CHECKLIST
C1
Revised 11/23/2020

Sewer Line Extension Design Checklist

Pierce County

DISCLAIMER—This checklist is provided to Consulting Engineers for the express purpose of assisting them in compiling sewer line extension design plans for submittal to Pierce County Planning & Public Works. This checklist is merely a guide to assist the design engineer in providing the minimum information required for plan submittal. This checklist should be used in conjunction with the sewer line extension standard plans in completing your design. The complexity of your design may require additional information not included on this checklist. This checklist may be revised from time to time and you should make sure you have the most recent copy prior to compiling a design.

Note: Resubmittals over two reviews may be charged an additional fee of $450.00

If you have any questions regarding this checklist, please contact our office at (253) 798-2737.

Project/Development Name: _____

A. Submittals

1. Plans must be submitted electronically by uploading PDF files at: https://pals.piercecountywa.gov/palsonline/#/dashboard. This checklist does not need to be submitted.
2. Separate sanitary sewer line extension applications and plans are required if the Applicant chooses to phase the construction of the project.
3. Submit a complete, itemized, stamped Engineer's Construction Cost Estimate for all the sanitary sewage facilities to be constructed within the existing public right-of-way and existing public sanitary sewer easements. Do not submit bond or assignment of fund documents with the initial submittal.
4. If there are off-site or on-site Public Sanitary Sewer Easements required, submit the name (and title, if the owner is a company) of the individual(s) empowered with signing easement documents for the property owner(s), and the legal description of the easement and graphic drawing of the easement on letter or legal size paper. The County will draft the easement document for the owner's signature. Off-site public easements must be executed and recorded prior to plan approval. On-site public easements must be signed by the property owner(s) and approved by the Development Engineering Section prior to plan approval.

   On-site public easements for sewer line extensions that are being installed to serve proposed lots in a future formal plat or binding site plan, may be executed on the face of the recorded formal plat or binding site plan document with the addition of specific easement dedication notes. Include the entire road width, if applicable.
5. If there are off-site or on-site Private Sanitary Sewer Easements required, submit the draft private easement documents for our review prior to execution and recording with the Pierce County Auditor's Office. If the proposed private sewer line will serve more than one existing parcel, a draft Perpetual Reciprocal Easement, Mutual Maintenance Agreement and Covenant Running with the Land must be submitted for our review and approval prior to execution and recording with the Pierce County Auditor's Office. Off-site private easements must be executed and recorded prior to plan approval.
6. If the Applicant proposes to enter into a Latecomers Agreement with the County in accordance with PCC 13.10, the agreement must be executed after plan approval but before SWLE permit issuance. Please see the form F6, "Latecomers Agreement Checklist," for additional submittal requirements.

A. Submittals

7. Will existing/proposed stubs serve all lots or structures by gravity? If not, private commercial or residential pump plans and specifications must be incorporated into the sewer line extension plans. For additional submittal requirements see Residential Pump Design Checklist (C4).
8. Plans must be sealed and signed by an engineer licensed in the State of Washington.
9. All sanitary sewer line extensions serving residential development must be public sanitary sewers.

   The ownership of sewer line extensions serving commercial development will be determined on a case-by-case basis.

B. Drafting

NOTE: all scale and size requirements shown below apply to an electronic drawing file scaled to fit a 22" x 34" (D-size) sheet of paper.

1. Sheets must be numbered consecutively (1 of 3, 2 of 3, etc.) The project name, range, township, section and the type of sewer line extension (public or private) must appear at the top of each sheet.
2. Include a cover sheet (if necessary) showing entire property and location of improvements at a standard engineering scale. Clearly label existing and proposed manholes with manhole numbers.
3. Include a Vicinity Map showing the project location. Provide a north arrow. Vicinity maps must include a major arterial (e.g., SR512, I-5, Canyon Road East, etc.)
4. Approval signature block: five inches wide and located in the upper right hand corner of each sheet.
5. Place the note "Plan approval expires three (3) years from the date of approval" inside or under the approval block.
6. Each plan sheet must have an engineering scale and north arrow which points to the top, left or right of the sheet.
7. Pierce County Datum: Elevations and contours must be based on NAVD 88. Each sheet with a plan or profile must have the note: "Datum based on NAVD 88." Clearly state which datum is used for the design.
8. Pierce County Benchmark or Temporary Benchmark: Location, description, and elevation must be shown on the plans. Show Pierce County Benchmark Reference Number if a Pierce County benchmark is used.
9. Show bearings and distances for all existing property lines. Show parcel number(s) and property lines of the existing and adjacent parcel(s).
10. Existing and proposed adjacent roads: Include edge of pavement, utilities, shoulder ditch, R/W centerline, etc. and clearly identify the road as public or private. Provide a typical cross section of new roads and a restoration detail for existing roads.
11. Project description: include project name, address and parcel number(s), address of parcel owner, number of units, buildings, lots, seats, employees, etc., and proposed use for each lot/tract (SFR, Duplex, Mobile Home, storm tract, etc.)
12. Show all existing structures on the site and label whether they will remain or be demolished. All plumbed structures that will remain must be connected to the sewer in conjunction with the sewer line extension.
13. Include the latest Pierce County Planning and Public Works Standard Sewer Construction Notes for sewer line extensions on the plans.

B. Drafting

14. Sewer design plans and profiles for public sanitary sewer mains must be drawn at the scales of 1"=20' to 1"= 50' horizontal. All private sewer mains may be drawn at any legible engineering scale.
    Horizontal and vertical scales must be complementary (i.e., 1"= 50' and 1"= 5', 1"= 20' and 1"= 2', etc.)
15. Color text and graphics are not allowed.
16. All symbols and line types shown on the drawings must be shown and described in a legend. Symbols and line types should match those shown on the Sewer Line Extension Standard Plan.
17. Text must be legible with no overlapping of text. Minimum text height is 0.08 inches. Minimum line width is 0.005 inches.
18. Hatching patterns (lines or dots) must have high transparency.
19. All designs must be on plan and profile sheets only. Separate plan sheets and profile sheets will not be accepted. Profile views must be aligned under the corresponding plan views.
20. Match-lines at manholes are preferred, however, as long as the pipe and manhole data are shown, matchlines should not be restricted to be at manholes only.
21. Show all existing and proposed manholes, cleanouts and sewer lines located on or adjacent to parcel shown.

    Existing and proposed private manholes must be named with the following convention:

    "SSMH #(permit number)-##"
    For example, private manhole #4 of SWLE 409235 should be labeled as "SSMH #409235-04"
    Letters are not allowed in the manhole numbering sequence (e.g., "SSMH #409235-4A").

    Existing and proposed public manholes must be named with the following convention:

    "SSMH #(Assigned number)"
    For example, public manhole #10983 should be labeled as "SSMH #10983".
    Cleanouts should be labeled as "SSCO" instead of "SSMH".

    Proposed public manhole numbers will be assigned by the plan reviewer after the proposed alignment has been accepted.
22. Show the length, diameter, type (i.e., PVC SDR 35, DIP CL 52, etc.) and slope of sewer pipe.
23. Show the sewer pipe diameter, length and type on the plan view. Include arrows at the manholes indicating the direction of flow of each line.
24. Show existing sewer lines with dashed lines, and proposed sewer lines with solid lines. Match the line type with the legend.
25. Pipe lengths and slopes must be measured from inside wall of manhole to inside wall of manhole, not center-to-center.
26. All existing and proposed utilities must be shown on plan and profile views. Include pipe size for water, storm and gas lines.
27. Show de-emphasized storm sewer catch basins and pipes in the plan and profile views with CB stationing and numbering. The profile view must also contain the catch basin rim and invert elevations, and pipe diameter(s). If clearance is an issue, pipe type is also required. Catch basin information must be field verified and a note indicating as such included on the drawings.

B. Drafting

28. Show the existing and proposed topography for the entire property using two foot contour intervals labeled with the elevation. If the property is flat, provide spot elevations. If the plan requires a cover sheet, the existing topography must be shown on the cover sheet and the proposed topography must be shown on the design sheets. Existing and proposed grade elevations along the centerline of the sewer must be shown at 50 foot intervals in the profile view.
29. All existing and proposed public and private off-site sewer easements must be shown on the plans along with the respective Auditor's Fee Numbers (AFN). Show bearings and distances of all sewer easement lines.
30. All existing and proposed public and private on-site sewer easements must be shown on the plans prior to plan approval.
31. Show the bearings and distances of existing and proposed sewers within existing and proposed easements as well as the easement boundaries.
32. The manhole rim and invert elevations and ladder location at the point of connection must be field verified prior to the submittal of the plans and shown on the plans as "Field Verified." If connection is between two existing manholes, the invert and rim elevations of the upstream and downstream manholes are required as well as the distance of the proposed connection point from both the upstream and downstream manholes. Saddle manholes are not acceptable.
33. Show the manhole number, rim elevation, manhole diameter, stationing, offset, special notes (i.e., "With Watertight Lid" or "HDPE Manhole") all invert elevations with directions, and pipe sizes of the sewer pipes entering and leaving each manhole or cleanout. Only manhole numbers, manhole diameter, stationing, offset, and special notes are required to be shown in manhole labeling in the plan view.
34. Side sewer stub locations must be shown on the plans and stationed from the nearest downstream manhole, or per the centerline of road stationing. A table may be used to consolidate the proposed stub location stationing, but a lot's stub location table must be shown on the same sheet as the lot. Even if a table is utilized, as-built locations of the stubs must be shown in the specified "bubble" format shown on the As-built Standard Plan. A minimum ½-inch diameter blank circle must be provided on each lot as a placeholder for the as-built stub location ("bubble") information. Side sewer stubs must connect perpendicular to the main, have no horizontal bends and have not more than one vertical bend in the public right of way. A building sewer may not terminate under roadway pavement.
35. Show the entire lot, lot number, and stub bubble for each lot on the plans.
36. Note the name of the licensed surveyor/engineer who provided the field topography on the plans. Include the date when the survey was completed.
37. Show all domestic wells within the plat, and on adjacent property within 100' of a sewer. Indicate if the well will remain or be decommissioned. If the well is to remain, label as Group A, B, or individual and show a 100' and 50' protective radius.
38. Provide details (standard or otherwise) for which reference has been made on the plans.

C. Design

1. Provide a 0.06' drop between invert(s) in and invert out of each manhole (same size pipe) for manholes without concrete channels (i.e. GU-lined). Manholes placed over existing mains must match the slope of the pipe. New connections to existing manholes with concrete channels must have a 0.10' drop for similar diameter pipes. Provide a minimum of 90 degrees between inlet and out pipes. Except with drop structures or as approved by Development Engineering.

C. Design

2. Where two or more pipes of dissimilar diameter meet at a manhole, use the 0.8 depth rule to determine the drop across the manhole:
   - Invert Elevation out + (0.8 x Diameter out) – (0.8 x Diameter in) = Invert Elevation in
   - If the larger line is larger than 15 inches in diameter, then match crowns of the two pipes.
3. Show the 100-year flood plain elevation on plans. The rims of all manholes and vaults must be set a minimum of one (1) foot above flood plain elevation. If the project is not within a 100 year flood plain, provide a statement on the plans.
4. Manholes must not be located in low points of vertical curves or curb flow lines.
5. Straight vertical and horizontal alignment between manholes is required.
6. Manholes must be installed at all changes in grade, changes in alignment, main intersections and road intersections. Manholes located on interceptor sewers (15" in diameter or larger), must have protective coatings installed per Pierce County Specifications.
7. Drop connections for concrete manholes: All drop connections must be GU inside drop structures. The minimum height of a drop is 4 feet from drop invert to channel invert. Only one drop structure per 48 inch diameter manhole is allowed unless prior written authorization is given by the Sewer Division. Drop structures must be within 3 feet, but no closer than one foot horizontally from a ladder. A minimum of a 54-inch diameter manhole is required if two inside drop structures are proposed. For HDPE manholes refer to the Pierce County Sanitary Sewer Standard Details Manual and Specifications.

   Show both top and bottom invert elevations for every drop structure.
8. The field verified location of the existing ladder must be shown at the point of connection into the existing manhole. If there is a conflict, the Applicant's Engineer must identify on the plans how the problem will be resolved.
9. On public and private systems, manholes are required at the terminus of all sewer mains unless otherwise approved by the the Development Engineering Section.
10. Maximum length of a sewer main (manhole to manhole) is determined by the following equation:

    Max. length = 475 ft – depth (rim to invert) of the deeper of the upstream or downstream manholes.
11. Minimum diameter for sewer mains is 8 inches (nominal).
12. For 8-inch diameter sewer mains that will serve only single-family residences and duplexes (this project and all future projects within the basin) the minimum slope must not be less than 0.50%. For 8-inch diameter sewer mains for projects that will serve other than single-family residences and duplexes, the minimum slope is 1.00% unless the engineer can provide calculations proving that a minimum self-cleaning velocity of 2 ft/sec can be obtained at less than 1.00% at full build-out of the project and/or tributary sewer basin. In no case will slope less than 0.40% be approved or accepted for 8-inch diameter sewer mains. For further information, see the "Calculation of Minimum Pipe Slopes to Obtain Self-Cleaning Velocities in Sanitary Sewers" handout. Calculations must be stamped, signed, and dated by a Professional Engineer licensed in the State of Washington.
13. Over-sizing pipes to obtain lower minimum slopes is not acceptable.
14. Proper location of all sewer manholes in existing or proposed public ROW is 5 feet south and west of centerline of the public road right-of-way.
15. Provide a roadway restoration detail on the plans. Limits of road restoration must be shown on the plan view. Existing ADA sidewalk ramps adjacent to limits of road restoration that do not meet standards shall be rebuilt to current standards. This may include the addition of double sidewalk ramps, revision of crosswalk alignment, revisions to traffic signals plans where applicable.

C. Design

16. Public sewers require at least 5 feet of cover for any type of pipe. Private sewers require a minimum of 3 feet of cover. Cover must be measured from the top of pipe.
17. Pipes with cover greater than 20 feet but less than 25 feet must be PVC SDR21. Pipes with cover greater than 25 feet must be ductile iron CL 52 or C900, with the appropriate DR rating for the application. Cover must be measured from the top of pipe.
18. Any ductile iron pipe used must be Class 52 and lined per Pierce County Specifications. All sewers to be constructed in fill areas must be DIP.
19. Transitioning from one pipe material or classification to another between the manholes will not be allowed except where required for inside drop structures.
20. Sanitary sewer lines and water main crossings:
    a. The standard minimum vertical separation for water lines is 1.5 feet above the sanitary sewer line. Separation must be measured from the outer walls of the pipes.
    b. Contact Development Engineering for unusual circumstances. They will determine if a reduced minimum vertical separation will be allowed for less than 1.5 feet but not less than 0.75 feet. Additional provisions will be required.
21. Sanitary sewer lines and utility crossing other than water lines:
    a. The standard minimum vertical separation for utilities other than water lines is 1.5 feet from the sanitary sewer. Separation must be measured from the outer walls of the pipes.
    b. If concrete encasement of the sanitary sewer is provided, then a reduced minimum vertical separation of 0.75 feet will be allowed. The concrete encasement must extend 10 feet on each side of the crossing. Class 52 ductile iron pipe may be used for the sanitary sewer in lieu of concrete encasement provided that there is no transitioning to other pipe materials between manholes.
22. All utilities crossing sewer mains and/or side sewer stubs must have the proper vertical clearances. Are there any side sewer conflicts with other utilities? Check for water lines, storm drainage systems to include percolation systems, utility vaults, etc.
23. Sewer main stationing must be tied to the centerline stationing of the existing/proposed public right-of-way or private road. Stationing equations are required at all intersections. All station lines must be labeled with bearings and distances.
24. Sewer mains with 20% slope or greater must be anchored securely with concrete anchors. The Applicant's Engineer must provide details and calculations to justify sizing and spacing of pipe anchors.
25. Minimum side sewer depth at property lines is 5 feet for gravity systems. Lots that are questionable for gravity service must indicate minimum finished floor elevations on the plans to ensure that gravity service can be obtained. All side sewers must be located a minimum of 10 feet from an adjoining property line unless adequate private sanitary sewer easements are provided. Side sewer depth at the property line must not exceed 8 feet unless otherwise approved by the the Development Engineering Section.
26. Gravity side sewer stubs must have a minimum 2% slope.
27. Two (2) feet minimum horizontal separation is required between pressure side sewer stubs. Two (2) feet minimum horizontal separation is required between gravity stubs on opposing sides of the sewer main. Ten (10) feet minimum horizontal separation is required between gravity side sewer stubs on the same side of the sewer main. Five (5) feet minimum horizontal separation is required between side sewer stubs and the outer wall of manholes unless the stub is connected to the manhole.

C. Design

28. Side sewer taps are not allowed to existing interceptors 18 inches in diameter or greater. Parallel sewer lines are required to provide service.

29. Force main connection into existing manholes require that the tapped manhole and the next manhole downstream have interior coatings applied per Pierce County Sanitary Sewer Specifications or use Polymer Concrete Inserts. Force main connections into new manholes require the discharge manhole and the downstream manhole to be Corrosion Resistant (HDPE or Polymer Concrete).

30. Parallel sewer and water lines must have ten (10) feet of horizontal separation (separation must be measured from the outer wall of the pipes).

31. Trench dams must be placed near the downstream end of each off-site public extension and each on-site public or private extension and on the downstream side of any crossing of streams, wetlands, drainage ditches, storm drainage ponds, infiltration trenches, or any other man-made or natural feature which may introduce surface or ground water to the bedding or backfill of the sanitary sewer trench.

32. Side Sewer Stub pipe material must match or exceed that of the mainline pipe material.

33. The maximum number of inlet pipes to a manhole is five (5). The minimum allowable horizontal angle between the centerlines of two 6-inch sewer pipes connected to the same manhole with a fiberglass invert liner is 29 degrees. The minimum angle between a 6-inch pipe and an 8-inch pipe connected to the same manhole with a fiberglass invert liner is 36 degrees. For existing manholes with concrete channels, the minimum distance between the outside edges of pipes measured along the inside wall of the manhole is 1 foot. Minimum separation between pipes in HDPE manholes must be per the manufacturer's recommendations. The angle between the centerline of all adjacent inlet and outlet pipes at HDPE manholes must be shown in the drawings.

34. 8-inch diameter stubs are required out of each proposed manhole at all public and private road intersections and where extensions may be required in the future. Stubs out of manholes at intersections must be at least as long as they are deep or as long as needed to be out of the travel lanes of the main road. Other stubs may be allowed to be only 2 feet long so as to act as a removable plug with the correct pipe type for future extension. For all main stubs the design drawings must show the diameter, slope, length, material and invert elevation at each end.

35. Sewer main extensions must be installed along the property's frontage at least as far as the road improvements required for the development, or half the property's frontage, whichever is greater.

36. Paved access is required to all existing/proposed manholes. The maximum allowable grade for access roads is 15% (12% max. if pavement other than asphalt or concrete is approved by the County). Manholes must be within the paved surface and have a minimum paved area 6 feet square centered on the manhole lid. Standard turnarounds must be provided to access roads that are either:
    a. greater than 150 feet long, or
    b. have curved alignments and are greater than 50 feet long, or connect to Interstate Highways, State Routes or major or secondary arterial roads as defined by County Ordinance 2008-19s (or principal or minor arterials as defined by FHWA 2010 in incorporated areas) and are greater than 50 feet long.

37. Manholes for dry-line sewer line extensions must have Pierce County Sewer Division access prevention bolts.

38. The minimum easement width for sewer mains is 15 feet with the main centered in the easement. The minimum public easement width on private roads shall be the entire width of the private roadway. Additional easement width may be required.

39. Off site Sewer Line Extensions must include a drainage plan with erosion control plan.

D. Low Pressure Force Main

1. A Drain Vault is required at low points of the force main such the low pressure sewer main can be completely drained for maintenance or repair. Drain vaults shall be similar to Standard Detail 5001 or 5002 without the air release/vacuum relief valve and shall be detailed on the plans.
2. Air release and/or vacuum relief valves are required at all high points in the force main unless velocity calculations are provided showing that an Air Relief Valve is not required. Calculations must be stamped, signed and dated by a Professional Engineer licensed in the State of Washington.
3. Each low pressure force main shall be limited to 20 SFR connections before discharge to a gravity system unless approved by the Sewer Division. When approved low pressure systems with more than 20 SFR connections at buildout shall be designed to provide a maximum of 8 hours retention prior to discharge to the gravity sewer system including retention time in the grinder pump basin. Calculations must be stamped, signed and dated by a Professional Engineer licensed in the State of Washington.
4. Live taps or tees on existing low pressure force mains are only allowed for a single residential grinder pump unit. Changes in low pressure force main size and connections of low pressure force mains serving more than one residential grinder pump shall be enclosed in a vault similar to Standard Detail 5004. Vaults shall be detailed on the plans.
5. Provide engineered pump and force main sizing calculations. Force main shall have velocities of at least 2 feet per second under build out conditions. Calculations must be stamped, signed and dated by a Professional Engineer licensed in the State of Washington. See Private Residential Pump Station Design Checklist for additional requirements.
6. Force main pipe material shall be HDPE DR 11 or PVC Class 200 or better.
7. At the end of the force main, install a terminal force main cleanout.
8. Thrust blocks are required at every bend in the force main. Each bend and thrust block shall be called out with pipe size, bend angle, thrust block, station, and offset. Welded HDPE or restrained joints maybe used in lieu of thrust blocks but calculations for restrained length must be provided and stated on plans. Calculations shall be stamped, signed and dated by a Professional Engineer licensed in the State of Washington.
9. Private Operation of Pumping Facilities. Pumping facilities installed on private property by and at the expense of a property owner shall be owned, operated, and maintained by the property owner. No pumping facility will be permitted to serve more than three separate dwelling units (or 3 REs) unless it contains two pumps. The private pumping facility and force main will be permitted to serve only those structures located on a single parcel of property.

   The Sewer Facility Plan for the pumping facilities must be prepared by a registered professional engineer and must be submitted to the Department for review and approval. Department approval of the pumping facilities shall not guarantee that the pumping facility will operate as designed.
10. Locate stations are required at a minimum every 1,000 feet. The location station shall have the locate wire (front and back) and a ground. A grounding rod must be installed.