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<td>Outside Setting for 1 ½&quot; and 2&quot; Water Meter with Check Valve and Bypass in Manhole</td>
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<td>Fire Hydrant Blowoff Assembly Detail 24&quot; Diameter and Larger</td>
<td>W-56</td>
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<td>Transmission Lines</td>
<td>W-57</td>
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<td>O-Ring Joint and Welded Joint Details Steel Pipe Lines</td>
<td>W-58</td>
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<td>Closure for Concrete and Steel Pipe</td>
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<td>Anode Test Site</td>
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<td>Sump Pit</td>
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<td>Tracer Wire Detail</td>
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<td>Fire Line for 3&quot; and Larger Pipe</td>
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<td>Fire Line for Less Than 3&quot; Pipe</td>
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<td>Single Family Fire Line</td>
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<td>Closure for Concrete and Steel Pipe</td>
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TYPICAL TRENCH SECTION

NOTES: 1. PAVING SHALL COMPLY WITH SECTIONS 11 & 20
2. TRENCH WALLS TO BE SUPPORTED AS REQUIRED BY O.S.H.A.

<table>
<thead>
<tr>
<th>PIPE DIAMETER</th>
<th>MINIMUM WIDTH</th>
<th>MAXIMUM WIDTH</th>
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<tr>
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</tr>
<tr>
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<td>1'-6&quot;</td>
<td>2'-6&quot;</td>
</tr>
<tr>
<td>8&quot;</td>
<td>1'-8&quot;</td>
<td>2'-8&quot;</td>
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<td>3'-0&quot;</td>
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</tr>
<tr>
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CITY OF ARVADA

TYPICAL TRENCH SECTION
PIPE PROTECTION
WATER MAINS

approved

date: 7-11 scale: NTS/dwn: O.D.Y. sht:

ENGINEERING DIVISION OF PUBLIC WORKS DEPT.

W-1
NOTES:
1. MINIMUM COVER TO BE 4.0' BELOW OFFICIAL STREET GRADE.
2. TRENCH WALLS TO BE SUPPORTED AS REQUIRED BY O.S.H.A.
3. PIPE SHALL BE BEDDED FROM 18" BELOW THE BOTTOM OF THE PIPE TO 12" ABOVE THE TOP OF THE PIPE.
4. TRENCH WIDTH SHALL NOT BE MORE THAN 16" NOR LESS THAN 12" WIDER THAN THE LARGEST OUTSIDE DIAMETER OF PIPE.
5. COMPACTION SHALL BE IN ACCORDANCE WITH SECTION 20
TYPICAL PLAN FOR CUL-DE-SACS

NOTE:

1. WHEN THE DISTANCE BETWEEN AN 8" MAIN AND THE CENTER OF A CUL-DE-SAC IS LESS THAN 600' BUT GREATER THAN 150', THE BRANCH LATERAL SHALL TERMINATE AT A FIRE HYDRANT. IF APPROVED BY CITY ENGINEER, THE LATERAL MAY TERMINATE AT A BLOW-OFF.
NOTES:

1- LAY PIPE FROM FITTING TO P.L.

2- INSTALL VALVE AT P.L.

3- STUB OUT TWO FULL PIPE LENGTHS FROM VALVE, PLUG END OF PIPE INSTALL BLOWOFF AND KICKBLOCK.

4- ALTERNATIVE TO NOTE 3: PROVIDE RESTRAINED JOINTS FROM VALVE TO FITTING AND ELIMINATE THE TWO FULL LENGTHS OF PIPE OUT OF VALVE AND TEMPORARY BLOW-OFF.
VALVE WITH 2" TEMPORARY BLOW-OFF SHALL HAVE REATTRAINED JOINTS BACK TO TEE. ALL THREAD MEGALUGS AND/OR JOINT RESTRAINTS.

VALVE SHALL HAVE RESTRAIN JOINTS BACK TO TEE AND AHEAD TO 2" TEMPORARY BLOW-OFF ALL THREAD, MEGALUGS AND/OR JOINT RESTRAINTS.
BLOW-OFF INSTALLATION
FOR 12" AND SMALLER PIPE

NOTE:
PLUG SHALL BE MECHANICALLY RESTRAINED:

PLAN
B - FOR BELL AND SPIGOT PIPE, TIE TO BELL.

ELEVATION
TRACER WIRE TO BE WHITE AWG #12 UF OR USE CABLE UL LISTED SINGLE COPPER CONDUTOR
COMPACTED BACKFILL

NEW SQUEEGEE BEDDING HAND OR MACHINE TAMPERED

WATER TIGHT FLEXIBLE COUPLING CONFORMING TO ASTM C425 BANDED WITH TWO SERIES 300 STAINLESS STEEL BANDS

WHERE APPLICABLE REPLACE EXISTING SEWER WITH BDR 35 PVC PIPE CONFORMING TO ASTM D3015

UNDISTURBED BEDDING

EXISTING SEWER

UNDISTURBED SOIL

2' MIN. BOTH SIDES

WATER LINE

SQUEEGEE

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

SEWER CROSSING UNDER WITH "D" LESS THAN 2'

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

SECTION A-A

CROSSING
STORM AND SANITARY SEWERS

CITY
of
ARVADA

approved  

W-10

No. Dwn. Date Revision

ENGINEERING DIVISION OF PUBLIC WORKS DEPT.
NOTES:

1.) LENGTH OF EXTENSION OF PIPE AND RESTRAINED JOINTS SHALL BE IN ACCORDANCE WITH THESE ENGINEERING STANDARDS.

2.) CATHODIC PROTECTION SHALL BE AS REQUIRED IN ACCORDANCE WITH THESE ENGINEERING STANDARDS.

3.) A BORED CROSSING MAY BE REQUIRED BY THE CITY ENGINEER.
PLAN FOR PERPENDICULAR CROSSING

OFFICIAL STREET GRADE

PLAN FOR ANGLE CROSSING

PROFILE

FORMULA FOR FINDING C:

\[ C = B + (2)(1.5) \left( \frac{B}{2} + A + F \right) \]

NOTES:
1. FINAL APPROVAL OF BORING AND CASING METHOD AND MATERIALS SHALL BE OBTAINED FROM THE ENGINEER PRIOR TO CONSTRUCTION.
2. SOIL AT ENDS OF CASING SHALL BE STABLE AT ALL TIMES.
3. CATHODIC PROTECTION SHALL BE PROVIDED FOR STEEL CASING AS REQUIRED BY THE ENGR.
4. CASING PIPE SHALL BE ONE PIECE, STRAIGHT, ROUND AND OF NEW MATERIAL.

BORED CROSSINGS BENEATH CONDUITS

approved ___________________________ P.E.
date: 7-11 scale: N/A dwn: 9.d.v. sht:

ENGINEERING DIVISION OF PUBLIC WORKS DEPT.
APS MODEL AW WRAP AROUND RUBBER END SEALS OR EQUAL.

PUSH-ON SINGLE GASKET CARRIER PIPE.

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

CASING SPACER AND INSULATOR

HARNESS LUGS WELDED TO CASING BOTH ENDS. (USE ONLY IF ALL CARRIER PIPE JOINTS ARE NOT RESTRAINED).

TIE RODS AND CLAMPS (USE ONLY IF ALL CARRIER PIPE JOINTS ARE NOT RESTRAINED).

NOTES:

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

2. SEE SHEET 12 FOR CASING LENGTH.

3. HARNESS LUGS TO BE INSULATED FROM DUCTILE IRON OR STEEL CARRIER PIPE.

4. CASING SPACERS AND INSULATORS TO BE PLACED AT 10 INTERVALS ALONG CARRIER PIPE WITH AN ADDITIONAL SPACER WITHIN 6" OF BOTH CASING PIPE ENDS.

5. RESTRAIN ALL CARRIER PIPE JOINTS WITHIN CASING PIPE.

6. MAXIMUM CENTER TO CENTER SPACING OF CASING SPACERS AND INSULATORS SHALL BE 10" WITH AN ADDITIONAL SPACER PLACED WITHIN 8" OF EACH END OF THE CASING PIPE.

CENTERING RESTRAINING CASING SPACERS & INSULATORS.

PIE CASEING DETAIL

NOTES:

1.) CENTERING RESTRAINING CASING SPACERS AND INSULATORS SHALL BE USED TO INSTALL CARRIER PIPE.

2.) TRENCH LAID CASINGS SHALL BE DESIGNED AND INSTALLED TO CONDUIT STANDARDS.

<table>
<thead>
<tr>
<th>CARRIER PIPE NOMINAL DIA.</th>
<th>CASING PIPE MIN. O.D.</th>
<th>MIN. WALL THICK</th>
<th>MINIMUM SPACER LENGTH</th>
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CITY of ARVADA

BORE CASING DETAILS FOR WATER AND SANITARY SEWER MAINS

approved  

date: 7-11  scale:  N/s  D/PY  sht:

ENGINEERING DIVISION OF PUBLIC WORKS DEPT.

W-13
CARRIER PIPE NOMINAL DIA. | STUD DIA. | A  | W   | Z   | T   | H   | E   | H₁  | Y   | X   |
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<td>4&quot; TO 12&quot;</td>
<td>3/4&quot;</td>
<td>5&quot;</td>
<td>1-1/2&quot;</td>
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<td>RING</td>
<td>7-1/2&quot;</td>
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NOTES:
1.) USE TWO HIGH STRENGTH STEEL TIE RODS AT END OF CASING.
2.) TIE ROD HOLE DIAMETER 1/8" LARGER THAN STUD DIAMETER.
3.) BOTTOM EDGE OF ALL PLATES SHAPED TO FIT O.D. OF PIPE.
4.) HARNESS LUGS AS PER AWWA MANUAL M-II.

COMBINATION FLANGED HARNESS LUG DETAILS

CITY OF ARVADA

approved: [Signature] P.E.

date: 7-11 scale: NTS dwn. d.y.

ENGINEERING DIVISION OF PUBLIC WORKS DEPT.

SHEET 25A OF 79 SHEETS

W-14
NOTE:
THE LOCATION RELATIVE TO THE CANAL, HEIGHT AND LENGTH OF THE CUT-OFF WALL WILL BE DETERMINED BY THE ENGINEER AND/OR THE CANAL CO.

ANY QUESTIONABLE FOUNDATION CONDITION SHOULD BE REFERED TO THE PROJECT ENGINEER

NOTE:
REINFORCEMENT NOT SHOWN.

TYPICAL CUTOFF WALL
FOR DITCH OR CANAL CROSSING

approved: [signature]
date: 7-11
scale: [scale]
sheet: [sheet]

CITY OF ARVADA
ENGINEERING DIVISION OF PUBLIC WORKS DEPT.

Sheet 33A of 79 Sheets
11¼", 22¼", 45° AND 90° BENDS

TYPICAL CROSS SECTION

MINIMUM BEARING SURFACE AREA
(IN SQUARE FEET)

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<thead>
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<td>7.00</td>
<td>14.00</td>
<td>27.75</td>
<td>51.00</td>
</tr>
</tbody>
</table>

TEES

NOTES:

1.) BEARING SURFACES SHOWN IN CHART ARE MINIMUM.
2.) BASED ON 150 PSI INTERNAL PIPE PRESSURE PLUS WATER HAMMER. 3", 4", 6", 8" AND 12" WATER HAMMER = 110 P.S.I. 16", 20" AND 24" WATER HAMMER = 70 P.S.I.
3.) BASED ON 3,000 psf SOIL BEARING CAPACITY.
4.) ALL BENDS, TEE BRANCHES AND DEAD ENDS SHALL BE RESTRAINED AND KICK BLOCKED.

CONCRETE KICKBLOCKS
BEARING SURFACES AND INSTALLATION

approved: [Signature]
date: 7-11
scale: 1"=1'-0"
sht: 19A of 79 SHEETS
CONCRETE KICKBLOCKS

WATER MAIN AND TAP SIZE COMBINATIONS WHICH REQUIRE A CONCRETE KICKBLOCK BEHIND THE MAIN AT THE TAPPING SLEEVE OR SADDLE.

ALL WATER MAINS

☑️ INDICATED CONCRETE KICKBLOCK REQUIRED

MAIN SIZE (INCHES)

ANY KICKBLOCK REQUIREMENTS FOR WATER MAIN AND TAP SIZE COMBINATIONS OTHER THAN THOSE SHOWN ABOVE WILL REQUIRE SPECIAL DESIGN APPROVAL BY THE ENGINEERING DIVISION.

CONCRETE KICKBLOCKS FOR WET TAPS

approved

date: 7-11  scale: ns1dwn  sht:

ENGINEERING DIVISION OF PUBLIC WORKS DEPT.
8 MIL PLASTIC AROUND PIPE REQUIRED AT ALL FITTINGS TO BE KICK BLOCKED

ENCASE PIPE TO SPRINGLINE

A-A

4"Ø-ANCHOR TIE DOWN

FORMED OR COMPACTED BACK FILL

CONCRETE KICK BLOCK

NOTE:
ALL BOLTS AND TIE ROD SHALL BE FIELD COATED WITH NO. 1200 PROTECTED MASTIC OR APPROVED EQUAL.

CONCRETE ENCASEMENT

PIPE

TIE RODS-ALL THREAD STEEL ROD OR ROUND IRON THREADED BOTH ENDS OR MEGALUGS

B-B

VERTICAL PLANE ANCHOR TIE DOWN 4" - 24" WATER PIPE

REACTION BLOCKING
ALL THREAD ANCHOR

CITY of ARVADA

W-18
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>DLG</td>
<td>DLG</td>
<td>DLG</td>
<td>DLG</td>
<td>DLG</td>
<td>DLG</td>
<td>DLG</td>
</tr>
<tr>
<td>TEE, Plug</td>
<td>30°</td>
<td>30°</td>
<td>45°</td>
<td>45°</td>
<td>81°</td>
<td>88°</td>
<td>88°</td>
</tr>
<tr>
<td>Valve</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Valve</td>
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<td></td>
</tr>
<tr>
<td>9&quot;</td>
<td>1&quot;</td>
<td>21&quot;</td>
<td>25&quot;</td>
<td>25&quot;</td>
<td>1&quot;</td>
<td>1&quot;</td>
<td>1&quot;</td>
</tr>
<tr>
<td>13&quot;</td>
<td>M.S.</td>
<td>M.S.</td>
<td>M.S.</td>
<td>M.S.</td>
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<td>M.S.</td>
<td>M.S.</td>
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<tr>
<td>Valve</td>
<td>M.S.</td>
<td>M.S.</td>
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<tr>
<td>Valve</td>
<td>M.S.</td>
<td>M.S.</td>
<td>M.S.</td>
<td>M.S.</td>
<td>M.S.</td>
<td>M.S.</td>
<td>M.S.</td>
</tr>
<tr>
<td>1&quot;</td>
<td>4&quot;</td>
<td>5&quot;</td>
<td>7&quot;</td>
<td>7&quot;</td>
<td>8&quot;</td>
<td>10&quot;</td>
<td>10&quot;</td>
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<tr>
<td>M.S.</td>
<td>M.S.</td>
<td>M.S.</td>
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<tr>
<td>Valve</td>
<td>M.S.</td>
<td>M.S.</td>
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<tr>
<td>Valve</td>
<td>M.S.</td>
<td>M.S.</td>
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<td>M.S.</td>
<td>M.S.</td>
<td>M.S.</td>
<td>M.S.</td>
</tr>
<tr>
<td>11 1/4&quot; Bend</td>
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<tr>
<td>NOTES:</td>
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<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1.) LENGTH OF RESTRAINED PIPE MEASURED EACH WAY FROM BENDS.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.) CLAMPS AND RODS NOT ALLOWED FOR 30&quot; &amp; LARGER PIPES. MEGALUGS NOT ALLOWED FOR PIPES LARGER THAN 48&quot; DIAMETER.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>3.) D = DIAMETER, L = LENGTH, G = GRADE, M.S. = MILD STEEL, H.S. = HIGH STRENGTH.</td>
<td></td>
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</tr>
<tr>
<td>4.) MINIMUM 4½&quot; GROUND COVER REQUIRED.</td>
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</tr>
<tr>
<td>5.) BASED ON 150 PSI INTERNAL PRESSURE, FOR L AND PRESSURES LISTED ON SHEET 26 FOR D AND G.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>6.) M.S. = MILD STAINLESS STEEL ROD ASTM A36 (36,000 psi TENSILE STRENGTH).</td>
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</tr>
<tr>
<td>7.) H.S. = HIGH STRENGTH STAINLESS STEEL ROD ASTM A193 GRADE B7 (125,000 psi TENSILE STRENGTH).</td>
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<td></td>
</tr>
<tr>
<td>8.) NUTS SHALL BE ASTM A307 GRADE A OR B HEXAGON HEAVY SERIES. HIGH STRENGTH NUTS SHALL BE ASTM A194 GRADE 2H.</td>
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</tr>
<tr>
<td>9.) SEE TIE ROD DETAIL DRAWING. ALSO, TIE ROD COUPLING DETAILS, CLAMP DETAILS AND SET CLAMP DETAILS.</td>
<td></td>
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</tr>
<tr>
<td>10.) LENGTH REFERS TO THE AMOUNT OF PIPE WHICH MUST BE RESTRAINED TOGETHER AND IS NOT NECESSARILY THE LENGTH OF THE RODS.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>11.) LENGTH OF RESTRAINED PIPE CHART IS ALSO FOR THE LENGTH OF JOINT RESTRAINT FOR MEGALUGS.</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>12.) CROSSES MUST BE RESTRAINED IN ALL APPLICABLE DIRECTIONS.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.) 24&quot; AND SMALLER IN LINE VALVES AND TEES SHALL HAVE A MECHANICAL JOINT RESTRAINT DEVICE ON EACH SIDE OF THE FITTING OR VALVE.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.) CONTRACTOR MUST NOTIFY THE UTILITIES DIVISION WHEN EXCAVATING NEXT TO AN EXISTING LIVE VALVE SO THAT A SECOND VALVE UPSTREAM OR DOWNSTREAM CAN BE CLOSED.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.) ALL PIPE JOINTS WITHIN CASING PIPES SHALL BE RESTRAINED.</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
TIE ROD DETAILS

NOTE:
1.) SEE TIED JOINTS, ROD DIMENSIONS SHEET.
2.) SEE CLAMP DETAILS AND DIMENSIONS (SHEET 23) FOR PROPER PLACEMENT OF WASHERS.
3.) MS=MILD STEEL A36 (36,000 psi TENSILE STRENGTH).
    HS=HIGH STRENGTH SS GRADE B7 (125,000 psi TENSILE STRENGTH).

WASHER DETAIL

<table>
<thead>
<tr>
<th>TIE RODS</th>
<th>WASHERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>ROD DIAMETER</td>
<td>THREAD LENGTH</td>
</tr>
<tr>
<td>3/4&quot;, 1&quot;</td>
<td>6&quot;</td>
</tr>
<tr>
<td>3/4&quot;, 1-1/2&quot; ALL THREAD</td>
<td>1' TO 11' &amp; 20'</td>
</tr>
</tbody>
</table>

TIE ROD AND WASHER DETAILS

CITY of ARVADA

approved: [Signature]
date: 7-11
scale: NSIdwn: 0.01y
sht:
ENGINEERING DIVISION OF PUBLIC WORKS DEPT.
PLAN

DETAIL

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>
</tr>
<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.

JOINT RESTRAINT DETAIL
EYE BOLTS

CITY OF ARVADA

approved

date: 7-11
scale: NS1down 0.5
sht:

ENGINEERING DIVISION OF PUBLIC WORKS DEPT.

W-21
### 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>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot;</td>
<td>4</td>
<td>4</td>
<td>9.13</td>
<td>7.50</td>
<td>4.90</td>
<td>0.50</td>
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<tr>
<td>6&quot;</td>
<td>6</td>
<td>6</td>
<td>11.13</td>
<td>9.50</td>
<td>7.00</td>
<td>0.50</td>
</tr>
<tr>
<td>8&quot;</td>
<td>6</td>
<td>6</td>
<td>13.38</td>
<td>11.75</td>
<td>9.15</td>
<td>0.62</td>
</tr>
<tr>
<td>12&quot;</td>
<td>8</td>
<td>8</td>
<td>17.85</td>
<td>16.25</td>
<td>13.30</td>
<td>0.75</td>
</tr>
<tr>
<td>14&quot;</td>
<td>10</td>
<td>10</td>
<td>20.36</td>
<td>18.75</td>
<td>15.49</td>
<td>0.88</td>
</tr>
<tr>
<td>16&quot;</td>
<td>12</td>
<td>12</td>
<td>22.63</td>
<td>21.00</td>
<td>17.55</td>
<td>0.88</td>
</tr>
<tr>
<td>18&quot;</td>
<td>12</td>
<td>12</td>
<td>24.85</td>
<td>23.25</td>
<td>19.65</td>
<td>1.13</td>
</tr>
<tr>
<td>20&quot;</td>
<td>14</td>
<td>14</td>
<td>27.13</td>
<td>25.50</td>
<td>21.79</td>
<td>1.25</td>
</tr>
<tr>
<td>24&quot;</td>
<td>16</td>
<td>16</td>
<td>31.63</td>
<td>30.00</td>
<td>25.99</td>
<td>1.42</td>
</tr>
<tr>
<td>30&quot;</td>
<td>20</td>
<td>20</td>
<td>39.12</td>
<td>36.88</td>
<td>32.22</td>
<td>1.50</td>
</tr>
<tr>
<td>36&quot;</td>
<td>24</td>
<td>24</td>
<td>46.00</td>
<td>43.75</td>
<td>38.52</td>
<td>1.50</td>
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<tr>
<td>42&quot;</td>
<td>28</td>
<td>28</td>
<td>53.48</td>
<td>50.62</td>
<td>44.67</td>
<td>3.88</td>
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<tr>
<td>48&quot;</td>
<td>32</td>
<td>32</td>
<td>60.36</td>
<td>57.50</td>
<td>50.97</td>
<td>3.88</td>
</tr>
</tbody>
</table>

### Notes:

Other mechanical joint restraint devices approved are Uni-Flange Series 1500 and Star Pipe AllGrip Series 3600.
TABLE OF DIMENSIONS FOR CLAMPS

| BAR SIZE | A | B | C | D | E | F | G | H | I | J | K | L/M | 1/2 M | 3/4 M | 1 M | 1 1/2 M | 2 M | 2 1/2 M | 3 M | 4 M | 5 M |
|----------|---|---|---|---|---|---|---|---|---|---|---|---|-----|-------|------|-----|---------|-----|-------|-----|-----|-----|
| 1/4"     |   |   |   |   |   |   |   |   |   |   |   |   |     |       |      |     |         |     |       |     |     |     |
| 1/2"     |   |   |   |   |   |   |   |   |   |   |   |   |     |       |      |     |         |     |       |     |     |     |
| 3/4"     |   |   |   |   |   |   |   |   |   |   |   |   |     |       |      |     |         |     |       |     |     |     |
| 1"       |   |   |   |   |   |   |   |   |   |   |   |   |     |       |      |     |         |     |       |     |     |     |

NOTE: ALL DIMENSIONS IN INCHES.

NOTE: NOT FOR USE WITH 18" & 20" D.I. COMPACT FITTINGS.

CLAMP DETAILS AND DIMENSIONS
FOR USE WITH C.I. & D.I.
FITTINGS ONLY

approved

date: 7-11
scale: N/1 dwg. D/DV
sht: W-23
FLANGE LUG DETAIL

DIMENSIONS (IN INCHES)

<table>
<thead>
<tr>
<th>PIPE DIA</th>
<th>N</th>
<th>D</th>
<th>H.S. ROD</th>
<th></th>
<th>M.S. ROD</th>
<th></th>
<th>R</th>
<th>S</th>
<th>U</th>
<th>V</th>
<th>PIPE DIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>2-1/4</td>
<td>2-5/16</td>
<td>7/8</td>
<td>3/4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>7/8</td>
<td>7-5/8</td>
<td>1</td>
</tr>
<tr>
<td>16</td>
<td>2-1/8</td>
<td>2-7/16</td>
<td>1-1/8</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1-1/8</td>
<td>1</td>
<td>9-5/8</td>
<td>1-1/8</td>
</tr>
<tr>
<td>24</td>
<td>2</td>
<td>2-5/8</td>
<td>1-3/8</td>
<td>1-1/4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1-1/4</td>
<td>1-1/8</td>
<td>11-3/8</td>
<td>1-1/4</td>
</tr>
<tr>
<td></td>
<td>RODS AND CLAMPS NOT ALLOWED</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>24</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

NOTES:

1.) MS MEANS MILD STEEL ROD ASTM A36.
   (NUTS SHALL BE ASTM A307 GRADE A OR B
   HEXAGON HEAVY SERIES.)

2.) HS MEANS HIGH STRENGTH STEEL
   ROD ASTM A193 GRADE B7.
   (NUTS SHALL BE ASTM A194 GRADE 2H.)
CONCRETE ENCASE
18" DIA x 8" THICK
WHEN BOX IS IN OPEN FIELD.

GROUND LINE

2" STANDARD A.W.W.A. NUT

STANDARD 6" VALVE BOX
WITH WIDE OVAL BASE.

1-1/2" EXTENSION SHAFT AS REQUIRED.
ANCHOR TO OPERATOR NUT
WITH 2 EACH 5/16" x 1/2" SET SCREWS. DRILL DIMPLES 1/8" DEEP INTO
THE NUT FOR SET SCREWS TO HOLD.

5" SOIL PIPE
OR COMPARABLE

NOTE:
THE VALVE BOX SHALL
NOT BE PLACED DIRECTLY
ON THE SOIL PIPE.

BUTTERFLY VALVE

VALVE OPERATOR

TRANSMISSION MAIN
BUTTERFLY VALVE
INSTALLATION

CITY OF ARVADA

ENGINNEERING DIVISION OF PUBLIC WORKS DEPT.

approved
DATE: 7-11
scale: 1"=1'-0"
shel:
INSULATED JOINT

FIELD COAT WITH JOINT WRAP PER AWWA C 209 TYPE II (ELASOMERIC TAPE) MINIMUM 2 LAYER WRAP AS PER SPECIFICATION

INSULATING GASKET
ONE PIECE INSULATING SLEEVE & WASHER
STEEL WASHER (F436)
BOLT
WASHER
NUT
FLANGED JOINT

INSULATED ROD

INSULATING GASKET
ONE PIECE INSULATING SLEEVE & WASHER
ROD
STEEL WASHER (F436)
BOLT
FLANGED JOINT
WASHER
NUT

BOLTED SLEEVE TYPE COUPLING

RUBBER BOOT

FIELD COAT WITH JOINT WRAP PER AWWA C 209 TYPE II (ELASOMERIC TAPE) MINIMUM 2 LAYER WRAP AS PER SPECIFICATION

CITY OF ARVADA

INSULATED JOINTS, RODS AND BOLTED SLEEVE TYPE COUPLINGS

approved by: ____________________________

scale: ____________________________
sht: ____________________________

ENGINEERING DIVISION OF PUBLIC WORKS DEPT.
Seals shall be modular mechanical type, consisting of interlocking synthetic runner links shaped to continuously fill the annular space between the pipe and wall opening. Links shall be loosely assembled with bolts to form a continuously rubber belt around the pipe with a pressure plate under each bolt head and nut, after the seal assembly is positioned in the sleeve, tightening of the bolts shall cause the rubber sealing elements to expand and provide an absolute water-tight seal between the pipe and wall opening. The seal shall be constructed so as to provide electrical insulation between the pipe and the wall. The pipe to wall penetration closures shall be "Link Seal" as manufactured by Thunderline Corporation, or approved equal.

Contractor shall determine the required inside diameter of each individual wall opening or sleeve before ordering, fabricating or installing. The inside diameter of each wall opening shall be sized to fit the pipe and Link-Seat to assure a water tight joint. If pipe O.D. is non standard due to coating, insulation, etc., consult the factory for engineering assistance and recommendation before proceeding with wall opening detail.

INSTALLATION shall be in accordance with manufacturer recommendations.
NOTES:

(1) MARK CURB WHERE SERVICE CROSSES BENEATH: °V°=WATER °X°=SEWER.

(2) ALL SERVICES TO BE STUBBED 7" INTO PROPERTY.

(3) WATER MAIN TAPS TO BE PERFORMED BY CITY FORCES.

(4) SANITARY SERVICES SHALL BE CONCRETE ENCASED WHEN THEY PARALLEL AND/OR LAY CLOSER THAN 10' FROM A WATER SERVICE.

(5) SANITARY SERVICES CROSSING WITHIN 2' BELOW OR ABOVE A WATER SERVICE SHALL BE CONCRETE ENCASED FOR A DISTANCE OF 10 L.F. EACH SIDE OF THE POINT OF INTERSECTION.

(6) COUPLINGS IN WATER SERVICE LINES ARE NOT PERMITTED WITHIN THE LIMITS OF CONCRETE ENCASEMENT OF A SANITARY SERVICE.

(7) Δ FOUR 45° BENDS MAXIMUM WILL BE ALLOWED IN A SANITARY SERVICE.

(8) NO METER PITS SHALL BE INSTALLED IN DRIVEWAYS, SIDEWALKS OR PARKING AREAS UNLESS APPROVED BY THE CITY ENGINEER. IF APPROVED, INSTALL HEAVY DUTY PIT, WITH DUCTILE IRON RING AND COVER.

(9) LOCATE WATER SERVICES UPSTREAM (UPHILL) FROM SANITARY SERVICES.

(10) INSTALL CURB STOP AND BOX WHEN SERVICE LINE IS 1 1/2" OR LARGER IN DIAMETER.
GENERAL METER NOTES

1. Location of meter to be approved by Project Engineer

2. All settings must be inspected by the Engineering Division before backfilling.

3. If the street or ground is not to final grade at the time of installation of the meter, the owner must raise or lower the meter vault when the final grade is established. Also the meter yoke must be adjusted to 10" to 14" below frost lid.

4. Joints and galvanized piping shall not be allowed inside the meter setting.

5. A bypass is required on all meters 1-1/2" and larger unless otherwise specified by Project Engineer. 1-1/2" and larger irrigation only meters do not require a bypass.

6. The service line through and on both sides of the meter pit must be of type K copper (3/4"-2").

7. No connections shall be made in the meter pit. Any connections including upsizing must be made more than 5 ft. from the meter pit on the downstream side.

8. Valves shall be in conformance with these standards
   A. Valves less than 3" shall be full port ball valves only.
   B. All gate valves 3" and larger shall conform with Arvada’s Standard Specifications (See section 30.2.2 "Valves").

9. Stop and Waste Valves shall be Mueller H-15214 or equivalent.

10. All valves 3 inch diameter and larger inside vaults shall be supported by adjustable steel pipe valve supports. 1-1/2 inch diameter and larger meters shall be supported by concrete blocks with steel shims, if required by Utilities Division.

11. Manhole rings and covers shall be in conformance with Drawing W-59 of these Engineering Standards.

12. Meter pits and covers shall be in conformance with Section 30.2 of these Engineering Standards.

13. Other meter settings:
    Settings of meters other than shown and detailed herein shall be considered as non-standard and shall require prior approval of proposed piping layout, meter setting and structural design of vault for each separate installation.

14. On 1½" & larger vault settings, Install Ramneck between set ring and all riser rings (or on lid section when risers are not required) to prevent infiltration.

CITY
of ARVADA

W-29
NOTES:

1. OWNER'S RESPONSIBILITY FOR LEAK REPAIR SHALL BE UP TO AND INCLUDING THE TUBE NUT WHICH THREADS ONTO THE METER YOKE OUTLET. OWNER'S RESPONSIBILITY FOR REPAIRS EXTENDS TO THE BUILDING FROM THE METER YOKE.

2. CITY OF ARVADA WILL REPAIR LEAKS ON SERVICE LINES, FROM THE CORPORATION STOP THROUGH THE METER YOKE.

3. METER PITS SHALL NOT BE INSTALLED IN SIDEWALKS OR DRIVEWAYS.

4. A STOP & WASTE VALVE MUST BE INSTALLED UPSTREAM OF BACKFLOW PREVENTION DEVICE AND DOWNSTREAM OF WATER METER ON ALL IRRIGATION ONLY SERVICES.

5. STOP & WASTE VALVE MUST ALSO BE INSTALLED DOWNSTREAM OF IRRIGATION SERVICE TEES PLACED ON DOMESTIC SERVICE LINES (UPSTREAM OF BACKFLOW PREVENTION DEVICE).

OWNERS SERVICE PIPE AND RESPONSIBILITY FOR REPAIRS OTHER THAN LEAKS

SERVICE STUB MINIMUM LENGTH (WATER AND SANITARY SEWER)

UTILITY EASEMENT

COVER FOR METER PIT SHALL BE INSTALLED & MAINTAINED 1" MINIMUM 2" MAXIMUM ABOVE THE ADJACENT GROUND.

DISTANCE VARIES

COVERED Combination CURB, GUTTER & SIDEWALK. MARK CURB WITH "COVER WATER SERVICE".

SERVICE PIPE SHALL BE TYPE K COPPER FROM MAIN THROUGH THE METER PIT TO THE BUILDING.

INSULATING COUPLING REQUIRED WITH METALLIC WATER MAINS.

CURB STOP REQUIRED ON 1 1/2" & LARGER METERS ONLY.

CORPORATION STOP AND SADDLE TAP BY CITY FORCES

WATER MAIN

SHOULD ANY SITUATION ARISE OTHER THAN SHOWN CONCERNING THE DEPTH OR OBSTRUCTION OF SERVICE LINE OR THE PLACEMENT OF METER PIT, CALL 720-898-7640 AND ASK FOR INSPECTION SECTION.

WATER SERVICE, PROFILE
5/8"x3/4", 3/4" AND 1"

approved  

date: 7-11  

scale:  

sht:

ENGINEERING DIVISION OF PUBLIC WORKS DEPT.
NOTES:
1.) Location of meter pit shall be established by the Project Engineer.
2.) All meter pits must be inspected by the municipal inspector before backfilling.
3.) Meter pits shall not be installed in driveways, sidewalks or parking lots unless approved by Engineer and an extra heavy dome and cover with recessed lid is used.
4.) A multi-family dwelling, serviced by a 3/4” water line will use a 3/4” meter.
5.) When approved for installation in asphalt, top of meter pit shall be flush with finish grade and recessed lid.
6.) No concrete floor allowed in meter pit.
7.) Lawn sprinkler connections shall be a minimum of five feet from the meter pit wall. On the out let side.

<table>
<thead>
<tr>
<th>METER SIZE</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>5/8&quot; x 3/4&quot;</td>
<td>12-5/8&quot;</td>
<td>7-7/8&quot;</td>
<td>7-3/16&quot;</td>
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<td>11-1/8&quot;</td>
<td>11-1/4&quot;</td>
<td>6&quot;</td>
<td>24&quot;</td>
</tr>
</tbody>
</table>
CONCRETE MANHOLE BASE BEAMS REQUIRED FOR INSTALLATIONS IN DRIVEWAYS AND PARKING AREAS, (9"x12"x60"). (SEE DETAIL BELOW)

**NOTES**

1- MANHOLE BASE BEAMS SHALL BE REQUIRED FOR INSTALLATIONS IN DRIVEWAYS, OR PARKING AREAS.

2- A 60" INSIDE DIA. MANHOLE PIT BY MINIMUM 4' HEIGHT IS REQUIRED FOR 1½" AND 2" METERS.

3- JOINTS INSIDE METER VAULT SHALL BE EITHER THREADED, COMPRESSION OR FLARE.

4- SEE DETAIL SHEET NO. W-29 FOR ADDITIONAL NOTES.

5- NO CONCRETE TO BE LAID IN FLOOR OF METER MANHOLE.

6- BOTTOM OF PIT TO HAVE 12" LAYER OF 1½" CRUSHED ROCK.

7- THE DISTANCE BETWEEN RUNGS, CLEATS, AND STEPS SHALL NOT EXCEED 12 INCHES AND SHALL BE UNIFORM THROUGHOUT THE LENGTH OF THE LADDER AND ALIGNED UNDER THE LID.

8- VAULT WALL PENETRATIONS MUST BE GROUTED WITH CONCRETE.

9- COPPERSETTER OR COPPER METER YOKE FOR 1-1/2" AND 2" WILL BE NO HIGHER THAN 15" WITH A BY-PASS AND BOOT FOR BY-PASS PROVIDED WITH SETTER (OR ABILITY TO LOCK OFF).

10- METER GAP SHALL BE 13¾" FOR 1½" SERVICE AND 17¾" FOR 2" SERVICE.

**DETAILS:**

1. CURB STOP
2. TYPE K COPPER TUBING
3. COPPERSETTER METER YOKE WITH BYPASS SEE SECTION 30.2.1
4. METER UNIT
5. 3" NIPPLE BETWEEN COPPERSETTER AND CHECK VALVE
6. 1" X 23" PIPE
7. MECH IRON PIPE TO FLARE COUPLING FROM INLET SIDE OF COPPERSETTER AND OUTLET SIDE OF CHECK VALVE OR COMPRESSION
8. ALL BRONZE SWING CHECK VALVE
9. FLAT MAN-HOLE LID WITH 24" OPENING.
10. CONCRETE BLOCK SUPPORTS 5"x12"x12"

**BASE BEAM DETAIL**

**OUTSIDE SETTING FOR 1-1/2" AND 2" WATER METER WITH CHECK VALVE AND BYPASS IN MANHOLE**

**CITY of ARVADA**

**approved**  [Signature]

**date:** 7-11  **scale:** NTS  **dwg:** D.D.V.  **sht:**

**ENGINEERING DIVISION OF PUBLIC WORKS DEPT.**

W-32
1- 90° BEND
2- TEE
3- BALL VALVE-ALL BRASS FULL PORT
4- METER UNIT
5- ALL BRONZE SWING CHECK VALVE
6- TYPE K COPPER TUBING
7- 60" DIAMETER CONCRETE MANHOLE
8- FLARED COPPER TO I, P, THREADED COUPLING OR
    COMPRESSION OR APPROVED EQUAL
9- FORD PACK JOINT COUPLING (1-1/2" METER
    CATALOG NO. C-55-66) OR (2" METER CATALOG
    NO. C-55-77) OR APPROVED EQUAL
10- BRASS TUBING
11- CONCRETE MANHOLE BASE BEAMS REQUIRED FOR
    INSTALLATIONS IN DRIVEWAYS AND PARKING AREAS.
12- CURB STOP VALVE AND SERVICE BOX
13- LOC-PAC COUPLING
14- METER GAP 13-1/4" (FOR 1-1/2" SERVICE) OR
    17-1/4" (FOR 2" SERVICE).

OUTSIDE SETTING FOR
1-1/2" AND 2" METER
BRASS ALTERNATIVE

CITY
of
ARVADA

approved  

date: 7-11  
scale: NSI  
sht:  
ENGINEERING DIVISION OF PUBLIC WORKS DEPT.
**WATER METER VAULT PLAN**

**BASE BEAM DETAIL**

**WATER METER VAULT SECTION**

**NOTES:**
1) MANHOLE BASE BEAMS (9"x12"x60") REQUIRED FOR INSTALLATIONS IN DRIVEWAYS AND PARKING AREAS
2) A 60" INSIDE DIAMETER MANHOLE IS REQUIRED FOR 1½" AND 2" SERVICES.
3) JOINTS INSIDE VAULT SHALL BE I.P. THREADED, FLARED OR COMPRESSION. (MUELLER 110 OR EQUAL).
4) WATER TIGHT SEAL ALL PIPE OUTLETS THROUGH WALL.
5) BOTTOM OF VAULT TO BE BEDDED WITH 12" LAYER OF 1½" CRUSHED ROCK.
6) NO CHANGE IN PIPE DIAMETER SHALL BE MADE IN THE METER VAULT.
7) 24" MANHOLE COVER TO BE CENTERED OVER LADDER RUNGS.
8) ALSO GENERAL NOTES 1 THRU 7 APPLY OF SHEET W-29.
9) CONCRETE BLOCKS OR BRICKS TO BE USED TO SUPPORT PLUMBING AT VALVES INSIDE VAULT. (5"x12"x12").
10) DISTANCE BETWEEN LADDER RUNGS 12" ALIGNED UNDER LID.
11) METER GAP 13-1/4" (FOR 1-1/2" SERVICE) OR 17-1/4" (FOR 2" SERVICE).
12) BALL VALVES SHALL BE ALL BRASS FULL PORT
13) CHECK VALVE NOT REQUIRED WHERE BACKFLOW PREVENTION DEVICE INSTALLED.

**OUTSIDE SETTING FOR 1½" AND 2" IRRIGATION (only) WATER METER IN MANHOLE**

**ENGINEERING DIVISION OF PUBLIC WORKS DEPT.**
GENERAL NOTES:
(1.) ALL INTERNAL PIPING MUST BE DUCTILE IRON WITH FLANGE FITTINGS.
ALL INTERNAL BOLTS MUST BE STAINLESS STEEL WITH BRASS NUTS.
(2.) METER TO BE INSTALLED ON STRAIGHT THROUGH LINE (NOT BYPASS), ALSO SAME SIDE AS VAULT ENTRY/ACCESS HOLE.
(3.) ALL INTERNAL VALVES TO BE RESILIENT SEAT GATE VALVE LOH WITH WHEEL OPERATOR.
(4.) WATER STRAINER MUST BE OF ALL BRONZE CONSTRUCTION OR EPOXY COATED DUCTILE IRON.
(5.) CHECK VALVE TO BE OF ALL BRONZE OR EPOXY COATED DUCTILE IRON BODY.
(6.) VAULT KNOCKOUTS FOR PIPING EXIT TO BE FILLED WITH SEAL OR EQUIVALENT.
INSTALLATIONS BELOW GROUNDWATER LEVEL SHALL REQUIRE WATERPROOF SEALANT BETWEEN ALL COLD JOINTS TO PREVENT GROUNDWATER FROM ENTERING VAULT.
(7.) PIPE SHALL BE 4" PVC OUTSIDE ALL 3" METER VAULTS.

PIPING LAYOUT FOR 3", 4", 6" & 8" COMPOUND OR TURBINE METER SETTING WITH BYPASS

CITY of ARVADA

approved

No Dwn. Date. Revision

ENGINEERING DIVISION OF PUBLIC WORKS DEPT.
GENERAL NOTES:
(1.) ALL INTERNAL PIPING MUST BE DUCTILE IRON WITH FLANGE FITTINGS.
ALL INTERNAL BOLTS MUST BE STAINLESS STEEL WITH BRASS NUTS.
(2.) A BYPASS IS NOT REQUIRED ON IRRIGATION ONLY METER SETTINGS.
(3.) ALL INTERNAL VALVES TO BE RESILIENT SEAT GATE VALVE W/HAND WHEEL OPERATOR.
(4.) WATER STRAINER MUST BE OF ALL BRONZE CONSTRUCTION OR EPOXY COATED DUCTILE IRON.
(5.) CHECK VALVE TO BE OF ALL BRONZE OR EPOXY COATED DUCTILE IRON BODY.
(6.) VAULT KNOCKOUTS FOR PIPING EXIT TO BE FILLED W/INK SEAL OR EQUIVALENT.
INSTALLATIONS BELOW GROUNDWATER LEVEL SHALL REQUIRE WATERPROOF SEALANT BETWEEN ALL COLD JOINTS TO PREVENT GROUNDWATER FROM ENTERING VAULT.

*NOTE:
CHECK VALVES ARE NOT REQUIRED WHERE A BACKFLOW PREVENTION DEVICE IS INSTALLED.
STEEL PIPE SUPPORTS NOT SHOWN IN THIS VIEW PIPE SUPPORTS TO BE USED AT EACH GATE VALVE.

EXISTING GRADE
CONC. EXTENSION COLLARS TO GRADE

PIPING LAYOUT FOR 3", 4", 6" & 8" TURBINE METER SETTING "IRRIGATION ONLY"

ddv 3/30/05 add notes

approved

engineering division of public works dept.
GENERAL NOTES:

1. ALL INTERNAL PIPING MUST BE DUCTILE IRON WITH FLANGE FITTINGS. ALL INTERNAL BOLTS MUST BE STAINLESS STEEL.

2. ALL INTERNAL VALVES TO BE RESILIENT SEAT GATE VALVE LHD W/HAND WHEEL OPERATOR.

3. WATER STRAINER MUST BE OF ALL BRONZE CONSTRUCTION OR EPOXY COATED DUCTILE IRON.

4. CHECK VALVE TO BE OF ALL BRONZE OR EPOXY COATED DUCTILE IRON BODY.

5. CHECK VALVE TO BE OF ALL BRONZE OR EPOXY COATED DUCTILE IRON BODY.

6. VAULT KNOCKOUTS FOR PIPING EXIT TO BE FILLED W/LINK SEAL OR EQUIVALENT. INSTALLATIONS BELOW GROUNDWATER LEVEL SHALL REQUIRE WATERPROOF SEALANT BETWEEN ALL COLD JOINTS TO PREVENT GROUNDWATER FROM ENTERING VAULT.

NOTE:

CHECK VALVES ARE NOT REQUIRED WHERE A BACKFLOW PREVENTION DEVICE IS INSTALLED.

STEEL PIPE SUPPORTS NOT SHOWN IN THIS VIEW PIPE SUPPORTS TO BE USED AT EACH GATE VALVE.

PIPING LAYOUT FOR F. M. C. T. METER WITH BYPASS 6" & 8" SERVICES ONLY

CITY of ARVADA

W-37
(1.) Precast Vaults Meeting These Dimension Requirements are Allowed.

(2.) Steel Reinforcement Shall be As Per Manufacturers Specifications to Provide H-20 Highway Loading.

NOTES:
For 3" Meter Vaults:
Pipe I.D.=3"
Castout=6"

For 4" Meter Vaults:
Pipe I.D.=4"
Castout=8"

2-PIPE CASTOUTS SEE NOTE ABOVE.

See Reinforcement Requirements Below

3/4" Non Skid Joint

Additional Reinforcement Required See Below

12" Sump Castout

See Reinforcement Requirements Below

4000 P.S.I. Minimum Strength Type II Concrete.

ARVADA 3" AND 4" WATER SERVICE METER VAULT WITH BYPASS
ISOMETRIC VIEW

approved

W-39
PLAN
Manhole Ring & Cover
With Elevation To Grade
36" x 24" Cover (Water).

ELEVATION
Steps @
12" O.C.

36"

Non-Skid
Lid Detail

ARVADA 3" AND 4" METER VAULT
IRRIGATION ONLY

City of
ARVADA

approved

Date: 7-11
Scale: WSDW 1/20
Sheet: W-40

Engineering Division of Public Works Dept.
(1.) Precast Vaults Meeting These Dimension Requirements are Allowed.

(2.) Steel Reinforcement Shall be As Per Manufacturers Specifications to Provide H-20 Highway Loading.

**NOTES:**
For 3" Meter Vaults:
Pipe I.D.=3"
Castout=6"

For 4" Meter Vaults:
Pipe I.D.=4"
Castout=8"

**NOTES:**
Minimum Reinforcement for Poured In Place Vaults
Cover: #5 @ 5" O.C.E.W. #7 Diagonally Around Opening and (4) #7 Across Cover Adjacent to Opening (2 Bars Each Side @ 3" O.C.).
Walls: #4 @ 12" O.C.E.W. 1" Clear From Inside Base: #5 @ 12" O.C.E.W. 1" Clear From Top Of Slab.
Corner Dowels: #5 Bar 2'-0" x 2'-0" @ 12" O.C.
Wall Dowels: #5 Bar 3'-0" x 3'-0" @ 12" O.C.
Design For H-20 Highway Loading.
4000 P.S.I. Minimum Strength Type II Concrete.

**ARVADA 3" AND 4" METER VAULT IRRIGATION ONLY ISOMETRIC VIEW**

![Diagram of ARVADA 3" and 4" Meter Vault Isometric View](image-url)
(1.) Precast Vaults Meeting These Dimension Requirements are Allowed.

(2.) Steel Reinforcement Shall be As Per Manufacturers Specifications to Provide H-20 Highway Loading.

**NOTES:**
1.) For 6" Meter Vaults
   Pipe I.D.=6"
   Castout=9"
2.) For 8" Meter Vaults
   Pipe I.D.=8"
   Castout=11"

2-Pipe Castouts
See Note Above

This Castout Not Required on Irrigation Only Services
(No Bypass).

**ARVADA 6" AND 8" WATER METER VAULT ISOMETRIC VIEW**

Design For H-20 Highway Loading.
4000 P.S.I. Minimum Strength Type II Concrete.

**approved**

**date:** 7-11
**scale:** 1"=1'-0"
**sht:**

ENGINEERING DIVISION OF PUBLIC WORKS DEPT.
DUAL 2" AIR RELEASE AND VACUUM VALVE INSTALLATION FOR MAINS LARGER THAN 12" DIAMETER

NOTES:
1.) USE 2" AIR VALVE ASSEMBLY ON 14" OR LARGER △ PIPE, VAL MATIC 202C, GA SERIES 945 OR ARI D-040 OR EQUAL △
2.) THE DISTANCE BETWEEN RUNGS, CLEATS, AND STEPS SHALL NOT EXCEED 12 INCHES AND SHALL BE UNIFORM THROUGHOUT THE LENGTH OF THE LADDER.
3.) LADDER RUNGS ARE REQUIRED IN PRECAST CONCRETE MANHOLES.

CONCRETE EXTENSION COLLARS
GROUND LINE
60" Ø PRECAST CONC. M.H. (ASTM C 478)
24" Ø MANHOLE △ RING & COVER (SEE DETAIL W-59)
FABRICATED SCREEN (SEE DETAIL W-51)
THD'D END
BREAK-AWAY COUPLING
6" Ø VENT PIPE (SEE DETAIL W-49)
6" Ø 90° BEND
2-2" THD'D COMBINATION AIR RELEASE AND VACUUM VALVES
2-2" I.P. THD'D BRASS NIPPLES
2-2" THD'D BALL VALVES (LARGER THAN 12" MAIN)
2-2" BALL VALVE CORP. STOPS THD'D BOTH ENDS WITH BRASS HANDLE
2-2" I.P. THD'D OUTLETS

ELEVATION

FOOTING DETAIL

PLAN

60" Ø PRECAST CONCRETE MANHOLE
2-2" AIR VALVES

CONC. M.H. BASE BEAMS
9"x 1"-0"x 8'-0" REINF. WITH BAR STEEL AS SHOWN.
ACCESS MANHOLE

NOTE:
USE 2" AIR VALVE ASSEMBLY ON 30" OR SMALLER PIPE.

FOR VENT PIPE DETAILS SEE SHEET NO. W-49

STATION LOCATION

- 20" O.D. ACCESS M.H.
- 60" O PRECAST CONC. M.H.
- CONC. BASE BEAMS

GROUND LINE

Q PIPE

8'-6" MIN.

STATION LOCATION

GROUND LINE

BRAKE AWAY COUPLING

- 72" O PRECAST CONC. M.H. INSTALLED OPPOSITE LADDER RUNGS.
- 20" O.D. ACCESS M.H.

CONC. BASE BEAMS

COMBINATION AIR/VACUUM VALVES

6'-0" MIN.

12'

Q PIPE

1'-0"

9'

2'-0"

12'

NOTES:
1.) SEE SHEET NO. W-48 FOR CONCRETE MANHOLE BASE BEAMS AND AIR/VACUUM VALVE DETAILS.
2.) LADDER RUNGS ARE REQUIRED IN PRECAST MANHOLES. THE DISTANCE BETWEEN RUNGS, CLEATS AND STEPS SHALL NOT EXCEED 12" AND SHALL BE UNIFORM THROUGHOUT THE LENGTH OF THE LADDER.
VENT PIPE INSTALLATION

1. VENT PIPES TO BE LOCATED IN FIELD AT THE NEAREST INTERSECTION OF THE STREET PROPERTY LINE AND THE SIDE LOT LINE.
2. FOR RESIDENTIAL INSTALLATIONS SEE SHEET NO. W-40

VENT PIPE AND BLACK IRON COUPLING DETAILS

6 5/8" O.D. GALVANIZED STEEL PIPE, SCHEDULE 40
STANDARD COUPLING FOR 6 5/8" O.D. PIPE

6" STEEL PIPE

FABRICATED VENT SCREEN
6 5/8" O.D. GALVANIZED STEEL PIPE, SCHEDULE 40 WITH THREADED JOINTS
CENTER OF ADAPTER AT GROUND LEVEL

NOTES:

VENT PIPE DETAIL

approved: [Signature]
date: 7-11
scale: NTS/12" 0.V.

ENGINEERING DIVISION OF PUBLIC WORKS DEPT.
ELEVATION
SCREEN FOR 6" VENT PIPE

METAL SCREEN
TO MATCH VALVE BODY, PIPE OR METER.

5/8" φ x 2-1/2" x 6" BAR
BENT AS SHOWN.

1" 1-1/4" DIA. THREADED ROD
1-1/4" STANDARD HEX NUT
1/2" φ x 2-1/2" x 2-1/2"
1-1/2" DIA. STEEL PIPE
1/2" φ x 5" x 5"

ADJUSTABLE-SUPPORT
(STANDARD)

3/4" φ x 2-1/2" x 6" BAR
BENT AS SHOWN.

2" DIA. THREADED ROD
2" HEAVY HEX NUT
5/8" φ x 4" x 4" BAR
3" DIA. STEEL PIPE
5/8" φ x 9" x 9"

ADJUSTABLE-SUPPORT
(HEAVY DUTY)

CITY
of
ARVADA

ADJUSTABLE STEEL PIPE
VALVE SUPPORT

approved
DATE
scale: NTS
no.
dwn.
revision

W-52
VALVE BOX SUPPORT PLATE AND VALVE OPERATOR EXTENSION GUIDE

CITY of ARVADA

approved

date: 7-11 scale: NS1dwn: D.O.V. sht:

ENGINEERING DIVISION OF PUBLIC WORKS DEPT.
NOTES:

1.) A RECTANGULAR VAULT IS REQUIRED (10'L x 7W x 6'-4"H) FOR 8" AND SMALLER MAIN VALVE. (14'L FOR 10" AND LARGER VALVE).

2.) ACCESS STAIRS WITH DOOR OUTSIDE OF PAVEMENT MAY BE REQUIRED ON STREET WITH HEAVY TRAFFIC.

3.) FOR CROSS SECTION VIEW SEE CROSS SECTION DRAWING, SHEET NO. 55.

4.) SUMP PUMP AND VENT FAN REQUIRED IN VAULTS WITH ELECTRICAL OR TELEMETRY EQUIPMENT.

5.) VAULT PIPE FOR PRV INSTALLATIONS SHALL BE D.I.

6.) LADDER RUNGS ARE REQUIRED IN VAULT, THE DISTANCE BETWEEN RUNGS, CLEATS, AND STEPS SHALL NOT EXCEED 12" AND SHALL BE UNIFORM THROUGHOUT THE LENGTH OF THE LADDER.

7.) MEGALUGS ARE ALLOWED IN XI BU OF RODS, ALL JOINTS WITHIN DESIGNATED ROOLED SECTION MUST BE RESTRIRED,

8.) VAULT KNOCKOUTS FOR PIPE ENTRY/EXIT TO BE FILLED WITH LINK SEAL OR EQUIVALENT.

PRESURE REGULATING VALVE
RECTANGULAR VAULT
TYPICAL PLAN

[Diagram of pressure regulating valve with detailed annotations]

W-54
NOTES:

1.) APPROVED PRECAST CONCRETE VAULTS:
AMCOR CONC, INC. (10'L x 7'W x 6'-6"H)
FOR 8" AND SMALLER MAIN VALVE
(14'L FOR 10" AND LARGER MAIN VALVE).

2.) CITY ENGINEERS APPROVAL IS REQUIRED FOR
SUMPF PIPE DISCHARGE TO STORM SEWERS.

3.) SEE SHEET W-54 FOR PLAN VIEW

4.) BYPASS NOT SHOWN THIS VIEW

5.) INTERIOR BREAKER BOX TO BE MOUNTED
ON SAME WALL AS LADDER RUNGS (MIN.
4' ABOVE FLOOR) INDIVIDUAL CIRCUITS
SHALL BE PROVIDED FOR LIGHTS AND
OUTLETS.

6.) PRESSURE GAUGES TO BE MOUNTED
ON 3/4" CORPORATION STOPS.

7.) CONDUIT RUNS SHALL BE PARALLEL
TO WALLS AND FLOOR.

8.) ALL WALL PENETRATIONS SHALL BE
SEALED WITH LINK SEAL OR EQUIVALENT.

PRESSURE REGULATING VALVE
RECTANGULAR VAULT
CROSS SECTION

City of
ARVADA

No. Dwn. Date Revision

approved

date: 7-11
scale: 1/4" = 1'0"
sht:

ENGINEERING DIVISION OF PUBLIC WORKS DEPT.

W-55
## PRV VAULT PIPING AND APPURtenANCES NOTES

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<th>DESCRIPTION AND/OR SPECIFICATION</th>
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<td>VAULT</td>
<td>H-20 HIGHWAY LOADING</td>
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<tr>
<td>VENT PIPING</td>
<td>6&quot; PVC, SCHEDULE 40, FITTINGS AND SCREEN</td>
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<tr>
<td>GATE VALVES</td>
<td>MJ, WHEEL OPERATOR, AWWA C-509, RESILIENT SEAT, OPEN LEFT.</td>
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<tr>
<td>PRV</td>
<td>PRESSURE REGULATING VALVE CLA-VAL, 92G-01 BCDK, CL. 150, 30 TO 300 PSI UP, 20 TO 200 PSI DOWN OR SINGER BRAND MODEL 106-PR, PRV TO BE SUPPLIED WITH POSITION INDICATOR ASSEMBLY, OPEN AND CLOSE SPEED CONTROLS, SUSTAINER INTERIOR EPOXY COATING AND PRESET PILOT VALVES IN ACCORDANCE WITH CITY SPECIFIED PRESSURES.</td>
</tr>
<tr>
<td>SUMP grate</td>
<td>NEENAH R-4380 OR EQUAL.</td>
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<tr>
<td>and frame</td>
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<tr>
<td>GAUGE</td>
<td>FLUID GAUGE 0-150 PSI, ASHCROFT OR MARSHALL TOWN OR EQUAL.</td>
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<tr>
<td>MANHOLE FRAME</td>
<td>NEENAH R-1741-D OR EQUAL.</td>
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<td>and cover</td>
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<td>SUMP PUMP</td>
<td>1/3 HP SUBMERSIBLE SUMP PUMP WITH AUTOMATIC OPERATION.</td>
</tr>
<tr>
<td>VENT FAN</td>
<td>180 CFM VENT FAN WITH AUTOMATIC OPERATION.</td>
</tr>
<tr>
<td>ELECTRICAL</td>
<td>WEATHER PROOF; WEATHER HEAD; BREAKER, JUNCTION AND SWITCH BOXES, SWITCHES, 2 DUPLEX RECEPTACLES WITH COVERS. 2 EXPLOSION PROOF LIGHT FIXTURES AND 75 WATT BULBS. TUBING, CONDUIT, GROUND ROD, WIRE, EXTERIOR DISCONNECT BOX, METER BOX ETC.</td>
</tr>
<tr>
<td>MISCELLANEOUS</td>
<td>TIE RODS OR MEGALUGS, TELEPHONE CONDUIT, CORPORATION STOPS, SPOOL PIECES, TEES, COUPLINGS, MASTIC, SEALS, SUMP DISCHARGE PIPING, ETC.</td>
</tr>
<tr>
<td></td>
<td>SEE DRAWINGS: W-54 AND W-55 FOR PLAN VIEW, CROSS SECTION AND ADDITIONAL NOTES.</td>
</tr>
</tbody>
</table>
TEMPORARY CONSTRUCTION WATER SET-UP

YOU MAY OBTAIN YOUR WATER FROM YOUR WATER SERVICE CONNECTION ONLY AFTER THE METER HAS BEEN SET BUT PRIOR TO COMPLETION OF THE PLUMBING INSIDE THE STRUCTURE. BY SIMPLY REMOVING THE COPPER SERVICE LINE FROM THE OUTLET OF THE METER YOKE AND ATTACHING A FLARE FITTING IRON PIPE ADAPTER IN ITS PLACE. THIS ADAPTER WILL ALLOW A GARDEN HOSE TO BE ATTACHED AND USED FOR CONVEYING CONSTRUCTION WATER THROUGH THE METER.

YOKE WITH VERTICAL INLET AND OUTLET SHOWN IN TYPICAL OUTSIDE SETTING WITH DOUBLE LID METER BOX COVER.

ATTACH A FLARE FITTING IRON PIPE ADAPTER TO THE METER YOKE FOR GARDEN HOSE CONNECTION.

REMOVE COPPER SERVICE LINE FROM OUTLET OF METER YOKE.

IF YOU HAVE ANY QUESTIONS PLEASE CALL CITY OF ARVADA, UTILITIES DIVISION (720) 898-7760

TEMPORARY WATER SET-UP
FOR CONSTRUCTION USE

CITY OF ARVADA

approved

ENGINEERING DIVISION OF PUBLIC WORKS DEPT.

W-57
IDENTIFICATION MARKS ON POSTS (REFERENCE POSTS ONLY) SHALL BE 3" DIA. CIRCLES BROKEN IN VERTICAL CENTER POINTING TO APPURTENANCE, WITH 1" STENCILS INSIDE CIRCLES INDICATING TYPE OF APPURTENANCE (MH, 12" GATE VALVE, ETC.) AND THE DISTANCE IN FEET AND INCHES FROM POST.
**WATER METER OR VALVE VAULT FRAME AND LID DETAIL**

**NOTE:**
30" DIAMETER FRAME (NOT SHOWN) SHALL BE DEETER #1197 OR NEENAH R-1798 OR EQUAL.

**NOTE:**
24"x36" FRAME AND LID (NOT SHOWN) SHALL BE DEETER #1191 OR EQUAL.

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**W-59**
NOTES:

1. HYDRANT VALVES AND FITTINGS TO BE 250 PSI RATING

2. ALL HYDRANT ASSEMBLY VALVES AND FITTINGS TO BE MECHANICAL JOINTS WITH MEGALUGS.

3. HYDRANT LEAD LINE AWWA C900 6" PVC CLASS 200 OR AWWA C909 6" PVC CLASS 150

4. ALL PIPES AND FITTINGS TO BE POLYETHYLENE WRAPPED

5. ALL RODDING SHALL BE PRIMED AND OR POLYKEN TAPE WRAPPED
BONDING O-RING JOINT FOR STEEL PIPE

EXTERIOR OF PIPE TO BE COAL TAR ENAMEL COATED AND WRAPPED WITH IMPREGNATED FIBROUS GLASS MAT AND ASBESTOS COAL TAR SATURATED FELT THAN WRAPPED WITH KRAFT PAPER IN ACCORDANCE WITH A.W.W.A. SPEC C-203

FIELD WELDED LAP JOINT FOR STEEL PIPE

INTERIOR OF PIPE TO BE CEMENT MORTAR LINED IN ACCORDANCE WITH A.W.W.A. SPEC C-205

O-RING JOINT AND WELDED JOINT DETAILS
STEEL PIPE LINES

W-61
FOR PRESTRESSED CONCRETE CYLINDER PIPE

FIELD COAT WITH P.W. NO. 1170 PRIMER & NO. 200 TAPE AS SPECIFIED OR EQUAL

FOR STEEL PIPE

CLOSURE

CLOSURE FOR CONCRETE AND STEEL PIPE

approved

date: 7-11 scale: NTS dwtn: D.D.V. sht:

ENGINEERING DIVISION OF PUBLIC WORKS DEPT.

W-62
NOTES:
1.) LEAVE 24" OF SLACK WIRE PER LEAD BOX
2.) PIPE SURFACE SHALL BE CLEANED OF ALL COATING AND FOREIGN MATTER AT POINT OF CADWELD BOND.
3.) INSULATE ALL CADWELDS WITH TERMITICAP AND INSULATE WITH COLD TAR AND PROTECTO WRAP
4.) PRE-SOAK ANODE 10 MINUTES IN WATER BEFORE INSTALLING
5.) BACKFILL ANODE WITH CLAY MATERIAL. DO NOT USE GRANULAR MATERIAL. (SEE SPECIFICATIONS)

4"-6" #200 PROTECTO WRAP
COLD APPLIED COAL TAR COATING #1170
15# TAR SATURATED ASBESTOS FELT
ORIGINAL PIPE COATING

CRIMP COPPER REINFORCING SLEEVE AND WIRE PRIOR TO BLAZING (SMALLER THAN STRONGLY)
INSULATED WIRE
#10-T.W. A.W.G.

MOTAR LINING
TO CAP IN METER BOX
TO SPLIT BOLT CONNECTOR

DETAIL "A" #15 DALDWELL CONNECTIONS
SECTION A-A

SUMP PIT DETAILS

NOTE:
DRAINAGE GRATES SHALL BE NEENAH R-4380 SERIES OR EQUAL.

12" DEPTH 1½" CRUSHED ROCK BASE UNDER VAULT.

24" CONCRETE PIPE

1-½"x1-½" STL. RING

FLOOR OF VAULT

26-5/8" DIA. FOR 24" BELL

7/8" TYP.

3/4" TYP.

26-5/8" DIA. FOR 24" BELL

1/2" FOR 24" PIPE

1/2" FOR 24" PIPE

CITY OF ARVADA

approved: [Signature]
date: 7-11 scale: NTS dwtn: O'DON scale: shpt:
ENGINEERING DIVISION OF PUBLIC WORKS DEPT.

W-64
TRACER WIRE BOX TO BE CP TEST SERVICES GLENN SERIES GLENN - 4 WITH LOCKING LID, 2 7/8" x 4 1/2"

LOOP WIRE INSIDE CP BOX. DO NOT CUT OR ATTACH WIRE TO THE BOX LID.

WIRE SHALL BE TAPE TO TOP OF PIPE

TRACER WIRE TO BE WHITE AWG #12 UF OR USE CABLE UL LISTED. SINGLE COPPER CONDUCTOR.

DRY CONN DIRECT BURY LUG.

FIRE HYDRANT TRACER WIRE (TEE)

FOR GROUND, USE 20" LENGTH x 3/8" DIA. COPPER GROUND ROD. ATTACH WIRE WITH 3/8" GROUND ROD CLAMP.

FOR FIRE HYDRANTS THE TRACER WIRE MUST BE LOOPED INTO THE CP BOX AND GROUND INTO THE BANK, A MINIMUM OF 18" DEEP.

TRACER WIRE TO BE WHITE AWG #12 UF OR USE CABLE UL LISTED. SINGLE COPPER CONDUCTOR.

DRY CONN DIRECT BURY LUG.

FIRE HYDRANT TRACER WIRE (ALL)
FIRE LINE DETAIL

NOTES
1. ALL FIRE LINES SHALL BE INSTALLED BY A CERTIFIED FIRE LINE CONTRACTOR IN ACCORDANCE WITH THE REQUIREMENTS OF THE FIRE DISTRICT.
2. FOR MULTI FAMILY COMMERCIAL INSTALLATIONS, DOMESTIC AND FIRE LINES SHALL BE RUN SEPARATELY TO THE MAIN. FOR SINGLE FAMILY INSTALLATIONS SEE DETAIL ON DWG. W-68.
3. PIPE SIZE TO BE APPROVED BY THE FIRE DISTRICT.

FIRE LINE
FOR 3" AND LARGER PIPE

[Signature] 
ENGINEERING DIVISION OF PUBLIC WORKS DEPT.
FIRE LINE DETAIL

Optional coupling used only when necessary.

Continuous length of soft type K copper.

Reducer (if necessary) to reduce from 2" dia.

2" resilient seat gate valve (AVK brand with 55 stem)
2" square operating nut & NPT threaded ends.

Valve box to sit on concrete cinder blocks or equal.

Corporation stop ball valve tapped straight out (no goose neck).

WATER MAIN

18" to 24" max.

GROUNDS LINE

BUILDING WALL

BUILDING FLOOR
GENERAL NOTES:
1. SIZE TO BE DETERMINED BY OWNER’S DESIGNER ACCORDING TO FIRE DISTRICTS REQUIREMENTS
2. REFER TO TABLE 30.1 FOR PIPE MATERIALS TYPE
3. METER PIT OR VAULT TO BE LOCATED OUTSIDE OF SIDEWALK AREA

FIRE LINE DETAIL

SINGLE FAMILY FIRE LINE

CITY OF ARVADA

approved

date: 7-11

scale: NTS/dwv QDY

sht:

ENGINEERING DIVISION OF PUBLIC WORKS DEPT.