

CONSTRUCTION STANDARDS AND SPECIFICATIONS
CITY OF WILLOUGHBY, OHIO

I. *General Standards*

- A. The "Construction and Material Specifications" of the State of Ohio Department of Transportation (ODOT), latest edition; the American Society of Testing and Materials (ASTM) specifications, latest edition; American Water Works Association (AWWA) Specifications, latest edition; American National Standards Institute (ANSI) Specifications, latest edition; and the American Association of State Highway and Transportation Officials (AASHTO) specifications, latest edition shall govern all work and materials as specified herein.
- B. Deviations from these standards and specifications are subject to the approval of the City Engineer and City Council.
- C. Slag products are prohibited for use as bedding, backfill, fill, base materials and aggregates.

II. *Improvements Within the Right-of-Way and Public Easements*

- A. Storm Sewers and Culverts
 - 1. Minimum Pipe Sizes
 - a. Mains - 12 inches in diameter
 - b. Laterals - 6 inches in diameter
 - 2. Pipe Materials - Mains and Laterals
 - a. Reinforced concrete pipe (RCP) (ASTM C-76) for sizes greater than 15 inches in diameter. Strength design as required.
 - b. Polyvinyl Chloride (PVC) pipe (ASTM D-3034; SDR 26) or reinforced concrete pipe (RCP) (ASTM C-76) for sizes 15 inches in diameter and below.
 - c. All pipe to have premium water-tight gasket joints.
 - 3. Pipe Materials - Driveway culverts
 - a. Reinforced concrete pipe (RCP) (ASTM C-76), corrugated polyethylene smooth interior pipe (AASHTO M-294, Type S), corrugated metal pipe (AASHTO M-36).
 - b. Concrete headwalls may be required.

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4. Pipe Materials - Roadway culverts
 - a. Reinforced concrete pipe (RCP) (ASTM C-76), reinforced concrete elliptical pipe (ASTM C-507), precast reinforced concrete box culverts (ASTM C-789, C-850), precast three-sided flat topped culverts, precast reinforced concrete arch culverts, poured in place reinforced concrete culverts. Structural design as required.
 - b. Concrete headwalls will be required.
 5. Inlet Basins (See Standard Details).
 6. Manholes (See Standard Details).
 - a. Maximum spacing 300 feet.
 - b. Manholes required at inlet basin connections, junctions, changes in direction, changes in grade and at end of sewer.
 7. Trench Details (See Standard Details).
 8. All mains are to be televised and videotaped prior to acceptance.
 9. Deflection testing (5%) required for all flexible pipe mains.
- B. Sanitary Sewers
1. Minimum pipe sizes
 - a. Mains - 8 inches in diameter
 - b. Laterals - 6 inches in diameter
 2. Pipe materials - mains and laterals.
 - a. Reinforced concrete pipe (RCP) (ASTM C-76), epoxy coated, for sizes greater than 15 inches in diameter. Strength design as required.
 - b. Polyvinyl Chloride (PVC) pipe (ASTM D-3034; SDR 26) for sizes 15 inches in diameter and below.
 - c. All pipe to have premium water-tight gasket joints.

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3. Manholes (See Standard Details)
 - a. Maximum spacing 300 feet.
 - b. Manholes required at junctions, changes in direction, changes in grade and at end of sewer.
4. Trench details (See Standard Details).
5. All mains are to be televised and videotaped prior to acceptance.
6. All sanitary sewers to be tested via air or exfiltration test. Allowable leakage rate is 100 gpd/in-mile (exfiltration).
7. Deflection testing (5%) required for all flexible pipe mains.

C. Pavements

1. Local residential streets shall be full depth asphalt pavement (ODOT 301, 448) with ODOT Type-2 concrete curb and gutter, 6-inch granular limestone base (ODOT 304) and 4-inch curb drains. Pavement design calculations are required based on the subgrade CBR.
2. All other streets shall be plain concrete pavement (ODOT 452) with integral 6-inch vertical curb (ODOT 609), on a 6-inch granular limestone base (ODOT 304) with 4-inch curb drains.
 - a. Pavement thickness
 - i) Local and Secondary streets - 8 inches
 - ii) Main streets - 9 inches
 - b. The pavement requirements may be made more stringent if found necessary by the City Engineer due to extra ordinary traffic loads or unusual soil conditions. Pavement design calculations are required.
3. Sidewalks - Plain concrete (ODOT 608)
 - a. Sidewalks, where required, will be 5 feet wide, 25 square foot blocks.
 - b. Sidewalks will be 4 inches thick except where crossing driveways or driveway aprons wherein they will be 6 inches thick in residential drives and 8 inches thick in non-residential drives.

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- c. Handicap ramps will be installed at all intersections or street crossings. (See Standard Details).
 - 4. Driveway Aprons - Plain concrete (ODOT 452) (See Standard Details)
 - a. Residential aprons will be 6 inches thick.
 - b. Non-residential aprons will be 8 inches thick.
 - c. Curb cuts must be performed using horizontal concrete saw equipment.
 - 5. The materials and the construction shall be in accordance with the current "Construction and Material Specifications" of the Ohio Department of Transportation, (ODOT), except where modified by the City Standards.
- D. Water Mains and Services
 - 1. All work must conform to the current standards and requirements of the Lake County Department of Utilities.
- E. Sanitary Force Mains
 - 1. Force Main Size
 - a. Pipe to be sized for a velocity between 3 and 10 foot per second, at design pumping rate.
 - b. The minimum pipe size for use with non-clog pumps is 4 inches in diameter. Smaller diameters must only be used with grinder pumps.
 - 2. Pipe Materials
 - a. Pipe and fittings 4 inches in diameter and larger shall be Ductile Iron Pipe (DIP) AWWA C-151. The minimum pipe barrel thickness shall be ANSI A21.50 (AWWA C-150) Class 53.
 - i. Outside of pipe to be coated with either coal tar or asphalt base bituminous material.
 - ii. The interior of the pipe shall be cement mortar and seal coated per ANSI A21.4 (AWWA C-104).
 - iii. Pipe joints shall have watertight gaskets per ANSI A21.11 (AWWA C-111.)

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- b. Pipe and fittings under 4 inches in diameter shall be PVC pipe (ASTM D-2241, SDR 26), with watertight gasket joints per ASTM F-477 and ASTM D-3139.
 - c. The force main pipe, joints, fittings and thrust restraint system shall be designed to withstand water hammer pressures associated with cyclic reversal stresses that are expected with the pump cycling.
 3. All fittings and appropriate joints shall be restrained by an approved retainer gland device or by concrete thrust blocking (See Standard Details). Calculations for thrust restraint shall be provided.
4. Relief Valves
 - a. Air relief valves shall be placed at force main high points.
 - b. Vacuum relief valves shall be provided to relieve negative pressures in the force main.

III. *Improvements on Private Property*

A. Storm Sewers and Culverts

1. Minimum pipe sizes
 - a. Mains - 8 inches in diameter
 - b. Connections - 6 inches in diameter
 - c. Single family – 6-inch connection in front and side yards, may be reduced to 4-inches in rear yard.
2. Pipe Materials - Mains, connections and culverts.
 - a. ODOT 603, Type A, B, C, D, E, and F conduits for non-residential developments. PVC (D-3034, SDR 35), RCP (C-76) or VCP (C-700) for residential developments.
 - b. All pipe to have silt tight gasket joints.
 - c. Headwalls may be required.
3. Inlet Basins/Yard Drains (See Standard Details).

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4. Manholes (See Standard Details).
 - a. Maximum spacing 300 feet.
 - b. Manholes required at inlet basin connections, junctions, changes in direction, changes in grade and at end of sewer.
 5. Trench Details (See Standard Details).
 6. All mains are to be televised and videotaped prior to final approval.
 7. Deflection testing (5%) required for all flexible pipe mains.
- B. Sanitary Sewers
1. Minimum pipe sizes
 - a. Mains - 8 inches in diameter
 - b. Connections - 6 inches in diameter
 2. Pipe materials - mains and connections.
 - a. Reinforced concrete pipe (RCP) (ASTM C-76), epoxy coated, for sizes greater than 15 inches in diameter. Strength design as required.
 - b. Polyvinyl Chloride (PVC) pipe (ASTM D-3034; SDR 26) for sizes 15 inches in diameter and below.
 - c. All pipe to have premium water-tight gasket joints.
 3. Manholes (See Standard Details)
 - a. Maximum spacing 300 feet.
 - b. Manholes required at junctions, changes in direction, changes in grade and at end of sewer.
 - c. Inspection/sampling manhole (See Standard Details) required for non-residential facilities. Multiple inspection manholes may be required or recommended for multi-building and/or multi-tenant sites.
 4. Trench details (See Standard Details).

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5. All mains are to be televised and videotaped prior to acceptance.
6. All sanitary sewers to be tested via air or exfiltration test. Allowable leakage is 100 gpd/in-mile (exfiltration).
7. Deflection testing (5%) required for all flexible pipe mains.

C. Pavements

1. Residential (one and two family) drives.
 - a. Plain concrete (ODOT 452) drives and aprons required for new construction.
 - b. Minimum thickness is 4 inches. (w/6" aprons)
2. Multi-family and non-residential drives and parking.
 - a. Plain concrete minimums (ODOT 452, 304). Pavement design calculations are required.
 - i) Driving lanes will be 6-inch minimum thickness on 4 inches of granular base. (w/8" aprons)
 - ii) Parking areas will be 6-inch minimum thickness on 3 inches of granular base.
 - b. Asphalt with granular base minimums (ODOT 301, 304, 448). Pavement design calculations are required.
 - i) Driving lanes will be 4 inches of asphalt on 6 inches of granular base. (w/8" concrete aprons)
 - ii) Parking areas will be 3 inches of asphalt on 6 inches of granular base.
3. Sidewalks will be plain concrete (ODOT 608), minimum 4 inches thick. (6 inches or 8 inches in drive aprons)

D. Water Mains and Services

1. All work must conform to the current standards and requirements of the Lake County Department of Utilities.

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E. Sanitary Force Mains

1. Force Main Size

- a. Pipe to be sized for a velocity between 3 and 10 foot per second, at design pumping rate.
- b. The minimum pipe size for use with non-clog pumps is 4 inches in diameter. Smaller diameters must only be used with grinder pumps.

2. Pipe Materials

- a. Pipe and fittings 4 inches in diameter and larger shall be Ductile Iron Pipe (DIP) AWWA C-151. The minimum pipe barrel thickness shall be ANSI A21.50 (AWWA C-150) Class 53.
 - i. Outside of pipe to be coated with either coal tar or asphalt base bituminous material.
 - ii. The interior of the pipe shall be cement mortar and seal coated per ANSI A21.4 (AWWA C-104).
 - iii. Pipe joints shall have watertight gaskets per ANSI A21.11 (AWWA C-111.)
- b. Pipe and fittings under 4 inches in diameter shall be PVC pipe (ASTM D-2241, SDR 26), with watertight gasket joints per ASTM F-477 and ASTM D-3139.
- c. The force main pipe, joints, fittings and thrust restraint system shall be designed to withstand water hammer pressures associated with cyclic reversal stresses that are expected with the pump cycling.

3. All fittings and appropriate joints shall be restrained by an approved retainer gland device or by concrete thrust blocking (See Standard Details). Calculations for thrust restraint shall be provided.

4. Relief Valves

- a. Air relief valves shall be placed at force main high points.
- b. Vacuum relief valves shall be provided to relieve negative pressures in the force main.

