

SECTION 12 MINIMUM TECHNICAL DESIGN STANDARDS - SEWERAGE

In addition to the technical design standards described below, the applicant shall also refer to the most current requirements set forth within the New Jersey Administrative Code Title 7, Department of Environmental Protection, and Title 5, Residential Site Improvement Standards, to assure compliance with all necessary permit applications.

12.1 Separate Sewers Required

The Authority will approve plans for proposed new sewerage systems or extensions only when designed upon the separate system plan, in which all water from roofs, cellars, streets, and other areas is to be excluded.

12.2 Summary of Information Required

The following documents, as prepared by the applicant's engineer, are:

- (a) A general map of the entire project including a key map showing the location of the project with respect to municipal boundaries.
- (b) An area map covering probable future tributary areas for sewer system projects.
- (c) Plans and Profiles of all proposed sewers.
- (d) Specifications for all proposed construction.
- (e) An Engineer's Report describing the proposed system. (See Section 12.7).

12.3 Preparation of Sewer Maps and Plans

12.3.1 General

Plans shall be drawn to standard scales generally 1" = 50' and shall show the entire area of the project. The name of the Engineer and his seal shall be shown. Where there is more than one sheet, all shall be bound together and an index map supplied, showing by number, the area and districts covered by the various sheets.

A general plan shall accompany each application for a new system or any extension or modification of any existing sewer system. Plans should be 24 by 36 inches where possible and not generally exceed 30 by 42 inches in size.

Plans shall show district boundaries and all existing and proposed streets and the surface elevations at all street intersections where sewer lines are proposed. Existing structures, both above and below ground, will be shown.

12.3.2 Symbols

Sewers to be built at present and sewers to be constructed later shall be shown by standard conventions. Existing sanitary sewers and combined sewers shall be shown by special designations. All topographical symbols and conventions used are to be the same as those of the United States Geological Survey.

12.3.3 Elevations

Elevations of the surfaces of streets shall be placed outside the street lines opposite their respective positions in the street. The elevations of sewer inverts shall be shown at street intersections, ends of lines, and wherever a change of grade occurs. The elevation of the surfaces shall be shown to the nearest 0.1 foot; those of the sewer inverts to the nearest 0.01 foot. All elevations will be referenced to the standard datum. Sufficient benchmarks shall be permanently established on U.S. Coast and Geodetic Survey Datum.

12.3.4 Distances, Grades, Sizes and Types

The horizontal distance and stationing between manholes, grades in percent and sewer sizes and types shall be shown on all proposed sewer lines. Arrows shall be drawn to indicate the direction of flow.

12.3.5 Sewer Appurtenances

All sewer appurtenances, such as manholes, siphons, pumping stations, etc., shall be designated on the plans by suitable symbols and referenced by a legend near the title.

12.4 Profiles

Profiles shall indicate all manholes (with manhole numbers), siphons, pumping stations, etc., and, in the case of stream crossings, elevations of stream beds, normal flow lines and the type of pipe. Figures showing the sizes and gradients of sewers; surface elevations, sewer inverts, etc., shall be shown at or between each manhole.

Profiles of sewer lines shall be drawn to standard scales which shall be shown upon each sheet.

On each sheet of profiles shall be given, in addition to the title, an index of the streets appearing on that sheet. Profile sheets shall be numbered consecutively.

12.5 Standard Details of Construction

The Mantua Township standard detail drawings of all sewer appurtenances, such as manholes, inspection chambers, siphons, pumping stations, etc., shall be utilized when preparing plans for approval.

12.6 Specifications

Specifications directly applicable to the sanitary engineering (including hydraulic features) of the proposed project shall accompany all plans.

12.7 The Engineer's Report

A report by the designing or consulting engineer shall accompany all plans and specifications. The report shall include or be accompanied by a signed and sealed statement by the engineer certifying that the proposed project complies with all of the Rules and Regulations of the Department of Environmental Protection; provided, however, if there are any exceptions thereto, the certification of compliance shall include a listing of such exceptions and an explanation of the reasons therefore. The report itself shall give all pertinent data upon which the design is based, including, where applicable and appropriate, the following:

12.7.1 Required Information Concerning Sewer Systems

- (a) The nature and extent of the area which it is proposed to include within the present system of sewerage, and of the area which it is planned shall drain ultimately into the system, including sections not within the boundaries of the affected municipality.
- (b) The number of houses and the population to be served, both present and estimated for at least twenty five (25) years hence, with computations and curves.
- (c) The estimated per capita daily flow of sewage to be cared for, with supporting data.
- (d) The total and per capita water consumption of the district to be served at the present time, if available.
- (e) The allowance made for infiltration in the sewers.
- (f) The estimated daily flow of sewage, including infiltration.
- (g) The character of the sewage (whether domestic or industrial wastes or process waters, and in case of the latter, the nature and approximate quantity of the same stated in specific terms); also a breakdown of all quantities.
- (h) That portion of the system to be built at the present time.
- (i) The minimum grades of sewers for each size used.
- (j) Logs of test borings and ground water elevations will be shown.

12.8 Capacity and Design Period

All sanitary sewers, including outfalls, shall be designed to carry at least twice the estimated average design flow when flowing half full. In the case of large interceptor sewer systems, consideration may be given to modified designs.

The design period for the estimated flow shall be at least twenty-five (25) years; longer periods are recommended for major projects.

For sewers other than circular in cross section, the data to be submitted shall include the geometrical shape, dimensions and hydraulic characteristics of the proposed sewer.

12.9 Materials, Minimum Grades and Velocity of Flow

- (a) All sewers shall be constructed of materials acceptable to the Authority for the purposes and conditions they are intended to serve.
- (b) Sewers shall be designed with such hydraulic slope as will give a mean velocity of not less than two (2) feet per second when flowing full or half full, based on Kutter's or Manning's formula with $n = 0.013$. The fall in feet per 100 ft. of sewer shall be not less than those identified in NJAC 7:14A-23.6.

When PVC pipe is utilized for sanitary sewerage, consideration may be given to utilizing a Kutter's or Manning's "N" of 0.010, thereby allowing lower grades.

- (c) Grades producing velocities in excess of 10 ft. per second are not permitted.
- (d) The minimum size of sewers will be 8-inch. Maximum manhole spacing shall be 400 feet.
- (e) Sewers crossing streams or to be located within ten (10) feet of a stream embankment or otherwise where unusual strength is indicated, shall be of steel, reinforced concrete, cast iron or other suitable material and shall be properly protected.
- (f) Sewers and water mains generally shall be separated, a distance of at least 10 feet horizontally. If such lateral separation is not possible, the pipes shall be in separate trenches with the sewer at least 18 inches below the bottom of the water main; or such other separation as approved by the Authority shall be made. In general, the vertical separation at a crossing of sewer and water line shall be at least 18 inches. Where this is not possible, the sewer shall be constructed of cast iron pipe using mechanical or slip- on joints, or hot poured lead joints for a distance of at least 10 feet on either side of the crossing or other suitable protection shall be provided.
- (g) Any sewer within 100 feet of a water supply well or a below grade reservoir shall be of steel, reinforced concrete, cast iron or other suitable material; shall be properly protected, of completely watertight construction, and shall be tested for water tightness after installation.

- (h) When grades less than those specified above are proposed, an explanation for the use of such grades shall be included in the Engineer's Report; and said explanation shall be included in the averment called for under 12.7.

12.10 Inverted Siphons

Inverted siphons shall be of cast iron or other approved material and shall have not less than two barrels. Provision shall be made for rodding and for flushing. A velocity of 3.0 feet per second should be provided.

12.11 Joints

Standard slip-on or other approved manufactured joints for PVC pipe may be used. Joints for ductile / cast iron pipes shall be of slip-on or mechanical type.

12.12 Manholes

Manholes shall be provided at the ends of each sewer line and at intersections and at all changes in grade, size or alignment. Lampholes will not be used.

Distances between manholes shall not exceed 400 feet for sewers 18 inches or less in diameter; 500 feet for sewers greater than 18 inches in diameter.

A drop pipe shall be provided for lateral sewers entering manholes above the manhole invert wherever the difference in elevation is two (2) feet or more. Elevation differences of less than (2) feet will require a modification of the pipe slope to tie into the existing channel.

No manholes or connections on a sanitary sewer system will be permitted within 100 feet of a water supply well or a below-grade reservoir.

Adequate provision shall be made for ventilation.

All manholes with forced main connections shall be cored and have a PVC or epoxy coated surface.

12.13 Pumping Stations

The applicant shall also refer to the most current version of the New Jersey Administrative Code Title 7, Chapter 14, Department of Environmental Protection to assure compliance with all TWA permit requirements.

12.13.1 General

Raw sewage shall be screened before pumping unless special pumping equipment approved by the Department of Environmental Protection is used. Comminutors may be approved in lieu of screens.

When two pumping stations are outletting into a common force main, the design shall provide for staged pumping, preferably by the use of variable-speed pumps, so as to eliminate, as far as practical, surges of flow.

An auxiliary source of power shall be provided for electrically driven pumps, unless an alternate is approved by the Authority.

Automatic sound alarms, operating independently of the station power, shall be installed to give warning of high water, power failure, or breakdown. Such alarm system shall extend by wire to the police station or other location where competent assistance can be obtained in emergency.

Pumping stations shall not be subject to flooding, must be accessible by motor vehicles, and must be fenced and landscaped.

Adequate light and ventilation shall be provided at all pumping stations. Where operational or maintenance duties are required in enclosed areas or pits, forced ventilation by suitable means shall be provided with sufficient capacity to induce at least twelve (12) air changes per hour.

Adequate fresh-water facilities shall be provided to permit routine wash down and cleaning operations at all pumping stations. Where a domestic water service connection is provided to a pumping station, the water supply shall be properly protected as described below. No connections between fresh-water and sewage pumps or pipes shall be permitted.

- (a) An adequate supply of water under pressure shall be installed.
- (b) Where a domestic water service connection is provided to a pumping station, the water supply shall be protected by an approved backflow prevention device acceptable to the N.J.D.E.P. Air gap separation shall be used to prevent cross connections within the dry well and shall mean a physical break between a supply pipe and a receiving vessel. The air gap shall be at least double the diameter of the supply pipe, measured vertically above the top rim of the vessel, in no case less than one inch. All hose connections from the domestic water supply shall be protected with an approved backflow prevention device acceptable to the N.J.D.E.P.
- (c) Taps supplying nonpotable water shall be clearly labeled "Unfit for Drinking".

12.13.2 Pumps

Pumping station capacity should be compatible with the ultimate capacity of the influent sewer. At least two pumps, each designed to handle peak flows for ten (10) years hence, shall be provided. If more than two pumps are provided, their capacities shall be such that, upon failure of the largest pump, the others will handle such peak flows. When ejectors are provided as the method of raising sewage, two compressor units are required, and they shall be so interconnected that the duplicate unit will commence operation in the event of failure of the one in use.

Pumps shall be installed in wet wells and should operate under a positive suction head. Flygt type submerged pumps with guide rails and special discharge flanges for raw sewage will be required. A means of flow metering is required. Shut-off valves will be provided on suction and discharge piping, which shall be flanged or otherwise removable, and check valves shall be provided on discharges. Special repair tools and accessories required for maintenance shall be provided.

Force main velocities shall not be less than 2 ft./second at normal pumping rates. Properly designed air release valves shall be provided on the high points of the force line.

12.13.3 Electrical Equipment

- (a) Electric motors shall be so located as to be protected from flooding.
- (b) Electric motors and electrical power equipment should not be installed in subsurface chambers; where installation in such a location is necessary, the motors and equipment shall be of the explosion - proof and damp - proof type.
- (c) All electrical equipment and work shall comply with Fire Underwriter's regulations for the location involved and to the National Electric Code.