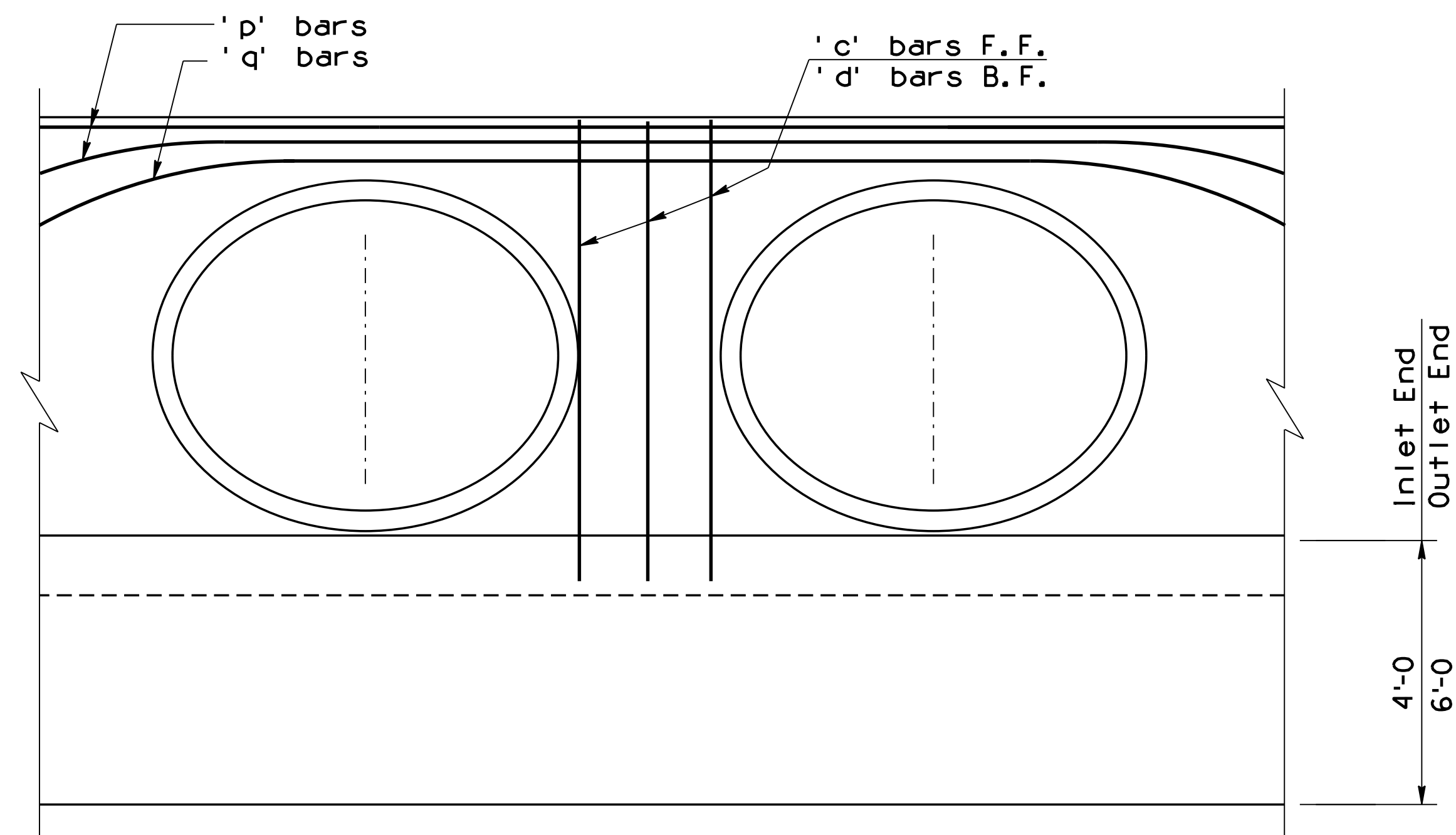
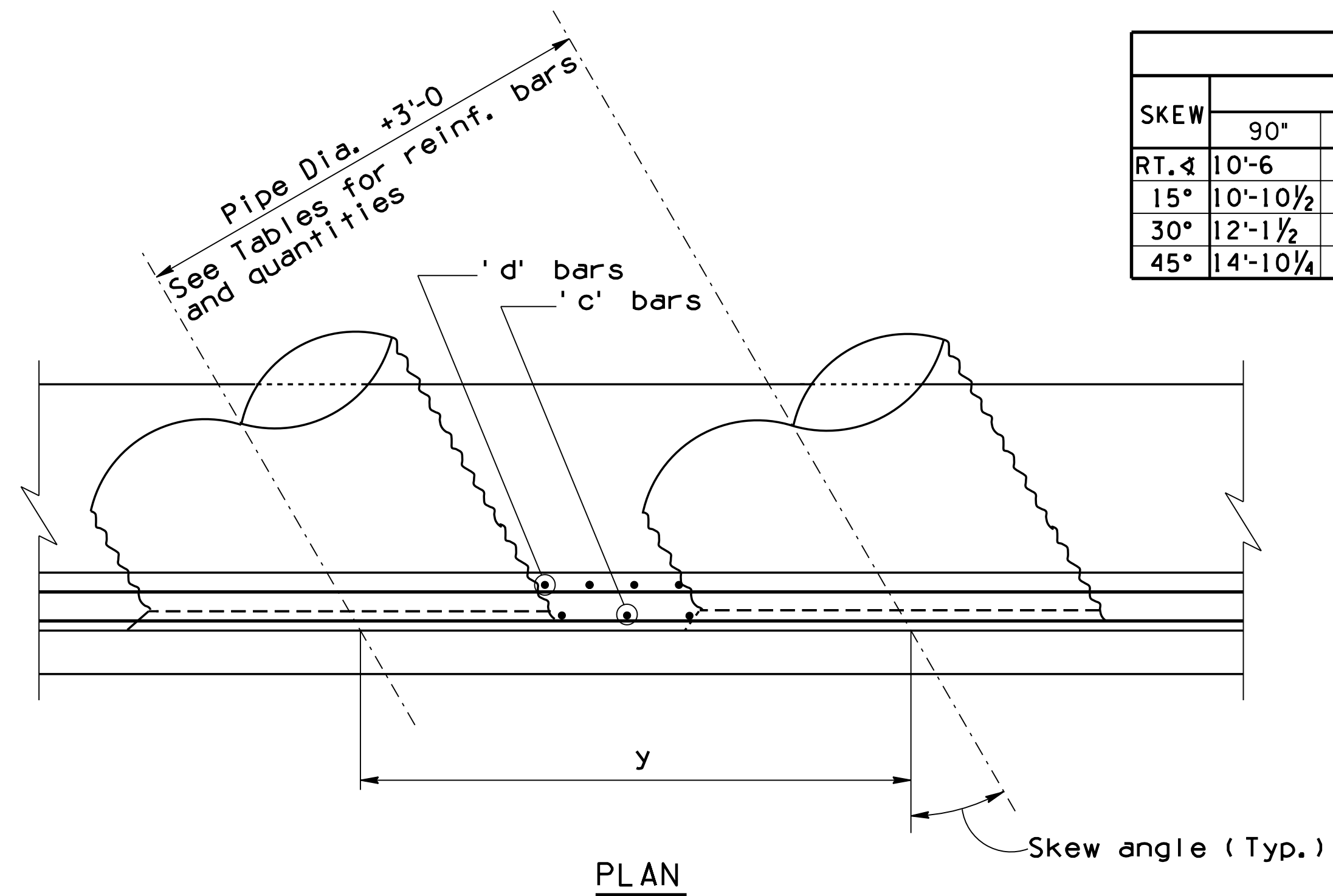


Note to Designer:
The information presented in this Standard Detail has been prepared in accordance with recognized engineering principles and is for general use. It should not be used for specific application without competent professional examination and verification of its suitability and applicability by a licensed professional engineer. Contents within the inner border line shall not be altered.

| NO. | DESCRIPTION OF REVISIONS | DATE |
|-----|--------------------------|------|
| 1 | Original Issue | 7-12 |
| 2 | | |
| 3 | | |
| 4 | | |



| SKEW | DIMENSION Y (FT.) | | | | | | | | | |
|-------|--------------------|------------|-------------|-------------|-------------|------------|-------------|------------|------------|------------|
| | PIPE Dia. (Inches) | | | | | | | | | |
| RT. Δ | 90° | 96° | 102° | 108° | 114° | 120° | 126° | 132° | 138° | 144° |
| 15° | 10'-6" | 11'-0" | 11'-6" | 12'-0" | 12'-6" | 13'-0" | 13'-6" | 14'-0" | 14'-6" | 15'-0" |
| 30° | 10'-10 1/2" | 11'-4 5/8" | 11'-10 5/8" | 12'-5 7/8" | 12'-11 1/4" | 13'-5 1/2" | 13'-11 3/4" | 14'-5 7/8" | 15'-0 7/8" | 15'-6 3/8" |
| 45° | 14'-10 1/4" | 15'-6 3/8" | 16'-3 3/8" | 16'-11 1/8" | 17'-8 1/8" | 18'-4 5/8" | 19'-1 1/8" | 19'-9 5/8" | 20'-6 5/8" | 21'-2 1/2" |

| SKEW | MARK | PIPE Dia. (Inches) | | | | | | | | | |
|-------|------|--------------------|----|-----|-----|-----|-----|-----|-----|-----|-----|
| | | 90 | 96 | 102 | 108 | 114 | 120 | 126 | 132 | 138 | 144 |
| RT. Δ | c | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| | d | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| | e8 | 10 | 10 | 11 | 11 | 12 | 12 | 13 | 13 | 14 | 14 |
| | u * | 6 | 7 | 7 | 7 | 8 | 8 | 8 | 8 | 9 | 9 |
| 15° | c | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| | d | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| | e8 | 10 | 11 | 11 | 12 | 12 | 13 | 13 | 14 | 14 | 15 |
| | u * | 7 | 7 | 7 | 8 | 8 | 8 | 8 | 9 | 9 | 10 |
| 30° | c | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| | d | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| | e9 | 11 | 12 | 13 | 13 | 14 | 14 | 15 | 15 | 16 | 17 |
| | u * | 8 | 8 | 8 | 9 | 9 | 10 | 10 | 10 | 11 | 11 |
| 45° | c | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| | d | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| | e9 | 14 | 15 | 16 | 16 | 17 | 18 | 18 | 19 | 20 | 20 |
| | u * | 10 | 10 | 10 | 11 | 11 | 12 | 12 | 13 | 13 | 13 |

* For Outlet End double No. of 'u' bars

| PIPE Dia. | RT. Δ | CONCRETE QUANTITIES PER ADDITIONAL PIPE (C.Y.) | | | | | | |
|-----------|-------|--|------|------|------------|------|------|------|
| | | INLET END | | | OUTLET END | | | |
| | | 15° | 30° | 45° | 15° | 30° | 45° | |
| 2:1 Slope | 90° | 7.2 | 7.5 | 8.0 | 10.2 | 7.8 | 8.3 | 9.2 |
| | 96° | 7.8 | 8.1 | 8.7 | 11.1 | 8.5 | 8.9 | 12.6 |
| | 102° | 8.5 | 8.8 | 9.4 | 12.0 | 9.2 | 9.6 | 13.6 |
| | 108° | 9.1 | 9.4 | 10.1 | 12.9 | 9.8 | 10.3 | 14.6 |
| | 114° | 9.8 | 10.2 | 10.9 | 13.8 | 10.6 | 11.1 | 15.6 |
| | 120° | 10.5 | 10.9 | 11.7 | 14.9 | 11.3 | 11.8 | 16.7 |
| | 126° | 11.2 | 11.6 | 12.5 | 15.9 | 12.0 | 12.6 | 17.8 |
| | 132° | 12.0 | 12.4 | 13.4 | 17.0 | 12.8 | 13.4 | 18.9 |
| | 138° | 12.8 | 13.2 | 14.3 | 18.0 | 13.7 | 14.2 | 20.0 |
| | 144° | 13.6 | 14.0 | 15.2 | 19.2 | 14.5 | 15.1 | 21.3 |
| 4:1 Slope | 90° | 6.8 | 7.1 | 7.8 | 9.7 | 7.7 | 8.2 | 9.0 |
| | 96° | 7.4 | 7.7 | 8.4 | 10.5 | 8.4 | 8.8 | 9.6 |
| | 102° | 8.0 | 8.3 | 9.2 | 11.4 | 9.0 | 9.5 | 10.5 |
| | 108° | 8.7 | 9.0 | 9.8 | 12.3 | 9.6 | 10.2 | 11.1 |
| | 114° | 9.3 | 9.7 | 10.6 | 13.2 | 10.3 | 11.0 | 12.0 |
| | 120° | 10.0 | 10.4 | 11.3 | 14.2 | 11.0 | 11.7 | 12.7 |
| | 126° | 10.7 | 11.1 | 12.1 | 15.2 | 11.8 | 12.5 | 13.6 |
| | 132° | 11.5 | 11.9 | 12.9 | 16.2 | 12.5 | 13.3 | 14.5 |
| | 138° | 12.2 | 12.7 | 13.7 | 17.3 | 13.2 | 14.2 | 15.3 |
| | 144° | 13.0 | 13.5 | 14.3 | 18.4 | 14.0 | 15.0 | 16.0 |
| 6:1 Slope | 90° | 6.4 | 6.7 | 7.7 | 9.1 | 7.6 | 7.8 | 8.9 |
| | 96° | 7.0 | 7.3 | 8.3 | 9.9 | 8.2 | 8.4 | 9.5 |
| | 102° | 7.6 | 7.9 | 8.9 | 10.8 | 8.8 | 9.1 | 10.2 |
| | 108° | 8.2 | 8.5 | 9.6 | 11.6 | 9.3 | 9.7 | 10.9 |
| | 114° | 8.9 | 9.2 | 10.3 | 12.5 | 10.1 | 10.5 | 11.7 |
| | 120° | 9.5 | 9.9 | 11.0 | 13.5 | 10.7 | 11.2 | 12.5 |
| | 126° | 10.2 | 10.6 | 11.7 | 14.5 | 11.4 | 12.0 | 13.2 |
| | 132° | 11.0 | 11.3 | 12.4 | 15.5 | 12.2 | 12.7 | 14.0 |
| | 138° | 11.7 | 12.1 | 13.2 | 16.5 | 12.8 | 13.6 | 14.8 |
| | 144° | 12.5 | 12.9 | 14.0 | 17.6 | 13.6 | 14.4 | 15.7 |

| PIPE Dia. | REINF. BAR QUANTITIES PER ADDITIONAL PIPE (Lbs.) | | | | | | | | | | | | | | | | | | | | | | | |
|-----------|--|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------------|-----|-----|------|-----|-----|-----|-----|-----|------|------|------|
| | INLET END | | | | | | | | | | | | OUTLET END | | | | | | | | | | | |
| | RT. Δ | | | 15° | | | 30° | | | 45° | | | RT. Δ | | | 15° | | | 30° | | | 45° | | |
| | 2:1 | 4:1 | 6:1 | 2:1 | 4:1 | 6:1 | 2:1 | 4:1 | 6:1 | 2:1 | 4:1 | 6:1 | 2:1 | 4:1 | 6:1 | 2:1 | 4:1 | 6:1 | 2:1 | 4:1 | 6:1 | 2:1 | 4:1 | 6:1 |
| 90° | 280 | 270 | 245 | 320 | 285 | 280 | 340 | 300 | 300 | 460 | 385 | 385 | 345 | 340 | 315 | 400 | 360 | 355 | 425 | 390 | 385 | 570 | 495 | 490 |
| 96° | 320 | 320 | 280 | 350 | 335 | 300 | 365 | 355 | 320 | 560 | 460 | 440 | 395 | 395 | 355 | 425 | 415 | 375 | 450 | 445 | 405 | 670 | 565 | 550 |
| 102° | 385 | 375 | 355 | 475 | 380 | 375 | 470 | 380 | 375 | 605 | 485 | 470 | 460 | 455 | 435 | 550 | 460 | 450 | 560 | 470 | 465 | 715 | 600 | 580 |
| 108° | 475 | 465 | 380 | 505 | 420 | 410 | 500 | 410 | 400 | 680 | 640 | 540 | 550 | 545 | 460 | 590 | 505 | 495 | 595 | 510 | 495 | 800 | 760 | 660 |
| 114° | 510 | 510 | 485 | 525 | 505 | 490 | 535 | 515 | 490 | 825 | 695 | 665 | 600 | 600 | 570 | 610 | 590 | 580 | 635 | 610 | 590 | 950 | 815 | 790 |
| 120° | 530 | 530 | 505 | 630 | 545 | 525 | 640 | 530 | 520 | 875 | 735 | 705 | 615 | 615 | 595 | 720 | 635 | 615 | 745 | 640 | 620 | 1005 | 860 | 835 |
| 126° | 565 | 565 | 540 | 670 | 565 | 545 | 695 | 565 | 550 | 915 | 760 | 740 | 650 | 650 | 630 | 770 | 660 | 640 | 800 | 675 | 660 | 1050 | 890 | 870 |
| 132° | 715 | 710 | 610 | 725 | 640 | 595 | 725 | 590 | 570 | 1210 | 985 | 845 | 815 | 805 | 710 | 825 | 740 | 695 | 840 | 800 | 680 | 1350 | 1125 | 985 |
| 138° | 770 | 770 | 735 | 790 | 770 | 765 | 785 | 730 | 605 | 1275 | 1055 | 1015 | 870 | 825 | 835 | 895 | 880 | 870 | 905 | 850 | 725 | 1420 | 1195 | 1155 |
| 144° | 800 | 800 | 770 | 965 | 820 | 780 | 835 | 775 | 745 | 1330 | 1085 | 1045 | 905 | 905 | 875 | 1075 | 930 | 890 | 955 | 900 | 865 | 1475 | 1225 | 1190 |

| SKEW | MARK * | BAR LENGTH ADJUSTMENT PER ADDITIONAL PIPE (FT.) | | | | | | | | | |
|-------|-----------------|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | | PIPE Dia. (Inches) | | | | | | | | | |
| RT. Δ | j, n1, n2, p, q | 10'-6" | 11'-0" | 11'-6" | 12'-0" | 12'-6" | 13'-0" | 13'-6" | 14'-0" | 14'-6" | 15'-0" |
| 15° | g, n1, n2, p, q | 10'-9" | 11'-3" | 12'-0" | 12'-6" | 13'-0" | 13'-6" | 14'-0" | 14'-6" | 15'-0" | 15'-6" |
| 30° | g, n1, n2, p, q | 12'-0" | 12'-9" | 13'-3" | 13'-9" | 14'-6" | 15'-0" | 15'-6" | 16'-3" | 16'-9" | 17'-3" |
| 45° | g, n1, n2, p, q | 14'-9" | 15'-6" | 16'-3" | 17'-0" | 17'-9" | 18'-3" | 19'-0" | 19'-9" | 20'-6" | 21'-3" |

* Increase bar lengths for single pipes by dimensions in table for each additional pipe.

NOTE:

For General Notes and additional Details, see SD 6.30 (1 of 5).

NOTES:

Multipipe culvert headwall quantities are obtained by multiplying quantity shown in tables by the number of additional pipes and adding to single pipe headwall quantity. Number of bars and quantities shown in tables are for one headwall.

| | |
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| DESIGN APPROVED <i>Shafiq U. Hasan</i> | ARIZONA DEPARTMENT OF TRANSPORTATION INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION BRIDGE GROUP STRUCTURE DETAIL |
| APPROVED FOR DISTRIBUTION <i>Jason A. Nehme</i> | PIPE CULVERT HEADWALLS MULTI-PIPE WITHOUT APRON |
| ROUTE | PROJECT NO. |
| LOCATION | FA NO. |
| DRAWING NO. SD 6.35 (1 of 2) | |
| SHEET NO. OF | |