

**PERKASIE REGIONAL AUTHORITY
GUIDELINES FOR DEVELOPERS AND ENGINEERS**



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Who is the Perkasie Regional Authority?

The Perkasie Regional Authority (PRA) provides water supply/distribution and sewer collection services to the Borough of Perkasie, as well as to neighboring East Rockhill Township and West Rockhill Township, and to portions of Hilltown Township. The PRA is an independent corporate instrumentality of the Commonwealth of Pennsylvania, exercising governmental, as well as private corporate power, in assisting the Commonwealth in meeting the needs of its citizens under the 1945 Pennsylvania's Municipality Authorities Act.

The Purpose of This Document

Listed in this document are suggestions and requirements of the PRA that we hope aid the Developer and Engineer in their process of meeting the needs of the developer and meeting the requirements of the municipal, county, state and federal authorities. We recognize that there are differences in the experiences among the design and operating professionals and that these experiences lead to requirements that may be more stringent or less stringent than the design professional has experienced on other projects. Our goal with this document is to supply information at the earliest opportunity so that the Engineer is not burdened with having to make multiple submittals, permit supplements or plan revisions.

The majority of this document is geared toward a land development project where new sanitary sewers and water mains are required. However, information provided in PRA specifications and details will be helpful for projects that involve only connecting a new building to existing public water and sanitary sewer facilities. The Developer of these smaller projects is also referred to the PRA Document *Rules, Regulations and Rates, Section I – Water Service, Section II – Sewer Service*.

This document is not a replacement for the statutory requirements and guidelines of local, state and federal governing entities. Nor is it a replacement for the PRA specifications, details, reference standards or the engineering application of scientific, economic, social, and practical knowledge needed to design, build and maintain water and sanitary sewer facilities.

Begin at the Beginning

Many municipalities strongly encourage the pre-submission of a sketch plan for an informal review prior to the preparation of a formal Land Development Application. This is also the point at which the PRA should be contacted. Paper copies of the existing water and sanitary sewer facilities may be available for the Developer's engineer to start the design process. Also, it may be best at this time to review the documents such as:

1. PA Department of Environmental Protection Sewage Facilities Planning Module
2. Application for Review
3. Perkasie Regional Authority Construction Agreement
4. Tapping Fee Agreement
5. Easement Documents

The Application for Review must be executed and funded prior to any review of plans other than the Sketch Plan.

Please note that Easements could range from a width of 30' or wider depending upon the depth of the utility mains, the number and spacing of mains, the soil type, the surrounding topography, site access or other concerns. Types of Easements may include General Utility Easements, Temporary Construction Easements, Access Easements, Utility Easements, etc. Easements should be one of the items discussed at a pre-sketch plan review or meeting.

Easement legal descriptions and a plot plan on 8-1/2x11 or 8-1/2x14 paper shall be submitted for review and approval. The plot plan shall show all courses, bearings and dimensions as to coincide with the written legal description. The plot plan shall also include a title block, tax map parcels numbers, dates, and revisions and be signed and sealed by the Engineer. A *.pdf copy is also required.

Other items to discuss early in the process include:

1. Bid/Estimated Cost and Construction Escrow Fund
2. Project Schedule
3. Additional-Insured Liability Insurance Requirement
4. Material Submittals for Review and Approval
5. Pre-Demolition Requirements
6. Notice to Proceed
7. Acceptance of Dedication
8. Escrow Maintenance Fund

Please note that it is the Developer's responsibility to obtain permits from the appropriate regulatory agency. PRA will need information for the ACT 537 documentation. PRA should be contacted for the Chapter 94 Report.

Specifications

The two main design documents for water main and gravity sanitary sewer construction include Standard Specifications for Perkasio Regional Authority, April 1997 and Perkasio Regional Authority Standard Construction Details. These two documents are available from the PRA or its Engineer. Electronic *.pdf copies are also available. The specification and construction details also include requirements for installation and testing.

The Standard Specifications for Perkasio Regional Authority includes many reference standards that are applicable for construction of the water and sanitary sewer systems. For potable water, these include ANSI/AWWA Standards and NSF/ANSI Standard 61. PRA also applies the ANSI/AWWA Standards to pressure sanitary sewer applications. For the construction of gravity sanitary sewer, reference standards of significance include ASTM, and PA DOT.

The pre-submission sketch plan may contain facilities or construction methods for which the PRA does not have standards developed at this time. Examples include Wells, Sanitary Sewer Pumping Stations, Water Main Booster Stations and Horizontal Directional Drilling. At this time, it is the responsibility of the Developer and Engineer to submit detailed information required for the Authority Engineer to assess the adequacy of these types of facilities and/or construction methods. The time required for this effort shall be included in the Developer's schedule.

As mentioned above, it is not the purpose of this document to replace or reiterate all the requirements of the PRA or list the standards of good engineering practice. Nor have we listed other specifications and permits that may govern aspects of the projects, such as state and federal standards governing pollution, wet lands, health and safety. The PRA Specifications and Construction Details give the Engineer a resource to help in the design and material selection for potable water and gravity sanitary sewer.

Construction Drawings

Every municipality probably has its own drawing requirements for Sketch Plans, Minor Subdivisions, Major Subdivisions or Land Development. It is not our intent for there to be two sets of plans. However, the PRA has three major needs. First, the plans and supplementary submittals need to be complete such that a comprehensive review can be completed. Second, that the plans are clear so that no misunderstanding of how the water, sewer and other utilities are to be installed. Third, that the plans (when revised for the as-built condition) can be used to mark all utilities in according to the PA ONE CALL requirements and that PRA can locate and make repairs to the water and sanitary sewer safely and economically.

Accordingly, the construction plans presented with an Application for Review shall include the following.

1. All plans shall be on 24" x 36" good quality paper with the development name included in the title block of each drawing.
2. The title page shall include a Location Map showing and labeling the adjacent streets/neighborhood.
3. The Record Plan Sheet shall include these two statements:

All public water and sanitary sewer services shall be supplied by the Perkasio Regional Authority. All public water and sanitary sewer utilities shall be designed, constructed and tested in accordance with the current version of the Standard Specifications for Perkasio Regional Authority and the Perkasio Regional Authority Standard Construction Details. Design, construction and testing is subject to the review and approval of the Authority. This includes construction up to and including the water meter and the sprinkler system backflow preventer. The water meter and sprinkler system backflow preventer are to be reviewed and tested by the Authority.

General Municipal Easements shall be granted to the Perkasio Regional Authority for the installation and maintenance of utilities

4. A plot plan sheet(s) shall be included showing the entire development or particular sections of the development at a scale of no smaller than 1" = 60'. This sheet should also include an index of the other utility plan sheets and perhaps graphical representation (box and sheet number identification in the foreground) of the individual plan sheets.
5. Plan views shall be drawn at a scale of 1" = 20'. Profile views shall be drawn to a 1" = 20' horizontal and 1" = 2' vertical scale. A 1" = 4' vertical scale may be approved if the existing slopes are steep. The profile view shall be directly below the plan view on the same sheet. Common points in plan and profile shall align at least at one location. Easement boundaries shall be shown, labeled and the area shaded or the boundary hatched. The plan view shall have match lines indicating on what sheet the plan continues.

6. Water and sanitary sewer lines shall be prominently shown. Storm sewers shall be shown with a lighter line weight.
7. The profile view shall show the existing grade in dotted lines and the proposed final grade in solid lines and a description of where the final grade elevation was taken, e.g. centerline of road.
8. Construction drawings shall show proposed and existing roads, curb, sidewalk, driveways, all other utilities, stormwater, retaining walls, landscaping, proposed and existing buildings (including floor elevations) and any other details necessary for clarity or understanding of proposed work.
9. There shall be a line type legend on each sheet.
10. A magnetic north arrow and graphic scale shall be shown on each utility sheet.
11. The elevations used for design shall be based on the North American Vertical Datum of 1988. The datum used and a benchmark shall be listed on the plans.
12. Any time a plan is revised, a revision note must be shown in or near the title block. The date of revision, initials of person responsible, and reason for change must be shown. "Authority Requirements" or other non-specific terms are not acceptable. "Authority Letter and the date of the letter" is acceptable.
13. Developer's engineer shall allow at least three weeks from the day plans have been received for engineering reviews. The Authority Engineer shall mark-up and return the plans, the Engineer shall make the noted corrections and resubmit the plans. This process shall continue until the plans are approved. For each submittal, supply two sets of plans, one for the files and one for Authority's Engineer to mark-up and return.

POTABLE WATER MAINS

1. An informal review of the sketch plan by Authority's Engineer will provide the Engineer with:
 - a. Whether water mains may be constructed in locations other than within the road right-of-way.
 - b. A decision on whether the proposed main may be connected to the existing main with a tapping sleeve and tapping valve or the design should include cutting in a new valve(s) and tee into the existing main.
 - c. The size and material of the water mains and water service tubing.
 - d. The extent (i.e. the beginning and end) of the water mains.
2. The Engineer shall strive to design the water main at a depth of four feet from the top of the main to the finished grade. It is this depth that is below the frost line and yet not too deep for prohibitive shoring or sloping of the trench excavation when making repairs.
3. Water mains shall be at least five feet away from curbs and shall not be installed under sidewalks.
4. If a water main crosses under a storm or sanitary sewer, the vertical separation between the top of the water main to the bottom of the crossing utility pipe shall be at least 18" at locations of RCP and soils with a lower bearing capacity to a minimum of 12" at locations with HDPE pipes and soils with a higher bearing capacity. A full length water main pipe shall be centered on the crossing utility pipe.
5. Bends shall be MJ DIP. The Engineer's design shall include the effect of the bend angle (horizontal and/or vertical deflection).
6. The maximum joint deflection for DIP shall be 2.5 degrees.

7. The maximum joint deflection for ANSI/AWWA C900 DR 18 shall be 1.0 degree or the amount permitted by the manufacturer. ANSI/AWWA C900 DR 18 pipe shall not be curved.
8. Use two 45 degree bends instead of a 90 degree bend for a 90 degree change in directions. Use two 22.5 degree bends instead of two 45 degree bends to offset the main.
9. Water Stations shall be measured along the water main and labeled W/STA. X+XX. A water structure (e.g. a valve box) at the beginning of the project shall be selected as Water Station 0+00. Tees may have two water stations, one being W/STA. 0+00
10. In the plan view, water services shall be labeled HSE. SER. W/STA. X+XX with the curb stop shown and labeled CS. Other water main appurtenances shall be shown, labeled and stationed in the plan view. Water main valves, tees, bends, fire hydrants, etc. (all but water services) shall be shown and labeled in the profile view. If permitted for clarity, the water main appurtenances and services may be listed in table form and the water stations need not be shown in the plan view. There shall be a table for each sheet.
11. Water services shall be designed such that no two services are spaced no closer than 24 inches when measured along the longitudinal axis of the main. Water services shall be installed perpendicular from the main to the curb stop.
12. In general, fire hydrants shall be located at high points in the main. High points shall be kept at a minimum. Once these locations have been identified, the Authority Engineer will provide assistance to the Developer to obtain any required approvals from the Municipal Fire Marshall/Fire Chief. It must be noted that is the Developer's responsibility to obtain any and all approvals from the Fire Marshall/Fire Chief. Pipe from the main to the fire hydrant shall be DIP.
13. Minimum diameter of water mains shall be eight (8) inches. Special circumstances may allow the use of a six (6) inch diameter line, such as extending an existing six (6) inch line, or in short, dead-end cul-de-sacs. Authority must approve use of six (6) inch lines for each special circumstance. Authority may require larger diameter mains to serve future developments.
14. Water lines shall extend to all boundaries of developments and shall terminate with a fire hydrant.
15. Authority shall place great emphasis on alternate supply routing methods (looping) into given areas, including interior lines within the development. Design shall include a minimum of two (2) off-site connections. Additional connections shall be required by the Authority in accordance with the proximity of existing water mains.
16. Three (3) main line gate valves shall be shown at each "Tee" junction and four (4) gate valves at each "Cross". No valves are to be installed deeper than five (5) feet. Valves shall be "clustered" at junctions for ease in locating them.
17. No water main shall extend for more than 1,000 feet without a gate valve for isolation. Within the development, gate valves shall be installed at least every 1000 feet.
18. Gate valves shall be provided at the end of any mains that may be extended in the future. One (1) length of pipe shall be extended beyond the valve. A plug or cap shall be placed at the end of the pipe. No services may be permitted past the valve.
19. Fire hydrants shall be provided at the end of all lines as covered by item 18 above, but always before the terminal gate valve, to act as a blow-off.
20. Fire hydrants shall be installed as blow-offs on all dead-end lines. No other types of blow offs shall be permitted.

21. Each hydrant shall be capable of delivering a minimum of 1,500 gallons per minute plus local flow as required by the Insurance Services Offices (ISO) or other appropriate authorities.
22. Fire hydrants shall be spaced so that every proposed house or other building is within 500 feet of a hydrant as measured along a street. This distance may be less than 500 feet if required by the Municipal Fire Marshall/Fire Chief. Hydrants should be located at or near street intersections. Final approval of fire hydrant locations shall be made by the Municipal Fire Marshall/Fire Chief or his designated representative. Hydrants not located at intersections shall be located on property lines. Fire hydrants shall be located at least ten (10) feet from any driveway or access way.
23. Pressure reducing valves shall be required at all connections between high-pressure and low-pressure zones. Authority must approve any proposed connection. Alternate feed lines may be required to avoid interconnections between zones.
24. When a choice of fittings is available, the fitting with the lowest all-around pressure drop shall be required.

GRAVITY SANITARY SEWERS

1. An informal review of the sketch plan by Authority's Engineer will provide the Engineer with:
 - a. Whether sanitary sewers may be constructed in locations other than within the road right-of-way.
 - b. The extent (i.e. the beginning and end) of the proposed gravity sanitary sewers.
 - c. The diameter and material of the sanitary sewer and the requirements for connecting to the existing system.
 - d. Lateral configurations (including basement service requirements) for single family dwellings and multifamily dwellings.
2. PRA does not have combined sewers. Drains shall not be connected to the sanitary sewers.
3. Sanitary sewer mains shall run straight from manhole to manhole. Due to the increasing usage of low flow plumbing fixtures, PRA would like the main extending downstream from the terminal manhole at a slope no less than 0.0100 ft./ft. However, this slope is subject to review if the sewer becomes excessively deep. Minimum slopes shall be avoided wherever possible.
4. Sanitary mains shall be at least five feet away from curbs and shall not be installed under sidewalks.
5. If a gravity sanitary sewer crosses under a storm sewer or water main, the vertical separation between the top of the water main to the bottom of the crossing utility pipe shall be a minimum of 18" at locations with RCP or DIP and soils with a lower bearing capacity to a minimum of 12" at locations with HDPE or PVC pipes and soils with a higher bearing capacity. A full length water main pipe shall be centered on the crossing utility pipe.
6. In the profile view, each manhole shall be identified with:
 - a. A consecutive number with the lowest manhole having the lowest number
 - b. Manhole type description as required, i.e. Waterproof Manhole (off-road manholes) or Drop Manholes
 - c. Drop manholes have exterior drops.
 - d. Road Stationing
 - e. Rim Elevation

- f. Invert In Elevations
 - i. If there is more than one sewage inlet main, label all mains A, B, C, etc. in both plan and profile.
 - ii. List two invert-in for a drop manhole, one for the higher cleanout access invert and one for the lower invert near the bench.
 - iii. Non-typical manholes may have other requirements.
- g. Invert Out Elevation
- h. The change in elevation from an invert-in to the invert-out shall be based on the following.
 - i. If the angle from the center of the sewage outlet main to the center of a sewage inlet main is from 90° to 149° , then the change in elevation from invert –in to invert-out shall be no less than 0.2 feet.
 - ii. If the angle from the center of the sewage outlet main to the center of a sewage inlet main is from 150° to 180° , then the change in elevation from invert-in to invert-out shall be no less than 0.3 feet.
 - iii. In no case shall the invert-in elevation less the invert-out elevation exceed 1.5 feet. In such cases, an outside drop manhole shall be used.
7. In the plan view, each manhole shall be labeled with a sanitary station of S/STA. 0+00. The sanitary station for each lateral shall be measured along the main from the downstream manhole (S/STA. 0+00) to the tee wye. The lateral shall be shown and labeled in the plan view LAT. S/STA. X+XX.
8. If permitted for clarity, the sanitary manholes and laterals may be listed in table form and the stations need not be shown in the plan view. There shall be a table for each sheet.
9. In the profile view, label each sanitary main with the length, diameter, material specification, standard dimension ratio and slope (ft./ft. to four decimal places).
10. Sanitary sewer mains shall generally be 8” diameter ASTM D-3034, SDR 26. If the depth of cover over the main exceeds 12 feet at any location, then the main shall be ANSI/AWWA C900 DR 18, manhole to manhole.
11. In the plan view, each lateral station shall be measured along the main from the downstream manhole (S/STA. 0+00) to the tee wye. The lateral shall be shown and labeled in the plan view LAT. S/STA. X+XX with the street cleanout labeled CO. Street cleanouts shall not be permitted in a driveway, driveway apron, sidewalk or ramp area if feasible. For lateral locations in a cul-de-sac, consult Authority Engineer.
12. The street cleanout shall be located as deemed appropriate by PRA, either:
 - a. Between the curb and sidewalk
 - b. At the property line
 - c. At the ROW boundary
 - d. At the electrical easement boundary furthest from the street.
13. Sanitary laterals to single residential units shall extend from the main through an 8x4 tee wye, installed perpendicular to the main to the street cleanout. The deflection at each joint shall not exceed manufacturer’s recommendations.
14. The need for additional cleanouts due to changes in direction of the lateral between the street cleanout and the building shall be determined by PRA.
15. Laterals shall not be installed with a slope of less than 0.0200 ft./ft.

16. Sewer mains shall extend to all boundaries of developments and all mains shall terminate with a manhole. Clean-outs and/or lamp holes shall not be permitted. Long laterals in excess of fifty (50) feet shall be discouraged. Laterals shall be straight, with no bends. Laterals shall be four (4) inch minimum diameter.
17. All sanitary sewer lines shall be tested by the Air Test Method. Should the lines fail the Air Test Method and a subsequent retest, the lines must be tested using the Water Test Method. The time and duration for all testing is detailed in the Authority's Specifications.
18. All sanitary sewer lines shall be flushed after passing the Air Test. Flushing shall be accomplished by starting at the highest manhole and working on each manhole section towards the downstream manhole. The lower manhole shall be plugged and the upper manhole filled with water two (2) feet over the top of the pipe. Water may be released into the next section immediately after the proper depth in the upper manhole is reached. Flushing is not required if lines have been water tested. Extreme care must be used when plugging pipes, especially if pneumatic plugs are used. Excessive pressure on plugs can cause the pipe to crack.
19. Authority discourages sewage pump stations (lift stations). Design of lift stations shall be based on the wet well/dry well configuration. Approval for construction of pump stations shall be subject to special review by the Authority and require approval by the Board of the Authority. When pump stations are permitted, the following are minimum standards that must be met. Pump stations shall be designed to handle the entire drainage area in which they are located. Pumps must be designed to handle minimum and maximum flows, paying strict attention to startup low flows and retention times in force mains. Pumps must be capable of easy change of impellers to increase capacity and also the change of pump size without structural changes to handle larger pumps. This shall include electrical service. Transformers, controls, etc. All must be designed to permit upgrading. Cycling times and capacities of wet wells shall be carefully considered for all ranges of flows. Motor electric back-up systems must be supplied, keeping in mind all conditions of flows and future requirements. Pump stations must be enclosed in an above-ground building. The building shall be aesthetically harmonious with the surrounding develop. Ease of maintenance shall be designed into the station. Baskets to collect trash and other large objects shall be installed in the open flow to the wetwell. Basket design shall permit easy removal and emptying. A complete set of all calculations shall be supplied at time of design review. Without calculation sheets, drawings shall not be accepted or reviewed.
20. Minimum sewer depths shall provide (6) feet of cover. When topographic conditions indicate the need for less than six (6) feet of cover, Authority shall make a special review of all factors. Manhole depths shall be no less than the full depth of the corbel section. Sewer depths greater than fourteen (14) feet shall be subject to specific review and could require a permanent maintenance escrow account.
21. All manholes shall be epoxy coated inside and outside with epoxy suitable for application on concrete with burial conditions. Color to be white.
22. Following testing and flushing, all sanitary sewer mains must be televised, as required in the Authority's Specifications.

EASEMENTS

1. Authority discourages the construction of sanitary sewers and water mains in off-street easements. Approval for construction of sanitary sewers or water mains in easements shall require special review by the Authority. Manhole, valve box, and pipe line accessibility for Authority maintenance equipment shall be considered in this review as well as maintenance requirements.
2. Sanitary sewer lines in all easements shall be as direct as possible with minimum changes in directions.
3. The minimum width of any easement shall be thirty (30) feet. For pipe depths greater than twelve (12) feet, wider easements shall be required. The widths of easements for deep lines shall be decided by the Authority after reviewing the topography and all physical obstructions.
4. Pipe lines shall be centered in the easement. If centering is not possible, the edge of easement shall be no less than fifteen (15) feet from the centerline of pipe.
5. If sanitary sewers and water lines are constructed in the same easement, there shall be a ten (10) foot separation between the pipes. The edges of easements shall be ten (10) feet from the centerline of the pipes. Benching may be required for sanitary sewer and water lines in the same easement.
6. If other utilities are within the same easement as a sanitary sewer or water main, the Authority shall determine the width of the easement required. The minimum standard of ten (10) feet from centerline of pipe to edge of easement shall apply.
7. Off-street easements, if not paved, shall have a base of eight (8) inches of crushed stone placed under four (4) inches of topsoil. Surface shall be sodded unless due to special circumstances, Authority authorizes select seeding. The full width of the easement shall be construction in accordance with this section.
8. All drawings, including easement drawings, deeds of easement, and all as-built drawings, shall have a note stating that no plantings, building, fences, or other structures may be placed in or on easements.

CONTRACTOR'S SUBMITTALS

1. For the components proposed to be used for the construction of the project, the Developer's Contractor shall submit a paper copy or an electronic copy of the manufacturers' submittal data for review and approval.
2. The manufacturer's submittal data shall include:
 - a. The manufacturer's name. For example, American-Darling
 - b. The model number. For example, 5-1/4" B-625-B-5 Fire Hydrant
 - c. The specifications for which the component was built. For example, ANSI/AWWA C502

- d. All options offered and selected. For example, Fire Hydrant – Open Left, Pentagon Operation Nut B-41, Configuration – two hose & one pumper, Pumper Nozzle – 4 ½” National Thread, Hose Nozzles – 2 ½” National Thread, No chains, Base Connection 6” MJ, Paint Color - Yellow.
3. One copy of the submittals will be returned marked as either Approved, Approved As-Noted or Not Approved. The contractor shall comply with all comments. Additional submittals may be requested.
4. For typical potable water and sanitary sewer projects, the contractor shall allow two weeks for the review and return of the materials based on the date the submittals were received.

CONSTRUCTION

1. The Engineer shall furnish three sets of plans signed, sealed and stamped “FOR CONSTRUCTION”. These plans shall include plans and details for E&S Pollution Control, Road Restoration, Stormwater, Landscaping, Lighting, etc.
2. A pre-construction meeting with the piping contractor is mandatory. This may be the same meeting required by the Bucks County Conservation District.
3. Written procedures and calculations are required for water main shutdowns and sanitary bypass pumping.
4. At least three days advance notice prior to starting sanitary sewer or water main construction is required to line up the inspector. Cut sheets for the sanitary sewer shall be submitted for review and approval at least three days prior to starting sanitary sewer construction.
5. Easements shall be staked-out, perhaps a combined stakeout with the Limit of Disturbance. Sanitary sewers shall be installed using a pipe laser to set the slope.
6. Developer/Engineer/Contractor shall not deviate construction from the plans issued FOR CONSTRUCTION without the written approval from the Authority’s Engineer.

AS-BUILT PLANS

1. The Construction Agreement requires that prior to PRA considering dedication, the Engineer must provide As-Built Plans. Authority’s Engineer will supply a template for the cover sheet.
2. During construction, the contractor shall be responsible for recording the locations of underground appurtenances that cannot be surveyed after installation. This information shall be used to create the As-Built Plans.
3. After construction has been completed, the project shall be surveyed and the construction plans shall be revised with the as-built elevations of sanitary and storm structures, main lengths, slopes, changes to the original design, etc. PRA does not require that original data remain on the plans and shown with a line through the data. However, if the plans are shown in this manner they will be accepted.
4. Once the Engineer’s As-Built plans are approved by Authority’s Engineer, the Engineer shall provide 24x36 drawings including one mylar set and three paper sets, a CD or flash drive with a *.pdf file and an AutoCAD 3D *.dwg file.