



Williamson County Driveway Policy

**Adopted and Effective
as of December 7th, 2021**

Section 1- Purpose/Overview

This policy describes the County's criteria for the design, construction, and maintenance of residential, agricultural, commercial/industrial, and multifamily driveways.

Section 2- Definitions

Access

A permitted or existing break in the right-of-way for entry and/or exit onto the county, state, or city roadway network.

Agricultural

Piece of real property that would meet the Williamson Central Appraisal District's criteria for an agricultural exemption.

Arterial Roads

Roads that are principally regional in nature and are used for through or high-volume traffic and shall be divided into the following two sub-classifications:

- a. Roads which are existing county roads, are at least one mile in length, and carry a numerical designation
- b. Roads included as an arterial on a county or city transportation plan

Developer or Builder

A person or entity that intends to develop, construct, or invest in a property for the purpose of selling or utilizing the property for generating revenue.

Plans

Construction drawings, specifications, bidding forms and other documents required for construction.

Registered Professional Engineer

A person licensed, as of the date of the plan being presented, to practice engineering by the Texas Board of Professional Engineers and Land Surveyors.

Resident

Person or persons who are currently, or will be, residing at the location for which the application is being submitted.

Road/Street

The terms "street" or "road" are interchangeable and mean a vehicular access way, including any and all components necessary for proper operations such as ditches, culverts, and bridges. The term is used to describe all vehicular access ways regardless of any other designation they may carry. Any vehicular access that serves more than 3 residences is considered a road for regulatory purposes.

Subdivision

The division of a tract of land into two or more parts to lay out:

- (A.) a subdivision of the tract, including an addition;
- (B.) lots; or
- (C.) streets, alleys, squares, parks, or
- (D.) other parts of the tract intended to be dedicated to public use or for the use of purchasers or owners of lots fronting on, or adjacent to, the streets, alleys, squares, parks, or other parts (Sec 232.001, Texas Local Government Code, as amended).

Variance

An exemption from any of the requirements of this policy.

Section 3- Driveway Types

- 3.1 There are three different driveway permit types which have different requirements:

3.1.1 Temporary

This is any driveway that will be utilized for maintenance or construction purposes and shall be removed within 60 days after project is complete.

3.1.2 Residential or Agricultural

This is any driveway approach, outside of a subdivision, that serves as access from a County roadway to a lot or parcel of land intended for up to three (3) family residences or meeting the definition of Agricultural property in Section 2.

3.1.3 Commercial/Industrial or Multifamily

This driveway type and requirements apply to all driveways serving as access to commercial/industrial and multifamily sites, related to new or modified site plans.

- 3.2 There are four main types of driveways: Straight Tie-In, Dip, Culvert, and Curb-and-Gutter as illustrated in Figure 3.1 below. The type of driveway required is dependent on the individual roadside conditions and roadside drainage.

3.2.1 Straight Tie-In Driveway

This driveway type is utilized when there is no ditch flow within the right-of-way.

3.2.2 Dip Driveway

This driveway type is utilized when ditch geometry cannot accommodate the minimum size culvert or as deemed appropriate by a professional engineer.

3.2.3 Culvert Driveway

This driveway type is utilized when ditch flow is present, and a culvert is required.

3.2.4 Curb-and-Gutter Driveway

This driveway type is utilized with curb and gutter roadways.

Figure 3.1: Driveway Types



Section 4- Permit Process

To obtain a permit to construct a proposed driveway or to modify an existing driveway, the applicant shall complete and submit a Williamson County Driveway/Access Application. Those applicants meeting the definition of a Developer or Builder shall follow the permit process outlined in Section 4.1. Those applicants meeting the definition of a Residential or Agricultural applicant shall follow the permit process outlined in Section 4.2.

4.1 Developer or Builder Driveway Application:

If the driveway application is submitted by a developer or builder, the design of the proposed driveway and culvert size, if necessary, shall be submitted with the application and reviewed in accordance with this policy. Developer or builder driveways include, but are not limited to, commercial/industrial, multifamily, and residential. These driveway applicants shall also adhere to Williamson County Emergency Services requirements.

If the driveway is associated with a commercial/industrial or multifamily site plan, the site plan must be submitted with the driveway application.

Pipe runners for safety end treatments may be necessary given the size of the culvert required or the class of the roadway being accessed.

Below outlines the information and action required for a developer or builder to submit the driveway application and construct the proposed driveway:

- 1) Submit a driveway plan signed and sealed by a professional engineer that meets requirements in accordance with this policy, and contains the following information for the proposed driveway:
 - a) Location
 - b) Dimensions
 - c) Radii
 - d) Spacing to driveways across the street and adjacent driveways
 - e) Grades of proposed driveway
 - f) Proposed type of driveway (Figure 3.1)
 - g) Culvert type (CMP, CMPA, or RCP) and size, if applicable
 - h) Any downstream or upstream ditch grading required to drain
 - i) Right-of-way or property lines
 - j) Utility locations
 - k) Erosion control measures
 - l) Floodplain boundaries, if applicable
 - m) Traffic control plans or standards
- 2) Submit supporting hydrology calculations documentation, including but not limited to:
 - a) Drainage Area Map including:
 - i) Drainage Area boundaries and sizes
 - ii) Labeled contours
 - iii) North arrow
 - iv) Time of concentration paths and values
 - v) Runoff coefficients or curve numbers
 - vi) Peak flows at proposed driveway location
 - b) HEC-HMS model/output or Rational Method calculations, as applicable
- 3) Submit hydrology calculations that meet the following design criteria (note – curb and gutter proposed driveways do not require hydrologic calculations)
 - a) All longitudinal drainage structures shall be designed to convey the NOAA Atlas-14 10-year storm event.
 - b) Driveway culverts shall have a minimum interior diameter of 18" or equivalent and a minimum length of 24 feet and shall include a concrete safety end treatment in accordance with current TxDOT safety end treatment standards. If any specification set out herein conflicts with TxDOT specifications, the specification set out herein shall govern. Larger or longer culverts shall be installed, if necessary, to accommodate drainage based upon a 10-year storm event flow frequency.
- 4) Submit hydraulic calculations and provide the following with submittal: (note – curb and gutter proposed driveways do not require hydraulic calculations)
 - a) Any model input/output associated to the final design of driveway culvert

- b) A profile shall be shown in the driveway plan for all drainage structures. Each profile shall show the design flow, velocity, invert elevations, and the hydraulic grade line for analyzed storm events.
 - c) If the ditch geometry does not accommodate the 10-year storm event, variances may be considered with approval of the County.
- 5) Developer or builder is responsible for removal and disposal of trees/brush/landscaping/debris within the right-of-way at proposed driveway location, and relocation of any utilities within the right-of-way.
 - 6) If grading is necessary upstream or downstream of driveway, the developer or builder is required to grade the ditch for positive drainage.
 - 7) Once the driveway application is approved by the County, the applicant may proceed with construction.
 - 8) At the following stages of construction, the applicant is required to contact the County for inspection. Inspections can be requested at 512-943-3330 or roadrequest@wilco.org :
 - a) Driveway type with culvert installation
 - i) Safety end treatment and concrete driveway inspection is required when the forms are set and before concrete is placed. The culvert size and grade will be inspected at this stage.
 - ii) When applicant has completed all construction activities related to the driveway, culvert, and safety end treatment
 - b) Driveway types without culvert installation
 - i) After grading and earthwork has been completed, but prior to driveway surface application or concrete placement.
 - ii) When applicant has completed all construction activities
 - 9) Inspections for straight tie-in and curb and gutter driveway types are not required but may be performed, at the applicant's request, if County resources allow.
 - 10) The driveway will be considered an authorized, permitted driveway after construction is complete and inspection determines the driveway meets the requirements of this policy.
 - 11) If the driveway is not constructed in accordance with the approved driveway application, the County reserves the right to remove the driveway.

4.2 Resident Driveway Application:

If the driveway application is submitted by a resident of Williamson County for residential or agricultural use, then the process described below shall be followed to submit the driveway application and construct the proposed driveway:

- 1) Submit a plan that contains the following information for the proposed driveway:
 - a) Map showing proposed driveway location

- b) Dimensions (main driveway width)
 - c) Spacing from edge of pavement of adjacent driveways
- 2) Upon completion and submittal of a Williamson County driveway application, applicant shall physically stake or mark the location of the proposed driveway.
 - 3) Once the application is accepted, the County shall visit the proposed location to obtain measurements for driveway design and verify that it is suitable as pertains to this policy.
 - 4) If a culvert is necessary, Williamson County will size the culvert in accordance with this policy and provide applicant with information relative to installation of the culvert and driveway.
 - 5) Driveway culverts shall include a concrete safety end treatment in accordance with current TxDOT safety end treatment standards. If any specification set out herein conflicts with TxDOT specifications, the specification set out herein shall govern.
 - 6) Applicant is responsible for purchasing the appropriate culvert size and installation of driveway/culvert and safety end treatment.
 - 7) Applicant is responsible for removal and disposal of trees/brush/landscaping/debris within the right-of-way at proposed driveway location, and relocation of any utilities within the right-of-way.
 - 8) If grading is necessary upstream or downstream of driveway, the County will grade the ditch before driveway application is approved.
 - 9) If grading is necessary, and once grading is complete, the County will notify applicant to proceed with construction of driveway.
 - 10) Applicant shall ensure that the proper culvert flowline slope is achieved while installing culvert pipe in accordance with this policy, if applicable.
 - 11) At the following stages of construction, the applicant is required to contact the County for inspection. Inspections can be requested at 512-943-3330 or roadrequest@wilco.org :
 - a) Driveway type with culvert installation
 - i) After applicant has bedded the culvert pipe to the correct slope and elevation, and prior to backfill operations.
 - ii) Safety end treatment and concrete driveway inspection is required when the forms are set and before concrete is placed.
 - iii) When applicant has completed all construction activities related to the driveway, culvert, and safety end treatment.
 - b) Driveway types without culvert installation
 - i) After grading and earthwork has been completed, but prior to driveway surface application or concrete placement.
 - ii) When applicant has completed all construction activities.
 - 12) Failure to contact Williamson County for required inspections, or failure to construct the driveway to County standards, may result in a notice to remove and replace the driveway.

- 13) The driveway will be considered an authorized, permitted driveway only after construction is complete and inspection determines the driveway meets the requirements of this policy.

Section 5 - General Conditions

- 5.1 Applications for permits shall be made by the property owner. A property owner may designate a representative by submitting an authorization letter with the application.
- 5.2 Applications for permits shall be made only for the purpose of securing, or modifying, access to the owner's property, but not for the purpose of parking or servicing vehicles on county right-of-way.
- 5.3 One application shall be utilized for each proposed, temporary, or modified driveway.
- 5.4 Lots bordering on existing arterial roads, that have access to internal public or private roadways, are prohibited access to arterial roadways.
- 5.5 The County will assume no responsibility for driveway maintenance. If obstructions occur within the driveway culvert, the County reserves the right to clear obstructions or repair/remove inoperable culverts that are causing adverse impacts to the roadway.
- 5.6 If any damage occurs within the right-of-way or surrounding area, it is the responsibility of the applicant.
- 5.7 The County will assume no responsibility for mailbox removal, relocation, or maintenance within delivery impact area. The property owner is to maintain the mailbox and adhere to USPS regulations in accordance with height and distance requirements for said mailbox. Mailboxes shall be breakaway and utilize the standard mailbox mounting assembly with current TxDOT standards. If mailbox location causes any roadway hazard, it will be subject to relocation at the cost of the property owner.
- 5.8 Shared driveways are limited to 3 residences; or platting requirements may apply.
- 5.9 Shared driveways are required to obtain a shared driveway access easement and file it with the County Clerk's office before final approval of driveway permit.
- 5.10 If driveway access location or use is changed from original application, the proposed driveway is required to be re-evaluated and subject to the current driveway policy.
- 5.11 When a driveway application is approved, the applicant has one year to complete construction of proposed or modified driveway. After one year, another application or additional inspection shall be required.

- 5.12 Temporary driveways must be approved through the driveway application process prior to installation. Temporary driveways and residual material shall be removed from the right-of-way within 60 days after completion of the project for which the driveway was installed.
- 5.13 All design and construction of a temporary driveways shall follow the conditions and criteria of this policy, with the exception that SETs will not be required and a 2-year storm event design may be utilized.
- 5.14 All driveway design and construction shall comply with the American with Disabilities Act Accessibility Guidelines and Texas Accessibility Standards. The applicant shall provide appropriate access in accordance with applicable law.
- 5.15 If proposed driveway is associated with commercial, industrial, or multifamily, then a site plan is necessary at the time of the application.
- 5.16 If the proposed driveway is located in a regulated FEMA or local floodplain, then a Floodplain Development Permit will also be required.
- 5.17 When necessary, traffic control will be the responsibility of the applicant.
- 5.18 Any applicant who wishes to receive a variance to this policy shall apply to the County Engineer. Variance requests will be reviewed by a committee, and appropriate action will be taken.

Section 6 - Design Criteria

- 6.1 Residential, Agricultural, Commercial/Industrial and Multifamily driveway design shall follow the geometry criteria as outlined in Appendix B.
- 6.2 All parts of entrances and exits on county right-of-way, including the radii, shall be confined within the applicant's property frontage. Frontage is that portion of the right-of-way lying between two most distant possible lines drawn perpendicularly from the centerline of the roadway to the applicant's abutting property line.
- 6.3 At any intersection of a county roadway with another roadway, road, or street where the existing right-of-way is flared or widened to allow for additional sight distance, no access driveway will be permitted within the flared or widened right-of-way section.
- 6.4 The angle of the driveway from the roadway pavement shall be 75 to 90 degrees, except that one-way 45- to 90-degree angle driveways will be permitted for connections to one-way frontage roads or lane divided roadways.
- 6.5 Driveways may not exceed seventy percent (70%) of roadway frontage.

- 6.6 All Commercial/Industrial, Agricultural, Multifamily and Residential driveways shall be designed to align with opposing driveways, if possible, or, shall meet spacing requirements, measured from edge to edge of driveways, in Table 6.1. Distances to driveways across the street shall be measured edge of pavement to the edge of pavement of the nearest driveway.

Table 6.1 Minimum Driveway/Access Spacing

Posted or Prima Facia Speed Limit (mph)	Distance (ft)
40	305
45	360
≥ 50	425

Notes: Distances are for passenger cars on level grade. These distances may be adjusted for downgrades and/or significant truck traffic. Where present or projected traffic operations indicate specific needs, consideration may be given to intersection sight distance and operational gap acceptance measurement adjustments.

- 6.7 Commercial/industrial and multifamily driveways with a posted or prima facia speed limit less than 40 mph shall be located no closer than 100 feet to an adjacent driveway, measured from edge to edge of driveways.
- 6.8 Residential and agricultural driveways on roadways with a posted or prima facia speed limit less than 40 mph shall be located no closer than 30 feet to an adjacent driveway, measured from edge to edge of driveways. Also, driveways shall not be constructed within the curb return of a street intersection.
- 6.9 An existing property with less than the required spacing (frontage), and no other legal or permissible access point, may seek a variance. The driveway location will be at the discretion of the County Engineer and shall provide the maximum spacing between access points.
- 6.10 Refer to Appendix C for required driveway grade breaks.

Section 7 – Drainage

- 7.1 Any impacts to drainage on the Williamson County roadway system resulting from installation of access driveways must be coordinated with and approved by Williamson County. Consideration also needs to be given to driveway geometrics, utility location or relocation, environmental requirements, flood-prone areas, wetlands considerations (if appropriate), and the need to follow all applicable state and federal laws and rules.
- 7.2 Drainage in roadside ditches shall not be altered or impeded. When drainage structures are required, the size and other design features shall be approved by Williamson County.

- 7.3 Access driveways shall be constructed to match the grade of the roadway pavement edge or the shoulder edge, if a shoulder is present. The driveway shall be designed and constructed in such a manner as to not impede the flow of water away from the roadway pavement, including properties that slope downward from the roadway.
- 7.4 At a culvert outlet, exit velocities shall be minimized to the greatest extent practical. Channel erodibility and local scour potential shall be evaluated and considered.
- 7.5 All driveway culverts shall have a minimum interior diameter of 18" or equivalent and a minimum length of 24 feet and shall include a concrete safety end treatment in accordance with current TxDOT safety end treatment standards. If any specification set out herein conflicts with TxDOT specifications, the specification set out herein shall govern. Larger or longer culverts shall be installed, if necessary, to accommodate drainage based upon a 10-year storm event flow frequency.
- 7.6 The design requirements of the driveway culvert safety end treatments are as follows:
 - 7.6.1 There shall be no culvert headwalls or similar vertical ends.
 - 7.6.2 Ends shall be sloped a 4:1 (4 horizontal to 1 vertical) or flatter with concrete riprap to prevent erosion and to protect the pipe end. When pipe runners are required, end slope shall be no less than 6:1 (6 horizontal to 1 vertical)

Section 8 - Construction and Materials

- 8.1 No construction work on the driveway shall be undertaken on the right-of-way until a fully executed driveway permit has been received by the applicant.
- 8.2 For residential and agricultural driveways, driveway surface material shall be determined by the applicant, but all-weather surface material is recommended. Commercial/industrial and multifamily driveways must be a concrete or asphalt surface.
- 8.3 If the driveway is a dip driveway and approved to be constructed at grade through the roadside ditch or natural grade of the roadside, it is recommended that the driveway have an all-weather surface material to conform to the cross section shape of the ditch or other natural grade of the roadside to form a stable driveway. An exception to using stabilized new surface may be approved by Williamson County if the roadside or ditch is naturally stabilized with rock which may be driven on without eroding or rutting in all types of weather.
- 8.4 A driveway must be constructed in accordance with a fully executed driveway permit and all applicable requirements. A Williamson County inspector will review the driveway construction to determine if it is acceptable or if modifications are needed.
- 8.5 The applicant shall furnish all materials necessary for the construction of the access driveways and all appurtenances authorized by the permit. All materials shall be of satisfactory quality and shall be subject to inspection and approval by Williamson County. It is recommended that

residential and agricultural access driveways have an all-weather surface to prevent tracking mud onto the roadway, to prevent damage to the edge of the roadway, and to assist in maintaining the integrity of the driveway.

- 8.6 Utilize manufacturer recommendations for minimum cover over driveway culvert.
- 8.7 All pipe used for cross drainage, parallel drainage, storm drains, and all other storm water conveyances within the right-of-way and/or easements in connection with draining or protecting the road system shall be designed and constructed with the following criteria in Table 8.1 below:

Table 8.1 - Pipe Criteria

Pipe Type	Reinforced Concrete Pipe (RCP)	Reinforced Concrete Box (RCB)	Corrugated Metal Pipe (CMP)	Corrugated Metal Pipe Arch (CMPA)	Reinforced Concrete	Precast concrete
Storm Drain Systems	X	X				
Cross Culverts	X	X				
Parallel (driveway) drainage	X	X	X	X		
Junction Boxes					X	X
Manholes					X	X
Fittings and Wyes						X
Notes 1. Cast-in-place is prohibited without prior approval from the County Engineer 2. Pipes must have a minimum interior diameter of eighteen inches (18") or equivalent						

Appendix A
Driveway Application

**Williamson County
Driveway/Access Application for Permit**

Name of Applicant: _____ Date: _____

E-mail: _____

Applicant Mailing Address: _____

Phone: _____

☐ Map with location of driveway provided attached* (required)

Physical Address of Property or WCAD Parcel #: _____

Location of Proposed Driveway on Property:

☐ Location is physically marked (staked, painted, tagged)* (required)

Latitude & Longitude (optional): _____

Comments: _____

Note – If driveway is within a regulated FEMA or local floodplain, an approved Floodplain Development Permit is required before construction. Visit www.wilco.org/roads/floodplain for more information.

Choose one:

☐ **Current/Future Homeowner or Agricultural Property Owner***

This option **not intended for land investors but as a benefit to Williamson County constituents. Deceitful representation will result in an invalid driveway permit.*

- Proposed driveway width (ft): _____
- Distance to adjacent driveways (ft): Left side (facing road) _____ Right side _____
- Proposed driveway material (examples: concrete/asphalt/caliche): _____
- Williamson County will size the culvert if required
- Applicant is responsible to order, purchase, and deliver culvert to property
- Applicant is responsible for culvert installation
- Applicant must contact Williamson County for inspections as outlined in Section 4.2 of the Williamson County Driveway Policy

☐ **Developer/Builder or Commercial/Business Property Owner**

- Submit a site plan for review to mygovernmentonline.org with this application.
- Site Plan name _____
- Applicant is responsible to size, order, purchase and install culvert per Williamson County Driveway Policy
- Submit driveway plan and culvert calculations with application per Williamson County Driveway Policy
- Applicant must contact Williamson County for inspections as outlined in Section 4.1 of the Williamson County Driveway Policy

Submit application to: Williamson County Engineer's Office

3151 S. E. Inner Loop, Georgetown, Texas 78626

Telephone: (512) 943-3330 Email: RoadRequest@wilco.org

WILLIAMSON COUNTY OFFICE USE ONLY:

Foreman: _____ **Date:** _____

Foreman Comments: _____

Driveway Location Dimensions:

Top Width of Ditch: _____

Utility conflicts: _____

Bottom Width of Ditch: _____

Max culvert size allowable in ditch: _____

Approximate Ditch Depth: _____

Upstream culvert size: _____

ROW Width from edge of pavement: _____

Downstream culvert size: _____

Existing Culvert Size: _____

Ditch grading – For Residential Driveways Only:

Upstream ditch grading required? ☐ Yes ☐ No

Downstream ditch grading required? ☐ Yes ☐ No

If Yes, Work Order number: _____

Grading complete date: _____

Design Engineer: _____ **Date:** _____

Driveway Type: _____

Culvert Sizing: _____

Engineer Comments: _____

Inspection Requirements:

- Inspection prior to covering culvert required? ☐ Yes ☐ N/A
- SET inspection before concrete is poured required? ☐ Yes ☐ N/A
- Inspection after driveway is complete required? ☒ Yes

Note - Driveways shall be in accordance with Williamson County Driveway Policy.

Form Revised: Dec 2021

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APPENDIX B

Driveway Criteria Table

Table 1 - Criteria for Residential Driveways (Not in a subdivision)					
Condition	Min. Radius (R) (ft)	Max. Width (W) (ft)	Suggested Max. Change in Grade (D) (%)	Surface	Concrete Safety End Treatment
With Pipe Culvert	15	24	15	All-Weather Surface ¹	4:1 Slope or Flatter
Dip Style	15	24	15	All-Weather Surface ¹	N/A
Straight Tie-In	15	24	15	All-Weather Surface ¹	N/A
1. Packed gravel, seal-coated asphalt, asphalt, concrete or similar material are recommended to prevent washing away.					

Table 2 - Criteria for Residential Driveways (In a subdivision)					
Condition	Min. Radius (R) (ft)	Max. Width (W) (ft)	Suggested Max. Change in Grade (D) (%)	Surface	Concrete Safety End Treatment
With Pipe Culvert	15	24	15	All-Weather Surface ¹	4:1 Slope or Flatter
Dip Style	10 ²	24	15	All-Weather Surface ¹	N/A
Straight Tie-In	10 ²	24	15	All-Weather Surface ¹	N/A
Curb-and-Gutter	5 ²	24	15	Asphalt or Concrete	N/A
1. Packed gravel, seal-coated asphalt, asphalt, concrete or similar material are recommended to prevent washing away.					
2. A 60 degree flare is acceptable.					
Note: Access must comply with plat notes and deed restrictions.					

Table 3 - Criteria for Multifamily or Commercial/Industrial Driveways							
Condition	Min. Radius (R) (ft)	Max. Width (W) (ft)	Min. Throat Length (ft) ≤ 45 mph	Min. Throat Length (ft) > 45 mph	Max. Change in Grade (D) (%)	Surface	Concrete Safety End Treatment
With Pipe Culvert	25	28	20	40	8	Asphalt or Concrete	4:1 Slope or Flatter
Dip Style	25	28	20	40	8	Asphalt or Concrete	N/A
Straight Tie-In	25	28	20	40	8	Asphalt or Concrete	N/A
Three Lanes without Divider	25	40	20	40	8	Asphalt or Concrete	4:1 Slope or Flatter ¹
Three Lanes with Divider	25	44	20	40	8	Asphalt or Concrete	4:1 Slope or Flatter ¹
Four Lanes without Divider	25	52	20	40	8	Asphalt or Concrete	4:1 Slope or Flatter ¹
Four Lanes with Divider	25	56	20	40	8	Asphalt or Concrete	4:1 Slope or Flatter ¹
1. With pipe/box culvert.							

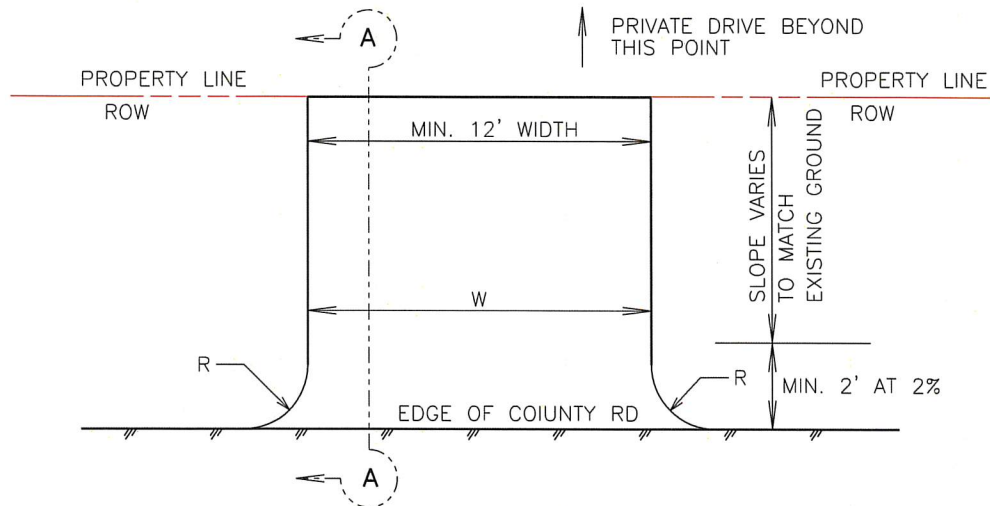
Table 4 - Criteria for Agricultural Driveways					
Condition	Min. Radius (R) (ft)	Max. Width (W) (ft)	Suggested Max. Change in Grade (D) (%)	Surface	Concrete Safety End Treatment
With Pipe Culvert	30	30	8	All-Weather Surface ¹	4:1 Slope or Flatter
Dip Style	30	30	8	All-Weather Surface ¹	N/A
Straight Tie-In	30	30	8	All-Weather Surface ¹	N/A
1. Packed gravel, seal-coated asphalt, asphalt, concrete or similar material are recommended to prevent washing away.					

Note: A request to exceed the maximum driveway width may be reviewed and approved by Williamson County Road and Bridge Division. A cleanout near the center of long culverts may be required and will be determined by Williamson County Road and Bridge Division.

The distance from the edge of the county road pavement to a gate must be sufficient to store the longest vehicle, or combination of vehicles, anticipated for use of the property. At a minimum, this distance should accommodate a pickup truck with trailer.

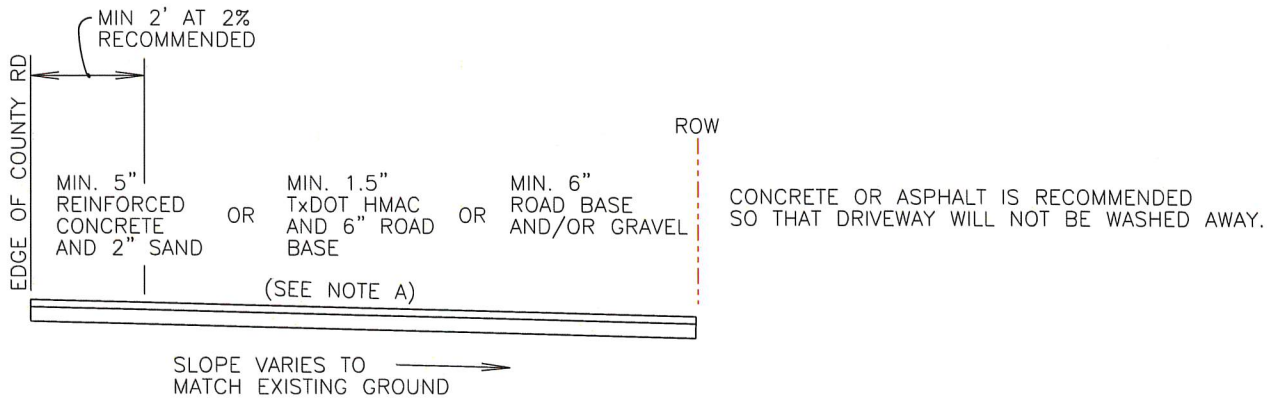
Appendix C

Driveway Exhibits



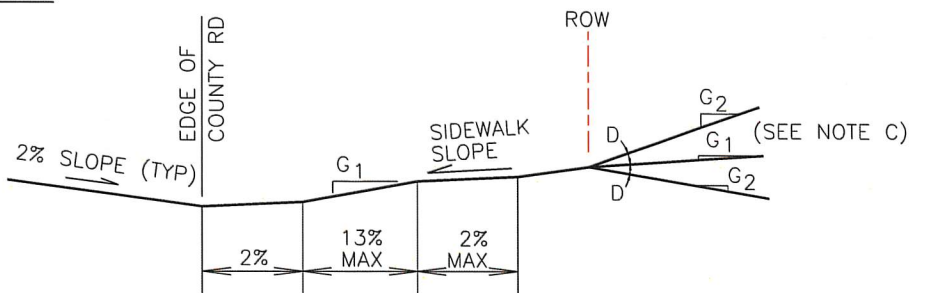
PLAN VIEW

N.T.S.



SECTION A-A

N.T.S.



ALLOWABLE GRADES

N.T.S.

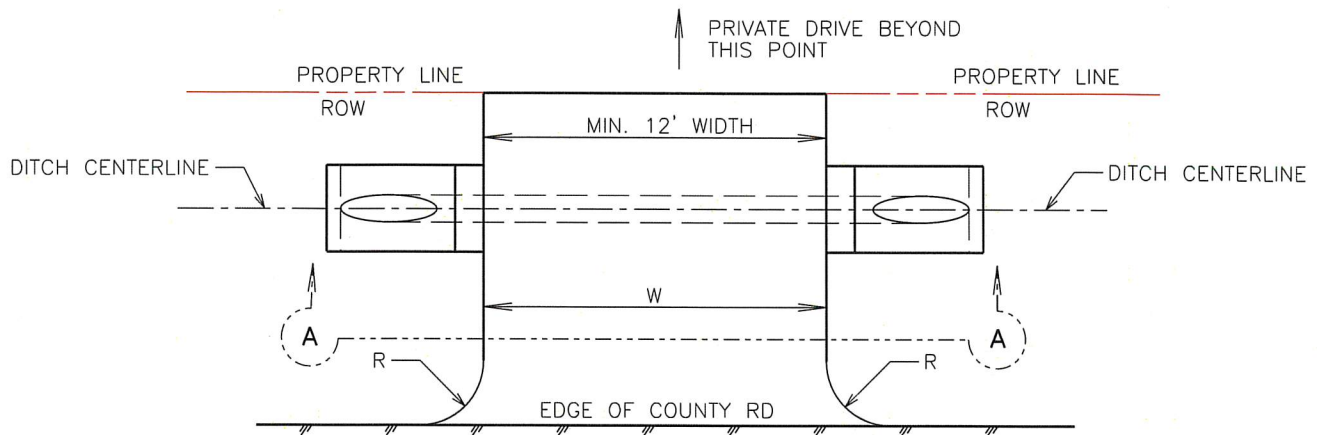
NOTES:

- MATERIAL DEPTHS SHOWN ABOVE ARE RECOMMENDED.
- ENGINEERED DRAWINGS MUST BE SUBMITTED FOR MULTIFAMILY OR COMMERCIAL/INDUSTRIAL DRIVEWAYS.
- WHILE THE PROPERTY OWNER REMAINS RESPONSIBLE FOR GRADE BREAKS WITHIN PRIVATE PROPERTY, IF "G2" IS GREATER THAN 15%, THE FIRE DEPARTMENT SHOULD BE CONSULTED WHERE THE DRIVEWAY IS ESSENTIAL TO EMERGENCY VEHICLE ACCESS. "D" IS THE ALGEBRAIC DIFFERENCE OF "G2" AND "G1" AND SHOULD NOT EXCEED THE MAXIMUM PERCENT STATED IN THE TABLES FOR DRIVEWAY CRITERIA.



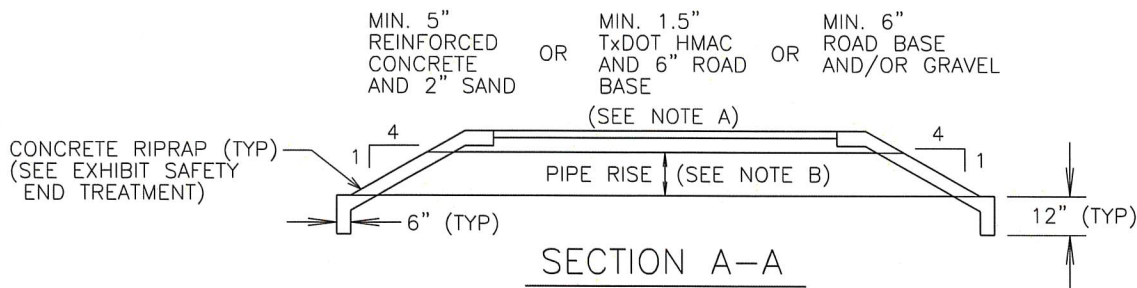
WILLIAMSON COUNTY
DEPT. OF
INFRASTRUCTURE

EXHIBIT
DRIVEWAY
STRAIGHT TIE-IN



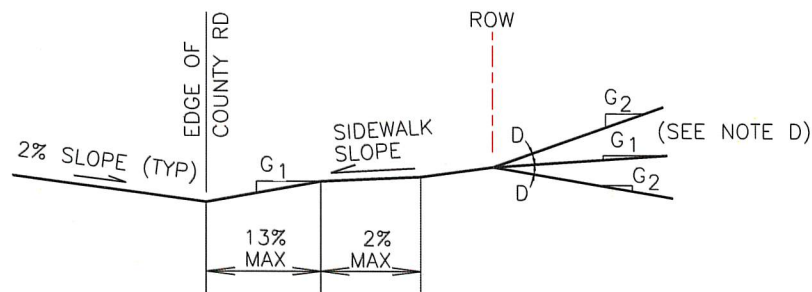
PLAN VIEW

N.T.S.



SECTION A-A

N.T.S.



ALLOWABLE GRADES

N.T.S.

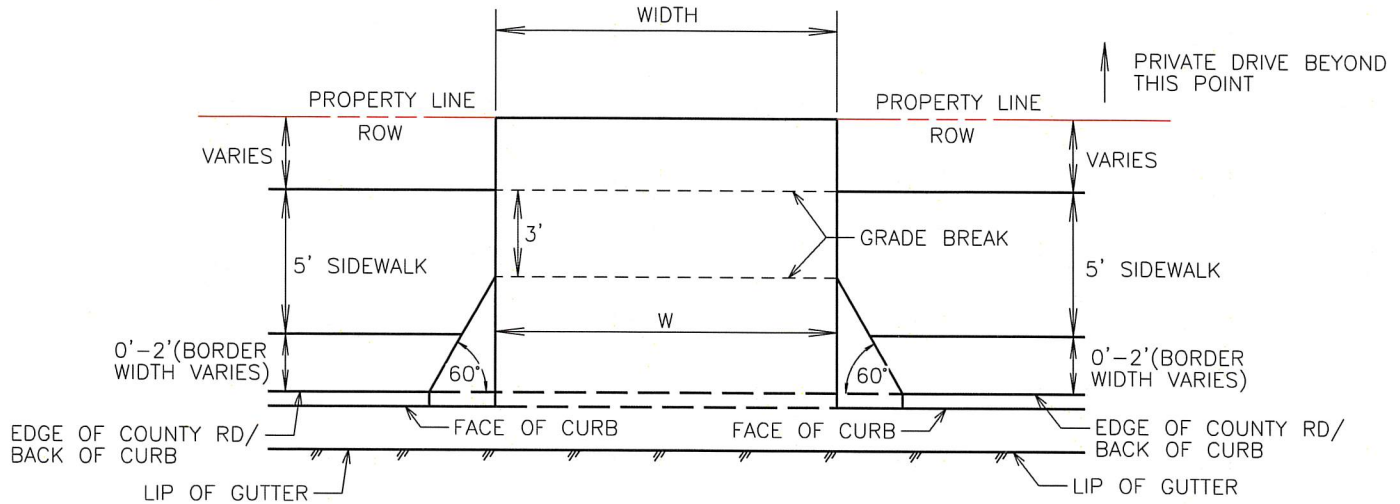
NOTES:

- A) MATERIAL DEPTHS SHOWN ABOVE ARE RECOMMENDED.
- B) INSTALL CULVERT PIPE TO MATCH DITCH CENTERLINE AND FLOWLINE.
- C) ENGINEERED DRAWINGS MUST BE SUBMITTED FOR MULTIFAMILY OR COMMERCIAL/INDUSTRIAL DRIVEWAYS.
- D) WHILE THE PROPERTY OWNER REMAINS RESPONSIBLE FOR GRADE BREAKS WITHIN PRIVATE PROPERTY, THE FIRE DEPARTMENT SHOULD BE CONSULTED WHERE THE DRIVEWAY IS ESSENTIAL TO EMERGENCY VEHICLE ACCESS. "D" IS THE ALGEBRAIC DIFFERENCE OF "G2" AND "G1" AND SHOULD NOT EXCEED THE MAXIMUM PERCENT STATED IN THE TABLES FOR DRIVEWAY CRITERIA.



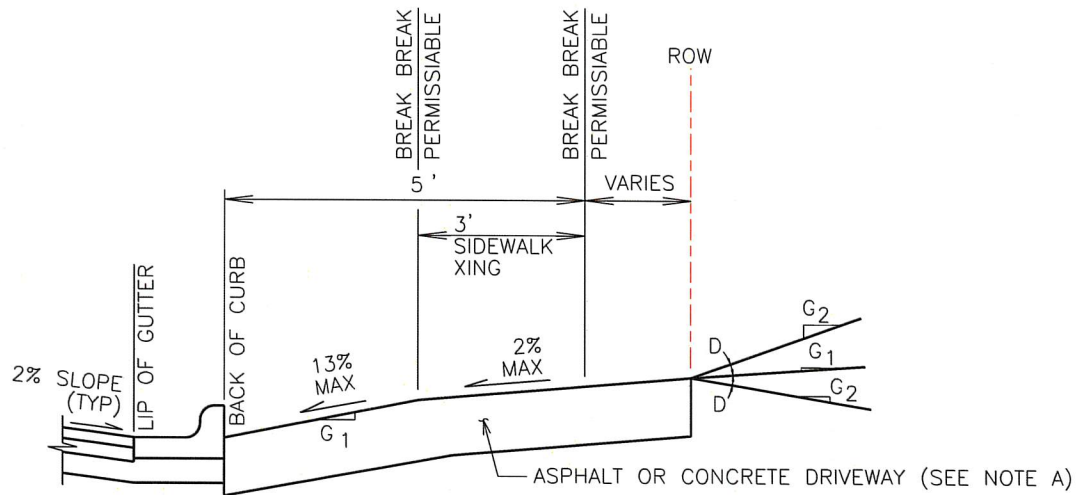
WILLIAMSON COUNTY
DEPT. OF
INFRASTRUCTURE

EXHIBIT
DRIVEWAY WITH
CULVERT PIPE



PLAN VIEW

N.T.S.



ALLOWABLE GRADES

N.T.S.

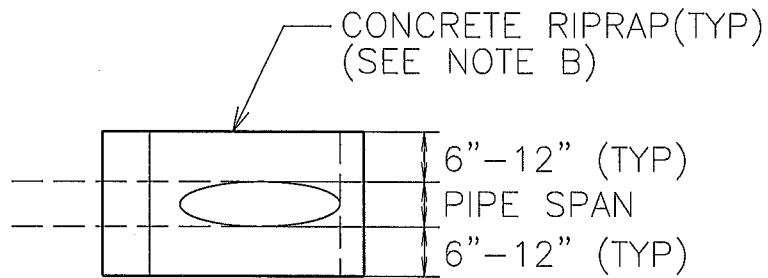
NOTES:

- A) MIN. 1.5" TxDOT HMAC AND 6" ROAD BASE OR MIN. 5" REINFORCED CONCRETE AND 2" SAND.
- B) ENGINEERED DRAWINGS MUST BE SUBMITTED FOR MULTIFAMILY OR COMMERCIAL/INDUSTRIAL DRIVEWAYS.
- D) WHILE THE PROPERTY OWNER REMAINS RESPONSIBLE FOR GRADE BREAKS WITHIN PRIVATE PROPERTY, THE FIRE DEPARTMENT SHOULD BE CONSULTED WHERE THE DRIVEWAY IS ESSENTIAL TO EMERGENCY VEHICLE ACCESS. "D" IS THE ALGEBRAIC DIFFERENCE OF "G2" AND "G1" AND SHOULD NOT EXCEED THE MAXIMUM PERCENT STATED IN THE TABLES FOR DRIVEWAY CRITERIA.



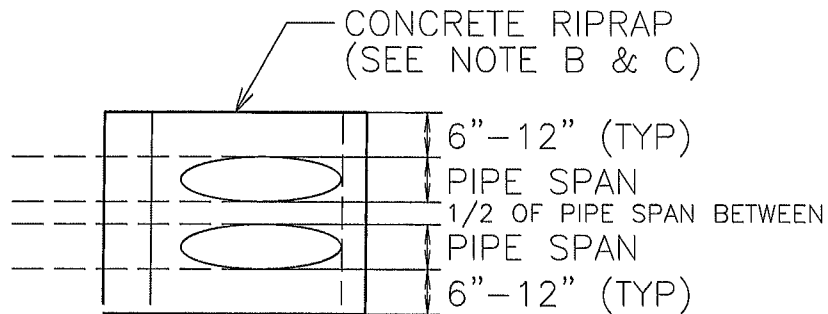
WILLIAMSON COUNTY
DEPT. OF
INFRASTRUCTURE

EXHIBIT
CURB & GUTTER
DRIVEWAY



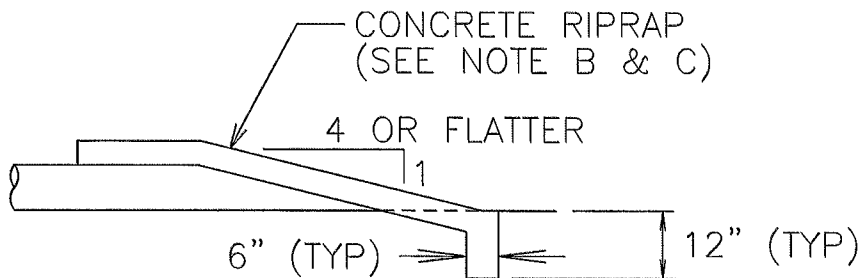
PLAN VIEW – SINGLE PIPE

N.T.S.



PLAN VIEW – MULTIPLE PIPES

N.T.S.



ELEVATION VIEW

N.T.S.

NOTES:

- A) PIPE SIZE TO BE DETERMINED OR AS APPROVED BY WILLIAMSON COUNTY.
- B) CONCRETE RIPRAP SHALL BE NORMAL 4" THICK REINFORCED WITH MIN. 6x6x1.5x1.5 WELDED WIRE MESH IN ACCORDANCE WITH CURRENT TxDOT SAFETY END TREATMENT STANDARDS.
- C) SPECIAL CONDITIONS MAY APPLY TO ARCH PIPES LARGER THAN DES 4 OR ROUND PIPES LARGER THAN 30" IN DIAMETER IN ACCORDANCE WITH CURRENT TxDOT SAFETY END TREATMENT STANDARDS.
- D) ENGINEERED DRAWINGS MUST BE SUBMITTED FOR MULTIFAMILY OR COMMERCIAL/INDUSTRIAL DRIVEWAYS.



WILLIAMSON COUNTY
DEPT. OF
INFRASTRUCTURE

EXHIBIT
SAFETY END TREATMENT
FOR
DRIVEWAY CULVERT

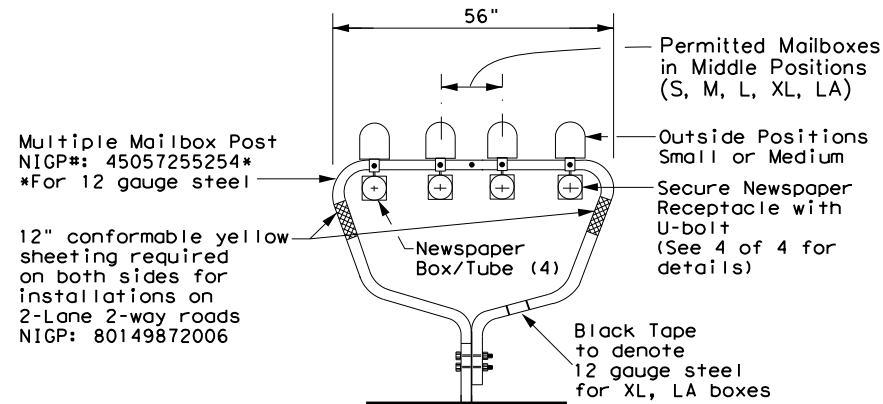
Appendix D

TxDOT Standards

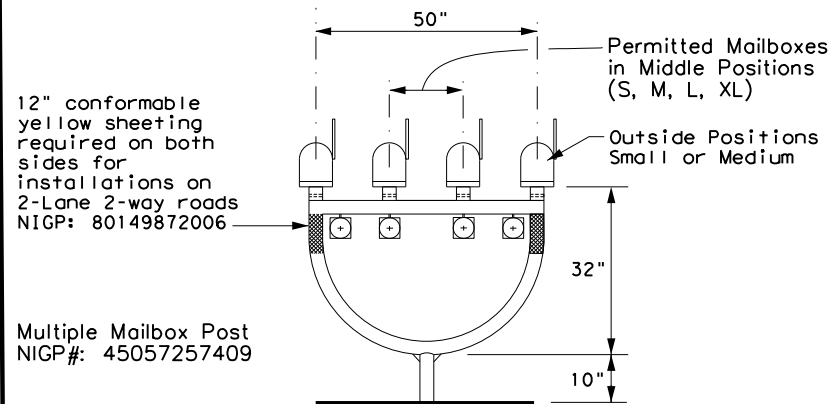
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: FILE:

TYPE 1 - MULTIPLE



TYPE 4 - MULTIPLE



MAILBOX SIZES

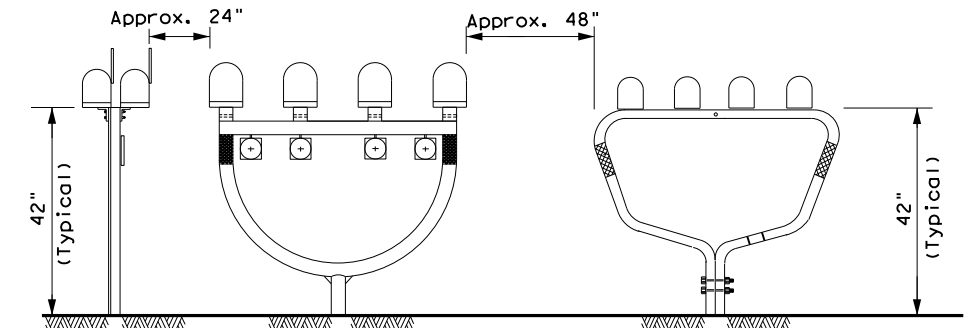
MAILBOX SIZE	TYPICAL DIMENSIONS			MAX **
	LENGTH	WIDTH	HEIGHT	
SMALL	19 1/2"	6"	7"	6 LBS
MEDIUM	22 1/2" *	8" *	11 1/2" *	8 LBS
LARGE	23 1/2"	11 1/2"	13 1/2"	11 LBS
EXTRA LARGE	18"	14"	12"	13 LBS
LOCKABLE	18"	11 1/2"	15"	23 LBS

* See Note 1.
** Excluding Molded Plastic on 4 X 4 Post

GENERAL NOTES:

- Dimensions shown (length, width, and height) are typical, not maximums. However, anytime a medium size mailbox is mounted on a single/double mount or on the outside position on a multi mount, the dimensions shown are maximums.
- Mailboxes shall be made of light weight sheet metal or light weight plastic. Heavy steel, cast iron or decorative mailboxes shall not be used on the state highway system.

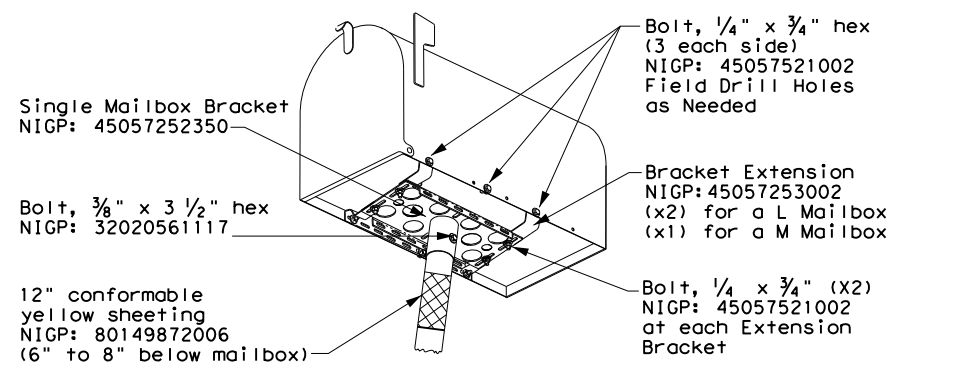
TYPICAL INSTALLATION MEASUREMENTS



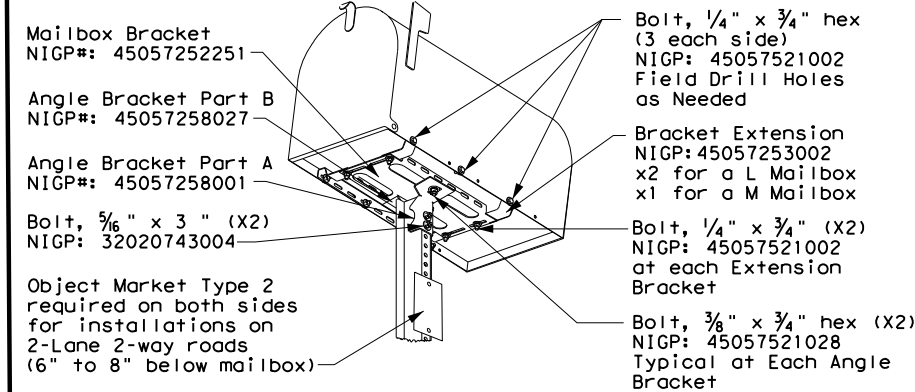
NOTE:

Mailbox installations in sidewalk areas shall be in accordance with the latest TxDOT Design Standard sheets PED-Pedestrian Facilities Curb Ramps.

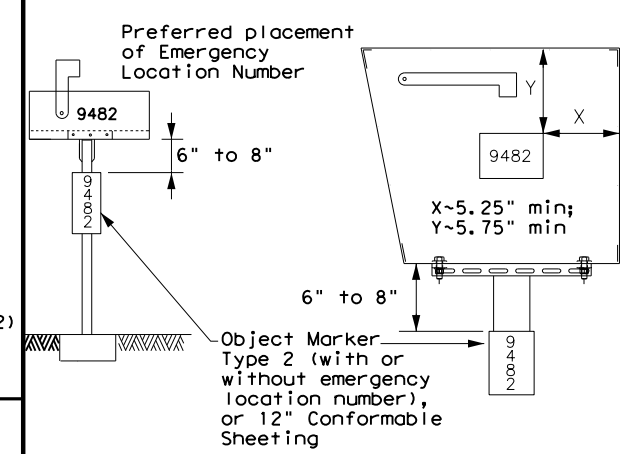
TYPE 2 and 4 - SINGLE/DOUBLE



TYPE 3 - SINGLE/DOUBLE



PLACEMENT OF EMERGENCY LOCATION NUMBER

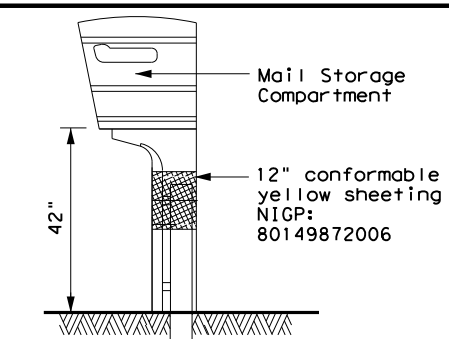


NOTES:

- Location numbers are provided by homeowner. Minimum size 1" height.
- Location number is typically placed on the mailbox in a contrasting color.
- Black numbers may be placed on the Type 2 object marker if the numbers cannot be placed on the mailbox.
- Alternatively, a green or blue plate with white numbers attached may be mounted below the object marker. Other contrasting color configuration, as approved, may be used.
- See 3 of 4 for Foundation details.
- See 4 of 4 for Hardware details.

SHEET 1 OF 4

TYPE 5



MAILBOX MOUNTING AND ASSEMBLY

MB(1)-21

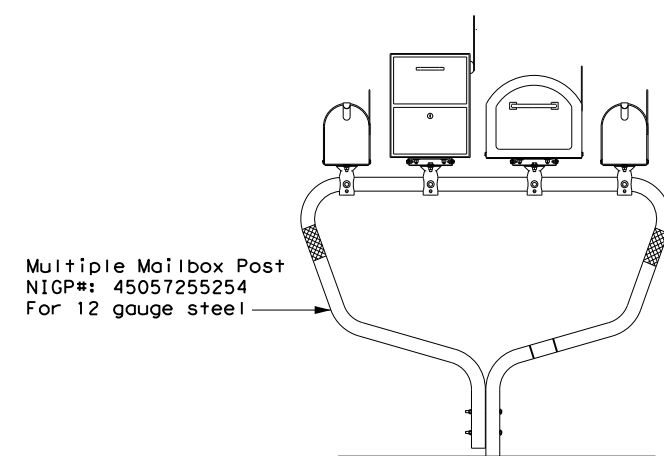
FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
2/2005	11/2009	4/2015		
6/2005	1/2011			
11/2006	7/2014			
	DIST	COUNTY		SHEET NO.

Maintenance Division Standard

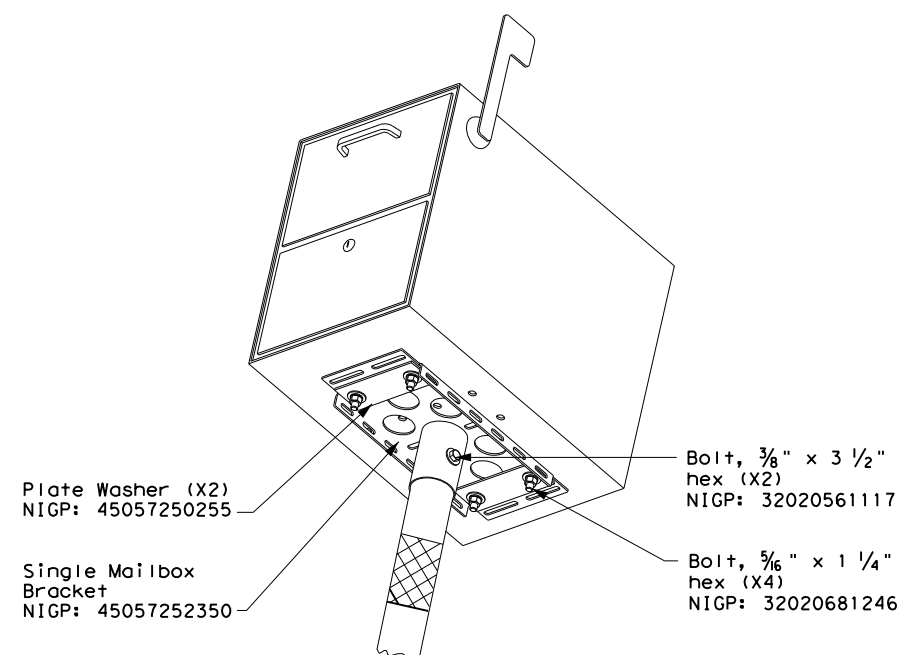
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

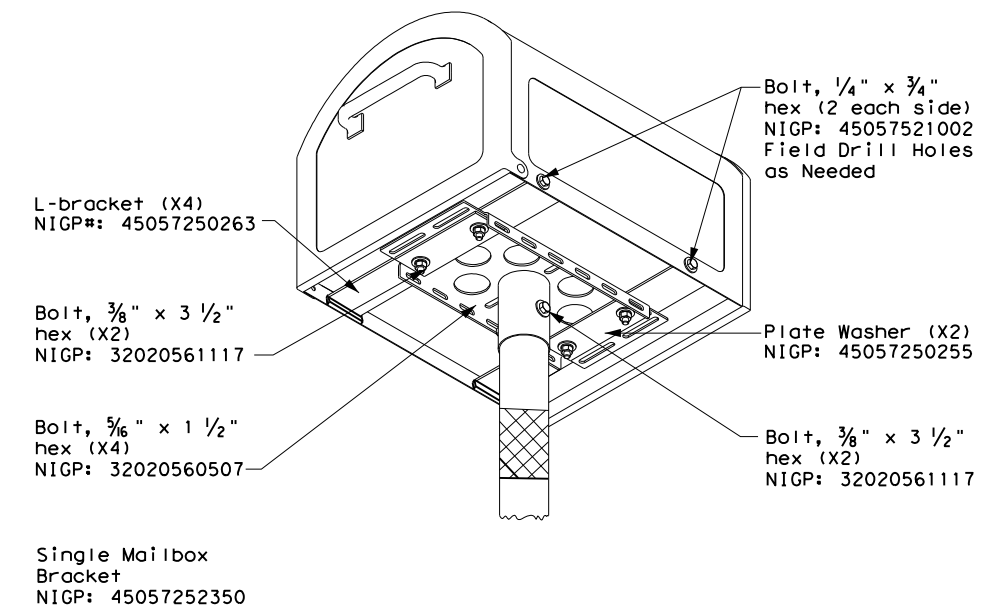
TYPE 1 - MULTI LOCKABLE AND XL MAILBOX



TYPE 2/4 - SINGLE LOCKABLE MAILBOX

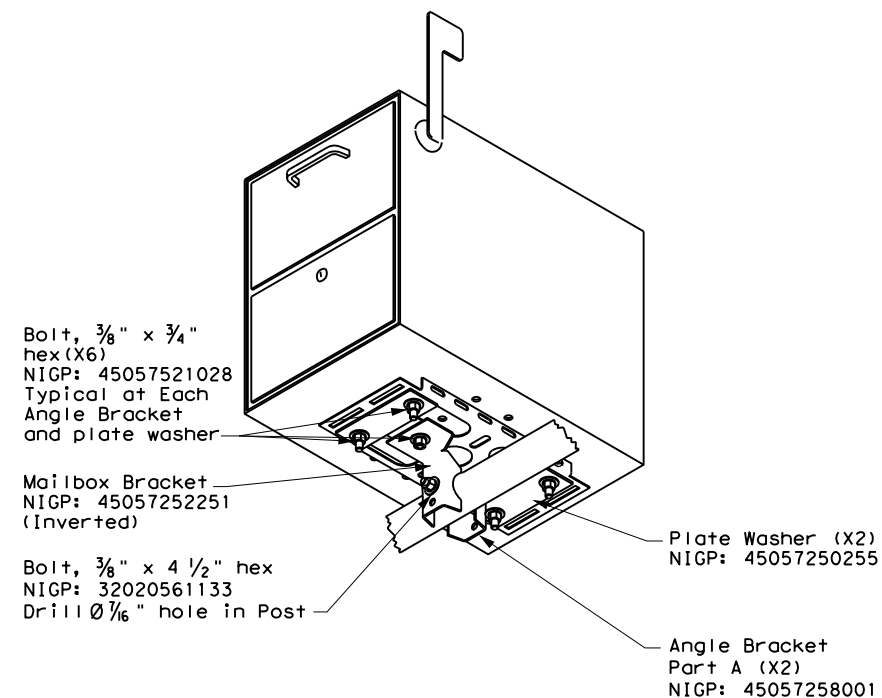


TYPE 2/4 - SINGLE XL MAILBOX

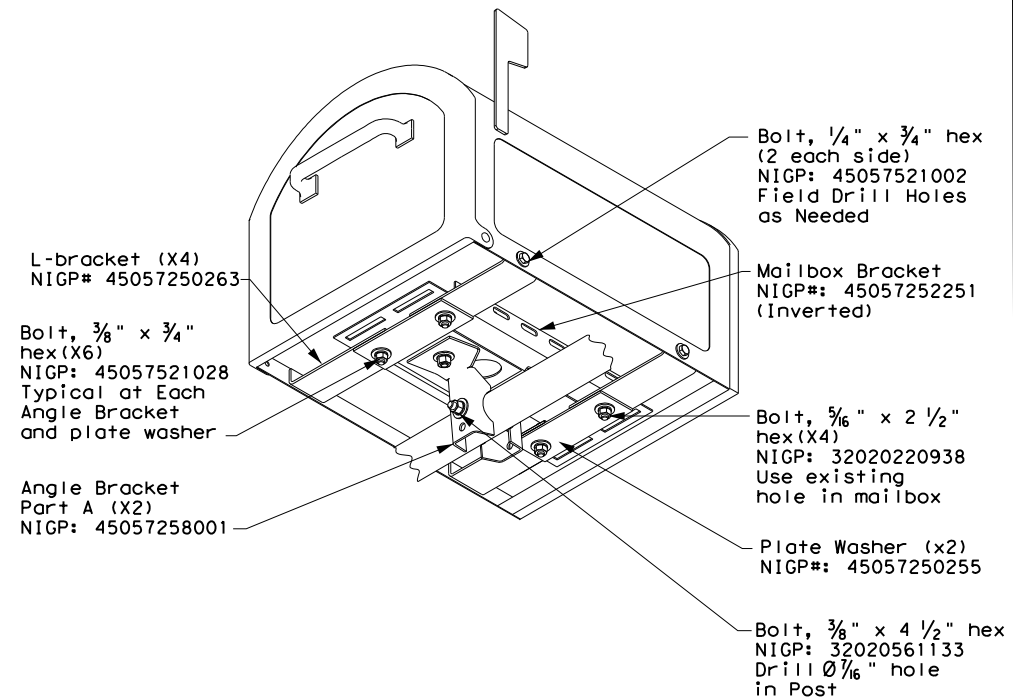


NOTE:
Follow same configuration when mounting an XL mailbox on a Type 4 multi post.

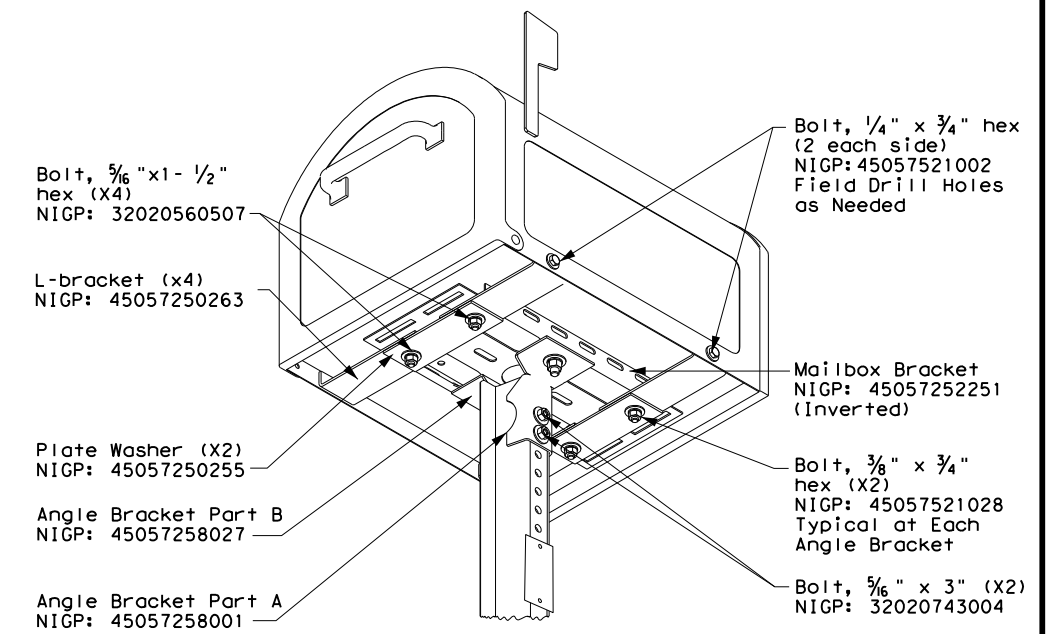
TYPE 1 MULTI - LOCKABLE ARCHITECTURAL (LA)



TYPE 1 MULTI - XL MAILBOX



TYPE 3 - XL MAILBOX MOUNTING



SHEET 2 OF 4

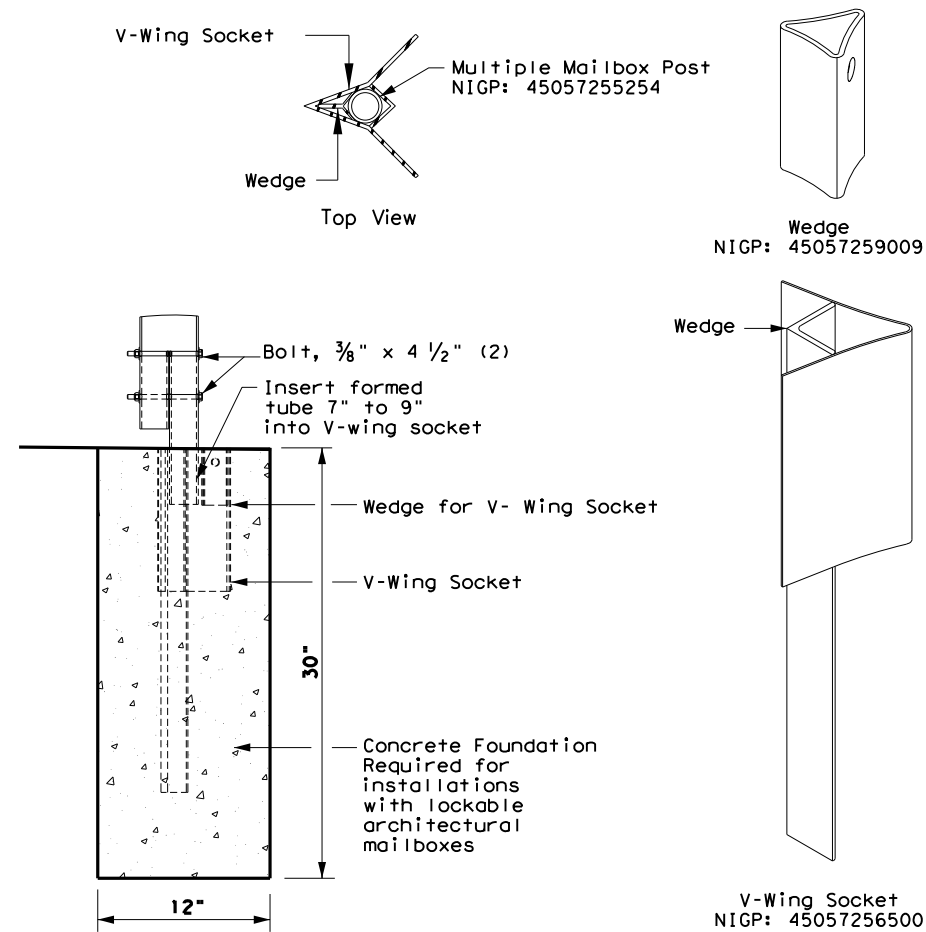
		Maintenance Division Standard	
XL AND LOCKABLE ARCHITECTURAL MAILBOX ASSEMBLY			
MB (2) - 21			
FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
© TxDOT March 2004		CONT	SECT
REVISIONS		JOB	
2/2005	11/2009	4/2015	HIGHWAY
6/2005	1/2011		
11/2006	7/2014		
DIST		COUNTY	SHEET NO.

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

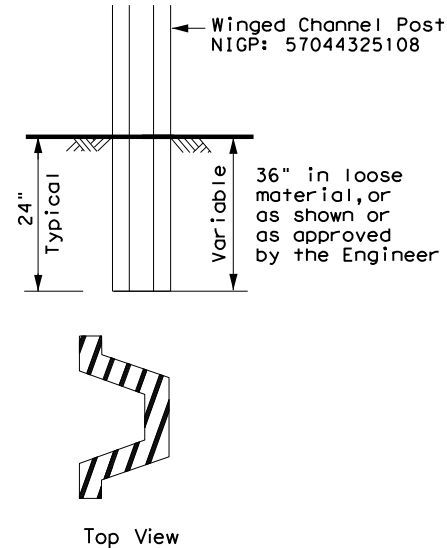
DATE: FILE:

TYPE 1 - SUPPORT/FOUNDATION

Thin Wall Tube w/ V-LOC Anchorage



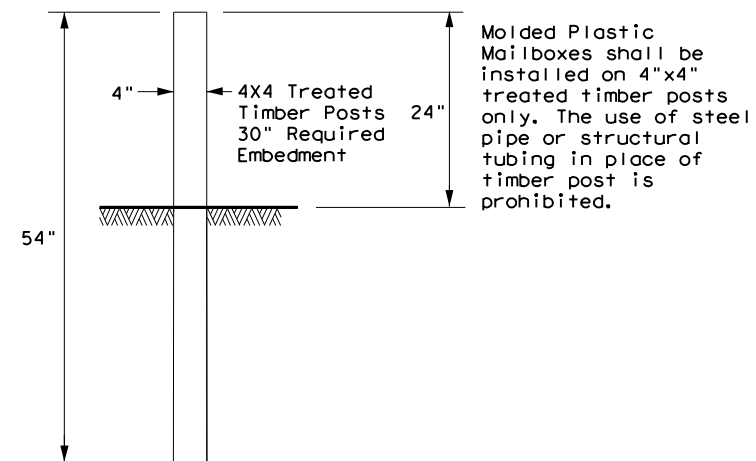
TYPE 3 - SUPPORT/FOUNDATION



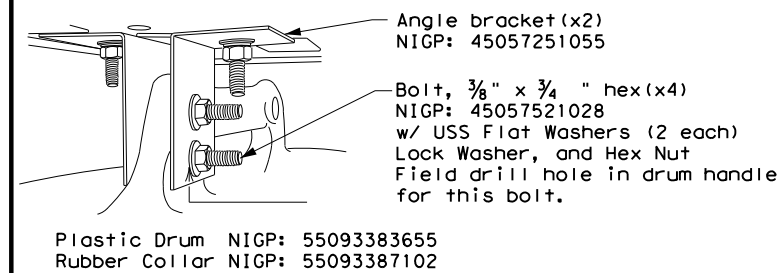
NOTES:

1. Attach Object Marker (OM) facing direction of traffic.
2. OM will also be required on opposite side if installed on a 2-Lane, 2-Way roadway.

TYPE 5 - SUPPORT/FOUNDATION



TYPE 6 - TEMPORARY MAILBOX SUPPORT

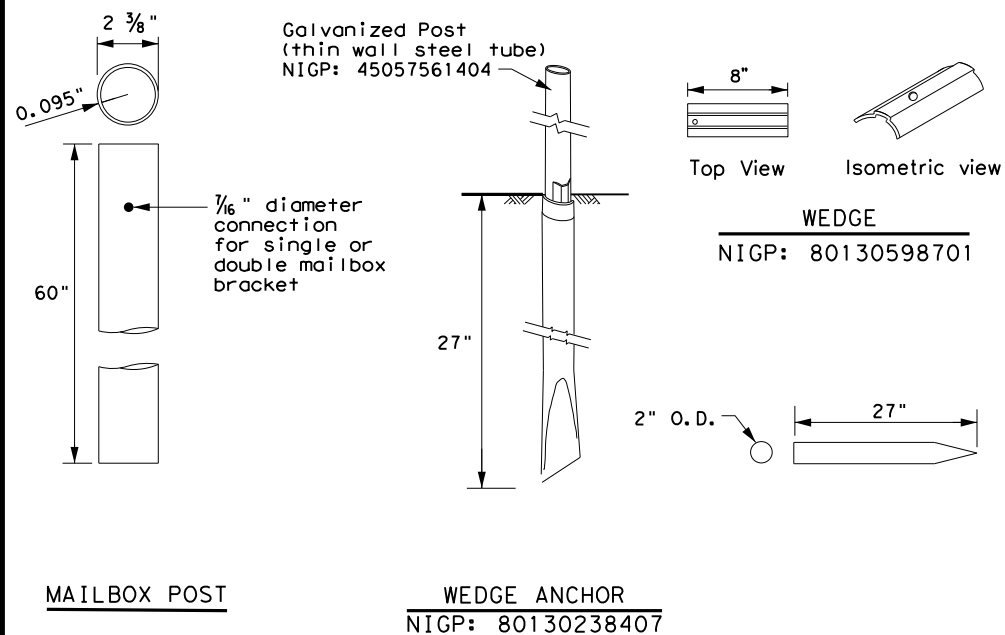


NOTES:

1. Place on approved plastic drum as shown in the Compliant Work Zone Traffic Control Devices (CWZTCD).
2. Existing attachment hardware shall be used unless damaged. Damaged hardware shall be replaced.

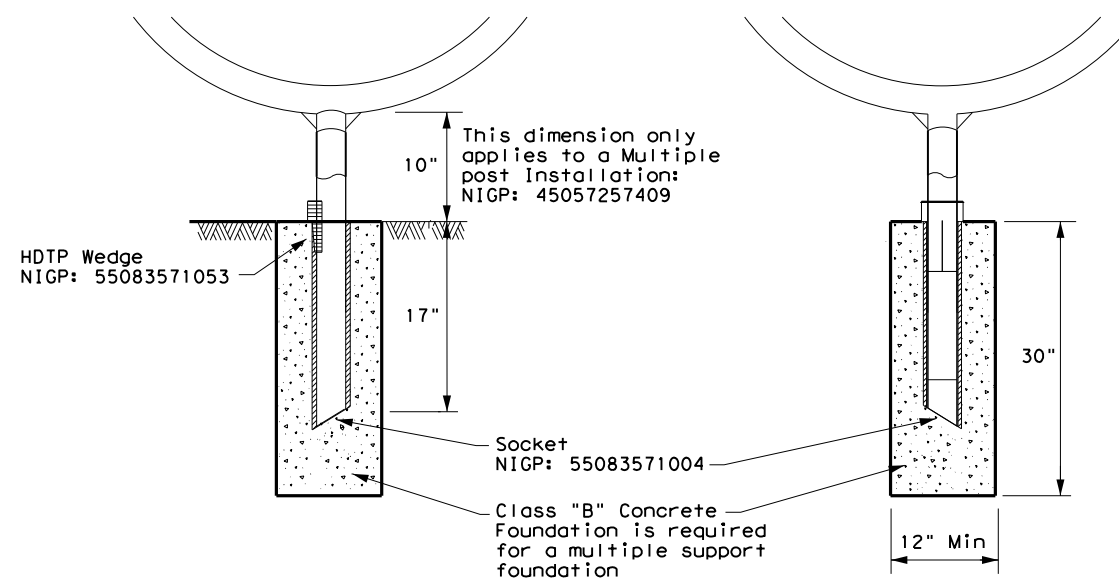
TYPE 2 - SUPPORT/FOUNDATION

Thin Wall Steel Tube w/Wedge Anchor System



TYPE 4 - SUPPORT/FOUNDATION

Whitecoated steel post NIGP: 45057561107
Multiple post NIGP: 45057257409
Recycled Rubber post (RR) NIGP: 45057561057



GENERAL NOTES:

1. Erect post plumb or vertical.
2. When galvanized part is required galvanize in accordance with Item 445.
3. Use a concrete footing as shown or when directed. Concrete footing will be required when soils do not hold the support/foundations in a stable condition, only on Type 1, Type 2, and Type 4

SHEET 3 OF 4



Texas Department of Transportation

Maintenance
Division
Standard

MAILBOX SUPPORT AND FOUNDATION

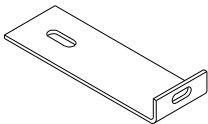
MB (3) - 21

FILE: MB-21.dgn	DN:	CK:	DW:	CK:
© TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS				
2/2005 11/2009 4/2015				
6/2005 1/2011	DIST	COUNTY		SHEET NO.
11/2006 7/2014				

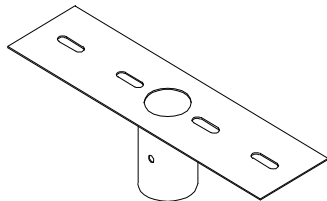
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: FILE:

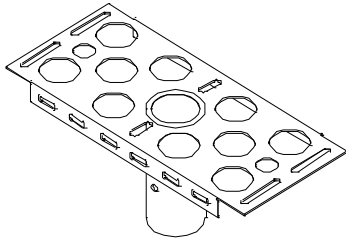
TYPE	TYPE 1	TYPE 2	TYPE 3	TYPE 4			TYPE 5	TYPE 6
Configuration	Multiple	Single or Double	Single or Double	Single	Double	Multiple	Single	Single
Mailbox Size NIGP #	Outside Position: S or M Inside Position: S, M, L, XL, or LA	Single: S, M, L, XL, or LA Double: SS, SM, MM	Single: S, M, L, or XL Double: SS, SM, MM	S, M, L, XL, or LA	SS, SM, or MM	Outside Position: S or M Inside Position: S, M, L, or XL	Molded Plastic	S, or M
Mailbox Post NIGP #	45057255254 (Galvanized Multiple)	45057561404 (Thin Walled Gavanize)	57044325108 (Wing Channel Post)	45057561107 (Thin walled white powder coated) 45057561057 (Recycled Rubber Post: S or M only)	45057561107 (Thin Walled White Powder Coated)	45057257409 (White Powder Coated Multiple)	4x4 Timber	Construction Barrel
Post and Mailbox Hardware NIGP #	45057259009 (Wedge) 45057256500 (V-Wing Socket) 45057253002 (Bracket Extension) 45057252251 (Mailbox Bracket) 45057258001 (Part A Angle Bracket x2) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket for XL x4)	80130598701 (Wedge) 80130238407 (Wedge Anchor) 45057253002 (Bracket Extension) 45057252343 (Double MB Bracket) 45057252350 (S. Mailbox Bracket) 45057252251 (Mailbox Bracket) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket forXL x4)	45057541653 (Type 3 Double Mailbox Bracket) 45057252251 (Mailbox Bracket) 45057253002 (Bracket Extension) 45057258001 (Part A Angle Bracket) 45057258027 (Part B Angle Bracket) 45057250255 (Plate Washer for XL x2) 45057250263 (L-Bracket for XL x4)	55083571053 (Wedge) 55083571004 (Socket) 45057252350 (Single Mailbox Bracket) 45057253002 (Bracket Extension) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket for XL x4)	55083571053 (Wedge) 55083571004 (Socket) 45057253002 (Bracket Extension) 45057252343 (Double Mount Bracket) 45057252251 (Mailbox Bracket x2)	55083571053 (Wedge) 55083571004 (Socket) 45057253002 (Bracket Extension) 45057252350 (Single Mount Bracket) 45057250255 (Plate Washer for XL x2) 45057250263 (L-Bracket for XL x4)	None	45057251055 Angle Bracket (x2)
Foundation Used	Class B Concrete (Required for LA Mailboxes)	Class B Concrete (Required for LA Mailboxes)	None	Class B Concrete (not used with recycled rubber post, required for LA Mailboxes)	Class B Concrete (not required)	Class B Concrete	None	None



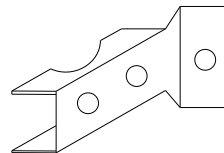
NIGP: 45057250263
L-Bracket x4 for
XL sized mailboxes



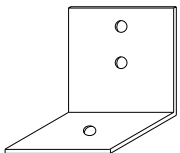
NIGP: 45057252343
Double Mailbox Bracket
For Type 2 and Type 4
double mount



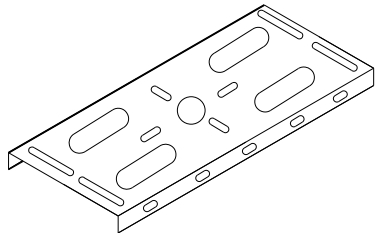
NIGP: 45057252350
Single Mailbox Bracket
For Type 2 single and for
Type 4 single and multi mount



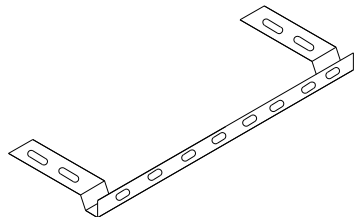
NIGP: 45057258001
Part "A" Angle Bracket
For Type 1 multi (2 per mailbox)
and Type 3 single and double



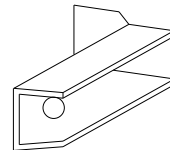
NIGP: 45057251055
Type 6 Angle Bracket
(2 per mailbox)



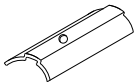
NIGP: 45057252251
Mailbox Bracket
For Type 1 multi and
any double mount (use 2)



NIGP: 45057253002
Bracket Extension
Use 1 for a medium Mailbox
Use 2 for a Large Mailbox



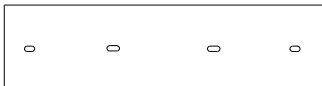
NIGP: 45057258027
Part "B" Angle Bracket
For Type 3 single
and double



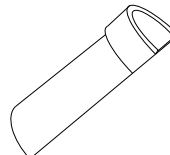
NIGP: 80130598701
Wedge for Type 2



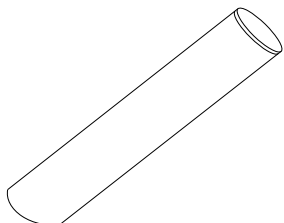
NIGP: 45057250255
Plate Washer for Architecural
and XL Mailboxes



NIGP: 45057541653
Type 3 double mailbox bracket



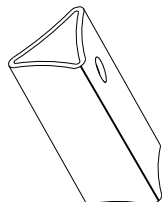
NIGP: 55083571053
Type 4 Mailbox Wedge



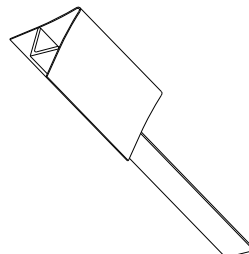
NIGP: 55083571004
Type 4 Mailbox Socket



NIGP: 80130238407
Type 2 Wedge Anchor



NIGP: 45057259009
Wedge for Type 1 V-wing Socket



NIGP: 45057256500
V-wing Socket for
Type 1 Foundation

NIGP #	OBJECT MARKERS AND CONFORMABLE SHEETING
55008311759	Type 2 OM 4"x4" (3 Needed) for Type 3 Wing Channel Post
55008312906	Type 2 OM 6"x12" (1 needed) for Type 3 Wing Channel Post
80149872006	12" Conformable Reflective Yellow Sheeting for Flexible Posts

NOTES:

- Type 2 object marker in accordance with Traffic Engineering Standard Delineators & Object Markers.
- A light weight receptacle for newspaper delivery can be attached to mailbox posts if the receptacle does not touch the mailbox, present a hazard to traffic or delivery of the mail, extend beyond the front of the mailbox, or display advertising, except the publication title.

BID CODES FOR CONTRACTS

MB-(X) ASSM TY (XXX) (X)

Type of Mailbox
S = Single
D = Double
M = Multiple
MP = Molded Plastic

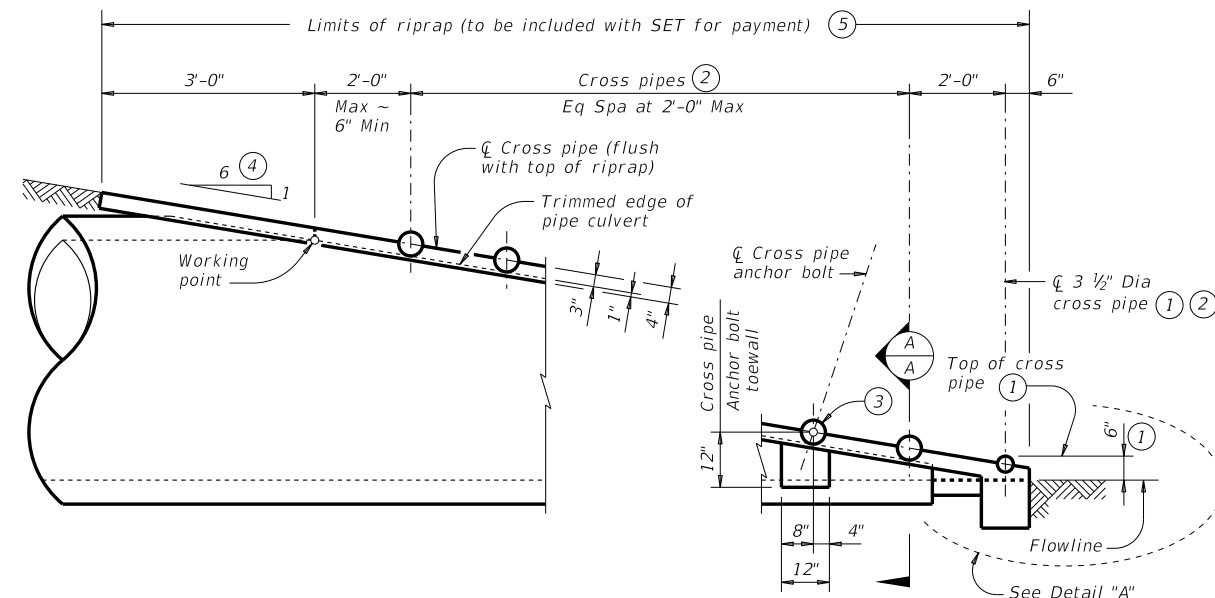
Type of Post
WC = Winged Channel Post
RR = Recycled Rubber
TWW = Thin Walled White Tubing
TWG = Thin Walled Galvanized Tubing
TIM = Timber

Type of Foundation
Ty 1 = V-Loc
Ty 2 = Wedge Anchor Steel System
Ty 3 = Winged Channel post
Ty 4 = Wedge Anchor Plastic System
Ty 5 = 4 X 4 Post

SHEET 4 OF 4

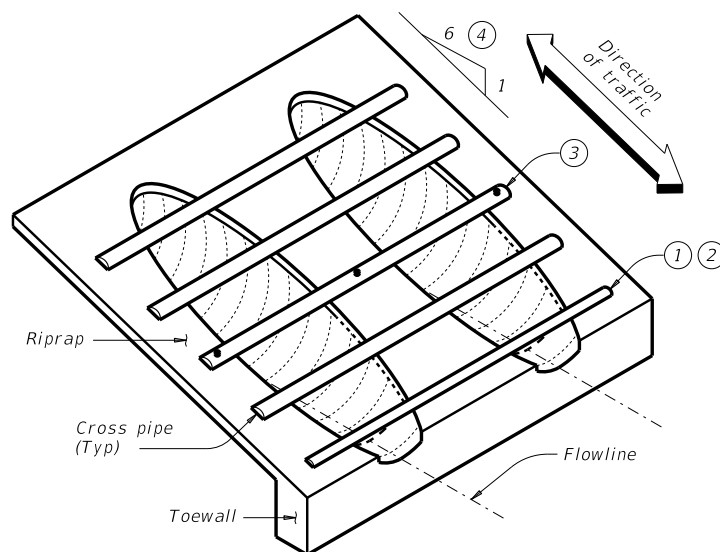
				Maintenance Division Standard			
NIGP PARTS LIST AND COMPATIBILITY							
MB(4) -21							
FILE: MB-21.dgn		DN: TxDOT		CK: TxDOT		DW: TxDOT	
© TxDOT March 2004		CONT		SECT		JOB	
2/2005		11/2009		4/2015		HIGHWAY	
6/2005		1/2011		DIST		COUNTY	
11/2006		7/2014		SHEET NO.			

DATE: _____
FILE: _____



SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

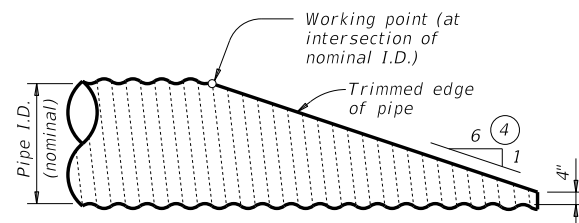
(Showing reinforced concrete pipe (RCP) culvert. Details of corrugated metal pipe (CMP) culvert are similar. pipe runners not shown for clarity.)



ISOMETRIC VIEW OF
TYPICAL INSTALLATION

SIDE ELEVATION OF TYPICAL
PIPE CULVERT MITER

(Showing corrugated metal pipe (CMP) culvert. Details at reinforced concrete pipe (RCP) culvert are similar.)



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

CROSS PIPE LENGTHS AND REQUIRED PIPE SIZES ②									
Corrugated Metal Pipe (CMP) Culverts									
Design	Conc Riprap (CY) ⑥	Pipe Culvert Span	Pipe Culvert Rise	Pipe Culvert Spa ~ G	Single Barrel ~ Q1	Multi- Barrel ~ Q1	Q2	Conditions for Use of Cross Pipes	Cross Pipe Sizes
1	0.6	17"	13"	1' - 0"	N/A	2' - 8"	2' - 5"	3 or more pipe culverts	3" Std (3,500" O.D.)
2	0.7	21"	15"	1' - 2"	N/A	3' - 1"	2' - 11"		
3	0.9	28"	20"	1' - 5"	N/A	3' - 9"	3' - 9"		
4	1.0	35"	24"	1' - 8"	4' - 4"	4' - 6"	4' - 7"	All pipe culverts	4" Std (4,500" O.D.)
5	1.2	42"	29"	1' - 11"	4' - 11"	5' - 2"	5' - 5"		
6	1.4	49"	33"	2' - 2"	5' - 6"	5' - 11"	6' - 3"		
7	1.6	57"	38"	2' - 5"	6' - 2"	6' - 8"	7' - 2"	All pipe culverts	5" Std (5,563" O.D.)
8	1.8	64"	43"	2' - 10"	6' - 9"	7' - 6"	8' - 2"		
9	1.9	71"	47"	3' - 2"	7' - 4"	8' - 3"	9' - 1"		
Reinforced Concrete Pipe (RCP) Culverts									
Design	Conc Riprap (CY) ⑥	Pipe Culvert Span	Pipe Culvert Rise	Pipe Culvert Spa ~ G	Single Barrel ~ Q1	Multi- Barrel ~ Q1	Q2	Conditions for Use of Cross Pipes	Cross Pipe Sizes
1	0.6	22"	13 1/2"	1' - 0"	N/A	3' - 1"	2' - 10"	3 or more pipe culverts	3" Std (3,500" O.D.)
2	0.7	26"	15 1/2"	1' - 2"	N/A	3' - 6"	3' - 4"		
3	0.9	28 1/2"	18"	1' - 5"	N/A	3' - 10"	3' - 9 1/2"		
4	1.0	36 1/4"	22 1/2"	1' - 8"	4' - 5"	4' - 7"	4' - 8 1/4"	All pipe culverts	4" Std (4,500" O.D.)
5	1.2	43 3/4"	26 5/8"	1' - 11"	5' - 1"	5' - 4"	5' - 6 3/4"		
6	1.4	51 1/8"	31 5/16"	2' - 2"	5' - 8"	6' - 1"	6' - 5 1/4"		
7	1.6	58 1/2"	36"	2' - 5"	6' - 4"	6' - 10"	7' - 3 1/2"	All pipe culverts	5" Std (5,563" O.D.)
8	1.8	65"	40"	2' - 10"	6' - 10"	7' - 7"	8' - 3"		
9	1.9	73"	45"	3' - 2"	7' - 6"	8' - 5"	9' - 3"		

- ① The proper installation of the first cross pipe is critical for vehicle safety. Place the top of the first cross pipe no more than 6" above the flow line.
- ② Provide cross pipes, except the first bottom pipe, of the size shown in the table. Provide a 3 1/2" standard pipe (4" O.D.) for the first bottom pipe.
- ③ Install the third Cross Pipe from the bottom of the culvert using a bolted connection. Ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access. At the Contractor's option, install all other cross pipes using the bolted connection details.
- ④ Match cross slope as shown elsewhere in the plans. Cross slope of 6:1 or flatter is required for vehicle safety.
- ⑤ Riprap placed beyond the limits shown will be paid as concrete riprap in accordance with Item 432, "Riprap".
- ⑥ Quantities shown are for one end of one pipe culvert. For multiple Pipe Culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only.

MATERIAL NOTES:

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Provide cross pipes that meet the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.

Provide ASTM A307 bolts and nuts.

Galvanize all steel components, except concrete reinforcing, after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

GENERAL NOTES:

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

Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the Pipe Runners.

Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap".
Payment for riprap and toewall is included in the price bid for each safety end treatment.

SHEET 1 OF 2




Texas Department of Transportation

**Bridge
Division
Standard**

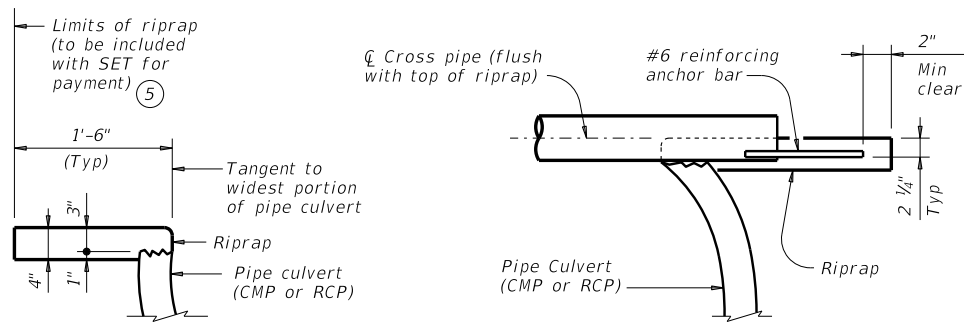
SAFETY END TREATMENT
FOR DESIGN 1 TO 9
ARCH PIPE CULVERTS
TYPE II ~ PARALLEL DRAINAGE

SETP-PD-A

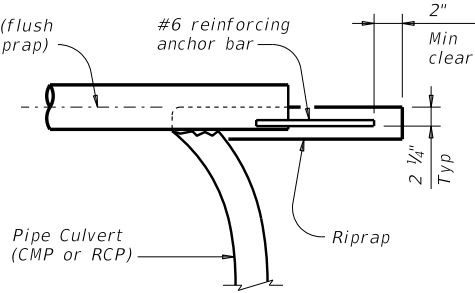
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REVISIONS									
		DIST	COUNTY					SHEET NO.	

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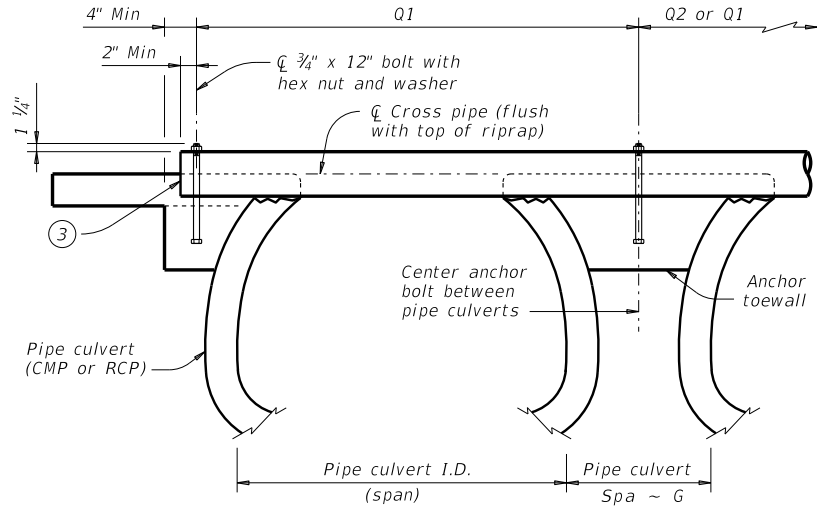
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SHOWING TYPICAL PIPE
CULVERT AND RIPRAP

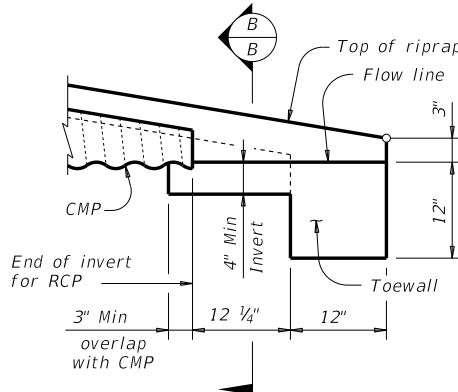


SHOWING CROSS PIPE
WITH ANCHOR BAR



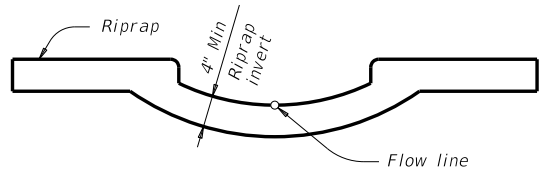
SHOWING CROSS PIPE
WITH BOLTED ANCHOR

SECTION A-A



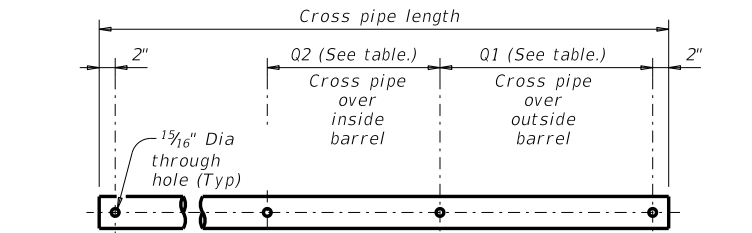
DETAIL "A"

(Showing invert with corrugated metal pipe (CMP) culvert. Reinforced concrete pipe (RCP) culvert details are similar. Cross pipes not shown for clarity.)

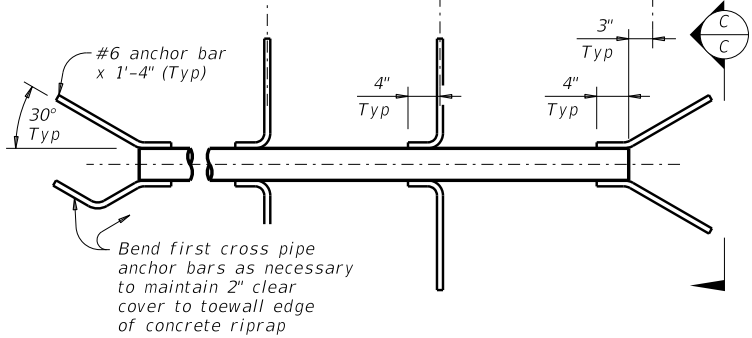


SECTION B-B

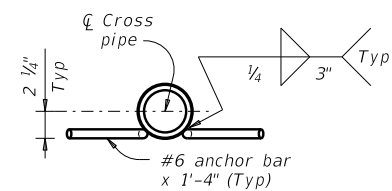
(Cross pipes not shown for clarity.)



PIPE WITH BOLTED ANCHOR




PIPE WITH ANCHOR BARS



SECTION C-C

CROSS PIPE DETAILS

SHEET 2 OF 2

**Texas Department of Transportation**

Bridge Division Standard

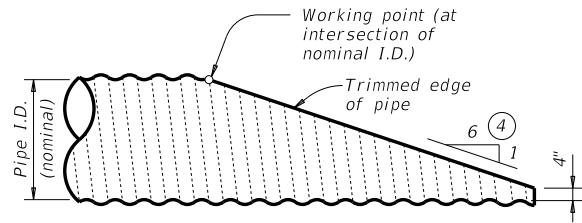
SAFETY END TREATMENT
FOR DESIGN 1 TO 9
ARCH PIPE CULVERTS
TYPE II ~ PARALLEL DRAINAGE

SETP-PD-A

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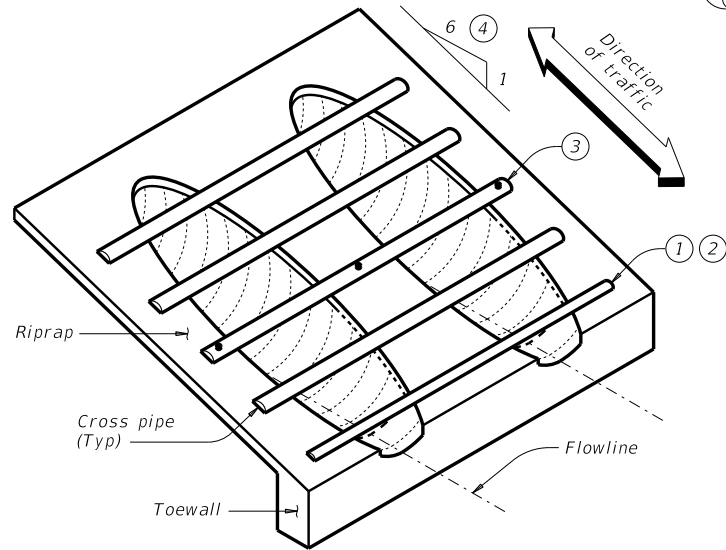
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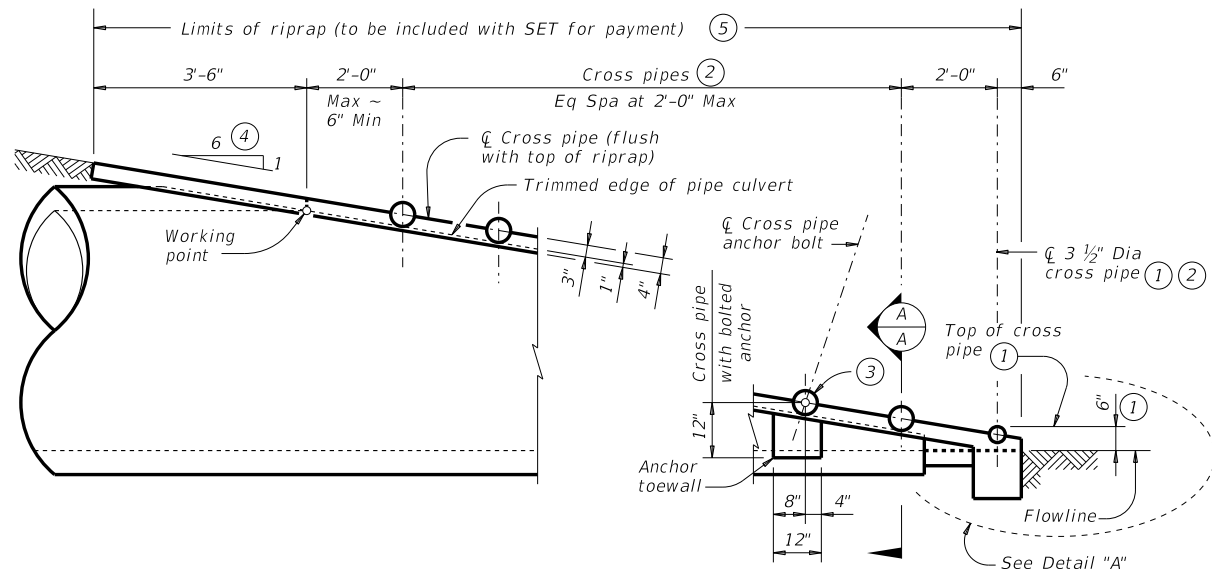


SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

(Showing corrugated metal pipe (CMP) culvert Details at reinforced concrete pipe (RCP) culvert are similar.)

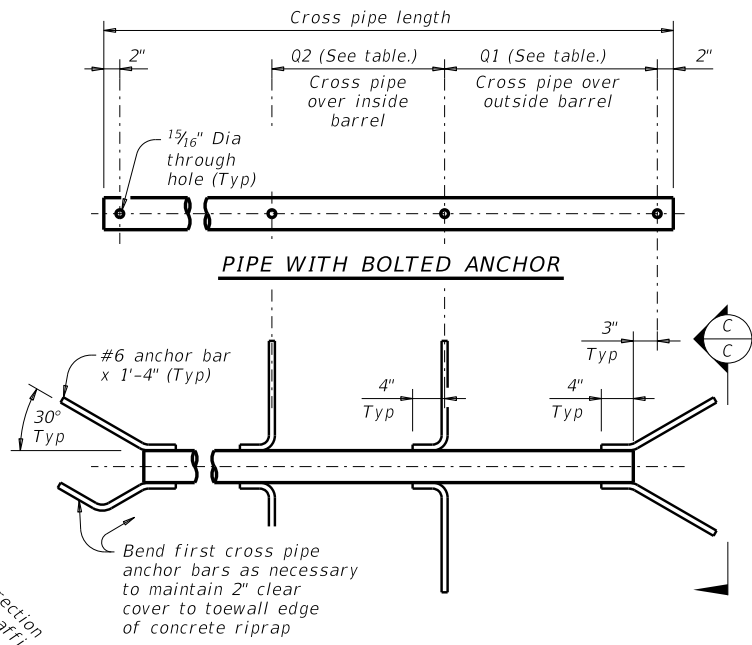


ISOMETRIC VIEW OF TYPICAL INSTALLATION

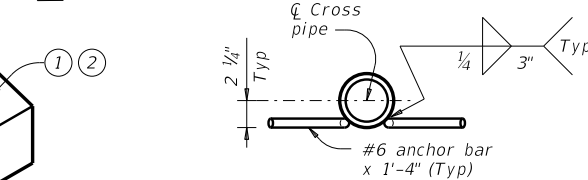


SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(Showing reinforced concrete pipe (RCP) culvert. Details at corrugated metal pipe (CMP) culvert are similar.)

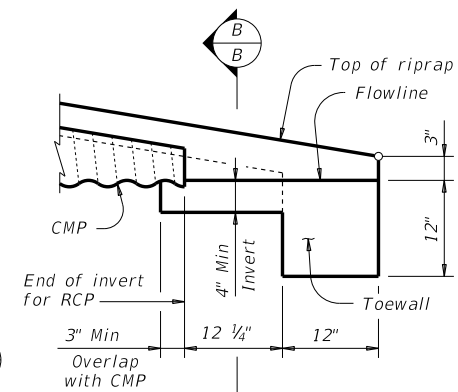


PIPE WITH BOLTED ANCHOR



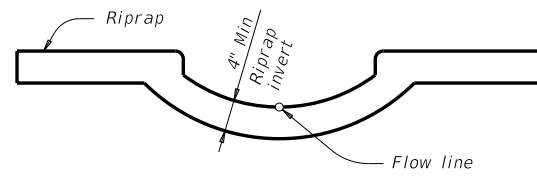
SECTION C-C

CROSS PIPE DETAILS



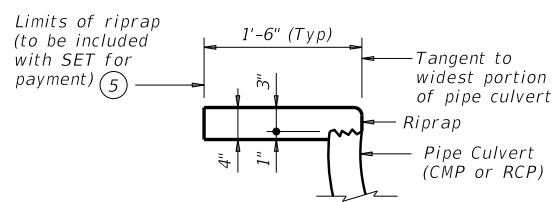
DETAIL "A"

(Showing invert with corrugated metal pipe (CMP) culvert. Reinforced concrete pipe (RCP) culvert details are similar. Cross pipes not shown for clarity.)

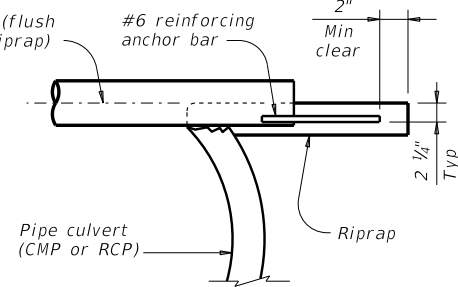


SECTION B-B

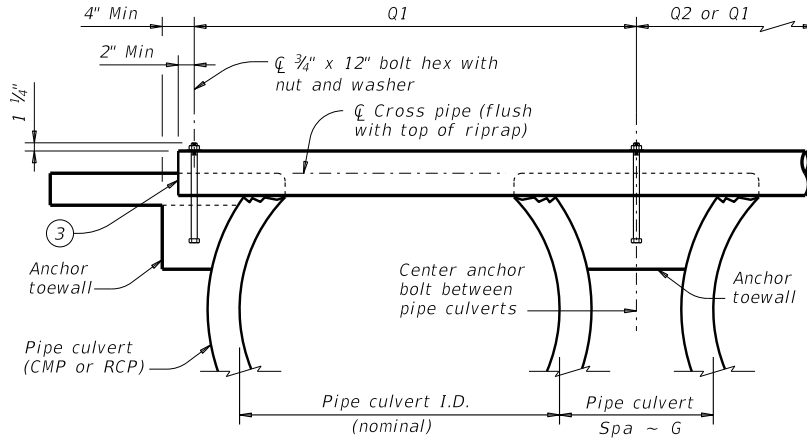
(Cross pipes not shown for clarity.)



SHOWING TYPICAL PIPE CULVERT AND RIPRAP



SHOWING CROSS PIPE WITH ANCHOR BAR



SHOWING CROSS PIPE WITH BOLTED ANCHOR

SECTION A-A

CROSS PIPE LENGTHS, REQUIRED PIPE SIZES, AND RIPRAP QUANTITIES

Nominal Culvert I.D.	Conc Riprap (CY) (6)	Pipe Culvert Spa ~ G	Single Barrel ~ Q1	Multi-Barrel ~ Q1	Q2	Conditions for Use of Cross Pipes	Cross Pipe Sizes
12"	0.6	0' - 9"	N/A	2' - 1"	1' - 9"	3 or more pipe culverts	3" Std (3.500" O.D.)
15"	0.7	0' - 11"	N/A	2' - 5"	2' - 2"		
18"	0.8	1' - 2"	N/A	2' - 10"	2' - 8"		
21"	0.9	1' - 4"	N/A	3' - 2"	3' - 1"		
24"	0.9	1' - 7"	N/A	3' - 6"	3' - 7"	3 or more pipe culverts	3 1/2" Std (4.000" O.D.)
27"	1.0	1' - 8"	N/A	3' - 10"	3' - 11"	2 or more pipe culverts	
30"	1.1	1' - 10"	N/A	4' - 2"	4' - 4"	All pipe culverts	
33"	1.2	1' - 11"	4' - 2"	4' - 5"	4' - 8"	All pipe culverts	4" Std (4.500" O.D.)
36"	1.3	2' - 1"	4' - 5"	4' - 9"	5' - 1"		
42"	1.5	2' - 4"	4' - 11"	5' - 5"	5' - 10"		
48"	1.7	2' - 7"	5' - 5"	6' - 0"	6' - 7"		
54"	2.0	3' - 0"	5' - 11"	6' - 9"	7' - 6"	All pipe culverts	5" Std (5.563" O.D.)
60"	2.2	3' - 3"	6' - 5"	7' - 4"	8' - 3"		
66"	2.4	3' - 3"	6' - 11"	7' - 10"	8' - 9"		
72"	2.7	3' - 4"	7' - 5"	8' - 5"	9' - 4"		

- The proper installation of the first cross pipe is critical for vehicle safety. Place the top of the first cross pipe no more than 6" above the flow line.
- Provide cross pipes, except the first bottom pipe, of the size shown in the table. Provide a 3 1/2" standard pipe (4" O.D.) for the first bottom pipe.
- Install the third cross pipe from the bottom of the culvert using a bolted connection. Ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access. At the Contractor's option, install all other cross pipes using the bolted connection details.
- Match cross slope as shown elsewhere in the plans. Cross slope of 6:1 or flatter is required for vehicle safety.
- Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap".
- Quantities shown are for one end of one reinforced concrete pipe (RCP) culvert. For multiple pipe culverts or for corrugated metal pipe (CMP) culverts, quantities will need to be adjusted. Riprap quantities are for contractor's information only.

MATERIAL NOTES:

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise. Provide cross pipes that meet the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 (Gr B), or API 5LX52. Provide ASTM A307 bolts and nuts. Galvanize all steel components, except concrete reinforcing, after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

GENERAL NOTES:

Cross pipes are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981. Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the cross pipes. Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap". Payment for riprap and toewall is included in the Price Bid for each Safety End Treatment.

					Bridge Division Standard				
SAFETY END TREATMENT FOR 12" DIA TO 72" DIA PIPE CULVERTS TYPE II ~ PARALLEL DRAINAGE									
SETP-PD									
FILE:	setppdse-20.dgn	DN:	GAF	CK:	CAT	DW:	JRP	CK:	GAF
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REVISIONS									
DIST		COUNTY		SHEET NO.					