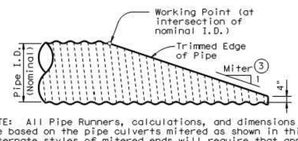
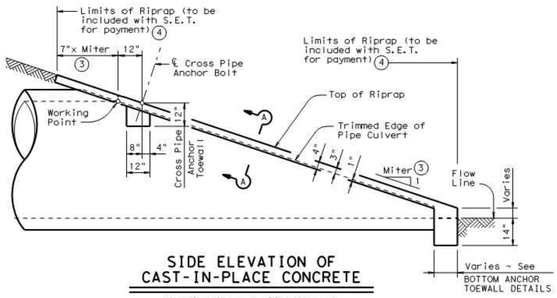
Plotted: Jun 11, 2020, 10:18 AM by user: john - Saved: 6/1/2020 by user: john
R:\ROCKISD\STONE CREEK ELEM\BIDSET\STONE CREEK DETAILS ONLY.dwg




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

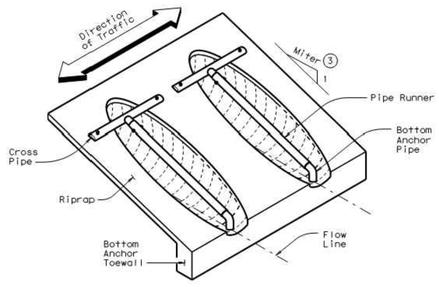
## SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

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




## SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(Showing Concrete Pipe Culvert. Details of Corrugated Metal Pipe Culvert are similar. Pipe Runners not shown for clarity)




## ISOMETRIC VIEW OF TYPICAL INSTALLATION

(Showing installation with no skew.)

### CROSS PIPE LENGTHS & PIPE RUNNER LENGTHS (1)(2)

| Nominal Culvert I.D. | Pipe Culvert Spa ~ G | Cross Pipe Length | Pipe Runner Length | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 3:1 Side Slope | | | | 4:1 Side Slope | | | | 6:1 Side Slope | | | |
| | | | 0° Skew | 15° Skew | 30° Skew | 45° Skew | 0° Skew | 15° Skew | 30° Skew | 45° Skew | 0° Skew | 15° Skew | 30° Skew | 45° Skew |
| 24" | 1'- 7" | 3'- 5" | N/A | N/A | N/A | 5'-10" | N/A | N/A | N/A | 8'- 1" | N/A | N/A | N/A | 12'- 9" |
| 27" | 1'- 8" | 3'- 8" | N/A | N/A | 5'- 5" | 6'-11" | N/A | N/A | 7'- 7" | 9'- 7" | N/A | N/A | 11'-11" | 14'-11" |
| 30" | 1'-10" | 3'-11" | N/A | N/A | 6'- 4" | 8'- 0" | N/A | N/A | 8'- 9" | 11'- 0" | N/A | N/A | 13'- 8" | 17'- 0" |
| 33" | 1'-11" | 4'- 2" | 6'- 2" | 6'- 5" | 7'- 3" | 9'- 1" | 8'- 6" | 8'-10" | 10'- 0" | 12'- 5" | 13'- 3" | 13'- 9" | 15'- 5" | 19'- 2" |
| 36" | 2'- 1" | 4'- 5" | 6'-11" | 7'- 3" | 8'- 2" | 10'- 2" | 9'- 6" | 9'-11" | 11'- 2" | 13'-10" | 14'- 9" | 15'- 3" | 17'- 2" | 21'- 3" |
| 42" | 2'- 4" | 4'-11" | 8'- 6" | 8'-10" | 9'-11" | 12'- 4" | 11'- 7" | 12'- 0" | 13'- 6" | 16'- 8" | 17'- 9" | 18'- 5" | 20'- 8" | 25'- 7" |
| 48" | 2'- 7" | 5'- 5" | 10'- 1" | 10'- 5" | 11'- 9" | N/A | 13'- 7" | 14'- 2" | 15'-10" | N/A | 20'- 9" | 21'- 6" | 24'- 2" | N/A |
| 54" | 3'- 0" | 5'-11" | 11'- 8" | 12'- 1" | N/A | N/A | 15'- 8" | 16'- 3" | N/A | N/A | 23'-10" | 24'- 8" | N/A | N/A |
| 60" | 3'- 3" | 6'- 5" | 13'- 3" | N/A | N/A | N/A | 17'- 9" | N/A | N/A | N/A | 26'-10" | N/A | N/A | N/A |

### TYPICAL PIPE CULVERT MITERS (3)

| Side Slope | 0° Skew | 15° Skew | 30° Skew | 45° Skew |
|---|---|---|---|---|
| 3:1 | 3:1 | 3.106:1 | 3.464:1 | 4.243:1 |
| 4:1 | 4:1 | 4.141:1 | 4.619:1 | 5.657:1 |
| 6:1 | 6:1 | 6.212:1 | 6.928:1 | 8.485:1 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

### CONDITIONS WHERE PIPE RUNNERS ARE NOT REQUIRED (2)

| Nominal Culvert I.D. | Single Pipe Culvert | Multiple Pipe Culverts |
|---|---|---|
| 12" thru 21" | Skews thru 45° | Skews thru 45° |
| 24" | Skews thru 45° | Skews thru 30° |
| 27" | Skews thru 30° | Skews thru 15° |
| 30" | Skews thru 15° | Skews thru 15° |
| 33" | Skews thru 15° | Always required |
| 36" | Normal (No Skew) | Always required |
| 42" to 60" | Always required | Always required |

### STANDARD PIPE SIZES & MAX PIPE RUNNER LENGTHS (1)

| Pipe Size | Pipe O.D. | Pipe I.D. | Max Pipe Runner Length |
|---|---|---|---|
| 2" STD | 2.375" | 2.067" | N/A |
| 3" STD | 3.500" | 3.068" | 10'- 0" |
| 4" STD | 4.500" | 4.026" | 19'- 8" |
| 5" STD | 5.563" | 5.047" | 34'- 2" |
| | | | |
| | | | |
| | | | |

### ESTIMATED CONCRETE RIPRAP QUANTITIES (CY) (5)

| Nominal Culvert I.D. | 3:1 Side Slope | | | | 4:1 Side Slope | | | | 6:1 Side Slope | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0° Skew | 15° Skew | 30° Skew | 45° Skew | 0° Skew | 15° Skew | 30° Skew | 45° Skew | 0° Skew | 15° Skew | 30° Skew | 45° Skew |
| 12" | 0.4 | 0.4 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.6 | 0.7 | 0.7 | 0.7 | 0.8 |
| 15" | 0.5 | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 | 0.6 | 0.7 | 0.7 | 0.7 | 0.8 | 0.9 |
| 18" | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 | 0.7 | 0.7 | 0.8 | 0.8 | 0.8 | 0.9 | 1.0 |
| 21" | 0.6 | 0.6 | 0.6 | 0.7 | 0.7 | 0.7 | 0.8 | 0.9 | 0.9 | 0.9 | 1.0 | 1.2 |
| 24" | 0.6 | 0.7 | 0.7 | 0.8 | 0.8 | 0.8 | 0.8 | 1.0 | 1.0 | 1.0 | 1.1 | 1.3 |
| 27" | 0.7 | 0.7 | 0.8 | 0.9 | 0.8 | 0.9 | 0.9 | 1.1 | 1.1 | 1.1 | 1.2 | 1.4 |
| 30" | 0.8 | 0.8 | 0.8 | 0.9 | 0.9 | 0.9 | 1.0 | 1.2 | 1.2 | 1.2 | 1.3 | 1.6 |
| 33" | 0.8 | 0.8 | 0.9 | 1.0 | 1.0 | 1.0 | 1.1 | 1.3 | 1.3 | 1.4 | 1.5 | 1.7 |
| 36" | 0.9 | 0.9 | 0.9 | 1.1 | 1.1 | 1.1 | 1.2 | 1.4 | 1.4 | 1.5 | 1.6 | 1.8 |
| 42" | 1.0 | 1.0 | 1.1 | 1.3 | 1.2 | 1.3 | 1.3 | 1.6 | 1.6 | 1.7 | 1.8 | 2.1 |
| 48" | 1.1 | 1.1 | 1.2 | N/A | 1.4 | 1.4 | 1.5 | N/A | 1.9 | 1.9 | 2.1 | N/A |
| 54" | 1.3 | 1.3 | N/A | N/A | 1.6 | 1.6 | N/A | N/A | 2.1 | 2.1 | N/A | N/A |
| 60" | 1.4 | N/A | N/A | N/A | 1.7 | N/A | N/A | N/A | 2.3 | N/A | N/A | N/A |

(1) Size of Pipe Runner shall be as shown in the tables. Cross Pipe shall be the same size as the Pipe Runner. Cross Pipe Stub Out and Bottom Anchor Pipe shall be the next smaller size pipe as shown in the STANDARD PIPE SIZES table.

(2) This standard allows for the placement of only one pipe runner across each culvert pipe opening. In order to limit the clear opening to be traversed by an errant vehicle, the following conditions must be met:

For 60" culvert pipes, the skew must not exceed 0°.
For 54" culvert pipes, the skew must not exceed 15°.
For 48" culvert pipes, the skew must not exceed 30°.
For all culvert pipe sizes 42" and less, the skew must not exceed 45°.

If the above conditions cannot be met, the designer should consider using a safety end treatment with flared wings. For further information, refer to the TxDOT "Roadway Design Manual".

(3) Miter = Slope of Mitered Pipe Culvert End

(4) Riprap placed beyond the limits shown will be paid as Concrete Riprap in accordance with Item 432, "Riprap".

(5) Quantities shown are for one end of one reinforced Concrete Pipe Culvert. For multiple Pipe Culverts or for Corrugated Metal Pipe Culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only.

SHEET 1 OF 2

Texas Department of Transportation
Bridge Division

# SAFETY END TREATMENT
FOR 12" DIA TO 60" DIA
PIPE CULVERTS
TYPE II ~ CROSS DRAINAGE

SETP-CD

| FILE: | setpcdse.dgn | DN: GAF | CK: CAT | DW: JRP | CK: GAF |
|---|---|---|---|---|---|
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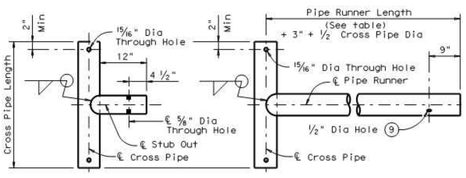
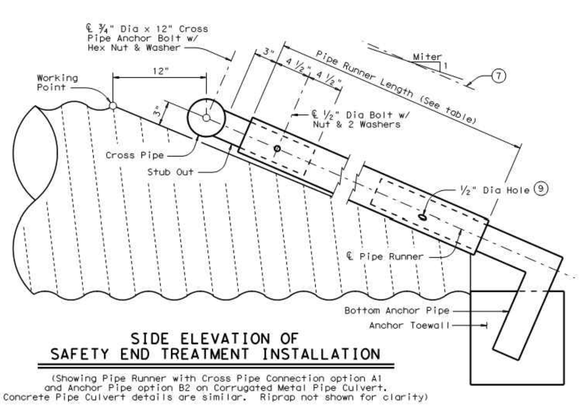
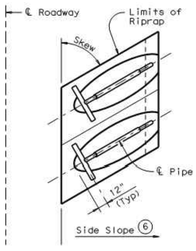



## CROSS PIPE AND CONNECTIONS DETAILS

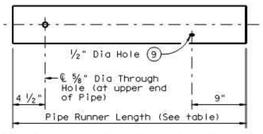



## SIDE ELEVATION OF SAFETY END TREATMENT INSTALLATION

(Showing Pipe Runner with Cross Pipe Connection option A1 and Anchor Pipe option B2 on Corrugated Metal Pipe Culvert. Concrete Pipe Culvert details are similar. Riprap not shown for clarity)

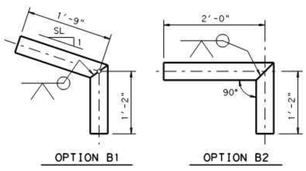



## PLAN OF SKEWED INSTALLATION

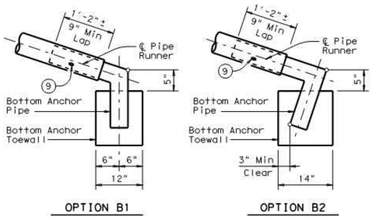



NOTE: The separate Pipe Runner shown is required when Cross Pipe Connection Option A1 is used.

## PIPE RUNNER DETAILS

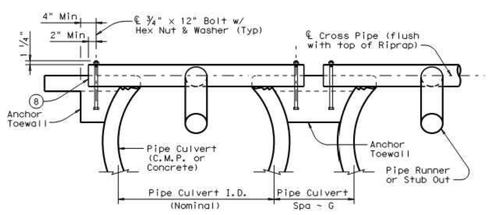



## BOTTOM ANCHOR PIPE DETAILS (10)

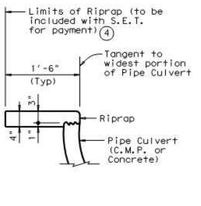



## BOTTOM ANCHOR TOEWALL DETAILS

(Culvert & Riprap not shown for clarity)




SHOWING CROSS PIPE & ANCHOR TOEWALL




SHOWING TYPICAL PIPE CULVERT & RIPRAP

SECTION A-A

(6) Recommended values of side slope are 3:1, 4:1, & 6:1. All quantities, calculations, and dimensions shown herein are based on these recommended values. Slope of 3:1 or flatter is required for vehicle safety.

(7) Note that actual slope of Pipe Runner may vary slightly from Side Slope of Riprap and trimmed Culvert Pipe edge.

(8) Care shall be taken to ensure that Riprap concrete does not flow into the Cross Pipe so as to permit disassembly of the bolted connection to allow cleanout access.

(9) After installation, the 1/2" hole shall be inspected to ensure that the lap of the Pipe Runner with the Bottom Anchor Pipe is adequate.

(10) At fabricator's option, a heat bend to a smooth 5" radius or a manufactured elbow (of the same material as the Runner) may be substituted for the mitered and welded joint in the Bottom Anchor Pipe.

### GENERAL NOTES:

Pipe Runners are designed for a traversing load of 1,800 pounds at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.

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

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

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

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

Bolts and nuts shall conform to ASTM A307.

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

RECORD DRAWING
THIS IS TO CERTIFY THAT CHANGES AND CORRECTIONS HAVE BEEN MADE TO CONFORM TO THE CONTRACTOR'S RECORD DRAWINGS OF THIS PROJECT.
SIGN: Christopher Conway
DATE: 06/01/2020
Glenn Engineering Corporation

SHEET 2 OF 2

Texas Department of Transportation
Bridge Division

# SAFETY END TREATMENT
FOR 12" DIA TO 60" DIA
PIPE CULVERTS
TYPE II ~ CROSS DRAINAGE

SETP-CD

| FILE: | setpcdse.dgn | DN: GAF | CK: CAT | DW: JRP | CK: GAF |
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Notes

| Revision | By | Appd | YYYY.MM.DD |
|---|---|---|---|
| 8 - RFI #40 | RAH | CMG | 2020.06.13 |
| 7 - RFI #79 - PC 20 - REV | RAH | CMG | 2020.06.13 |
| 6 - RFI #115 AND #117 | RAH | CMG | 2020.06.13 |
| 5 - RFI #90 AND #121 | RAH | CMG | 2019.12.12 |
| 4 - RFI #142 | RAH | CMG | 2019.07.23 |
| 3 - CITY COMMENTS | RAH | CMG | 2019.04.30 |
| 2 - ASI #1 - CITY COMMENTS | RAH | CMG | 2019.04.02 |
| Issued | By | Appd | YYYY.MM.DD |
| 100%CD - for Bidding and Construction | RAH | CMG | 2019.03.01 |

Permit/Seal

MIKE GLENN 130509 TEXAS
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Client/Project
Rockwall ISD
Elementary School #15
2911 Greenway Drive
Rockwall, TX 75087

Title
STORM DETAILS 5

Project No. 214030654
Revision 8
Scale AS SHOWN
Drawing No. C 05.17

ROCKWALL INDEPENDENT SCHOOL DISTRICT

Consultants

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