

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PROMULGATED BY THE
 PUBLIC WORKS STANDARDS INC.
 GREENBOOK COMMITTEE
 1984
 REV. 1993, 1996, 2009, 2011

CATCH BASIN
 MANHOLE FRAME AND COVER

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN

312-4

SHEET 1 OF 2

SEE OCPW STANDARD PLAN 312-4-OC FOR CONDITIONS

NOTES

1. THE CAST IRON USED SHALL CONFORM TO ASTM A48M CLASS 35B.
2. THE FRAME AND COVER SHALL BE COATED WITH ASPHALTUM OR BITUMINOUS PAINT AFTER TESTING AND INSPECTION.
3. FOUNDRY IDENTIFYING MARK, HEAT AND DATE SHALL BE CAST ON THE BOTTOM OF THE COVER AND ON THE INSIDE OF THE FRAME.
4. IMPORTED COVERS AND FRAMES SHALL HAVE THE COUNTRY OF ORIGIN MARKING IN COMPLIANCE WITH FEDERAL REGULATIONS.
5. WEIGHT OF FRAME SHALL BE 30 POUNDS (15 kg). WEIGHT OF COVER SHALL BE 85 POUNDS (40 kg). ACTUAL WEIGHTS SHALL BE WITHIN A RANGE OF 95% TO 110%.
6. THE MANHOLE FRAME AND COVER SHALL BE INSPECTED BY THE ENGINEER PRIOR TO SHIPMENT TO THE WORK SITE. ACCEPTANCE WILL BE INDICATED BY THE AGENCY'S MARK.
7. AGENCY INSCRIPTION SHALL BE AS SPECIFIED ON THE PLANS OR SPECIAL PROVISIONS.

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

CATCH BASIN MANHOLE FRAME AND COVER

STANDARD PLAN

312-4

SHEET 2 OF 2

SEE OCPW STANDARD PLAN 312-4-OC FOR CONDITIONS

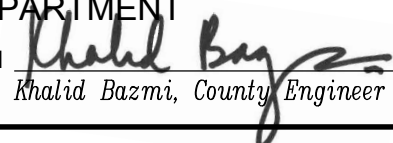
THE FOLLOWING STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION, 2012 EDITION, OF THE PUBLIC WORKS STANDARDS, INC. HAVE BEEN ADOPTED BY OCPW WITH CONDITIONS WHICH SHALL APPLY TO OCPW USE. THE CONDITIONS ARE LISTED BELOW.

| <u>SPPWC #</u> | <u>OCPW #</u> | <u>NAME AND CONDITIONS</u> |
|----------------|---------------|--|
| 312-4 | 312-4-OC | <u>CATCH BASIN MANHOLE FRAME AND COVER</u> 1. DELETE NOTE 2. 2. FRAME AND COVER SHALL BE GALVANIZED. |

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Revision: August 2018

Approved

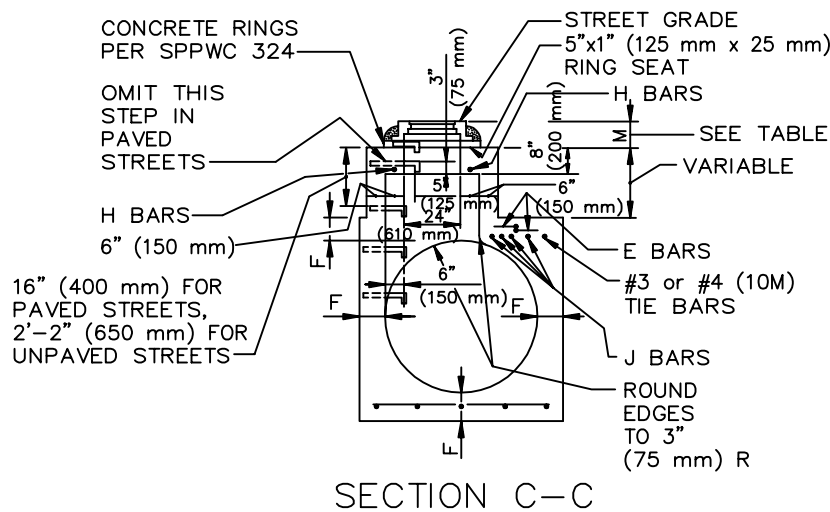
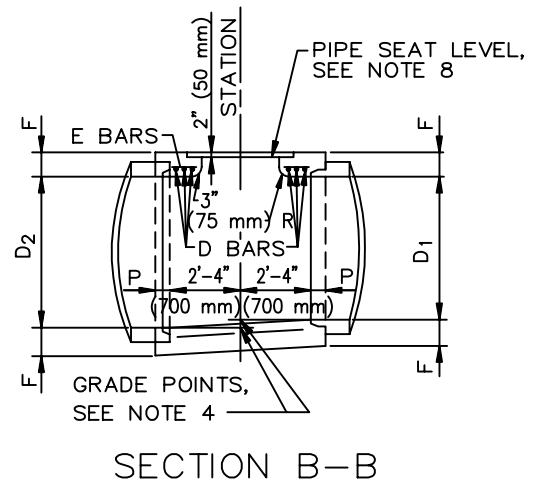
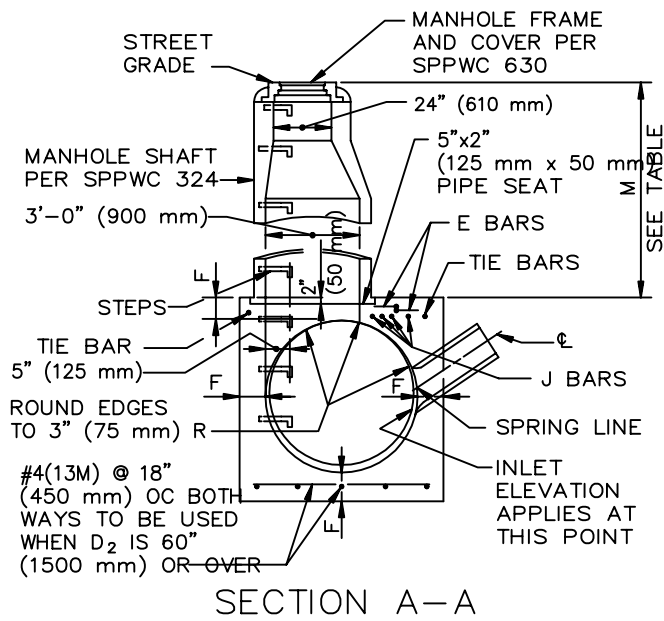
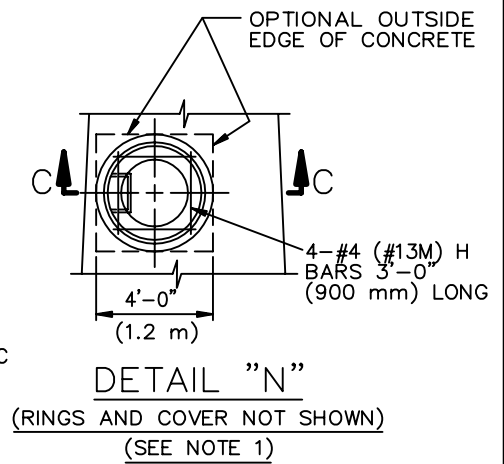
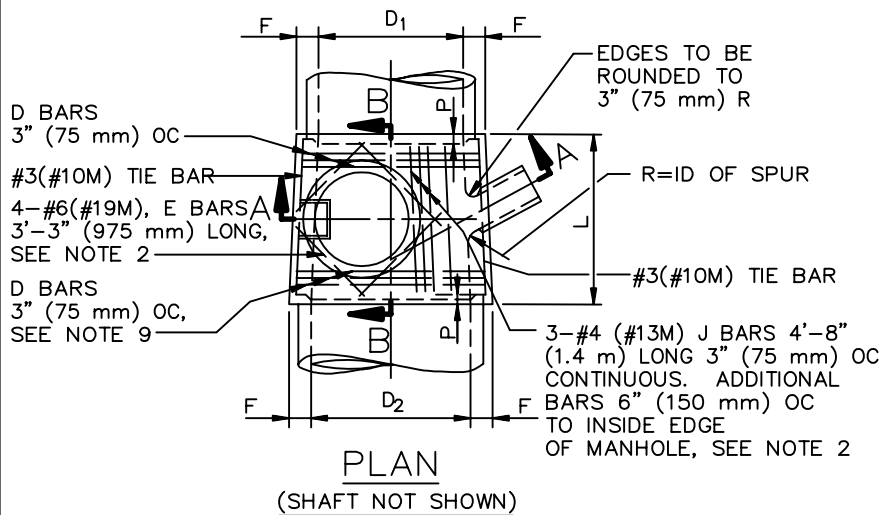

Khalid Bazmi, County Engineer

STD. PLAN

312-4-OC

SPPWC STANDARD PLAN - CATCH BASIN MANHOLE FRAME AND COVER

SHT. 1 OF 1



STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PROMULGATED BY THE
PUBLIC WORKS STANDARDS INC.
GREENBOOK COMMITTEE
1992
REV. 1996, 2009

MANHOLE PIPE-TO-PIPE
MAIN LINE ID=36" (900 mm) OR LARGER

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN

320-2

SHEET 1 OF 4

SEE OCPW STANDARD PLAN 320-2-OC FOR CONDITIONS

| TABLE OF VALUES FOR F | |
|-----------------------|------------------|
| D ₂ | F |
| 36" (900 mm) | 6 1/2" (165 mm) |
| 39" (975 mm) | 7" (180 mm) |
| 42" (1050 mm) | 7 1/2" (190 mm) |
| 45" (1125 mm) | 7 3/4" (195 mm) |
| 48" (1200 mm) | 8" (205 mm) |
| 51" (1275 mm) | 8 1/2" (215 mm) |
| 54" (1350 mm) | 9" (230 mm) |
| 57" (1425 mm) | 9 1/4" (235 mm) |
| 60" (1500 mm) | 9 1/2" (240 mm) |
| 63" (1575 mm) | 10" (255 mm) |
| 66" (1650 mm) | 10 1/4" (260 mm) |
| 69" (1725 mm) | 10 3/4" (275 mm) |
| 72" (1800 mm) | 11" (280 mm) |
| 78" (1950 mm) | 11 3/4" (300 mm) |
| 84" (2100 mm) | 12 1/2" (320 mm) |
| 90" (2250 mm) | 13 1/4" (335 mm) |
| 96" (2400 mm) | 14" (355 mm) |
| 102" (2550 mm) | 15 1/2" (395 mm) |
| 108" (2700 mm) | 16" (405 mm) |
| 114" (2850 mm) | 16 1/2" (420 mm) |
| 120" (3000 mm) | 17" (430 mm) |
| 126" (3150 mm) | 17" (430 mm) |
| 132" (3300 mm) | 17 1/2" (445 mm) |
| 138" (3450 mm) | 17 1/2" (445 mm) |
| 144" (3600 mm) | 18" (455 mm) |

| TABLE OF VALUES FOR M (SEE NOTE 1) | | | | |
|------------------------------------|--------------|---------------------|----------------|-----------------|
| SECTION | PAVED STREET | | UNPAVED STREET | |
| | MAX | MIN | MAX | MIN |
| A-A | | 2'-10 1/2" (867 mm) | | 3'-6" (1060 mm) |
| C-C | 11" (282 mm) | 8 1/2" (217 mm) | 16" (410 mm) | 15" (380 mm) |

| STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION | | STANDARD PLAN |
|---|--|---------------|
| MANHOLE PIPE-TO-PIPE MAIN LINE ID = 36" (900 mm) OR LARGER | | 320-2 |
| | | SHEET 2 OF 4 |

SEE OCPW STANDARD PLAN 320-2-OC FOR CONDITIONS

NOTES

1. WHEN DEPTH M FROM STREET GRADE TO THE TOP OF THE BOX IS LESS THAN 2'-10 1/2" (867 mm) FOR PAVED STREETS OR 3'-6" (1060 mm) FOR UNPAVED STREETS, CONSTRUCT MONOLITHIC SHAFT PER SECTION C-C AND DETAIL "N". SHAFT FOR ANY DEPTH OF MANHOLE MAY BE CONSTRUCTED PER SECTION C-C. WHEN DIAMETER D₁ IS 48" (1200 mm) OR LESS, CENTER OF SHAFT MAY BE LOCATED PER NOTE 2.
2. CENTER OF MANHOLE SHAFT SHALL BE LOCATED OVER CENTER LINE OF STORM DRAIN WHEN DIAMETER D₁ IS 48" (1200 mm) OR LESS, IN WHICH CASE PLACE E BARS SYMMETRICALLY AROUND SHAFT AT 45° WITH CENTERLINE AND OMIT J BARS.
3. L AND P SHALL HAVE THE FOLLOWING VALUES UNLESS OTHERWISE SHOWN ON THE PROJECT DRAWINGS:
 - A. D₂=96" (2400 mm) OR LESS, L=5'-6" (1.7 m), P=5" (130 mm)
 - B. D₂ OVER 96" (2400 mm), L=6'-0" (1.8 m), P=8" (210 mm)L MAY BE INCREASED OR LOCATION OF MANHOLE SHIFTED TO MEET PIPE ENDS. WHEN L GREATER THAN THAT SHOWN ABOVE IS SPECIFIED, D BARS SHALL BE CONTINUED 6" (150 mm) OC.
4. STATIONS OF MANHOLES SHOWN ON PLANS APPLY AT CENTERLINE OF SHAFT. ELEVATIONS ARE SHOWN AT CENTERLINE OF SHAFT AND REFER TO THE PROLONGED INVERT GRADE LINES.
5. REINFORCEMENT SHALL CONFORM TO ASTM A 615M, GRADE 300 (ASTM A 615, GRADE 40), AND SHALL TERMINATE 1 1/2" (40 mm) CLEAR OF CONCRETE SURFACES UNLESS OTHERWISE SHOWN.
6. FLOOR OF MANHOLE SHALL BE STEEL TROWELED TO SPRING LINE.
7. BODY OF MANHOLE SHALL BE POURED IN ONE CONTINUOUS OPERATION EXCEPT THAT A CONSTRUCTION JOINT WITH A LONGITUDINAL KEYWAY MAY BE PLACED AT SPRING LINE.
8. THICKNESS OF THE DECK SHALL VARY WHEN NECESSARY TO PROVIDE A LEVEL SEAT BUT SHALL NOT BE LESS THAN THE TABULAR VALUES FOR F SHOWN ON SHEET 2.
9. D BARS SHALL BE #4 (#13M) FOR D₂≤39" (975 mm) OR LESS, #5 (#16M) FOR D₂ = 42" (1050 mm) TO 84" (2100 mm) INCLUSIVE AND #6 (#19M) FOR D₂ = 90" (2250 mm) OR OVER.
10. CENTERLINE OF INLET PIPE SHALL INTERSECT INSIDE FACE OF CONE AT SPRING LINE UNLESS OTHERWISE SHOWN.
11. STEPS SHALL CONFORM TO SPPWC 635 OR 636. UNLESS OTHERWISE SHOWN, STEPS SHALL BE UNIFORMLY SPACED 14" (350 mm) TO 15" (375 mm) OC. THE LOWEST STEP SHALL NOT BE MORE THAN 24" (600 mm) ABOVE THE INVERT.
12. THE FOLLOWING CRITERIA SHALL BE USED FOR THIS MANHOLE:
 - A. MAIN LINE = 36" (900 mm) INSIDE DIAMETER OR LARGER. EXCEPT IF THE MAIN LINE RCP DOWNSTREAM OF MANHOLE IS 36" (900 mm) TO 42" (1050 mm) INSIDE DIAMETER AND THE MAIN LINE RCP UPSTREAM IS 33" (825 mm) OR LESS SPPWC 321 SHALL BE USED.

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

MANHOLE PIPE-TO-PIPE
MAIN LINE ID = 36" (900 mm) OR LARGER

STANDARD PLAN

320-2

SHEET 3 OF 4

SEE OCPW STANDARD PLAN 320-2-OC FOR CONDITIONS

- B. THE OUTSIDE DIAMETER OF THE LATERAL MUST BE LESS THAN OR EQUAL TO 1/2 THE INSIDE DIAMETER OF THE MAIN LINE. IF THE UPSTREAM AND DOWNSTREAM DIAMETERS OF THE MANHOLE ARE NOT THE SAME, THE GOVERNING INSIDE DIAMETER OF THE MAIN LINE SHALL BE CONSIDERED TO BE THAT WHERE THE EXTENDED CENTERLINE OF THE LATERAL ENTERS THE MANHOLE.
- C. IN NO INSTANCE SHALL THE INSIDE DIAMETER OF THE LATERAL TO THE MANHOLE BE GREATER THAN 30" (750 mm).
13. MANHOLE FRAME AND COVER SHALL CONFORM TO SPPWC 630 UNLESS OTHERWISE SHOWN.
14. MANHOLE SHAFT SHALL CONFORM TO SPPWC 324 UNLESS OTHERWISE SHOWN.
15. WHERE A MANHOLE SHAFT – 36" (900 mm) WITHOUT REDUCER IS SPECIFIED REFER TO SPPWC 326.
16. WHERE A PRESSURE MANHOLE SHAFT – WITH ECCENTRIC REDUCER IS SPECIFIED REFER TO SPPWC 328.
17. WHERE A PRESSURE MANHOLE SHAFT – 914 mm (36") WITHOUT REDUCER IS SPECIFIED REFER TO SPPWC 329.
18. THE FOLLOWING SPPWC ARE INCORPORATED HEREIN:
- 324 MANHOLE SHAFT – WITH ECCENTRIC REDUCER
 - 326 MANHOLE SHAFT – 36" (900 mm) WITHOUT REDUCER
 - 328 PRESSURE MANHOLE SHAFT – WITH ECCENTRIC
 - 329 PRESSURE MANHOLE SHAFT 36" (914 mm) WITHOUT REDUCER
 - 630 24" (610 mm) MANHOLE FRAME AND COVER
 - 633 36" (914 mm) MANHOLE FRAME AND COVER
 - 635 STEEL STEP
 - 636 POLYPROPYLENE PLASTIC STEP

THE FOLLOWING STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION, 2009 EDITION, OF THE PUBLIC WORKS STANDARDS, INC. HAVE BEEN ADOPTED BY OCPW WITH CONDITIONS WHICH SHALL APPLY TO OCPW USE. THE CONDITIONS ARE LISTED BELOW.


| | | |
|----------------|---------------|--|
| <u>SPPWC #</u> | <u>OCPW #</u> | <u>NAME AND CONDITIONS</u> |
| 320-2 | 320-2-OC | MANHOLE PIPE-TO-PIPE MAIN LINE ID=36" (900MM) OR LARGER |

1. REVISE THE NAME OF SPPWC STD. PLAN 320-2 TO "JUNCTION STRUCTURE - TYPE II".
2. REVISE NOTES AS FOLLOWS:
 - 3B. D₂ OVER 96 INCHES (2400 mm), L=6 FEET (1.8 m), P=8 INCHES 2 (210 mm), L MAY BE INCREASED A MAXIMUM OF 1 FOOT AT EACH END TO MEET PIPE ENDS; CONTINUE D BARS AT 3 INCHES ON-CENTER. WHEN L IS GREATER THAN THAT SHOWN ABOVE IS SPECIFIED, D BARS SHALL BE CONTINUED 6 INCHES (150 mm) ON-CENTER.
 - II. STEPS SHALL CONFORM TO STD. PLAN 1507 OR SPPWC STD. PLAN 635. UNLESS OTHERWISE SHOWN, STEPS SHALL BE UNIFORMLY SPACED 14 INCHES (350 mm) TO 15 INCHES (375 mm) ON-CENTER. THE LOWEST STEP SHALL NOT BE MORE THAN 24 INCHES (600 mm) ABOVE THE INVERT.
14. MANHOLE SHAFT SHALL CONFORM TO STD. PLAN 1503 UNLESS OTHERWISE SHOWN.
3. DELETE NOTES 16, 17 & 18.
4. ADD NOTES:
 19. RINGS, REDUCER AND PIPE FOR ACCESS SHAFT SHALL BE SEATED IN 1:2 MORTAR AND NEATLY POINTED OR WIPED INSIDE THE SHAFT. GROUT BETWEEN THE SHAFT AND THE PIPE OR RING SEAT.
 20. THE ANGLE BETWEEN THE LATERAL AND THE MAIN LINE SHALL NOT BE GREATER THAN 45 DEGREES WHEN THE FLOW IN THE LATERAL EXCEEDS 10 PERCENT OF THE FLOW IN THE MAIN LINE.
 21. CONSTRUCT DEEP MANHOLE LANDING(S) PER STD. PLAN 1508 AND INCREASE JUNCTION STRUCTURE BOTTOM WIDTH TO 4 FEET MINIMUM WHEN THE COMBINED DEPTH OF THE PIPE DIAMETER AND MANHOLE SHAFT (M) IS 20 FEET OR GREATER AND THE MANHOLE SHAFT IS GREATER THAN 12 FEET OR, AS DIRECTED BY THE ENGINEER.

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Revision: August 2018

Approved


Khalid Bazmi, County Engineer

STD. PLAN

320-2-OC

SPPWC STANDARD PLAN - MANHOLE PIPE-TO-PIPE
MAIN LINE ID = 36" (900 mm) OR LARGER
(JUNCTION STRUCTURE - TYPE II)

SHT. 1 OF 2

THE FOLLOWING STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION, 2009 EDITION, OF THE PUBLIC WORKS STANDARDS, INC. HAVE BEEN ADOPTED BY OCPW WITH CONDITIONS WHICH SHALL APPLY TO OCPW USE. THE CONDITIONS ARE LISTED BELOW.

SPPWC # OCPW # NAME AND CONDITIONS

320-2

320-2-OC

MANHOLE PIPE-TO-PIPE
MAIN LINE ID=36" (900mm) OR LARGER

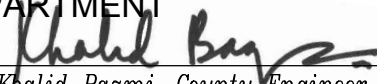
5. INCREASE DIMENSION "F" AT EDGES TO A MINIMUM OF 6 INCHES+(PIPE WALL THICKNESS) FOR EMBEDMENT DIMENSION "P"+6 INCHES.
6. REVISE A PORTION OF "TABLE OF VALUES FOR F" AS SHOWN:

| TABLE OF VALUES FOR F | |
|-----------------------|-------------|
| D ₂ | F |
| 36" (900 mm) | 8" (205 mm) |
| 39" (975 mm) | 8" (205 mm) |
| 42" (1050 mm) | 8" (205 mm) |
| 45" (1125 mm) | 8" (205 mm) |

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Revision: August 2018

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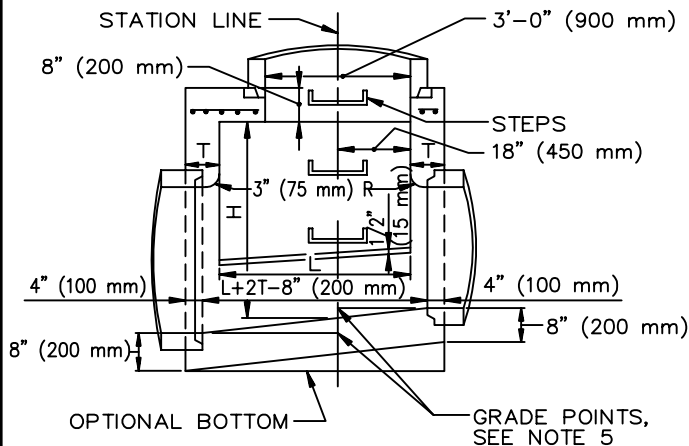
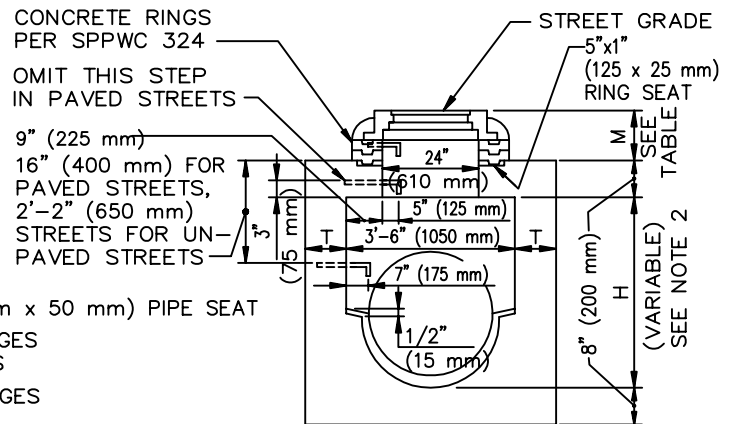
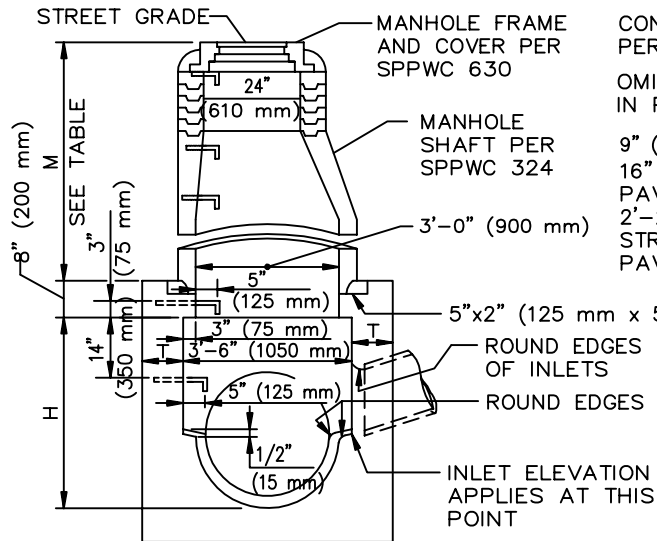
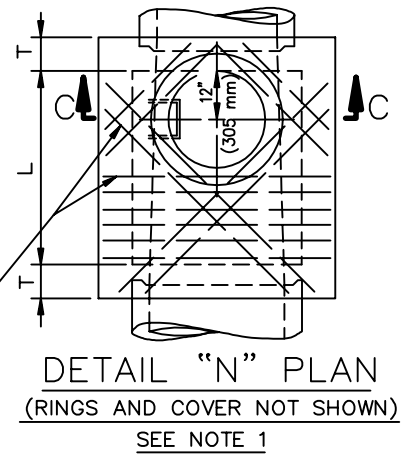
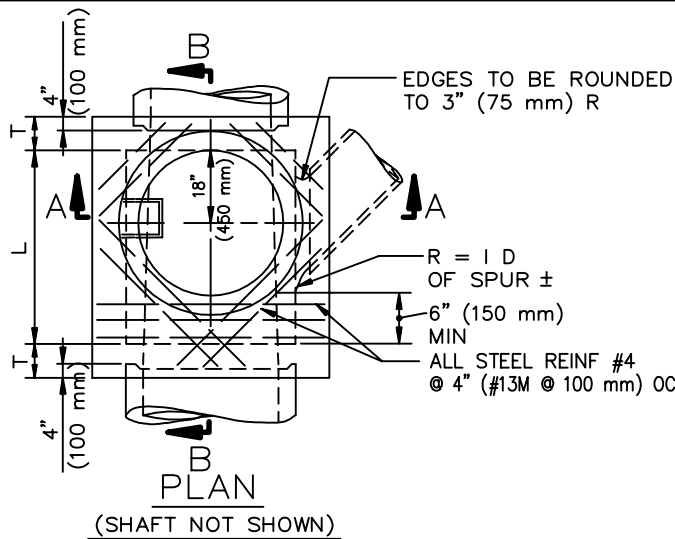

Khalid Bazmi, County Engineer

STD. PLAN

320-2-OC

SPPWC STANDARD PLAN - MANHOLE PIPE-TO-PIPE
MAIN LINE ID = 36" (900 mm) OR LARGER
(JUNCTION STRUCTURE - TYPE II)

SHT. 2 OF 2



| TABLE OF VALUES FOR M (SEE NOTE 1) | | | | |
|------------------------------------|--------------|---------------------|----------------|-----------------|
| SECTION | PAVED STREET | | UNPAVED STREET | |
| | MAX | MIN | MAX | MIN |
| A-A | | 2'-10 1/2" (867 mm) | | 3'-6" (1060 mm) |
| C-C | 11" (282 mm) | 8 1/2" (217 mm) | 16" (410 mm) | 15" (380 mm) |

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PROMULGATED BY THE
PUBLIC WORKS STANDARDS INC.
GREENBOOK COMMITTEE
1992
REV. 1996, 2009

**MANHOLE PIPE-TO-PIPE (ONE OR BOTH
MAIN LINE IDS 33" (825 mm) OR SMALLER)**

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN

321-2

SHEET 1 OF 3

SEE OCPW STANDARD PLAN 321-2-OC FOR CONDITIONS

NOTES

1. WHEN DEPTH M FROM STREET GRADE TO THE TOP OF THE BOX IS LESS THAN 2'-10 1/2" (867 mm) FOR PAVED STREETS OR 3'-6" (1060 mm) FOR UNPAVED STREETS, CONSTRUCT SHAFT PER SECTION C-C AND DETAIL "N". DEPTH M MAY BE REDUCED TO AN ABSOLUTE LIMIT OF 6" (150 mm) WHEN LARGER VALUES OF M WOULD REDUCE H IN SECTION C-C TO 3'-6" (1060 mm) OR LESS.
2. H (IN SECTION A-A AND B-B) SHALL NOT BE LESS THAN 4'-0" (1.2 m), BUT MAY BE INCREASED PROVIDED THAT THE VALUE OF M SHALL NOT BE LESS THAN THE MINIMUM SPECIFIED AND THAT THE REDUCER SHALL BE USED. FOR H (IN SECTION C-C) SEE NOTE 1.
3. L SHALL BE 4'-0" (1.2 m) UNLESS OTHERWISE SHOWN. L MAY BE INCREASED OR LOCATION OF MANHOLE SHIFTED TO MEET PIPE ENDS, BUT ANY CHANGE IN LOCATION OF THE SPUR MUST BE APPROVED BY THE ENGINEER.
4. T SHALL BE 8" (200 mm) FOR VALUES OF H UP TO AND INCLUDING 8'-0" (2.4 m) AND 10" (250 mm) FOR VALUES OF H OVER 8'-0" (2.4 m).
5. STATIONS OF MANHOLES SHOWN ON PLANS APPLY AT CENTERLINE OF SHAFT. ELEVATIONS ARE SHOWN AT CENTERLINE OF SHAFT AND REFER TO THE PROLONGED INVERT GRADE LINES. SEE NOTE 3.
6. REINFORCEMENT SHALL CONFORM TO ASTM A 615, GRADE 40 (ASTM A 615M, GRADE 300), AND SHALL TERMINATE 1 1/2" (40 mm) CLEAR OF CONCRETE SURFACES UNLESS OTHERWISE SHOWN.
7. FLOOR OF MANHOLE SHALL BE STEEL TROWELED TO SPRING LINE.
8. BODY OF MANHOLE SHALL BE POURED IN ONE CONTINUOUS OPERATION EXCEPT THAT A CONSTRUCTION JOINT WITH A LONGITUDINAL KEYWAY MAY BE PLACED AT SPRING LINE.
9. THICKNESS OF THE DECK SHALL VARY WHEN NECESSARY TO PROVIDE A LEVEL SEAT BUT SHALL NOT BE LESS THAN 8" (200 mm).
10. STEPS SHALL CONFORM TO SPPWC 635 OR 636. UNLESS OTHERWISE SHOWN, STEPS SHALL BE UNIFORMLY SPACED 14" (350 mm) TO 15" (375 mm) OC. THE LOWEST STEP SHALL NOT BE MORE THAN 24" (600 mm) ABOVE THE LEDGE AT THE SIDE OF THE MANHOLE.

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN

**MANHOLE PIPE-TO-PIPE (ONE OR BOTH
MAIN LINE IDS 33" (825 mm) OR SMALLER)**

321-2

SHEET 2 OF 3

SEE OCPW STANDARD PLAN 321-2-OC FOR CONDITIONS

11. THE FOLLOWING CRITERIA SHALL BE USED FOR THIS MANHOLE:

- A. MAIN LINE = 33" (825 mm) INSIDE DIAMETER OR LESS. (EXCEPTION – IF THE MAIN LINE RCP DOWNSTREAM OF THE MANHOLE IS 36" (900 mm) TO 42" (1050 mm) INSIDE DIAMETER AND THE MAIN LINE RCP UPSTREAM IS 33" (825 mm) OR LESS.) SPPWC 320 OR 322 IS NOT APPLICABLE WHERE THE MAIN LINE CONDUIT IS LESS THAN 36" (900 mm) IN DIAMETER.
- B. SEE SECTION A – A. THE MAXIMUM SIZE LATERAL THAT MAY BE CONNECTED TO THIS MANHOLE IS SUCH THAT THE DISTANCE FROM THE OUTSIDE (TOP) OF THE LATERAL TO THE BOTTOM OF THE 8" (200 mm) THICK TOP OF THE MANHOLE CHAMBER, MEASURED VERTICALLY FROM THE END OF THE RCP, SHALL BE A MINIMUM OF 6" (150 mm).
- C. IF THE SIZE OF THE LATERAL IS SUCH THAT THE ABOVE–SPECIFIED MINIMUM DISTANCES CANNOT BE MAINTAINED, THEN ONE OF THE FOLLOWING ALTERNATE SOLUTIONS MUST BE USED.
 - 1. PROVIDE A SPECIAL STRUCTURE.
 - 2. PROVIDE TWO STANDARD STRUCTURES, CONSISTING OF THIS MANHOLE PLACED UPSTREAM OR DOWNSTREAM FROM THE APPLICABLE JUNCTION STRUCTURE OR TRANSITION STRUCTURE.

12. MANHOLE FRAME AND COVER SHALL CONFORM TO SPPWC 630 UNLESS OTHERWISE SHOWN.

13. MANHOLE SHAFT SHALL CONFORM TO SPPWC 324 UNLESS OTHERWISE SHOWN.

14. WHERE A MANHOLE SHAFT – 36" (900 mm) WITHOUT REDUCER IS SPECIFIED REFER TO SPPWC 336.

15. WHERE A PRESSURE MANHOLE SHAFT – WITH ECCENTRIC REDUCER IS SPECIFIED REFER TO SPPWC 328.

16. WHERE A PRESSURE MANHOLE SHAFT – 36" (900 mm) WITHOUT REDUCER IS SPECIFIED REFER TO SPPWC 329.

17. THE FOLLOWING SPPWC ARE INCORPORATED HEREIN:

- 324 MANHOLE SHAFT – WITH ECCENTRIC REDUCER
- 326 MANHOLE SHAFT – 36" (900 mm) WITHOUT REDUCER
- 328 PRESSURE MANHOLE SHAFT – WITH ECCENTRIC
- 329 PRESSURE MANHOLE SHAFT – 36" (900 mm) WITHOUT REDUCER
- 630 24" (610 mm) MANHOLE FRAME AND COVER
- 633 36" (900 mm) MANHOLE FRAME AND COVER
- 635 STEEL STEP
- 636 POLYPROPYLENE PLASTIC STEP

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

**MANHOLE PIPE-TO-PIPE (ONE OR BOTH
MAIN LINE IDS 33" (825 mm) OR SMALLER)**

STANDARD PLAN

321-2

SHEET 3 OF 3

SEE OCPW STANDARD PLAN 321-2-OC FOR CONDITIONS

[illegible]

1. REVISE THE NAME OF SPPWC STD. PLAN 321-2 TO 1.
"JUNCTION STRUCTURE-TYPE I".
2. SECTION A-A, B-B, & C-C:
 - REVISE THE TOP THICKNESS OF THE BASE FROM 8 INCHES TO 10 INCHES.
 - REVISE THE PIPE EMBEDMENT INTO THE BASE FROM 4 INCHES TO 5 INCHES.
 - A 4 INCHES X 4 INCHES MORTAR FILLET SHALL BE PLACED BETWEEN THE BASE AND THE RINGS IF THE STRUCTURE IS NOT LOCATED IN A PAVED STREET. (SECTION C-C)
3. MANHOLE SHAFT SHALL CONFORM TO STD. PLAN 1503.
4. CONCRETE RINGS SHALL CONFORM TO STD. PLAN 1502.
5. REPLACE NOTE 3 WITH THE FOLLOWING:
"LENGTH L SHALL BE 4 FEET FOR LATERALS OF 20 INCHES OR LESS AND 5 FEET FOR LATERALS GREATER THAN 20 INCHES, UNLESS OTHERWISE SHOWN ON THE IMPROVEMENT PLAN. LENGTH L MAY BE INCREASED A MAXIMUM OF ONE FOOT AT EACH END TO MEET PIPE ENDS. CONTINUE #4 REBARS AT 4 INCHES ON-CENTER."
6. REPLACE NOTE 10 WITH THE FOLLOWING:
"STEPS SHALL CONFORM TO SPPWC STD. PLAN 635 OR STD. PLAN 1507. UNLESS OTHERWISE, SHOWN, STEPS SHALL BE UNIFORMLY SPACED 14 INCHES (350 MM) TO 15 INCHES (375 MM) ON-CENTER. THE LOWEST STEP SHALL NOT BE MORE THAN 24 INCHES (600 MM) ABOVE THE LEDGE AT THE SIDE OF THE MANHOLE."
7. DELETE NOTES 10 AND 13-17.

SHT. 1 OF 2

THE FOLLOWING STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION, 2009 EDITION, OF THE PUBLIC WORKS STANDARDS, INC. HAVE BEEN ADOPTED BY OCPW WITH CONDITIONS WHICH SHALL APPLY TO OCPW USE. THE CONDITIONS ARE LISTED BELOW.

| | | |
|----------------|---------------|--|
| <u>SPPWC #</u> | <u>OCPW #</u> | <u>NAME AND CONDITIONS</u> |
| 321-2 | 321-2-OC | MANHOLE PIPE-TO-PIPE (ONE OR BOTH MAIN LINE IDS 33" (825 MM) OR LARGER) |

8. ADD NOTES:

18. RINGS, REDUCER AND PIPE FOR ACCESS SHAFT SHALL BE SEATED IN 1:2 MORTAR AND NEATLY POINTED OR WIPED INSIDE THE SHAFT. GROUT BETWEEN THE SHAFT AND THE PIPE OR RING SEAT.
19. LEDGE SHALL BE SLOPED AT 2 INCHES PER FOOT.
20. THE ANGLE BETWEEN THE LATERAL AND THE MAIN LINE SHALL NOT BE GREATER THAN 45 PERCENT WHEN THE FLOW IN THE LATERAL EXCEEDS 10 PERCENT OF THE FLOW IN THE MAIN LINE.
21. CONSTRUCT DEEP MANHOLE LANDING(S) PER STD. PLAN 1508 AND INCREASE JUNCTION STRUCTURE BOTTOM WIDTH TO 4 FEET MINIMUM WHEN THE COMBINED DEPTH OF THE PIPE DIAMETER AND MANHOLE SHAFT (M) IS 20 FEET OR GREATER AND THE MANHOLE SHAFT IS GREATER THAN 12 FEET OR, AS DIRECTED BY THE ENGINEER.

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Revision: August 2018

Approved

Khalid Bazmi
Khalid Bazmi, County Engineer

STD. PLAN

321-2-OC

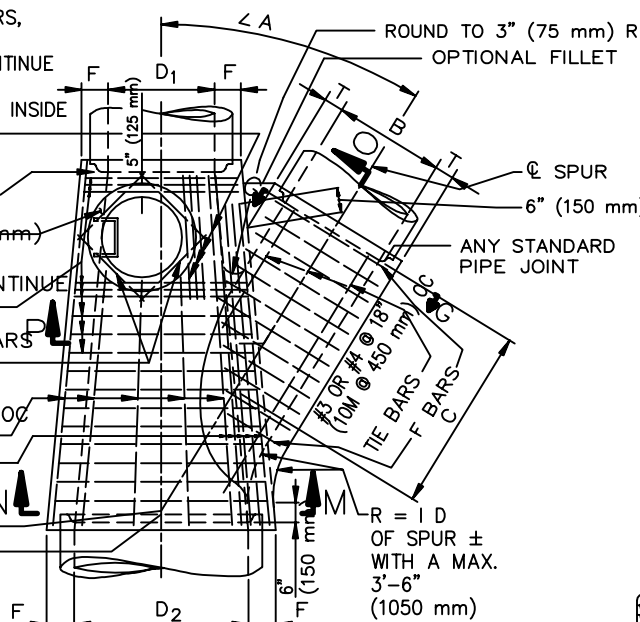
SPPWC STANDARD PLAN - MANHOLE PIPE-TO-PIPE (ONE OR BOTH
MAIN LINE IDS 33" (825 mm) OR SMALLER)
(JUNCTION STRUCTURE - TYPE I)

SHT. 2 OF 2

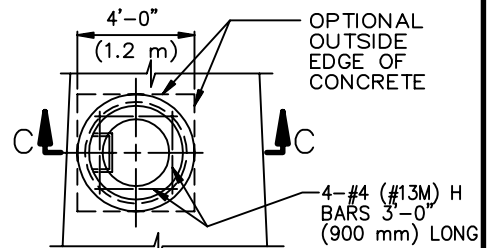
3-#4 (#13M) J BARS,
4'-8" (1.4 m) LONG,
3" (75 mm) OC CONTINUE
ADDITIONAL BARS
6" (150 mm) OC TO INSIDE
EDGE OF MANHOLE

STATION
5"x 2" PIPE SEAT
(125 mm x 50 mm)
3-D BARS, 3"
(75 mm) OC CONTINUE
6" (150 mm) OC
4-#6 (#19M) E BARS
SEE NOTE 3
#3 OR #4 @ 18"
(10M @ 450 mm) OC
TIE BARS
A & B BARS

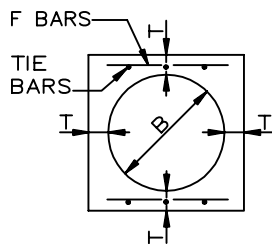
STATION POINT
STATION



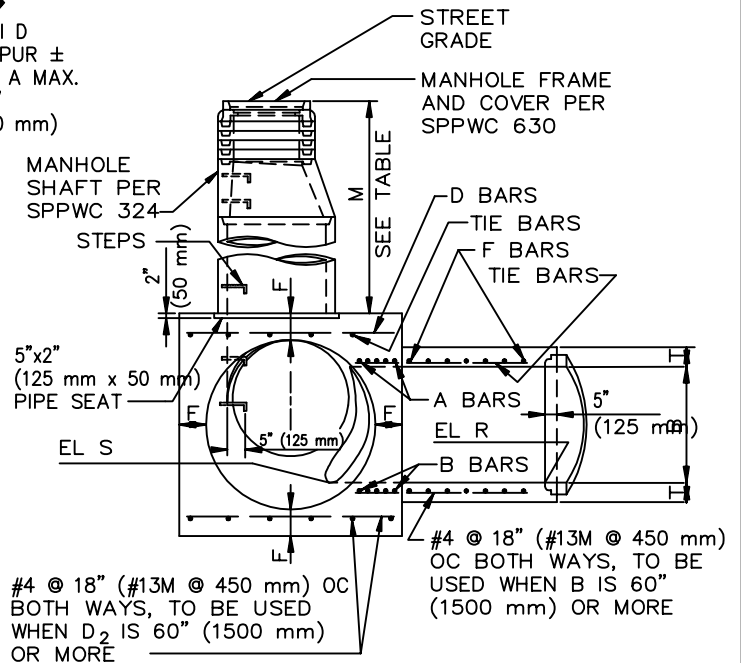
PLAN
(SHAFT NOT SHOWN)



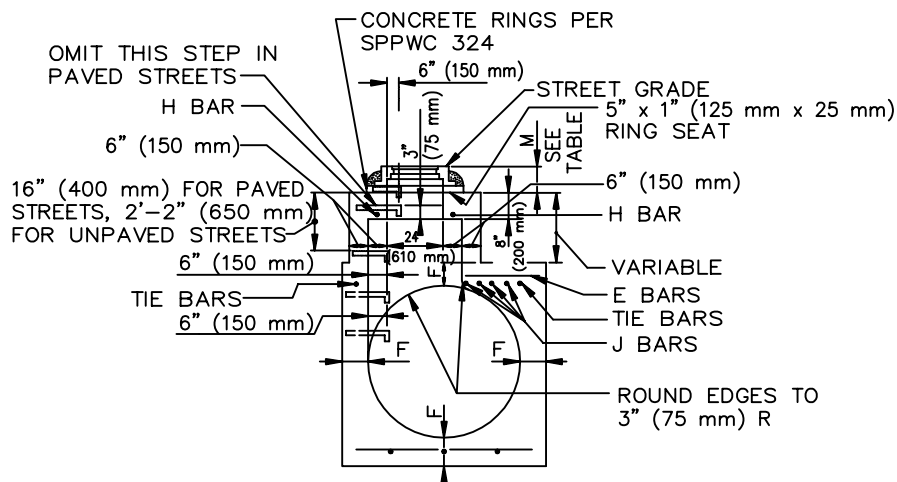
DETAIL "N"
(RINGS AND COVER NOT SHOWN)
SEE NOTE 2



SECTION G-G



SECTION N-M-P-O



SECTION C-C

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PROMULGATED BY THE
PUBLIC WORKS STANDARDS INC.
GREENBOOK COMMITTEE
1992
REV. 1996, 2009

MANHOLE PIPE-TO-PIPE
(LARGE SIDE INLET)

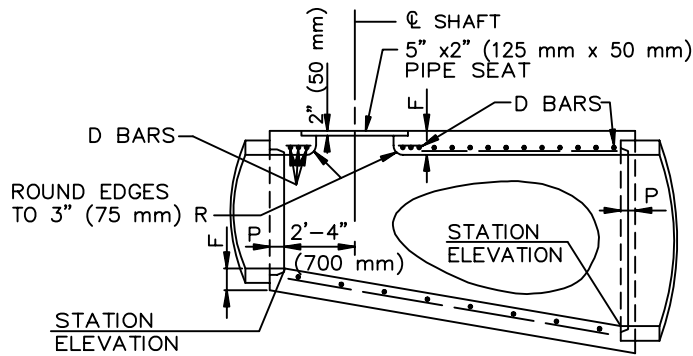
USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN

322-2

SHEET 1 OF 4

SEE OCPW STANDARD PLAN 322-2-OC FOR CONDITIONS



LONGITUDINAL SECTION

| TABLE OF BARS SIZES | | |
|--------------------------------|-------------------------|--------------------------|
| D ₂ OR B | A & B | D OR F |
| 12\" (300 mm)–39\" (975 mm) | #5 @ 3\" (#16M @ 75 mm) | #4 @ 6\" (#13M @ 150 mm) |
| 42\" (1050 mm)–84\" (2100 mm) | #6 @ 3\" (#19M @ 75 mm) | #5 @ 6\" (#16M @ 150 mm) |
| 90\" (2250 mm)–144\" (3600 mm) | #7 @ 3\" (#22M @ 75 mm) | #6 @ 6\" (#19M @ 150 mm) |

| TABLE OF VALUES FOR M (SEE NOTE 2) | | | | |
|------------------------------------|--------------|---------------------|----------------|-----------------|
| SECTION | PAVED STREET | | UNPAVED STREET | |
| | MAX | MIN | MAX | MIN |
| N-M-P-O | | 2'-10 1/2" (867 mm) | | 3'-6" (1060 mm) |
| C-C | 11" (282 mm) | 8 1/2" (217 mm) | 16" (410 mm) | 15" (380 mm) |

| TABLE OF VALUES FOR F | |
|-----------------------|-------------------|
| D ₂ | F |
| 36\" (900 mm) | 6 1/2\" (165 mm) |
| 39\" (975 mm) | 7\" (180 mm) |
| 42\" (1050 mm) | 7 1/2\" (190 mm) |
| 45\" (1125 mm) | 7 3/4\" (195 mm) |
| 48\" (1200 mm) | 8\" (205 mm) |
| 51\" (1275 mm) | 8 1/2\" (215 mm) |
| 54\" (1350 mm) | 9\" (230 mm) |
| 57\" (1425 mm) | 9 1/4\" (235 mm) |
| 60\" (1500 mm) | 9 1/2\" (240 mm) |
| 63\" (1575 mm) | 10\" (255 mm) |
| 66\" (1650 mm) | 10 1/4\" (260 mm) |
| 69\" (1725 mm) | 10 3/4\" (275 mm) |
| 72\" (1800 mm) | 11\" (280 mm) |
| 78\" (1950 mm) | 11 3/4\" (300 mm) |
| 84\" (2100 mm) | 12 1/2\" (320 mm) |
| 90\" (2250 mm) | 13 1/4\" (335 mm) |
| 96\" (2400 mm) | 14\" (355 mm) |
| 102\" (2550 mm) | 15 1/2\" (395 mm) |
| 108\" (2700 mm) | 16\" (405 mm) |
| 114\" (2850 mm) | 16 1/2\" (420 mm) |
| 120\" (3000 mm) | 17\" (430 mm) |
| 126\" (3150 mm) | 17\" (430 mm) |
| 132\" (3300 mm) | 17 1/2\" (445 mm) |
| 138\" (3450 mm) | 17 1/2\" (445 mm) |
| 144\" (3600 mm) | 18\" (455 mm) |

| TABLE OF VALUES FOR T | |
|-----------------------|-------------------|
| B | T |
| 12\" (300 mm) | 4\" (100 mm) |
| 15\" (375 mm) | 4 1/4\" (110 mm) |
| 18\" (450 mm) | 4 1/2\" (115 mm) |
| 21\" (525 mm) | 5\" (125 mm) |
| 24\" (600 mm) | 5 1/4\" (135 mm) |
| 27\" (675 mm) | 5 1/2\" (140 mm) |
| 30\" (750 mm) | 6\" (150 mm) |
| 33\" (825 mm) | 6 1/4\" (160 mm) |
| 36\" (900 mm) | 6 1/2\" (165 mm) |
| 39\" (975 mm) | 7\" (180 mm) |
| 42\" (1050 mm) | 7 1/2\" (190 mm) |
| 45\" (1125 mm) | 7 3/4\" (195 mm) |
| 48\" (1200 mm) | 8\" (205 mm) |
| 51\" (1275 mm) | 8 1/2\" (215 mm) |
| 54\" (1350 mm) | 9\" (230 mm) |
| 57\" (1425 mm) | 9 1/4\" (235 mm) |
| 60\" (1500 mm) | 9 1/2\" (240 mm) |
| 63\" (1575 mm) | 10\" (255 mm) |
| 66\" (1650 mm) | 10 1/4\" (260 mm) |
| 69\" (1725 mm) | 10 3/4\" (275 mm) |
| 72\" (1800 mm) | 11\" (280 mm) |
| 78\" (1950 mm) | 11 3/4\" (300 mm) |
| 84\" (2100 mm) | 12 1/2\" (320 mm) |
| 90\" (2250 mm) | 13 1/4\" (335 mm) |
| 96\" (2400 mm) | 14\" (355 mm) |
| 102\" (2550 mm) | 15 1/2\" (395 mm) |
| 108\" (2700 mm) | 16\" (405 mm) |
| 114\" (2850 mm) | 16 1/2\" (420 mm) |
| 120\" (3000 mm) | 17\" (430 mm) |
| 126\" (3150 mm) | 17\" (430 mm) |
| 132\" (3300 mm) | 17 1/2\" (445 mm) |
| 138\" (3450 mm) | 17 1/2\" (445 mm) |
| 144\" (3600 mm) | 18\" (455 mm) |

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

**MANHOLE PIPE–TO–PIPE
(LARGE SIDE INLET)**

STANDARD PLAN

322–2

SHEET 2 OF 4

SEE OCPW STANDARD PLAN 322-2-OC FOR CONDITIONS

NOTES

1. VALUES FOR A, B, C, D_1 , D_2 , ELEVATION R AND ELEVATION S ARE SHOWN ON THE PLANS. ELEVATION S APPLIES AT INSIDE WALL OF STRUCTURE.
2. WHEN DEPTH M FROM STREET GRADE TO THE TOP OF THE BOX IS LESS THAN 2'-10 1/2" (867 mm) FOR PAVED STREETS OR 3'-6" (1060 mm) FOR UNPAVED STREETS, CONSTRUCT MONOLITHIC SHAFT PER SECTION C-C AND DETAIL "N". SHAFT FOR ANY DEPTH OF MANHOLE MAY BE CONSTRUCTED PER SECTION C-C. WHEN DIAMETER D_1 IS 48" (1200 mm) OR LESS, CENTER OF SHAFT MAY BE LOCATED PER NOTE 3.
3. CENTER OF MANHOLE SHAFT SHALL BE LOCATED OVER CENTERLINE OF STORM DRAIN WHEN DIAMETER D_1 IS 48" (1200 mm) OR LESS, IN WHICH CASE PLACE E BARS SYMMETRICALLY AROUND SHAFT AT 45° WITH CENTERLINE.
4. LENGTH OF MANHOLE MAY BE INCREASED AT OPTION TO MEET PIPE ENDS, BUT ANY CHANGE IN LOCATION OF SPUR MUST BE APPROVED BY THE ENGINEER.
5. P SHALL BE 5" (125 mm) FOR $D_2=96"$ (2400 mm) OR LESS AND 8" (200 mm) FOR D_2 OVER 96" (2400 mm).
6. REINFORCEMENT SHALL CONFORM TO ASTM A 615, GRADE 40 (ASTM A 615M, GRADE 300), AND SHALL TERMINATE 1 1/2" (40 mm) CLEAR OF CONCRETE SURFACES UNLESS OTHERWISE SHOWN.
7. FLOOR OF MANHOLE SHALL BE STEEL TROWELED TO SPRING LINE.
8. BODY OF MANHOLE SHALL BE POURED IN ONE CONTINUOUS OPERATION EXCEPT THAT A CONSTRUCTION JOINT WITH A LONGITUDINAL KEYWAY MAY BE PLACED AT SPRING LINE.
9. THICKNESS OF THE DECK SHALL VARY WHEN NECESSARY TO PROVIDE A LEVEL SEAT BUT SHALL NOT BE LESS THAN THE TABULAR VALUES OF F SHOWN ON TABLE, SHEET 1.
10. IF LATERALS ENTER ON BOTH SIDES OF MANHOLE, SHAFT SHALL BE LOCATED ON SIDE RECEIVING THE SMALLER LATERAL.
11. STEPS SHALL CONFORM TO SPPWC 635 OR 636. UNLESS OTHERWISE SHOWN, STEPS SHALL BE UNIFORMLY SPACED 14" (350 mm) TO 15" (375 mm) OC. THE LOWEST STEP SHALL NOT BE MORE THAN 24" (600 mm) ABOVE THE INVERT.
12. THE FOLLOWING CRITERIA SHALL BE USED FOR THIS MANHOLE:
 - A. THIS STANDARD PLAN IS USED WHEN SPPWC 320 IS INADEQUATE.
MAIN LINE = 36" (900 mm) INSIDE DIAMETER OR LARGER.
 - B. LATERAL = 12" (300 mm) TO 144" (3600 mm) INSIDE DIAMETER; HOWEVER, THE INSIDE DIAMETER SHALL NOT EXCEED THE INSIDE DIAMETER OF THE MAIN LINE.

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

MANHOLE PIPE-TO-PIPE (LARGE SIDE INLET)

STANDARD PLAN

322-2

SHEET 3 OF 4

SEE OCPW STANDARD PLAN 322-2-OC FOR CONDITIONS

13. MANHOLE FRAME AND COVER SHALL CONFORM TO SPPWC 630 UNLESS OTHERWISE SHOWN.
14. MANHOLE SHAFT SHALL CONFORM TO SPPWC 324 UNLESS OTHERWISE SHOWN.
15. WHERE A MANHOLE SHAFT – 36" (900 mm) WITHOUT REDUCER IS SPECIFIED REFER TO SPPWC 326.
16. WHERE A PRESSURE MANHOLE SHAFT – WITH ECCENTRIC REDUCER IS SPECIFIED REFER TO SPPWC 328.
17. WHERE A PRESSURE MANHOLE SHAFT – 36" (914 mm) WITHOUT REDUCER IS SPECIFIED REFER TO SPPWC 329.
18. THE FOLLOWING SPPWC ARE INCORPORATED HEREIN:
 - 324 MANHOLE SHAFT – WITH ECCENTRIC REDUCER
 - 326 MANHOLE SHAFT – 36" (900 mm) WITHOUT REDUCER
 - 328 PRESSURE MANHOLE SHAFT – WITH ECCENTRIC
 - 329 PRESSURE MANHOLE SHAFT – 36" (914 mm) WITHOUT REDUCER
 - 630 24" (610 mm) MANHOLE FRAME AND COVER
 - 633 36" (914 mm) MANHOLE FRAME AND COVER
 - 635 STEEL STEP
 - 636 POLYPROPYLENE PLASTIC STEP

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

**MANHOLE PIPE-TO-PIPE
(LARGE SIDE INLET)**

STANDARD PLAN

322-2

SHEET 4 OF 4

SEE OCPW STANDARD PLAN 322-2-OC FOR CONDITIONS

THE FOLLOWING STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION, 2009 EDITION, OF THE PUBLIC WORKS STANDARDS, INC. HAVE BEEN ADOPTED BY OCPW WITH CONDITIONS WHICH SHALL APPLY TO OCPW USE. THE CONDITIONS ARE LISTED BELOW.

| <u>SPPWC #</u> | <u>OCPW #</u> | <u>NAME AND CONDITIONS</u> |
|----------------|---------------|---|
| 322-2 | 322-2-OC | <u>MANHOLE PIPE-TO-PIPE (LARGER SIDE INLET)</u> |

1. REVISE THE NAME OF STANDARD PLAN 320-2 TO
"JUNCTION STRUCTURE - TYPE III".
2. REVISE NOTES AS FOLLOWS:
 - 3B. D₂ OVER 96 INCHES (2400 mm), L=6 FEET-0 INCH (1.8 m), P=8 INCHES (210 mm), L MAY BE INCREASED A MAXIMUM OF 1 FOOT AT EACH END TO MEET PIPE ENDS; CONTINUE D BARS AT 3 INCHES ON-CENTER. WHEN L GREATER IS THAN THAT SHOWN ABOVE IS SPECIFIED, D BARS SHALL BE CONTINUED 6 INCHES (150 mm) ON-CENTER.
 11. STEPS SHALL CONFORM TO STD. PLAN 1507 OR SPPWC STD. PLAN 635. UNLESS OTHERWISE SHOWN, STEPS SHALL BE UNIFORMLY SPACED 14 INCHES (350 mm) TO 15 INCHES (375 mm) ON-CENTER. THE LOWEST STEP SHALL NOT BE MORE THAN 24 INCHES (600 mm) ABOVE THE INVERT.
 14. MANHOLE SHAFT SHALL CONFORM TO STD. PLAN 1503 UNLESS OTHERWISE SHOWN.
3. DELETE NOTES 16, 17 & 18.
4. ADD NOTES:
 19. RINGS, REDUCER AND PIPE FOR ACCESS SHAFT SHALL BE SEATED IN 1:2 MORTAR AND NEATLY POINTED OR WIPED INSIDE THE SHAFT. GROUT BETWEEN THE SHAFT AND THE PIPE OR RING SEAT.
 20. THE ANGLE BETWEEN THE LATERAL AND THE MAIN LINE SHALL NOT BE GREATER THAN 45 DEGREE WHEN THE FLOW IN THE LATERAL EXCEEDS 10 PERCENT OF THE FLOW IN THE MAIN LINE.
 21. CONSTRUCT DEEP MANHOLE LANDING(S) PER STD. PLAN 1508 AND INCREASE JUNCTION STRUCTURE BOTTOM WIDTH TO 4 FEET MINIMUM WHEN THE COMBINED DEPTH OF THE PIPE DIAMETER AND MANHOLE SHAFT (M) IS 20 FEET OR GREATER AND THE MANHOLE SHAFT IS GREATER THAN 12 FEET OR AS DIRECTED BY THE ENGINEER.
5. INCREASE DIMENSION "T" AT EDGES TO A MINIMUM OF 6 INCHES+(PIPE WALL THICKNESS) FOR EMBEDMENT DIMENSION "P"+6 INCHES.

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Revision: August 2018

Approved


Khalid Bazmi, County Engineer

STD. PLAN

322-2-OC

SPPWC STANDARD PLAN - MANHOLE PIPE-TO-PIPE (LARGE SIDE INLET)
(JUNCTION STRUCTURE - TYPE III)

SHT. 1 OF 2

THE FOLLOWING STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION, 2009 EDITION,
OF THE PUBLIC WORKS STANDARDS, INC. HAVE BEEN ADOPTED BY OCPW WITH
CONDITIONS WHICH SHALL APPLY TO OCPW USE. THE CONDITIONS ARE LISTED BELOW.

SPPWC # OCPW # NAME AND CONDITIONS
322-2 322-2-OC MANHOLE PIPE-TO-PIPE (LARGER SIDE INLET)

6. REVISE A PORTION OF "TABLE OF VALUES FOR F" AS SHOWN:

| TABLE OF VALUES FOR F | |
|-----------------------|-------------|
| D ₂ | F |
| 36" (900 mm) | 8" (205 mm) |
| 39" (975 mm) | 8" (205 mm) |
| 42" (1050 mm) | 8" (205 mm) |
| 45" (1125 mm) | 8" (205 mm) |

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Revision: August 2018

Approved

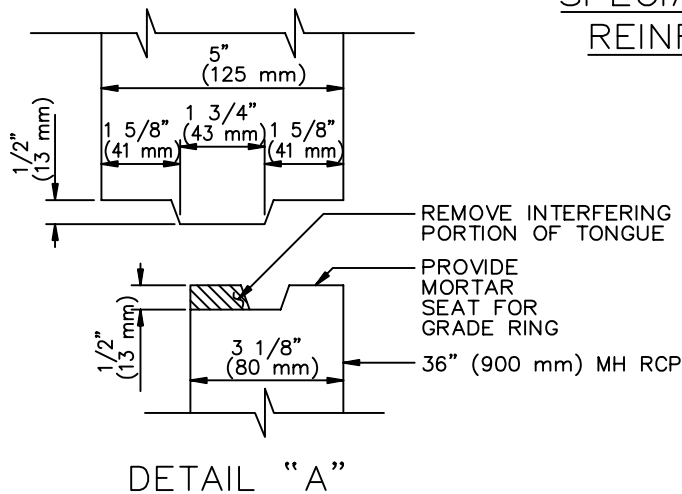
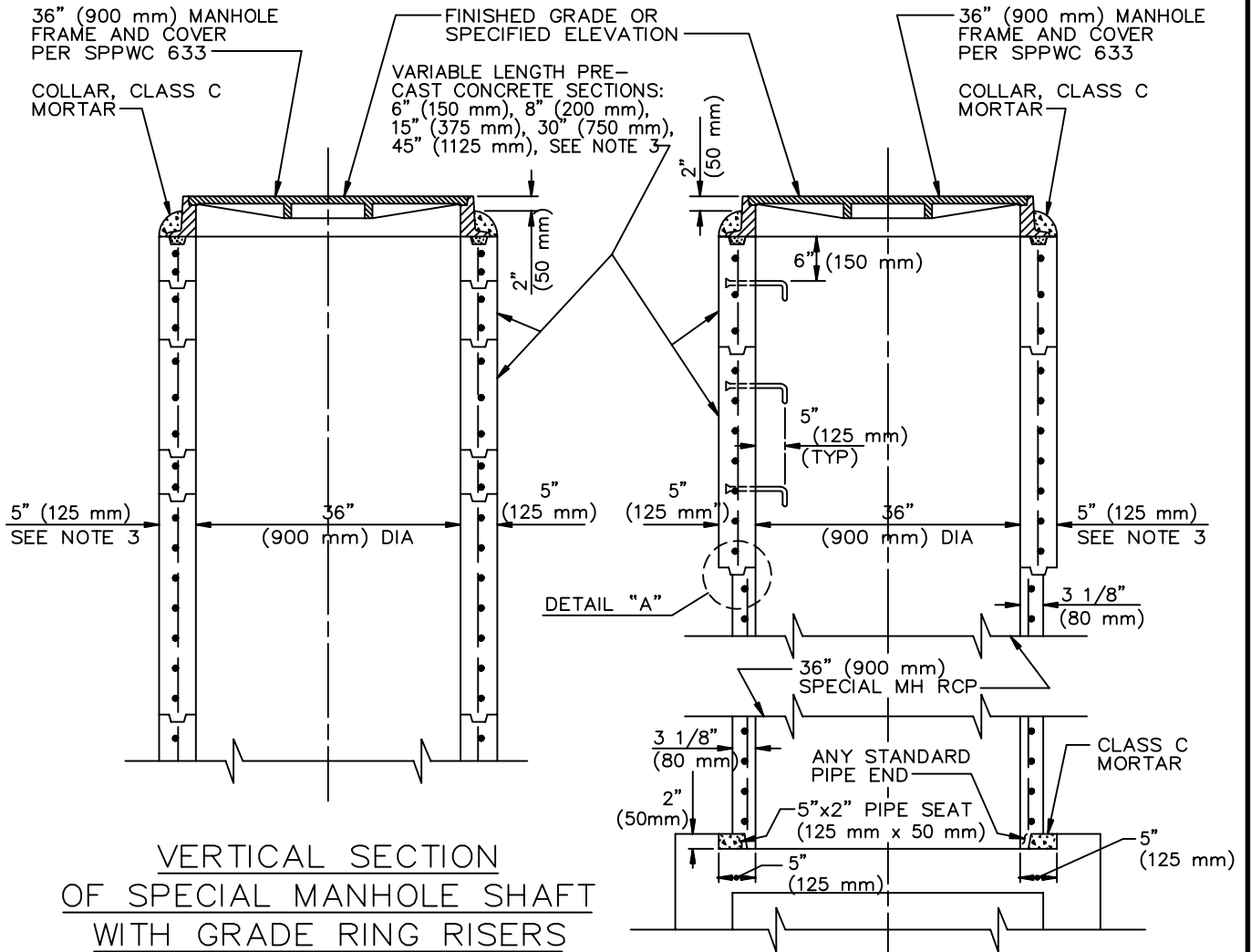

Khalid Bazmi, County Engineer

STD. PLAN

322-2-OC

SPPWC STANDARD PLAN - MANHOLE PIPE-TO-PIPE (LARGE SIDE INLET)
(JUNCTION STRUCTURE - TYPE III)

SHT. 2 OF 2



STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PROMULGATED BY THE
PUBLIC WORKS STANDARDS INC.
GREENBOOK COMMITTEE
1992
REV. 1996, 2009

**MANHOLE SHAFT
36"(900 mm) WITHOUT REDUCER**

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN

326-2

SHEET 1 OF 2

SEE OCPW STANDARD PLAN 326-2-OC FOR CONDITIONS

NOTES

1. UNLESS OTHERWISE INDICATED THIS STRUCTURE SHALL CONFORM TO ASTM C 478 (ASTM C 478M). ALL STEEL SHALL TERMINATE 1 1/2" (40 mm) CLEAR OF CONCRETE SURFACES AND ALL CONCRETE SHALL BE PER SSPWC.
2. WHERE A 36" (900 mm) MANHOLE IS CONSTRUCTED WITH 36" (900 mm) MANHOLE RCP, THE RCP SECTION SHALL CONTAIN A CIRCULAR CAGE AND HAVE A LOAD CARRYING CAPACITY OF AT LEAST 1000D (50D). SPECIAL MANHOLE SHAFT SHALL BE PER THIS STANDARD AND 36" (900 mm) MANHOLE FRAME AND COVER SHALL BE PER SPPWC 633.
3. THE MANHOLE SHAFT AND RINGS MAY BE PLAIN CONCRETE. FOR PLAIN CONCRETE SECTIONS THE MINIMUM THICKNESS SHALL BE 6" (150 mm).
4. ALL JOINTS SHALL BE SEALED BY FILLING THE ANNULAR SPACES WITH CLASS C MORTAR. THE INSIDE OF THE SHAFT AT EACH JOINT SHALL BE WIPED CLEAN OF EXCESS MORTAR.
5. PROTECTIVE PLASTIC LINER (T LOCK) OR ENGINEER-APPROVED COATINGS WHERE REQUIRED BY THE PLANS SHALL BE IN ACCORDANCE WITH SSPWC AND THE MANUFACTURER'S DIRECTIONS.
6. STEPS SHALL CONFORM TO SPPWC 635 OR 636. THE TOP STEP SHALL BE PLACED 6" (150 mm) BENEATH THE MANHOLE COVER FRAME. UNLESS OTHERWISE SHOWN, STEPS SHALL BE UNIFORMLY SPACED 14" (350 mm) TO 15" (375 mm) OC.
7. THE PRECAST CONCRETE MANHOLE STRUCTURES WILL BE INSPECTED BY THE ENGINEER WHO WILL INDICATE ACCEPTANCE FOR SHIPMENT TO THE JOB BY MARKING THE STRUCTURES WITH THE AGENCY'S STAMP.
8. THE VERTICAL SIDES OF THE MANHOLE SHAFT SHALL BE LOCATED ABOVE AND IN LINE WITH THE SIDE OF THE STORM DRAIN CONDUIT.
9. CONSTRUCT MANHOLE SAFETY LEDGE PER SPPWC 330 IF DEPTH OF MANHOLE TO INVERT IS GREATER THAN 20' (6 m) AND MANHOLE SHAFT IS GREATER THAN 10' (3 m).
10. THE FOLLOWING SPPWC ARE INCORPORATED HEREIN:

633 36" (900 mm) MANHOLE FRAME AND COVER
635 STEEL STEP
636 POLYPROPYLENE PLASTIC STEP

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

**MANHOLE SHAFT
36"(900 mm) WITHOUT REDUCER**

STANDARD PLAN

326-2

SHEET 2 OF 2

SEE OCPW STANDARD PLAN 326-2-OC FOR CONDITIONS

THE FOLLOWING STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION, 2009 EDITION, OF THE PUBLIC WORKS STANDARDS, INC. HAVE BEEN ADOPTED BY OCPW WITH CONDITIONS WHICH SHALL APPLY TO OCPW USE. THE CONDITIONS ARE LISTED BELOW.

| <u>SPPWC #</u> | <u>OCPW #</u> | <u>NAME AND CONDITIONS</u> |
|----------------|---------------|---|
| 326-2 | 326-2-OC | <u>MANHOLE SHAFT</u> <u>36" (900 mm) WITHOUT REDUCER</u> |

1. REVISE THE NAME OF STANDARD PLAN 326-2 TO 1.
"MANHOLE SHAFT 36" (900 mm) WITHOUT REDUCER."
2. REVISE NOTES AS FOLLOWS: STEPS SHALL CONFORM TO STD. PLAN 1507 OR SPPWC STD. PLAN 635. UNLESS OTHERWISE SHOWN, STEPS SHALL BE UNIFORMLY SPACED 14 INCHES (350 mm) TO 15 INCHES (375 mm) ON-CENTER. THE LOWEST STEP SHALL NOT BE MORE THAN 24 INCHES (600 mm) ABOVE THE INVERT.
3. DELETE NOTE 10.

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Revision: August 2018

Approved

Khalid Bazmi, County Engineer

STD. PLAN

326-2-OC

SPPWC STANDARD PLAN -

MANHOLE SHAFT
36" (900 mm) WITHOUT REDUCER
(MANHOLE SHAFT 36" WITHOUT REDUCER)

SHT. 1 OF 1

CL MAIN LINE RCP OR
REINFORCED MONOLITHIC
ARCH, SEE NOTE 2

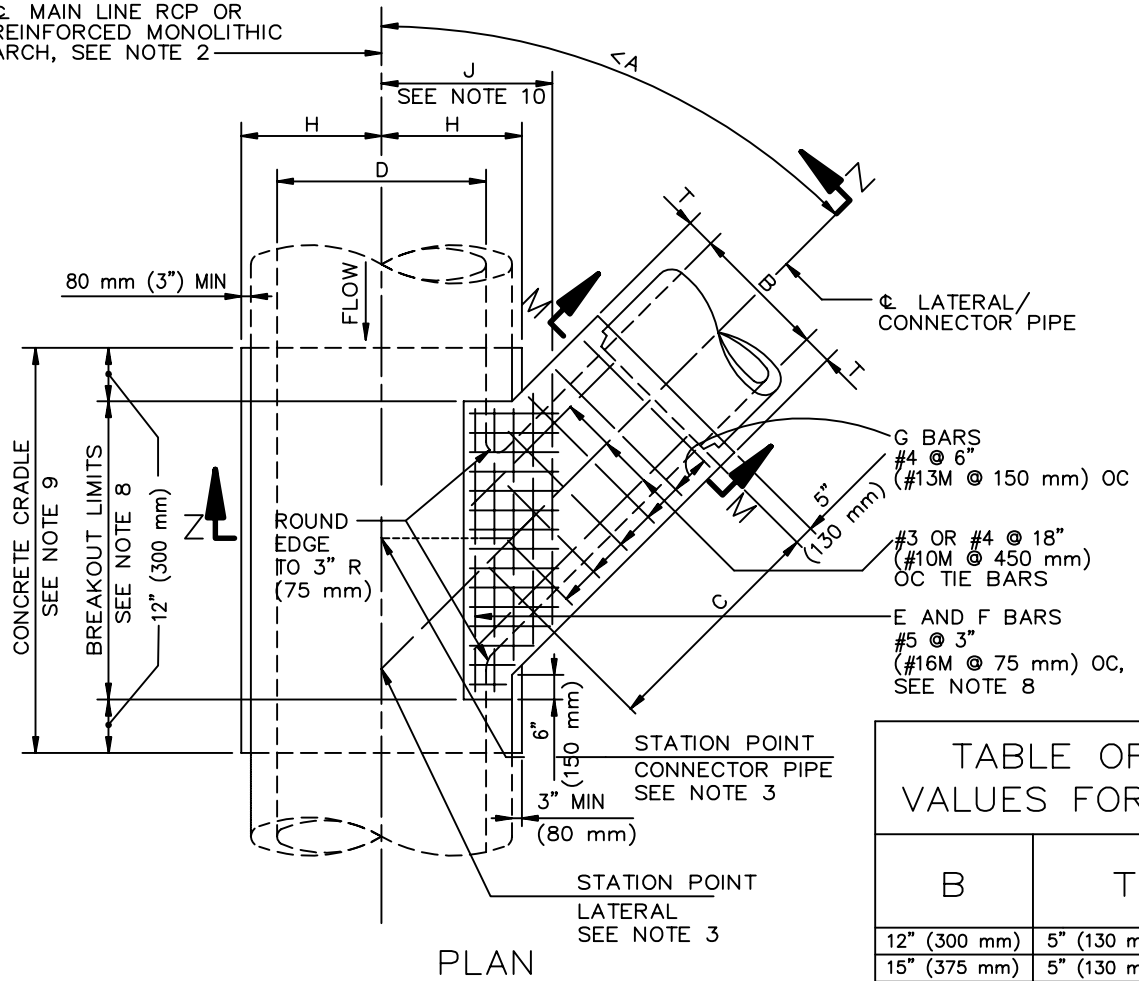
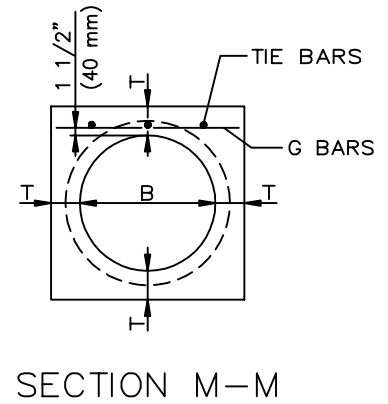
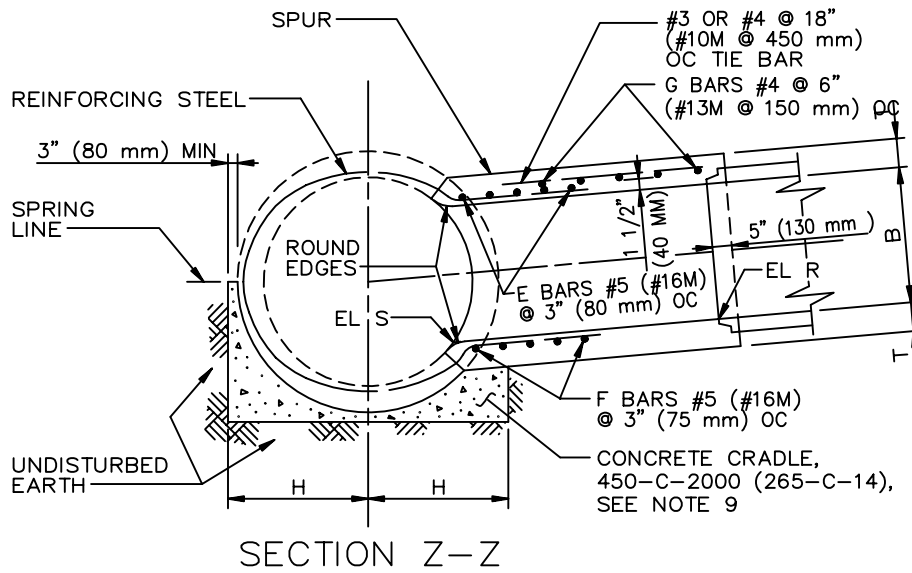


TABLE OF
VALUES FOR T

| B | T |
|--------------|-----------------|
| 12" (300 mm) | 5" (130 mm) |
| 15" (375 mm) | 5" (130 mm) |
| 18" (450 mm) | 5" (130 mm) |
| 21" (525 mm) | 5" (130 mm) |
| 24" (600 mm) | 5 1/2" (140 mm) |
| 27" (675 mm) | 5 1/2" (140 mm) |
| 30" (750 mm) | 6" (150 mm) |
| 33" (825 mm) | 6 1/2" (170 mm) |
| 36" (900 mm) | 6 1/2" (170 mm) |
| 39" (975 mm) | 7" (180 mm) |



STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PROMULGATED BY THE
PUBLIC WORKS STANDARDS INC.
GREENBOOK COMMITTEE
1984
REV. 1996, 1999, 2009

JUNCTION STRUCTURE—PIPE TO PIPE
INLET ID ≥ 24" (600 mm) OR OD > 1/2 MAIN LINE ID

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN

331-3

SHEET 1 OF 2

SEE OCPW STANDARD PLAN 331-3-OC FOR CONDITIONS

NOTES

1. THIS JUNCTION STRUCTURE SHALL BE USED WHEN THE OUTSIDE DIAMETER OF THE LATERAL IS GREATER THAN $1/2$ THE INSIDE DIAMETER D OF THE MAIN LINE; OR WHEN THE INSIDE DIAMETER B OF THE LATERAL IS GREATER THAN 24" (600 mm). B SHALL NOT EXCEED $0.75 D$ OR 39" (975 mm).
2. IF THE MAIN LINE IS A REINFORCED MONOLITHIC ARCH STORM DRAIN, D SHALL REFER TO THE CLEAR SPAN OF THE ARCH. REINFORCING STEEL SHALL BE CUT AND BENT INTO THE JUNCTION STRUCTURE IN THE SAME MANNER AS FOR A PIPE. A CONCRETE CRADLE IS NOT REQUIRED FOR A REINFORCED MONOLITHIC ARCH.
3. STATIONS SHOWN ON THE PLANS FOR LATERALS APPLY AT THE INTERSECTION OF CENTERLINES OF MAIN LINE AND LATERAL. STATIONS SHOWN ON THE PLANS FOR CATCH BASIN CONNECTOR PIPES APPLY AT THE INTERSECTION OF THE INSIDE WALL OF THE MAIN LINE WITH THE CONNECTOR PIPE CENTERLINE.
4. VALUES FOR A, B, C AND D SHALL BE SHOWN ON THE PLANS. ELEVATION R AND ELEVATION S SHALL BE SHOWN ONLY WHEN REQUIRED PER NOTE 5.
5.
 - a. ELEVATIONS R AND S NEED NOT BE SHOWN ON THE PLANS IF THE INLET PIPE IS TO ENTER THE MAIN LINE RADially.
 - b. ELEVATION R SHALL BE SHOWN ON THE PLANS ONLY IF A STUB IS TO BE PROVIDED IN THE MAIN LINE FOR FUTURE CONNECTION OF AN INLET PIPE.
 - c. ELEVATION S SHALL BE SHOWN ON THE PLANS IF AN INLET PIPE IS TO ENTER THE MAIN LINE OTHER THAN RADially. INLET PIPE SHALL BE LAID ON A STRAIGHT GRADE FROM ELEVATION S TO THE CATCH BASIN OR GRADE BREAK IN LINE.
6. THE INLET PIPE SHALL ENTER THE MAIN LINE RADially UNLESS OTHERWISE INDICATED. THE INLET PIPE MAY ENTER THE MAIN LINE OTHER THAN RADially IF ANGLE A IS GREATER THAN 45° ; B IS LESS THAN OR EQUAL TO 24" (600 mm) AND THE OUTSIDE DIAMETER OF THE INLET PIPE IS LESS THAN $0.5 D$; OTHERWISE, SPPWC 340 SHALL BE USED.
7. NO MORE THAN ONE OPENING SHALL BE MADE IN ANY ONE SECTION OF PIPE.
8. THE OPENING FOR THE BREAKOUT SHALL BE RECTANGULAR AND CUT NORMAL TO THE PIPE SURFACE WITHOUT DAMAGING THE REINFORCING STEEL. THE TRANSVERSE REINFORCEMENT OF THE MAIN LINE SHALL BE CUT AT THE CENTER OF THE OPENING AND BENT INTO THE TOP AND BOTTOM SLABS OF THE SPUR.
9. THE MAIN LINE SHALL BE REINFORCED WITH A CONCRETE CRADLE AND ENCASEMENT (AS APPLICABLE). A CONCRETE ENCASEMENT IS REQUIRED IF A JOINT IN THE MAIN LINE FALLS WITHIN THE LIMITS OF THE CRADLE. THE CONCRETE ENCASEMENT SHALL EXTEND 12" (300 mm) ABOVE THE TOP OF THE MAIN LINE AND TO THE LIMITS OF THE CRADLE. IF CONNECTING TO AN EXISTING STORM DRAIN, PORTION OF CRADLE OPPOSITE INLET MAY BE OMITTED.
10. REINFORCING STEEL SHALL CONFORM TO ASTM A 615, GRADE 40, (ASTM A 615M, GRADE 300), AND BE PLACED $1\frac{1}{2}$ " (40 mm) CLEAR FROM CONCRETE SURFACES, UNLESS OTHERWISE SHOWN F BARS SHALL BE CARRIED TO A POINT NOT LESS THAN J DISTANCE FROM CENTER LINE WITH $J=7D/12 + 6"$ (150 mm).
11. FLOOR OF THE SPUR SHALL BE STEEL-TROWELED TO THE SPRING LINE OF THE SPUR.

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

JUNCTION STRUCTURE—PIPE TO PIPE
INLET ID \geq 24" (600 mm) OR OD $> 1/2$ MAIN LINE ID

STANDARD PLAN

331-3

SHEET 2 OF 2

SEE OCPW STANDARD PLAN 331-3-OC FOR CONDITIONS

THE FOLLOWING STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION, 2009 EDITION, OF THE PUBLIC WORKS STANDARDS, INC. HAVE BEEN ADOPTED BY OCPW WITH CONDITIONS WHICH SHALL APPLY TO OCPW USE. THE CONDITIONS ARE LISTED BELOW.

| | | |
|----------------|---------------|--|
| <u>SPPWC #</u> | <u>OCPW #</u> | <u>NAME AND CONDITIONS</u> |
| 331-3 | 331-3-OC | <u>JUNCTION STRUCTURE PIPE-TO-PIPE</u> <u>INLET ID > 24" (600 MM) OR OD > MAIN LINE</u> |

1. REVISE THE NAME OF STANDARD PLAN 331-3 TO "JUNCTION STRUCTURE-TYPE IV".
2. ADD NOTE:
12. JUNCTION STRUCTURE-TYPE IV SHALL BE USED ONLY WHEN SUFFICIENT MEANS OF ACCESS IS AVAILABLE FOR STORM DRAIN MAINTENANCE.
3. REPLACE "TABLE OF VALUES FOR T" WITH:

| TABLE OF VALUES FOR T | |
|--------------------------|----|
| B | T |
| 12" | 6" |
| 15" | 6" |
| 18" | 6" |
| 21" | 6" |
| 24" | 7" |
| 27" | 7" |
| 30" | 7" |
| 33" | 8" |
| 36" | 8" |
| 39" | 8" |

4. INCREASE DIMENSION "T" AT EDGES TO A MINIMUM OF 6 INCHES+(PIPE WALL THICKNESS).

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

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Approved

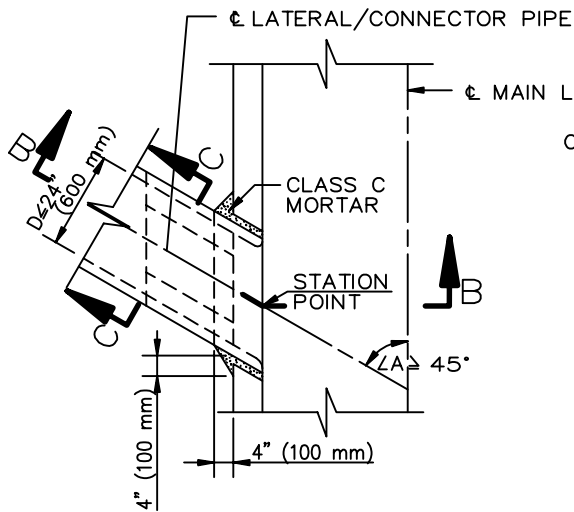

Khalid Bazmi, County Engineer

STD. PLAN

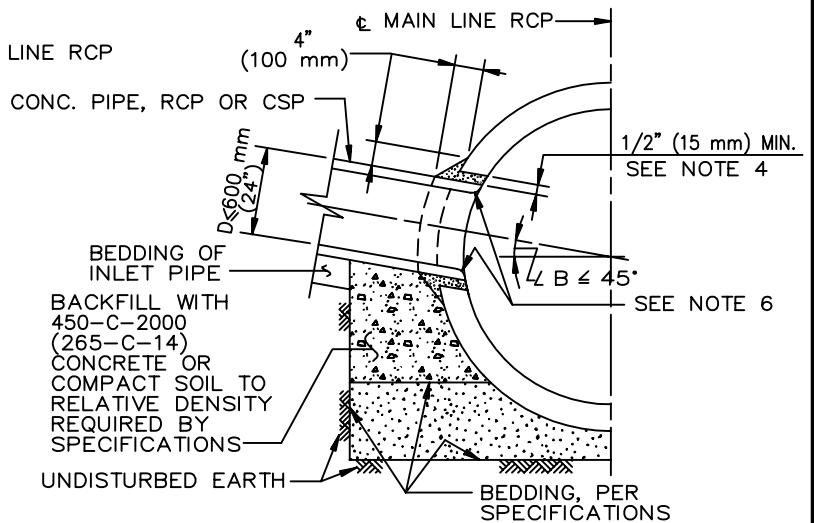
331-3-OC

SPPWC STANDARD PLAN - JUNCTION STRUCTURE-PIPE TO PIPE
INLET ID > 24" (600 mm) OR OD > 1/2 MAIN LINE ID
(JUNCTION STRUCTURE-TYPE IV)

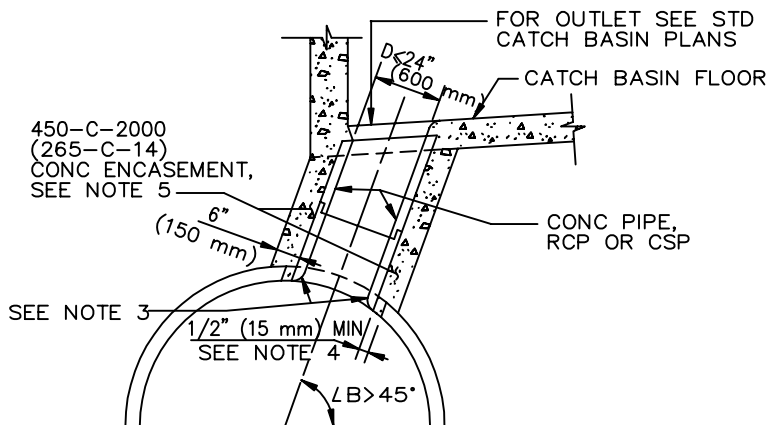
SHT. 1 OF 1



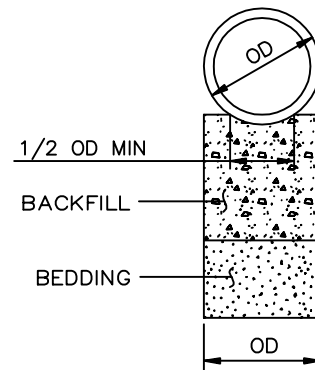
CASE 1
PLAN



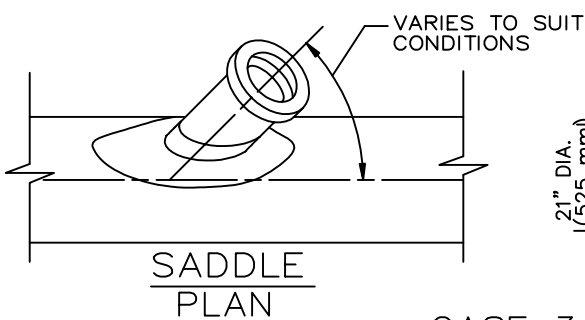
CASE 1
SECTION B-B



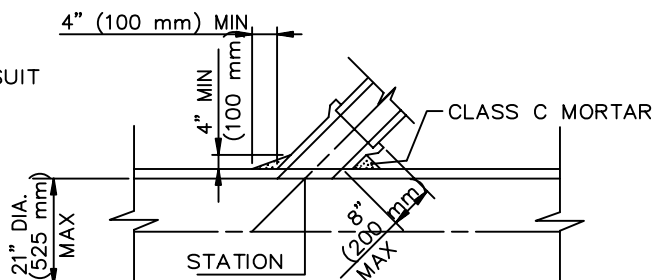
CASE 2
(SEE NOTES 9 & 10)



CASE 1
SECTION C-C



SADDLE
PLAN



SADDLE
SECTION

CASE 3
SADDLE CONNECTION

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PROMULGATED BY THE
PUBLIC WORKS STANDARDS INC.
GREENBOOK COMMITTEE
1984
REV. 1996, 2009

JUNCTION STRUCTURE – PIPE TO PIPE
(ID ≤ 24" (600 mm))

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN

332-2

SHEET 1 OF 2

SEE OCPW STANDARD PLAN 332-2-OC FOR CONDITIONS

NOTES

CASE 1 AND CASE 2

1. IF ANGLE A IS LESS THAN 45° OR IF D IS LARGER THAN 24" (600 mm), THEN ANOTHER STANDARD STRUCTURE SHALL BE SPECIFIED.
2. THE OUTSIDE DIAMETER OF THE INLET PIPE SHALL NOT EXCEED 1/2 THE INSIDE DIAMETER OF THE MAIN LINE.
3. THE INLET PIPE SHALL ENTER THE MAIN LINE RADially. IF THE INLET PIPE CANNOT ENTER RADially, THEN ANOTHER STANDARD STRUCTURE SHALL BE SPECIFIED.
4. THE SIZE OF THE OPENING INTO THE MAIN LINE SHALL BE THE OUTSIDE DIAMETER OF THE INLET PIPE PLUS 1" (30 mm) MINIMUM TO 3" (75 mm) MAXIMUM.
5. ALL CONNECTOR PIPES FOR CASE 2 SHALL BE ENCASED IN CONCRETE IF LAID WITHIN THE MAIN LINE EXCAVATED TRENCH OR IF LAID ON FILL WHICH HAS NOT BEEN DENSIFIED.
6. BURN OR CHIP END OF CONNECTOR PIPE FLUSH WITH INNER SURFACE OF MAIN LINE. ROUND EDGE OF CONCRETE PIPE OR RCP.
7. ALL CSP AND FITTINGS SHALL BE GALVANIZED.
8. STATION SPECIFIED ON THE PLANS APPLIES AT THE INTERSECTION OF THE INSIDE WALL OF MAIN LINE AND THE CENTERLINE OF INLET PIPE.
9. CASE 2 SHALL NOT BE USED TO CONNECT TO THE FLOOR OF A GRATING CATCH BASIN WHERE THE GRATE WILL BE SUBJECT TO VEHICLE TRAFFIC.
10. FOR CASE 2, NOT MORE THAN 12' (3.5 m) OF INLET PIPE SHALL BE LOCATED WITHIN THE MAIN LINE EXCAVATED TRENCH.

CASE 3

11. CONNECTIONS TO PIPES 21" (525 mm) OR LESS IN DIAMETER WITHOUT JUNCTION STRUCTURES OR PRECAST Y BRANCHES SHALL BE MADE WITH SADDLES.
12. THE OUTSIDE DIAMETER OF THE INLET PIPE SHALL NOT EXCEED ONE-HALF THE INSIDE DIAMETER OF THE MAIN LINE.
13. TRIM OR CUT SADDLE TO FIT SNUGLY OVER THE OUTSIDE OF THE MAIN LINE SO ITS AXIS WILL BE ON THE LINE AND GRADE OF THE CONNECTOR PIPE.
14. THE OPENING INTO THE PIPE SHALL BE CUT AND TRIMMED TO FIT THE SADDLE SO THAT NO PART WILL PROJECT WITHIN THE BORE OF THE SADDLE PIPE.
15. THE CONNECTOR PIPE SHALL BE SUPPORTED AS SHOWN IN CASES 1 AND 2.

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

JUNCTION STRUCTURE – PIPE TO PIPE
(ID ≤ 24" (600 mm))

STANDARD PLAN

332-2

SHEET 2 OF 2

SEE OCPW STANDARD PLAN 332-2-OC FOR CONDITIONS

THE FOLLOWING STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION, 2009 EDITION, OF THE PUBLIC WORKS STANDARDS, INC. HAVE BEEN ADOPTED BY OCPW WITH CONDITIONS WHICH SHALL APPLY TO OCPW USE. THE CONDITIONS ARE LISTED BELOW.

| <u>SPPWC #</u> | <u>OCPW #</u> | <u>NAME AND CONDITIONS</u> |
|----------------|---------------|---|
| 332-2 | 332-2-OC | JUNCTION STRUCTURE – PIPE TO PIPE (ID \leq 24" (600 MM)) |

1. REVISE THE NAME OF STANDARD PLAN 331-3 TO "JUNCTION STRUCTURE-TYPE VI".

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Revision: August 2018

Approved


Khalid Bazmi, County Engineer

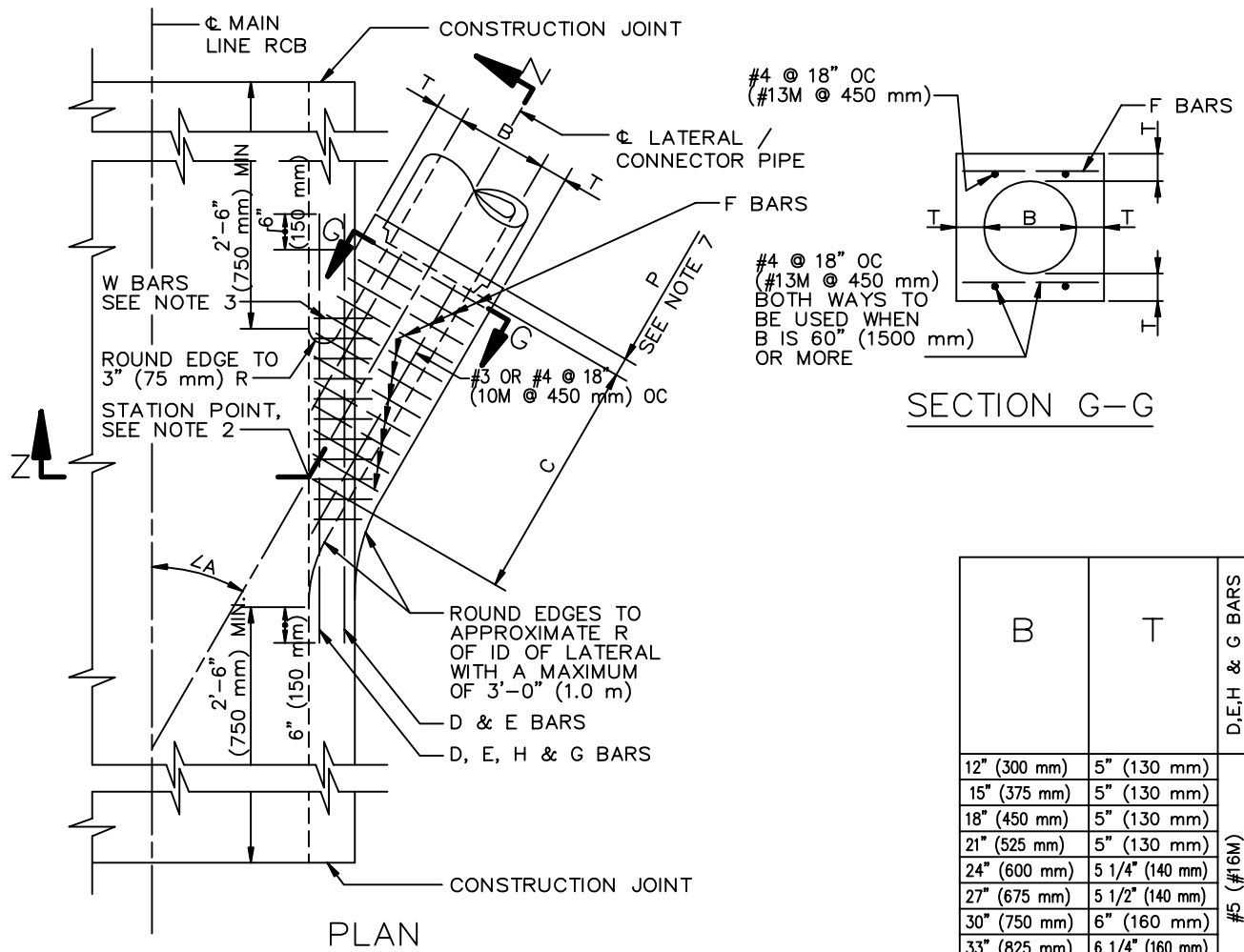
STD. PLAN

332-2-OC

SPPWC STANDARD PLAN -

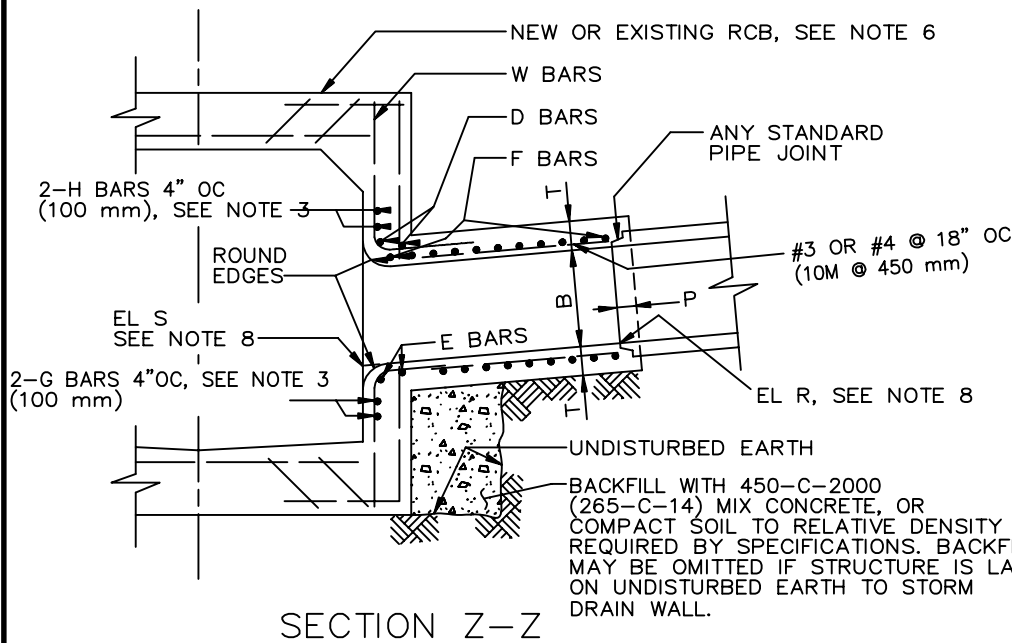
JUNCTION STRUCTURE - PIPE TO PIPE
(ID \leq 24" (600 mm))
(JUNCTION STRUCTURE - TYPE VI)

SHT. 1 OF 1



SECTION G-G

| B | T | D, E, H & G BARS | F BARS |
|----------------|------------------|------------------|----------------------------|
| 12" (300 mm) | 5" (130 mm) | #5 (#16M) | #4 @ 6" (#13M @ 150 mm) OC |
| 15" (375 mm) | 5" (130 mm) | | |
| 18" (450 mm) | 5" (130 mm) | | |
| 21" (525 mm) | 5" (130 mm) | | |
| 24" (600 mm) | 5 1/4" (140 mm) | | |
| 27" (675 mm) | 5 1/2" (140 mm) | | |
| 30" (750 mm) | 6" (160 mm) | #5 (#16M) | #4 @ 6" (#13M @ 150 mm) OC |
| 33" (825 mm) | 6 1/4" (160 mm) | | |
| 36" (975 mm) | 6 1/2" (170 mm) | | |
| 39" (990 mm) | 7" (180 mm) | | |
| 42" (1050 mm) | 7 1/2" (190 mm) | | |
| 45" (1125 mm) | 7 3/4" (200 mm) | | |
| 48" (1220 mm) | 8" (210 mm) | #6 (#19M) | #5 @ 6" (#16M @ 150 mm) OC |
| 51" (1275 mm) | 8 1/2" (220 mm) | | |
| 54" (1350 mm) | 9" (230 mm) | | |
| 57" (1500 mm) | 9 1/4" (240 mm) | | |
| 60" (1500 mm) | 9 1/2" (240 mm) | | |
| 63" (1650 mm) | 10" (260 mm) | | |
| 66" (1680 mm) | 10 1/4" (260 mm) | #7 (#22M) | #5 @ 6" (#16M @ 150 mm) OC |
| 69" (1800 mm) | 10 3/4" (280 mm) | | |
| 72" (1850 mm) | 11" (280 mm) | | |
| 78" (1950 mm) | 11 3/4" (300 mm) | | |
| 84" (2100 mm) | 12 1/2" (320 mm) | | |
| 90" (2400 mm) | 13 1/4" (340 mm) | | |
| 96" (2440 mm) | 14" (360 mm) | #7 (#22M) | #5 @ 6" (#16M @ 150 mm) OC |
| 102" (2550 mm) | 15 1/2" (400 mm) | | |
| 108" (2700 mm) | 16" (410 mm) | | |
| 114" (3000 mm) | 16 1/2" (420 mm) | | |
| 120" (3050 mm) | 17" (430 mm) | | |
| 126" (3150 mm) | 17" (430 mm) | | |
| 132" (3300 mm) | 17 1/2" (450 mm) | #7 (#22M) | #5 @ 6" (#16M @ 150 mm) OC |
| 138" (3450 mm) | 17 1/2" (450 mm) | | |
| 144" (3600 mm) | 18" (460 mm) | #7 (#22M) | #5 @ 6" (#16M @ 150 mm) OC |
| | | | |



STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PROMULGATED BY THE
PUBLIC WORKS STANDARDS INC.
GREENBOOK COMMITTEE
1984
REV. 1996, 2009

JUNCTION STRUCTURE – PIPE TO RCB

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN

333-2

SHEET 1 OF 2

SEE OCPW STANDARD PLAN 333-2-OC FOR CONDITIONS

NOTES

1. VALUES FOR A, B AND C SHALL BE SHOWN ON THE PLANS. ELEVATION R AND ELEVATION S SHALL BE SHOWN WHEN REQUIRED PER NOTE 8.
2. STATIONS SPECIFIED ON THE PLANS APPLY AT THE INTERSECTION OF CENTERLINES OF MAIN LINE AND LATERALS, EXCEPT THAT STATIONS FOR CATCH BASIN CONNECTOR PIPES APPLY AT INSIDE WALL OF STRUCTURE.
3. REINFORCING STEEL SHALL CONFORM TO ASTM A 615, GRADE 40, (ASTM A 615M, GRADE 300), AND SHALL TERMINATE 1 1/2" (40 mm) CLEAR OF CONCRETE SURFACE UNLESS OTHERWISE SHOWN.
 - a. W BARS ARE OF SIZE AND SPACING SPECIFIED FOR WALL STEEL ON PLANS, AND SHALL BE CUT IN CENTER OF OPENING AND BENT INTO TOP AND BOTTOM OF JUNCTION STRUCTURE.
 - b. OMIT H BARS WHEN SOFFIT OF SPUR IS 12" (300 mm) OR LESS BELOW SOFFIT OF MAIN LINE, AND OMIT G BARS WHEN INVERT OF SPUR IS 12" (300 mm) OR LESS ABOVE FLOOR OF MAIN LINE.
4. JUNCTION STRUCTURE SHALL BE POURED MONOLITHICALLY WITH MAIN LINE, MANHOLE OR TRANSITION STRUCTURE.
5. FLOOR OF STRUCTURE SHALL BE STEEL-TROWELED TO THE SPRING LINE.
6. WHEN CONNECTING TO EXISTING RCB, BREAKOUT LIMITS AND DETAILS SHALL BE SHOWN ON THE PLANS.
7. EMBEDMENT, P, SHALL BE 5" (130 mm) FOR B = 96" (2400 mm) OR LESS 8" (200 mm) FOR B OVER 96" (2400 mm).
8. IF ELEVATION R AND ELEVATION S ARE NOT SHOWN ON THE PLANS THEN THE INLET OPENING SHALL FALL 6" (150 mm) BELOW THE SOFFIT OF THE MAIN LINE WITH THE INLET PIPE LAID ON A STRAIGHT GRADE FROM MAIN LINE TO CATCH BASIN OR TO GRADE BREAK IN INLET LINE. ELEVATION S SHALL BE SHOWN ON THE PLANS IF THE INLET OPENING FALLS MORE THAN 6" (150 mm) BELOW THE SOFFIT OF THE MAIN LINE WITH THE INLET PIPE LAID ON A STRAIGHT GRADE AS STATED ABOVE.
ELEVATION R SHALL BE SHOWN ON THE PLANS ONLY WHEN A STUB IS TO BE PROVIDED FOR A FUTURE CONNECTION.
9. LATERALS OR CONNECTOR PIPES 24" (600 mm) OR LESS IN DIAMETER SHALL BE NO MORE THAN 5' (1.5 m) ABOVE THE INVERT. LATERALS OR CONNECTOR PIPES 27" (675 mm) OR LARGER IN DIAMETER SHALL BE NO MORE THAN 18" (450 mm) ABOVE THE INVERT, WITH THE EXCEPTION THAT CATCH BASIN CONNECTOR PIPES LESS THAN 50' (15 m) IN LENGTH SHALL NOT BE MORE THAN 5' (1.5 m) ABOVE THE INVERT.
10. THE NEED FOR AN EDGE BEAM AND/OR ADDITIONAL REINFORCEMENT SHALL BE INVESTIGATED BY THE ENGINEER FOR ANY ONE OF THE FOLLOWING CONDITIONS:
 - a. ANGLE A IS LESS THAN 30°
 - b. TOP OF INLET PIPE IS LESS THAN 6" (150 mm) BELOW THE SOFFIT
 - c. FLOW LINE OF INLET PIPE IS LESS THAN 7" (180 mm) ABOVE THE FLOOR OF THE RCB AT THE INSIDE FACE

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

JUNCTION STRUCTURE – PIPE TO RCB

STANDARD PLAN

333-2

SHEET 2 OF 2

SEE OCPW STANDARD PLAN 333-2-OC FOR CONDITIONS

THE FOLLOWING STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION, 2009 EDITION, OF THE PUBLIC WORKS STANDARDS, INC. HAVE BEEN ADOPTED BY OCPW WITH CONDITIONS WHICH SHALL APPLY TO OCPW USE. THE CONDITIONS ARE LISTED BELOW.

| <u>SPPWC #</u> | <u>OCPW #</u> | <u>NAME AND CONDITIONS</u> |
|----------------|---------------|---|
| 333-2 | 333-2-OC | <u>JUNCTION STRUCTURE – PIPE TO RCB</u> |

1. REVISE THE NAME OF STANDARD PLAN 333-2 TO "JUNCTION STRUCTURE – TYPE V".
2. REVISE NOTES:
 2. STATIONS SPECIFIED ON THE PLANS APPLY AT THE INTERSECTION OF CENTERLINES OF THE LATERALS AND THE INSIDE WALL OF STRUCTURE.
 - 3B. OMIT H BARS WHEN SOFFIT OF LATERAL IS 12 INCHES (300 MM) OR LESS BELOW SOFFIT OF MAIN LINE, AND OMIT G BARS WHEN INVERT OF LATERAL IS 12 INCHES (300 MM) OR LESS ABOVE FLOOR OF MAIN LINE.
 8. IF ELEVATION R AND ELEVATION S ARE NOT SHOWN ON THE PLANS THEN THE INLET OPENING SHALL FALL 6 INCHES (150 MM) BELOW THE SOFFIT OF THE MAIN LINE WITH THE INLET PIPE LAID ON A STRAIGHT GRADE FROM MAIN LINE TO CATCH BASIN OR TO GRADE BREAK IN INLET LINE. ELEVATION R SHALL BE SHOWN ON THE PLANS ONLY WHEN A STUB IS TO BE PROVIDED FOR A FUTURE CONNECTION. LATERALS OR CONNECTOR PIPES 24 INCHES OR LESS IN DIAMETER.
 9. SHALL BE IN THE LOWER 3 OF THE STRUCTURE. LATERALS OR CONNECTOR PIPES 27 INCHES OR LARGER IN DIAMETER SHALL BE NO MORE THAN 18 INCHES ABOVE THE INVERT, WITH THE EXCEPTION THAT CATCH BASIN CONNECTOR PIPES LESS THAN 50 FEET IN LENGTH SHALL NOT BE MORE THAN 5 FEET ABOVE THE INVERT. MINIMUM DIAMETER OF LATERAL OR CONNECTOR PIPES SHALL BE 18 INCHES.
4. ADD NOTE:
 - II. THIS JUNCTION STRUCTURE MAY BE USED WHEN ANGLE A 30 DEGREE, BARREL WIDTH OF THE RCB IS 20 FEET OR LESS, AND COVER OVER RCB IS 10 FEET OR LESS.
5. INCREASE DIMENSION "T" AT EDGES TO A MINIMUM OF 6 INCHES+(PIPE WALL THICKNESS) FOR EMBEDMENT DIMENSION "P"+6 INCHES.

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Revision: August 2018

Approved

Khalid Bazmi
Khalid Bazmi, County Engineer

STD. PLAN

333-2-OC

SPPWC STANDARD PLAN -

JUNCTION STRUCTURE - PIPE TO RCB
(JUNCTION STRUCTURE - TYPE V)

SHT. 1 OF 2

THE FOLLOWING STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION, 2009 EDITION, OF THE PUBLIC WORKS STANDARDS, INC. HAVE BEEN ADOPTED BY OCPW WITH CONDITIONS WHICH SHALL APPLY TO OCPW USE. THE CONDITIONS ARE LISTED BELOW.

SPPWC # OCPW # NAME AND CONDITIONS
 333-2 333-2-OC JUNCTION STRUCTURE – PIPE TO RCB

6. THIS JUNCTION STRUCTURE MAY BE USED FOR PIPE INLETS TO VERTICAL WALL CONCRETE CHANNELS.
7. REVISE A PORTION OF THE TABLE AS SHOWN.

| B | T | BARS | |
|---------------|----|-------------|------------|
| | | D, E, H & G | F |
| 12" (300 mm) | 6" | #5 | #4 @ 6" OC |
| 15" (375 mm) | 6" | | |
| 18" (450 mm) | 6" | | |
| 21" (525 mm) | 6" | | |
| 24" (600 mm) | 7" | | |
| 27" (675 mm) | 7" | | |
| 30" (750 mm) | 7" | | |
| 33" (825 mm) | 8" | | |
| 36" (975 mm) | 8" | | |
| 39" (990 mm) | 8" | | |
| 42" (1050 mm) | 8" | | |
| 45" (1125 mm) | 8" | | |

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Revision: August 2018

Approved


 Khalid Bazmi, County Engineer

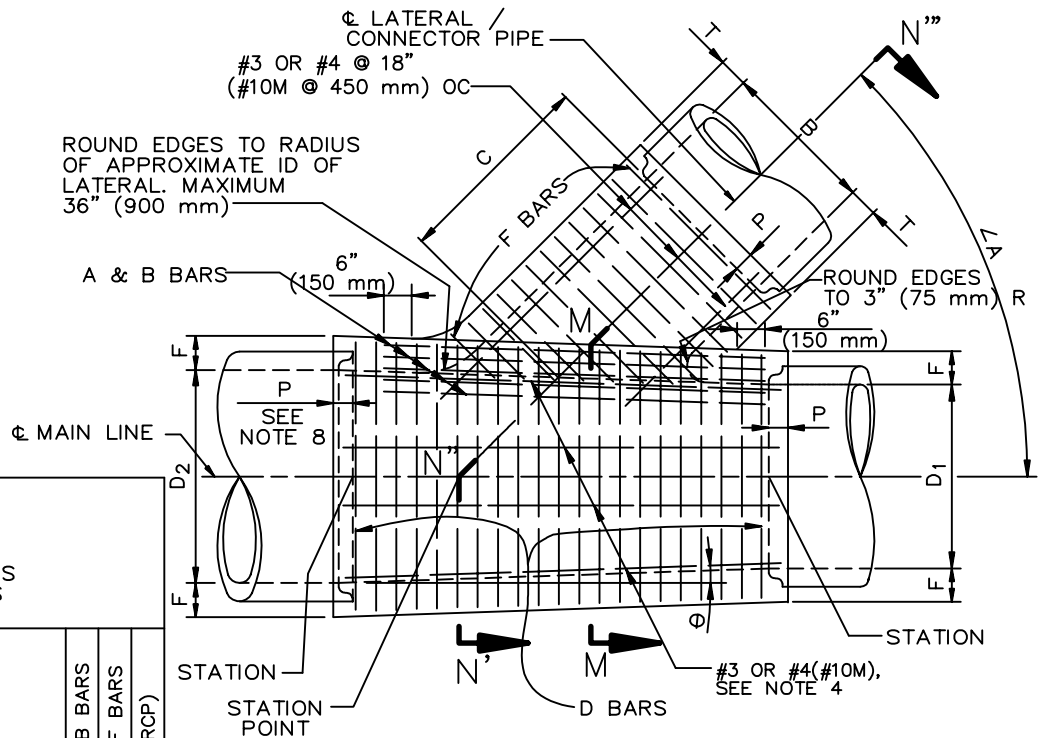
STD. PLAN

333-2-OC

SPPWC STANDARD PLAN -

JUNCTION STRUCTURE - PIPE TO RCB (JUNCTION
 STRUCTURE - TYPE V)

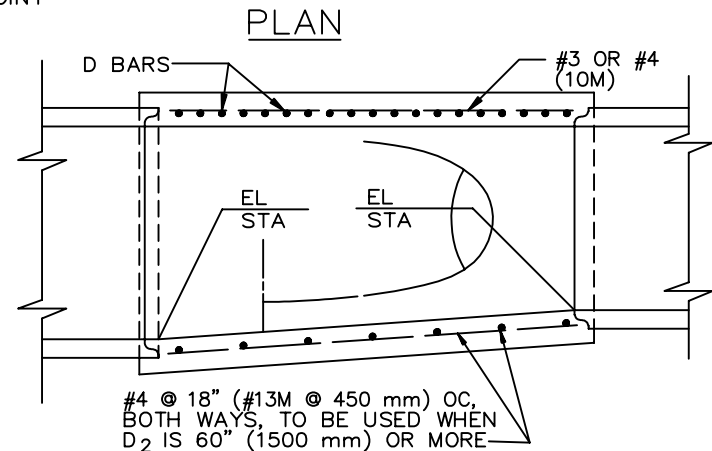
SHT. 2 OF 2



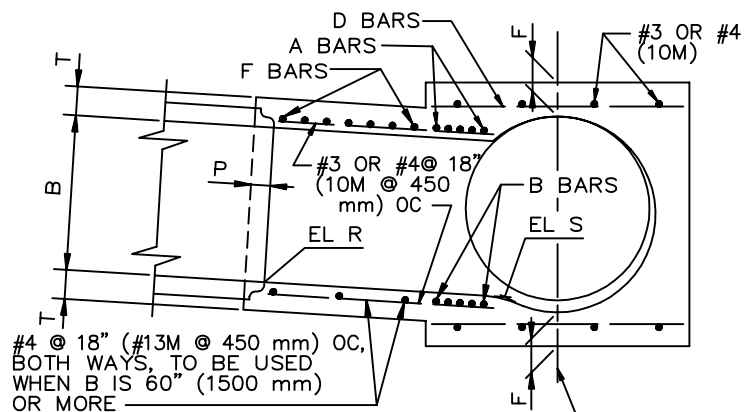
TABLE

FOR DIMENSIONS
AND BAR SIZES

| D ₂ OR B (INCHES) (mm) | | F OR T (INCHES) (mm) | | A OR B BARS | D OR F BARS | P (RCP) |
|--|------|-------------------------------|-----|-------------|-------------|-------------|
| 12 | 300 | 4 | 110 | OC | OC | 5" (125 mm) |
| 15 | 375 | 4 1/4 | 110 | | | |
| 18 | 450 | 4 1/2 | 120 | | | |
| 21 | 525 | 5 | 130 | | | |
| 24 | 600 | 5 1/4 | 140 | | | |
| 27 | 675 | 5 1/2 | 140 | | | |
| 30 | 750 | 6 | 160 | | | |
| 33 | 825 | 6 1/4 | 160 | | | |
| 36 | 900 | 6 1/2 | 170 | | | |
| 39 | 975 | 7 | 180 | | | |
| 42 | 1050 | 7 1/2 | 190 | | | 5" (125 mm) |
| 45 | 1125 | 7 3/4 | 200 | | | |
| 48 | 1200 | 8 | 210 | | | |
| 51 | 1275 | 8 1/2 | 220 | | | |
| 54 | 1350 | 9 | 230 | | | |
| 57 | 1425 | 9 1/4 | 240 | | | |
| 60 | 1500 | 9 1/2 | 250 | | | |
| 63 | 1575 | 10 | 260 | | | |
| 66 | 1650 | 10 1/4 | 260 | | | |
| 69 | 1725 | 10 3/4 | 280 | | | |
| 72 | 1800 | 11 | 280 | | | 8" (200 mm) |
| 78 | 1950 | 11 3/4 | 300 | | | |
| 84 | 2100 | 12 1/2 | 320 | | | |
| 90 | 2250 | 13 1/4 | 340 | | | |
| 96 | 2400 | 14 | 360 | | | |
| 102 | 2550 | 15 1/2 | 400 | | | |
| 108 | 2700 | 16 | 410 | | | |
| 114 | 2850 | 16 1/2 | 420 | | | |
| 120 | 3000 | 17 | 440 | | | |
| 126 | 3150 | 17 | 440 | | | |
| 132 | 3300 | 17 1/2 | 450 | | | |
| 138 | 3450 | 17 1/2 | 450 | | | |
| 144 | 3600 | 18 | 460 | | | |



LONGITUDINAL SECTION



SECTION N'-N'-N'
PROJECTED ON M-M-N'

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PROMULGATED BY THE
PUBLIC WORKS STANDARDS INC.
GREENBOOK COMMITTEE
1992
REV. 1995, 2009

TRANSITION STRUCTURE
PIPE TO PIPE

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN

340-2

SHEET 1 OF 2

SEE OCPW STANDARD PLAN 340-2-OC FOR CONDITIONS

NOTES

1. THE HORIZONTAL ANGLE OF CONVERGENCE OR DIVERGENCE, θ , SHALL NOT EXCEED $5^{\circ} 45'$.
2. VALUES FOR A, B, C, D₁ AND D₂ ARE SHOWN ON THE PLANS. ELEVATION R AND ELEVATION S ARE SHOWN WHEN REQUIRED BY NOTE 10.
3. FLOOR OF STRUCTURE SHALL BE STEEL TROWELED TO SPRING LINE.
4. REINFORCEMENT STEEL SHALL CONFORM TO ASTM A 615 (A 615 M), GRADE 300 (40), AND SHALL TERMINATE $1\frac{1}{2}"$ (40 mm) CLEAR OF CONCRETE SURFACES UNLESS OTHERWISE SHOWN. LONGITUDINAL BARS SHALL BE #3 OR #4 @ 18" (#10M @ 450 mm) OC OR LESS.
5. ELEVATION S APPLIES AT INSIDE WALL OF STRUCTURE.
6. TRANSITION STRUCTURE SHALL BE POURED IN ONE CONTINUOUS OPERATION, EXCEPT THAT THE CONTRACTOR SHALL HAVE THE OPTION OF PLACING AT THE SPRING LINE A CONSTRUCTION JOINT LONGITUDINAL KEYWAY.
7. THE LENGTH OF THE STRUCTURE MAY BE INCREASED AT THE OPTION OF THE CONTRACTOR TO MEET RCP ENDS, USING D BARS, LONGITUDINAL AND BOTTOM REINFORCEMENT IN EXTENDED PORTION OF SAME DIAMETER AND SPACING AS SPECIFIED IN THE TABLE, BUT ANY CHANGE IN THE LOCATION OF SPUR MUST BE APPROVED BY THE ENGINEER.
8. EMBEDMENT P SHALL BE AS SPECIFIED IN THE TABLE, UNLESS OTHERWISE SHOWN ON THE PLANS.
9. WHEN THERE IS NO SPUR REQUIRED, A & B BARS SHALL BE OMITTED.
10. WHEN ELEVATION R AND ELEVATION S ARE NOT SHOWN ON PLANS, INLET PIPE SHALL ENTER MAIN LINE RADially. WHEN INLET PIPE ENTERS MAIN LINE OTHER THAN RADially, ELEVATION S SHALL BE SHOWN ON PLANS, AND INLET PIPE SHALL BE LAID ON A STRAIGHT GRADE FROM ELEVATION S TO CATCH BASIN OR GRADE BREAK IN INLET LINE. ELEVATION R SHALL BE SHOWN ON THE PLANS ONLY WHEN STUB IS TO BE PROVIDED IN MAIN LINE FOR FUTURE CONSTRUCTION OF INLET PIPE.
11. THE MAXIMUM COVER ABOVE THIS STRUCTURE SHALL BE 25' (7.5 m). IF THE COVER EXCEEDS 25' (7.5 m') A SPECIAL STRUCTURE SHALL BE DESIGNED FOR THE COVER AND DETAILED ON THE PLANS.

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

TRANSITION STRUCTURE PIPE TO PIPE

STANDARD PLAN

340-2

SHEET 2 OF 2

SEE OCPW STANDARD PLAN 340-2-OC FOR CONDITIONS

THE FOLLOWING STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION, 2009 EDITION, OF THE PUBLIC WORKS STANDARDS, INC. HAVE BEEN ADOPTED BY OCPW WITH CONDITIONS WHICH SHALL APPLY TO OCPW USE. THE CONDITIONS ARE LISTED BELOW.

SPPWC # OCPW # NAME AND CONDITIONS
 340-2 340-2-OC TRANSITION STRUCTURE – PIPE TO PIPE

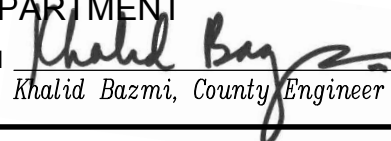
1. SPPWC STANDARD PLAN 340-2 MAY ONLY BE USED WHEN THE ENGINEER DETERMINES SUFFICIENT MEANS OF ACCESS IS AVAILABLE FOR STORM DRAIN MAINTENANCE.
2. ADD NOTES: 12. THE ANGLE BETWEEN THE LATERAL AND THE MAIN LINE SHALL NOT BE GREATER THAN 45 DEGREES WHEN THE FLOW IN THE LATERAL EXCEEDS 10 PERCENT OF THE FLOW IN THE MAIN LINE.
3. INCREASE DIMENSIONS "T"&"F" AT EDGES TO A MINIMUM OF 6 INCHES + (PIPE WALL THICKNESS) FOR EMBEDMENT DIMENSION "P" + 6 INCHES.
4. REVISE A PORTION OF "TABLE FOR DIMENSIONS AND BAR SIZES" AS SHOWN:

| TABLE FOR DIMENSIONS AND BAR SIZES | | | | | |
|--|------|--------------|------|-------------|-------------|
| D ₂ OR B | | F OR T | | A OR B BARS | D OR F BARS |
| (INCHES) | (mm) | (INCHES) | (mm) | | |
| 18 | 450 | 6 | 120 | #5 @ 3" OC | #4 @ 6" OC |
| 21 | 525 | 6 | 130 | | |
| 24 | 600 | 6 | 140 | | |
| 27 | 675 | 6 | 140 | | |
| 30 | 750 | 6 | 160 | | |
| 33 | 825 | 7 | 160 | | |
| 36 | 900 | 7 | 170 | | |
| 39 | 975 | 7 | 180 | #6 @ 3" OC | #5 @ 6" OC |
| 42 | 1050 | 8 | 190 | | |
| 45 | 1125 | 8 | 200 | | |
| 48 | 1200 | 8 | 210 | | |

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Revision: August 2018

Approved

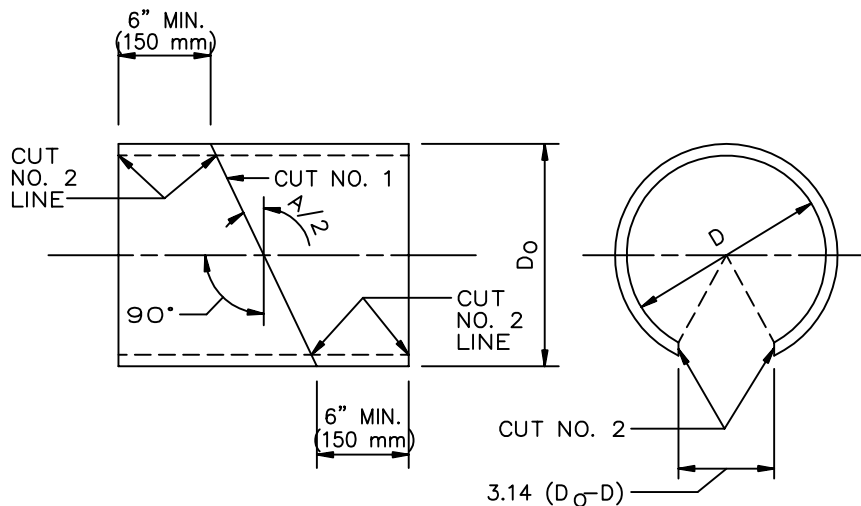
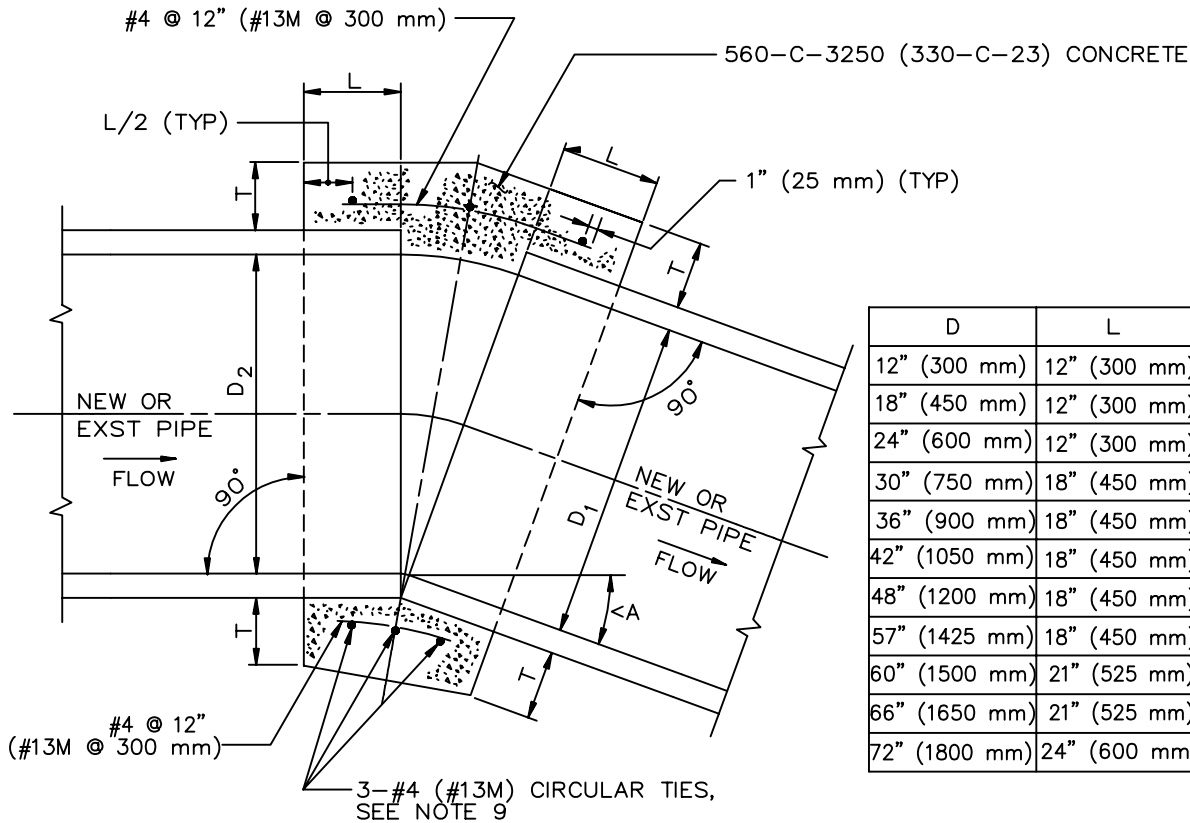

 Khalid Bazmi, County Engineer

STD. PLAN

340-2-OC

SPPWC STANDARD PLAN - TRANSITION STRUCTURE - PIPE TO PIPE

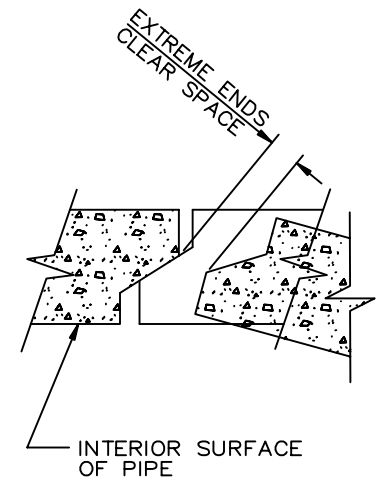
SHT. 1 OF 1



DETAIL "A" (SEE NOTE 10)
SONO-TUBE, OR EQUAL, INTERIOR FORM

CUT NO. 1: SAW THE TUBE AT AN ANGLE OF A/2 WITH THE TRANSVERSE PLANE. REVERSE ONE SECTION AND TAPE BOTH SECTIONS TOGETHER FORMING THE DEFLECTION ANGLE A.

CUT NO. 2: SAW THE TUBE LONGITUDINALLY REMOVING A STRIP 3.14 (D_o - D) WIDE ON THE SIDE OPPOSITE THE OPEN JOINT. BEND THE ENDS OF THE CUT TOGETHER AND INSERT THE TUBE IN THE PIPE.



DETAIL "B"
TYPICAL JOINT FOR
REINFORCED CONCRETE PIPE

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PROMULGATED BY THE
PUBLIC WORKS STANDARDS INC.
GREENBOOK COMMITTEE
1992
REV. 1996, 1997, 1999, 2009

CONCRETE COLLAR FOR RCP
12" (300 mm) THROUGH 72" (1800 mm)

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN

380-4

SHEET 1 OF 2

SEE OCPW STANDARD PLAN 380-4-OC FOR CONDITIONS

NOTES

1. A CONCRETE COLLAR IS REQUIRED WHERE THE CHANGE IN GRADE EXCEEDS 10%.
2. FOR CURVE JOINTS (SEE DETAIL B, SHEET 1)
IF THE EXTREME ENDS OF THE PIPE LEAVE A CLEAR SPACE THAT IS GREATER THAN 1" (25 mm), BUT IS LESS THAN 3" (75 mm) A CONCRETE COVER IS REQUIRED IN ACCORDANCE WITH SSPWC 306-1.2.4.
IF THE EXTREME ENDS OF THE PIPE LEAVE A CLEAR SPACE THAT IS EQUAL TO OR GREATER THAN 3" (75 mm), BUT LESS THAN 6" (150 mm), A CONCRETE COLLAR IS REQUIRED. IF THE CLEAR SPACE IS 6" (150 mm) OR GREATER, A TRANSITION STRUCTURE IS REQUIRED.
3. CONCRETE COLLAR SHALL NOT BE USED FOR A SIZE CHANGE ON THE MAIN LINE.
4. CONNECTOR PIPES
 - A. WHERE PIPES OF DIFFERENT DIAMETERS ARE JOINED WITH A CONCRETE COLLAR, L AND T SHALL BE THOSE OF THE LARGER PIPE. $D = D_1$ OR D_2 , WHICHEVER IS GREATER.
 - B. WHEN D_1 IS EQUAL TO OR LESS THAN D_2 , JOIN INVERTS AND WHEN D_1 IS GREATER THAN D_2 , JOIN SOFFITS.
5. FOR PIPE LARGER THAN 72" (1800 mm) SPECIAL COLLAR DETAILS ARE REQUIRED.
6. FOR PIPE SIZE NOT LISTED USE NEXT SIZE LARGER.
7. REINFORCEMENT SHALL CONFORM TO ASTM A 615 (A 615 M) GRADE 40 (300).
8. WHERE REINFORCING IS REQUIRED THE DIAMETER OF THE CIRCULAR TIES SHALL BE $D + (2 \times \text{WALL THICKNESS}) + T$.
9. REINFORCING SHALL BE USED WHERE THE PIPE DIAMETER IS GREATER THAN 21" (525 mm) AND ON ALL PIPES WHERE THE SPACES BETWEEN THE EXTREME OUTER ENDS IS 3" (75 mm) OR LARGER.

CIRCULAR TIES:

| PIPE DIAMETER | NO. OF CIRCULAR TIES |
|--------------------------------|----------------------|
| 21" (525 mm) OR LESS | 3 |
| 24" (600 mm) TO 30" (750 mm) | 3 |
| 33" (825 mm) TO 57" (1425 mm) | 4 |
| 60" (1500 mm) TO 72" (1800 mm) | 5 |

WHERE THE SPACE BETWEEN PIPE ENDS EXCEEDS 3" (75 mm), THE NUMBER OF CIRCULAR TIES SHALL BE INCREASED TO MAINTAIN AN APPROXIMATE SPACING OF 6" (150 mm) O.C.

10. WHERE THE PIPE IS 21" (525 mm) OR LESS IN DIAMETER AN INTERIOR FORM OF UNSEALED SONO-TUBE OR EQUAL SHALL BE USED TO PROVIDE A SMOOTH INTERIOR JOINT. THE PAPER FORM MAY BE LEFT IN PLACE (SEE DETAIL A). WHEN THE PIPE IS 24" (600 mm) OR LARGER A REMOVABLE INTERIOR FORM SHALL BE USED OR THE INTERIOR JOINT SHALL BE COMPLETELY FILLED WITH MORTAR AND NEATLY POINTED.

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

CONCRETE COLLAR FOR RCP
12" (300 mm) THROUGH 72" (1800 mm)

STANDARD PLAN

380-4

SHEET 2 OF 2

SEE OCPW STANDARD PLAN 380-4-OC FOR CONDITIONS

| <u>SPPWC #</u> | <u>OCPW #</u> | <u>NAME AND CONDITIONS</u> |
|----------------|---------------|---|
| 380-4 | 380-4-OC | <u>CONCRETE COLLAR FOR RCP</u> 12" THROUGH 72" |

- | D | L | T | $\angle A$ |
|---------------|--------------|--------------|------------|
| 12" (300 mm) | 12" (300 mm) | 4" (100 mm) | 01°49'35" |
| 18" (450 mm) | 12" (300 mm) | 5" (125 mm) | 01°16'14" |
| 24" (600 mm) | 12" (300 mm) | 6" (150 mm) | 00°58'27" |
| 30" (750 mm) | 18" (450 mm) | 7" (175 mm) | 00°47'23" |
| 36" (900 mm) | 18" (450 mm) | 9" (225 mm) | 00°39'51" |
| 42" (1050 mm) | 18" (450 mm) | 9" (225 mm) | 00°34'23" |
| 48" (1200 mm) | 18" (450 mm) | 10" (250 mm) | 00°30'14" |
| 54" (1372 mm) | 18" (450 mm) | 10" (250 mm) | 00°26'58" |
| 60" (1500 mm) | 21" (525 mm) | 11" (275 mm) | 00°24'21" |
| 66" (1650 mm) | 21" (525 mm) | 11" (275 mm) | 00°22'12" |
| 72" (1800 mm) | 24" (600 mm) | 12" (300 mm) | 00°20'23" |

DEPARTMENT
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380-4-OC

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