DETAIL A

NOTE: ALL METAL SURFACES SHALL BE COATED WITH TWO COATS OF HEAVY COAL TAR PAINT.
NOT TO SCALE

NOTES:

1. THIS DETAIL IS FOR BUTTERFLY VALVE INSTALLATIONS 20-INCHES IN DIAMETER OR SMALLER.
2. CARE SHALL BE TAKEN WHEN INSTALLING VALVES TO ASSURE PROPER SUPPORT OF THE VALVE. THE AUTHORITY MAY REQUIRE 3/4" CRUSHED ROCK TO BE INSTALLED UNDER THE VALVE TO PROVIDE PROPER SUPPORT.
3. VALVES SHALL NOT BE PLACED IN CONCRETE CROSS PANS.
4. OPERATING NUTS SHALL NOT BE SET CLOSER THAN THREE (3) FEET TO FINAL GRADE OR DEEPER THAN FIVE (5) FEET FROM FINAL GRADE. OPERATOR EXTENSIONS SHALL BE CONNECTED TO VALVE OPERATOR USING SET SCREW.
5. BUTTERFLY VALVE AND OPERATOR SHALL BE POLYETHYLENE WRAPPED.
TOP SECTION OF VALVE BOX, TYLER 6860 SERIES OR EQUAL (EXTENSIONS IF REQUIRED). HOLE TO BE DRILLED IN FIELD OR CAST-IN-PLACE.

60" DIA. PRECAST CONCRETE FLAT MH COVER (ASTM C478)

OPERATOR EXTENSION

EXTENSION GUIDE

60" DIA. PRECAST CONCRETE MANHOLE SECTIONS (ASTM C478)

MAIN SIZE X 6" TEE ROTATED 45° DOWNWARD

6" GATE VALVE

MASTIC SEALANT

6" - 45° BEND

ADJUSTABLE SUPPORT

7" SQ. CONCRETE PAD TO REST ON UNDISTURBED SOIL

ELEVATION

NOTES:

1. FIRE HYDRANT MAY BE USED AS AN ALTERNATE BLOW-OFF. SEE DETAIL.

2. ALL METAL SURFACES SHALL BE COATED WITH TWO COATS OF HEAVY COAL TAR PAINT.

VALVE BOX SUPPORT PLATE, 12" X 12" X 3/16". ANCHOR WITH 2 1/2" SS EXPANSION ANCHORS

24" STD RING AND COVER

2 - 4 BRICK COURSES OR CONCRETE RINGS

STD. STEPS

6" X 90° FLANGED ELBOW UP

MIN 6 x 6 - 10 x 10 WWF

STANDARDS & SPECIFICATIONS

REVISED: BLOW-OFF VALVE 16" + LARGER MAINS

DATE: DRAWING NO. 200-06

SHEET 2 OF 3
18" SQ. X 6" THICK CONCRETE COLLAR WHEN NOT IN ASPHALT

NOTE:
ALL FITTINGS TO BE MECHANICAL JOINT AND RODDED FOR PROPER RESTRAINT

3-PIECE VALVE BOX WITH 5 1/4" BARREL AND WIDE OVAL BASE, TYLER 6860 SERIES OR EQUAL

MAIN SIZE X 6" Tee rotated 45° downward

2" nut adapter

6" gate valve

6" - 45° bend

6" - 90° bend with thrust block

PAINTED YELLOW

4' - 6" MIN.
1/2" OF GROUT OVER FOUR INCH BRICK COURSE AT EACH END OF CASING.

PUSH-ON SINGLE CASKET OR MECHANICAL JOINT DUCTILE IRON CARRIER PIPE

1" STEEL BAND

STEEL CASING PIPE (SEE TABLE BELOW FOR SIZE AND WALL THICKNESS).

REDWOOD RUNNER

1" STEEL BANDS (3 PER SLED)

OVERALL PIPE JOINT DIMENSION

90°

0°

STEEL CASING PIPE

TREATED REDWOOD RUNNER

SLED DETAIL

NOTES:

1. RUNNER LENGTH TO BE 75% OF LAYING LENGTH.

2. CASING LENGTH IS MIN. OF 18 FEET. CONCRETE ENCASMENT OF SEWER SHALL EXTEND A DISTANCE OF 10 FEET HORIZONTALLY AND PERPENDICULAR TO EITHER SIDE OF THE WATER MAIN.

3. HARNESS LUGS TO BE INSULATED FROM D.I. PIPE.

PIPE CASING DETAIL

<table>
<thead>
<tr>
<th>CARRIER PIPE NOMINAL DIA.</th>
<th>CASING PIPE MIN. O.D.</th>
<th>MIN. WALL THICK</th>
<th>MINIMUM RUNNER SIZE</th>
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</thead>
<tbody>
<tr>
<td>4&quot;</td>
<td>12&quot;</td>
<td>0.188&quot;</td>
<td>2&quot; x 4&quot;</td>
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<td>8&quot;</td>
<td>18&quot;</td>
<td>0.282&quot;</td>
<td>2&quot; x 4&quot;</td>
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<td>12&quot;</td>
<td>22&quot;</td>
<td>0.344&quot;</td>
<td>2&quot; x 4&quot;</td>
</tr>
<tr>
<td>16&quot;</td>
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</tr>
<tr>
<td>20&quot;</td>
<td>32&quot;</td>
<td>0.469&quot;</td>
<td>2&quot; x 6&quot;</td>
</tr>
</tbody>
</table>

NOTES:

1.) NEOPRENE OR PVC RUNNERS MAY BE USED AS AN ALTERNATIVE TO TREATED REDWOOD.

2.) TRENCH LAID CASINGS SHALL BE DESIGNED AND INSTALLED TO CONDUIT STANDARDS.
TABLE OF DIMENSIONS FOR CLAMPS

<table>
<thead>
<tr>
<th>BAR SIZE</th>
<th>1/2</th>
<th>3/4</th>
<th>1</th>
<th>1-1/2</th>
<th>2</th>
<th>2-1/2</th>
<th>3</th>
<th>3-1/2</th>
<th>4</th>
<th>5</th>
<th>6</th>
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<td></td>
</tr>
</tbody>
</table>

NOTE: ALL DIMENSIONS IN INCHES.

NOTE: NOT FOR USE WITH 18” & 20”
D.I. COMPACT FITTINGS.
#4 TIES
18" CTRS

3" CLEAR
MIN. (TYP.)

VARIABLE

6" MIN.

6" MIN.

SEE BAR SIZING
AND LOCATION TABLE

SEE BAR SIZING
AND LOCATION TABLE

3000 P.S.I.
CONCRETE
VIBRATED
IN PLACE

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>NO. OF LONGITUDINAL BARS AND LOCATION</th>
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</thead>
<tbody>
<tr>
<td>6&quot;</td>
<td>4 – NO. 4 BARS</td>
</tr>
<tr>
<td>8&quot;</td>
<td>8 – NO. 4 BARS</td>
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<td>12 – NO. 4 BARS</td>
</tr>
<tr>
<td>36&quot;</td>
<td>16 – NO. 4 BARS</td>
</tr>
</tbody>
</table>

1 EACH CORNER
3 EACH SIDE
3 EACH SIDE
3 EACH SIDE
4 EACH SIDE
4 EACH SIDE
4 EACH SIDE
4 EACH SIDE
4 EACH SIDE
5 EACH SIDE
GENERAL NOTES:
1. FOR INSTALLATION IN ROADWAYS, DRIVEWAYS, SIDEWALKS, OR PARKING AREAS PRIOR APPROVAL REQUIRED.

2. NO CONCRETE FLOOR ALLOWED IN METER PIT.

3. METER PIT SHALL BE CONSTRUCTED OF ANY COMBINATION OF CONCRETE RINGS TOTAL - 48" IN LENGTH.

4. ADJUSTMENT RINGS SHALL BE 2", 3", 4" OR 6" IN HEIGHT AND SHALL BE INSERTED BETWEEN THE DOME AND TOP RING.

5. NO CONNECTIONS OR CHANGES IN PIPE DIAMETER SHALL BE MADE FROM THE MAIN TAP TO A DISTANCE OF FIVE FEET BEYOND THE METER PIT WALL ON THE OUTLET SIDE.

6. LID SHALL SAY "WATER METER"

<table>
<thead>
<tr>
<th>METER SIZE</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>5/8&quot; x 3/4&quot;</td>
<td>12-5/8&quot;</td>
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<td>7-13/16&quot;</td>
<td>4&quot;</td>
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<td>3/4&quot;</td>
<td>14-1/4&quot;</td>
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<td>8-15/16&quot;</td>
<td>5&quot;</td>
</tr>
<tr>
<td>1&quot;</td>
<td>17-1/4&quot;</td>
<td>11-1/16&quot;</td>
<td>11-1/4&quot;</td>
<td>6&quot;</td>
</tr>
</tbody>
</table>
LIST OF MATERIALS

1. RING AND COVER – J’MARK NO. J-2290 (81 LBS.) OR APPROVED EQUAL WITH INTERNAL FROST LID.
2. METER PIT – ARCO NO. 24-4 PRECAST MANHOLE (24” DIA.) OR APPROVED EQUAL.
3. SERVICE LINE – COPPER TUBING TYPE K, SAME DIAMETER AS THE METER.
4. METER YOKE ASSEMBLY – FORD 80 SERIES COPPER SETTER OR APPROVED EQUAL.
5. SHUT-OFF VALVE.
6. CORPORATION STOP. A SADDLE MAY BE REQUIRED.

ADDITIONAL NOTES

1. THE AUTHORITY SHALL INSPECT FROM THE MAIN TO THE BUILDING PRIOR TO BACKFILLING.
2. IF THE SURFACE IS NOT TO FINAL GRADE AT THE TIME OF THE METER INSTALLATION, THE PROPERTY OWNER SHALL RAISE OR LOWER THE METER PIT ACCESS MANHOLE TO MATCH THE FINAL GRADE.
3. THE METER SHALL BE A POSITIVE DISPLACEMENT ROCKWELL OR NEPTUNE TRIDENT 8, READING IN GALLONS.
4. CAP TYPE TOP LID SHALL BE CAST IRON ONLY. THE INNER LID SHALL BE CAST IRON, ALUMINUM OR RUBBER. THE ALUMINUM SHALL BE COATED WITH A POLYMER SUCH AS EPOXY. CAST IRON SHALL BE COATED WITH AN ASPHALT BASE PAINT.
LIST OF MATERIALS

1. CORPORATION STOP VALVE.
2. CURB STOP VALVE AND BOX W/ 2" OPERATOR NUT AND FLARED COPPER ENDS.
   CURB STOP VALVE BOX MUST BE A 3-PIECE BOX WITH 5-1/4" BARREL AND WIDE OVAL BASE (TYLER 6860 SERIES, OR APPROVED EQUAL).
3. SERVICE LINE — COPPER TUBING TYPE K, SAME DIAMETER AS THE METER.
4. METER — POSITIVE DISPLACEMENT ROCKWELL OR NEPTUNE TRIDENT B, READING IN GALLONS
5. RING AND COVER — J'MARK NO. J1163 (125 LBS. COVER) OR APPROVED WITH WATER CAST INTO COVER.
6. METER PIT — 48" DIA. PRECAST MANHOLE ASTM C478, FLAT TOP.
7. BALL VALVE— FORD BALL VALVE CURB STOP W/ FEMALE THREAD IRON PIPE & FLARED COPPER ENDS OR EQUAL (2 REQ.)
8. BRASS FLANGE COUPLING
9. FORD LOCK-PAK ADJUSTMENT COUPLING W/2 STAINLESS STEEL SET SCREWS.
10. STOP & WASTE VALVE W/FLARED COPPER ENDS.

NOTES

1. THE DISTRICT SHALL INSPECT FROM THE MAIN TO THE BUILDING PRIOR TO BACKFILLING.
2. IF THE SURFACE IS NOT TO FINAL GRADE AT TIME OF THE METER INSTALLATION, THE PROPERTY OWNER SHALL RAISE OR LOWER THE METER PIT ACCESS MANHOLE TO MATCH THE FINAL GRADE.
3. COUPLINGS SHALL BE PROVIDED ON UPSTREAM AND DOWNSTREAM SIDES OF METER TO ALLOW FOR REMOVAL.
4. TOP STEP 18" — 24" BELOW THE SURFACE, REMAINDER SPACED AT 12" INTERVALS.
NOTE:

1. PLACEMENT OF STOP BOX CAN VARY FROM A MAXIMUM OF 5 FEET OUTSIDE THE PROPERTY LINE TO THE PROPERTY LINE. PLACEMENT OF THE STOP BOX OUTSIDE THE PROPERTY LINE IS PREFERRED.

2. OWNER'S RESPONSIBILITY FOR LEAK REPAIR SHALL BE UP TO AND INCLUDING THE TUBE NUT WHICH THREADS ONTO THE CURB STOP. OWNER'S RESPONSIBILITY FOR REPAIRS OTHER THAN LEAK REPAIR EXTENDS TO THE CORPORATION STOP.

3. ACWWA WILL REPAIR LEAKS ON SERVICE LINES WHEN NOTIFIED, FROM THE CORPORATION STOP TO CURB STOP.

SHOULD ANY SITUATION ARISE OTHER THAN SHOWN CONCERNING THE DEPTH OR CONSTRUCTION OF SERVICE LINE OR THE PLACEMENT OF METER PIT OR STOP BOX CALL 303-790-4830 AND ASK FOR CUSTOMER SERVICES FIELD SECTION.
FIRELINE OR DOMESTIC CONNECTION WITH MAIN EXTENSION

FIRELINE OR DOMESTIC CONNECTION

FIRELINE CONNECTION WITH DOMESTIC SERVICE TEE

NOTE: 4" FIRELINE CONNECTION WITH 1-1/2" OR 2" DOMESTIC TEE SHALL BE PLUGGED AND TAPPED WITH AWWA CC THREADS FOR APPLICABLE SIZE.

1. EXISTING MAIN  8. CONCRETE NICKEL/LEAD
2. TAPPING SLEEVE  9. M.U. ANCHORING TEE (SHINING TEE WHERE APPLICABLE)
3. TAPPING VALVE  10. M.U. VALVE
4. DOUBLE SPIGOT PIPE  11. DOMESTIC SERVICE TEE OR SERVICE TAP
5. PROPERTY LINE VALVE  12. POLYETHYLENE WRAPPED
6. TIE RODS (MEGAUGS ARE NOT ACCEPTABLE)  13. 90° FITTING (BEND FOR 2" & SMALLER)
7. PIPE CLAMP  14. VALVE OR CURBSTOP AS NOTED ON PLANS & CONTINUE PER APPLICABLE METER DETAIL

STANDARDS & SPECIFICATIONS

REVISED: 2" AND LARGER

DATE: FIRELINE CONNECTION

DRAWING NO. 200-17
NOTE:
PIPE MUST BE "FULLY" RESTRAINED
WITH EITHER RODDING OR
MECHANICAL JOINT RESTRAINT
SUCH AS MEGALUGS, OR APPROVED
EQUAL.

HYDRANT SHALL BE PLUMB IN ALL
DIRECTIONS WITH PUMPER NOZZLE
FACING STREET AND SHALL BE PAINTED
YELLOW.

COVER ROCK WITH APPROVED FILTER
BLANKET OR 8 MIL
POLYETHYLENE SHEET
PRIOR TO PLACING
BACKFILL

0.25 CU.YD.
(3/4" - 3/8")
WELL GRADED
CRUSHED ROCK

1 CU. YD. (3/4" - 3/8")
WELL GRADED CRUSHED ROCK

SUPPORT BLOCKING
(IF NEEDED)

MUELLER A-473 OR WATEROUS WB-67 OR M&H HYDRANT

STANDARDS & SPECIFICATIONS

DATE: DRAWING NO. 200-18

REVISED: FIRE HYDRANT DETAIL
GENERAL NOTES:
1. FOR INSTALLATION IN ROADWAYS, DRIVEWAYS, SIDEWALKS, OR PARKING AREAS PRIOR APPROVAL REQUIRED.
2. NO CONCRETE FLOOR ALLOWED IN METER PIT.
3. METER PIT SHALL BE CONSTRUCTED OF ANY COMBINATION OF CONCRETE RINGS TOTAL 48" IN LENGTH.
4. ADJUSTMENT RINGS SHALL BE 2", 3", 4" OR 6" IN HEIGHT AND SHALL BE INSERTED BETWEEN THE DOME AND TOP RING.
5. NO CONNECTIONS OR CHANGES IN PIPE DIAMETER SHALL BE MADE FROM THE MAIN TAP TO A DISTANCE OF FIVE FEET BEYOND THE METER PIT WALL ON THE OUTLET SIDE.
6. LID SHALL SAY "WATER METER".

METER SIZE | A | B | C | D
---|---|---|---|---
5/8" x 3/4" | 12-5/8" | 7-13/16" | 7-13/16" | 4"
3/4" | 14-1/4" | 9-5/16" | 8-15/16" | 5"
1" | 17-1/4" | 11-1/16" | 11-1/4" | 6"
LIST OF MATERIALS

1. RING AND COVER — J’MARK NO. J-2290 (81 LBS.) OR APPROVED EQUAL WITH INTERNAL POST.
2. METER PIT — ARCO NO. 24-4 PRECAST MANHOLE (24” DIA.) OR APPROVED EQUAL.
3. SERVICE LINE — COPPER TUBING TYPE K, SAME DIAMETER AS THE METER.
4. METER YOKE ASSEMBLY — FORD 80 SERIES COPPER SETTER OR APPROVED EQUAL.
5. SHUT-OFF VALVE
6. CORPORATION STOP, A SADDLE MAY BE REQUIRED.
7. RE-USE SOURCE WATERLINE.

NOTES

1. THE AUTHORITY SHALL INSPECT FROM THE MAIN TO THE BUILDING PRIOR TO BACKFILLING.
2. IF THE SURFACE IS NOT TO FINAL GRADE AT TIME OF THE METER INSTALLATION, THE PROPERTY OWNER SHALL RAISE OR LOWER THE METER PIT ACCESS MANHOLE TO MATCH THE FINAL GRADE.
3. THE METER SHALL BE A POSITIVE DISPLACEMENT ROCKWELL OR NEPTUNE TRIDENT 8, READING IN GALLONS.
4. COUPLINGS SHALL BE PROVIDED ON UPSTREAM AND DOWNSTREAM SIDES OF METER TO ALLOW FOR REMOVAL.
5. TRACER WIRE TO BE ATTACHED TO ALL WATER LINES.
6. CAP TYPE TOP LID SHALL BE CAST IRON ONLY. THE INNER LID SHALL BE CAST IRON, ALUMINUM OR RUBBER. THE ALUMINUM SHALL BE COATED WITH A POLYMER SUCH AS EPOXY. CAST IRON SHALL BE COATED WITH AN ASPHALT BASE PAINT.
7. FOR INSTALLATION IN ROADWAYS, DRIVEWAYS, SIDEWALKS, OR PARKING AREAS PRIOR APPROVAL REQUIRED.
8. NO CONCRETE FLOOR ALLOWED IN METER PIT.
9. METER PIT SHALL BE CONSTRUCTED OF ANY COMBINATION OF CONCRETE RINGS TOTAL — 48” IN LENGTH.
10. ADJUSTMENT RINGS SHALL BE 2”, 3”, 4” OR 6” IN HEIGHT AND SHALL BE INSERTED BETWEEN THE DOME AND THE TOP RING.
11. NO CONNECTIONS OR CHANGES IN PIPE DIAMETER SHALL BE MADE FROM THE MAIN TAP TO A DISTANCE OF FIVE FEET BEYOND THE METER PIT WALL ON THE OUTLET SIDE.
SECTIOINAL PLAN

METER SIZE | A | B | C | D
---|---|---|---|---
3/8" x 3/4" | 12-5/8" | 7-13/16" | 7-13/16" | 4"
3/4" | 14-1/4" | 9-5/16" | 8-15/16" | 5"
1" | 17-1/4" | 11-1/16" | 11-1/4" | 6"

FROST PROOF Bonnet
1. Cast iron cap type top lid
2. Install lid 1/2" above ground

FOGDED BRASS PENTAGON BOLT

LOCKING SCREW

VALVE

PLUG

FLOW

2" NUT ADAPTER

Contractor to provide pipe connection from curbstop to plug for future use

SECTIOINAL PLAN

SECTION A

TO RPBPE DEVICE AND IRRIGATION

(SEE DETAIL A, SHEET 9 OF 9)

SHEET 3 OF 9

IRRIGATION METER BACKFLOW PREVENTER

3/4" THRU 1"

STANDARDS & SPECIFICATIONS

REVISED:

DATE:

DRAWING NO. 200-21
LIST OF MATERIALS

1. RING AND COVER – J’MARK NO. J-2290 (81 LBS.) OR APPROVED EQUAL WITH WITH INTERNAL POST
2. METER PIT – ARCO NO. 24–4 PRECAST MANHOLE (24” DIA.) OR APPROVED EQUAL.
3. SERVICE LINE – COPPER TUBING TYPE K, SAME DIAMETER AS THE METER.
4. METER YOKE ASSEMBLY – FORD 80 SERIES COPPER SETTER OR APPROVED EQUAL.
5. SHUT-OFF VALVE.
6. CORPORATION STOP, A SADDLE MAY BE REQUIRED.
7. EXISTING DOMESTIC SOURCE WATERLINE.
8. FUTURE RE-USE SOURCE WATERLINE.
9. CURB STOP WITH 2” VALVE NUT ADAPTER AND BOX.

NOTES

1. THE AUTHORITY SHALL INSPECT FROM THE MAIN TO THE BUILDING PRIOR TO BACKFILLING.
2. IF THE SURFACE IS NOT TO FINAL GRADE AT TIME OF THE METER INSTALLATION, THE PROPERTY OWNER SHALL RAISE OR LOWER THE METER PIT ACCESS MANHOLE TO MATCH THE FINAL GRADE.
3. THE METER SHALL BE A POSITIVE DISPLACEMENT ROCKWELL OR NEPTUNE TRIDENT 8, READING IN GALLONS.
4. COUPLINGS SHALL BE PROVIDED ON UPSTREAM AND DOWNSTREAM SIDES OF METER TO ALLOW FOR REMOVAL.
5. CONTRACTOR TO PROVIDE CONNECTION FROM CURBSTOP TO PLUG AND ALL APPURTENANCES FOR RE-USE LINE.
6. TRACER WIRE TO BE ATTACHED TO ALL WATER LINES.
7. CAP TYPE TOP LID SHALL BE CAST IRON ONLY. THE INNER LID SHALL BE CAST IRON, ALUMINUM OR RUBBER. THE ALUMINUM SHALL BE COATED WITH A POLYMER SUCH AS EPOXY. CAST IRON SHALL BE COATED WITH AN ASPHALT BASE PAINT.
8. FOR INSTALLATION IN ROADWAYS, DRIVEWAYS, SIDEWALKS, OR PARKING AREAS PRIOR APPROVAL REQUIRED.
9. NO CONCRETE FLOOR ALLOWED IN METER PIT.
10. METER PIT SHALL BE CONSTRUCTED OF ANY COMBINATION OF CONCRETE RINGS TOTAL – 48” IN LENGTH.
11. ADJUSTMENT RINGS SHALL BE 2”, 3”, 4” OR 6” IN HEIGHT AND SHALL BE INSERTED BETWEEN THE DOME AND THE TOP RING.
12. NO CONNECTIONS OR CHANGES IN PIPE DIAMETER SHALL BE MADE FROM THE MAIN TAP TO A DISTANCE OF FIVE FEET BEYOND THE METER PIT WALL ON THE OUTLET SIDE.

SHEET 4 OF 9
LIST OF MATERIALS

1. CORPORATION STOP VALVE.
2. CURB STOP VALVE AND BOX W/ 2” OPERATOR NUT AND FLARED COPPER ENDS. CURB STOP VALVE BOX MUST BE A 3-PIECE BOX WITH 5-1/4” BARREL AND WIDE OVAL BASE (TYLER 6860 SERIES, OR APPROVED EQUAL).
3. SERVICE LINE - COPPER TUBING TYPE K, SAME DIAMETER AS THE METER.
4. METER - POSITIVE DISPLACEMENT ROCKWELL OR NEPTUNE TRIDENT 8, READING IN GALLONS.
5. RING AND COVER - J'MARK NO. J1163 (125 LBS. COVER) OR APPROVED WITH WATER CAST INTO COVER.
6. METER PIT - 48” DIA. PRECAST MANHOLE ASTM C478, FLAT TOP.
7. BALL VALVE- FORD BALL VALVE CURB STOP W/ FEMALE THREAD IRON PIPE & FLARED COPPER ENDS OR EQUAL. (2 REQ.)
8. BRASS FLANGE COUPLING
9. FORD LOK-PAK ADJUSTMENT COUPLING W/2 STAINLESS STEEL SET SCREWS.
10. STOP & WASTE VALVE W/FLARED COPPER ENDS.

NOTES

1. THE DISTRICT SHALL INSPECT FROM THE MAIN TO THE BUILDING PRIOR TO BACKFILLING.
2. IF THE SURFACE IS NOT TO FINAL GRADE AT TIME OF THE METER INSTALLATION, THE PROPERTY OWNER SHALL RAISE OR LOWER THE METER PIT ACCESS MANHOLE TO MATCH THE FINAL GRADE.
3. COUPLINGS SHALL BE PROVIDED ON UPSTREAM AND DOWNSTREAM SIDES OF METER TO ALLOW FOR REMOVAL.
4. TOP STEP 18” – 24” BELOW THE SURFACE, REMAINDER SPACED AT 12” INTERVALS.
5. REFER TO IRRIGATION SYSTEM RP-TYPE BACKFLOW PREVENTER SCHEMATIC DETAIL IF METER TO BE USED FOR RE-USE, IRRIGATION OR EFFLUENT WATER PURPOSES.
FOOTING DETAIL
2 (REQUIRED)

#4@18"

SECTIONAL PLAN
NO SCALE

SECTION A
NO SCALE

STANDARDS & SPECIFICATIONS

IRRIGATION METERS
1-1/2" THRU 2" WITH PRV

DATE:          DRAWING NO. 200-25
LIST OF MATERIALS

1. CORPORATION STOP VALVE.
2. CURB STOP VALVE AND BOX W/ 2” OPERATOR NUT AND FLARED COPPER ENDS. CURB STOP VALVE BOX MUST BE A 3-PIECE BOX WITH 5-1/4” BARREL AND WIDE OVAL BASE (TYLER 6860 SERIES, OR APPROVED EQUAL)
3. SERVICE LINE – COPPER TUBING TYPE K, SAME DIAMETER AS THE METER.
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7. BALL VALVE – FORD BALL VALVE CURB STOP W/ FEMALE THREAD IRON PIPE & FLARED COPPER ENDS OR EQUAL (2 REQ.)
8. BRASS FLANGE COUPLING.
9. FORD LOK-PAK ADJUSTMENT COUPLING W/2 STAINLESS STEEL SET SCREWS.
10. STOP & WASTE VALVE W/FLARED COPPER ENDS.

NOTES

1. THE DISTRICT SHALL INSPECT FROM THE MAIN TO THE BUILDING PRIOR TO BACKFILLING.
2. IF THE SURFACE IS NOT TO FINAL GRADE AT TIME OF THE METER INSTALLATION, THE PROPERTY OWNER SHALL RAISE OR LOWER THE METER PIT ACCESS MANHOLE TO MATCH THE FINAL GRADE.
3. BRASS FLANGE COUPLINGS SHALL BE PROVIDED ON UPSTREAM AND DOWNSTREAM SIDES OF METER TO ALLOW FOR REMOVAL.
4. TOP STEP TO BE 18” TO 24” BELOW THE SURFACE, AT 12” VERTICAL INTERVALS.
5. REFER TO IRRIGATION SYSTEM RP-TYPE BACKFLOW PREVENTER SCHEMATIC DETAIL IF APPLICABLE.

SHEET 8 OF 9

STANDARDS & SPECIFICATIONS

DATE:  DRAWING NO. 200-26

IRRIGATION METERS
1-1/2” THRU 2” WITH PRV

REVISED:
TO IRRIGATION SYSTEM MANIFOLD

BACKFLOW PREVENTER DEVICE
SEE DETAIL A

VARIES PER INSTALLATION

STOP AND WASTE VALVE

METER PIT

CORPORATION STOP

CURB STOP

SERVICE LINE

PLAN

INSTALL RPB Device
(FEBCO 825YA, OR APPROVED EQUIVALENT)

TYPE K COPPER PIPE TO METER PIT

QL OF RPB Device

FROM STOP & WASTE VALVE

4' 6" MIN

TO IRRIGATION

DETAIL A

NO SCALE

SHEET 9 of 9

STANDARDS & SPECIFICATIONS

IRRIGATION SYSTEM WITH RPB

REVISED:

DATE:

DRAWING NO. 200-27
NOTE:

1 – PLACEMENT OF STOP BOX CAN VARY FROM A MAXIMUM OF 5 FEET OUTSIDE THE PROPERTY LINE TO THE PROPERTY LINE. PLACEMENT OF THE STOP BOX OUTSIDE THE PROPERTY LINE IS PREFERRED.

2 – OWNER'S RESPONSIBILITY FOR LEAK REPAIR SHALL BE UP TO AND INCLUDING THE TUBE NUT WHICH THREADS ONTO THE STOP AND WASTE VALVE. OWNER'S RESPONSIBILITY FOR REPAIRS OTHER THAN LEAK REPAIR EXTENDS TO THE CORPORATION STOP.

3 – ACWWA WILL REPAIR LEAKS ON SERVICE LINES WHEN NOTIFIED, FROM THE CORPORATION STOP TO STOP AND WASTE VALVE.

NOTE:

SHOULD ANY SITUATION ARISE OTHER THAN SHOWN CONCERNING THE DEPTH OR OBSTRUCTION OF SERVICE LINE OR THE PLACEMENT OF METER PIT OR STOP BOX, CALL 303-790-4830 AND ASK FOR CUSTOMER SERVICES FIELD SECTION.

DIRECT TAPS ARE NOT ALLOWED. SADDLE TAPS ARE REQUIRED FOR ALL PIPE.
**DIMENSIONS**

<table>
<thead>
<tr>
<th>ALLOWABLE PIPE DIAMETER INCHES</th>
<th>BOLT SIZE</th>
<th>NO. OF BOLTS REQUIRED</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>3/4&quot;</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>3/4&quot;</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>3/4&quot;</td>
<td>2</td>
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<tr>
<td>10</td>
<td>3/4&quot;</td>
<td>4</td>
</tr>
<tr>
<td>12</td>
<td>3/4&quot;</td>
<td>6</td>
</tr>
</tbody>
</table>

**NOTES:**

1. THE BOLT SHALL BE MANUFACTURED OF "COR-TEN" OR APPROVED EQUAL.
2. THE BOLT MAY BE HEAT TREATED.
11\(^{1/4}\), 22\(^{1/2}\), 45\(^{\circ}\) AND 90\(^{\circ}\) BENDS

TEE

NOTES:

1.) BEARING SURFACES SHOWN IN CHART ARE MINIMUM.
2.) BASED ON 150 PSI INTERNAL PIPE PRESSURE PLUS WATER HAMMER.
4", 6", 8" AND 12" WATER HAMMER = 110 P.S.I.
16", 20" AND 24" WATER HAMMER = 70 P.S.I.
3.) CONCRETE MUST BE MINIMUM OF 3000 PSI, AND CURE FOR 24 HOURS BEFORE TAMING OR COMPACTING.
4.) BASED ON 3,000 psf SOIL BEARING CAPACITY.
5.) NA = NOT APPLICABLE.

TYPICAL CROSS SECTION

MINIMUM BEARING SURFACE AREA
(IN SQUARE FEET)

<table>
<thead>
<tr>
<th>SIZE OF PIPE</th>
<th>11(^{1/4})</th>
<th>22(^{1/2})</th>
<th>45(^{\circ})</th>
<th>90(^{\circ})</th>
<th>TEE OR DEAD END</th>
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</thead>
<tbody>
<tr>
<td>4&quot;</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>N.A.</td>
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<tr>
<td>6&quot;</td>
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<td>1.25</td>
<td>2.25</td>
<td>4.25</td>
<td>3.00</td>
</tr>
<tr>
<td>8&quot;</td>
<td>1.00</td>
<td>2.00</td>
<td>4.00</td>
<td>8.00</td>
<td>5.25</td>
</tr>
<tr>
<td>12&quot;</td>
<td>2.25</td>
<td>4.50</td>
<td>8.75</td>
<td>12.00</td>
<td>11.25</td>
</tr>
<tr>
<td>16&quot;</td>
<td>3.75</td>
<td>7.50</td>
<td>14.50</td>
<td>27.00</td>
<td>19.00</td>
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<tr>
<td>20&quot;</td>
<td>5.00</td>
<td>10.00</td>
<td>19.50</td>
<td>35.50</td>
<td>25.00</td>
</tr>
<tr>
<td>24&quot;</td>
<td>7.00</td>
<td>14.00</td>
<td>27.75</td>
<td>51.00</td>
<td>36.00</td>
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MECHANICAL JOINT RESTRAINT

WEDGE DETAIL

BOLT HOLE DETAIL

DIMENSIONS

<table>
<thead>
<tr>
<th>NOMINAL PIPE SIZE</th>
<th>NO. OF BOLTS</th>
<th>NO. OF WEDGES</th>
<th>K2 INCHES</th>
<th>J INCHES</th>
<th>F INCHES</th>
<th>M INCHES</th>
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<tbody>
<tr>
<td>PVC 4&quot;</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PVC 6&quot;</td>
<td>6</td>
<td>3</td>
<td>11.12</td>
<td>9.50</td>
<td>7.00</td>
<td>0.88</td>
</tr>
<tr>
<td>PVC 8&quot;</td>
<td>6</td>
<td>4</td>
<td>13.37</td>
<td>11.75</td>
<td>9.15</td>
<td>1.00</td>
</tr>
<tr>
<td>PVC 10&quot;</td>
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<td>6</td>
<td>15.62</td>
<td>14.00</td>
<td>11.20</td>
<td>1.00</td>
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<tr>
<td>PVC 12&quot;</td>
<td>8</td>
<td>8</td>
<td>17.88</td>
<td>16.25</td>
<td>13.30</td>
<td>1.25</td>
</tr>
<tr>
<td>PDI 4&quot;</td>
<td>4</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PDI 6&quot;</td>
<td>6</td>
<td>3</td>
<td>11.12</td>
<td>9.50</td>
<td>7.00</td>
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<tr>
<td>PDI 8&quot;</td>
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<tr>
<td>PDI 10&quot;</td>
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<td>14.00</td>
<td>11.20</td>
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<tr>
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<td>8</td>
<td>17.88</td>
<td>16.25</td>
<td>13.30</td>
<td>1.25</td>
</tr>
</tbody>
</table>
FIELD INSTALLATION—POLYETHYLENE WRAP

STEP-1
PLACE TUBE OF POLYETHYLENE MATERIAL AROUND PIPE PRIOR TO LOWERING PIPE INTO TRENCH.

STEP-2
PULL THE TUBE OVER THE LENGTH OF THE PIPE. TAPE TUBE TO PIPE AT JOINT. FOLD MATERIAL AROUND THE ADJACENT SPIDOT END AND WRAP WITH THREE CIRCUMFERENTIAL TURNS OF TWO-INCH WIDE PLASTIC TAPE TO HOLD PLASTIC TUBE AROUND SPIDOT END.

STEP-3
ADJACENT TUBE OVERLAPS FIRST TUBE AND IS SECURED WITH PLASTIC ADHESIVE TAPE. THE POLYETHYLENE TUBE MATERIAL COVERING THE PIPE WILL BE LOOSE. EXCESS MATERIAL SHALL BE NEATLY DRAWN UP AROUND THE PIPE BARREL, FOLDED INTO AN OVERLAP ON TOP OF THE PIPE AND HELD IN PLACE BY MEANS OF PIECES OF THE PLASTIC TAPE AT APPROXIMATELY THREE TO FIVE FOOT INTERVALS.
# Rod Diameter, Grade & Length of Restrained Pipe

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>4&quot;</th>
<th>6&quot;</th>
<th>8&quot;</th>
<th>12&quot;</th>
<th>16&quot;</th>
<th>20&quot;</th>
<th>24&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>FITTING</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>90° BEND</td>
<td>3/4&quot;</td>
<td>30'</td>
<td>M.S.</td>
<td>3/4&quot;</td>
<td>45'</td>
<td>M.S.</td>
<td>3/4&quot;</td>
</tr>
<tr>
<td>TEE, PLUG</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VALVE</td>
<td>3/4&quot;</td>
<td>30'</td>
<td>M.S.</td>
<td>3/4&quot;</td>
<td>45'</td>
<td>M.S.</td>
<td>3/4&quot;</td>
</tr>
<tr>
<td>22(1/2)° BEND</td>
<td>3/4&quot;</td>
<td>1'</td>
<td>M.S.</td>
<td>3/4&quot;</td>
<td>4'</td>
<td>M.S.</td>
<td>3/4&quot;</td>
</tr>
<tr>
<td>11(1/2)° BEND</td>
<td>3/4&quot;</td>
<td>1'</td>
<td>M.S.</td>
<td>3/4&quot;</td>
<td>1'</td>
<td>M.S.</td>
<td>3/4&quot;</td>
</tr>
</tbody>
</table>

**NOTES:**

1. LENGTH OF RESTRAINED PIPE MEASURED EACH WAY FROM VALVES AND BENDS.
2. CLAMPS, RODS & MEGALUGS NOT ALLOWED FOR 24" & LARGER PIPES.
3. D = DIAMETER, L = LENGTH, G = GRADE
   M.S. = MILD STEEL, H.S. = HIGH STRENGTH.
4. MINIMUM 4.5' GROUND COVER REQUIRED.
5. BASED ON 150 PSI INTERNAL PRESSURE.
8. NUTS SHALL BE ASTM A307 GRADE A OR B HEXAGON HEAVY SERIES
   HIGH STRENGTH NUTS SHALL BE ASTM A 194, GRADE 2H.
9. SEE TIE ROD DETAIL DRAWING. ALSO, TIE ROD COUPLING DETAILS;
   CLAMP DETAILS AND SET CLAMP DETAILS.
10. LENGTH REFERS TO THE AMOUNT OF PIPE WHICH MUST BE RESTRAINED
    TOGETHER AND IS NOT NECESSARILY THE LENGTH OF THE RODS.
11. LENGTH OF RESTRAINED PIPE CHART IS ALSO FOR THE LENGTH OF JOINT
    RESTRAINT FOR ESBA IRON MEGALUGS OR UNIFLANGE PIPE RESTRAINT DEVICES.
12. CROSSES MUST BE RESTRAINED IN ALL APPLICABLE DIRECTIONS.
13. 12" AND SMALLER IN LINE VALVES AND TEE'S SHALL HAVE A MECHANICAL JOINT RESTRAINT
    DEVICE ON EACH SIDE OF THE FITTING OR VALVE. MECHANICAL JOINT RESTRAINT DEVICE SHALL BE:
    DIP – ESBA 1100 SERIES, UNI-FLANGE SERIES 1400, OR EQUIVALENT; PVC – ESBA MEGALUG 2000 PV SERIES,
    UNI-FLANGE SERIES 1500, OR EQUIVALENT.
14. A SECOND VALVE WILL BE REQUIRED TO BE CLOSED WHEN EXCAVATING NEXT TO AN EXISTING VALVE.
NOTES:
1. PAVING SHALL COMPLY WITH LOCAL AUTHORITY JURISDICTION.
2. TRENCH WALLS TO BE SUPPORTED AS REQUIRED BY O.S.H.A.
3. MINIMUM COVER TO BE BELOW OFFICIAL STREET GRADE.
4. MINIMUM TRENCH WIDTH = PIPE O.D. + 12"
   MAXIMUM TRENCH WIDTH = PIPE O.D. +24"
TIE ROD DETAILS

WASHER DETAIL

## TIE RODS

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4”,1”</td>
<td>6”</td>
<td>1’ TO 11’ &amp; 20’</td>
<td>MS</td>
</tr>
<tr>
<td>3/4”,1-1/2”</td>
<td>ALL THREAD</td>
<td>1’ TO 11’ &amp; 20’</td>
<td>HS</td>
</tr>
</tbody>
</table>

## WASHERS

<table>
<thead>
<tr>
<th>D</th>
<th>E</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>5”</td>
<td>1/8” Larger than Rod Ø</td>
<td>1/2”</td>
</tr>
<tr>
<td>6”</td>
<td>1/8” Larger than Rod Ø</td>
<td>5/8”</td>
</tr>
</tbody>
</table>

**NOTE:**

1.) SEE TIED JOINTS, ROD DIMENSIONS SHEET.
2.) SEE CLAMP DETAILS AND DIMENSIONS FOR PROPER PLACEMENT OF WASHERS.
3.) MS=MILD STEEL
    HS=HIGH STRENGTH
INSTALL A SINGLE STRAND (NO LOOPS) OF COPPER WIRE TO THE TOP OF VALVE BOX ALONG THE INSIDE OF UPPER VALVE BOX SECTION

THERMOWELD OR USE A NO 12 COPPER CONNECTOR TYPE BURNODY NO YCS OR EQUAL

THERMOWELD OR USE A NO 12 COPPER CONNECTOR TYPE DOWCERT NO DPC2 NO MAC NO 08 OR EQUAL (SEE DETAIL 'A') THIS SHEET

USE NO 1 COPPER TIE WIRE

COPPER WIRE MUST BE TAPED TO TOP OF PIPE EVERY 3 TO 4 FOOT

WIRE TO BE TAPED ON EACH SIDE OF EVERY JOINT

THERMOWELD OR USE A NO 12 COPPER CONNECTOR TYPE BURNODY NO YCS OR EQUAL FOR TEE CONNECTION (SEE DETAIL 'B' THIS SHEET) OUTSIDE POLYWRAP

DETAIL 'A'

DETAIL 'B'
1.) LENGTH OF EXTENSION OF PIPE AND HARNESS RODS SHALL BE IN ACCORDANCE WITH THESE ENGINEERING STANDARDS.

2.) ALL WATER MAINS TWELVE (12") INCHES OR SMALLER, WHICH CROSS UNDER DISTRICT CONDUITS SHALL BE DUCTILE IRON.

3.) A BORED CROSSING MAY BE REQUIRED BY THE ENGINEER.
NOTES:
1. GATE VALVES SHALL OPEN CCW AND BE RESILIENT SEAT MEETING REQUIREMENTS OF AWWA C509.
2. FITTINGS SHALL BE WRAPPED WITH 8 MIL MINIMUM THICKNESS POLYETHYLENE SHEETING.
3. VALVE BOX TOP SHALL BE SET 1/2" BELOW FINAL ASPHALT PAVEMENT GRADE.
4. PROVIDE MARKER POST WHERE NECESSARY.
4" DIA. SCHEDULE 40 STEEL POST, PAINTED YELLOW AND FILLED WITH CONCRETE

VALVE SIZE

TYPE OF VALVE

DISTANCE TO VALVE

NOTE:
2" CAPITAL LETTERS FACING VALVE

CONCRETE

UNDISTURBED SOIL

STANDARDS & SPECIFICATIONS

REVISED:

VALVE MARKER POST

DATE: DRAWING NO. 200-39
NOTE:
TURN BEND TOWARD OUTLET PIPE TO FACILITATE SMOOTH TRANSITION.

CAST-IN-PLACE OR PRECAST BASE

MANHOLE INTERIOR WALL

ANCHOR W/ EPOXY

3/8" x 1" STAINLESS STEEL STRAP

3/8" x 2" STAINLESS STEEL NUTS & BOLTS

GROUT OPENING WATER TIGHT

8" TO 12"

8" SPECIAL CROSS

8" SEWER

2 STRAPS MIN. PER PIPE LENGTH, MAX 5' SPACING

CAST GASKETWPE 90° BEND IN BENCH MATCH CROWNS WITH OUTLET PIPE

PLAN

SECTION A-A

STANDARDS & SPECIFICATIONS

INSIDE DROP MANHOLE

DATE: DRAWING NO. 300-01

REVISED:
ELEVATION

NOTE:
1. STEPS SHALL BE LOCATED ABOVE THE EXIT PIPE IN A STRAIGHT LINE, 12” ON CENTER (O.C.) VERTICALLY.

2. 60” DIA. MANHOLES SHALL HAVE A 30” STANDARD RING AND COVER, J-MARK NO. J-1361 OR APPROVED EQUAL.

3. 48” DIA. MANHOLES SHALL HAVE A 24” STANDARD RING AND COVER, J-MARK NO. J-1161 OR APPROVED EQUAL.

4. MORTAR SHALL COVER THE LEVELING COURSES AND RING TO WITHIN 1” FROM THE SURFACE, AND SHALL BE USED ON THE INSIDE OF THE BARREL AT THE JOINTS.

5. ALL MANHOLES IN EXCESS OF 20’ IN DEPTH SHALL HAVE AN INTERMEDIATE GRATING LOCATED AT THE CENTER OF THE DEPTH.

6. THE WORD "SEWER" SHALL BE BOLDLY CAST ON ALL COVERS.

ALTERNATE FLAT LID

FLEXIBLE PLASTIC JOINT MATERIAL (K.T. SNYDER “RAM–NEK” OR APPROVED EQUAL)

DETAIL A

STANDARDS & SPECIFICATIONS

STANDARD MANHOLE

DATE: DRAWING NO. 300–02

REVISED:
NOTE:
1. STRAIGHT SECTIONS MAY BE LAID THROUGH THE MANHOLE WITH CROWN REMOVED.
2. SECTIONS NOT LAID THROUGH THE MANHOLE SHALL DROP A MINIMUM OF 0.2'.
3. BENCHES SHALL SLOPE 2 IN/FT.
4. THERE SHALL BE A JOINT MADE AT THE EDGE OF THE MANHOLE BASE.
5. THE TOP OF THE BASE SHALL BE LEVEL IN ALL CASES.
6. SHORT STUBS SHALL BE INSTALLED ON VCP AND RCP LINES WHERE THE LINE ENTERS AND LEAVES THE BASE.
NOTES: 1. PAVING SHALL COMPLY WITH LOCAL AUTHORITY JURISDICTION.
2. TRENCH WALLS TO BE SUPPORTED AS REQUIRED BY O.S.H.A.
3. MINIMUM COVER TO BE BELOW OFFICIAL STREET GRADE.
4. MINIMUM TRENCH WIDTH = PIPE O.D. + 12"
   MAXIMUM TRENCH WIDTH = PIPE O.D. +24"
TYPICAL MANHOLE SECTION
WITH ECCENTRIC CONE

NOTES:
1. ALL JOINTS TO BE RUBBERNEK OR RAMNEK IF ABOVE THE WATER TABLE, FLEXIBLE PLASTIC SEALING
   COMPOUND IF BELOW THE WATER TABLE, AS PER SPECIFICATION.
2. ALL JOINTS SHALL BE DOUBLE SEALED WITH FLEXIBLE PLASTIC JOINT SEALING MATERIAL TO EXTRUDE INTO
   MANHOLE, AND BE TRIMMED OFF.
3. ALL MANHOLES PLACED IN THE "OPEN SPACE" AREAS SHALL BE INSTALLED WITH THE RING AND COVER AT
   AN ELEVATION THAT IS 6" ABOVE FINAL GRADE WITH A COLLAR OF CONCRETE. A MARKER POST SHALL BE
   INSTALLED NEARBY. SEE MARKER POST DETAIL.
4. STEPS INSTALLED OVER DOWNSTREAM INVERT OF MANHOLE.
5. 60" OR LARGER DIAMETER MANHOLES REQUIRE A 30" OPENING.
6. SEE EITHER CAST-IN-PLACE OR PRECAST MANHOLE BASE DETAIL
7. ALL COVERS TO BE CASTINGS, INC. J-1161 FOR 24" OPENING OR J-1361 FOR 30" OPENINGS.
8. RING AND COVER SHALL BE CASTINGS J-1161 FOR 24" AND J-1361 FOR 30".
9. AVOID 12" HIGH BARREL SECTIONS

STANDARDS & SPECIFICATIONS

DATE:  REVISEd:

MANHOLE RISER

DRAWING NO. 300-06
NOTES:

1. MANHOLE SHALL HAVE EITHER CAST-IN-PLACE REINFORCED CONCRETE BASE OR PRECAST BASE.
2. SQUARE BASES ARE ACCEPTABLE (IF APPROVED BY AUTHORITY).
3. SEE STANDARD PLAN FOR SECTIONS A–A AND B–B.
*NOTE: 1) PREPOURED INVERTS ARE NOT ALLOWED
2) AVOID 12" BARREL SECTIONS.
NOTES:
1. SEE MANHOLE REINFORCEMENT DETAIL FOR BASE.
2. STEPS INSTALLED OVER DOWNSTREAM INVERT OF MANHOLE.

CONCRETE AROUND DROP SECTION ONLY

WATERSTOP GASKET

SHAPED INVERTS

CONCRETE (SEE EITHER CAST-IN-PLACE OR PRECAST MANHOLE BASE DETAIL

#4 REBAR 12" O.C. EACH WAY

PVC 90° BEND

PVC
4" DIA. SCHEDULE 40 STEEL POST, PAINTED YELLOW AND FILLED WITH CONCRETE

SEWER MAIN SIZE

DISTANCE TO MANHOLE

NOTE:
2" CAPITAL LETTERS FACING MANHOLE

PAINTED SILVER BAND

PAINTED YELLOW

CONCRETE

UNDISTURBED SOIL

NOTE:
PROVIDE ONLY IF MANHOLE NOT IN TRAVELED WAY

MANHOLE MARKER POST

STANDARDS & SPECIFICATIONS

DATE: DRAWING NO. 300-11

REVISED:
STORM SEWER AND SANITARY SEWER CROSSING

WHERE APPLICABLE
REPLACE EXISTING SEWER WITH DUCTILE IRON PIPE CONFORMING TO AWWA C911 OR PVC SDR 35 PVC PIPE CONFORMING TO ASTM D3034

UNDISTURBED SOIL
UNDISTURBED BEDDING
UNDISTURBED SOIL

CLASS "B" CONCRETE

NOTICE:
ANY SUBDrain UNDER THE SEWER SHALL BE REPLACED SUCH THAT NO FLOW SHALL ENTER THE WATER LINE TRENCH.

SECTION A-A

TOP OF WATERLINE
EDGE OF TRENCH

WITH "D" LESS THAN 2'

NOTE:
ALL EXISTING SEWER DAMAGED DURING INSTALLATION MUST BE REPLACED WITH PVC PIPE.

SEWER CROSSING PLAN

STANDARDS & SPECIFICATIONS

DATE:  DRAWING NO. 300-12
CENTER OF TEE BRANCH TO BE PLACED IN UPPER THIRD OF MAIN.

1/8 BEND CONNECTION TO TEE

CENTER OF TEE BRANCH TO BE PLACED IN UPPER THIRD OF MAIN.

1/8 BEND & SADDLE CONNECTION

NOTES:
1. BELLS SHALL NOT TOUCH THE SIDES OR BOTTOM OF THE BELL HOLE.
2. THE BARREL SECTION SHALL BE SUPPORTED THROUGHOUT ITS LENGTH.
3. SERVICE TAPS SHALL BE IN-LINE TEE OR MACHINE TAPPED. HAND TAPS SHALL NOT BE ALLOWED.
4. SERVICE LINES SHALL BE LOCATED 5' DOWNHILL FROM CENTERLINE OF THE LOT AND A MINIMUM OF 10' FROM THE WATER SERVICE LINE.
5. THE MIN. SERVICE LINE GRADE SHALL BE 1/4" PER FT.
6. JOINTS SHALL BE WATER TIGHT.
7. WHEN SERVICE STUB-INS ARE INSTALLED WITH THE SEWER MAIN, THEY SHALL BE EXTENDED AT LEAST TO PROPERTY LINE AND SHALL BE PLUGGED WITH A 2x4 MARKER FOR LOCATION OF END.
TERMINAL CLEANOUT

NOTES:
NOT A WMD STANDARD DETAIL
SIX INCH PRIVATE SEWERS ONLY
ACCEPTABLE PIPE TYPES – VCOP, PVC, DIP
<table>
<thead>
<tr>
<th>TIME (MIN)</th>
<th>BASINS LESS THAN 5 SQ MILES</th>
<th>BASINS BETWEEN 5 AND 10 SQ MILES</th>
<th>BASINS BETWEEN 10 AND 20 SQ MILES</th>
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<tbody>
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N.T.S.

STANDARDS & SPECIFICATIONS

DATE:

DRAWING NO. 400-01

REvised:

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**NOTE:**
1. DEPTH AT EACH DURATION = ONE HOUR RAINFALL DEPTH x RESPECTIVE DURATION
2. SEE FIGURE 400-6 FOR GRAPH OF THESE VALUES

N.T.S.
THE DRAINAGE REPORT WITH PLAN DRAWINGS, AS NOTED BELOW HAS BEEN RECEIVED AND FOUND TO LACK THE INFORMATION NOTED. THIS INFORMATION MUST BE SUBMITTED BEFORE THE REPORT WILL BE ACCEPTED FOR REVIEW. PLEASE PROVIDE THE REQUIRED INFORMATION AND RETURN THIS CHECKLIST WITH YOUR SUBMITTAL.

SUBDIVISION:
LOCATION:
DATE SUBMITTED: TYPE OF REPORT: PRELIM FINAL
SUBMITTED BY: FIRM:
CONTACT: PHONE:
SUBMITTED DATE: (1) (2) (3) (4)
DATE APPROVED:

### CHECKLIST

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<td>TRAVEL TIME VEL</td>
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<tr>
<td>REMARKS</td>
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</tr>
</tbody>
</table>

N.T.S.
A = BASIN DESIGNATION  
B = AREA IN ACRES  
C = COMPOSITE RUNOFF COEFFICIENTS  
D = DESIGN POINT DESIGNATION  

**SUMMARY RUNOFF TABLE**  
(TO BE PLACED ON DRAINAGE PLAN)  

<table>
<thead>
<tr>
<th>DESIGN POINT</th>
<th>CONTRIBUTING AREA (ACRES)</th>
<th>RUNOFF 5YR (CFS)</th>
<th>PEAK 100YR (CFS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>XX</td>
<td>XX.XX</td>
<td>XX.X</td>
<td>XX.X</td>
</tr>
</tbody>
</table>
$V_R$, PRODUCT OF VELOCITY AND HYDRAULIC RADIUS

REVISED JUNE, 1954

N.T.S.
1. Main channel capacity to be no less than 20% of 100-year at main channel depth.

2. Trickle channel: Minimum capacity to be 12% of 100-year flow, but not more than 20% of 100-year flow. Trickle channel to be constructed of concrete or other materials approved by the City Engineer. See Figure 400-16 for requirements in sandy soils.

3. Normal depth: Flow depth for 100-year flow shall not exceed 5 feet.

4. Freeboard: Freeboard to be a minimum of 1 foot.

5. Maintenance access road: Minimum width to be 12 feet. City may require all or part of the road to be surfaced.

6. Easement/row width: Minimum width to include freeboard and maintenance access road.

7. Overbank flow in excess of main channel to be carried in this area. Area may be used for recreation purposes.

N.T.S.
TYPE I

*** SHOULDER WIDTH VARIES

ALLOWABLE LONGITUDINAL SLOPE FROM 0.5% TO 3.0%

TYPE II

6" LAYER OF RIPRAP WITH D50=3", AND FILTER MATERIAL

*** SHOULDER WIDTH VARIES

ALLOWABLE LONGITUDINAL SLOPE FROM 0.5% TO 1.5%

TYPE III

*** SHOULDER WIDTH VARIES

ALLOWABLE LONGITUDINAL SLOPE LESS THAN 0.5%

Note:
1. SEE FIGURE 400— FOR CAPACITY OF ROADSIDE DITCH.
2. FOR STREET SLOPES GREATER THAN MAXIMUM ALLOWABLE, CHECK DROPS (2' MAXIMUM HEIGHT) WILL BE REQUIRED.

N.T.S.
<table>
<thead>
<tr>
<th>SLOPE (%)</th>
<th>DITCH TYPE I</th>
<th>DITCH TYPE II</th>
<th>DITCH TYPE III</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>VEL. (FPS)</td>
<td>Q (CFS)</td>
<td>VEL. (FPS)</td>
</tr>
<tr>
<td>0.5</td>
<td>1.4</td>
<td>4</td>
<td>2.2</td>
</tr>
<tr>
<td>1.0</td>
<td>2.5</td>
<td>11</td>
<td>3.3</td>
</tr>
<tr>
<td>1.5</td>
<td>3.4</td>
<td>20</td>
<td>NOT PERMITTED</td>
</tr>
<tr>
<td>2.0</td>
<td>4.3</td>
<td>26</td>
<td>NOT PERMITTED</td>
</tr>
<tr>
<td>2.5</td>
<td>5.0</td>
<td>32</td>
<td>NOT PERMITTED</td>
</tr>
<tr>
<td>3.0 (4)</td>
<td>5.7</td>
<td>37</td>
<td>NOT PERMITTED</td>
</tr>
</tbody>
</table>

NOTES:

1. SEE FIGURE 400-17 FOR GEOMETRY OF ROADSIDE DITCH.

2. VELOCITY IS BASED UPON THE SCS RETARDANCE CURVE "D". SEE FIGURE 400-13.


4. MAXIMUM PERMISSIBLE SLOPE FOR ROADSIDE DITCH IS 3.0%. SLOPE LIMITATION IS BASED ON A MAXIMUM FROUDE NUMBER OF 0.8 FOR TYPE I AND II AND 0.9 FOR TYPE III DITCH.

5. LINEARLY INTERPOLATE FOR INTERMEDIATE SLOPES.

N.T.S.
NOTE: CONCRETE TO BE REINFORCED WITH FIBERMESH PER MANUFACTURERS SPECIFICATIONS

COMBINATION CHANNEL SECTION
REDUCTION FACTOR FOR ALLOWABLE GUTTER CAPACITY WHEN APPROACHING AN ARTERIAL STREET

REDUCTION FACTOR FOR ALLOWABLE GUTTER CAPACITY LOCAL AND COLLECTOR STREETS

APPLY REDUCTION FACTOR FOR APPLICABLE SLOPE TO THE THEORETICAL GUTTER CAPACITY TO OBTAIN ALLOWABLE GUTTER CAPACITY APPROACHING ARTERIAL STREET

Below Minimum Allowable Street Grade

MINOR STORM

MAJOR STORM

s=0.6%
F=0.8

s=0.4%
F=0.5

SLOPE OF GUTTER (%)
MAJOR STORM

(A) SYMMETRICAL STREET SECTION

(B) NON-SYMMETRICAL STREET SECTION

NOTE: FOR NON-SYMMETRICAL STREET SECTION, ADJUST THE TOTAL GUTTER CAPACITY BY REDUCING THE ALLOWABLE GUTTER CAPACITY FOR THE GUTTER WITH THE HIGHER FLOWLINE.

N.T.S.

STANDARDS & SPECIFICATIONS

GUTTER CAPACITY ADJUSTMENT

DRAWING NO. 400-15
### Legend:

- $Q_L$ = Local runoff for design storm tributary to designate inlet (CFS)
- $Q_I$ = Runoff intercepted by inlet (CFS)
- $Q_{CO}$ = Carry over runoff past inlet (CFS)
- $Q_T$ = Total runoff at inlet = $Q_L + Q_{CO}$
- $Q_P$ = Runoff in pipe

### Summary of Flows for Design Example #4

<table>
<thead>
<tr>
<th>INLET</th>
<th>$Q^*$ ALLOW</th>
<th>$Q_L$</th>
<th>$Q_{CO}$</th>
<th>$Q_T$</th>
<th>$Q_I$</th>
<th>$Q_{CO}$</th>
<th>$Q$ SEWER</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO. 1; 15' TYPE R</td>
<td>8.6</td>
<td>8</td>
<td>0</td>
<td>8</td>
<td>6.4</td>
<td>1.6</td>
<td>6.4</td>
</tr>
<tr>
<td>NO. 2; 10' TYPE R</td>
<td>7.2</td>
<td>4</td>
<td>1.6</td>
<td>5.6</td>
<td>3.7</td>
<td>1.9</td>
<td>10.1</td>
</tr>
<tr>
<td>NO. 3; 10' TYPE R</td>
<td>10.4</td>
<td>8</td>
<td>1.9</td>
<td>9.9</td>
<td>9.9</td>
<td>0</td>
<td>20.0</td>
</tr>
</tbody>
</table>

* Maximum allowable inlet capacity at maximum allowable gutter capacity, from Figure 400-28.
### Vertical Dimension of Pipe (inches)
- 15 to 36
- 42 and larger

### Maximum Allowable Distance Between Manholes and/or Cleanouts
- 400 feet
- 500 feet

### Minimum Radius for Radius Pipe

<table>
<thead>
<tr>
<th>Diameter of Pipe</th>
<th>Radius of Curvature</th>
</tr>
</thead>
<tbody>
<tr>
<td>48” to 54”</td>
<td>28.50 feet</td>
</tr>
<tr>
<td>57” to 72”</td>
<td>32.00 feet</td>
</tr>
<tr>
<td>78” to 108”</td>
<td>38.00 feet</td>
</tr>
</tbody>
</table>

Short radius bends shall not be used on sewers 42 inches or less in diameter.

### Minimum Pipe Diameter

<table>
<thead>
<tr>
<th>Type</th>
<th>Minimum Equivalent Pipe Diameter</th>
<th>Minimum Cross-Sectional Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Trunk</td>
<td>18 inches</td>
<td>1.77 sq ft</td>
</tr>
<tr>
<td>*Lateral from Inlet</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Minimum size of lateral shall also be based upon a water surface inside the inlet with a minimum distance of 1 foot below the grate or throat.

### Manning's n-Value

<table>
<thead>
<tr>
<th>Sewer Type</th>
<th>Capacity Calculation</th>
<th>Velocity Calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete (Newer Pipe)</td>
<td>.013</td>
<td>.011</td>
</tr>
<tr>
<td>Concrete (Older Pipe)</td>
<td>.015</td>
<td>.012</td>
</tr>
<tr>
<td>Concrete (Preliminary Sizing)</td>
<td>.015</td>
<td>.012</td>
</tr>
<tr>
<td>Plastic</td>
<td>.011</td>
<td>.009</td>
</tr>
</tbody>
</table>

N.T.G.

**STORM SEWER ALIGNMENT AND SIZE CRITERIA**

**STANDARDS & SPECIFICATIONS**

**REVISED:**

**DATE:**

**DRAWING NO.** 400-18
EXPANSION/CONTRACTION

(a) EXPANSION ($K_e$)

<table>
<thead>
<tr>
<th>$\theta^\circ$</th>
<th>$\frac{D_2}{D_1} = 3$</th>
<th>$\frac{D_2}{D_1} = 1.5$</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>0.17</td>
<td>0.17</td>
</tr>
<tr>
<td>20</td>
<td>0.40</td>
<td>0.40</td>
</tr>
<tr>
<td>45</td>
<td>0.86</td>
<td>1.06</td>
</tr>
<tr>
<td>60</td>
<td>1.02</td>
<td>1.21</td>
</tr>
<tr>
<td>90</td>
<td>1.06</td>
<td>1.14</td>
</tr>
<tr>
<td>120</td>
<td>1.04</td>
<td>1.07</td>
</tr>
<tr>
<td>180</td>
<td>1.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>

* THE ANGLE $\theta$ IS THE ANGLE IN DEGREES BETWEEN THE SIDES OF THE TAPERING SECTION

(b) PIPE ENTRANCE FROM RESERVOIR

- BELL-MOUTH $H_L = 0.04 \frac{V^2}{2g}$
- SQUARE EDGE $H_L = 0.5 \frac{V^2}{2g}$
- GROOVE END U/S FOR CONCRETE $H_L = 0.2 \frac{V^2}{2g}$

(c) CONTRACTION ($K_c$)

<table>
<thead>
<tr>
<th>$\frac{D_2}{D_1}$</th>
<th>$K_c$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.5</td>
</tr>
<tr>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>0.6</td>
<td>0.3</td>
</tr>
<tr>
<td>0.8</td>
<td>0.1</td>
</tr>
<tr>
<td>1.0</td>
<td>0</td>
</tr>
</tbody>
</table>

N.T.S.

STORM SEWER ENERGY LOSS COEFFICIENT
CASE I

CONDUIT ON 90° CURVES

NOTE: HEAD LOSS APPLIED AT PC FOR LENGTH

<table>
<thead>
<tr>
<th>RADIUS</th>
<th>$K_b$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 X D</td>
<td>0.50</td>
</tr>
<tr>
<td>(2 TO 8) X D</td>
<td>0.25</td>
</tr>
<tr>
<td>(8 TO 20) X D</td>
<td>0.04</td>
</tr>
<tr>
<td>&gt;20 X D</td>
<td>0</td>
</tr>
</tbody>
</table>

*WHEN CURVES OTHER THAN 90° ARE USED, APPLY THE FOLLOWING FACTORS TO 90° CURVES
60° CURVE 85%
45° CURVE 70%
22–1/2° CURVE 40%

CASE II

BENDS WHERE RADIUS IS EQUAL TO DIAMETER OF PIPE

NOTE: HEAD LOSS APPLIED AT BEGINNING OF BEND

<table>
<thead>
<tr>
<th>9° BEND</th>
<th>$K_b$</th>
</tr>
</thead>
<tbody>
<tr>
<td>90</td>
<td>0.50</td>
</tr>
<tr>
<td>60</td>
<td>0.43</td>
</tr>
<tr>
<td>45</td>
<td>0.35</td>
</tr>
<tr>
<td>22–1/2</td>
<td>0.20</td>
</tr>
</tbody>
</table>

N.T.S.
BENDS AT MANHOLES

LOSS COEFFICIENT $k_b$

DEFLECTION ANGLE $\theta$ DEGREES

NOTE: HEAD LOSS APPLIED AT OUTLET OF MANHOLE
CASE I
INLET OR STRAIGHT THROUGH MANHOLE ON MAIN LINE

USE EQUATION 400-4
\( K_j = 0.05 \)

CASE III
MANNHOLE ON MAIN LINE WITH 90° BRANCH LATERAL

\[ \theta' \quad K_j \]

\begin{align*}
22\frac{1}{2} & : 0.75 \\
45 & : 0.50 \\
60 & : 0.35 \\
90 & : 0.25 \\
NO \ LATERAL & : SEE \ CASE \ I
\end{align*}

CASE II
INLET ON MAIN LINE WITH BRANCH LATERAL

USE EQUATION 400-4
\( K_j = 1.25 \)

CASE IV
INLET OR MANHOLE AT BEGINNING OF LINE

N.T.S.
CULVERT RATING

PROJECT ___________________ LOCATION ___________________ STATION __________

LOW POINT ELEV

ELEV

H_W

D

H

ELEV

h_o

T_W

S_o

L

S_o L

CULVERT DATA

TYPE ___________________ n ___________________

INLET ___________________ Q_full __________

K_e ___________________ V_full __________

OUTLET CONTROL EQUATIONS

(1) \( H_W = H + h_o - L S_o \)

(2) FOR \( T_W < D \): \( h_o = \frac{d_c + D}{2} \) OR \( T_W \) (WHICHEVER IS GREATER)

\( T_W > D \): \( h_o = T_W \)

(3) FOR BOX CULVERT: \( d_c = 0.315 (Q/B)^{2/3} \leq D \)

<table>
<thead>
<tr>
<th>Q</th>
<th>( \frac{H_W}{D} )</th>
<th>H_W</th>
<th>H</th>
<th>T_W</th>
<th>( T_W &lt; D )</th>
<th>( T_W &gt; D )</th>
<th>CONT</th>
<th>CONTROL</th>
<th>ELEV</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
</tbody>
</table>

N.T.S.

STANDARDS & SPECIFICATIONS

REVISED:

CULVERT RATING

DATE: ___________________ DRAWING NO. 400–24
SECTION – BASIN FLOOR

END SILL

H = \frac{3w}{d}
L = \frac{4w}{3}
\alpha = \frac{w}{2}
\beta = \frac{3w}{8}
\gamma = \frac{w}{2}
d = \frac{w}{6}
t = \frac{w}{12}

PROJECTED PIPE AREA
IMPACTS BAFFLE SURFACE

ALWAYS ALIGN CLEANOUT NOTCHES IN BAFFLE AWAY FROM THE PROJECTED PIPE AREA

END VIEW – BAFFLE NOTCHES

For two pipes of equal size and similar flow rate:
\[ W_2 = 1.5 \ W_1 \]
\[ W_1 \] from Detail 400-52 based on higher flow of \( D_1 \) or \( D_2 \)

WIDTH ADJUSTMENT FOR DOUBLE PIPE OUTLET

N.T.S.

STANDARDS & SPECIFICATIONS

REVISED:

IMPACT STILLING BASIN

DATE:

DRAWING NO. 400-25
<table>
<thead>
<tr>
<th>SHAPE</th>
<th>COEFFICIENT</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHARP CRESTED</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROJECTION RATIO (H/P = 0.4)</td>
<td>3.4</td>
<td>H&lt;1.0</td>
</tr>
<tr>
<td>PROJECTION RATIO (H/P = 2.0)</td>
<td>4.0</td>
<td>H&gt;1.0</td>
</tr>
<tr>
<td>BROAD CRESTED</td>
<td></td>
<td></td>
</tr>
<tr>
<td>W/SHARP U/S CORNER</td>
<td>2.6</td>
<td>MINIMUM VALUE</td>
</tr>
<tr>
<td>W/ROUNDED U/S CORNER</td>
<td>3.1</td>
<td>CRITICAL DEPTH</td>
</tr>
<tr>
<td>TRIANGULAR SECTION</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A) VERTICAL SLOPE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:1 D/S SLOPE</td>
<td>3.8</td>
<td>H&gt;0.7</td>
</tr>
<tr>
<td>4:1 D/S SLOPE</td>
<td>3.2</td>
<td>H&gt;0.7</td>
</tr>
<tr>
<td>10:1 D/S SLOPE</td>
<td>2.9</td>
<td>H&gt;0.7</td>
</tr>
<tr>
<td>B) 1:1 U/S SLOPE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:1 D/S SLOPE</td>
<td>3.8</td>
<td>H&gt;0.5</td>
</tr>
<tr>
<td>3:1 D/S SLOPE</td>
<td>3.5</td>
<td>H&gt;0.5</td>
</tr>
<tr>
<td>TRAPEZOIDAL SECTION</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:1 U/S SLOPE, 2:1 D/S SLOPE</td>
<td>3.4</td>
<td>H&gt;1.0</td>
</tr>
<tr>
<td>2:1 U/S SLOPE, 2:1 D/S SLOPE</td>
<td>3.4</td>
<td>H&gt;1.0</td>
</tr>
<tr>
<td>ROAD CROSSINGS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GRAVEL</td>
<td>3.0</td>
<td>H&gt;1.0</td>
</tr>
<tr>
<td>PAVED</td>
<td>3.1</td>
<td>H&gt;1.0</td>
</tr>
</tbody>
</table>

**SCHEMATIC**

**ADJUSTMENT FOR TAILWATER**

N.T.S.
TYPE 1 OUTLET

*HEADWATER FOR 5 YEAR FLOW

TOP OF BERM

100 YEAR OVERFLOW CREST

EROSION PROTECTION ON D/S SLOPE

OVERFLOW SPILLWAY

DROP INLET

SLOPE

OUTLET PIPE 5 CAPACITY (18" Ø)

5 YEAR CONTROL AT THROAT OF OUTLET PIPE, ORIFICE PLATE MAY BE REQUIRED

TYPE 2 OUTLET

*HEADWATER FOR 100 YEAR FLOW

OUTLET PIPE 100 YEAR CAPACITY (18" Ø)

N.T.S.
(A) ORIFICE PLATE DETAILS

TAMPER PROOF BOLTS
ORIFICE PLATE
OUTLET PIPE
FLOOR OF OUTLET

RECESS FOR PLATE

SECTION A–A

NOTE: TRASHRACK CAPACITY TO BE 10 TIMES ORIFICE CAPACITY

(B) TRASHRACK AREA REQUIREMENTS

<table>
<thead>
<tr>
<th>ORIFICE AREA (FT²)</th>
<th>RATIO OF CLEAR OPENING AREA TO ORIFICE AREA</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.01</td>
<td>100</td>
</tr>
<tr>
<td>0.1</td>
<td>50</td>
</tr>
<tr>
<td>1.0</td>
<td>20</td>
</tr>
<tr>
<td>10.0</td>
<td>10</td>
</tr>
<tr>
<td>10.0</td>
<td>5</td>
</tr>
<tr>
<td>10.0</td>
<td>4</td>
</tr>
</tbody>
</table>

ORIFICE DIAMETER

NOTE:
FOR ORIFICE DIAMETER LESS THAN 3", USE A MINIMUM CLEAR OPENING OF 2 FT²

N.T.S.

STANDARDS & SPECIFICATIONS

DATE: 

DRAWING NO. 400–28 

REVISED: 

DETENTION POND DETAILS
NOTE:

1. NUMBERS REFER TO SEQUENCE OF MORTAR INJECTION
2. LINERS MAY BE USED PROVIDED THE FROUDE NUMBER OF THE CHANNEL SECTION IS LESS THAN 0.8

N.T.S.
REINFORCED CONCRETE PIPE (RCP)

MINIMUM COVER PER SPECIFICATIONS OR PER CONSTR. DRAWINGS.

FOUNDATION 12” MIN.

COMPACTED NATIVE MATERIAL

PIPE DIA. Bc

GEOTEXTILE FABRIC

BEDDING

d = 4” (18” ≤ Bc ≤ 30”)
d = 6” (36” ≤ Bc ≤ 54”)
d = 8” (Bc > 60”)

MIN. TRENCH WIDTH
W = Bc + 36

3/4”, 1” OR 1-1/2” CRUSHED ROCK.

POLYVINYL CHLORIDE PIPE (PVC)

MINIMUM COVER PER SPECIFICATIONS OR PER CONSTR. DRAWINGS.

FOUNDATION 12” MIN.

COMPACTED NATIVE MATERIAL

PIER DIA. Bc

GEOTEXTILE FABRIC

BEDDING

d = 4” (18” ≤ Bc ≤ 30”)
d = 6” (36” ≤ Bc ≤ 54”)

MIN. TRENCH WIDTH
W = Bc + 36

3/4”, 1” OR 1-1/2” CRUSHED ROCK.

HIGH DENSITY POLYETHYLENE (HDPE) CORRUGATED METAL PIPE (CMP)

MINIMUM COVER PER SPECIFICATIONS OR PER CONSTR. DRAWINGS.

FOUNDATION 12” MIN.

COMPACTED NATIVE MATERIAL

PIECE DIA. Bc

GEOTEXTILE FABRIC

BEDDING

d = 4” (18” ≤ Bc ≤ 30”)
d = 6” (36” ≤ Bc ≤ 54”)

MIN. TRENCH WIDTH
W = Bc + 36

3/4”, 1” OR 1-1/2” CRUSHED ROCK.

NATIVE SOIL:

| COARSE GRAINED SAND AND GRAVEL (50% OR MORE BY WEIGHT RETAINED ON # 40 SIEVE) |
| CDOT CLASS A FILTER MATERIAL (SECTION 703.04) |
| FINE GRAINED SOIL (LESS THAN 50% RETAINED ON # 40 SIEVE) |
| UDFCD TYPE 1 FILTER MATERIAL ODOT FINE AGGREGATE FOR CONCRETE AASHTO M6 (SECTION 703.01) |

* MINIMUM COVER SHALL NOT INCLUDE PAVEMENT.
** MAY BE REQUIRED IN AREAS WITH HIGH GROUNDWATER TABLE OR UNSUITABLE SUB-GRADE.

STORM DRAINAGE PIPE BEDDING DETAILS

STANDARDS & SPECIFICATIONS

REVISIONS:

DATE: DRAWING NO. 400-30

N.T.S.
**SECTION B-B**

**SECTION C-C**

- **6" VERT. C.G.**
- **8%**
- **2%**
- **SLOPE VARIES**
- **6"**
- **6" MIN.**
- **E+3"**
- **6" MAX.**
- **D**
- **6"**
- **12"**
- **3/16" CLEARANCE**
- **1/4" X 3/4" F.H. MACHINE SCREWS**
- **Ø 24" O.C. COUNTER SINK FLUSH WITH PLATE**
- **11/2" X 11/2" X 1/4" ANGLE IRON DRILLED & TAPED FOR 1/4" MACHINE SCREWS**
- **3 REBAR 6" LONG WELD TO ANGLE 18" O.C.**

**DETAIL D**

**MULTIPLE CHASE**

**CHASE DRAIN DETAILS**

**STANDARDS & SPECIFICATIONS**

**DATE:**

**REVISED:**

**DRAWING NO. 400-31**

**N.T.S.**
SECTION A-A

4'-0" DIA. (PIPE 15" AND SMALLER)
5'-0" DIA. (PIPE 18" THROUGH 27")
6'-0" DIA. (PIPE 30" THROUGH 36")

6" MIN.

SLOPE 2" PER FOOT

8" MIN.

SECTION B-B

FLEXIBLE BUTYL RESIN SEALING COMPOUND

FLEXIBLE BUTYL RESIN SEALING COMPOUND

NOTES:

1. JOINTS TO BE SET IN FLEXIBLE BUTYL RESIN SEALING COMPOUND AND GROUTED WITH MORTAR INSIDE AND OUTSIDE.

2. BASES SHALL BE REINFORCED WHEN THE DISTANCE FROM INVERT TO TOP OF COVER WILL EXCEED 15 FT. REINFORCING TO BE APPROVED BY CITY ENGINEER.

3. SQUARE BASES ARE ACCEPTABLE.

4. FOR PIPE 36" AND LARGER, OR WHERE CONDITIONS SUCH AS MULTIPLE PIPES WARRANT, A CONCRETE BOX BASE WILL BE REQUIRED. (SEE CDOT STANDARD DRAWING M-604-20)

N.T.S.

STANDARD MANHOLE BASE
NOTES:
1. ALL JOINTS TO BE SET IN FLEXIBLE BUTYL RESIN SEALING COMPOUND AND PLASTERED WITH MORTAR 5/8" THICK AND EXTENDING 4" EACH SIDE OF JOINT INSIDE AND OUTSIDE.
2. MORTAR ON RISER RINGS IS ACCEPTABLE.
3. MANHOLES INSTALLED OUTSIDE OF STREET RIGHT-OF-WAY SHALL HAVE LOCKING COVERS.
4. "SEWER" TO BE IMPRINTED ON COVER.
5. FOR PIPE 36" AND LARGER, OR WHERE CONDITIONS SUCH AS MULTIPLE PIPES WARRANT, A CONCRETE BOX BASE WILL BE REQUIRED.
   (SEE CDOT STANDARD DRAWING M-604-20)

ALTERNATE FLAT TOP
N.T.S.

4"-0" DIA. (PIPE 15" & SMALLER)
5"-0" DIA. (PIPE 18" THROUGH 27")
6"-0" DIA. (PIPE 30" THROUGH 36")

TYPICAL MANHOLE SECTION
WITH ECCENTRIC CONE

4 WIRE HOOPS CAST INTO EACH SECTION AS SHOWN

DENVER STANDARD PATTERN

CEMENT MORTAR

ALUMINUM STEPS OR PLASTIC COVERED STEPS
M.P. INC., INC, PS-2-PF-S
CAST INTO SECTIONS AT 12"-16" VERTICAL SPACING AND ALIGNED

11-#5 BARS HOOKED AT EACH END

REBAR

4" MIN.
5"-0" DIA. OR
6"-0" DIA., M.H.

4"-0" DIA.
5"-0" DIA. FOR 6' DIA.
6"-0" DIA. FOR 6' DIA.

4 WIRE HOOPS CAST INTO EACH SECTION AS SHOWN

24" OR 30" DIA.

5" MAX.

PLAN

18" MAX.

5"-0" (PIPE 30" THROUGH 36")

5"-0" (PIPE 18" THROUGH 27")

5"-0" (PIPE 15" & SMALLER)

18" MAX.

48" MAX.

48" MAX.

24" MAX.

48" MAX.

5" MAX.

5/8" MAX.

5/8" MAX.
ATTACH HINGE TO GRATING WITH (2) 3/8" DIA. BOLTS x 1" O.C. W/HEX NUTS. ATTACH HINGE TO PLATFORM WITH (2) 3/8 DIA. x 3" LG. RED HEADS OR EQUAL.

ALUMINUM GRATING, 3/16" x 1 1/4" BEARING BARS.

NOTE:
1. ALL JOINTS TO BE SET IN FLEXIBLE BUTYL RESIN SEALING COMPOUND AND PLASTERED WITH MORTAR 5/8" THICK AND EXTENDING 4" EACH SIDE OF JOINT INSIDE AND OUTSIDE.

ALIGN STEPS ABOVE & OPPOSITE PLATFORM OPENING AS SHOWN TO TOP OF MANHOLE

SAFETY HANDHOLD TO PLATFORM

STANDARD PRECAST FLAT TOP WITH 4X4, 4/4 MESH

TO BE USED WHEN THE DISTANCE FROM INVERT TO TOP OF COVER EXCEEDS 17 FT.

FOR MANHOLES OVER 17’ IN DEPTH

N.T.S.
### TABLE ONE ~ BAR LIST FOR CURB INLETS, TYPE "R"

<table>
<thead>
<tr>
<th>MARK</th>
<th>O.C. SPACING (in)</th>
<th>TYPE</th>
<th>ALL INLETS</th>
<th>INLETS, H ≤ 5'</th>
<th>INLETS, H &gt; 5'</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>L = 5'</td>
<td>10'</td>
<td>15'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>LENGTH (ft-in)</td>
<td>NO.</td>
<td>LENGTH (ft-in)</td>
</tr>
<tr>
<td>401</td>
<td>11&quot;</td>
<td>II</td>
<td>15&quot;</td>
<td>7</td>
<td>21&quot;</td>
</tr>
<tr>
<td>402</td>
<td>11&quot;</td>
<td>II</td>
<td>17&quot;</td>
<td>7</td>
<td>26&quot;</td>
</tr>
<tr>
<td>403</td>
<td>9&quot;</td>
<td>II</td>
<td>14&quot;</td>
<td>3</td>
<td>18&quot;</td>
</tr>
<tr>
<td>405</td>
<td>8&quot;</td>
<td>II</td>
<td>10&quot;</td>
<td>11</td>
<td>1&quot;</td>
</tr>
<tr>
<td>406</td>
<td>7&quot;</td>
<td>II</td>
<td>12&quot;</td>
<td>7</td>
<td>10&quot;</td>
</tr>
<tr>
<td>407</td>
<td>5/8&quot;</td>
<td>II</td>
<td>10&quot;</td>
<td>3</td>
<td>7&quot;</td>
</tr>
<tr>
<td>408</td>
<td>12&quot;</td>
<td>II</td>
<td>6&quot;</td>
<td>6</td>
<td>10&quot;</td>
</tr>
<tr>
<td>410</td>
<td>11&quot;</td>
<td>II</td>
<td>8&quot;</td>
<td>3</td>
<td>15&quot;</td>
</tr>
<tr>
<td>411</td>
<td>11&quot;</td>
<td>II</td>
<td>6&quot;</td>
<td>3</td>
<td>6&quot;</td>
</tr>
<tr>
<td>412</td>
<td>11&quot;</td>
<td>II</td>
<td>5&quot;</td>
<td>3</td>
<td>8&quot;</td>
</tr>
<tr>
<td>413</td>
<td>11&quot;</td>
<td>II</td>
<td>7&quot;</td>
<td>3</td>
<td>9&quot;</td>
</tr>
<tr>
<td>501</td>
<td>5 1/2&quot;</td>
<td>II</td>
<td>11&quot;</td>
<td>22</td>
<td>5&quot;</td>
</tr>
<tr>
<td>502</td>
<td>5 1/2&quot;</td>
<td>II</td>
<td>12&quot;</td>
<td>11&quot;</td>
<td>6&quot;</td>
</tr>
<tr>
<td>503</td>
<td>5 1/2&quot;</td>
<td>II</td>
<td>13&quot;</td>
<td>12&quot;</td>
<td>8&quot;</td>
</tr>
<tr>
<td>601</td>
<td>3/4&quot;</td>
<td>II</td>
<td>28&quot;</td>
<td>28&quot;</td>
<td>28&quot;</td>
</tr>
<tr>
<td>602</td>
<td>5 1/2&quot;</td>
<td>II</td>
<td>32&quot;</td>
<td>32&quot;</td>
<td>32&quot;</td>
</tr>
<tr>
<td>603</td>
<td>5 1/2&quot;</td>
<td>II</td>
<td>36&quot;</td>
<td>36&quot;</td>
<td>36&quot;</td>
</tr>
</tbody>
</table>

**Note:** INLETS are OUT-TO-OUT of the HEAVY BLACK LINE.

### TABLE TWO ~ BARS AND QUANTITIES VARIABLE WITH "H"

<table>
<thead>
<tr>
<th>&quot;H&quot; (ft-in)</th>
<th>LENGTH (ft-in)</th>
<th>NO. MOD</th>
<th>DROP BOX</th>
</tr>
</thead>
<tbody>
<tr>
<td>401</td>
<td>402</td>
<td>403</td>
<td>404</td>
</tr>
<tr>
<td>405</td>
<td>406</td>
<td>407</td>
<td>408</td>
</tr>
<tr>
<td>410</td>
<td>411</td>
<td>412</td>
<td>413</td>
</tr>
<tr>
<td>501</td>
<td>502</td>
<td>503</td>
<td>504</td>
</tr>
<tr>
<td>601</td>
<td>602</td>
<td>603</td>
<td>604</td>
</tr>
</tbody>
</table>

**Note:** FOR L = 5', L = 10' AND L = 15', REGULAR INLETS TOTAL QUANTITIES NEEDED ARE OUTSIDE OF THE HEAVY BLACK LINE. DROP BOX INLETS TOTAL QUANTITIES NEEDED ARE INSIDE OF THE HEAVY BLACK LINE.

### BAR BENDING DIAGRAMS ~ (Dimensions are OUT-TO-OUT of bar)

**NTS:**

**STANDARDS & SPECIFICATIONS**

**REvised:**

**Curb Inlet Type R**

**Sheet 3 of 4**
NO DUMPING!

STORM SEWER
DRAINS TO RIVER

ELBERT COUNTY

1" (25mm) LETTERING
(RECESSED FLUSH)

1/2" [13mm] LETTERING
RECESSED

1/2" [13mm] LETTERING
RECESSED

2" [51mm]

TOP OF COVER

SECTION OF COVER

23 7/8" DIA. [606mm]

1" [25mm]

7 1/4" [184mm]

5/8" [16mm]

7/8" [22mm]

3½" [10mm]

3/8" [10mm]

BOTTOM OF COVER

PICKSLOT DETAIL

COVER: GRAY IRON ASTM A48 CL35 B
LOAD RATING: H-20
COVER: 135 LBS 61kg
PRODUCT NUMBER 00240562
√ MACHINED SURFACE
EAST JORDAN IRON WORKS #2405A
PRODUCT #240562

N.T.S.

STORM SEWER MANHOLE LID

STANDARDS & SPECIFICATIONS

REVISED:

DATE:

DRAWING NO. 400-39
STORM OR SANITARY SEWER CROSSING UNDER WATER MAIN

IF \( d_3 \geq 18'' \), ENCASEMENT NOT REQUIRED

NOTES:

1. CONCRETE COLLAR AROUND STORM SEWER JOINTS MAY BE ACCEPTED WITH WRITTEN APPROVAL BY THE CITY ENGINEER AND ONLY FOR PIPE 30'' OR LARGER.

2. CONCRETE TO BE CAST AGAINST UNDISTURBED SOIL OR SHORING.

3. LENGTH OF ENCASEMENT SHALL EXTEND AT LEAST 10- FEET EACH SIDE OF WATER MAIN.

4. UNLESS OTHERWISE NOTED ON PLAN/PROFILE DRAWINGS, ENCASEMENTS NEED NOT BE REINFORCED.

5. FILLER MATERIAL BETWEEN CONDUITS TO BE:
   a) APPROVED COMPRESSIBLE MATERIAL SUCH AS STYROFOAM, ETC. IF \( d_4 \leq 6'' \).
   b) COMPACTED BACKFILL, IF \( d_4 > 6'' \).

6. SHORING OR SHEETING, IF USED, TO BE CUT OFF AT TOP OF ENCASEMENT

STORM OR SANITARY SEWER CROSSING OVER TOP OF WATER MAIN

ENCASEMENT REQUIRED REGARDLESS OF DIMENSION \( d_3 \)
(SEE NOTE 1 FOR SPECIAL CASES)

N.T.S.
LOCAL TYPE II (ASPHALT) W/GRAVEL SHOULDERS

MINIMUM CULVERT SIZE = 18"

LOCAL TYPE II (ASPHALT)

N.T.S.

STANDARDS & SPECIFICATIONS

DATE: DRAWING NO. 500-02

LOCAL ROAD

TYPE II

REVISED:
INTERNAL TERMINATION WILL VARY PER DEVELOPMENT

TRAFFIC CONTROL SIGN

NOTE:
1. DEVELOPER TO INSTALL INLAY & PAVEMENT MARKINGS SUCH AS ARROWS, STOP BARS & ONLY SYMBOLS PER CITY SPECIFICATIONS.

2. TRAFFIC CONTROL SIGNS TO BE INSTALLED PER CITY SPECIFICATIONS BY DEVELOPER.

THE CROOVED RECTANGULAR PORTION OF THE RAMP AND CUTTER SHALL BE INTEGRAL DAVIS COLOR TILE RED (3 POUNDS OF COLOR PIGMENT NO. 1117 PER SACK OF CEMENT) AND SHALL BE CURED WITH CLEAR CURING COMPOUND
CORNER CLEARANCE REQUIREMENTS FOR UNCONTROLLED LOCAL STREET INTERSECTIONS TO MAINTAIN ADEQUATE SIGHT DISTANCE

SIGHT DISTANCE REQUIRED ALONG MAJOR ROAD

STOPPED APPROACH

D=10' TO DRIVERS EYE FROM CURBLINE EXTENDED

SIGHT DISTANCE REQUIRED ALONG MAJOR ROAD

<table>
<thead>
<tr>
<th>DESIGN SPEED OF THRU ROADWAY (MPH)</th>
<th>MINIMUM SIGHT DISTANCE FOR STOPPED VEHICLE (FT)</th>
<th>GRADE CORRECTION DISTANCE (FT.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>250</td>
<td>3% 6%</td>
</tr>
<tr>
<td>30</td>
<td>300</td>
<td>3% 6%</td>
</tr>
<tr>
<td>35</td>
<td>350</td>
<td>3% 6%</td>
</tr>
<tr>
<td>40</td>
<td>400</td>
<td>3% 6%</td>
</tr>
<tr>
<td>45</td>
<td>450</td>
<td>3% 6%</td>
</tr>
</tbody>
</table>

N.T.S.

STANDARDS & SPECIFICATIONS

REVISED: SIGHT DISTANCE

DATE: DRAWING NO. 500-10
CUL-DE-SAC MAY HAVE A MAXIMUM LENGTH OF 500', MEASURED FROM INTERSECTION Q TO RADIUS POINT. (TYP.)

LOCAL—LOW VOLUME

LOCAL—STANDARD RESIDENTIAL

LOCAL—STANDARD COMMERCIAL/INDUSTRIAL

NOTE: THESE STANDARDS MAY BE APPLIED TO ASYMMETRICAL CUL-DE-SACS. • DESIGN ENGINEER SHOW REFERENCE ELEVATIONS AT THESE POINTS.

N.T.S.

STANDARDS & SPECIFICATIONS

REvised:

CUL-DE-SAC DETAIL

DATE: DRAWING NO. 500-11
### Expansion Joint Material

0.5" expansion joint material at each end of all curb returns and at 150 feet max. spacing.

### Layout

- **Dowel Bar with Expansion Cap**
  - 0.75" x 24" greased dowel bar with expansion cap.

- **Premolded Non-Extruding Expansion Joint Material**
  - 0.5" premolded non-extruding expansion joint material.

### Notes:

1. Expansion joint material shall be non-extruding and resilient type to meet AASHTO Spec. M-213.
2. Any over-excavation shall be replaced with granular backfill compacted to 95% maximum dry density as determined by ASTM D-698.
3. Type 2 spill curb may be required for special conditions.
4. Gutters cross slope shall be 1/2"/ft when draining away from curb and 1/2"/ft when draining toward curb.
5. Type 2 curb & gutter is for use in commercial, arterials and collector streets.

---

**Legend for Radii**

<table>
<thead>
<tr>
<th>A</th>
<th>1/8&quot; to 1/4&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>1&quot;</td>
</tr>
<tr>
<td>C</td>
<td>1-1/2&quot;</td>
</tr>
<tr>
<td>D</td>
<td>1-1/2&quot; to 2&quot;</td>
</tr>
</tbody>
</table>

---

**6" Vertical Curb & Gutter**

**6" Vertical Median Curb & Gutter**

---

**Standards & Specifications**

**Revised: 6" Vertical Curb and Gutter**

**Date:**

**Drawing No. 500-13**
0.5" EXPANSION JOINT MATERIAL AT EACH END OF ALL CURB RETURNS AND AT 150 FEET MAX. SPACING
10' MAX. SPACING BETWEEN CONTRACTION JOINTS

BACK OF CURB

LAYOUT

0.25" MAX. GROOVE JOINT

0.75" X 24" GREASED DOWEL BAR WITH EXPANSION CAP

0.5" PREMOLDED NON-EXTRUDING EXPANSION JOINT MATERIAL

EXPANSION JOINT

CONTRACTION JOINT

2'-0" 11" 3'-7"

2" 4" 2'

R=15" R=2'

6" 6-1/2" 3'-8-1/2"

NOTES:

1. EXPANSION JOINT MATERIAL SHALL BE NON-EXTRUDING AND RESILIENT TYPE TO MEET AASHO SPEC. M-213.

2. ANY OVER-ECAVATION SHALL BE REPLACED WITH GRANULAR BACKFILL COMPACTED TO 95% MAXIMUM DRY DENSITY AS DETERMINED BY ASTM D-698.

N.T.S.

STANDARDS & SPECIFICATIONS

REVISED:

4" MOUNTABLE CURB, GUTTER AND WALK

DATE: DRAWING NO. 500-14
VERTICAL CURB, GUTTER & SIDEWALK

SECTION A–A

FIBER MESH OR OTHER REINFORCEMENT APPROVED BY CITY ENGINEER

SIDEWALK RAMP, TYPE A-2

TOOLED JOINT 6” O.C.

24” LONG DOWELS IF NOT POURED MONOLITHICALLY

N.T.S.

STANDARDS & SPECIFICATIONS

REVISED:

CROSS PAN
INDUSTRIAL/ARTERIAL/ COLLECTOR STREET

DATE: DRAWING NO. 500-15
COMBINATION CURB, GUTTER & SIDEWALK TYPE 1

SECTION A-A

FIBER MESH OR OTHER REINFORCEMENT APPROVED BY CITY ENGINEER

RADIUS POINT
SIDEWALK RAMP, TYPE L-1
TOOLED JOINTS 6" O.C.
24" LONG DOWELS IF NOT POURED MONOLITHICALLY

NO LIP
FL

4'-0" 8'-0"
2" 8"

N.T.S.

STANDARDS & SPECIFICATIONS

REVISED:

CROSS PAN LOCAL STREET

DATE: DRAWING NO. 500-16
2' x 2' Prestressed, Reinforced Concrete Truncated Dome Tiles with 0.9 in (23 mm) Nominal Diameter, a Height of Nominal 0.2 in (5 mm) and Spacing of 2.35 in (60 mm) Center to Center.

6.5' Combination Curb, Gutter and Sidewalk 25.0' Radius

3' Min. Sidewalk as Shown on Plans

4' Min. 2' Min. 2'

Concrete Sidewalk
Concrete Pedestrian Curb

Gutter Varies 6''-8''

Detectable Warning and Well

SECTION B-B

SECTION A'-A

N.T.S.
2" x 2" PRESTRESSED, REINFORCED CONCRETE TRUNCATED DOME TILES WITH 0.9 IN (23 MM) NOMINAL DIAMETER, A HEIGHT OF NOMINAL 0.2 IN (5 MM) AND SPACING OF 2.35 IN (60 MM) CENTER TO CENTER.

6" VERT. CURB, GUTTER ATTACHED 8" SIDEWALK 30.0" RADIUS

3' MIN. SIDEWALK AS SHOWN ON PLANS

6 1/2' MIN. 2' MIN.

12:1 TOP OF PAVEMENT

20:1 GUTTER VARIES 6" - 8"

CONCRETE SIDEWALK

CONCRETE PEDESTRIAN CURB

DETECTABLE WARNING AND WELL

SECTION A'-A

SECTION B-B

N.T.S.

STANDARDS & SPECIFICATIONS

REVISED:

VERT. CURB, GUTTER, ATTACHED SIDEWALK

DATE: DRAWING NO. 500-18
NOTES:

1. HORIZONTAL GEOMETRY OF THE BACK OF WALK VAVIES DEPENDING ON THE CURB RADIUS AND PRE-EXISTING PHYSICAL OBSTRUCTIONS. THE DESIGN SHALL ADEQUATELY PROVIDE A MINIMUM WIDTH ROUTE BEHIND THE RAMP WITH AN AESTHETICALLY PLEASING APPEARANCE.

2. 1 1/2" WIDE X 1/2" DEEP GROOVES SHALL BE SPACED AT 12''

3. THE RAMP AND WINGS SHALL BE TEXTURED WITH A COARSE BROOMED FINISH.

N.T.S.
SUBBASE MATERIAL CARRIED THROUGH SHOULDER

SUBBASE MATERIAL NOT CARRIED THROUGH SHOULDER

CURB AND GUTTER SECTION

NOTE: WHERE THE BOTTOM OF SELECT MATERIAL IS GREATER THAN 4'-0" BELOW PAVEMENT, THE UNDERDRAIN PIPE IS TO BE COINCIDENT WITH THE BOTTOM OF SELECT MATERIAL, AND THE TRENCH DEPTH AND BACKFILL QUANTITY INCREASED ACCORDINGLY.

N.T.S.
ELEVATION OF BOTTOM OF SAND OR ROCK TO CONFORM TO BOTTOM OF CURB ELEVATION

FILTER FABRIC 1" MIN OVERLAP

4", 6" OR 8" PIPE

CLASS A 3/4" WASHED ROCK

1/2"/FT

1"-0"

2"

2"-0"

N.T.S.

STANDARDS & SPECIFICATIONS

REVISED:

PIPE UNDERDRAIN FOR RAISED IRRIGATED MEDIANS

DATE:

DRAWING NO. 500-24
2" x 4" RAIL
1" x 4" PICKETS
4" x 4" POST
WITH 8' SPACING

PROVIDE A 1"
MOUND AROUND
EACH POST TO
DRAIN AWAY
FROM POST

NOTE: PICKETS SHOULD
ABUTT AGAINST EACH OTHER.

SUBGRADE

12" DIA. CONCRETE
PIER

FRONT VIEW

SIDE VIEW

N.T.S.

STANDARDS &
SPECIFICATIONS

REVISED:

SOUND BARRIER
FENCE

DATE:

DRAWING NO. 500-25
NOTES:

1) A STRUCTURAL ENGINEERING DESIGN
FOR THE WALL AND FOUNDATION SHALL
BE SUBMITTED TO THE CITY FOR APPROVAL.

2) COLORS FOR SPLIT CONCRETE BLOCKS
SHALL BE LIMITED TO:
BROWN # 277, TAN # 276, RED # 265
AS MANUFACTURED BY THREE-COOPER OR
APPROVED EQUAL.

N.T.S.
NOTE:

SIDEWALK UNDERDRAIN IS TO BE USED WHEN THE SIDEWALK LONGITUDINAL GRADIENT IS 3% OR MORE AND WHEN THE UNDERLYING SOIL HAS 34% OR MORE PASSING THE NO. 200 SIEVE AND HAS A PI OF 30 OR MORE.

SIDEWALK UNDERDRAINS SHOULD BE TIED INTO THE STORM SEWER SYSTEM AT POINTS ABOUT A CITY BLOCK APART. UNDERDRAIN RUNS MUST NOT EXCEED 1,000 FEET IN LENGTH WITHOUT DISCHARGING INTO THE STORM DRAIN SYSTEM OR INTO AN OPEN DRAIN. THE LENGTH OF RUN MAY BE INCREASED UP TO AN ADDITIONAL 1,000 FEET IF 8" DIAMETER PIPE IS USED IN THE DOWNSTREAM 1,000 FEET SECTION OF THE RUN.

* THIS PORTION TO BE DELETED WHEN SIDEWALK IS ADJACENT TO CURB OR CURB AND GUTTER WITH NO UTILITY STRIP

D = ALL PIPE TO BE 6" UNLESS OTHERWISE NOTED. CORRUGATED PERFORATED PLASTIC PIPE OR ALTERNATE TYPES AS APPROVED BY CITY ENGINEER.
TYPE 1 AND TYPE 1A ALUMINUM AND STAINLESS STEEL DRIVEN MONUMENTS

MONUMENTS ARE INSTALLED BY ATTACHING THE PROPER SIZE CAP TO ONE END OF A SECTION OF STEEL TO THE OTHER. THE CAP IS THEN PLACED OVER THE STEEL DRIVER TO THE MONUMENT SITE. WHEN ADDITIONAL SECTIONS OF STEEL ARE NEEDED, THEY ARE ATTACHED USING A SET OF ADJUSTABLE WRENCHES. MONUMENTS ARE SECURED IN THE ROD WITH A THREADED CAP OR A BRASS CAP. THE ROOF SECTION IS PLACED OVER THE END OF THE TOP CAP WITH A BRASS INSERT TO ACCOMMODATE THE CONCRETE CEMENT.

TYPE 1 MONUMENTS TYPICALLY USE A THREE-FOOT SECTION OF STEEL. WHEN SUBSURFACE ROCK OR CONCRETE IS ENCOUNTERED, A THREE-FOOT SECTION IS USED AND UP TO 12 INCHES OF CONCRETE IS INCORPORATED. THE MONUMENT SHALL BE EMBEDDED IN THE ROOF OR CONCRETE TO A MINIMUM DEPTH OF 12 INCHES. THE CAP MAY BE SHUFFLED TO ACCOMMODATE THE CONCRETE.

TYPE 1A MONUMENTS ARE USED FOR EXISTING OR REPLACEMENT SECTIONS OF STEEL. THE ADJUSTABLE CAPS ARE USED FOR NABED ADJUSTMENTS. THE ADJUSTABLE CAPS ARE CORPORATION WITH THE ADJUSTABLE CAPS.

TYPE 2 AND TYPE 2A ALUMINUM FINNED ROD MONUMENTS

TYPE 2 MONUMENTS ARE USED FOR HORIZONTAL CONTROL MONUMENTS IN EXISTING AND REPLACEMENT SECTIONS. THE ADJUSTABLE CAPS ARE USED FOR NABED ADJUSTMENTS. THE ADJUSTABLE CAPS ARE CORPORATION WITH THE ADJUSTABLE CAPS.

TYPE 3 AND TYPE 3A ALUMINUM PIPE MONUMENTS

TYPE 3 MONUMENTS ARE USED FOR MONUMENTS WHICH ARE TO BE EMBEDDED IN existing concrete or rock. THE ADJUSTABLE CAPS ARE USED FOR NABED ADJUSTMENTS. THE ADJUSTABLE CAPS ARE CORPORATION WITH THE ADJUSTABLE CAPS.

TYPE 4 BRASS CAP MONUMENT

TYPE 4 MONUMENTS ARE PLACED IN CONCRETE OR ROCK. THE ADJUSTABLE CAPS ARE USED FOR NABED ADJUSTMENTS. THE ADJUSTABLE CAPS ARE CORPORATION WITH THE ADJUSTABLE CAPS.

TYPE 5 BRASS CAP MONUMENT

TYPE 5 MONUMENTS ARE PLACED IN CONCRETE OR ROCK. THE ADJUSTABLE CAPS ARE USED FOR NABED ADJUSTMENTS. THE ADJUSTABLE CAPS ARE CORPORATION WITH THE ADJUSTABLE CAPS.
CHECK DAM

Definition
Small temporary dam constructed across a swale or drainage ditch.

Purposes
To reduce the velocity of stormwater flows and erosion of the swale or ditch.

ROCK CHECK DAM

1′-6"

Median 12 inch Rock

2:1 or flatter

L=The distance such that points A and B are of equal elevation

SPACING BETWEEN CHECK DAMS

N.T.S.
CONSTRUCTION FENCE

15 FT. (MAX)

2'-6" (MIN)

12" (MIN)

ANCHOR

ORANGE PLASTIC FENCE
11 GA. WIRE CLAMP

TIES FOR "STUDDED TEE"

"STUDDED TEE" LINE POST

STANDARDS & SPECIFICATIONS

DATE:  DRAWING NO. 600-03

CONSTRUCTION FENCE

REVISED:
TEMPORARY DIVERSION DITCH

DEFINITION
A TEMPORARY RIDGE OF COMPACTED SOIL LOCATED AT THE TOP, MIDSLOPE, OR BASE OF A DISTURBED AREA

PURPOSE
1. TO DIVERT STORM RUNOFF FROM HIGHER DRAINAGE AREAS AWAY FROM THE UNPROTECTED SLOPES TO A PERMANENT CHANNEL OR TEMPORARY CHANNEL DIVERSION.

2. TO DIVERT SEDIMENT-LADEN RUNOFF FROM THE MIDSLOPE OF A DISTURBED AREA TO A TEMPORARY SLOPE DRAIN.

3. TO DIVERT SEDIMENT-LADEN RUNOFF FROM THE BASE OF A DISTURBED AREA TO A SEDIMENT TRAPPING FACILITY.
INLET PROTECTION

Definition
A sediment filter or an excavated impounding area around a storm drain drop inlet or curb inlet.

Purposes
To reduce sediment from entering storm drainage systems prior to permanent stabilization of disturbed areas.

Special Application
This method of inlet protection is applicable where heavy concentrated flows are expected, but not where ponding around the structure might cause
INLET PROTECTION

Definition

A sediment filter or an excavated impounding area around a storm drain or curb inlet.

Purposes

To reduce sediment from entering storm drainage systems prior to permanent stabilization of disturbed area.
TEMPORARY SEDIMENT TRAP

Definition
A small temporary ponding area, formed by constructing an earthen embankment with a rock-covered outlet across a drainage swale, or by excavation of a depression below original grade. Relative elevations should contain all runoff within the trap area.

Purposes
To detain sediment-laden runoff from disturbed areas long enough to allow the majority of the sediment to settle out.

EXCAVATED SEDIMENT TRAP

- Diversion Dike
- Original Grade
- Rock-Lined Inlet
- Rock-Lined Outlet

EMBANKMENT SEDIMENT TRAP

- Maximum Sediment Storage Clean-out Level (1/2 total depth)
- Rock Lining: 9” thick layer of 6” rock on 3” thick layer of 1/2”–3/4” filter

STANDARDS & SPECIFICATIONS
REVISED:
DATE: DRAWING NO. 600–07
TEMPORARY SEDIMENT TRAP
TEMPORARY SEDIMENT BASIN

DEFINITION
A TEMPORARY BASIN WITH A CONTROLLED STORM WATER RELEASE STRUCTURE, FORMED BY EXCAVATION OR CONSTRUCTION OF AN EMBANKMENT OF COMPACTED SOIL, REQUIRED FOR ALL DRAINAGE AREAS GREATER THAN 1 ACRE.

PURPOSE
TO DETAIN SEDIMENT-LADEN RUNOFF FROM DISTRIBUTED AREAS TO ALLOW THE MAJORITY OF THE SEDIMENT TO SETTLE OUT.

LIMITING GEOMETRY:
L/W GREATER THAN 2.0

REQUIRED VOLUME TO CREST OF EMERGENCY SPILLWAY = 1800 CUBIC FEET PER ACRE OF DRAINAGE AREA. SHOULD BE CLEANED OUT PRIOR TO BECOMING HALF FULL.

100-YEAR OR LARGER EMERGENCY SPILLWAY
EMERGENCY SPILLWAY SHOULD NOT BE CONSTRUCTED OVER FILL MATERIAL

INFLOW

OUTLET SEE DETAIL B

STANDARDS & SPECIFICATIONS
REVISED:
DATE:
DRAWING NO. 600-08
TEMPORARY SEDIMENT BASIN
TEMPORARY SEDIMENT BASIN
OUTLET DETAIL B

SEE DETAIL OF RISER PIPE

SEDIMENT BASIN SURFACE

GRAVEL (1-1/2" ROCK) AROUND RISER

4" DIA. RISER PIPE W/END

1-1/2" DIA. AIR VENT IN THREADED CAP

WATER QUALITY OUTLET HOLES, 1/4" DIA.

SCHEDULE 40 PIPE

6 COLUMNS

RISER PIPE DETAIL
SEEDING AND MULCHING INSTALLATION NOTES

1. All brands furnished shall be free from such noxious seeds as Russian or Canadian thistle, course fescue, European bindweed, Johnson grass, Knap weed, and leafy spurge.

2. The seeder shall furnish to the Contractor a signed statement certifying that the seed furnished is from a lot that has been tested by a recognized laboratory. Seed that has become wet, moldy, or otherwise damaged in transit or in storage, will not be acceptable. Seed tickets shall be provided to the Engineer upon request.

3. Drill seeding mix shall conform to the seed mix table.

4. If the seed available on the market does not meet the minimum purity and germination percentages specified, the subcontractor must compensate for a lesser percentage of purity or germination by furnishing sufficient additional seed to equal the specified product. The tags from the seed mixes must be supplied to contractor and forwarded to the Engineer.

5. The formula used for determining the quantity of pure live seed (PLS) shall be (pounds of seed) X (purity) X (germination) = pounds of pure live seed (PLS).

6. Perminate seed mix shall be used unless otherwise approved by the Engineer.

7. All areas to be seeded and mulched shall have native topsoil or approved soil amendments spread to a depth of at least 6 inches (loose depth). Haul roads and other compacted areas shall be loosened to a depth of 6 inches prior to spreading topsoil.

8. Soil is to be thoroughly loosened (tilled) to a depth of at least 6 inches prior to seeding. The top 6 inches of the seed bed shall be free of rocks greater than 4 inches and soil clods greater than 2 inches. Seeding over any compacted areas that haven’t been thoroughly loosened shall be rejected.

9. Seed is to be applied using a mechanical drill to a depth of 1/4 inch. Row spacing shall be no more than 6 inches. Material used for mulch shall consist of long-stemmed straw. At least 50 percent of the mulch, by weight, shall be 10 inches or more in length. Mulch shall be applied and mechanically anchored to a depth of at least 2 inches. Mulch shall be applied at a rate of 4000 Lb. of straw per acre.

10. If the permittee demonstrates to the Engineer that it is not possible to drill seed, seed is to be uniformly broadcast at two times the drilled rate, then lightly harrowed to provide a deed depth of approximately 1/4 inch, then rolled to compact, then mulched as specified above.

11. Seeding and mulching shall be completed within 30 days of initial exposure or 7 days after grading is substantially complete in a given area (as defined by the Engineer). This may require multiple mobilizations for seeding and mulching.

12. Mulch shall be applied within 24-hours of seeding.

13. Tackifier should be utilized to help with straw displacement.
1. Seed shall be drilled only (no hydroseed).

2. Seed type and amount of pure live seed (PLS) required per acre shall be:

### NATIVE AREA SEED MIX

<table>
<thead>
<tr>
<th>SEED NAME</th>
<th>BOTANIC NAME</th>
<th>% IN MIX</th>
<th>POUNDS OF PLS PER ACRE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slender Wheatgrass</td>
<td>Agropyron Trachycaulum</td>
<td>0%</td>
<td>3 lbs.</td>
</tr>
<tr>
<td>Mountain Brome</td>
<td>Bromus Marginatus</td>
<td>0%</td>
<td>3 lbs.</td>
</tr>
<tr>
<td>Indian Ricegrass</td>
<td>Oryzopsis Hymenoides</td>
<td>0%</td>
<td>2 lbs.</td>
</tr>
<tr>
<td>Thickspike Wheatgrass</td>
<td>Agropyron Dasystachyum</td>
<td>0%</td>
<td>2 lbs.</td>
</tr>
<tr>
<td>Western Wheatgrass</td>
<td>Agropyron Smithii</td>
<td>0%</td>
<td>2 lbs.</td>
</tr>
<tr>
<td>Arizona Fescue</td>
<td>Festuca Arizonica</td>
<td>0%</td>
<td>2 lbs.</td>
</tr>
<tr>
<td>Sandburg Bluegrass</td>
<td>Poa Sandbergii</td>
<td>0%</td>
<td>0.5 lbs.</td>
</tr>
<tr>
<td>Rocky Mountain Penstemon</td>
<td>Penstemon Strictus</td>
<td>0%</td>
<td>0.5 lbs.</td>
</tr>
<tr>
<td>Blue Flax</td>
<td>Linium Lewissii</td>
<td>0%</td>
<td>0.5 lbs.</td>
</tr>
<tr>
<td>Mountain Lupine</td>
<td>Lupinus Alpestris</td>
<td>0%</td>
<td>1 lbs.</td>
</tr>
<tr>
<td>Lance-leafed Coreopsis</td>
<td>Coreopsis Lanceolata</td>
<td>0%</td>
<td>0.5 lbs.</td>
</tr>
<tr>
<td>Rubber Rabbitbrush</td>
<td>Chysothanis Nauseosus</td>
<td>0%</td>
<td>0.5 lbs.</td>
</tr>
<tr>
<td>Fringed Sagebrush</td>
<td>Artemisia Frigida</td>
<td>0%</td>
<td>0.3 lbs.</td>
</tr>
<tr>
<td>Prairie Sage</td>
<td>Artemesia Ludoviciana</td>
<td>0%</td>
<td>0.2 lbs.</td>
</tr>
</tbody>
</table>

**TOTAL 22.5 lbs.**

### SWALES/DRAINAGE AREA SEED MIX

<table>
<thead>
<tr>
<th>SEED NAME</th>
<th>BOTANIC NAME</th>
<th>% IN MIX</th>
<th>POUNDS OF PLS PER ACRE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Streambank Wheatgrass</td>
<td>Agropyron Riparium</td>
<td>0%</td>
<td>4 lbs.</td>
</tr>
<tr>
<td>Thickspike Wheatgrass</td>
<td>Agropyron Dasystachyum</td>
<td>0%</td>
<td>7 lbs.</td>
</tr>
<tr>
<td>Mountain Brome</td>
<td>Bromus Marginatus</td>
<td>0%</td>
<td>3 lbs.</td>
</tr>
<tr>
<td>Western Wheatgrass</td>
<td>Agropyron Smithii</td>
<td>0%</td>
<td>3 lbs.</td>
</tr>
<tr>
<td>Tufted Hairgrass</td>
<td>Deschampsia Caespitosa</td>
<td>0%</td>
<td>2 lbs.</td>
</tr>
<tr>
<td>Nuttall Alkaligrass</td>
<td>Puccinellia Airoides</td>
<td>0%</td>
<td>0.5 lbs.</td>
</tr>
<tr>
<td>Western Yarrow</td>
<td>Achillea Lanulosa</td>
<td>0%</td>
<td>0.5 lbs.</td>
</tr>
<tr>
<td>New England Aster</td>
<td>Aster Novae-angliae</td>
<td>0%</td>
<td>0.5 lbs.</td>
</tr>
<tr>
<td>Rocky Mountain Iris</td>
<td>Iris Missouriensis</td>
<td>0%</td>
<td>0.5 lbs.</td>
</tr>
</tbody>
</table>

**TOTAL 21.0 lbs.**
SILT FENCE EROSION BARRIER

SILT FENCE INSTALLATION

STEEL T POST OR 2"x4" WOOD POST (ANCHORED TO FABRIC)

FABRIC MATERIAL (ANCHORED IN TRENCH)

4"x4" TRENCH COMPACTED BACKFILL

FLOW

NOTE: EROSION CONTROL MEASURES SHALL BE MAINTAINED UNTIL LANDSCAPING IS COMPLETED.

SECTION

STANDARDS & SPECIFICATIONS

REVISEd:

SILT FENCE EROSION BARRIER

DATE:          DRAWING NO. 600-12
VEHICLE TRACKING CONTROL

NOTE: EROSION CONTROL MEASURES SHALL BE MAINTAINED AT ALL TIMES AS DIRECTED BY THE CITY ENGINEER.

NOTES
1. ALL ROCK TO BE REMOVED UPON COMPLETION OF CONSTRUCTION.
2. PUBLIC ROADWAY TO BE KEPT CLEAN AND FREE OF MUD, DIRT AND DEBRIS AT ALL TIMES.
STRAW BALE EROSION BARRIER

TRENCH EXCAVATION

STRAIN BALE INSTALLATION

SECTION

NOTE: EROSION CONTROL MEASURES SHALL BE MAINTAINED UNTIL LANDSCAPING IS COMPLETED.
OUTLET STRUCTURE