STANDARD DRAWINGS

Application of Standard Drawings

The standard drawings below shall be used in the design and construction of public improvements in the City of Beaverton.

Disclaimer and Design Engineer’s Responsibilities

The standard drawings are not to scale, are schematic in nature, and may not be suitable “as is” for a specific use or location. Therefore, it is the Design Engineer’s responsibility to ensure that all of the design components in a standard drawing are suitable for: the use intended, each specific location, and safe use by the general public. In addition, the sizes of, locations of, and spaces between the components must all be sufficient to meet all project requirements and the City’s operational and maintenance requirements.

Requirements for Modification of a Standard Drawing

All modified standard drawings and supplemental drawings shall have the City’s title block, logo, block information, drawing title and number removed, and shall bear the seal of the Design Engineer responsible for modifying or preparing them, respectively. If the City’s title for a standard drawing is re-used on a modified standard drawing, the word “(MODIFIED)” in all upper case letters and enclosed in parentheses as shown, shall be added at the end of the title.

In addition, it is the Design Engineer’s responsibility to modify and/or supplement the standard drawings with technical specifications and additional drawings as necessary to provide a complete, properly functioning project that conforms in all respects to the City’s requirements.
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NOTES:
1. Standard monument box for AC pavement shall be cast iron with 8-inch minimum inside diameter, Olympic Foundry # M1014 or equal.
2. Matching monument box cover shall be cast iron with MON or MONUMENT cast into the top face, Olympic Foundry # 14 - 6169 or equal.
3. New manholes are to be located a minimum of 4 feet from center of its base to monument box.
1. Monument box for PCC pavement shall be cast iron with 8 inch minimum inside diameter, Olympic Foundry # M1015 or equal.
2. Matching monument box cover shall be cast iron with MON or MONUMENT cast into the top face, Olympic Foundry # 14 - 6174 or equal.
3. New manholes are to be located a minimum of 4 feet from center of its base to monument box.

**NOTES:**

**BOX SECTION**
NOTES:

1. All monuments shall use either \( \frac{5}{8} \) inch \( \times \) 30 inches long iron rod or \( \frac{3}{4} \) inch \( \times \) 30 inches long iron pipe.

2. All monuments shall be in accordance with the *Oregon Revised Statutes* Chapters 92 and 209.

3. For post-construction monumentation on existing asphalt surfaces, see *Beaverton Standard Dwg 138*. 
1. All monuments shall use either 5/8 inch Ø x 30 inches long iron rod or 3/4 inch Ø x 30 inches long iron pipe.
2. All monuments shall be in accordance with the Oregon Revised Statutes Chapters 92 and 209.
3. Place 3 - 2”x2” spacers, cut from 2” concrete patio block, evenly spaced to match finish grade.
4. For post-construction monumentation on existing asphalt surfaces, see Beaverton Standard Dwg 138.

NOTES:
1. All monuments shall use either 5/8 inch Ø x 30 inches long iron rod or 3/4 inch Ø x 30 inches long iron pipe.
2. All monuments shall be in accordance with the Oregon Revised Statutes Chapters 92 and 209.
3. Place 3 - 2”x2” spacers, cut from 2” concrete patio block, evenly spaced to match finish grade.
4. For post-construction monumentation on existing asphalt surfaces, see Beaverton Standard Dwg 138.
1. All monuments shall use either $\frac{5}{8}$ inch Ø x 30 inches long iron rod or $\frac{3}{4}$ inch Ø x 30 inches long iron pipe.

2. All monuments shall be in accordance with the Oregon Revised Statutes Chapters 92 and 209.
1. All monuments shall use either 5/8 inch Ø x 30 inches long iron rod or 3/4 inch Ø x 30 inches long iron pipe.

2. All monuments shall be in accordance with the Oregon Revised Statutes Chapters 92 and 209.

3. Monument box shall be set within a 6 inch wide, round collar of 5,000 psi, high-early Portland Cement Concrete.

4. Place 3 - 2"x2" spacers, cut from 2" concrete patio block, evenly spaced to match finish grade.

5. For post-monumentation on existing concrete surfaces, core-drill or diamond saw-cut is required.
NOTES:
1. BOX NUMBERS AND NAMES SHALL NOT BE LESS THAN 1" HIGH
2. POSTS MUST BE OF ADEQUATE STRENGTH AND SIZE
3. ALL MAILBOX LOCATIONS AND CLUSTERS MUST CONFORM TO THE REQUIREMENTS OF THE UNITED STATES POSTAL SERVICE (USPS)
4. INSTALLATION SHALL COMPLY WITH AASHTO - ROADSIDE DESIGN GUIDE (CHAP 11)
5. FOR STREETS WITH GRAVEL SHOULDERS (NO CURBS), FACE OF MAILBOX SHALL BE SET AT THE BACK OF THE GRAVEL SHOULDER
6. MAINTAIN 5' MINIMUM CLEAR ZONE AT THE BACK OF THE MAILBOX FOR ADA ACCESS. FOR EXISTING SIDEWALKS WITHOUT THE 5’ MIN CLEAR ZONE, CONSTRUCT ADDITIONAL SIDEWALK PANELS AT BACK OF SIDEWALK, MINIMUM 3' EACH SIDE OF MAILBOX OR MATCH EXISTING SIDEWALK PANELS, WHICHEVER IS GREATER. NEW BACK OF SIDEWALK SHALL MEET 5’ MIN CLEAR ZONE REQUIREMENTS. TRANSITION NEW PANELS TO EXISTING WALK WITH 45° TRIANGULAR SHAPED PANELS
1. A planter strip is required on all Arterials.
2. Paved width and planter strip are measured to face of curb.
3. Provide 0.5 feet from right-of-way line to the back of sidewalk for maintenance and survey monument protection.
4. Street trees and street lights are required and shall be located within the planter strip.
5. Engineer/Designer is required to check for special district design parameters. Contact Community Development - Planning Division for additional information.
6. Power, street lights, traffic signal, and all other franchise utility boxes/vaults shall be located outside of ADA ramps & landings.
NOTES:
1. A planter strip is required on all Collectors.
2. Paved width and planter strip are measured to face of curb.
3. Provide 0.5 feet from right-of-way line to the back of sidewalk for maintenance and survey monument protection.
4. Street trees and street lights are required and shall be located within the planter strip.
5. Engineer/Designer is required to check for special district design parameters. Contact Community Development - Planning Division for additional information.
6. Power, street lights, traffic signal, and all other franchise utility boxes/vaults shall be located outside of ADA ramps & landings.
NOTES:
1. A planter strip is required on all Neighborhood Routes.
2. Paved width and planter strip are measured to face of curb.
3. Provide 0.5 feet from right-of-way line to the back of sidewalk for maintenance and survey monument protection.
4. Street trees and street lights are required and shall be located within the planter strip.
5. Engineer/Designer is required to check for special district design parameters. Contact Community Development - Planning Division for additional information.
6. Power, street lights, traffic signal, and all other franchise utility boxes/vaults shall be located outside of ADA ramps & landings.
A planter strip is required on all Arterials.

2. Paved width and planter strip are measured to face of curb.

3. Provide 0.5 feet from right-of-way line to the back of sidewalk for maintenance and survey monument protection.

4. Street trees and street lights are required and shall be located within the planter strip.

5. For cul-de-sac requirements, see drawing 201

6. Engineer/Designer is required to check for special district design parameters. Contact Community Development - Planning Division for additional information.

7. Power, street lights, traffic signal, and all other franchise utility boxes/vaults shall be located outside of ADA ramps & landings.
1. See drawing 200-4 for Local Street right-of-way and paved width standards.
2. Length of cul-de-sac shall not exceed 200 feet.
3. On a cul-de-sac serving only residential uses and having no more than five abutting residential units, the dimensions of the cul-de-sac bulb may be reduced to provide:
   a. a minimum 24 foot radius to face of curb,
   b. a minimum 30 foot radius to right of way,
   c. a minimum 5 foot wide curb tight sidewalk (measured from back of curb) with easements for street trees and street lighting outside of the right of way.
4. Refer to USPS standards for Cluster Box Unit (CBU). Preferred location of CBUs shall be in cul-de-sac throat.

NOTES:

1. See drawing 200-4 for Local Street right-of-way and paved width standards.
2. Length of cul-de-sac shall not exceed 200 feet.
3. On a cul-de-sac serving only residential uses and having no more than five abutting residential units, the dimensions of the cul-de-sac bulb may be reduced to provide:
   a. a minimum 24 foot radius to face of curb,
   b. a minimum 30 foot radius to right of way,
   c. a minimum 5 foot wide curb tight sidewalk (measured from back of curb) with easements for street trees and street lighting outside of the right of way.
4. Refer to USPS standards for Cluster Box Unit (CBU). Preferred location of CBUs shall be in cul-de-sac throat.
The City Engineer must give specific approval for use of an offset crown. Offset crown cross-sections may be used in areas of substantial cross-slope. Offset crown cross-sections shall not be used to increase design speed in horizontal curves. Super elevation sections shall be used for that purpose. Maximum elevation difference of curbs or edge of pavement is determined by cross-slopes and width of street.

NOTES:
1. The City Engineer must give specific approval for use of an offset crown.
2. Offset crown cross-sections may be used in areas of substantial cross-slope.
3. Offset crown cross-sections shall not be used to increase design speed in horizontal curves. Super elevation sections shall be used for that purpose.
4. Maximum elevation difference of curbs or edge of pavement is determined by cross-slopes and width of street.
EXTRUDED OR MOUNTABLE CURB

Access width can be narrowed to 20 feet with the approval of the Fire Marshal and City Engineer.

Curb height is not to exceed 6-inches.

"NO PARKING" area is to be defined by yellow curb.

"NO PARKING / FIRE LANE / TOW ZONE" sign locations to be determined by the Fire Marshal and City Engineer.

Drainage is required to prevent ponding.

Area of turnaround is to be permanently maintained, cleared and unobstructed at all times.

Adjacent landscape is to be approved by City of Beaverton Board of Design Review.

Use of this turnaround at any specific site must be approved by the Fire Marshal and City Engineer.

NOTES:
1. Access width can be narrowed to 20 feet with the approval of the Fire Marshal and City Engineer.
2. Curb height is not to exceed 6-inches.
3. "NO PARKING" area is to be defined by yellow curb.
4. "NO PARKING / FIRE LANE / TOW ZONE" sign locations to be determined by the Fire Marshal and City Engineer.
5. Drainage is required to prevent ponding.
6. Area of turnaround is to be permanently maintained, cleared and unobstructed at all times.
7. Adjacent landscape is to be approved by City of Beaverton Board of Design Review.
8. Use of this turnaround at any specific site must be approved by the Fire Marshal and City Engineer.
NOTES:

1. Utilities shall be located as shown unless otherwise approved by the City Engineer.
2. The SANITARY SEWER ZONE shown above is the preferred corridor in which sewers are to be located, unless otherwise approved by the City Engineer.
3. Storm sewer and gas are to be located on the south or west side of the street.
4. Water, communications, and power are to be located on the north or east side of the street.
5. Install sanitary and storm sewer to Clean Water Services Design & Construction Standards.
6. The separation between water lines and sewer lines, subject to approval by the City Engineer, may be less than 10 feet, as per Oregon Dept. of Human Services Rules, Public Water Systems, ORS 333-061-0050 (9)
7. Sanitary/Storm sewer manholes and water valve covers shall be located outside of vehicle wheel paths
1. For use along medians, gutters may be reduced when preapproved by City Engineer.
2. Concrete to have compressive strength of 4,000 psi at 28 days.
3. Expansion joints to be provided at each:
   a. Point of tangency.
   b. Cold joint.
   c. Side of inlet structures.
   d. Side of driveways.
4. Expansion joint material to be pre-molded, asphalt impregnated, non-extruding, with a thickness of 1/2 inch.
5. Contraction Joints shall have:
   a. Spacing of not more than 15 feet.
   b. Depth of joint of at least 1 1/2 inches.
6. Base rock 1 1/2"-0 or 3/4"-0, 95% (AASHTO T-180) compaction. Base rock shall be to subgrade of street structure or 7.5 inches, whichever is greater, and shall extend 12 inches behind the curb.
7. Drainage weephole shall be:
   a. 3-inch diameter I.D. plastic pipe with coupling and beveled outlet end to match face of curb.
   b. Centered with contraction joints.
   c. Core-drilled through existing curbs for drainage access.
1. Mountable curb and gutter **REQUIRES PREAPPROVAL** by the City Engineer. This curb design is limited to use in cul-de-sacs and other special circumstances specifically approved.

2. Weepholes for downspout drain pipes are not allowed with this curb type, but weepholes for vault drain pipes are allowed. See *Beaverton Standard Dwg 202*. Vault drain pipe shall be 3" I.D. plastic pipe with coupling.

3. Concrete to have compressive strength of 4,000 psi at 28 days.

4. Expansion joints to be provided at each:
   a. Point of tangency.
   b. Cold joint.
   c. Side of inlet structures.
   d. Side of driveways.

5. Expansion joint material to be pre-molded, asphalt impregnated, non-extruding, with a thickness of 1/2 inch.

6. Contraction Joints shall have:
   a. Spacing of not more than 15 feet.
   b. Depth of joint of at least 1 1/2 inches.

7. Base Rock 1 1/2"-0 or 3/4"-0, 95% (AASHTO T-180) compaction. Base rock shall be to subgrade of street structure or 7.5 inches, whichever is greater, and shall extend 12 inches behind the curb.
1. Mountable curb and gutter requires preapproval by the City Engineer.
2. This drainage weep hole to be used only with gravity vault drains.
3. Concrete to have compressive strength of 4,000 psi at 28 days.
4. Drainage weep hole shall be 3 inch diameter ID plastic pipe with coupling and beveled outlet end to match face of curb.
5. Modified standard curb and gutter to be same as standard curb and gutter except for gutter width shown.
NOTES:

1. Type 'A' curb **REQUIRES PREAPPROVAL** by the City Engineer.
   For use ONLY when replacing similar curb. This curb is not intended for new construction.
2. Concrete to have compressive strength of 4,000 psi at 28 days.
3. Expansion joints to be provided at each:
   a. Point of tangency.
   b. Cold joint.
   c. Side of inlet structures.
   d. Side of driveways.
4. Expansion joint material to be pre-molded, asphalt impregnated, non-extruding, with a thickness of 1/2 inch.
5. Contraction joints shall have:
   a. Spacing of not more than 15 feet.
   b. Depth of Joint of at least 1 1/2 inches.
6. Base rock 1 1/2"-0 or 3/4"-0, 95% (AASHTO T-180) compaction. Base rock shall be to subgrade of street structure or 7.5 inches, which ever is greater, and shall extend 12 inches behind the curb.
7. Drainage weephole shall be:
   a. 3 inch I.D. plastic pipe with coupling and beveled outlet end to match face of curb.
   b. Centered with contraction joints.
1. Retrofit curb and gutter REQUIRES PREAPPROVAL by the City Engineer. Removing only the top portion of the curb to make the curb cut is not allowed, unless expressly approved. Remove curb shown cross-hatched above, except as required otherwise by note #2.

2. If curb is to be removed before final asphalt lift is in place or if pavement is PCC, gutter must be removed with curb. Replace existing curb and gutter with new curb and gutter with curb cut per Beaverton Standard Dwg 205.

3. If all asphalt lifts are in place, curb only shall be removed at full depth, and reinstalled with #4 rebar. Rebar dowels shall be placed 3 inches below top of gutter and shall be 18 inches maximum on center and 6 inches from each end of cut.

4. Saw-cut line shall be as close to face of curb as possible.

5. Concrete to have compressive strength of 4,000 psi at 28 days.

6. Bevel the curb cut back from gutter to back of curb at 8.33% (1:12).

7. Curb joint shall be a trowelled joint with a minimum 1/2 inch radius along back of curb.

8. Tie ends of new curb to existing curbs with #4 rebar dowels centered in curb and 3" below top of curb.

NOTES:
1. Section A-A may be used for curb-tight sidewalk driveway aprons if sidewalk’s width is 10’ or more.
2. Concrete shall have a minimum breaking strength of 4,000 psi after 28 days.
3. Curb joint shall be a troweled joint with a minimum 1/2 inch radius along back of curb.
4. Expansion joints shall be 1/2 inch pre-molded asphalt impregnated material, cedar or approved equal extending from top of base to finished grade.
5. For driveways 24 feet wide or greater, concrete to be increased to a 7 inch depth.
6. Finish with broom and edge all joints.
7. Weepholes not to be placed in wing.
8. If curbing is being removed to install a driveway and the gutter should become separated from the driving surface in excess of 1/16 inch, then the gutter shall also be removed and replaced.
9. Wings of the commercial driveway which are a portion of the sidewalk shall not exceed 8.333% (1:12).
10. ODOT Standard Drawings for driveways may be used when preapproved by City Engineer.
11. Slope of the driveway may be away from the curb when preapproved by City Engineer.
1. Section A-A may be used for curb-tight sidewalk driveway aprons if sidewalks width is 10' or more.
2. Concrete shall have a minimum breaking strength of 4,000 psi after 28 days.
3. Finish with broom and edge all joints.
4. If curbing is being removed to install a driveway and the gutter should become separated from the driving surface in excess of 1/16 inch, then the gutter shall also be removed and replaced.
5. Curb joint shall be a troweled joint with a minimum 1/2 inch radius along back of curb.
6. Expansion joints shall be 1/2 inch pre-molded asphalt impregnated material, cedar or approved equal extending from top of base to finished grade.
7. Weepholes shall not be placed in wing.
8. Slope of the driveway may be away from the curb when preapproved by City Engineer.
9. Refer to Beaverton Development Code for additional driveway requirements.
PLANTER STRIP

1. Concrete shall have a minimum compressive strength of 4,000 psi at 28 days. For slump see specifications.
2. Sidewalk panels shall be square with their length equal to the sidewalk's width, except that sidewalks in the Regional Center, Town Center, Station Area and Station Community districts may be wider than 6 feet, in which cases their panels may be 4 to 6 feet square, but all of equal size.
3. Expansion joints to be placed at sides of driveway approaches, utility vaults, sidewalk ramps and/or at points of tangency in curb as shown on the standard drawings for sidewalk ramps and at spacing not to exceed 45 feet.
4. Sidewalk shall have a minimum thickness of 4 inches, except that sidewalk that is intended as a portion of a driveway shall have a minimum thickness of 6 inches. See Beaverton Standard Dwgs 210 & 211.
5. Finish with broom and edge all joints.
6. Width of curb is included in planter strip width.
7. Street trees are required except where specifically modified or waived in writing by the City Engineer.
8. For sidewalk repairs, replacements and installations in existing developments, match existing width of sidewalks, and sidewalk panels' widths and lengths.
1. Curb tight sidewalks **REQUIRE PREAPPROVAL** by the City Engineer. They are used for sidewalk repairs, replacements and installations in existing developments. Match width of existing sidewalks, and widths and lengths of existing sidewalk panels.

2. Concrete shall have a minimum compressive strength of 4,000 psi at 28 days, For slump see specifications.

3. Sidewalk panels shall be square with their length equal to the sidewalk's width, except that sidewalks in the Regional Center, Town Center, Station Area and Station Community districts may be wider than 6 feet, in which cases their panels may be 4 to 6 feet square, but all of equal size.

4. Expansion joints to be placed at sides of driveway approaches, utility vaults, sidewalk ramps and/or at points of tangency in curb as shown on the standard drawings for sidewalk ramps and at spacing not to exceed 45 feet.

5. For sidewalks adjacent to the curb and poured at the same time as the curb, the joint between them shall be troweled with a minimum 1/2 inch radius.

6. Sidewalk shall have a minimum thickness of 4 inches, except that sidewalk that is intended as a portion of a driveway shall have a minimum thickness of 6 inches. See Drawings 210 & 211.

7. Where vehicular access across sidewalk is required by City, a 40 foot long section of sidewalk shall be provided in the access area, shall be 6-inches thick and shall be reinforced with 6"x6"x10 ga steel mesh. Location of 40 foot long section to be as directed by City Engineer.

8. Finish with broom and edge all joints.

9. Street trees, treewells and grates are required except where specifically modified or waived in writing by the City Engineer.

10. For sidewalk widths around grated treewells, and tree grate requirements, see **Beaverton Standard Dwg 241**.
1. Curb Tight Sidewalk **REQUIRES PREAPPROVAL** by City Engineer. Submit the design for a specific project with transitions from a Standard Sidewalk with planter strip to curb tight sidewalk.

2. For Standard Sidewalk information see *Beaverton Standard Dwg 215*.

3. For Curb Tight Sidewalk information see *Beaverton Standard Dwg 216*.

4. Curb radius shown is for cul-de-sac. Other curves as approved by City Engineer.
NOTES:

1. Extensions are intended to simulate a parked vehicle, therefore shall only be allowed in conjunction with on-street parking.
2. Intersection radii shall be checked to assure safe passage of the design vehicle. In all cases, emergency vehicles shall be accommodated.
3. Drainage shall be addressed with the appropriate agency.
4. Refer to Engineering Design Manual for ADA ramp, sidewalk, planter strip, parking lane, and travel lane requirements.
NOTICE

THIS ROAD WILL BE EXTENDED WITH FUTURE DEVELOPMENT

FOR INFO CONTACT
CITY OF BEAVERTON
503-526-2420

NOTES:
1. Flat blanks shall be 0.080 inch gauge with 6063 T6 alodine coated aluminum substrate.
2. All letters shall be black and series are as noted.
3. Background shall be white 3M Scotchlite brand High Intensity Reflective sheeting.
4. For sign mounting, see drawing 400.
5. Border shall be offset 1/2" from edge of sign and shall be 3/4" wide
6. Corner radii shall be 1.875"

SCALE: NONE
DATE: SEPT 2018
1. Retrofit ramp **REQUIRES PREAPPROVAL** by the City Engineer.
2. Sidewalk ramp shall meet **ADA Standards**.
3. This drawing is for retrofitted ramps only, where site constraints prohibit installing two ramps. The Engineer shall prepare a site-specific drawing for each ramp, accepting full responsibility for correcting all unacceptable ramp construction resulting from applying this drawing "as is".
4. Sawcut and remove the existing sidewalk, curb and gutter to the nearest cold joint.
5. Ramp shall be located relative to crosswalk or stop line.
6. Detectable warning shall be 24 inches long in the direction of travel and full width of the ramp, made of concrete imbedded yellow tiles, that have truncated domes aligned on a square grid with its gridlines parallel and perpendicular to the centerline of the ramp, from the approved list in the *Engineering Design Manual*, Sec 210.10.
7. Concrete shall have a compressive strength of 4,000 psi at 28 days.
8. Bevel the curb cut from gutter to back of curb at 8.33% (1:12).
9. Construct curb with varying exposure tapered longitudinally so that the top of the curb matches the normal projected back of sidewalk as shown in section B-B.
10. Score at grade changes, surface texture changes and at other points shown. Edges shall be shined.
11. Curb inlet or catch basin shall not be allowed in front of sidewalk ramp.
1. Retrofit ramp **REQUIRES PREAPPROVAL** by the City Engineer.
2. Sidewalk ramp shall meet **ADA Standards**.
3. This drawing is for retrofitted ramps only, where site constraints prohibit installing two ramps. The Engineer shall prepare a site-specific drawing for each ramp, accepting full responsibility for correcting all unacceptable ramp construction resulting from applying this drawing "as is".
4. Sawcut and remove the existing sidewalk, curb and gutter to the nearest cold joint.
5. Each ramp shall be located relative to crosswalk or stop line.
6. Detectable warning shall be 24 inches long in the direction of travel and full width of the ramp, made of concrete imbedded yellow tiles, that have truncated domes aligned on a square grid with its gridlines parallel and perpendicular to the centerline of the ramp, from the approved list in the Engineering Design Manual, Sec 210.10.
7. Concrete shall have a compressive strength of 4,000 psi at 28 days.
8. Bevel the curb cut from gutter to back of curb at 8.33% (1:12).
9. Construct curb with varying exposure tapered longitudinally so that the top of the curb matches the normal projected back of sidewalk as shown in section B-B.
10. Score at grade changes, surface texture changes and at other points shown. Edges shall be shined.
11. For sidewalk widths, see drawing 216.
12. Curb inlet or catch basin shall not be allowed in front of sidewalk ramp.
1. Tree species and caliper size are to be approved by the City Arborist.
2. Adjust planting locations so that tree crown or root ball does not conflict with above or below ground utilities.
3. Do not undermine curb or sidewalk when excavating.
4. An 18 inches deep, root barrier shall be added where required by the City Arborist.
5. Opposite tree stakes, provide two, 3 inch diameter ADS perforated pipe watering troughs, filled with pea gravel.
6. Provide a loop in chain lock or guy hose large enough to allow for trunk growth.
7. Tree stakes are to be removed following the required establishment period.

NOTES:

1. Tree species and caliper size are to be approved by the City Arborist.
2. Adjust planting locations so that tree crown or root ball does not conflict with above or below ground utilities.
3. Do not undermine curb or sidewalk when excavating.
4. An 18 inches deep, root barrier shall be added where required by the City Arborist.
5. Opposite tree stakes, provide two, 3 inch diameter ADS perforated pipe watering troughs, filled with pea gravel.
6. Provide a loop in chain lock or guy hose large enough to allow for trunk growth.
7. Tree stakes are to be removed following the required establishment period.
1. Grates are to be made of cast iron with a natural finish.
2. Castings will be 3/4 inch thick in 4 pieces.
3. The center opening shall be 16 inch diameter with a breakout at 23 1/2 inches.
4. Slotted penetrations shall be no greater than 3/8 inch wide.
5. An 18 inch deep root barrier shall be placed at both sides and along sidewalk face.
6. Provide two, 3 inch diameter ADS perforated pipe watering troughs filled with pea gravel.
7. Do not undermine curb or sidewalk when excavating.
8. ADA clearance shall be 4 feet as shown, unless otherwise permitted by the City Engineer pursuant to a design exception under Section 160 of the Engineering Design Manual.
FOLD BACK, TRIM & REMOVE TOP HALF OF BURLAPPED ROOT BALL

6" GRATE TO ROOTBALL CLEARANCE

SIDWALK

FOLD BACK, TRIM & REMOVE TOP HALF OF BURLAPPED ROOT BALL

4" ADS PERF PIPE FILLED WITH PEA GRAVEL

THOROUGHLY MOISTENED NATIVE SOIL

HAND TAMMED NATIVE SOIL

ROOT BARRIER

SIDWALK

4" ADS PERF PIPE FILLED WITH PEA GRAVEL

3" DIA. SLEEVE - EXTEND 2" BEYOND WALL OF TREEWELL

SCH 40 PVC (VARY) REDUCER, SCH 40 PVC (VARY) X 1/2" TEE, SCH 40 PVC 1/2" STREET EL

CLASS 200 PVC 1/2" PIPE

SCH 40 PVC 1/2" F-AD. STREET EL, SCH 80 PVC 1/2" THREADED RISER, NO. 514-20 TORO BUBBLER

4" ADS PERF PIPE FILLED WITH PEA GRAVEL

ROOTBALL

SCH 40 PVC PIPE SIZE VARIES FROM 2" TO 3/4"

SCH 40 PVC (VARY) X 1/2" TEE, SCH 80 PVC 1/2" RISER, NO. 514-20 TORO BUBBLER

4" ADS PERF PIPE FILLED WITH PEA GRAVEL

4"

18" ROOT BARRIER AT 3 SIDEWALK FACES

CURB

8"

SIDEWALK

TREEWELL CROSS-SECTION

TREEWELL PLAN VIEW

SCALE:  NONE
DATE:  JUNE 2018

TREEWELL IRRIGATION

Beaverton
ENGINEERING

242
CONSTRUCTION NOTES:

1. Grind for extra depth at edges as shown.
2. Apply bitumal tack coat over air-blown cleaned and swept asphalt concrete.
3. Asphalt shall be rolled for compaction per specifications.
4. Finish edges by applying tack coat and sand sweeping. Tack coat shall conform to ODOT Specifications, Type CSS-1, CSS-1H.

APPLICATION NOTES:

[Approved for use when the conditions below exist.]
1. Locations per approved plan.
2. Neighborhood Routes and Local Streets only.
4. Tangent sections or curves with 300 ft. radius or larger.
5. Grade less than 8%.
6. No more than 2 travel lanes.
7. Not an existing or planned Transit Route.
8. Not a Primary Emergency Vehicle Route.
APPLICATION NOTES:
[Approved for use when the conditions below exist.]

1. Locations per approved plan.
2. Posted speed 25 mph.
3. Tangent sections or curves with 300 ft. radius or larger.
4. Grade less than 8%.
5. No more than 2 travel lanes.

CONSTRUCTION NOTES:
1. Grind for extra depth at edges as shown.
2. Apply bitumal tack coat over air-blown cleaned and swept asphalt concrete.
3. Asphalt shall be rolled for compaction per specifications.
4. Finish edges by applying tack coat and sand sweeping.
   Tack coat shall conform to ODOT Specifications, Type CSS-1, CSS-1H.
**CONSTRUCTION NOTES:**

1. Median Island may be constructed without speed hump.
2. Sawcut and remove existing A.C. for construction of traffic circle by one of two methods:
   a. Sawcut to within 2 inches of curb form line, fill void between curb and pavement with concrete, or
   b. Remove a minimum of 14 inches beyond curb form line, patch pavement with Level 2, \( \frac{1}{2} \)" ACP. Finish edges by applying tack coat and sand sweeping.
3. Construct Type 'A' P.C.C. curb for island perimeter.
   a. Grind for extra depth at edge as shown.
   b. Apply tack coat over air-blown cleaned and swept asphalt concrete.
   c. Finish edges by applying tack coat and sand sweeping. Tack coat shall conform to ODOT Specifications, Type CSS -1, CSS -1H.
CONSTRUCTION NOTES:

1. Median island may be constructed without speed hump.
2. Sawcut and remove existing A.C. for construction of traffic circle by one of two methods:
   a. Sawcut to within 2 inches of curb form line, fill void between curb and pavement with concrete, or
   b. Remove a minimum of 14 inches beyond curb form line, patch pavement with compacted Level 2, ½" ACP. Finish edges by applying tack coat and sand sweeping.
3. Construct Type 'A' P.C.C. curb for island perimeter.
   a. Grind for extra depth at edge as shown.
   b. Apply tack coat over air-blown cleaned and swept asphalt concrete.
   c. Finish edges by applying tack coat and sand sweeping.
      Tack coat shall conform to ODOT Specifications, Type CSS -1, CSS -1H.
1. Construct A.C. speed table between curbs.
   a. Grind for extra depth at edge as shown.
   b. Apply tack coat over air-blown cleaned and swept asphalt concrete.
   c. Finish edges by applying tack coat and sand sweeping. Tack coat shall conform to ODOT Specifications, Type CSS -1, CSS -1H.
2. See Beaverton Standard Dwg 420 for barrier details.

APPLICATION NOTES:
[Approved for use when the conditions below exist.]
1. Locations per approved plan.
2. Posted speed 25 mph.
3. Tangent sections or curves with 300 ft. radius or larger.
4. Grade less than 8%.
5. No more than two travel lanes.
CONSTRUCTION NOTES:
1. Median island may be constructed without speed hump.
2. Sawcut and remove existing A.C. for construction of median island by one of two methods:
   a. Sawcut to within 2 inches of curb form line, fill void between curb and pavement with concrete, or
   b. Remove a minimum of 14 inches beyond curb form line, patch pavement with compacted Level 2, 1/2" ACP. Finish edges by applying tack coat and sand sweeping.
3. Construct Type 'A' P.C.C. curb for island perimeter.
4. For speed hump details, see drawing 255.
5. For barrier details, see drawing 420.

APPLICATION NOTES:
[Approved for use when the conditions below exist.]
1. Locations per approved plan.
2. Posted speed 25 mph.
3. Tangent sections or curves with 300 ft. radius or larger.
4. Grade less than 8%.
5. No more than two travel lanes.
APPLICATION NOTES:
[Approved for use when the conditions below exist.]
1. Locations per approved plan.
2. Posted speed 25 mph.
3. No more than 2 travel lanes.

CONSTRUCTION NOTES:
1. Sawcut and remove existing AC for construction of traffic circle by one of two methods:
   a. Sawcut to within 2 inches of curb form line, fill void between curb and pavement with concrete, or
   b. Remove a minimum of 14 inches beyond curb form line, patch pavement with compacted Level 2, ½” ACP. Finish edges by applying tack coat and sand sweeping.
2. Contraction joint spacing shall be not more than 10 feet equally spaced around circle. Depth of the joint shall be at least 1 ½ inches.
1. Install per manufacturer's recommendations. Block style, size and batter may vary, see specifications.

2. Connect 3" PVC drain pipe with 45° bend to perforated pipe. Daylight with Weep hole through curb at 8' minimum from end of retaining wall.

NOTES:
1. Install per manufacturer's recommendations. Block style, size and batter may vary, see specifications.
2. Connect 3" PVC drain pipe with 45° bend to perforated pipe. Daylight with Weep hole through curb at 8' minimum from end of retaining wall.
NOTES:
1. Install tie bars along longitudinal joints between concrete panels. Tie bars are not installed between concrete pavement and ACP pavement.
2. Center tie bars and dowel bars on joint.
3. If the time frame designated for opening traffic is less than 72 hours after concrete placement, provide Class HES4000 - 1 concrete designed to attain a minimum average compressive strength of 3,000 psi prior to allowing traffic on the concrete. Otherwise furnish Class 4000 - 1 paving concrete.
4. The surface of the concrete shall have a textured finish using a steel-tine tool with 1/8 inch tines that will mark the finished concrete to a depth of 1/16 inch to 1/8 inch. Randomly space the markings from 1/2 inch to 1 1/4 inches as approved. Avoid overlaps of the texturing. Markings shall be transverse to the roadway centerline and full roadway width.
5. New interior longitudinal and transverse joints shall be sawcut as soon as the concrete has set enough to allow sawing without tearing or raveling.
6. The new saw cut transverse and longitudinal joints shall be filled with poured rubber-asphalt joint filler. The saw cut joint shall be flushed with water, vacuumed to remove cement slurry and dried before installing the joint filler.
7. Irregularly shaped panels, rectangular panels with an aspect ratio exceeding 1:1.25, and panels containing more than one utility structure (such as manholes, valves, etc.) shall be reinforced. See reinforcement grid details this sheet.
8. All tie bars and dowel bars shall be Grade 60 steel and shall be smooth, epoxy coated, circular, and greased.
1. Place 2 layers of #30 felt bond breaker meeting the requirements of ASTM D226, Type II at isolation joints.

2. Locate joint on center of manhole rim when possible.

(2) #4 bars (hoops) @ 3" on center. 3" minimum clearance from isolation joint. 2" minimum vertical clearance from surface of concrete.

(8) #5 bars @ 12" on center each way. 3" min. clearance from isolation joint. 2" min. vertical clearance from surface of concrete.

NOTES:
1. Place 2 layers of #30 felt bond breaker meeting the requirements of ASTM D226, Type II at isolation joints.
2. Locate joint on center of manhole rim when possible.
1. Install tie bars along longitudinal joints between full panel replacement and existing concrete pavement. Tie bars are not installed between concrete pavement and ACP pavement.

2. Place 2 layers of #30 felt bond breaker meeting the requirements of ASTM D226, Type II at joints between panel replacement and existing panel.

3. Place new dowel bars between any existing (cut) dowel bars.

4. Center tie bars and dowel bars on joint.

5. Any repair of PCC pavement must be a full panel replacement.

6. Dowel holes should be \( \frac{5}{16} \) inch oversize in diameter and 9 inches to 9.5 inches deep for 18 inch long smooth dowels and 18 inches to 18.5 inches deep for 36 inch long tie bars. A hand held drill is not allowed.

7. Fill clean dowel hole with quick-set epoxy grout complying with ASTM C 881 Types IV or V, Grade 3, Classes B & C, suitable for anchoring smooth dowel bars in hardened concrete and on the ODOT QPL. Insert smooth fully greased dowels with grout retention ring into hole.

8. If the time frame designated for opening traffic is less than 72 hours after concrete placement, provide Class HE54000 - 15 concrete designed to attain a minimum average compressive strength of 3,000 psi prior to allowing traffic on the concrete. Otherwise furnish Class 4000 - 15 paving concrete.

9. The surface of the concrete shall have a textured finish using a steel-tine tool with 8 inch tines that will mark the finished concrete to a depth of 1 inch to 1 1/4 inches as approved. Avoid overlaps of the texturing. Markings shall be transverse to the roadway centerline and full roadway width.

10. New interior longitudinal and transverse joints shall be sawcut as soon as the concrete has set enough to allow sawing without tearing or raveling.

11. The new saw cut transverse and longitudinal joints shall be filled with poured rubber-asphalt joint filler. The saw cut joint shall be flushed with water, vacuumed to remove cement slurry and dried before installing the joint filler.

12. Irregularly shaped panels, rectangular panels with an aspect ratio exceeding 1:1.25, and panels containing more than one utility structure (such as manholes, valves, etc.) shall be reinforced. See reinforcement grid details this sheet.

13. All tie bars and dowel bars shall be Grade 60 steel and shall be smooth, epoxy coated, circular, and greased.

### Dowel Bar Table

<table>
<thead>
<tr>
<th>Pavement Thickness (T)</th>
<th>Dowel Dia.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3” – 8”</td>
<td>1/2”</td>
</tr>
<tr>
<td>9” – 16”</td>
<td>1/4”</td>
</tr>
<tr>
<td>10” – 8”</td>
<td>1/4”</td>
</tr>
</tbody>
</table>

### Notes:

1. Install tie bars along longitudinal joints between full panel replacement and existing concrete pavement. Tie bars are not installed between concrete pavement and ACP pavement.

2. Place 2 layers of #30 felt bond breaker meeting the requirements of ASTM D226, Type II at joints between panel replacement and existing panel.

3. Place new dowel bars between any existing (cut) dowel bars.

4. Center tie bars and dowel bars on joint.

5. Any repair of PCC pavement must be a full panel replacement.

6. Dowel holes should be \( \frac{5}{16} \) inch oversize in diameter and 9 inches to 9.5 inches deep for 18 inch long smooth dowels and 18 inches to 18.5 inches deep for 36 inch long tie bars. A hand held drill is not allowed.

7. Fill clean dowel hole with quick-set epoxy grout complying with ASTM C 881 Types IV or V, Grade 3, Classes B & C, suitable for anchoring smooth dowel bars in hardened concrete and on the ODOT QPL. Insert smooth fully greased dowels with grout retention ring into hole.

8. If the time frame designated for opening traffic is less than 72 hours after concrete placement, provide Class HE54000 - 15 concrete designed to attain a minimum average compressive strength of 3,000 psi prior to allowing traffic on the concrete. Otherwise furnish Class 4000 - 15 paving concrete.

9. The surface of the concrete shall have a textured finish using a steel-tine tool with 8 inch tines that will mark the finished concrete to a depth of 1 inch to 1 1/4 inches as approved. Avoid overlaps of the texturing. Markings shall be transverse to the roadway centerline and full roadway width.

10. New interior longitudinal and transverse joints shall be sawcut as soon as the concrete has set enough to allow sawing without tearing or raveling.

11. The new saw cut transverse and longitudinal joints shall be filled with poured rubber-asphalt joint filler. The saw cut joint shall be flushed with water, vacuumed to remove cement slurry and dried before installing the joint filler.

12. Irregularly shaped panels, rectangular panels with an aspect ratio exceeding 1:1.25, and panels containing more than one utility structure (such as manholes, valves, etc.) shall be reinforced. See reinforcement grid details this sheet.

13. All tie bars and dowel bars shall be Grade 60 steel and shall be smooth, epoxy coated, circular, and greased.
1. These trench backfill requirements apply to all public utility pipes. For additional requirements, see CWS Design and Construction Standards and City's Engineering Design Manual section 211.

2. For trenches 12" wide or less in streets with classifications higher than Residential, use controlled density fill (CDF) as per sec 210.19. For all other trenches, use 3/4" - 0" aggregate compacted to 95% of max density per AASHTO t-99 and ODOT/APWA spec 00405.

3. Use class 'A' backfill compacted to 90% of max density per AASHTO t-99 and ODOT/APWA spec 00405.

4. Tracer wire shall be placed above non-metallic pipe and 2 feet below finished grade when required by Oregon State Plumbing code. Reference City's EDM section 211.1.4.o. Storm and sanitary sewer services shall be marked with magnetic tape per CWS D&C section 5.09.4.c

5. Restore to original conditions or better. See specifications and drawing 302.

6. For conduit trench requirements see drawing 301.

7. The City reserves the right to require compaction testing of the bedding material when it exceeds the 4-inch base section beneath the pipe.
1. THESE TRENCH BACKFILL REQUIREMENTS APPLY TO ALL PUBLIC UTILITY PIPES. FOR ADDITIONAL REQUIREMENTS, SEE CWS DESIGN AND CONSTRUCTION STANDARDS AND CITY’S ENGINEERING DESIGN MANUAL SECTIONS 211.

2. FOR TRENCHES 12" WIDE OR LESS IN STREETS WITH CLASSIFICATIONS HIGHER THAN RESIDENTIAL, USE CONTROLLED DENSITY FILL (CDF) AS PER SEC 210.19. FOR ALL OTHER TRENCHES, USE 3/4" - 0" AGGREGATE COMPACTED TO 95% OF MAX DENSITY PER AASHTO T-99 AND ODOT/APWA SPEC 00405.

3. USE CLASS ‘A’ BACKFILL COMPACTED TO 90% OF MAX DENSITY PER AASHTO T-99 AND ODOT/APWA SPEC 00405.

4. TRACER WIRE SHALL BE PLACED ABOVE NON-METALIC PIPE AND 2 FEET BELOW FINISHED GRADE WHEN REQUIRED BY OREGON STATE PLUMBING CODE. REFERENCE CITY’S EDM SECTION 211.1.4.o.

5. RESTORE TO ORIGINAL CONDITIONS OR BETTER. SEE SPECS AND BEAVERTON STANDARD DWG 302.
1. This drawing applies to trench cuts and other kinds of pavement cuts.

2. For width dimensions, see *Engineering Design Manual* and the notes that follow.

3. Sawcut existing AC pavement full depth. Sawcut existing PCC pavement according to Drawing 310.

4. Restore existing pavement material(s) to pre-existing or better conditions. Thickness shall be as follows:
   a. For existing Portland Cement Concrete (PCC): existing pavement thickness plus 2 inches, but not less than 8 inches. On Arterial and Collector streets, concrete patching material shall be high early strength class 5,000 psi PCC approved by City Engineer.
   b. For existing Asphalt Concrete (AC): resurface to a minimum of $3\frac{1}{2}''$ of Level 2, $1\frac{1}{2}''$ ACP or existing AC thickness plus 2 inches, whichever is greater, but do not exceed 6 inches. Compact AC in 2-inch maximum lifts to 91% of maximum density (*Rice*).
   c. Base course shall be $3/4''-0$ aggregate compacted to 95% of max density as per AASHTO T-99 and ODOT/APWA Spec 00405. Minimum thickness shall be 8 inches under AC pavement and 2 inches under PCC pavement.

5. All cut edges of AC shall be sand sealed with CRS-1 or CRS-2 emulsified asphalt or equal.

6. If new edge of pavement is less than three feet from another patched, curb or edge of street, replace the pavement in between.

7. If any part of more than one pre-existing patch edge is within 3 feet of the T-cut, remove and restore the pavement to the far edge of the furthest pre-existing patch.

8. On longitudinal pavement cuts, the edge of the T-cut shall not lie in a wheel path. Width of T-cut shall be widened where necessary to move the edge out of the wheel path and either to parallel and 6 inches from the nearest lane line, or to the location required by note 6 or 7 above as applicable, whichever is the furthest from the pavement cut.

9. If an edge of a T-cut will be within 5 feet or less of an area of distressed existing pavement, the length and width of the pavement restoration shall be determined by City Engineer upon notification by the Contractor.

10. Width from edge of trench shall be 6 inches minimum for trenches that are 12 inches wide or less and 12 inches minimum for trenches wider than 12 inches. The width may be increased up to 10 feet on both sides of the pavement cut as approved by City Engineer.
1. OPTION A (not allowed on Arterial streets, bus routes or truck routes.): Sawcut pavement 4 inches deep or 1/2 the panel thickness (T), whichever is greater, before removal. Break out with mechanical hammer and carefully remove remaining concrete next to joint so as not to disturb the pavement surface to remain. One side of utility cut is to be along existing joint. OPTION B: Sawcut pavement full depth and install 1\(1/2\) inch Ø dowels as shown. After drilling holes, place non-shrink grout in back of holes before inserting dowels. (Note: At interfaces of two adjacent new panels, an approved keyway may be substituted for dowels. For sawcuts through existing panel joints, sawcut existing panel joint(s) full depth before removing existing pavement.)

2. Partial panel replacement may be approved by the City Engineer per the Engineering Design Manual.

3. If utility trench width is greater than 1/2 of the panel width, then remove pavement to the next joint.

4. If utility trench wall must be closer than 3 feet from the joint, then remove pavement to the joint.

5. When panels are offset or irregular in any manner, the City Engineer shall determine the area of pavement replacement.

6. After placement of pavement, re-sawcut the joints that intersect the trench. The depth of sawcut is to be T/3. Seal the new joints per the Engineering Design Manual.

7. If pavement is undermined during repair, sawcut and remove pavement back to undisturbed subgrade.

8. If pavement is damaged during repair, sawcut and remove back to undamaged pavement.

NOTES:

1. **OPTION A** (not allowed on Arterial streets, bus routes or truck routes.): Sawcut pavement 4 inches deep or 1/2 the panel thickness (T), whichever is greater, before removal. Break out with mechanical hammer and carefully remove remaining concrete next to joint so as not to disturb the pavement surface to remain. One side of utility cut is to be along existing joint. **OPTION B**: Sawcut pavement full depth and install 1\(1/2\) inch Ø dowels as shown. After drilling holes, place non-shrink grout in back of holes before inserting dowels. (Note: At interfaces of two adjacent new panels, an approved keyway may be substituted for dowels. For sawcuts through existing panel joints, sawcut existing panel joint(s) full depth before removing existing pavement.)

2. Partial panel replacement may be approved by the City Engineer per the **Engineering Design Manual**.

3. If utility trench width is greater than 1/2 of the panel width, then remove pavement to the next joint.

4. If utility trench wall must be closer than 3 feet from the joint, then remove pavement to the joint.

5. When panels are offset or irregular in any manner, the City Engineer shall determine the area of pavement replacement.

6. After placement of pavement, re-sawcut the joints that intersect the trench. The depth of sawcut is to be T/3. Seal the new joints per the **Engineering Design Manual**.

7. If pavement is undermined during repair, sawcut and remove pavement back to undisturbed subgrade.

8. If pavement is damaged during repair, sawcut and remove back to undamaged pavement.
INSTALL #5 TIE BARS, 20" LONG @ 30" CENTERS

UNDISTURBED SUBGRADE

SAWCUT AND BREAK OUT REMAINING CONCRETE - SEE NOTE 1

OPTION A: Sawcut pavement 4 inches deep or 1/2 the panel thickness (T), whichever is greater, before removal. Break out with mechanical hammer and carefully remove pavement next to joint so as not to disturb the pavement surface to remain. OPTION B: Sawcut pavement full depth and install #5 tie bars and 1 1/2 inch Ø dowels as shown (minimum of 2). (Note: At interfaces of two adjacent new panels, an approved keyway may be substituted for dowels.)

TIE BARS: after drilling holes, place non-shrink grout in back of holes before inserting tie bars.

Partial panel replacement may be approved by the City Engineer per the Engineering Design Manual.

If utility trench width is greater than 1/2 of the panel width, then remove pavement to the next joint. For sawcuts through existing panel joints, sawcut existing panel joint(s) full depth before removing existing pavement.

If utility trench wall must be closer than 3 feet from the joint, then remove pavement to the joint.

When panels are offset or irregular in any manner, the City Engineer shall determine the area of pavement replacement.

After placement of pavement, re-sawcut the joints that intersect the trench. The depth of sawcut is to be T/3. Seal the new joints per the Engineering Design Manual.

If pavement is undermined during repair, sawcut and remove pavement back to undisturbed subgrade.

If pavement is damaged during repair, sawcut and remove back to undamaged pavement.

HIGH EARLY STRENGTH 5,000 PSI PCC

UNDISTURBED SUBGRADE

CROSS SECTION

STREET CUT IN PCC PAVEMENT PARALLEL TO CENTERLINE

SCALE: NONE
DATE: JUNE 2018
1. If any part of an AC pavement restoration fails, a corrective inlay will be required. The width and length of the inlay will be determined by the City Engineer pursuant to these Standard Drawings.

2. In this example, the utility cut or trench is located within an AC roadway without a bike lane or parking lane, and there is less than 3 feet between the final pavement cut and the edge of AC pavement. Therefore, the permitee shall grind and inlay to the edge of the pavement as shown.

3. Where there is 3 feet or more between final pavement cut and edge of AC pavement, permitee may "jog" the grind and inlay as shown. The number of jogs shall be kept to a minimum.

6. The width of example "A-1" grind / mill and inlay shall be 9 feet minimum, 13 feet maximum.
If any part of an AC pavement restoration fails, a corrective inlay will be required. The width and length of the inlay will be determined by the City Engineer pursuant to these Standard Drawings.

In this example, the utility cut or trench is located within an AC roadway without a bike lane or parking lane, and there is 3 feet or more between the final pavement cut and the edge of AC pavement.

The width of example "A-2" grind / mill and inlay shall be 9 feet minimum, 13 feet maximum.
NOTES:

1. If any part of an AC pavement restoration fails, a corrective inlay will be required. The width and length of the inlay will be determined by the City Engineer pursuant to these Standard Drawings.

2. In this example, the utility cut or trench is located within an AC roadway without a bike lane or parking lane, and there is less than 5 feet between parallel trench cuts.

3. The width of example "A-3" grind/mill and inlay shall be 9 feet minimum, 24 feet maximum, and shall not encroach on adjacent travel lane or turn lane unless one of the two parallel pavement cuts is in each lane, and then not more than 2 feet.
1. If any part of an AC pavement restoration fails, a corrective inlay will be required. The width and length of the inlay will be determined by the City Engineer pursuant to these Standard Drawings.

2. In this example, the utility cut or trench is located within an AC roadway with a bike lane or parking lane, and there is less than 3 feet between the final pavement cut and the edge of AC pavement.

3. The number of jogs in the inlay shall be kept to a minimum.

4. The width of example "B-1" grind / mill and inlay shall be 9 feet minimum, 13 feet maximum.
1. If any part of an AC pavement restoration fails, a corrective inlay will be required. The width and length of the inlay will be determined by the City Engineer pursuant to these Standard Drawings.

2. In this example, the utility cut or trench is located within an AC roadway with a bike lane or parking lane, and there is 3 feet or more between the edge of AC pavement and final pavement cut.

3. The number of jogs in the inlay shall be kept to a minimum.

4. The width of example "B-2" grind / mill and inlay shall be 9 feet minimum, 13 feet maximum.
1. If any part of an AC pavement restoration fails, a corrective inlay will be required. The width and length of the inlay will be determined by the City Engineer pursuant to these Standard Drawings.

2. In this example, the utility cut or trench is located within an AC roadway with a bike lane or parking lane, and there is less than 5 feet between parallel trench cuts.

3. The number of jogs in the inlay shall be kept to a minimum.

4. The width of example "B-3" grind / mill and inlay shall be 9 feet minimum, 24 feet maximum, and shall not encroach on adjacent travel lane or turn lane unless one of the two parallel pavement cuts is in each lane, and then the grind / mill and inlay shall not encroach more than 2 feet.
1. This manhole adjustment method is to be used for adjusting a new or existing manhole after paving over it with the HMAC base and wearing courses.

2. Cover manhole with building paper and construct HMAC base and wearing courses.

3. Sawcut square or circular excavation around manhole 12 inches minimum from manhole frame. Orient diagonal of square so that it is parallel to roadway centerline.

4. Raise manhole frame and cover to finish grade by installing concrete grade rings and leveling mortar. No more than 10 inches of concrete grade rings shall be used to adjust any manhole to grade. Metal paving rings/risers are not allowed, except as necessary during a pavement overlay project, in which case only one (1) paving ring is allowed. Engineer must design and include calculations in the construction plan set, showing which manhole adjustment option will be used at each location.

5. Backfill with early strength PCC and HMAC wearing course.

NOTES:

- AC PAVEMENT BASE COURSE
- #4 BAR OR HOOP - 2 EACH
- CONCRETE GRADE RINGS - SEE NOTE 4
- BACKFILL WITH EARLY STRENGTH CONCRETE AS REQUIRED

SECTION A-A

PLAN

DATE: JUNE 2018
NOTES:
1. This manhole adjustment method is to be used for adjusting a new or existing manhole before paving over it with the HMAC wearing course or a pavement overlay.
2. If manhole is in street to be overlaid, go directly to note 3. If manhole is in a new pavement section, cover manhole with building paper and construct HMAC base course over manhole.
3. Sawcut square or circular excavation around manhole 12 inches minimum from manhole frame. Orient diagonal of square so that it is parallel to roadway centerline.
4. Raise manhole frame and cover to finish grade by installing concrete grade rings and leveling mortar. No more than 10 inches of concrete grade rings shall be used to adjust any manhole to grade. Metal paving rings/risers are not allowed, except as necessary during a pavement overlay project, in which case only one (1) paving ring is allowed. Engineer must design and include calculations in the construction plan set, showing which manhole adjustment option will be used at each location.
5. Backfill with early strength PCC.
6. Construct HMAC wearing course.
1. All pre-cast manhole sections shall conform to the requirements of ASTM C-478.

2. See CWS Standard Drawing O20 for poured in place concrete manhole base.

3. All joints and rubber gaskets shall conform to the requirements of ASTM C-443.

4. All pipe connections to manhole shall be watertight.

5. Pipe connections of 24" or greater shall require a manhole and channel detail.

6. Pipe connections of four or more mainlines shall require a manhole connection and channel detail.

7. Provide a minimum of 8" of intact (undisturbed) manhole wall between pipe breakouts as measured on the inside face of the manhole.

8. Breakout of wall for pipe shall be 2" minimum and 4" maximum clear of pipe wall.

9. This detail limited to maximum interior drop of 12" for sanitary connection and 48" for storm connection.

10. Watertight/tamper proof manhole frame and cover shall be used in all easement and off street areas. See CWS Standard Drawing 130.

11. All joints and rubber gaskets shall conform to the requirements of ASTM C-443.

12. The City reserves the right to require compaction testing of the bedding material when it exceeds the 12-inch base section beneath the manhole.

NON-SHRINKING GROUT. SEE DRAWING 331

12" MINIMUM OF 3/4"-0" COMPACTED BASE MATERIAL

LOCATE FRAME AND COVER OVER LEDGE OF AT LEAST 12" IN WIDTH

MAXIMUM 27" FROM TOP OF FIRST STEP TO TOP OF CASTING AND 18" MINIMUM FROM THE TOP OF THE CONE SECTION

STANDARD FRAME AND COVER OR WATERTIGHT FRAME AND COVER. SEE CWS STANDARD DRAWINGS NO. 110, 120, OR 130

SET FRAME IN NON-SHRINK GROUT

GRADE RINGS (2", 4", OR 6")

MAXIMUM 10" SET IN NON-SHRINK GROUT

STANDARD ECCENTRIC

36" CONE

MANHOLE SECTION (VARIABLE 1'-4')

MANHOLE STEPS SEE CWS STD DWG NO. 100

48" MINIMUM

5" MINIMUM

SEE DETAIL "A"

CONSTRUCT CHANNEL AND MIN 12" SHELF IN FIELD

PIPE I.D.

SMOOTH FINISH CHANNEL TO 3/4 VERTICAL HEIGHT OF PIPE

JANITORIAL SERVICES
NOTES:

2. NON-FLEXIBLE PIPES SHALL HAVE A SHEAR JOINT WITHIN 18"-24" OF THE INSIDE WALL OF THE MANHOLE.
NOTES:
1. This drawing replaces CWS Standard Dwg 050 and has been modified for use by City of Beaverton Ordinance #4303.
2. All joints and rubber gaskets shall conform to the requirements of ASTM C-433.
3. All manhole sections shall conform to the requirements of ASTM C-478 and applicable provisions of drawing 330.
4. Steps required on flat top manholes deeper than 48 inches.
5. *When depth of manhole is less than 4 feet, make hole for frame and cover in center of cover slab. Provide cover slab reinforcing design for all applications. Submit design to the City for review.
6. *Impact slab required when cover slab protrudes into road base material. Provide impact slab reinforcing design. Submit design to the City for review.
7. *Provide cover slab reinforcing design for all applications. Submit design to the City for review.
8. *The City reserves the right to deviate from this drawing and related requirements in the Engineering Design Manual as dictated by project design parameters, and as approved by the City Engineer.

* INDICATES MODIFICATIONS OF CWS STANDARD DWG 050
1. Manhole cone shall be manufactured by Cascade Concrete Products Inc or approved equal and conform to the requirements of ASTM C-478 and applicable provisions of drawing 330.
2. Reinforcing steel is grade 60. Steel area is 0.12 square inch per foot, (D3 on 3 inch spacing), 2" clear of the external surface.
3. All joints and rubber gaskets shall conform to the requirements of ASTM C-433.
4. Concrete shall have a 28 day ultimate strength of 4000 psi.
5. Lower section height varies and is to be determined by engineer.
STANDARD CAST IRON FRAME AND COVER PER CWS STANDARD DWG 160 SEE NOTE 2

FINISH GRADE

2" MIN CLEARANCE

CONCRETE ENCASED BOTTOM OF WYE FOR PLASTIC PIPE

3/4"-0

OUT OF SIDEWALK (BEHIND SIDEWALK UNLESS OTHERWISE INDICATED)

IN SIDEWALK

SEE DETAIL

NON-SHRINK GROUT

STANDARD MANHOLE GRADE RING

TOPSOIL UNLESS OTHERWISE SPECIFIED

WATERTIGHT PIPE PLUG WITH STOPS

PROVIDE 3/4"-0 FOR A MINIMUM OF 6" AROUND CLEANOUT

DETAIL

TO BUILDING

PLUG AT END OF SEWER MAIN

TO SEWER MAIN

3/4"-0

CONCRETE ENCASED BOTTOM OF WYE FOR PLASTIC PIPE

3/4"-0

NOTES:
1. Concrete encase entire wye section and 45° bend if concrete pipe.
2. Cleanout in sidewalk to be centered in sidewalk width.
NOTES:
1. Curb inlet top section and base are similar to, and structural reinforcing is equal to, ODOT/APWA curb inlet Type CG-3 Alternate Top Section, with altered dimensions, as shown.
2. All fabricated metal parts shall be new structural, ASTM A-36 steel, and be hot-dipped galvanized after fabrication, and all steel reinforcing shall be as per ODOT/APWA Standard Dwg ERD372.
3. All poured in place concrete shall have a 28 day strength of 3,000 psi, and slump of 2" to 4".
4. Install steps when distance from top of lid to flowline of pipe is greater than 48 inches, see Clean Water Services Standard Dwg 100. Set first step 12 inches from top of grate.
5. Install structure on minimum of 8 inches of 3/4"-0 compacted base material.
This detail is required only when pipe slope is 20% or greater.

<table>
<thead>
<tr>
<th>SLOPE</th>
<th>MINIMUM ANCHOR SPACING, CENTER TO CENTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.20 - 0.34</td>
<td>35 feet</td>
</tr>
<tr>
<td>0.35 - 0.50</td>
<td>25 feet</td>
</tr>
<tr>
<td>0.51 +</td>
<td>15 feet or concrete encasement</td>
</tr>
</tbody>
</table>
NOTES:

1. Baffle wall shall have #4 bar at 12" spacing each way.
2. Water tight seal of the concrete baffle wall and manhole wall/floor via integrally cast construction by the manhole manufacturer or equivalent.
3. Upper flow orifice shall be aluminum, aluminumized steel or treatment 1 galvanized steel.
4. Frame and ladder or steps are to be offset so that shear gate is visible from the top; climb-down space is clear of riser and gate; frame is clear of curb.
5. Multi-orifice elbows shall be pre-installed to insure ladder clearance.
6. Restrictor plate with orifice as specified in the contract. Opening is to be cut round and smooth. Neoprene gasket shall be installed between the orifice plate and concrete baffle to provide a watertight seal.
7. Shear gate shall be made of aluminum alloy in accordance with ASTM B 265 and ASTM B. 275, designation Z352A or cast iron in accordance with ASTM A 48, Class 30B. Lift handle may be solid rod or hollow tubing with adjustable hook as required. Neoprene rubber gasket required between riser mounting flange and gate flange. Whiting surfaces of lid and body shall be machined for proper fit. Flange mounting bolts shall be 1/2" diameter stainless steel.
8. Shear gate maximum opening shall be controlled by limited hinge movement, stop tab or some other devise.
9. Alternate shear gates designs are acceptable, if material specifications are met and flange bolt pattern matches.
10. Manhole certification required for traffic loading.

Installation Note:

Position hood such that bottom flange is min. 2" below the orifice B invert.

One snout may be use for both orifice C and B.

It may need be necessary to use two snouts and off set orifices to meet plan elevation.

Fenetra Detail:

Flow Control Structure Table

<table>
<thead>
<tr>
<th>Diameter Of Manhole (In.)</th>
<th>60&quot; MIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>F.L. (In)</td>
<td></td>
</tr>
<tr>
<td>F.L. (Out)</td>
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</tr>
<tr>
<td>Outlet Pipe Diameter (In.)</td>
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<tr>
<td>Number Of Orifice</td>
<td></td>
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<tr>
<td>Orifice A Elevation</td>
<td></td>
</tr>
<tr>
<td>Diameter Of Orifice A (In.)</td>
<td></td>
</tr>
<tr>
<td>Orifice B Elevation</td>
<td></td>
</tr>
<tr>
<td>Diameter Of Orifice B (In.)</td>
<td></td>
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<tr>
<td>Orifice C Elevation</td>
<td></td>
</tr>
<tr>
<td>Diameter Of Orifice C (In.)</td>
<td></td>
</tr>
<tr>
<td>Overflow Elevation</td>
<td></td>
</tr>
<tr>
<td>Rim Elevation</td>
<td></td>
</tr>
</tbody>
</table>
1. PROVIDE PROTECTION FROM ALL VEHICLE TRAFFIC, EQUIPMENT STAGING, AND FOOT TRAFFIC IN PROPOSED FACILITY AREAS PRIOR TO, DURING, AND AFTER CONSTRUCTION.
2. SIDEWALK ELEVATION MUST BE SET ABOVE CHECK DAM AND INLET/OUTLET ELEVATIONS TO ALLOW OVERFLOWS TO DRAIN TO STREET OR PIPED OVERFLOW SYSTEM AS APPLICABLE.
3. PLANter SHALL BE FLAT BOTTOM IN ALL DIRECTIONS TO WITHIN 1 INCH. CHECK DAMS SHALL BE PLACED ACCORDING TO INDIVIDUAL PROJECT PLANS PER CWS LIDA HANDBOOK DRAWING 406. PROVIDE 2" MIN FREEBOARD.
4. STREET SIDE CURB NOTCHES TO BE LOCATED AS IDENTIFIED ON PROJECT PLANS.
5. SIDEWALK CURB NOTCH: 1" LOWER THAN SIDEWALK, SLOPED TO FACILITY. SIDEWALK DRAINAGE NOTCHES SHALL ALIGN WITH SIDEWALK CONTRACT JOINTS AND LOW POINTS.
6. STREET SIDE LIDA PLANTER SHALL BE DESIGNED TO PERMANENTLY IMPEDE THE POSSIBILITY OF WATER FLOW FROM THE SWALE TO THE ADJACENT ROADWAY SUBGRADE WITHOUT THE USE OF FLEXIBLE LINERS AS WELL AS BE DESIGNED TO WITHSTAND A DYNAMIC 40 TON WHEEL LOAD ON THE ADJACENT ROADWAY LOCATED BETWEEN 6 TO 24 INCHES FROM THE ROADSIDE CURB FACE.
7. PERFORATED PIPE IN UNLINED FACILITIES: BOTTOM OF PIPE SHALL BE SET AT 2 1/2" ABOVE SUBGRADE. PERFORATED PIPE IN LINED FACILITIES: BOTTOM OF PIPE SHALL BE SET AT BASE OF DRAIN ROCK LAYER.
8. HYDRANTS, UTILITY POLES, OR ANY UTILITY BOXES PLACED WITHIN PLANTER MUST BE APPROVED BY JURISDICTION IN WRITING.
9. ACTUAL ELEVATIONS AND DIMENSIONS TO BE CONSTRUCTED AS IDENTIFIED ON PROJECT PLANS.
10. ENSURE THAT A DOWNSTREAM CATCH BASIN IS IN PLACE FOR EMERGENCY OVERFLOW.
**SCALE: NONE**

**DATE: JUNE 2018**

**CWS STREETSIDE LIDA PLANTER WITH STREET PARKING WITH C.O.B. MODIFICATIONS**

1. PROVIDE PROTECTION FROM ALL VEHICLE TRAFFIC, EQUIPMENT STAGING, AND FOOT TRAFFIC IN PROPOSED FACILITY AREAS PRIOR TO, DURING, AND AFTER CONSTRUCTION.
2. SIDEWALK ELEVATION MUST BE SET ABOVE CHECK DAM AND INLET/OUTLET ELEVATIONS TO ALLOW OVERFLOW TO DRAIN TO STREET OR PIPED OVERFLOW SYSTEM AS APPLICABLE.
3. PLANTER SHALL BE FLAT BOTTOM IN ALL DIRECTIONS TO WITHIN 1 INCH. CHECK DAMS SHALL BE PLACED ACCORDING TO INDIVIDUAL PROJECT PLANS PER CWS LIDA HANDBOOK DRAWING 406. PROVIDE 2" MIN FREEBOARD.
4. STREET SIDE CURB NOTCHES TO BE LOCATED AS IDENTIFIED ON PROJECT PLANS.
5. SIDEWALK CURB NOTCH: 1" LOWER THAN SIDEWALK, SLOPED TO FACILITY. SIDEWALK DRAINAGE NOTCHES SHALL ALIGN WITH SIDEWALK CONTRACTION JOINTS AND LOW POINTS.
6. **STREET SIDE LIDA PLANTER SHALL BE DESIGNED TO PERMANENTLY IMPED THE POSSIBILITY OF WATER FLOW FROM THE SWALE TO THE ADJACENT ROADWAY SUBGRADE WITHOUT THE USE OF FLEXIBLE LINERS AS WELL AS BE DESIGNED TO WITHSTAND A DYNAMIC 40 TON WHEEL LOAD ON THE ADJACENT ROADWAY LOCATED BETWEEN 6 TO 24 INCHES FROM THE ROADSIDE CURB FACE.
7. PERFORATED PIPE IN UNEARTHED FACILITIES: BOTTOM OF PIPE SHALL BE SET AT 2 1/2" ABOVE SUBGRADE. PERFORATED PIPE IN UNEARTHED FACILITIES: BOTTOM OF PIPE SHALL BE SET AT BASE OF DRAIN ROCK LAYER.
8. HYDRANTS, UTILITY POLES, OR ANY UTILITY BOXES PLACED WITHIN PLANTER MUST BE APPROVED BY JURISDICTION IN WRITING.
9. ACTUAL ELEVATIONS AND DIMENSIONS TO BE CONSTRUCTED AS IDENTIFIED ON PROJECT PLANS.
10. ENSURE THAT A DOWNSTREAM CATCH BASIN IS IN PLACE FOR EMERGENCY OVERFLOW.
NOTES:

1. INSTALL FLOW SPREADERS AT 50 FT. INTERVAL MEASURED ALONG SWALE CENTERLINE AND DOWNSTREAM OF THE PT OF EACH CURVE.
2. ROCK SHALL BE ANGULAR AND BLOCKY WITH 75% FRACTURED FACE MINIMUM.
3. FLOW SPREADER ROCK SIZE SHALL BE BASED ON VELOCITY OF FLOWS. 8"-10" ROCK CAN BE USED FOR THE WATER QUALITY FLOW. ROCK SIZE MUST BE ENGINEERED FOR FLOWS GREATER THAN THE WATER QUALITY FLOW.
4. FLOW SPREADER ROCK SHALL BE PLACED ON NATIVE SOIL PRIOR TO PLACEMENT OF TOP SOIL.
NOTES:
1. Indexed PVC gasketed saddle shall conform to ASTM 3034 SDR35.
2. PVC compounds shall conform to ASTM d1784 with cell class of 12454-B/C or 12364-C.
3. All elastomeric seals (rubber gaskets) shall conform to ASTM F477.
4. Indexed PVC gasketed saddle shall be installed with rubber gaskets approved for the sewer main wall configuration (profile or smooth wall).
5. Stainless steel bands shall be 300 series, 9/16" band width, cadmium plated, carbon steel, and attached with hex head, slotted screws.
6. Insertion hole shall be core drilled.
7. Indexed saddle shall be inserted a minimum of 1/4" from outside wall of host pipe and shall not protrude beyond the inside wall of the host pipe.
NOTES:
1. Sign post shall be inserted a minimum of 12 inches into the 36 inch base.
2. See Chapter 4 of the Engineering Design Manual for the material specifications.
TYPICAL SIGN LOCATIONS

1. Sign locations shall be according to the MUTCD and as modified herein.
2. Signs where the sidewalk is curb tight shall be located 6 inches outside the sidewalk to a maximum distance of 7 feet from the face of curb.
NOTES:
1. Flat blanks shall be 0.080" gauge with 6063 T6 alodine coated aluminum substrate.
2. Background shall be white 3M Scotchlite brand High Intensity Reflective sheeting.
3. Symbol shall be black, 5" EM series
4. Legend text shall be 1.5" C series.
5. Border, legend, circle & diagonal shall be red.
6. For sign mounting, see drawing 400.
1. On all streets with posted speeds of 25 mph or less, new street name letters shall be 4 inches tall.
2. Letter styles from the *Standard Alphabets for Highway Signs Manual* shall be as follows:
   a. For the name of street use 4 inch series 'C'.
   b. For numbered streets use 4 inch series 'D' for the number and 3 inch series 'C' for the suffix.
   c. For prefixes, suffixes and block numbers use 3 inch series 'C'.
3. All signs shall include block numbers, as assigned by the City. Number streets shall include block numbers only when they differ from the actual street number.
4. Flat blanks for 4 inch street name signs shall be 0.100 inch gauge with 6063 T6 alodine coated aluminum substrate.
5. The minimum length shall be 24 inches and the maximum length shall be 36 inches, in 6 inch increments, with 1.5 inch radius corners.
6. Street name signs shall be green *3M Scotchlite* brand High Intensity Prizmatic Reflective sheeting.
7. All letters, numbers and borders shall be white *3M Scotchlite* brand High Intensity Prizmatic Reflective sheeting.
8. For post mounting assembly see *Beaverton Standard Dwg 400*.

**NOTES:**

1. On all streets with posted speeds of 25 mph or less, new street name letters shall be 4 inches tall.
2. Letter styles from the *Standard Alphabets for Highway Signs Manual* shall be as follows:
   a. For the name of street use 4 inch series 'C'.
   b. For numbered streets use 4 inch series 'D' for the number and 3 inch series 'C' for the suffix.
   c. For prefixes, suffixes and block numbers use 3 inch series 'C'.
3. All signs shall include block numbers, as assigned by the City. Number streets shall include block numbers only when they differ from the actual street number.
4. Flat blanks for 4 inch street name signs shall be 0.100 inch gauge with 6063 T6 alodine coated aluminum substrate.
5. The minimum length shall be 24 inches and the maximum length shall be 36 inches, in 6 inch increments, with 1.5 inch radius corners.
6. Street name signs shall be green *3M Scotchlite* brand High Intensity Prizmatic Reflective sheeting.
7. All letters, numbers and borders shall be white *3M Scotchlite* brand High Intensity Prizmatic Reflective sheeting.
8. For post mounting assembly see *Beaverton Standard Dwg 400*.
1. On all streets with posted speeds of 30 mph and greater, new street name letters shall be 6 inches tall.

2. Letter styles from the *Standard Alphabets for Highway Signs Manual* shall be as follows:
   a. For the name of street use 6 inch series 'C'.
   b. For numbered streets use 6 inch series 'D' for the number and 4 inch series 'C' for the suffix.
   c. For prefixes and suffixes use 4 inch series 'C'.

3. All signs shall include block numbers, as assigned by the City. Number streets shall include block numbers only when they differ from the actual street number.

4. Flat blanks for the 6 inch street name signs shall be 0.100 inch gauge with a 6063 T6 alodine coated aluminum substrate.

5. The minimum length shall be 24 inches and the maximum length shall be 48 inches, in 6 inch increments, with 1.5 inch radius corners.

6. Street name signs shall be green *3M Scotchlite* brand High Intensity Prizmatic Reflective sheeting.

7. All letters, numbers and borders shall be white *3M Scotchlite* brand High Intensity Prizmatic Reflective sheeting.

8. For post mounting assembly see *Beaverton Standard Dwg 400*.

**NOTES:**

- **A**
- **B**
- **C**
- **D**
- **E**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>10&quot;</strong></td>
<td>6&quot;</td>
<td>4&quot;</td>
<td>2 ¼&quot;</td>
<td>1 ½&quot;</td>
<td></td>
</tr>
</tbody>
</table>

**CRITICAL DIMENSIONS**
Notes:
1. Flat blanks shall be 0.060 inch gauge with 6063 T6 alodine coated aluminum substrate.
2. Both sides of block number plate shall be green 3M Scotchlite brand High Intensity Prizmatic Reflective sheeting.
3. All numbers shall be 3 inch series "B", white 3M Scotchlite brand High Intensity Prizmatic Reflective sheeting.
4. Always mount lower plate on the side nearest to intersection.
5. For street name sign, see Beaverton Standard Dwg 411.
1. Flat blanks shall be 0.080 inch gauge with 6063 T6 alodine coated aluminum substrate.
2. All letters shall be black series "C".
3. Background shall be white 3M Scotchlite brand High Intensity Reflective sheeting.
4. For sign mounting, see Beaverton Standard Dwg 400.

NOTES:
1. Flat blanks shall be 0.080 inch gauge with 6063 T6 alodine coated aluminum substrate.
2. All letters shall be black series "C".
3. Background shall be white 3M Scotchlite brand High Intensity Reflective sheeting.
4. For sign mounting, see Beaverton Standard Dwg 400.
1. Flat blanks shall be 0.080 inch gauge with 6063 T6 alodine coated aluminum substrate.
2. All letters shall be black and series are as noted.
3. Background shall be white 3M Scotchlite brand High Intensity Reflective sheeting.
4. For sign mounting, see Beaverton Standard Dwg 400.
1. Specific signing as directed by MUTCD or as allowed by the City Traffic Engineer.
2. Use predrilled (ODOT style) "V-Loc Mailbox Support System".
3. Cut bolt end within 1/4 inch of nut, deform end to prevent removal.
4. All bolts, nuts and washers shall be galvanized steel unless otherwise noted.
5. Barricade is to be located 12 inches from back of curb.
1. A minimum 6 inch core drill hole, at 6 to 12 inches from the edge of pavement or 6 inches from the lip of gutter pan or face of curb when gutter is not present.
2. Seal the top of conduit with duct seal.

NOTES:
NOTE:
Conduit shall protrude a maximum of 2 inches above the finished surface foundation.
ELEVATION

SECTION A-A

NOTES:
1. Rails shall be white and red encapsulated lens sheeting.
2. Rails shall be 2"x8" pressure treated lumber.
4. For wider applications, multiple sections as shown shall be used.

SECTION B - B
NOTES:
1. Rails shall be white and red encapsulated lens sheeting.
2. Rails shall be 2"x8" pressure treated lumber.
4. For wider applications, multiple sections as shown shall be used.
5. The above barricade indicates that the traffic passes of the left of the device. If traffic is to pass to the right, the stripes angle must be reversed.
NOTES:
1. If maximum allowable slope of 3:1 must be exceeded or a retaining wall is to be constructed at edge of path (with City Engineer's approval only), provide handrail approved by the City Engineer along the entire length of the non-conforming slope or retaining wall.
2. Edge clearance of 2' or more is desirable from handrails, trees, walls, fences, poles, guardrails or other lateral obstructions.
3. 3:1 side slope is desirable for mowing purposes.
4. Provide City approved drainage pipe at low points.
5. Reseed disturbed surfaces.
6. Path may be offset from centerline of property corridor only with approval from the City Engineer.
7. Path cross-slope to be designed at 1.5% max, 2.0% max constructed.
NOTES:
Approved for use under the following conditions:
1. Locations per approved plan.
2. Neighborhood routes & local streets only.
3. Street has posted speed 25 mph or less.
4. Tangent sections or curves with 300' radius or larger
5. Street has no more than 2 travel lanes.

Other conditions require a design exception. See Sect 160 of the Engineering Design Manual.

MID-BLOCK PEDESTRIAN CROSSING
SECTION A-A

Fence

Existing or new gate/end post

Removable vehicle barrier post. See drawing 715

Shared-Use path. See drawing 700

PLAN VIEW

Fencing & post

4" yellow stripe

3' 3' 3' 3'

10'-20'
NOTES:
1. Barrier is to be used only when specifically approved by City Engineer.
2. Barrier is not to be used on fire accesses.
3. Padlock to be provided by the City.
TYPICAL WATER LINE TRENCH BACKFILL

CLASS 'A' BACKFILL
OUTSIDE STREET RIGHT-OF-WAY
AS APPROVED BY ENGINEER

CLASS 'B' BACKFILL
WITHIN STREET RIGHT-OF-WAY

MOUND EXCESS NATIVE MATERIAL TO ALLOW FOR SETTLEMENT. SEE NOTE 3.

EXISTING GROUND

MIN. DEPTH:
36" FOR PIPES ≤ 12" Ø;
48" FOR PIPES > 12" Ø & IN UNIMPROVED AREAS

MIN. 5" OF DENSE GRADED HMAC (2 LIFTS) OR MATCH EXIST. A.C. SAND SEAL ALL EDGES

SAW CUT FOR TRENCH

2nd SAW CUT FOR A.C. REPAIR – 6" MIN OR TRIM EDGES TO SOUND PAVEMENT

EXISTING A.C.

CLASS 'A'
NATIVE BACKFILL
- 90% COMPACTION

EXISTING SUBGRADE MATERIAL

CLASS 'B' MATERIAL
3/4"-0" CRUSHED ROCK – 95% COMPACTION

PIPE ZONE MATERIAL
(CLASS 'B' MATERIAL)
COMPACTION 90%

PIPE BEDDING MATERIAL (CLASS 'B' MATERIAL) DEPTH BELOW OUTSIDE OF PIPE BELL, SEE TABLE A.

FILTER FABRIC (WHEN REQUIRED)

TRENCH FOUNDATION STABILIZATION, AS REQUIRED

DIM "D"

DIM "C"

DIM "B"

24" MINIMUM

TABLE A

<table>
<thead>
<tr>
<th>&quot;A&quot; (IN)</th>
<th>&quot;B&quot; (IN)</th>
<th>&quot;C&quot; (IN)</th>
<th>&quot;D&quot; (IN)</th>
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<td>4</td>
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<td>12</td>
</tr>
<tr>
<td>24</td>
<td>8</td>
<td>6</td>
<td>12</td>
</tr>
</tbody>
</table>

NOTES:
1. "A" = NOMINAL PIPE DIAMETER
2. SEE "CITY OF BEAVERTON ENGINEERING DESIGN MANUAL" FOR ADDITIONAL REQUIREMENTS.
3. RESTORE LANDSCAPE TO PRE-EXISTING CONDITIONS OR BETTER.

Beaverton Engineering
DATE: JUNE 2018

SCALE: NONE

620-1
TYPICAL WATER LINE & FIRE HYDRANT LOCATION

NOTES:
1. A TVF&R DEPUTY FIRE MARSHAL MUST APPROVE LOCATION OF ALL FIRE HYDRANTS.
2. HYDRANT SHALL BE LOCATED IN AN AREA WHICH ALLOWS FOR REQUIRED CLEAR ZONE SURROUNDING THE HYDRANT. SEE DRAWING 650-1 FOR CLEAR ZONE DETAIL.
3. SEE DRAWINGS 650-2 & 650-3 FOR HYDRANT INSTALLATION DETAILS.
4. CURB AND SIDEWALK CONFIGURATION CAN BE FOUND IN THE CITY'S TRANSPORTATION SYSTEM PLAN.
KEYNOTES:

1. CONCRETE THRUST BLOCK POURED AGAINST UNDISTURBED EARTH. THRUST BLOCK SIZE SHALL BE PER TABLE 1 AND SHALL NOT BE LESS THAN ONE FOOT IN ANY DIMENSION. CONCRETE SHALL BE CLASS 3000.

2. COVER TAPPING SLEEVE WITH 8 MIL PLASTIC MATERIAL AS SHOWN PRIOR TO POURING THRUST BLOCK AND BACKFILLING.

3. STAINLESS STEEL TAPPING SLEEVE WITH GASKET AND FLANGED CONNECTION.

4. GATE VALVES 10” AND LARGER WITH LESS THAN 24” BETWEEN THE OPERATING NUT AND FINISHED GRADE WILL REQUIRE A HORIZONTAL BEVEL GEAR ACTUATOR.

5. ALL JOINTS ON BRANCH PIPE SHALL BE RESTRAINED.

NOTES: (TAPPING CONTRACTOR ONLY)

1. BEFORE INSTALLING TAPPING SLEEVE, CONTRACTOR SHALL THOROUGHLY CLEAN PIPE TO REMOVE ALL DIRT, ROCKS, AND OTHER FOREIGN MATERIAL FROM PIPE WHERE SLEEVE WILL BE INSTALLED.

2. SLEEVE BOLTS SHALL BE TIGHTENED TO MANUFACTURER’S TORQUE SPECIFICATIONS.

3. CONTRACTOR SHALL ENSURE THAT GASKET IS PROPERLY ALIGNED AND FREE OF FOREIGN MATERIAL PRIOR TO TIGHTENING SLEEVE BOLTS.

4. SLEEVE LOCATION AND INSTALLATION SHALL BE APPROVED BY WATER OPERATIONS INSPECTOR PRIOR TO TAPPING.

5. CONTRACTOR SHALL AIR TEST SLEEVE TO 40 PSI PRIOR TO TAPPING.

6. CONTRACTOR SHALL FLUSH VALVE PRIOR TO PIPE CONNECTION.

7. EDGE OF TAPPING SLEEVE SHALL BE A MINIMUM OF 18” FROM BEND OR JOINT.

<table>
<thead>
<tr>
<th>BRANCH PIPE DIA (IN)</th>
<th>THRUST BLOCK BEARING AREA (MIN SF)</th>
<th>THRUST BLOCK CONCRETE (MIN CY)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>1.3</td>
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<td>0.75</td>
</tr>
<tr>
<td>18</td>
<td>26.0</td>
<td>0.97</td>
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</table>
KEYNOTES:

1. 2" X 12" BRASS NIPPLE
2. 2" CTS x CTS 90° ELBOW
3. 2" TYPE K RIGID COPPER
4. GRANULAR DRAIN BACKFILL MATERIAL
5. 8" PVC ASTM D-3034, LENGTH AS REQUIRED
6. MJ RESTRAINED JOINT W/ MEGAPLUG, CAP TAPPED 2" IP THREAD
7. 2" MIPT x CTS ADAPTOR
8. FIPT x CTS ADAPTOR W/ 2" MIPT BRASS PLUG (HAND TIGHT)
9. 2" GATE VALVE W/2" OPERATING NUT FIPT x FIPT
10. VALVE BOX & LID. SEE DRAWING 640-2

NOTES:
1. THIS DETAIL IS APPLICABLE TO DEAD END LINES SERVING CUSTOMERS WHICH WILL NOT BE EXTENDED IN THE FUTURE.
KEYNOTES:
1. 2" X 12" GALVANIZED PIPE NIPPLE
2. MJ RESTRAINED JOINT W/ MEGALUG, CAP TAPPED 2" IP THREAD
3. 2" GALVANIZED NIPPLE (LENGTH WILL VARY)
4. 2" FIPT 90° GALVANIZED ELBOW
5. PIPE BEDDING AND BACKFILL MATERIAL PER DRAWING 620–1
6. 2" FIPT X CTS ADAPTOR W/ 2" MIPT BRASS PLUG (HAND TIGHT)

NOTES:
1. THIS DETAIL APPLICABLE TO DEAD END LINES SERVING CUSTOMERS WHICH MAY/WILL BE EXTENDED IN THE FUTURE.
2. INSTALL GATE VALVE SIZED AT FULL PIPE DIAMETER WHERE SHOWN.
KEYNOTES:

1. MJ RESTRAINED JOINT W/ MEGALUG & ECCENTRIC CAP, TAPPED 4" IPT
2. PIPE BEDDING AND BACKFILL MATERIAL – SEE DRAWING 620-1
3. 4" THREADED GALVANIZED PIPE SPOOL W/ COUPLER & PLUG (HAND TIGHT).
   CUT PIPE TO REQUIRED LENGTH.
4. 4" THREADED GALVANIZED 90° ELBOW
5. FULLY RESTRAINED LINE SIZE BUTTERFLY VALVE (SEE NOTES 1 & 2 BELOW)
6. 4" THREADED GALVANIZED PIPE
7. STANDARD VALVE BOX – SEE DRAWING 640-2

NOTES:
1. THIS DETAIL APPLICABLE TO DEAD END LINES SERVING CUSTOMERS WHICH MAY/WILL BE
   EXTENDED IN THE FUTURE.
2. ALL PIPE JOINTS SHALL BE RESTRAINED.
3. FOR PIPES LARGER THAN 12", SEE ENGINEER FOR BLOW-OFF REQUIREMENT.
4. GALVANIZED PIPE IS ACCEPTABLE FOR USE IN PLACE OF DUCTILE IRON PIPE. CONTACT
   THE WATER DEPARTMENT FOR DETAILS.
5. ADD 1" CARV UPSTREAM OF GATE VALVE WHERE DEAD END IS LOCATED AT HIGH POINT.
CHANNEL ENCLOSURE "GREEN" WITH HEX LOCKING SYSTEM

KEYNOTES:
1. 2"x12" BRASS NIPPLE
2. 2" CTSxMIPT COUPLING
3. 2" TYPE K RIGID COPPER PIPE
4. 2" CTSxCTS 90° ELBOW
5. 2" GATE VALVE W/ 2" OPERATING NUT (REQ'D ON PIPE 12" AND LARGER)
6. MEGALUG & MJ CAP W/ 2" IP TAP
7. 8"x8"x8" CONCRETE PIER BLOCK ON UNDISTURBED NATIVE SOIL
8. FULLY RESTRAINED LINE SIZE MJ GATE VALVE
9. STANDARD VALVE BOX – SEE DRAWING 640-2
10. CLEAN 1" DRAIN ROCK, 2 CU FT MIN
11. AUTO-FLUSHER. SEE APPROVED PRODUCTS LIST

SCALE: NONE
DATE: JUNE 2018
ELEVATION

CHANNEL ENCLOSURE "GREEN" WITH HEX LOCKING SYSTEM

UV RESISTANT BOX WITH LOCKING LID

DECHLOR BASKET

4" AIR GAP

6" SEWER CONNECTION

SPECIFY DEPTH OF BURY WHEN ORDERING

WATER MAIN

KEYNOTES:
1. 2" x 4" BRASS NIPPLE
2. 2" CTSxMIPT COUPLING
3. 2" TYPE K RIGID COPPER PIPE
4. 2" CTSxCTS 90° ELBOW
5. 2" GATE VALVE W/ 2" OPERATING NUT (REQ'D ON PIPE 12" AND LARGER)
6. TAPPING SADDLE W/ 2" THREADED OUTLET
7. 8"x8"x8" CONCRETE PIER BLOCK ON UNDISTURBED NATIVE SOIL
8. WATER MAIN
9. STANDARD VALVE BOX – SEE DRAWING 640-2
10. CLEAN 1" DRAIN ROCK, 2 CU FT MIN
11. AUTO-FLUSHER, SEE APPROVED PRODUCTS LIST

PLAN

CURB & GUTTER

18" MIN

PLANTER OR SIDEWALK

6" MIN

FILE: 630-7.dwg

DATE: June 2018
NOTES:
1. STRADDLE BLOCKS SHALL BE USED ONLY ON EXISTING PIPES WITH NO MECHANICAL RESTRAINTS OR AT LOCATIONS WHERE MECHANICAL PIPE JOINT RESTRAINTS ARE NOT FEASIBLE. PRIOR APPROVAL BY WATER OPERATIONS IS REQUIRED.
2. INSTALL MINIMUM 8-MIL TOTAL THICKNESS POLYETHYLENE SHEET AROUND RESTRAINT CLAMPS AND SECURE SHEET ENDS PRIOR TO POURING CONCRETE.
3. THIS DETAIL APPLICABLE TO 8" AND SMALLER WATER MAINS. CONCRETE STRADDLE BLOCKS FOR 10" AND LARGER WATER MAINS SHALL BE DESIGNED AND STAMPED BY THE ENGINEER OF RECORD.
4. ANY FIELD MIXING OF CONCRETE SHALL BE APPROVED BY A CITY INSPECTOR.
### Bearing Area of Thrust Blocks in Sq Ft

<table>
<thead>
<tr>
<th>FITTING SIZE</th>
<th>TEE</th>
<th>90° BEND</th>
<th>45° BEND</th>
<th>22 1/2° BEND</th>
<th>11 1/4° BEND</th>
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<td>45.2</td>
<td>64.0</td>
<td>34.6</td>
<td>17.7</td>
<td>8.9</td>
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</tbody>
</table>

Values based on 200 PSI water pressure and 2000 PSF soil bearing capacity.

### Volume of Thrust Block in Cu Yds (Vertical)

<table>
<thead>
<tr>
<th>FITTING SIZE</th>
<th>45° BEND</th>
<th>22.5° BEND</th>
<th>11.25° BEND</th>
</tr>
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</tr>
<tr>
<td>6</td>
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</tr>
<tr>
<td>16</td>
<td>14.8</td>
<td>5.6</td>
<td>2.3</td>
</tr>
</tbody>
</table>

### Steel Rebar (2)

### Vertical Bend

### Notes:
1. All pipe fitting tees, bends, and dead ends shall be restrained by concrete thrust blocking or mechanical pipe joint restraints.
2. Concrete thrust blocking or straddle blocks shall be used only on existing pipes with no mechanical restraints or at locations where mechanical pipe joint restraints are not feasible. Prior approval by water operations is required. See drawing 630–8 for straddle block requirements.
3. All concrete thrust blocking shall be poured against undisturbed earth.
4. All concrete shall be class 3000.
5. Install minimum 8–mil total thickness polyethylene sheet around fitting. Secure sheet ends to prevent infiltration of dirt between sheet and pipe fitting prior to pouring concrete.
6. Protect mechanical joint followers and bolts from concrete with temporary forms and polyethylene sheeting – see note 5.
7. Any field mixing of concrete shall be approved by water operations.
FOSTER ADAPTOR OPTION
SEE NOTE 7.

KEYNOTES:
1. MJ TEE
2. MJ CROSS
3. MJ GATE VALVE
4. MJ BUTTERFLY VALVE
5. FOSTER ADAPTOR
6. RESTRAINED DIP SPOOL PE:
   1'-0" MIN/2'-0" MAX

NOTES:
1. VALVES SHALL BE SAME SIZE AS
   WATER MAIN BEING SUPPLIED.
2. GATE VALVES 12" AND SMALLER.
   BUTTERFLY VALVES 16" AND LARGER.
3. MAXIMUM SPACING FOR VALVES: 500
   FT.
4. VALVES SHALL NOT BE LOCATED IN
   CURB, GUTTER, OR SIDEWALK AREA.
5. SEE DRAWING 640-2 FOR VALVE BOX
   REQUIREMENTS.
6. ALL MECHANICAL JOINTS SHALL BE
   RESTRAINED.
7. FOSTER ADAPTOR OPTION MAY BE USED
   WITH PRIOR APPROVAL BY THE PUBLIC
   WORKS DEPARTMENT ENGINEER.
KEYNOTES:

1. OLYMPIC FOUNDRY VB910 VALVE BOX & COVER WITH "WATER" CAST IN THE TOP SURFACE.

2. UNPAVED AREAS ONLY: PROVIDE 24" SQUARE BY 5 1/2" THICK CONCRETE PAD CENTERED ON VALVE BOX. INSTALL OVER 4" COMPACTED 3/4"-0" CRUSHED ROCK.

3. 6" SCH 40 OR D3034 PVC PIPE RISER WITH END CUT TO FIT OVER VALVE HOUSING, LENGTH AS NECESSARY.

4. MJ GATE VALVE (BUTTERFLY VALVE SIMILAR, NOT SHOWN)

NOTES:

1. CENTER VALVE BOX ON AXIS OF OPERATING NUT AND SET PLUMB WITH FINISHED GRADE.

2. OPERATOR EXTENSION REQUIRED WHEN VALVE NUT IS DEEPER THAN 6 FEET FROM FINISHED GRADE. REFER TO DRAWING 640-4
KEYNOTES:
1. 5” OD STEEL PIPE
2. ½” CARRIAGE BOLT
3. 5”Ø x ½” STEEL PLATE W/ 3”Ø CENTER HOLE
4. ½” NYLON LOCKING NUT

NOTES:
1. USE OF HIGH VOLUME TRAFFIC LIDS MUST BE APPROVED BY WATER OPERATIONS.
KEYNOTES:

1. 2" SQUARE STEEL STOCK 2" LONG
2. 1/4" STEEL PLATE ROCK GUARD SHALL BE 3/8" SMALLER DIAMETER THAN ID OF PIPE RISER (TYP)
3. 2"x2"x.120 WALL SQUARE TUBE OR 1" SCH 80 STEEL PIPE, HOT DIP GALVANIZED AFTER FABRICATION
4. 8" D3034 PVC PIPE RISER, ONE CONTINUOUS LENGTH AS REQUIRED
5. 2" SQUARE SOCKET MADE WITH 3/4" THICK STEEL PLATE OR 2 1/2"x2 1/2"x.180 WALL T.S.

NOTES:

1. OPERATOR EXTENSION REQUIRED WHEN VALVE NUT IS DEEPER THAN 6 FT FROM FINISHED GRADE
2. STEEL MATERIALS SHALL BE GRADE ASTM A36 OR EQUIVALENT
KEYNOTES:
1. ¾” OR 1” CORP STOP CCxCTS
2. DRAIN ROCK
3. ¾” OR 1” TYPE K SOFT COPPER TUBING
4. ¾” OR 1” ANGLE METER STOP BALL VALVE W/CTS INLET AND 1”x¾” BRASS BUSHING
5. ¾” OR 1” x3” BRASS NIPPLE
6. ¾” OR 1” BRASS 90° ELBOW
7. ¾” OR 1” x3 BRASS NIPPLE W/BRASS COUPLER
8. ¾” OR 1” COMB. AIR VALVE (CARV)
9. WATTS MODEL A–387A NYLON ½” BARB TO ½” MIPT ADAPTOR *
10. TORO FUNNY PIPE (FP) #53265 *
11. FP #53306 ½” FEMALE ELBOW & #53388 ½” MALE ADAPTOR *
12. FP #53389 ¾” MALE ADAPTOR *
13. ¾” GALV TEE
14. ¾” GALV PIPE
15. ¾” SCREENED TANK VENT
16. WATER METER BOX 10”x15”x12” W/SOLID COVER. ARMORCAST OR EQUIV.

NOTES:
1. IN UNDEVELOPED AREAS: INSTALL BLUE-COLORED CARSONITE STAKE WITH "AIR RELEASE VALVE" IN 1” BLACK LETTERS ON BOTH SIDES. LOCATE POST WITHIN 3’ OF THE METER BOX.
2. *ALTERNATE: WATTS MODEL A–785 BRASS ¾” x CLOSE NIPPLE, WATTS A–815 (103–R) REDUCING COUPLING, ½” FIPT x ¾” FIPT, & FP #53388 ½” MALE ADAPTOR.
3. A MINIMUM 1% UPWARD SLOPE SHALL BE MAINTAINED ON THE COPPER TUBING FROM THE WATER MAIN TO THE CARV.
KEYNOTES:

1. 3/4" OR 1" CORP STOP CCxCTS
2. NYLON WIRE TIE
3. 3/4" OR 1" TYPE K SOFT COPPER TUBING
4. 3/4" OR 1" ANGLE METER STOP BALL VALVE W/CTS INLET AND 1"x3/4" BRASS BUSHING
5. 3/4" OR 1" x3" BRASS NIPPLE
6. 3/4" OR 1" BRASS 90° STREET ELBOW
7. 3/4" OR 1" BRASS COUPLER
8. 3/4" OR 1" COMB. AIR VALVE (CARV)
9. WATTS MODEL A-387A NYLON 3/4"
    BARB TO 3/8" MIPT ADAPTOR
10. TORO FUNNY PIPE (FP) #53265
11. FP #53306 1/2" FEMALE ELBOW &
    #53304 1/2" MALE ADAPTOR W/ 40 MESH BRASS SCREEN WRAPPED ON NIPPLE, HELD W/ NYLON WIRE TIE
12. 2"-6" PVC PIPE W/ SLOT FOR SERVICE LINE
13. DRAIN ROCK
14. CHARLES INDUSTRIES, LTD
    NON-LOUVERED VERTICAL PEDESTAL MODEL #103, DARK GREEN COLORED W/ BRACKET OPTION 'A'

NOTES:

1. A MINIMUM 1% UPWARD SLOPE SHALL BE MAINTAINED ON THE COPPER TUBING FROM THE WATER MAIN TO THE CARV.
KEYNOTES:

1. ¾" OR 1" CORP STOP CCxCTS
2. ¾" OR 1" TYPE K SOFT COPPER TUBING (SEE NOTE 2)
3. ¾" OR 1" CURB STOP VALVE FIPT x FIPT W/ CTSxMIPT ADAPTOR
4. ¾" OR 1" x6" BRASS NIPPLE
5. ¾" OR 1" BRASS 90° ELBOW W/ FIPT COUPLER
6. 18"x12"x2" CONCRETE PAD
7. ¾" OR 1" AIR RELEASE VALVE (ARV) A.R.I. MODEL S-050V
8. WATER METER BOX 13"x24"x12" W/ SOLID COVER. ARMORCAST OR EQUIV.
9. 2"–6" PVC PIPE WITH SLOT FOR SERVICE LINE
10. DRAIN ROCK

NOTES:

1. IN UNDEVELOPED AREAS: INSTALL BLUE–COLORED CARSONITE STAKE WITH "AIR RELEASE VALVE" IN 1" BLACK LETTERS ON BOTH SIDES, BY WATER DEPARTMENT STAFF. LOCATE POST WITHIN 3’ OF THE AIR RELEASE METER BOX
2. A MINIMUM 1% UPWARD SLOPE SHALL BE MAINTAINED ON THE COPPER TUBING FROM THE WATER MAIN TO THE CARV.
3. AIR VENT PIPE REQUIRED IN AREAS OF HIGH GROUND WATER, SEE DRAWING 640–5
KEYNOTES:

1. 2" TAPPING SADDLE
2. 2" CORP STOP MIPTxCTS
3. 2" CTSxCCTS 90° ELBOW
4. 2" CTSxMIPT COUPLING
5. 2" GATE VALVE W/ 2" OPERATING NUT FIPTxFIPT
6. 2" TYPE K RIGID COPPER PIPE (SEE NOTE 2)
7. VALVE BOX PER 540-2
8. 2" BRASS CTSxCCTS 90° ELBOW
9. 8"x8"x8" CONCRETE PIER BLOCK
10. 2" CTSxFIPT COUPLER
11. 2" COMB. AIR VALVE (CARV) A.R.I. MODEL D-040-P
12. WATER METER BOX 13"x24"x12" W/ SOLID COVER. ARMORCAST OR EQUIV.
13. DRAIN ROCK
14. 1½" GALV SCH 40 MIPTxSLIP (GLUE)
15. 1½" GALV SCH 40 PIPE
16. 1½" GALV COMPRESSION COUPLER
17. 1½" GALV TEE
18. 1½" SCREENED TANK VENT

NOTES:

1. IN UNDEVELOPED AREAS: INSTALL BLUE-COLORED CARBONITE STAKE WITH "AIR RELEASE VALVE" IN 1" BLACK LETTERS ON BOTH SIDES. LOCATE POST WITHIN 3' OF THE AIR RELEASE METER BOX.
2. A MINIMUM 1% UPWARD SLOPE SHALL BE MAINTAINED ON THE COPPER TUBING FROM THE WATER MAIN TO THE CARV.
NOTES:

1. THE FOLLOWING ITEMS ARE PROHIBITED WITHIN THE CLEAR ZONE:
   • VEHICLE PARKING
   • FENCES
   • TREES
   • LARGE SHRUBS
   • RETAINING WALLS
   • STREET LIGHTS
   • SIGNS & SIGN POSTS
   • ANYTHING ELSE THAT MAY INTERFERE WITH THE OPERATION OF THE HYDRANT

2. THE FOLLOWING ITEMS ARE ALLOWED WITHIN THE CLEAR ZONE:
   • LAWN GRASS
   • MULCH
   • BARKDUST
   • GROUND COVER
   • LOW PLANTINGS
KEYNOTES:

1. APPROVED FIRE HYDRANT ASSEMBLY PER MANUFACTURER’S SPECIFICATIONS WITH STORZ HPFA50–45NH PERMANENT HYDRANT ADAPTER ON THE 4½” PORT.
2. DRAIN ROCK, 4 CU. FT. MINIMUM
3. TYPICAL 6” MEGALUG RETAINER OR EQUAL AT EACH PIPE FITTING
4. 12”x12”x8” CONCRETE PIER BLOCK PLACED ON UNDISTURBED NATIVE SOIL
5. 6” MJxMJ GATE VALVE.
6. WATER MAIN SIZE MJ x 6” MJ TAPPING SLEEVE, SEE DRAWING 630–2, SEE NOTE 4
7. CONCRETE THRUST BLOCK, SEE DRAWING 630–9
8. VALVE BOX, SEE DRAWING 640–2

NOTES:

1. REFER TO DRAWING 650–1 FOR HYDRANT CLEAR ZONE REQUIREMENTS
2. HYDRANT BURY DEPTH — 30” MIN., 6’ MAX.
3. WHEN FINAL LIFT OF HMAC IS PLACED, CONTRACTOR TO SET A BLUE REFLECTOR BUTTON FOR THE FIRE DEPARTMENT. SEE DRAWING 650–4 FOR PLACEMENT
4. USE MJ OR FLG VALVE & TEE AS NEEDED TO PLACE VALVE BOX OUTSIDE OF WHEEL PATH.
KEYNOTES:

1. APPROVED FIRE HYDRANT ASSEMBLY PER MANUFACTURER’S SPECIFICATIONS.
2. DRAIN ROCK, 4 CF MINIMUM
3. 12”x12”x8” CONCRETE PIER BLOCK PLACED ON UNDISTURBED NATIVE SOIL
4. 6” FLGxFLG GATE VALVE
5. WATER MAIN SIZE MJ x 6” FLG TEE OR TAPPING SLEEVE & BACKFILL, SEE DRAWING 630–2
6. VALVE BOX SETTING, SEE DRAWING 640–2
7. REFER TO TRENCH BACKFILL DRAWING 620–1
8. GRANULAR BACKFILL.

NOTES:

1. REFER TO DRAWING 650–1 FOR HYDRANT CLEAR ZONE REQUIREMENTS.
2. HYDRANT BURY DEPTH: 30” MINIMUM, 6 FT MAXIMUM.
3. FLANGE HYDRANT USE IS DEPENDENT ON SPACE CONSTRAINTS AND REQUIRES WATER DEPARTMENT APPROVAL.
4. WHEN FINAL LIFT OF HMAC IS PLACED, CONTRACTOR TO PLACE A BLUE REFLECTOR BUTTON FOR THE FIRE DEPARTMENT. SEE DRAWING 650–4 FOR PLACEMENT.
NOTES:

1. IF HYDRANT IS LOCATED WITHIN THE RADIUS OF AN INTERSECTION, PLACE A MARKER ON EACH ROADWAY IN THE CENTER LANES CLOSEST TO THE HYDRANT.

2. PLACE MARKER PERPENDICULAR (90') TO HYDRANT

3. CONTRACTOR TO SUPPLY BLUE REFLECTORS. CONTRACTOR SHALL SUPPLY MELT DOWN THERMOPLASTIC PADS IF 10 OR MORE ARE REQUIRED. WATER OPERATIONS SHALL SUPPLY IF FEWER THAN 10 ARE REQUIRED.
NOTE:
1. EXCAVATE A HOLE LARGE ENOUGH TO ACCESS CORP
2. TURN CORP OFF
3. SEVER COPPER AWAY FROM CORP STOP
4. REMOVE CORP STOP FROM MAIN AND INSTALL TAPERED BRASS PLUG
5. BACKFILL WITH 3/4 MINUS GRANULAR ROCK, FULL TRENCH DEPTH
6. ABANDONMENT TO BE DONE WITH THE WATER DEPT. INSPECTOR PRESENT
**Sampling Station**

Kupferle Foundry Co

Eclipse #88 SS

W/ ¼" ball valve on vent pipe, W/ non-threaded spigot

4" x 4" treated wood border

Min 36" x 36"

1½" round rock

18" min depth

Fill flush w/ surface

3' of ¾" brass standpipe

LL ¾" brass street elbow

W/ ¾" LL brass nipple

LL ¾" B25172 N 110 CTSxFIPT curb valve Mueller LL

¾" service connection

See drawing 560-5

Water valve box and cover

See drawing 540-2

Profile View
1" SERVICE CONNECTION

SCALE: NONE

DATE: JUNE 2018

660-3

NOTES:
1. ORS 92.044(7) PROHIBITS LOCATING ANY UTILITY INFRASTRUCTURE WITHIN 1 FT OF A SURVEY MONUMENT. DEVELOPER SHALL PAY FOR ANY RELOCATION SERVICES AND/OR METER BOXES FOUND TO FALL WITHIN 1 FT OF A SURVEY MONUMENT LOCATION.

2. ALL FITTINGS SHALL BE BRASS OR COPPER

3. WATER DEPARTMENT WILL INSTALL METER AFTER WATER MAIN HAS BEEN APPROVED FOR PUBLIC USE AND REQUIRED FEES HAVE BEEN PAID.

4. ALL SERVICE LINES SHALL BE INSTALLED PRIOR TO PRESSURE TESTING

5. IF METER BOX IS IN A CURB TIGHT SIDEWALK, PLUMBING CONTRACTOR SHALL MAKE SERVICE CONNECTION PRIOR TO SIDEWALK POUR.
KEYNOTES:
1. WATER MAIN
2. TAPPING SADDLE W/2" CC THREAD OUTLET
3. 2"x4" BRASS NIPPLE
4. 2" GATE VALVE w/2" OPERATING NUT FIPT x FIPT
5. (2) 2" BRASS STREET ELLS
6. VALVE BOX PER 540-2
7. 2" TYPE K RIGID COPPER PIPE
8. 2" CTS x CTS 90° ELL
9. USE 2" CTS x MIPT COUPLING
10. 1½" OR 2" WATER METER WITH AUTOMATED METER READER (AMR)
11. WATER METER BOX 17" x 30" x 18" DEEP
12. 2" FLANGED ANGLE METER BALL VALVE W/2" CTS INLET
13. 8"x8"x8" CONC. PIER BLOCK OR EQUIVALENT SUPPORT ON UNDISTURBED EARTH
14. 2" FLANGED ANGLE METER BALL VALVE W/2" FIPT OUTLET (CITY TO INSTALL WHEN METER IS PLACED)

NOTES:
1. SERVICE LINES BETWEEN THE WATER MAIN AND THE METER SHALL HAVE 30" OF COVER FOR IMPROVED AREAS AND 42" OF COVER FOR UNIMPROVED AREAS.
2. ALL FITTINGS SHALL BE BRASS OR COPPER.
3. WATER OPERATIONS WILL INSTALL METER AFTER WATER MAIN HAS BEEN APPROVED FOR PUBLIC USE, REQUIRED FEES HAVE BEEN PAID, AND ALL BACKFLOW PREVENTION REQUIREMENTS HAVE BEEN MET.
4. ALL SERVICE LINES SHALL BE INSTALLED PRIOR TO PRESSURE TESTING.
1½" AND 2" SERVICE CONNECTION

KEYNOTES:
1. WATER MAIN
2. TAPPING SADDLE W/2” THREADED OUTLET
3. 2" x 4" BRASS NIPPLE
4. 2" GATE VALVE w/2” OPERATING NUT FIPT x FIPT
5. SEE APPROVED MATERIALS LIST
6. VALVE BOX PER 540–2
7. 2" TYPE K RIGID COPPER PIPE
8. 2” CTS x CTS 90’ ELL
9. USE 2” CTS x MIPT COUPLING
10. 1 1/2" OR 2" WATER METER WITH AUTOMATED METER READER (AMR)
11. WATER METER BOX 17” x 30” x 18” DEEP
12. 4” PVC PIPE, LENGTH AS REQUIRED
13. 8”x8”x8” CONC. PIER BLOCK OR EQUIVALENT SUPPORT ON UNDISTURBED EARTH

NOTES:
1. SERVICE LINES BETWEEN THE WATER MAIN AND THE METER SHALL HAVE 30" OF COVER FOR IMPROVED AREAS AND 42" OF COVER FOR UNIMPROVED AREAS.
2. ALL FITTINGS SHOWN SHALL BE BRASS OR COPPER.
3. WATER OPERATIONS WILL INSTALL METER AFTER WATER MAIN HAS BEEN APPROVED FOR PUBLIC USE, REQUIRED FEES HAVE BEEN PAID, AND ALL BACKFLOW PREVENTION REQUIREMENTS HAVE BEEN MET.
4. ALL SERVICE LINES SHALL BE INSTALLED PRIOR TO PRESSURE TESTING.
KEYNOTES:

1. LADDER EXTENSION SHALL BE ALUMINUM AND EXTEND 42” ABOVE THE TOP RUNG OF THE LADDER. EXTENSION SHALL BE BOLTED UP BEHIND LADDER RUNGS.

2. ATTACH LADDER SUPPORT TO INSIDE FACE OF VAULT OPENING AND FLOOR OF VAULT WITH STAINLESS STEEL HARDWARE AS SHOWN. Q of RUNG MUST BE SET 7” FROM FACE OF SURFACE BEHIND RUNG.

3. PROVIDE 15” MINIMUM LATERAL CLEARANCE ON EACH SIDE OF LADDER Q.

4. LADDER SHALL MEET THE REQUIREMENT OF OSHA AND SHALL BE HOT-DIPPED GALVANIZED AFTER FABRICATION.
NOTES:

1. SUMP PUMP – EBARA EPPD–3AS1, HONDA WSP33K1AA, OR APPROVED EQUAL
2. MOUNT GFI RECEPTACLE 6” BELOW CEILING OF VAULT UNLESS LOCATED OTHERWISE BY NATIONAL AND/OR LOCAL ELECTRIC CODES.
3. AN ALTERNATE SUMP PUMP MAY BE REQUIRED FOR INSTALLATIONS IN SPECIALTY VAULTS. CONTACT THE WATER DEPARTMENT FOR ALTERNATE SUMP PUMP DETAIL DRAWING.
NOTES:
1. This is a public facility, governed by UPC, SOPC and Oregon Dept. of Human Services, as applicable.
2. Finished grade shall slope away from the vault cover to prevent ponding around the cover.
3. Vault door mechanisms shall not project below the ceiling of the vault interior.
4. Aluminum ladder with extension to be O.S.H.A. approved, (Utility Vault Co. 1672 or equal). Ladder to have clear access from vault door.
5. Seal pipe penetrations with nonshrink grout to achieve a water tight seal. Piping shall not be directly imbedded in concrete or masonry. Provide pipe straps for thrust resistance per State of Oregon Plumbing Code (SOPC).
6. Check valve to be union style (compression) or install union with check valve.
7. Slope interior toward end of floor for sump or gravity drain outlet. Trim floor drain grating as required for pump installation. For alternate floor center drain, see Drawing 690-4A.

<table>
<thead>
<tr>
<th>METER SIZE</th>
<th>UTILITY VAULT CO. VAULT MODEL NO.</th>
<th>BILCO - VAULT DOOR MODEL NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3&quot;</td>
<td>676-WA</td>
<td>J-5AL</td>
</tr>
<tr>
<td>4&quot; &amp; 6&quot;</td>
<td>687-WA</td>
<td>J-5AL</td>
</tr>
<tr>
<td>8&quot;</td>
<td>810-LA</td>
<td>JD-3AL</td>
</tr>
</tbody>
</table>

WATER SERVICE LINE AND METER VAULT (AS SHOWN BELOW) PROVIDED BY CUSTOMER. INSTALLATION OF METER BY CITY. METER COST PAID BY CUSTOMER.
ISOLATION JOINT TEST STATION
Note: Isolation flange joint shown, others similar

CASING TEST STATION
2" PVC pipe with loose top end cap, no bottom cap

COMBINATION TEST STATION
Test wires (typ)
Exothermic weld wire connection (typ)
See drawing 680-8

MONITORING TEST STATION
No. 8 AWG stranded copper wire (one shown, two required)
Exothermic weld wire connection (typ)
See drawing 680-8
Dielectric isolation joint
Insulating casing seal
Test station. See drawings 680-6 or 680-7

Casing pipe
Carrier pipe
Dielectric isolation joint
Insulating casing seal

Test station. See drawings 680-6 or 680-7
Test wires (typ)
TERMINAL ASSEMBLY
AS REQUIRED
SEE DETAIL BELOW

ENGRAVED TERMINAL
LABEL (TYPICAL)
1/4" HIGH LETTERS

1/4" DIA HOLE
(TYP 8 PLACES)

TERMINAL BLOCK

1/4-20 UNC BRASS HEX NUT
1/4" BRASS WASHERS
CABLE/WIRE SIZE AND
COLOR AS SPECIFIED
CRIMP TYPE WIRE
CONNECTOR
"BUNDY" OR EQUAL
1/4-20 UNC x 1-1/4"
LONG BRASS ROUND HEAD
SLOTTED CAP SCREW
1/4" BRASS WASHER

NOTES:
1. PROVIDE SUFFICIENT SLACK IN ALL WIRES SO THAT TEST
BOARDS CAN BE LIFTED TWO (2) FEET OUT OF TEST BOX.
2. WIRE SHALL BE HMWPE, THWN, XHHW OR RW INSULATED.
3. CONNECT TEST LEADS AS SHOWN ON PROJECT PLANS
KEYNOTES:
1. TYPICAL DUCTILE IRON PIPE W/ PUSH-ON JOINT (SHOWN)
2. CROSS-LAMINATED POLYETHYLENE ENCASEMENT TUBE PER SPECIFICATIONS.
3. TYPICAL PVC OR POLYETHYLENE ADHESIVE TAPE OR PLASTIC TIE STRAPS
4. LONGITUDINAL OVERLAP POLYETHYLENE TUBE, 1 FT MINIMUM AT EACH PIPE JOINT
5. FOLD EXCESS TUBE MATERIAL SNUG AGAINST PIPE AND SECURE IN PLACE
6. SECURE EACH END OF POLYETHYLENE TUBE

NOTES:
1. INSTALL POLYETHYLENE TUBE IN ACCORDANCE WITH ANSI/WWA C105/A21.5 METHOD A
2. CLEAN PIPE SURFACE OF CLAY, MUD, DEBRIS, ETC. BEFORE INSTALLING POLYETHYLENE ENCASEMENT
3. PROTECT POLYETHYLENE-ENCASE PIPE WHEN LIFTING OR HANDLING
4. REPAIR ALL SMALL RIPS, TEARS, OR OTHER DAMAGE TO POLYETHYLENE TUBE WITH PVC OR POLYETHYLENE ADHESIVE TAPE, OR COVER THE DAMAGED AREA WITH A FULL CIRCUMFERENCE WRAP OF POLYETHYLENE SHEET AND SEAL THE EDGES WITH ADHESIVE TAPE
5. AVOID DAMAGE TO POLYETHYLENE DURING BACKFILLING AND COMPACTION WORK
6. PROVIDE UNDERLAYER OF 40 MIL GEOMEMBRANE AT JOINT TYPES OTHER THAN PUSH-ON JOINTS.
PROTECTIVE GEOMEMBRANE SLEEVE WRAP FOR CROSSING CATHODICALLY PROTECTED PIPES

SEE DRAWING 620-1 FOR MIN TRENCH WIDTH AND BACKFILL REQUIREMENTS

DUPLICATE IRON PIPE SHEATHED IN MIN LAYER OF 40 MIL PVC GEOMEMBRANE, MIN. 6” OVERLAP AT SEAMS & POSITION THE LAYERS WITH SEAMS 180° APART

CATHODICALLY PROTECTED PIPE OR STRUCTURE

MIN. 40 MIL THICKNESS PVC GEOMEMBRANE SHEETING SECURED WITH POLYETHYLENE TAPE ALONG ITS LENGTH, MAX. 24” O.C.

MINIMUM 24” LONGITUDINAL OVERLAP AT SEAM

POLYETHYLENE TAPE

PROVIDE UNDER LAYER OF 40 MIL GEOMEMBRANE WRAP AT JOINTS

DUCTILE IRON PIPE

(OR AS DIRECTED BY ENGINEER)

18” MIN.

(OR AS DIRECTED BY ENGINEER)

10’ MIN

CATHODICALLY PROTECTED PIPE OR STRUCTURE
NOTES:
1. PROVIDE A SLEEVE WHEN CROSSING OVER OR UNDER POTENTIAL STRAY CURRENT SOURCES.
2. WHEN SLEEving A PIPE JOINT, PROVIDE 2 CASING SPACERS, 1 EACH SIDE OF JOINT.
3. COPPER SHALL BE WRAPPED WITH 20 mil PVC TAPE W/ 50% OVERLAP (40 mil TOTAL), INSIDE & OUTSIDE OF PVC SLEEVE.
4. OVERLAP GEOMEMBRANE SHEETING A MINIMUM OF ¼ OF THE PIPE CIRCUMFERENCE. ENSURE OVERLAP RUNS ALONG CROWN OF PIPE.
5. SLEEVES AND CASINGS SHALL BE DRY AND MOISTURE FREE BEFORE SEALING.
TEST STATION MOUNTING TYPES:

**TYPE A**
(At the approval of the Water Dept.)

- Mount to pressure treated 4"x4" post
- Conduit strap, typ
- Conduit bushing
- Rigid conduit
- 2" min.
- Finish grade

**TYPE B**
(At the approval of the Water Dept.)

- Test station cover
- Pipeline terminals
- Reference electrode terminal
- PVC post
- Anchor
- Finish grade

Valve box & cover. See drawing 640-2

24"x24"x6" concrete pad, sidewalk slab, or pavement

Test station wires per test station type & wire identification

8" PVC pipe. Provide 24" minimum length from finished grade to bottom of PVC pipe

TEST STATION INSTALLATION

COMBINED CP TEST STATION
ABOVE GRADE INSTALLATION
DETAILS

SCALE: NONE
DATE: JUNE 2018

FILENAME: 680-6.dwg
TEST STATION MOUNTING TYPES:

**TYPE C**
SEE DRAWING 640–2

**TYPE D**
(AT THE APPROVAL OF THE WATER DEPT.)

NOTE: PROVIDE 24” MIN. SLACK LOOPS IN WIRES REQUIRED ON ALL OPTIONS.

TEST STATION INSTALLATION

24"x24"x6" CONCRETE PAD, SIDEWALK SLAB, OR PAVEMENT

VALVE BOX & COVER.
SEE DRAWING 640-2

8" PVC PIPE. PROVIDE 24" MINIMUM LENGTH FROM FINISHED GRADE TO BOTTOM OF PVC PIPE

TEST STATION WIRES PER TEST STATION TYPE & WIRE IDENTIFICATION

RIGID CONDUIT

FINISH GRADE

FINISH GRADE

Beaverton ENGINEERING

FILENAME: 680-7.dwg

COMBINED CP TEST STATION BELOW GRADE INSTALLATION DETAILS

SCALE: NONE

DATE: JUNE 2018

680-7
NOTES:
1. APPLY WELD CAP DIRECTLY TO PIPE, NOT TO PIPE WRAP.
   USE PRIMER AS REQUIRED BY THE MANUFACTURER.
2. COMPLETELY ENCLOUSE WIRE WITHIN WELD CAP
3. REPAIR ANY DAMAGED COATING NOT COVERED BY WELD CAP

EXOTHERMIC WELD - DI & STEEL PIPE

NOTES:
1. LOCATE ANODES WITHIN 3' HORIZONTALLY OF CENTERLINE OF PIPE.
2. PLACE GALVANIC ANODE IN CLEAN NATIVE BACKFILL AND COMPACT TO 12" ABOVE ANODE.
3. ANODES MAY BE PLACED HORIZONTALLY OR VERTICALLY (HORIZONTALLY SHOWN)
4. ANODE WIRE SHALL BE EXOTHERMIC WELDED DIRECTLY TO PIPE OR INCORPORATED INTO THE JOINT BOND WITH A SPLIT-BOLT CONNECTION.

GALVANIC ANODE INSTALLATION

<table>
<thead>
<tr>
<th>PIPE Ø</th>
<th># OF ANODES</th>
</tr>
</thead>
<tbody>
<tr>
<td>16&quot; OR SMALLER</td>
<td>1 PER 100' (2 MIN)</td>
</tr>
<tr>
<td>18&quot; - 32&quot;</td>
<td>2 PER 100'</td>
</tr>
<tr>
<td>32&quot; OR LARGER</td>
<td>4 PER 100'</td>
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FOR PIPE RUNS 100' OR GREATER

<table>
<thead>
<tr>
<th>PIPE Ø</th>
<th># OF ANODES</th>
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</thead>
<tbody>
<tr>
<td>16&quot; OR SMALLER</td>
<td>2 (1 PER END)</td>
</tr>
<tr>
<td>18&quot; OR LARGER</td>
<td>4 (2 PER END)</td>
</tr>
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</table>

FOR PIPE RUNS LESS THAN 100'

ANODE SCHEDULE
BONDING CABLES OF SUFFICIENT LENGTH TO MAINTAIN SLACK AFTER INSTALLATION. SEE NOTE 1. SEE TABLE FOR CABLE SIZE.

BELL AND SPIGOT RUBBER GASKET JOINT

NOTES:
1. TWO BONDING CABLES REQUIRED FOR EACH PIPE JOINT. CABLES TO BE INSTALLED SEPARATELY, APPROX 6" APART ON PIPE ALONG LENGTH OR CIRCUMFERENCE.
2. WHEN TEST CABLES ARE REQUIRED, INSTALL IN SAME MANNER AS BONDING CABLES.
3. REPAIR EXTERIOR PIPE COATING IN ACCORDANCE WITH PIPE MANUFACTURER'S RECOMMENDATIONS.

FLEXIBLE COUPLING

SPLIT BOLT CONNECTOR

NO. 2 AWG STRANDED COPPER WIRE. 1 BOND WIRE SHOWN (2 REQ'D)

EXOTHERMIC WELD WIRE CONNECTION (TYP)

NO. 4 AWG STRANDED COPPER WIRE. CONNECT TO PIPE RUN AS SHOWN

JOIN BOND FITTINGS & VALVES

BONDING CABLE SIZES FOR DUCTILE IRON PIPE

<table>
<thead>
<tr>
<th>PIPE DIAMETER</th>
<th>CABLE SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>20&quot; &amp; SMALLER</td>
<td>#4 AWG/HMWPE</td>
</tr>
<tr>
<td>24&quot; AND LARGER</td>
<td>#2 AWG/HMWPE</td>
</tr>
</tbody>
</table>

EXTRACTION_INFO

BONDING OF DIP JOINTS AND FITTINGS

DATE: JUNE 2018

SEE NOTE 3

SEE DRAWING 680-8 (TYP 4 PLACES)
INSULATING FLANGE DETAIL

Tape wrap circumference of flange with 20 mil PVC tape
Insulating Washer (typ)
Steel Washer with oversized ID (typ)
Insulating sleeve, length to extend into oversized ID steel washer
Full face 3/8" thick insulating gasket

DIELECTRIC ISOLATION JOINT ASSEMBLY

No 12 AWG solid copper wire. Provide bond only where specified
Mastic or epoxy coat this weld
Exothermic weld wire connection (typ)
Insulating boot (typ)

NOTES

INSULATING FLANGE DETAIL
1. Below grade insulating flange installations as shown
2. Bolt length shall be long enough to have a minimum of three threads exposed beyond nut when fully tightened
3. For high strength bolts, additional standard high strength washers required

FLEX COUPLING
4. Center flexible coupling over insulating boots
5. Exothermic weld to coupling prior to assembly. Do not burn boots
6. Bond the coupling to a protected side of the joint where specified

DIELECTRIC ISOLATION FLEXIBLE COUPLING
WITH AIR GAP

PERMANENTLY ATTACHED PIPE

AIR GAP = 2 x PIPE I.D. (1” MIN.)

HOSE CONNECTION

WITH PORTABLE ASSEMBLY

DOUBLE CHECK ASSEMBLY

3” METER W/ 2” GATE VALVE

WITH TRUCK MOUNTED ASSEMBLY

DOUBLE CHECK ASSEMBLY

3” METER W/ 2” GATE VALVE

NOTES:

1. REMOVE CHAPMAN VALVE AND HOSE FROM HYDRANT WHEN DONE FILLING TRUCK.
2. CROSS CONNECTION PROTECTION TO BE VERIFIED BY WATER OPERATIONS WHEN PURCHASING BULK WATER PERMIT.
P V B – PRESSURE VACUUM BREAKER ASSEMBLY

1. ONLY ONE PVB REQUIRED TO SERVE THE ENTIRE SYSTEM. CONTROL VALVES (ON/OFF VALVES) ARE ALLOWED DOWNSTREAM OF (AFTER) THE PVB.

2. PVB’S MUST BE INSTALLED A MINIMUM OF ONE FOOT (12”) ABOVE THE HIGHEST WATER OUTLET.

3. PVB’S MUST BE TESTED BY A STATE–CERTIFIED BACKFLOW ASSEMBLY TESTER WHEN INSTALLED, ANNUALLY, AND WHEN MOVED OR REPAIRED.

4. NO CHEMICALS OR FERTILIZER MAY BE INTRODUCED INTO AN IRRIGATION SYSTEM EQUIPPED WITH PVB’S.

5. NO PUMPS ALLOWED ON THE DOWNSTREAM SIDE OF (AFTER) A PVB.

6. PROTECT FROM FREEZING.

TYPICAL ZONE CONTROL SHUTOFF VALVES
D. C. — DOUBLE CHECK VALVE ASSEMBLY

1. ONLY ONE DC REQUIRED TO SERVE THE ENTIRE SYSTEM. CONTROL VALVES (ON/OFF VALVES) ARE ALLOWED DOWNSTREAM OF (AFTER) THE DC.
2. DC MUST BE TESTED BY A STATE–CERTIFIED BACKFLOW ASSEMBLY TESTER WHEN INSTALLED, ANNUALLY, AND WHEN MOVED OR REPAIRED.
3. NO CHEMICALS OR FERTILIZER MAY BE INTRODUCED INTO AN IRRIGATION SYSTEM EQUIPPED WITH A DC.
4. SEE DETAIL WTR—BF20A OR 640–3B FOR INSTALLATION REQUIREMENTS.
5. PROTECT FROM FREEZING.

R. P. — REDUCED PRESSURE PRINCIPLE BACKFLOW ASSY.

1. ONLY ONE RP REQUIRED TO SERVE THE ENTIRE SYSTEM. CONTROL VALVES (ON/OFF VALVES) ARE ALLOWED DOWNSTREAM OF (AFTER) THE RP.
2. RP MUST BE INSTALLED A MINIMUM OF ONE FOOT (12") ABOVE GROUND LEVEL.
3. RP MUST BE TESTED BY A STATE–CERTIFIED BACKFLOW ASSEMBLY TESTER WHEN INSTALLED, ANNUALLY, AND WHEN MOVED OR REPAIRED.
4. IN A RP–EQUIPPED SYSTEM, FERTILIZER AND OTHER AGRICULTURAL CHEMICALS MAY BE INTRODUCED DOWNSTREAM OF (AFTER) THE RP.
5. PROTECT FROM FREEZING.
NOTES:
1. PLACE DC WITHIN PROPERTY LINE AS CLOSE TO METER AS POSSIBLE WITH NO CONNECTIONS OR TEES BETWEEN METER AND DC.
3. ALL BOXES LOCATED IN TRAFFIC AREAS SHALL BE RATED FOR THE ANTICIPATED LOADS AND FURNISHED WITH APPROVED TRAFFIC-RATED COVERS.
4. DC’S SHALL BE READILY ACCESSIBLE WITH ADEQUATE SPACE FOR TESTING AND MAINTENANCE. PROVIDE AT LEAST 6 INCHES OF CLEARANCE ON BOTH SIDES AND BELOW THE DC.
5. WHEN THE DC IS INSTALLED BELOW GROUND, THE TEST PORTS MUST NOT FACE DOWNWARD. TEST PORTS MUST BE PROVIDED WITH PLASTIC OR BRASS PLUGS.
6. THE DC SHALL BE INSTALLED AT A DEPTH OF 24 INCHES BELOW GROUND. IF FREEZE PROTECTION IS PROVIDED, THE 24 INCH DEPTH MAY BE REDUCED.
7. CONTACT CITY OF BEAVERTON BUILDING DEPARTMENT FOR THE REQUIRED PLUMBING PERMIT.
8. UPON COMPLETION OF INSTALLATION, THE DC MUST BE TESTED BY A STATE CERTIFIED BACKFLOW TESTER.
9. CONNECT BOXES TOGETHER WITH CORROSION-RESISTANT FASTENERS TO FORM A SINGLE ENCLOSURE. SECURE THE LID OF THE LOWER BOX TO PREVENT DEBRIS FROM ENTERING.
10. CONSULT WITH BUILDING DEPARTMENT FOR PROPER SIZING OF DC.
NOTES:
1. PLACE DC WITHIN PROPERTY LINE AS CLOSE TO METER AS POSSIBLE WITH NO CONNECTIONS OR TEES BETWEEN METER AND DC.
3. ALL BOXES LOCATED IN TRAFFIC AREAS SHALL BE RATED FOR THE ANTICIPATED LOADS AND FURNISHED WITH APPROVED TRAFFIC-RATED COVERS.
4. DC’S SHALL BE READILY ACCESSIBLE WITH ADEQUATE SPACE FOR TESTING AND MAINTENANCE. PROVIDE AT LEAST 6 INCHES OF CLEARANCE ON BOTH SIDES AND BELOW THE DC.
5. WHEN THE DC IS INSTALLED BELOW GROUND, THE TEST PORTS MUST NOT FACE DOWNWARD. TEST PORTS MUST BE PROVIDED WITH PLASTIC OR BRASS PLUGS.
6. THE DC SHALL BE INSTALLED AT A MAXIMUM DEPTH OF 24 INCHES BELOW GROUND. IF FREEZE PROTECTION IS PROVIDED, THE 24 INCH DEPTH MAY BE REDUCED.
7. CONTACT CITY OF BEAVERTON BUILDING DEPARTMENT FOR THE REQUIRED PLUMBING PERMIT.
8. UPON COMPLETION OF INSTALLATION, THE DC MUST BE TESTED BY A STATE CERTIFIED BACKFLOW TESTER.
9. CONNECT BOXES TOGETHER WITH CORROSION-RESISTANT FASTENERS TO FORM A SINGLE ENCLOSURE. SECURE THE LID OF THE LOWER BOX TO PREVENT DEBRIS FROM ENTERING.
10. CONSULT WITH BUILDING DEPARTMENT FOR PROPER SIZING OF DC.
3" AND LARGER DOUBLE CHECK VALVE ASSEMBLY (DC)

KEYNOTES:
1. APPROVED DOUBLE CHECK (DC) ASSEMBLY PER STANDARDS
2. CONCRETE VAULT WITH ACCESS HATCH DOORS
3. TYPICAL VAULT DOOR
4. SUMP PUMP INCLUDING 1-1/2" PVC DISCHARGE PIPING WITH CHECK VALVE, OR 4" PVC GRAVITY DRAIN WITH BACKWATER VALVE TO STORM SEWER. SEE BUILDING DEPT FOR REQUIRED PERMITS.
5. TYPICAL PIPE SUPPORTS – SEE NOTE 10, DRAWING 690-4B
6. TYPICAL CONCRETE BALLAST – SEE NOTE 8, DRAWING 690-4B
7. TYPICAL NON-RISING STEM (N.R.S.) GATE VALVES
8. FLANGE COUPLING ADAPTER
9. ADAPTER FLANGE
10. 12" DIA SUMP WITH PUMP OR GRAVITY DRAIN
11. COMPACTED CLASS B BACKFILL BASE 6" MINIMUM
12. OSHA-APPROVED LADDER – SEE DRAWING 670-1
GENERAL NOTES:
1. PLACE DC ASSEMBLY WITHIN PROPERTY LINE AS CLOSE TO METER AS POSSIBLE WITH NO CONNECTIONS OR TEES BETWEEN METER AND DC.
2. THIS IS TO BE A PRIVATE FACILITY, GOVERNED BY OSPC AND OREGON HEALTH AUTHORITY, AS APPLICABLE.
3. ALL MJ JOINTS SHALL HAVE MECHANICAL JOINT RESTRAINTS.
4. CONTRACTOR TO SEAL ALL OPENINGS IN VAULT WITH NON-SHRINK GROUT OR "LINK-SEAL.”
5. COAT ALL EXTERIOR VAULT SURFACES WITH CO–MA–SEAL OR APPROVED EQUAL.
6. PROVIDE POWER SOURCE AS REQUIRED FOR SUMP PUMP. SECURE POWER CORD TO DISCHARGE PIPING WITH NYLON CABLE TIES. SEE DRAWING 670–2 FOR SUMP PUMP INSTALLATION DETAILS.
7. PUMP DISCHARGE TO APPROVED LOCATION PER PLUMBING INSPECTOR.
8. IN AREAS PRONE TO HIGH GROUNDWATER POUR CONCRETE BALLAST (3 CUBIC YARDS MINIMUM); ENGINEER IS RESPONSIBLE TO ENSURE ADEQUATE BALLAST IS PROVIDED TO PREVENT FLOATING OF VAULT.
9. VAULT DOOR MECHANISMS SHALL NOT PROTRUDE BELOW THE CEILING OF THE VAULT INTERIOR.
10. ASSEMBLY IS TO BE SUPPORTED BY A SUBSTANTIAL RUST–RESISTANT PRODUCT SUCH AS "STANDON" OR APPROVED EQUAL TO PREVENT UNDUE STRESS OR STRAIN ON THE ASSEMBLY AND PIPING.
11. VAULT TOP SHALL BE SET LEVEL WITH ADJACENT HARD SURFACE (CONCRETE OR AC PAVEMENT).
12. FOR INSTALLATION IN LANDSCAPE AREA, PLACE VAULT TOP 3”–5” ABOVE GROUND SURFACE AND SLOPE GROUND AWAY AT 4" PER FOOT TYPICAL. DO NOT BURY HATCH DRAIN.
13. EXTEND DUCTILE IRON PIPE 5’ MINIMUM OUT OF VAULT TO PROTECT FROM BREAKING DUE TO VAULT SETTLEMENT.
14. SEE DRAWING 690–4A FOR PLAN AND ELEVATION VIEWS.
15. CONSULT WITH BUILDING DEPARTMENT FOR PROPER SIZING OF DC.
16. WHEN LOCATED IN PEDESTRIAN WALKWAY A NON–SLIP LID AND GROUTED PICK HOLES ARE REQUIRED.

<table>
<thead>
<tr>
<th>DCVA SIZE</th>
<th>OLDCastle VAULT NO.</th>
<th>DOOR MODEL NO.</th>
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<tr>
<td>3”</td>
<td>577–LA</td>
<td>57–T–2–332P</td>
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<tr>
<td>4”</td>
<td>577–LA</td>
<td>57–T–2–332P</td>
</tr>
<tr>
<td>6”</td>
<td>676–WA</td>
<td>676–T–2–332P</td>
</tr>
<tr>
<td>8”</td>
<td>687–WA</td>
<td>687–T–2–332P</td>
</tr>
<tr>
<td>10”</td>
<td>5106–WA</td>
<td>5106–3–T–2–332P</td>
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</table>

OR APPROVED EQUAL
3" AND LARGER DOUBLE CHECK DETECTOR ASSEMBLY

FILE: 690-5A.dwg

FILENAME: 690-5A.dwg

DATE: JUNE 2018

SCALE: NONE

690-5A
3" AND LARGER DOUBLE CHECK DETECTOR ASSEMBLY

SCALE: NONE
DATE: JUNE 2018

690-5B

FILENAME: 690-5B.dwg

KEYNOTES:
1. APPROVED DOUBLE CHECK DETECTOR ASSEMBLY (DCDA) PER STANDARDS
2. CONCRETE VAULT WITH ACCESS HATCH DOORS
3. TYPICAL VAULT DOOR
4. SUMP PUMP INCLUDING 1 1/2" PVC DISCHARGE PIPING WITH CHECK VALVE, OR 4" PVC GRAVITY DRAIN WITH BACKWATER VALVE TO STORM SEWER. SEE BUILDING DEPT FOR REQUIRED PERMITS.
5. TYPICAL PIPE SUPPORTS – SEE NOTE 10, DRAWING 690-5C
6. TYPICAL CONCRETE BALLAST – SEE NOTE 8, DRAWING 690-5C
7. TYPICAL OS&Y GATE VALVES FOR DCDA, 3" MINIMUM CLEARANCE IN OPEN POSITION
8. FLANGE COUPLING ADAPTER
9. ADAPTER FLANGE
10. 12" DIA SUMP WITH PUMP OR GRAVITY DRAIN
11. COMPACTED CLASS B BACKFILL BASE 6" MINIMUM
12. OSHA–APPROVED LADDER, SEE DRAWING 670–1
13. CHECK VALVE WITH BALL DRIP VALVE PER NFPA 13 AND NFPA 24 STANDARDS
15. DETECTOR METER – SEE NOTE 15, DRAWING 690-5C
16. F.D.C. SHALL BE PROVIDED WITH LOCKING FDC PLUGS.
GENERAL NOTES:
1. CONSULT WITH FIRE DEPARTMENT FOR SIZING OF DCDA.
2. THIS IS TO BE A PRIVATE FACILITY, GOVERNED BY OPSC, NFPA, OREGON HEALTH AUTHORITY, AND HILLSBORO FIRE MARSHAL, AS APPLICABLE.
3. ALL MJ JOINTS SHALL HAVE MECHANICAL JOINT RESTRAINTS.
4. CONTRACTOR TO SEAL ALL OPENINGS IN VAULT WITH NON-SHRINK GROUT OR "LINK-SEAL."
5. COAT ALL EXTERIOR VAULT SURFACES WITH CO-MA-SEAL, OR APPROVED EQUAL.
6. PROVIDE POWER SOURCE AS REQUIRED FOR SUMP PUMP. SECURE POWER CORD TO DISCHARGE PIPING WITH NYLON CABLE TIES. SEE DRAWING 670-2 FOR SUMP PUMP INSTALLATION DETAILS.
7. PLUMB PUMP DISCHARGE TO APPROVED LOCATION PER PLUMBING INSPECTOR.
8. IN AREAS PRONE TO HIGH GROUNDWATER POUR CONCRETE BALLAST (3 CUBIC YARDS MINIMUM); ENGINEER IS RESPONSIBLE TO ENSURE ADEQUATE BALLAST IS PROVIDED TO PREVENT FLOATING OF VAULT.
9. VAULT DOOR MECHANISMS SHALL NOT PROTRUDE BELOW THE CEILING OF THE VAULT INTERIOR.
10. ASSEMBLY IS TO BE SUPPORTED BY A SUBSTANTIAL RUST-RESISTANT PRODUCT SUCH AS "STANDON" OR APPROVED EQUAL TO PREVENT UNDUE STRESS OR STRAIN ON THE ASSEMBLY AND PIPING.
11. VAULT TOP SHALL BE SET LEVEL WITH ADJACENT HARD SURFACE (CONCRETE OR AC PAVEMENT).
12. FOR INSTALLATION IN LANDSCAPE AREA, PLACE VAULT TOP 3”–5” ABOVE GROUND SURFACE AND SLOPE GROUND AWAY AT ¼” PER FOOT TYPICAL. DO NOT BURY HATCH DRAIN.
13. EXTEND DUCTILE IRON PIPE 5' MINIMUM OUT OF VAULT TO PROTECT FROM BREAKING DUE TO VAULT SETTLEMENT.
14. SEE DRAWING 690–5A FOR PLAN AND ELEVATION VIEWS. TYPICAL LAYOUT SHOWN, MAY BE INSTALLED IN OPPOSITE CONFIGURATION TO CONFORM TO SITE CONDITION REQUIREMENTS.
15. DETECTOR METER SHALL BE MART & COMPATIBLE WITH SENsus MX4.
16. WHEN LOCATED IN PEDESTRIAN WALKWAY A NON–SLIP LID AND GROUTED PICK HOLES ARE REQUIRED.
NOTES:
1. PLACE RP WITHIN PROPERTY LINE AS CLOSE TO METER AS POSSIBLE WITH NO CONNECTIONS OR TEES BETWEEN METER AND RP.
2. PROVIDE ADEQUATE PROTECTION AGAINST FREEZING
3. PROVIDE A SCREENED DRAIN CAPABLE OF PASSING A FULL RELIEF DISCHARGE (SEE DRAWING 690-10 FOR GUIDANCE ON DRAIN SIZING).
4. ALL PRE-MANUFACTURED ENCLOSURES SHALL COMPLY WITH ASSE1060, CLASS III.
5. CONCRETE PAD MUST BE SET AT OR ABOVE SURROUNDING FINISH GRADE AND/OR MAXIMUM FLOOD ELEVATION.
6. DEVICE IS TO BE SUPPORTED BY SUBSTANTIAL MATERIAL SUCH AS UNISTRUT TO RESIST RUST AND DECAY. SUPPORTS ARE TO BE INSTALLED TO PREVENT UNDUE STRESS OR STRAIN ON THE DEVICE AND ITS SERVICE PIPING.
7. AS A PRIVATE FACILITY, THE INSTALLATION IS GOVERNED BY THE OPSC AND OREGON HEALTH AUTHORITY, AS APPLICABLE.
8. CONSULT WITH BUILDING DEPARTMENT FOR PROPER SIZING OF RP.
COAT ALL EXTERIOR SURFACES W/ CRYSTAL SEAL, COMASEAL, OR APPROVED EQUAL

OLDCASTLE VAULT NO. 444–LA W/332P H–20 RATED ACCESS DOOR (OR EQUAL)

TYP PIPE SUPPORTS SEE NOTE 4

PLAN

UNION (TYP)

ENCLOSE VAULT IN EARTH BERM FOR FREEZE PROTECTION. SLOPE EARTH AWAY FROM VAULT.

ISOLATE PIPE FROM CONCRETE AS PER PLUMBING CODE (TYP)

APPROVED RP SEE NOTE 4

RODENT SCREEN – CLAMP 1/4” STEEL MESH TO DRAIN

COMPACTED CLASS B BACKFILL–MIN 6” BASE

METER SIDE

12” MIN

CURB

DRAIN TO DAYLIGHT. SLOPE 1/4” PER FOOT MIN AWAY FROM VAULT. SEE NOTE 3 FOR SIZING DRAIN

CUSTOMER SIDE

ELEVATION

NOTES:
1. PLACE RP WITHIN PROPERTY LINE AS CLOSE TO METER AS POSSIBLE WITH NO CONNECTIONS OR TEES BETWEEN METER AND RP.
2. VAULT FLOOR ELEVATION MUST BE SET AT OR ABOVE SURROUNDING FINISH GRADE AND/OR MAXIMUM FLOOD ELEVATION.
4. DEVICE IS TO BE SUPPORTED BY SUBSTANTIAL MATERIAL SUCH AS UNISTRUT TO RESIST RUST AND DECAY. SUPPORTS ARE TO BE INSTALLED TO PREVENT UNDUE STRESS OR STRAIN ON THE DEVICE AND ITS SERVICE PIPING.
5. AS A PRIVATE FACILITY, THE INSTALLATION IS GOVERNED BY THE OPSC AND OREGON HEALTH AUTHORITY, AS APPLICABLE.
6. CONSULT WITH BUILDING DEPARTMENT FOR PROPER SIZING OF RP.
NOTES:

1. PLACE RP WITHIN PROPERTY LINE AS CLOSE TO METER AS POSSIBLE WITH NO CONNECTIONS OR TEES BETWEEN METER AND RP.
2. PROVIDE STRUCTURE ADEQUATE FOR FREEZE PROTECTION.
3. PROVIDE A SCREENED DRAIN CAPABLE OF PASSING A FULL RELIEF DISCHARGE (SEE DRAWING 690-10 FOR GUIDANCE ON DRAIN SIZING).
4. A DOOR OR OTHER APPROVED ACCESS SHALL BE PROVIDED.
5. STRUCTURES SHALL COMPLY WITH LOCAL BUILDING CODES.
6. CONCRETE PAD MUST BE SET AT OR ABOVE SURROUNDING FINISH GRADE AND/OR MAXIMUM FLOOD ELEVATION.
7. DEVICE IS TO BE SUPPORTED BY SUBSTANTIAL MATERIAL SUCH AS UNISTRUT, STANDON, OR APPROVED EQUAL TO RESIST RUST AND DECAY. SUPPORTS ARE TO BE INSTALLED TO PREVENT UNDUE STRESS OR STRAIN ON THE DEVICE AND ITS SERVICE PIPING.
8. ALL MJ JOINTS SHALL HAVE MECHANICAL JOINT RESTRAINTS.
9. AS A PRIVATE FACILITY, THE INSTALLATION IS GOVERNED BY THE OPSEC AND OREGON HEALTH AUTHORITY, AS APPLICABLE.
10. CONSULT WITH FIRE DEPARTMENT INSPECTOR OR BUILDING DEPARTMENT FOR SIZING OF RP.
1. ENCLOSE VAULT IN EARTH BERM AS TO PROVIDE ADEQUATE FREEZE PROTECTION.
2. O&S\&Y VALVES REQUIRED ONLY IN FIRE SERVICE APPLICATIONS. (MINIMUM CLEARANCE OF 3-INCHES REQUIRED BETWEEN VAULT LID AND TOP OF O&S\&Y VALVES IN OPEN POSITION.)
3. PROVIDE A SCREENED DRAIN CAPABLE OF PASSING A FULL RELIEF DISCHARGE (SEE DRAWING 690-10 FOR GUIDANCE ON DRAIN SIZING).
4. ALL ENCLOSURES SHALL COMPLY WITH ASSE1060.
5. VAULT FLOOR MUST BE SET AT MINIMUM 12 INCHES ABOVE SURROUNDING FINISH GRADE TO ALLOW GRAVITY DRAINAGE.
6. DEVICE IS TO BE SUPPORTED BY SUBSTANTIAL MATERIAL SUCH AS UNISTRUT, STANDON, OR APPROVED EQUAL TO RESIST RUST AND DECAY. SUPPORTS ARE TO BE INSTALLED TO PREVENT UNDUE STRESS OR STRAIN ON THE DEVICE AND ITS SERVICE PIPING.
7. ALL MJ JOINTS SHALL HAVE MECHANICAL JOINT RESTRAINTS.
8. AS A PRIVATE FACILITY, THE INSTALLATION IS GOVERNED BY THE OPSC AND OREGON HEALTH AUTHORITY, AS APPLICABLE.
9. CONSULT WITH FIRE DEPARTMENT INSPECTOR OR BUILDING DEPARTMENT FOR SIZING OF RP.
10. FOR DOMESTIC SERVICE APPLICATIONS RP MUST BE PLACED AS CLOSE TO METER AS POSSIBLE WITH NO CONNECTIONS OR TEES BETWEEN METER AND RP.
APPROXIMATE RELIEF VALVE DISCHARGE RATES
FOR REDUCED PRESSURE BACKFLOW ASSEMBLIES

MAXIMUM FLOW (GPM) PER DRAIN PIPE SIZE
FOR EFFECTIVE DRAINAGE OF R.P. DISCHARGE
INTO A VAULT. SEE NOTE BELOW.

<table>
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<th>PIPE SIZE</th>
<th>FLOW (GPM)</th>
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<tr>
<td>2.5&quot;</td>
<td>105</td>
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<tr>
<td>3&quot;</td>
<td>262</td>
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<tr>
<td>4&quot;</td>
<td>1620</td>
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NOTE:
CARE SHOULD BE TAKEN TO ENSURE THAT THE ENTIRE DRAINAGE SYSTEM HAS ADEQUATE
CAPACITY TO CARRY THE CONTINUOUS DISCHARGE RATES SHOWN ABOVE. DESIGNER SHALL
BE RESPONSIBLE FOR PROVIDING ADEQUATELY SIZED DRAIN LINES FOR THE APPLICABLE
RELIEF VALVE DISCHARGE RATE. FOR PARALLEL ASSEMBLIES, THE DRAINAGE SYSTEM
SHOULD BE DESIGNED FOR THE DISCHARGE FROM BOTH ASSEMBLIES.
KEYNOTES:

1. NORMALLY CLOSED VALVE
   - VALVES SHALL MATCH MAINLINE SIZE
   - ALL JOINTS SHALL BE RESTRAINED
   - SEE DRAWING 640-2 FOR VALVE BOX REQUIREMENTS

2. LINE SIZE x 4” MJ TEE W/ 4” MJ PLUG AND 2” THREADED TAP

3. 2” THREADED GATE VALVE

4. 2” TYPE K RIGID COPPER

5. 2” MIPTxCTS ADAPTER

6. 2” METER BOX (17”x30”x18”)

7. 2” CTSxCTS ELBOW