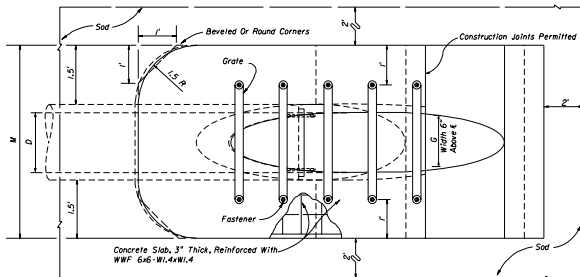


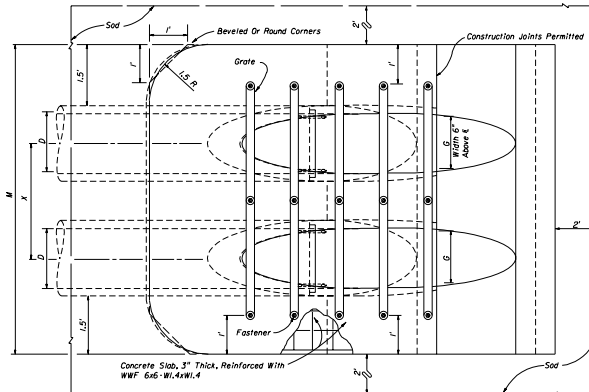
DIMENSIONS & QUANTITIES

| D | X | A | B | C | E | F | G | M | | | | N | GRATE SIZES | | CONCRETE (Cu. Yds.) | | | | SODDING (Sq. Yds.) | | | |
|-----|--------|------|-------|-------|-------|-----|------|-------------|-------------|-------------|-----------|------|----------------------|-------------------|---------------------|-------------|-------------|-----------|--------------------|-------------|-------------|-----------|
| | | | | | | | | Single Pipe | Double Pipe | Triple Pipe | Quad Pipe | | Standard Weight Pipe | Extra Strong Pipe | Single Pipe | Double Pipe | Triple Pipe | Quad Pipe | Single Pipe | Double Pipe | Triple Pipe | Quad Pipe |
| 15" | 2'-7" | 2.27 | 4.09 | 6.36 | 4.03 | 8' | 1.22 | 4.63 | 7.21 | 9.79 | 12.37 | 1.59 | | | 0.76 | 1.46 | 1.54 | 1.94 | 8 | 10 | 11 | 12 |
| 18" | 2'-10" | 2.36 | 5.32 | 7.49 | 5.03 | 9' | 1.41 | 4.92 | 7.75 | 10.58 | 13.42 | 1.21 | | | 0.85 | 1.28 | 1.71 | 2.17 | 9 | 10 | 12 | 13 |
| 24" | 3'-5" | 2.53 | 7.98 | 9.97 | 7.07 | 11' | 1.73 | 5.20 | 8.92 | 12.33 | 15.79 | 1.26 | | | 1.02 | 1.58 | 2.15 | 2.75 | 10 | 12 | 13 | 15 |
| 30" | 4'-3" | 2.70 | 9.25 | 11.95 | 9.03 | 13' | 2.00 | 6.08 | 10.33 | 14.58 | 18.83 | 1.29 | 24" | 3" | 1.23 | 1.98 | 2.74 | 3.50 | 12 | 14 | 15 | 17 |
| 36" | 5'-1" | 2.87 | 11.31 | 14.81 | 11.03 | 15' | 2.24 | 6.67 | 11.75 | 16.83 | 21.92 | 1.33 | 24" | 3" | 1.40 | 2.38 | 3.33 | 4.24 | 13 | 15 | 17 | 20 |
| 42" | 6'-0" | 3.05 | 13.37 | 16.42 | 13.03 | 17' | 2.45 | 7.25 | 13.25 | 19.25 | 25.25 | 1.38 | 24" | 3" | 1.60 | 2.83 | 4.04 | 5.26 | 14 | 17 | 19 | 22 |
| 48" | 6'-9" | 3.22 | 15.43 | 18.65 | 15.03 | 19' | 2.65 | 7.83 | 14.58 | 21.33 | 28.08 | 1.42 | 24" | 3" | 1.81 | 3.26 | 4.70 | 6.14 | 15 | 18 | 21 | 24 |
| 54" | 7'-8" | 3.39 | 17.49 | 20.88 | 17.03 | 21' | 2.83 | 8.42 | 16.06 | 23.75 | 31.42 | 1.46 | 3" | 4" | 2.03 | 3.78 | 5.54 | 7.58 | 17 | 20 | 23 | 27 |
| 60" | 8'-6" | 3.56 | 19.55 | 23.17 | 19.03 | 23' | 3.00 | 9.00 | 17.50 | 26.00 | 34.50 | 1.50 | 3" | 4" | 2.28 | 4.36 | 6.43 | 8.50 | 18 | 22 | 25 | 29 |

Δ 6.42" Δ 6.25" Dimensions permitted to allow use of 8" standard pipe lengths.
 ○ 10.40" ○ 10.40" Dimensions permitted to allow use of 12" standard pipe lengths.
 Δ ○ Concrete slab shall be deepened to form bridge across crown of pipe. See section below.

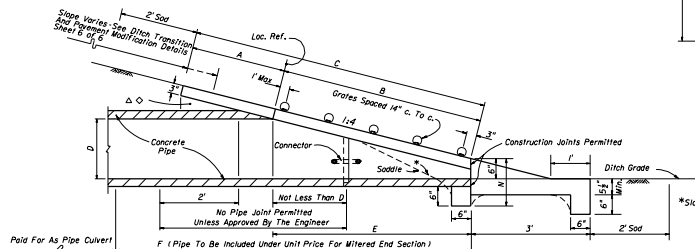


TOP VIEW-SINGLE PIPE



TOP VIEW-MULTIPLE PIPE

Note: See Sheets 5 and 6 for details and general notes.



SECTION

Paid For As Pipe Culvert

F (Pipe To Be Included Under Unit Price For Mitered End Section)

*Slope: To 1 Pipe For Pipes 18" And Smaller
1:2 For Pipes 24" And Larger.

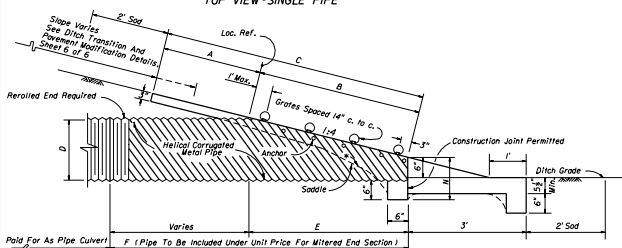
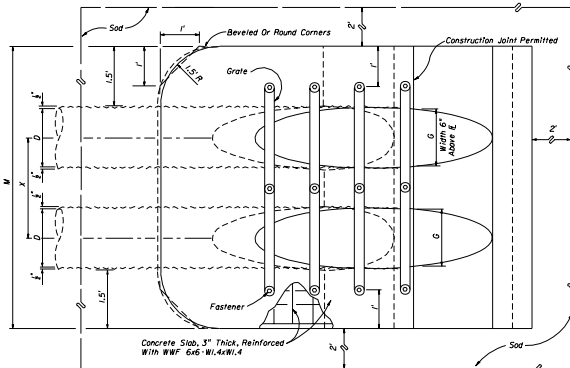
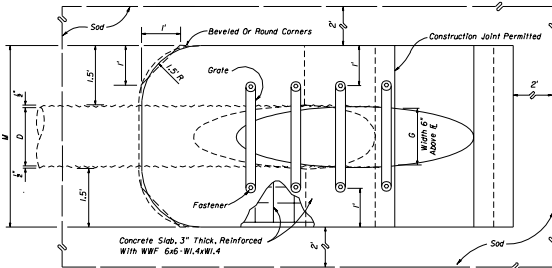
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
ROAD DESIGN

**SIDE DRAIN
MITERED END SECTION**
SINGLE AND MULTIPLE ROUND CONCRETE PIPE

| Revised | Checked | Approved By |
|---------|---------|-------------------------|
| 02/78 | 06/78 | A. A. McNamee |
| 06/78 | 06/78 | State Drainage Engineer |
| 06/78 | 00 | 1 of 6 |

DIMENSIONS & QUANTITIES

| D | X | A | B | C | E | F | G | M | | | | N | GRATE SIZES | | CONCRETE (Cu. Yds.) | | | | SODDING (Sq. Yds.) | | | | REMARKS |
|-----|--------|------|--------|--------|-------|-------|-------|-------------|-------------|-------------|------------|-------|----------------------|-------------------|---------------------|-------------|-------------|------------|--------------------|-------------|-------------|------------|--|
| | | | | | | | | Single Pipe | Double Pipe | Triple Pipe | Quad. Pipe | | Standard Weight Pipe | Extra Strong Pipe | Single Pipe | Double Pipe | Triple Pipe | Quad. Pipe | Single Pipe | Double Pipe | Triple Pipe | Quad. Pipe | |
| 10" | 2'-0" | 2.5' | 0.72' | 3.22' | 0.7' | 4.0' | 0.58' | 3.75' | 5.75' | 7.75' | 9.75' | 1.04' | | | 0.52 | 0.90 | 1.22 | 1.54 | 7 | 8 | 8 | 9 | These sizes are restricted to inlet and outlet treatment for water management systems or similar applications. |
| 10" | 2'-2" | 2.5' | 1.34' | 3.84' | 1.3' | 5.0' | 0.81' | 3.92' | 6.08' | 8.25' | 10.41' | 1.04' | | | 0.64 | 0.99 | 1.34 | 1.70 | 7 | 8 | 9 | 10 | |
| 12" | 2'-4" | 2.5' | 2.06' | 4.56' | 2.0' | 6.0' | 1.00' | 4.08' | 6.42' | 8.75' | 11.08' | 1.04' | | | 0.68 | 1.09 | 1.48 | 1.88 | 7 | 8 | 10 | 11 | |
| 15" | 2'-7" | 2.5' | 3.09' | 5.59' | 3.0' | 7.0' | 1.23' | 4.33' | 6.92' | 9.50' | 12.08' | 1.04' | | | 0.64 | 1.00 | 1.35 | 1.71 | 8 | 9 | 10 | 11 | |
| 18" | 2'-10" | 2.5' | 4.02' | 6.62' | 4.0' | 8.0' | 1.41' | 4.58' | 7.42' | 10.25' | 13.08' | 1.04' | | | 0.69 | 1.09 | 1.49 | 1.89 | 9 | 10 | 11 | 12 | |
| 24" | 3'-5" | 2.5' | 6.18' | 8.68' | 6.0' | 10.0' | 1.73' | 5.08' | 8.50' | 11.92' | 15.33' | 1.04' | | | 0.83 | 1.34 | 1.82 | 2.34 | 10 | 11 | 13 | 14 | |
| 30" | 4'-3" | 2.5' | 8.25' | 10.75' | 8.0' | 12.0' | 2.00' | 5.58' | 9.83' | 14.08' | 18.33' | 1.04' | 2 1/2" | 3" | 0.96 | 1.63 | 2.32 | 2.99 | 11 | 13 | 15 | 17 | |
| 36" | 5'-1" | 2.5' | 10.3' | 12.8' | 10.0' | 14.0' | 2.24' | 6.08' | 11.7' | 16.25' | 21.33' | 1.04' | 2 1/2" | 3" | 1.08 | 1.92 | 2.77 | 3.62 | 12 | 14 | 17 | 19 | |
| 42" | 6'-0" | 2.5' | 12.37' | 14.87' | 12.0' | 16.0' | 2.45' | 6.58' | 12.58' | 18.58' | 24.58' | 1.04' | 2 1/2" | 3 1/2" | 1.20 | 2.26 | 3.34 | 4.61 | 13 | 16 | 18 | 21 | |
| 48" | 6'-9" | 2.5' | 14.43' | 16.93' | 14.0' | 18.0' | 2.65' | 7.08' | 13.83' | 20.58' | 27.33' | 1.04' | 2 1/2" | 3 1/2" | 1.60 | 3.11 | 4.62 | 6.12 | 14 | 17 | 20 | 23 | |
| 54" | 7'-8" | 2.5' | 16.49' | 18.99' | 16.0' | 20.0' | 2.83' | 7.58' | 15.25' | 22.92' | 30.58' | 1.04' | 3" | 4" | 1.76 | 3.56 | 5.34 | 7.14 | 15 | 19 | 22 | 26 | |
| 60" | 8'-6" | 2.5' | 18.55' | 21.05' | 18.0' | 22.0' | 3.00' | 8.08' | 16.58' | 25.08' | 33.58' | 1.04' | 3" | 4" | 1.94 | 4.03 | 6.12 | 8.20 | 17 | 20 | 24 | 28 | |



NOTE: See Sheets 5 and 6 for details and general notes.

*Slopes:
To 6" Pipe For Pipe 18" And Smaller
1:2 For Pipe 24" And Larger

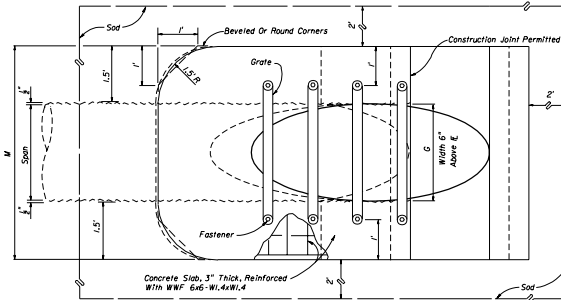
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
ROAD DESIGN

**SIDE DRAIN
MITERED END SECTION**
SINGLE AND MULTIPLE ROUND CORRUGATED METAL PIPE

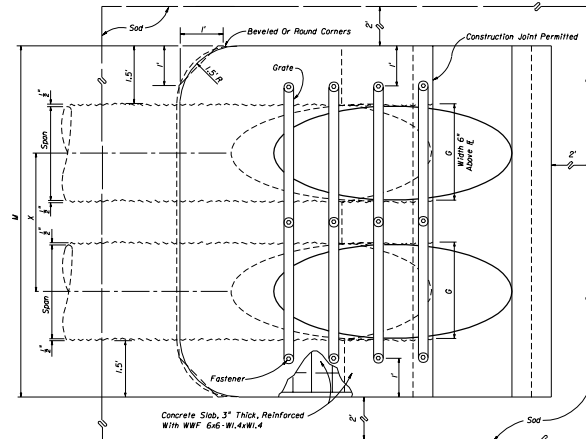
| Revised | By | Date | Approved By |
|-------------|-----|-------|---------------------|
| Designed By | DRP | 08/77 | <i>J. A. McLeod</i> |
| Drawn By | MMH | 08/77 | |
| Checked By | AG | 08/77 | |

DIMENSIONS & QUANTITIES

| 1974 AASHTO | | | | | | | | | | | | CONCRETE (Cu. Yds.) | | | | SODDING (Sq. Yds.) | | | | | | | |
|-------------|------|--------|------|--------|--------|--------|-----|-------|-------------|-------------|-------------|---------------------|-------|----------------------|-------------------|--------------------|-------------|-------------|------------|-------------|-------------|-------------|------------|
| Span | Rise | X | A | B | C | E | F | G | M | | | | N | GRATE SIZES | | Single Pipe | Double Pipe | Triple Pipe | Quad. Pipe | Single Pipe | Double Pipe | Triple Pipe | Quad. Pipe |
| | | | | | | | | | Single Pipe | Double Pipe | Triple Pipe | Quad. Pipe | | Standard Weight Pipe | Extra Strong Pipe | | | | | | | | |
| 17" | 13" | 2'-6" | 2.5' | 2.4' | 4.9' | 2.33' | 7' | 1.39' | 4.50' | 7.00' | 9.50' | 12.00' | 1.04' | | | 0.62 | 0.95 | 1.27 | 1.60 | 8 | 9 | 10 | 11 |
| 21" | 15" | 2'-10" | 2.5' | 3.09' | 5.59' | 3.00' | 8' | 1.76' | 4.83' | 7.67' | 10.50' | 13.33' | 1.04' | | | 0.69 | 1.06 | 1.44 | 1.77 | 8 | 9 | 11 | 12 |
| 28" | 20" | 3'-5" | 2.5' | 4.8' | 7.3' | 4.67' | 9' | 2.22' | 5.42' | 8.83' | 12.25' | 15.67' | 1.04' | | | 0.81 | 1.26 | 1.73 | 2.19 | 9 | 11 | 12 | 14 |
| 35" | 24" | 4'-0" | 2.5' | 6.08' | 8.68' | 6.00' | 11' | 2.95' | 6.00' | 10.00' | 14.00' | 18.00' | 1.04' | 2 1/2" | 3" | 0.94 | 1.51 | 2.09 | 2.66 | 10 | 12 | 14 | 15 |
| 42" | 29" | 4'-9" | 2.5' | 7.90' | 10.40' | 7.67' | 12' | 3.91' | 6.58' | 11.33' | 16.08' | 20.83' | 1.04' | 2 1/2" | 3 1/2" | 1.06 | 1.76 | 2.46 | 3.16 | 11 | 13 | 15 | 17 |
| 49" | 33" | 5'-6" | 2.5' | 9.28' | 11.78' | 9.00' | 14' | 3.34' | 7.17' | 12.67' | 18.17' | 23.67' | 1.04' | 2 1/2" | 3 1/2" | 1.19 | 2.02 | 2.84 | 3.68 | 12 | 14 | 17 | 19 |
| 57" | 38" | 6'-4" | 2.5' | 11.00' | 13.50' | 10.67' | 16' | 3.65' | 7.83' | 14.17' | 20.50' | 26.83' | 1.04' | 3" | 4" | 1.35 | 2.35 | 3.35 | 4.36 | 13 | 16 | 19 | 22 |
| 64" | 43" | 7'-7" | 2.5' | 12.71' | 15.21' | 12.33' | 17' | 3.89' | 8.42' | 15.50' | 22.58' | 29.67' | 1.04' | 3" | 4" | 1.50 | 2.70 | 3.86 | 5.03 | 14 | 17 | 20 | 24 |
| 71" | 47" | 7'-10" | 2.5' | 14.09' | 16.59' | 13.67' | 19' | 4.14' | 9.00' | 16.83' | 24.67' | 32.50' | 1.04' | 3" | 4" | 1.62 | 2.94 | 4.27 | 5.59 | 15 | 18 | 22 | 25 |

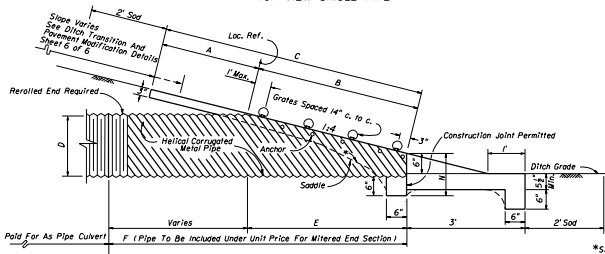


TOP VIEW-SINGLE PIPE



TOP VIEW-MULTIPLE PIPE

NOTE: See Sheets 5 and 6 for details and general notes.



SECTION

*Slopes:

To Span Line For Pipe Arch 28" x 20" And Smaller
 to 2" For Pipe Arch 35" x 24" And Larger

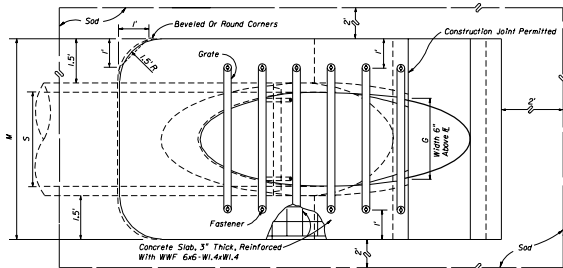
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
ROAD DESIGN

**SIDE DRAIN
MITERED END SECTION**
SINGLE AND MULTIPLE CORRUGATED METAL PIPE-ARCH

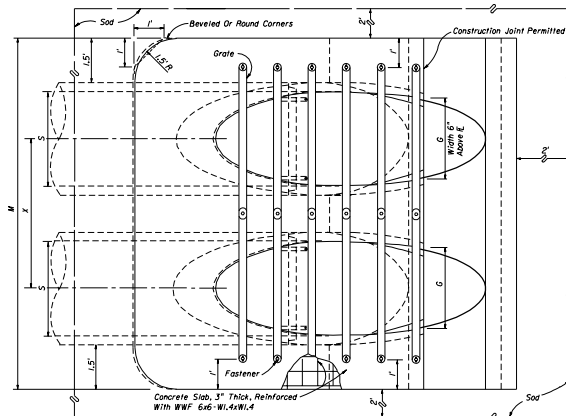
| | | | | | |
|-------------|-----|------|-------|-------------|-----------------------|
| Designed By | ESM | Date | 06/77 | Approved By | <i>J. A. Robinson</i> |
| Drawn By | MM | Date | 06/77 | Scale | AS SHOWN |
| Checked By | JW | Date | 06/77 | Sheet No. | 3 of 6 |

DIMENSIONS & QUANTITIES

| Rise R | Span S | X | A | B | C | E | F | G | M | | | | N | GRATE SIZES | | CONCRETE (Cu. Yds.) | | | | SODDING (Sq. Yds.) | | | |
|-----------|-----------|--------|-------|--------|--------|--------|-----|-------|----------------|----------------|----------------|---------------|-------|-------------------------|----------------------|---------------------|----------------|----------------|---------------|--------------------|----------------|----------------|---------------|
| | | | | | | | | | Single Pipe | Double Pipe | Triple Pipe | Quad. Pipe | | Standard Weight Pipe | Extra Strong Pipe | Single Pipe | Double Pipe | Triple Pipe | Quad. Pipe | Single Pipe | Double Pipe | Triple Pipe | Quad. Pipe |
| 12" | 18" | 2'-10" | 2.36' | 3.06' | 5.42' | 3.03' | 5' | 1.50' | 4.92' | 7.75' | 10.58' | 13.42' | 1.21' | | 0.68 | 1.04 | 1.41 | 1.77 | 8 | 9 | 11 | 12 | |
| 14" | 23" | 3'-4" | 2.44' | 3.75' | 6.29' | 3.70' | 6' | 1.90' | 5.38' | 8.71' | 12.04' | 15.38' | 1.23' | | 0.76 | 1.19 | 1.63 | 2.05 | 9 | 10 | 12 | 13 | |
| 18" | 30" | 4'-0" | 2.62' | 5.47' | 8.09' | 5.36' | 8' | 2.37' | 6.04' | 10.04' | 14.04' | 18.04' | 1.27' | 28" | 3" | 0.95 | 1.52 | 2.19 | 2.65 | 10 | 12 | 13 | 15 |
| 24" | 38" | 5'-0" | 2.79' | 7.89' | 9.99' | 7.03' | 10' | 2.85' | 6.79' | 11.79' | 16.79' | 21.79' | 1.31' | 28" | 3" | 1.18 | 1.96 | 2.74 | 3.53 | 11 | 13 | 15 | 18 |
| 28" | 45" | 5'-11" | 3.05' | 8.90' | 11.95' | 8.70' | 12' | 3.19' | 7.50' | 13.42' | 19.33' | 25.25' | 1.38' | 28" | 3" | 1.41 | 2.42 | 3.44 | 4.45 | 12 | 15 | 18 | 20 |
| 34" | 53" | 7'-0" | 3.22' | 10.62' | 13.84' | 10.36' | 13' | 3.57' | 8.25' | 15.25' | 22.25' | 29.25' | 1.42' | 3" | 3" | 1.63 | 2.92 | 4.22 | 5.52 | 12 | 17 | 20 | 23 |
| 38" | 60" | 7'-10" | 3.39' | 11.99' | 15.38' | 11.70' | 15' | 3.95' | 8.92' | 16.75' | 24.58' | 32.42' | 1.46' | 3" | 4" | 1.83 | 3.36 | 4.89 | 6.41 | 14 | 18 | 21 | 25 |
| 43" | 68" | 8'-11" | 3.56' | 13.77' | 17.27' | 13.36' | 17' | 4.28' | 9.61' | 18.58' | 27.50' | 36.42' | 1.50' | 4" | 4" | 2.09 | 3.95 | 5.80 | 7.65 | 16 | 20 | 23 | 27 |
| 48" | 76" | 9'-11" | 3.73' | 15.43' | 19.16' | 15.03' | 19' | 4.59' | 10.42' | 20.33' | 30.25' | 40.17' | 1.54' | Special | Special | 2.37 | 4.54 | 6.73 | 8.92 | 17 | 21 | 26 | 30 |
| 53" | 83" | 10'-8" | 3.91' | 17.15' | 21.06' | 16.70' | 20' | 4.77' | 11.08' | 21.75' | 32.42' | 43.08' | 1.58' | Special | Special | 2.61 | 5.09 | 7.56 | 10.03 | 18 | 23 | 27 | 32 |
| 58" | 91" | 11'-8" | 4.08' | 18.81' | 22.95' | 18.36' | 22' | 5.07' | 11.83' | 23.50' | 35.17' | 46.83' | 1.63' | Special | Special | 2.91 | 5.77 | 8.64 | 11.50 | 19 | 24 | 29 | 35 |

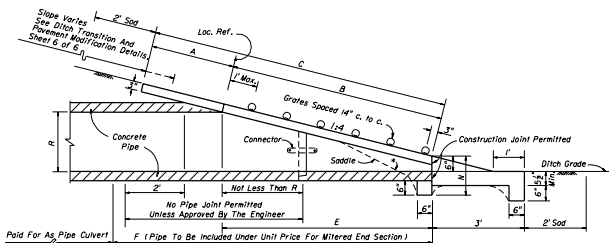


TOP VIEW - SINGLE PIPE



TOP VIEW - MULTIPLE PIPE

NOTE: See Sheets 5 and 6 for details and general notes.



SECTION

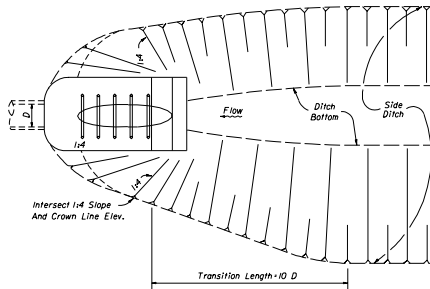
*Slope:
To Major Axis For Pipes 24" x 38" and Smaller.
1:2 For Pipes 29" x 45" and Larger.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
ROAD DESIGN

SIDE DRAIN MITERED END SECTION SINGLE AND MULTIPLE ELLIPTICAL CONCRETE PIPE

| Drawn By | Scale | Checked By | Date | Approved By |
|----------|--------------|------------|-------|--------------------|
| MSD | 1/8" = 1'-0" | MSD | 06/10 | <i>[Signature]</i> |
| MSD | 1/8" = 1'-0" | MSD | 06/10 | STATE OF FLORIDA |
| MSD | 1/8" = 1'-0" | MSD | 06/10 | 4 of 6 |

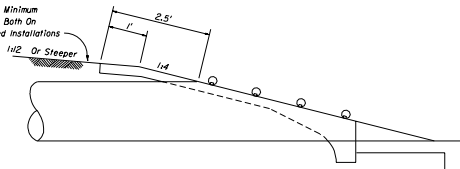
GENERAL NOTES



PLAN

DITCH TRANSITION

Modified Slope When Minimum Cover Or Less Occurs Both On Existing And Proposed Installations



PERMISSIBLE PAVEMENT MODIFICATION

1. Unless otherwise designated in the plans, concrete pipe mitered end sections may be used with any type of side drain pipe; corrugated steel pipe mitered end sections may be used with any type of side drain pipe except aluminum pipe; and, corrugated aluminum mitered end sections may be used with any type of side drain pipe except steel pipe. When bituminous coated metal pipe is specified for side drain pipe, mitered end sections shall be constructed with like pipe or concrete pipe. When the mitered end section pipe is dissimilar to the side drain pipe, a concrete jacket shall be constructed in accordance with Index No. 280.
2. Concrete pipe used in the assembly of mitered end sections shall be of selective lengths to avoid excessive connections.
3. Corrugated metal pipe galvanizing that is damaged during beveling and perforating for mitered end section shall be repaired.
4. That portion of corrugated metal pipe in direct contact with the concrete slab shall be bituminous coated prior to placing of the concrete.
5. Corrugated polyethylene pipe (CPE) for side drain application of 15", 18" or 24" diameter shall utilize either corrugated metal or concrete mitered end sections. When used in conjunction with corrugated metal mitered end sections, connection shall be by either a formed metal band specifically designated to join CPE pipe and metal pipe or other coupler approved by the State Drainage Engineer. When used in conjunction with a concrete mitered end section, connection shall be by concrete jacket constructed in accordance with Index No. 280.
6. When existing multiple side drain pipes are spaced other than the dimensions shown in this detail, or have non-parallel axes, or have non-uniform sections, the mitered end sections will be constructed either separately as single pipe mitered end sections or collectively as multiple pipe end sections as directed by the Engineer; however, mitered end sections will be paid for each, based on each independent pipe end.
7. In addition to the requirements of Section 430-4, side drain culverts shall comply with the cover requirements shown on Index No. 205.
8. The reinforced concrete slab shall be constructed for all sizes of side drain pipe and cast in place with Class I concrete.
9. Round pipe size 30" or greater, pipe-arch size 35" x 24" or greater and elliptical pipe 19" x 30" or greater shall be grated unless excepted in the plans. Smaller sizes of pipe shall be grated only when called for in plans. The lower grate on trailing downstream ends on divided highways shall be omitted.
10. Grates are to be fabricated from steel ASTM A53, Grade B, pipe. The lower grate on all traffic approach ends shall be Schedule 80 and all remaining grates shall be Schedule 40.
Grates subject to soil free and corrosive free environment may be fabricated from galvanized pipe, with base metal exposed during fabrication repaired as specified in Section 562, Standard Specifications; or, fabricated from black pipe and hot dipped galvanized after fabrication in accordance with ASTM A123. Grates subject to soil water or highly corrosive environment shall be hot dipped galvanized after fabrication in accordance with ASTM A123.
11. Ditch transitions shall be used on all grades in excess of 3% as directed by the Engineer.
12. The project engineer shall contact the District Drainage Engineer for possible alternate treatment prior to constructing side drain mitered end sections where a minimum spacing of 30' will not result between the toe points of the mitered end sections.
13. The cost of all pipe (s), grates, fasteners, reinforcing, connectors, anchors, concrete, sealants, jackets and coupling bands shall be included in the cost for the mitered end section. Sodding shall be paid for separately under the contract unit price for Sodding, S1.
14. Mitered end sections shall be paid for under the contract unit price for Mitered End Section (SD), Ea., based on each independent pipe end.

DESIGN NOTES

1. In critical hydraulic locations, grates shall not be used until potential debris transport has been evaluated by the drainage engineer and appropriate adjustments made. Ditch grades in excess of 3% or pipe with less than 1.5' of cover and grades in excess of 1% will require such an evaluation (General Note 9).
2. The design engineer shall determine highly corrosive locations and specify in the plans when the grates shall be hot-dipped galvanized after fabrication (General Note 10).
3. The design engineer shall determine and designate in the plans which alternate types of mitered end section will not be permitted. The restriction shall be based on corrosive or structural requirements.

| | | | |
|--|-------|-------------------------|-------|
| STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN | | | |
| SIDE DRAIN MITERED END SECTION | | | |
| NOTES & INFORMATION | | | |
| Name | Date | Approved By | |
| DESIGNED BY | 08/77 | <i>J. A. McLaughlin</i> | |
| <small>STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION</small> | | | |
| Drawn By | 08/77 | Checked By | 08/77 |
| Checked By | 08/77 | 00 | 273 |