

DIVISION C - WASTEWATER COLLECTION SYSTEM

C 1.00 GENERAL

C 1.01 PURPOSE

The purpose of this *Wastewater Collection System Engineering Standards* document is to provide a consistent policy under which Millersburg's wastewater collection system will be designed and constructed. The elements contained in this document are for both public improvements as part of City of Millersburg contracted projects and private projects, which design and construct new public wastewater collection infrastructure as part of private development projects.

The overall goal of the *Wastewater Collection System Engineering Standards* presented herein shall be as follows:

- A. The system shall provide sanitary sewer infrastructure to all legal tax lots of record within the city of Millersburg.
- B. Collection system components shall have the necessary hydraulic capacity to safely convey all design flows.
- C. System shall be sufficiently deep to adequately serve the basin for which they are constructed. The use of individual sanitary sewer sump-pump systems for specific properties shall not be used unless approved by the City Engineer.
- D. Collection system components shall have adequate structural strength to safely withstand all expected external design loads.
- E. System shall be designed and configured to prevent infiltration and inflow of ground and surface waters.
- F. System shall be designed to be economical and safe to construct.
- G. System shall be designed to minimize maintenance and operational requirements.

It is important to emphasize that this document is not intended to inappropriately restrict or constrain the originality or innovativeness of the Engineer and his or her ability to exercise and apply professional judgement to each situation and project. The City recognizes that all wastewater systems have their unique characteristics and situations. It is expected that the Engineer will bring to each project the best of skills from the Engineer's respective discipline. If the Engineer anticipates challenges in meeting these Engineering Standards, they should contact the City prior to extensive design efforts. The City shall seek to work with each designer to achieve a satisfactory design and construction project that is in the best long-term interests of the City of Millersburg and one that complies with all applicable rules and regulations.

C 1.02 REVISIONS TO THESE ENGINEERING STANDARDS

Revisions to these Engineering Standards will likely be made from time to time. The date appearing on the title page is the date of the latest revision. Users should apply the latest version to the contemplated work.

C 1.03 SHORTENED DESIGNATION

These City of Millersburg *Wastewater Collection System Engineering Standards* shall be referred to in the text as the “*Engineering Standards.*”

C 1.04 APPLICABILITY

This Engineering Standards document shall govern all design, construction, or rehabilitation of wastewater collection systems and related facilities, both public and private, within the City of Millersburg. This document shall be routinely referred to as the Engineering Standards. Professional engineering services provided to fulfill the requirements of these Engineering Standards shall be in full compliance with Oregon Revised Statute 672 for professional engineers.

Complete plans and specifications for proposed sanitary sewer projects, including any necessary public dedications and easements, will be submitted to the City for approval. Such plans and specifications must receive City approval prior to construction permit issuance and prior to beginning of construction. Engineering documents will be prepared by a professional engineer registered and licensed in the State of Oregon.

C 1.05 REFERENCES

These Engineering Standards are intended to be consistent with the most current provisions of the documents and requirements as listed below. Periodic revisions to these Engineering Standards shall be necessary to maintain consistency in that regard. Nevertheless, all projects are expected to be consistent with the following:

- A. All conveyance system components shall use engineering design criteria and concepts consistent with the most recent Wastewater Master Plan adopted by the Millersburg City Council unless more restrictive criteria are identified herein. Where additional detailed information and background is required for a particular project, the Wastewater Master Plan shall be referred and adhered to, as applicable.
- B. Construction requirements and details shall follow the City of Millersburg's Standard Construction Specifications
- C. All conveyance system components will be designed in accordance with the rules and regulations of the Oregon Department of Environmental Quality
- D. Projects will adhere to Oregon Administrative Rules, Chapter 340, Division 52
- E. Uniform Plumbing Code with Oregon Amendments
- F. Millersburg Municipal Code and Ordinances
- G. Projects shall be consistent with:
 1. Manual of Practice, FD-5 from the Water Environment Federation
 2. Applicable design guidelines published by the American Society of Civil Engineers

C 1.06 CITY OF MILLERSBURG STANDARD CONSTRUCTION SPECIFICATIONS

The City of Millersburg has adopted the City of Albany's *Standard Construction Specifications*. Except where the *Engineering Standards* provide otherwise, design

detail, workmanship, and materials will be in accordance with the current edition of the City of Albany's *Standard Construction Specifications*.

C 1.07 DEFINITIONS AND TERMS

The following definitions will be used and apply throughout this document:

- A. As-Built Drawings: Final project drawings that have been revised by the Engineer to reflect as-built construction conditions.
- B. Building Drain: The building drain is that part of the lowest piping of building's drainage system that receives the wastewater from inside the building and conveys it to the private service, which begins 5 feet outside the building's foundation wall or footing.
- C. City: The City of Millersburg, Oregon.
- D. City Engineer: City Engineer shall mean the City Engineer of the City of Millersburg or her/his authorized representative.
- E. Collector Sanitary Sewer: Any public sanitary sewer to which a private service lateral connects or may connect in the future. Collector sewers shall be 8-inches in diameter or greater.
- F. Commercial User: Any user of the sanitary sewer who is neither a residential nor an industrial user. This definition is specific to these Engineering Standards and is not intended to be used for billing purposes.
- G. Cooling Water: Water other than sewage or industrial waste that is used as a medium for carrying away excess heat and that is not co-mingled with any other liquid waste or solids carrying stream.
- H. Definition of Words: Wherever, in these *Engineering Standards*, the words directed, required, permitted, ordered, designated, or words of like importance are used, they will be understood to mean the direction, requirement, permission, or order of designation of the City Engineer. Similarly, the words approved, acceptable, and satisfactory will mean approved by, acceptable to, or satisfactory to the City Engineer.
- I. Domestic Sewage: Liquid and water borne waste derived from residential properties, free of industrial wastes, and of such character that it may be safely discharged to the collection system without the need for special prior treatment.
- J. Drainage Basin: One of the sanitary sewer drainage basins and service areas for the City of Millersburg, as defined in the *Sanitary Sewer System Master Plan*.
- K. Easement: Land upon which the City has obtained the right, from a private property owner or other public entity, to construct, own, and maintain the public sanitary sewer system.
- L. Engineer: The Engineer, including the City's Engineer, shall be a professional engineer licensed in the State of Oregon, under whose direction the plans, profiles, details, and specifications for the project work are prepared and submitted for City review and approval.
- M. Industrial User: A business establishment that uses water in a variety of chemical,

- manufacturing, refining, or other material processing operations, which results in wastewater that is significantly altered in strength, composition, and character from that of domestic sewage. This definition is specific to these Engineering Standards and is not intended to be used for billing purposes.
- N. Industrial Wastewater: Wastewater from an industrial user.
 - O. Interceptor Sewer: Any public sanitary sewer 10-inches in diameter or greater constructed to accommodate more than one collector sanitary sewer.
 - P. Plans: Engineering design construction drawings, which depict the location, character, dimensions, and details of the collection system to be constructed or rehabilitated.
 - Q. Private Collection System: A privately-owned and maintained sewer system installed to serve multi-unit structures, such as apartments, manufactured home parks, or schools, or those private systems that will serve commercial or industrial properties.
 - R. Public Sewer: Any sewer in a public right-of-way or easement operated and maintained by the City.
 - S. Public Service Lateral: That part of each property's sanitary sewer service line which extends from the public main to the limit of the public ROW. For sanitary sewer mainlines located within easements, the limit of the public service lateral will be the edge of a sanitary sewer easement.
 - T. Private Service: That part of each property's sanitary sewer service line that is on private property outside of any sewer easements.
 - U. Residential User: The owner, lessee, or occupant of a single dwelling unit in one structure.
 - V. Right-of-Way (ROW): Land or interest therein that by deed, conveyance, agreement, easement, dedication, usage, or process of law is reserved for or dedicated to the use of the general public, within which the City shall have the right to install and maintain sanitary sewers and related appurtenances.
 - W. Roadway: That portion of the right-of-way used, or to be used, for vehicle movement, which exists between the curbs or proposed curb lines.
 - X. Sewage: Wastewater derived from human habitation and use of buildings for residential, institutional, or commercial purposes, not including storm water and industrial waste.
 - Y. Standard Drawings: The drawings of structures or devices commonly used on City work and referred to on the plans. The Standard Drawings are contained within and considered a part of the *Standard Construction Specifications*.
 - Z. Uniform Plumbing Code: Uniform Plumbing Code adopted by the International Association of Plumbing and Mechanical Officials, current edition as revised by the State of Oregon, called the *Oregon State Plumbing Specialty Code*.
 - AA. Wastewater Collection System: The wastewater collection system, also referred to as the conveyance system or the collection system, shall include all interceptors,

mainlines, service laterals, force mains, pump stations, manholes, cleanouts, and related facilities, all of which are located within dedicated public ROW or easements and all of which are owned, operated, and maintained by the City of Millersburg. Overall, that public infrastructure maintained and operated by the City of Millersburg for collecting, pumping, and conveying sanitary sewage.

C 1.08 SPECIALTY ITEMS

The design of the following items is considered non-standard and unique. They are not covered in this document. Some of these items are covered in other standards-related City documents that can be provided to the Engineer upon request, as indicated below:

- A. Sewage Lift Stations
- B. Force Mains
- C. Energy Dissipaters
- D. Regulating Devices
- E. Flow Measurement Devices

Whenever these special situations are encountered, the Engineer shall provide appropriate design drawings, details, and calculations for review and approval by the City Engineer.

C 2.00 – SYSTEM DESIGN AND SIZING CRITERIA

C 2.01 GENERAL DESIGN CONSIDERATIONS

Sanitary sewers shall be designed to remove the domestic sewage and industrial wastes from all residences, commercial, or industrial buildings, and all public and private establishments. All sanitary sewers shall be laid at a depth sufficient to drain private services, to protect them against damage by frost or traffic, and to drain basement sewers. Sewer systems shall be designed to accommodate all anticipated future flows from the drainage basin in which they are located. Separate pumping for individual properties shall be avoided wherever possible. Individual pumps for properties shall be under the ownership of and maintenance responsibility of the property owner.

Under no circumstance should stormwater, including street, roof, or footing drainage, be discharged into the sanitary sewer system. Similarly, unpolluted cooling waters shall not be discharged into any sanitary sewer. However, overflow drains and filter backwash lines of swimming pools and “hot tubs” shall be discharged into the sanitary sewer system.

As a condition of sewer service, all developments will be required to provide public sewers to adjacent or upstream parcels in order to provide for an orderly development of the drainage area. This shall include the extension of sewer mains, within the ROW of streets or within easements, as anticipated to meet future development needs. Property with multiple frontages will be required to extend sewer along all frontages. This requirement will include both mainline and interceptor sewers. Interceptor sewers may need to be oversized in order to provide capacity for upstream development.

C 2.02 SYSTEM SIZING REQUIREMENTS & CRITERIA

All conveyance system components will use and be consistent with the engineering design criteria and concepts presented in the most recent *Sanitary Sewer System Master Plan* and updated environmental regulations and/ or monitoring/modeling information the City has. Where additional detailed information and background is required for a particular project, the *Sanitary Sewer System Master Plan* shall be referred and adhered to. Each system will be designed to serve its respective drainage basin, as shown in the most current *Sanitary Sewer System Master Plan*. The engineer will provide a drawing of the exact area proposed to be served.

In sizing the collection system, the general design criteria to be followed is shown in Table C 2.02-A (refer also to the *Sanitary Sewer System Master Plan*). The criteria in Table C 2.02-A may be modified if more current or other relevant information is available to support the change. Population calculations used to forecast service area flows will be consistent with the *Sanitary Sewer System Master Plan*. The engineer should also refer to and coordinate with the most recent version of *Millersburg's Comprehensive Development Plan* and the latest projected population densities as appropriate for each project. Note that in the absence of more specific project design data, the Alternative Peak-Hour Design Flow of 400 gal/cap/day may be used with concurrence of the City Engineer.

In addition to the criteria in Table C 2.02-A, all sewers will normally be designed with reserve capacity to allow for unforeseen increases in flow due to land-use changes. The engineer will be prepared to submit for review pipe-sizing design calculations. These

calculations will include the maximum and minimum daily flows based upon population estimates, land-use assumptions, and all other assumed factors relative to criteria listed in Table C 2.02-A. For unique or special situations, a separate study may be required to justify a proposed project or development. The study shall provide detailed information on all engineering design aspects and considerations for City review and approval.

**Table C 2.02-A
Collection System Sizing Criteria**

Persons per Residential Residence	2.46
Residential Average Flow	75 gal/capita/day
Commercial Flow Allowance Light	1,500 gal/gross-acre/day
Industrial Flow Allowance Heavy	1,300 gal/gross-acre/day
Industrial Flow Allowance	6,000 gal/gross-acre/day
Residential Flow Peaking Factor – serving < 500 homes	3.35
Residential Flow Peaking Factor – serving > 1200 homes	3.0
Professional/Commercial Peaking Factor	3.0
Industrial Flow Peaking Factor Initial	Project specific
Minimum Flow Factor Ultimate	Project specific
Minimum Flow Factor	Project specific
Service Area Infiltration/Inflow Allowance	3500 gal/gross-acre/day
Alternative Peak-Hour Design Flow	400 gal/cap/day

Regardless of the size of the area being served, the standard minimum pipeline diameter for all mainline sanitary sewers will be 8 inches. All pipelines will be designed to be self-cleansing with a minimum pipeline velocity of 2.0 ft./sec. when flowing either full or half full. Proposed sewers that are larger than required, but which are solely recommended in order to meet grade requirements, are not allowed. Surcharging will also not be designed into the conveyance system.

For special situations, a 6-inch diameter sewer may be approved if the total length of the line is less than 200 feet and if it has no possibility of being extended.

B 3.00 - PHYSICAL DESIGN REQUIREMENTS

C 3.01 HORIZONTAL ALIGNMENT & CONFIGURATION

- A. Location within Public Streets. All sanitary sewer shall be located at the centerline of public streets. If alternative locations or skewed alignments are proposed, these locations and alignments must be approved by the City Engineer. All changes in horizontal alignment of the sanitary sewer will be accomplished through the use of manholes. Between manholes, sewers will be laid on a straight and true alignment without horizontal curves or pipe slope deviations.
- B. Proximity to Water Lines and Water Wells. A 10-foot horizontal separation between any sanitary sewer and an adjacent water line shall be provided at all times. This applies regardless of whether the sewer is below or above the adjacent water line. Parallel water and sewer lines in the same trench will not be allowed. Wherever a water line and sanitary sewer must cross, the crossing angle shall be approximately 90 degrees. All requirements of OAR Chapter 333 will be strictly adhered to.

All sewer lines shall also be at least 50 horizontal feet from any potable water source well, unless express approval of the Oregon State Health Division is obtained. Where this requirement is waived, pressure sanitary sewer piping shall be used to protect the potable water source.

The City may require greater than 10 feet of separation between sewer and water lines. This might be the case when the relative depth between the water and sewer line exceeds 10 feet or if the sewer line has a diameter greater than 24 inches. In these and other similar situations, increased separation between the lines may be needed to protect the water line and insure a stable utility trench if the sewer must be excavated for maintenance needs.

- C. Flood Plain Location and Stream Crossings. Manholes shall not be located within established 100-year flood plains without permission of the City Engineer. Sewers located along streams shall be located outside of the streambed and shall be sufficiently removed from the streambed to accommodate possible future stream widening or riparian improvements.

If crossing of streams and watercourses is required, the crossing shall be as nearly perpendicular to the stream as practical. Pipe cover at the crossing shall be a minimum of 36 inches. Appropriate protection will be required over the top of the pipe for protection from water erosion and channel excavation. Trench dams shall be used on either side of the crossing to prevent migration of stream water along trench lines. The entire crossing shall also satisfy the requirements and provisions of a permit issued by the Oregon Division of State Lands and other permitting agencies when applicable.

If an inverted siphon is to be installed, it shall be designed per the most recent Water Environment Federation guidelines. In general, dual pipelines shall be used, based on maintaining a minimum velocity in each line of 3.0 ft/sec. Control manholes are required at each end of the siphons such that either pipeline can be taken out of service under average flow conditions.

- D. Railroad Crossings. Wherever a sanitary sewer crosses underneath a railroad, the

piping shall be installed within a steel pipe casing per the *Standard Construction Specifications*. The casing shall extend to the limits of the railroad ROW, plus an additional horizontal distance on each end of the casing equal to approximately the casing depth at the ROW limits. Casing design shall be based on all applicable and anticipated dead and live loads, based on the requirements of the railroad involved.

C 3.02 VERTICAL ALIGNMENT AND CONFIGURATION

- A. General Requirements. All sewers shall be laid on a consistent and uniform grade. Changes in piping size and grade shall only occur at manholes. The minimum grade for all pipelines will be one that results in a minimum flow velocity of 2.0 ft./sec. when the pipe is flowing full or half-full. This slope shall be based on calculations using the Manning pipe friction formula with a coefficient of $n=0.013$. In all cases, the minimum slope for all pipelines will be as shown in Table C 3.02-A. The slopes of lines will typically be calculated based on the average depth at the center of each manhole.

**Table C 3.02-A
Minimum Collection System Slopes**

Pipe Diameter (Inches)	Grade (Feet per 100 Feet)
6	0.50
8	0.40
10	0.28
12	0.22
15 and larger	0.20

Note that new PVC sewers likely have a manufacturer's "n" value of about 0.009. However, regardless of pipe material, sand, grit, and slime build up on pipe walls. This results in true "n" values over time of about 0.013. As a consequence, a Manning coefficient of 0.013 shall be used for design of PVC piping systems. This same value shall also be used for concrete piping. If an alternative piping material is approved, either the pipe manufacturer's recommended coefficient shall be used or an "n" value of 0.013, whichever is greater.

- B. Maximum Grade. The maximum grade for sanitary sewers shall generally be limited such that pipeline velocities when flowing full do not exceed 15 ft/sec. Outside drop manholes with flatter pipe slopes should be used in steep slope locations.
- C. End of Line Segments. For the last piping segment at the upstream-end of collection system areas, the slope of the piping shall be steepened as much as reasonable and practical. The greater pipe slope shall help achieve better cleansing velocities due to the relatively low flow at these locations. Engineer will strive for minimum velocities of 2.5 – 3.0 ft./sec. in these reaches of the collection system.

Conversely, where piping shall be extended in the future, the proposed design may need to use flatter pipeline slopes than those that would only serve the present project. This would be the situation where available elevation must be preserved in order to extend future service to upstream properties. Engineer will review the upstream service areas' elevational needs, and will adjust the sewer grades as necessary to insure future service can be adequately provided and extended as required.

- D. Minimum Pipe Depths. At all locations, sewer main lines shall be at a depth of 4.5 feet or greater below the finish grade elevation. Minimum pipe depth shall be measured between the finished surface grade at the center line of the sewer and the top of sewer pipe. Sewers at depths less than this create problems with water line crossings, lateral tee orientation, service to properties with deep lot depths, and proper cover over the pipe per manufacture's recommendations. Fill may be required on development sites to maintain adequate cover over sewer lines.
- E. Proximity to Water Lines. At all locations, sewer lines must be at least 18 inches or more below the water line. If less separation is required, AWWA C-900 or C-905 pressure pipe shall be used, positioned so that a full pipe section is centered under the water line. Any sanitary sewer piping installed under this criteria shall be pressure tested at a minimum of 15 psig for gravity flow, or at higher pressures as required and as applicable for the specific force main involved.

C 3.03 PIPELINE MATERIALS

All piping shall have sufficient structural strength to withstand all external dead and live loads, which can be reasonably anticipated. Piping shall be corrosion and erosion resistant with a minimum life expectancy of 75 years and meet the material requirements in the *Standard Construction Specifications*.

All sanitary sewer piping shall have flexible, watertight gaskets, and piping that is as specified in the *Standard Construction Specifications*. To prevent extraneous infiltration into the collection system, gasketed watertight plugs shall be provided at the ends of all pipelines, at manhole pipe stubs, and at any and all capped lateral fittings.

C 3.04 MANHOLES & ACCESSORIES

- A. Locations & Requirements. Manholes shall be provided at all of the following locations and shall meet the requirements indicated:
 - 1. At all changes in horizontal alignment, vertical grade, and pipe sizes.
 - 2. All sanitary sewer-piping connections to manholes shall be made with watertight, flexible manhole/pipe rubber connectors.
 - 3. Spacing between manholes shall not exceed 450 feet. Deviation from this standard will be considered based on whether or not flushing, cleaning, and TV inspection equipment can adequately service the proposed spacing.
 - 4. Manholes shall be placed at the upstream end of each mainline.
 - 5. Manholes shall not be placed in curbs or gutters or behind curbs.

6. Provide two manholes for locations where the horizontal angle between the outgoing sanitary sewer and the incoming line will be less than 75 degrees. This is intended to prevent wastewater from discharging into the oncoming flow of an opposing sewer.
7. All non-standard locations will need to be reviewed and approved by the City on a case-by- case basis.

All manholes shall have a minimum diameter of 48 inches and shall be in compliance with the *Standard Construction Specifications*. For pipelines 36 inches in diameter or less, the manhole opening shall have a nominal 24-inch diameter.

- B. Hydraulic Design. Manholes will typically be provided with a 0.1-foot hydraulic drop through the manhole whenever the inlet and outlet piping are in a relatively straight in-out configuration, having about 180 degrees of separation between the lines. Where the inlet and outlet piping form approximately a 90-degree angle, a 0.2-foot drop shall be provided. The maximum hydraulic drop through a manhole will be limited to current DEQ requirements. New piping, which is to be connected to existing manholes, shall generally adhere to these same hydraulic considerations. Existing concrete channels within the manhole shall be modified accordingly.

For incoming and outgoing sewers of different sizes, either the pipe crowns or their respective 0.8- diameter elevations shall be matched. Manhole channels shall meet the requirements of the *Standard Construction Specifications*.

- C. Interior and Exterior Drop Manholes. Under normal circumstances, the maximum vertical drop through a manhole will be limited to current DEQ requirements. Appropriate concrete channelization shall be provided in the manhole.

Exterior drop manholes shall be constructed in accordance with the *Standard Construction Specifications* whenever more than 2 feet of vertical separation exists between the inlet and outlet piping. Outside drop assemblies shall only be used for pipelines 12 inches in diameter and smaller. Larger pipelines shall be introduced into the manhole at the manhole invert. Overall, drop manholes will only be allowed in cases of significant elevation differences between incoming and outgoing lines, or when special conditions exist such as a conflict with existing facilities or utilities that cannot be resolved.

- D. Manhole Access. For ease of maintenance and inspection, all manholes shall be installed within the ROW of paved public streets. If a manhole must be located outside of the public street ROW, access to the manhole shall be provided by means of an easement having a width consistent with Division A of these Engineering Standards. The easement shall be complete with an all-weather drivable surface from the adjacent public street to the manhole. The drivable surface shall extend to a point at least 5 feet beyond the manhole for equipment access.

For manholes located in unimproved areas, they shall have their lids positioned approximately one foot above the surrounding grade.

- E. Manhole Connections and Future Extensions. For manholes located at the ends of

lines and for which future extensions will be required, provisions shall be made to facilitate the future work. If the alignment and grade of the future piping is well established, and the piping is expected to be constructed in the foreseeable future, a 1.5-foot long pipe stub with a removable watertight plug shall be provided consistent with the future alignment. The manhole base shall be channelized accordingly. If the future connection is not imminent and its alignment is uncertain, then the pipe stub can be omitted.

- F. Special Manhole Covers. For all manholes located in backyards, side lots, or are otherwise substantially outside of the traveled ROW, the City may require tamperproof, locking lids. For public lines in easements within parking lots or other similar traveled areas, locking lids will generally not be required. In all areas prone to ponding, flooding, or along stream corridors, and in all areas below the 100-year flood plain, waterproof covers shall be installed. Alternatively, manholes may be constructed with extra barrel sections to achieve a rim elevation one foot above the 100-year floodplain elevation if approved by the City Engineer. These types of manhole locations should be avoided whenever feasible and practical.

Where internal system overflows may occur and covers are intended to prevent such overflows, the manhole cone and cover shall be provided with vent piping. The manhole and cover shall be designed to resist the resulting hydrostatic forces. Vent piping configuration and cover restraint shall be approved by the City.

- G. Cleanouts. Temporary cleanouts on sewer mains may be installed within the public ROW at the end of a stub-street, which is expected to be extended during the next phase of construction or within the foreseeable future, and where the design of the system does not warrant that a manhole be constructed at this location. All cleanout standpipes shall be 8 inches in size. Installation of permanent cleanouts will be considered on a case-by-case basis.

C 3.05 SERVICE LATERALS

- A. General Requirements. All public service laterals shall extend from the sanitary sewer mainline to the private property line. The entire length of the lateral shall be within the public ROW. Each property shall have its own, separate lateral.

Each property shall have its own private sanitary sewer service lateral from the public ROW or easement to the building being served. This private piping shall conform to State and local plumbing codes and restrictions. No roof runoff, foundation drain, or stormwater line of any kind shall be connected to service laterals.

Laterals which serve individual single-family residences or equivalent dwellings shall be 4 inches in diameter. Multi-family dwellings or commercial buildings shall have 6-inch laterals.

- B. Alignment and Grade. All public service laterals within the ROW shall be oriented perpendicularly to the mainline without intermediate horizontal bends between the mainline and the private property. Within cul-de-sacs, or in other areas where irregular tax lot configurations exist, a mainline 60-degree wye connection may be used, with straight piping thereafter to the right-of-way line. In all situations where

the public service lateral is not perpendicular to the sewer main, a continuous tracer wire shall be installed from the main to the clean-out of the service lateral at the ROW.

Public service laterals shall be sloped from the main at a slope varying from 2 to 45 percent. At the ROW, service lines shall be sufficiently deep such that they can be extended at a minimum slope of 2 percent to the structure. Depth of public service laterals at the ROW shall be 4 to 6 feet below street gutters. In areas where sewer depth is a challenge, a minimum depth at street gutter line of 3.5 feet will be accepted. For deep sanitary sewers, the riser pipe at the main may be installed at an angle varying from 45 degrees to 80 degrees, with the lateral slope flattened out thereafter in order to meet the overall grade requirements.

No 4-inch or 6-inch service lateral from adjacent private property will be allowed to be connected directly to a manhole.

C. Other Requirements. The following additional requirements apply to public service laterals:

1. For existing homes without sanitary sewer service or for vacant lots, new public service laterals shall be provided as part of new development projects or other street rehabilitation/utility projects.
2. The length of service laterals shall generally be limited to 100 feet. Where one or more service laterals will exceed 100 feet in length in order to serve the adjacent private property, a public main and manhole may be required, located in an easement, as determined by the City.
3. All service laterals shall be provided with a two-way cleanout at the private property line in accordance with the *Standard Construction Specifications*. The cleanout shall be located within the sidewalk.
4. Backwater check valves and isolation gate valves are required for all homes where potential flooding exists if the public sanitary sewer system were to backup. These valves shall be private valves installed as part of the private service piping.

C 3.06 PRIVATE COLLECTION SYSTEMS

Typically, as indicated in the *Millersburg Land Use Development Code*, sanitary sewer mainlines that are proposed to extend 100 feet or more onto private property, shall be public lines. However, the City may approve these as private collection systems on a case-by-case basis. Systems for manufactured home parks, apartment complexes, or commercial and industrial complexes may qualify.

All private systems shall connect to the public system at a standard manhole within the public ROW or easement. Immediately upstream of the connecting manhole at the property line, a separate manhole or mainline cleanout will typically be required. The manhole or mainline cleanout shall meet the requirements of the City Engineer.