

June 2014

Public Works Design Standards



City of Banks
13680 NW Main Street
Banks, OR 97106

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Revised May 2019

CITY OF BANKS
PUBLIC WORKS DESIGN STANDARDS

ADOPTED JUNE 2014

REVISED MAY 2019

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CITY OF BANKS

PUBLIC WORKS DESIGN STANDARDS

JUNE 2014 – REVISED MAY 2019

CHAPTER 1 – GENERAL

1.10.0 REQUIREMENTS FOR PUBLIC INFRASTRUCTURE IMPROVEMENTS

- 1.10.1 Public infrastructure improvements are conditioned through the development review process, City of Banks (City) ordinances and other policies adopted by the City. No public street improvements or utility construction shall commence prior to the City Manager and other owning agency's (such as ODOT, Washington County, Fire Department, CWS etc.) approval of the construction plans. Designs submitted for approval shall be stamped by a Registered Professional Engineer licensed to practice in the State of Oregon.
- 1.10.2 Submittal requirements consist of design plans, grading plans, erosion control plans and other information as required for street or utility construction, including paving, curbs and sidewalks, sanitary sewer, water system and storm drainage. Other information required may include a transportation study, storm water report, and geotechnical report. Developers shall be responsible for preparation of plans and specifications to comply with all conditions of approval from the City, and requirements from other owning and regulatory agencies.
- 1.10.3 Developers shall be responsible to coordinate with City staff and all utility providers prior to preparation of preliminary design drawings. The Developer shall be responsible for amending the design plans such that the review agencies accept the documents.
- 1.10.4 The current revision of the APWA/ODOT Standard Specifications for Construction and Drawings for Public Works Construction are hereby adopted and incorporated as part of this document by reference except as modified herein.
- 1.10.5 Prior to any construction activity within a public right-of-way, the Contractor shall apply for a street opening permit which must be approved by the City Manager. Contractors shall post a financial guarantee acceptable to the City for the duration of the work, which shall be released upon satisfactory completion. The financial guarantee shall be for 110% of the construction cost. The Contractor shall be responsible for 12-month warranty on all work in the public right-of-way. The financial guarantee for the 1-year warranty period shall be in a form acceptable to the city and filed with the City.
- 1.10.6 These design standards are intended for standard development projects and therefore do not provide for all situations such as pump stations, bridge crossings, railroad crossings, retaining walls, bridges and similar improvements.
- 1.10.7 These design standards are for streets, water system, sanitary sewer and storm drainage. For more detailed design standards on sanitary sewer and storm drainage see clean Water Services (CWS).

- 1.10.8 Where there are discrepancies between the design standards and the standard details, the design standards take precedence.
- 1.10.9 These design standards are intended to implement many of the City's policies and requirements as set forth in the following documents: Banks Comprehensive Plan, Banks Municipal Code, the Transportation System Plan (TSP), and the Water Master Plan.

1.20.0 DESIGN PLAN FORMAT

- 1.20.1 The plans shall be submitted on 22-inch x 34-inch plans sheets.
- 1.20.2 Vicinity Maps shall be located on the first sheet of all plans and shall show the location of the project with respect to the nearest major street intersection.
- 1.20.3 A north arrow shall be shown on each plan view sheet of the plans and adjacent to any other drawing which is not oriented the same as other drawings on the sheet.
- 1.20.4 Plan scales shall be 1" = 1'V, 1" = 10'H; 1" = 2'V, 1" = 20'H; 1" = 4'V, 1" = 40'H; or 1" = 5'V, 1" = 50'H for all drawings except details.
- 1.20.5 Letter size shall not be smaller than 0.10 inch high.
- 1.20.6 The location and elevation of a National Geodetic Survey, United States Geological Survey, State Highway or Washington County bench mark shall be shown. No other datum shall be used without permission of the City Manager. Temporary bench marks and elevations shall be shown on the plans.
- 1.20.7 A title block shall appear on each sheet of the plan set and shall be placed in the lower right-hand corner, of the sheet, across the bottom edge of the sheet or across the right-hand edge of the sheet. The title block shall include the names of the project, the engineering firm, the owner, the sheet title and the sheet number.
- 1.20.8 The seal of the Registered Professional Engineer responsible for preparation of the plans shall appear on each sheet.
- 1.20.9 The description and date of all revisions to the plans shall be shown on each sheet affected, and shall be approved and dated by a Registered Professional Engineer as evidenced by signature or initial.
- 1.21.0 General Sheets shall include the following:
 - a. A title sheet with the vicinity map, index of sheets, legend and general construction notes. The general notes should include at least general construction notes, construction execution, material types and testing requirements.
 - b. A site plan showing the entire development including streets, utilities and lots. The boundaries of this map should extend at least 150 feet past the

development. This map may be provided at a scale of 1" = 100', or 1" = 200'.

- c. A grading plan showing the existing and proposed grading. This would also show the location of any retaining walls.
- d. An erosion control plan and details.

1.21.1 Plan views shall show the following:

- a. Right-of-Way, property, tract, and easement lines.
- b. Subdivision name, lot numbers, street names and other identifying labels. Developer's name, address and phone number. Subdivision and street names are subject to approval of the City Planning Department.
- c. Location and stationing of existing and proposed street centerline and faces of curb.
- d. Horizontal alignment and curve data of street centerline and curb returns including radius, delta and length.
- e. Existing underground utilities and vegetation in conflict with the construction or operation of the street.
- f. Match lines with sheet number references.
- g. Street stationing to be noted at 100-foot intervals.
- h. Top of curve elevations along curb returns at quarter-deltas.
- i. Location of the low points of street grades and curb returns.
- j. Sidewalk ramp locations.
- k. Crown lines along portions of streets transitioning from one typical section to another.
- l. Centerline stationing of all intersecting streets.
- m. Location and description of existing survey monuments, including but not limited to, section corners, quarter corners and donation land claim corners.
- n. Legend.
- o. Location of proposed utilities including pipes, manholes, clean-outs, valves, fire hydrants, vaults, water meters and other features. The pipes and manholes shall be stationed, and the manholes shall be numbered.
- p. Show the location of the water and sanitary sewer service lines. Standard sizes can be established in the construction notes or details. Other than standard size should be noted on the plans.

- q. The location of driveways and street trees should be shown to determine if there are conflicts with utilities.

1.21.2 Profile views shall show the following:

- a. Stationing, elevations, vertical curve data and slopes for center of streets or top of curbs. For offset or super-elevation cross sections, both curbs shall be profiled. Where curbs are not to be constructed, centerline of street and ditch inverts shall be shown.
- b. Original ground along the centerline and if necessary at the edges of the right-of-way if grade differences are significant.
- c. Centerline of existing streets for a distance of at least 150 feet each way at intersections with proposed streets and past the limits of construction.
- d. Vertical alignment of streets.
- e. The top of curve for all cul-de-sacs, eyebrows, and curb returns.
- f. For sewer and storm lines show the pipe size, slope, and length. Provide the manhole number, station, rim elevation, and inverts. Also show the backfill type, and the surface material.
- g. For water lines show the pipe size and location of fittings. Also show the backfill type, and the surface material.
- h. Show all other known underground facilities such as gas lines, power, cable, etc.

1.21.3 Detail sheets shall include the following items:

- a. All details required for the work shall be included on the construction drawings including standard details. These may be modified with notes to cover slight changes required to unique circumstances.
- b. Show unique details that are not covered by standard details.
- c. Show details of manufacturer designed items such as gravity block retaining walls. Also provide the design criteria.

1.30.0 REVIEW PROCEDURE

1.30.1 Ten sets of complete plans shall be submitted for City review. This review is to check that the all required information has been submitted and that plans meet the requirements of the City's Public Works Design Standards (Design Standards) and various master plans.

- a. The plan submittal should include the construction documents and final reports as required such as storm water, geotechnical and transportation.

- b. Construction documents must be submitted as a single package to the City.
- c. The developer is responsible for submitting the plans to other review agencies.
- d. Before construction documents can be approved a copy of all required permits or approvals from other agencies must be sent to the City. These may be submitted separately, but the construction documents will be reviewed again with regard to the permit requirements.

1.30.2 Upon completion of the detailed review by the City, the City will provide the developer the design review comments. This may be in the form of one set of plans with "Red Line" comments, and/or a design review memo.

1.30.3 After the design engineer has completed all revisions, ten revised plans and the original "Red Line" plans (and/or review memo with reply) shall be returned to the City for review. This process shall continue until the plans are accepted.

1.40.0 Record Drawings

1.40.1 Following completion of construction, the Design Engineer shall submit to the City as applicable, two sets of record drawing blue lines, and one set on electronic media in AutoCAD format.

1.40.2 Record drawings shall be labeled as such on each sheet whether there were changes on that sheet or not.

1.40.3 As-built drawings shall describe any and all revisions to the previously approved construction plans, shall indicate the limits of any surplus material placed as fill on building sites, and shall be accompanied by a certification letter from the design engineer, indicating that the record drawings are accurate.

1.40.4 Final plat signatures or occupancy permits will not be issued prior to receipt of record drawings.

1.50.0 MODIFICATIONS TO THE STANDARDS

1.50.1 The City Engineer may accept modifications to design standards where there is one of the following conditions:

- unusual conditions
- an existing condition that controls design
- safety impacts
- unique or innovative development
- potential negative off-site impacts

1.50.2 Where design standard modifications are requested, it is the responsibility of the design engineer to provide sufficient documentation to the City Engineer to justify the request. This may come in the form of studies, calculations or other data as required.

- 1.50.3 Any modification must still meet the requirements of land use requirements, codes and regulations, and land use decisions.

1.60.0 DEFINITIONS

| | |
|--------|--|
| AASHTO | American Association of State Highway and Transportation Officials |
| ADA | Americans with Disabilities Act |
| ADD | average daily demand |
| APWA | American Public Works Association |
| CDF | control density backfill |
| CWS | Clean Water Services |
| DI | Ductile Iron |
| ea | each |
| ft | feet |
| gpm | gallons per minute |
| H-O-A | Hand-Off-Automatic |
| HP | horsepower |
| ITE | Institute of Transportation Engineers |
| L | length of taper in feet |
| MDD | maximum daily demand |
| mph | miles per hour |
| na | not applicable |
| NEMA | National Electrical Manufacturers Association |
| O&M | Operations and Maintenance |
| OAR | Oregon Administrative Rules |
| ODOT | Oregon Department of Transportation |
| PDD | peak daily demand |
| PRV | pressure reducing valve |
| PVC | polyvinyl chloride |
| Q | quantity |
| ROW | right of way |
| S | design speed in mph |
| TDH | total dynamic head |
| TSP | Transportation System Plan |
| W | offset width in feet |

1.70.0 RIGHT OF WAY PERMITS

1.70.1 Policy and Purpose of Right-of-Way Regulation

- a. The City, in furtherance of the public health, safety and welfare, hereby declares it a matter of public concern and importance to maintain the safety, utility and structural integrity of all public rights-of-way within the City.
- b. The City recognizes that public rights-of-way are obtained, dedicated, maintained, and used for the movement of goods and people and the placement of public facilities and utilities that are compatible with those uses. The City declares it a matter of public concern that the public rights-of-way within its borders be protected and that use of the rights-of-way be regulated so as to protect these important assets for these public purposes.

- c. Toward this end, the City declares that the protection of the public health, safety and welfare requires certain regulations on the use of, and uses within, the public right-of-way so as to protect and maintain these public purposes.
- d. For purposes of these Design Standards, “right-of-way” includes all publicly dedicated streets, roads, alleys, highways and bike paths owned, held or maintained by the City, Washington County, or the State of Oregon, with the understanding that, if entities other than the City have regulatory or permitting authority over such a right-of-way, any permittee hereunder must obtain any permit or authorization required by any other governmental entity for the proposed activity.

1.70.2 Right-of-Way Permit Required

- a. Any individual, corporation, organization, partnership or similar entity shall apply for and obtain a City-issued Right-of-Way Permit before using any public right-of-way, including streets, roads, alleys, bridges, bike lanes and pedestrian paths, within the city limits for any of the following uses:
 - 1. Transport of goods or passage of one or more vehicles longer than 40 feet singly or as a single unit in combination or 60 feet total for the combination of vehicles including length of load or otherwise oversize according to ORS 818.010.
 - 2. Transport of goods or passage of one or more vehicles heavier than 34,000 pounds gross vehicle weight unless weight is mitigated by use of additional axles as prescribed by ORS 818.080 or a route is otherwise identified as weight limited.
 - 3. Placement of underground, above ground or overhead wires, pipes, fiber optic lines, poles, transmitters, receivers, antennas, equipment cabinets or other equipment within, over or under the public right-of-way, or the extension, expansion or replacement of any of the foregoing facilities in the public right-of-way. These activities may also require a franchise with the City for long-term occupation and use of the public rights-of-way.
 - 4. Obstruction of the normal passage of goods and people over the public right-of-way for any period of time by occupying the right-of-way with a stationary object or passage of pedestrians or vehicle(s), whether motorized or non-motorized, moving slower than the posted speed. This includes parades, bicycle or foot races, fairs, festivals and the like, as well as survey work within the right-of-way that may obstruct or slow traffic. These activities may also require a land use or special use permit depending upon the specific proposal.

5. Any pavement or concrete cutting, boring, excavation, digging, construction, building or physical disturbance of, or within, the right-of-way.
- b. Any entity required by this ordinance to obtain a Right-of-Way Permit shall apply using forms provided by the city and, as applicable, provide the following information:
1. The name, address, phone number and other contact information of the person or entity responsible for the permitted use and the same contact information for the person who will be on-site in the city when the requested use is occurring.
 2. Detailed description of the use or project proposed, including nature of the use, size, weight, number of vehicles, bicycles, people/pedestrians, the reason for the construction or excavation within the right-of-way, etc.
 3. Engineered drawings of the underground, above ground or overhead wires, pipes, fiber optic lines, poles, transmitters, receivers, antennas, equipment cabinets or other equipment within, over or under the public right-of-way, or the extension, expansion or replacement of any of the foregoing facilities in the public right-of-way.
 4. Specific dates, times, frequency and locations (specific portions of identified rights-of-way) for which the permit is sought and during which the right-of-way will be used, disturbed or affected.
 5. Detailed description of the anticipated impact of the proposed use, including poles and other structures that will need to be moved, reconstructed, reinforced and/or repaired. This should also include a description of the traffic, pedestrian and bicycle safety impacts of the proposed use. For construction or excavation, this includes the exact location, size of excavation, depth, etc., and a detailed description of the utilities that may be affected.
 6. A detailed description of the mitigation measures, including safety measures proposed to maintain public safety, and measures to protect and repair the structural integrity of the right-of-way.
 7. Any other relevant information related to the unique nature of the proposed use or otherwise required by the City for a full evaluation of the proposed use and its impact of the public right-of-way. The City may rely on ORS 818.105 and 818.220 as a framework for identifying relevant information required for a complete application.
- c. All applicants for a Right-of Way Permit may be required to reimburse the City for all of the City's reasonable costs incurred in evaluating the applicant's proposal, impacts and permit/condition compliance, including review by the City Engineer, City Planner, City Attorney and any other outside consultant.

- d. Approval of a Right-of-Way Permit, including conditions designed to protect the long-term function, safety and structural integrity of the right-of-way and all utility infrastructure within the right-of-way, shall not be unreasonably withheld. However, where protection of the function, safety and structural integrity of the right-of-way or utility infrastructure within the right-of-way cannot be assured through the imposition of conditions, the permit shall be denied.
- e. All Right-of-Way Permit applications shall be reviewed and decided in writing by the City Manager in consultation with the City Planner, City Engineer, and any affected state, county or federal agencies. The City Manager may refer any Right-of-Way Permit application to the City Council for review and decision.
- f. Any decision on a Right-of-Way Permit by the City Manager is final unless appealed to the City Council. A Right-of-Way Permit decision may be appealed to the City Council by requesting council review within 14 days of when the City Manager's decision is reduced to writing and signed. Any decision by the City Council on a Right-of-Way Permit is final. The City's decision on a Right-of-Way Permit is not a "land use decision" or "limited land use decision" under ORS Chapter 197, nor is it a "permit" under ORS Chapter 227.

1.70.3 Authority to Condition Use of the Right-of-Way

- a. Any Right-of-Way Permit approved by the City shall include reasonable conditions designed to protect the long-term function, safety and structural integrity of the right-of-way, City facilities and utilities within the right-of-way and near-by affected land, and preservation of aesthetic/scenic street views including, but not limited to the following:
 - 1. Traffic safety measures, flaggers, warning signs, lights and any other measure deemed necessary to protect public safety including limits to time of day or season to limit impacts on pedestrians, vehicular access in the school zone, time-sensitive commerce during harvest, etc.
 - 2. Reconstruction, rehabilitation, reinforcement and/or repair of any physical element or support structure of, in or near the public right-of-way that may be affected or need to be altered to accommodate the use.
 - 3. Measures necessary to maintain property operation and integrity of utilities within the right-of-way before, during and after the applicant's use of the right-of-way.
 - 4. The posting of a financial guarantee, in a form approved by the City Attorney in an amount approved by the City Engineer, sufficient to reconstruct, rehabilitate or repair any physical element or support structure in or near the public right-of-way following the use.
 - 5. Indemnification of the City for any claim arising from property damage, injury or death resulting from any activity by the permittee.

6. The temporary movement of poles, utility lines or other existing structures or facilities within or near the public right-of-way that may be affected by the proposed use.
 7. A reduction in the height, profile or other visible aspect of any facility or fixture proposed for the public right-of-way to preserve the aesthetic views or design standards of city streets, especially Main Street.
 8. Any other condition or requirement deemed reasonably necessary to protect the long-term function, safety and structural integrity of the right-of-way and utilities within the right-of-way.
- b. As a condition of permit approval, the City may require an applicant to enter a legally binding and enforceable Road Use Agreement that imposes specific requirements and obligations on the permittee to ensure compliance with the permit and to achieve the objectives of these Design Standards.
 - c. Conditions may take the form of conditions required before the use of the public right-of-way can begin, conditions regulating the proposed use of the right-of-way, and/or conditions to be performed following the use. Conditions shall be performed to the satisfaction of the City Engineer or other appropriate responsible city official and shall be completed at the expense of the permit holder. Failure to completely and properly fulfill all conditions of a Right-of-Way Permit may result in cancellation of the permit, may be grounds for revocation of all other Right-of-Way Permits or denial of future applications, and may be grounds for initiation of civil or criminal enforcement actions in state or municipal court.
 - d. The City may issue or amend from time to time seasonal weight restrictions on some city streets as deemed necessary by the City Engineer. The City will consult and coordinate with Washington County in these regulations.
 - e. In addition to any other available remedy, the City may enforce requirements of a Right-of-Way Permit in municipal court or Washington County Circuit Court.

1.70.4 Design Standards for permanent facilities in the Right-of-Way

All permanent facilities proposed to be erected, constructed or expanded within the public right-of-way shall be subject to the following basic requirements.

- a. No permanent fixtures shall be placed in the public right-of-way that obstruct vehicle traffic lanes, obstruct sight distance at intersections and driveways, or reduce the usable width of the sidewalk to less than 4 feet.
- b. Fixtures or placements that obstruct or eliminate one or more on-street parking spaces may be allowed under special circumstances where there is a net benefit to the public, such as dedication of on-street parking spaces to permanent and protected bicycle parking or use by a café or restaurant for outside seating.

- c. No new permanent fixtures or facilities shall be allowed in the public right-of-way without an engineer's certification that the fixture or facility will create or exacerbate a traffic safety hazard, pose an unsafe obstruction in the traffic clear area, or safety hazard to vehicles that might leave the travel lane.
- d. No permanent fixtures, pole extensions, or other facilities in the public right-of-way shall be taller than 35 feet.
- e. Compliance with all applicable provisions of the City's Design Standards.

1.70.5 Obligations on the City

- a. In administering this ordinance and exercising regulatory control over the public rights-of-way within its boundaries, the City is not obligated to maintain or repair the public right-of-way or otherwise assume jurisdiction or other obligations that it has not otherwise elected to assume.
- b. Nothing in this chapter authorizes the City to approve a proposed use on private property or land outside of the public right-of-way. A permit applicant is required to seek any additional approvals or permission from private property owners and other affected governmental entities. If excavation is proposed, the applicants shall contact the one-call utility line locate before beginning work. Permit applicants may also be required to obtain a franchise from the City for long-term use of the public right-of-way. Permit applicants may also be required to obtain land use approval, a construction permit, or a special events permit for the requested activity.

1.70.6 Exemptions to the Right-of-Way Permit Requirement

In administering this ordinance and exercising regulatory control over the public right-of-way, the City Manager may exempt the following activities from the permit requirements of these Design Standards:

- a. The seasonal transportation of agricultural products.
- b. Work done by or for the City for a specific city project.
- c. Work necessary to respond to an isolated emergency situation, affecting the public health, safety and welfare, that requires an expedited process.
- d. Truck transportation for work done on a project within the City limits on private or public property that requires approval by the City using another review process, such as a land use approval. Any such permit review process shall include consideration of the right-of-way and transportation safety issues set forth in these Design Standards.

1.70.7 Right-of-Way Permit Denial or Revocation and Appeal

The following procedures shall govern the denial or revocation of a Right-of-Way Permit and an applicant's remedies therefrom.

- a. Grounds for Denial or Revocation. A Right-of-Way Permit may be revoked or denied if the permit holder:
 - 1. Is charged with and fails to contest or is conclusively determined to be in violation of, two or more provisions of this chapter in a 12-month period.
 - 2. Operates a business in a way that creates or constitutes a nuisance.
 - 3. Fails to supply the information required on the City's business license form or submits misleading or false information, or submitted misleading or false information on a previous application.

- b. Notification:
 - 1. If the City determines that grounds for revocation of a Right-of-Way Permit exist, a notice of revocation will be issued in writing and delivered to the permit holder in a manner reasonably calculated to give notice, including delivery by United States first-class mail, postage prepaid to the address provided on the license application form.
 - 2. The revocation is effective 14 calendar days after issuance of the notice unless the licensee files a written appeal with the City, after which revocation would be effective if the licensee fails to appear at the appeal hearing.
 - 3. Denial of a Right-of-Way Permit is effective upon issuance and may be appealed within 14 days of issuance.

- c. Appeal. In the event of a Right-of-Way Permit revocation or denial, the following appeal procedures shall apply:
 - 1. The permittee or applicant shall initiate the appeal by filing a written notice appeal with the City Manager no later than 14 calendar days after issuance of the notice of revocation or denial.
 - 2. Upon filing of an appeal, the City Manager will schedule a public hearing before the City Council to decide the appeal.
 - 3. The City Council has the authority to administer oaths, take the testimony of witnesses, and prescribe procedures for conducting a hearing in general conformity with ORS Chapter 183.
 - 4. The appealing party or any other person the City Council deems to have relevant evidence concerning the existence of grounds for revocation will be allowed to present testimony and documentary evidence at the hearing.
 - 5. After considering the arguments and evidence, the City Council will determine whether the Right-of-Way Permit should be revoked or denied, as applicable. The City Council's decision is the City's final decision in the matter.

1.70.8 Violations

- a. Any person who fails to obtain a Right-of-Way Permit when one is required by these Design Standards, violates any permit condition or any other provision of the City's Municipal Code, shall be subject to civil citation pursuant to Chapter 37 (Civil Enforcement) of the City's Municipal Code, in addition to any other means of enforcement available to the City before any court or administrative body of competent jurisdiction. Upon a determination that a person has violated any requirement or prohibition of these Design Standards, that person shall be subject to a fine of up to \$500 per violation. Each day of violation, event, or occurrence may be deemed a separate citable and punishable offense.

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CITY OF BANKS

PUBLIC WORKS DESIGN STANDARDS

JUNE 2014 – REVISED MAY 2019

CHAPTER 2 – STREETS

2.10.0 GENERAL

- 2.10.1 All street designs shall provide for the safe and efficient travel to the public. Streets shall be designed to carry the recommended traffic volumes identified for each street classification. Street classifications are set forth in the City's Transportation System Plan as updated.
- 2.10.2 Streets shall be designed to meet or exceed minimum guidelines. These guidelines are set forth in the "AASHTO Policy on Geometric Design of Highways and Streets" (latest edition). Traffic Control Devices shall conform to the "Manual on Uniform Traffic Control Devices for Streets and Highways," Federal Highway Administration, with Oregon Supplements, Oregon Department of Transportation (latest edition).
- 2.10.3 A transportation study may be required:
- a. If a transportation study was required during land use planning, then it shall be finalized as part of the design. This should take into account any changes to the development, existing conditions, or agency requirements since the time the draft report was done.
 - b. If a transportation study was not required during land use planning, it shall be required during design if the proposed development creates more than 300 Average Daily Trips based upon the ITE Trip Generation Manual.
 - c. At a minimum the traffic report shall evaluate nearby intersections as identified by the City and shall determine existing conditions (service level, v/c ratio, cueing) during average day conditions, PM peak and AM peak; projected conditions, identify changes and recommend potential solutions. The potential solutions should also be evaluated.
- 2.10.4 A geotechnical report may be required for the streets or general site grading. The report shall include a site specific investigation including a description of existing conditions based upon existing data and site investigations, slope stability, groundwater location, design criteria and construction recommendations. The report shall be required under certain conditions such as:
- a. If there are suspect ground conditions such as potentially poor soil, unstable ground or slide conditions on the site or nearby
 - b. If there will be significant cut or fill
 - c. If there will be structures that are public, or structures that are supporting infrastructure such as retaining walls or bridges.

2.10.5 Any street improvements taking place in the highway right-of-way fall under the jurisdiction of ODOT and are not governed by these Design Standards.

2.10.6 Any street improvements taking place in the County right-of-way fall under the jurisdiction of County and are not governed by these Design Standards.

2.20.0 STREET DESIGN

2.20.1 Street Sections – City Streets

a. The street sections shall be as shown in the following tables.

Street Design and Construction Standards*

Street Standards

| Street Classification | ROW Width | Pavement Width |
|--|--------------------|----------------|
| Arterial | See ODOT Standards | |
| Collector: 2 Lanes | 58' | 34' |
| Collector: 2 Lanes + Parking | 74' | 50' |
| Collector: 3 Lanes | 72' | 48' |
| Collector: 3 Lanes + Parking | 88' | 64' |
| Local + Parking | 54' | 32' |
| Radius for turnaround at end of cul-de-sac | 55' | 42' |

* City standards are advisory on ODOT or County managed roadways.

Bicycle, Pedestrian, and On-Street Parking Standards*

| Street Classification | Planting Strip Minimum | Sidewalk Width Minimum | Bicycle Facilities | | On-Street Parking Width Minimum |
|-----------------------|------------------------|--|--------------------|---------------|---------------------------------|
| | | | Width Minimum | Width Minimum | |
| Arterial* | See ODOT Standards | | | | |
| Collector (2 Lanes) | 5' | 6' | 6' | | 8' |
| Collector (3 Lanes) | 5' | 6' | 6' | | 8' |
| Local | 5' | 6' | 6' | | 8' |
| Multi-Use Trail | Optional | 10' trail with 2' shoulders 8' minimum vertical clearance | | | None |

*Unless otherwise specified, all standards apply to two sides of street.

- b. Planter Strips
 - 1. Trees should be planted no closer than 2 feet to the edge of the pavement.
 - 2. The City may require additional width or area through the land division process.
 - 3. Planting strips shall have either grass, groundcover, bark mulch, or river rock as defined in Appendix C, Plant and Non-Plant Alternatives to Lawn.
- c. Alternative Requirements – On a case by case basis the City Engineer and City Planner may allow alternative right-of-way and pavement widths for local streets and residential routes. These may be considered in the following conditions:
 - 1. In sensitive lands such as wetlands, floodplains or slope hazard areas.
 - 2. In areas designated as steep slopes (slopes greater than 20% or as amended by the City ordinances).
 - 3. Minor partitions that occur in otherwise developed neighborhoods.
 - 4. Street improvements in fully developed neighborhoods.

2.20.2 Pavement Design

- a. Pavement design shall in no case be less than provided in the design standards. Heavier sections may be required depending upon soil conditions, or the amount of traffic and in particular truck traffic anticipated. Pavement sections for industrial streets, arterials and highways shall be specifically designed.
- b. Perpetual pavement design will be considered in lieu of standard pavement design.
- c. Street sections shall be as shown in Standard Detail No. 212. The base rock thickness shown in the detail shall include a 2-inch leveling course.
- d. The sub-base shall be proof rolled at the time of construction. The City or its agent and the City Engineer shall inspect the sub-base as it is proof rolled and determine if the sub-base needs to be improved. Compaction testing of the base material and density tests of the pavement shall be conducted to insure that the requirements shown on Standard Detail No. 212 are met.

2.20.3 Horizontal Alignment

- a. Centerline alignment of improvements should be parallel to the centerline of the right-of-way.
- b. Centerline of a proposed street extension shall be aligned with the existing street centerline.
- c. The following are guidelines for minimum centerline horizontal curve radius:

| | | |
|---------------|---|----------|
| Collector | - | 270 feet |
| Local Streets | - | 165 feet |

2.20.4 Vertical Alignment

- a. Minimum tangent street gradients shall be 0.5% along the crown and curb.
- b. Maximum street gradients shall be 15% for collector, and local streets, and 10% for arterials. Grades in excess of the standards must be approved by the City Engineer on an individual basis based upon the following criteria:
 - 1. There is no practical access to property being developed through adjacent properties.
 - 2. The cut/fill required to maintain the standard slopes may cause destabilization of soils.
- c. Local streets intersecting with a collector or greater functional classification street or streets intended to be posted with a stop sign shall provide a landing averaging 2% or less. Landings are that portion of the street within 50 feet of the edge of the intersecting street at full improvement.
- d. Grade changes of more than 1% shall be accomplished with vertical curves, with minimum length of 50 feet. Vertical curves shall be designed per the "AASHTO Policy on Geometric Design of Highways and Streets". "K" values shall be shown on the plans.
 - 1. For local streets with a design speed of 25 mph the "K" values are: 12 for a crest curve, 26 for a sag curve.
 - 2. Vertical curves may be shortened at intersections where there is a stop sign or a "tee" intersection.
- e. At street intersections, the crown of the major (higher classification) street shall continue through the intersection. The roadway section of the minor street will flatten to match the major street at the curb line.
- f. Street grades, intersections and superelevation transitions shall be designed to not allow concentrations of stormwater to flow over the pavement.

- g. The standard street cross-slope shall be 2.5%. Minimum cross-slopes allowed shall be 2%, and the maximum shall be 3.5%. City streets shall be designed such that superelevation is not required. Superelevation may only be used if approved by the City Engineer.

2.20.5 Intersections

- a. The interior angle at intersecting streets shall be kept as near to 90 degrees as possible and in no case shall it be less than 75 degrees.
- b. Offset intersections shall not be allowed. For intersections where the centerlines of the streets do not align, the minimum spacing shall be as follows:

| <u>Street Class</u> | <u>Intersection Spacing (feet)</u> |
|---------------------|------------------------------------|
| Collector | 250 to 600* |
| Local/Cul-de-sac | 200 to 600 |

*The City Engineer may permit a minimum spacing of not less than , 200 feet (Collector), when findings are made to establish that:

- 1. Without the change, there could be no public street access from the parcel(s) to the existing street, or
 - 2. The change is necessary to support local pedestrian, bicycle circulation and access, and
 - 3. The change is necessary due to topographic constraints, and
 - 4. All other provisions of the street design requirements can be met.
- c. Curb radii at intersections shall be as shown below for the various classifications. The right-of-way radii at intersections shall be sufficient to maintain at least the same right-of-way to curb spacing as the lower classified street.

| | |
|---------------|-------------|
| Collector | R = 30 feet |
| Local Streets | R = 25 feet |

2.20.6 Cul-de-sacs and Eyebrows

- a. Eyebrows shall be allowed only on local streets.
- b. Cul-de-sacs shall not be more than 400 feet in length, and shall serve no more than 18 dwellings. The length of a cul-de-sac shall be measured along the centerline of the roadway from the near side right-of-way of the nearest through traffic intersecting street to the farthest point of the cul-de-sac right-of-way.
- c. The minimum radius for a cul-de-sac bulb right of way shall be 60 feet with a minimum curb radius of 50 feet.

- d. The minimum curb radius for transitions into cul-de-sac bulbs shall be 25 feet minimum and the right-of-way radius shall be sufficient to maintain the same right-of-way to curb spacing as in the adjacent portion of the road.

2.20.7 Half-Width Street Improvements

- a. Half-width streets will only be approved when the abutting or opposite frontage property is undeveloped and the full improvement will be provided with development of the abutting or opposite (upon right-of-way dedication) frontage property.
- b. The right-of-way and pavement width will be approved by the City Engineer. In no case shall the pavement width required be less than that required to provide two lanes of traffic to pass at a safe distance. For a 32-foot local street, the half-width street pavement width will be 20 feet.
- c. A development on an unimproved substandard street shall be responsible for constructing a continuous, 20-foot-wide half-width street to a connection with the nearest publicly owned right-of-way.
- d. In cases where an existing street is to be improved, the improvement shall be to at least the centerline of the street or 20 feet wide whichever is more.

2.20.8 Pavement Transitions and Tapers

- a. In the direction of vehicular traffic where the street width transitions from narrower to wider the taper shall be three to one.
- b. In the direction of vehicular traffic where the street width transitions from wider to narrower the length of the transition taper shall be determined as follows:

$$L = S \times W \quad \text{for } S = 45 \text{ mph or greater}$$

$$L = S \times S \times W/60 \quad \text{for } S \text{ less than } 45 \text{ mph}$$

L – length of taper in feet

S – design speed in mph

W – offset width in feet

- c. Delineator may be required at tapers.

2.20.9 Sidewalks

- a. Sidewalks shall be a minimum of 4 inches of concrete over 2 inches of base rock.
- b. The maximum cross slope shall be 2%.

- c. The minimum horizontal clearance on a sidewalk shall be 4 feet with regard to obstructions such as mailboxes, sign posts, power poles, etc. The vertical clearance shall be a minimum of 7 feet.
- d. Sidewalks are intended to be within the right-of-way. In special circumstances the City may allow them to be outside of the right-of-way, but they then must be within a dedicated easement.
- e. Handrails or fences may be required should there be vertical drops next to the sidewalk of 6 inches or more, or there are steep slopes next to the sidewalk.
- f. Two sidewalk ramps meeting Americans with Disabilities Acts (ADA) requirements shall be located at each corner. Mid-block sidewalk ramps may be required where there are pedestrian facilities. Other factors may dictate the location of ramps.

2.20.10 Curb & Gutter

- a. A monolithic curb and gutter is the City standard per Standard Detail No. 200.
- b. Mountable curbs will not be used unless approved by the City Engineer in special circumstances such as developments with townhouses where 90% of the frontage is driveway.
- c. A standard curb per Standard Detail No. 202 may be used in special circumstances such as retrofits as approved by the City Engineer.

2.20.11 Driveways

- a. Access to private property shall be permitted with the use of driveway curb cuts. The access points with the street shall be the minimum necessary to provide access while not inhibiting the safe circulation and carrying capacity of the street. Driveways shall meet all applicable guidelines of the Americans with Disabilities Act (ADA).
- b. Driveways shall be limited to one per property except for certain uses which include large commercial uses such as large box stores, large public uses such as schools and parks, drive through facilities, property with a frontage of over 250 feet and similar uses.
- c. Double frontage lots and corner lots may be limited to access from a single street, usually the lower classification street.
- d. If additional driveways are approved by the City Engineer, a finding shall be made that no eminent traffic hazard would result and impacts on through traffic would be minimal. Restrictions may be imposed on additional driveways, such as limited turn movements, shared access between uses, closure of existing driveways, or other access management actions.

- e. Within commercial, industrial, mixed use, and multi-family areas, shared driveways and internal access between similar uses are encouraged to reduce the access points to the higher classified roadways, to improve internal site circulation, and to reduce local trips or movements on the street system. Shared driveways or internal access between uses will be established by means of common access easements at the time of development.
- f. Driveway widths shall be as shown on the following table.

Driveway Widths (Minimum/Maximum, feet)

| Street Classification | Res. | Comm. | Ind. |
|-----------------------|-----------|-------|-------|
| Collector: | 12/24 (1) | 12/36 | 12/36 |
| Local : | 12/24 (1) | 12/36 | 12/36 |
| Cul-de-sac: | 12/24 (1) | 12/36 | 12/36 |

Res. = Residential Zone
 Comm. = Commercial Zone
 Ind. = Industrial Zone
 Notes: (1) 28' maximum with 3-car garage.

- g. Driveway spacing shall be as shown in the following table.

Minimum Driveway Spacing

| Street Classification | Intersection | Driveway |
|-----------------------|--------------|----------|
| Collector(2) | 100' (1) | 100' (1) |
| Local | 50' (1) | 10' |
| Cul-de-sac | 50' (1) | 10' |

Notes: (1) Minimum distance or no closer than 60% of parcel frontage unless this prohibits access to the site, in which case City Engineer may approve a deviation.
 (2) Direct access to this street will not be allowed if an alternative exists or is planned.

* Driveways shall not be constructed within the curb return of a street intersection.

- h. Curb cuts shall be a minimum of 5 feet from the property line, unless a shared driveway is installed. Deviation may be approved by the City Engineer.
- i. For Collectors, driveways adjacent to street intersections shall be located beyond the required queue length for traffic movements at the intersection. If this requirement prohibits access to the site, a driveway with restricted turn movements may be permitted.
- j. Multi-family access driveways will be required to meet the same access requirements as commercial driveways if the multi-family site generated 100 or more trips per day.

2.20.12 Bikeways

- a. General – The City has adopted a Transportation System Plan, which includes a Bicycle/Pedestrian Plan. This plan summarizes the City's policy and implementation strategies for bikeways within the City. The City will use both AASHTO and ODOT standards and criteria as the minimum guidelines for bikeway design, construction, and control.

The guidelines for bikeways consist of the following:

- 1. AASHTO, "Guide to Development of Bicycle Facilities," latest edition.
 - 2. ODOT, "Oregon Bicycle & Pedestrian Plan", latest edition.
 - 3. Manual on Uniform Traffic Control Devices with Oregon supplements by Oregon Transportation Commission, latest edition.
- b. Location – Bikeway location and widths for on-street bike lanes are shown on the street section table in paragraph 2.20.1 of these Design Standards. Structural sections of street bikeways shall conform to that of the street. Bikeways that are outside of street sections will be considered two-way and shall be a minimum of 12 feet wide. These shall have a minimum of 2-foot-wide gravel shoulders on both sides.
- c. Intended Use – Bikeways are categorized by their intended use.
 - 1. Bike Lane – Street. One-directional bicycle use only. Minimum lane width of 6 feet.
 - 2. Local Trail. Off-street, combined bicycle and pedestrian users. Two-way directional and 12 feet wide minimum. Hardscape surface.
 - 3. Multi-Use Trail. Off-street, combined bicycle and pedestrian users. Two-way directional and 12 feet minimum width. Surfacing may be soft or hardscape.
- d. Design Criteria – Design shall meet the criteria per AASHTO and ODOT, but shall also meet the following criteria:
 - 1. All bikeways shall have a minimum cross-slope of 1% and a maximum cross-slope of 2%. A cross-slope or crown may be required, depending on site conditions.
 - 2. Bikeway curvature will be based on a minimum design speed of 20 mph.
 - 3. Bikeway grades shall be limited to a maximum of 5%. Where topography dictates, grades over 5% are acceptable when a higher design speed is used and additional width is provided.
 - 4. Bikeways shall be constructed for three different situations where limited maintenance vehicle (City-owned) use will occur, and where heavy maintenance vehicle use will occur and where vehicles do not

have access. In all three cases, subgrade preparation will require removal of existing organic material and compaction.

| Bikeway Thickness | | |
|-------------------|------------|-----------|
| Vehicle Use | Surface | Aggregate |
| Inaccessible | Soft | 8" |
| Limited | 3" Asphalt | 4" |
| Heavy | 6" Asphalt | 8" |

5. When drainage such as side ditches is required parallel with the bikeway, the ditch centerline shall be at least 5 feet from the edge of the pavement. Ditch side slope adjacent to the bikeway shall be no steeper than 2:1 when measuring the horizontal distance to the vertical distance.
 6. When culverts cross bikeways, the ends of the pipe shall be no closer than 5 feet from the edge of the bikeway.
 7. Street bikeways shall be defined by striping, signage, and pavement markings for the exclusive use of bicyclists.
- e. Bikeways that cross streets shall intersect at a 90 degree angle.
1. Radius – Approach radius are dependent upon the approaching slope and design speed.
 2. Signage – Type, size and location to be in accordance with the Manual of Uniform Traffic Control Devices (MUTCD). Placement shall not confuse crossing motorists.
 3. Approach – When possible, bikeway approaches to the intersection shall be at level grade and provide adequate site distance. Provide detectable warning surfaces in accordance with MUTCD. All cross slopes, ramps, and transitions shall be ADA compliant.

2.20.13 Parking

- a. On street parking location and widths are shown on the street section table in paragraph 2.20.1 of these Design Standards.
 1. Local Street shall have parallel parking. Parking may be deleted in special circumstances such as conserving major trees, streets are located in sensitive lands, or hazardous conditions at the City's discretion.

2.20.14 Street Signs & Stripping

- a. A street signing and stripping plan shall be included in plan submittals for new streets. Street stripping and signing shall be in accordance with ODOT standards and guidelines.

2.20.15 Street Lighting

- a. A street lighting plan shall be included in plan submittals for new streets. Street lighting shall be for the safety of pedestrians as well as traffic safety.

2.20.16 Traffic Calming

- a. Traffic calming measures are encouraged and are supported as shown in the following table.

Allowed Traffic Calming Measures by Roadway Functional Classification

| Traffic Calming Measure | Is Measure Supported? (per Roadway Classification) ^a | | |
|---|---|---------------|---|
| | Arterial | Collector | Residential Route/ Local Street |
| Curb Extensions | See ODOT Standards | Supported | Calming measures are supported on roads that have connectivity (more than two accesses) and are accepted and field tested by the Banks Fire District. |
| Roundabouts | | Supported | |
| Medians and Pedestrian Islands | | Supported | |
| Pavement Texture | | Supported | |
| Speed Hump | | Not Supported | |
| Raised Crosswalk | | Not Supported | |
| Speed Cushion (provides emergency pass-through with no vertical deflection) | | Not Supported | |
| Choker | | Not Supported | |
| Traffic Circle | | Not Supported | |
| Diverter (with emergency vehicle pass through) | | Supported | |
| Chicanes | | Not Supported | |

NOTES:

- a. Traffic calming measures are supported with the qualification that they meet Banks Fire District guidelines including minimum street width, emergency vehicle turning radius, and accessibility/connectivity.

2.20.17 Temporary Dead-end Streets

- a. Temporary dead-end streets more than 100 feet long shall have temporary turn-arounds that meet the requirements of the City's Fire District.
- b. Appropriate easements shall be provided for the temporary turnaround.

2.20.18 Mailboxes

- a. Clustered mailboxes shall be as defined in the State of Oregon Structural Specialty Code (Section 1102).
- b. Clustered mailboxes located in the public right-of-way shall be located and designed according to the standards found in the State of Oregon Structural Specialty Code (Section 1111)

2.20.19 Street Trees

- a. General – As used in these standards, “ANSI Z-60.1-2004” is the “American National Standards Institute Z-60.1-2004. American National Standard for Nursery Stock. Published by the American Nursery & Landscape Association.”
- b. Compliance – The Standards contained in this section shall be utilized for street trees required to be planted in the public right-of-way in accordance with the City’s Municipal Code Section 152.060, or as a condition of a development land use approval in accordance with the City’s Municipal Code Title 15, or for a City improvement project. Street trees needing or required to be replaced must also adhere to these standards in order to ensure that new trees planted along public right-of-ways are the approved species for the location, of the highest quality, require low maintenance, and do not interfere with public safety.
- c. Street Tree Planting Approval – No street trees shall be planted in the public right-of-way without a City approval prior to planting a street tree or mass planting of street trees within a development. Upon completion of the tree planting, the landscape contractor or property owner shall notify the City to schedule a final inspection.
- d. Street Tree Selection – The species of trees to be planted shall be selected in accordance with the matrix elements in the Approved Street Tree Species List in Appendix B or as otherwise approved by the City.
- e. Street Tree Quality at Time of Planting
 1. A street tree shall have a straight trunk perpendicular to the ground with the lowest scaffold branches a minimum height of 5-feet above the ground. Scaffold branches are the primary limbs radiating from the trunk of a tree from which all subordinate branches grow. Any structural pruning of the scaffold branches to obtain the above clearance or required appearance must have been pruned the year prior to digging the tree.
 2. Street trees shall be grown to the standards and specifications of the American Standard for Nursery Stock (ANSI Z-60.1-2004), published by the American Nursery & Landscape Association.
 3. Street trees shall be provided reasonably free, as defined by nursery industry standards for street trees, from insects and disease, decay,

major structural defects, and damage to the bark, the trunk, all branches, and the root system.

4. Street tree scaffold branches shall be well proportioned and pointing upward where they attach to the main trunk, with an average spacing of at least 6 inches. Trees with a main trunk branch “Y” are not acceptable.
- f. Street Tree Size at Time of Planting
1. Street trees shall be a minimum of 2 inches in caliper, measured 5 feet above mean ground level, and shall be a minimum of 10 feet high at the time the trees are dug.
 2. Notwithstanding the provisions of 2.20.19.d. and 2.20.19.f.1., the City may approve the planting of smaller caliper trees, if the approved species of trees of the appropriate caliper can be shown to be currently unavailable within the region and an acceptable substitute species. Submit recommendation from the landscape architect or landscape contractor justifying the need to deviate from the standard. If smaller caliper trees are approved, the time it takes the trees to reach the required caliper size shall be included in the establishment period.
- g. Street Tree Condition at Time of Planting – Trees shall be transported and provided in either of the following conditions at time of planting:
1. Balled and burlap-wrapped or in wire baskets, providing:
 - a) Trees shall have a tight, sound root ball with firm attachment of the trunk. Trees with trunks loosely attached to the root ball will not be accepted.
 - b) Root ball size and condition shall conform to the standards and specifications of the American Standard for Nursery Stock (ANSI Z-60.1-2004), published by the American Nursery & Landscape Association.
 - c) Root balls shall not be allowed to dry out at any time from the nursery to final planting. Any trees stressed from the lack of sufficient water will not be accepted.
 - d) Trees shall have a well-developed root system and not be root bound or have circling/girdling roots.
 - e) As shown in Standard Detail No. 215, the tree shall be supported with a scaffold and a temporary tree watering bag shall be installed to establish the tree.
 - f) Maintain trees for a minimum of 90 days
 2. In a container providing:
 - a) The trees are free of circling, girdling roots, i.e. root bound.
 - b) The trees have rooted to the inside edges of the container.
- h. Tree Planting Location Standards
1. On public streets without sidewalks, trees shall be located so as to accommodate future sidewalk placement and be located with regard to current and future utility line corridors. Trees and shrubs (which attain

a height of 30 inches or more, as measured from the road surface) that may form a hedge or screen shall not be allowed within the sight distance clearance of a street, alley, or driveway intersection so as to obscure required traffic sight distances. Curves in the road and other site specific factors may require extensions of these dimensions. For more information on sight distance clearance, see the City's Municipal Code Section 151.065 and Chapter 3 of the Oregon DOT Highway Design Manual.

2. Minimum Street Tree Planting Clearances

| Feature | Minimum Distance from Feature | | |
|--------------------------------|---|--------------------------------|------------------------------|
| | Small Tree (up to 35' ht.) | Medium Tree (up to 60' ht.) | Large Tree (over 60' ht.) |
| Public Intersections | 25' | 35' | 35' |
| Alley and Private Intersection | 15' | 15' | 15' |
| Courtesy Walks/Sidewalks | 2' | 3' | 4' |
| Driveway Intersections | 5' | 10' | 15' |
| Fire Hydrants | 10' | 10' | 10' |
| Manholes and Catch Basins | 5' | 10' | 15' |
| Water Meters | 5' | 5' | 5' |
| Property Lines | 2' | 2' | 2' |
| Underground Utilities | 5' | 5' | 5' |
| Utility Boxes | 5' | 5' | 5' |
| Utility Poles | 5' | 10' | 15' |
| Street Lights | 15' | 20' | 25' |
| Stop Signs/Lights | Mature Tree Shall not block sign Comply with sight distance requirements | | |
| Regulatory Signs | Mature Tree Shall not block sign Comply with sight distance requirements | | |

3. Minimum Distance from Sidewalk and Curbs

- a) Trees shall be centered in the planting strip between the sidewalk and the street curb. Trees shall be planted in planting strips 3 feet wide or greater. Planting strips less than 3 feet wide shall have either grass, groundcover, bark mulch, or river rock as defined in Appendix C, Plant and Non-Plant Alternatives to Lawn.

4. Overhead Utility Lines

- a) Only approved trees, as listed on the attached Appendix B, shall be planted under overhead utility lines. Trees shall have a maximum mature height of 5 feet below the overhead utility line. Failure to do so will result in the removal and replacement of said tree(s) at the owners' expense.

5. Underground Utilities

- a) Trees shall not be planted over existing or future public or private underground utility line locations. Trees shall be planted so that the mature root system is a minimum of 5 feet from the outer edge of the underground utility.

6. Clearance Areas

- a) Trees and landscaping within and behind the public right-of-way shall be maintained to provide 8 feet of clearance over sidewalks and 13 feet of clearance over street areas.

7. Linear Spacing

- a) Trees shall be spaced so mature canopies do not overlap, be placed in accordance with this standard, and in accordance with the land use approval. Where a tree falls at the same location as a utility feature (i.e., fire hydrant, manhole, catch basin, utility box, utility pole, street light, or underground utilities) in the right-of-way, the tree may be skipped.

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CITY OF BANKS

PUBLIC WORKS DESIGN STANDARDS

JUNE 2014 – REVISED MAY 2019

CHAPTER 3 – SANITARY SEWERS

3.10.0 STANDARDS

- 3.10.1 The sanitary sewer system is owned and operated by Clean Water Services (CWS), and the design of the system shall meet CWS standards. However, the following is provided as guidelines for sanitary sewers in the City of Banks.
- a. Public Facilities – Sanitary sewer facilities shall be designed such that they do not negatively impact other public facilities such as streets, the water system, and sanitary sewer system.
 - b. Public Facilities – Sanitary sewer facilities shall be designed such that they do not interfere with any other City Design Standards being met.
 - c. System Location – Public sanitary sewer lines shall be located within the public right-of-way where possible. These lines are placed in the public right-of-way for ease of maintenance and access, control of the facility, operation of the facility, and to provide required replacement and/or repair. Any sanitary sewer lines not placed in the public right-of-way shall be located in a public utility easement.
 - d. Extensions – All development projects will be required to provide public sewers to adjacent upstream parcels in order to provide for an orderly development of the drainage area. This shall include the extension of sewer mains in easements across the property to adjoining properties, and across and along the street frontage of the property to adjoining properties when the main is located in the street right-of-way. This shall include trunk sewers that are sized to provide capacity for upstream development.
 - e. Capacity – Sanitary sewer system capacity shall be designed for ultimate development density of the tributary area. The system shall allow for future system extension and for future development based on current or proposed land use designations.
 - f. Gravity Collection – Sanitary sewer systems shall, in general, be designed to provide gravity service to all areas of development. Exceptions can be considered, on a case-by-case basis, when technology, topography, or environmental sensitivity indicates an adjustment to these Design Standards is appropriate.

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**CITY OF BANKS
PUBLIC FACILITY IMPROVEMENTS**

DESIGN MANUAL AND STANDARD SPECIFICATIONS

JUNE 2014 – REVISED MAY 2019

CHAPTER 4 – WATER MAINS

4.10.0 GENERAL DESIGN REQUIREMENTS

- 4.10.1 Performance Standards – Water distribution systems shall be designed to meet Oregon Administrative Rules Chapter 333 (including ORS448), AWWA Standards, and guidelines of the Water System Master Plan, April 1997, and its updates.
- 4.10.2 Demand Requirements – Water system design shall provide adequate flow for fire protection during projected maximum water usage and consumption.
- 4.10.3 System Pressure – Required water system demands and fire flow shall be met while maintaining the minimum operating pressures required by the State (20 psi).
- 4.10.4 System Pressure – The minimum pressure under static conditions (non-fire flow) shall be 40 psi.
- 4.10.5 System Pressure – The maximum pressure delivered to a service shall be 80 psi. Main line pressure may be higher than this if individual PRVs are used.
- 4.10.6 Fire Flow – Residential fire flow shall be 1,000 gallons per minute (gpm), commercial/industrial/ institutional fire flow shall be 3,000 gpm. Fire flow for certain industrial areas, high density areas, or special uses will be determined on a case by case method by the Fire Chief.
- 4.10.7 Extensions – New water systems shall allow for future extensions, beyond present development, that are consistent with the Master Plan and the distribution system. Distribution piping shall be extended to the boundary of the development to facilitate future extensions. This shall include the extension of mains in easements across the property to adjoining properties, and across and along the street frontage of the property to adjoining properties when the main is located in the street right of way. This shall include mains that are sized to provide capacity for future developments.
- 4.10.8 Looping – The water distribution system will be looped where ever possible. This may require the placement of mains in easements, or extending pipe on street frontages without services.
- 4.10.9 Location – All public water lines shall be located within the public right of way whenever possible. Under special conditions the placing of public water lines outside of public right of way may be approved by the City Engineer.

- 4.10.10 Watercourses – For any project requiring construction within or adjacent to watercourses and/or wetlands, in addition to approval by the City, permits from the appropriate responsible agencies (Oregon Department of Fish and Wildlife, Oregon Division of State Lands, U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, U.S. National Marine Fisheries Service, etc.) shall be obtained. Copies thereof, or written evidence that no permit is required, shall be given to the City prior to any clearing or construction.
- 4.10.11 Velocity – Velocities in distribution mains may be designed for, but not exceed 8 feet per second for combined fire, domestic and irrigation flows. Velocity in service lines shall be designed not to exceed 10 feet per second.
- 4.10.12 Modeling – For portions of the water system with mid-range to low static pressures, required flows may be difficult to achieve while still maintaining a minimum system residual of 20 psi. A water modeling report shall be submitted to verify the adequacy of the design in these areas.

4.20.0 PIPE MATERIALS AND SIZE

- 4.20.1 General – All public water distribution systems shall be constructed with ductile iron pipe, minimum thickness Class 52 or with Polyvinyl Chloride (PVC) pipe which conforms to AWWA C900 or C905 and UNI-B-11 standards.
- 4.20.2 Ductile Iron Pipe – All ductile iron pipe shall be cement mortar lined pipe with push on or mechanical type joints. When a corrosive potential condition is encountered, all ductile iron pipe and fittings will be polyethylene encased with an 8-mil tubing meeting manufacturer and AWWA standards. Where an active cathodic protection system is encountered as a result of other utilities, a deviation from the normal pipe design/material/installation practice may be required by the City Engineer. (Polyvinyl chloride [PVC] pipe may be considered as an alternate to ductile iron pipe where an active cathodic protection system is encountered.)
- 4.20.3 Polyvinyl Chloride (PVC) Pipe and Tracer Wire Installation – All PVC pipe 4 inch through 12 inch shall conform to AWWA C900 and UNI B 11 standards. All PVC pipe shall have a dimension ratio no greater than 18, with an outside diameter identical to cast iron. Tracer wire shall be a minimum 12-gauge coated copper wire and installed with all PVC water pipe.
- 4.20.4 Alternate Pipe Material – Where required for added strength, ductile iron pipe will be used (minimum for Class 52). Ductile iron pipe shall be used when cover is less than 2 feet.
- 4.20.5. Service Lines – Pipe material for service lines shall be as follows:
 - a. For 1-inch service lines use soft temper type “K” copper pipe complying with ASTM B88.
 - b. For 2-inch service lines use type “K” copper pipe complying with ASTM B88. Soft temper with flare fittings is not acceptable.
 - c. When a corrosive potential condition is encountered and the copper service passes over or under an active cathodic protection system, the service will

be installed in a Schedule 40 PVC conduit for a distance of 10 feet on each side of the active system.

- d. For service 4-inch and larger the pipe material shall match the main line pipe.

4.20.6 Main Line Pipe Size – Water distribution main sizes shall generally conform to the following:

- a. 4 inch – May only be used with approval of the City Engineer in residential zones on dead-end streets less than a center line distance of 250 feet measured from the center of the intersecting street to the radius point of the cul-de-sac of a dead-end street with service to not more than 12 single family residences; and shall be connected to a looped 6-inch or larger main. Fire hydrants shall not be permitted on 4-inch lines. All 4-inch lines shall terminate with a standard blow off.
- b. 6 inch – Minimum size residential subdivision distribution water main for the grid (looped) system, not to exceed an unsupported length of 600 feet and shall not be permanently dead-ended.
- c. 8 inch – This is the standard size for new distribution pipe. Minimum size for permanently dead-ended mains supplying fire hydrants with a fire flow of 1,000 gpm and for primary feeder mains in residential subdivisions, not to exceed an unsupported length of 600 feet unless otherwise approved by City Engineer.
- d. 10 inch and larger – As required for primary transmission lines in subdivisions, industrial and commercial areas.

4.30.0 FITTINGS & RESTRAINT

- 4.30.1 Location – All abrupt changes in vertical or horizontal alignment shall be made with a fitting and adequate thrust restraint.
- 4.30.2 Material – Fittings for both DI and PVC pipe shall be ductile iron. They shall have either flanged or mechanical joint end conditions. Flanged end conditions are typically only used when two or more fittings and/or valves are connected together.
- 4.30.3 Restraint – Restraint shall be provided at fittings. This may be done with concrete thrust blocks or restrained joints.
 - a. Concrete thrust blocks must be poured against undisturbed earth. The concrete thrust block may not bare against structures (such as manholes or detention tanks), other pipes, or other trenches.
 - b. Where concrete thrust blocks cannot be used, then restrained joints must be used. The restrained joints will be required on the fitting, and on a certain amount of pipe joints. The design engineer will be required to calculate how many joints must be restrained.

4.40.0 DEAD-MAINS

- 4.40.1 Future Extension – Dead-end mains which will be extended in the future shall be provided with a properly sized blow off. They shall also be provided with a mainline size shut off valve to facilitate line extension.
- 4.40.2 Permanent Dead-Ends – Permanent dead-end mains shall terminate with a Standard Blow Off Assembly. They shall be no longer than 250 feet and shall serve no more than 12 homes.
- 4.40.3 Location – The installation of permanent or long-term dead-end mains greater than 250 feet, upon which fire protection depends and the dependence of relatively large areas on single mains, will not be permitted unless otherwise approved by the City Engineer.
- 4.40.4 Temporary Dead-Ends – No more than 20 single family residences should be temporarily served from an un-looped waterline during a phased construction.

4.50.0 ALIGNMENT AND COVER

4.50.1 LOCATION

- a. Right-of-Way – All waterlines shall be located within the public right of way or as directed and approved by the City Engineer.
- b. Easements – The City Engineer, under special conditions, may allow a public waterline to be located within a public water easement.
- c. Location in Streets – In general, water systems shall be located 12 feet south and east from the right of way centerline or as approved by the City Engineer.
- d. Curves – Curved alignment for waterlines or mains is permitted and shall follow the street centerline when practical. The minimum allowed radius shall be based on allowable pipe deflection for the pipe diameter and the pipe laying length, but not to exceed 3 joint deflections.

4.50.2 MINIMUM COVER

- a. Minimum Cover – The standard minimum cover over buried water mains within the street right-of-way shall be 36 inches from finished grade.
- b. Minimum Cover – The minimum cover for mains in easements across private property shall be 48 inches from finished grade.
- c. Deviations – Deviation from the above standards will be considered on a case by case basis when the following exists:
 - 1. When there is underlying rock strata that prohibits placement of the water, a written request must be submitted to the City Engineer, together with submission of a soils report, with a plan and profile certifying that bed rock exists less than 3 feet below the undisturbed ground surface.

2. Substantial utilities exist at an elevation conflicting with the waterline; and installation of the waterline below such utility would cause the new waterline to be at an unreasonably deep elevation below finished grade.
 3. When connection is made to an existing water main that does not have the minimum cover.
- d. Backfill – Where the water main or service is installed at a depth of 24 inches or less below finished grade, control density backfill (CDF) shall be used in place of standard backfill material.

4.50.3 SEPARATION WITH SEWER LINES

- a. Mains – Water mains shall be installed to provide the minimum clear distance as described in the OAR Chapter 333, Public Water Systems. Water mains shall be installed to go over sewer lines with a minimum of 18 inches of vertical clearance at the intersections of these pipes (in accordance with the requirements of OAR Chapter 333, Public Water Systems).
- b. Services – Where individual properties are served by private pumps and force mains discharging to a public sanitary sewer at the property line, and a domestic water well is also on that same property, either Uniform Plumbing Code (for water systems servicing three or less dwelling units) or State Health Department (for community water systems servicing four or more dwelling units) specified separation of sewer and waterlines shall apply.

4.50.4 SEPARATION WITH UTILITIES

- a. Horizontal Separation – The minimum spacing between water mains and storm drains, gas lines, and other underground utilities, excepting sanitary sewers, shall be 3 feet horizontally when the standard utility location cannot be maintained. This separation also applies to water service and utility service lines.
- b. Vertical Separation— Where water mains are being designed for installation parallel with other water mains, utility pipe, or conduit lines, the vertical separation shall be 12 inches below or in such a manner which will permit future side connections of mains, hydrants, or services, and avoid conflicts with parallel utilities without abrupt changes in vertical grade of the above mentioned main, hydrant, or service.
- c. Crossing – Where crossing of utilities is required, the minimum vertical clearance shall be 6 inches.

4.50.5 EASEMENTS

- a. Placement – Water mains placed in easements along a property line shall have the equal width easements centered about the property line and the pipe shall be offset 18 inches from the property lines. For water mains

placed in easements located other than along a property line, the pipe shall be placed in the center of the easement.

- b. Use – The conditions of the easement shall be such that the easement shall not be used for any purpose that would interfere with the unrestricted use for water main purposes.
 - 1. Under no circumstances shall a building or structure be placed over a water main or easement. This shall include overhanging structures with footings located outside the easement. This shall be recorded in the easement description.
 - 2. Sidewalks, curbs and pavement are allowed to be constructed over easements. Preferably they shall be at approximately 90 degrees to the easement.
 - 3. Fences and minimal landscaping are allowable in easements. Landscaping within the easement shall exclude the planting of all trees and also shrubs normally expected to exceed 2 feet in height.
 - 4. The easement shall clearly state that all improvements (including landscaping) within the easement are the sole responsibility of the property owner and that if, for maintenance purposes, it is necessary for the City to remove the improvements, it will be the responsibility of the property owner to reinstall them.
- c. Standard Size – Easements for sewers less than 12 inches in diameter shall have a minimum width of 15 feet.
- d. Additional Width – Water mains with inside diameters greater than 12 inches will require wider easements. In areas of steep (15% slope or greater), unusual topography or deeper cover, wider easement will also be required.
- e. Multiple Pipes – For multiple pipes to be located within the same easement the above rules apply except that the separation of the pipes, both horizontally and vertically must be considered.
 - 1. A minimum of a 1-foot horizontal separation of the outside surfaces, including bells, is required.
 - 2. If the pipes are at differing elevations, then the easement width will be required to be wider. See Section 3.0024 for calculation of easement width based upon depth.
- f. Location – Easement locations for public mains serving a Planned Unit Development, apartment complex, or commercial/industrial development shall be in private drives or similar open areas which will permit unobstructed vehicle access and operation of facilities for maintenance by City personnel.

- g. Marking – Any water main placed within a water main easement will be permanently marked with blue plastic markers at all angle points, and no less than every 200 feet, or at a change in direction. In addition, markers shall be placed where the waterline intersects the public right of way at the easement location. A monument cap set in the pavement of parking lots, driveways, etc. shall be an acceptable alternative to the sign.
- h. Schedule – All easements shall be furnished to the City for review and approval prior to recording or the start of construction.

4.50.6 RELATION TO WATERCOURSES

- a. General – New water mains may cross over or under existing streams, ponds, rivers, or other bodies of water.
- b. Appurtenances – All crossings shall be designed with a shut off valve on both sides of the water body. The valves shall be easily accessible and not subject to flooding. Air release valves may be required.
- c. Above Water Crossings – The pipe crossings shall be engineered to provide support, anchorage, protection from freezing and protection from damage. The piping shall remain accessible for repair and maintenance. All above water crossings will require review and approval by the City Engineer as well as the owning agency of any structure that the water line is attached to.
- d. Underwater Crossings
 1. Mains crossing stream or drainage channels shall be designed to cross as nearly perpendicular to the channel as possible.
 2. Permits for in water work may be required from the Division of State Lands and the Corps of Engineers.
 3. The minimum cover from the bottom of the stream bed or drainage channel to the top of pipe shall be 36 inches.
 4. A scour pad centered on the waterline will be required for mains less than 12 inches inside diameter when the cover from the top of the pipe to the bottom of the stream bed or drainage channel is 30 inches or less. The scour pad shall be concrete, 6 inches thick and 6 feet wide; reinforced with number four bars 12 inches on center both ways; and shall extend to a point where a one to one slope begins at the top of the bank and slopes down from the bank away from channel centerline and intersects the top of the pipe. There shall be a minimum 6-inch clearance between bottom of pad and top of waterline.
- e. Parallel – Water mains located along or parallel to streams shall be located outside of the streambed and sufficiently removed therefrom to provide for future, possible stream channel widening.
- f. Pipe Material – The pipe material shall be ductile iron (DI). For underwater crossings the pipe shall have restrained joints.

4.60.0 APPURTENANCES

4.60.1 VALVES

- a. Size – In general, valves shall be the same size as the mains in which they are installed.
- b. Type – For main line valves, use gate valves for sizes 10 inches or smaller, and use butterfly valves for sizes 12 inch and larger. Other types of valves may be used for purposes other than main lines valves such as at services, air release valves and such.
- c. Pressure Rating – All gate valves shall be pressure rated for 200 psi and all butterfly valves shall be pressure rated for 150 psi. All ductile iron mechanical joint fittings shall be pressure rated at 350 psi. All flanged fittings and cast iron mechanical joint fittings shall be pressure rated at 250 psi. All fittings shall be factory cement mortar lined and coated.
- d. Location – Distribution system valves shall be located at and flanged to the tee or cross fitting. There shall be a sufficient number of valves so located that not more than four, and preferably three valves, must be operated to affect any one particular shutdown.
- e. Location – Valves shall be located on both sides of special crossings such as waterways, bridges, railroads or highways.
- f. Spacing – The spacing of valves shall be such that the length of any one shutdown in commercial or industrial areas shall not exceed 500 feet or 800 feet in other areas. Transmission water mains shall have valves at not more than 1,000-foot spacings.
- g. Tees & Crosses – In general, a tee intersection shall be valved in two branches and a cross intersection shall be valved in three branches. Hazardous crossings such as creeks, railroad and freeway crossings, shall be valved on each side. Valves shall be accessible at all times.
- h. Air Release – When a hydrant tee or a tee branching to a cul-de-sac blow-off is installed in a sloped waterline, install a main line valve on the up hill run of the tee, to allow for release of air from hydrant or blow-off. An additional main line valve may be needed on the down hill run of the tee for other operational purposes. See 4.0033 for other locations for air release valves.
- i. Extensions – Distribution tees and crosses with valves for future branch lines on transmission mains may be required at the direction of the City Engineer.

4.60.2 FIRE HYDRANTS

- a. Spacing – The distribution of hydrants shall be based upon the required average fire flow for the area served.

1. Residential areas shall have a spacing of approximately 500 feet.
 2. Commercial or industrial subdivisions shall have a spacing of approximately 300 feet.
 3. In large industrial complexes the spacing shall be at least 1,000 feet.
 4. These spacing may be adjusted by the Fire Department and the City Engineer.
- b. Location – Fire hydrants shall be located according to the following criteria:
1. Residential hydrants shall be located as nearly as possible to the corner of street intersections and not more than 500 feet from any cul-de-sac radius point. The local Fire Chief may adjust the location.
 2. All fire hydrants will be located at the back of the existing or proposed sidewalk, in the planter strip or behind the sidewalk if adequate right-of-way exists. In general, fire hydrants will be located at or near the P.C. of the curb return or at a common property line.
 3. Unless off of a fireline/fire sprinkler service, fire hydrants shall be placed on the same side of the right-of-way/street as the waterline serving the fire hydrant, unless otherwise approved by the City Engineer.
 4. Hydrants shall not be located within 20 feet of any building, nor will they be blocked by parking.
 5. No hydrant shall be installed within 5 feet of any existing above ground utility nor shall any utility install facilities closer than 5 feet from an existing hydrant.
- c. Alignment – Pumper port of fire hydrant shall be perpendicular to the curb line and shall face the road or travelway.
- d. Easement – If any public hydrant encroaches on private property, an easement will be provided as directed by the City Engineer.
- e. Supporting Pipe Size – No fire hydrant shall be installed on a main of less than 8 inches inside diameter unless it is in a looped system of 6-inch mains. The hydrant lead shall be a minimum 6 inch inside diameter.
- f. Extensions – Maximum 6 foot bury hydrants will be required in all installations. Installation of hydrant extensions will not be allowed, unless approved by the City Engineer.
- g. Hydrant Valve – Each fire hydrant shall have an auxiliary valve and valve box which will permit repair of the hydrant without shutting down the main supplying the hydrant. Such auxiliary valves shall be resilient wedge gate valves. The auxiliary valve shall have mechanical joint by-flange joint ends as referenced in the Standard Drawing No. 401. The valve shall be

connected directly to the water main using a flange joint tee and “Megalug” retainer glands.

- h. Protection – Guard posts (bollards), a minimum of 3 feet high, shall be required for protection from vehicles when necessary. Such protection shall consist of 4 inch-diameter steel pipes, 6 feet long, filled with concrete, and buried a minimum of 3 feet deep in concrete, and located at the corners of a 6-foot square with the hydrant located in the center. Use of posts other than at the four corners may be approved by the City Engineer.

4.60.3 PRESSURE REDUCING AND AIR VALVE UNITS

- a. Main Line PRV – The City's water distribution system is divided into several pressure zones. Where water systems cross these zone lines, a pressure reducing valve (PRV) station may be required. The PRV station shall have the following components at a minimum.
 - 1. The station shall normally be installed in a concrete vault with a double access hatch and access ladder with an extender.
 - 2. There shall be at least two PRV's. A large PRV sized for fire flow demands (typically one size smaller than the pipe size), and one small PRV for normal demands.
 - 3. There shall be isolation valves on both sides of each PRV such that a PRV could be taken off line and the station would still be operable.
 - 4. There shall be pressure gauges on both sides of each PRV.
 - 5. Depending upon the location a drain or sump pump may be required.
- b. Individual PRV – Where the main line pressure is above 80 psi at a service, an individual PRV will be required. It shall be installed following the water meter. It shall be installed in a meter box and shall have isolation valves on both sides.
- c. Air Release Valves – At local high point in transmission mains and distribution mains there must be a method of releasing accumulated air. If there is insufficient means of releasing air (such as services or fire hydrants), then air release valves shall be installed.
- d. Combination Air Valve – At locations in the system where there is a possibility of creating a vacuum, a combination air release/air relief valve shall be installed. Potential locations include the discharge side of booster pump stations, siphons or inverted siphons, or where the pipe grade changes sharply with a long, steep downhill stretch.

4.60.4 BLOW OFFS

- a. Dead-Ends – Blow off shall be located at all dead-end lines, even if they are temporary. If the main line is expected to be extended, then there shall be a main line sized valve at the blow off.

- b. Drains – Blow offs may also be required at low points in transmission and distribution mains.

4.70.0 BACKFLOW PREVENTION

- 4.70.1 General – Backflow prevention assemblies shall be provided as required by OAR Chapter 333, Division 61, Section 0070, and as provided for in the City’s Municipal Code. Backflow prevention shall be required for all premises with a cross-connection to the potable water system, including but not limited to irrigation and fire suppression systems. Backflow prevention assemblies may be required for premises without a cross-connection under the authority of the Oregon Specialty Plumbing Code.
- 4.70.2 Location – Backflow assemblies shall be located at the right-of-way and on the lot which it serves.
- 4.70.3 Installation – For installation requirements refer to Chapter 333 of the OARs.
- 4.70.4 Type – All assemblies shall be state-approved and testable.
- 4.70.5 Ownership – Maintenance and testing of backflow prevention assemblies shall be the responsibility of the property owner.

4.80.0 WATER SERVICE LINES

4.80.1 POTABLE WATER SERVICE

- a. Sizes – The sizes of water service lines, which may be used, are 1", 2", 4", 6", 8", 10", and 12". Water service lines will be reviewed for impacts on the distribution system and shall not be greater in size than the distribution main.
- b. Service & Meter Size – The following chart shows the meter size for each service size along with the capacity of the meter.

WATER SERVICE AND METER SIZING

| Service Size | Meter Size | Max. Design Flow (GPM) |
|--------------|------------|------------------------|
| 1" | 5/8" | 24 |
| 1" | 1" | 40 |
| 2" | 1 1/2" | 80 |
| 2" | 2" | 128 |
| 4" | 3" | 256 |
| 4" | 4" | 400 |
| 6" | 6" | 800 |
| 8" | 8" | 1280 |
| 10" | 10" | 2000 |
| 12" | 12" | 2640 |

Notes:

1. Continuous flow not to exceed 30% of maximum design flow for 3/4" to 2" disk meters.
2. Continuous flow not to exceed 50% of maximum design flow for all compound meters.
3. In no case shall a new service be provided off of an existing galvanized waterline.

- c. Service Design – Water services shall be designed based upon the following criteria:
1. Each individual building lot shall be connected by a single, separate, private service line connected to the public water main.
 2. The City will provide and install the water meter. Meter shall be Sensus SR II Low Lead Meter with TouchRead/Pit Lid, 1 cubic foot resolution electronic register fitted with M2 Model 520M Smartpoint Single Port Touch Coupler Endpoint.
 3. In general, each service shall be comprised of the following elements: service saddle, corporation stop, service pipe, angle meter stop, and meter box.
 4. For larger services, the service saddle may be replaced by a tee, and the corporation stop by a valves and valve box.
 5. As required by system pressure, there will also be an individual PRV, two isolation valves, and a meter box.
 6. For large services (pipes 4 inch and larger, meters 3 inch and larger), a design drawing must be submitted to the City showing the vault and fitting requirements with the expected flow (normal and maximum day flow) requirements and proposed usage.
- d. Location of Meters – Meter boxes for smaller services (1-inch and 2-inch lines) shall be located based upon the following criteria:
1. The meter box shall be located behind the sidewalk and shall be size and manufacturer shown on Standard Detail No. 416 or 417.
 2. Meters shall be located 18 inches each side of a common side property line.
 3. Whenever possible, individual service connections shall terminate in front of the property to be served along the street frontage where property is addressed.
 4. Service lines shall normally extend from the main at 90 degrees from the main.
 5. Water service via an easement across a separate parcel under separate ownership or capable of being sold off is not allowed unless otherwise approved by City Engineer.
 6. For large services (pipes 4 inch and larger, meters 3 inch and larger), meter vaults shall be placed at the entrance to the property being served, unless otherwise approved by the City Engineer.
 7. Meter boxes should be located out of vehicle travel ways such as driveways or access ways. When this is not possible, the meter boxes shall be traffic rated.

- e. Multiple Services – In special circumstances and with the approval of the City Engineer, there may be multiple services to a single property. For instance, a large commercial development with multiple tenants on a single property.
 - 1. Multiple service connections to a premise shall be laid out to follow a logical sequence of addresses, to facilitate matching of service connection to building(s).
 - 2. On-site waterlines shall be laid out to facilitate a logical matching of service connection to building and address.
- f. Marking Services – The curb shall have a "W" stamped in the face or top of the curb at the center of the service line crossing.

4.80.2 IRRIGATION SERVICES

- a. Multiple Services – In special circumstances and with the approval of the City Engineer, there may be multiple services to a single property. For instance, a large commercial development with multiple tenants on a single property if approved by the City Engineer.
 - 1. Single family residences and small commercial developments do not need to have a separate irrigation service.
 - 2. Irrigation systems connected to a potable water service shall have a State approved backflow prevention device.
 - 3. Separate irrigation services shall meet the same criteria as standard services with regard to location and size.
 - 4. Separate irrigation services shall have the same elements as a standard service with the exception that it will also have a State approved backflow prevention device.

4.80.3 FIRE SERVICE

There are three categories of private fire services: 1) hydrants, 2) fire sprinkler lines, and 3) combination hydrant and fire sprinkler lines.

- a. Fire services that service private fire hydrants shall have a separate service line. Fire services that only serve sprinkler lines may or may not have a separate service line depending upon the size of the installation.
- b. Separate fire services shall have the same elements and requirements as a standard large service with the exception that it will also have a State approved backflow prevention device. Design drawing must be submitted to the City.
- c. The City shall install a flow meter and sensor on all separate fire service lines.

- d. Separate fire services shall meet the same criteria as standard services with regard to location and size.
- e. Fire sprinkler systems for single family residences shall be served through the potable water service line and meter. The combined domestic, irrigation, and fire sprinkler flow demands may not exceed the City's allowable flow for that particular size of service and meter.
- f. Fire sprinkler systems connected to a potable water service shall have a State approved backflow prevention device.

4.90.0 SYSTEM TESTING

4.90.1 TESTING

- a. All new water systems (lines, valves, hydrants, and services) and repaired pipelines that were depressurized and wholly or partly dewatered during construction shall be individually tested. The tests shall include:
 - 1. Pressure testing
 - 2. Chlorination
 - 3. Bacteria test
- b. All testing shall be performed in accordance with the APWA and AWWA Specifications and in the presence of a City representative as determined by the City Engineer.
- c. A copy of all test results shall be provided to the City.
- d. No connection to the existing system shall be made until the new system has been tested and accepted.

4.100.0 WATER QUALITY SAMPLING STATIONS

- 4.100.1 Water sampling stations will be required and installed in all new subdivisions, or as directed by the City Engineer. In general, install sampling stations at the end of temporary or permanent dead-end water lines, at least one per development or as directed by the City Engineer. See Standard Detail No. 418.

4.110.0 PUMP STATION DESIGN STANDARDS

- 4.110.1 Division of State Health – Pump stations shall be designed to meet the minimum requirements and guidelines as set forth in the Oregon Administrative Rules, Chapter 333.
- 4.110.2 Predesign Report – A pump station predesign report shall be required which will have the following elements at a minimum:
 - a. Calculation of ADD, MDD, and PDD for the development and service area.

- b. Pump information such as: pumping capacity for one pump and multiple pumps running for service pumps, pump curves for both service pumps and fire flow pumps.
- c. Pump motor electrical data including HP, voltage, phase, and amps for both the service pumps and fire flow pumps.
- d. Calculation of the system pressure. Provide the suction pressure, the discharge pressure, and the pressure to be seen in the distribution system served by the pump station.
- e. Provide a surge analysis. This is particularly important if the station is large or discharges to a closed system. Describe and size the surge control system if it required.
- f. Describe and size the pump control system. This should include an estimation of the pump starts per hour.
- g. Provide the sizing of the standby generator.
- h. Provide a description of the pump station and generator housing.
- i. Listing and sizing of the major equipment including: pumps, generator and automatic transfer switch, control system, telemetry equipment (auto dialer at a minimum), control valves.
- j. Listing of the appurtenant equipment such as: gauges, pressure gauges, lights, outlets, heaters and fans (depending on the type of station), housing size and type, main breaker, security, access for equipment removal, electrical enclosures and NEMA rating, 1-inch hose bibb and reduced pressure backflow preventer, fencing.
- k. Description of the control panel and what is included such as: H-O-A switch, hour meter, reset. Also, provide a description of the pump station control scheme including the alarms.

4.110.3 Type of Station – A package pump station installed inside a building is the preferred pump station design.

4.110.4 Facilities – The following additional elements shall be addressed in the design: site access, landscaping, security, utilities (water, power), earthwork and site drainage. A geotechnical report may be required depending upon the location.

4.110.5 Minimum Requirements – The pump station shall meet the following minimum requirements:

- a. The design capacity for the service pumps shall be the PDD. The design capacity for the fire flow pumps shall be based upon the type of service.
- b. There shall be a minimum of two duty pumps, and two fire flow pumps. They shall be high efficiency pumps.

- c. There shall be a permanent standby generator and automatic transfer switch.
- d. There shall be control valves as required based upon the size of the pumps. This may include pump control valves, surge control valves, combination air release/air relief valves. There shall be check valves and shut off valves for each pump.
- e. There shall be a pump control system. The preferred system for small pump stations is a hydro-pneumatic tank.
- f. The pump starts per hour shall be limited to the recommended number for the horsepower of the motor.
- g. Surge control system as needed. A surge control tank is preferred where the potential surge is high.
- h. The equipment shall be protected from the weather. The preferred option is a building constructed of split faced CMU block with a metal roof.
- i. The piping shall be DI. In the case of package stations, the piping can be steel. The piping shall be structured such that it is easily taken apart to replace or maintain the piping and equipment.
- j. Where fences are required by the City they shall be 6-foot chain link fence with three strands of barbed wire and redwood slats shall surround the pump station, or as directed by the City.
- k. Steel fabrications shall be hot dipped galvanized. Corrosion resistant painting shall be required on valves, piping, and pipe fittings or other items not galvanizable.

4.110.6 Controls and Alarms – The controls and alarms shall have the following elements at a minimum.

- a. Each pump shall have an H-O-A switch, an hour meter, and a reset button.
- b. For duplex stations the pumps shall alternate lead-lag positions.
- c. There shall be at least the following control points based upon pressure settings: first duty pump on, second duty pump on, duty pumps off and fire flow pump on, pumps off.
- d. There shall be at least the following telemetry points: pump failure, power failure, telemetry failure, low pressure, high pressure. These shall be sent to the City of Banks Public Works Department SCADA System.
- e. There shall be a visual alarm (red light in protective housing) on the pump station.

4.110.7 Operation & Maintenance (O&M) – The following are the minimum operation and maintenance requirements:

- a. Provide an operation and maintenance manual for the pump station as a whole. This should include: name and contact information for the equipment supplier and the contractor, basic data for the station such as capacity (Q &TDH), control set points, hydro-pneumatic tank size (if used), pump curves, alarms, equipment supplied, etc., as well as startup procedures, standard maintenance tasks and schedule, and a trouble shooting guide.
- b. Provide product data for all equipment and materials in the pump station including O&M manual for each piece of equipment.
- c. Provide record drawings.
- d. Perform the startup on the equipment and on the station as a whole. Each operation of the pump station should be tested and recorded. Provide an equipment testing and sign off sheet for each piece of equipment.
- e. Provide a minimum of 2 hours of training to the City staff.
- f. Provide the following spare parts: Supply two sets each of all gaskets, bearings, and mechanical seals for rotating equipment.

4.110.8 Codes – Pump station and related facilities will be constructed in conformance with the current edition of the National Electric Code, the Uniform Building Code, and the Uniform Plumbing Code as adopted by the State of Oregon and the City of Banks, and the National Fire Protection Association Division 820 (NFPA 820) Standards.

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CITY OF BANKS

PUBLIC WORKS DESIGN STANDARDS

JUNE 2014 – REVISED MAY 2019

CHAPTER 5 – STORM DRAINAGE

5.10.0 GENERAL DESIGN REQUIREMENTS

- 5.10.1 Standards – The storm drainage system is owned and operated by Clean Water Services (CWS), and must meet CWS standards. The following guidelines are provided for storm drainage systems.
- a. Neighboring Property – Surface or subsurface drainage, caused or affected by changing the natural grade of the existing ground or removal of natural ground cover or placement of impervious surfaces, shall not be allowed to flow over adjacent public or private property in a volume, rate, or location materially different from that which existed before development occurred.
 - b. Neighboring Property – The proposed improvements, including changes to the natural grade, placement of structures or changes to vegetation, shall not block or change existing drainage such that it causes ponding, flooding, or damage to adjacent properties or structures.
 - c. Neighboring Property – Where subsurface disposal is proposed there shall be sufficient data, including site specific soils testing, to show that it will work and will not negatively affect adjacent properties.
 - d. Neighboring Property – Where changes to existing drainage patterns are proposed including overland flow, mitigating measures will need to be taken such that neighboring properties are not adversely affected. This may include the installation of french drains or other measures. Drainage facilities crossing private neighboring property must be engineered to contain the stormwater without causing erosion or other adverse effects to the private neighboring property.
 - e. Public Facilities – Storm drainage facilities shall be designed such that they do not negatively impact other public facilities such as streets or water and sewer systems.
 - f. Public Facilities – Storm drainage facilities shall be designed such that they do not interfere with any other City Design Standards being met.
 - g. Private Drainage – Detention and treatment requirements and design for private storm drainage shall meet the same requirements as the public facilities. The design of these facilities shall be included in the public improvement plans, including facilities for individual lots.

- h. System Location – Public storm lines shall be located within the public right-of-way where possible. These lines are placed in the public right-of-way for ease of maintenance and access, control of the facility, operation of the facility, and to provide required replacement and/or repair. Any storm lines not placed in the public right-of-way shall be located in a public utility easement.

Appendix A

Standard Details

STANDARD DETAIL INDEX

| DETAIL NO. | DETAIL TITLE |
|------------|--|
| | GENERAL |
| 100 | Residential Boulevard |
| 101 | Arterial Street Section |
| 102 | Residential Collector Street Sections |
| 103 | Residential Street Section |
| 104A | Local Trail & Multi-Use Bikeway |
| 104B | Local Trail & Multi-Use Bikeway Sections |
| 105 | Standard Utility Locations (For Curbed Street) |
| 106 | Standard Monument Box |
| 107 | Asphalt Centerline Monuments |
| | STREETS |
| 200 | Standard Monolithic Curb & Gutter |
| 201 | Mountable Curb & Gutter |
| 202 | Type A Replacement Curb |
| 203 | Standard Commercial Driveway |
| 204 | Standard Residential Driveway |
| 205 | Typical Sidewalk (For Local Street) |
| 206 | Standard To Curb Tight Sidewalk Transition |
| 207 | Standard Sidewalk Ramps with Planter Strip |
| 208 | Standard Curb Tight Sidewalk Ramp |
| 209 | Combination Curb Tight Sidewalk Ramp |
| 210 | MidBlock Sidewalk Ramp With Planter Strip |
| 211 | MidBlock Curb Tight Sidewalk Ramp |
| 212 | Local Transitional Street Section |
| 213 | Asphaltic Concrete Speed Hump |
| 214 | Asphaltic Concrete Speed Table |
| 215 | Street Tree Planting Detail |
| 216 | Street Tree Well Detail |
| 218 | Bikeway & Street Intersection |



JUNE 2014 (REV JUNE 2018)

APPROVAL DATE

PUBLIC WORKS DEPARTMENT

STANDARD DETAILS INDEX

DWG. NO.

1

STANDARD DETAIL INDEX

| DETAIL NO. | DETAIL TITLE |
|------------|--|
| | TRAFFIC |
| 300 | Typical Sign Assembly |
| 301 | Typical Sign Location |
| 302 | Street Barricade-Type III |
| 303 | Removable Bollard |
| | WATER |
| 400 | Typical Minimum Water Valve Location |
| 401 | Straddle Thrust Block New Pipe Connection |
| 402 | Straddle Thrust Block Exist Pipe Connection |
| 403 | Water Pipe Slope Anchor |
| 404 | Horizontal Thrust Blocking |
| 405 | Vertical Thrust Blocking |
| 406 | Standard Trench Sections |
| 407 | Standard Wet Tap |
| 408 | Standard Valve Box |
| 409 | Standard Water Valve Operator Extension |
| 410 | Standard Fire Hydrant Assembly |
| 411 | Standard 2-Inch Blowoff |
| 412 | Standard 4-Inch Blowoff |
| 413 | Standard Blowoff for Low Points in Waterlines |
| 414 | 1-Inch Combination Air and Vacuum Valve |
| 415 | 2-Inch Combination Air and Vacuum Valve |
| 416 | Standard 1-Inch Water Service |
| 417 | Standard 2-Inch Water Service (Irrigation 1.5 to 2-Inch Meter) |
| 418A | Sampling Station Intallation |
| 418B | Meter Box Sampling Station Intallation |
| 419 | Pressure Reducing Valve Vault |
| 420 | Private 1-Inch Reduced Pressure Backflow Preventer |
| 421 | Private 1.5 and 2-Inch Reduced Pressure Backflow Preventer |
| 422 | Private DCVA For Domestic and Landscape Irrigation Systems |
| 423 | Compound Water Meter Vault |
| 424 | Private Double Check Backflow Preventer Vault |
| 425 | Private Fire Service Vault |
| 426 | Private Comb. Fire Service Vault and Domestic Double Check Valve |



JUNE 2014 (REV JUNE 2018)

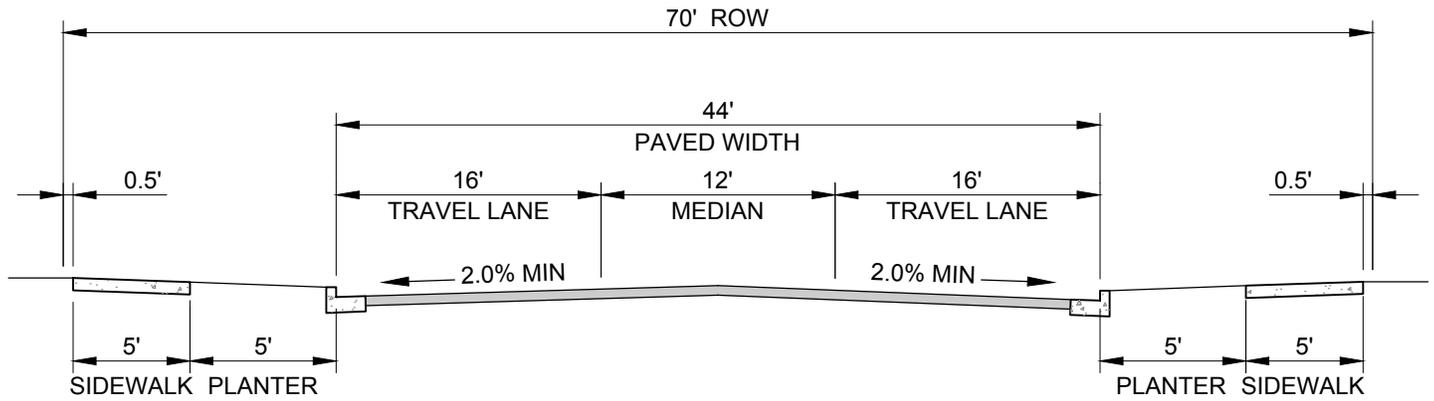
APPROVAL DATE

PUBLIC WORKS DEPARTMENT

STANDARD DETAILS INDEX

DWG. NO.

2



SECTION

NOTES:

1. PAVED WIDTH AND PLANTER STRIP ARE MEASURED TO FACE OF CURB.
2. PROVIDE 0.5 FEET FROM RIGHT-OF-WAY LINE TO THE BACK OF SIDEWALK FOR MAINTENANCE AND SURVEY MONUMENT PROTECTION.
3. STREET TREES AND STREET LIGHTS ARE REQUIRED.

PUBLIC WORKS DEPARTMENT

DWG. NO.

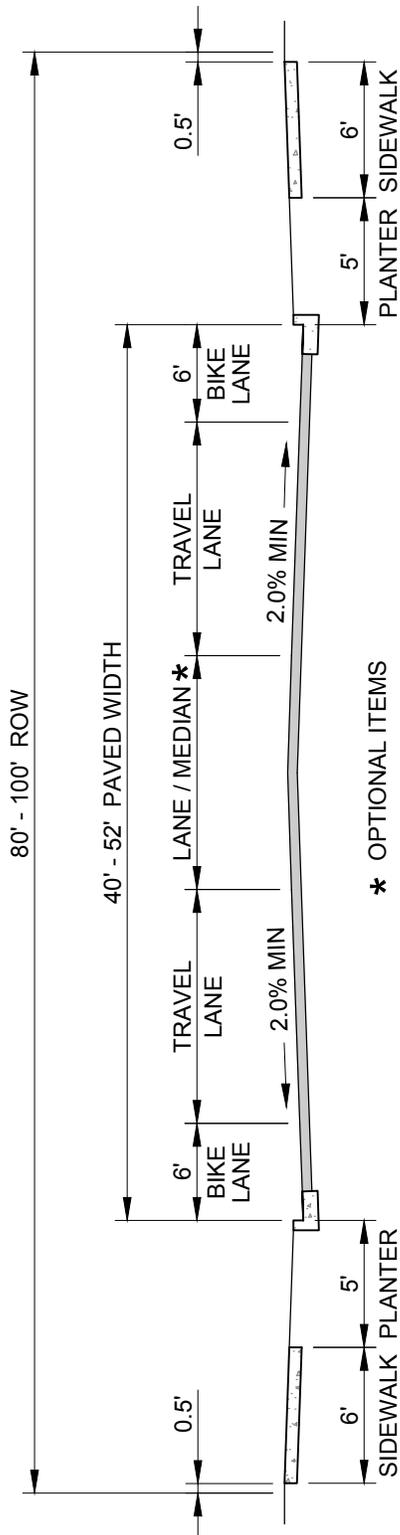


JUNE 2014 (REV JUNE 2018)

APPROVAL DATE

RESIDENTIAL BOULEVARD

100



SECTION

NOTES:

1. PAVED WIDTH AND PLANTER STRIP ARE MEASURED TO FACE OF CURB.
2. PROVIDE 0.5 FEET FROM RIGHT-OF-WAY LINE TO THE BACK OF SIDEWALK FOR MAINTENANCE AND SURVEY MONUMENT PROTECTION.
3. STREET TREES AND STREET LIGHTS ARE REQUIRED.



JUNE 2014 (REV JUNE 2018)

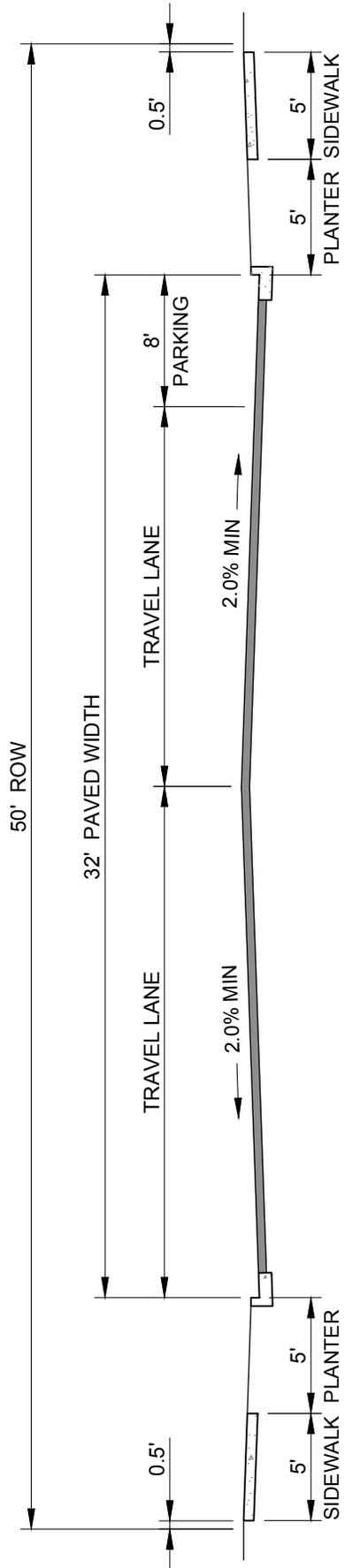
APPROVAL DATE

PUBLIC WORKS DEPARTMENT

ARTERIAL STREET SECTION

DWG. NO.

101

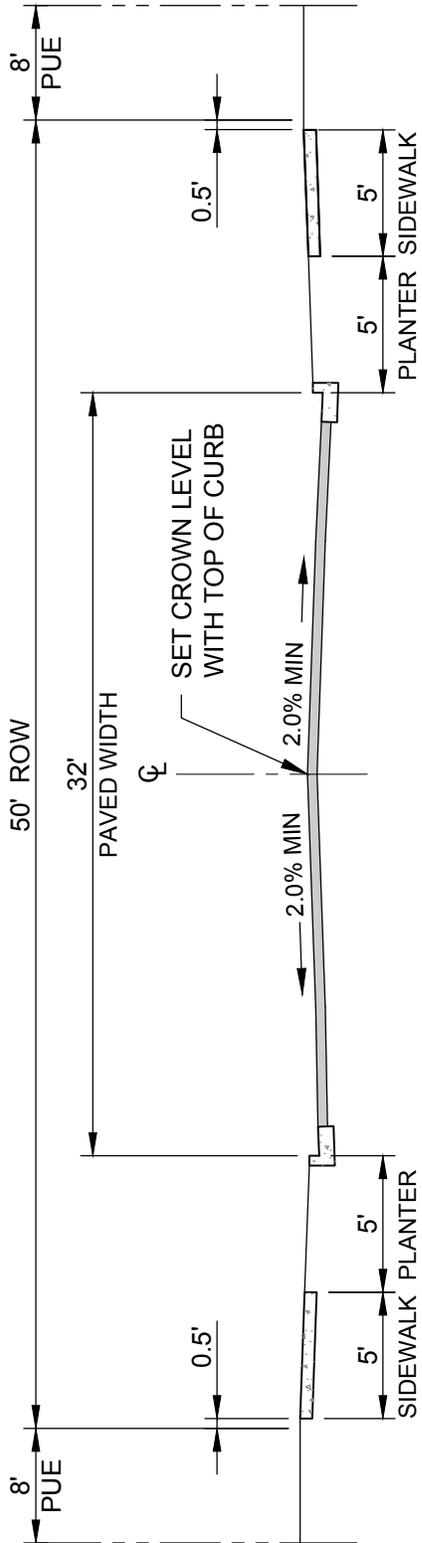


RESIDENTIAL COLLECTOR

NOTES:

1. PAVED WIDTH AND PLANTER STRIP ARE MEASURED TO FACE OF CURB.
2. PROVIDE 0.5 FEET FROM RIGHT-OF-WAY LINE TO THE BACK OF SIDEWALK FOR MAINTENANCE AND SURVEY MONUMENT PROTECTION.
3. STREET TREES AND STREET LIGHTS ARE REQUIRED.

| | | | |
|--|---|---|----------------------------|
|  | <p>JUNE 2014 (REV JUNE 2018)</p> <p>APPROVAL DATE</p> | <p>PUBLIC WORKS DEPARTMENT</p> <p>RESIDENTIAL COLLECTOR STREET SECTIONS</p> | <p>DWG. NO.</p> <p>102</p> |
|--|---|---|----------------------------|



SECTION

NOTES:

1. PAVED WIDTH AND PLANTER STRIP ARE MEASURED TO FACE OF CURB.
2. PROVIDE 0.5 FEET FROM RIGHT-OF-WAY LINE TO THE BACK OF SIDEWALK FOR MAINTENANCE AND SURVEY MONUMENT PROTECTION.
3. STREET TREES AND STREET LIGHTS ARE REQUIRED.



JUNE 2014 (REV JUNE 2018)

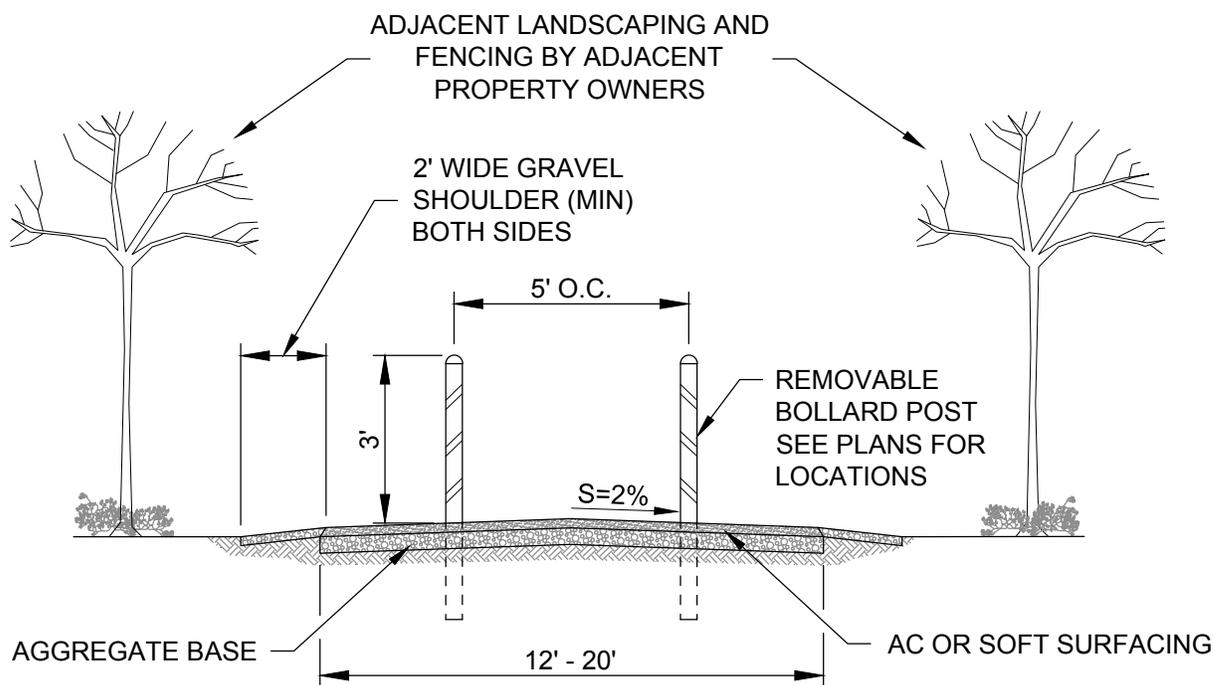
APPROVAL DATE

PUBLIC WORKS DEPARTMENT

RESIDENTIAL STREET SECTION

DWG. NO.

103



NOTES:

1. AGGREGATE BASE - 3/4"-0 CRUSHED ROCK, 4" DEPTH.
2. SUBGRADE AND BASE ROCK SHALL BE COMPACTED TO 95% RELATIVE DENSITY PER AASHTO T-180.
3. WHERE LIGHTING IS REQUIRED, MEET IES STANDARDS FOR PEDESTRIAN SCALE LIGHTING. STYLE AND HEIGHT MAY VARY (UP TO 16-FEET IN HEIGHT).
4. WHERE ACCESSWAYS CONTINUE ACROSS STREETS, ADA RAMPS SHALL BE REQUIRED.
5. DEPENDING ON SITE CONDITIONS, EITHER CROSS-SLOPE OR CROWNING MAY BE REQUIRED, SEE PLANS.
6. MINIMUM WIDTH OF PAVEMENT IS 12-FEET.



JANUARY 2016 (REV JUNE 2018)

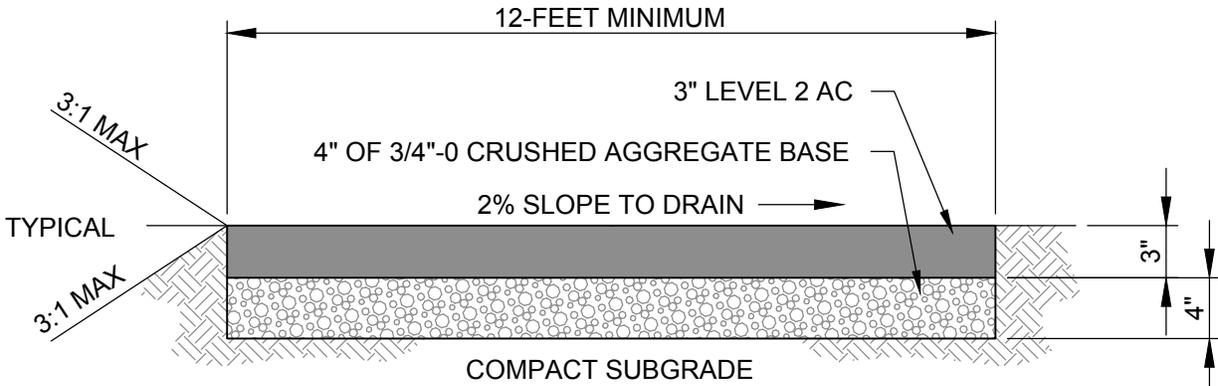
APPROVAL DATE

PUBLIC WORKS DEPARTMENT

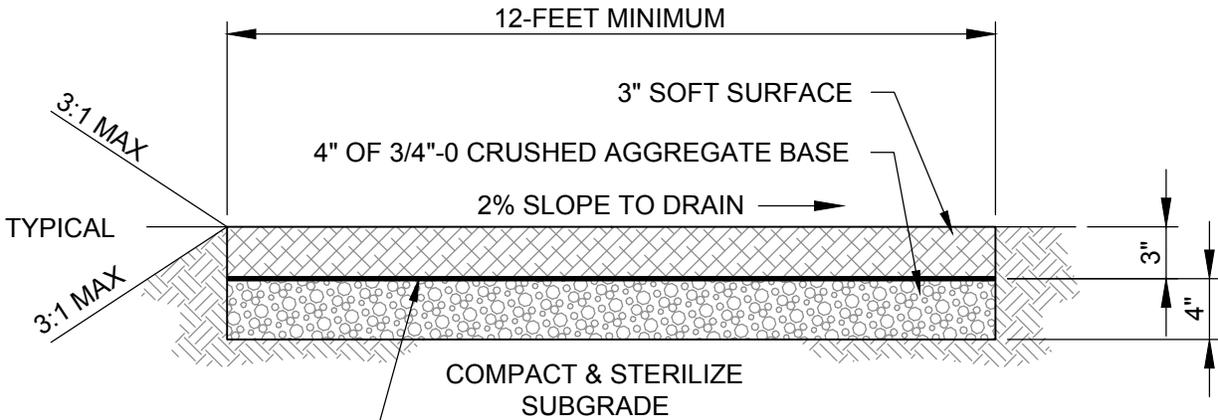
LOCAL TRAIL AND MULTI-USE
BIKEWAY

DWG. NO.

104A



LOCAL/MULTI-USE TRAIL (HARDSCAPE)



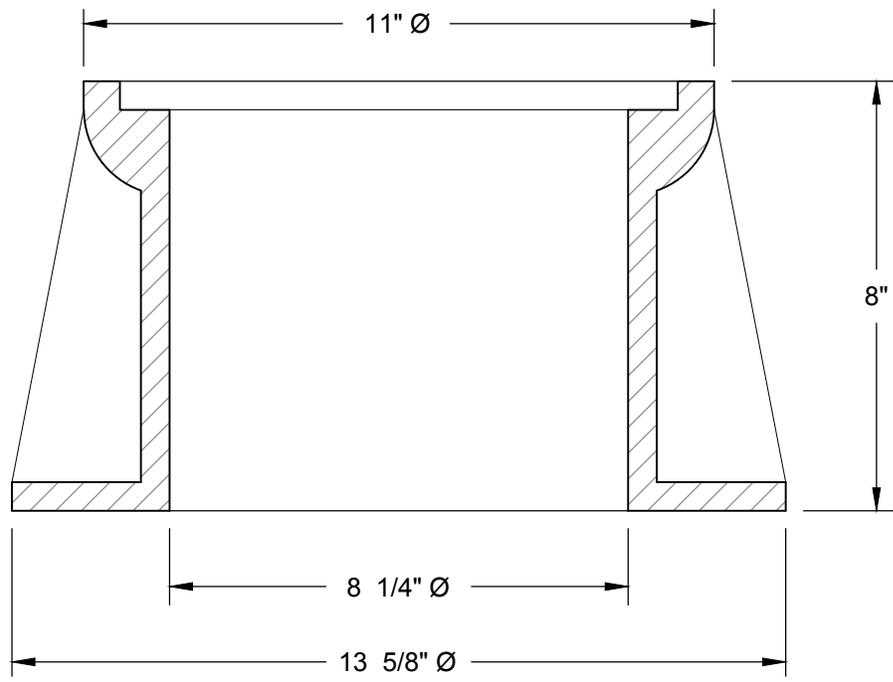
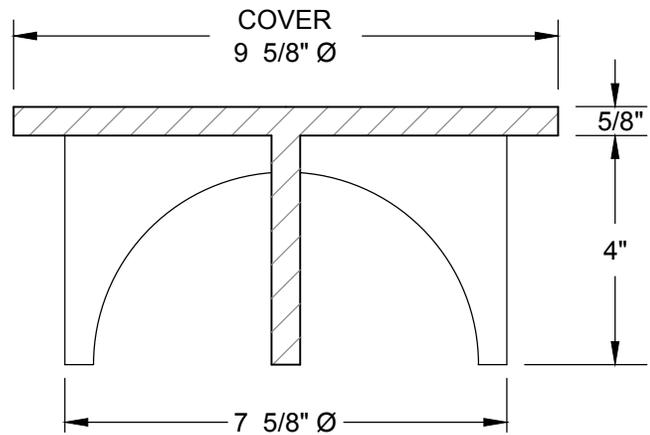
WEED CONTROL GEOTEXTILE,
WEED-CHEK LANDSCAPE MAT
OR APPROVED EQUAL

MULTI-USE TRAIL

NOTES:

1. PROVIDE DRAINAGE AT LOW POINTS, AS DIRECTED.
2. PROVIDE 2-FOOT WIDE 3/4"-0 GRAVEL SHOULDER ON CUT/FILL SLOPE EDGES.
3. MAXIMUM SLOPE OF CUT AND FILL EDGES, 3:1.
4. SUBGRADE AND BASE ROCK SHALL BE COMPACTED TO 95% RELATIVE DENSITY PER AASHTO T-180.

| | | | |
|--|---|---|----------|
|  | | PUBLIC WORKS DEPARTMENT | DWG. NO. |
| | JANUARY 2016 (REV JUNE 2018) APPROVAL DATE | LOCAL TRAIL AND MULTI-USE BIKEWAY SECTIONS | 104B |



BOX SECTION

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.

PUBLIC WORKS DEPARTMENT

DWG. NO.

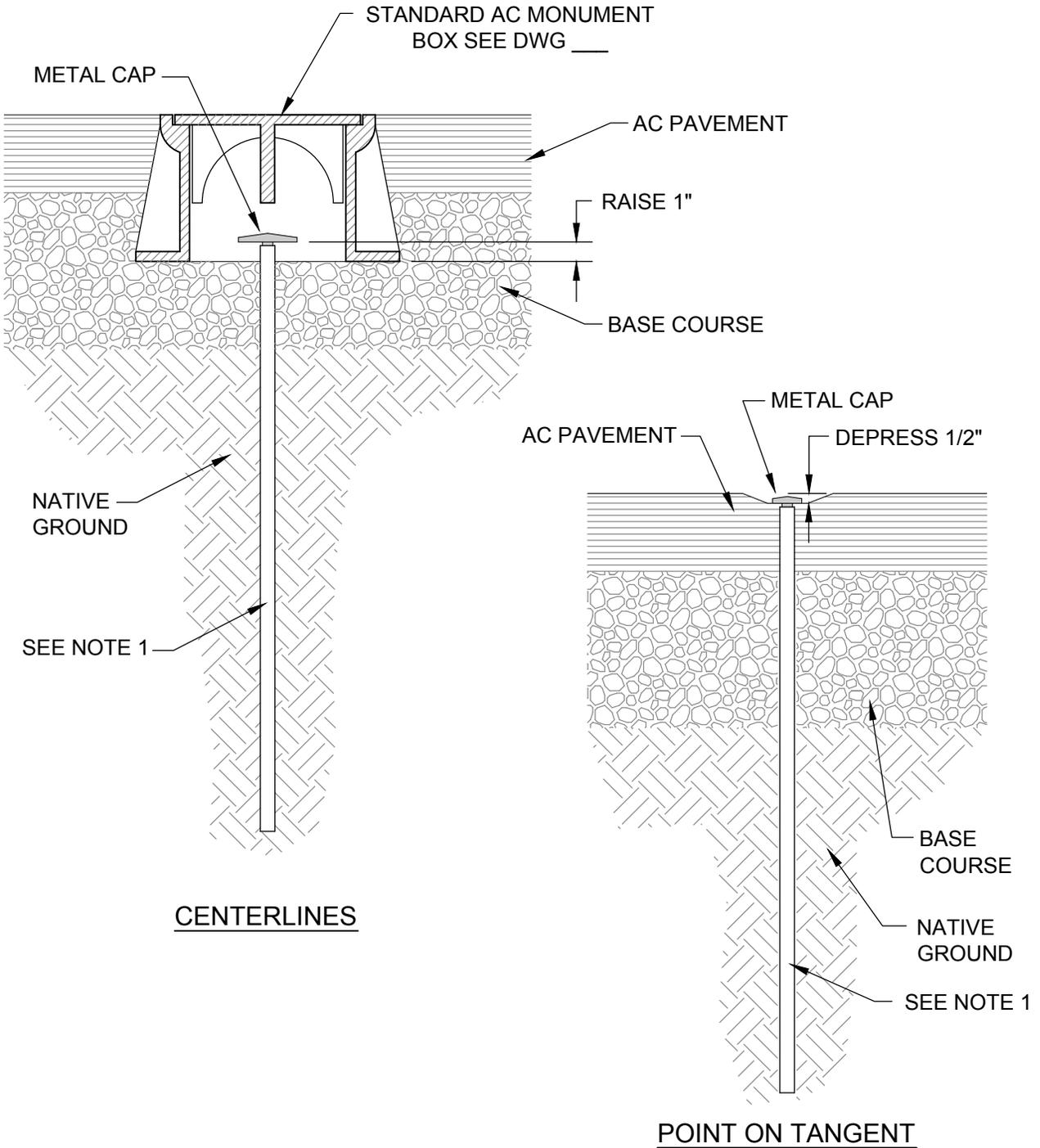


JUNE 2014 (REV JUNE 2018)

APPROVAL DATE

STANDARD MONUMENT BOX

106



NOTES:

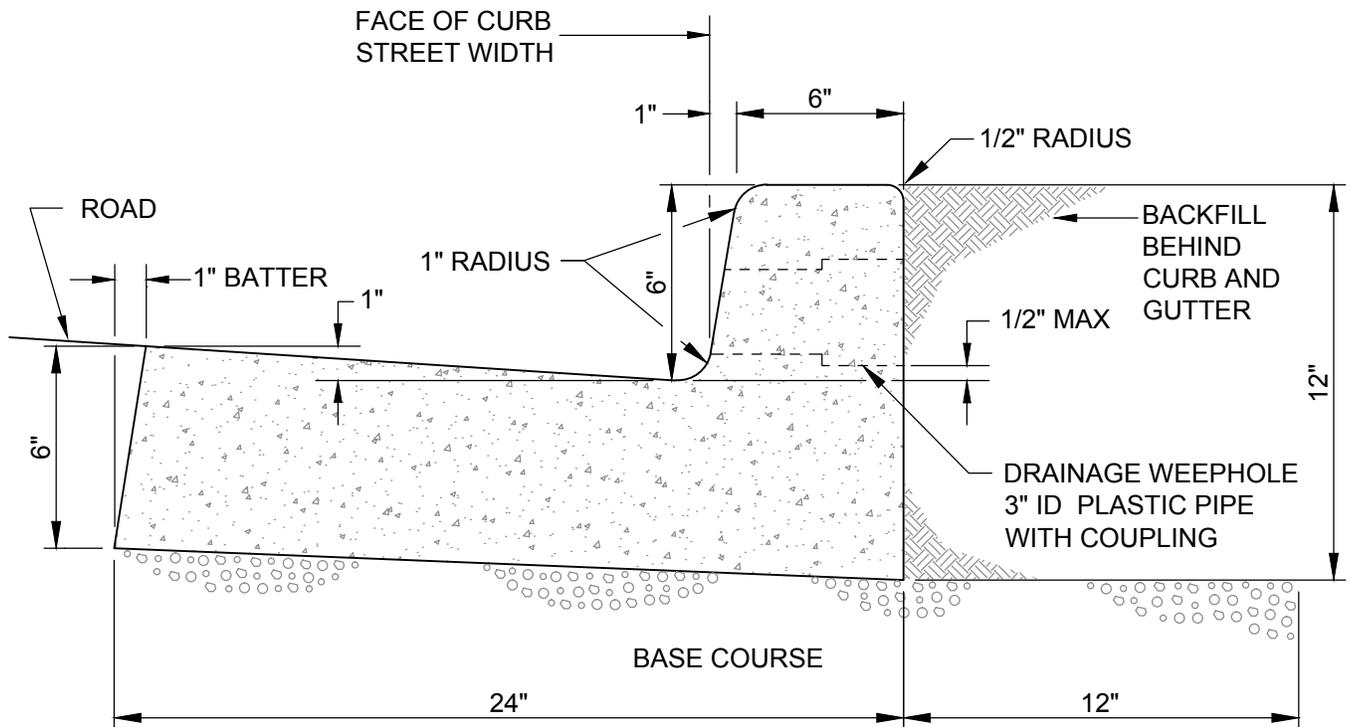
- 1. ALL MONUMENTS SHALL USE EITHER 5/8 INCH Ø X 30 INCHES LONG IRON ROD .
- 2. ALL MONUMENTS SHALL BE IN ACCORDANCE WITH THE OREGON REVISED STATUTES CHAPTERS 92 AND 209.



JUNE 2014 (REV JUNE 2018)
 APPROVAL DATE

PUBLIC WORKS DEPARTMENT
 ASPHALT CENTERLINE
 MONUMENTS

DWG. NO.
 107



NOTES:

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:
 - POINT OF TANGENCY
 - COLD JOINT
 - SIDE OF INLET STRUCTURES
 - 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:
 - SPACING OF NOT MORE THAN 15 FEET.
 - DEPTH OF JOINT OF AT LEAST 1½ INCHES
6. BASE ROCK 2"-0 OR 3/4"-0, 95% (AASHTO T-180) COMPACTION. BASE ROCK SHALL BE TO SUBGRADE OF STREET STRUCTURE OR 4 INCHES, WHICHEVER IS GREATER, AND SHALL EXTEND 12 INCHES BEHIND THE CURB
7. DRAINAGE WEEPHOLE SHALL BE:
 - 3-INCH DIAMETER I.D. PLASTIC PIPE WITH COUPLING AND BEVELED OUTLET END TO MATCH FACE OF CURB
 - CENTERED WITH CONTRACTION JOINTS
 - CORE-DRILLED THROUGH EXISTING CURBS FOR DRAINAGE ACCESS



JUNE 2014 (REV JUNE 2018)

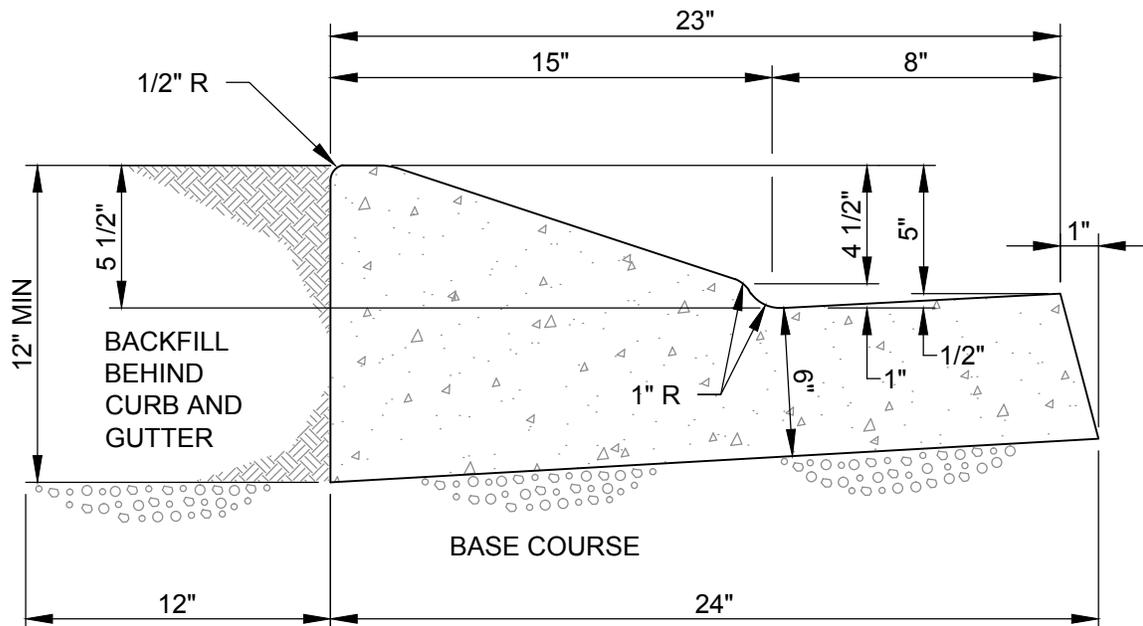
APPROVAL DATE

PUBLIC WORKS DEPARTMENT

STANDARD MONOLITHIC
CURB AND GUTTER

DWG. NO.

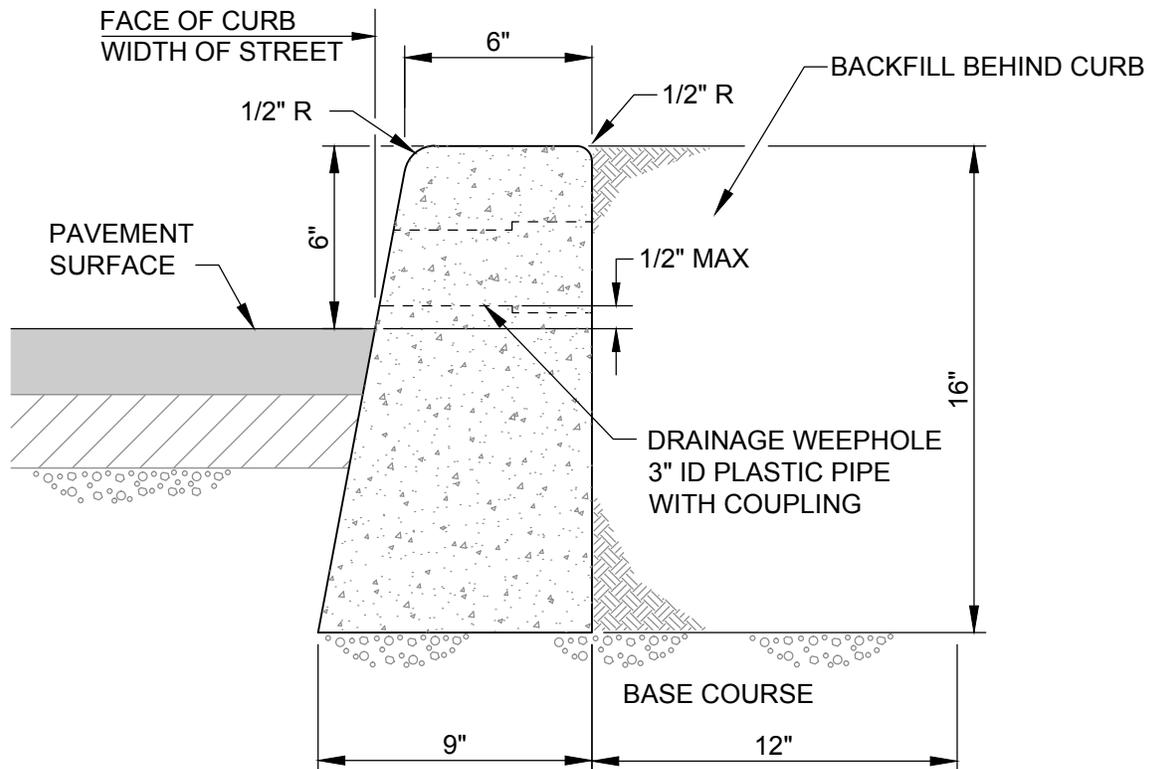
200



NOTES:

1. MOUNTABLE CURB AND GUTTER REQUIRES PREAPPROVED BY CITY ENGINEER, THIS CURB DESIGN IS LIMITED TO USE IN CUL-DE-SACS AND OTHER SPECIAL CIRCUMSTANCES SPECIFICALLY APPROVED
2. CONCRETE TO HAVE COMPRESSIVE STRENGTH OF 4,000 PSI AT 28 DAYS
3. EXPANSION JOINTS TO BE PROVIDED AT EACH:
 - POINT OF TANGENCY
 - COLD JOINT
 - SIDE OF INLET STRUCTURES
 - 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:
 - SPACING OF NOT MORE THAN 15 FEET.
 - DEPTH OF JOINT OF AT LEAST 1 1/2 INCHES
6. BASE ROCK 2"-0 OR 3/4"-0, 95% (AASHTO T-180) COMPACTION. BASE ROCK SHALL BE TO SUBGRADE OF STREET STRUCTURE OR 4 INCHES, WHICHEVER IS GREATER, AND SHALL EXTEND 12 INCHES BEHIND THE CURB

| | | | |
|--|--|----------------------------------|------------|
|  | | PUBLIC WORKS DEPARTMENT | DWG. NO. |
| | JUNE 2014 (REV JUNE 2018) APPROVAL DATE | MOUNTABLE CURB AND GUTTER | 201 |



NOTES:

1. TYPE "A" CURB REQUIRES PREAPPROVAL BY CITY ENGINEER, FOR USE ONLY WHEN REPLACING SIMILAR CURB AND 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:
 - POINT OF TANGENCY
 - COLD JOINT
 - SIDE OF INLET STRUCTURES
 - 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:
 - SPACING OF NOT MORE THAN 15 FEET.
 - DEPTH OF JOINT OF AT LEAST 1½ INCHES
6. BASE ROCK 2"-0 OR 3/4"-0, 95% (AASHTO T-180) COMPACTION. BASE ROCK SHALL BE TO SUBGRADE OF STREET STRUCTURE OR 4 INCHES, WHICHEVER IS GREATER, AND SHALL EXTEND 12 INCHES BEHIND THE CURB
7. DRAINAGE WEEPHOLE SHALL BE:
 - 3-INCH DIAMETER I.D. PLASTIC PIPE WITH COUPLING AND BEVELED OUTLET END TO MATCH FACE OF CURB
 - CENTERED WITH CONTRACTION JOINTS



JUNE 2014 (REV JUNE 2018)

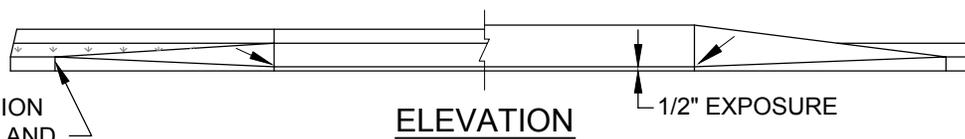
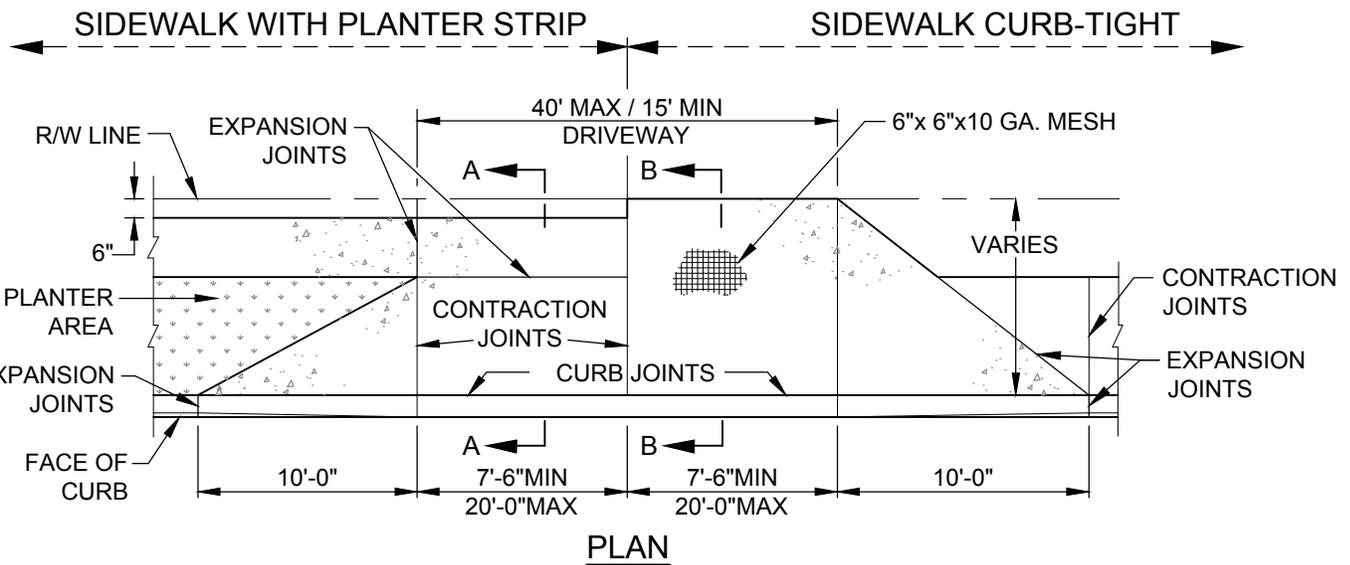
APPROVAL DATE

PUBLIC WORKS DEPARTMENT

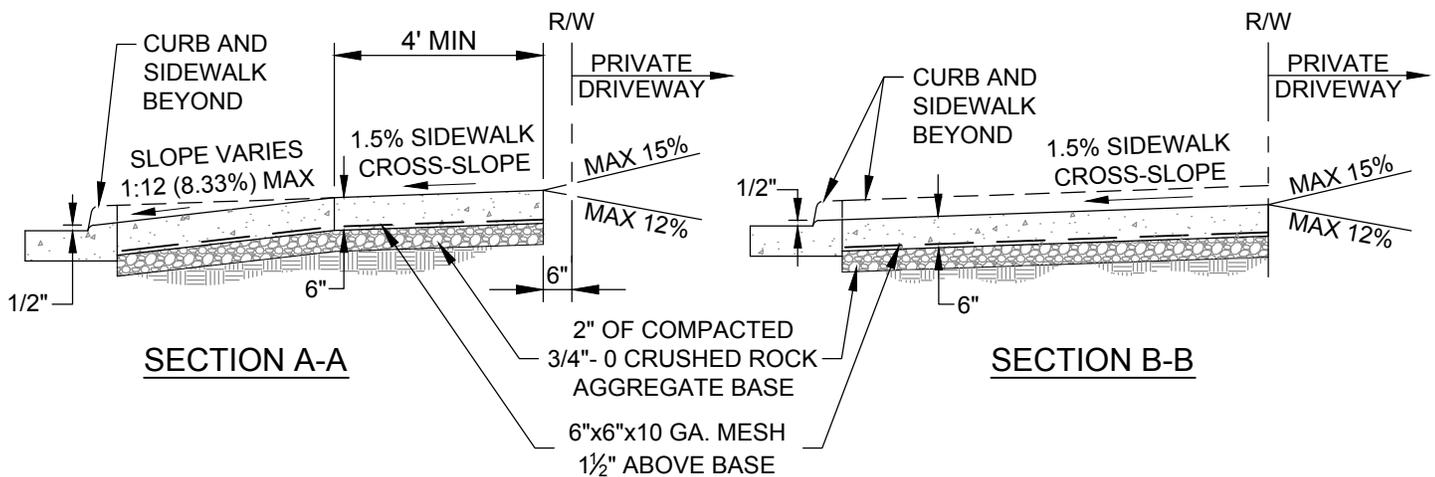
TYPE "A" REPLACEMENT CURB

DWG. NO.

202



USE EXTG EXPANSION JOINT OR SAWCUT AND PLACE COLD JOINT (TYP.)



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.



JUNE 2014 (REV JUNE 2018)

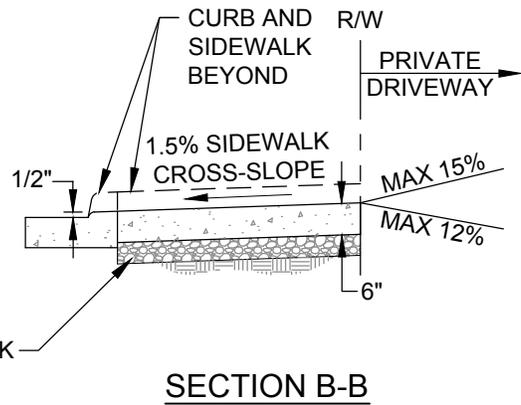
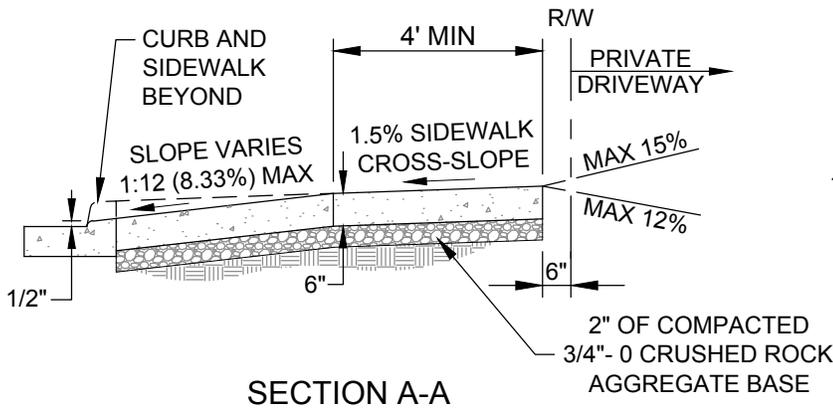
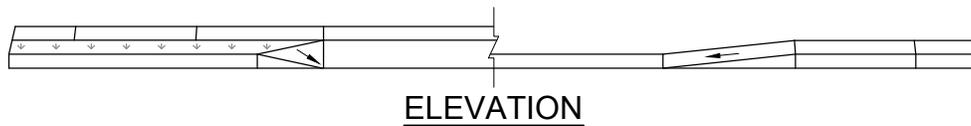
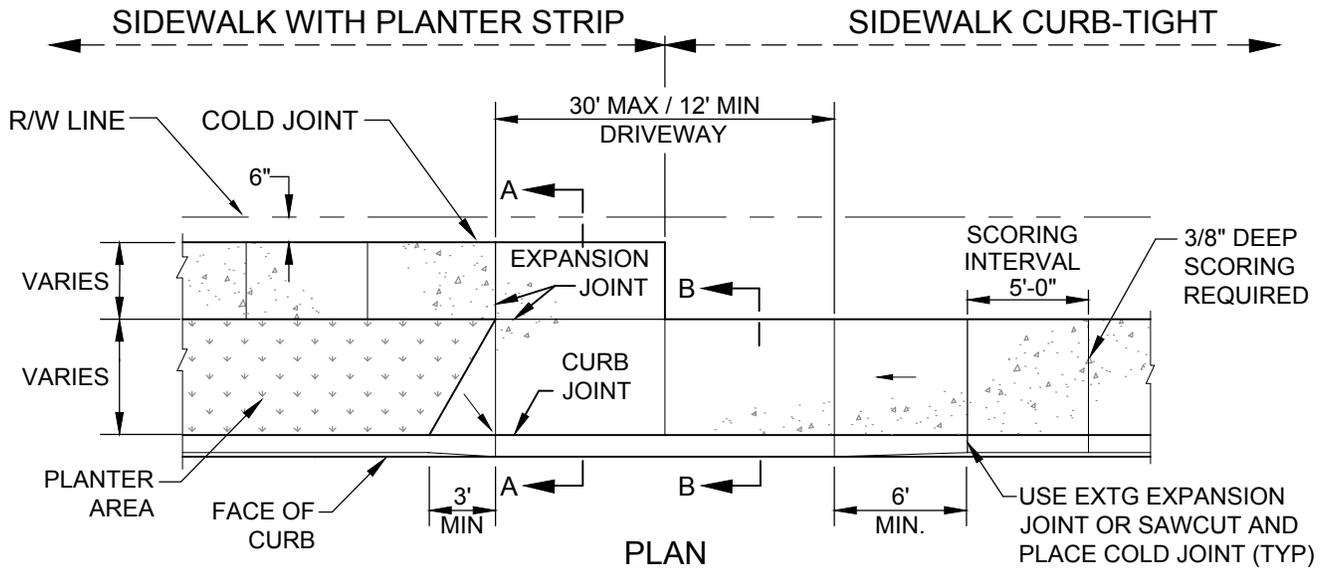
APPROVAL DATE

PUBLIC WORKS DEPARTMENT

STANDARD COMMERCIAL DRIVEWAY

DWG. NO.

203



NOTES:

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.



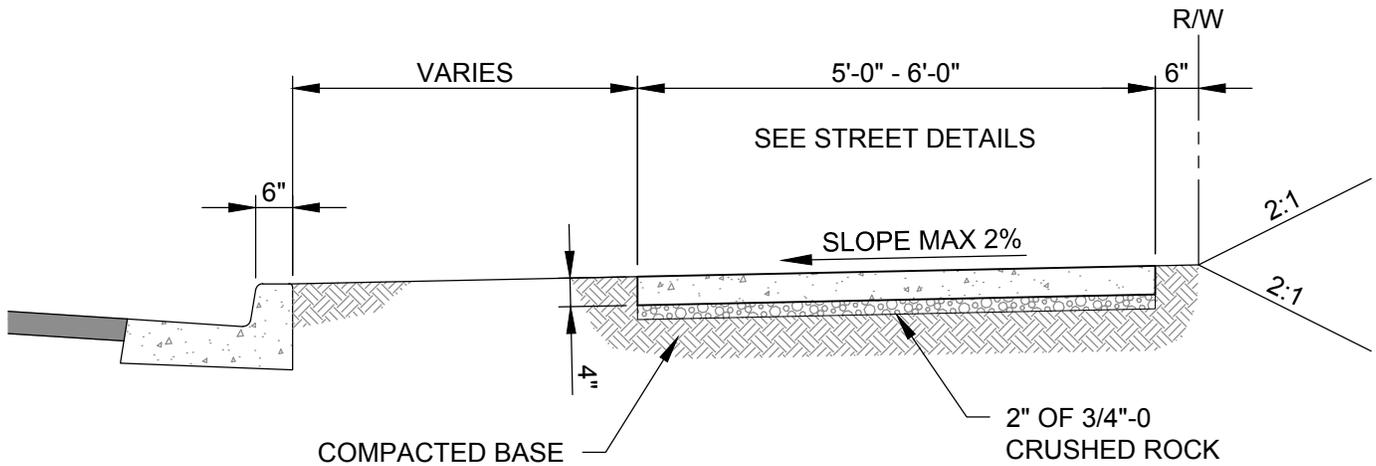
JUNE 2014 (REV JUNE 2018)
APPROVAL DATE

PUBLIC WORKS DEPARTMENT

STANDARD RESIDENTIAL DRIVEWAY

DWG. NO.

204



NOTES:

1. LOCATION AND WIDTH OF SIDEWALK WILL VARY DEPENDING UPON FUNCTIONAL CLASSIFICATION OF THE STREET. SEE TYPICAL STREET SECTION DRAWINGS.
2. CONCRETE TO HAVE COMPRESSIVE STRENGTH OF 3300 PSI AT 28 DAYS
3. EXPANSION JOINTS SHALL BE PROVIDED AT EACH:
 - POINT OF TANGENCY
 - COLD JOINT
 - SIDE OF DRIVEWAYS
4. EXPANSION JOINTING MATERIAL TO BE PRE-MOLDED, ASPHALT IMPREGNATED, NON-EXTRUDING, WITH A THICKNESS OF 1/2"-INCH
5. CONTRACTION JOINTS SHALL HAVE:
 - SPACING OF NOT MORE THAN 15- FEET
 - DEPTH OF JOINT OF AT LEAST 1 1/2-INCHES
6. ALL SURFACES SHALL BE TROWELED AND BROOMED IN A WORKMANLIKE MANNER ALL CONTRACTION JOINTS SHALL BE STEEL TROWELED (3-INCH TYP)



JUNE 2014 (REV JUNE 2018)

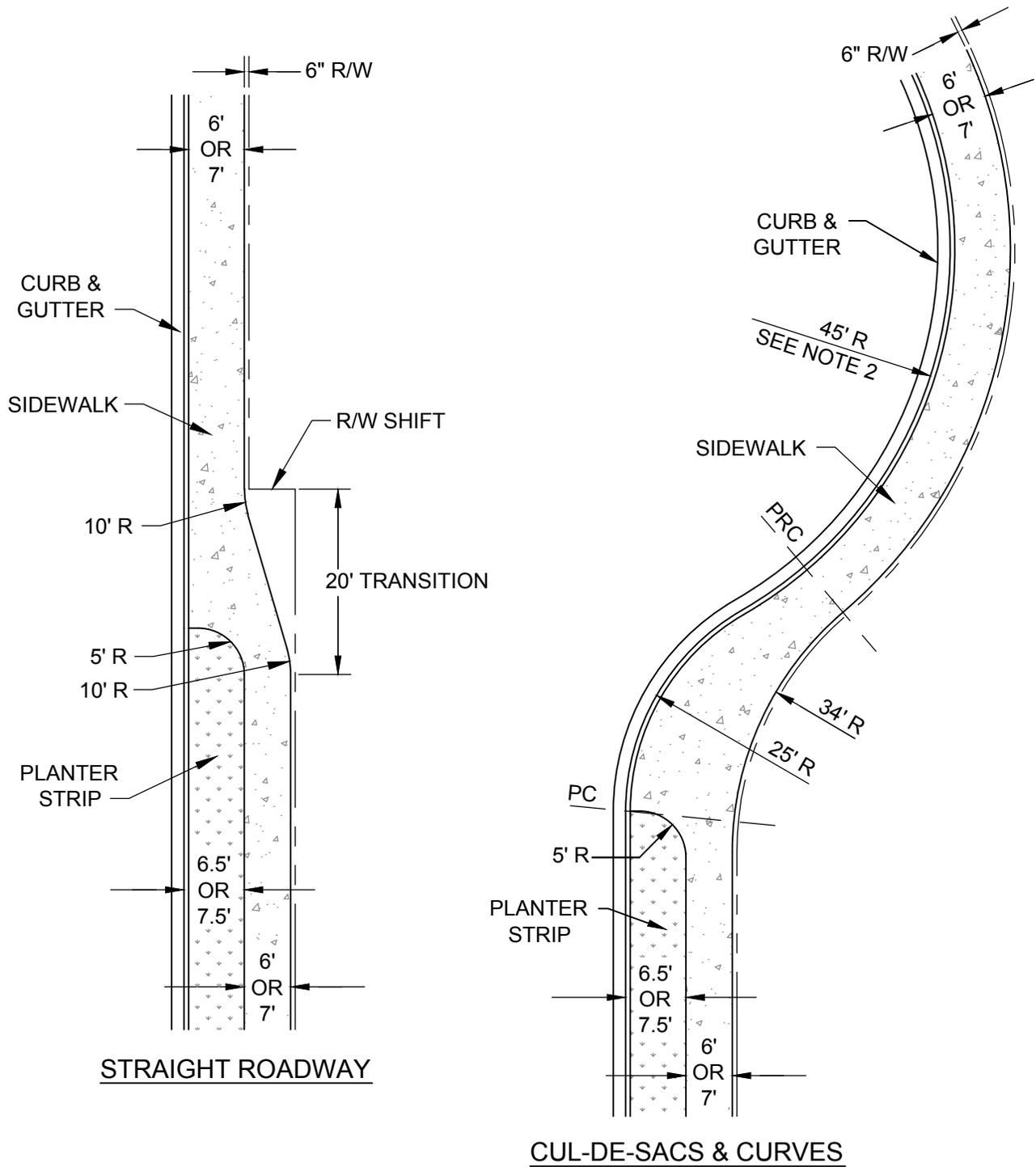
APPROVAL DATE

PUBLIC WORKS DEPARTMENT

TYPICAL SIDEWALK
(FOR LOCAL STREET)

DWG. NO.

205



STRAIGHT ROADWAY

CUL-DE-SACS & CURVES

NOTES:

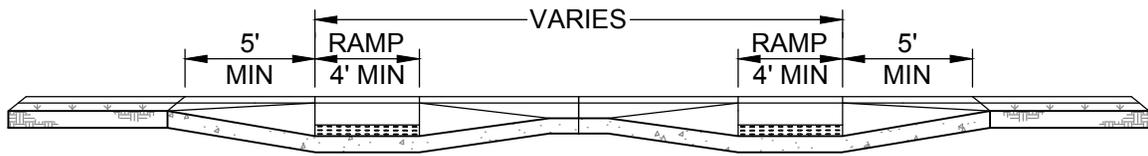
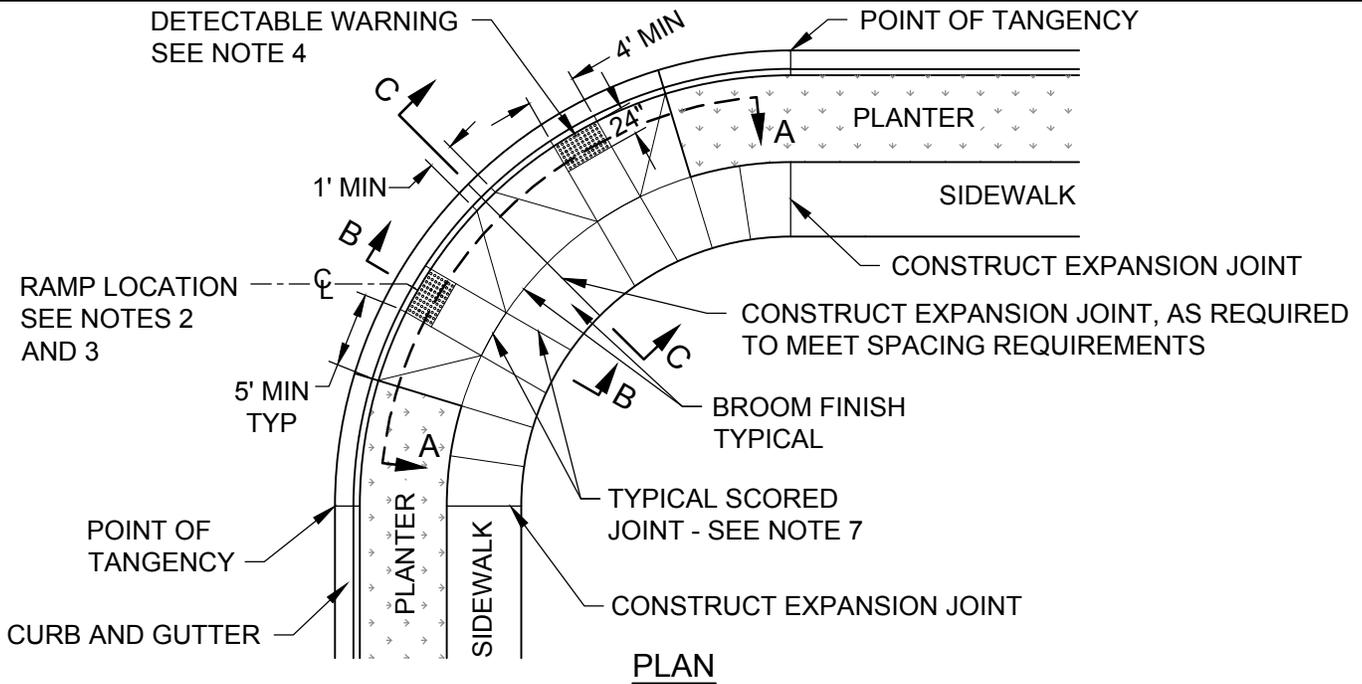
1. CURB TIGHT SIDEWALK REQUIRES PREAPPROVAL BY CITY ENGINEER. SUBMIT THE DESIGN FOR A SPECIFIC PROJECT WITH TRANSITIONS FROM A STANDARD SIDEWALK WITH PLANTER STRIP TO CURB TIGHT SIDEWALK
2. CURB RADIUS SHOWN IS FOR CUL-DE-SAC. OTHER CURVES AS APPROVED BY CITY ENGINEER



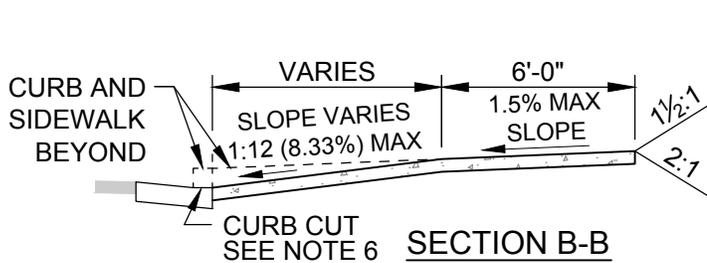
JUNE 2014 (REV JUNE 2018)
 APPROVAL DATE

PUBLIC WORKS DEPARTMENT
 STANDARD TO CURB TIGHT
 SIDEWALK TRANSITION

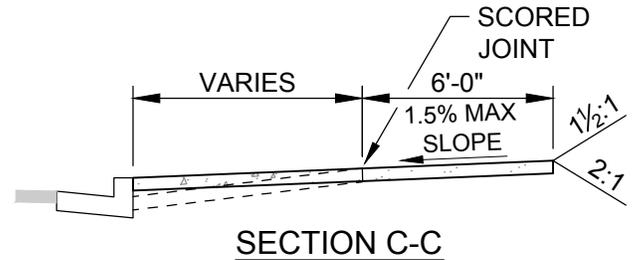
DWG. NO.
 206



SECTION A-A



SECTION B-B



SECTION C-C

NOTES:

1. SIDEWALK RAMP SHALL MEET ADA STANDARDS.
2. 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 " .
3. EACH RAMP SHALL BE LOCATED RELATIVE TO CROSSWALK OR STOP LINE.
4. 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.
5. CONCRETE SHALL HAVE A COMPRESSIVE STRENGTH OF 4,000 PSI AT 28 DAYS.
6. BEVEL THE CURB CUT FROM GUTTER TO BACK OF CURB AT 8.33% (1:12).
7. SCORE AT GRADE CHANGES, SURFACE TEXTURE CHANGES AND AT OTHER POINTS SHOWN. EDGES SHALL BE SHINED.
8. CURB INLET OR CATCH BASIN SHALL NOT BE ALLOWED IN FRONT OF SIDEWALK RAMP.
9. A SINGLE RAMP MAY BE USED AT " T " INTERSECTIONS AT THE LOCATIONS SHOWN ON PLANS.



JUNE 2014 (REV JUNE 2018)

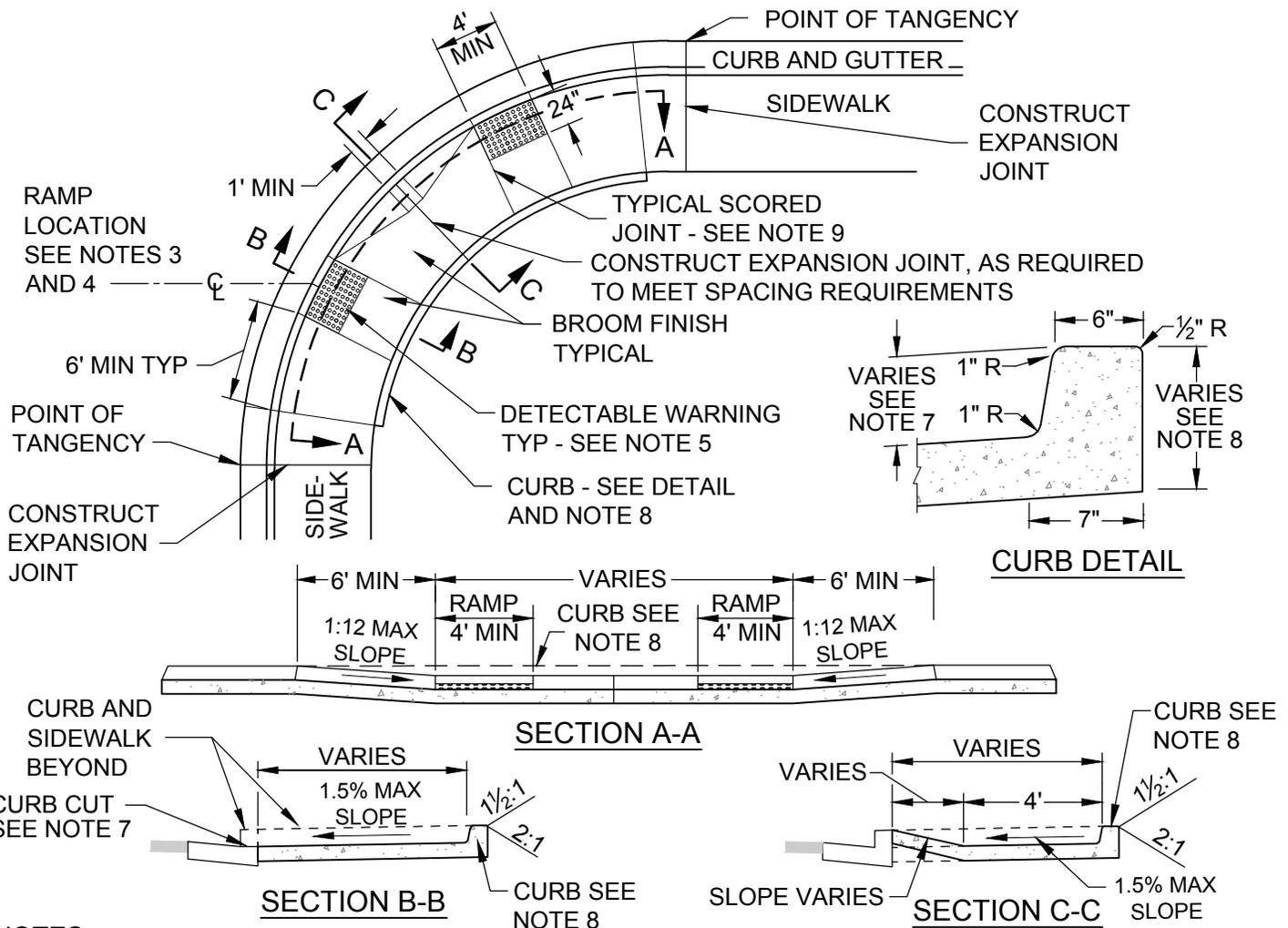
APPROVAL DATE

PUBLIC WORKS DEPARTMENT

STANDARD SIDEWALK RAMPS
WITH PLANTER STRIP

DWG. NO.

207



NOTES:

1. CURB TIGHT SIDEWALK RAMPS REQUIRE PREAPPROVAL BY THE CITY ENGINEER.
2. SIDEWALK RAMP SHALL MEET ADA STANDARDS.
3. 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. EACH RAMP SHALL BE LOCATED RELATIVE TO CROSSWALK OR STOP LINE.
5. 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.
6. CONCRETE SHALL HAVE A COMPRESSIVE STRENGTH OF 4,000 PSI AT 28 DAYS.
7. BEVEL THE CURB CUT FROM GUTTER TO BACK OF CURB AT 1.5%.
8. CONSTRUCT THE CURB WITH VARYING EXPOSURE TAPERED LONGITUDINALLY SO THAT THE TOP OF THE CURB MATCHES THE NORMAL PROJECTED BACK OF SIDEWALK AS SHOWN IN CROSS SECTIONS B-B AND C-C, WHERE THE ADJACENT GROUND IS IMPROVED AND SLOPES AWAY FROM SIDEWALK, AND WHERE THE BACK EDGE OF NEW SIDEWALK AT RAMP IS LESS THAN 0.6 FEET ABOVE THE GUTTER FLOWLINE.
9. SCORE AT GRADE CHANGES, SURFACE TEXTURE CHANGES AND AT OTHER POINTS SHOWN. EDGES SHALL BE SHINED.
10. CURB INLET OR CATCH BASIN SHALL NOT BE ALLOWED IN FRONT OF SIDEWALK RAMP.
11. A SINGLE RAMP MAY BE USED AT " T " INTERSECTIONS AT THE LOCATIONS SHOWN ON PLANS.



JUNE 2014 (REV JUNE 2018)

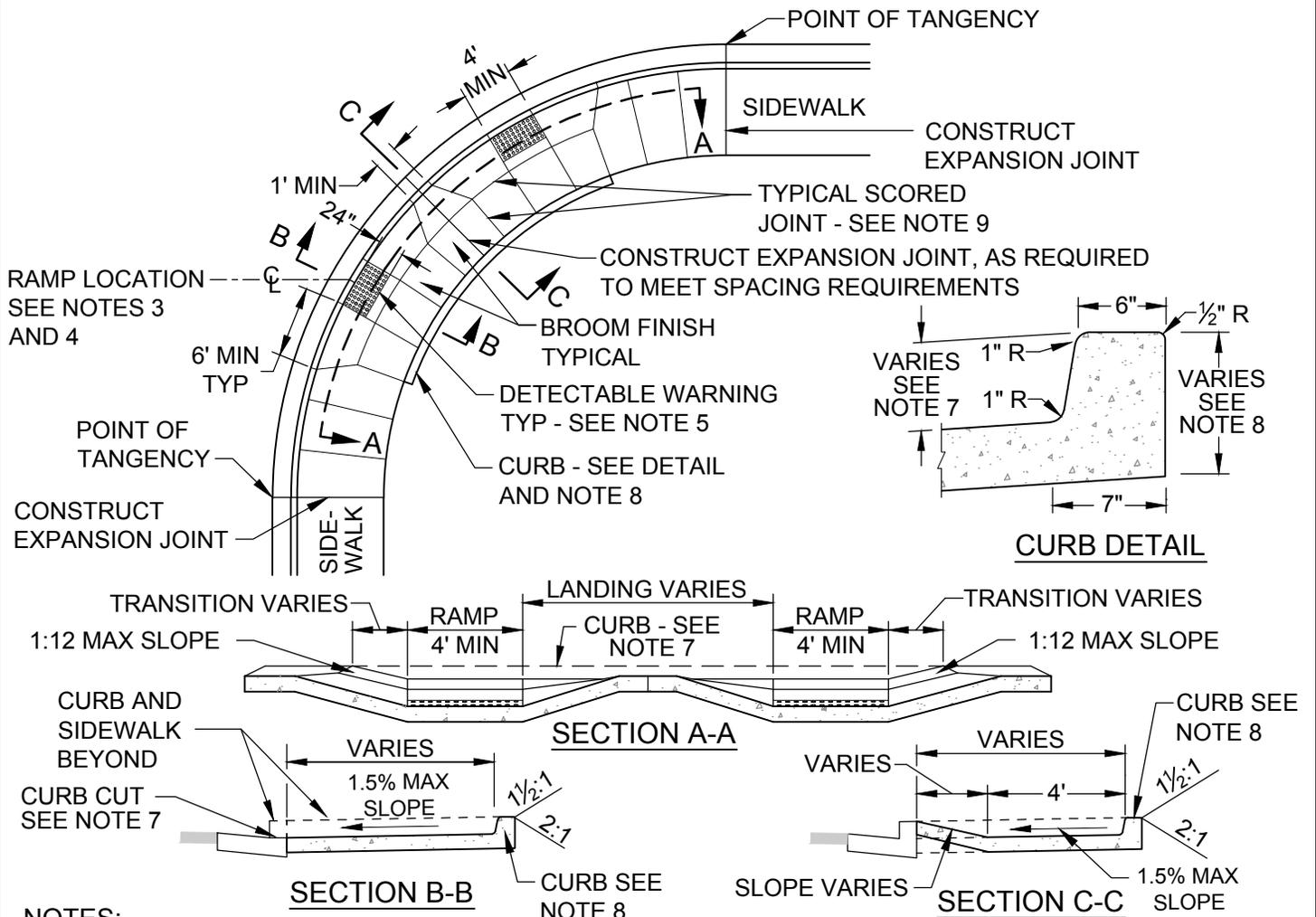
APPROVAL DATE

PUBLIC WORKS DEPARTMENT

**STANDARD CURB TIGHT
SIDEWALK RAMP**

DWG. NO.

208



NOTES:

1. CURB TIGHT SIDEWALK RAMPS REQUIRE PREAPPROVAL BY THE CITY ENGINEER.
2. SIDEWALK RAMP SHALL MEET ADA STANDARDS.
3. 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. EACH RAMP SHALL BE LOCATED RELATIVE TO CROSSWALK OR STOP LINE.
5. 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.
6. CONCRETE SHALL HAVE A COMPRESSIVE STRENGTH OF 4,000 PSI AT 28 DAYS.
7. BEVEL THE CURB CUT FROM GUTTER TO BACK OF CURB AT 1.5%.
8. CONSTRUCT THE CURB WITH VARYING EXPOSURE TAPERED LONGITUDINALLY SO THAT THE TOP OF THE CURB MATCHES THE NORMAL PROJECTED BACK OF SIDEWALK AS SHOWN IN CROSS SECTIONS B-B AND C-C, WHERE THE ADJACENT GROUND IS IMPROVED AND SLOPES AWAY FROM SIDEWALK, AND WHERE THE BACK EDGE OF NEW SIDEWALK AT RAMP IS LESS THAN 0.6 FEET ABOVE THE GUTTER FLOWLINE.
9. SCORE AT GRADE CHANGES, SURFACE TEXTURE CHANGES AND AT OTHER POINTS SHOWN. EDGES SHALL BE SHINED.
10. CURB INLET OR CATCH BASIN SHALL NOT BE ALLOWED IN FRONT OF SIDEWALK RAMP.
11. A SINGLE RAMP MAY BE USED AT " T " INTERSECTIONS AT THE LOCATIONS SHOWN ON PLANS.



JUNE 2014 (REV JUNE 2018)

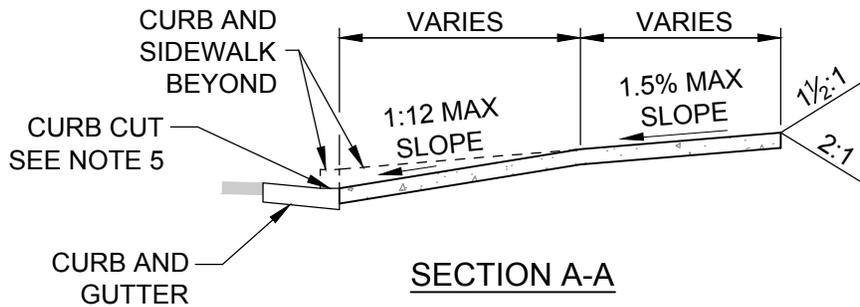
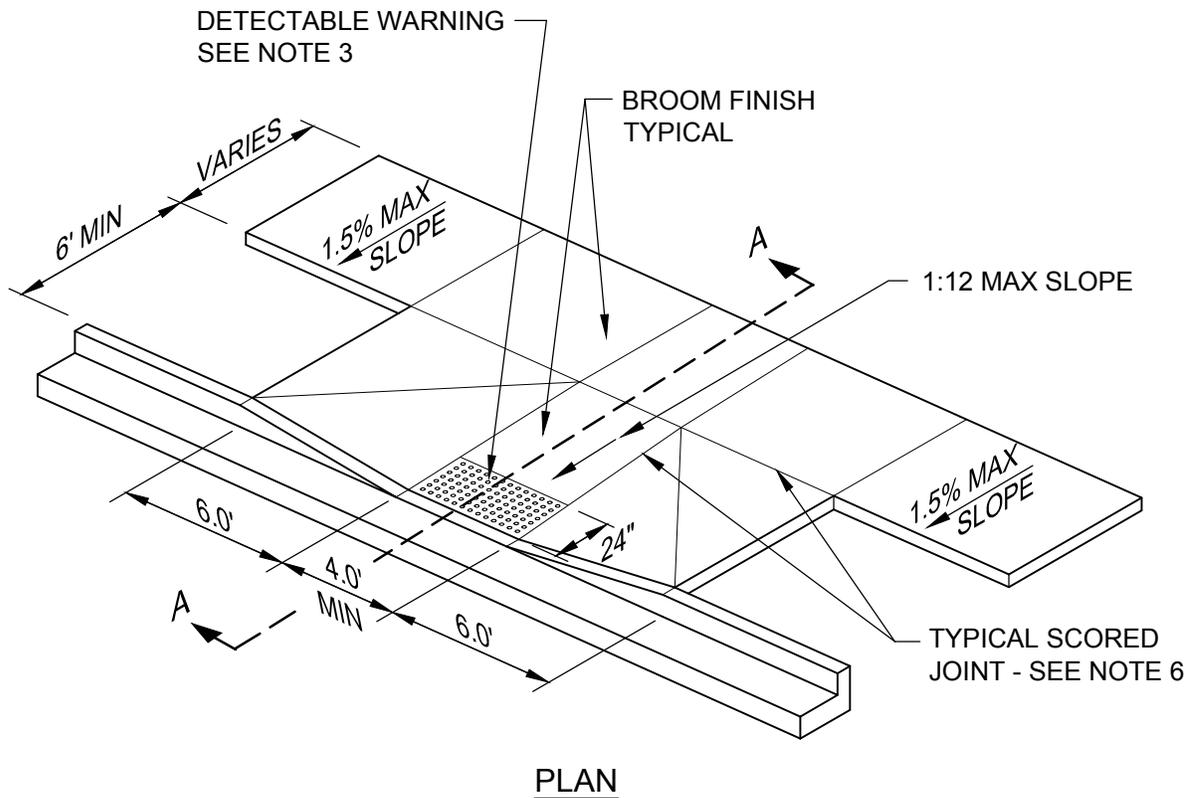
APPROVAL DATE

PUBLIC WORKS DEPARTMENT

**COMBINATION CURB TIGHT
SIDEWALK RAMP**

DWG. NO.

209



NOTES:

1. SIDEWALK RAMP SHALL MEET ADA STANDARDS.
2. 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 ".
3. 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.
4. CONCRETE SHALL HAVE A COMPRESSIVE STRENGTH OF 4,000 PSI AT 28 DAYS.
5. BEVEL THE CURB CUT FROM GUTTER TO BACK OF CURB AT 8.33% (1:12).
6. SCORE AT GRADE CHANGES, SURFACE TEXTURE CHANGES AND AT OTHER POINTS SHOWN. EDGES SHALL BE SHINED.



JUNE 2014 (REV JUNE 2018)
APPROVAL DATE

PUBLIC WORKS DEPARTMENT

MIDBLOCK SIDEWALK RAMP
WITH PLANTER STRIP

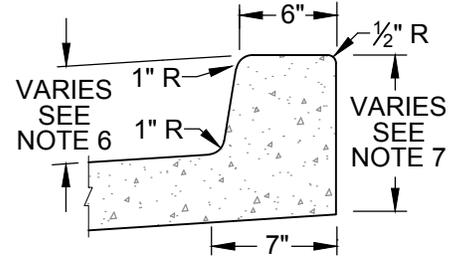
DWG. NO.

210

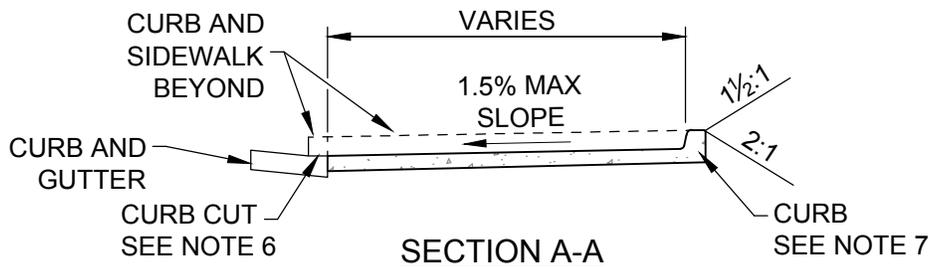
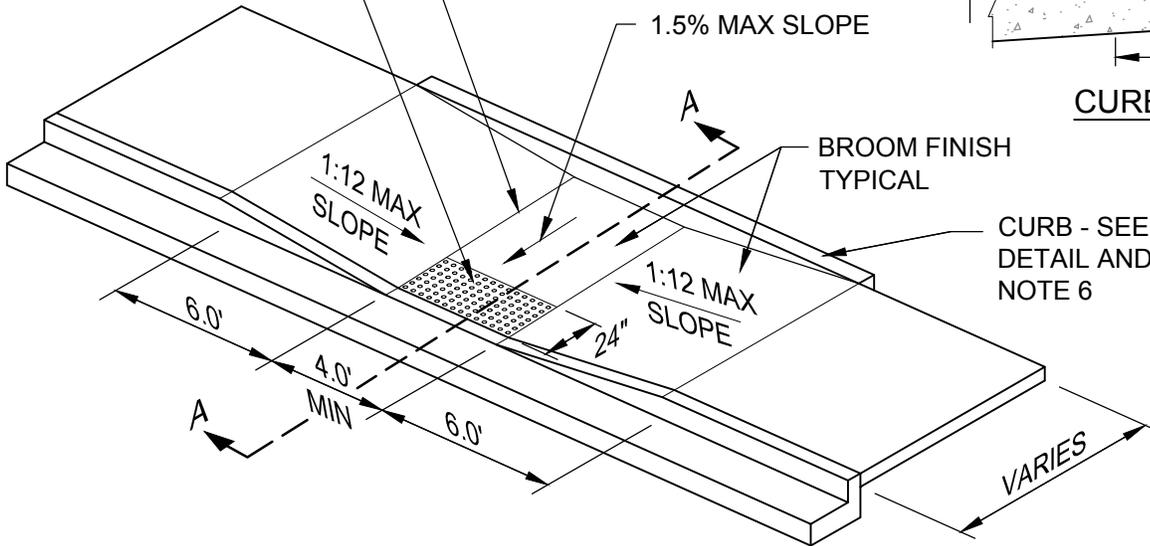
DETECTABLE WARNING
SEE NOTE 4

TYPICAL SCORED
JOINT - SEE NOTE 8

1.5% MAX SLOPE



CURB DETAIL



SECTION A-A

NOTES:

1. CURB TIGHT SIDEWALK REQUIRES PREAPPROVAL BY THE CITY ENGINEER.
2. SIDEWALK RAMP SHALL MEET ADA STANDARDS.
3. 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. 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.
5. CONCRETE SHALL HAVE A COMPRESSIVE STRENGTH OF 4,000 PSI AT 28 DAYS.
6. BEVEL THE CURB CUT FROM GUTTER TO BACK OF CURB AT 1.5%.
7. 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 A-A, WHERE THE ADJACENT GROUND IS IMPROVED AND SLOPES AWAY FROM SIDEWALK, AND WHERE THE BACK EDGE OF NEW SIDEWALK AT RAMP IS LESS THAN 0.6 FEET ABOVE THE GUTTER FLOWLINE.
8. SCORE AT GRADE CHANGES, SURFACE TEXTURE CHANGES AND AT OTHER POINTS SHOWN. EDGES SHALL BE SHINED.



JUNE 2014 (REV JUNE 2018)

APPROVAL DATE

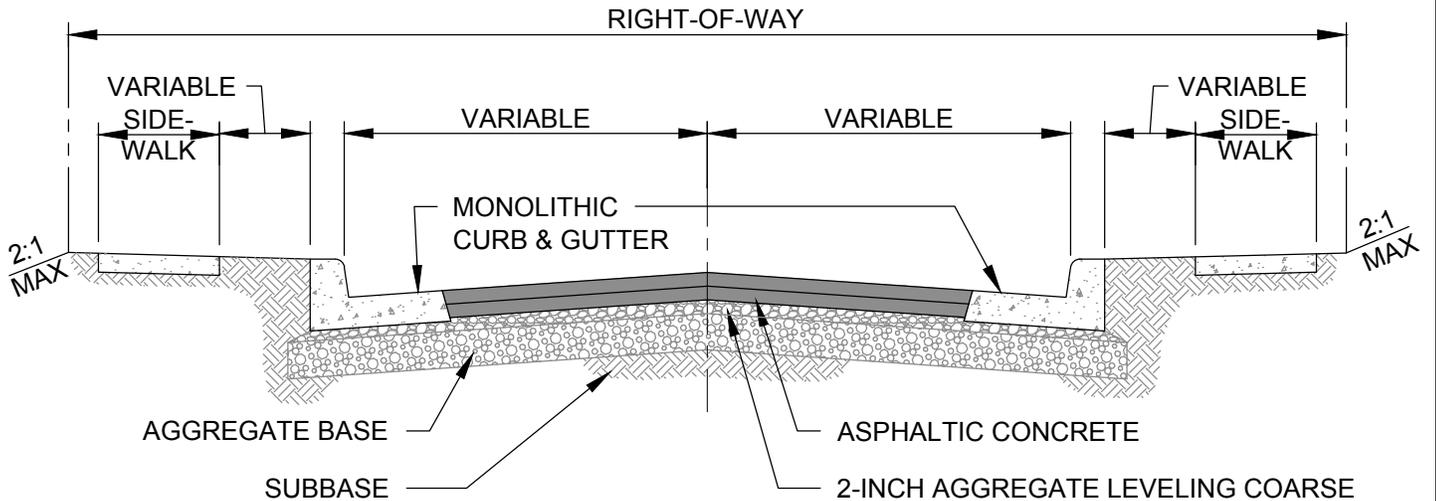
PUBLIC WORKS DEPARTMENT

MIDBLOCK CURB TIGHT
SIDEWALK RAMP

DWG. NO.

211

TYPICAL STREET SECTION



NOTES:

1. ASPHALTIC CONCRETE INSTALLED IN TWO LIFTS, LEVEL 3, 1/2" DENSE GRADED HMAC PER ODOT SPECIFICATIONS 00744
2. AGGREGATE BASE 1"-0" CRUSHED ROCK, PER ODOT SPEC 02630.
3. SUB-GRADE AND BASEROCK SHALL BE COMPACTED TO 95% RELATIVE DENSITY PER AASHTO T-180
4. ALTERNATIVE PAVEMENT MATERIALS WILL BE CONSIDERED FOR APPROVAL BY CITY ENGINEER
5. WHERE NO PLANTER STRIP IS REQUIRED, THE SIDEWALK SHALL HAVE A MINIMUM 5-FOOT CLEAR OF ALL OBSTACLES, UNLESS APPROVED BY CITY ENGINEER
6. THE ASPHALT SHALL BE A MINIMUM OF 92% OF THEORETICAL MAXIMUM DENSITY

| FUNCTIONAL CLASSIFICATION | BASE ROCK | PAVEMENT DEPTH |
|---------------------------|-----------|----------------|
| RESIDENTIAL STREET | 10" | 3.5" |
| RESIDENTIAL COLLECTOR | 12" | 3.5" |
| ARTERIAL | 12" | 4" |



JUNE 2014 (REV JUNE 2018)

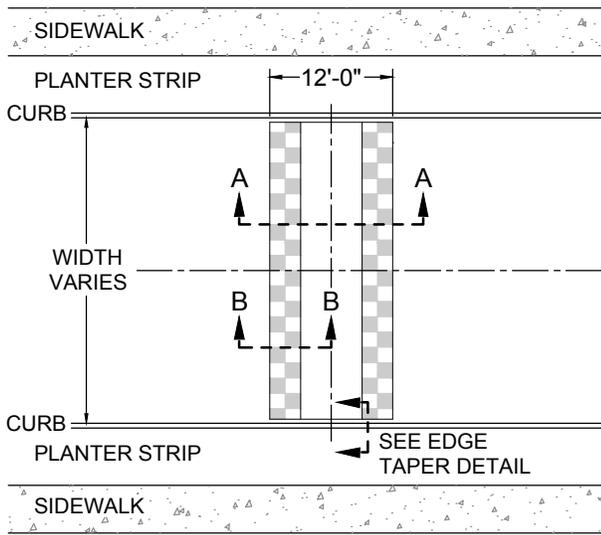
APPROVAL DATE

PUBLIC WORKS DEPARTMENT

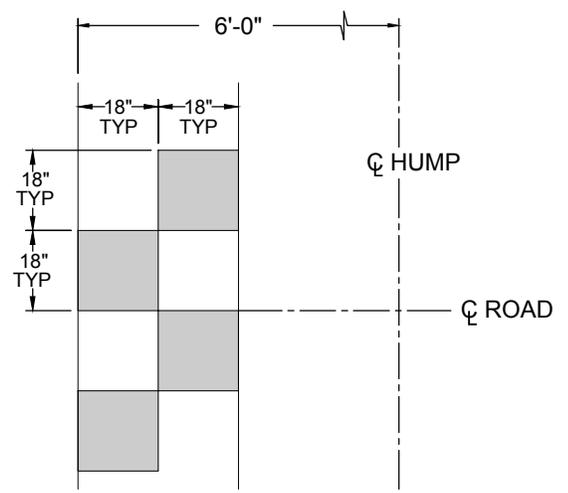
LOCAL TRANSITIONAL STREET SECTION

DWG. NO.

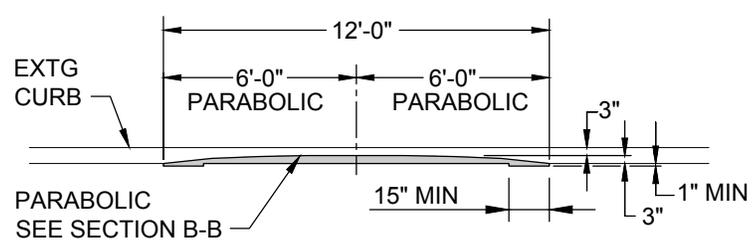
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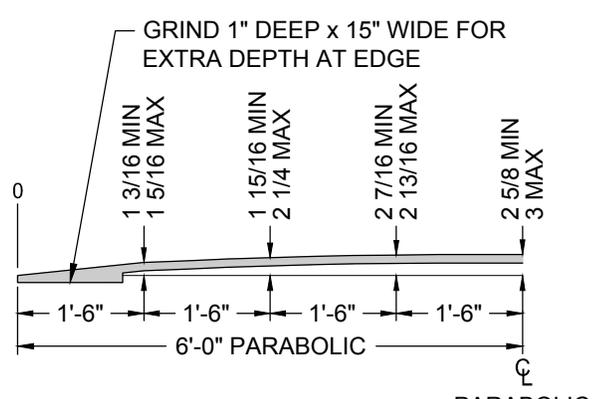
PLAN VIEW



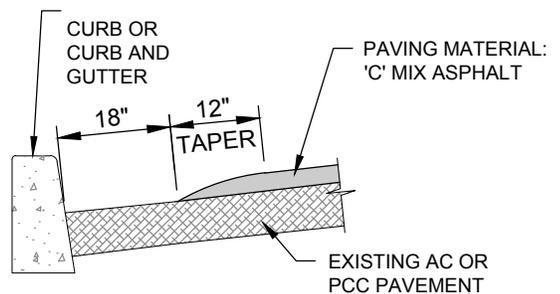
PAVEMENT MARKING DETAIL



SECTION A-A



SECTION B-B



EDGE TAPER DETAIL

CONSTRUCTION NOTES:

1. GRIND FOR EXTRA DEPTH AT EDGES AS SHOWN.
2. APPLY BITUMAL TACK COAT OVER AIR-BLOWN CLEANED AND SWEEPED 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.
3. POSTED SPEED 25 MPH.
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.



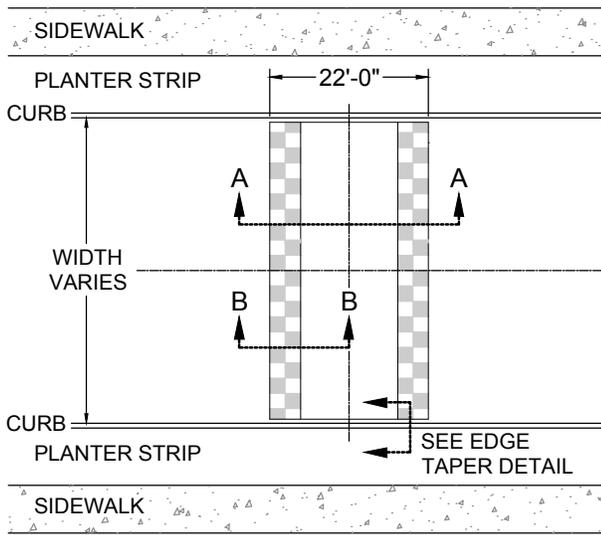
JUNE 2014 (REV JUNE 2018)
APPROVAL DATE

PUBLIC WORKS DEPARTMENT

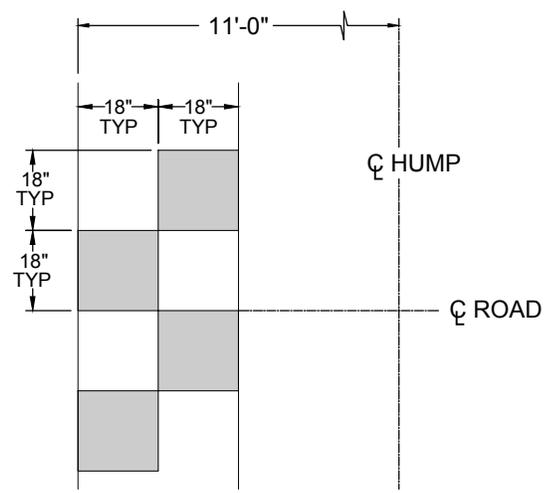
ASPHALTIC CONCRETE
SPEED HUMP

DWG. NO.

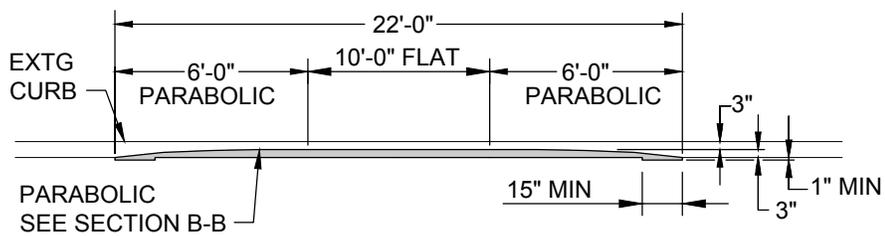
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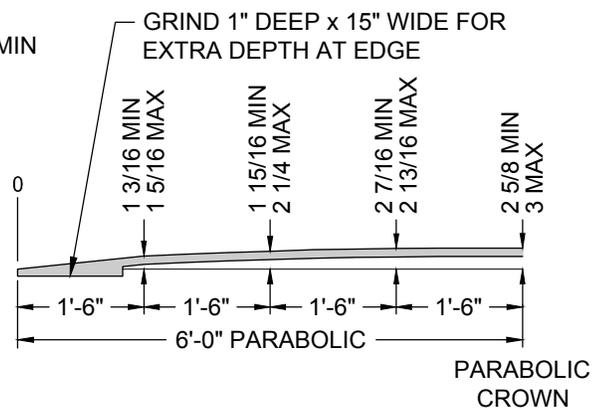
PLAN VIEW



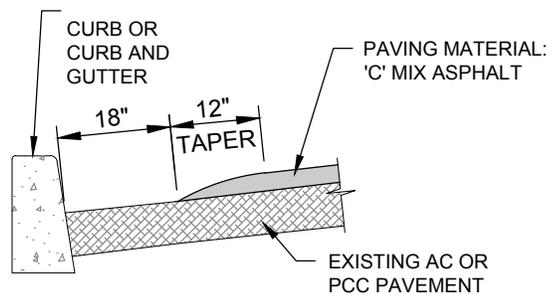
PAVEMENT MARKING DETAIL



SECTION A-A



SECTION B-B



EDGE TAPER DETAIL

CONSTRUCTION NOTES:

1. GRIND FOR EXTRA DEPTH AT EDGES AS SHOWN.
2. APPLY BITUMAL TACK COAT OVER AIR-BLOWN CLEANED AND SWEEPED 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. 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.

| | | | |
|--|---|--|----------------------------|
|  | <p>JUNE 2014 (REV JUNE 2018)</p> <p>APPROVAL DATE</p> | <p>PUBLIC WORKS DEPARTMENT</p> <p>ASPHALTIC CONCRETE SPEED TABLE</p> | <p>DWG. NO.</p> <p>214</p> |
| | | | |

CENTER TREES BETWEEN CURB AND SIDEWALK OR CURB AND PROPERTY LINE

TREES SHALL BE A MINIMUM OF 2" CALIPER FOR APPROVED TREE VARIETIES (SEE APPENDIX B OF THE DESIGN MANUAL AND STANDARD SPECIFICATIONS)

INSTALL ROOT BARRIER* WHERE ANY TREE LOCATION IS WITHIN 4' OF ANY CURB, SIDEWALK, CYCLE TRACK, OR DRIVEWAY

CHAINLOCK #4 TREE TIES

2-2" x 2" x 8" WOOD STAKES MIN. 2 EACH DRIVEN OUTSIDE ROOT BALL

INSTALL TEMPORARY TREE WATERING BAG**

REMOVE BURLAP & TWINE FROM TOP 1/3 OF BALL AND TUCK AROUND BALL DEPRESS SOIL AND BARK MULCH CIRCLE 2" MIN. DEPTH FOR WATERING BASIN

CURB

5' TO SCAFFOLD BRANCHES

SIDEWALK (TYP.)

INSTALL ROOT BARRIER* WHERE ANY TREE LOCATION IS WITHIN 4' OF ANY CURB, SIDEWALK, CYCLE TRACK, OR DRIVEWAY

TREE WELL

USE PLANTING MIX SUITABLE FOR TREE SPECIES AND EXISTING SOILS

1' - PLUS DIA. OF ROOT BALL
6" MINIMUM UNDER ROOT BALL

* ROOT BARRIERS:

INSTALL 24" X 15' APPROVED ROOT BARRIER, CENTERED 7.5' ON EACH SIDE OF TREE.

APPROVED ROOT BARRIERS:

DEEPROOT UB 24-2
VILLA LINEAR BARRIER
NDS EP OR EQUIVALENT

** APPROVED WATERING BAGS:

TREEGATOR
OOZE TUBE
KING TREE
OR EQUAL



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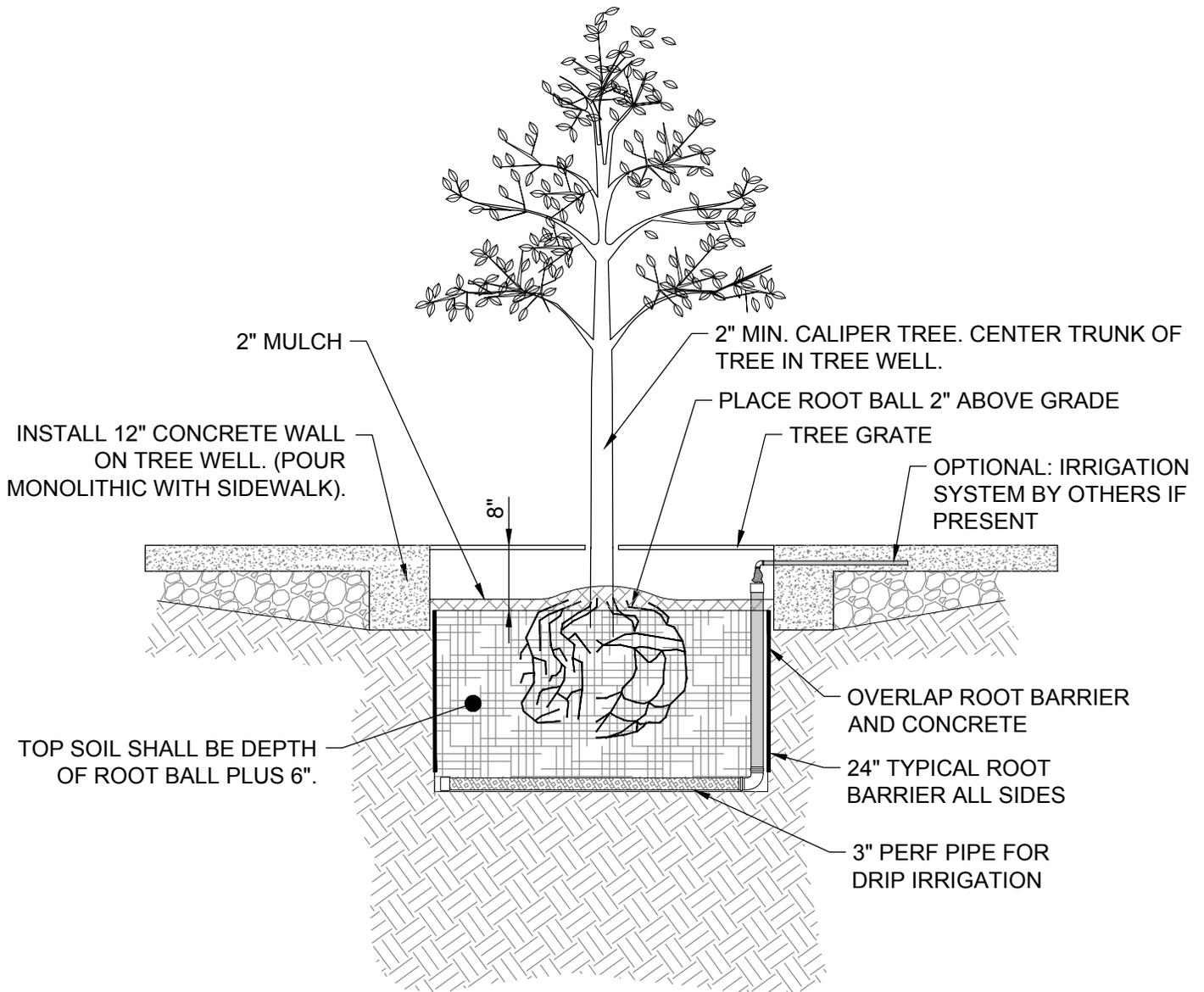
APPROVAL DATE

PUBLIC WORKS DEPARTMENT

STREET TREE PLANTING DETAIL

DWG. NO.

215



NOTES

1. SEE APPENDIX B OF THE DESIGN MANUAL AND STANDARD SPECIFICATIONS FOR APPROVED TREE VARIETIES.

PUBLIC WORKS DEPARTMENT

DWG. NO.

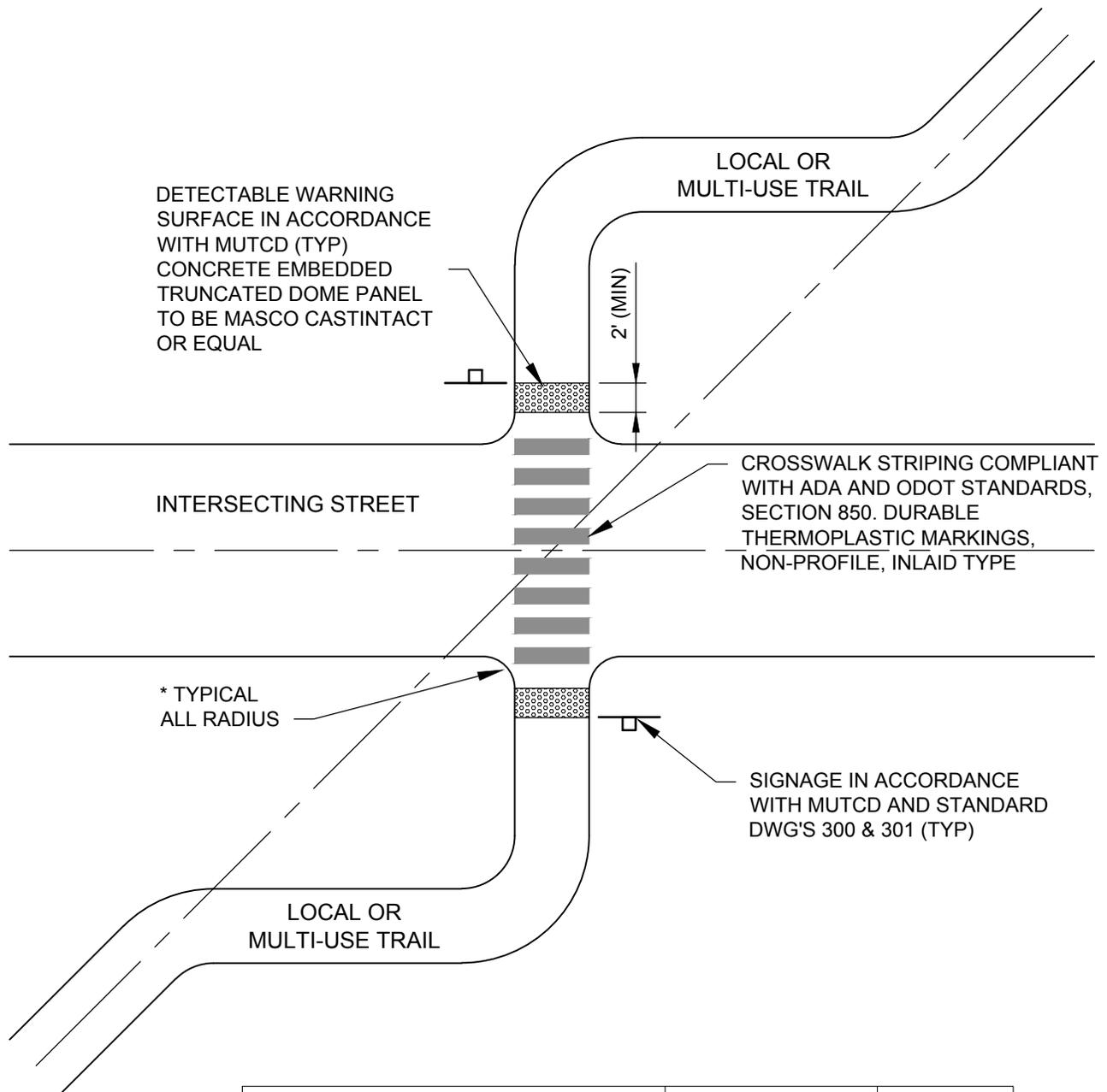


JUNE 2014 (REV JUNE 2018)

APPROVAL DATE

TREE WELL PLANTING DETAIL

216



| CONDITIONS | DESIGN SPEED (mph) | * CURVE RADIUS (ft) |
|--|--------------------|---------------------|
| Long Downgrades (steeper than 4% and longer than 500 ft) | 30 | 166 |
| Open Country (level or rolling); Shared-use paths in urban areas | 20 | 74 |
| Approaching Intersections | 12 | 27 |

BIKEWAY DESIGN SPEED AND CURVE RADIUS



JANUARY 2016 (REV JUNE 2018)

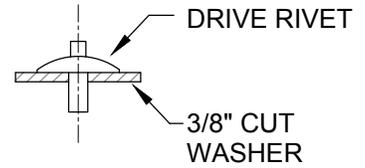
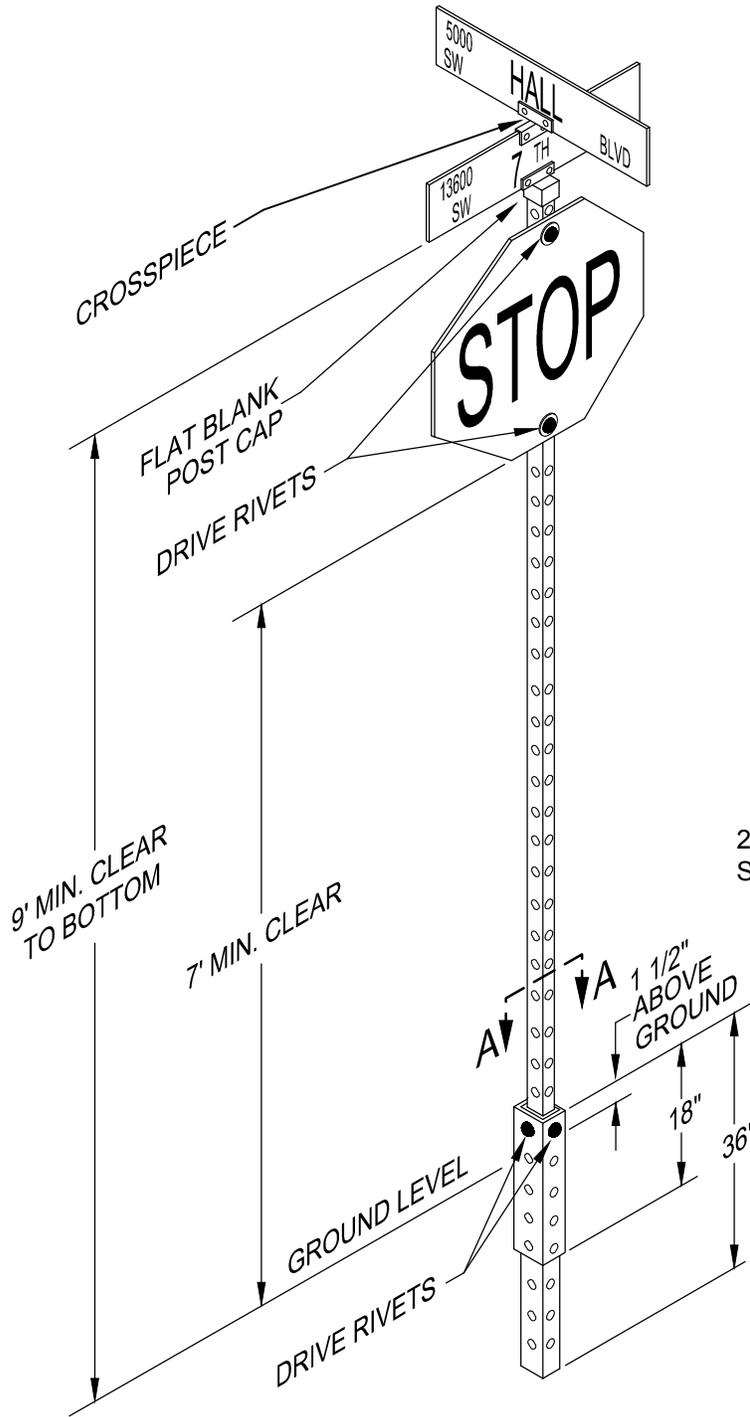
APPROVAL DATE

PUBLIC WORKS DEPARTMENT

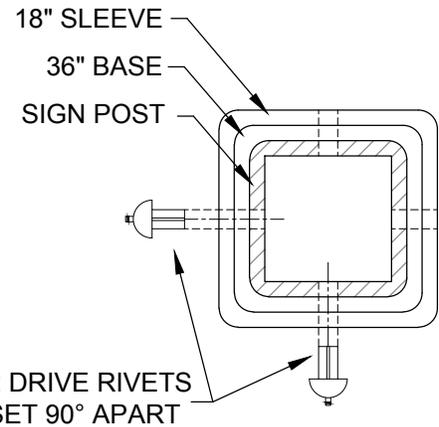
BIKEWAY & STREET INTERSECTION

DWG. NO.

218



**DRIVE RIVET DETAIL
FOR MOUNTING SIGN**



SECTION A - A

NOTES:

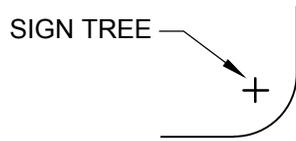
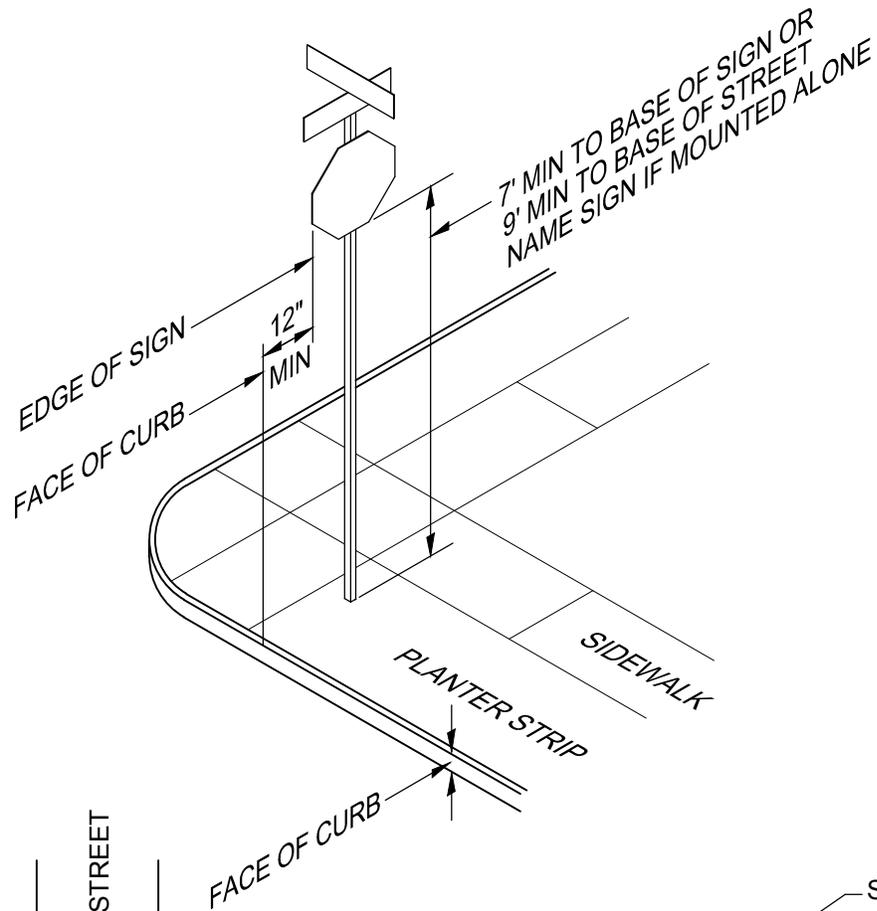
1. SIGN POST SHALL BE INSERTED A MINIMUM OF 12 INCHES INTO THE 36 INCH BASE.
2. CAP AND CROSSPIECE TO BE OF THE SAME STYLE.
3. STOP SIGN SHALL CONFORM TO MUTCD STANDARD DETAIL R1-1. SEE APPENDIX D.
4. STREET SIGN SHALL CONFORM TO MUTCD STANDARD DETAIL D3-1. SEE APPENDIX D.



JUNE 2014 (REV JUNE 2018)
APPROVAL DATE

PUBLIC WORKS DEPARTMENT
TYPICAL SIGN ASSEMBLY

DWG. NO.
300

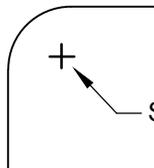
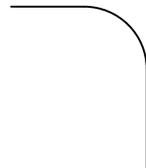
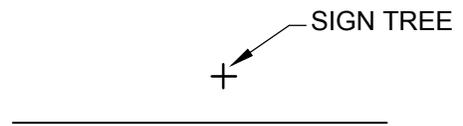


MINOR STREET

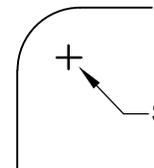
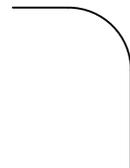


FACE OF CURB

MAJOR STREET



SIGN TREE



SIGN TREE

CROSS INTERSECTION

TEE INTERSECTION

NOTES:

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.



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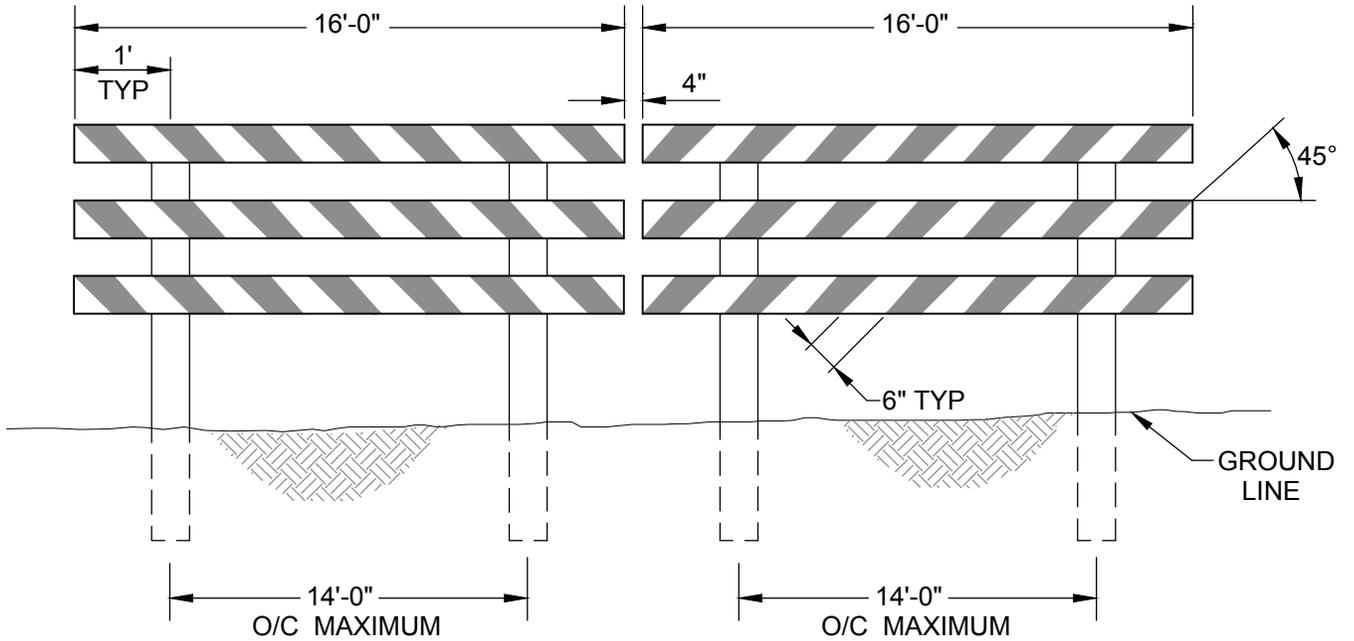
APPROVAL DATE

PUBLIC WORKS DEPARTMENT

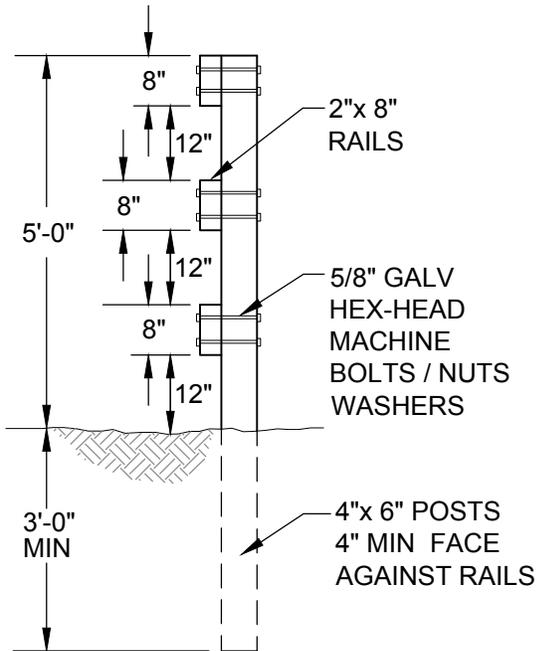
TYPICAL SIGN LOCATIONS

DWG. NO.

301



ELEVATION



SECTION

NOTES:

1. RAILS ARE TO BE WHITE AND RED INCAPSULATED LENS SHEETING.
2. POSTS ARE TO BE PRESSURE TREATED.
3. SEE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS AND THE OREGON SUPPLEMENT FOR:
 3F.1 BARRICADES
 6F.60 BARRICADE DESIGN & APPLICATION
4. FOR WIDER APPLICATIONS, MULTIPLE SECTIONS AS SHOWN SHALL BE USED.



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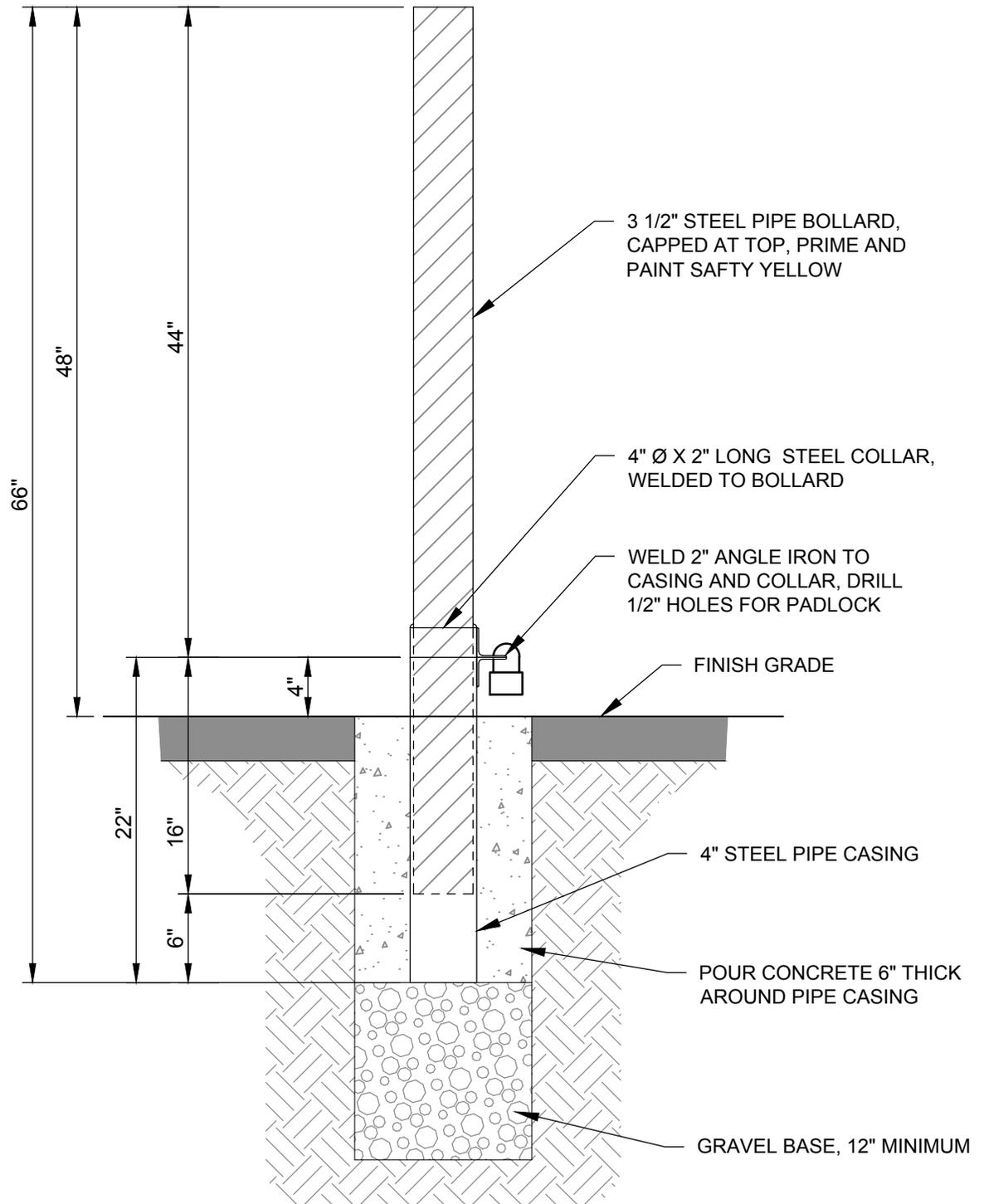
APPROVAL DATE

PUBLIC WORKS DEPARTMENT

STREET BARRICADE - TYPE III

DWG. NO.

302



STEEL PIPE SPECIFICATIONS:

ASTM A-53 STEEL, SCHEDULE 40, BLACK, HOT DIPPED, ZINC COATED, WELDED, SEAMLESS 4-INCH STEEL PIPE, O.D. = 4.500", I.D. = 4.026" THICKNESS = 0.237". 3 1/2-INCH STEEL PIPE, O.D. = 4.000", I.D. = 3.549", THICKNESS = 0.226".

PUBLIC WORKS DEPARTMENT

DWG. NO.

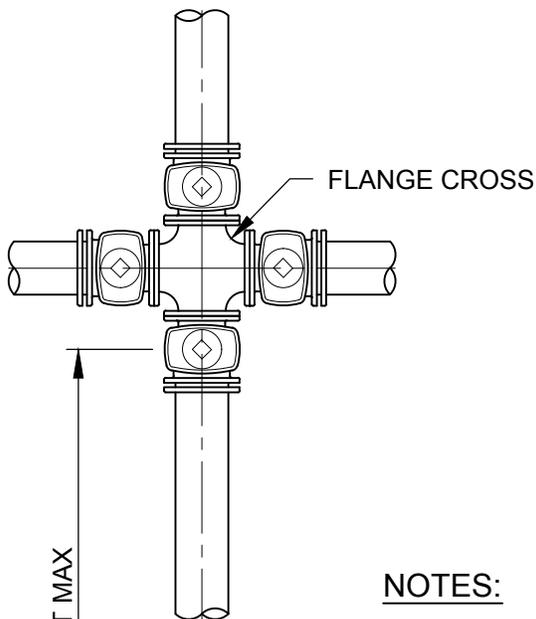
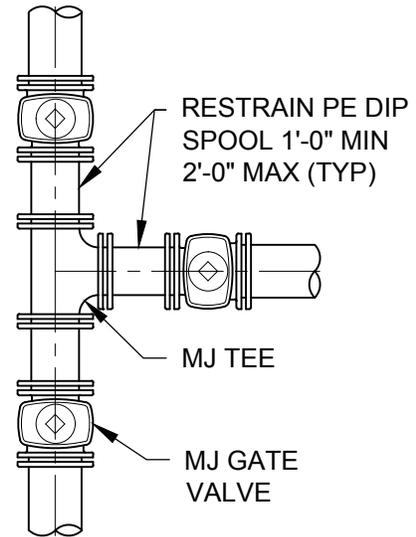
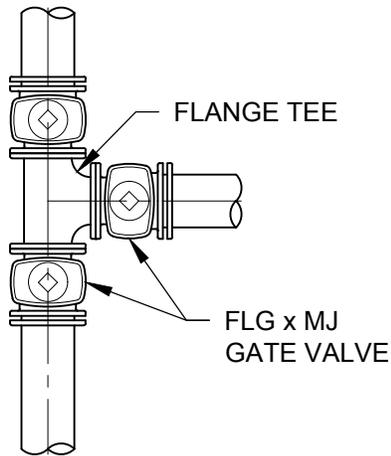
REMOVABLE BOLLARD

303

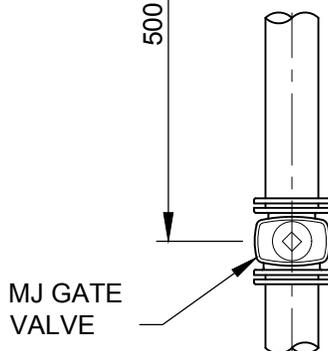


JANUARY 2016 (REV JUNE 2018)

APPROVAL DATE



MJ OPTION
SEE NOTE 7



NOTES:

1. VALVES ARE NOT TO BE LOCATED IN CURB AND GUTTER AREA
2. VALVE BOXES ARE REQUIRED AT EACH VALVE LOCATION AS PER STD DWG 408
4. MAXIMUM SPACING FOR VALVES: 500 FEET
5. ALL VALVES TO CONFORM TO AWWA STANDARDS
6. USE GATE VALVES FOR 8 INCH AND SMALLER LINES, BUTTERFLY VALVE FOR 10 INCH AND LARGER LINES, OR AS SPECIFIED BY THE CITY ENGINEER
7. RESTRAINED MJ AND SPOOL CONNECTION OPTION MAY BE USED WITH PREAPPROVAL BY THE CITY ENGINEER.



JUNE 2014 (REV JUNE 2018)

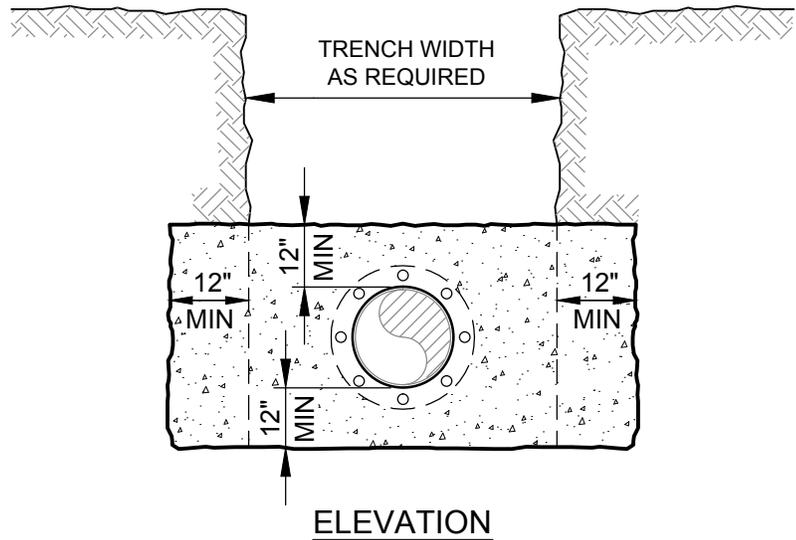
APPROVAL DATE

PUBLIC WORKS DEPARTMENT

TYPICAL MINIMUM WATER VALVE LOCATION

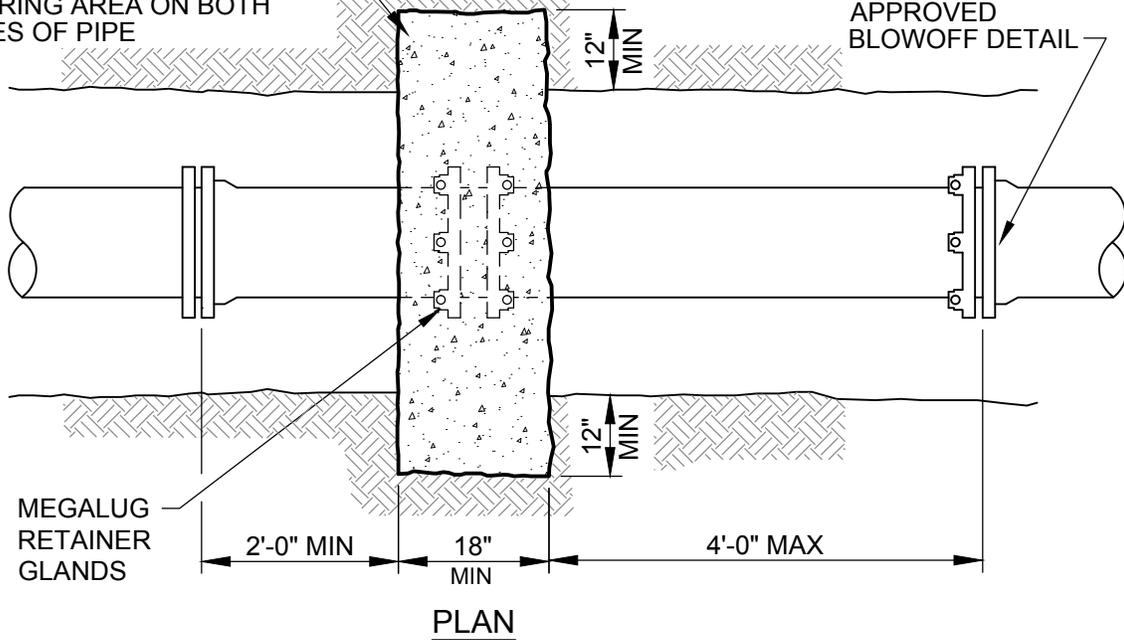
DWG. NO.

400



3,000 PSI COMPRESSIVE STRENGTH CONC THRUST BLOCK AGAINST UNDISTURBED EARTH BEARING AREA ON BOTH SIDES OF PIPE

MJ FITTING WITH MEGALUG JOINT RESTRAINT AS REQUIRED OR SEE APPROVED BLOWOFF DETAIL



| MIN. BEARING AREA OF IN LINE THRUST BLOCK | |
|---|----------------|
| SIZE (INCHES) | AREA (SQ. FT.) |
| 4 | 2.2 |
| 6 | 5.0 |
| 8 | 8.7 |
| 10 | 13.6 |
| 12 | 19.6 |



JUNE 2014 (REV JUNE 2018)

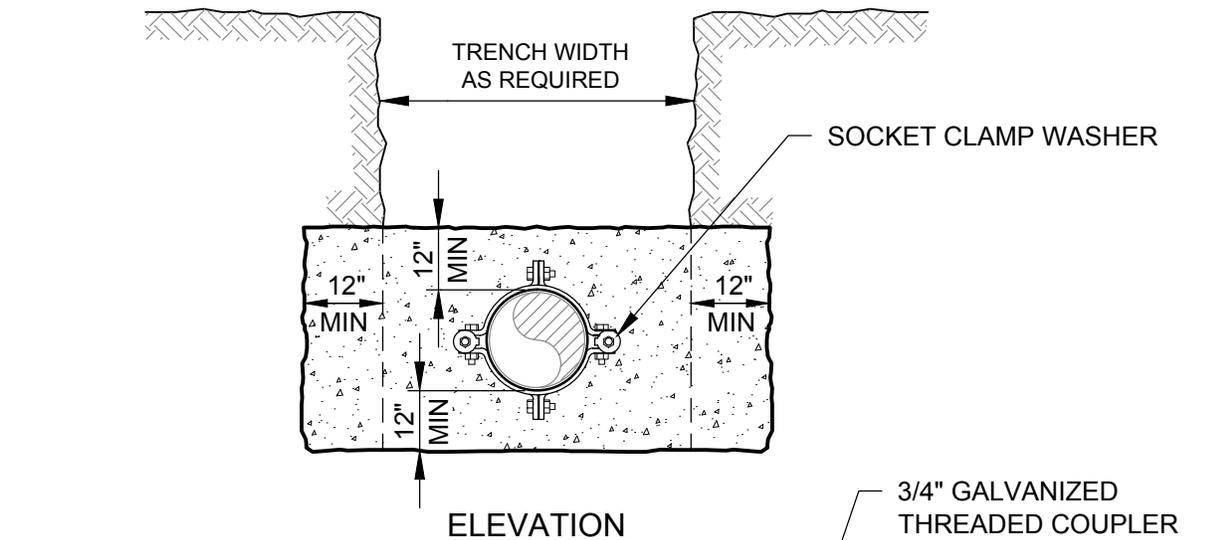
APPROVAL DATE

PUBLIC WORKS DEPARTMENT

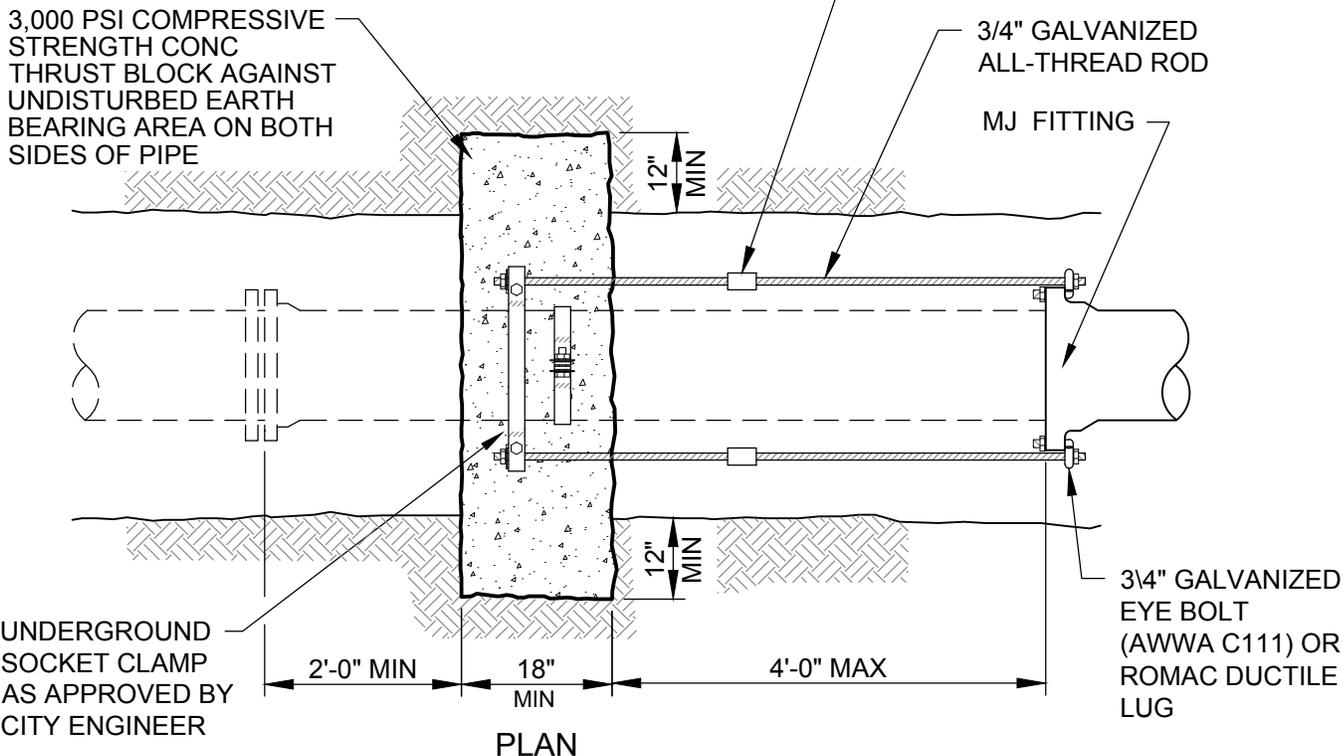
**STRADDLE THRUST BLOCK
NEW PIPE CONNECTION**

DWG. NO.

401



3,000 PSI COMPRESSIVE STRENGTH CONC THRUST BLOCK AGAINST UNDISTURBED EARTH BEARING AREA ON BOTH SIDES OF PIPE



| MIN. BEARING AREA OF IN LINE THRUST BLOCK | |
|---|----------------|
| SIZE (INCHES) | AREA (SQ. FT.) |
| 4 | 2.2 |
| 6 | 5.0 |
| 8 | 8.7 |
| 10 | 13.6 |
| 12 | 19.6 |



JUNE 2014 (REV JUNE 2018)

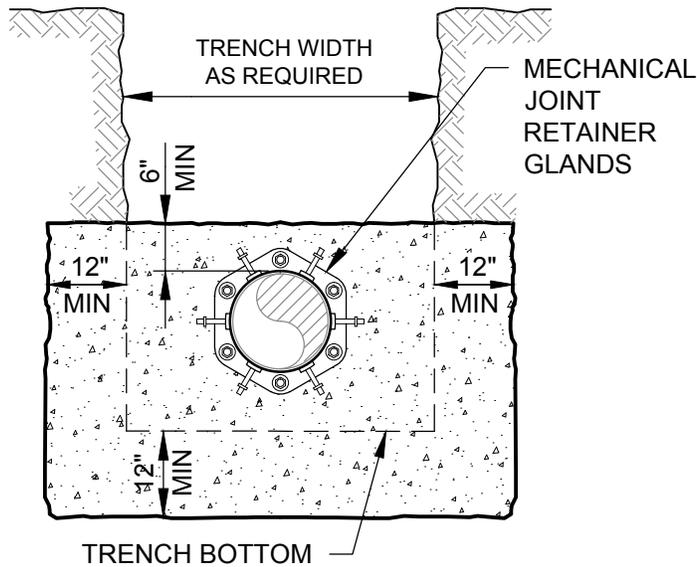
APPROVAL DATE

PUBLIC WORKS DEPARTMENT

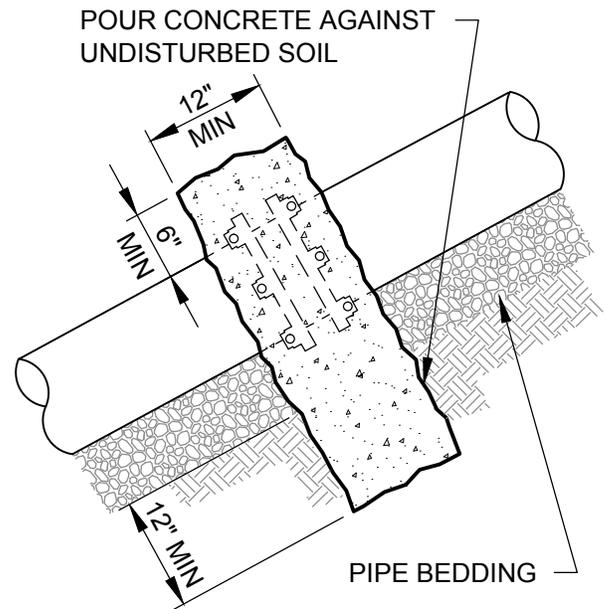
**STRADDLE THRUST BLOCK
EXIST PIPE CONNECTION**

DWG. NO.

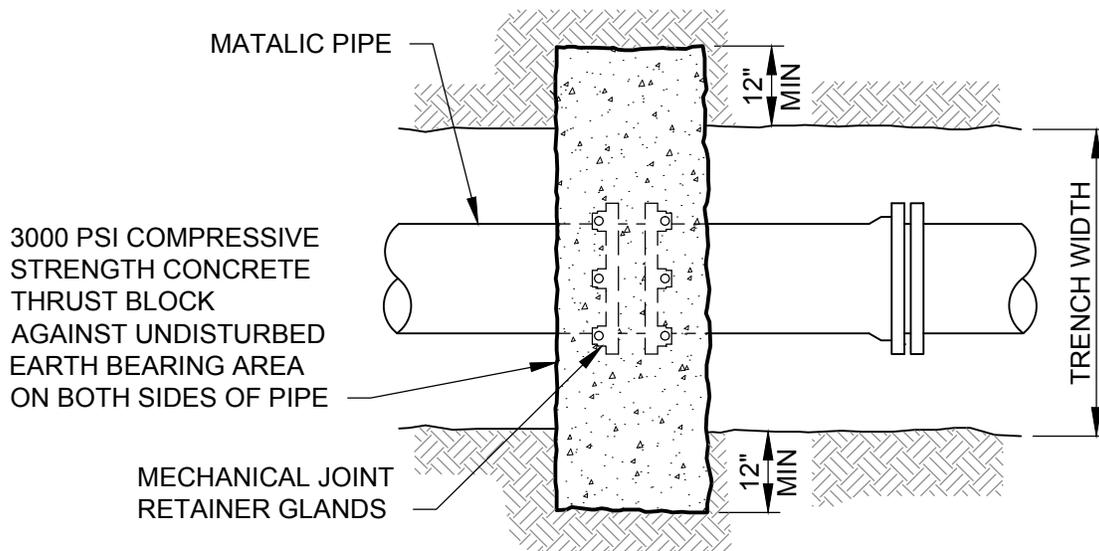
402



SECTION



ELEVATION



PLAN

NOTES:

1. THIS DETAIL IS REQUIRED ONLY WHEN PIPE SLOPE IS 20% OR GREATER.

| SLOPE | MIN ANCHOR SPACING, CENTER TO CENTER |
|-------------|---|
| 0.20 - 0.34 | 35 FEET |
| 0.20 - 0.50 | 25 FEET |
| 0.51 + | 15 FEET OR CONCRETE ENCASEMENT |



JUNE 2014 (REV JUNE 2018)

APPROVAL DATE

PUBLIC WORKS DEPARTMENT

WATER PIPE
SLOPE ANCHOR

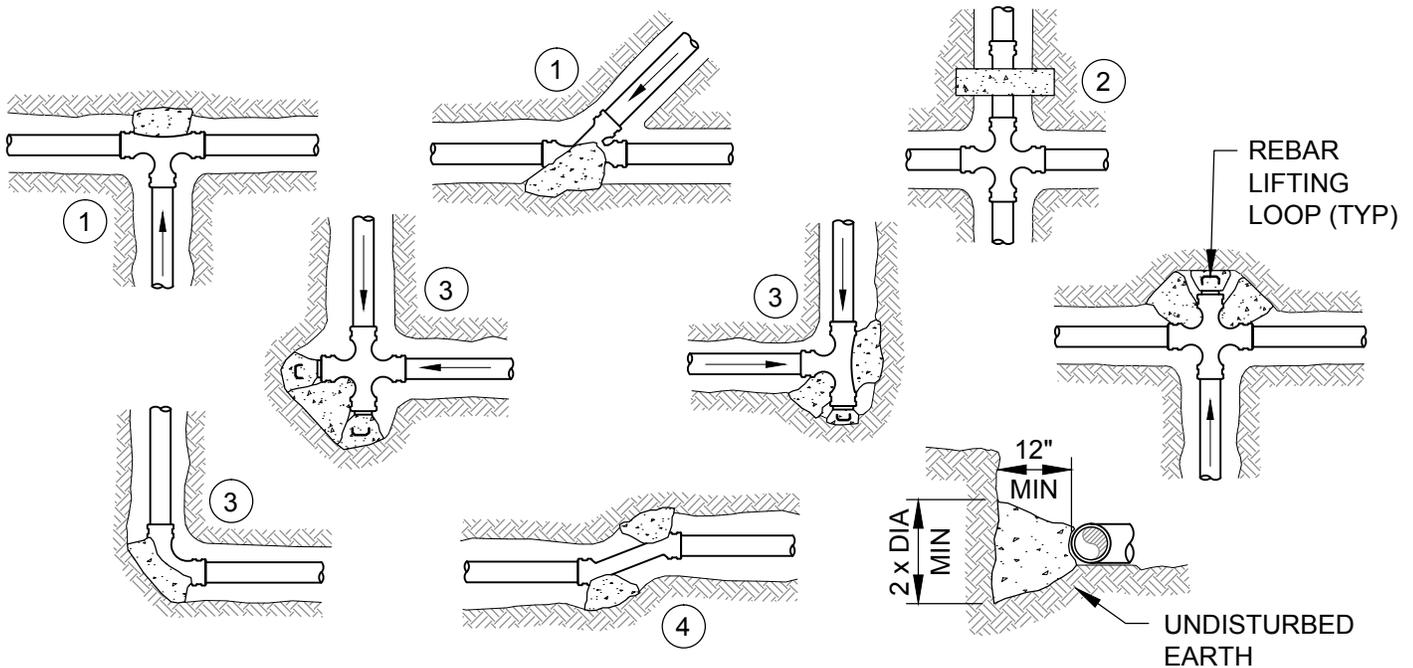
DWG. NO.

403

| FITTING SIZE (INCHES) | TEE AND WYE (1) | STRADDLE BLOCK (2) | PLUGGED CROSS TEE PLUGGED-RUNS 90° BEND (3) | 45° BEND (4) | 22 1/2° BEND (4) | 11 1/4° BEND (4) |
|-------------------------|-----------------|--------------------|---|--------------|------------------|------------------|
| 2 | * | * | * | * | * | * |
| 4 | 1.7 | 2.1 | 2.4 | 1.3 | * | * |
| 6 | 3.7 | 4.9 | 5.3 | 2.9 | 1.5 | * |
| 8 | 6.7 | 8.7 | 9.5 | 5.1 | 2.7 | 1.3 |
| 10 | 10.5 | 13.6 | 14.8 | 8.0 | 4.1 | 2.0 |
| 12 | 15.1 | 19.6 | 21.3 | 11.6 | 5.9 | 2.9 |
| 16 | 26.8 | 34.8 | 37.9 | 20.5 | 10.4 | 5.2 |
| 18 | 33.9 | 44.0 | 47.9 | 25.9 | 12.8 | 6.7 |
| LARGER | * * | * * | * * | * * | * * | * * |

BEARING AREA OF THRUST BLOCKS (SQ FT)

- * BLOCK TO UNDISTURBED TRENCH WALLS
- * * THRUST BLOCKS FOR PIPES LARGER THAN 18" WILL BE INDIVIDUALLY DESIGNED BY THE ENGINEER



NOTES:

1. ALL VALUES ARE BASED ON THE FOLLOWING ASSUMPTIONS:
 - AVG. PRESSURE = 100 PSI x 2 (SAFETY FACTOR)
 - 1500 PSF SOIL BEARING CAPACITY
 - NORMAL DISTRIBUTION DESIGN VELOCITY NOT TO EXCEED 5 F/S
2. ALL FITTINGS SHALL BE WRAPPED IN PLASTIC PRIOR TO PLACEMENT OF CONCRETE
3. ALL THRUST BLOCKS SHALL BE FORMED TO ELIMINATE ANY CONCRETE AROUND FITTING BOLTS
4. BEARING SURFACE OF THRUST BLOCKING SHALL BE AGAINST UNDISTURBED SOIL
5. ALL CONCRETE MIX SHALL HAVE A MIN. 28 DAY STRENGTH OF 3000 PSI
6. ALL PIPE ZONES SHALL BE GRAVEL FILLED AND COMPACTED
7. THRUST BLOCKS FOR PLUGGED CROSS AND PLUGGED TEE SHALL HAVE #4 REBAR LIFTING LOOPS INSTALLED AS SHOWN



JUNE 2014 (REV JUNE 2018)

APPROVAL DATE

PUBLIC WORKS DEPARTMENT

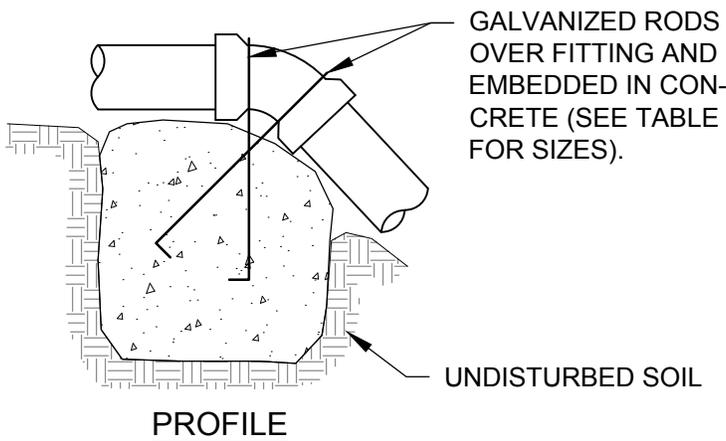
HORIZONTAL THRUST BLOCKING

DWG. NO.

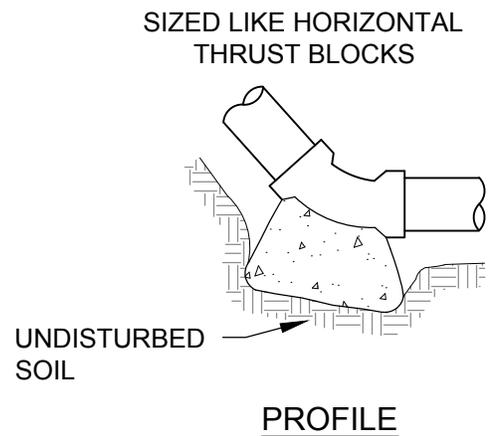
404

NOTES:

1. GRAVITY VERTICAL THRUST BLOCKS VALUES SHALL BE REVIEWED BY THE ENGINEER
2. KEEP CONCRETE CLEAR OF JOINT AND JOINT ACCESSORIES. FITTINGS SHALL BE WRAPPED IN PLASTIC PRIOR TO PLACEMENT OF CONCRETE
3. CONCRETE THRUST BLOCKING SHALL BE POURED AGAINST UNDISTURBED EARTH
4. CONCRETE MIX SHALL HAVE A MIN. 28 DAY STRENGTH OF 3000 P.S.I.
5. GRAVITY THRUST BLOCK VOLUMES FOR VERTICAL BENDS HAVING UPWARD RESULTANT THRUSTS ARE BASED ON TEST PRESSURE OF 150 P.S.I.G. AND THE WEIGHT OF CONCRETE = 4050 LBS./CU.YD.
6. VERTICAL BENDS THAT REQUIRE A GRAVITY THRUST BLOCK VOLUME EXCEEDING 5 CUBIC YARDS REQUIRE SPECIAL BLOCKING DETAILS DESIGNED BY THE ENGINEER. NOTE VOLUMES SHOWN INSIDE HEAVY LINE IN TABLE
7. PAYMENT SHALL BE THE SAME AS FOR HORIZONTAL THRUST BLOCKS
8. ALL REBAR SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM-123 (MIN. 3.4 MIL), REBAR SHALL BE BENT BEFORE GALVANIZATION, AND LAST 4" OF BAR SHALL BE BENT 90 DEGREES WITH A 1/2" RADIUS BEND. REBAR SHALL BE TIGHTLY FIT TO RESTRAINED FITTING



GRAVITY VERTICAL THRUST BLOCK



VERTICAL THRUST BLOCK

| VOLUME OF GRAVITY THRUST BLOCK IN CUBIC YARDS (VERTICAL BENDS) | | | |
|--|------------|---------|---------|
| FITTING SIZE | BEND ANGLE | | |
| | 45° | 22 1/2° | 11 1/4° |
| 4 | 1.1 | 0.4 | 0.2 |
| 6 | 2.7 | 1.0 | 0.4 |
| 8 | 4.0 | 1.5 | 0.6 |
| 10 | 6.0 | 2.3 | 0.9 |
| 12 | 8.5 | 3.2 | 1.3 |
| 14 | 11.5 | 4.3 | 1.8 |
| 16 | 14.8 | 5.6 | 2.3 |

| TIE DOWN ROD SIZE FOR GRAVITY THRUST BLOCK | | |
|--|----------|-----------|
| FITTING SIZE | ROD SIZE | EMBEDMENT |
| 12" AND LESS | #6 | 30" |
| 14" - 16" | #8 | 36" |



JUNE 2014 (REV JUNE 2018)

APPROVAL DATE

PUBLIC WORKS DEPARTMENT

VERTICAL THRUST BLOCKING

DWG. NO.

405

IF NATIVE MATERIAL IS UNSUITABLE FOR BACKFILL, APPROVED GRANULAR MATERIAL WILL BE REQ'D

NATIVE MATERIAL OR 4" OF 1" MINUS AS REQ'D

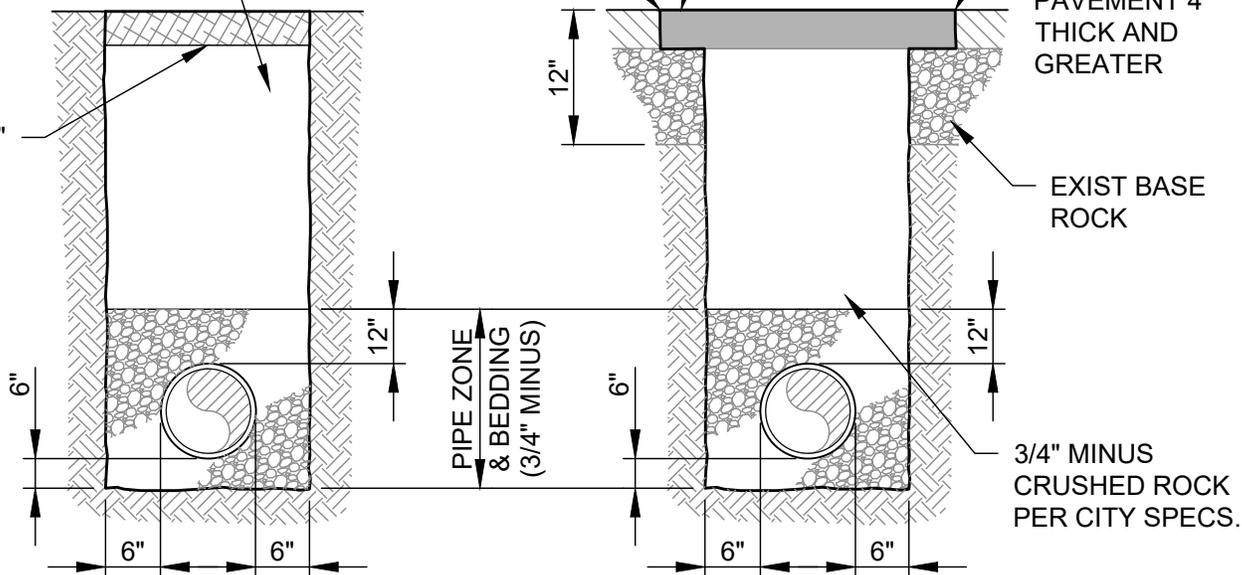
SAW CUT EXIST AC TO NEAT STRAIGHT LINES

4" AC PAVEMENT OR SAME AS EXIST DEPTH, WHICHEVER IS GREATER, OR AS REQ'D BY PERMIT

PAY WIDTH
PIPE ID + 2'-6"

T-CUT AND TACK EDGES, PAVEMENT 4" THICK AND GREATER

EXIST BASE ROCK



LANDSCAPED SECTION

SHOULDER OR PAVING SECTION

NOTES:

1. ALL WATER MAINS SHALL HAVE A MIN. COVER OF 36" IN RIGHT-OF-WAY AND 48" IN EASEMENTS
2. ALL TRENCH BACKFILL SHALL BE COMPACTED TO 95% OF MAX. DENSITY PER AASHTO T-180 OR AS SPECIFIED IN THE CONTRACT DOCUMENTS
3. ALL TRENCH BACKFILL AND PATCHING SHALL CONFORM TO THE STANDARDS AND SPECIFICATIONS OF THE GOVERNING AGENCY
4. SAND BACKFILL WILL BE REQ'D IN PIPE ZONE WHEN PIPE LINE IS TO BE POLYBAGGED
5. BACKFILL SHALL BE PLACED AND COMPACTED IN LIFTS, OR AS DETERMINED IN FIELD BY THE CITY ENGINEER

PUBLIC WORKS DEPARTMENT

DWG. NO.

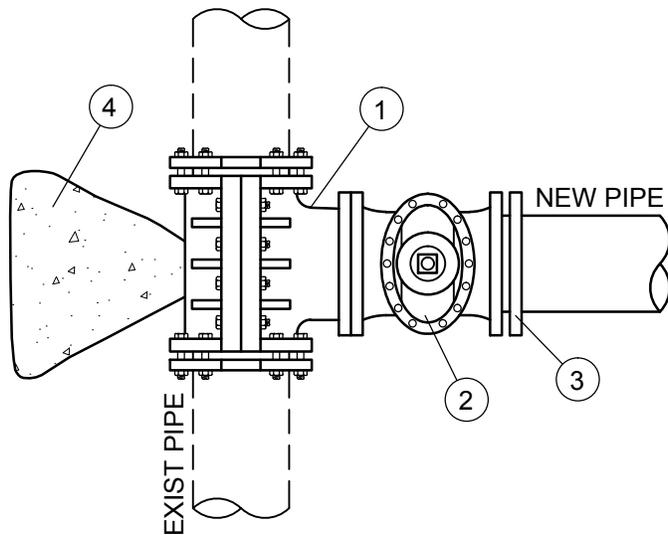
STANDARD
TRENCH SECTIONS

406



JUNE 2014 (REV MARCH 2019)

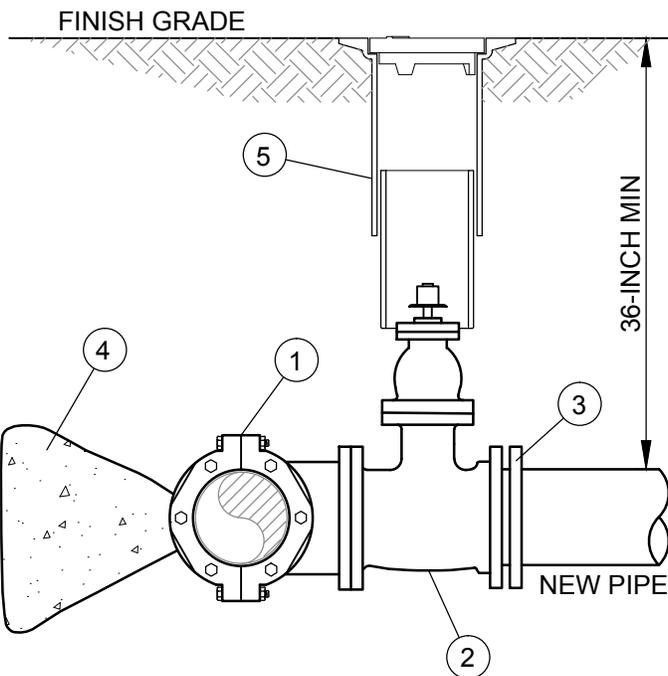
APPROVAL DATE



PLAN

MATERIALS:

- ① STAINLESS STEEL OR CAST IRON MECHANICAL JOINT TAPPING SLEEVE EQUAL TO ROCKWELL 622
- ② TAPPING VALVE (FLG x MJ) WITH 2" AWWA OPERATING NUT, NON-RISING STEM, EQUAL TO DRESSER M&H 3067-01
- ③ OPTION: EBAA IRON "MEGALUG" FOLLOWER GLAND
- ④ CONCRETE THRUST BLOCKING
- ⑤ VALVE BOX



ELEVATION

NOTES:

- 1. PRIOR TO BORING:
 - A) TAPPING SLEEVE AND VALVE SHALL BE PRESSURE TESTED AT 225 PSI FOR A PERIOD OF 15 MINUTES, PRESSURE LOSE DURING TESTING SHALL NOT EXCEED 5 PSI
 - B) TAPPING SLEEVE AND VALVE SHALL BE STERILIZED PER SPECIFICATIONS
- 2. PRIOR TO FINAL CONNECTION OF TAPPING VALVE TO NEW PIPING, THE NEW PIPING SHALL BE PRESSURE TESTED AND STERILIZED PER SPECIFICATIONS



JUNE 2014 (REV JUNE 2018)

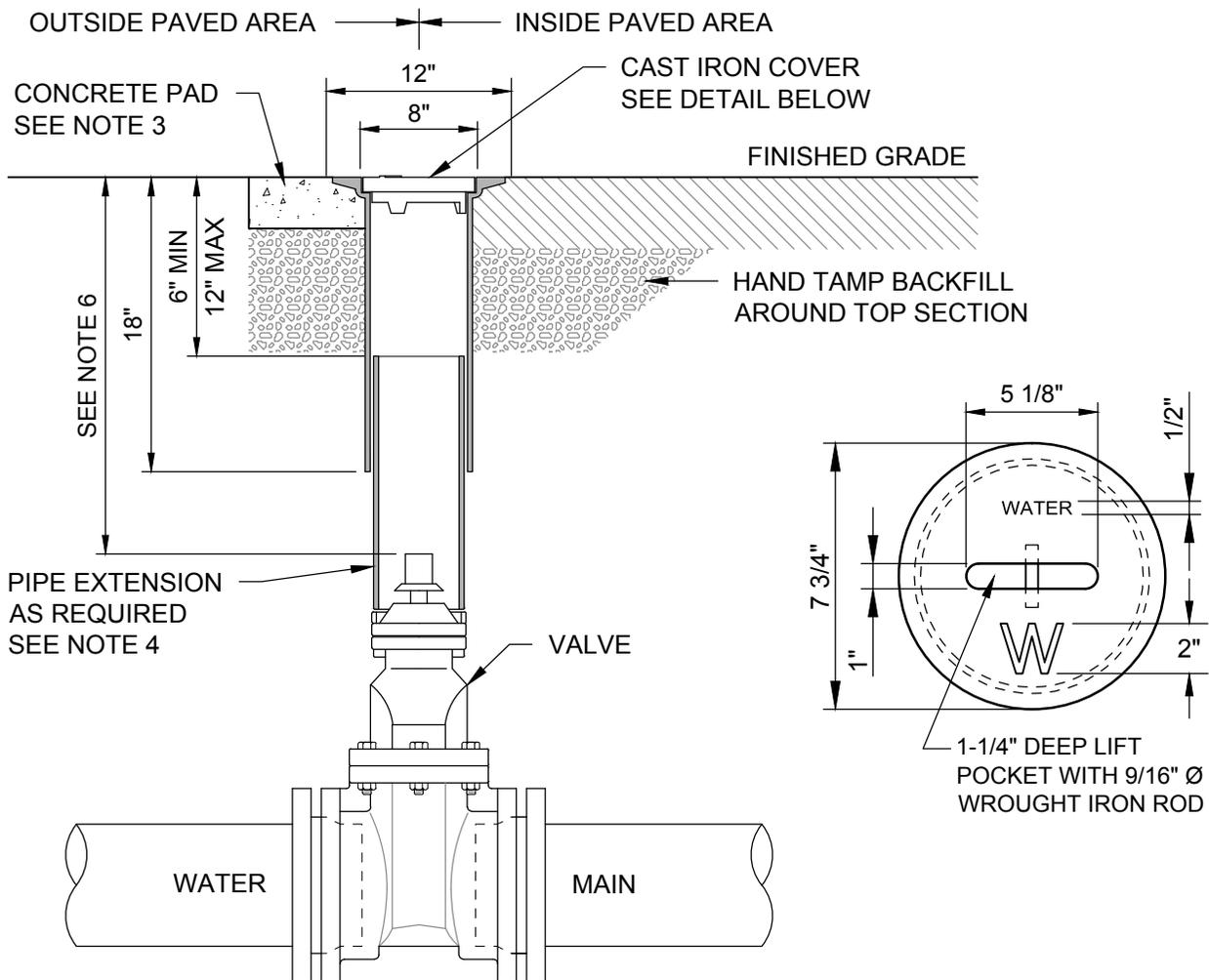
APPROVAL DATE

PUBLIC WORKS DEPARTMENT

STANDARD
WET TAP

DWG. NO.

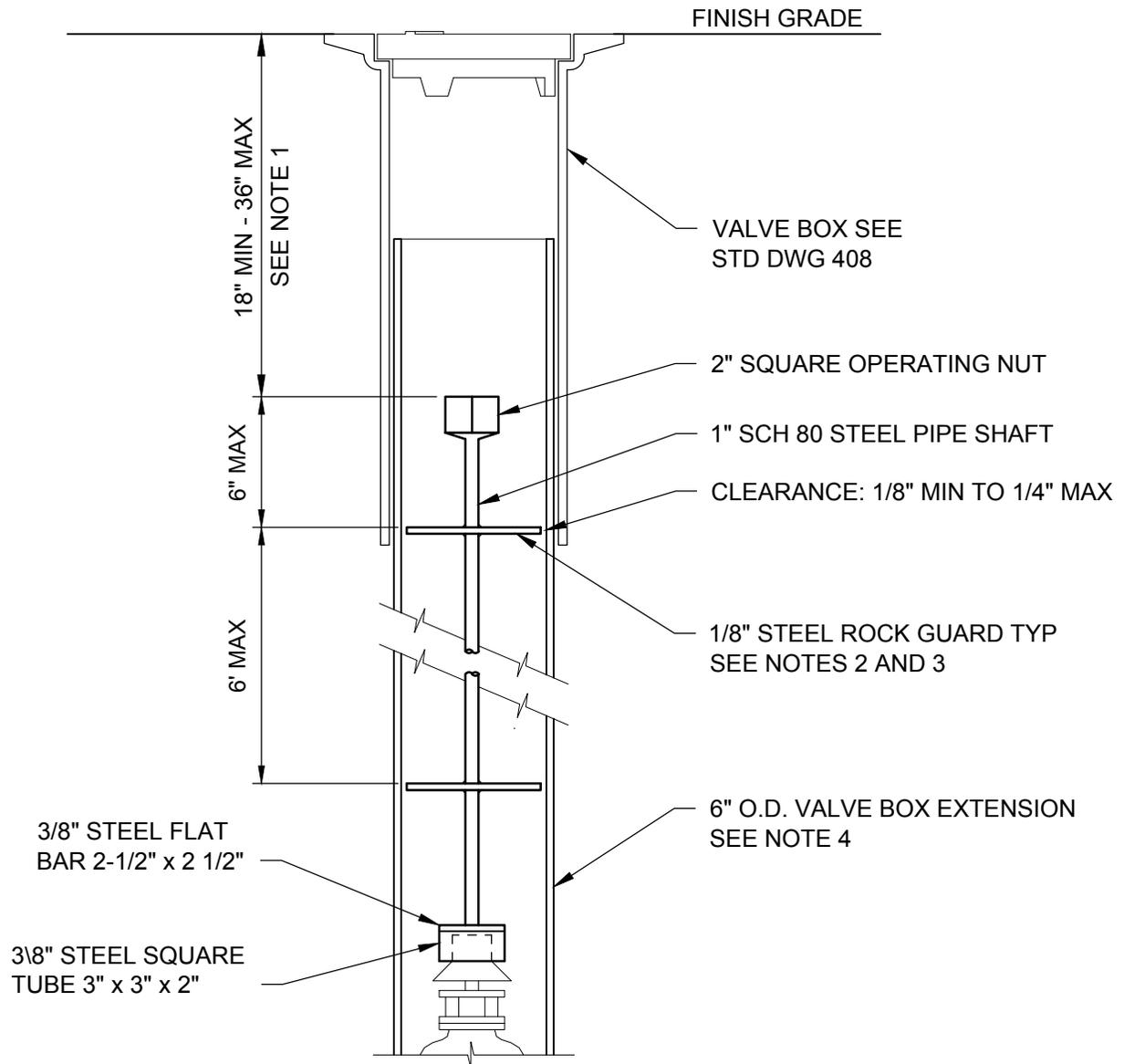
407



NOTES:

1. VALVE TYPE, SIZE AND ENDS AS SPECIFIED OR SHOWN ON PLANS
2. ALL VALVE THAT ARE 2-INCH AND LARGER SHALL HAVE AN OPERATING NUT
3. WHEN USED IN NON-PAVED AREAS, PROVIDE A 18-INCH SQUARE OR 24-INCH DIAMETER ROUND BY 4-INCH THICK PORTLAND CEMENT CONCRETE PAD
4. FOR PIPE EXTENSION SECTION: USE 6-INCH OD 12 GAUGE STEEL PIPE OR 6-INCH ASTM D3034 SDR 35 PVC PIPE IN ONE-PIECE CONSTRUCTION WITH NO LONGITUDINAL CUTS
5. THE CAST IRON COVER IS TO HAVE " WATER " OR " W " CAST WITH RAISED LETTERING INTO TOP SURFACE
6. WHEN THE VALVE NUT IS 60-INCHES OR DEEPER BELOW FINISHED GRADE, PROVIDE STANDARD WATER VALVE OPERATOR EXTENSION
7. FOR 18-INCHES OF VALVE BOX, FLANGED UPPER SECTION OF VALVE BOX AND COVER, USE " OLYMPIC FOUNDRY - VB 910 "
8. USE FOR ALL VALVES AND 2-INCH BLOW-OFF STANDPIPES

| | | | |
|---|--|-------------------------------|------------|
|  | | PUBLIC WORKS DEPARTMENT | DWG. NO. |
| | JUNE 2014 (REV JUNE 2018) APPROVAL DATE | STANDARD VALVE BOX | 408 |



NOTES:

1. EXTEND THE 2-INCH SQUARE OPERATING NUT WHEN THE VALVE NUT IS 60-INCHES OR DEEPER BELOW THE FINISHED GRADE
2. THE ROCK GUARD SHALL BE 1/8-INCH STEEL PLATE WELDED TO THE PIPE SHAFT WITH A DIAMETER THAT IS 3/8-INCH LESS THAN THE INSIDE DIAMETER OF THE VALVE BOX
3. WHERE THE DEPTH IS OVER 6-FEET, A SECOND PLATE SHALL BE INSTALLED EQUIDISTANT BETWEEN THE FIRST ROCK GUARD AND THE VALVE NUT. SECOND PLATE SHALL BE CONSTRUCTED SAME AS THE ROCK GUARD
4. EXTEND VALVE BOX BY USING ONE PIECE WITH NO LONGITUDINAL CUTS, TO THE LENGTH REQUIRED, OF 6-INCH O.D., 12 GAUGE STEEL PIPE OR D3034-SDR 35 PVC PIPE



JUNE 2014 (REV JUNE 2018)

APPROVAL DATE

PUBLIC WORKS DEPARTMENT

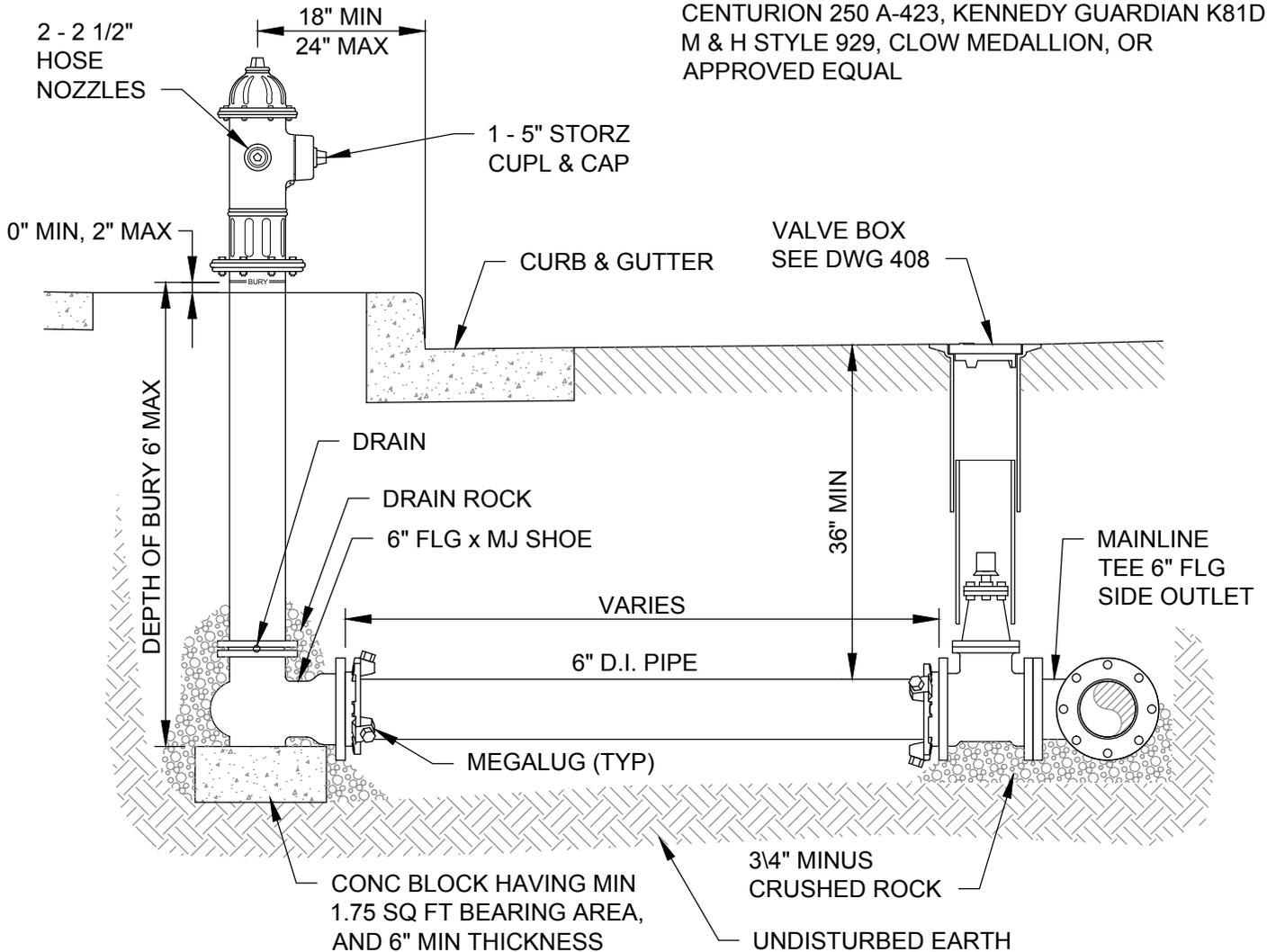
STANDARD WATER VALVE
OPERATOR EXTENSION

DWG. NO.

409

NOTES:

1. HYDRANTS TO BE APPROVED BY CITY ENGINEER
2. HYDRANT COLOR TO BE SHERWIN WILLIAMS GCC-5006 (RED)
3. ALL MJ'S ON TEE, VALVE & F.H. TO BE RESTRAINED WITH "MEGALUG" FOLLOWER GLANDS. RESTRAIN MIN 10' OF PIPE EACH SIDE OF TEE ON MAIN LINE, NO JOINTS BETWEEN VALVE AND SHOE UNLESS OVER 18-FOOT
4. HYDRANT DRAIN HOLES TO REMAIN OPEN TO DRAIN ROCK AND OPERATIONAL
5. MIN. 4 CU. FT. OF 1 1/2"-3/4" CLEAN DRAIN ROCK SHALL BE PLACED AROUND SHOE UP TO A MIN. OF 6" ABOVE DRAIN OUTLETS
6. WHERE PLANTER STRIP EXISTS, HYDRANT SHALL BE PLACED SO FRONT PORT IS A MIN. OF 18-INCHS BEHIND FACE OF CURB
7. WHERE INTEGRAL SIDEWALK & CURB EXIST, HYDRANT PORT SHALL BE PLACED AT BACK OF SIDEWALK, OR AS DIRECTED BY ENGINEER
8. BURY OF HYDRANT SHALL BE MEASURED FROM FINISHED GRADE TO BOTTOM OF CONNECTING PIPE, HYDRANT SHALL HAVE A MAX. OF A 6-FOOT BURY
9. HYDRANT VALVE SHALL BE MUELLER RESILIENT WEDGE GATE VALVE #A-2360-16 OR APPROVED EQUAL
10. HYDRANT SHALL BE MUELLER SUPER CENTURION 250 A-423, KENNEDY GUARDIAN K81D, M & H STYLE 929, CLOW MEDALLION, OR APPROVED EQUAL



JUNE 2014 (REV JUNE 2018)

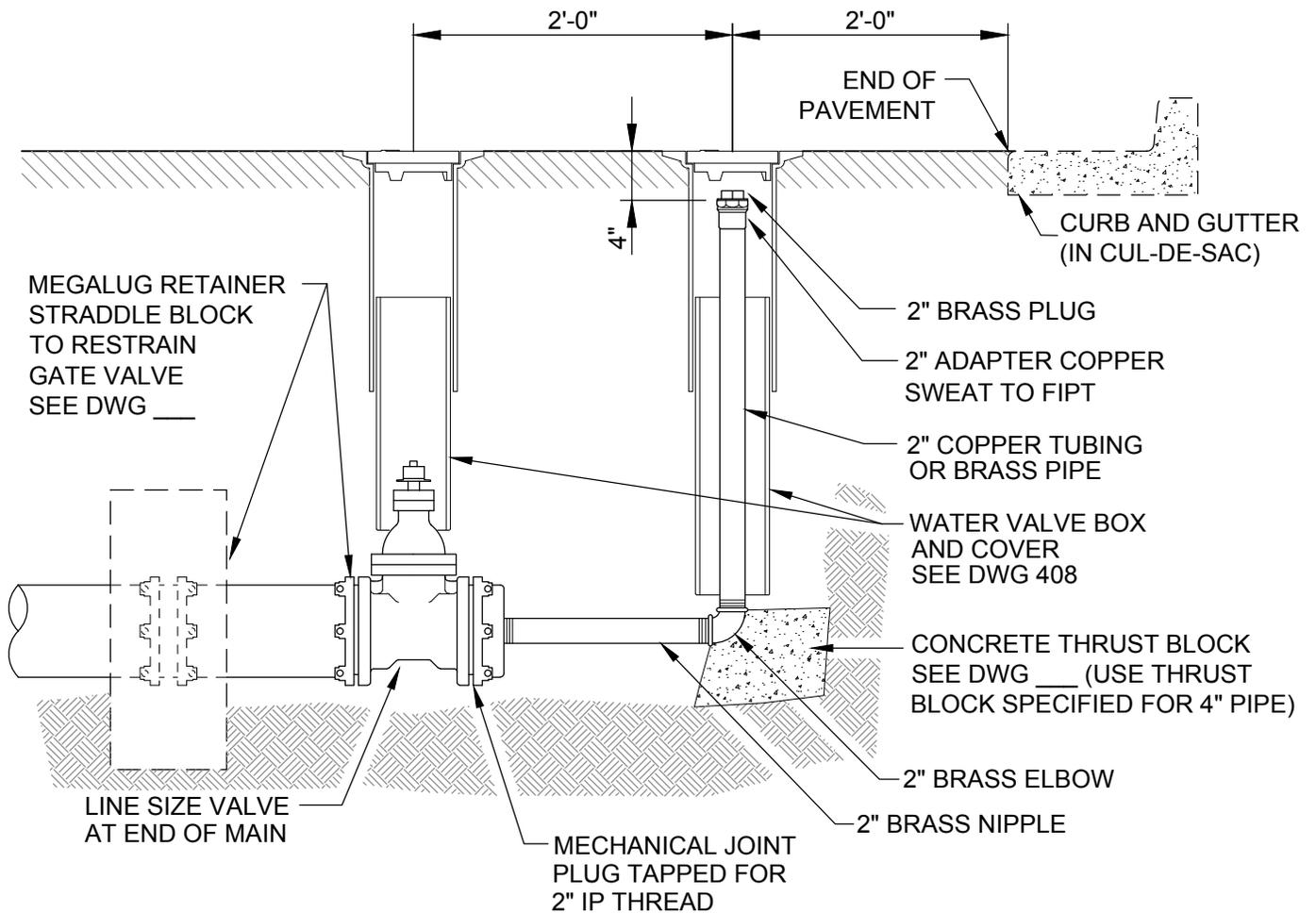
APPROVAL DATE

PUBLIC WORKS DEPARTMENT

**STANDARD FIRE
HYDRANT ASSEMBLY**

DWG. NO.

410



NOTES:

1. THIS BLOWOFF IS TO BE USED AT ENDS OF CUL-DE-SACS AND AT END OF WATER LINES THAT MAY BE EXTENDED IN THE FUTURE
2. BLOWOFF SIZE MUST BE IN ACCORDANCE WITH AWWA FLUSHING FLOW RATES, BUT NOT LESS THAN 2-INCHES FOR 8-INCH LINES AND SMALLER WITH 4-INCH BEING THE NEXT APPROVED SIZE (FOR BLOWOFFS 4-INCHES AND LARGER, SEE DWG 412)
3. BLOWOFF IS NOT TO BE LOCATED IN GUTTER OR DITCH
4. ALL 2-INCH FITTINGS SHALL BE BRASS, USE BRASS OR COPPER FOR ALL PIPING



JUNE 2014 (REV JUNE 2018)

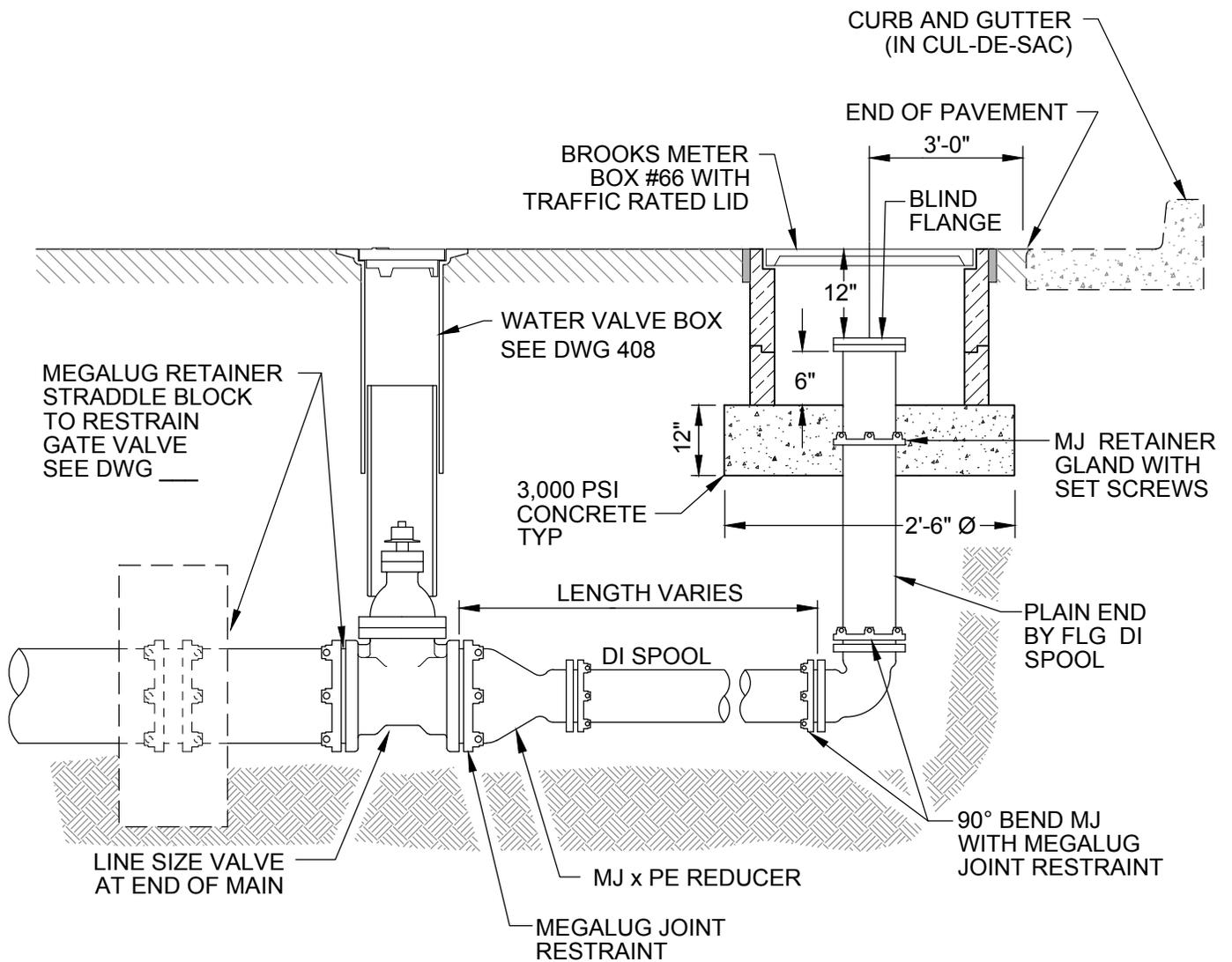
APPROVAL DATE

PUBLIC WORKS DEPARTMENT

STANDARD
2-INCH BLOWOFF

DWG. NO.

411



NOTES:

1. THIS BLOWOFF IS TO BE USED AT ENDS OF CUL-DE-SACS AND AT END OF WATER LINES THAT MAY BE EXTENDED IN THE FUTURE
2. BLOWOFF SIZE MUST BE IN ACCORDANCE WITH AWWA FLUSHING FLOW RATES, BUT NOT LESS THAN 4-INCHES FOR LINES LARGER THAN 8-INCHES
3. STRADDLE BLOCK SHALL NOT BE CLOSER THAN 2-FEET FROM PIPE JOINT
4. STRADDLE BLOCK SHALL EXTEND 12-INCHES MINIMUM INTO UNDISTURBED SOIL AT BOTTOM AND EACH SIDE OF TRENCH



JUNE 2014 (REV JUNE 2018)

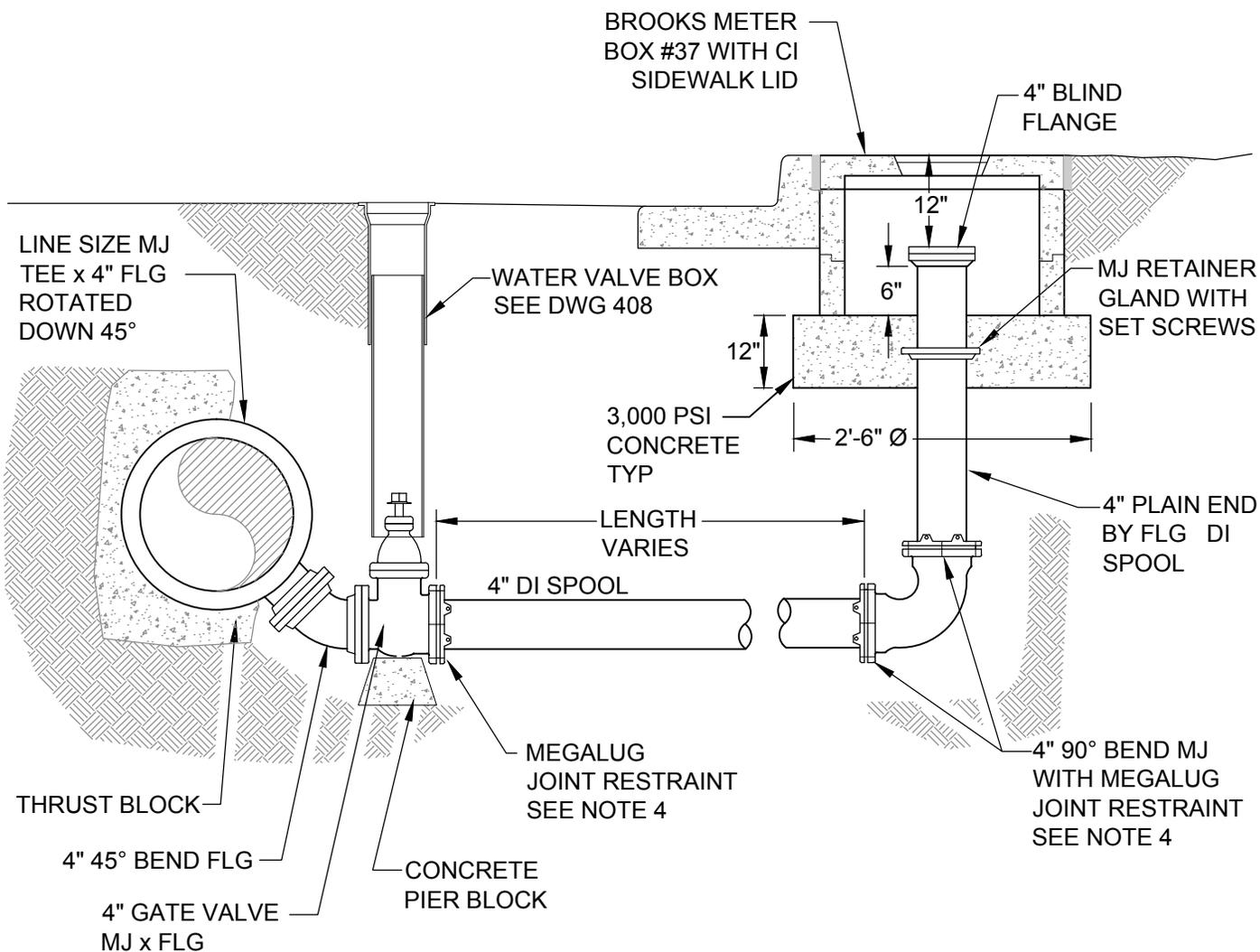
APPROVAL DATE

PUBLIC WORKS DEPARTMENT

STANDARD
4-INCH BLOWOFF

DWG. NO.

412



NOTES:

1. THIS BLOWOFF IS TO BE USED AT LOW POINTS IN THE WATER LINE.
2. BLOWOFF SHALL BE SIZED AT 25% OF LINE DIAMETER OR 4 INCHES, WHICHEVER IS LARGER.
3. BLOWOFF SHOWN IS 4 INCHES IN DIAMETER AND SHALL ONLY BE USED ON LINES WITH DIAMETERS OF 16 INCHES OR LESS.



JUNE 2014 (REV JUNE 2018)

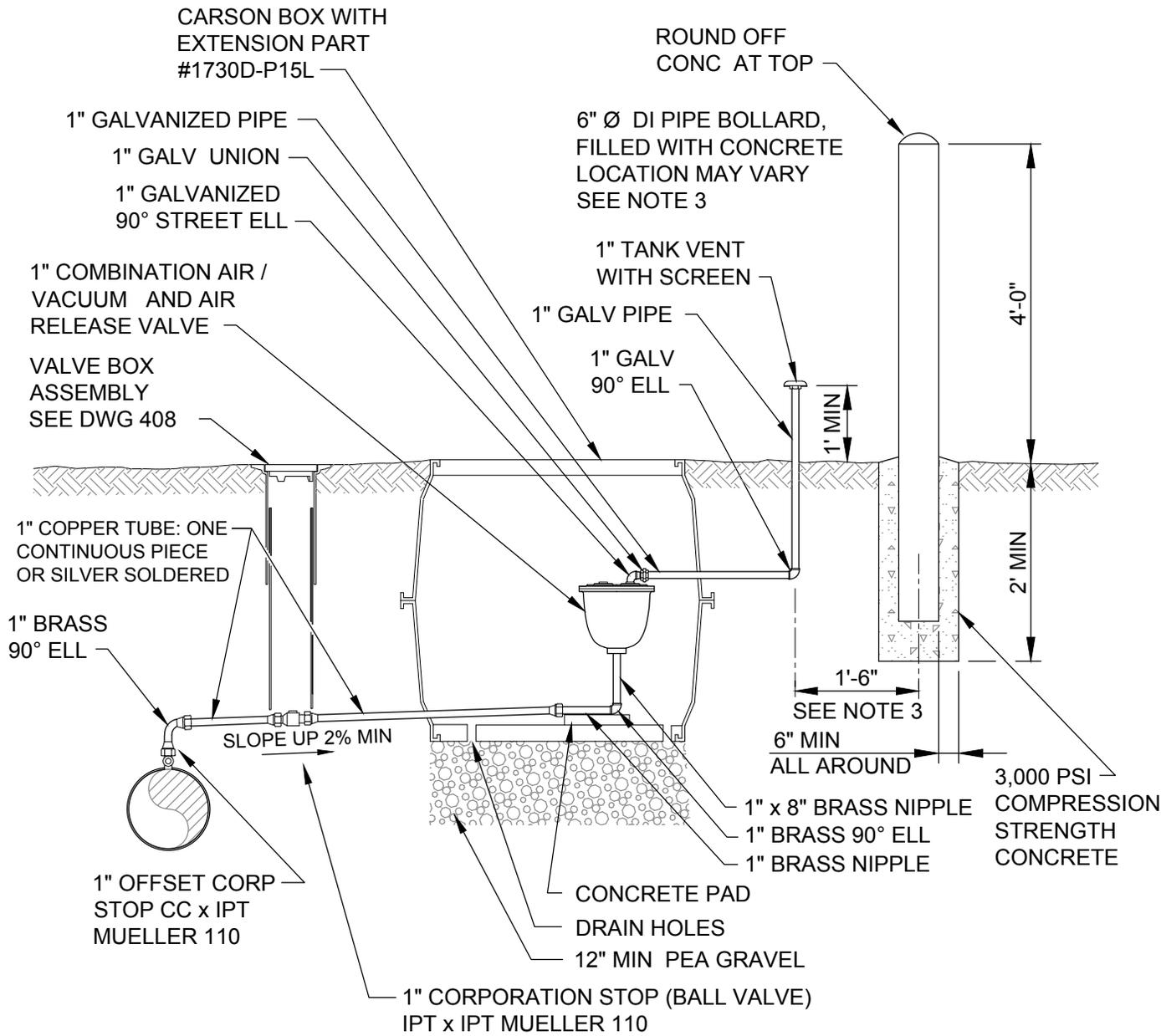
APPROVAL DATE

PUBLIC WORKS DEPARTMENT

STANDARD BLOWOFF FOR LOW POINTS IN WATERLINES

DWG. NO.

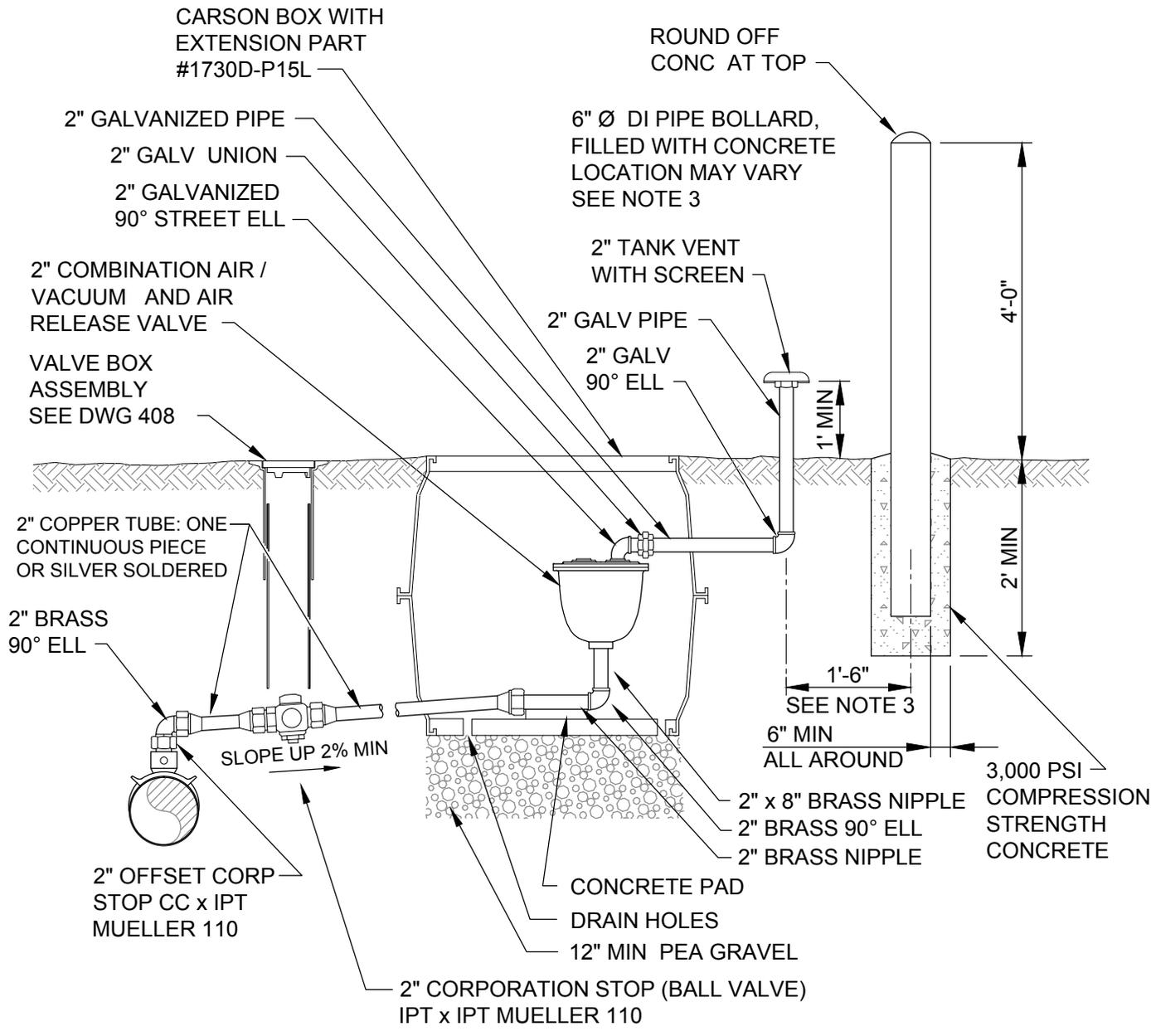
413



NOTES:

1. VALVE SIZE AND TYPE TO BE SPECIFIED BY THE DESIGN ENGINEER AND APPROVED BY THE CITY ENGINEER
2. PAINT BOLLARD YELLOW
3. TO AVOID CONFLICTS, EXACT LOCATION OF SHUTOFF VALVE AND BOLLARD TO BE DETERMINED IN THE FIELD BY THE CITY ENGINEER
4. GALVANIZED PIPE IS PERMITTED ONLY ON THE OUTLET SIDE OF THE COMBINATION VALVE

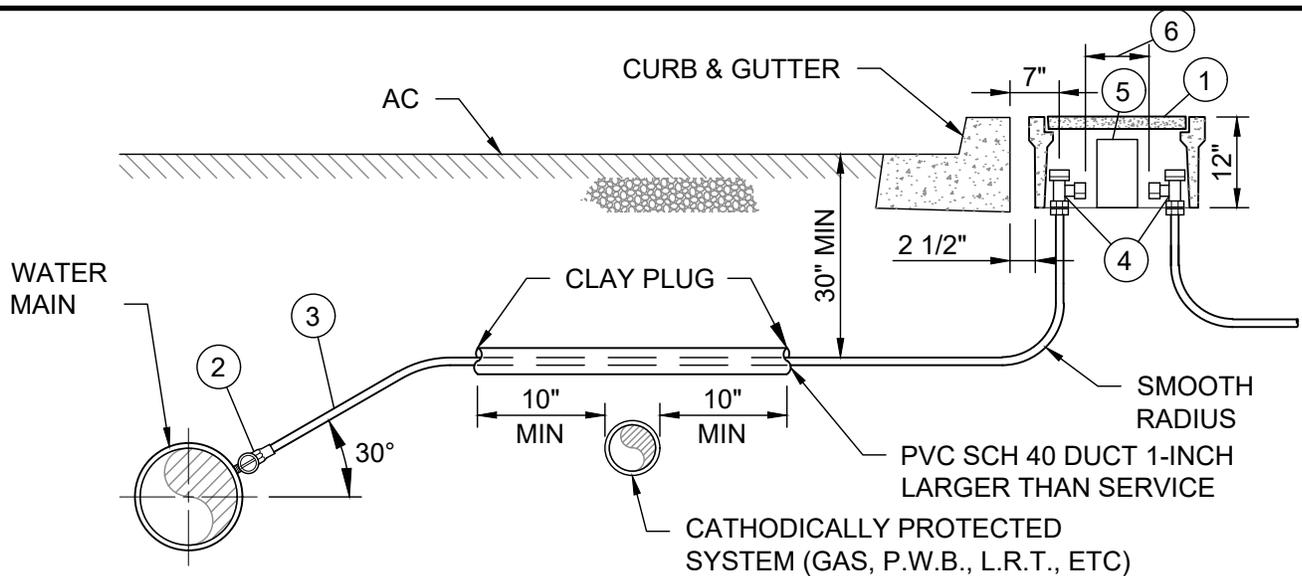
| | | |
|--|--|----------|
|  | PUBLIC WORKS DEPARTMENT | DWG. NO. |
| | 1-INCH COMBINATION AIR AND VACUUM VALVE | 414 |
| JUNE 2014 (REV JUNE 2018) APPROVAL DATE | | |



NOTES:

1. VALVE SIZE AND TYPE TO BE SPECIFIED BY THE DESIGN ENGINEER AND APPROVED BY THE CITY ENGINEER
2. PAINT BOLLARD YELLOW
3. TO AVOID CONFLICTS, EXACT LOCATION OF SHUTOFF VALVE AND BOLLARD TO BE DETERMINED IN THE FIELD BY THE CITY ENGINEER
4. GALVANIZED PIPE IS PERMITTED ONLY ON THE OUTLET SIDE OF THE COMBINATION VALVE

| | | |
|--|--|------------|
|  | PUBLIC WORKS DEPARTMENT | DWG. NO. |
| | 2-INCH COMBINATION AIR AND VACUUM VALVE | 415 |
| JUNE 2014 (REV JUNE 2018) <small>APPROVAL DATE</small> | | |



MATERIALS:

- ① CONSOLIDATED SUPPLY CO. 12 BODY GRAY WIDE BODY METER BOX (11" x 18" x 12") + 4M LID GRAY SOLID METER COVER WITH MAGNET (11" x 18"), BOTH H20. PROVIDE HEIGHT EXTENSION AS REQUIRED.
- ② MUELLER CORP. STOP NO. H-15000, H-15008 (110 COMPRESSION), OR FORD F600
- ③ 1" SOFT TEMPER, TYPE "K" COPPER TUBING COMPLYING WITH ASTM B-88 OR PLASTIC POLYMER PIPE AS APPROVED
- ④ MUELLER ANGLE METER STOP NO. H-14255, H-14258 (110 COMPRESSION), FORD NO. KV23-444W, OR APPROVED EQUAL
- ⑤ METER SHALL BE INSTALLED BY THE CITY.
- ⑥ FOR A 5/8" METER, THIS DIMENSION IS 7.5" (STANDARD). FOR A 1" METER, THIS DIMENSION IS 10.75".

NOTES:

- 1. SUBSTITUTES FOR ANY MATERIALS SHOWN SHALL BE APPROVED BY THE CITY ENGINEER
- 2. ALL PIPE AND STRUCTURE ZONES SHALL BE BACKFILLED USING 3/4" MINUS CRUSHED ROCK AND COMPACTED TO 95% MAX. DENS. AS DETERMINED BY AASHTO T-180
- 3. WHEN AN ACTIVE CATHODIC PROTECTED SYSTEM IS ENCOUNTERED, SCH. 40 PVC SHALL BE INSTALLED WITH IMPERVIOUS PLUG AS SHOWN ABOVE
- 4. METER BOX SHALL BE CENTERED OVER THE COMPLETED METER ASSEMBLY
- 5. FOR VACANT RESIDENTIAL LOTS, LOCATE SERVICE 18" INSIDE SIDE LOT LINE. LOT LINE TO BE PROJECTED PERPENDICULAR TO CURB
- 6. ANGLE METER STOP SHALL BE PERPENDICULAR TO CURB LINE
- 7. SET CORPORATION STOP AT 3 OR 9 O'CLOCK ON WATER MAIN
- 8. TRAFFIC BEARING METER BOX LIDS SHALL BE USED WHERE METERS ARE LOCATED WITHIN ANY PORTION OF DRIVEWAY OR APRON AND OTHER TRAFFIC AREAS
- 9. ONLY APPROVED BIT AND TAPPING MACHINE ALLOWED FOR INSTALLATION OF CORP. STOP
- 10. COPPER SERVICE SHALL BE INSTALLED IN A DIRECT LINE BETWEEN TAP AND METER

PUBLIC WORKS DEPARTMENT

DWG. NO.

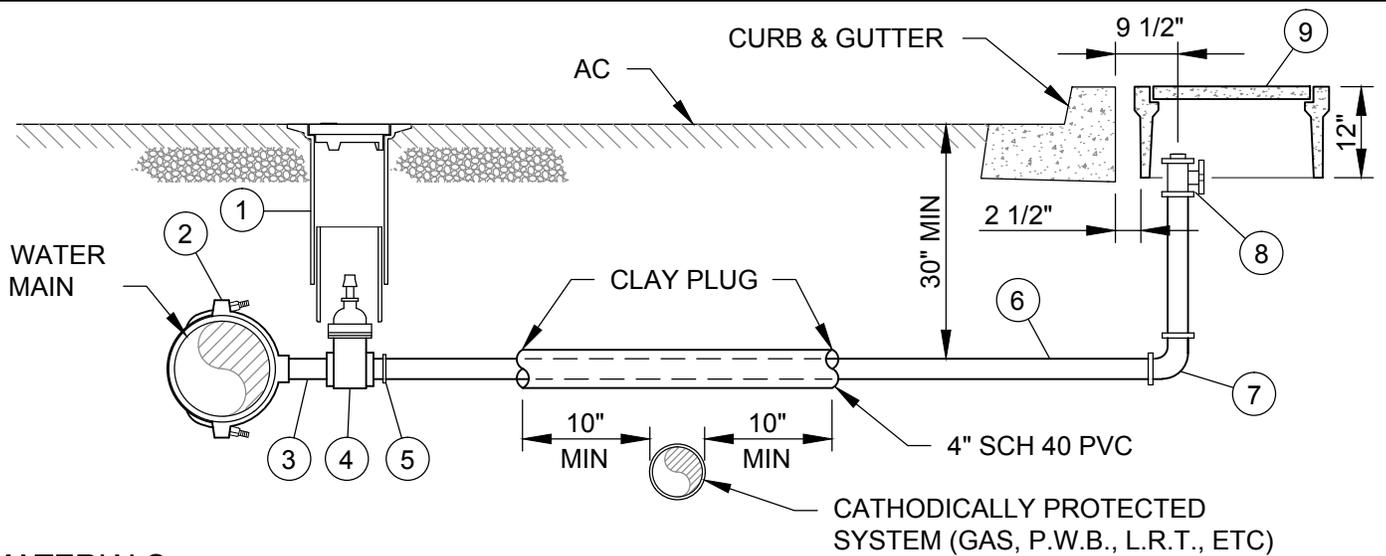
**STANDARD
1-INCH WATER SERVICE**

416



FEBRUARY 2017 (REV MARCH 2019)

APPROVAL DATE



MATERIALS:

- ① STANDARD VALVE BOX, LID AND 6" PVC EXTENSION (SEE DWG 408)
- ② PIPE O.D. x 2" TEE OR 2" F.I.P. SERVICE SADDLE (McDONALD MFG CO - # 3826 OR APPROVED EQUAL)
- ③ 2" BRASS M.I.P. NIPPLE
- ④ 2" F.I.P. GATE VALVE (MUELLER NO. A-2369-8 OR APPROVED EQUAL)
- ⑤ 2" M.I.P. x COPPER FLARE (MUELLER NO. H-15425, FORD NO. C28-77) OR MUELLER 110 COMPRESSION COUPLING (NO. H-15428)
- ⑥ 2" ASTM B-88 TYPE "K" RIGID COPPER TUBING. SOFT TEMPER REQ'D WITH FLARE FITTINGS
- ⑦ 2" 90° BEND, COPPER FLARE (MUELLER NO. H-15525 OR FORD NO. L22-77) OR MUELLER 110 COMPRESSION (NO. H-15526)
- ⑧ 1 1/2" - 2" ANGLE METER STOP, MUELLER NO. H-14276 (FLARE) OR H-14277 (110 COMPRESSION) OR FORD NO. FV23-777W (FLARE)
- ⑨ OLDCASTLE METER BOX, BODY NO. 38 (1 1/2"), OR 65 (2"), LID & COVER NO. 38-S (1 1/2"), OR 65-DPRL (2")

NOTES:

- 1. SUBSTITUTES FOR ANY MATERIALS SHOWN SHALL BE APPROVED BY THE CITY ENGINEER
- 2. ALL PIPE AND STRUCTURE ZONES SHALL BE BACKFILLED USING 3/4" MINUS CRUSHED ROCK AND COMPACTED TO 95% MAX. DENS. AS DETERMINED BY AASHTO T-180
- 3. WHEN AN ACTIVE CATHODIC PROTECTED SYSTEM IS ENCOUNTERED, SCH. 40 PVC SHALL BE INSTALLED WITH IMPERVIOUS PLUG AS SHOWN ABOVE
- 4. METER BOX SHALL BE CENTERED OVER THE COMPLETED METER ASSEMBLY
- 5. CUSTOMER SHALL INSTALL AN APPROVED BACKFLOW PREVENTION ASSEMBLY AT RIGHT-OF-WAY
- 6. ANGLE METER STOP SHALL BE PERPENDICULAR TO CURB LINE



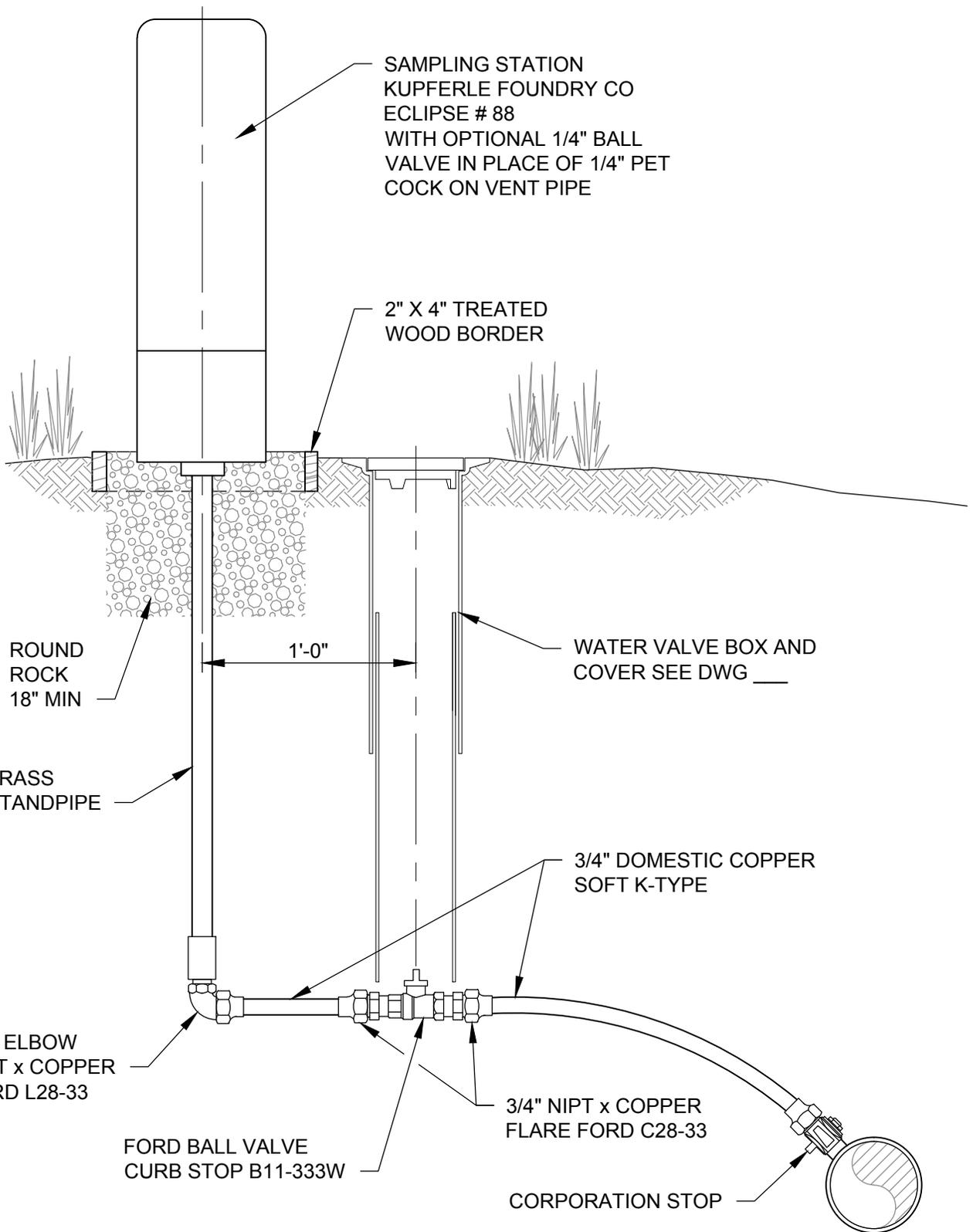
JUNE 2014 (REV JUNE 2018)
APPROVAL DATE

PUBLIC WORKS DEPARTMENT

STANDARD 2-INCH WATER SERVICE
IRRIGATION (1-1/2"- 2" METER)

DWG. NO.

417



JUNE 2014 (REV JUNE 2018)

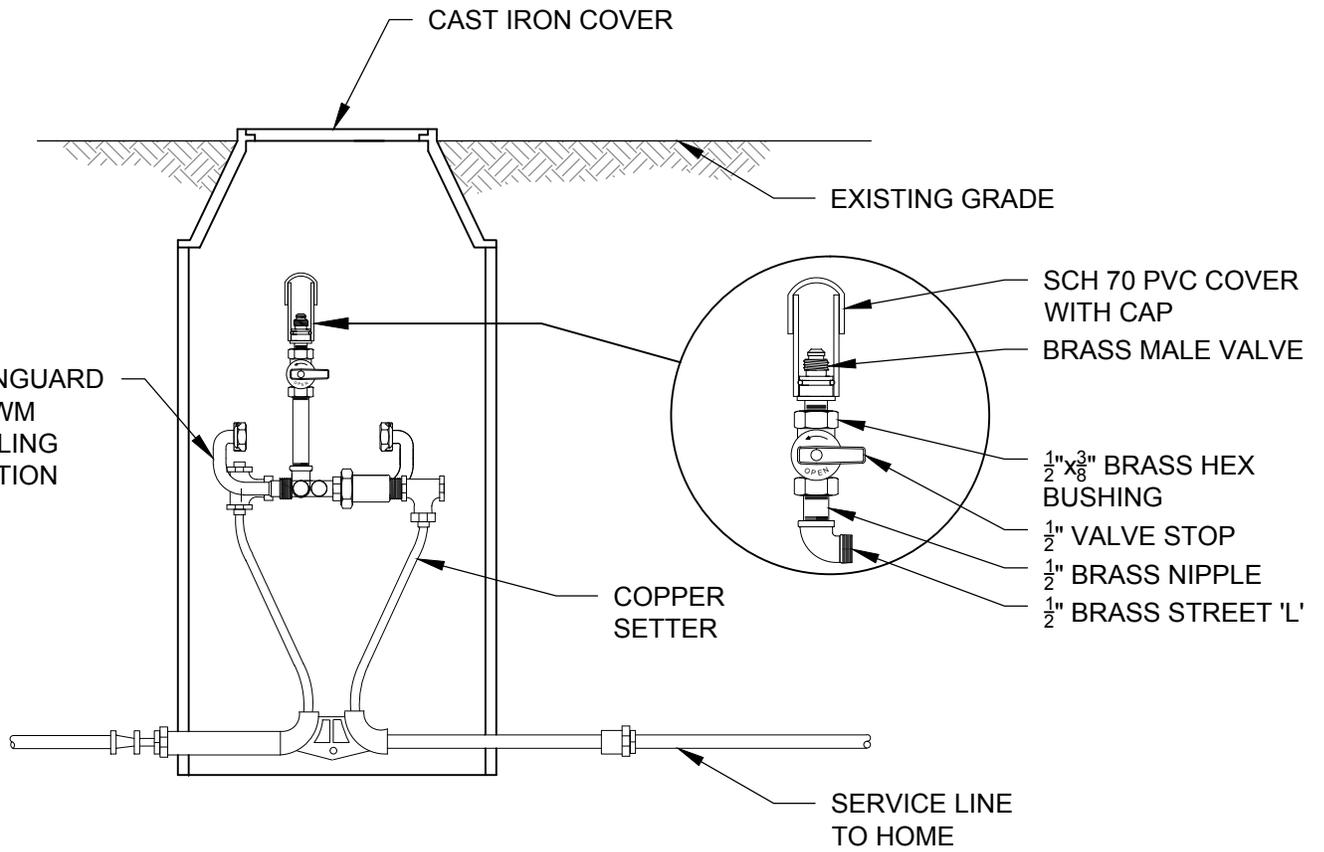
APPROVAL DATE

PUBLIC WORKS DEPARTMENT

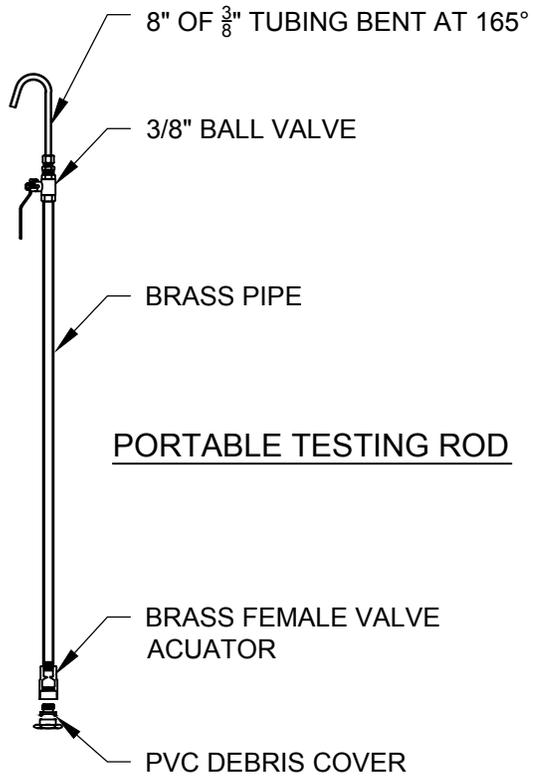
SAMPLING STATION
INSTALLATION

DWG. NO.

418A



METER BOX SETTING



PORTABLE TESTING ROD

PUBLIC WORKS DEPARTMENT

DWG. NO.

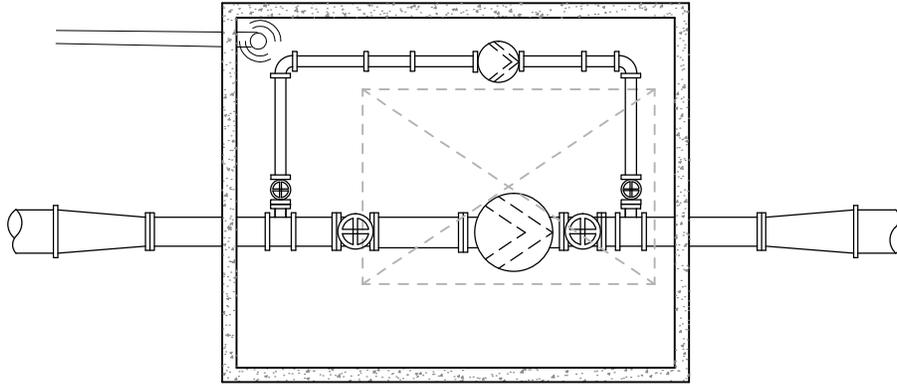
METER BOX SAMPLING STATION
INSTALLATION

418B

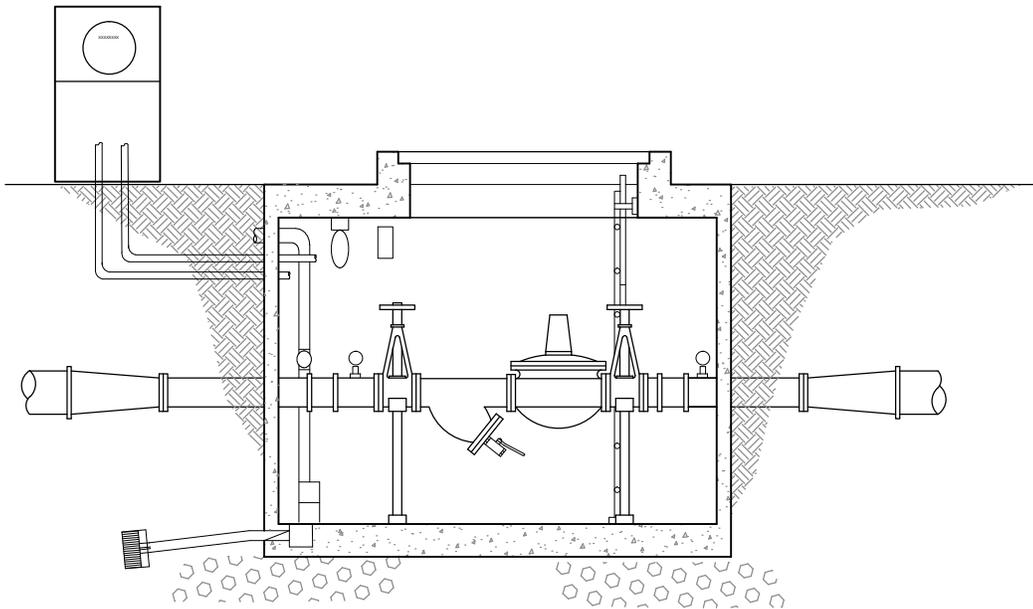


JUNE 2014 (REV JUNE 2018)

APPROVAL DATE



PLAN



SECTION

NOTE:

PACKAGED PRESSURE REDUCING VAULTS BY GC SYSTEMS OR APPROVED EQUAL ARE REQUIRED.

PUBLIC WORKS DEPARTMENT

DWG. NO.

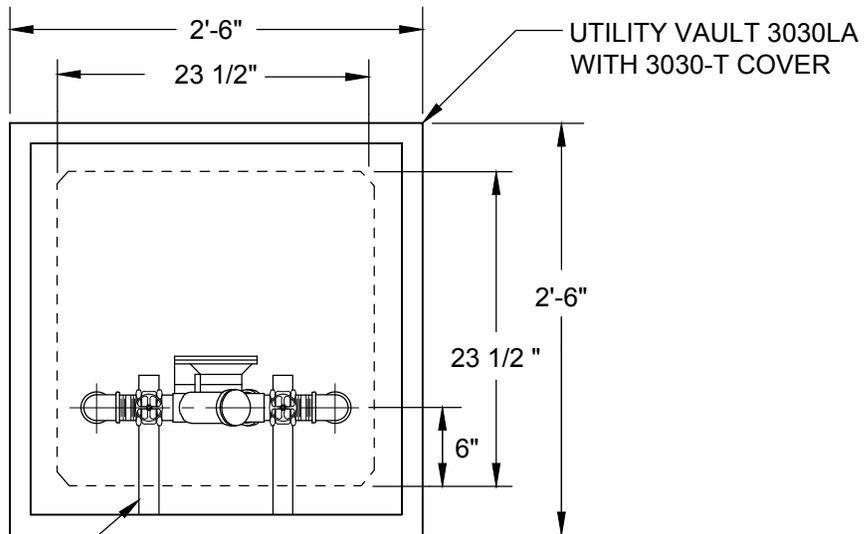


JUNE 2014 (REV JUNE 2018)

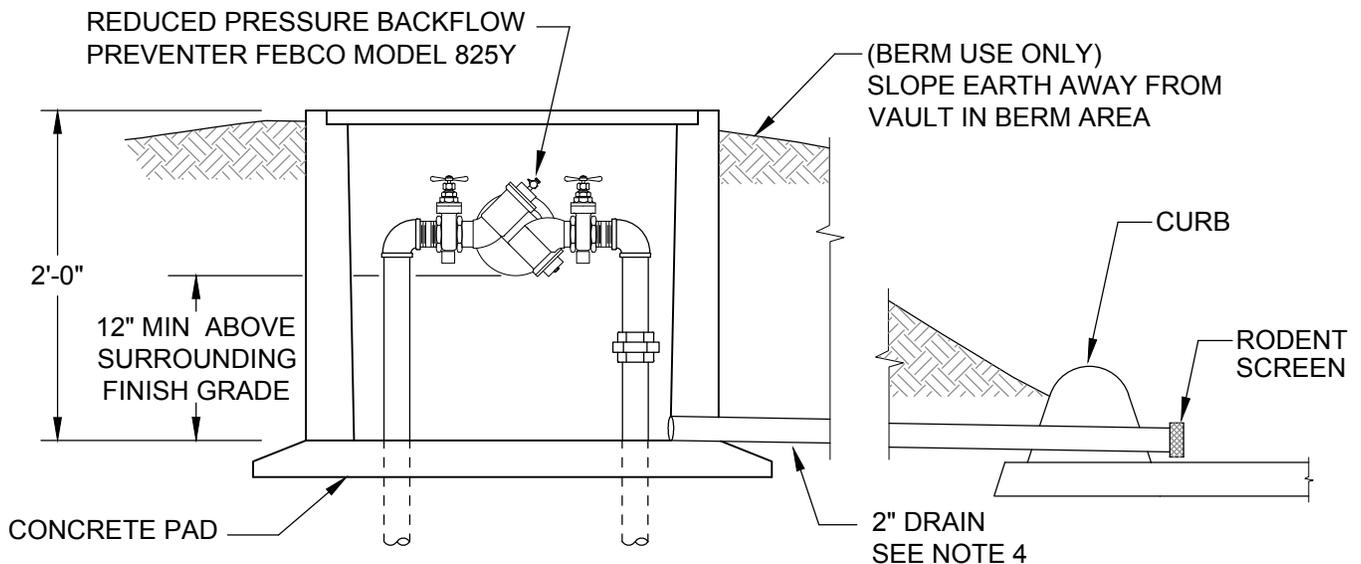
APPROVAL DATE

PRESSURE REDUCING VALVE VAULT

419



PLAN



ELEVATION

NOTES:

1. THIS IS AN ABOVE GROUND INSTALLATION. DRAWING DEPICTS INSTALLATION IN A BERM.
2. THIS IS TO BE A PRIVATE FACILITY, GOVERNED BY UPC AND OREGON DEPT. OF HUMAN SERVICES , AS APPLICABLE.
3. DEVICE IS TO BE SUPPORTED BY SUBSTANTIAL MATERIAL, RESISTANT TO RUST AND DECAY. SUPPORTS ARE TO BE INSTALLED TO PREVENT UNDUE STRESS OR STRAIN TO THE DEVICE AND ITS SERVICE PIPING.
4. INSTALL A 2 INCH DRAIN WITH A MINIMUM 1/8 INCH PER FOOT SLOPE AWAY FROM VAULT TO DAYLIGHT. DRAIN IS TO BE BORE SITED WITH NO TURNS OR BENDS IN THE DRAIN LINE.



JUNE 2014 (REV JUNE 2018)

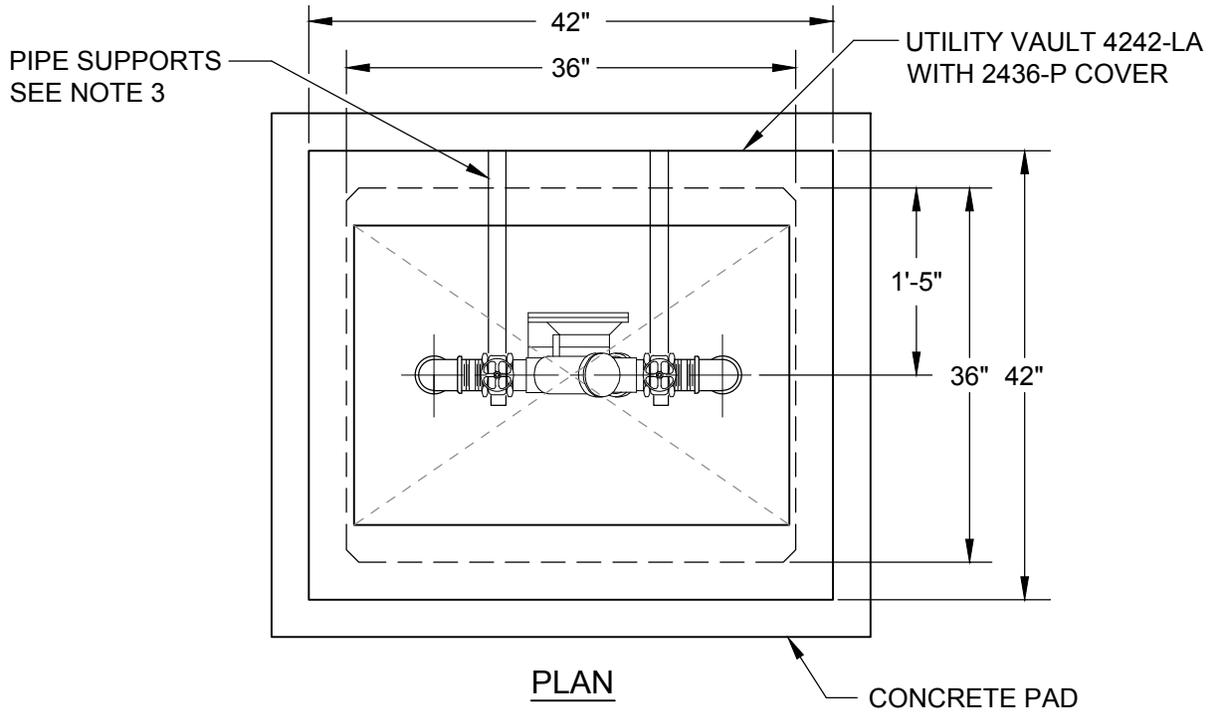
APPROVAL DATE

PUBLIC WORKS DEPARTMENT

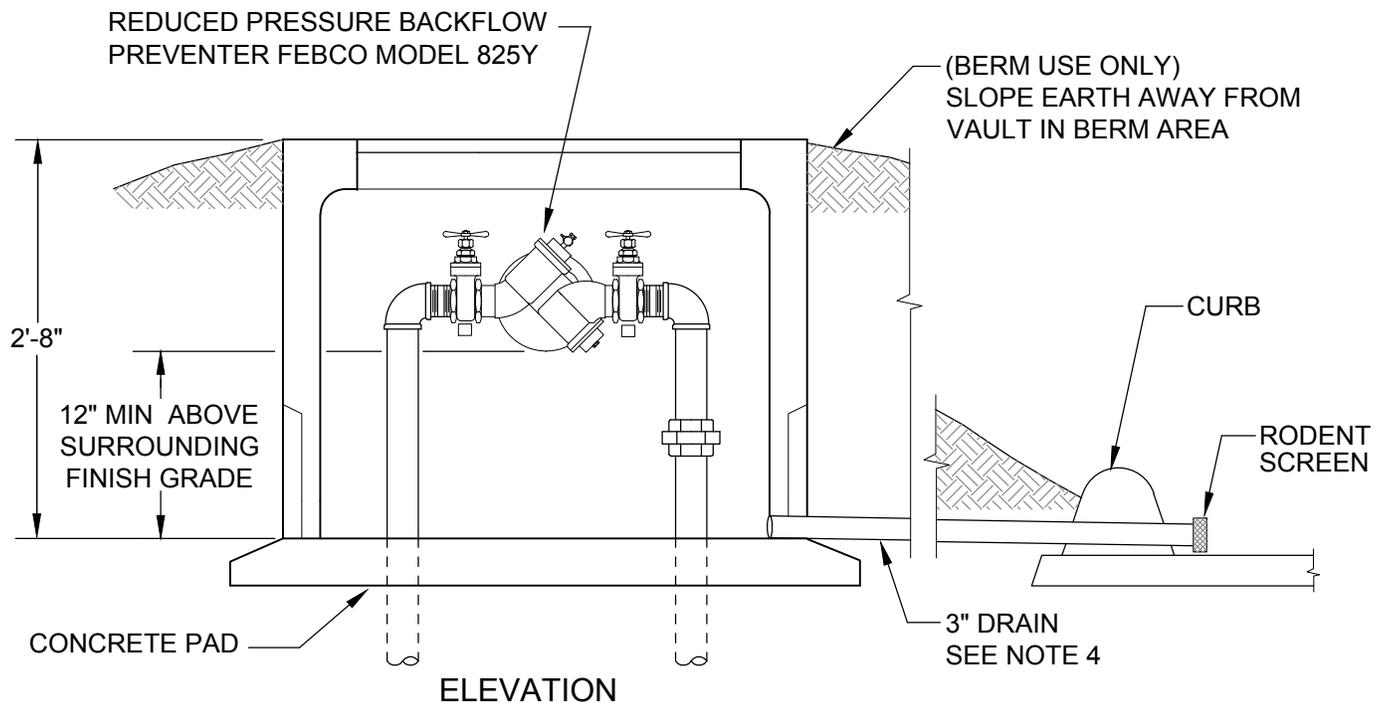
PRIVATE 1-INCH REDUCED PRESSURE BACKFLOW PREVENTER

DWG. NO.

420



PLAN



ELEVATION

NOTES:

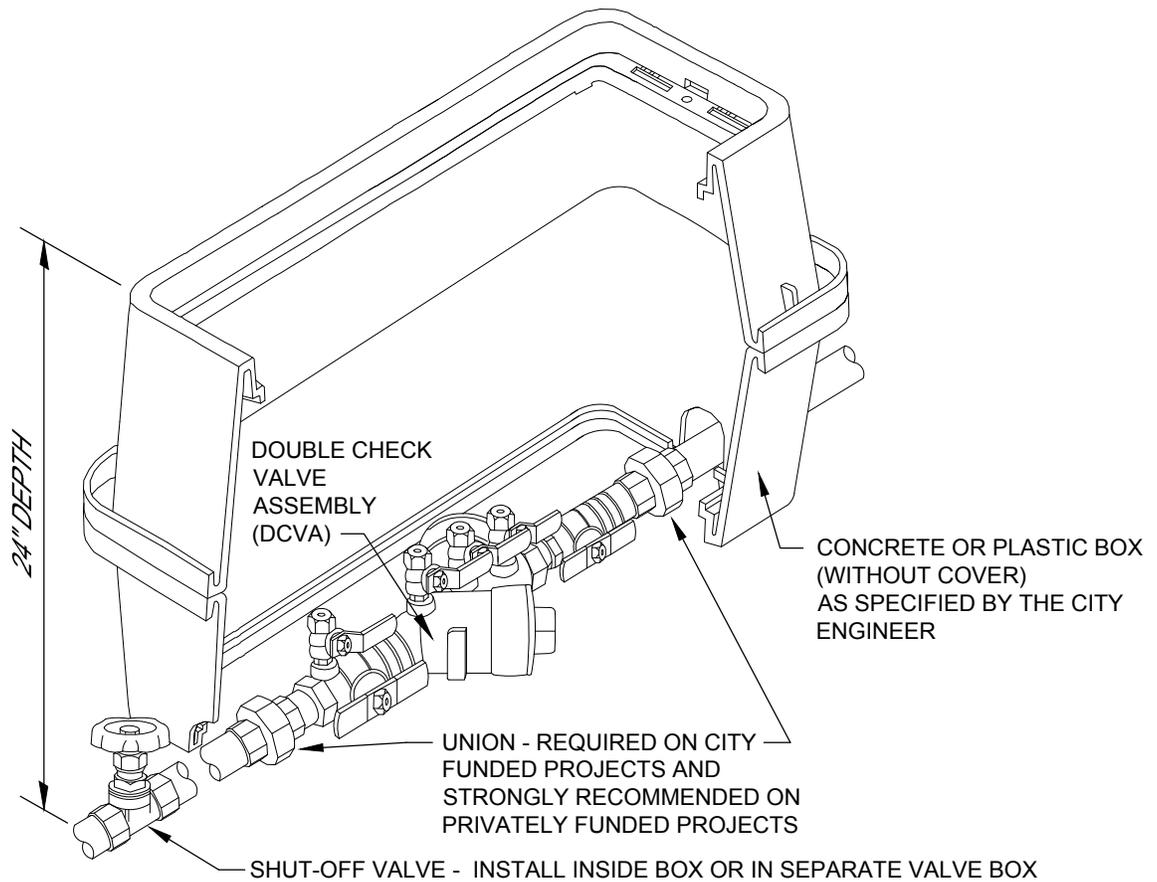
1. THIS IS AN ABOVE GROUND INSTALLATION. DRAWING DEPICTS INSTALLATION IN A BERM.
2. THIS IS TO BE A PRIVATE FACILITY, GOVERNED BY UPC AND OREGON DEPT. OF HUMAN SERVICES , AS APPLICABLE.
3. DEVICE IS TO BE SUPPORTED BY SUBSTANTIAL MATERIAL, RESISTANT TO RUST AND DECAY. SUPPORTS ARE TO BE INSTALLED TO PREVENT UNDUE STRESS OR STRAIN TO THE DEVICE AND ITS SERVICE PIPING.
4. INSTALL A 3 INCH DRAIN WITH A MINIMUM 1/8 INCH PER FOOT SLOPE AWAY FROM VAULT TO DAYLIGHT.



JUNE 2014 (REV JUNE 2018)
APPROVAL DATE

PUBLIC WORKS DEPARTMENT
PRIVATE 1-1/2 & 2-INCH REDUCED PRESSURE BACKFLOW PREVENTER

DWG. NO.
421



INSTALLATION REQUIREMENTS:

1. WHEN REQUIRED, BACKFLOW PREVENTION ASSEMBLIES FOR THE PROTECTION OF THE PUBLIC WATER SYSTEM SHALL MEET THE REQUIREMENTS SET FORTH IN THE CURRENT OREGON ADMINISTRATIVE RULES CHAPTER 333-061-0070, UNIFORM PLUMBING CODE. CONTACT THE CROSS-CONNECTION INSPECTOR, IN THE CITY OF BANKS PUBLIC WORKS DEPARTMENT , FOR CURRENT REQUIREMENTS.
2. ALL BOXES LOCATED IN DRIVEWAYS AND SIDEWALKS SHALL HAVE APPROVED TRAFFIC-RATED COVERS.
3. DOUBLE CHECK VALVE ASSEMBLIES (DCVA'S) UP TO AND INCLUDING 1 INCH SHALL BE INSTALLED IN PACIFIC WATER WORKS METER BOX MBE #66. THE DCVA SHALL BE READILY ACCESSIBLE WITH ADEQUATE SPACE FOR TESTING AND MAINTENANCE. DCVA'S LARGER THAN 1 INCH AND UP TO 2 INCHES SHALL BE INSTALLED IN AN APPROVED SIZE BOX, WITH AT LEAST 6 INCHES OF CLEARANCE ON BOTH SIDES AND UNDER THE DCVA. DCVA'S LARGER THAN 2 INCHES SHALL BE INSTALLED IN AN APPROVED VAULT. CONTACT THE CROSS-CONNECTION INSPECTOR, BY CALLING THE CITY OF BANKS PUBLIC WORKS DEPARTMENT , FOR PROPER SIZING.
4. WHEN THE DCVA IS INSTALLED BELOW GROUND, THE TEST PORTS MUST NOT BE FACING DOWNWARD. THE TEST PORTS MUST BE PLUGGED WITH THREADED PLUGS. NO DISSIMILAR METALS FOR PLUGS.
5. THE DCVA SHALL BE INSTALLED AT A DEPTH OF 24 INCHES BELOW GROUND; PLUMBING CODE REQUIRES 24 INCHES, ALLOWING FOR FREEZE PROTECTION.
6. THE DCVA SHALL BE TESTED BY A STATE CERTIFIED TESTER FOLLOWING INSTALLATION AND ANNUALLY THEREAFTER, AND WHEN MOVED OR REPAIRED .
7. OREGON ADMINISTRATIVE RULES REQUIRE INSTALLATION OF A DCVA AT THE SERVICE CONNECTION WHERE AN APPROVED AIR GAP DOES NOT EXIST.
8. A PLUMBING PERMIT IS REQUIRED TO INSTALL AN IRRIGATION SPRINKLER SYSTEM.
9. UPON COMPLETION OF INSTALLATION, THE CITY OF BANKS SHALL BE NOTIFIED WITHIN 24 HOURS FOR CITY PERSONNEL TO INSPECT THE INSTALLATION.
10. THIS IS TO BE A PRIVATE FACILITY, GOVERNED BY UPC AND OREGON DEPT. OF HUMAN SERVICES , AS APPLICABLE.

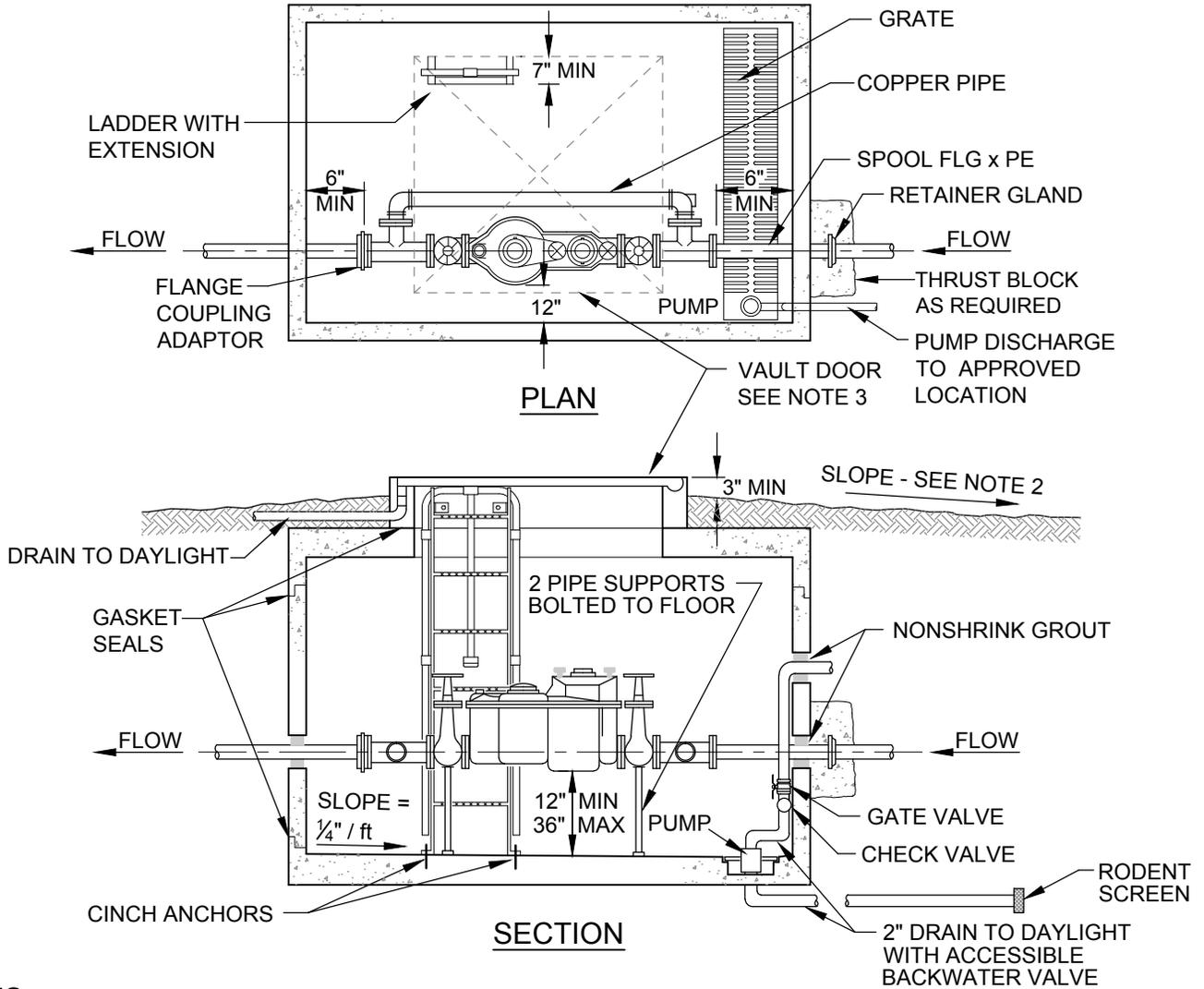


JUNE 2014 (REV JUNE 2018)
 APPROVAL DATE

PUBLIC WORKS DEPARTMENT
 PRIVATE DOUBLE CHECK VALVE
 ASSEMBLY (DCVA) FOR DOMESTIC AND
 LANDSCAPE IRRIGATION SYSTEMS

DWG. NO.
 422

WATER SERVICE LINE AND METER VAULT (AS SHOWN BELOW) PROVIDED BY CUSTOMER. INSTALLATION OF METER BY CITY. METER COST PAID BY CUSTOMER.



NOTES:

1. THIS IS A PUBLIC FACILITY, GOVERNED BY UNIFORM PLUMBING CODE, STATE OF OREGON PLUMBING CODE 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 .
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.

| METER SIZE | UTILITY VAULT CO. VAULT MODEL NO. | BILCO - VAULT DOOR MODEL NO. |
|------------|-----------------------------------|------------------------------|
| 3" | 676-WA | J-5AL |
| 4" & 6" | 687-WA | J-5AL |
| 8" | 810-LA | JD-3AL |

PUBLIC WORKS DEPARTMENT

DWG. NO.

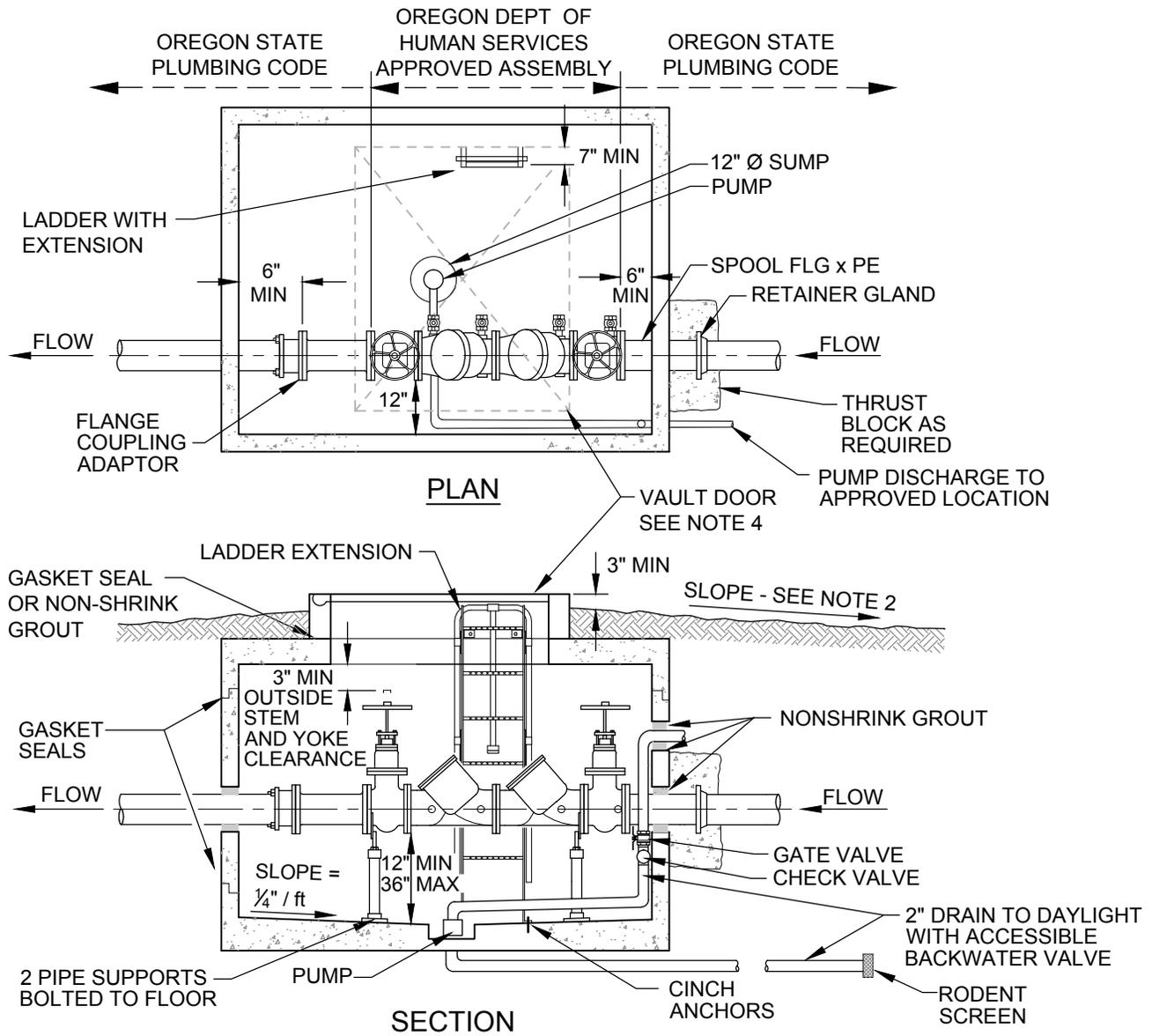


JUNE 2014 (REV JUNE 2018)

APPROVAL DATE

COMPOUND WATER METER VAULT

423



NOTES:

1. THIS IS TO BE A PRIVATE FACILITY, GOVERNED BY UNIFORM PLUMBING CODE AND OREGON DEPT. OF HUMAN SERVICES, AS APPLICABLE.
2. FINISHED GRADE SHALL SLOPE AWAY FROM THE VAULT COVER SO AS TO PREVENT PONDING AROUND THE COVER.
3. 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 .
4. VAULT DOOR MECHANISMS SHALL NOT PROJECT BELOW THE CEILING OF THE VAULT INTERIOR.
5. 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.
6. SLOPE INTERIOR TOWARD CENTER OF FLOOR FOR SUMP OR GRAVITY DRAIN OUTLET.

| DOUBLE CHECK SIZE | UTILITY VAULT CO. - MODEL NO. | |
|-------------------|-------------------------------|------------|
| | VAULT | VAULT DOOR |
| 3" & 4" | 677-LA | 332P |
| 6" | 676-WA | 332P |
| 8" | 687-WA | 332P |



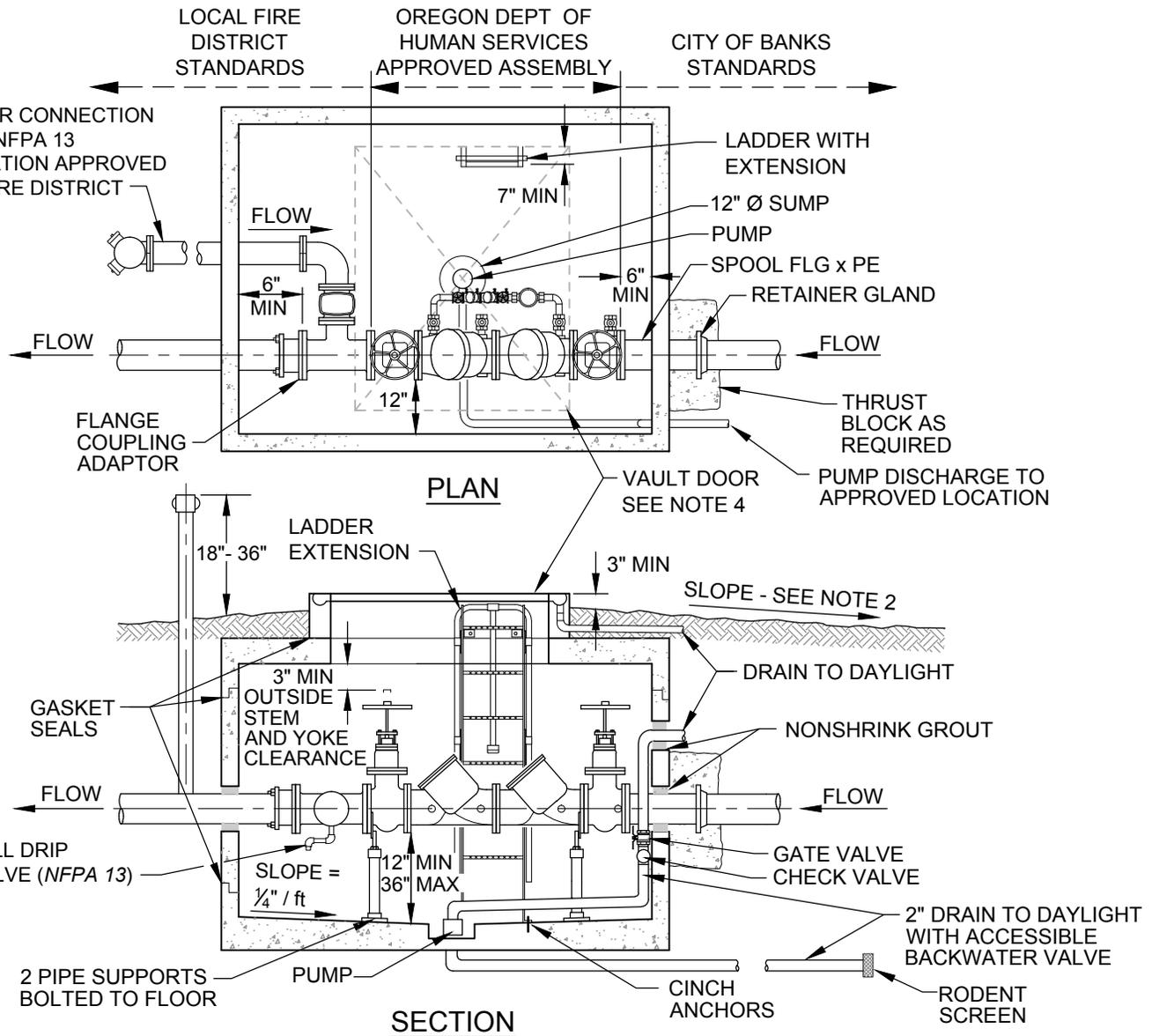
JUNE 2014 (REV JUNE 2018)
APPROVAL DATE

PUBLIC WORKS DEPARTMENT

PRIVATE DOUBLE CHECK BACKFLOW PREVENTER VAULT

DWG. NO.

424



NOTES:

1. THIS IS TO BE A PRIVATE FACILITY, GOVERNED BY UNIFORM PLUMBING CODE AND OREGON DEPT. OF HUMAN SERVICES, NFPA AND FIRE MARSHALL, AS APPLICABLE.
2. FINISHED GRADE SHALL SLOPE AWAY FROM THE VAULT COVER SO AS TO PREVENT PONDING AROUND THE COVER.
3. 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 .
4. VAULT DOOR MECHANISMS SHALL NOT PROJECT BELOW THE CEILING OF THE VAULT INTERIOR.
5. 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.
6. SLOPE INTERIOR TOWARD CENTER OF FLOOR FOR SUMP OR GRAVITY DRAIN OUTLET.

| DOUBLE DETECTOR CHECK SIZE | UTILITY VAULT CO. - MODEL NO. | | BILCO - VAULT DOOR MODEL NO. |
|----------------------------|----------------------------------|-------------------------------------|------------------------------|
| | VAULT WITH FIRE DEPT. CONNECTION | VAULT WITHOUT FIRE DEPT. CONNECTION | |
| 4" | 676-WA | 577-WA | J-5AL |
| 6" | 687-WA | 676-WA | J-5AL |
| 8" & 10" | 5106-LA | 687-WA | JD-3AL |

PUBLIC WORKS DEPARTMENT

DWG. NO.

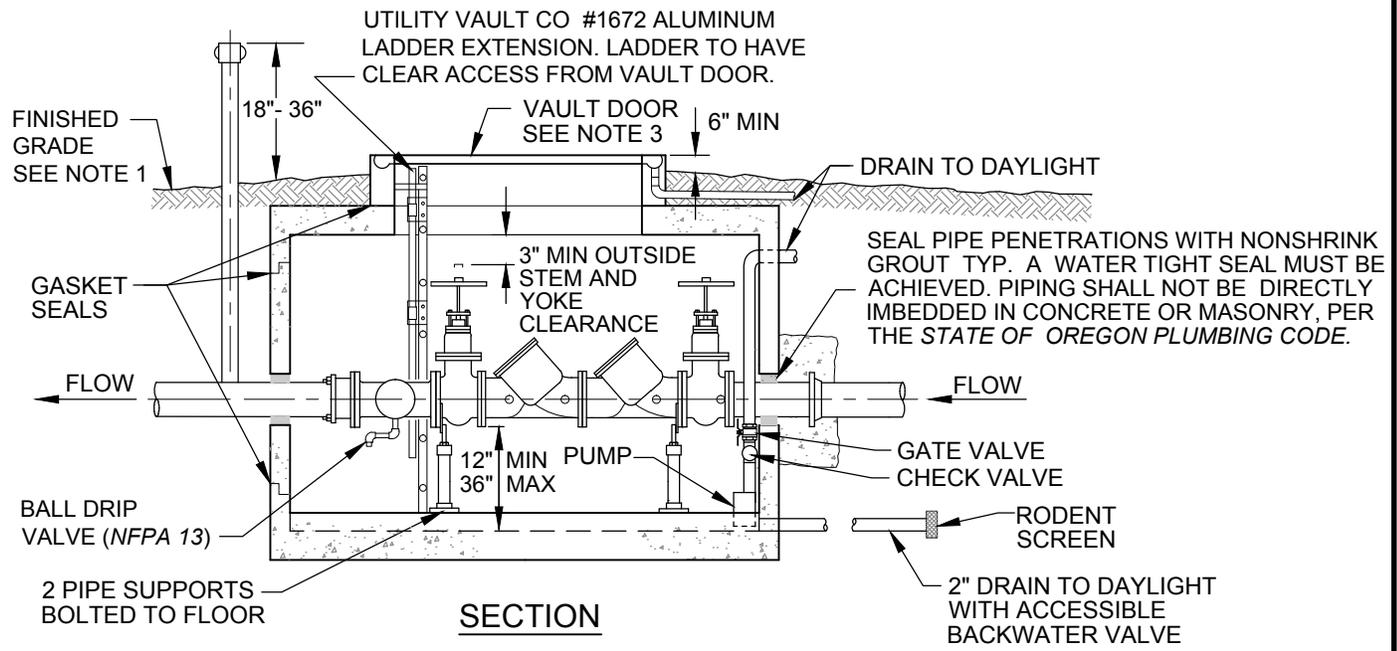
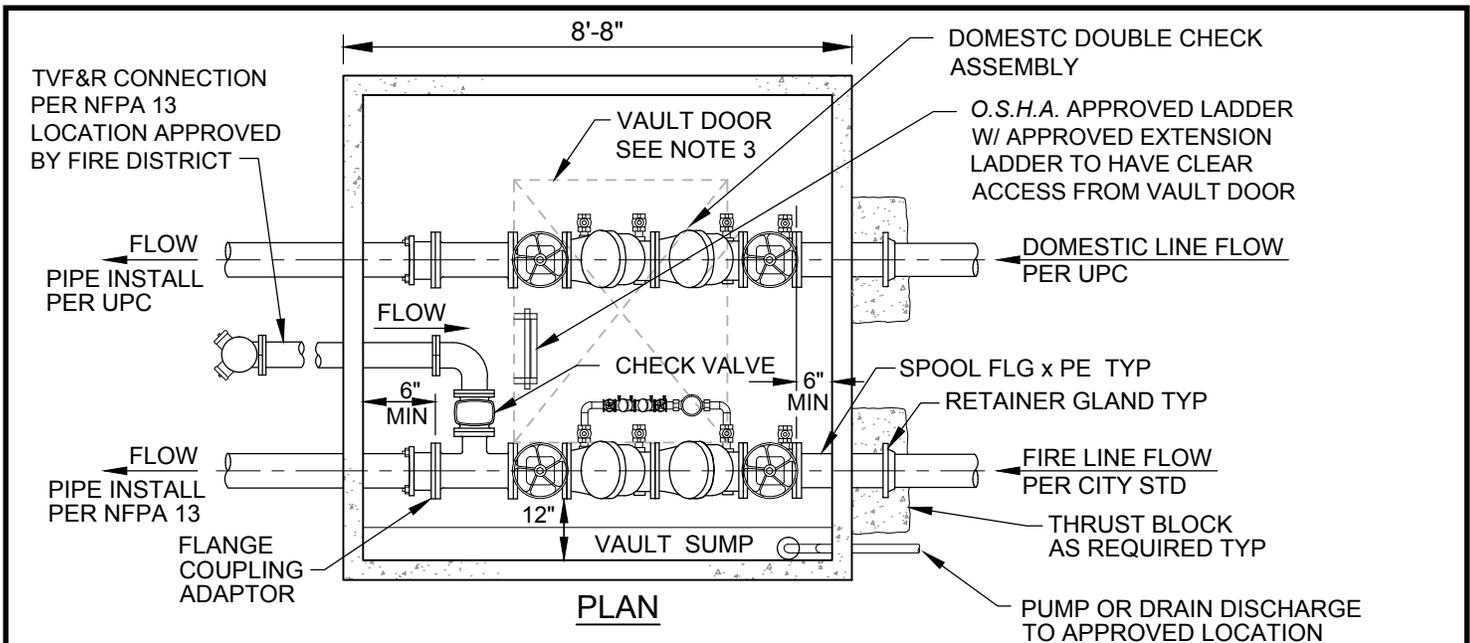
PRIVATE FIRE SERVICE VAULT

425



JUNE 2014 (REV JUNE 2018)

APPROVAL DATE



| FIRE LINE DOUBLE DETECTOR CHECK SIZE | UTILITY VAULT CO VAULT MODEL NO. | SYRACUSE CASTINGS VAULT DOOR MODEL NO. |
|--------------------------------------|----------------------------------|--|
| 4" - 6" | 810-LA | CHD-11AL |
| 8" & LARGER | BY ENGINEER | BY ENGINEER |

NOTES:

1. FINISHED GRADE SHALL SLOPE AWAY FROM THE VAULT COVER SO AS TO PREVENT PONDING AROUND THE COVER.
2. THIS IS TO BE A PRIVATE FACILITY, GOVERNED BY UPC, NFPA, OREGON DEPT. OF HUMAN SERVICES AND FIRE MARSHAL, AS APPLICABLE.
3. VAULT DOOR MECHANISMS SHALL NOT PROJECT BELOW THE CEILING OF THE VAULT INTERIOR.
4. FOR FIRE LINE SIZES 8 INCHES AND LARGER, CONSULT WITH CITY UTILITIES ENGINEER FOR ADDITIONAL VAULT DETAILS.

Appendix B

Approved Street Tree List

APPENDIX B - PARKS, RECREATION AND TREE BOARD STREET TREE LIST

| 3 to 3.5 foot Planting Strip - With or without overhead lines | | | | |
|--|--|----------------------|----------------------|--|
| Common Name | Scientific Name | Mature Height | Canopy Spread | Feature |
| Blireiana Plum | Prunus x blireiana | 20' | 20' | Flower; Fall Color |
| Bigleaf Snowbell | Styrax obassia | 35' | 25' | Flower; Fall Color |
| Black Hawthorn | Crataegus douglasii | 45' | 25' | Flower; Fruit/Nuts for Wildlife |
| Cascara | Rhamnus purshiana | 30' | 25' | Flower; Fruit/Nuts for Wildlife; Textured bark |
| Glorybower Tree | Clerodendrum trichotomum | 20' | 20' | Flower; Fruit/Nuts for Wildlife |
| Japanese Maple | Acer palmatum | 12' | 6' | Fall Color |
| Japanese Lilac Tree | Syringa reticulata | 25' | 20' | Flower; Fruit/Nuts for Wildlife |
| Japanese Snowbell | Styrax japonicus | 25' | 25' | Flower |
| Persian Parrotia | Perrotia persica | 35' | 20' | Flower; Fall Color Textured bark |
| Prairiefire Crabapple | Malus 'Prairiefire' | 20' | 20' | Flower; Fruit/Nuts for Wildlife |
| Rocky Mountain Glow Maple | Acer grandidentatum | 25' | 15' | Fall Color |
| Roughbark Maple | Acer triflorum | 25' | 20' | Fall Color; Textured bark |
| Trident Maple | Acer buergeranum | 25' | 20' | Fall Color |
| 4 to 5.5 foot Planting Strip - With overhead lines | | | | |
| Common Name | Scientific Name | Mature Height | Canopy Spread | Feature |
| Chinese Dogwood | Cornus kousa var. chinensis | 25' | 25' | Flowers; Fall Color |
| David's Maple | Acer davidii | 30' | 20' | Fall Color, Textured Bark |
| Edith Bogue Magnolia | Magnolia grandiflora 'Edith Bogue' | 30' | 15' | Flowers; Evergreen |
| Galaxy Magnolia | Magnolia 'Galaxy' | 35' | 25' | Flowers |
| Flowering Ash | Fraxinus ornus | 30' | 15' | Fall Color |
| Golden Desert Ash | Fraxinus excelsior 'Aureaefolia' | 25' | 20' | Fall Color |
| Japanese Maple | Acer palmatum | 12' | 6' | Fall Color |
| Little Gem Magnolia | Magnolia grandiflora 'Little Gem' | 20' | 10' | Flowers; Evergreen |
| Paperbark Maple | Acer griseum | 25' | 20' | Fall Color, Textured Bark |
| Persian Parrotia | Perrotia persica | 35' | 20' | Flower |
| Prairiefire Crabapple | Malus 'Prairiefire' | 20' | 20' | Flower; Fruit/Nuts for Wildlife |
| Saratoga Ginkgo | Ginkgo biloba 'Saratoga' | 35' | 30' | Fall Color |
| September Goldenrain | Koelreuteria paniculata 'September' | 30' | 25' | Flower; Fall Color |
| Sourwood | Oxydendrum arboreum | 35' | 20' | Flowers; Fall Color |
| Tricolor Beech | Fagus sylvatica 'Purpurea Tricolor' | 35' | 25' | Fall Color |
| Tschonoskii Crabapple | Malus 'Tschonoskii' | 30' | 15' | Flowers; Fall Color; Fruit/Nuts for Wildlife |
| 4 to 5.5 foot Planting Strip - Without overhead lines | | | | |
| Common Name | Scientific Name | Mature Height | Canopy Spread | Feature |
| Autumn Applause Ash | Fraxinus americana 'Autumn Applause' | 40' | 28' | Fall Color |
| Black Tupelo | Nyssa sylvatica | 45' | 20' | Fall Color; Textured Bark; Fruit/Nuts for Wildlife |
| Chancellor Linden | Tillia cordata 'Chancole' | 35' | 20' | Fall Color |
| Crimson Spire Oak | Quercus alba x Q. robur 'Chrimschmidt' | 45' | 15' | Fall Color |
| Greenspire Linden | Tillia cordata 'Greenspire' | 35' | 20' | Fall Color |
| Metro Gold Hedge Maple | Acer campestre 'Panacek' | 30' | 25' | Fall Color |
| Kobus Magnolia | Magnolia kobus | 40' | 30' | Flowers |
| Moonglow Sweetbay | Magnolia virginia 'Moonglow' | 35' | 30' | Flowers; Evergreen |
| Pyramidal European Hornbeam | Carpinus betulus 'Fastigiata' | 40' | 25' | Fall Color |
| Saratoga Ginkgo | Ginkgo biloba 'Saratoga' | 35' | 30' | Fall Color |
| Sterling Linden | Tillia tomentosa 'Sterling' | 45' | 35' | Fall Color |
| Tricolor Beech | Fagus sylvatica 'Purpurea Tricolor' | 35' | 25' | Fall Color |

APPENDIX B - PARKS, RECREATION AND TREE BOARD STREET TREE LIST

6 to 8 foot Planting Strip - With overhead lines

| Common Name | Scientific Name | Mature Height | Canopy Spread | Feature |
|-----------------------------|-------------------------------------|---------------|---------------|---------------------------|
| Canada Red Chokecherry | Prunus virginiana 'Canada Red' | 35' | 20' | Flowers; Fall Color |
| Edith Bogue Magnolia | Magnolia grandiflora 'Edith Bogue' | 30' | 15' | Flowers; Evergreen |
| Paperbark Maple | Acer griseum | 25' | 20' | Fall Color, Textured Bark |
| Little Gem Magnolia | Magnolia grandiflora 'Little Gem' | 20' | 10' | Flowers; Evergreen |
| September Goldenrain | Koelreuteria paniculata 'September' | 30' | 25' | Flower; Fall Color |
| Schubert Select Chokecherry | Prunus virginiana 'Schubert Select' | 35' | 20' | Flowers; Fall Color |

6 to 8 foot Planting Strip - Without overhead lines

| Common Name | Scientific Name | Mature Height | Canopy Spread | Feature |
|-----------------------|---|---------------|---------------|---------------------------|
| Accolade Elm | Ulmus japoica x wilsoniana 'Morton' | 70' | 60' | Fall Color |
| Autumn Purple Ash | Fraxinus americana 'Junginger' | 45' | 40' | Fall Color |
| Bur Oak | Quercus macrocarpa | 55' | 45' | Fruit/Nuts for Wildlife |
| Forest Green Oak | Quercus frainetto 'Schmidt' | 50' | 30' | Fruit/Nuts for Wildlife |
| Glenleven Linden | Tillia cordata 'Glenleven' | 45' | 30' | Fall Color |
| Green Vase Zelkova | Zelkova serrata 'Green Vase' | 50' | 40' | Fall Color |
| Hackberry | Celtis occidentalis | 45' | 35' | Fall Color; Textured Bark |
| Legacy Sugar Maple* | Acer saccharum 'Legacy' | 50' | 35' | Fall Color |
| Patmore Ash | Fraxinus pennsylvanica 'Patmore' | 45' | 35' | Fall Color |
| Red Sunset Maple | Acer rubrum 'Franksred' or 'Red Sunset' | 45' | 35' | Fall Color |
| Redmond Lindon | Tillia americana 'Redmond' | 40' | 25' | Textured Bark |
| Rivers Purple Beech | Fagus sylvatica 'Riversii' | 60' | 40' | Fall Color; Textured Bark |
| Sawtooth Oak | Quercus acutissima | 40' | 40' | Fall Color |
| Scarlet Oak | Quercus coccinea | 50' | 40' | Fall Color |
| Sunburst Honeylocust | Gleditsia triacanthos 'Sunburst' | 45' | 35' | Fall Color |
| Sourwood | Oxydendrum arboreum | 35' | 20' | Flowers; Fall Color |
| Swamp White Oak | Quercus bicolor | 45' | 45' | Fruit/Nuts for Wildlife |
| Tricolor Beech | Fagus sylvatica 'Purpurea Tricolor' | 35' | 25' | Fall Color |
| Turkish Filbert | Corylus corlurna | 40' | 30' | Fruit/Nuts for Wildlife |
| Urbanite Ash | Fraxinus pennsylvanica 'Urbanite' | 50' | 40' | Fall Color |
| Village Green Zelkova | Zelkova serrata 'Village Green' | 40' | 38' | Fall Color |

* May substitute Green Mountain or Commemoration Sugar Maple

8.5 foot and wider Planting Strip - With overhead lines

| Common Name | Scientific Name | Mature Height | Canopy Spread | Feature |
|--------------------------|--------------------------------|---------------|---------------|---------------------|
| Akebono Flowering Cherry | Prunus x yedoensis 'Akebono' | 25' | 25' | Flowers |
| Canada Red Chokecherry | Prunus virginiana 'Canada Red' | 25' | 20' | Flowers; Fall Color |
| Yoshino Cherry | Prunus yedoensis | 30' | 30' | Flowers; Fall Color |

APPENDIX B - PARKS, RECREATION AND TREE BOARD STREET TREE LIST

8.5 foot & wider Planting Strip - Without overhead lines

| Common Name | Scientific Name | Mature Height | Canopy Spread | Feature |
|-----------------------------|-----------------------------------|---------------|---------------|---------------------------|
| Bloodgood London Plane Tree | Platanus x acerifolia 'Bloodgood' | 50' | 40' | Textured Bark |
| English Oak | Quercus robur | 50' | 40' | Fruit/Nuts for Wildlife |
| Green Vase Zelkova | Zelkova serrata 'Green Vase' | 50' | 40' | Fall Color |
| Kentucky Coffee Tree | Gymnocladus dioicus | 60' | 40' | Fall Color |
| Metro Gold Hedge Maple | Acer campestre 'Panacek' | 30' | 25' | Fall Color |
| Rivers Purple Beech | Fagus sylvatica 'Riversii' | 60' | 40' | Fall Color; Textured Bark |
| Sterling Linden | Tillia tomentosa 'Sterling' | 45' | 35' | Fall Color |
| Sunburst Honeylocust | Gleditsia triacanthos 'Sunburst' | 45' | 35' | Fall Color |
| Turkish Filbert | Corylus corlurna | 40' | 30' | Fruit/Nuts for Wildlife |
| Urbanite Ash | Fraxinus pennsylvanica 'Urbanite' | 50' | 40' | Fall Color |
| Yellowwood | Cladrastis kentukea | 40' | 40' | Flowers; Textured Bark |

Park Areas - Without overhead lines

| Common Name | Scientific Name | Mature Height | Canopy Spread | Feature |
|-------------------|-------------------------------------|---------------|---------------|---------------------------|
| Accolade Elm | Ulmus japoica x wilsoniana 'Morton' | 70' | 60' | Fall Color |
| Coast Redwood | Sequoia sempervirens | 100'+ | 60' | Evergreen |
| Dawn Redwood | Metasequoia glyptostroboides | 75' | 30' | Fall Color; Textured Bark |
| Douglas Fir | Pseudotsuga menziesii | 100'+ | 60' | Evergreen |
| Oregon White Oak | Quercus garryana | 65' | 40' | Fruit/Nuts for Wildlife |
| Western Hemlock | Tsuga heterophylla | 100'+ | 40' | Evergreen |
| Western Red Cedar | Thuja plicata | 100'+ | 30' | Evergreen |

Appendix B

Approved Street Tree List

APPENDIX B - PARKS, RECREATION AND TREE BOARD STREET TREE LIST

| 3 to 3.5 foot Planting Strip - With or without overhead lines | | | | |
|--|--------------------------|----------------------|----------------------|--|
| Common Name | Scientific Name | Mature Height | Canopy Spread | Feature |
| Blireiana Plum | Prunus x blireiana | 20' | 20' | Flower; Fall Color |
| Bigleaf Snowbell | Styrax obassia | 35' | 25' | Flower; Fall Color |
| Black Hawthorn | Crataegus douglasii | 45' | 25' | Flower; Fruit/Nuts for Wildlife |
| Cascara | Rhamnus purshiana | 30' | 25' | Flower; Fruit/Nuts for Wildlife; Textured bark |
| Glorybower Tree | Clerodendrum trichotomum | 20' | 20' | Flower; Fruit/Nuts for Wildlife |
| Japanese Maple | Acer palmatum | 12' | 6' | Fall Color |
| Japanese Lilac Tree | Syringa reticulata | 25' | 20' | Flower; Fruit/Nuts for Wildlife |
| Japanese Snowbell | Styrax japonicus | 25' | 25' | Flower |
| Persian Parrotia | Perrotia persica | 35' | 20' | Flower; Fall Color Textured bark |
| Prairiefire Crabapple | Malus 'Prairiefire' | 20' | 20' | Flower; Fruit/Nuts for Wildlife |
| Rocky Mountain Glow Maple | Acer grandidentatum | 25' | 15' | Fall Color |
| Roughbark Maple | Acer triflorum | 25' | 20' | Fall Color; Textured bark |
| Trident Maple | Acer buergeranum | 25' | 20' | Fall Color |

| 4 to 5.5 foot Planting Strip - With overhead lines | | | | |
|---|-------------------------------------|----------------------|----------------------|--|
| Common Name | Scientific Name | Mature Height | Canopy Spread | Feature |
| Chinese Dogwood | Cornus kousa var. chinensis | 25' | 25' | Flowers; Fall Color |
| David's Maple | Acer davidii | 30' | 20' | Fall Color, Textured Bark |
| Edith Bogue Magnolia | Magnolia grandiflora 'Edith Bogue' | 30' | 15' | Flowers; Evergreen |
| Galaxy Magnolia | Magnolia 'Galaxy' | 35' | 25' | Flowers |
| Flowering Ash | Fraxinus ornus | 30' | 15' | Fall Color |
| Golden Desert Ash | Fraxinus excelsior 'Aureaefolia' | 25' | 20' | Fall Color |
| Japanese Maple | Acer palmatum | 12' | 6' | Fall Color |
| Little Gem Magnolia | Magnolia grandiflora 'Little Gem' | 20' | 10' | Flowers; Evergreen |
| Paperbark Maple | Acer griseum | 25' | 20' | Fall Color, Textured Bark |
| Persian Parrotia | Perrotia persica | 35' | 20' | Flower |
| Prairiefire Crabapple | Malus 'Prairiefire' | 20' | 20' | Flower; Fruit/Nuts for Wildlife |
| Saratoga Ginkgo | Ginkgo biloba 'Saratoga' | 35' | 30' | Fall Color |
| September Goldenrain | Koelreuteria paniculata 'September' | 30' | 25' | Flower; Fall Color |
| Sourwood | Oxydendrum arboreum | 35' | 20' | Flowers; Fall Color |
| Tricolor Beech | Fagus sylvatica 'Purpurea Tricolor' | 35' | 25' | Fall Color |
| Tschonoskii Crabapple | Malus 'Tschonoskii' | 30' | 15' | Flowers; Fall Color; Fruit/Nuts for Wildlife |

| 4 to 5.5 foot Planting Strip - Without overhead lines | | | | |
|--|--|----------------------|----------------------|--|
| Common Name | Scientific Name | Mature Height | Canopy Spread | Feature |
| Autumn Applause Ash | Fraxinus americana 'Autumn Applause' | 40' | 28' | Fall Color |
| Black Tupelo | Nyssa sylvatica | 45' | 20' | Fall Color; Textured Bark; Fruit/Nuts for Wildlife |
| Chancellor Linden | Tillia cordata 'Chancole' | 35' | 20' | Fall Color |
| Crimson Spire Oak | Quercus alba x Q. robur 'Chrimschmidt' | 45' | 15' | Fall Color |
| Greenspire Linden | Tillia cordata 'Greenspire' | 35' | 20' | Fall Color |
| Metro Gold Hedge Maple | Acer campestre 'Panacek' | 30' | 25' | Fall Color |
| Kobus Magnolia | Magnolia kobus | 40' | 30' | Flowers |
| Moonglow Sweetbay | Magnolia virginia 'Moonglow' | 35' | 30' | Flowers; Evergreen |
| Pyramidal European Hornbeam | Carpinus betulus 'Fastigiata' | 40' | 25' | Fall Color |
| Saratoga Ginkgo | Ginkgo biloba 'Saratoga' | 35' | 30' | Fall Color |
| Sterling Linden | Tillia tomentosa 'Sterling' | 45' | 35' | Fall Color |
| Tricolor Beech | Fagus sylvatica 'Purpurea Tricolor' | 35' | 25' | Fall Color |

APPENDIX B - PARKS, RECREATION AND TREE BOARD STREET TREE LIST

6 to 8 foot Planting Strip - With overhead lines

| Common Name | Scientific Name | Mature Height | Canopy Spread | Feature |
|-----------------------------|-------------------------------------|---------------|---------------|---------------------------|
| Canada Red Chokecherry | Prunus virginiana 'Canada Red' | 35' | 20' | Flowers; Fall Color |
| Edith Bogue Magnolia | Magnolia grandiflora 'Edith Bogue' | 30' | 15' | Flowers; Evergreen |
| Paperbark Maple | Acer griseum | 25' | 20' | Fall Color, Textured Bark |
| Little Gem Magnolia | Magnolia grandiflora 'Little Gem' | 20' | 10' | Flowers; Evergreen |
| September Goldenrain | Koelreuteria paniculata 'September' | 30' | 25' | Flower; Fall Color |
| Schubert Select Chokecherry | Prunus virginiana 'Schubert Select' | 35' | 20' | Flowers; Fall Color |

6 to 8 foot Planting Strip - Without overhead lines

| Common Name | Scientific Name | Mature Height | Canopy Spread | Feature |
|-----------------------|---|---------------|---------------|---------------------------|
| Accolade Elm | Ulmus japoica x wilsoniana 'Morton' | 70' | 60' | Fall Color |
| Autumn Purple Ash | Fraxinus americana 'Junginger' | 45' | 40' | Fall Color |
| Bur Oak | Quercus macrocarpa | 55' | 45' | Fruit/Nuts for Wildlife |
| Forest Green Oak | Quercus frainetto 'Schmidt' | 50' | 30' | Fruit/Nuts for Wildlife |
| Glenleven Linden | Tillia cordata 'Glenleven' | 45' | 30' | Fall Color |
| Green Vase Zelkova | Zelkova serrata 'Green Vase' | 50' | 40' | Fall Color |
| Hackberry | Celtis occidentalis | 45' | 35' | Fall Color; Textured Bark |
| Legacy Sugar Maple* | Acer saccharum 'Legacy' | 50' | 35' | Fall Color |
| Patmore Ash | Fraxinus pennsylvanica 'Patmore' | 45' | 35' | Fall Color |
| Red Sunset Maple | Acer rubrum 'Franksred' or 'Red Sunset' | 45' | 35' | Fall Color |
| Redmond Lindon | Tillia americana 'Redmond' | 40' | 25' | Textured Bark |
| Rivers Purple Beech | Fagus sylvatica 'Riversii' | 60' | 40' | Fall Color; Textured Bark |
| Sawtooth Oak | Quercus acutissima | 40' | 40' | Fall Color |
| Scarlet Oak | Quercus coccinea | 50' | 40' | Fall Color |
| Sunburst Honeylocust | Gleditsia triacanthos 'Sunburst' | 45' | 35' | Fall Color |
| Sourwood | Oxydendrum arboreum | 35' | 20' | Flowers; Fall Color |
| Swamp White Oak | Quercus bicolor | 45' | 45' | Fruit/Nuts for Wildlife |
| Tricolor Beech | Fagus sylvatica 'Purpurea Tricolor' | 35' | 25' | Fall Color |
| Turkish Filbert | Corylus corlurna | 40' | 30' | Fruit/Nuts for Wildlife |
| Urbanite Ash | Fraxinus pennsylvanica 'Urbanite' | 50' | 40' | Fall Color |
| Village Green Zelkova | Zelkova serrata 'Village Green' | 40' | 38' | Fall Color |

* May substitute Green Mountain or Commemoration Sugar Maple

8.5 foot and wider Planting Strip - With overhead lines

| Common Name | Scientific Name | Mature Height | Canopy Spread | Feature |
|--------------------------|--------------------------------|---------------|---------------|---------------------|
| Akebono Flowering Cherry | Prunus x yedoensis 'Akebono' | 25' | 25' | Flowers |
| Canada Red Chokecherry | Prunus virginiana 'Canada Red' | 25' | 20' | Flowers; Fall Color |
| Yoshino Cherry | Prunus yedoensis | 30' | 30' | Flowers; Fall Color |

APPENDIX B - PARKS, RECREATION AND TREE BOARD STREET TREE LIST

| 8.5 foot & wider Planting Strip - Without overhead lines | | | | |
|---|-------------------------------------|----------------------|----------------------|---------------------------|
| Common Name | Scientific Name | Mature Height | Canopy Spread | Feature |
| Bloodgood London Plane Tree | Platanus x acerifolia 'Bloodgood' | 50' | 40' | Textured Bark |
| English Oak | Quercus robur | 50' | 40' | Fruit/Nuts for Wildlife |
| Green Vase Zelkova | Zelkova serrata 'Green Vase' | 50' | 40' | Fall Color |
| Kentucky Coffee Tree | Gymnocladus dioicus | 60' | 40' | Fall Color |
| Metro Gold Hedge Maple | Acer campestre 'Panacek' | 30' | 25' | Fall Color |
| Rivers Purple Beech | Fagus sylvatica 'Riversii' | 60' | 40' | Fall Color; Textured Bark |
| Sterling Linden | Tillia tomentosa 'Sterling' | 45' | 35' | Fall Color |
| Sunburst Honeylocust | Gleditsia triacanthos 'Sunburst' | 45' | 35' | Fall Color |
| Turkish Filbert | Corylus corlurna | 40' | 30' | Fruit/Nuts for Wildlife |
| Urbanite Ash | Fraxinus pennsylvanica 'Urbanite' | 50' | 40' | Fall Color |
| Yellowwood | Cladrastis kentukea | 40' | 40' | Flowers; Textured Bark |
| Park Areas - Without overhead lines | | | | |
| Common Name | Scientific Name | Mature Height | Canopy Spread | Feature |
| Accolade Elm | Ulmus japoica x wilsoniana 'Morton' | 70' | 60' | Fall Color |
| Coast Redwood | Sequoia sempervirens | 100'+ | 60' | Evergreen |
| Dawn Redwood | Metasequoia glyptostroboides | 75' | 30' | Fall Color; Textured Bark |
| Douglas Fir | Pseudotsuga menziesii | 100'+ | 60' | Evergreen |
| Oregon White Oak | Quercus garryana | 65' | 40' | Fruit/Nuts for Wildlife |
| Western Hemlock | Tsuga heterophylla | 100'+ | 40' | Evergreen |
| Western Red Cedar | Thuja plicata | 100'+ | 30' | Evergreen |

Appendix C

Plant and Non-Plant Alternatives to Lawn



Plant Alternatives to Lawn

Name: Creeping Juniper / Blue Rug Juniper

Type: Conifer Ground Cover

Description: One of the finest trailing junipers having a uniform, full centered growth habit with intense silver-blue evergreen foliage. Excellent groundcovers or cascading over walls. Easy to care for.

Water Requirements: Low, drought resistant, needs water to establish, occasional water, and during extreme heat.

Size: Spreads low in height, to 3-7 ft wide, can be maintained by trimming / edging.

Walkable: Yes, can handle moderate – high foot traffic



Source : <http://www.monrovia.com/plant-catalog/plants/1677/blue-rug-juniper/>

Name: Kinnikinnick, Manzanita
(*Arctostaphylos uva-ursi*)

Type: Shrub, Groundcover

Description: This slow-growing ground cover is one of the best all-around native evergreen shrubs. Used in a majority of City of Beaverton's landscapes because of its hardiness, beautiful displays of flowers and berries, low maintenance and they look good year-round. A mat-forming evergreen shrub producing lovely pink flowers that later turn into red berries.

Water Requirements: Low

Size: 3-5 inches in height, can spread to 4 feet

Walkable: Yes, can handle moderate – high foot traffic



Name: Siberian Cypress
(*Microbiota Decussata*)

Type: Evergreen Shrub
Groundcover

Description: This very low growing, wide spreading shrub has a juniper-like appearance with bright spearmint green, feathery, scale-like foliage that develops a brown-purple hue in cold weather. A graceful, yet hardy evergreen that is well-suited for use in rock gardens or massed as lush, easy-care groundcover.

Water: Once established, needs occasional watering - more in extreme heat.

Size: Moderate growing; reaches 18 in. tall, spreading 6 ft. wide or more.

Walkable: Yes, can handle moderate – high foot traffic



Name: Creeping Myrtle (*Vinca Minor*)

Type: Ground Cover

Description: Evergreen groundcover with shiny green leaves borne in pairs on long, arching stems. Star-like, 1-inch-wide blue flowers bloom for one month in spring. Cultivars include 'Bowles,' which blooms sporadically throughout the growing season, and variegated vinca, with creamy white-and-green leaves.

Water: Low-moderate watering needs

Size: Creeping myrtle is a fast-spreading, 4- to 8-inch-tall

Walkable: Can handle low-moderate foot traffic



Source : <http://www.monrovia.com/plant-catalog/plants/2218/bowles-common-periwinkle/>

Name: Blue Star Creeper (*Isotoma Fluviatilis*)

Type: Ground Cover

Description: A wonderful creeping perennial for filling the edge of a pond or moist landscape. Tiny green leaves form a dense, low mat between stepping stones, under shrubs, and around ponds and decks. Tiny light blue star-shaped flowers cover the plant in spring.

Water: Requires evenly moist soil-water weekly or more often in extreme heat.

Size: Creeping grower to 2 to 4 in. tall, spreading to 12 to 18 in. wide.

Walkable: Can handle low-moderate foot traffic



Name: Woolly Thyme (*THYMUS PRAECOX PSEUDOLANUGINOSUS*)

Type: Ground Cover

Description: Durable perennial with aromatic leaves, perfect for filling between stepping stones or as a water-wise ground cover. Creates a low, lush mat of soft foliage. Tuck in to pots to trail over the edges. Showy pink flowers attracts butterflies. Herbaceous.

Water: Water regularly, when top 3 in. of soil is dry.

Size: Slow grower to 3 in. tall, 12 in. wide.

Walkable: Can handle moderate foot traffic





Non-plant Alternatives to Lawn

Description: Brown Bark Nuggets (thicker than traditional bark dust), **OR** River Rock.
If this option is chosen, weed barrier is required underneath.

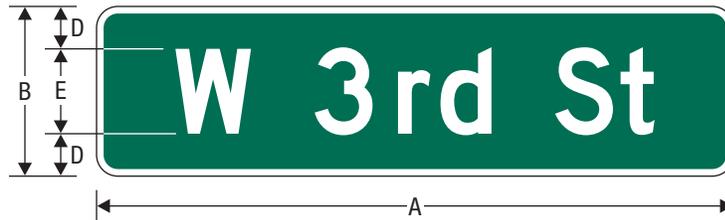
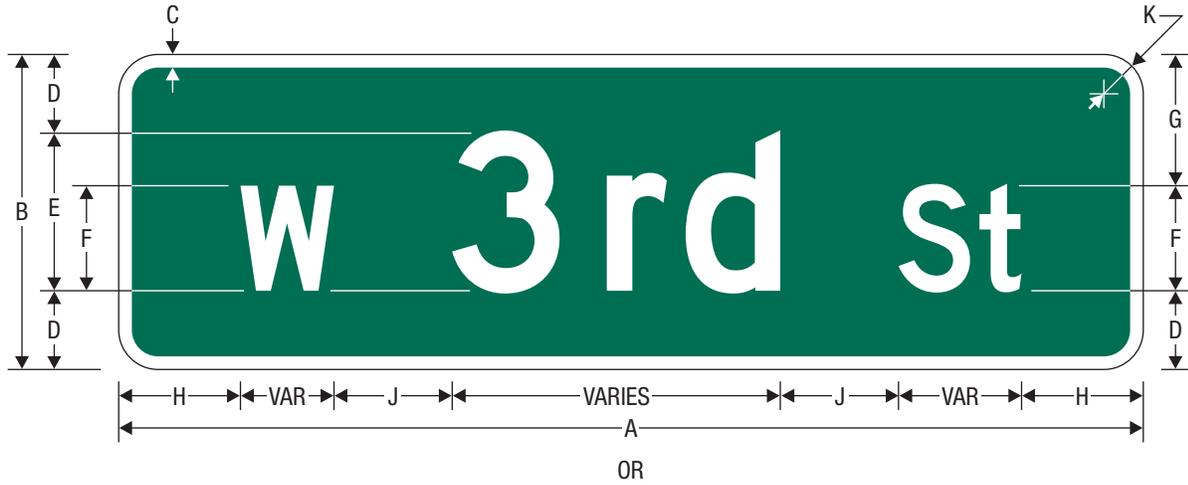
Pros: inexpensive, easy to maintain

Cons: Weeds will eventually grow above barrier, will have to be tended to on an annual basis ... area will need to be re-mulched every 3-5 years



Appendix D

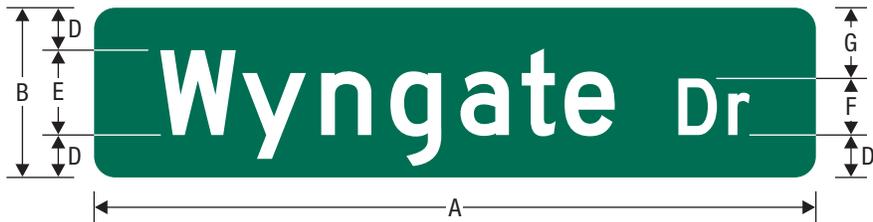
MUTCD Design Details



D3-1 (Sheet 1 of 3)
 Street Name Sign



D3-1 – PRINCIPAL LEGEND WITH DESCENDING STROKES

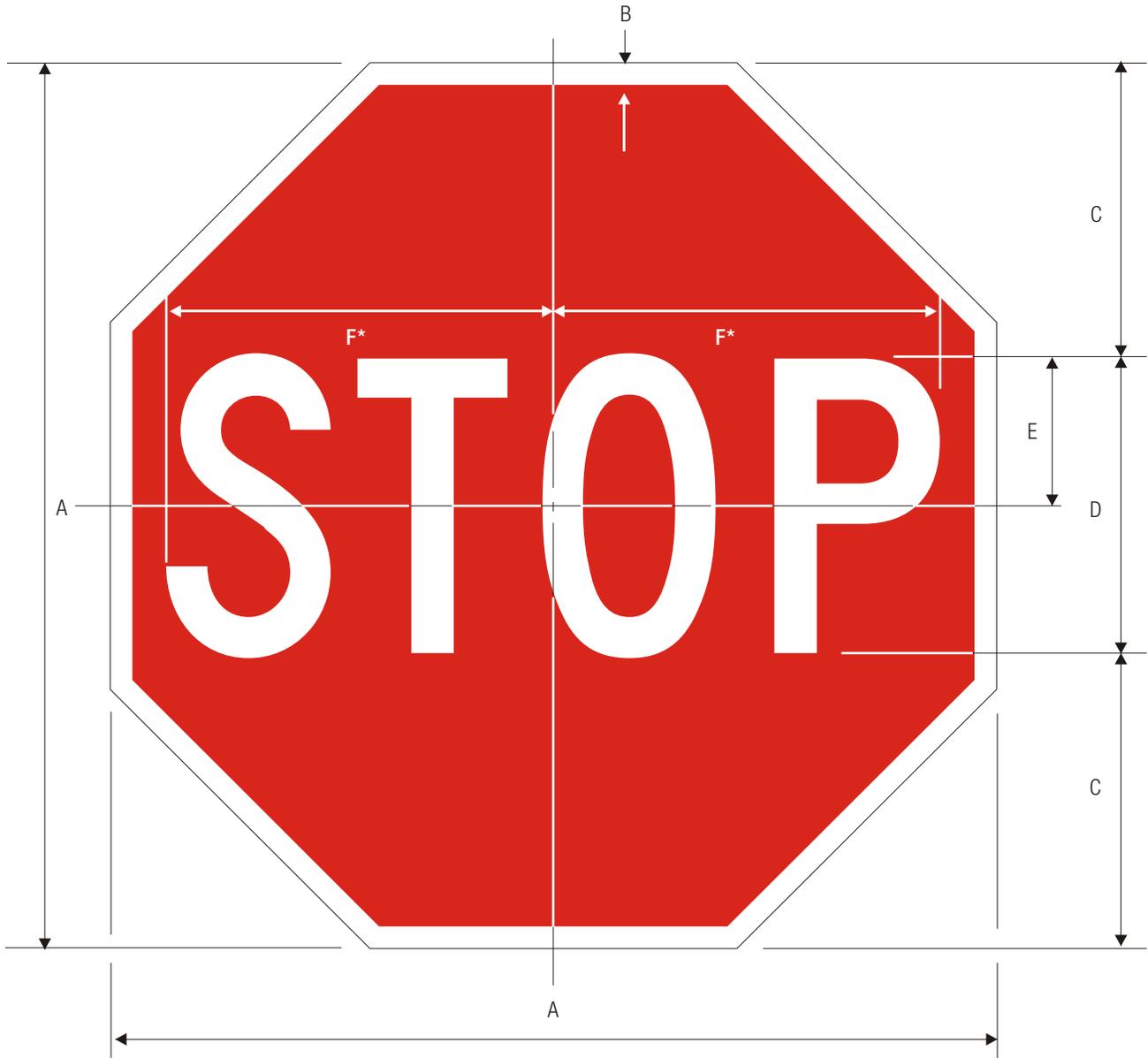


D3-1 – WITHOUT BORDER, PRINCIPAL LEGEND WITH OR WITHOUT DESCENDING STROKES

C

| A | B | C | D | E | F | G | H | J | K | L | M | N |
|-----|----|-------|---|------|--------|------|------------|-----|-------|------|------|------|
| VAR | 8 | 0.375 | 2 | 4 D | 3 D | 3 | 3 (MIN) | 3 | 1 | 1.75 | 2.25 | 2.75 |
| VAR | 12 | 0.5 | 3 | 6 D | 4 D | 5 | 4.5 (MIN) | 4.5 | 1.5 | 2.75 | 3.25 | 4.75 |
| VAR | 18 | 0.75 | 5 | 8 D | 5.33 D | 7.67 | 5.33 (MIN) | 6 | 1.875 | 5 | 5 | 7.67 |
| VAR | 24 | 1 | 6 | 12 D | 8 D | 10 | 9 (MIN) | 9 | 2.25 | 5.5 | 6.5 | 9.5 |

COLORS: LEGEND, BORDER – WHITE (RETROREFLECTIVE)
 BACKGROUND – GREEN (RETROREFLECTIVE)
 BACKGROUND (ALTERNATE) – BLUE OR BROWN (RETROREFLECTIVE)

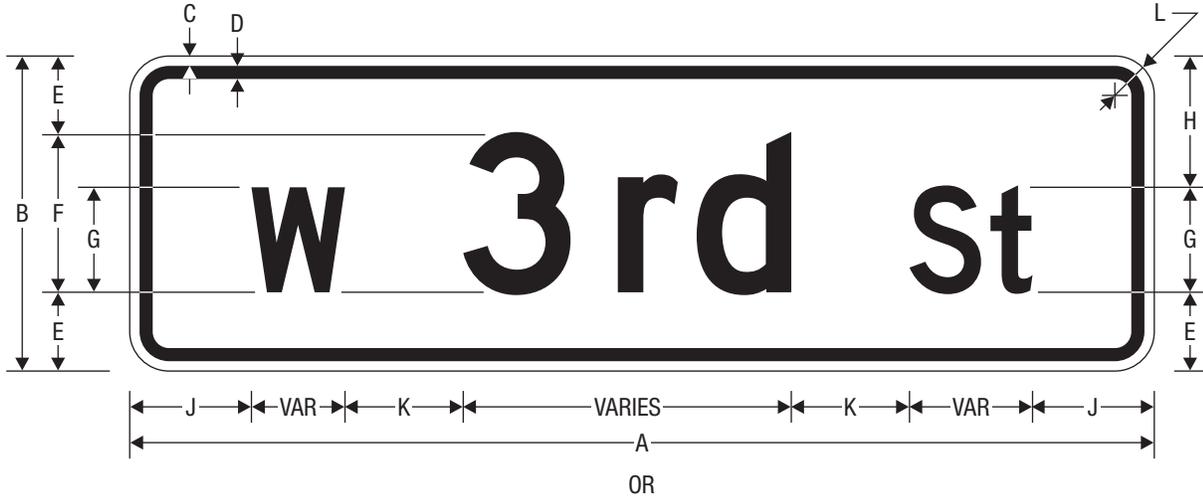


R1-1
STOP

*Reduce spacing 40%

| A | B | C | D | E | F |
|-------------|------|----|------|---|------|
| 18 | .375 | 6 | 6 C | 3 | 7.75 |
| 24 | .625 | 8 | 8 C | 4 | 10 |
| C 30 | .75 | 10 | 10 C | 5 | 12.5 |
| 36 | .875 | 12 | 12 C | 6 | 15 |
| 48 | 1.25 | 16 | 16 C | 8 | 20 |

COLORS: LEGEND — WHITE (RETROREFLECTIVE)
BACKGROUND — RED (RETROREFLECTIVE)



D3-1 (Sheet 2 of 3)
 Street Name Sign
 (ALTERNATE COLOR ARRANGEMENT)

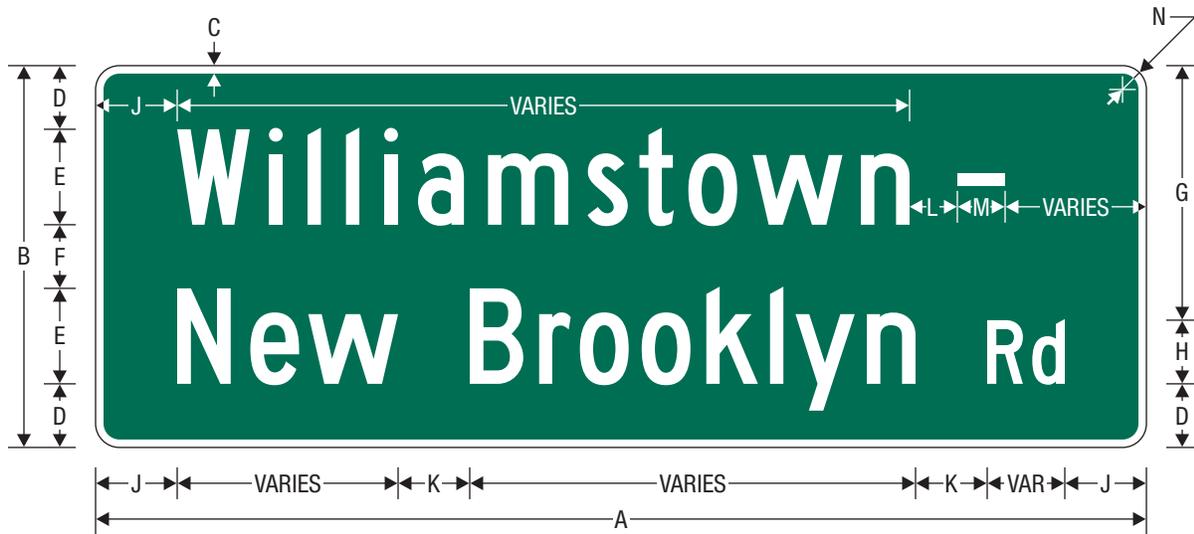


D3-1 – PRINCIPAL LEGEND WITH DESCENDING STROKES
 (ALTERNATE COLOR ARRANGEMENT)

C

| A | B | C | D | E | F | G | H | J | K | L | M | N | P |
|-----|----|-------|-------|---|------|-----|----|------------|-----|-------|-----|-----|-----|
| VAR | 8 | 0.25 | 0.375 | 2 | 4 D | 3 D | 3 | 3 (MIN) | 3 | 1 | 1.5 | 2.5 | 2.5 |
| VAR | 12 | 0.375 | 0.5 | 3 | 6 D | 4 D | 5 | 4.5 (MIN) | 4.5 | 1.5 | 2.5 | 3.5 | 4.5 |
| VAR | 18 | 0.5 | 0.75 | 5 | 8 D | 6 D | 7 | 5.33 (MIN) | 6 | 1.875 | 4.5 | 5.5 | 6.5 |
| VAR | 24 | 0.625 | 0.875 | 6 | 12 D | 8 D | 10 | 9 (MIN) | 9 | 2.25 | 5 | 7 | 9 |

COLORS: LEGEND, BORDER – BLACK (NON-RETROREFLECTIVE)
 BACKGROUND – WHITE (RETROREFLECTIVE)



D3-1 (Sheet 3 of 3)
 Street Name Sign

C

| A | B | C | D | E | F | G | H | J | K | L | M | N |
|-----|----|-------|------|------|-----|-------|--------|------------|-----|---|---|-------|
| VAR | 15 | 0.375 | 2.25 | 4 C | 2.5 | 9.75 | 3 C | 3 (MIN) | 3 | 2 | 2 | 1 |
| VAR | 24 | 0.5 | 4 | 6 C | 4 | 16 | 4 C | 4.5 (MIN) | 4.5 | 3 | 3 | 1.5 |
| VAR | 33 | 0.75 | 5.5 | 8 C | 6 | 22.17 | 5.33 C | 5.33 (MIN) | 6 | 4 | 4 | 1.875 |
| VAR | 48 | 1 | 8 | 12 C | 8 | 32 | 8 C | 9 (MIN) | 9 | 6 | 6 | 2.25 |

COLORS: LEGEND, BORDER — WHITE (RETROREFLECTIVE)
 BACKGROUND — GREEN (RETROREFLECTIVE)
 BACKGROUND (ALTERNATE) — BLUE OR BROWN (RETROREFLECTIVE)