY OF NEW BRAUNFELS
CITYWIDE PEDESTRIAN IMPROVEMENTS

ROADWAY PLAN LAYOUT

A2 - SETTLERS CROSSING - STA 12+65 TO STA 21+00

90% SUBMITTAL	PROJECT NO: NB 22-172		DATE: 6/20/2024
BMB NO. C-1638	DSGN BY: CB/CDA	CHKD BY: CB	SHEET: 11

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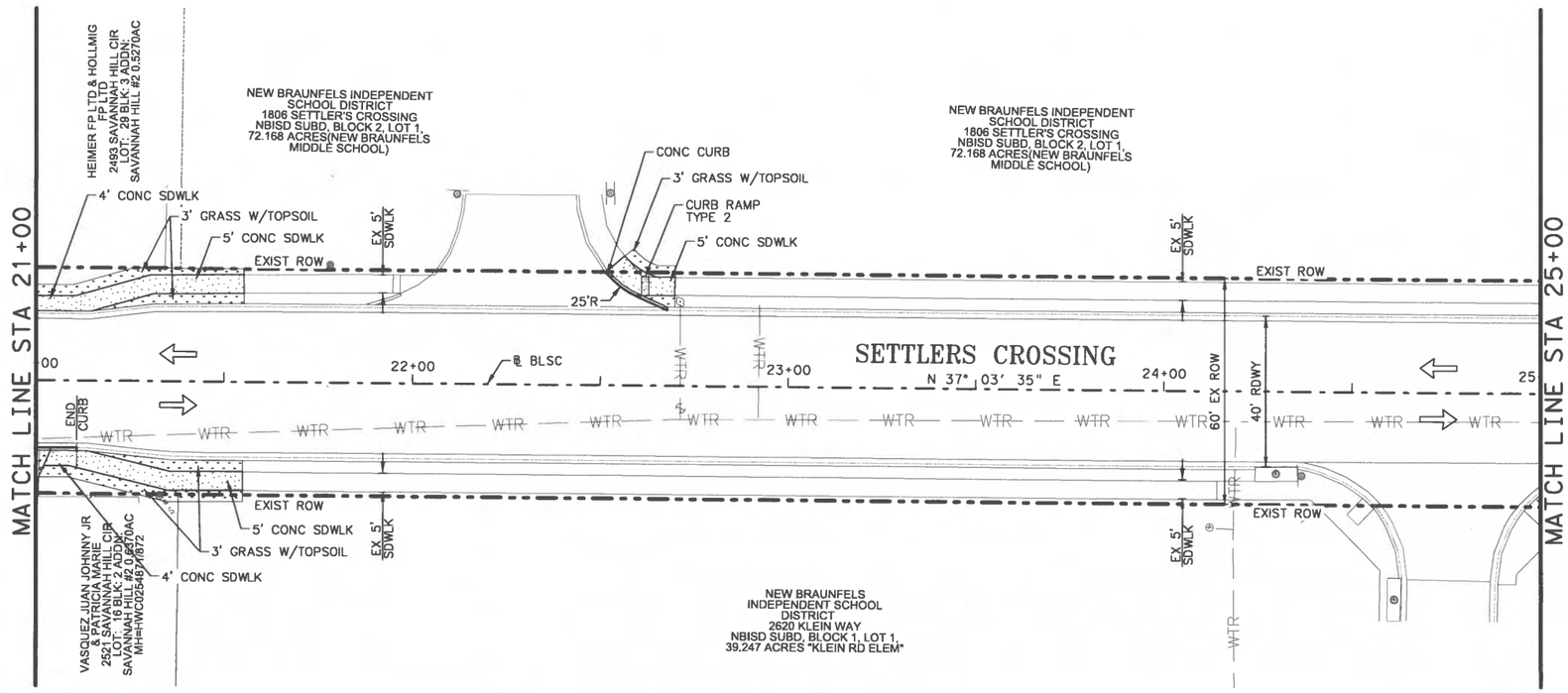

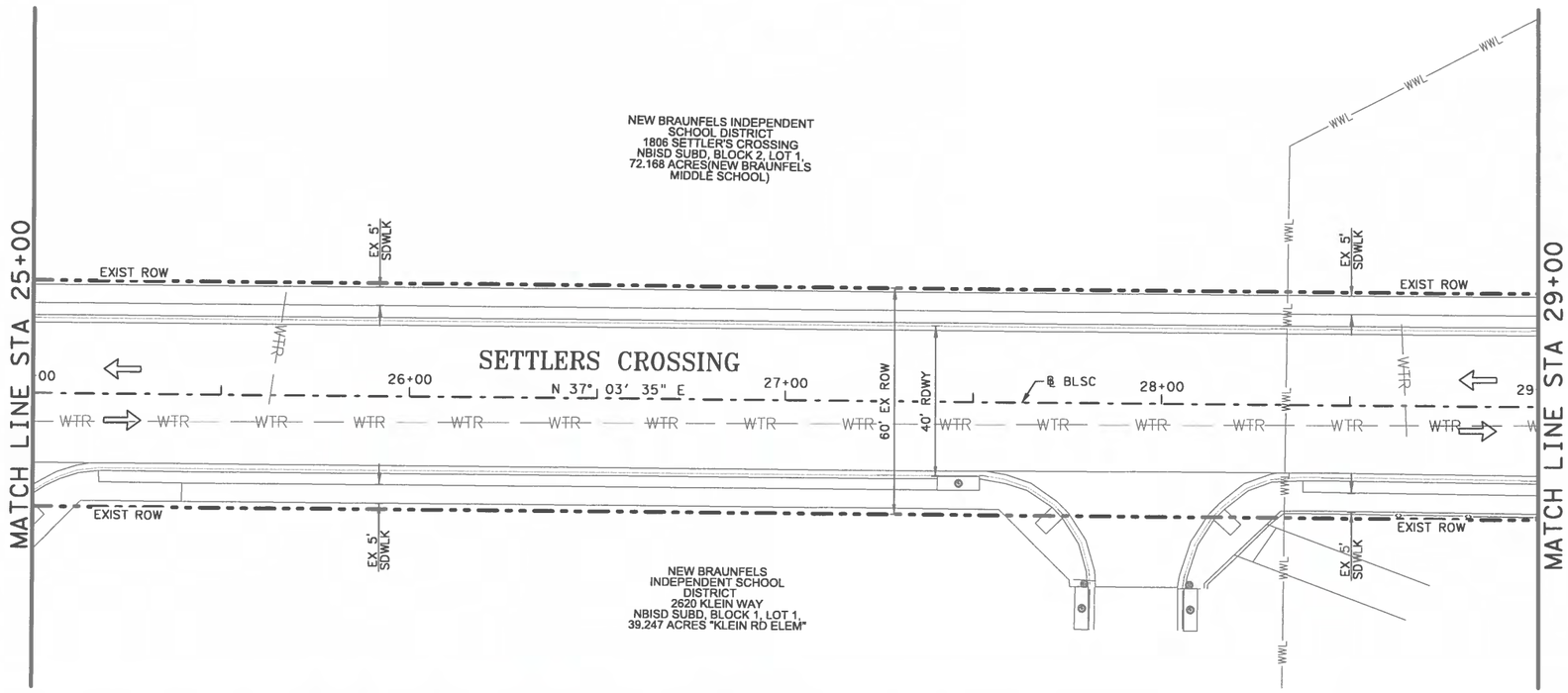

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LEGEND:

- EXIST CURB
- EXIST EDGE OF ROADWAY
- EXIST CHAINLINK FENCE
- EXIST MISCELLANOUS FENCE
- APPARENT EXIST RIGHT OF WAY
- PROP CURB
- PROP RETAINING WALL
- PROP CURB & GUTTER
- PROP DRIVEWAY / RIPRAP
- PROP TOPSOIL W/ GRASS
- PROP SIDEWALK
- PROP CUT & RESTORE ASPH PVMNT
- DIRECTION OF TRAFFIC
- DRIVEWAY NUMBER (16)
- SIGN POST
- [A] REFL PAV MRK TY I (W)4"(SLD)(100MIL)
- [B] REFL PAV MRK TY I (W)8"(SLD)(100MIL)
- [C] REFL PAV MRK TY I (W)24"(SLD)(100MIL)
- [D] REFL PAV MRK TY I (Y)4"(SLD)(100MIL)
- [E] REFL PAV MRK TY I (W)(ARROW)(100MIL)
- [F] REFL PAV MRK TY I (W)(YLD TRI)(100MIL)
- [G] REFL PAV MRKR TY I-C
- [H] REFL PAV MRKR TY II-A-A
- [I] REFL PAV MRKR TY II-C-R
- [J] INSTL OM ASSM (OM-2Z)(WFLX)GND(BI)
- [K] ELIM EXT PAV MRK & MRKS

20 0 40
HORIZ SCALE: 1"= 40'

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CITY OF NEW BRAUNFELS
CITYWIDE PEDESTRIAN IMPROVEMENTS

ROADWAY PLAN LAYOUT

A2 - SETTLERS CROSSING - STA 21+00 TO STA 29+00

90% SUBMITTAL	PROJECT NO: NB 22-172	DATE: 6/20/2024
BMB NO. C-1638	DSGN BY: CB/CDA CHKD BY: CB	SHEET: 12

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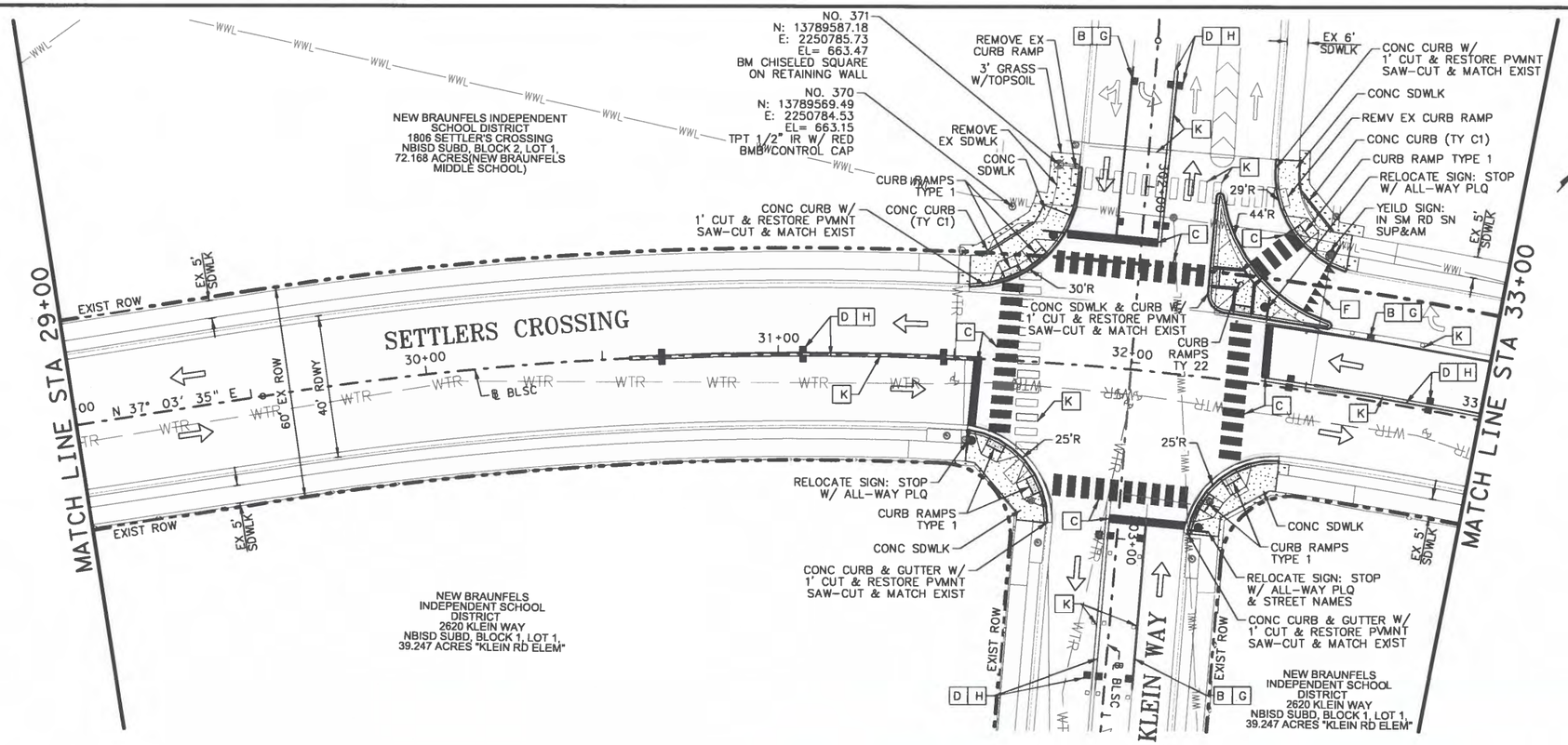

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- PROP CUT & RESTORE ASPH PVMNT
- DIRECTION OF TRAFFIC
- DRIVEWAY NUMBER
- SIGN POST

A	REFL PAV MRK TY I (W)4"(SLD)(100MIL)
B	REFL PAV MRK TY I (W)8"(SLD)(100MIL)
C	REFL PAV MRK TY I (W)24"(SLD)(100MIL)
D	REFL PAV MRK TY I (Y)4"(SLD)(100MIL)
E	REFL PAV MRK TY I (W)(ARROW)(100MIL)
F	REFL PAV MRK TY I (W)(YLD TRI)(100MIL)
G	REFL PAV MRKR TY I-C
H	REFL PAV MRKR TY II-A-A
I	REFL PAV MRKR TY II-C-R
J	INSTL OM ASSM (OM-2Z)(WFLX)GND(BI)
K	ELIM EXT PAV MRK & MRKS

20 0 40
HORIZ SCALE: 1"= 40'

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CITY OF NEW BRAUNFELS
CITYWIDE PEDESTRIAN IMPROVEMENTS

ROADWAY PLAN LAYOUT

A2 - SETTLERS CROSSING - STA 29+00 TO STA 37+00

90% SUBMITTAL	PROJECT NO: NB 22-172		DATE: 6/20/2024
BMB NO. C-1638	DSGN BY: CB/CDA	CHKD BY: CB	SHEET: 13

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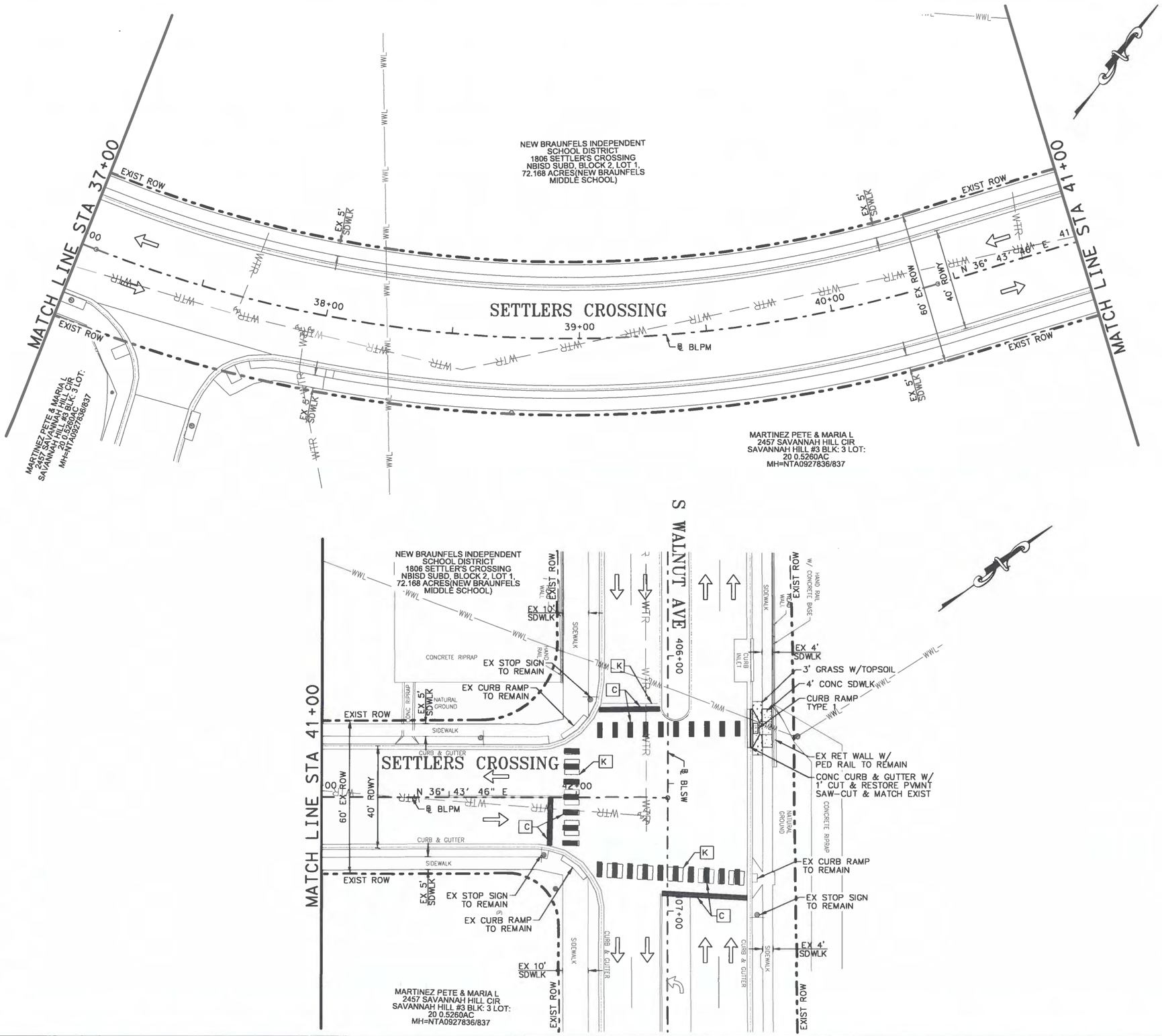

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- PROP CURB & GUTTER
- PROP DRIVEWAY / RIPRAP
- PROP TOPSOIL W/ GRASS
- PROP SIDEWALK
- PROP CUT & RESTORE ASPH PVMNT
- DIRECTION OF TRAFFIC
- DRIVEWAY NUMBER (16)
- SIGN POST

A	REFL PAV MRK TY I (W) 4" (SLD) (100MIL)
B	REFL PAV MRK TY I (W) 8" (SLD) (100MIL)
C	REFL PAV MRK TY I (W) 24" (SLD) (100MIL)
D	REFL PAV MRK TY I (Y) 4" (SLD) (100MIL)
E	REFL PAV MRK TY I (W) (ARROW) (100MIL)
F	REFL PAV MRK TY I (W) (YLD TRI) (100MIL)
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H	REFL PAV MRKR TY II-A-A
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J	INSTL OM ASSM (OM-2Z) (WFLX) GND (BI)
K	ELIM EXT PAV MRK & MRKS

20 0 40
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CITY OF NEW BRAUNFELS
CITYWIDE PEDESTRIAN IMPROVEMENTS

ROADWAY PLAN LAYOUT

A2 - SETTLERS CROSSING - STA 37+00 TO STA 42+36

90% SUBMITTAL	PROJECT NO: NB 22-172		DATE: 6/20/2024
BMB NO. C-1638	DSGN BY: CB/CDA	CHKD BY: CB	SHEET: 14

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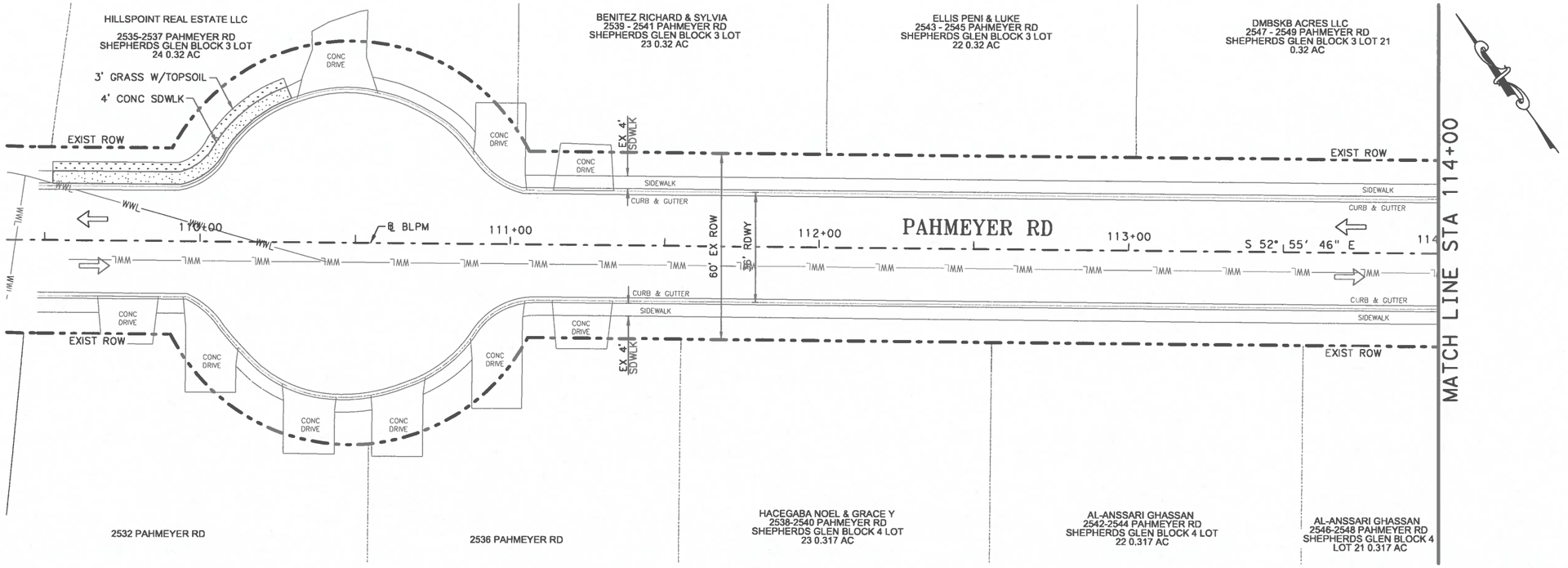

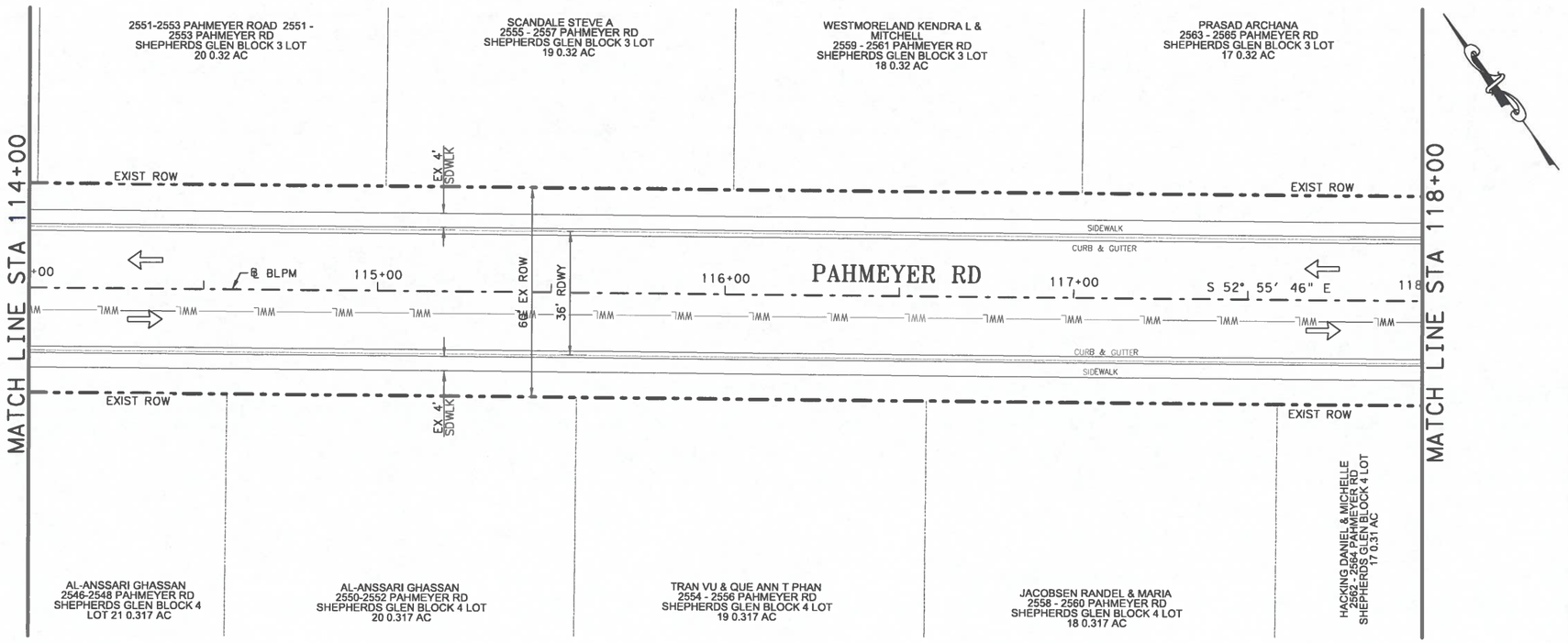

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- EXIST EDGE OF ROADWAY
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- DRIVEWAY NUMBER
- SIGN POST

A	REFL PAV MRK TY I (W)4"(SLD)(100MIL)
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C	REFL PAV MRK TY I (W)24"(SLD)(100MIL)
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20 0 40
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CITY OF NEW BRAUNFELS
CITYWIDE PEDESTRIAN IMPROVEMENTS

ROADWAY PLAN LAYOUT

A2 - PAHMEYER RD - STA 109+50 TO STA 118+00

90% SUBMITTAL	PROJECT NO: NB 22-172		DATE: 6/20/2024
BMB NO. C-1638	DSGN BY: CB/CDA	CHKD BY: CB	SHEET: 15

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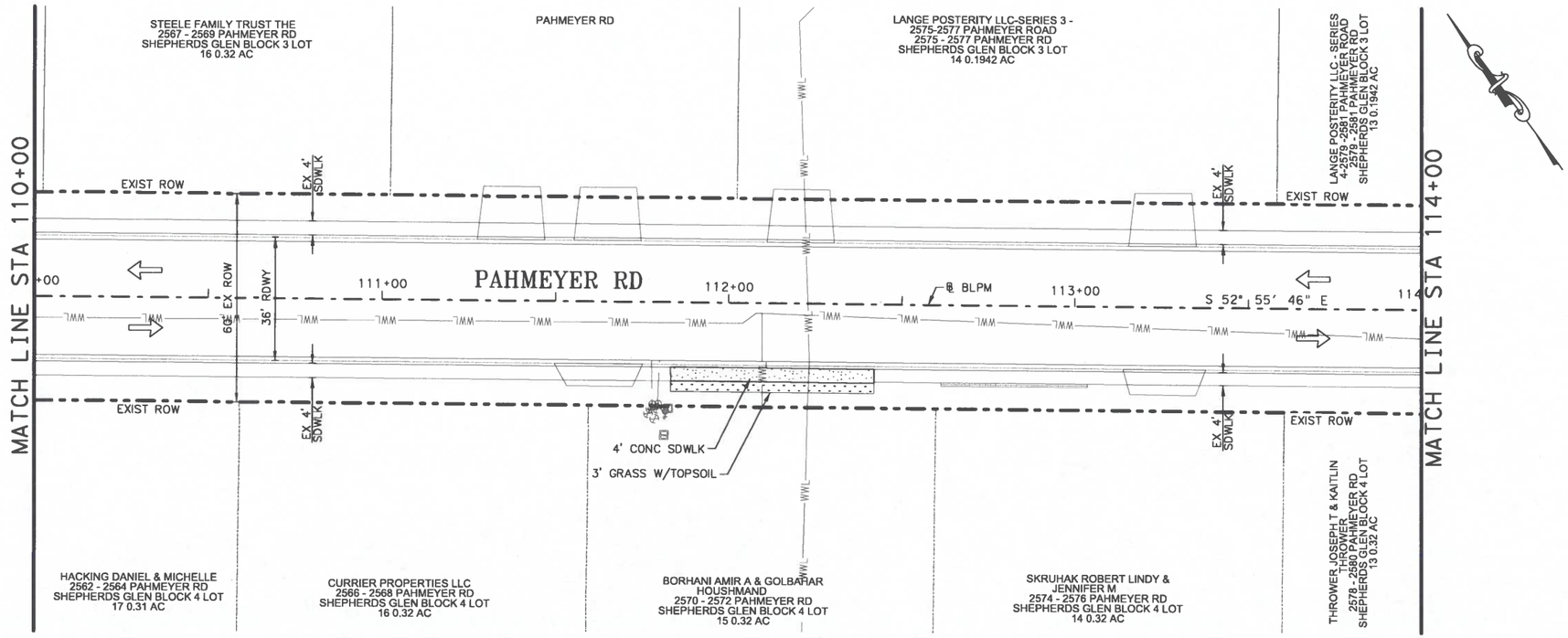

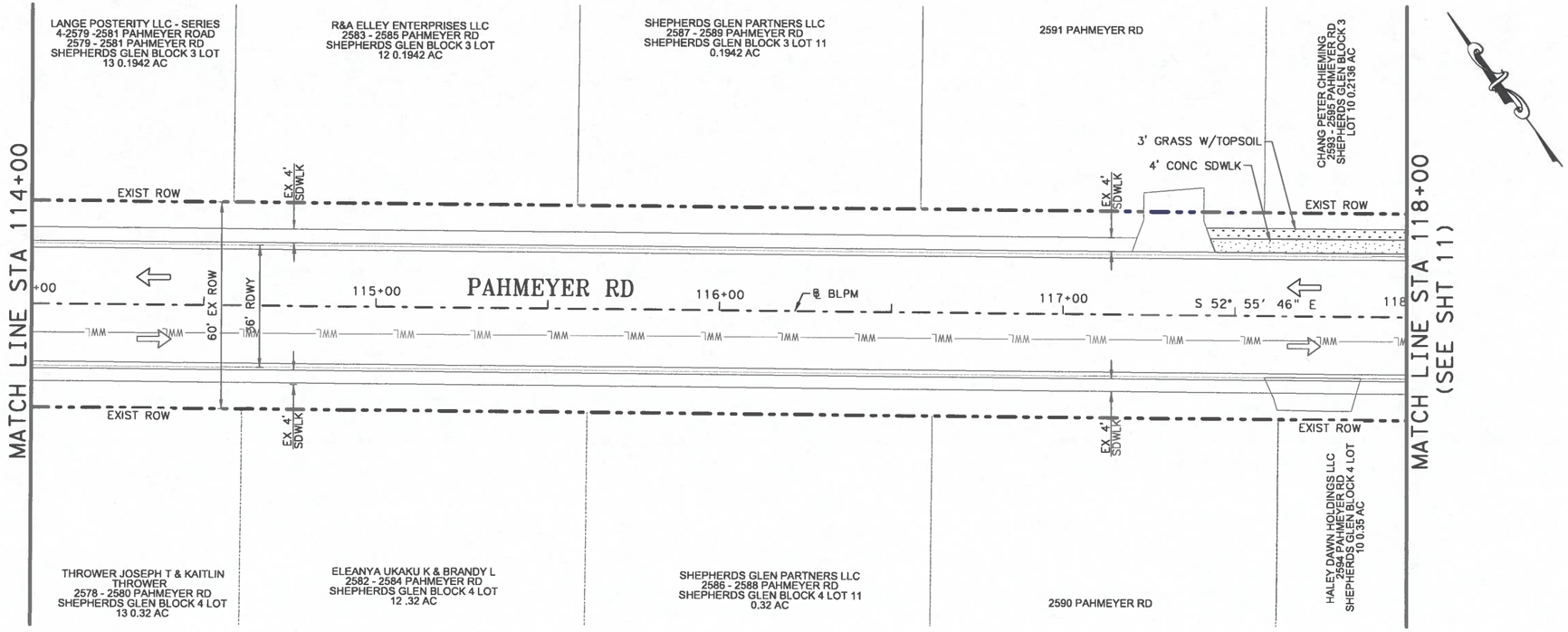

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- PROP SIDEWALK
- PROP CUT & RESTORE ASPH PVMNT
- DIRECTION OF TRAFFIC
- DRIVEWAY NUMBER
- SIGN POST

A	REFL PAV MRK TY I (W) 4" (SLD) (100MIL)
B	REFL PAV MRK TY I (W) 8" (SLD) (100MIL)
C	REFL PAV MRK TY I (W) 24" (SLD) (100MIL)
D	REFL PAV MRK TY I (Y) 4" (SLD) (100MIL)
E	REFL PAV MRK TY I (W) (ARROW) (100MIL)
F	REFL PAV MRK TY I (W) (YLD TRI) (100MIL)
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J	INSTL OM ASSM (OM-2Z) (WFLX) GND (BI)
K	ELIM EXT PAV MRK & MRKS

20 0 40
HORIZ SCALE: 1"= 40'

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CITY OF NEW BRAUNFELS
CITYWIDE PEDESTRIAN IMPROVEMENTS

ROADWAY PLAN LAYOUT

A2 - PAHMEYER RD - STA 110+00 TO STA 118+00

90% SUBMITTAL	PROJECT NO: NB 22-172		DATE: 6/20/2024
BMB NO. C-1638	DSGN BY: CB/CDA	CHKD BY: CB	SHEET: 16

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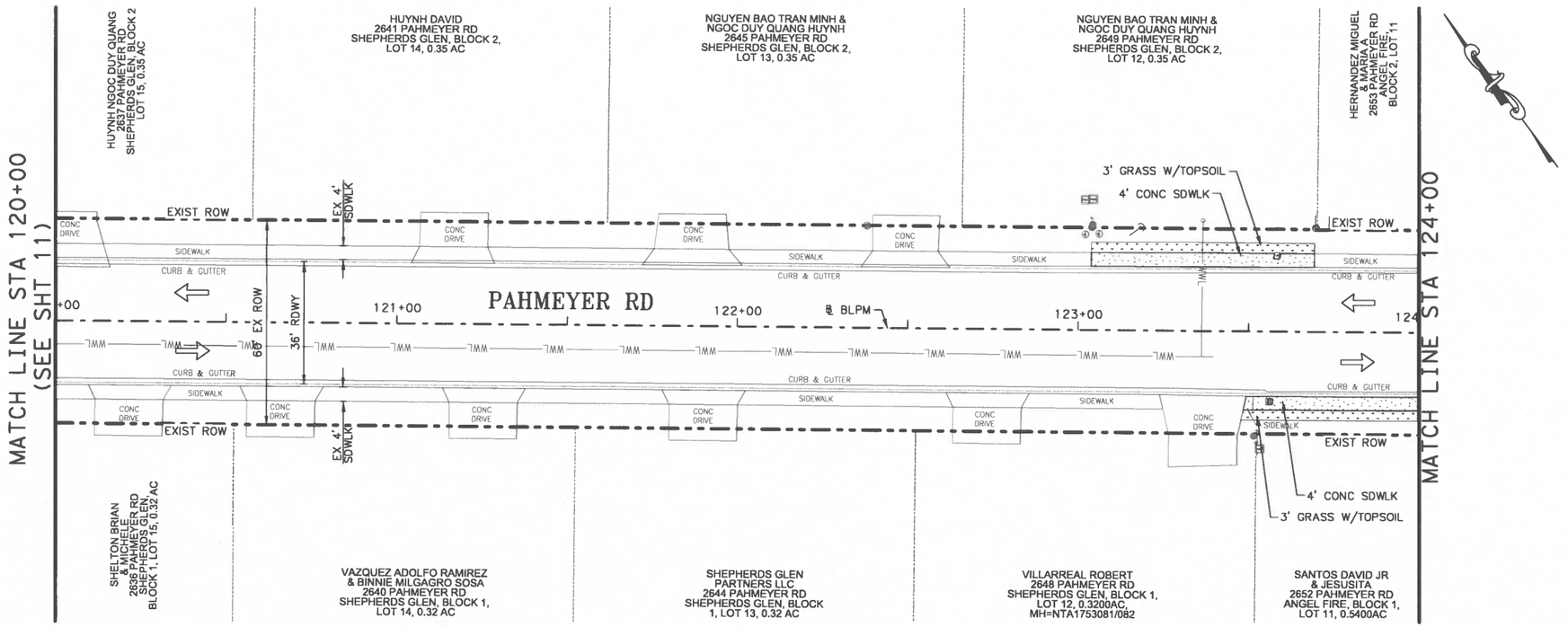

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- DIRECTION OF TRAFFIC
- DRIVEWAY NUMBER (16)
- SIGN POST

A	REFL PAV MRK TY I (W)4"(SLD)(100MIL)
B	REFL PAV MRK TY I (W)8"(SLD)(100MIL)
C	REFL PAV MRK TY I (W)24"(SLD)(100MIL)
D	REFL PAV MRK TY I (Y)4"(SLD)(100MIL)
E	REFL PAV MRK TY I (W)(ARROW)(100MIL)
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G	REFL PAV MRKR TY I-C
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K	ELIM EXT PAV MRK & MRKS

20 0 40
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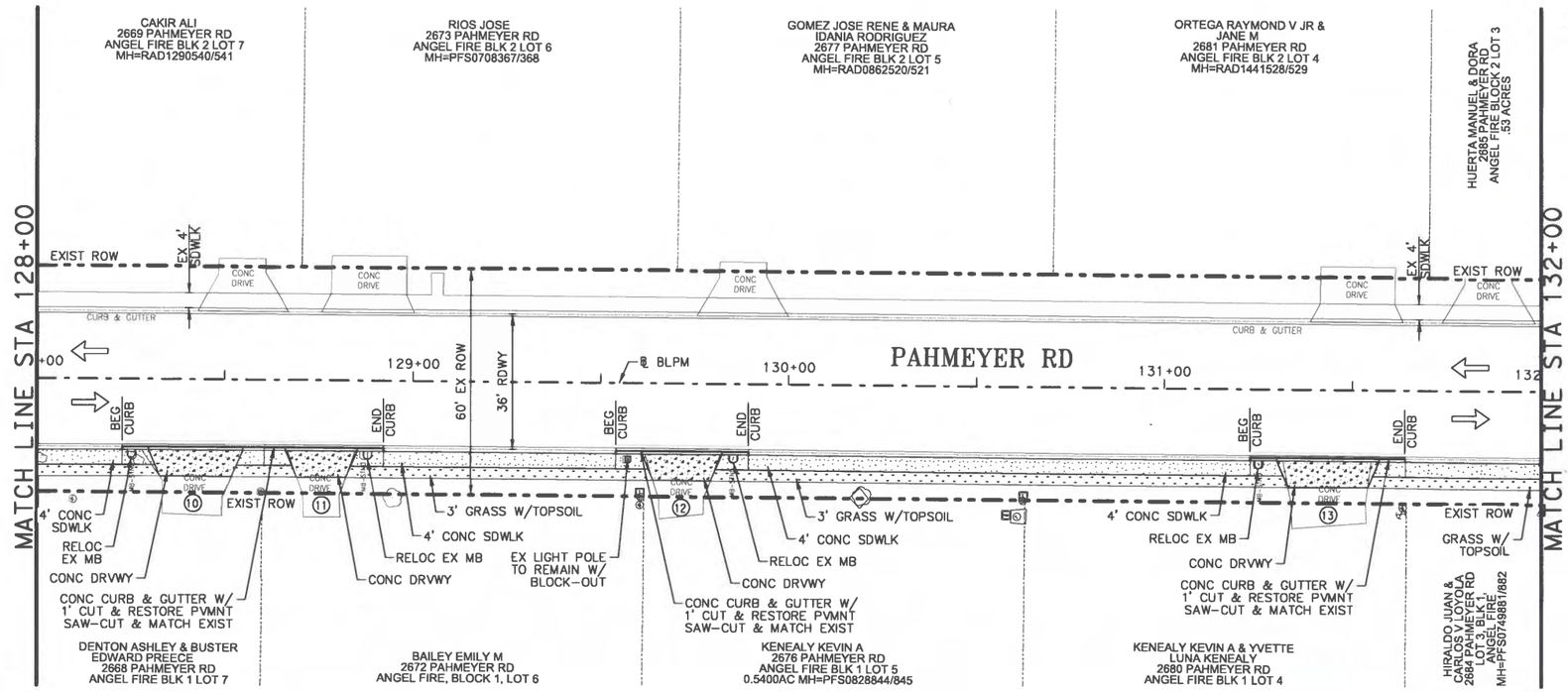
CITY OF NEW BRAUNFELS
CITYWIDE PEDESTRIAN IMPROVEMENTS

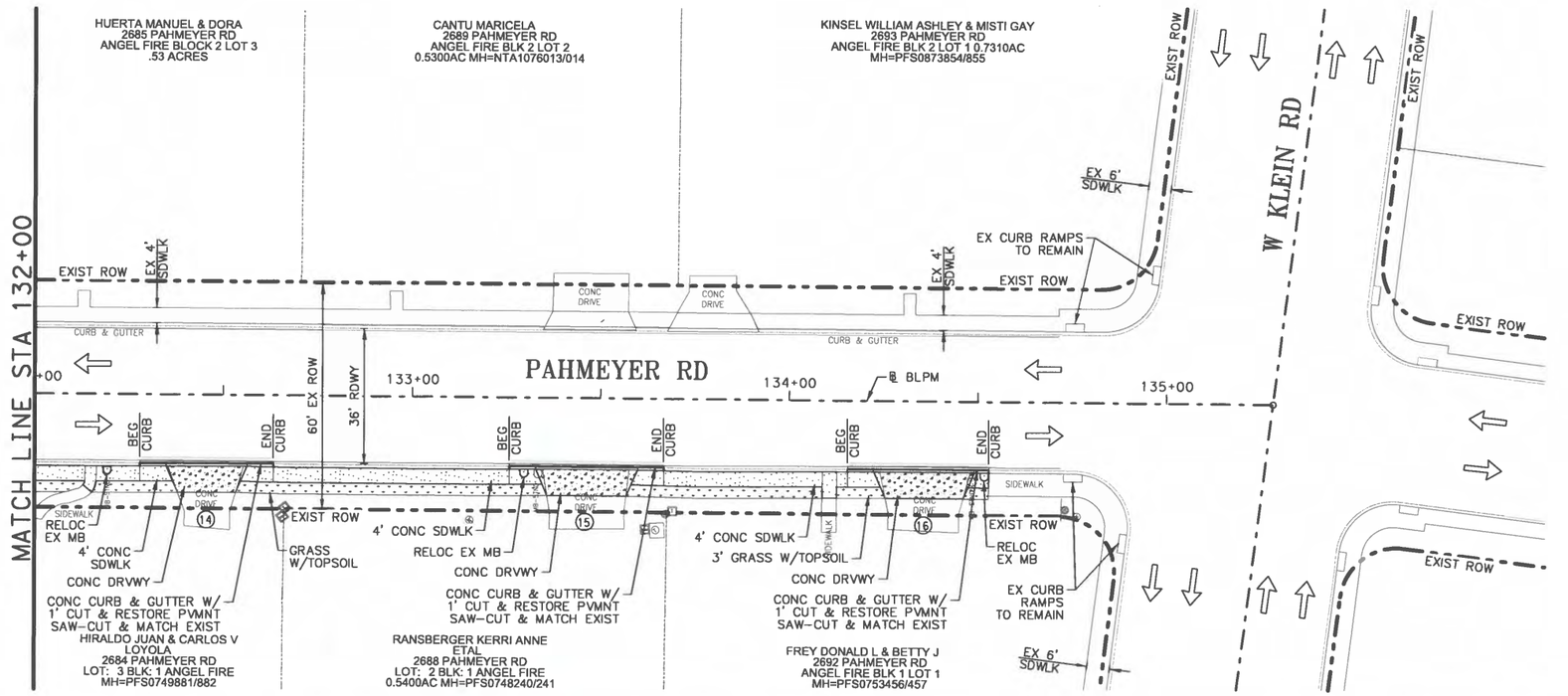
ROADWAY PLAN LAYOUT

A2 - PAHMEYER RD - STA 120+00 TO STA 128+00

90% SUBMITTAL	PROJECT NO: NB 22-172		DATE: 6/20/2024
BMB NO. C-1638	DSGN BY: CB/CDA	CHKD BY: CB	SHEET: 17

W:\Work\C-1605 CoNB Citywide Pedestrian Improvements\Design-Preliminary Phase\0\CAD\04 ROADWAY SHEETS\Package 2 - A2 Sheets\A2-RDWY PP07.dgn 6/20/2024 4:37:18 PM





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20 0 40
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CITYWIDE PEDESTRIAN IMPROVEMENTS

ROADWAY PLAN LAYOUT

A2 - PAHMEYER RD - STA 128+00 TO STA 135+28

90% SUBMITTAL	PROJECT NO: NB 22-172		DATE: 6/20/2024
BMB NO. C-1638	DSGN BY: CB/CDA	CHKD BY: CB	SHEET: 18

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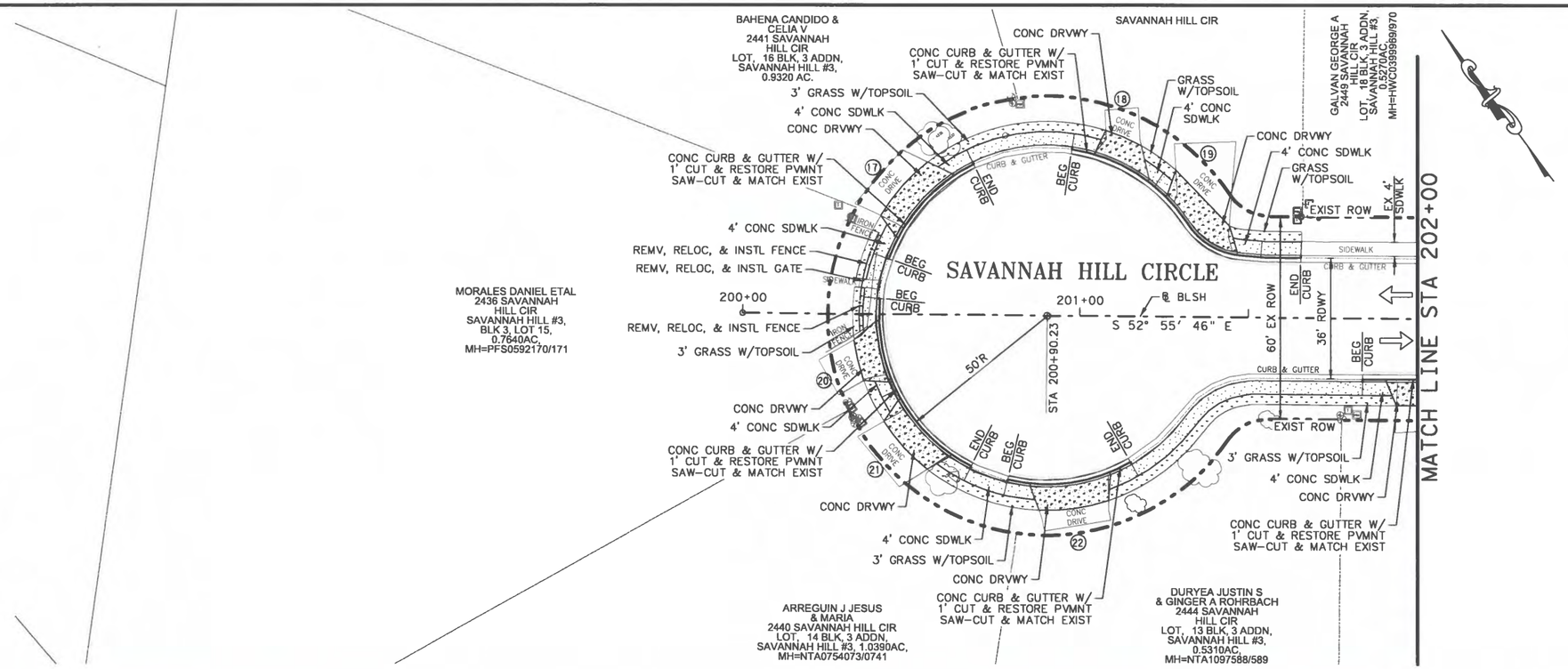

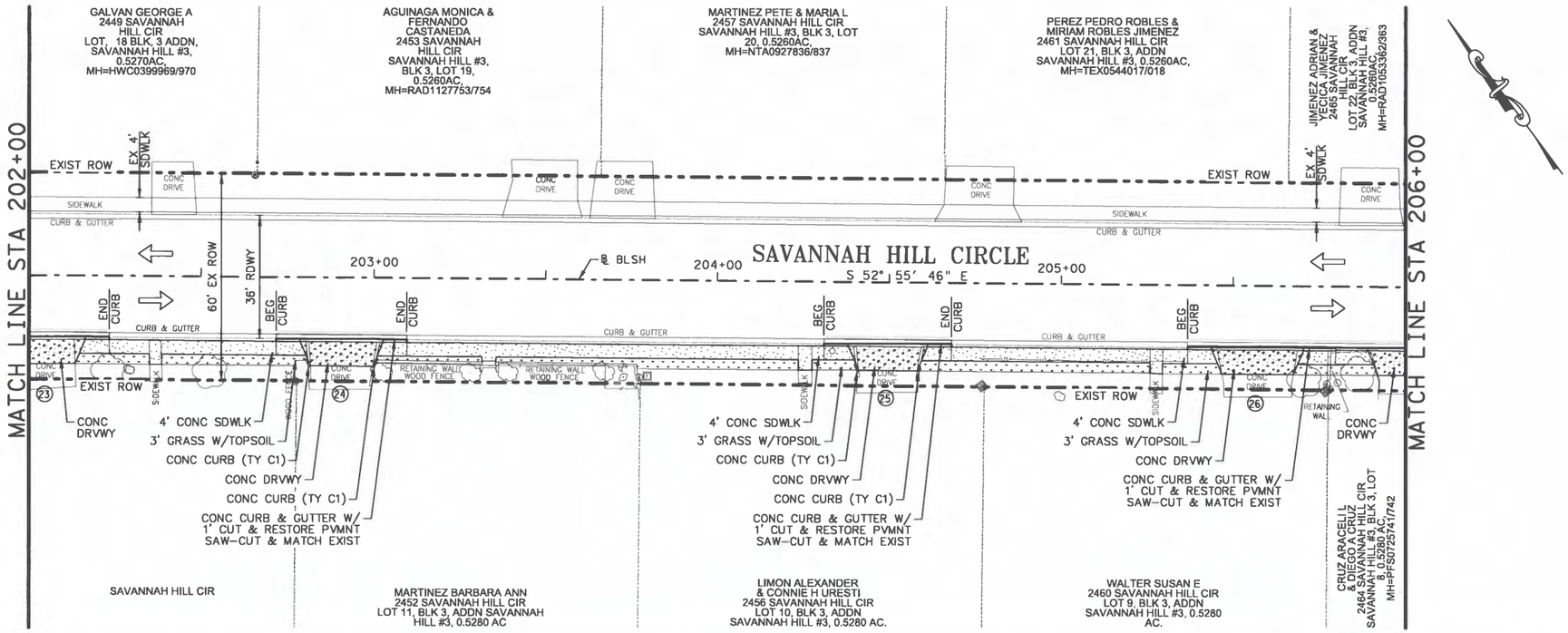

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- PROP CUT & RESTORE ASPH PVMNT
- DIRECTION OF TRAFFIC
- DRIVEWAY NUMBER
- SIGN POST

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B	REFL PAV MRK TY I (W)8"(SLD)(100MIL)
C	REFL PAV MRK TY I (W)24"(SLD)(100MIL)
D	REFL PAV MRK TY I (Y)4"(SLD)(100MIL)
E	REFL PAV MRK TY I (W)(ARROW)(100MIL)
F	REFL PAV MRK TY I (W)(YLD TRI)(100MIL)
G	REFL PAV MRKR TY I-C
H	REFL PAV MRKR TY II-A-A
I	REFL PAV MRKR TY II-C-R
J	INSTL OM ASSM (OM-2Z)(WFLX)GND(BI)
K	ELIM EXT PAV MRK & MRKS

20 0 40
HORIZ SCALE: 1"= 40'

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City of New Braunfels

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CITY OF NEW BRAUNFELS
CITYWIDE PEDESTRIAN IMPROVEMENTS

ROADWAY PLAN LAYOUT

A2 - SAVANNAH HILL CIRCLE - STA 200+00 TO STA 206+00

90% SUBMITTAL	PROJECT NO: NB 22-172		DATE: 6/20/2024
BMB NO. C-1638	DSGN BY: CB/CDA	CHKD BY: CB	SHEET: 19

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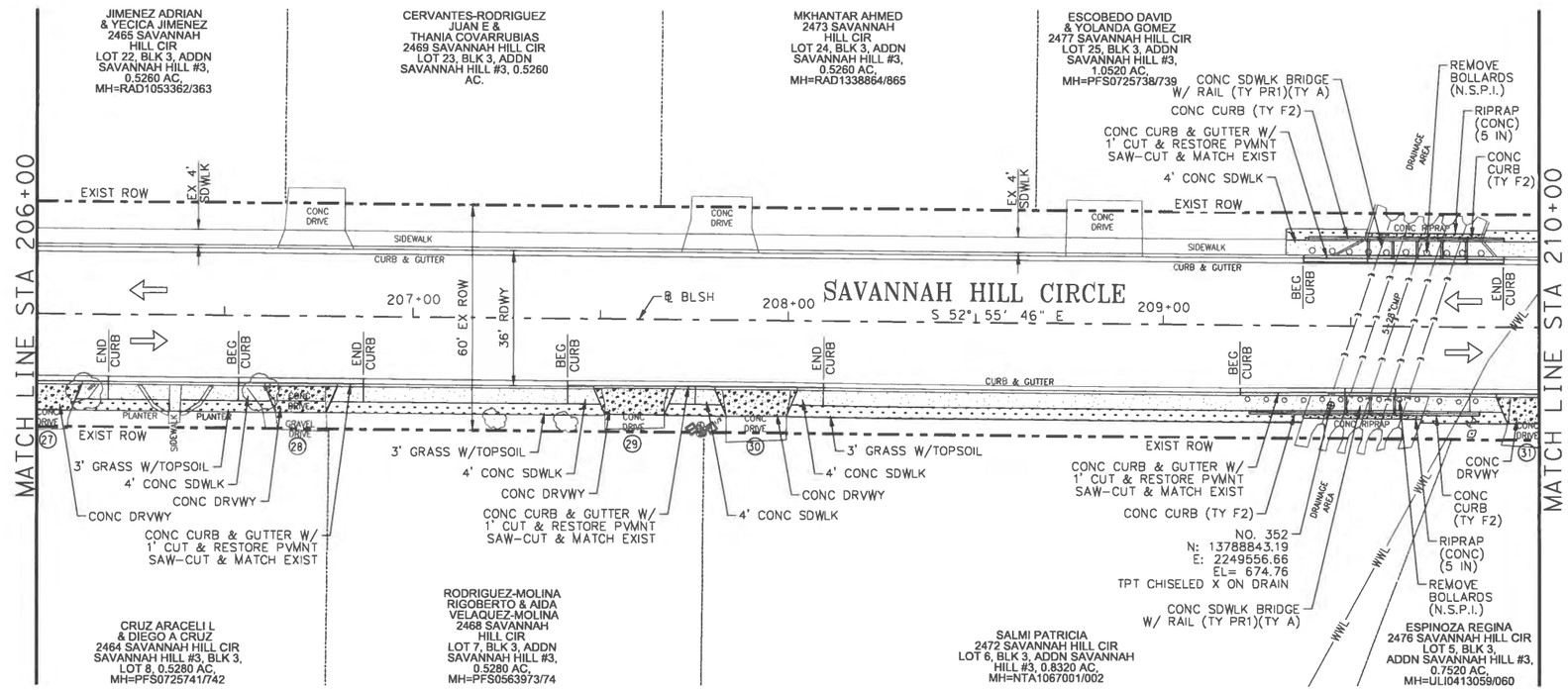

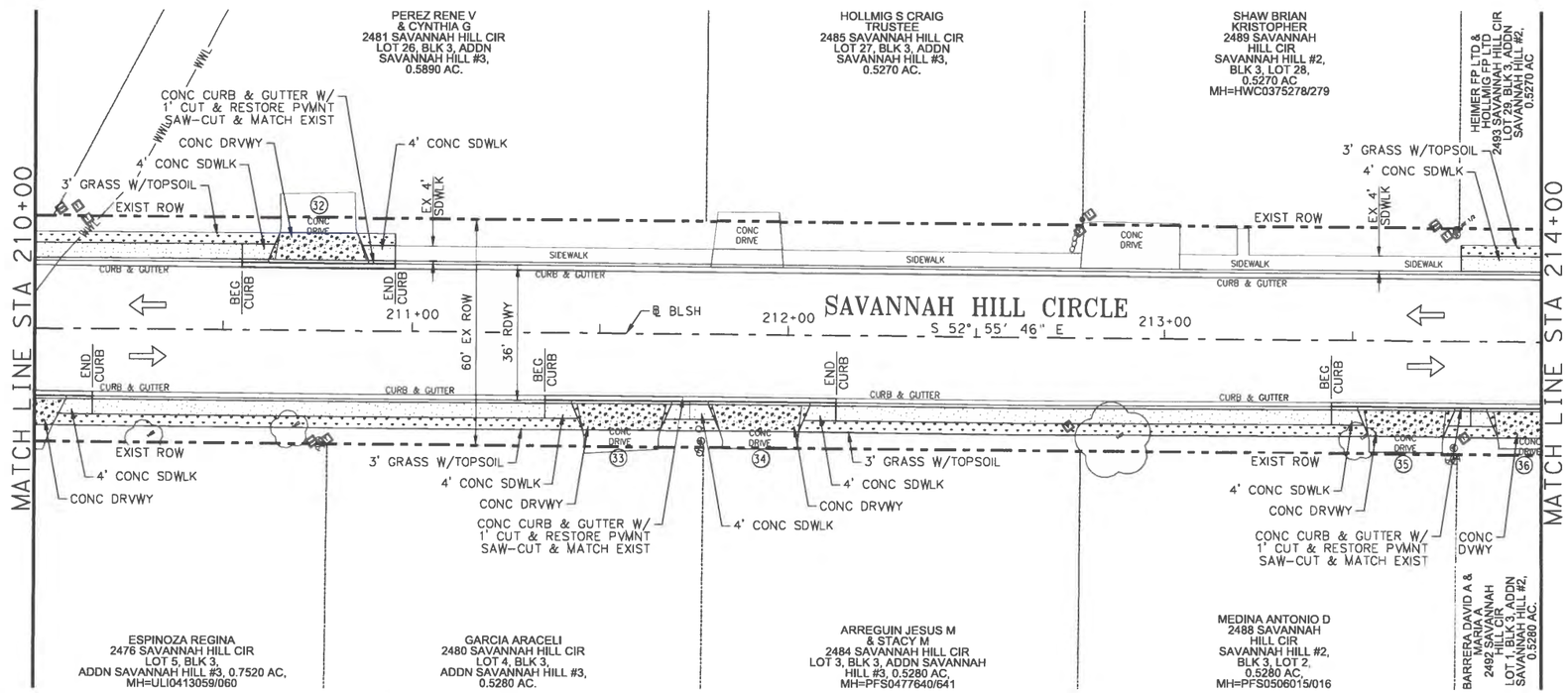

NOTE:

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LEGEND:

- EXIST CURB
- EXIST EDGE OF ROADWAY
- EXIST CHAINLINK FENCE
- EXIST MISCELLANOUS FENCE
- APPARENT EXIST RIGHT OF WAY
- PROP CURB
- PROP RETAINING WALL
- PROP CURB & GUTTER
- PROP DRIVEWAY / RIPRAP
- PROP TOPSOIL W/ GRASS
- PROP SIDEWALK
- PROP CUT & RESTORE ASPH PVMNT
- DIRECTION OF TRAFFIC
- DRIVEWAY NUMBER (16)
- SIGN POST

A	REFL PAV MRK TY I (W)4"(SLD)(100MIL)
B	REFL PAV MRK TY I (W)8"(SLD)(100MIL)
C	REFL PAV MRK TY I (W)24"(SLD)(100MIL)
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G	REFL PAV MRKR TY I-C
H	REFL PAV MRKR TY II-A-A
I	REFL PAV MRKR TY II-C-R
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K	ELIM EXT PAV MRK & MRKS

20 0 40
HORIZ SCALE: 1"= 40'

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7/2/2024

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CITY OF NEW BRAUNFELS
CITYWIDE PEDESTRIAN IMPROVEMENTS

ROADWAY PLAN LAYOUT

A2 - SAVANNAH HILL CIRCLE - STA 206+00 TO STA 214+00

FINAL SUBMITTAL	PROJECT NO: NB 22-172		DATE: 7/2/2024
BMB NO. C-1638	DSGN BY: CB/CDA	CHKD BY: CB	SHEET: 20

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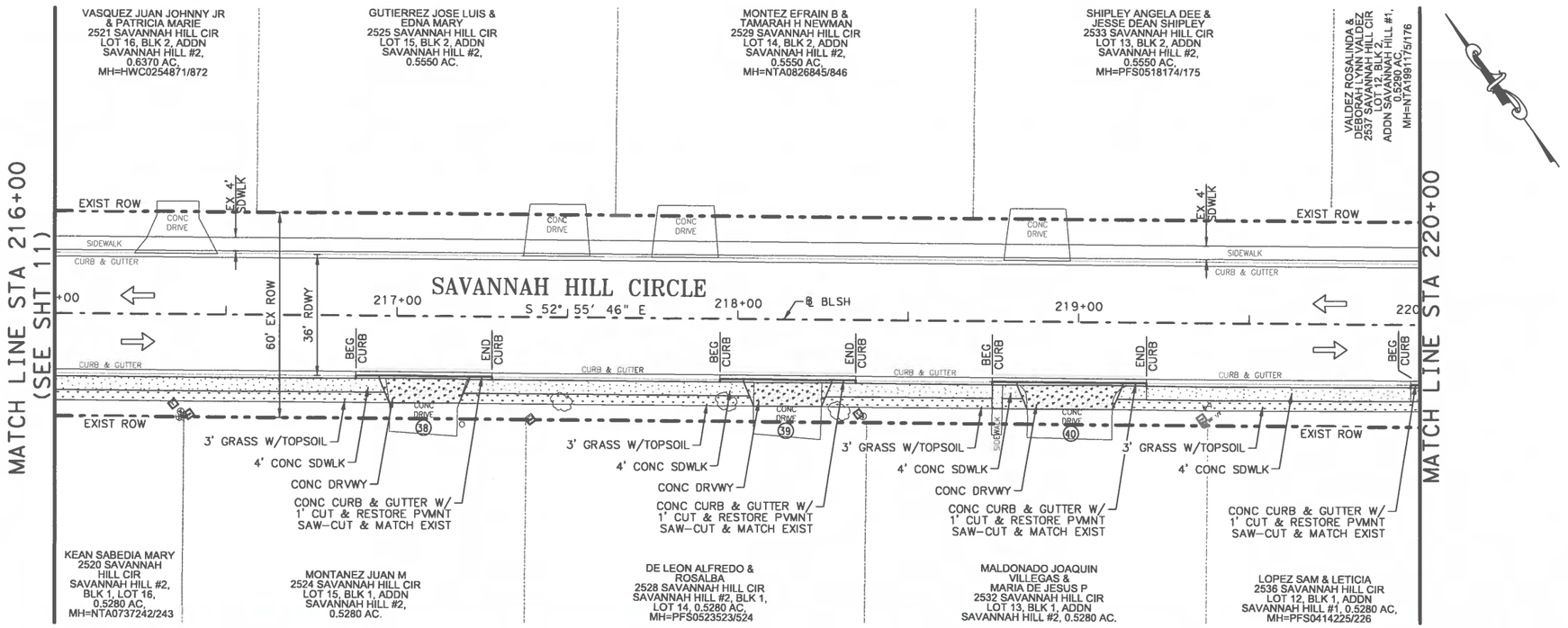

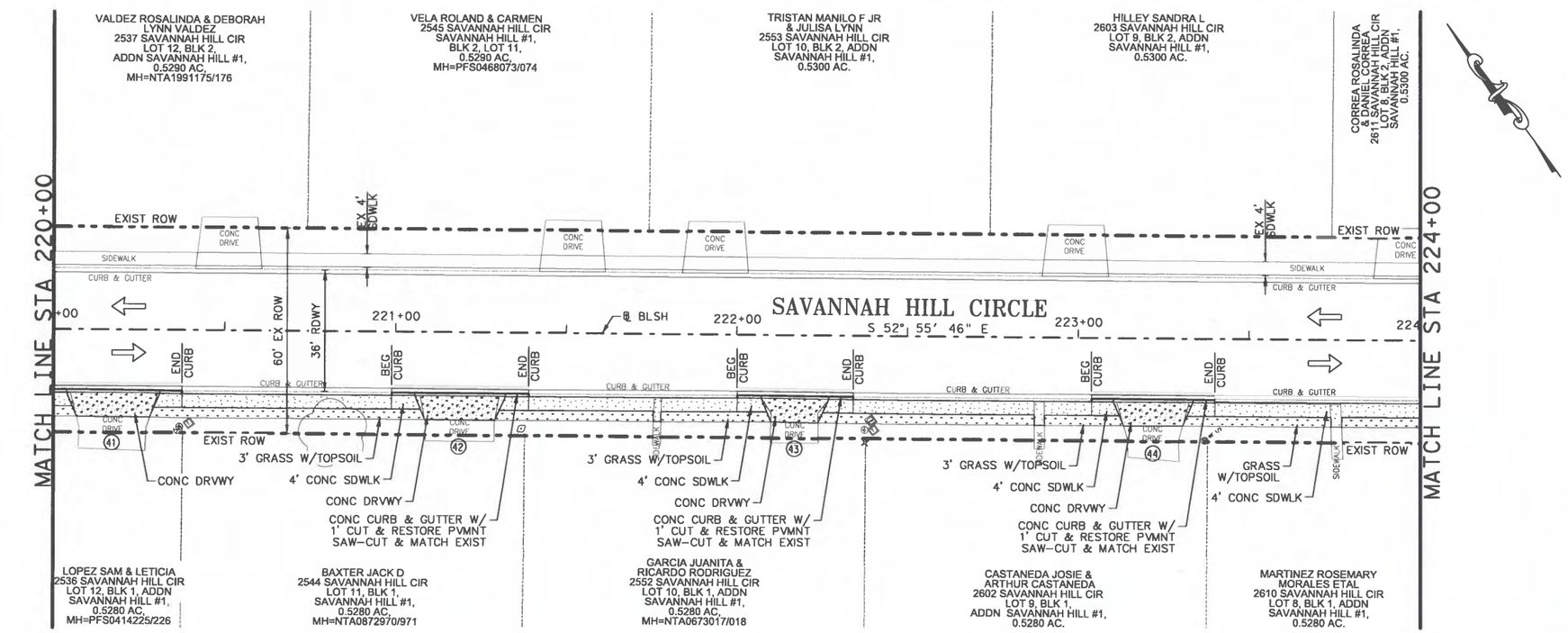

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LEGEND:

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- PROP CURB & GUTTER
- PROP DRIVEWAY / RIPRAP
- PROP TOPSOIL W/ GRASS
- PROP SIDEWALK
- PROP CUT & RESTORE ASPH PVMNT
- DIRECTION OF TRAFFIC
- DRIVEWAY NUMBER (16)
- SIGN POST

A	REFL PAV MRK TY I (W)4"(SLD)(100MIL)
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K	ELIM EXT PAV MRK & MRKS

20 0 40
HORIZ SCALE: 1"= 40'

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CITY OF NEW BRAUNFELS
CITYWIDE PEDESTRIAN IMPROVEMENTS

ROADWAY PLAN LAYOUT

A2 - SAVANNAH HILL CIRCLE - STA 216+00 TO STA 224+00

90% SUBMITTAL	PROJECT NO: NB 22-172		DATE: 6/20/2024
BMB NO. C-1638	DSGN BY: CB/CDA	CHKD BY: CB	SHEET: 21

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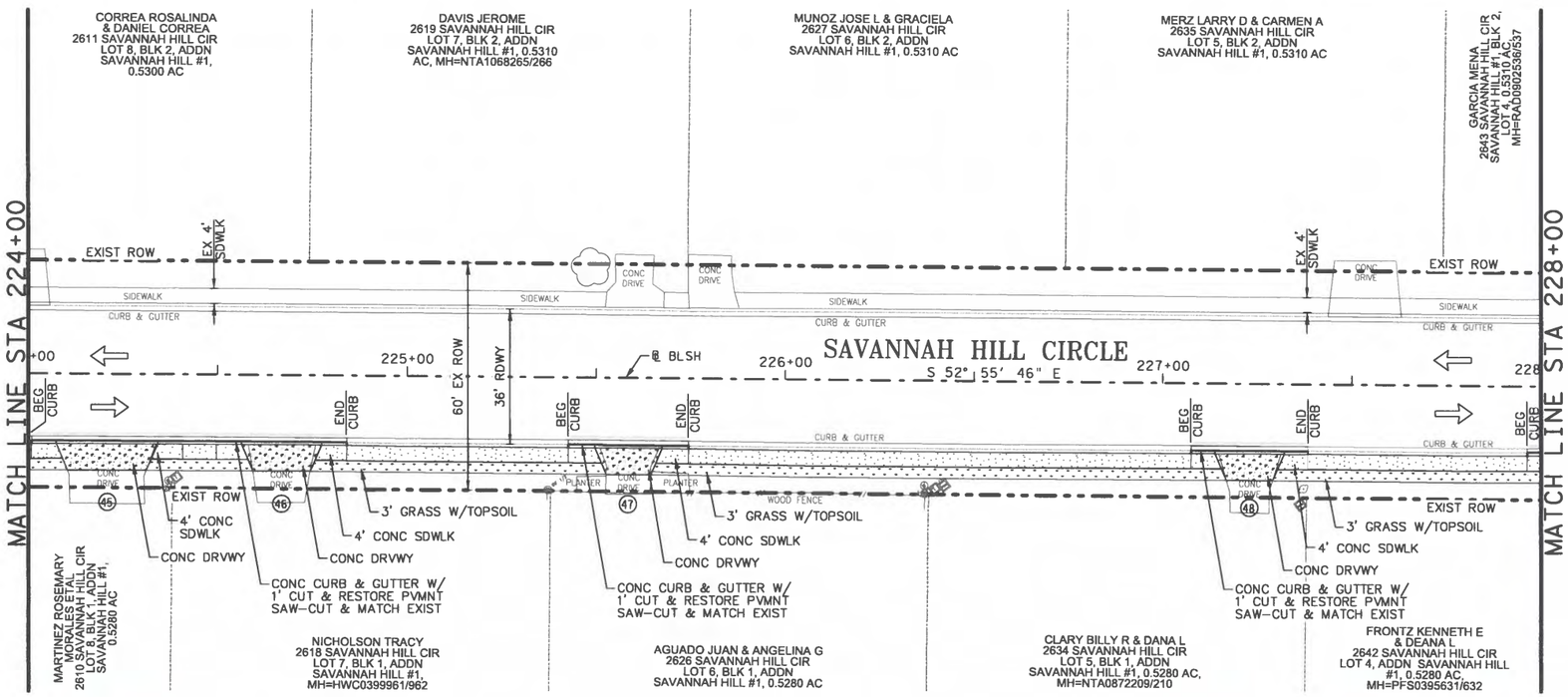

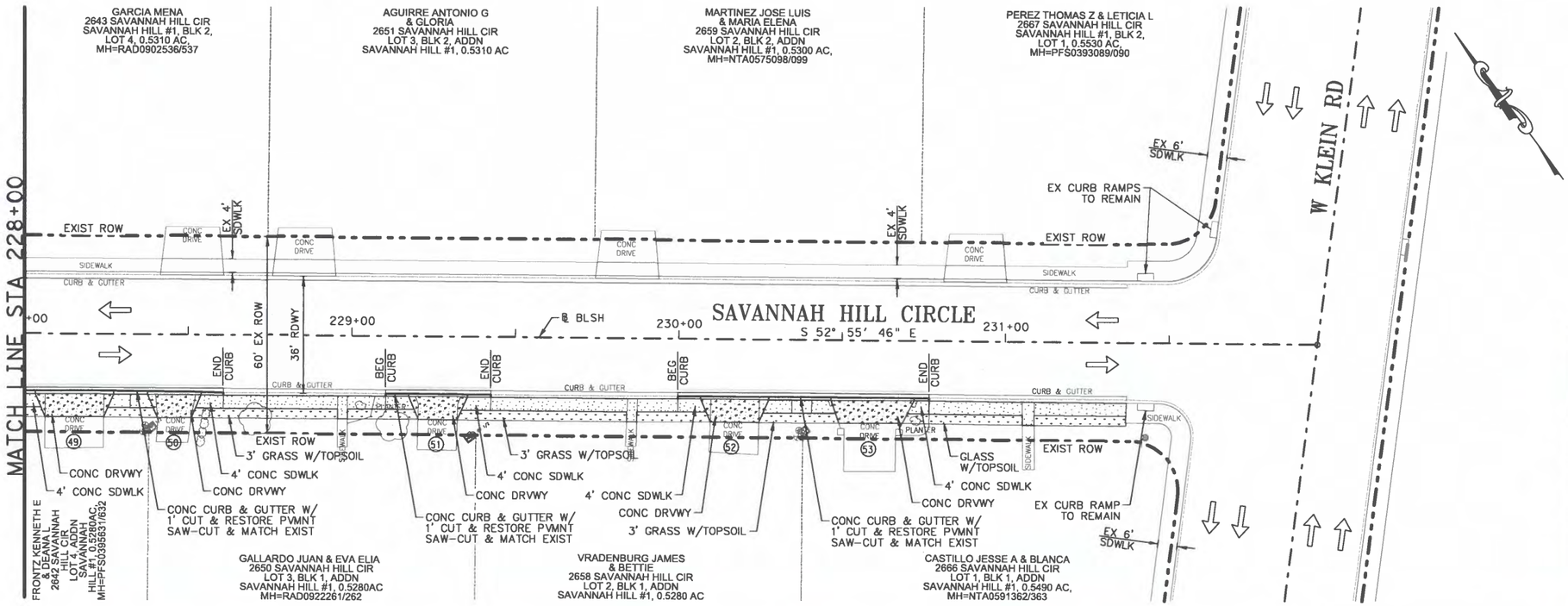

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- DIRECTION OF TRAFFIC
- DRIVEWAY NUMBER (16)
- SIGN POST

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E	REFL PAV MRK TY I (W)(ARROW)(100MIL)
F	REFL PAV MRK TY I (W)(YLD TRI)(100MIL)
G	REFL PAV MRKR TY I-C
H	REFL PAV MRKR TY II-A-A
I	REFL PAV MRKR TY II-C-R
J	INSTL OM ASSM (OM-2Z)(WFLX)GND(BI)
K	ELIM EXT PAV MRK & MRKS

20 0 40
HORIZ SCALE: 1"= 40'

STATE OF TEXAS
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6/21/24

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CITY OF NEW BRAUNFELS
CITYWIDE PEDESTRIAN IMPROVEMENTS

ROADWAY PLAN LAYOUT

A2 - SAVANNAH HILL CIRCLE - STA 224+00 TO STA 231+95

90% SUBMITTAL	PROJECT NO: NB 22-172		DATE: 6/20/2024
BMB NO. C-1638	DSGN BY: CB/CDA	CHKD BY: CB	SHEET: 22

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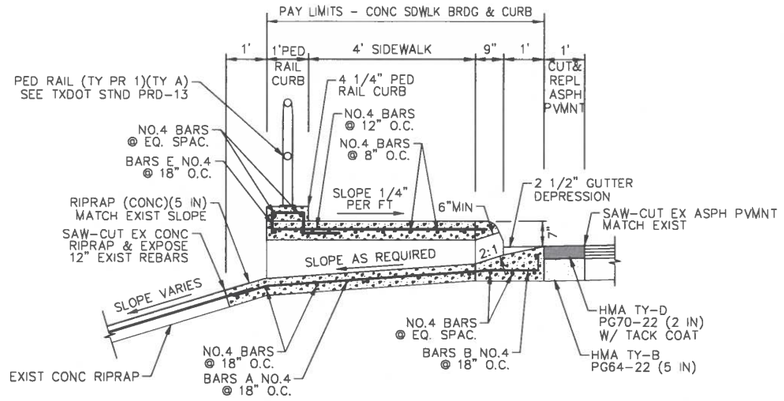
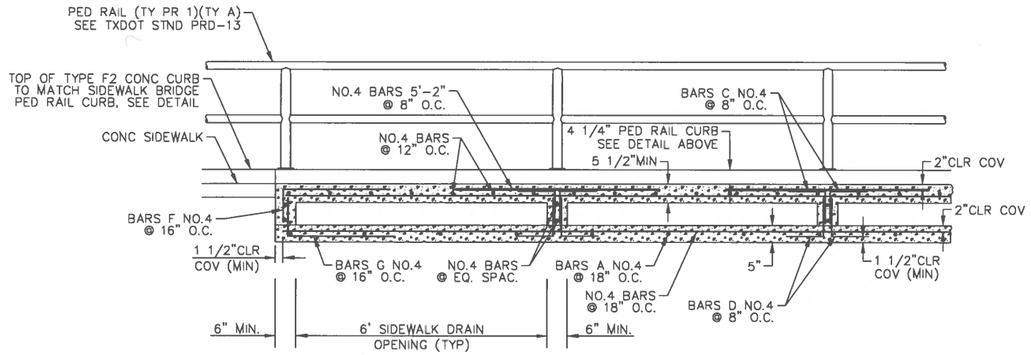
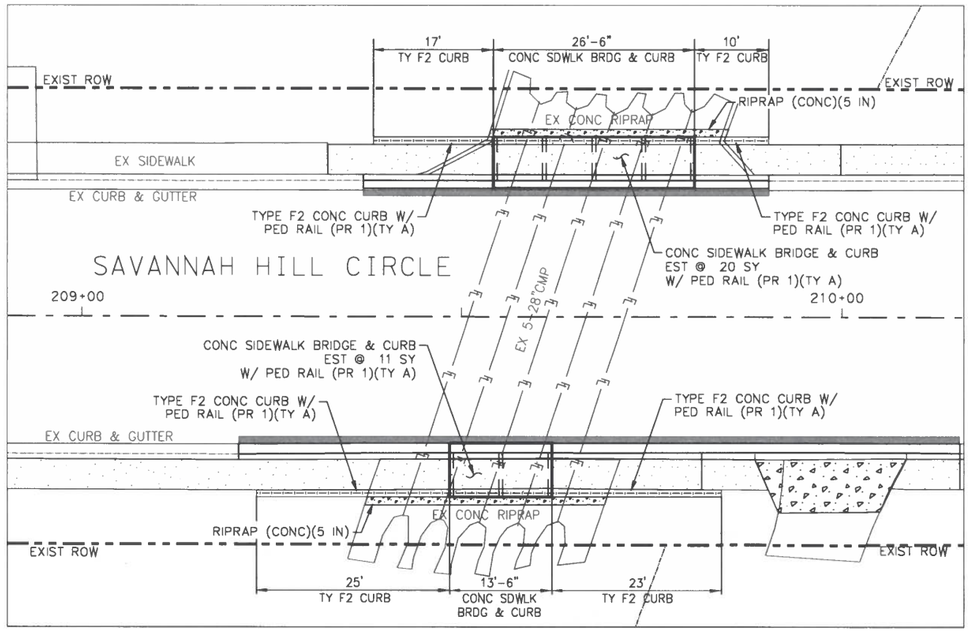


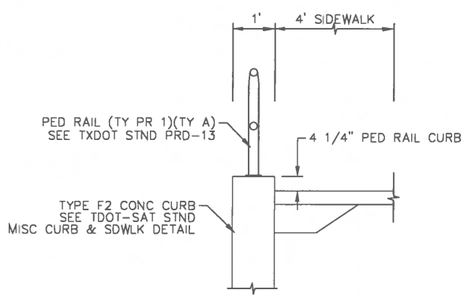
CONC SIDEWALK BRIDGE & CURB
SECTION VIEW
NOT TO SCALE



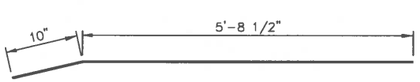
CONC SIDEWALK BRIDGE
ELEVATION VIEW
NOT TO SCALE



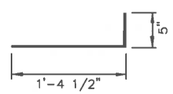
SIDEWALK BRIDGE & TYPE F2 CONC CURB
PLAN VIEW
SCALE: 1"=20'



TYPE F2 CONC CURB DETAIL
AT BACK OF SIDEWALK
NOT TO SCALE



BARS A



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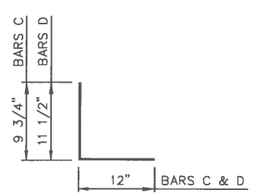

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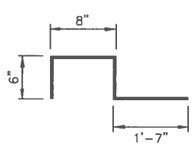

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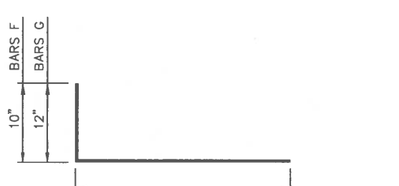

BARS F & G

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7/2/2024

City of New Braunfels

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CITY OF NEW BRAUNFELS
CITYWIDE PEDESTRIAN IMPROVEMENTS

MISCELLANEOUS DETAILS

CONCRETE SIDEWALK BRIDGE & CURB

FINAL SUBMITTAL	PROJECT NO: NB 22-172		DATE: 7/2/2024
BMB NO. C-1638	DSGN BY: CB/CDA	CHKD BY: CB	SHEET: 22A

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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. Where highway construction or maintenance work is being undertaken, other than mobile operations as defined by the Texas Manual on Uniform Traffic Control Devices, CSJ limit signs are required. CSJ limit signs are shown on BC(2). The OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits. For mobile operations, CSJ limit signs are not required.

11. 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 NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

1. Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources.

2. Work zone traffic control devices shall be compliant with the Manual for Assessing safety Hardware (MASH).

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13 9-07 8-14 5-10 5-21	DIST	COUNTY		SHEET NO. 23

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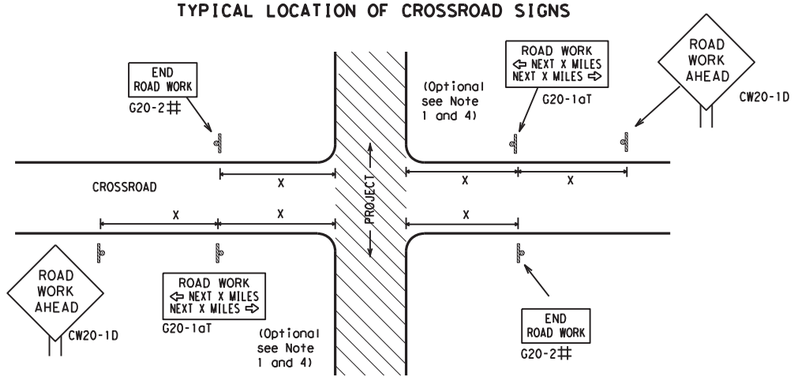
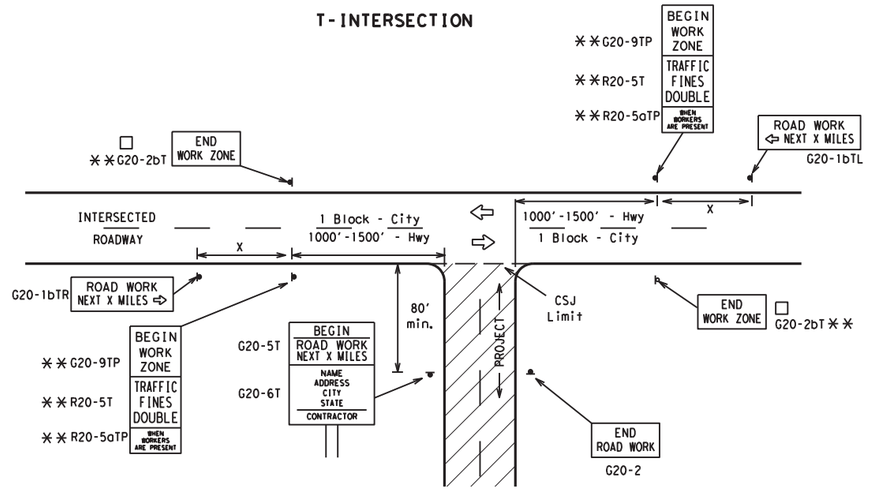
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

1. The Engineer will determine the types and location of any additional traffic control devices, such as a flagger and accompanying signs, or other signs, that should be used when work is being performed at or near an intersection.
2. If construction closes the road at a T-intersection, the Contractor shall place the "CONTRACTOR NAME"(G20-6T) sign behind the Type 3 Barricades for the road closure (see BC(10) also). The "ROAD WORK NEXT X MILES" left arrow(G20-1bTL) and "ROAD WORK NEXT X MILES" right arrow (G20-1bTR)" signs shall be replaced by the detour signing called for in the plans.

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

SIZE

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

SPACING

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

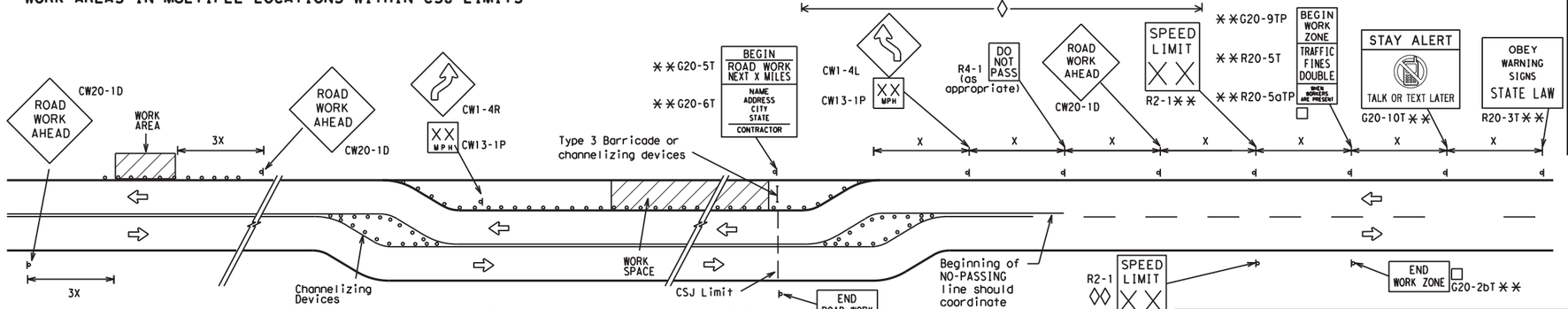
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

△ 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 as per TMUTCD Part 5. 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.

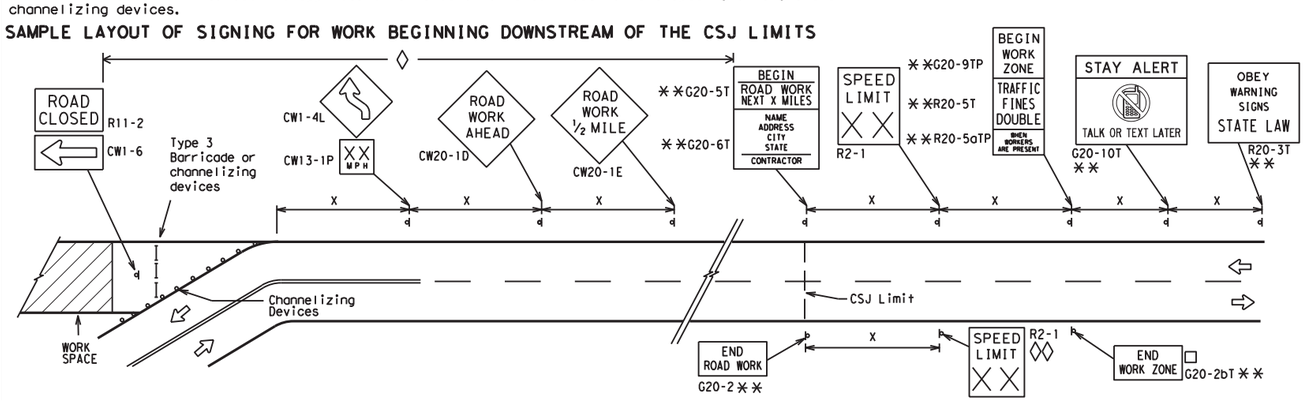
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

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



NOTES

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

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

** CSJ limit signing is required for highway construction and maintenance work, with the exception of mobile operations.

◊ Area for placement of "ROAD WORK AHEAD" (CW20-1D)sign and other signs or devices as called for on the Traffic Control Plan.

◊◊ Contractor will install a regulatory speed limit sign at the end of the work zone.

LEGEND

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

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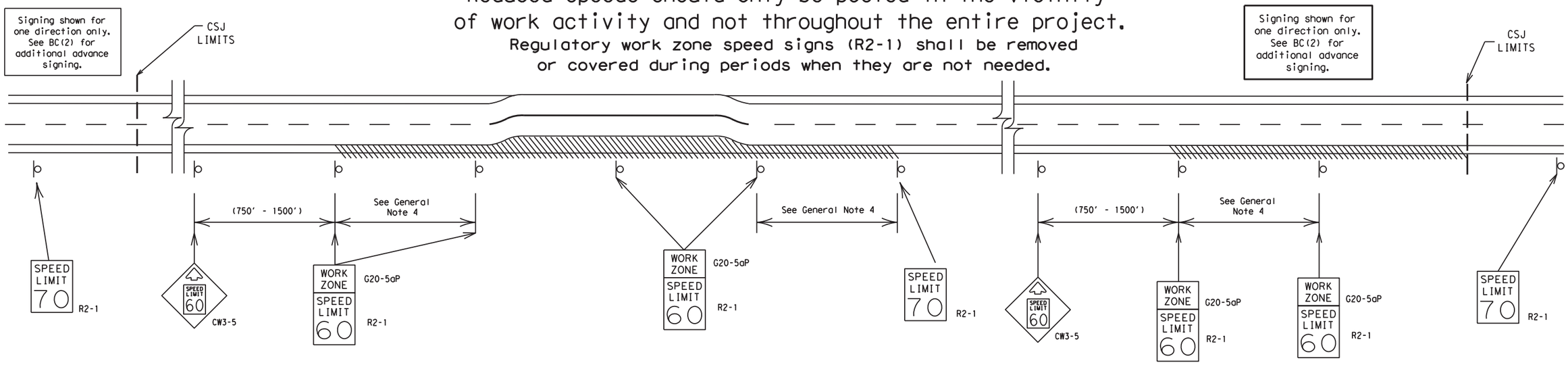
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

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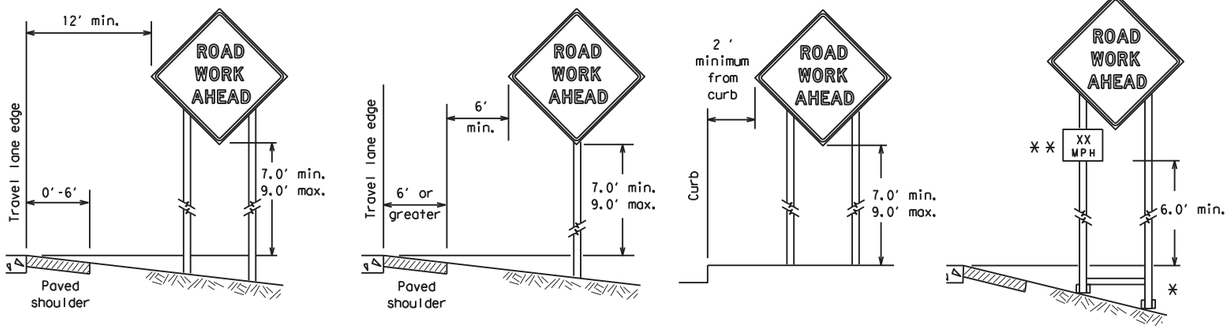
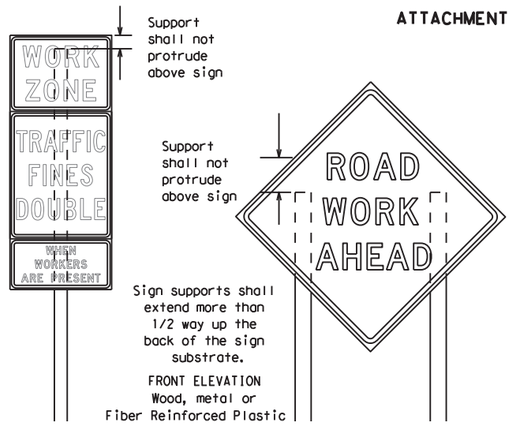
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

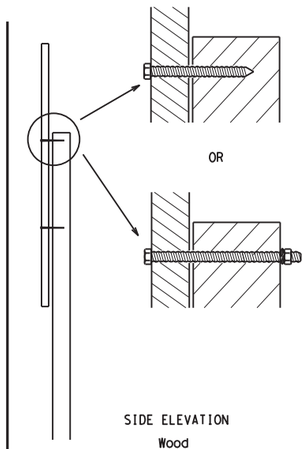


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





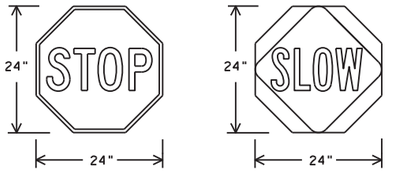
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



SHEETING REQUIREMENTS (WHEN USED AT NIGHT)		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	ORANGE	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDER	WHITE	TYPE B OR C SHEETING
LEGEND & BORDER	BLACK	ACRYLIC NON-REFLECTIVE FILM

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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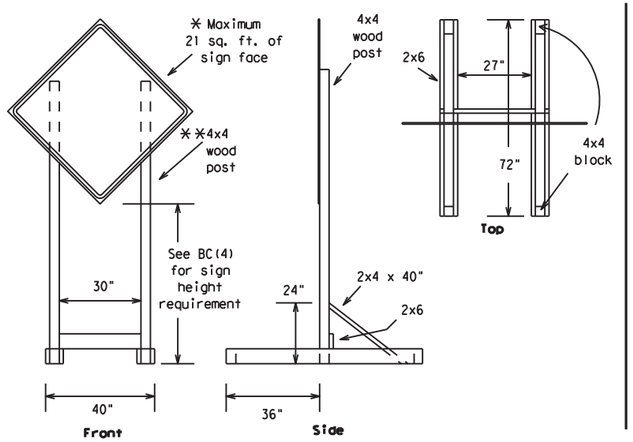
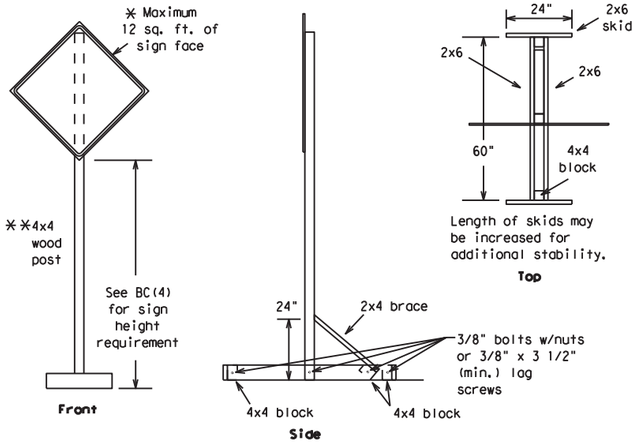
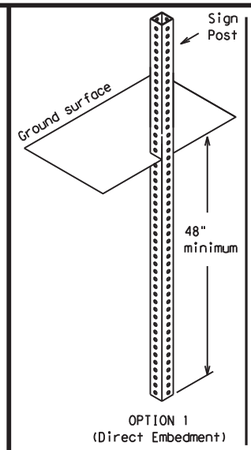
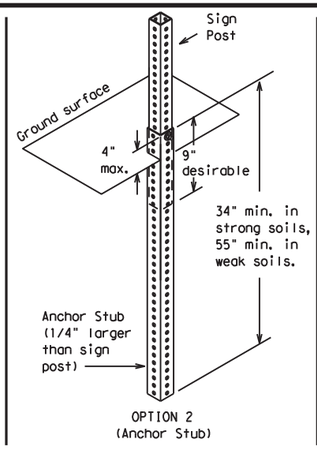


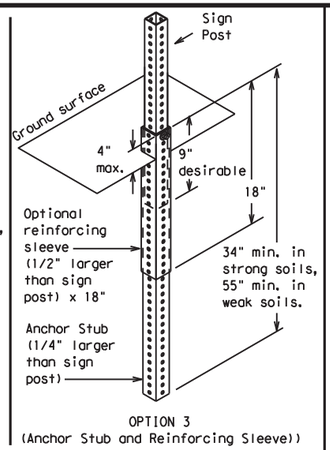


SKID MOUNTED WOOD SIGN SUPPORTS

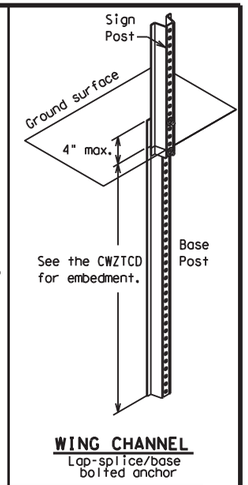
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS







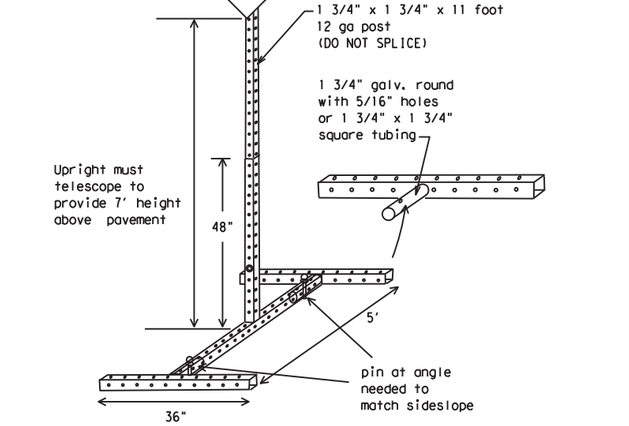
PERFORATED SQUARE METAL TUBING

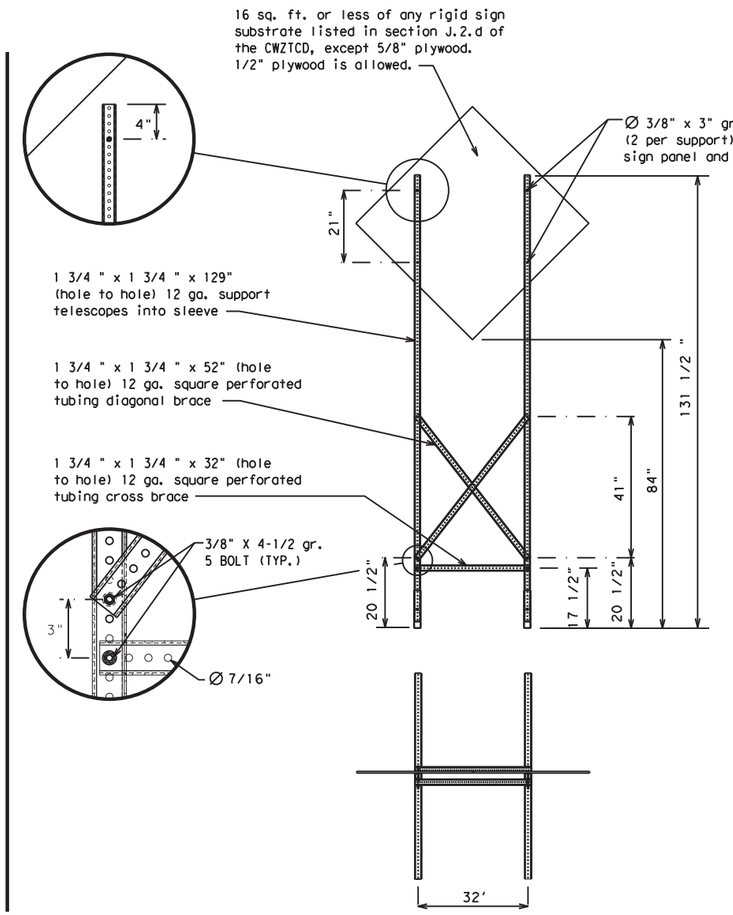


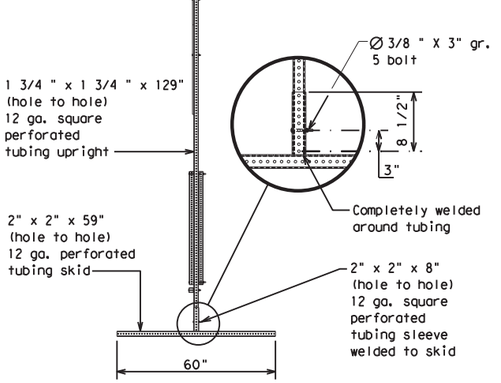
WING CHANNEL
Lap-splice/base bolted anchor

GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS				
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21				28

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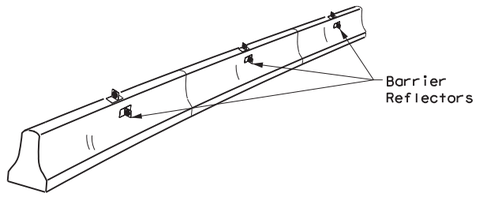
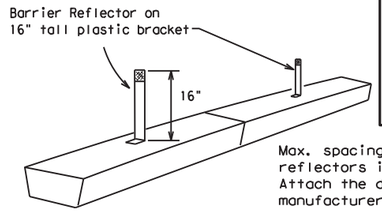
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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



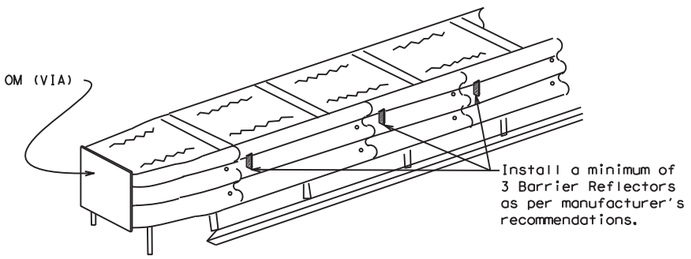
CONCRETE TRAFFIC BARRIER (CTB)

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



Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB)



DELINEATION OF END TREATMENTS

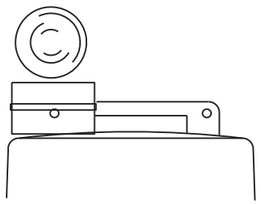
LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

LPCB is approved for use in work zone locations, where the posted speed is 45mph, or less. See Roadway Standard Sheet LPCB.

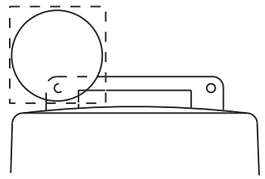
END TREATMENTS FOR CTB'S USED IN WORK ZONES

End treatments used on CTB's in work zones shall meet the apppropriate crashworthy standards as defined in the Manual for Assessing Safety Hardware (MASH). Refer to the CWZTCD List for approved end treatments and manufacturers.

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

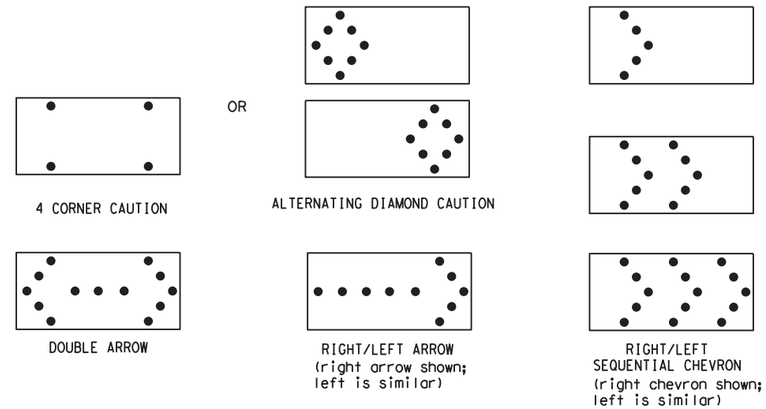
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

1. Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the Manual for Assessing Safety Hardware (MASH).
2. Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
3. Refer to the CWZTCD for a list of approved TMAs.
4. TMAs are required on freeways unless otherwise noted in the plans.
5. A TMA should be used anytime that it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the work performance.
6. The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is an extended distance from the TMA.

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21				29

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

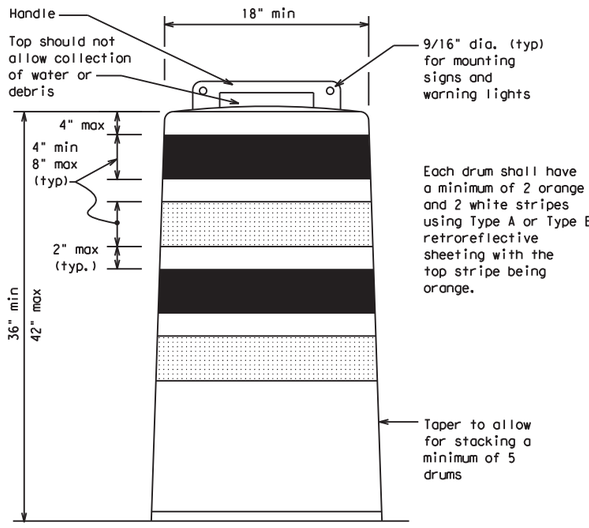
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

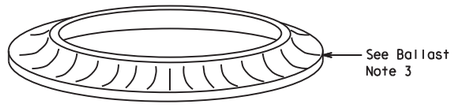
RETROREFLECTIVE SHEETING

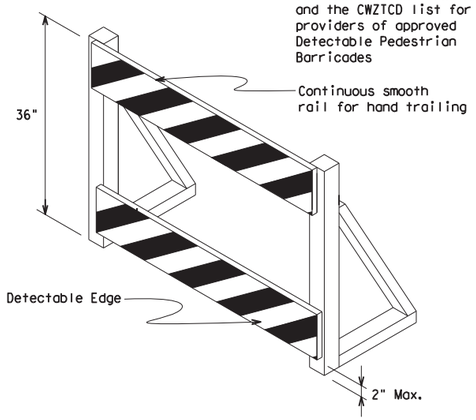
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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



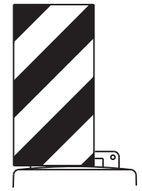




DETECTABLE PEDESTRIAN BARRICADES

1. When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, the temporary facilities shall be detectable and include accessibility features consistent with the features present in the existing pedestrian facility. Refer to WZ(BTS-2) for Pedestrian Control requirements for Sidewalk Diversions, Sidewalk Detours and Crosswalk Closures.
2. Where pedestrians with visual disabilities normally use the closed sidewalk, a Detectable Pedestrian Barricade shall be placed across the full width of the closed sidewalk instead of a Type 3 Barricade.
3. Detectable pedestrian barricades similar to the one pictured above, longitudinal channelizing devices, some concrete barriers, and wood or chain link fencing with a continuous detectable edging can satisfactorily delineate a pedestrian path.
4. Tape, rope, or plastic chain strung between devices are not detectable, do not comply with the design standards in the "Americans with Disabilities Act Accessibility Guidelines (ADAAG)" and should not be used as a control for pedestrian movements.
5. Warning lights shall not be attached to detectable pedestrian barricades.
6. Detectable pedestrian barricades should use 8" nominal barricade rails as shown on BC(10) provided that the top rail provides a smooth continuous rail suitable for hand trailing with no splinters, burrs, or sharp edges.

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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

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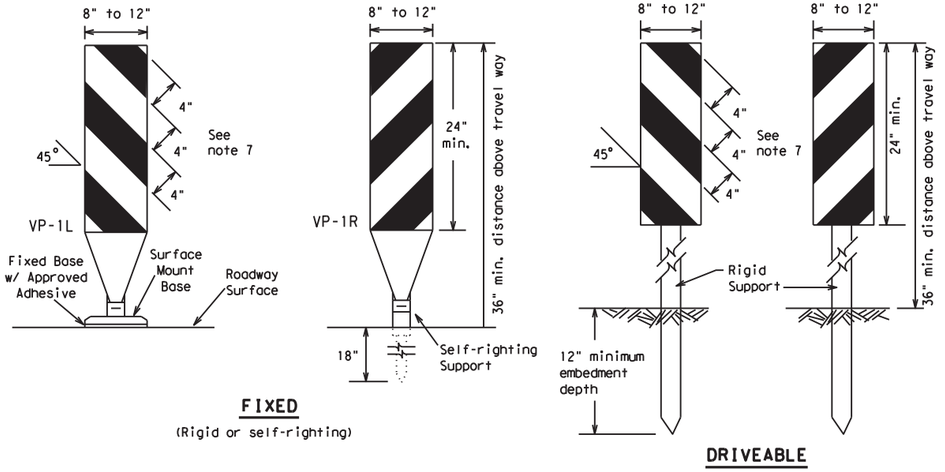
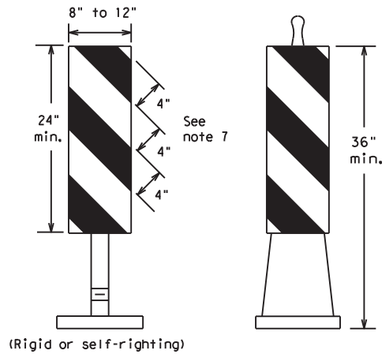


FIXED
(Rigid or self-righting)

DRIVEABLE

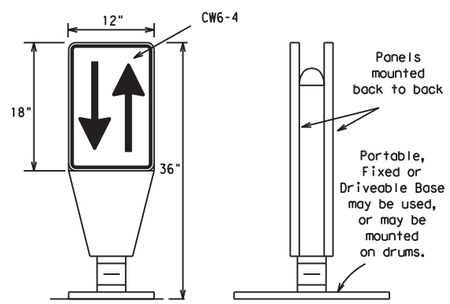


(Rigid or self-righting)

PORTABLE

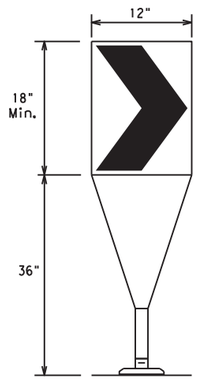
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



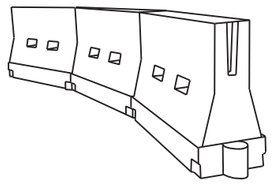
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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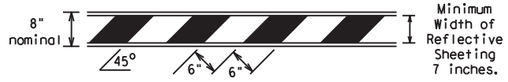
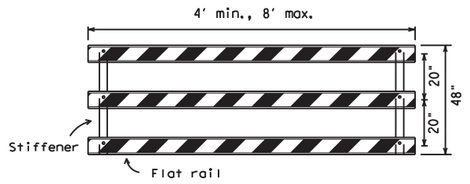
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



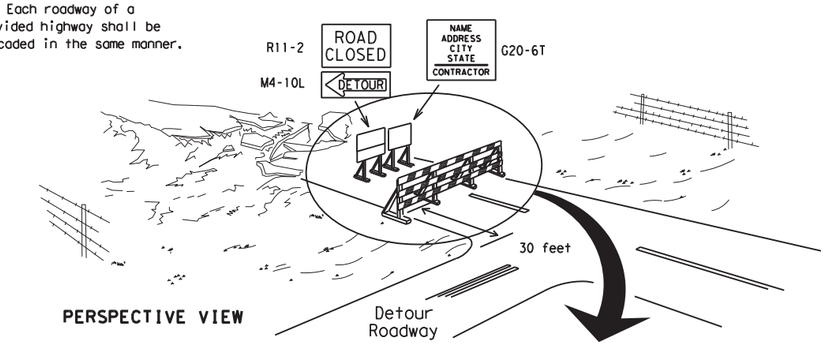
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

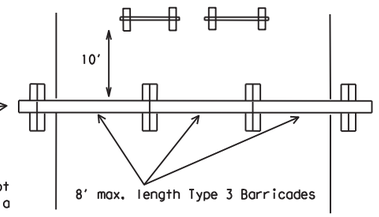
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

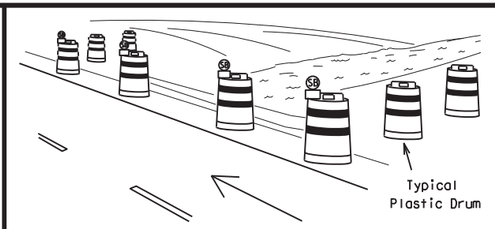
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

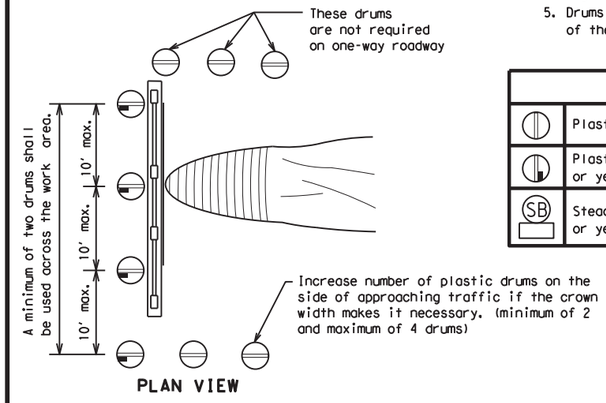
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

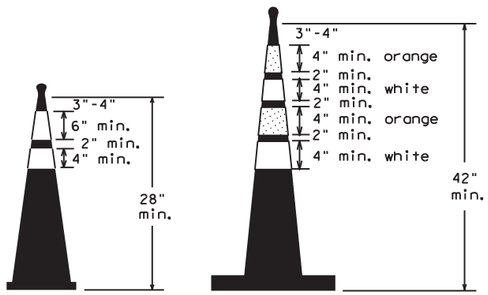
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



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

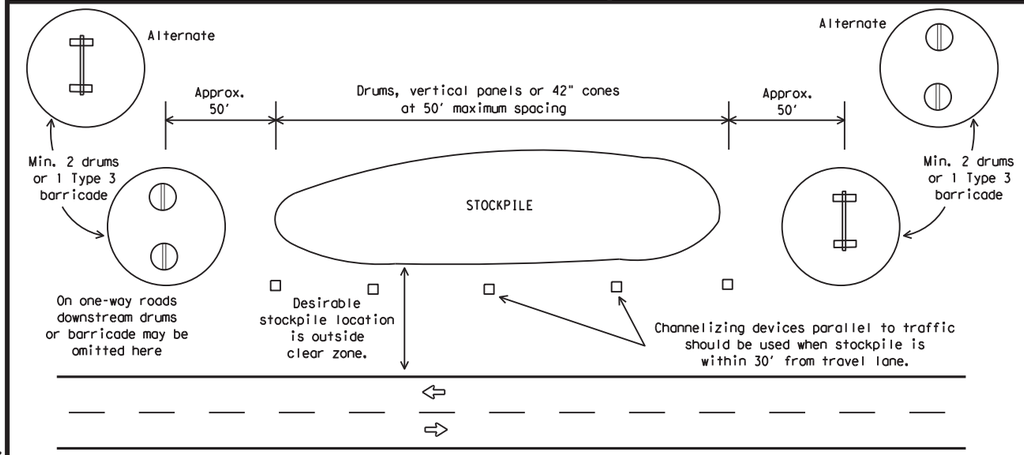
PLAN VIEW

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

1. Traffic cones and tubular markers shall be predominantly orange, and meet the height and weight requirements shown above.
2. One-piece cones have the body and base of the cone molded in one consolidated unit. Two-piece cones have a cone shaped body and a separate rubber base, or ballast, that is added to keep the device upright and in place.
3. Two-piece cones may have a handle or loop extending up to 8" above the minimum height shown, in order to aid in retrieving the device.
4. Cones or tubular markers shall have white or white and orange reflective bands as shown above. The reflective bands shall have a smooth, sealed outer surface and meet the requirements of Departmental Material Specification DMS-8300 Type A or Type B.
5. 28" cones and tubular markers are generally suitable for short duration and short-term stationary work as defined on BC(4). These should not be used for intermediate-term or long-term stationary work unless personnel is on-site to maintain them in their proper upright position.
6. 42" two-piece cones, vertical panels or drums are suitable for all work zone durations.
7. Cones or tubular markers used on each project should be of the same size and shape.



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

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SHEET 10 OF 12

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

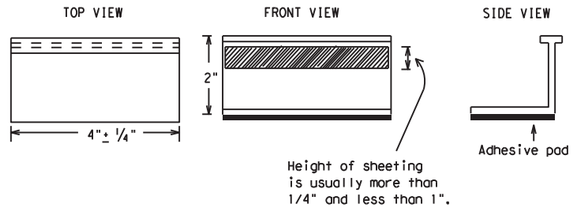
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

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BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

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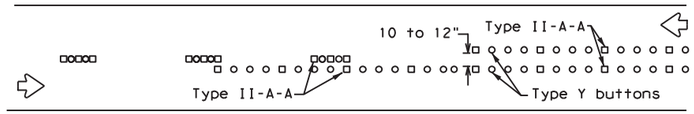
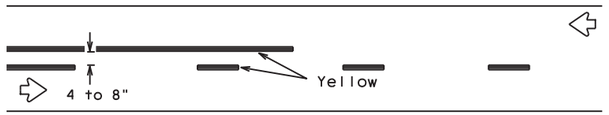
PAVEMENT MARKING PATTERNS

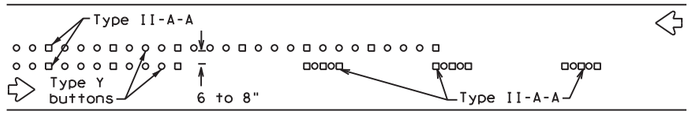
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



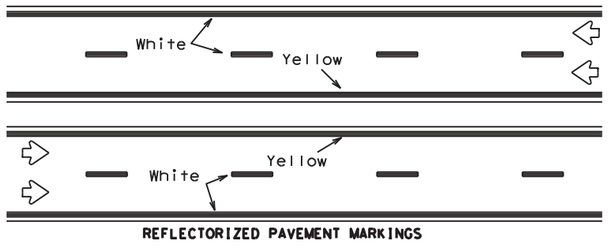
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



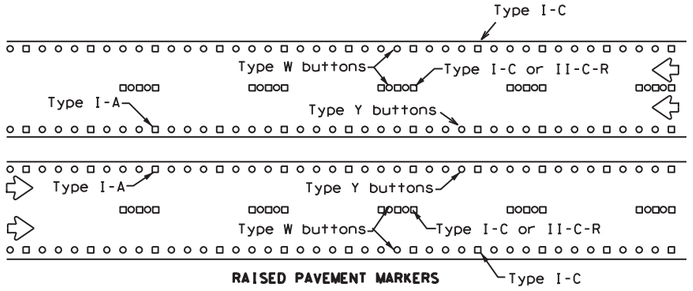
RAISED PAVEMENT MARKERS - PATTERN B

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

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



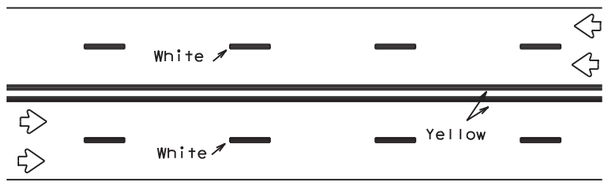
REFLECTORIZED PAVEMENT MARKINGS



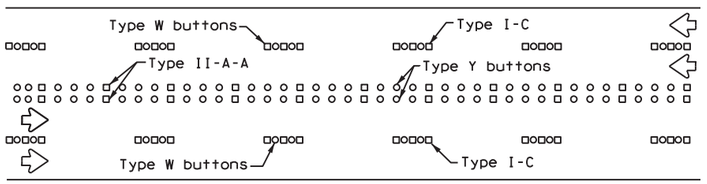
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



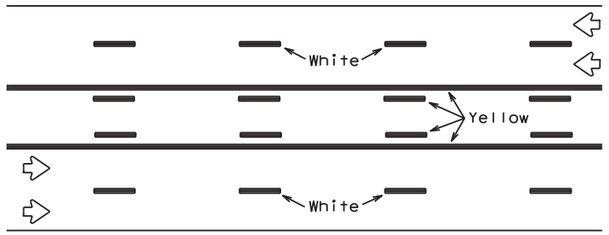
REFLECTORIZED PAVEMENT MARKINGS



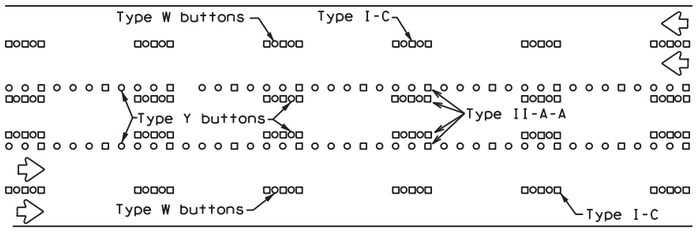
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

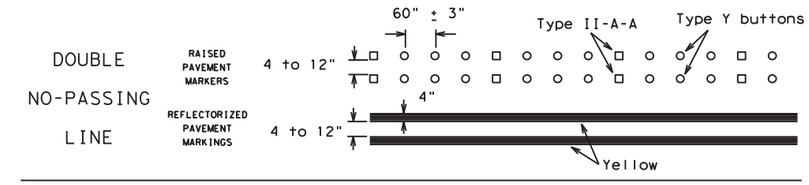
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

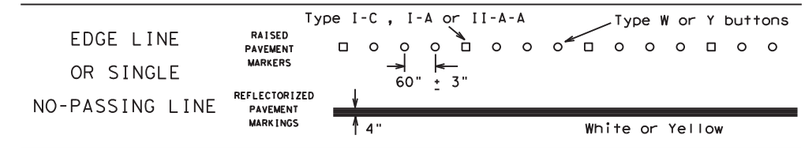
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

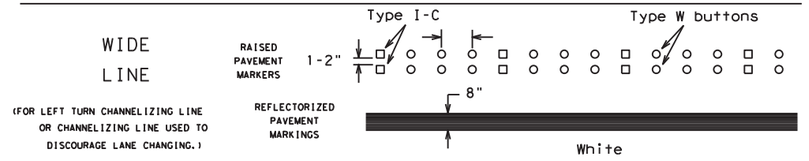


EDGE LINE OR SINGLE NO-PASSING LINE



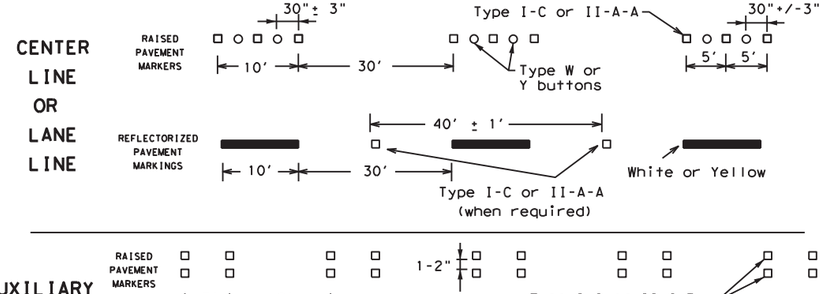
WIDE LINE

(FOR LEFT TURN CHANNELIZING LINE OR CHANNELIZING LINE USED TO DISCOURAGE LANE CHANGING.)

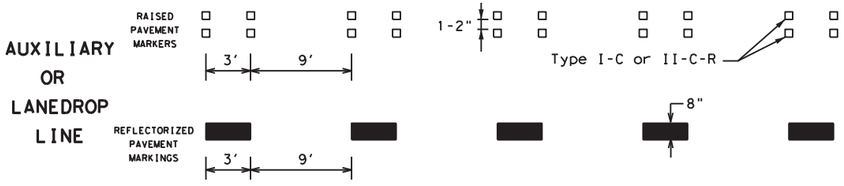


BROKEN LINES

CENTER LINE OR LANE LINE

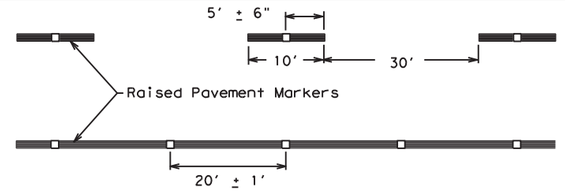


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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 Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	DIST	COUNTY		SHEET NO. 34

106

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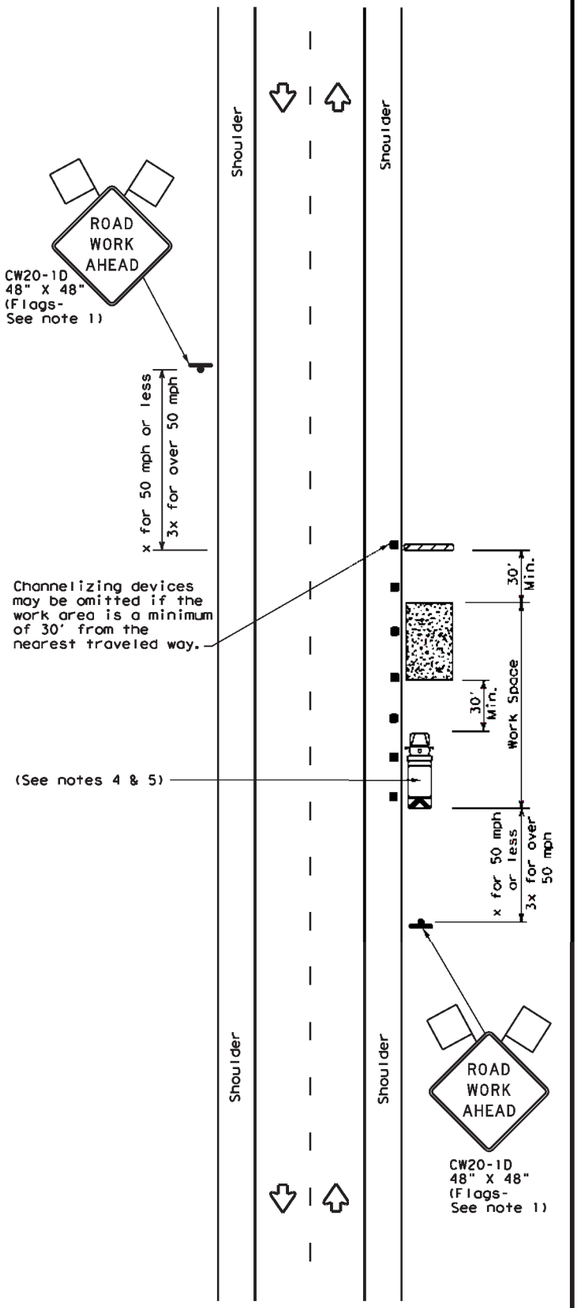
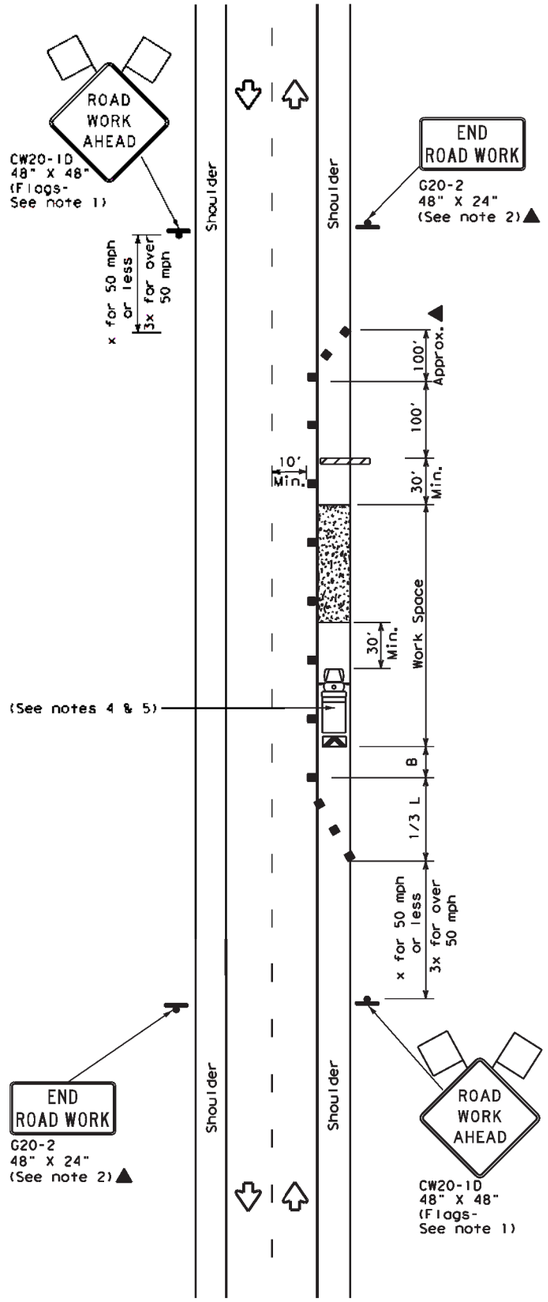


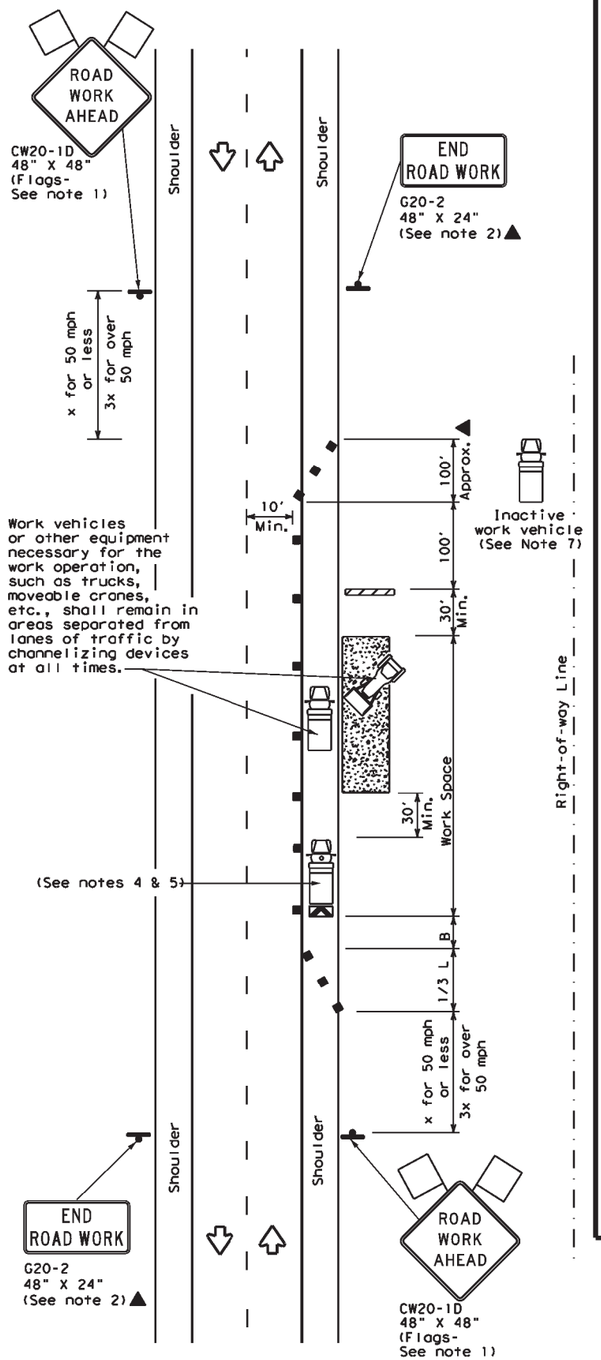
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated in the plans, or for routine maintenance work, when approved by the Engineer.
3. Stockpiled material should be placed a minimum of 30 feet from nearest traveled way.
4. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.
6. See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
7. Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
8. CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-18

FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 2-12 1-97 2-18	DIST	COUNTY		SHEET NO. 35

DATE:
FILE:

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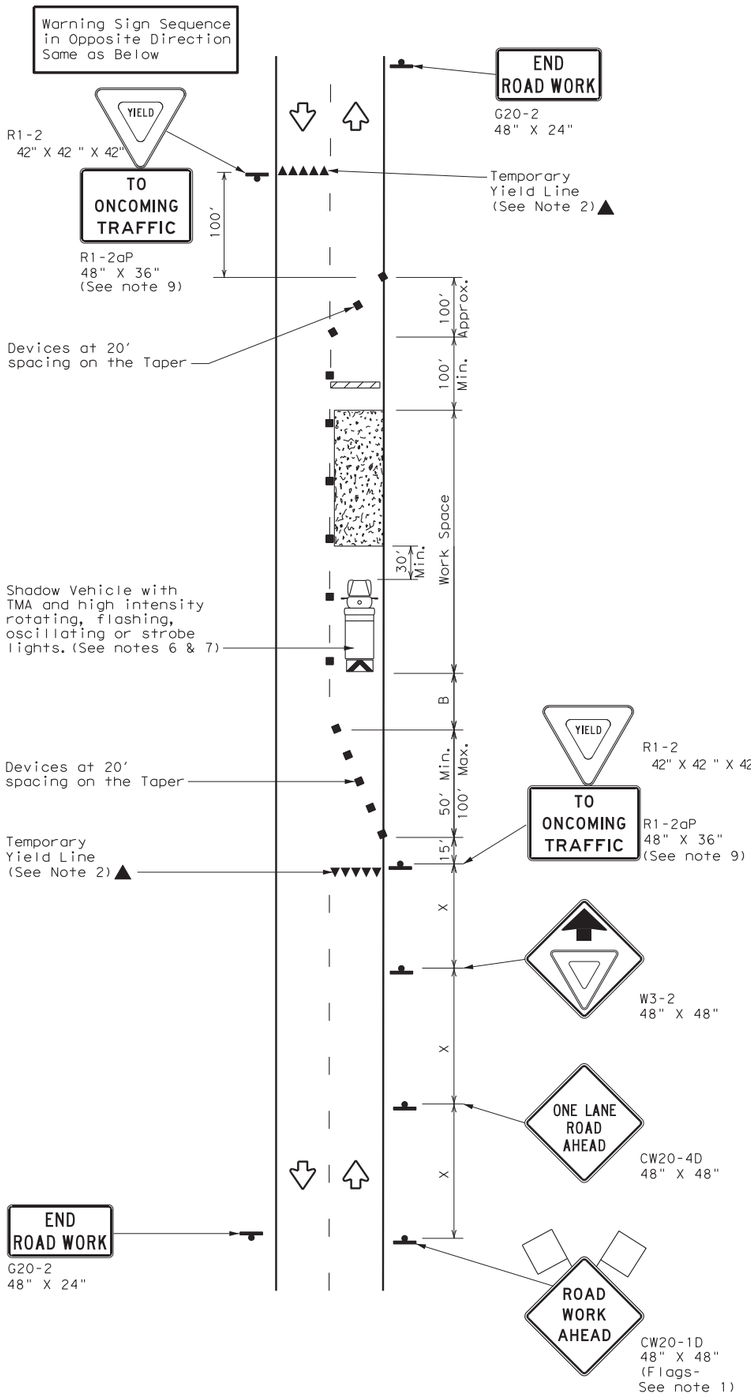
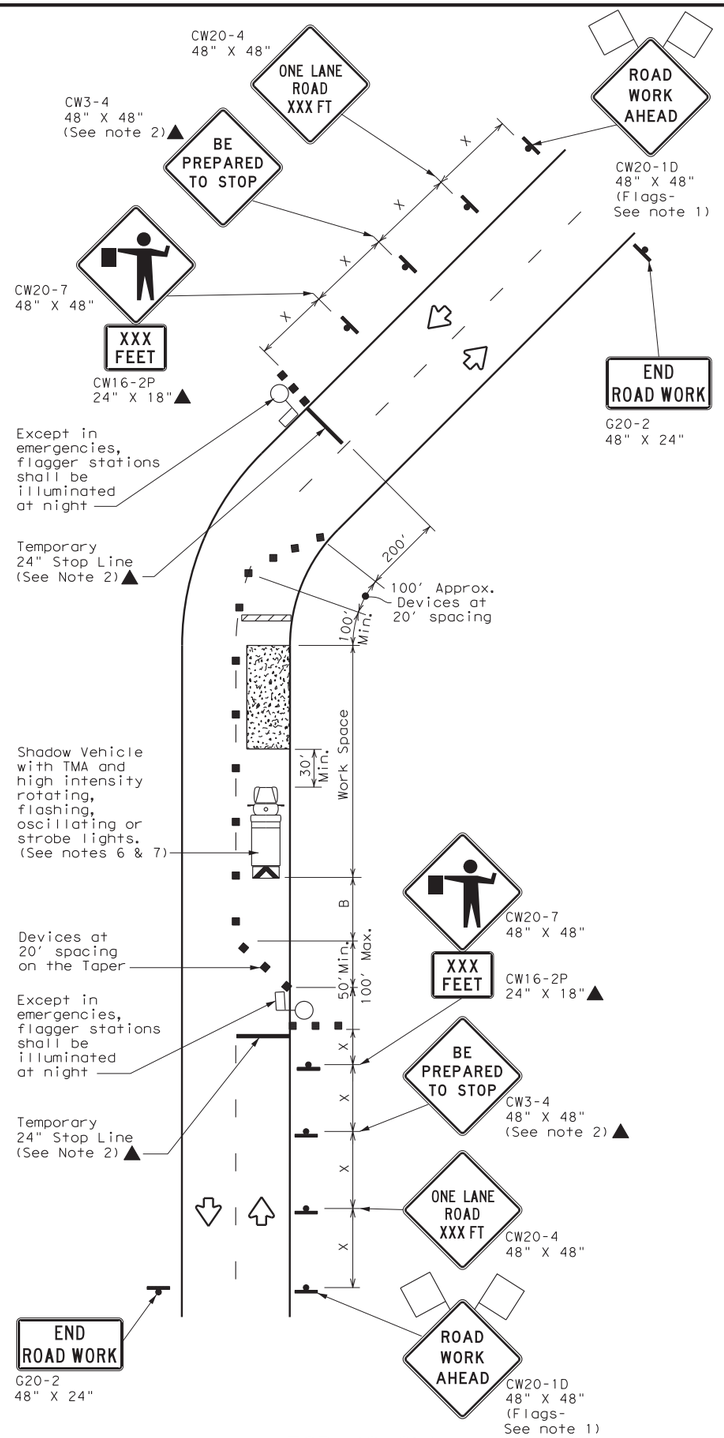
DATE:
FILE:



TCP (2-2a)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See Note 9)



TCP (2-2b)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH FLAGGERS

LEGEND

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

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

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

TYPICAL USAGE

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4 "ONE LANE ROAD XXX FT" sign, but proper sign spacing shall be maintained.
4. Flaggers should use two-way radios or other methods of communication to control traffic.
5. Length of work space should be based on the ability of flaggers to communicate.
6. 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.
7. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-2a)

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

TCP (2-2b)

10. Channelizing devices on the center line may be omitted when a pilot car is leading traffic and approved by the Engineer.
11. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain stopping sight distance to the flagger and a queue of stopped vehicles. (See table above).
12. Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situtations.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY
TRAFFIC CONTROL

TCP(2-2)-18

FILE: tcp2-2-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS				
8-95 3-03	DIST	COUNTY		SHEET NO.
1-97 2-12				36
4-98 2-18				

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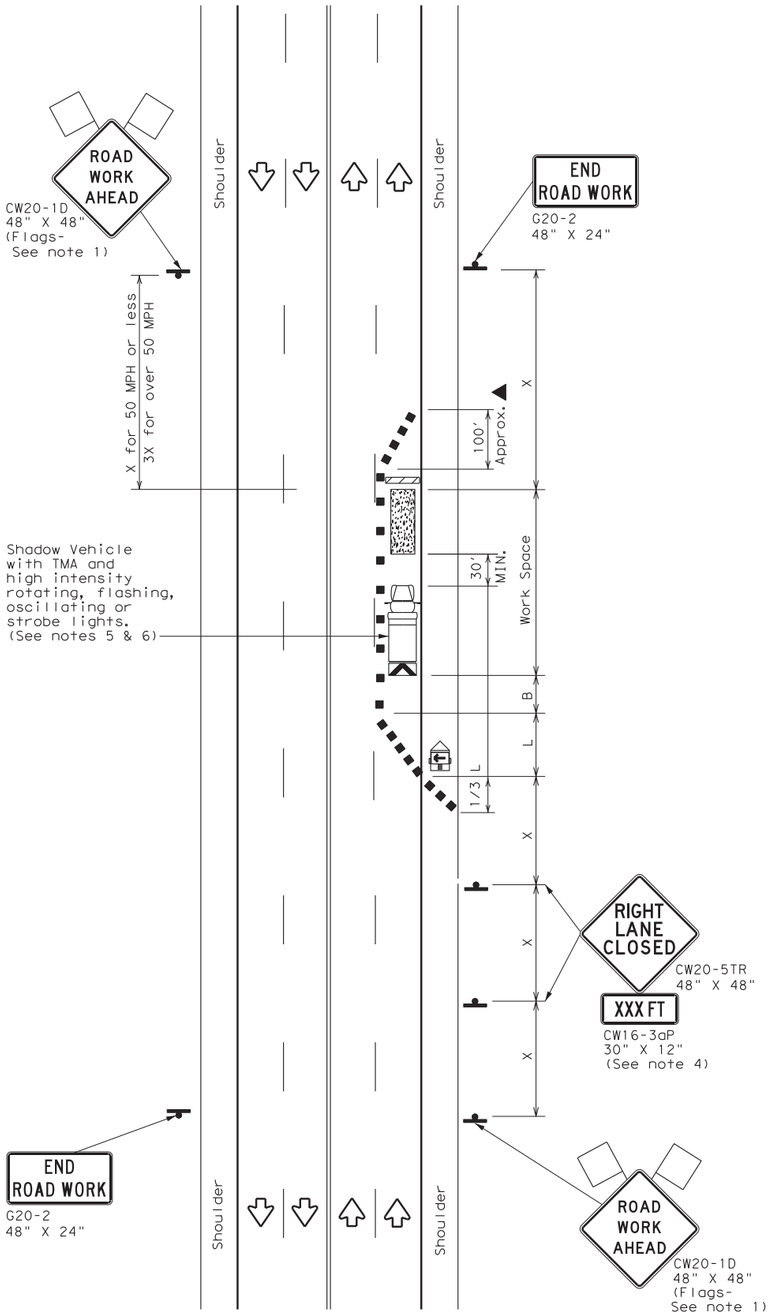
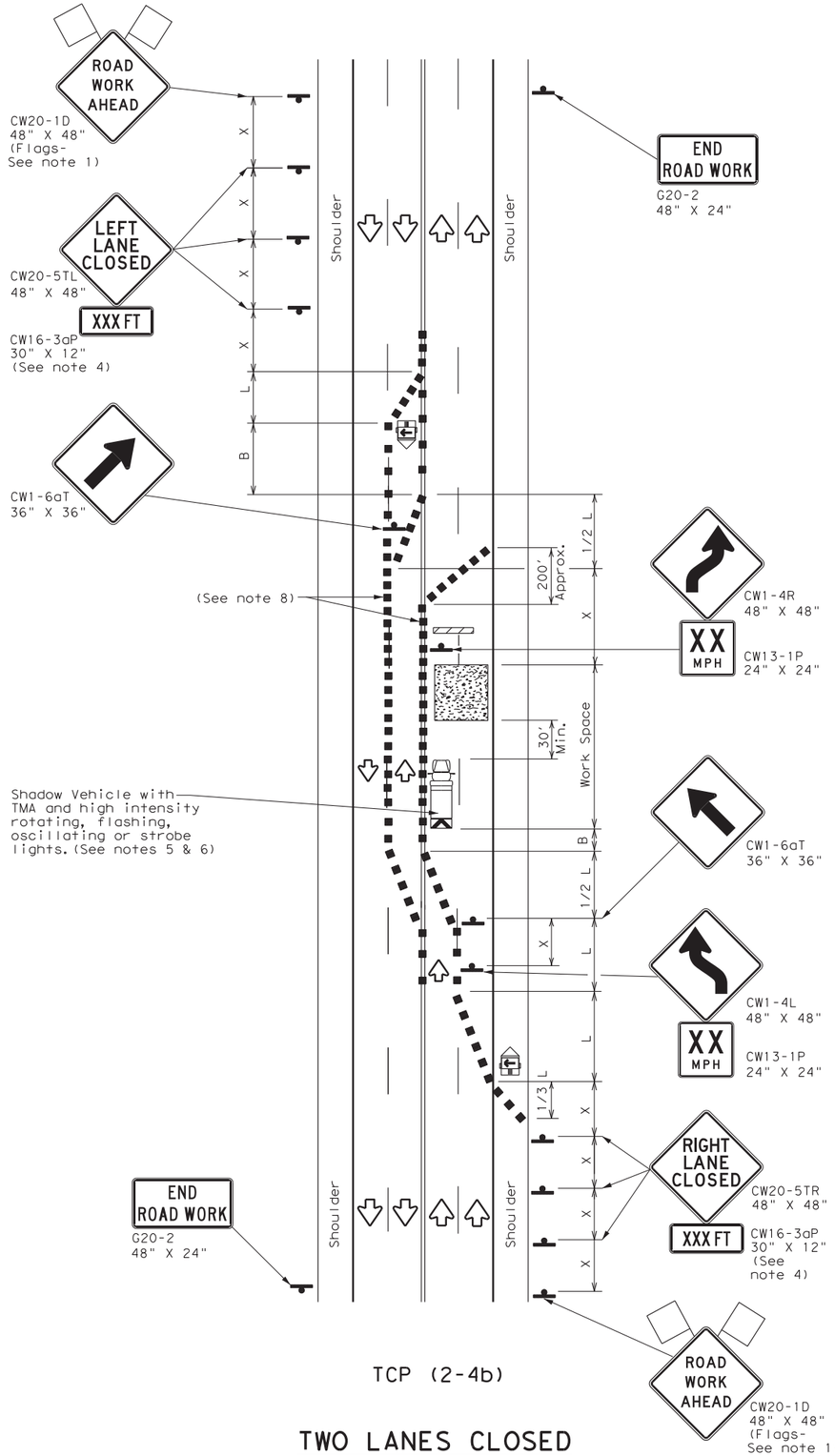
DATE:
FILE:



TCP (2-4a)

ONE LANE CLOSED



TCP (2-4b)

TWO LANES CLOSED

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The downstream taper is optional. When used, it should be 100 feet minimum length per lane.
4. For short term applications, when post mounted signs are not used, the distance legend may be shown on the sign face rather than on a CW16-3aP supplemental plaque.
5. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
6. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-4a)

7. 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 to protect the work space from opposing traffic with the arrow board placed in the closed lane near the end of the merging taper.

TCP (2-4b)

8. For shorter durations 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 1/2(S) where S is the speed in mph. This tighter devices spacing is intended for the area of conflicting markings, not the entire work zone.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(2-4)-18

FILE: tcp2-4-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03				
1-97 2-12	DIST	COUNTY		SHEET NO.
4-98 2-18				37

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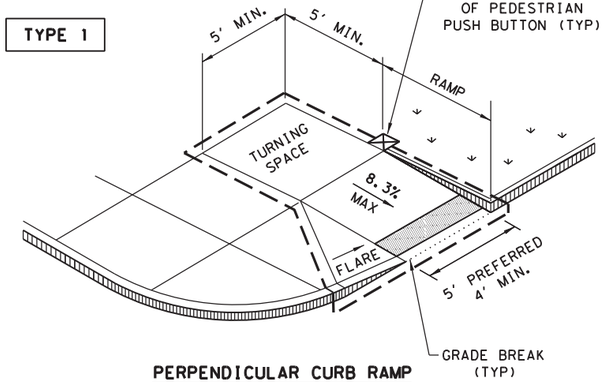
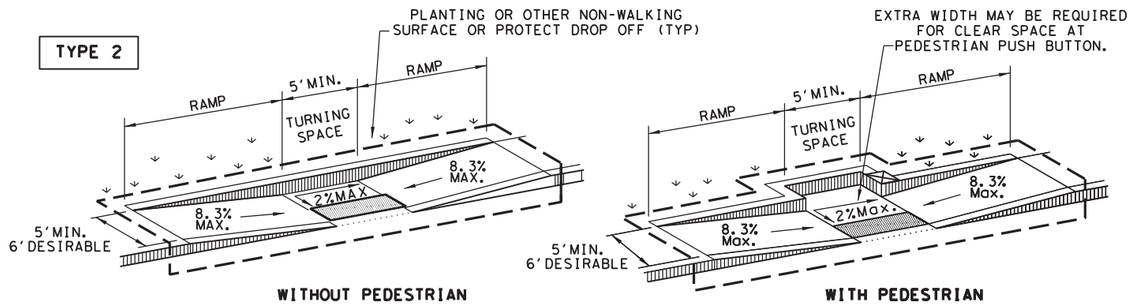
DATE:
FILE:

TYPE 1



PERPENDICULAR CURB RAMP

TYPE 2

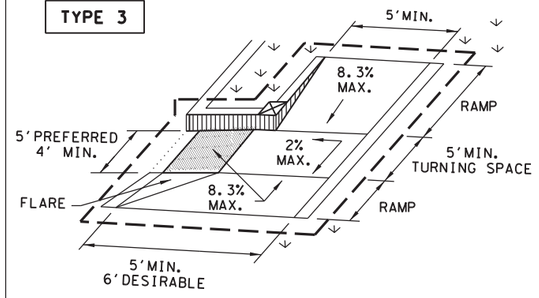


WITHOUT PEDESTRIAN PUSH BUTTON

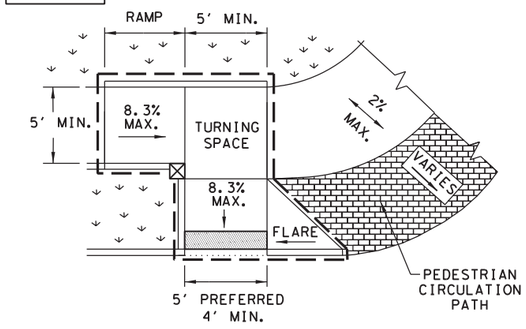
WITH PEDESTRIAN PUSH BUTTON

PARALLEL CURB RAMP

TYPE 3

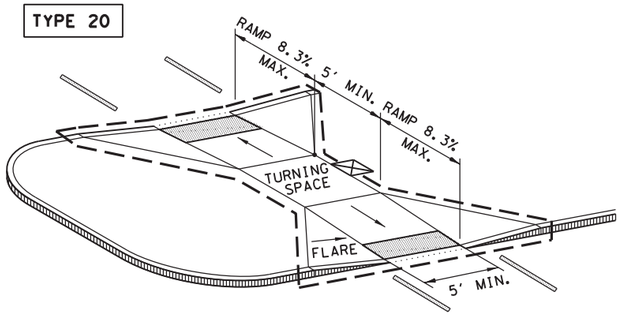


TYPE 6



COMBINATION CURB RAMPS

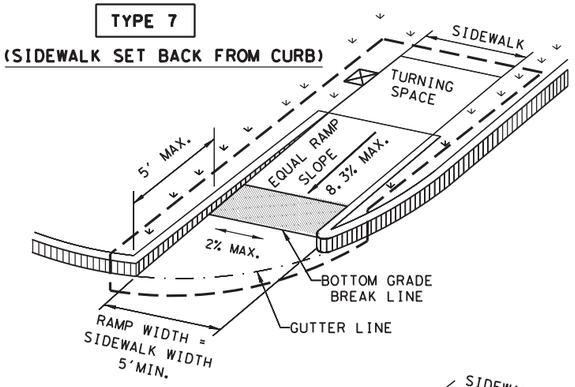
TYPE 20



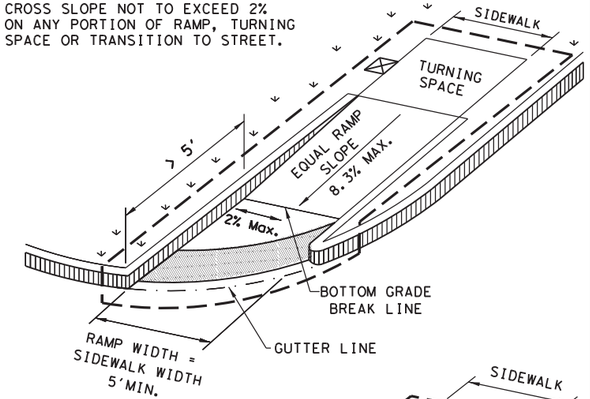
CURB RAMPS AT MEDIAN ISLANDS

TYPE 7

(SIDEWALK SET BACK FROM CURB)

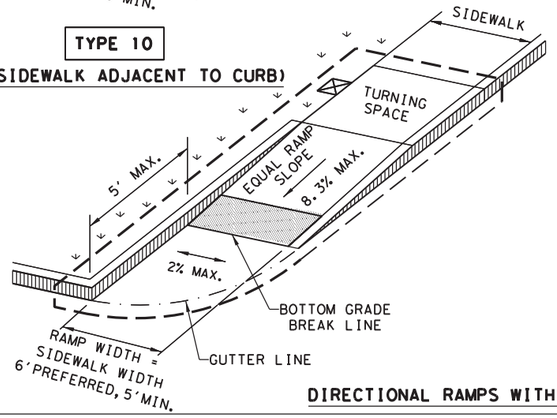


CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.

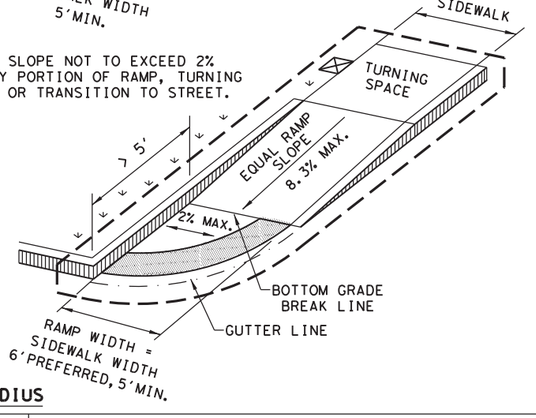


TYPE 10

(SIDEWALK ADJACENT TO CURB)

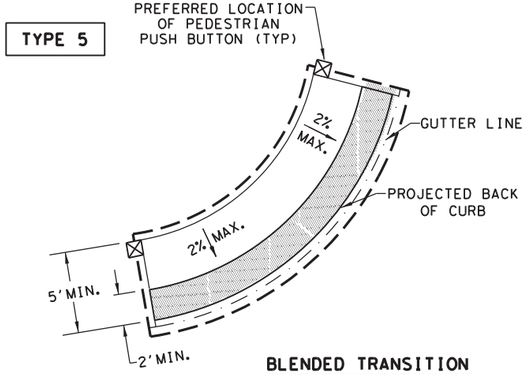


CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.



DIRECTIONAL RAMPS WITHIN RADIUS

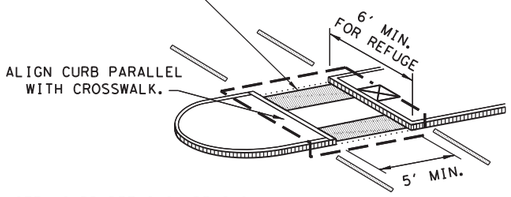
TYPE 5



BLENDED TRANSITION
(FLUSH LANDING)

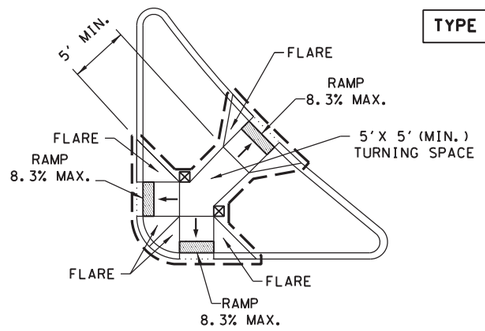
TYPE 21

INSTALL DETECTABLE WARNING SURFACE AT EACH END OF THE CUT-THROUGH RAMP WITH A MINIMUM 2' USUAL SIDEWALK SURFACE BETWEEN. IF MEDIAN IS LESS THAN 6' WIDE, ELIMINATE DETECTABLE WARNING SURFACES.



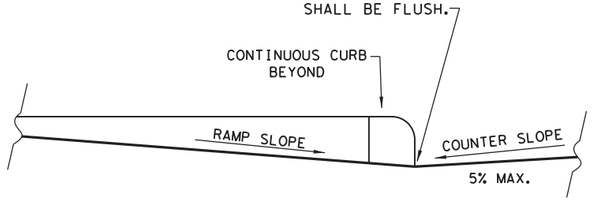
NOTE: CURB DETAILS ARE SHOWN ELSEWHERE IN THE PLANS.

TYPE 22



COMBINATION ISLAND RAMPS

BOTTOM GRADE BREAK OF CURB RAMP WILL NORMALLY BE AT GUTTER LINE. SURFACE SLOPES AT GRADE BREAKS SHALL BE FLUSH.



TYPICAL SECTION OF PERPENDICULAR CURB RAMP AT CONNECTION TO ROADWAY

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.

DETECTABLE WARNING SURFACE

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON IF APPLICABLE.

GUTTER LINE

GRADE BREAK

RAMP LIMITS OF PAYMENT

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
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REVISIONS				
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY		SHEET NO.
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DATE:
FILE:

GENERAL NOTES

CURB RAMPS

1. Install a curb ramp or blended transition at each pedestrian street crossing.
2. All slopes shown are maximum allowable. Cross slopes of 1.5% and lesser running should be used. Adjust curb ramp length or grade of approach sidewalks as directed.
3. Maximum allowable cross slope on sidewalk and curb ramp surfaces is 2%.
4. 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.
5. Turning Spaces shall be 5'x 5' minimum. Cross slope shall be maximum 2%.
6. Clear 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.
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 latest draft of the Proposed Guidelines for Pedestrian Facilities in the Public Right of Way (PROWAG) as published by the U.S. Architectural and Transportation Barriers Compliance Board (Access Board).
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. Provide curb ramps to connect the pedestrian access route at each pedestrian street crossing. Handrails are not required on curb ramps.
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. Furnish and install No. 3 reinforcing steel bars at 18" o.c. both ways, unless otherwise directed.
16. Provide a smooth transition where the curb ramps connect to the street.
17. 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.
18. Existing features that comply with applicalble standards may remain in place unless otherwise shown on the plans.

DETECTABLE WARNING MATERIAL

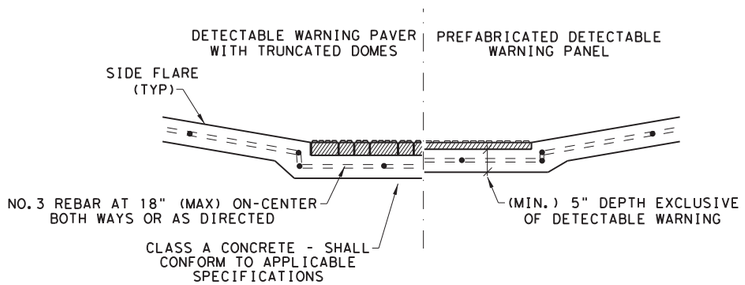
19. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with PROWAG. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material adjacent to uncolored concrete, unless specified elsewhere in the plans.
20. 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.
21. Detectable warning surfaces must be firm, stable and slip resistant.
22. Detectable warning surfaces shall be a minimum of 24 inches 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.
23. Detectable warning surfaces shall be located so that the edge nearest the curb line is at the back of curb and neither end of that edge is greater than 5 feet from the back of curb. Detectable warning surfaces may be curved along the corner radius.
24. Shaded areas on Sheet 1 of 4 indicate the approximate location for the detectable warning surface for each curb ramp type.

DETECTABLE WARNING PAVERS (IF USED)

25. 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.
26. Lay full-size units first followed by closure units consisting of at least 25 percent (25%) of a full unit. Cut detectable warning paver units using a power saw.

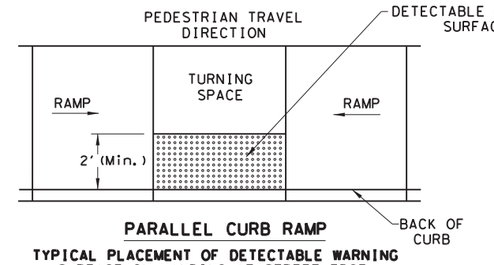
SIDEWALKS

27. Provide clear ground space at operable parts, including pedestrian push buttons. Operable parts shall be placed within unobstructed reach range specified in PROWAG section R406.
28. 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.
29. Street grades and cross slopes shall be as shown elsewhere in the plans.
30. Changes in level greater than 1/4 inch are not permitted.
31. 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 five percent (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 PROWAG R409.
32. Handrail extensions shall not protrude into the usable landing area or into intersecting pedestrian routes.
33. 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".
34. Sidewalk details are shown elsewhere in the plans.

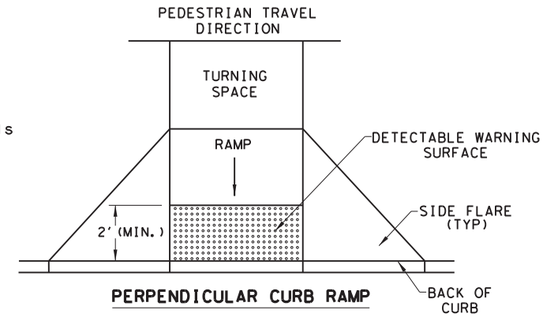


SECTION VIEW DETAIL
CURB RAMP AT DETECTIBLE WARNINGS

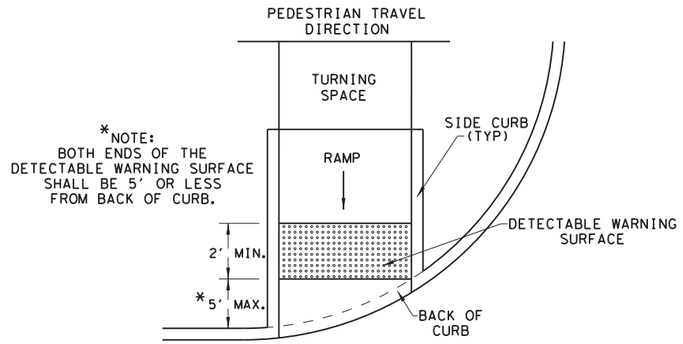
DETECTABLE WARNING SURFACE DETAILS



PARALLEL CURB RAMP
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON LANDING AT STREET EDGE.



PERPENDICULAR CURB RAMP
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.



DIRECTIONAL CURB RAMP
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
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REVISIONS REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY		SHEET NO.
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DATE:
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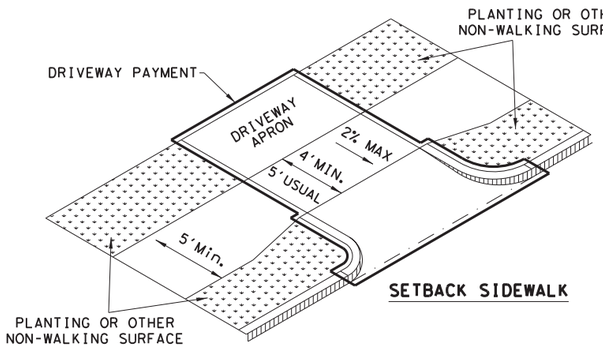
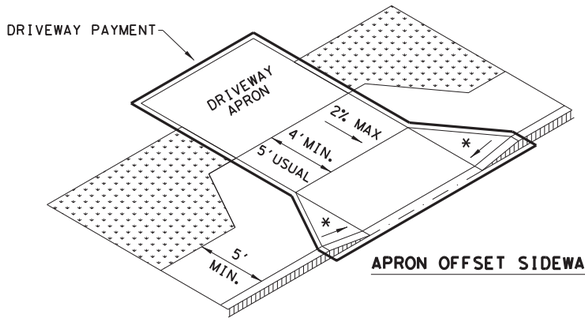
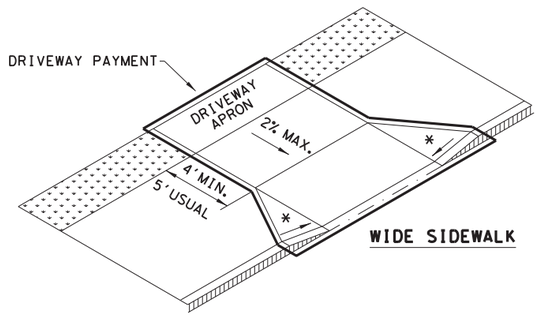
SIDEWALK TREATMENT AT DRIVEWAYS



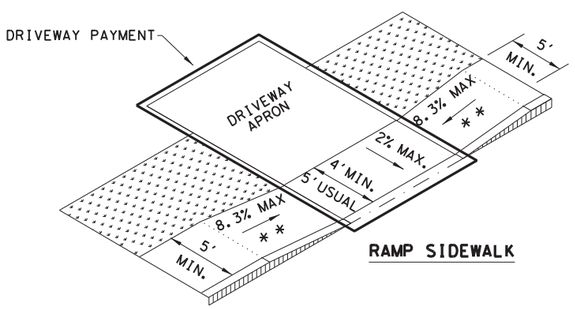
SETBACK SIDEWALK



APRON OFFSET SIDEWALK



WIDE SIDEWALK

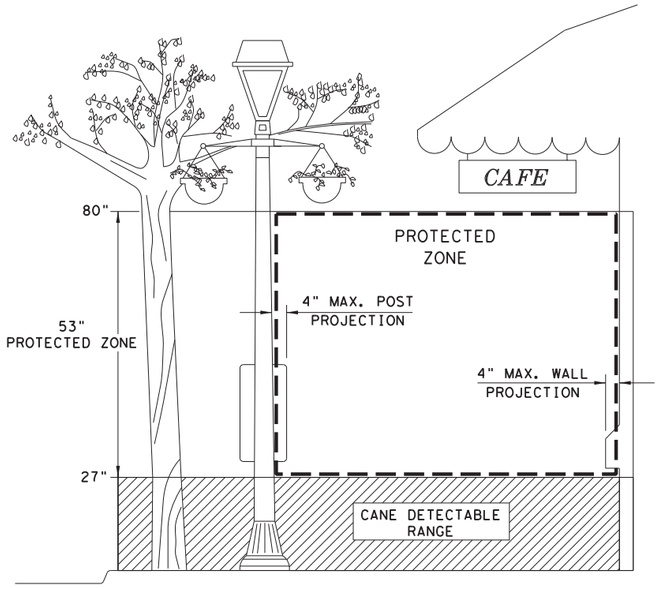


RAMP SIDEWALK

NOTES:

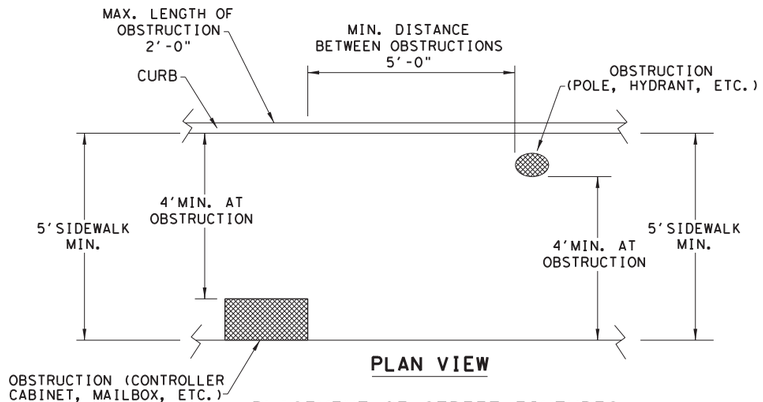
* WHERE DRIVEWAYS CROSS THE PEDESTRIAN ROUTE, SIDES SHALL BE FLARED AT 10% MAX SLOPE.

* * IF CURB HEIGHT IS GREATER THAN 6 INCHES, USE GRADE LESS THAN OR EQUAL TO 5%. HANDRAIL AND DETECTABLE WARNING ARE NOT REQUIRED.



PROTECTED ZONE

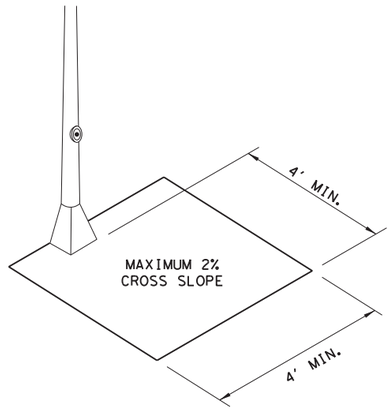
NOTE: IN PEDESTRIAN CIRCULATION AREA, MAXIMUM 4" PROJECTION FOR POST OR WALL MOUNTED OBJECTS BETWEEN 27" AND 80" ABOVE THE SURFACE.



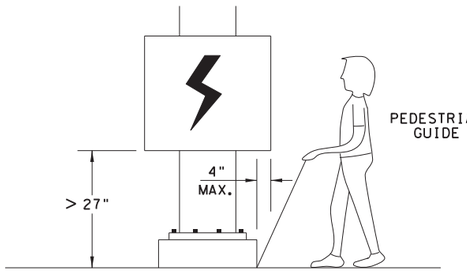
PLAN VIEW

PLACEMENT OF STREET FIXTURES

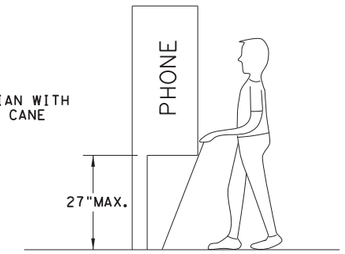
NOTE: ITEMS NOT INTENDED FOR PUBLIC USE. MINIMUM 4' X 4' CLEAR GROUND SPACE REQUIRED AT PUBLIC USE FIXTURES.



CLEAR 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"

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

PED-18

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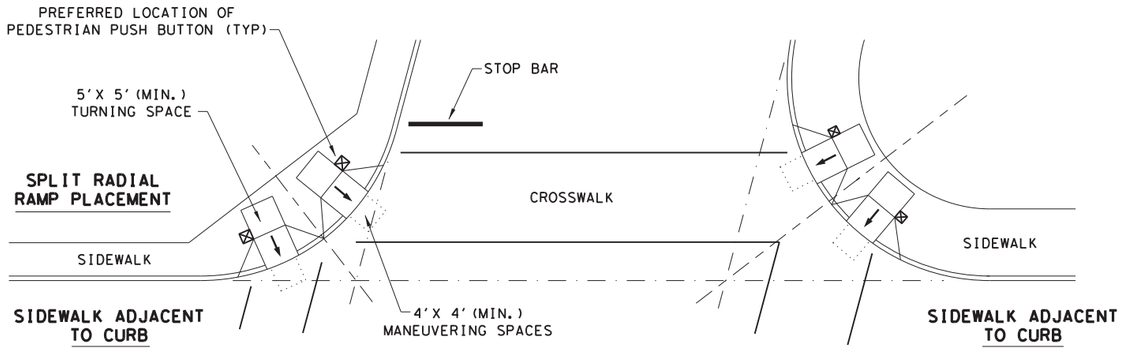
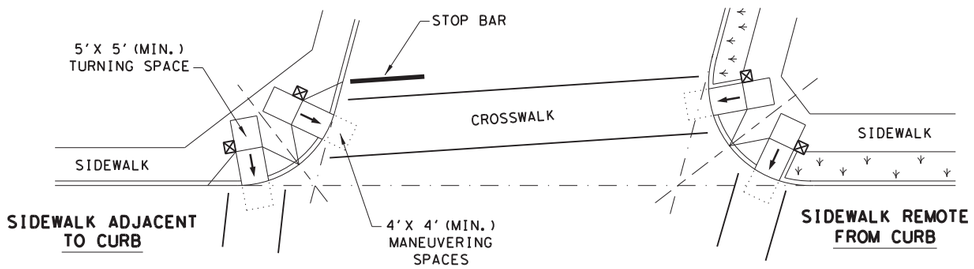
TYPICAL CROSSING LAYOUTS

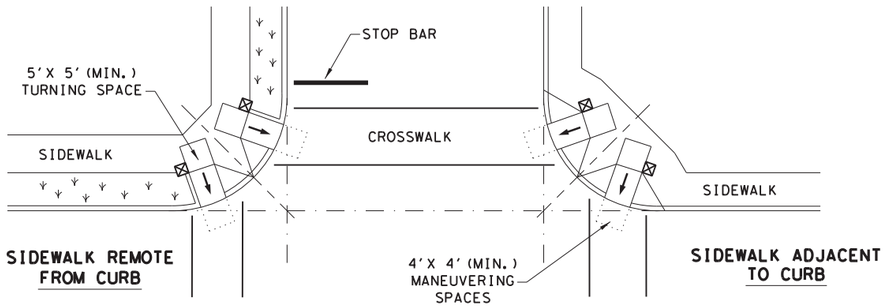
SEE SHEET 1 OF 4 FOR DETAILS AND DIMENSIONS



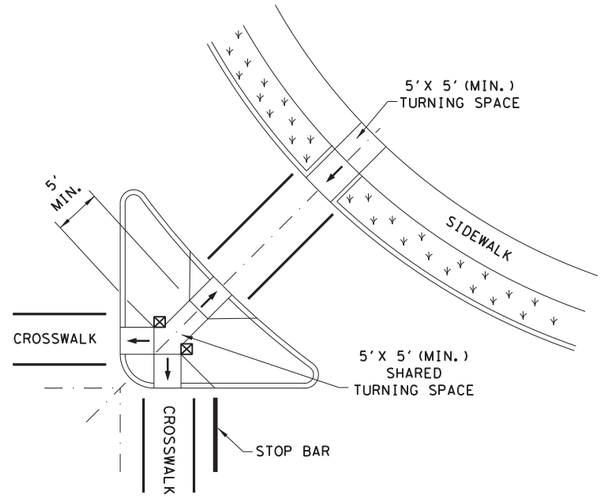
SKEWED INTERSECTION WITH "LARGE" RADIUS



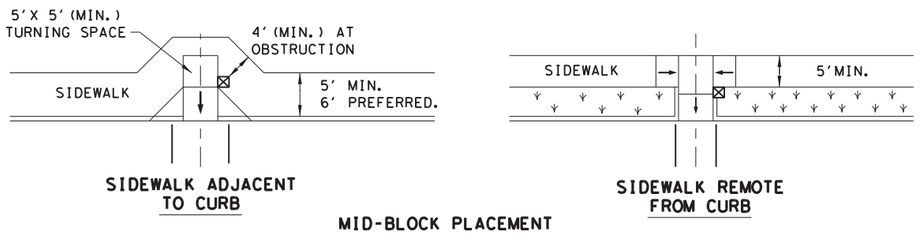
SKEWED INTERSECTION WITH "SMALL" RADIUS



NORMAL INTERSECTION WITH "SMALL" RADIUS



AT INTERSECTION
W/FREE RIGHT TURN & ISLAND



MID-BLOCK PLACEMENT
PERPENDICULAR RAMPS

LEGEND:

SHOWS DOWNWARD SLOPE. →

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON (IF APPLICABLE). ☒

DENOTES PLANTING OR NON-WALKING SURFACE NOT PART OF PEDESTRIAN CIRCULATION PATH.

SHEET 4 OF 4

Texas Department of Transportation | Design Division Standard

PEDESTRIAN FACILITIES
CURB RAMPS

PED-18

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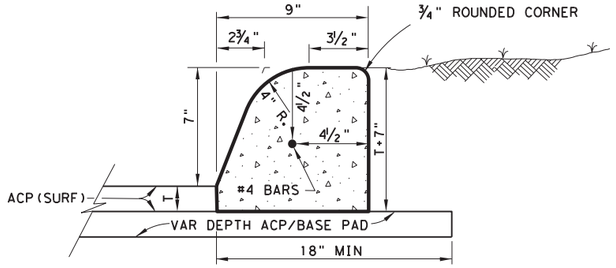
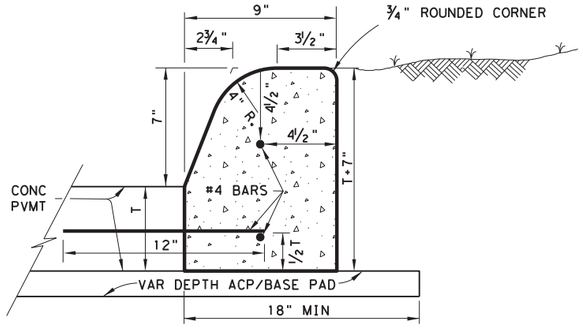
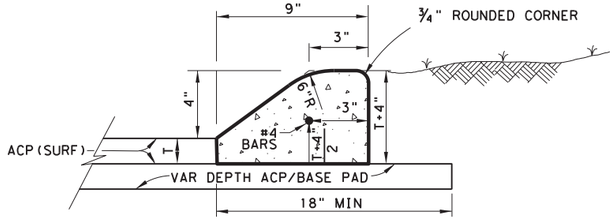


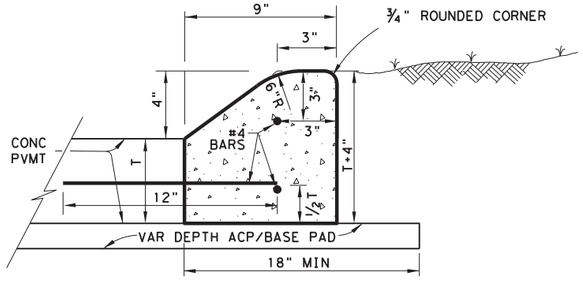
CONCRETE CURB (TYPE 1)
W/ ACP



CONCRETE CURB (TYPE 1)
W/ CONC PAVEMENT



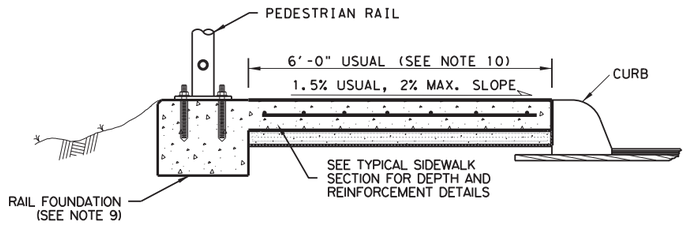
CONCRETE CURB (TYPE 2)
W/ ACP



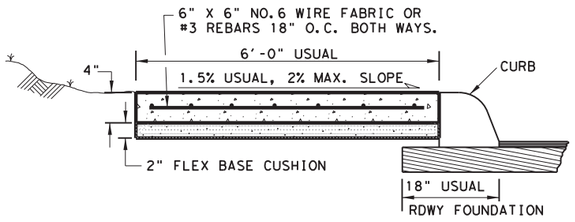
CONCRETE CURB (TYPE 2)
W/ CONC PAVEMENT

GENERAL NOTES:

1. CONCRETE CURB TYPE 1 AND 2 SHOWN SHALL MEET THE MINIMUM SPECIFICATION REQUIREMENTS OF CLASS "A" CONCRETE PER ITEM 529 AND 421.
2. ALL REINFORCING STEEL SHALL BE GRADE 60
3. WHERE CONCRETE CURB IS PLACED ON EXISTING CONCRETE PAVEMENT, THE PAVEMENT SHALL BE DRILLED AND THE REINFORCING BARS GROUTED IN PLACE.
4. 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.
5. VERTICAL AND HORIZONTAL DOWEL BARS AND TRANSVERSE REINFORCING BARS SHALL BE PLACED AT 4 FEET C-C, UNLESS OTHERWISE SHOWN.
6. ONE-HALF INCH EXPANSION JOINT MATERIAL SHALL BE PROVIDED WHERE CURB OR CURB AND GUTTER IS ADJACENT TO SIDEWALK OR RIPRAP. THIS IS SUBSIDIARY TO THE CURB, ITEM 529.
7. LAYDOWN CURB AT DRIVEWAYS WILL BE PAID AS SUBSIDIARY TO ITEM 530.
8. FOR SIDEWALK DETAILS AT DRIVEWAYS, SEE SAN ANTONIO DISTRICT STANDARD "DRIVEWAY DETAILS".
9. SEE PEDESTRIAN HANDRAIL DETAILS STANDARD "PRD" FOR MORE INFORMATION. CONCRETE RAIL FOUNDATION TO BE POURED WITH THE SIDEWALK BUT PAYMENT IS SUBSIDIARY TO ITEM 450 "RAILING".
10. CLEAR SIDEWALK WIDTH EXCLUDING THE PEDESTRIAN RAIL FOUNDATION SHALL BE 6' UNLESS OTHERWISE SPECIFIED IN THE PLANS

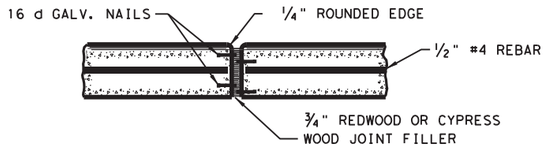


TYPICAL SIDEWALK SECTION WITH PEDESTRIAN RAIL



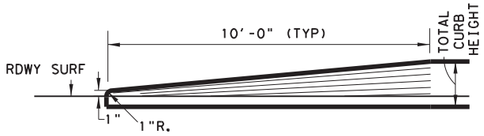
TYPICAL SIDEWALK SECTION

GROOVED JOINTS IN THE SIDE WALK SHALL BE AT A MAX. SPACING OF 10 FT. AND SHALL HAVE ¾" EXPANSION JOINTS AT A MAX. SPACING OF 60' AND TO COINSIDE WITH THE CURB EXP. JOINTS.



TYPICAL CURB EXPANSION JOINT DETAIL

EXPANSION JOINTS TO BE PLACED AT BEGINNING AND END OF CURVES, DRIVEWAYS WHEELCHAIR RAMPS, INLETS, ILLUMINATION/ SIGNAL FOUNDATIONS AND OTHER FIXED OBJECTS.



TRANSITION FOR CONCRETE CURB ENDS

SEE CURB DETAIL FOR REINFORCEMENT

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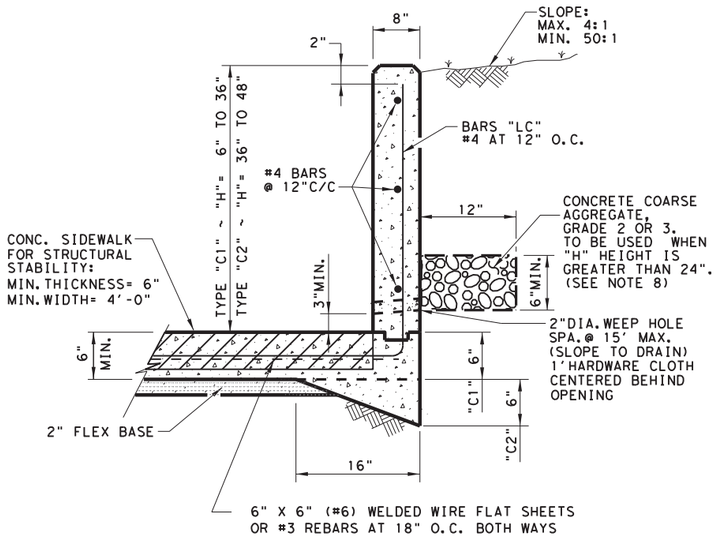
San Antonio District

MISCELLANEOUS CURB AND SIDEWALK DETAILS

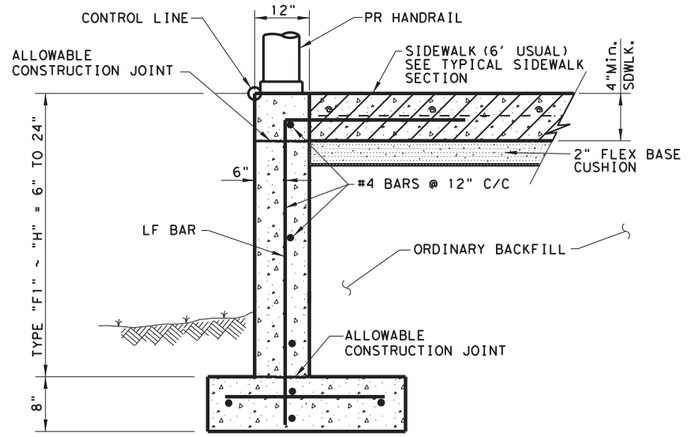
San Antonio District Standard
Sheet (1 of 2)

T:Engdata/Standards/MiscCurbdetails.dgn	PREPARED BY AND FOR USE OF TxDoT.					
ORIGINAL DRAWING DATE:	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT #			SHEET
REVISIONS		6				42
09-01-08	COUNTY		CONTROL	SECTION	JOB	HIGHWAY
10-10-17 sidewalk width equals 6' usual						
07-22-20 9" curb + curb w/ conc pvmt det.						

$TIME$
$DATE$
$FILE$



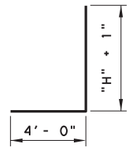
TYPE "C1" & "C2" CURB



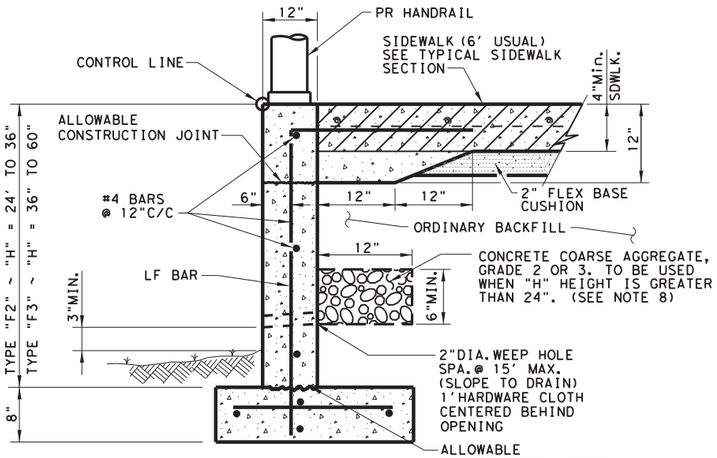
TYPE "F1" CURB

GENERAL NOTES:

1. CONCRETE FOR CURB TYPE F AND C SHOWN SHALL MEET THE MINIMUM SPECIFICATION REQUIREMENTS OF CLASS "C" CONCRETE PER ITEM 421
2. ALL REINFORCING STEEL SHALL BE GRADE 60
3. WHERE CONCRETE CURB I SPLACED ON EXISTING CONCRETE PAVEMENT, THE PAVEMENT SHALL BE DRILLED AND THE REINFORCING BARS GROUTED IN PLACE.
4. EXPANSION AND CONTRACTION JOINTS SHALL BE CONSTRUCTED TO MATCH PAVEMENT JOINITS 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.
5. VERTICAL AND HORIZONTAL DOWEL BARS AND TRANSVERSE REINFORCING BARS SHALL BE PLACED AT 4 FEET C-C, UNLESS OTHERWISE SHOWN.
6. ONE-HALF INCH EXPANSION JOINT MATERIAL SHALL BE PROVIDED WHERE CURB OR CURB AND GUTTER IS ADJACENT TO SIDEWALK OR RIPRAP. THIS IS SUBSIDIARY TO THE CURB, ITEM 529.
7. UNTIL THE SIDEWALK IS COMPLETE, LATERAL SUPPORT FOR THE "F" CURBS WILL BE REQUIRED.
8. IF AGGREGATE IS REQUIRED PER THE DETAIL, IT IS PAID AS SUBSIDIARY TO THE CURB, ITEM 529.

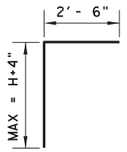


BAR "LC"

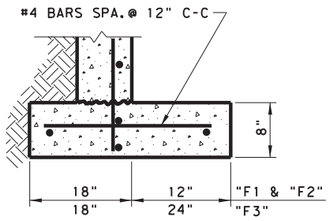


TYPE "F2" & "F3" CURB

DESIGN SOIL PARAMETERS:
Soil Unit Wt. = 120 pcf
Phi = 30 Degrees
Cohesion = 50 psf
Min. PI = 15
Max. PI = 30
SURCHARGE:
TYPE F CURB q = 2' Adjacent to sidewalk
Max. slope behind TYPE C Curb = 4:1
Min. Factor of Safety against sliding is 1.5.
Designed in accordance with current AASHTO Standards and Interim Specifications.



BAR "LF"



FOOTING DETAIL

CLASS C CONCRETE PAID UNDER ITEM 531, SIDEWALK. (NOTE. ADDITIONAL CONCRETE TO MEET THE THICKENED SECTIONS REQUIRED BY THESE DETAILS IS SUBSIDIARY TO ITEM 531, CURB.)

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Texas Department of Transportation
San Antonio District

MISCELLANEOUS CURB AND SIDEWALK DETAILS

San Antonio District Standard
Sheet (2 of 2)

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PREPARED BY AND FOR USE OF TxDoT.

ORIGINAL DRAWING DATE:

REVISIONS
09-01-08
10-10-17 sidewalk width equals 6' usual
07-22-20 9" curb + curb w/ conc pvmt det.
- -

STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT #	SHEET
	6		43

COUNTY	CONTROL	SECTION	JOB	HIGHWAY

$TIME$
$DATE$
$FILE$

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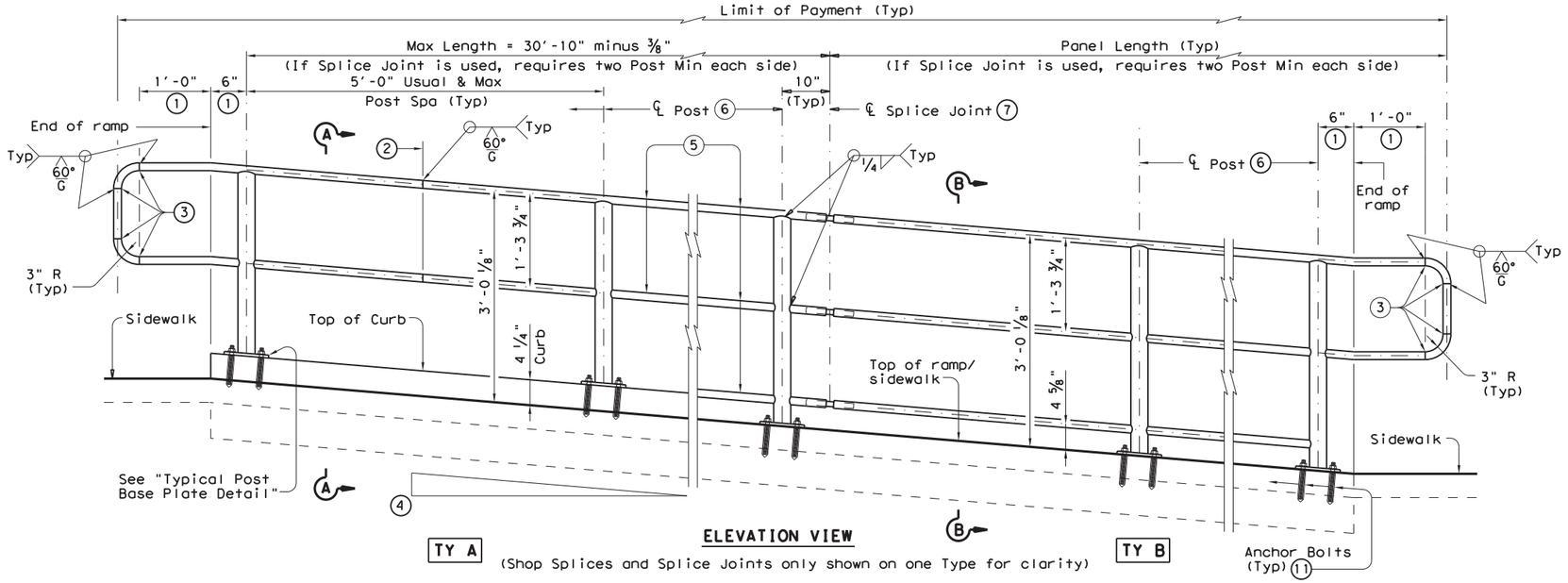
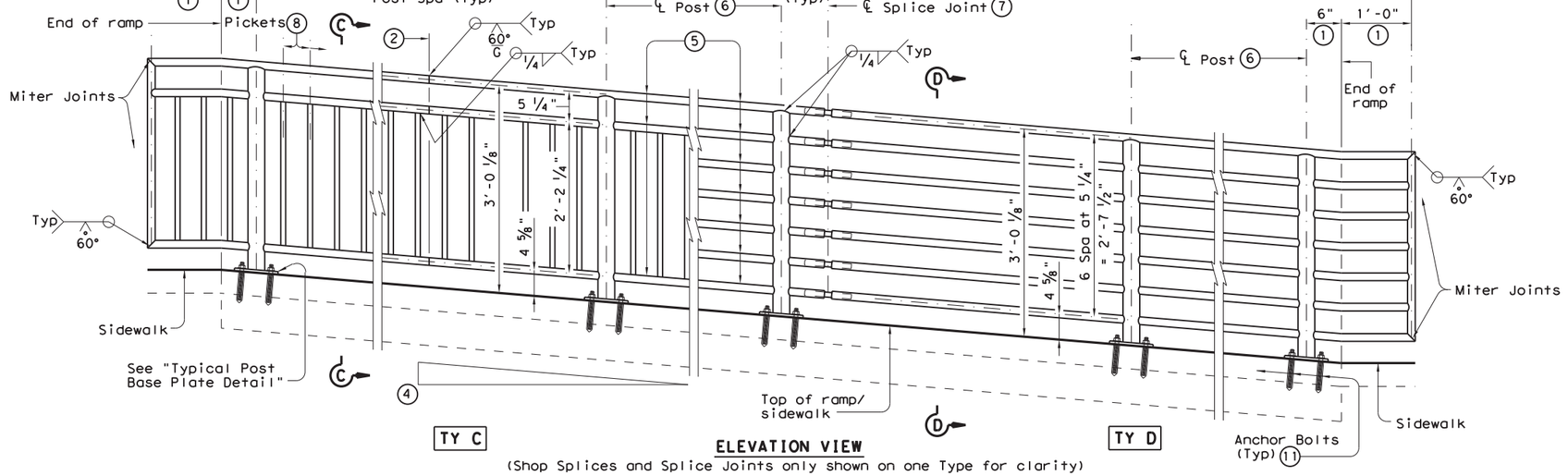


ELEVATION VIEW

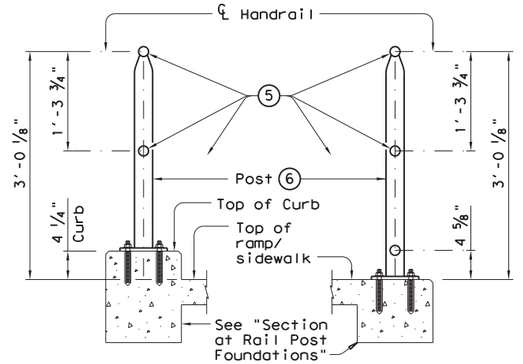
(Shop Splices and Splice Joints only shown on one Type for clarity)



ELEVATION VIEW

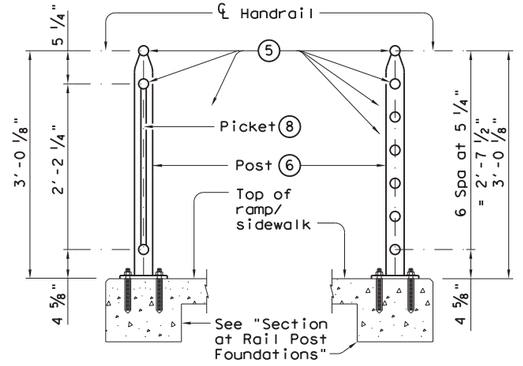
(Shop Splices and Splice Joints only shown on one Type for clarity)

RECOMMENDED USAGE ⑨⑩	
Dropoff Height/ Condition	Recommended Rail Options
< 30" dropoff	TY A, TY B, TY C, or TY D
≥ 30" dropoff, or along Bike Path	TY E or TY F



SECTION A-A
(Showing Handrail **TY A**)

SECTION B-B
(Showing Handrail **TY B**)



SECTION C-C
(Showing Handrail **TY C**)

SECTION D-D
(Showing Handrail **TY D**)

1. Parallel to ground.
2. One shop splice per panel is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.
3. Shop splice is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.
4. See Ramp Details located elsewhere in plans for ramp slope and dimensions. Maximum ramp slope will not exceed 8.3 percent. Level landing required for each 30" rise if grade exceeds 5 percent.
5. 1 ½" Dia. Standard Pipe (1.900" O.D., 0.145" wall thickness). Parallel to ramp / sidewalk. Provide holes as needed in 1 ½" Dia. pipe for galvanizing drainage and venting.
6. 2 ½" Dia. Standard Pipe (2.875" O.D., 0.203" wall thickness). See "Post Mount Detail" for crimping and trimming post to fit Dia. of top rail. Provide holes as needed in post for galvanizing drainage and venting. Plumb all posts.
7. See "Handrail Fabrication Details" for Splice Joints.
8. ℄ ⅝" Dia. Round Bar equal spacing at 4 ½" Max. Plumb all pickets.
9. When needed for accessibility (grade > 5 percent) or as needed for pedestrian safety.
10. Not to be used on bridges.
11. See "General Notes" for anchor bolt information.

SHEET 1 OF 3

Texas Department of Transportation

Design Division Standard

PEDESTRIAN HANDRAIL DETAILS

PRD-13

FILE: prd13.dgn	DN: TxDOT	CK: AM	DW: JTR	CK: CGL
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REVISIONS REVISED MAY, 2013 (VP)				
	DIST	COUNTY		SHEET NO.
				44

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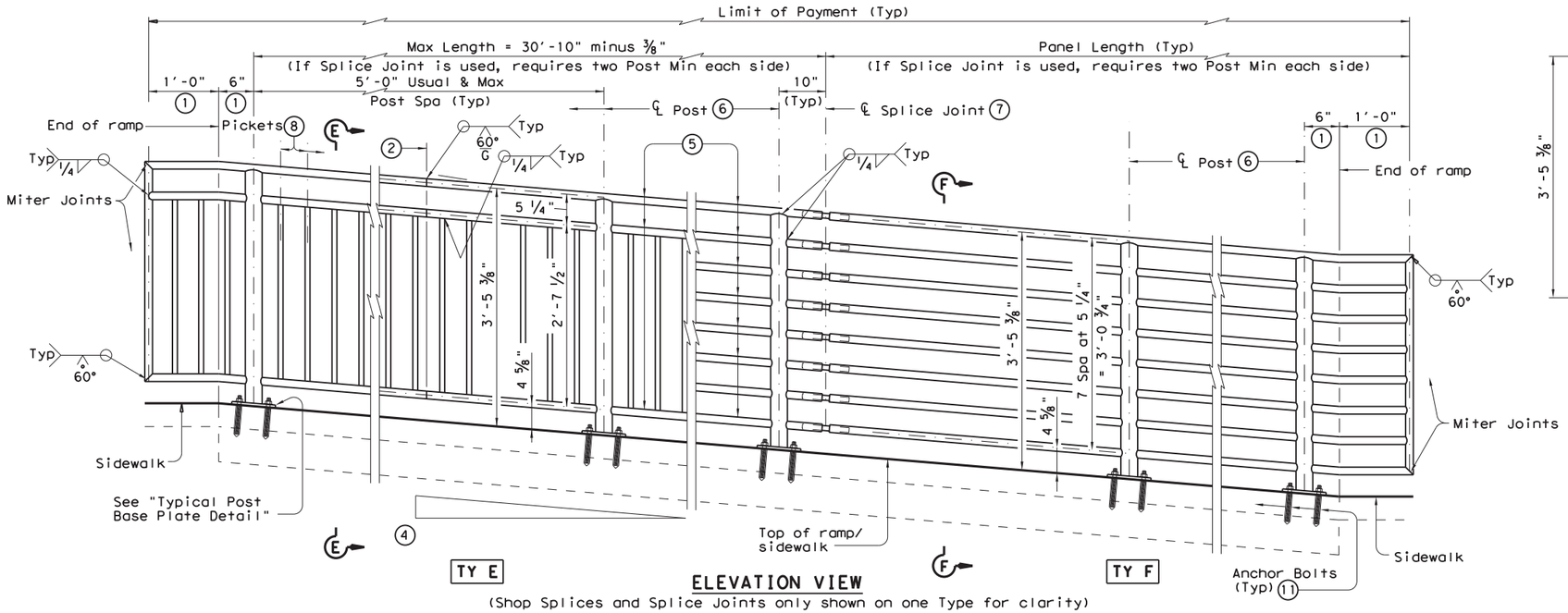
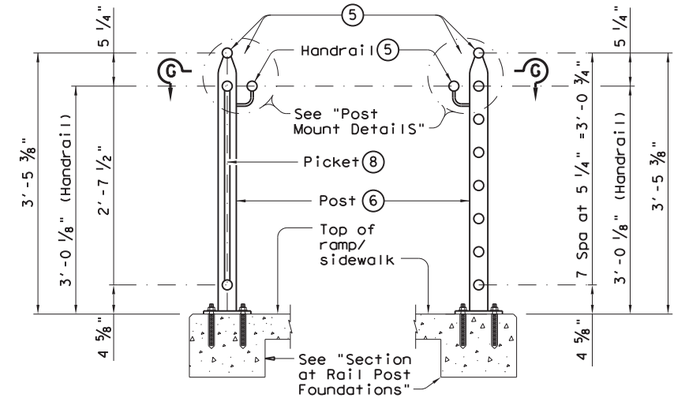


ELEVATION VIEW

(Shop Splices and Splice Joints only shown on one Type for clarity)

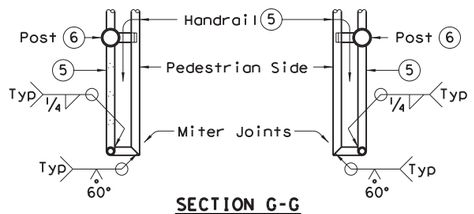


SECTION E-E

(Showing Handrail **TY E**)

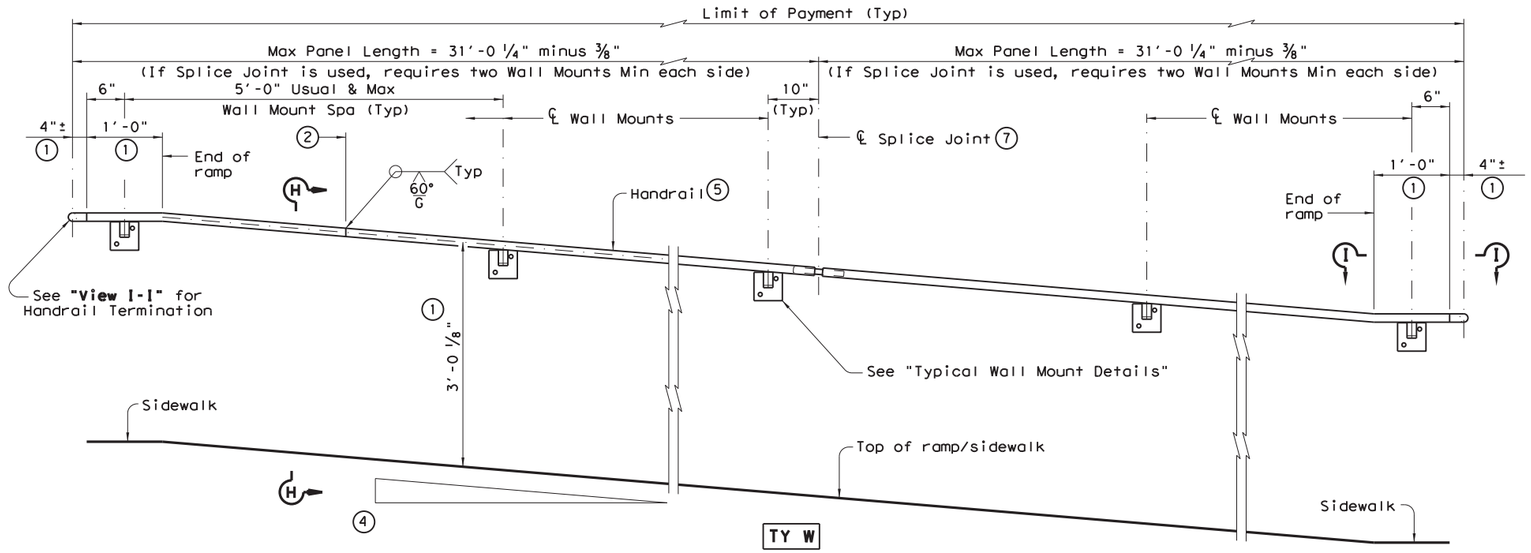
SECTION F-F

(Showing Handrail **TY F**)

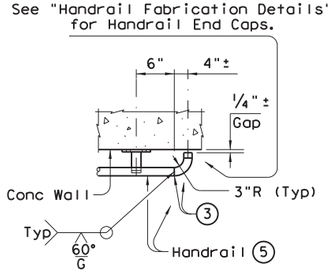


SECTION G-G

(Showing Handrail Termination)

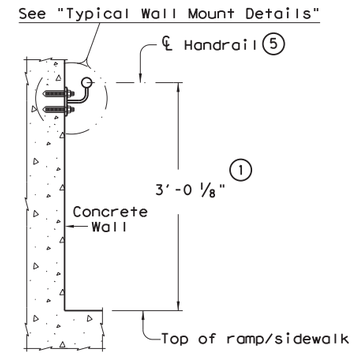


ELEVATION VIEW



VIEW I-I

(Showing Handrail Termination)



SECTION H-H

(Showing Handrail **TY W**)

1. Parallel to ground.
2. One shop splice per panel is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.
3. Shop splice is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.
4. See Ramp Details located elsewhere in plans for ramp slope and dimensions. Maximum ramp slope will not exceed 8.3 percent. Level landing required for each 30" rise if grade exceeds 5 percent.
5. 1 ½" Dia. Standard Pipe (1.900" O.D., 0.145" wall thickness). Parallel to ramp / sidewalk. Provide holes as needed in 1 ½" Dia. pipe for galvanizing drainage and venting.
6. 2 ½" Dia. Standard Pipe (2.875" O.D., 0.203" wall thickness). See "Post Mount Detail" for crimping and trimming post to fit Dia. of top rail. Provide holes as needed in post for galvanizing drainage and venting. Plumb all posts.
7. See "Handrail Fabrication Details" for Splice Joints.
8. ℄ ⅝" Dia. Round Bar equal spacing at 4 ½" Max. Plumb all pickets.
11. See "General Notes" for anchor bolt information.

SHEET 2 OF 3

Texas Department of Transportation

Design Division Standard

PEDESTRIAN HANDRAIL DETAILS

PRD-13

FILE: prd13.dgn	DN: TxDOT	CK: AM	DW: JTR	CK: CGL
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REVISIONS REVISED MAY, 2013 (VP)	DIST	COUNTY		SHEET NO.
				45

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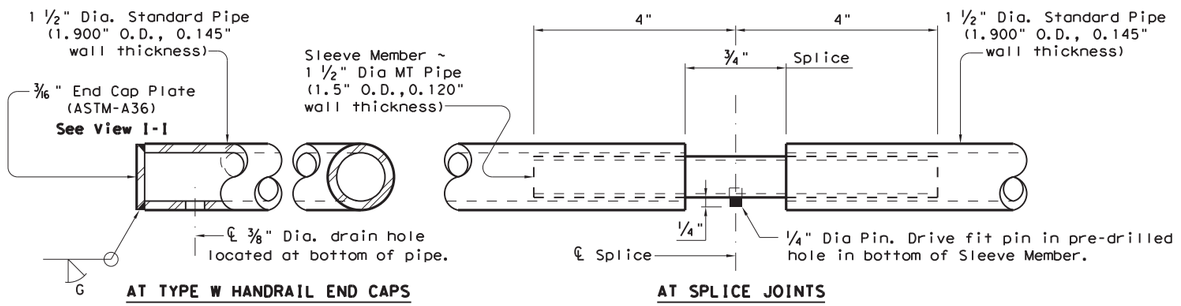
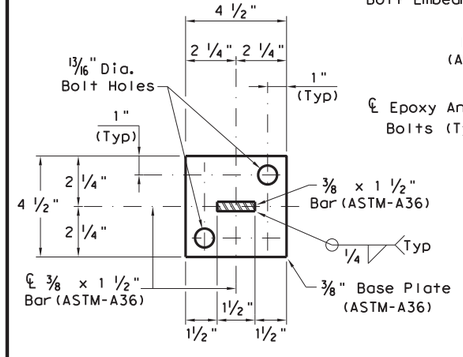
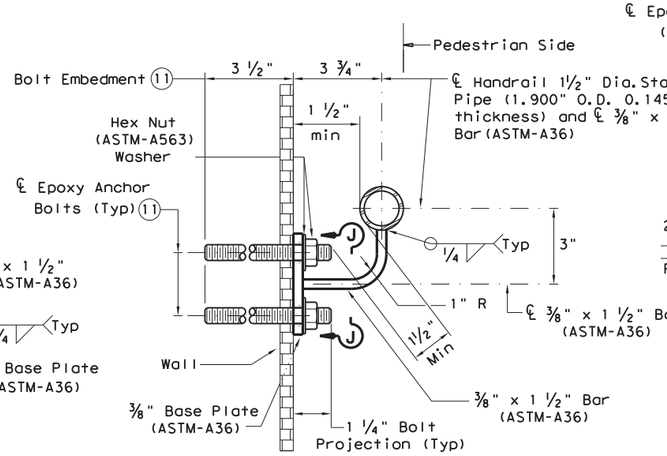


HANDRAIL FABRICATION DETAILS

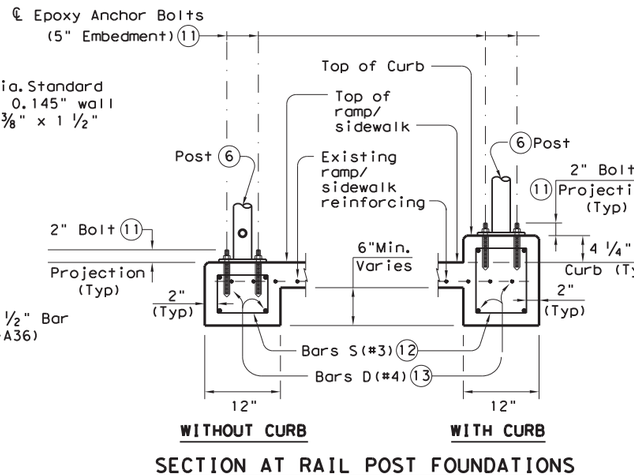


SECTION J-J
(Anchor Bolts not shown for clarity)

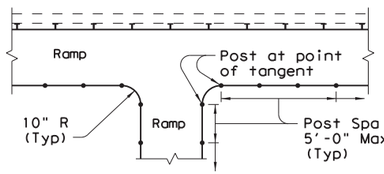


SECTION AT WALL MOUNT

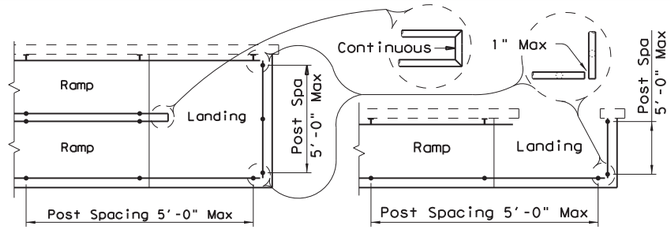
TYPICAL WALL MOUNT DETAILS



SECTION AT RAIL POST FOUNDATIONS



RAMP INTERSECTION



MULTI-LEVEL RAMP
SINGLE-LEVEL RAMP

PLAN SHOWING RAIL AT RAMP CONDITIONS

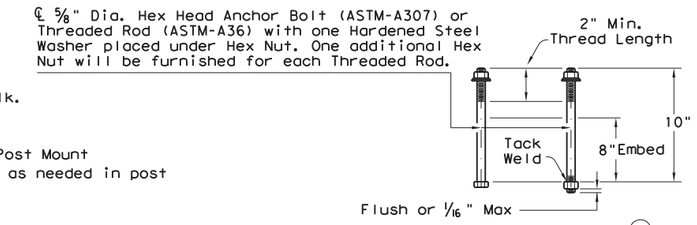
(5) 1 ½" Dia. Standard Pipe (1.900" O.D., 0.145" wall thickness). Parallel to ramp/sidewalk. Provide holes as needed in 1 ½" Dia. pipe for galvanizing drainage and venting.

(6) 2 ½" Dia. Standard Pipe (2.875" O.D., 0.203" wall thickness). Plumb all posts. See "Post Mount Detail" for crimping and trimming post to fit the diamenter of top rail. Provide holes as needed in post for galvanizing drainage and venting.

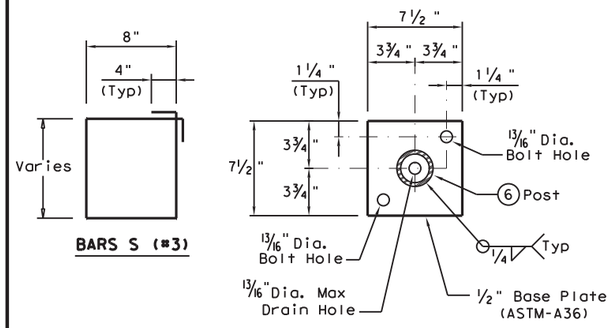
(11) See "General Notes" for anchor bolt information.

(12) Bars S(#3) spaced at 12" Max (Spaced 3" from outside edge of overall length of Ramp/Sidewalk).

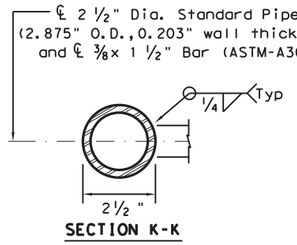
(13) Provide 1 ½" end cover to Bars D(#4) from outside edge of overall length of Ramp/Sidewalk.



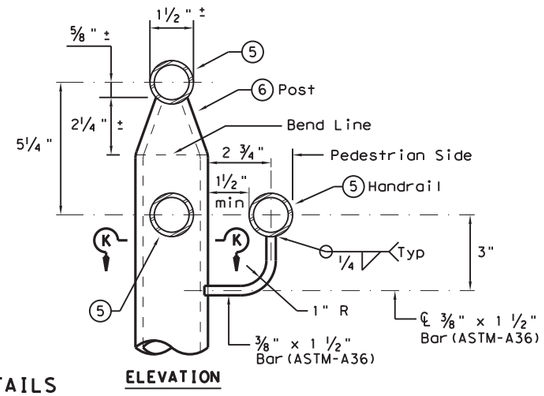
CAST-IN-PLACE ANCHOR BOLT OPTIONS
(Used for Post Base Plate only)



TYPICAL POST BASE PLATE DETAIL



SECTION K-K



ELEVATION

POST MOUNT DETAILS

GENERAL NOTES

Designed according to ADAAG, Texas Accessibility Standards, Uniform Building Code, and AASHTO LRFD Specifications.

Handrail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

Pipe will conform to ASTM-A53 Grade B or A500 Grade B. Steel plates and steel bars will conform to ASTM-A36. Mechanical tubing (MT) will conform to ASTM A513 Grade 1015 or higher. Galvanize all steel components except reinforcing steel unless noted otherwise.

Concrete for foundations will be in accordance with Item 531 "Sidewalks". All reinforcing steel must be Grade 60. Bar laps, where required, will be as follows: Uncoated ~ #4 = 1'-5" Epoxy coated ~ #4 = 2'-1"

When the plans require painted steel, follow the requirements for painting galvanized steel in Item 446, "Cleaning and Painting Steel". Sleeve Members will receive galvanization and only get field painted after installation unless directed otherwise by Engineer.

Epoxy Anchor bolts for wall mount and post base plate will be 5/8" Dia. ASTM A36 threaded rods with one hex nut and one hardened steel washer at each bolt. 5/8" Dia. threaded rod embedment depth for wall mounts is 3 ½" and embedment depth for post base plate is 5".

Embed threaded rods into concrete with a Type III (Class C) epoxy meeting the requirements of DMS-6100, "Epoxies and Adhesives". Mix and dispense adhesive with the manufacturer's static mixing nozzle/dual cartridge system. Core drill holes (percussion drilling not permitted).

At the contractor's option the post base plate anchor bolts may be cast with the Ramp/Sidewalk (See Cast-in-Place Anchor Bolt Options).

Optional cast-in-place anchor bolts will be 5/8" Dia ASTM A307 Grade A bolts (or A36 threaded rods with one tack welded hex nut each) with one hex nut and one hardened steel washer at each bolt. Embedment depth of cast-in-place bolt will be 8" for post base plate.

Handrails and any wall or other surface adjacent to them will be free of any sharp or abrasive elements.

Submit shop drawings to the Engineer unless otherwise noted. For curved handrail applications, fabricate the handrail to the curve if radius is less than 600 ft. Shop drawings are required when rail is fabricated to the curve.

For all handrails, erection drawings will be submitted to the Engineer for approval to ensure proper installation.

Drawings will show handrail mount locations with bolts setting, spacing, ramp slope, and/or splice joint locations, and handrail lengths with identification showing where each handrail goes on the layout.

Payment for concrete sidewalks or curb ramps will be paid for in accordance with Item 531 "Sidewalks".

Payment for all items shown is to be included in unit price bid in accordance with Item 450 "Railing" of the type specified.

All exposed edges will be rounded or chamfered to approximately 1/8" by grinding.

Texas Department of Transportation

Design Division Standard

PEDESTRIAN HANDRAIL DETAILS

PRD-13

FILE: prd13.dgn	DN: TxDOT	CK: AM	DW: JTR	CK: CGL
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REVISIONS				
REVISED MAY, 2013 (VP)	DIST	COUNTY		SHEET NO.
				46

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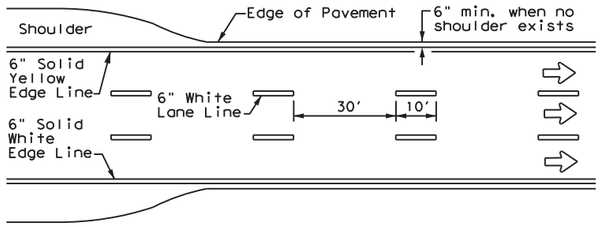
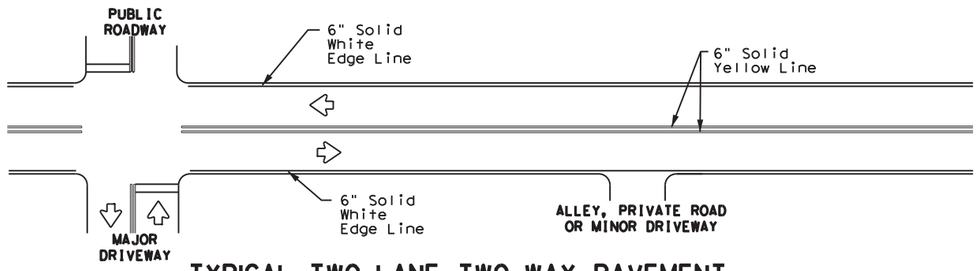
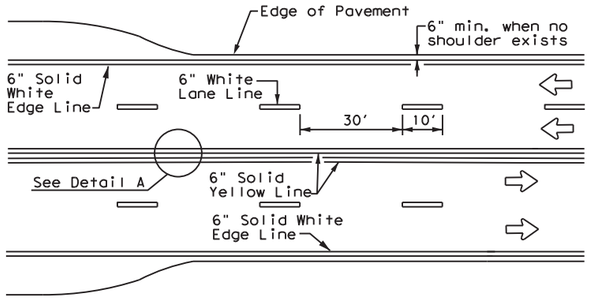
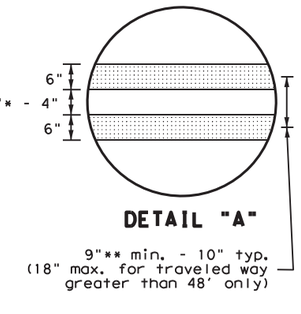


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

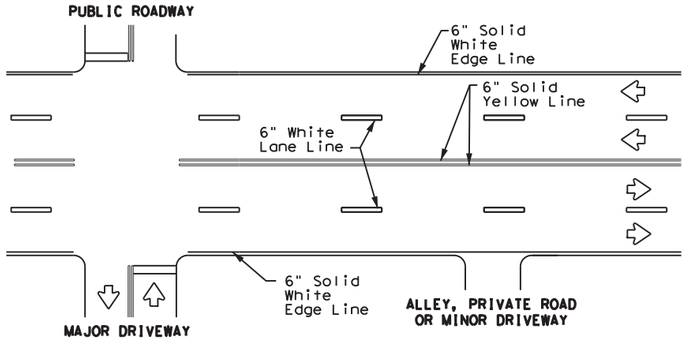




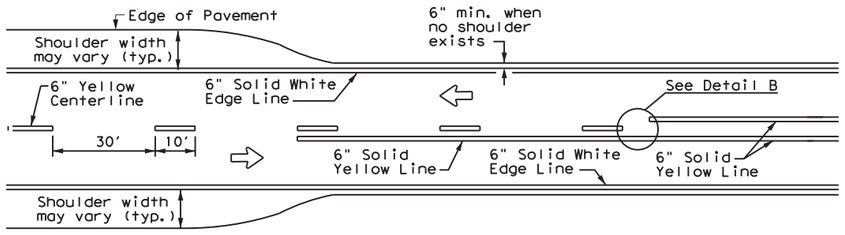
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

* 2" minimum for restripe projects when approved by the Engineer.

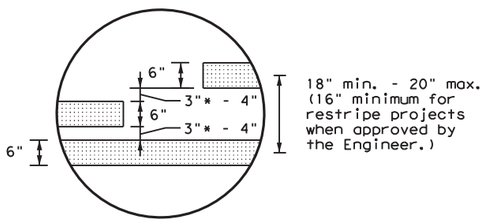
** 8" minimum for restripe projects when approved by the Engineer.



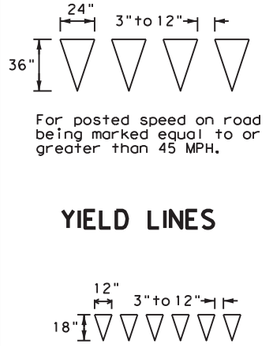
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

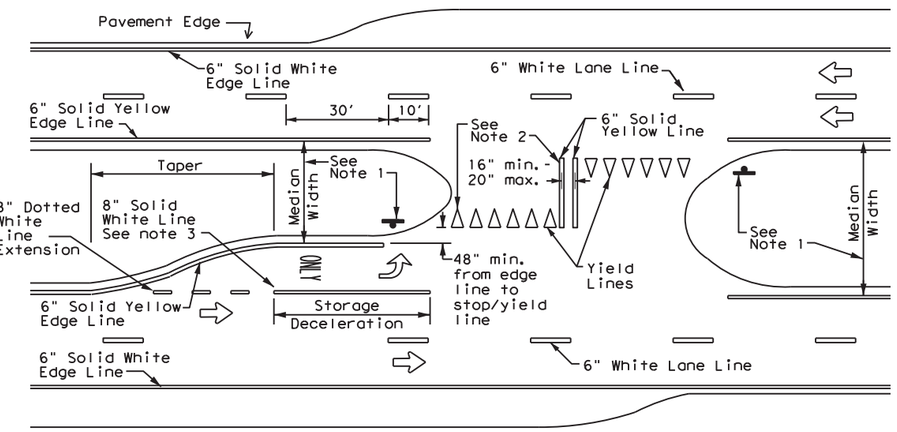


TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



* 2" minimum for restripe projects when approved by the Engineer.





FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

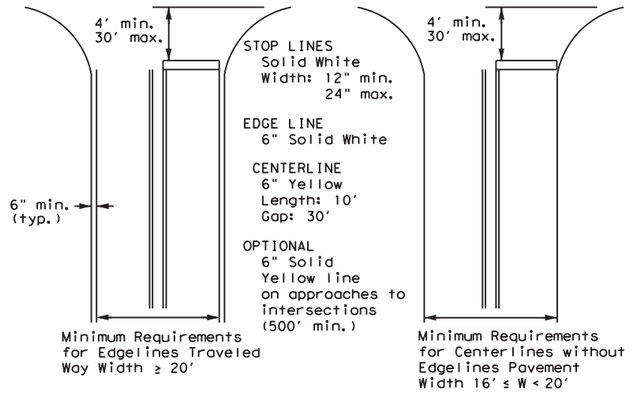
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.
2. Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines shall only be used with yield signs.
3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

GENERAL NOTES

1. Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines are not required in curb and gutter sections of roadways.
2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the center of edge line to the center of edge line of a two lane roadway.

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

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



NOTE: Traveled way is exclusive of shoulder widths. Refer to General Note 2 for additional details.

GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Roadways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-22

FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
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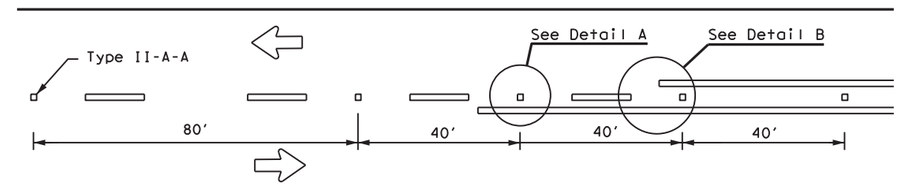
REVISIONS 11-78 8-00 6-20 / 8-95 3-03 12-22 / 5-00 2-12	DIST	COUNTY		SHEET NO. 47

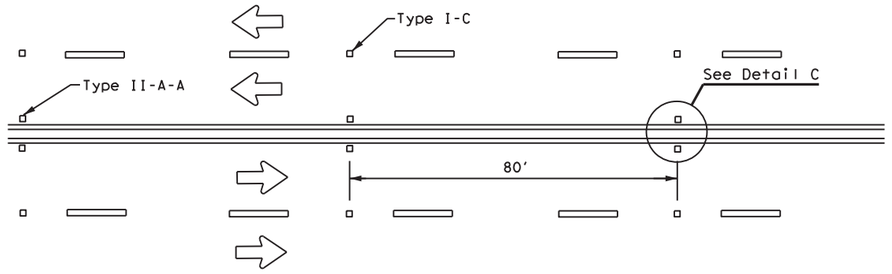
22A

DATE:
FILE:

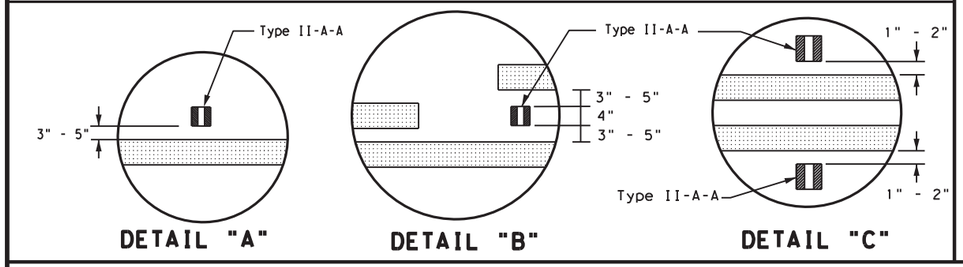
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

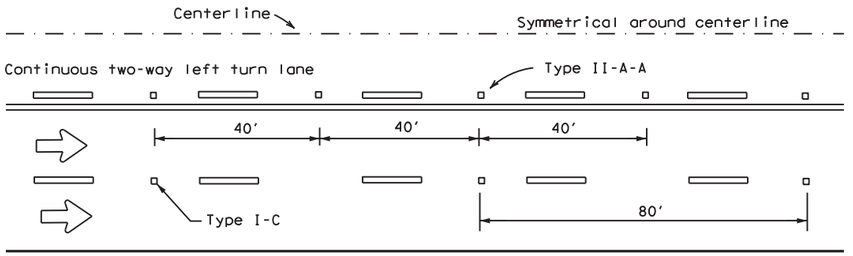


CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS

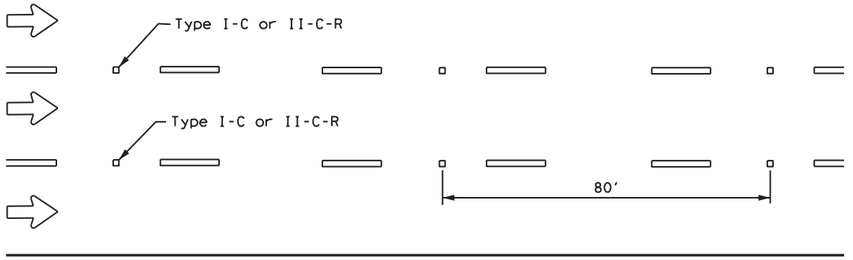


CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS





CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



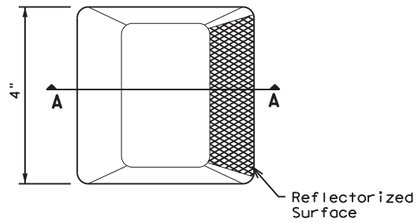
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

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

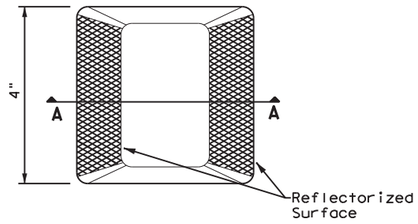
See Note 3.

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

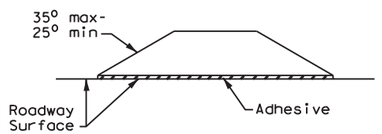
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

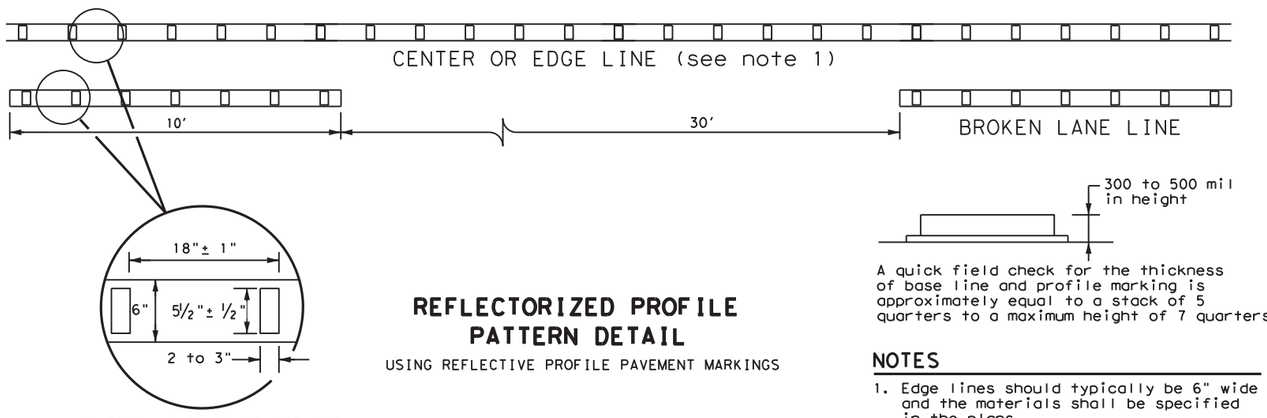


Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS



6" EDGE LINE, 6" CENTERLINE OR 6" LANE LINE

REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTES

1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

1. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.
3. Use raised pavement marker Type I-C with undivided roadways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.

Texas Department of Transportation

Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-22

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
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REVISIONS 4-77 8-00 6-20 4-92 2-10 12-22 5-00 2-12	DIST	COUNTY		SHEET NO. 48

22B

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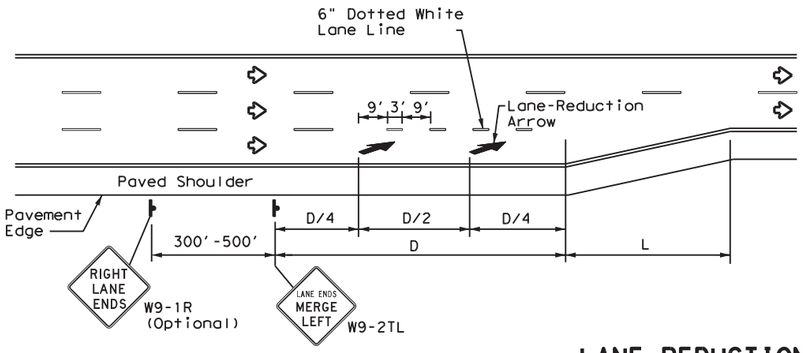
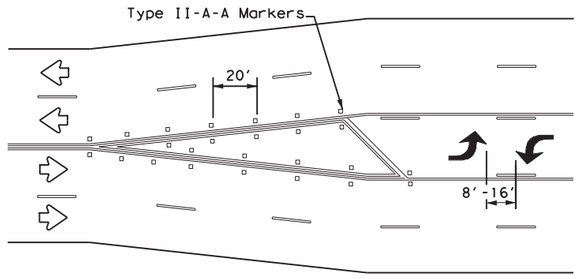


LANE REDUCTION

NOTES

1. Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. For Texas Super 2 Passing Lanes, see TS2(PL) standard sheets.
2. On divided highways, an additional RIGHT LANE ENDS (W9-1R) sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
3. Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.

ADVANCED WARNING SIGN DISTANCE (D)		
Posted Speed	D (ft)	L (ft)
30 MPH	460	$L=\frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	



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.

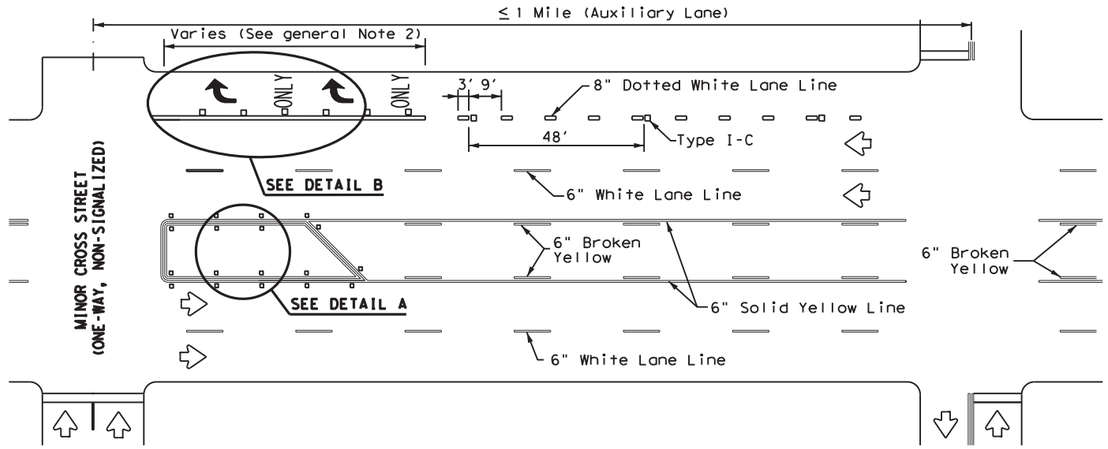
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

GENERAL NOTES

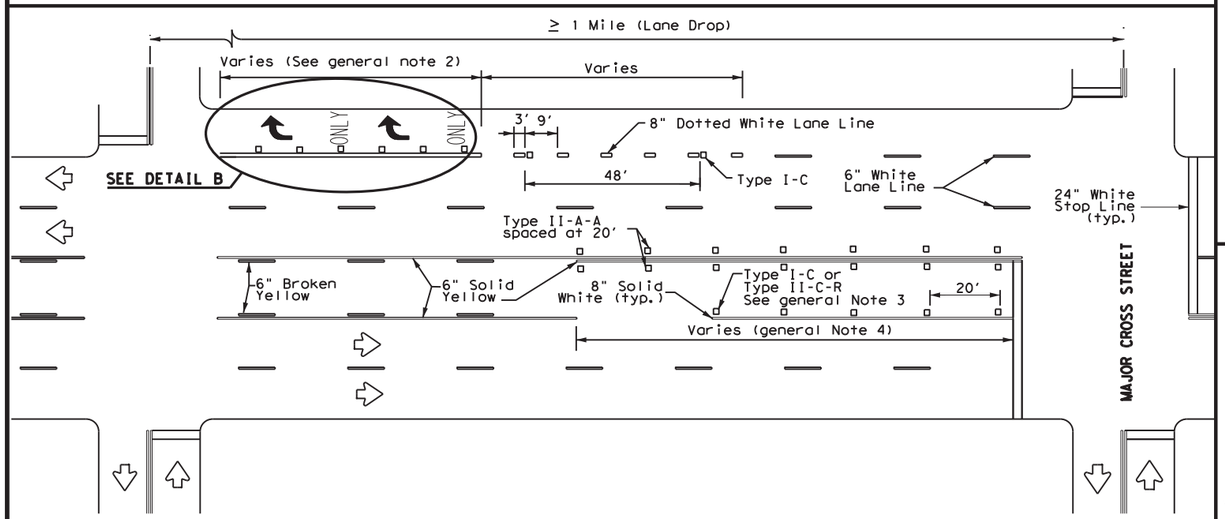
1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
2. When lane-use words 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.
3. Use raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.
4. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer. See Chapter 3 of the Roadway Design Manual for additional information on turning lanes or storage lengths.

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

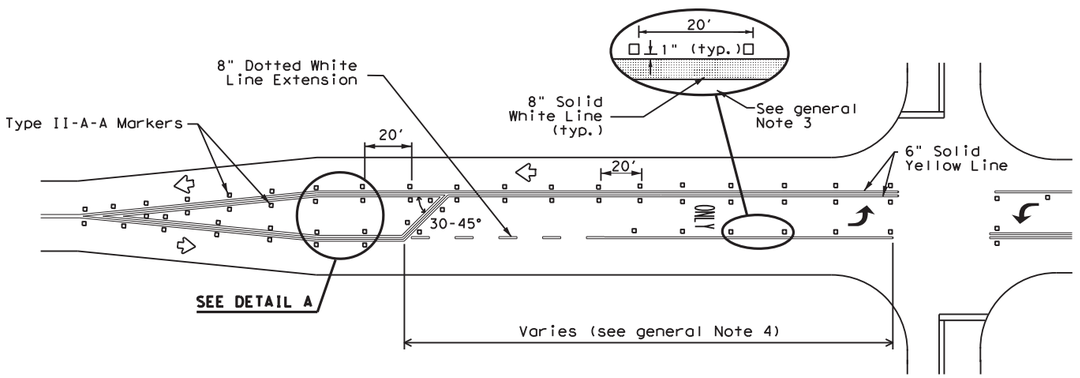
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



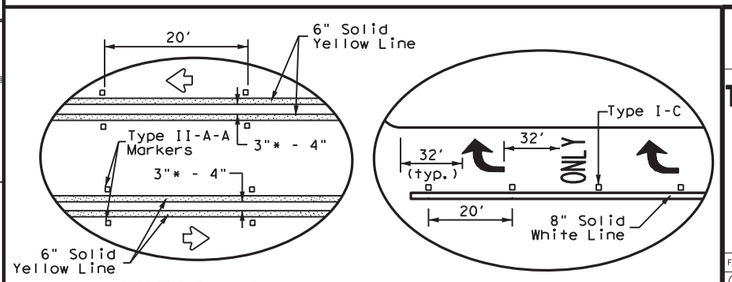
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP



TYPICAL TWO-LANE ROADWAY INTERSECTION WITH LEFT TURN BAYS



* 2" minimum allowed for restripe projects when approved by the Engineer.

Texas Department of Transportation

Traffic Safety Division Standard

TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS

PM(3)-22

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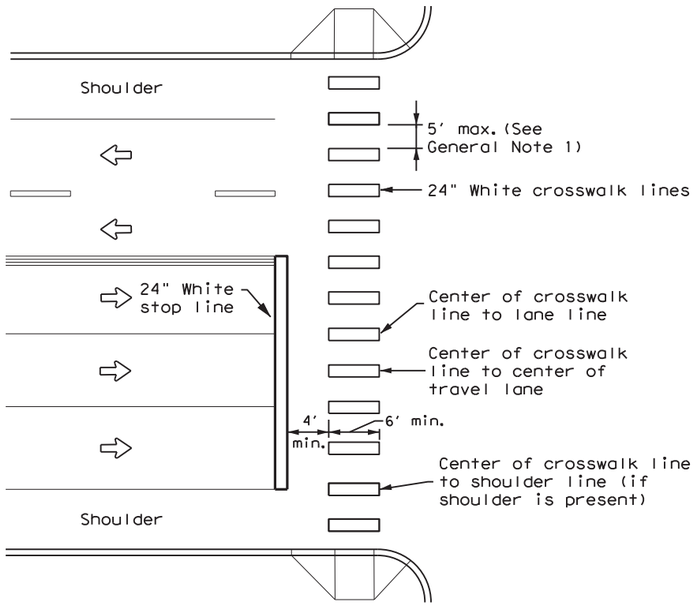


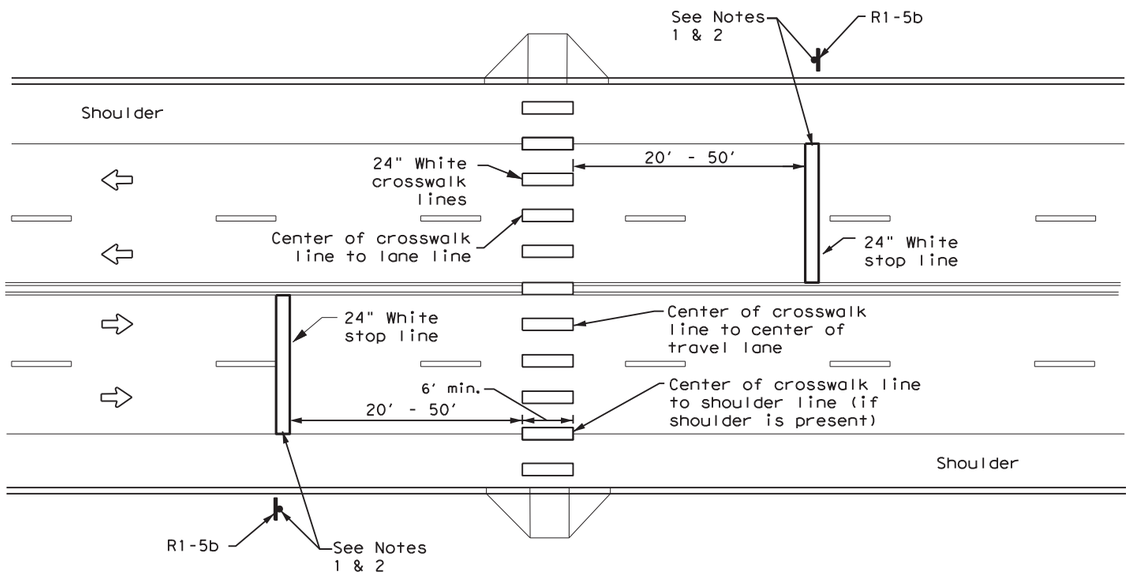
HIGH-VISIBILITY LONGITUDINAL CROSSWALK AT CONTROLLED APPROACH

GENERAL NOTES

1. Longitudinal crosswalk lines should not be placed in the wheel path of vehicles. Center the crosswalk lines on travel lanes, lane lines, and shoulder lines (if present).
2. A minimum 6" clear distance shall be provided to the curb face. If the last crosswalk line falls into this distance it must be omitted.
3. For divided roadways, adjustments in spacing of the crosswalk lines should be made in the median so that the crosswalk lines are maintained in their proper location across the travel portion of the roadway.
4. At skewed crosswalks, the crosswalk lines are to remain parallel to the lane lines.
5. Each crosswalk shall be a minimum of 6' wide.
6. The High-Visibility Longitudinal Crosswalk is the preferred crosswalk pattern on State Highways. Other crosswalk patterns as shown in the "Texas Manual on Uniform Traffic Control Devices" may be used. All crosswalk designs and dimension shall comply with the "Texas Manual on Uniform Traffic Control Devices."
7. Final placement of Stop Bar and Crosswalk shall be approved by the Engineer in the field.

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

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



UNSIGNALIZED MIDBLOCK HIGH-VISIBILITY LONGITUDINAL CROSSWALK

NOTES:

1. Use stop bars with Stop Here For Pedestrians (R1-5b) signs at unsignalized midblock cross walks.
2. Use stop bars with STOP HERE ON RED (R10-6 or R10-6a) signs at mid block crosswalks controlled by traffic signals or pedestrian hybrid beacons.

Texas Department of Transportation

Traffic Safety Division Standard

CROSSWALK PAVEMENT MARKINGS

PM(4)-22A

FILE: pm4-22a.dgn	DN:	CK:	DW:	CK:
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6-22				50
12-22				

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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)

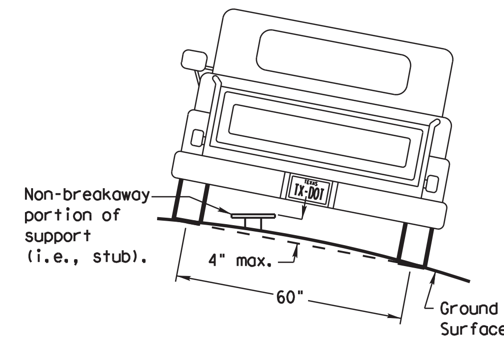
Anchor Type

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

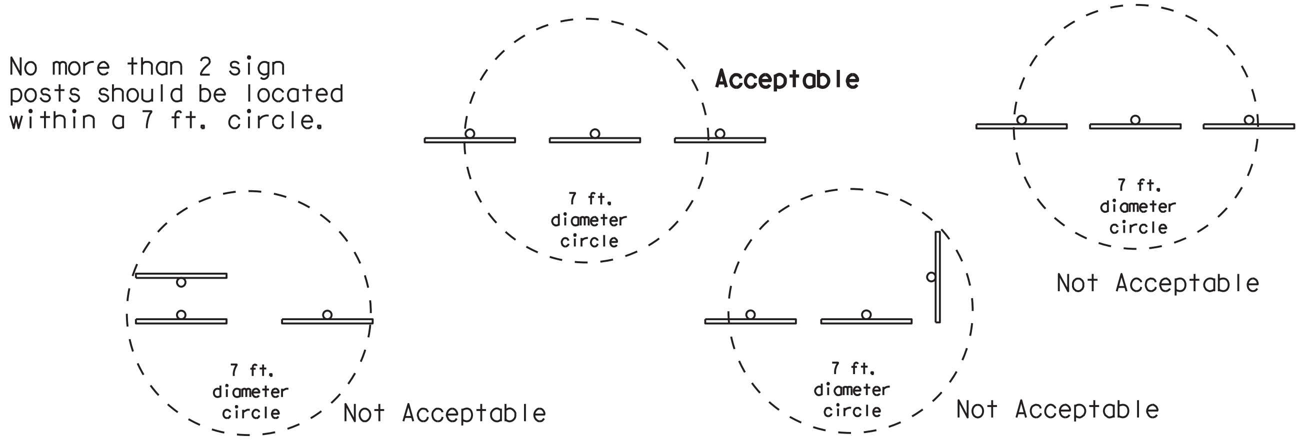
P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
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



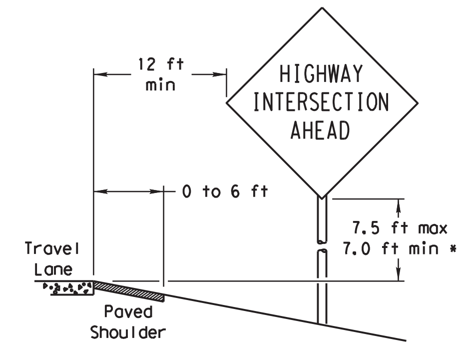
To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

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



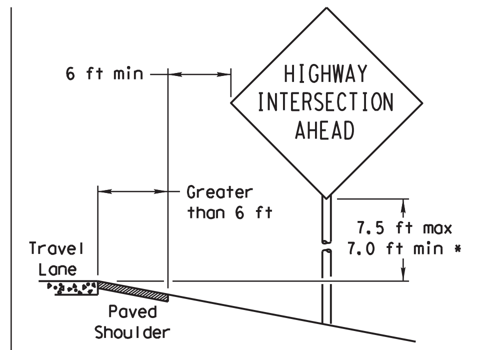
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

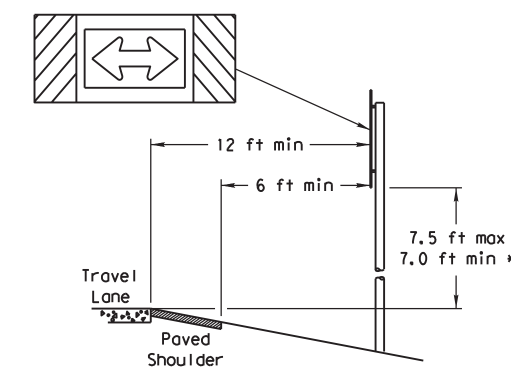
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



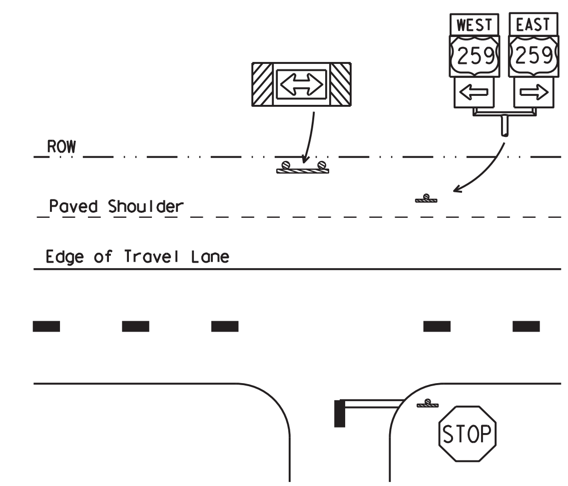
GREATER THAN 6 FT. WIDE

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.

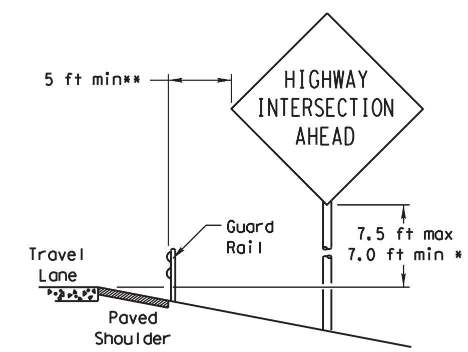
T-INTERSECTION



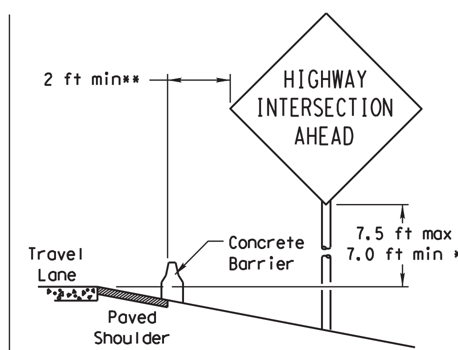
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

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

* 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.

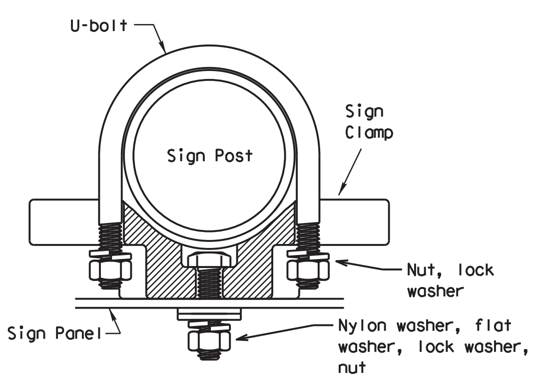
The maximum values may be increased when directed by the Engineer.

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

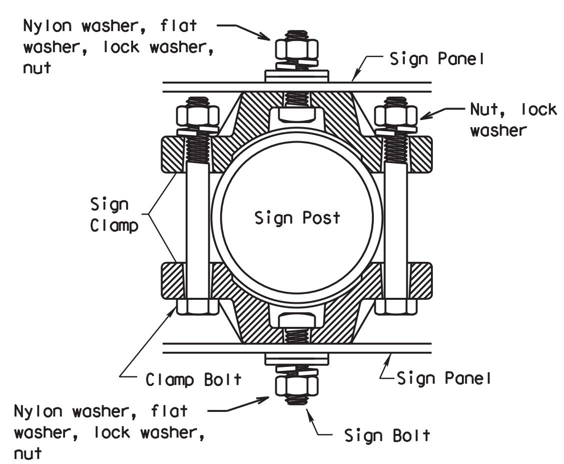
The website address is:
http://www.txdot.gov/publications/traffic.htm

TYPICAL SIGN ATTACHMENT DETAIL

Single Signs



Back-to-Back Signs



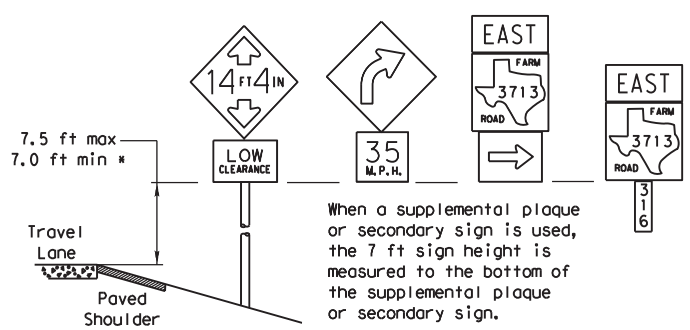
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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.

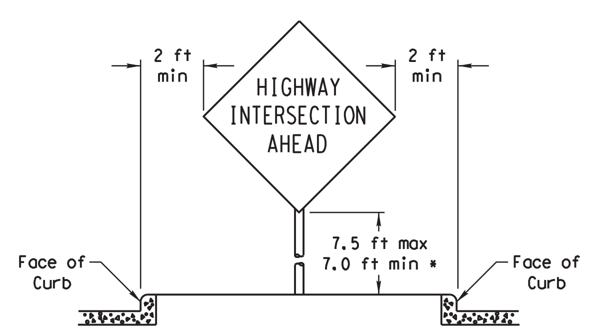
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



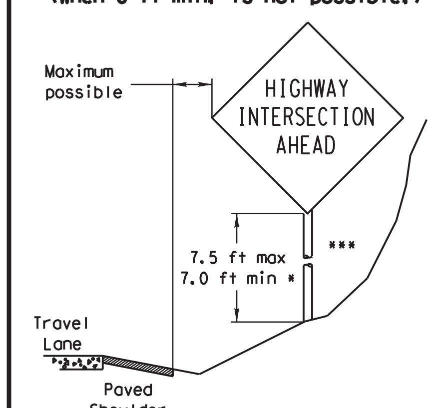
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

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.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

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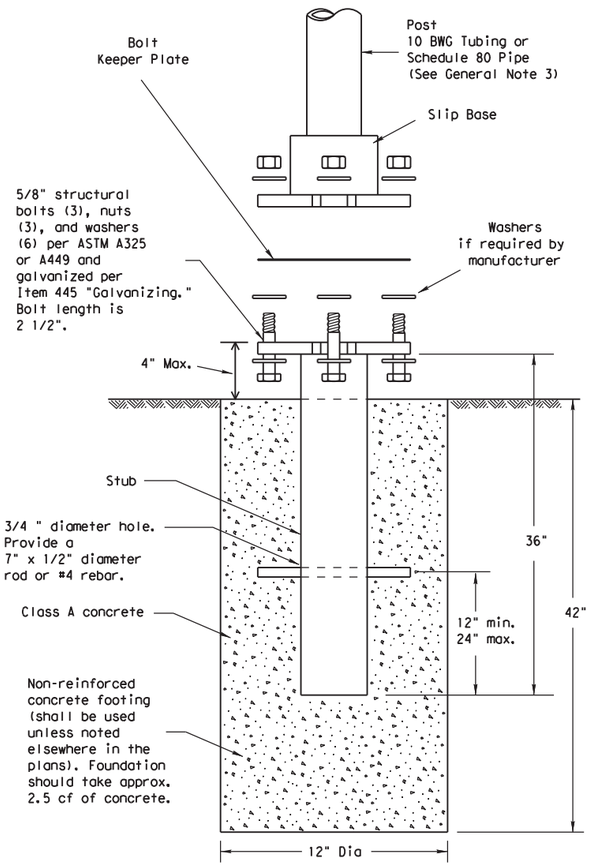
TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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

NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.txdot.gov/business/producer_list.htm The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   - 0.134" nominal wall thickness
   - Seamless or electric-resistance welded steel tubing or pipe
   - 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
     - 20% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
   - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
   - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.

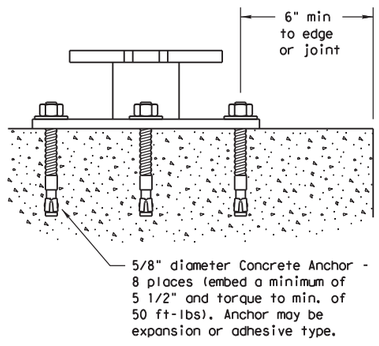
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum yield strength
     - 62,000 PSI minimum tensile strength
     - 21% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
   - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
   - Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

Foundation
1. Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
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. Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
4. Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
5. The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support
1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



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

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." 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. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

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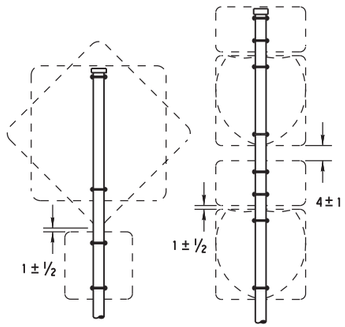
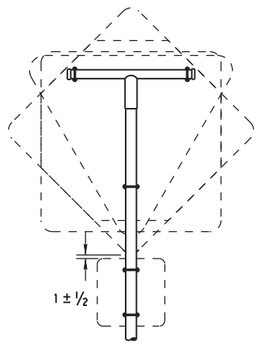


SM RD SGN ASSM TY XXXXX(1)XX(P)



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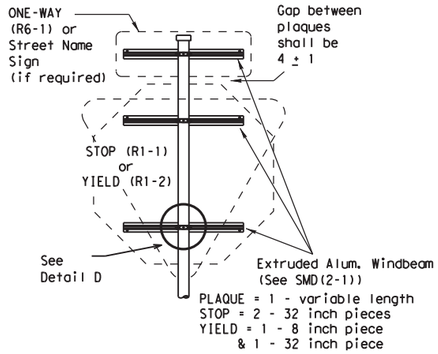
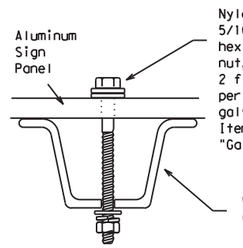
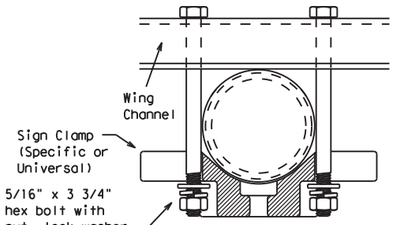


SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



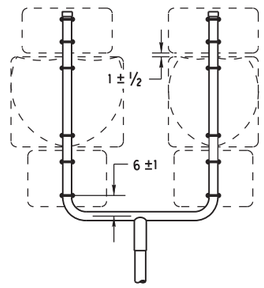
Top View

Detail A

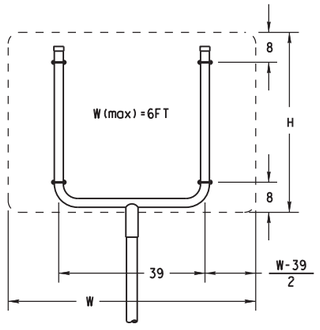


Top View

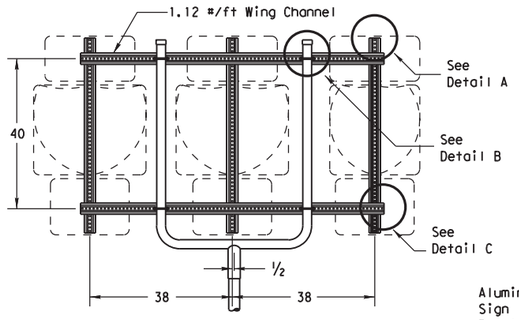
Detail B



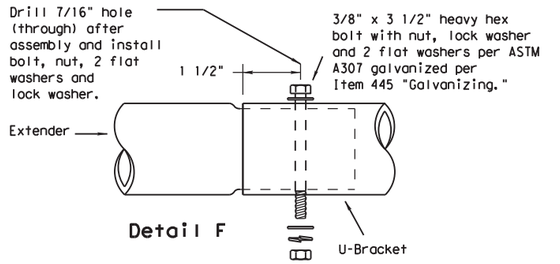
SM RD SGN ASSM TY XXXXX(1)XX(U)



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

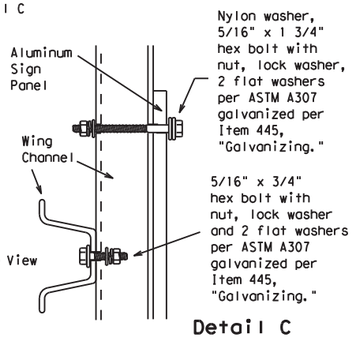


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

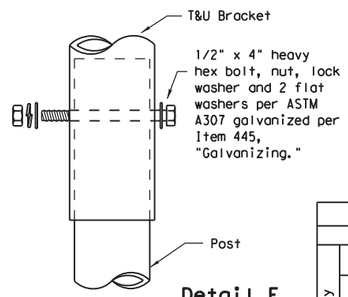


Detail F

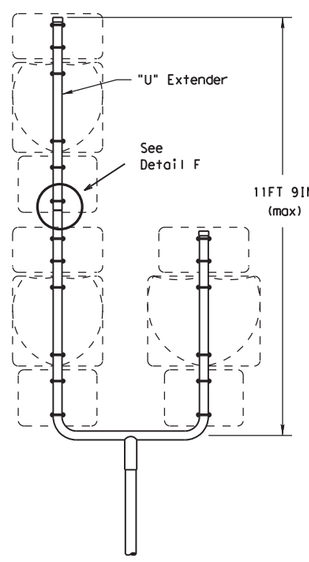
Splices shall only be allowed behind the sign substrate.



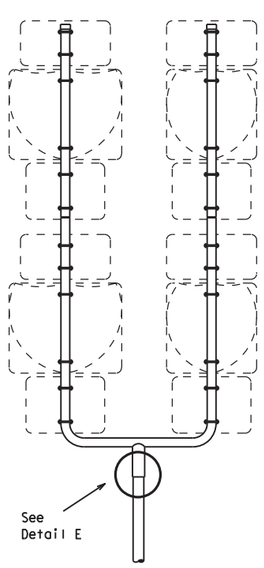
Detail C



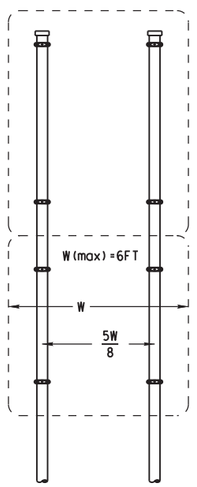
Detail E



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

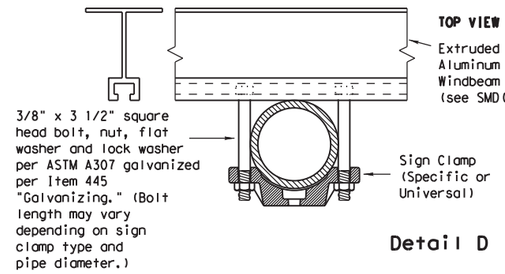


SM RD SGN ASSM TY S80(1)XX(U-2EXT)

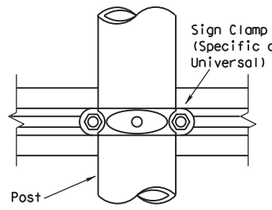


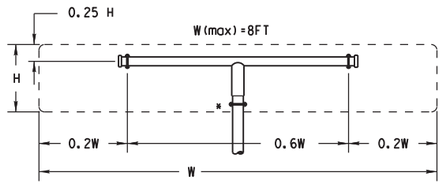
SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW



Detail D

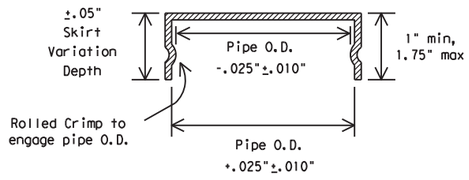




SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

All dimensions are in english unless detailed otherwise.

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)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

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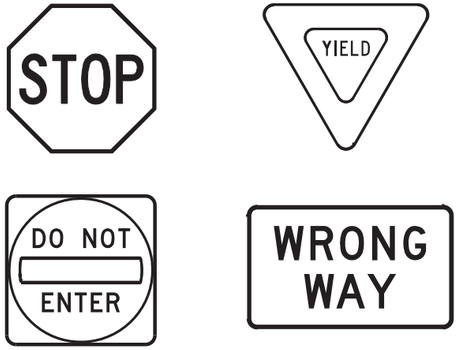
REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(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

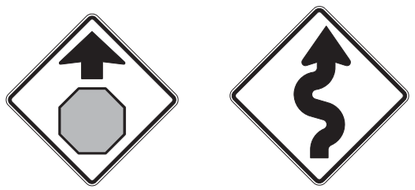
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(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_{FL} OR C_{FL} SHEETING
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_{FL} OR C_{FL} SHEETING
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/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(4)-13

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