

Basis of Design

This section applies to underground storm drainage systems.

Background

- The University storm drains located east of Montlake Boulevard, and about half of the University storm drains west of Montlake Boulevard, flow to Union Bay. The remaining University storm drains flow to Metro storm sewers and Metro combined sewers. Much of the area between Columbia Road to Snohomish Lane drains to Portage Bay via the Metro overflow pipe from the Metro “University Regulator Station”. Refer to University drawing 805RU-02 for more information.
- Refer to University drawings 875RU-1 through 875RU-17 for existing utilities. The above drawings are updated regularly, but are schematic and may not be accurate or complete.

Design Criteria

- Design and install storm sewers and appurtenances in accordance with WSDOT/APWA Standard Specifications.
- Provide engineering calculations used to size the piping.
- Bury mains with at least 24 inches of cover from finish grade to top of pipe. Use Seattle aggregate No. 9 for pipe bedding. Refer to the section on earthwork for backfill requirements.
- Use 6-inch or larger diameter pipe.
- Design storm drains to handle a 25-year, 24-hour peak flow.
- Do not use lift stations to pump storm water.
- Provide manholes every 300 feet or less.
- Provide a manhole, full-sized clean-out, or catch basin at changes in direction or diameter.
- Install clean-outs at connections to buildings and ensure that an electrical receptacle is available within 100 feet.
- Use 54-inch diameter manholes unless approved by University staff.
- Refer to Utility Corridor Arrangement drawing (see Roadways section) for piping placement under roadways.
- Backfill around catch basins with CDF.

Design Evaluation

The following information is required to evaluate the design:

- Programming Phase: Statement of design intent.
- Schematic Phase: Drawings showing existing utilities and a narrative material and system description.
- Design Development Phase: Demolition plans, utility plans showing new and existing utilities, utility details, and an outline specification.

- Construction Document Phase: Complete plans and specifications, including the following:
 - 1) Pipe sizes, routing, points of connection, trench and bedding details, connection and joint details, manhole and catch basin plans and sections, clean-out details, and building penetration details
 - 2) Plan(s) showing all existing underground tunnels and utilities (power, communications, gas, water, storm drain, sanitary sewer, and street lighting). A survey drawing may be adequate for this purpose, providing it has been reviewed to ensure that all utilities are included and that each utility is clearly distinguishable from other drawing information.
 - 3) Invert elevations at the inlet and outlet of each catch basin or manhole, at building connections, and at changes in grade, alignment, or pipe size
 - 4) Grate and cover elevations
 - 5) Pipe slopes
 - 6) For projects where the utility plans are an assembly of multiple sheets, provide a simplified composite utility plan showing all existing and new utilities on one sheet.
 - 7) Drawings and specifications of all on-site storm water detention ponds and landscape features.

Construction Submittals

- Provide standard industry submittal requirements.

Related Sections

- Facilities Services Design Guide - Earthwork
- Facilities Services Design Guide - Roadways
- Facilities Services Design Guide - Waste & Drains

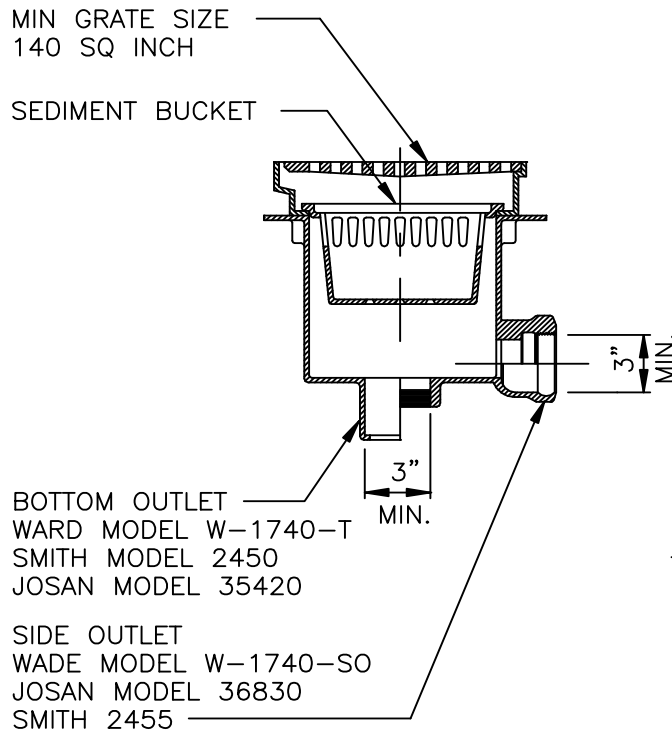
Products, Materials and Equipment

- All products, materials, and equipment shall conform to WSDOT/APWA Standards.
- Piping: SDR 35 PVC pipe per ASTM D3034 for sizes 12 inches in diameter and below, and reinforced concrete pipe per ASTM 67 for sizes above 12 inches in diameter. Exception: Use ductile iron pipe, or ductile iron sleeve, where high surface loads exist, under roadways, and where minimum cover cannot be achieved.
- Pipe connections: Use fittings made of the same material as the connecting pipe. Use an appropriate adapter when changing materials (e.g. when penetrating a concrete manhole with a PVC pipe).
- Exterior below grade pipe penetrations: Link-Seals, or approved substitution
- Manhole lids: Ductile iron, permanently marked "DRAIN" or "STORM". Do not use locking lids.

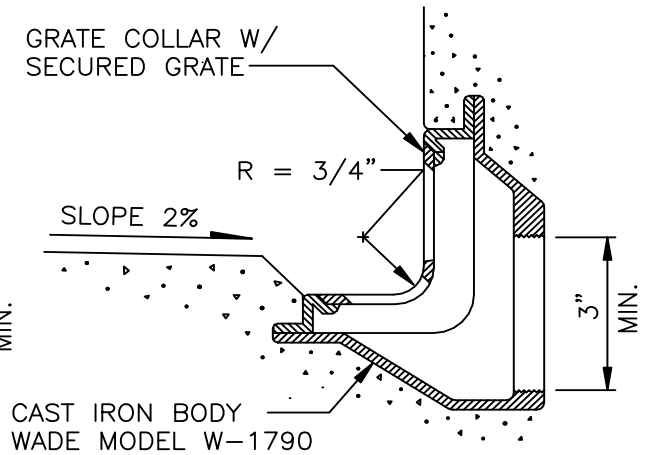
Installation, Fabrication and Construction

- Install and clean storm drains in accordance with WSDOT/APWA Standard Specifications.
- Refer to the following University drawings:
 - 1) Area Way Drain, Bldg., Ramps, Balcony, and Landing
 - 2) Roadway & Utility Corridor Arrangement (see Roadways section)
- Refer to following City of Seattle (COS) Standard Plans:
 - 1) Catch Basin (COS 240a); install inlet pipe invert at least 6 inches above outlet pipe invert.
 - 2) Catch Basin (COS 242); install inlet pipe invert at least 6 inches above outlet pipe invert.
 - 3) Catch Basin and Inlet Installation (COS 260b)
 - 4) Catch Basin and Inlet Installation (COS 260a)
 - 5) Typical Catch Basin Connection (COS 261)
 - 6) Inlet (COS 252)
 - 7) Inlet (COS 250)
 - 8) Inlet Frame (COS 262)
 - 9) Inlet Frame (COS 263)
 - 10) Inlet Frame & Grate (COS 264)
 - 11) Manhole (COS 201a)
 - 12) Drop Connection (COS 233)
 - 13) 8" Clean-out (COS 280)
 - 14) Typical Trench Section (COS 284)
 - 15) Pipe Bedding (COS 285)

END OF DESIGN GUIDE SECTION



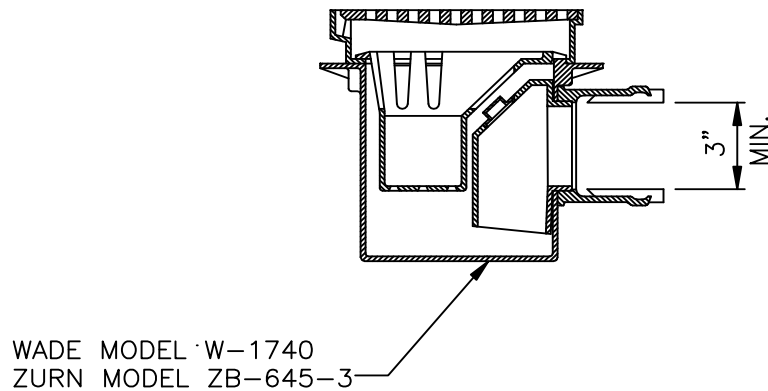
FLOOR DRAINS W/ SEDIMENT BUCKET



NOTES :

1. GRATE COLLAR WIDTH 8 3/8"
2. BODY WIDTH 11 3/8"

SIDE WALL DRAIN



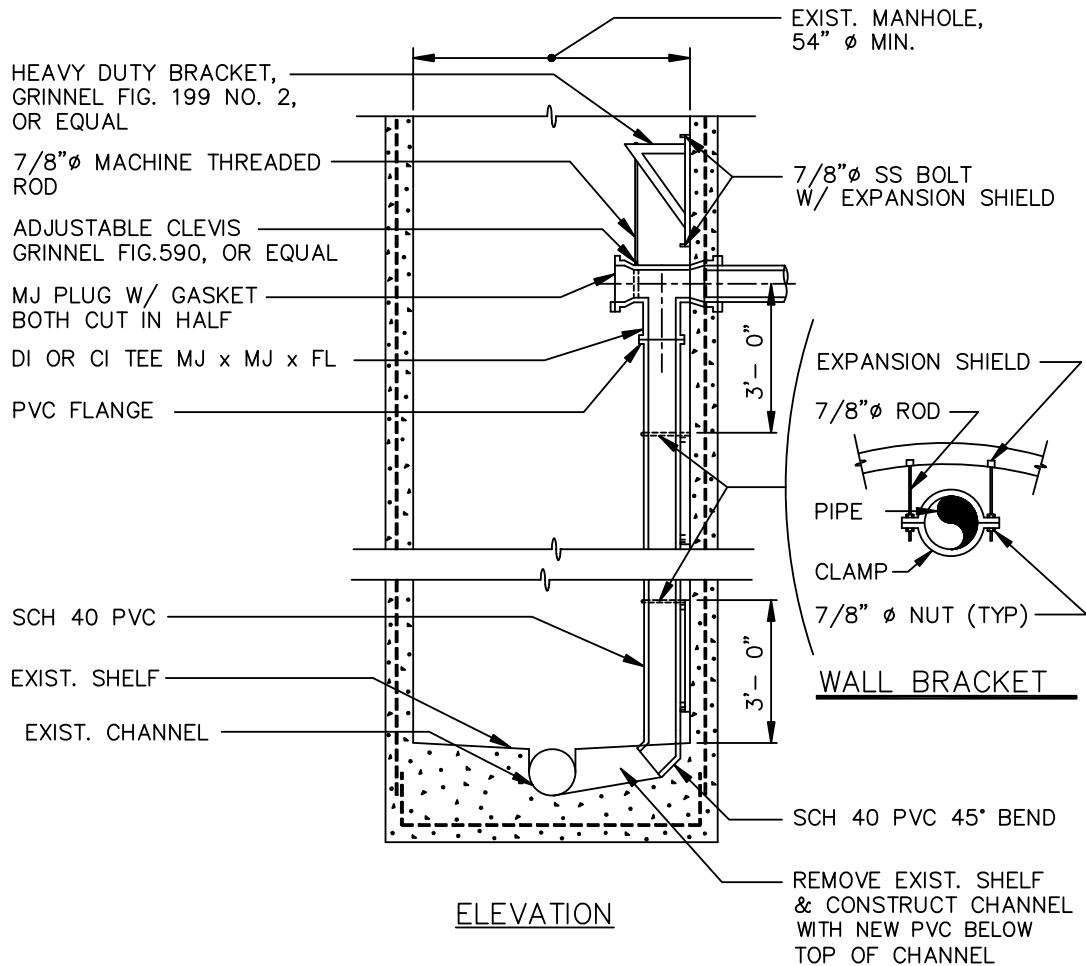
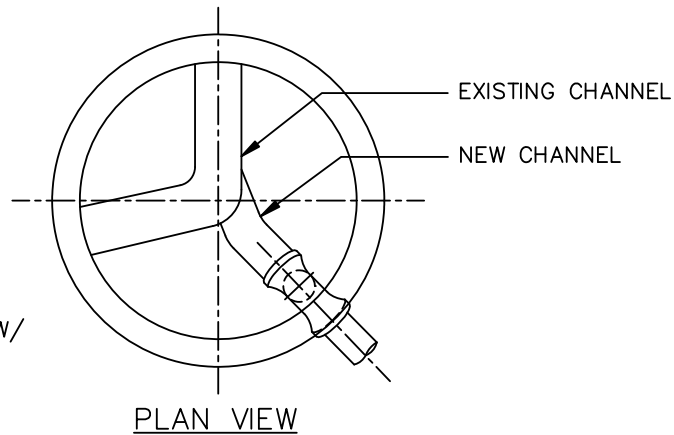
FLOOR DRAINS W/ TRAP

SD-C-37

Area Way Drain at Buildings, Ramp, Balconies & Landings

NOTE:

AFTER INSTALLATION ALL SHUCKLE BOLTS, NUTS & BRACKETS TO BE COATED W/ TWO COATS OF ASPHALT ROYSTON ROSKOTE #612XM OR APPROVED EQUAL.



SD-C-64

54" or Larger Drop Manhole Interior