REGULATIONS FOR SEWER DESIGN AND CONSTRUCTION
TOWN OF PEPPERELL, MASSACHUSETTS

RULES REGULATING THE DESIGN AND CONSTRUCTION OF PUBLIC AND PRIVATE SEWERS AND DRAINS: BY THE WASTEWATER COMMITTEE IN THE TOWN OF PEPPERELL, COUNTY OF MIDDLESEX, COMMONWEALTH OF MASSACHUSETTS, PURSUANT TO CHAPTER 83 SECTION10, OF GENERAL LAWS OF COMMONWEALTH OF MASSACHUSETTS.

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ARTICLE A-I
DEFINITIONS

Unless the context specifically indicates otherwise, the meaning of terms used in this ordinance shall be as follows:

Act: The Federal Water Pollution Control Act (P.L. 92-500), also known as the Clean Water Act, as amended (33 U.S.C. 1251, et. seq.).

Applicant: Any person requesting approval to discharge wastewater into the Town of Pepperell wastewater facilities.

Approval: Written approval.

Appurtenance: Any component associated with the physical operation of the sewer system.

ASTM: American Society for Testing and Materials

Authority: The Pepperell Board of Public Works.

Authorized Representative of Industrial User:

a. A principal executive officer of at least the level of vice-president, if the industrial user is a corporation; or

b. A general partner or proprietor if the industrial user is a partnership or proprietorship respectively; or

c. A duly authorized representative of the individual designated above, if such representative is responsible for the overall operation of the facilities from which the discharge of wastewater originates.

Benefit Assessment Fee: The fee, established by the Board of Public Works, which the Town of Pepperell will assess a person who enters his particular drain into a main drain or common sewer, or who by more remote means receives benefit thereby for draining his land or buildings, shall pay to the Town a proportional part of the cost of making and repairing the same, and of the charge, not already assessed, of making and repairing other main drains and common sewers through which the same discharges, pursuant to Chapter 83, Section 14.

Betterment: An assessment levied on a property that allows that property to receive an equitable entitlement, for a limited period, and in conformance with the Sewer Use Ordinance, to connect to the municipal sewer system. Said entitlement allows a single residential dwelling unit to discharge a wastewater volume of less than two hundred and fifty gallons per day (250 gpd). In the case of division of a lot into two or more parcels of land following the assessment of a betterment, only one parcel shall utilize the equitable entitlement associated with that betterment. In the case of (i) a change in the use of property whose owners were assessed a betterment, following such assessment, to provide for a use that was not in existence at the time of assessment or permitted by right under zoning in effect at the time of assessment; or (ii) an expansion of the use of property whose owners were assessed a betterment, which use was in existence at the time of assessment, following such assessment; or (iii) the establishment of any use in an area greater than two hundred feet (200') from the established street line at the time of assessment of the land that is within two hundred feet (200') from such street line; or (iv) any reconstruction, extension, structural change or alteration of a structure on land whose owners were assessed a betterment, following such assessment, the owner of the land upon which such change or expansion of use, establishment of use beyond two hundred feet (200') or reconstruction, extension, structural change or alteration, shall apply to the Board of Public Works for a determination as to whether such activity is reasonably anticipated to increase the wastewater effluent flow upon which the original betterment assessment was based by fifty percent (50%) or by two hundred fifty gallons per day (250gpd), and, if the Board of Public Works determine that such activity is anticipated to increase such flow either by fifty (50%) or by two hundred and fifty gallons per day (250 gpd), the new connection or continued connection of such land shall be subject to a System Development Charge.

Biochemical Oxygen Demand (BOD): The quantity of oxygen utilized in the biochemical oxidation of organic matter under standard laboratory procedure in five (5) days at twenty (20) Celsius, expressed in milligrams per liter.

Board: The Pepperell Board of Public Works or its authorized representative.

Building Drain: The part of the lowest horizontal piping of a drainage system that receives the discharge from soil, waste, and other drainage pipes inside the walls of the building and conveys it to the building sewer, which begins ten (10) feet outside the inner face of the building wall.

Building Sewer or Service Connection: The extension from the building drain to the public sewer or other place of disposal.

Business/Commercial Establishment: Any use of the property that is not herewith in defined as "residential" or "industrial."

Cleanout: Shall mean piping and appurtenances designed and installed to provide access to horizontal or vertical sewer lines for cleaning and inspection.

Commercial Wastewater: Shall mean wastewater from commercial establishments such as retail businesses, restaurants, banks and other businesses which discharge only domestic or sanitary sewage.

Control Manhole: A manhole that is installed along a sewer and which provides access for the observation, sampling, and measuring of wastes.

Cooling Water: The water discharged from any system of condensation, air conditioning, cooling, refrigeration or other sources. Such water shall contain no polluting substances, which could produce a Biological Oxygen Demand, Suspended Solids, toxic pollutants or substances limited in these Regulations.

DEP: Massachusetts Department of Environmental Protection

Domestic Wastewater: The wastewater discharged from, but not limited to, washing machines, sinks, showers, bath tubs, dishwashers, toilets, urinals or any drain equipped with garbage grinder, exclusive of Industrial Wastes.

Drain Layer: A person licensed by the Town of Pepperell to lay building sewers from existing public sewers to building drains.

Easement: An acquired legal right for the limited use of land owned by others.

EPA: The United States Environmental Protection Agency.

Excessive: An elevated level of quantity and/or concentration of a wastewater constituent, which in the judgment of the Board meets any of the following criteria:

a. Will cause damage to any P.O.T.W.

b. Will be harmful to any or all wastewater treatment processes.

c. Cannot be removed in the treatment works or P.O.T.W. to the degree required to meet effluent discharge limitations.

d. Can otherwise endanger life, limb, or public property

e. Can constitute a nuisance

Facilities: Include structures and conduits for the purpose of collecting, treating, or disposing of domestic, industrial, or other wastewaters (including, but limited to, treatment and disposal works, lateral, interceptor, outfall, and outlet sewers, pumping stations, equipment and furnishings, and other connected appurtenances).

Floatable Oil: Oil, fat, wax, or grease that will separate from wastewater under the force of gravity. A wastewater shall be considered free of floatable oil if it is properly treated and does not cause increases in operation and maintenance costs, or cause the types of failures within the collection system that can typically be attributed to the presence of floatable oil.

Floor drain: A receptacle to receive and convey runoff water or other liquid from building floors to the building drain system.

Flow equalization facilities: Tanks and/or equipment that provide storage of wastewater for release to a sewer system or treatment plant at a controlled rate, thus mitigating variations in flow and composition.

Garbage: The food wastes resulting from the handling, preparation, cooking, serving or distributing of food.

Grease interceptor: A device to separate light density liquids (grease, fats, cooking oils, etc.) from wastewater and retain for easy removal.

Hauler: Any person who contracts for the disposal of septage and has obtained a Septage Handler Permit from the Board of Health.

Improved Property: Any property with a structure that shall discharge domestic wastewater, and/or industrial wastes.

Incompatible Pollutant: A substance that is not amenable to substantial removal by the P.O.T.W., or a substance that may cause damage to transmission or treatment facilities, or that may impact overall treatment of wastewater. Incompatible Pollutants include, but are not limited to, toxic biocumulative Organics, toxic metals and persistent Organics.

Industrial Establishment: Any room, group of rooms, building or other facility used or intended for use in the operation of one (1) business enterprise for manufacturing, processing, cleaning, laundering, assembling or preparing any product, commodity or article, from which any process waste, as distinct from domestic wastewater, may be discharged.

Industrial User: A manufacturing, processing, or other non-residential facility (such as hospitals, commercial laundries, and tank and barrel cleaning operations, etc.) that discharges non-sanitary industrial wastes into a public sewer.

Industrial Wastes: Any solid, liquid or gaseous wastes and wastewater, exclusive of domestic wastewater, resulting from an industrial or manufacturing process; or discharged from a commercial, governmental or institutional facility; or from the development, recovery or processing of natural resources and any wastes not listed as conventional pollutants under 40CFR.17.

Infiltration: Surface runoff or groundwater that unintentionally enters the public sewer system through such means as, but not limited to, defective pipes, pipe joints, connections or manholes.

Inflow: The water discharged into a sanitary sewer system and/or service connection from such illegal sources as, but not limited to, roof leaders, downspouts, cellars, swimming pools, yard drains, foundation drains, cooling water discharges, or storm drains that collect surface runoff.

Interceptors - sediment (solids): A device to separate and retain solids such as plaster, broken glass, hair, lint, sand or other materials detrimental to the sewage works.

Interceptors/separators - 0il: A device to separate light density oils from wastewater and retain and divert the collected oils to a storage tank.

Interference: A discharge which, alone or in conjunction with discharges from other sources:

a. Inhibits or disrupts the treatment facility, its treatment processes or operations, or its sludge processes, or disposal; and

b. Causes a violation of any requirement of the treatment facility NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued there under (or more stringent State or local regulations): Section 405 of the Clean Waters Act, the Solid Waste Disposal Act (SWDA) (including Title 11, more commonly referred to as the Resource Conservation and Recovery Act (RCRA), and including State regulations contained in any State sludge management plan prepared pursuant to Subtitle D of the SWDA), the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act.

Invert: The bottom inside of the sewer pipe.

Major Contributing Industry: A facility that: (1) has flow of 25,000 gallons or more per average work day; (2) has a flow greater than five percent (5%) of the flow carried by the municipal system receiving the waste; (3) has in its waste a toxic pollutant in toxic amounts as defined in standards issued under Section 307 (a) of P.L. 92-500; or (4) has a significant impact, either singly or in combination with other contributing industries, on a publicly owned treatment works or on the quality of effluent from that treatment works.

National Categorical Pretreatment Standard or Pretreatment Standard: Any regulation containing pollutant discharge limits promulgated by the U.S. Environmental Protection Agency in accordance with Section 307 (b) and (c) of the Act (33 U.S.C. 1347), which applies to Industrial Users.

National Pollution Discharge Elimination System (NPDES) Permit: A permit issued pursuant to Section 402 of the Act (33 U.S.C. 1342).

Natural Outlet: Any outlet into a watercourse, pond, ditch, lake, or other body of surface or groundwater.

OSHA: Occupational Safety and Health Administration

Owner: Any person or persons vested with ownership, legal or equitable, sole or partial, of any property.

Pass Through: A discharge that exits the treatment facility into waters of the United States in quantities or concentrations that alone or in conjunction with discharges from other sources, are a cause of a violation of any requirement of the treatment facilities NPDES permit (including an increase in the magnitude or duration of a violation).

Pepperell Sewer Area: The area of the Town of Pepperell provided with public and private sewers which connect to the Pepperell Wastewater Treatment Plant and appurtenant works which exist in public ways and private lands within the Town of Pepperell and connections to same system by means of an approved permit authorized by the Pepperell Board of Public Works or it's authorized agent.

Person: Any individual, firm, company, association, society, corporation, group, or

municipality.

pH: The logarithm of the reciprocal of the hydrogen ion concentration, expressed in moles per liter. Neutral water, for example, has a pH value of 7 and a hydrogen ion concentration of 10 to the negative seven (-7). Any EPA approved method of measurement may be used for this measurement.

Phosphorus or Total Phosphorus: The total of organic phosphorus and inorganic phosphorus.

Plumbing Inspection Permit: A notification by the applicant to the Plumbing Inspector that work that could affect the sanitary sewer was to commence and that he is authorized by the applicant to review the property to determine if further work would be required. This "Inspection Permit" shall in no way negate the need for a "Plumbing Permit" issued by the Plumbing Inspector, but conversely a "Plumbing Permit" issued by the Plumbing Inspector shall negate the need for this "Inspection Permit" issued by the Sewer Department.

Pretreatment Requirements: Any substantive or procedural requirement related to pretreatment, other than a National Pretreatment Standard imposed on a user.

Properly Shredded Garbage: Garbage that has been shredded to such a degree that all particles will be carried freely under the flow conditions normally prevailing in public sewers, with no particle greater than one-half (1/2) inch (1.27 centimeters) in any dimension.

Pollutant: Any material or substance that may cause an alteration of the chemical, physical, biological or radiological integrity of a treatment facility or its receiving waters.

Publicly Owned Treatment Works (POTW) or Treatment Facility: Treatment works operated by the Town of Pepperell or their agents, including any devices and systems (whether owned by them or under their control) used in the collection, storage, treatment, recycling and reclamation of wastewater including the Wastewater Treatment Works or Plants and appurtenances, structures, pipes, pumping stations and systems whether operated by the Town directly or by their agent.

Public Sewer: A common sewer that is owned, operated and maintained by the Town of Pepperell, through the Board of Public Works.

Receiving Waters: Any watercourse, river, pond, ditch, lake, aquifer, or other body of surface water or groundwater receiving wastewater discharges.

Roof drain: A receptacle to receive and convey rain water from roof to a storm water drainage system.

Sanitary Sewer: A sewer that carries wastewater, and was not designed to carry storm water, surface water, or groundwater.

Septage: The solid and semi-solid material resulting from on-site wastewater pretreatment in a septic tank.

Sewage: See wastewater.

Sewer: A pipe or conduit that carries wastewater.

Sewerage: The complete system of piping, pumps, and appurtenances for the collection and

transport of wastewater.

Sewer Extension: A continuation of the public sewer on public property and/or an easement granted to the Town of Pepperell.

Sewer Saddles: The pipe fitting installed on an existing public sewer for connection of a building/house service.

Shall: Is mandatory; "May" is permissive.

Slug: Any discharge of water, wastewater, or industrial waste that exceeds by more than five (5) times the average twenty-four (24) hour constituent concentration, or flow, during normal operation for any duration longer than fifteen (15) minutes.

Special Assessment: The assessment or tax for benefits or improvements to a building lot which may access the Pepperell Sewer System, which shall include a proportional part of the charge of making and repairing same, and of the charge, not already assessed, of making and repairing other drains and common sewers through which the same discharges, pursuant to Chapter 80, Chapter 80A, and Chapter 83, Section 15.

State: The Massachusetts Department of Environmental Protection, Division of Water Pollution Control.

Storm Drain or Storm Sewer: A pipe that carries storm water, surface water, drainage, and unpolluted cooling water, but excludes wastewater.

Superintendent: Shall mean the Superintendent of Sewer & Wastewater Division of the Pepperell Department of Public Works or his designee, acting on behalf of the Board of Public Works of the Town of Pepperell.

Suspended Solids: Solids that either float on the surface of, or are in suspension in water, wastewater, or other liquids, and which are not removable by laboratory filtering. Suspended solids are referred to as nonfilterable residue in the laboratory test prescribed in "Standard Methods for the Examination of Water and Wastewater."

System Development Charge: A fee assessed under M.G.L. c. 83 § 17 to property that has not had a “betterment assessment” levied and now has applied to connect to the municipal system, or to properties that have been assessed a “betterment” but wish to increase the entitlement of the assessment by more than fifty percent (50%) or to a total actual flow in excess of 250 gpd. System Development Charge(s) shall be reduced by any betterment previously paid. See Article II Building Sewers (Service Connections) Section 4, Connections Costs.

Uniform Unit" or "Sewer Unit: For use in the Regulation for the Payment of Wastewater System Costs, shall be based on the peak loading of 330 gallons per day from a single family, 3 bedroom home, as defined in the State Environmental Code (Title V). Table IV-A, of the Pepperell *Regulation for the Payment of Wastewater System Costs*, lists equivalent loadings for facilities other than a single family home. Used for calculating assessments,

Wastes: Substances in liquid, solid or gaseous form that can be carried in water.

Wastewater: The spent water of a community. May be a combination of the liquid and water-carried wastes from residences, commercial buildings, industrial plants, and institutions.

Wastewater Treatment Works: Any arrangements of devices and structures used for treating wastewater.

Wastewater Works (facilities): All structures, equipment and processes for collecting, pumping, treating, and disposing, of wastewater.

Watercourse: A channel in which a flow of water occurs, either continuously or intermittently.

Water Unit: shall mean water use of 748 gallons which shall be equivalent to 100 cubic feet by standard conversion. This is the standard billing unit for the Sewer & Wastewater Division.

ARTICLE A-II

REQUIREMENTS FOR BUILDING SEWER AND SEWER EXTENSIONS

Section 1. General Requirements

(a) No person shall uncover, make any connections with or opening into, use, alter or disturb any public sewer, appurtenance thereof without first obtaining a written permit from the Pepperell DPW Sewer & Wastewater Division and if required, a permit from the Massachusetts Division of Water Pollution Control in accordance with 314 CMR Section 7.00: *Massachusetts Sewer System Extension and Connection Permit Program* (Appendix B).

(b) The amount of Pepperell sewer service capacity available to an Owner or Applicant including residential, business, commercial, and/or industrial applications shall be equal to:

The presently available discharge capacity (average daily flow) as dictated in the NPDES permit,
LESS: The actual average daily effluent flow to that system for the previous six months,
LESS: Available unused capacity for the Town of Groton.
LESS: The anticipated daily effluent capacity from all unconnected properties that have sewer available by direct connection or properties that have paid a betterment assessment.

These figures indicating the Availability of Capacity shall be on file and available at the Pepperell DPW – Sewer & Wastewater Division office located at the Wastewater Treatment Facility. The Pepperell Board of Public Works reserves the right to limit future proposed connections based on the above formula and the availability of flow from Groton as determined by the Inter-Municipal Agreement as amended.

(b) All costs and expenses incidental to the installation and connection of the building sewer to the public sewer main or to a house service connected to the public sewer shall be borne by the property owner. The property owner shall indemnify the Town of Pepperell from any loss or damage that may directly or indirectly result from the installation of the building sewer.

Section 2. Permit Requirements

(a) Building Sewer(s): Building sewer applications may be obtained from the Sewer & Wastewater Division. The completed application and a permit fee in the amount shown on the Fee Schedule (Usage Fee Regulation, Appendix A. Section II. Other Fees as amended) per building sewer shall be submitted to the DPW. The following conditions shall apply to all building sewer service connections:

(1) Existing public sewer and/or building/house service location (if any) may be obtained from the Sewer & Wastewater Division.

(2) The application shall list the name of property owner and contain all the information requested.

(3) The application for building sewer(s) shall be submitted to the Sewer & Wastewater Division Fourteen days prior to the anticipated date of installation.

(4) The Permit shall be valid for 90 calendar days permit extensions must be approved by the Superintendent of the Sewer & Wastewater Division.

(5) Any developer of a subdivision, shall submit a completed application form and permit fee for the building sewer for each unit before installing any building sewer.

(6) All work shall be done by a properly licensed Drain Layer in the Town of Pepperell.

(b) Industrial Connection(s) :

(1) Industrial connection(s) applications shall be requested in writing from the DPW Sewer & Wastewater Division. The request for an application shall include a description of the project, estimated flow rates and expected growth, and list all materials to be discharged into the public sewer.

(2) The applicant shall be responsible for compliance with the requirements set forth in the Town of Pepperell's "*Regulation of Sewer Design, Construction and Use*." The applicant shall submit engineered plans of proposed sewer connection(s). The applicant shall provide all information on the operation of systems which will discharge into the public sewer.

(3) No toxic wastes shall be discharged to the public sewer or wastes that will harm the biological system at the wastewater treatment plant. Industries that will discharge concentrated wastes or wastes determined to require pretreatment shall pre-treat at their expense.

(4) Completed application for industrial connection(s) shall be submitted to the Sewer & Wastewater Division and shall allow sixty (60) days to make preliminary investigation into any wastes proposed for discharge.

(5) Permits shall be issued for a specific time period, not to exceed five (5) years. A permit may be issued for a specific period less than a year or may be stated to expire on a specific date. The user shall apply for permit re-issuance a minimum of one hundred eighty (180) days prior to expiration of the user's permit. The terms and conditions of the permit may be subject to modification by the Board of Public Works during the term of the permit as limitations or requirements of the Town of Pepperell's N.P.D.E.S. discharge permit may be amended or other just cause exists. The user shall be informed of any proposed changes in his permit at least thirty (30) days prior to the effective date of the change. Any changes or new conditions in the permit shall include a reasonable time schedule for compliance.

(c) Sewer Extension(s):

(1) A sewer extension in a private way, or for a subdivision, or which requires the Town to extend the public sewer, shall be applied for in writing to the Pepperell Department of Public Works Sewer & Wastewater Division. An engineered plan of the sewer extension with a horizontal scale of one (1) inch equals forty (40) feet and a vertical scale of one (1) inch equals four (4) feet on standard 24 inch x 36 inch sheets shall be submitted with the application. The Department of Public Works will require forty-five (45) days for review of plans for sewer extension. Application and permit fees and fees for inspection services for sewer extensions shall be determined in accordance with *Usage Fee Regulation, Appendix A, Section II. Other Fees* and shall be paid before plans for sewer extensions are reviewed.

(2) The Department of Public Works reserves the right to reject any and all applications not meeting the requirements of the Town of Pepperell's *"Regulation of Sewer Design, Construction and Use."*

(3) All costs for sewer extension for construction on private property or for the sole benefit of a private concern shall be paid by the applicant.

(4) All Sewer Extension permits approved by the Department of Public Works shall include the installation of sewer service laterals from the main to the property line for each property along the sewer installation.

(5) The Town of Pepperell may provide access from the public sewers to the property lines. The Town is not obligated to extend the public sewer to connect a private or commercial building, a subdivision, or other development. The Town of Pepperell will not extend the public sewer onto private property unless by specific easement granted to the Town of Pepperell.

(6) Connection of apartment complexes, condominiums, and industries which require a sewer extension across private property shall be completed and maintained at the owner's expense or by means not limited to a tenant's association. Any private sewer found to be defective shall be repaired by the property owner at the property owner's expense.

(7) Sewer extensions shall meet the requirements of the Division of Water Pollution

Control Sewer Extension and Connection Permits, 314 CMR, M.G.L. Chapter 7.00, as most recently amended. Plans shall be prepared in accordance with New England Interstate Water Pollution Control Commission's "Guides for the Design of Wastewater Treatment Works" (TR-16), latest edition.

(d) Changes to Permitted Connection:

(1) Wastewater connection permits are issued to all properties at the time of connection to the municipal system for an intended purpose and anticipated flow rate at the time of issue. After the property is connected to the system, if a new, relocated or lager-capacity connection is proposed for such property, or there is to be a change in the use of such property or any structure thereon to provide for a new use or an expansion of an existing use or any reconstruction, extension, structural change or alteration of a structure on such property, and the Superintendent determines that such change or activity is reasonably anticipated to increase the average daily wastewater effluent flow by fifty percent (50%) or to an actual total flow of more than two hundred fifty gallons per day (250 gpd) above the prior calendar year, or the last actual operational year, then the connection or continued connection of such property shall require the approval of the Board of Public Works, which approval shall not be unreasonably withheld. The Board shall also determine whether the connection or continued connection is subject to a System Development Charge.

Section 3. New Developments or Subdivisions

(a) The developer of any subdivision, located within the Pepperell Sewer Service Area (as expanded) and within a reasonable distance of an existing public sewer, shall connect the sewer in the subdivision to the public sewer, provided all other conditions of Section 2 are met and capacity is available in the system and at the treatment facility. The cost of connecting the sewer to the existing public sewer shall be borne by the developer. Determination by the Department of Public Works of what constitutes a reasonable distance shall take into account the size, nature and location of the subdivision.

(b) When a developer installs sewers in new streets or rights-of-way in anticipation of the extension of an existing public sewer, the cost of installing building sewers shall be borne by the developer.

(c) The design of any proposed wastewater facilities must be approved by the Board of Public Works and the Superintendent of the Sewer & Wastewater Division prior to issuance of permit for construction. Construction of wastewater facilities must be inspected and approved by authorized agents of the Department of Public Works - Sewer & Wastewater Division and the cost for engineering and inspection of the construction shall be borne by the developer or other sponsoring parties or agencies.

(d) Developers shall meet all requirements set forth by the Town of Pepperell's Planning Board for the acceptance of a subdivision. Design and/or construction, and/or inspection and approval of the wastewater facilities by the Board of Public Works shall not serve as the Town's acceptance of any other constructed utilities, road or way on behalf of the Town.

Section 4. Licenses, Bonds, Insurance Coverage

(a) Licenses:

(1) All contractors (drain layers) retained by property owners for the purpose of constructing and installing and/or repairing sewers within the Town, including installation, saddles, service laterals, main line, manholes and other related materials, shall be licensed by the Town of Department of Public Works – Sewer & Wastewater Division.

(2) Licenses to install building sewers and make connections to the building/house service or the public sewer will be issued to experienced and competent contractors upon submission of the appropriate application, bonds, insurance certificates and payment of the licensing fee in the amount shown on the Fee Schedule (Usage Fee Regulation, Appendix A, Section II. Other Fees). Licenses must be renewed for each calendar year for the fee shown on the Fee Schedule. (See Form No. 3)

(3) Violation of the requirements of these regulations shall be cause for revocation of license.

(b) Bonds:

(1) Drain layers shall post a bond in the amount of $5,000 to assure the satisfactory completion of work. In the event that the work to be done is estimated at greater than $5,000.00, the bond requirement shall be equal to the total estimate of the sewer installation. The bond shall remain in full effect for a period of one year after satisfactory completion of the most recent work performed by the drain layer. For the period of one (1) year from the date of completion of the work, the drain layer shall repair, without cost to the property owner or Town, all defects in the work or parts of the work furnished or built by the drain layer and any damage resulting from faulty workmanship performed by the drain layer or due to faulty or imperfect material or equipment furnished by the drain layer.

(2) Developers constructing subdivisions, housing complexes or multi-housing units of which all or part are intended for private sale, and the wastewater facilities for the project are to be accepted, operated and maintained by the Town, shall include in the performance bond and labor and material payment bond required by the "Rules and Regulations Governing Subdivision of Land," coverage for the construction cost of the sewer lines, pumps, manholes and building/house service intended for Town acceptance. This coverage shall remain in force until the work is successfully completed and accepted by the Board of Public Works.. Work not completed in accordance with these regulations to the satisfaction of the Board of Public Works, will be completed at the developer's expense. The payment bond shall remain in force for a period of (1) one year from the date of successful completion of all the work planned for Town acceptance. Any and all defects in workmanship and materials, and any damage resulting from the defects, shall be repaired by the developer without cost to the Town, during the one (1) year period.

(3) This bond requirement serves as coverage for the construction of building sewers and wastewater facilities installed by developers. Bond requirements for wastewater facilities contracted by the Town shall be established in those contracts.

(c) Insurance Coverage:

(1) Drain layers doing work hereunder shall maintain minimum insurance coverage as follows:

Public Liability	$500,000 Bodily Injury
Property Damage Liability	$500,000 each occurrence

(2) Drain layers shall file a certificate of insurance with the Sewer & Wastewater Division. These insurance limits shall serve as coverage for construction of building sewers only. Insurance coverage for public sewer projects contracted by the Town shall be established in those contracts.

Section 5. Special Conditions

(a) Two or more buildings located on separate parcels of land may be connected to a single building sewer subject to the following conditions:

(1) Access to the public sewer system by the individual building is not available. (See Regulation of Sewer Design, Construction and Use - Article III, Section 6.)

(2) Multiple connection shall be sized so that no more than two (2) buildings share a single 6 inch diameter building sewer.

(3) Cleanouts shall be provided at the junction of two (2) building sewers.

(4) Proof of easement agreements, as recorded with the Registry of Deeds, shall be provided to the Board of Public Works.

(b) Only one building shall use a pressure building sewer discharge line unless as specified under Article A-VI, Section 10 for a low pressure sewer system.

Section 6. Record Drawings

(a) All work performed under these rules and regulations shall be recorded on a set(s) of record drawings conforming to the specifications of the Board of Public Works. Location to include swing tie measurements to manholes, cleanouts, wyes, building/house service stubs, etc. Invert elevations, slope calculations and any other deviation to the plans shall be recorded pursuant to M.G.L. Chapter 21, Sections 27(8) and 45. Location of cleanouts shall be furnished along with location of building sewers and commercial and industrial connections.

Section 7. Right of Waiver

(a) The Board of Public Works reserves the right to waive any portions of these rules and regulations which may cause undue hardship, or during emergency conditions, or within the best interest of the Town. Each request for waiver shall be made in writing to the Board of Public Works , Attn Director of Public Works, Town Hall, 1 Main Street, Pepperell, MA 01463. All waivers to be posted and recorded in the official Board meeting minutes and forwarded to Town Clerk. Waivers shall not be effective until posted. Nothing stated in this section shall be interpreted to mean that the Board of Public Works has the right to waive any Massachusetts General Laws or State regulations referenced in these rules and regulations, as these references are only provided to be of assistance to the applicants.

Section 8. Appeals

(a) Any person requesting appeal of rulings by the Superintendent of the Sewer & Wastewater Division made under these rules and regulations shall do so in writing to the Director of the Department of Public Works within twenty-one (21) days of the ruling. A hearing will be scheduled at the next regular meeting of the Board of Public Works following one (1) week of public notice. Cost of public notice shall be borne by the applicant and pre-paid to the Department of Public Works prior to the hearing date. The Director of the Department of Public Works shall forthwith and no later than fourteen (14) days, set a date for said hearing and notify the public in a newspaper of general distribution in Town at least 5 days prior to day of hearing. All decisions of the Board of Public Works shall be final. All appeals to be posted and recorded in the official Board of Public Works meeting minutes and forwarded to the Town Clerk. Appeals shall not be effective until posted.

Section 9. Additional Rules

(a) The Town of Pepperell reserves the right to adopt from time to time, additional rules and regulations as it shall deem necessary and proper relating to connections and extensions.

ARTICLE A-III

SEWER DESIGN

Section 1. Size of Sewer

(a) No public, main line, gravity sewers shall be less than eight (8) inches in diameter.

(b) Building sewers shall be a minimum of six (6) inches in diameter.

(c) Forcemain sewers shall be sized to provide, at design average flow, velocity in excess of 2 feet per second. In no case shall forcemains be less than 4 inches (10.2 cm) in diameter.

(d) Low pressure sewers shall be a minimum of 1-1/2 inches in diameter and be sized to provide, at design average flow, velocity in excess of 2 feet per second.

Section 2. Depth of Sewer

(a) No building sewer shall have less than 4 feet cover over the crown of the pipe unless approved by the Superintendent of the Sewer & Wastewater Division (See Exhibit D, Figure 8). No sewer extensions or other public sewers shall have less than 5 feet cover over the crown of the pipe unless approved by the Superintendent of the Sewer & Wastewater Division. The Board of Public Works reserves the right to impose special conditions on such approvals.

(b) When the vertical distance between the main line sewer and the building/house service, at the location of the main line sewer, is greater than four (4) feet, a vertical pipe riser (chimney connection) shall be used to connect the building/house service to the main line sewer. (See Exhibit D)Alternative designs may be approved by the Superintendent of the Sewer & Wastewater Division.

Section 3. Slope

(a) All sewers shall be so designed and constructed to give mean velocities, when flowing full, of not less than 2.0 feet per second, based on Manning's formula using an "n" value of 0.013. Use of other "n" values may be permitted if deemed justifiable on the basis of research or field data presented. The following are the minimum slope (S) which should be provided; however, slopes greater than these are desirable:

Sewer Size	Minimum Slope in Feet Per 100 Feet	S
6 inch	2.0 (1/4" per foot)	0.0200
8 inch	0.40	0.0040
10 inch	0.28	0.0028
12 inch	0.22	0.0022
14 inch	0.17	0.0017
15 inch	0.15	0.0015
16 inch	0.14	0.0014
18 inch	0.12	0.0012
21 inch	0.10	0.0010
24 inch	0.08	0.0008

(b) For all new gravity sewer main lines, the last section of the line shall be design to have a flow rate of 2 feet per second based on the estimated flows from the proposed connections on the respective line. When further extension of the system is not expected the actual flows for that line should be considered when design main line, lower flows require increased slopes to maintain the 2 feet per second velocity. This requirement shall be the sole discretion of the Superintendent of the Sewer & Wastewater Division.

(b) Under special conditions, if detailed justification is presented, slopes slightly less than those required for the 2.0 feet per second velocity when flowing full may be permitted. Such decreased slopes will only be considered where the depth of flow will be 0.3 of the diameter or greater for design average flow. Whenever such decreased slopes are selected, the design engineer must furnish with the sewer design plans, a report containing detailed justification for the decreased slopes and computations for the depths of flow in such pipes at minimum, average, and daily or hourly rates of flow. Decreased slopes may cause additional sewer maintenance expenses. The Board of Public Works reserves the right to impose special conditions when decreased slopes are approved.

(c) Sewers shall be laid with uniform slope between manholes. Sewers on 20 percent slope or greater shall be anchored securely.

Section 4. Sewer Length

(a) No gravity building sewer shall exceed 200 feet in length. Cleanouts shall be provided for lengths greater than 100 feet, at direction changes greater than forty-five degrees (45°), elevation changes, and within 10 feet of the building.

(b) No gravity sewer main shall exceed 300 feet between manholes. Manholes shall be installed at points of direction change or grade change in each sewer main.

(c) No force main or low pressure main shall exceed 500 feet between clean out manholes or air release manholes.

Section 5. Alignment

(a) All sewer extensions and other public sewers shall be laid true to line and grade so that inspection can be performed by sighting through the pipe from manhole to manhole. Changes in grade or slope shall warrant the installation of manholes for such transitions.

(b) Building sewer deflection may be permitted within the limitations of the pipe joint and shall in no case exceed 5 degrees (5°). The use of elbows shall be required for greater deflection. No elbow shall be used which is greater than a 45 degree angle. Two 45 degree elbows may be used provide a minimum (2) two foot straight section of pipe is used between each elbow.

Section 6. Manholes (See Exhibit C, C-1, C-2)

(a) **Location:** Manholes shall be installed at the end of each line; at all changes in grade, size or alignment; at all intersections; and distances not greater than 300 feet.

(b) **Drop Type:** An inside drop pipe or an outside drop pipe shall be provided for a sewer entering a manhole at an elevation of 24 inches or more above the manhole invert. Where the difference in elevation between the incoming sewer and the manhole invert is less than 24 inches, the invert should be filleted to prevent solids deposition. For larger sewers where this would be impracticable, the invert of the manhole shall be so constructed so that there is a smooth transition of flow in the manhole.

Outside drop pipe shall be the preferred method of installation. The drop shall be secured in placed with a minimum of 12- inches of cement on all sides, below and above the pipe.

(c) **Diameter:** The minimum diameter of regular manholes shall be 48 inches. Manholes with inside drop pipe shall be 60 inches in diameter. A minimum access diameter of 24 inches shall be provided.

(d) **Inverts and Bench:** The flow channel through manholes shall be made to conform to shape and slope of the sewers entering and leaving the manholes. The bench shall be constructed so that under peak design conditions the flow will remain in the channel (See Exhibit C,).

(e) **Frames and Covers:** Provide standard manhole frames and covers Free and clear opening of 26 Inches, Made in the USA. The Town has Standardized with LeBaron LB268-3 Frame and Cover See article A-IV section (d)(8).

(f) **Watertightness:** Water tight covers shall be used in areas where the top of the manhole will be below FEMA flood levels and in areas known to be subject to flooding.

ARTICLE A-IV

MATERIALS FOR CONSTRUCTION OF BUILDING SEWERS AND PUBLIC SEWERS

Section 1. Building Sewers

(a) Existing building sewers may be used only when they meet all requirements of this regulation.

(b) Gravity building sewer shall be polyvinyl chloride (PVC) sewer pipe, **SDR35** (standard dimension ratio), and conform to **ASTM D3034** (Type PSM Polyvinyl Chloride Sewer Pipe and Fittings), [See Section 2. (d) Materials].

(c) Low pressure sewer shall be High Density Polyethylene (HDPE) sewer pipe, SDR 11 (standard dimension ratio), Performance Pipe PE 3408 and conform to ASTM D 3350 Cell classification 345464C. Fittings shall conform to STM D2683 and D3261.

(d) All joints in PVC pipe shall be made using rubber rings furnished by the manufacturer of the pipe and installed in strict accordance with the manufacturer's recommendations. Joint gaskets shall be installed and secured into place so that they cannot be dislodged during the joint assembly. The completed joint shall be watertight.

(e) All joints in HDPE sewer shall be heat fusion, electro fusion or mechanical compression fitting. The preferred method of joining two sections of pipe, in-line tee's, angles, and reducing fittings shall be heat fusions. Method of making the connection shall be at the discretion of the Superintendent of the Sewer & Wastewater Division.

(e) Pipes which are bent or bowed shall not be used. Appropriate adapters shall be used when changing from one kind of pipe to another. Bell and spigot (ball and socket, push on) adapters and/or clamp and oil resistant gaskets by Fernco, or approved equal shall be used. Substitution of other types of joints shall be made only with the approval of the Superintendent of the Sewer & Wastewater Division.

(f) Pipe Adapters: Pipe adapters for connecting gravity building sewers to building drains shall be flexible rubber for adapting 4 inch to 6 inch with stainless steel clamps by Fernco Co. or equal. Standard pipe reducers shall conform to the pipe standards and shall be bell and spigot joints. Pipe adapters for the low pressure sewer shall be either stainless steel type or HDPE mechanical compression fitting with IP male thread.

(g) Pipe joint lubricant shall be as provided by the pipe manufacturer. <u>The use of automotive grease and/or petroleum based lubricants is not permitted.</u>

Section 2. Public Sewers

(a) Requirements for public sewers shall be applicable to sewer extensions, and sewer systems in developments and subdivisions. All plans for public sewers, sewer extensions, and proposed developments and subdivisions shall be submitted for review called for in Article A-II, Section 2.(c) and Section 3. The following material specifications shall be used as guidelines for submittal of plans for review. Changes in these specifications may be required, if the nature of wastes carried or design/ construction problems require a change in the materials used.

(b) Reference in the specifications to any article, device, product, material, fixture, form, or type of construction, etc. by name, make or catalog number is included to establish a standard of quality. Any article, device, product, material, fixture, form or type of construction which, in the judgment of the Superintendent of the Sewer & Wastewater Division, is equal to that named, may be substituted.

(c) Each straight pipe and standard fitting shall have cast upon it, or stamped on the pipe, the manufacturer's name and trademark, nominal pipe size and material designation.

(d) Materials:

(1) **Polyvinyl Chloride Pipe** - Gravity Sewer (See Table I): Polyvinyl Chloride (PVC) gravity sewer pipe and fittings shall conform to **SDR35** (standard dimension ratio), and conform to **ASTM D3034** (Type PSM Polyvinyl Chloride Sewer Pipe and Fittings). Joints shall be elastomeric gasket joints, providing a watertight seal, conforming to ASTM D3212 (Joints for Drain and Sewer Plastic Pipes Using Flexible, Elastomeric Seals).

(2) **High Density Polyethylene (HDPE) Pressure Pipe** -

(A) **Force Main:** High Density polyethylene (HDPE) pipe and fittings manufactured according to AWWA C906 for sizes 4" through54". Pipe and fittings shall be rated HDPE SDR 11 Ductile Iron Pipe Size (DIPS), rated for 160 PSI HDPE pipe and fittings shall be a PE 3408 High Density Polyethylene meeting ASTM D3350, manufactured to AWWA C906 for sizes 4 inch through 45 inches. All fittings shall conform to ASTM D2683 (Socket type) or ASTM D 3261 (Butt heat fusion type) and be so marked

(B) **Low Pressure Sewers:** High Density Polyethylene (HDPE) low pressure sewer pipe shall be used, SDR 11 (standard dimension ratio), Performance Pipe PE 3408 and conform to ASTM D 3350 Cell classification 345464C and AWWA C901. Fittings shall conform to STM D2683 or D3261 and be so marked. All joints and connections shall be butt heat fused were possible, Alternate methods of connection include electro fusion and mechanical compression fittings .The method used shall be at the discretion of the Superintendent of the Sewer & Wastewater Division.

(3) **Ductile Iron Pipe and Fittings:** Ductile iron pipe and fittings shall conform to

ANSI A21.51. (Ductile Iron Pipe, Centrifugally Cast in Metal Molds and Sand-lined Molds - Thickness **Class 51** minimum). Fittings shall be **Class C** and conform to **ANSI 21.10.** Ductile iron pipe shall be bell and spigot joints. Ductile iron pipe shall have nominal laying length of at least sixteen (16) feet. Pipe and fittings shall be given an exterior coating of bituminous paint and an inside cement mortar lining in accordance with **ANSI 21.4** (Cement-Mortar Lining for Ductile-Iron and Gray-Iron Pipe and Fittings). The cement mortar lining shall be given a protective coating of bituminous paint.

(4) **Valves: Gate, air release, corporations, curb stops.**

(A) Gate valves for forcemain drains and cleanouts shall be ductile iron solid wedge gate valves made in accordance with **AWWA Specification C-500** or Resilient-seated gate valves made in accordance with **AWWA Specification C-509**. Valves to be rated for 125 psi working pressure. Valve body and bonnet to be coated inside and out with fusion bonded epoxy.

(B) Air release and vacuum release valves are to be installed at high points in forcemains and shall be designed for use in sewage and shall have a cast iron body conforming to **ASTM A48, Class 30 or A126, Class B** with stainless steel floats and stainless steel trim conforming to **ASTM A276** or Bronze trim conforming to **ASTM B62**, and pressure rated for 0 to 300 psi.

(C) Bronze valves and fittings for low pressure sewers shall be bronze conforming to **ASTM B62 Alloy C83600** for corporation stops and curb stops and shall be full ported ball valves with threaded AWWA taper or AWWA I.P.T. conforming to **AWWA C800** standard for underground service lines. Valves to be as manufactured by Mueller Co., Ford or equal. Valves to have large operating head, one piece body and be rated by AWWA for 300 psi working pressure.

Engineered Thermoplastic Valves and Fittings: All plastic valve and fitting components are to be tested for compliance with ASTM D1599 (Categories 7.1.1, 7.2.2, and 7.2.3). Components shall be tested against the requirements of ASTM D2513 (Categories 6.10.1 and 6.10.2).

All pipe connections shall be made using compression fitting connections including a Buna-N O-ring for sealing to the outside diameter of the pipe. A split collet locking device shall be integrated into all pipe connection fittings to securely restrain the pipe from hydraulic pressure and external loading caused by shifting and settling.

Glass filled nylon valves shall be pressure tight in both directions. The tee-head shall include a ratcheting feature to prevent breaking from over-torquing the valve handle. Buna-N O-rings shall be used to provide a redundant, watertight seal on the stem. A spherical, Teflon filled polypropylene ball shall be supported in molded, Teflon seats to provide watertight seals in either direction, as well as maximum flow capacity and ease of operation. Valves shall be designed to withstand a working pressure of 150 psi minimum

(D) Check valves for low pressure services shall be bronze, swing check type, conforming to **ASTM B62 Alloy C83600** as manufactured by Mueller Co. or equal, pressure rated to 250 psi, or

Check Valves shall be injection molded from non-corroding, glass fiber reinforced PVC for durability. The check valve flapper shall include a non-fouling, integral hinge made from fabric reinforced synthetic elastomer to assure corrosion resistance, dimensional stability, fatigue strength and trouble free operation. The check valve will provide a full-ported passageway and shall introduce a friction loss of less than 6 inches of water at maximum rated flow. A nonmetallic hinge shall be an integral part of the flapper assembly providing a maximum degree of freedom to assure seating at low back pressure. , or equal.

(E) Curb boxes shall be steel extension type, with cast iron lid with brass pentagon head plug, with stationary rod, and cast iron arched base. All boxes to be coated with asphalt-base paint or curb boxes may be constructed of iron filled polypropylene to provide durability and magnetic detectability, pentagon head plug with stationary rod, arched base. All components shall be inherently corrosion resistant to assure durability in the ground. Curb boxes shall provide height adjustment downward (shorter) from their nominal height.

Cast iron Sewer Cleanout covers marked "SEWER" shall be placed over all low pressure curb boxes for proper identification If located within a paved area or at the discretion of the Superintendent of the Sewer & Wastewater Division

(5) Other Pipe Materials: As technology changes, other materials may be considered for substitution by the Superintendent of the Sewer & Wastewater Division and the Director of the Department of Public Works..

(6) Manholes:

A. **Barrels and Cone Sections:** Manhole barrels and cone sections shall be precast reinforced concrete and shall conform to **ASTM C478** (Precast Reinforced Concrete Manhole Sections) except as specified otherwise. Minimum diameter for a gravity manhole shall be 48 inches and 60 inches for any forcemain or low pressure sewer.

B. **Base Section:** Manhole base sections shall be monolithic to a point six inches above the crown of the incoming pipe and shall conform to **ASTM C478**, except as specified otherwise. For inside or outside drop manholes, openings for pipes shall be a minimum of six inches from any horizontal joint.

C. **Inverts and Shelf:** Manhole inverts and shelf shall provide a smooth sloped channel constructed to conform to the size and the shape of the inlet and discharge pipe or pipes. The invert shall be constructed of brick **Grade SS or Grade meeting ASTM C32** (Sewer and Manhole Brick) and shall be constructed with mortar using **Type II** portland cement. The base work below the brick shall be suitable materials consisting of cast-in-place concrete, solid brick construction, or crushed stone compacted in place, subject to the approval of the Superintendent of the Wastewater & Sewer Division. (See Exhibit C, Figure 7) Alternate invert construction may include a one-piece fiberglass flume, shelf and bells precast into the manhole base. Channels shall be at least the same depth as the pipe diameter and the shelf shall have a non-skid surface. The bells shall either accept the "boot" connector or a properly sized rubber ring to seal the pipe to the manhole connection in accordance with **ASTM C 923 and ASTM C 1244.**

D. **Horizontal Joints:** Horizontal joints between sections of precast concrete barrels shall be of a type approved by the Superintendent of the Sewer & Wastewater Division, and shall have an elastomeric or mastic-like gasket for watertightness.

E. Corbel of manhole (between manhole cone and frame and cover) shall be constructed of brick **Grade SS meeting ASTM C32** (Sewer and Manhole Brick) and shall be constructed with mortar using **Type II** portland cement. Outside of corbel shall be coated with mortar and sealed. Care shall be made to provide water tight construction. Flexible gaskets or mastic-like gasket shall be placed between the manhole frame casting and the top course of brick to provide added sealing against leaks which may be caused by thermal or frost action against the manhole cover. Frame chimney seals may be required as specified in Section 2(d)(9).

At the discretion of the Superintendent of the Sewer & Wastewater Division, High Density Polyethylene Manhole Adjustment Rings may be used. HDPE Manhole Adjusting Rings shall meet ASTM specification D1248-84 and manufactured by LADTECH, Inc, Lino Lakes, MN or similar type of product meeting all specifications.

(7) **Manhole Rungs:** Manhole rungs shall be steel reinforced copolymer, polypropylene plastic of an approved design. Rungs shall not be less than twelve (12) inches wide. Rungs shall be manufactured by M.A. Industries, Inc., East Point, Georgia or Improved Construction Method, Inc., Jacksonville, Arkansas.

(8) **Cast Iron Manholes Frames and Covers:** Cast iron manhole frames and covers shall be heavy duty suitable for **H-20** loadings and conform to the standards of the Town, as regards pattern, dimensions and weight. They shall be gray cast iron. Castings shall be true to pattern and free from flaws. The bearing surfaces of manhole frames and covers shall be machined to give continuous contact along the entire perimeter. Manhole frames and covers shall be manufactured by E.L. LeBaron Foundry Company (LB268-3), or Neenah Foundry Company, or equal with 24 inch clear opening and 26 inch covers. All covers shall have the word "SEWER" cast into the top surface.

(9) **Watertight Cast Iron Manhole Frames and Covers:** Watertight manhole frames and covers shall be used in sewers constructed in floodplain or floodway areas. Manhole covers shall be type BW or SW manufactured by E.L. LeBaron Foundry Company (LBW268-1), or Neenah Foundry or equal with 26 inch diameter covers, and 24 inch diameter clear openings and shall be supplied with inner cover and locking bar. Covers shall have the word "SEWER" cast into the top surface.

(10) Watertight covers and standard covers subject to flooding or covers in cross country sewers shall be installed with a flexible manhole frame chimney seal consisting of an internal or external rubber compound conforming to **ASTM C923** standards, with a minimum 1,500 psi tensile strength, maximum 18% compression set and hardness (durometer) of 48. Bands shall be used to compress the rubber seal to the corbel and shall be 16 gauge stainless steel conforming to **ASTM A240, type 304** with screws conforming to **ASTM F593 and 594, type 304.**

(11) Ductile iron manhole frames and covers shall be manufactured of flake graphite (gray iron) complying with the requirements of **ASTM A48-83** or spheroidal or nodular graphite iron (ductile iron) complying with the requirements of **ASTM A536-80.** Frames and covers shall be round Model GTS, Class 400 as furnished by Quality Water Products, Inc. or equal. Frames and cover shall meet a test load rating of 88,000 pounds. Frames and cover shall be of the locking type with blocking keys. Frames shall have a polyethylene gasket. Covers shall have cast in the word "SEWER". Watertight covers shall have a watertight "O"- ring and shall be rated to 15 psi external pressure. Cover shall be secured by means of 6 cams and stainless steel bolts.

12) Pipe joint lubricant shall be as provided by the pipe manufacturer. The use of automotive grease and/or petroleum based lubricants is not permitted.

Section 3. Materials for Pipe Installation

(a) **Pipe Bedding:**

(1) Material for gravity pipe bedding shall be washed and screened sharp gravel, well graded in sizes from 1/4 inch to 1-1/2 inch inclusive. It shall be clean, hard, durable and free from dust, clay or organic matter. It shall be well compacted in place. Pipe bedding shall be used to cover the pipe to a height of 6 inches above the crown of the pipe.

(2) Materials for force main pipe and low pressure pipe shall be sand free of all rocks stones and debris greater than ¼ inch. It shall be well compacted in place. Bedding shall be placed from six (6) inches below the pipe to six inches Above the crown of the pipe.

(b) **Blanket Materials:** Material to be installed from 6 inches above the crown of the pipe to eighteen inches or one and a half (11/2) feet above the crown of the pipe shall be clean sharp sand or the following:

(1) **Subsoil** - material excavated on site which is friable, natural soil composed of gravel, sand, or silty or clayey gravel and sand; free from debris, concrete or other rubble, organic matter, muck, peat, excavated rock and boulders over 6 inches in maximum dimensions; or

(2) **Crushed Gravel** - crusher run gravel consisting of inert material that is hard durable stone and coarse sand, free from loam or clay, surface coatings and deleterious material. Gradation shall be in conformance with **MDPW** Specification for Processed Gravel for Sub-base, **M1.03.1** and the following gradation limits:

Sieve Size	Percent Passing by Weight
3 inch	100%
1-1/2 inch	70 - 100%
3/4 inch	50 - 85%
No. 4	30 - 60%
No. 200	0 - 12% (based on fraction passing the No. 4 sieve.)

(c) **Backfill Materials:** Material to be used as backfill shall be common fill defined in (b)(1) above as subsoil.

(d) **Unsuitable Materials:** Materials unsuitable for use as backfill materials include cut or broken pavement, debris, concrete or other rubble, organic materials, muck, peat, silty soils or clayey soil, rock over 6 inches in maximum dimension and any material which will not provide sufficient support or maintain the installed sewers or appurtenant construction in a stable condition.

(e) **Excavation Support:** Lumber used for sheeting, walers, struts, shores, bracing, and other system members shall be free from loose knots and other defects that may impair its strength or durability. Lumber shall be spruce, fir or equal. All trenching support shall comply with OSHA standard 29 CFR 1926 Subpart P Excavations 1926.650 through 1926.652

(f) **Rip-Rap Material:** Stone for rip-rap shall be sound, of approved quality, nearly cubical in shape and consist of field stones, boulders, quarry stones or rock fragments. At least fifty percent (50%) shall be not less than twelve (12) inches in the least dimension. The remainder shall be graded to form a compact mass when installed.

ARTICLE A-V

CONSTRUCTION OF BUILDING SEWER AND PUBLIC SEWERS

Section 1. Notification and Permits

(a) Massachusetts General Law, Chapter 82, Section 40 requires that all public utility companies shall be notified in writing at least 72 hours (excluding Saturdays, Sundays and legal holidays) before excavation in a public way. Such notification gives the companies the opportunity to cooperate in protecting underground cables, pipe, structures, etc., from possible accidental damage or resulting service interruption.

(b) Excavation required in a public way or street under the Town of Pepperell's jurisdiction shall be made only after a Road Opening Permit has been issued by the Superintendent of the DPW – Highway Division. Excavation required in a public street under the jurisdiction of the Commonwealth of Massachusetts Department of Public Works (MDPW) shall not begin until a permit has been obtained from the MDPW.

(c) The owner of any particular underground structure shall be notified promptly of damage to the structure. Whenever the Department of Public Works, Town, or public utility companies may require, pipes or other underground structures encountered in excavating or trenching shall be properly supported across the excavation or trench. Obtain locations of other public utilities of the Town that may be encountered in the sewer installation. All requirements of these utilities in the form of, and not limited to, fees, permits and repair methods shall be met. The Town of Pepperell utilities are not registered under "Dig-Safe" therefore notification of each utility not covered by "Dig-Safe" is required.

Section 2. General Requirements

(a) All excavations required for building sewers and public sewers shall be open trench work unless otherwise approved by the Superintendent of the Sewer & Wastewater Division. Pipe laying and backfill shall be done in accordance with the standard practice to provide proper support, drainage, and freedom from rock damage in backfilling. No backfill shall be placed until the pipe has been inspected by the Superintendent of the Sewer & Wastewater Division or his designated inspector.

(b) Before excavation is started, the bituminous or concrete street surface shall be cut vertically in a line parallel to the center line of construction, and slightly wider than the trench width, using an approved hand or power operated tool, so as to allow for trench excavation without further disturbing the surface on either side of the trench. All excavation shall be of sufficient width and depth with proper allowance for sheathing and bracing.

(c) Excavation, concrete work, backfill, embankments and paving shall not be performed during freezing weather or upon frozen material. New work shall be bonded to old or existing work, all subject to the approval of the Superintendent of the Sewer & Wastewater Division. The Superintendent of the Sewer & Wastewater Division shall have the right to decide when the weather is unsuitable.

Section 3. Permits and Use of Explosives

(a) Obtain all required licenses, permits and insurance for the use of explosives.

(b) Use explosives only in compliance with local regulations, laws, and ordinances and as approved by the Director of Public Works. Blasting shall be conducted with all possible care so as to avoid injury to persons and property. Cover all blasting charges with mats or heavy timbers and take every precaution for the adequate protection of all persons, traffic, building, trees and other property. Sufficient warning shall be given to all persons in the vicinity of the work before blasting. Caps or other exploders shall not be kept in the same place in which dynamite or other explosives are stored.

Section 4. Excavation (See Exhibit A)

(a) Entrances and exits to abutting properties, private ways, alleys and streets for ordinary traffic in and out of all premises shall be provided and maintained. Carry out the work in such a manner so as to minimize the interference and inconvenience to business concerns on account of the construction work. Truck away excavated materials to a stockpile and truck the materials back to the construction site for use as backfill if the Superintendent of the Sewer & Wastewater Division deems it necessary as a means of minimizing interference and inconvenience to business concerns.

All trench excavation shall conform to OSHA regulation 29CFR 1926 Subpart P Excavation.

(b) Length of Trench Allowed to be Open:

(1) The length of trench allowed to be open shall be subject to approval by the Superintendent of the Sewer & Wastewater Division. The total running length of all work in each section shall be kept as short as practical.

(2) At traveled way areas, trenches shall not remain open overnight or weekends, trenches to be safely barricaded and lighted and checked regularly.

(c) Excavation shall be carried to a point at least six (6) inches below the bottom of the pipe. If the bottom of any excavation has been removed below the required grade, it shall be brought to grade by refilling with gravel or other selected material which shall be well compacted. Materials shall be compacted to 90% maximum density (Modified Proctor) at optimum moisture content.

(d) Where the excavation is close to existing underground structures or utilities, the

excavation shall be dug by hand to insure against damage of utilities or against disturbing load bearing soil.

Section 5. Dewatering Trenches

(a) The trenches and all other excavations shall be kept entirely free of water at all times until the sewers are laid, backfilled and tested and all other structures are finished ready for operation. Sand, silt, and debris entering the building sewer, sewer extensions or other public sewer due to improper removal of water or by neglect of the work shall be removed. During excavation the installed pipe shall be capped at all times to prevent the entrance of groundwater, silt, mud, debris, and overflow of septic tanks, dry wells, leach fields, storm drains and any other inflow.

Section 6. Excavation Support

(a) Furnish, put in place, and maintain such sheeting, shoring and bracing, as may be required to support the sides of the excavation and to prevent any movement which could in any way injure the work, cause safety hazard, diminish the necessary width of trenches or other excavations, or otherwise delay the work or endanger adjacent structures.

(b) All sheeting, shoring and bracing shall be of the sizes and strength needed to properly support the superimposed loads and to prevent any movement, displacement or settlement of adjacent structures, properties and utilities, pursuant to **OSHA regulations 29 CFR, Part 1926 Subpart P Excavations**

(c) Sheeting shall be driven where needed for stability, and excavation work conducted in such a manner as to prevent the material in back of the sheeting from running under the sheeting and into the excavation. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed, they shall be immediately filled and well compacted. Sheeting shall not cross the pipe line nor shall it be driven to such a depth at manholes that it will bear upon the pipe.

(d) Sheeting shall not unnecessarily be driven below the sewer invert. But where this is necessary, it shall not be removed, but cut two (2) feet higher than the top of the pipe and left in place.

(e) The sheeting, shoring, bracing or parts thereof, shall be left in place after the completion of the work in locations where necessary to support existing structures. All sheathing which is left in place shall be cut off at least two (2) feet below the surface.

(f) Lumber removed may not be reused.

(g) The Superintendent of the Sewer & Wastewater Division has the right to order sheeting and bracing installed and/or left in place, but this shall not be construed as creating any obligation on his part to issue such orders, and his failure to exercise his right to do so shall not relieve the excavating contractor from liability for damages to persons or property occurring from or upon the work occasioned by negligence or otherwise growing out of a failure on the part of the excavating contractor to install or leave in place in the excavation, sufficient sheeting and bracing to prevent any caving or moving of the ground adjacent to the sides of the excavation.

(h) All excavation works shall be performed in accordance with 29 CFR 1926 Occupational Safety and Health Standards for the Construction Industry.

Section 7. Pipe Bedding, Pipe Installation and Blanket Placement (See Exhibit A)

(a) Gravity Sewer

(1) All building sewers, sewer extensions, and other public sewers shall be bedded in clean gravel [see Article A-IV, Section 3.(a)1] or other selected material, acceptable to the Sewer Superintendent. Blocking under the pipe is not permitted. Bedding material shall be properly compacted and shaped to fit the barrel of the pipe.

(2) Each pipe shall be laid true to line and grade and in such manner as to form a close concentric joint with the adjoining pipe and to prevent sudden offsets of the flow line. As the work progresses, the interior of the sewer shall be cleared of all silt, mud, debris and materials.

(3) Pipe laying shall proceed upgrade with the spigot ends pointing in the direction of flow. Joining pipes shall be performed in accordance with the manufacturer's recommendations.

(4) After installing the pipe on the bed, the bedding material shall be placed and compacted to the spring line (horizontal center line) of the pipe. BEDDING MATERIAL SHALL BE THEN PLACED TO A LEVEL OF 6 INCHES ABOVE THE CROWN OF THE PIPE.

(5) **Blanket:** Blanket materials [see Article A-IV, Section 3.(b)] shall be placed from the top of the bedding material to a level 18 inches above the crown of the pipe and compacted. Green plastic marking tape six (6) inches in width with the marking " Caution BURIED SEWER LINE BELOW" shall be laid at the top of the blanket or 18" above the crown of the pipe.

(6) **Compaction:** Place and compact bedding and blanket material in continuous layers not exceeding six (6) inches loose depth. Materials shall be compacted to 90% maximum density **(Modified Proctor)** at optimum moisture content.

(a) Low Pressure Sewer and Force Mains

(1) All low pressure sewers and Force mains, including but not limited to building sewers, sewer extensions, and other public sewers shall be bedded in a clean sand [see Article A-IV, Section 3.(a)2] or other selected material, acceptable to the Sewer Superintendent. Blocking under the pipe is not permitted. Bedding material shall be properly compacted and shaped to fit the barrel of the pipe. The maximum distance between cleanout manhole structures shall be 500 feet.

(2) Each pipe shall be laid true to line and grade and in such manner as to form a close concentric joint with the adjoining pipe. Joints shall be heat fused to minimize the use of mechanical couplings. All fittings, tees and reducers shall be fusible type were possible. The use of electro fusion type fittings shall be allowed if approved by the Superintendent of the Sewer & Wastewater Division. As the work progresses, the interior of the sewer shall be cleared of all silt, mud, debris and materials.

(3) Joining pipes shall be performed in accordance with the manufacturer's recommendations. A trace wire, 10 gauge multi stranded and coated, shall be layed along the pipe and extend to the surface of the curb box or cleanout structure. Ends of the wire shall be easily Accessible to Sewer & wastewater Division personnel.

(4) After installing the pipe on the bed, the bedding material shall be placed and compacted to the spring line (horizontal center line) of the pipe. BEDDING MATERIAL SHALL BE THEN PLACED TO A LEVEL OF 6 INCHES ABOVE THE CROWN OF THE PIPE.

(5) **Blanket:** Blanket materials [see Article A-IV, Section 3.(b)] shall be placed from the top of the bedding material to a level 18 inches above the crown of the pipe and compacted. Green plastic marking tape six (6) inches in width with the marking " Caution BURIED SEWER BELOW" shall be laid at the top of the blanket or 18" above the crown of the pipe. Pressure sewer shall also include an 8 to 10 gauge trace wire.

(6) **Compaction:** Place and compact bedding and blanket material in continuous layers not exceeding six (6) inches loose depth. Materials shall be compacted to 90% maximum density **(Modified Proctor)** at optimum moisture content.

Section 8. Backfilling Trenches (See Exhibit A, Figures 1 and 2)

(a) As soon as practicable after the pipe has been installed and the blanket material has been installed and compacted, the backfilling shall begin and shall thereafter proceed expeditiously.

(b) **Backfill:** Material for backfilling [see Article A-IV, Section 3.shall be placed and compacted to depths, contours and grade required. Backfill systematically and as early as possible, to allow maximum time for natural settlement. Each layer of backfill shall be compacted after it is placed.

(c) Place and compact backfill in continuous layers from the top of the blanket as follows:

(1) **Under Grassed Areas:** Twelve (12) inches loose depth to four (4) inches below finish grade.

(2) **Under Paving:** Six (6) inches loose depth to underside of road base or sub-base.

All backfill materials shall be compacted to 90% maximum density **(Modified Proctor)** at optimum moisture content.

(d) Hydro-hammers used to prepare the base or sub-base for the road surface shall not be used within three (3) feet of the top of the pipe. Hydro-hammers may be used at distances greater than three (3) feet above the top of the pipe if the backfill has been compacted to 90% maximum density **(Modified Proctor)** at optimum moisture content.

(e) No stone or rock fragment shall be backfilled into the trench nor shall masses of backfilling material be dropped, as from a bucket on excavating equipment, into the trench in such a manner as to endanger the pipe.

(f) Care shall be taken to prevent stones and lumps becoming nested. All voids between stones shall be completely filled with fine material.

(g) Any voids left by the removal of sheeting shall be completely refilled with suitable materials thoroughly compacted.

(h) Pieces of bituminous pavement shall be excluded from the backfill unless expressly permitted by the Sewer Superintendent, in which case the bituminous pavement pieces shall be broken up as directed.

(i) If, in the opinion of the Superintendent of the Sewer & Wastewater Division, the material to be used in backfilling is unsuitable material [see Article A-IV, Section 3.(d)], the material shall be removed and replaced with suitable material.

(j) Excavated material which is acceptable for surfacing or pavement sub-base shall be placed at the top of the backfill to such depth as may be specified elsewhere or as directed. The surface shall be brought to the required grade and stones raked out and removed.

Section 9. Backfilling Around Structures

(a) As soon as practicable after the pipes and manholes have been placed, leakage tests shall be made after which backfilling shall begin and shall thereafter be prosecuted expeditiously. Unequal pressure shall be avoided by carrying the backfill material up evenly. The materials shall be placed and compacted in accordance with Section 8.(c).

Section 10. Surplus Material

(a) All surplus material is to be removed as directed by the Superintendent of Sewer & Wastewater Division, or property owner.

Section 11. Pavement

(a) Road pavements constructed over pipe trenches shall match the existing road surface and be installed after the backfill has been thoroughly compacted. All work shall be done as directed by the Superintendent of the DPW – Highway Division, and shall be in accordance with the standards of the Town of Pepperell for Town roads. For state roads all work shall be done in accordance with the Commonwealth of Massachusetts, Department of Public Works Standard Specifications for Highway and Bridges, dated 1988.

(b) Where the sewer is laid in a paved shoulder, or in a gravel shoulder, or in existing or new rights-of-way including private property, the area disturbed by construction shall be resurfaced to match the original conditions and surface.

(c) Where there is reinforced concrete slab under bituminous concrete top, the reinforced concrete slab shall be restored.

(d) Where the trench is in a paved road or shoulder or sidewalk or pavement of any kind, after the trench is backfilled, apply a temporary bituminous concrete patch which shall be maintained so as not to create a nuisance or a traffic hazard until the final surface is applied. All patching and paving work on the Town roads subject to approval by the Superintendent of the DPW – Highway Division.

Section 12. Protection of Slope

(a) Any slope of the filled-in area, exposed to flooding shall be protected by rip-rap at finished grade. Thickness of rip-rap layer shall be not less than twelve (12) inches.

(b) All other slopes shall be covered with six (6) inches of loam and properly seeded.

Section 13. Vacuum Testing

(a) The installed sewer manholes shall be gas and water tight. Each manhole shall be tested by negative air pressure or water leakage in accordance with the follow procedures

(d) .Prior to backfill of the structure, a vacuum test in accordance with ASTM C-1244. This is only a preliminary test of the structure and must be done prior to backfilling.

i. After the structure has been properly back filled, it shall be tested by negative air pressure (vacuum). Manhole testing is to be completed prior to construction of invert channels where practical

ii. A vacuum pressure of 5 inches of Hg shall be attained, allow two minutes for pressure to stabilize before starting the test.

iii. The vacuum test shall run for a period of ten minutes, checking the vacuum pressure drop at the five minute mark. A drop of less than 0.5 inches of Hg over ten minutes shall be criteria for acceptance.

(b) Alternative Manhole leakage testing shall be at the discretion of the Superintendent of the DPW - Sewer & Wastewater Division.

Section 14. Pressure Testing - Gravity Sewers

(a) Pressure testing of gravity sewers shall be of the following method:

(1) **Air Testing (Preferred Method):** Low pressure air testing of the pipe lines shall conform to ASTM method F1417-92. Air is to be applied slowly until the pressure reaches 4 psi, Allow 2 minutes for temperature adjustment. The test, made between two manholes 300 feet apart, shall conform to the following requirements:

a. Air pressure at start 3.5 psi. Air pressure shall be adjusted 0.433 psi for each foot below ground water table. Water drop test will be adjusted in same manner. Infiltration test may be substituted for air test in high groundwater areas subject to the approval of the Sewer Superintendent.

b. Air pressure at stop shall be equal to the starting pressure or within one (1) psi of the starting pressure for the testing time listed below:

Pipe Size	Time
6"	5 min. 40 sec.
8"	7 min. 36 sec.
10"	11 min. 52 sec.
12"	17 min. 05 sec.
15"	26 min. 42 sec.
18"	38 min. 27 sec.

(c) Should the sections under test fail to meet the requirements, the leak shall be located and the repairs necessary to eliminate the leak shall be accomplished. The sewer shall then be retested.

(d) Building/house services shall be tested by either a dye test of each pipe joint during new construction or a pressure test of the entire line as described in Section 14.

Section 15. Pressure Testing - Force Mains and Low Pressure Sewers

(a) Force mains (Ductile Iron Type) shall be tested for pressure and leakage in accordance with AWWA C600 - Installation of Ductile Iron Water Mains and Their Appurtenances, except as amended or added below:

(1) Test Duration: 2 hours.

(2) Test Pressure: 150% of maximum operating pressure.

(3) Allowable Pressure Loss: Pressure shall not vary more than ±5 psi for the duration of the pressure test.

(4) Allowable Leakage: Allowable leakage shall be determined by the following formula:

$$L = \frac{SD\ \ P}{133200}$$

L = allowable leakage, in gallons per hour.
S = length of pipe tested, in feet.
D = nominal pipe diameter, in inches.
P = average test pressure, in psi (gauge).

(5) Allowable leakage, in gallons per hour, per 1000 feet of pipe line can be determined from the following chart.

Average Test Pressure	Nominal Pipe Diameter-in.						
psi	3	4	6	8	10	12	14
250	0.36	0.47	0.71	0.95	1.19	1.42	1.66
225	0.34	0.45	0.68	0.90	1.13	1.35	1.58
200	0.32	0.43	0.64	0.85	1.06	1.28	1.48
175	0.30	0.40	0.59	0.80	0.99	1.19	1.39
150	0.28	0.37	0.55	0.74	0.92	1.10	1.29
125	0.25	0.34	0.50	0.67	0.84	1.01	1.18
100	0.23	0.30	0.45	0.60	0.75	0.90	1.05

(b) Force mains (High Density Polyethylene - HDPE Type) and their appurtenances shall be tested for pressure and leakage in accordance with the following test method:

(1) Test Duration: 2 hours.

(2) Test Pressure: 150% of maximum operating pressure. SDR 35 HDPE shall be tested at 230 psi

(3) Allowable Pressure Loss: Pressure shall not vary more than ±5 psi for the duration of the pressure test.

(4) Allowable Leakage: Allowable leakage shall be determined by the following formula:

$$L = \frac{SD\ \ P}{133200}$$

L = allowable leakage, in gallons per hour.
S = length of pipe tested, in feet.
D = nominal pipe diameter, in inches.
P = average test pressure, in psi (gauge).

(5) Allowable leakage, in gallons per hour, per 1000 feet of pipe line can be determined from the following chart.

Average Test Pressure	Nominal Pipe Diameter-in.						
psi	3	4	6	8	10	12	14
250	0.36	0.47	0.71	0.95	1.19	1.42	1.66
225	0.34	0.45	0.68	0.90	1.13	1.35	1.58
200	0.32	0.43	0.64	0.85	1.06	1.28	1.48
175	0.30	0.40	0.59	0.80	0.99	1.19	1.39
150	0.28	0.37	0.55	0.74	0.92	1.10	1.29
125	0.25	0.34	0.50	0.67	0.84	1.01	1.18
100	0.23	0.30	0.45	0.60	0.75	0.90	1.05

(c) Low pressure sewers and their appurtenances shall be tested for pressure and leakage in accordance with the following method:

(1) Test Duration: 2 hours.

(2) Test Pressure: 150% of maximum operating pressure or 200 PSI which ever is greater.

(3) Allowable Pressure Loss: Pressure shall not vary more than ±5 psi for the duration of the pressure test.

(4) Allowable Leakage: Allowable leakage shall be determined by the following formula:

$$L = \frac{SD\ \ P}{133200}$$

L = allowable leakage, in gallons per hour.
S = length of pipe tested, in feet.
D = nominal pipe diameter, in inches.
P = average test pressure, in psi (gauge).

Section 16. Relation to Water Mains and/or Water Services (See Exhibit B)

(a) Whenever possible, sewers shall be installed with a minimum of 10 feet horizontal separation between the sewer and potable water lines. Should a lateral separation of 10 feet not be possible, one of the following methods of protection shall be employed. In both methods, the water main invert shall be 18 inches above the sewer crown.

(1) Lay sewer and water main in separate trench.

(2) Lay the sewer and water main in same trench with the water main at one side on a bench of undisturbed earth.

(b) Whenever sewers must cross under water mains, the sewer shall be laid at such an elevation that the top of the sewer is at least 18 inches below the bottom of the water main. When the elevation of the sewer cannot be varied to meet the above requirements, the water main shall be relocated to provide this separation or reconstructed with mechanical-joint cement lined ductile iron pipe for a distance of 10 feet on each side of the sewer. One full length of water main should be centered over the sewer so that both joints will be as far from the sewer as possible.

(c) When it is impossible to obtain horizontal and/or vertical separation as stipulated above, both the water main and sewer shall be constructed of mechanical-joint cement lined ductile iron pipe or other material based on equivalent watertightness and structural soundness. Both pipes shall be pressure tested by an approved method to assure watertightness or both pipes shall be encased in concrete.

Section 17. Cleanouts

(a) Gravity Sewer

(1) Cleanouts shall be made a minimum of six inch (6”) SDR 35 PVC pipe conforming in size and thickness to that required for pipe and fittings to which the cleanout will be connected. The design shall be such that the closure plug when properly secured will make a gas-tight and watertight seal.

(2) Minimum of one cleanout shall be installed were the building sewer transitions into the service connection. The cleanout should be located as close to the building as possible.

(3) Cleanouts shall be installed in building sewers not more than 100 feet apart and at each change of direction or elevation .. The initial cleanout shall be located were the building sewer transitions to the service line.

(4) Cleanouts shall have removable plugs or caps and a cast iron cover at finished grade.

(b) Force Main and Low Pressure Sewers

(1) Cleanouts shall be made to allow connection to a 1 ½ inch threaded nipple. A valve shall be located on the clean out as well as on the main line up stream of the clean-out “T” .

(2) Cleanout manholes shall be a minimum of 60 inches in diameter and be installed not more than 500 feet apart. An air release manhole may be used as a cleanout manhole. The minimum diameter of the manhole may be reduced to a 48 inch manhole at the discretion of the Superintendent of the Sewer & Wastewater Division.

Section 18. Elbows - Bends

(a) No elbow or bend greater than 45° shall be installed in building sewers. The use of 2 or more 45° elbows may be used upon approval of the Sewer Superintendent. In such cases, a (2) two foot straight section of pipe shall be installed between each elbow for a practical length to facilitate sewer rooting and cleaning equipment.

ARTICLE A-VI

APPURTENANT WORKS

Section 1. Interceptors-Grease

(a) All institutions or commercial establishments in which grease, fats, or oils, are waste products of food cooking or processing or in which grease, fats or oils are wasted, in connection with utensils, vat, dish or floor cleaning processes, that may be detrimental to the building sewer, the public or private sewer or sewage treatment plant and any receiving watercourse, shall install grease interceptors of an approved type. Typical applications are: restaurants - pot and pan sinks, dishwashers; and, food and meat packing and processing establishments.

(b) **Construction:** Grease interceptors shall be made of durable corrosion resistant materials. They shall have a double wall trap partition, and a gas and watertight cover securely fastened in place with easy means of manual or automatic removal of grease.

(c) **Capacity:** Grease interceptors shall have the grease retention capacity for the specified flow through rate as indicated in Table IV and V unless they are of the automatic draw off type, where sizing shall be according to flow rates as stated by manufacturer subject to acceptance by the Board of Public Works.

(d) **Installation:** Where practical and feasible one (1) grease interceptor shall be provided for each fixture or unit of equipment that discharges grease, fat, and/or emulsified grease laden waste. However, where necessary, the Sewer Superintendent, may approve grouping of two (2) or more fixtures or units on a single grease interceptor, subject to approval of the grease interceptor size and proper installation of flow control as stated herein. The grease interceptor shall in all instances, be installed as close as possible to the fixture or unit served and located where it will be readily accessible for maintenance and inspection. Plans showing location shall be submitted for approval prior to construction.

(e) **Flow Control:** A device which controls the rate of flow through a grease interceptor shall be installed in accordance with the manufacturer's recommendation. On multiple discharges to a common grease interceptor, a flow control shall be installed in the waste branch leading from each fixture and shall be so rated that the combined flow from all discharges will not develop sufficient head so the established flow rate of the grease interceptor can be exceeded.

(f) **Servicing:** Grease interceptors shall be of the type that can be cleaned of grease in a short period of time. Interceptors shall be easily accessible for cleaning and the accumulated materials shall be removed at such intervals as may be necessary to insure exclusion of these materials from the sewage system.

(g) **Water-cooled grease interceptors shall not be installed.** Grease interceptor shall not be installed where surrounding temperatures under operating conditions are less than 40°F. Grease interceptor shall not receive the discharge from a food waste grinder.

TABLE IV
EQUIVALENT FLOW RATES

Fixture-Equipment Drain Outlet or Trap Size (Inches)	Drainage Fixture-Unit Value	Equivalent Flow Rate (gallons per minute)
1-1/4	1	7.5
1-1/2	2	15.0
2	3	22.5
2-1/2	4	30.0
3	5	37.5
4	6	45.0

References:

1. Commonwealth of Massachusetts Plumbing Code
2. National Plumbing Code

TABLE V
CAPACITY OF GREASE INTERCEPTOR

Total Flow-Through Rating (gallons per minute)	Grease Retention Capacity (pounds)
4	8
7	14
10	20
15	30
20	40
25	50
35	70
50	100

Section 2. Interceptors/Separators - Oil

(a) At all commercial establishments, storage or repair garages, gasoline stations with grease and service facilities, factories, processing plants, etc., where oil laden wastes are produced, oil interceptors/separators shall be installed to intercept and separate oils from wastewater entering the building drainage system, public sewer or other point of disposal.

(b) **Construction:** Oil interceptors/separators shall be made of durable corrosion resistant materials. They shall have a means of retaining solids, be fitted with a gas tight cover, have a double wall deep seal trap partition, an automatic means of diverting intercepted oils to a storage tank, and a minimum two-inch (2") size dual vent connection in the main separating chamber.

(c) **Capacity:** Oil interceptors/separators shall be sized in accordance with manufacturer's gallon per minute (gpm) rating, subject to approval by the Sewer Superintendent, to handle the anticipated maximum gpm flow rate of oil laden water that will be discharged from all drains served.

(d) **Installation:** Oil interceptors/separators of size and type described shall be installed, subject to approval of the Sewer Superintendent in the building sewer and be equipped with a flow control and shall be vented to atmosphere.

(e) **Flow Control:** A device which controls the rate of flow through an oil interceptor/separator shall be installed ahead of the interceptor/separator in an accessible location for inspection and service. It shall be installed in accordance with the manufacturer's recommendations.

(f) **Servicing:** Oil interceptors/separators shall be installed in a location readily accessible for servicing, maintenance and removal of accumulated oil and sediment at such intervals as necessary to insure exclusion of these materials from the sewage system and to insure efficient operation of the interceptor/separator.

Section 3. Interceptors-Sediment (Solids)

(a) All bottling establishments, slaughter houses, barber shops, car washes and other similar locations, as required by the Sewer Superintendent, where wastes bearing plaster, hair, lint, entrails, broken glass, sand, strings or other solids are produced, shall install sediment interceptors as defined and described to separate solids from wastewater entering the building drainage system, public sewer or other point of disposal.

(b) **Construction:** Sediment interceptors shall be made of durable corrosion-resistant materials, and shall be equipped with a basket, screens or similar intercepting device which is removable for cleaning.

(c) **Installation:** Sediment interceptors shall be installed where required, and located accessible for easy cleaning, and subject to approval of the Sewer Superintendent. On lavatories and sinks, the sediment interceptor shall provide a trap seal within the body to serve as the fixture trap.

Section 4. Roof Drains

(a) General purpose, parapet, gutter, cornice, deck or control flow roof drains shall **not** be connected to the wastewater collection system.

Section 5. Floor Drains

(a) All areas which are subject to water spillage, overflow of washing equipment or cleaning water shall have an approved floor drain installed. Every public rest room shall have not less than one (1) approved floor drain connected to the sanitary system. One floor drain shall be installed for each 400 sq. ft. of floor areas or major fraction thereof. All areas where food is either handled or processed shall have sanitary type of floor drains installed.

(b) Construction:

(1) Floor drains shall be constructed of cast iron, bronze or other durable corrosion resistant materials. All internal surfaces shall be sloped to outlet to facilitate drainage. Floor drains installed in rooms which are required to have waterproof floors shall have an integral flange, seepage openings and clamping device which will securely clamp the waterproof membrane. Each floor drain grate must be load rated to safely bear the maximum anticipated load which will pass over it. Floor drains which receive debris laden wastewater shall have a suitable sediment bucket in the drain body, which will intercept and retain this debris.

(2) In food handling/processing areas, sanitary floor drains shall have an acid resistant porcelain enamel interior, (or equivalent, as approved by the Sewer Superintendent or Plumbing Inspector), and either a bronze or nickel bronze top rim and grate. Food scraps, peelings and miscellaneous kitchen debris shall be intercepted by a sediment bucket inserted in drain body. Sediment bucket shall be easily removable to permit frequent cleaning.

(c) **Installation:** Floor drains shall be installed at the low points of the area to be drained, with tops of drains set flush with finished floor. Drains shall be easily accessible for maintenance.

Section 6. Sumps and Ejectors (Internal Plumbing Only)

(a) Portions of building drains which cannot be discharged to the building sewer by gravity flow shall be discharged into a tightly covered and vented sump from which the contents shall be lifted (pumped) and discharged into the building gravity drainage system by automatic pumping equipment or by any equally efficient method approved by the Sewer Superintendent. Only such drains that must be lifted for discharge shall be discharged into sumps. All other drains shall be discharged by gravity.

(b) **Design:** Sump and pumping equipment shall be so designed as to discharge all contents accumulated in the sump during the cycle of emptying operation. The storage of drainage in a sump or ejector shall not exceed a period of twelve (12) hours.

(c) **Venting:**

(1) The system of drainage piping below the sewer level shall be installed and vented in a manner similar to that of the gravity system.

(2) Building sump vents shall be sized in accordance with the Commonwealth of Massachusetts Plumbing Code.

(3) Vents from pneumatic ejectors or similar equipment shall be carried separately to the open air as a vent terminal.

(d) **Duplex Equipment:** Sumps receiving the discharge from six (6) or more water closets shall be provided with duplex pumping equipment. The sump vent shall be of proper size to meet the venting requirements based on the discharge rate of the sump pump.

(e) **Sewage Ejectors or Sewage Pumps:** A sewage ejector or sewage pump receiving discharge from water closets or urinals shall have a minimum discharge capacity of 20 gallons per minute. In one-family dwellings, the ejector or pump shall be capable of passing a 1-1/2 inch diameter solid ball and the discharge piping of each ejector or pump shall have a backwater valve and be a minimum of 2 inches. In other than one-family dwellings, the ejector or pump shall be capable of passing a 2-inch diameter solid ball and the discharge piping of each ejector or pump shall have a backwater valve and be a minimum of 3 inches.

(f) Sumps for floor foundations and french drains for conveyance of ground water shall **not** be connected to the building drain or to the wastewater collection system. **Discharge of storm waters to the sanitary sewer is forbidden** (see "Regulation of Sewer Use - Article II, Section 2).

Section 7. Grinder Pump Systems (Building Sewer Drains)

(a) Individual building drains which cannot be discharged to the sewer by gravity flow due to elevation or excessive distance (as defined in Article A-III, Section 4(a)) shall be discharged into a tightly covered and vented pump chamber, basin, or station, from which the contents shall be lifted (pumped) by automatic, grinder type, pumping equipment or by any equally efficient method approved by the Superintendent of DPW – Sewer & Wastewater Division and discharged into the gravity sewer system or to a Low Pressure Sewer System which shall discharge to a gravity sewer system.

(b) Grinder pump stations shall be of the wet pit/dry pit type and shall consist of a grinder pump suitably mounted in a basin having a minimum capacity of 60 gallons and constructed of fiberglass reinforced polyester (FRP) resin or corrugated high density polyethylene (CHDPE) with a smooth inner surface. Each basin shall be furnished with an EPDM grommet or PVC closet flange to accept a minimum 4.5" O.D. DWV pipe. Discharge piping shall be 304 stainless steel and terminate outside the pump chamber with 1-1/4 inch NPT fitting. All penetrations in the tank to be factory installed and sealed.

(c) All outside installations shall be provided with a poured-in-place, concrete anti-floatation collar of sufficient size and weight to overcome buoyancy forces. Inlet and discharge piping shall be installed at a minimum depth of 4 feet to assure maximum frost protection.

(d) The Grinder Pump System shall be provided with a **NEMA 4X** electrical quick disconnect, pump removal system, shut-off valve, anti-siphon valve, and full-ported check valve assembled within the basin, with remote **NEMA 3R, UL** listed electrical alarm/disconnect panel with all necessary internal wiring and controls. Pumps to have alarm light and bell with external silence push-button switch, push-to-run switch, and be capable of connection to emergency power source. Duplex units shall have alarm lights which shall indicate which pump requires service. Pump systems must be capable of either inside or outside installation. For ease of serviceability, all pump systems shall be of like type and horsepower as manufactured by Environment One Corporation or Barnes Pumps equal.

(e) The grinder pumping equipment must include an integral grinder capable of handling any reasonable quantity of "foreign objects" such as plastic, wood, paper, glass, rubber and the like which find their way into a building sewer drain as a result of carelessness or accident on the part of the building occupants. The grinder pump must be capable of processing such foreign objects without jamming, stalling, overloading or undue noise. Grinder shall process these materials to particles which will freely pass through the pump the and 1-1/4 inch pipe system. The grinder shall be of a configuration to provide a positive flow of solids into the grinding zone with sufficient action to scour the tank free of deposits or sludge banks which could otherwise accumulate and dislodge and impair the operation of the pump.

(f) The grinder shall be direct driven by a single, one piece stainless steel motor shaft. The grinder impeller assembly shall be securely fastened to the pump motor shaft. The grinder will be of the rotating type with a stationary hardened and ground chrome steel shredding ring spaced in accurate close annual alignment with the driven impeller assembly, which shall carry two hardened type 400 series stainless steel cutter bars.

(g) Pumps for low pressure sewer systems shall be semi-positive displacement, progressing cavity, type rated at 11 gpm against a total dynamic head of 92 feet (40 psig) and 9 gpm at 138 feet (60 psig.). The pump(s) shall be capable of operating at negative heads without overloading the motor(s). Motor shall be a minimum of 1 HP, 1725 RPM, 240 volt, 60 Hertz, 1 Phase with a high starting torque of 8.4 foot pounds with U.L. certification with protection against locked rotor and overload conditions.

(h) All maintenance functions for the Grinder Pump Station must be possible without entry of the grinder pump station under**" OSHA 1910.146 Permit Required Confined Spaces."** Entry means the action by which a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space. Therefore each pump and motor unit shall be provided with double lifting hooks with nylon lift out-harness to facilitate pump removal. Outside or underground installations shall provide access through an integral extension of the wet well assembly and shall be provided with a lockable fiberglass cover. All electrical and mechanical connections must be provided with easy disconnect accessibility.

(i) Low pressure sewer systems shall have redundant check valves and anti-siphon valves. Multiple connections to a low pressure sewer system may be permitted if designed by a qualified Professional Engineer and approved by the Town.

(j) No more than one single family home may be connected to a single pump unit.

RECOMMENDED GRINDER PUMP DESIGN TABLE

OCCUPANCY TYPE	FLOW	PUMP UNITS	STORAGE - GALLONS
Single Family	0 - 500 gpd	1	60
Duplex	500 -1200 gpd	1	120
Multi-family (3-6 units)	1200-1500gpd	2	120

* Applications with greater than 6 units shall be subject to review on a case by case basis.

(k) Low Pressure sewers shall have pressure sewer cleanouts provided if in excess of between 400 and 600 feet or at junctions of one or more low pressure lines. Connections and cleanout details are shown in Exhibits G, H, and I.

Section 8. Wastewater Pumping Stations

(a) Wastewater Pumping Stations shall be protected from physical damage by the 100 year flood and shall remain fully operational and accessible during the 25 year flood. A suitable superstructure, preferably located off the right of way of streets and alley, shall be provided. It is important that the station be readily accessible during all weather conditions.

(b) Where it may be necessary to pump wastewater prior to grit removal, the design of the wet well shall receive special attention and the discharge piping shall be designed to prevent grit settling in pump discharge lines of pumps not in operation. Vertical runs of discharge piping shall be kept to a minimum.

(c) Wastewater pumping stations shall be vacuum-assist, self priming, above ground type. Other types as described herein may be approved where circumstances justify their use. Design considerations shall include, at a minimum, the following items.

1.0 Pump Station Requirements

(A) Duplicate pumping equipment shall be provided. If only 2 pumps are provided, either shall be capable of handling peak design flows. Where 3 or more pumps are provided, they shall be designed to fit actual flow conditions and must be so designed that with any one pump out of service the remaining pumps will have capacity to pump peak design flow.

(B) Pumps shall be capable of passing spheres of at least 3 inches (7.6 cm) in diameter. Pump suction and discharge openings shall be at least 4 inches (10.2 cm) in diameter.

(C) Pumps shall be designed for the specific application. Designer shall submit for review, factory certification of pump performance under the proposed operating conditions. Such information shall include static suction lift as measured from "Lead Pump Off" elevation to center line of pump suction, friction and other hydraulic losses of the suction piping, vapor pressure of the liquid, altitude correction, required net positive suction head, and a safety factor of at least 6 feet (1.8 m).

(D) Vacuum-assist pumps shall be equipped with dual vacuum pumps capable of automatically and completely removing air from the suction lift pump. The vacuum pumps shall be adequately protected from damage due to sewage. The combined total of dynamic suction head at design operating conditions shall not exceed 22 feet (6.7 m).

(E) Motors shall be premium efficiency type which may be eligible for applicable Massachusetts Electric Company financial assistance, or other similar agency serving Pepperell and Groton.
If variable speed motors are used, they shall be controlled by variable frequency drives.

(F) Provisions shall be made in the piping system for the installation of in line sewage grinders and odor control devices. Flow measurement devices shall be considered for larger stations. At a minimum, run time meters for each pump shall be provided.

(G) Pumping Station wet well shall be reinforced concrete pre-cast or cast-in-place and designed for the structural and buoyant uplift loads. The wet well, or dry well if applicable, shall be thoroughly water proofed with high build epoxy or equal. The effective capacity of the wet well should provide a holding period not to exceed ten minutes for the design average flow. Pump cycle times should be large enough to prevent motor damage. Motor starts should be limited to 6 per hour under average design conditions. Alternating pump cycles shall not be considered as a means to reach the motor start criteria. Floor slope shall have a minimum slope of 1 to 1 to the hopper bottom. The horizontal area of the hopper bottom shall be no greater than necessary for proper installation and function of the inlet. Suction inlet shall be of the bellmouth type. Minimum clearance from suction inlet to bottom of wet well floor shall be d/3 where d is the suction pipe diameter in inches.

(H) Proper ventilation shall be provided for all pumping stations. There shall be no interconnection between the wet well and dry well or pump house ventilation. Adequate ventilation shall be provided for all wet wells where the pump pit is below ground, or equipment requiring maintenance and inspection are located within the wet well. For continuous operation, at least 12 air changes per hour shall be provided. For intermittent operation, at least 30 air changes per hour shall be provided.

(I) Access to pumps and wet well shall be sufficiently sized for the proper and safe removal of pumps and equipment or access for cleaning. All routine maintenance functions for the Pump Station must be possible without entry of the pump station under **" OSHA 1910.146 Permit Required Confined Spaces."** Entry means the action by which a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.

(J) Level sensing devices shall be designed for pump control and high and low level alarms. Sensing devices shall be accessible for inspection and maintenance from the surface of the wet well. Fixed bubbler piping or fixed floats shall be designed to prevent clogging, fouling, or solids collection which would prevent or inhibit their proper operation.

(K) Design shall provide for emergency operations such as: power loss, phase power loss, pump failure, motor high temperature, seal leak, high and low wet well. All pumping stations shall be provided with an independent engine-generator sized so that it can handle peak flows under extended power failure conditions. Generator shall be capable of operating all pumps needed for peak flow plus, lighting, pump controls, alarm controls, heating ventilation and sump pumps. Generator shall be provided with automatic and manual start-up and cut-in capability during loss of normal power or loss of any phase, and automatic exerciser which may be set on any selected schedule to run generator through a full test cycle on a routine basis. Alarms shall be monitored by pump controller and indicate by light and horn: power failure, phase loss, pump failure, high wet well, low wet well. Alarms shall be sent from the controller to an independent programmable alarm phone dialer which shall notify operations personnel of alarm conditions.

(L) Pump Station building shall be designed to enclose all pumps and generator equipment. Building to provide protection from the weather and freezing and protect equipment from vandalism. Building shall provide access to equipment for maintenance and removal of equipment. The building shall be designed to blend into the neighborhood with consideration for appearance, noise and odor control. Screening may be required and will be subject to review by the Board of Public Works. The building shall also be subject to local building codes and zoning limitations.

(M) Safety concerns shall be addressed by the designer. When chemical oxidizing agents are used for odor control or pre-treatment, appropriate safety and storage facilities shall be provided. Operator emergency eye wash stations and showers are among considerations. Local power lock-out controls shall be provided for all pumps and chemical feed systems. Adequate lighting shall be provided with proper ventilation as defined in this regulation. Lift hooks for pump removal shall be placed over the equipment in a workable location, when possible. Any special tools, lifting devices or equipment needed for service of proposed equipment shall be provided. Safety nets at hatches over pumps or over wet wells are to be provided for protection from falls or to catch falling tools.

2.0 Optional Pump Station Requirements

(A) Optional pump station types include dry well type, self-priming suction-lift and submersible. These stations may be approved where circumstances justify their use. In addition to the applicable design considerations in Section 8, the following requirements are to be met.

(B) Dry well stations shall provide a separate dry well and wet well with separate access and ventilation. Access to the dry well shall be by stairways for operations personnel. Access for equipment removal shall be through hatches with lift hooks to be provided. Dry wells shall be provided with dewatering sump pump(s) to remove leakage or drainage to a point of discharge above the wet well high water alarm. Floors shall be sloped at 0.02 feet per feet to the sump drain.

(C) Self-priming, suction-lift stations are not desirable due to energy requirements during priming.

(D) Self-priming, flooded suction pumps may be used in a dry well type station.

(E) Submersible stations may be considered provided they meet applicable requirements of Section 8 and provided the pumps and equipment are specifically designed for submerged use in wastewater. Submersible pumps shall be provided with an effective method of removal for maintenance and replacement without dewatering the wet well or disconnection of any piping in the wet well. Pumps shall be provided with shaft seal failure alarms. All wiring shall meet National Electrical Code for Class I, Division 2 locations. Ground fault interruption protection shall be provided to de-energize the circuit in the event of failure of the power cable or motor housing. Cables shall be provided with strain relief appurtenances. Level sensing devices shall be removable from the surface for cleaning and maintenance.

(F) Additional requirements may be made on the design of pumping stations, as required by the Board of Public Works. Additional requirements may also be made as stated in Article III, Section 2 and 8 of these regulations.

Section 9. Equipment Inside Buildings

(a) All interceptors (grease, oil and solids) and appurtenant works and equipment installed inside buildings shall be in compliance with the Massachusetts Plumbing Code and the installation shall be inspected by a Plumbing Inspector.

Section 10. Low Pressure Sewer Systems

(a) Low Pressure Sewer Systems serving more than one low pressure sewer service shall meet all conditions of these regulations including, Article A-IV, Section 3 relative to materials and Article A-VI, Section 7 Grinder Pump Systems.

(b) Low pressure sewer systems shall be designed for a flushing velocity of 2 feet per second based on the design flow, discharge head, friction loss, accumulative head loss, pipe size, number of grinder pumps connected to each branch.

(c) Design to be certified by a Registered Professional Engineer.

TOWN OF PEPPERELL
CONCENTRATION LIMITS FOR CERTAIN POLLUTANTS
INDUSTRIAL WASTES LIMITS

WASTE PARAMETER (mg/L)	Daily Avg. (mg/L)	Daily Max.
TSS	20.	30.
Cyanide (dest. by Cl_2)	0.1	0.2
Cyanide (total)	0.25	0.65
Fluoride	20.	40.
Aluminum	1.5	2.0
Barium	2.0	4.0
Cadmium	0.5	1.0
Chromium (+6)	0.1	0.25
Chromium (total)	1.5	3.0
Copper	1.5	3.0
Iron	2.0	3.0
Lead	0.4	0.8
Manganese	2.0	4.0
Nickel	1.8	3.6
Silver	0.15	0.3
Tin	2.0	4.0
Zinc	1.5	3.0
pH	6.5 - 9.5 (range)	

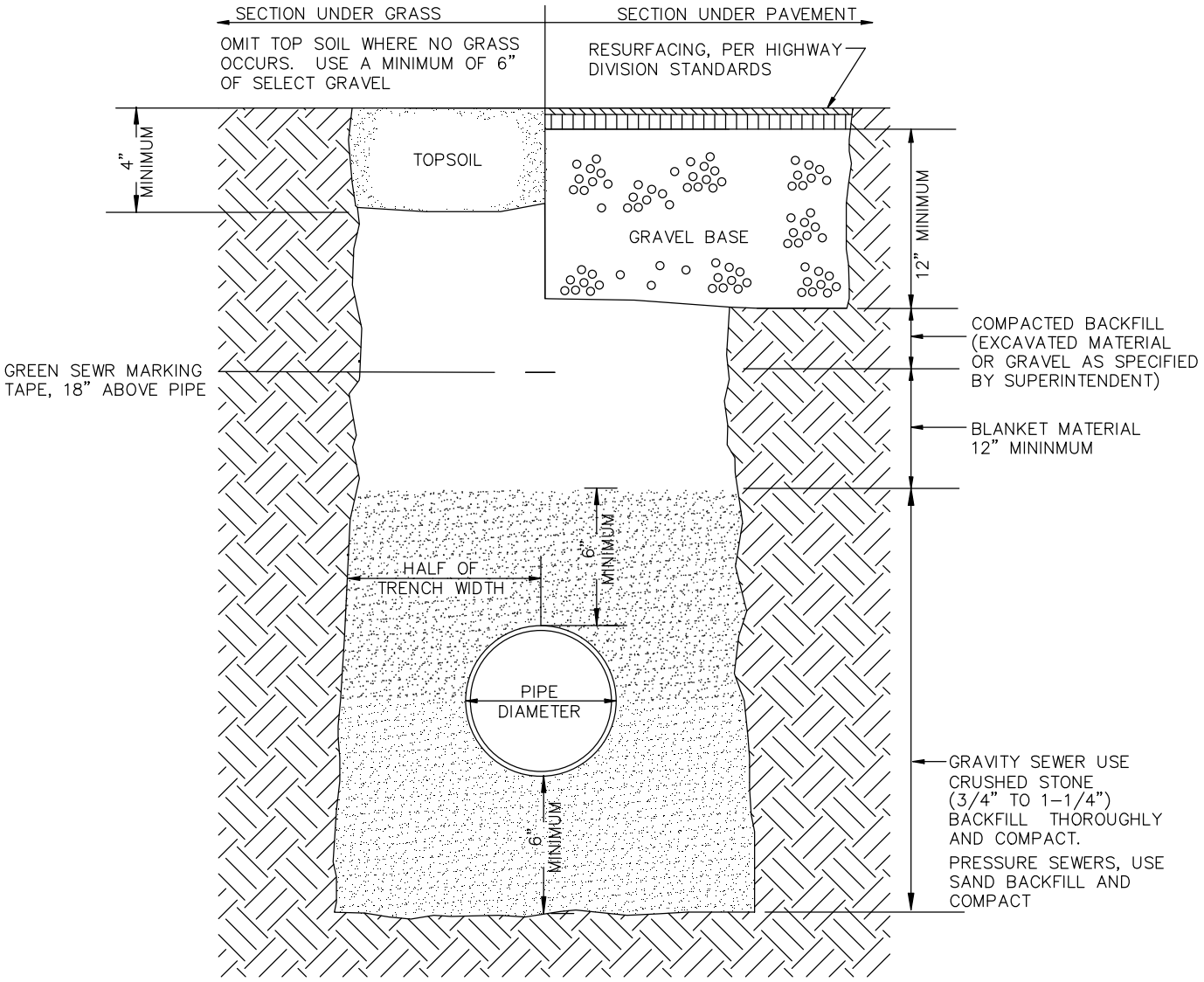
Note

Daily Avg. values refer to an eight grab composite collected over a normal operating day.

Daily Max. value refers to an individual grab sample.

Metal concentrations represent total metal limits (i.e., sum of dissolved and suspended forms).

EXHIBITS



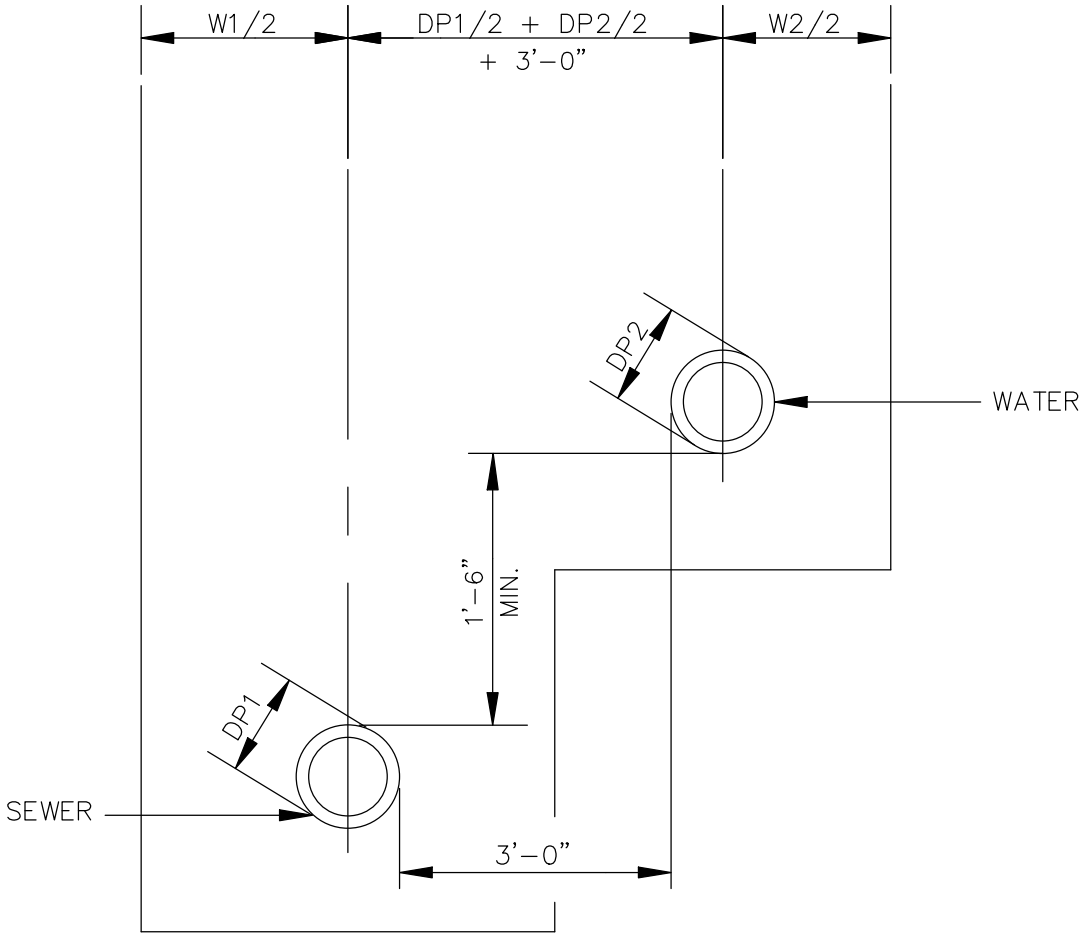
NOTE: COMPACT TRENCH TO 95% MAXIMUM DRY DENSITY IN LIFTS NOT TO EXCEED SEWER DIVISION STANDARD SPECIFICATIONS. (6" LIFTS UNDER PAVEMENT, 12" LIFTS IN UNPAVED AREAS)

TYPICAL TRENCH DETAIL

SCALE: N.T.S.

TOWN OF PEPPERELL
REGULATION OF SEWER DESIGN, CONSTRUCTION, AND USE

EXHIBIT A



NOTES:

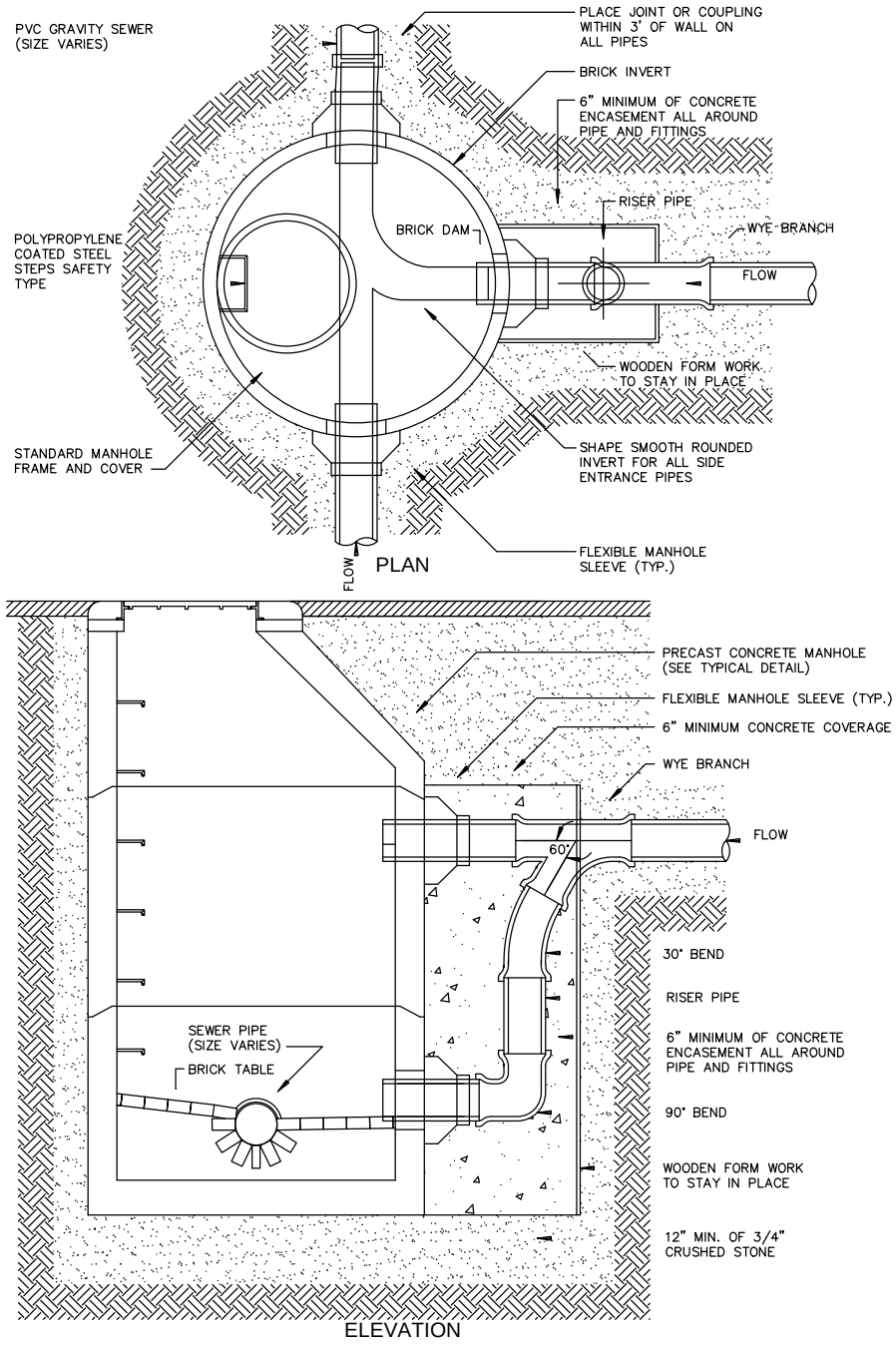
1. FOR EXCAVATION, BEDDING AND BACKFILL DETAILS, AND FOR PAYMENT LIMITS NOT SHOWN, SEE TYPICAL TRENCH DETAIL.

MINIMUM SEPERATION FOR WATER AND SEWER IN SAME TRENCH

NOT TO SCALE

TOWN OF PEPPERELL
REGULATION OF SEWER DESIGN, CONSTRUCTION, AND USE

EXHIBIT B

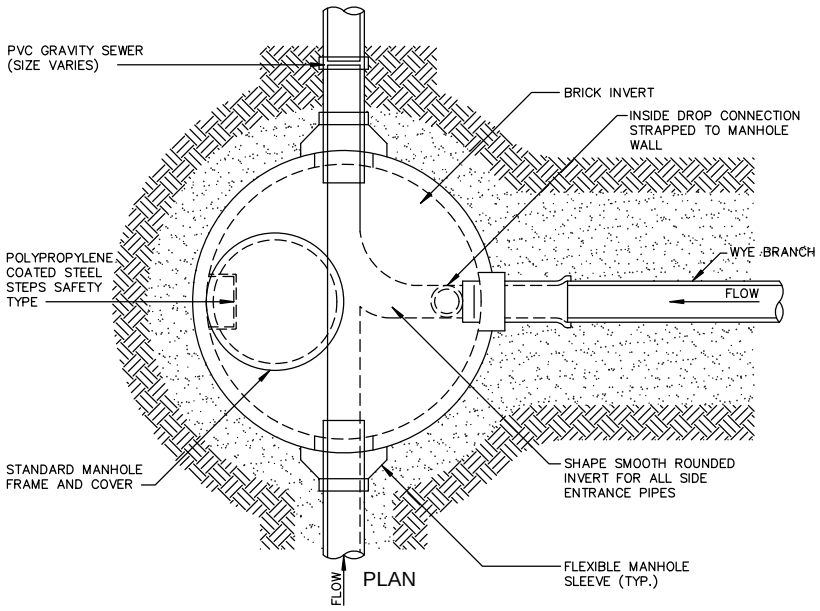


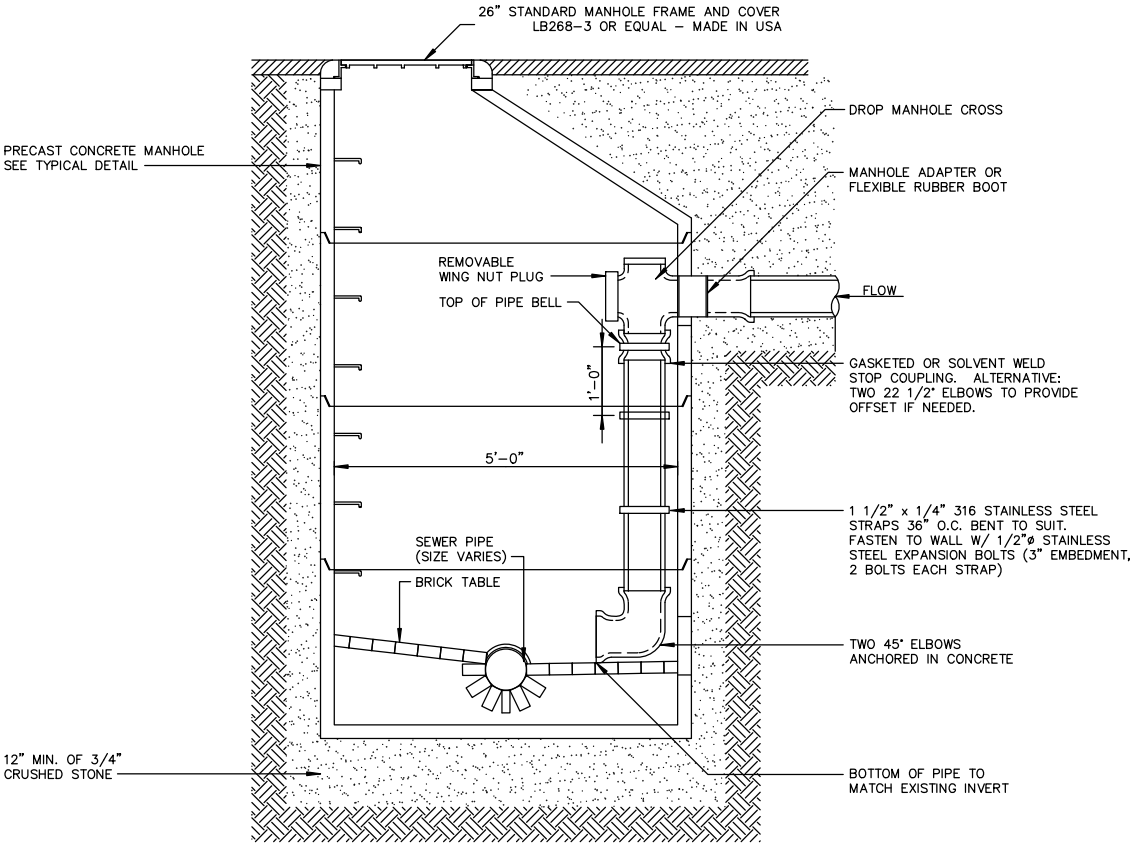
EXTERIOR DROP MANHOLE

NOT TO SCALE

TOWN OF PEPPERELL
REGULATION OF SEWER DESIGN,
CONSTRUCTION, AND USE

EXHIBIT C-1





NOTE:

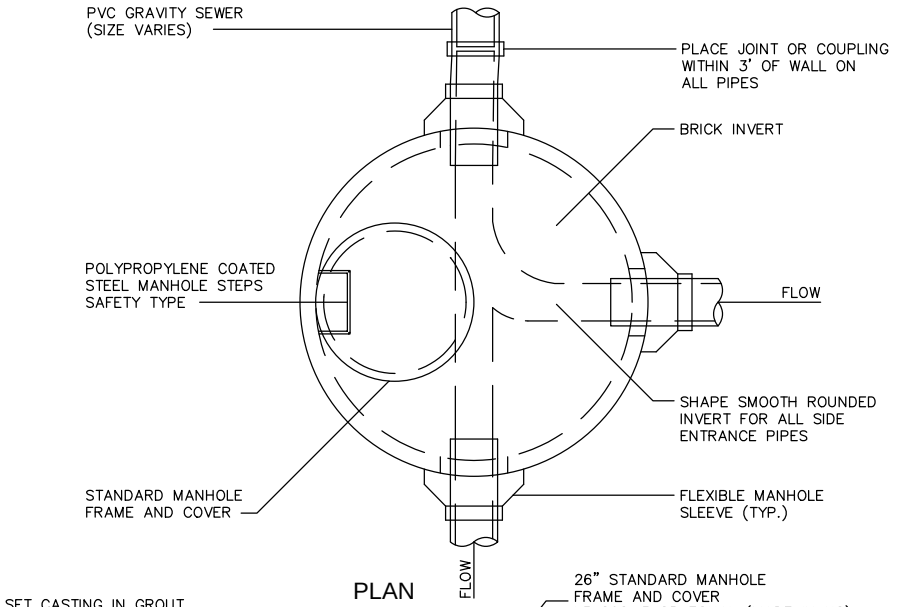
DROP MANHOLES SHALL BE USED WHEN ENTRANCE PIPE INVERTS ARE 2' OR GREATER THAN MANHOLE INVERT.

INTERIOR DROP MANHOLE

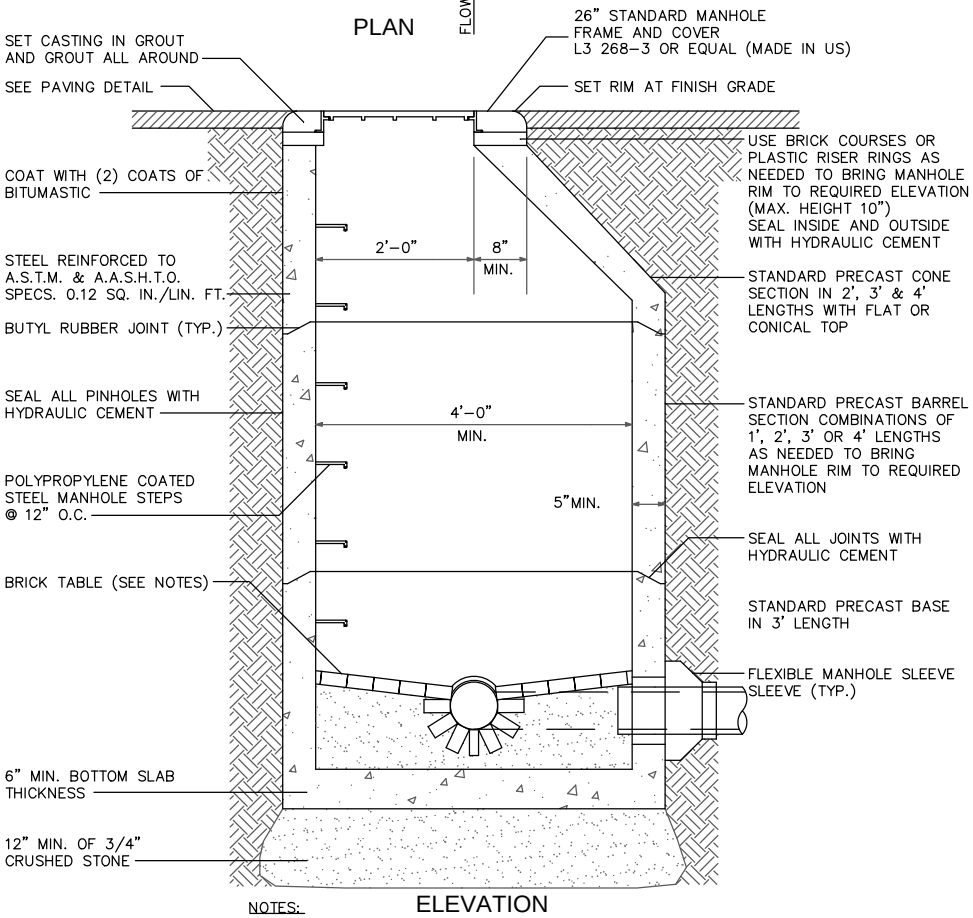
NOT TO SCALE

TOWN OF PEPPERELL
REGULATION OF SEWER DESIGN,
CONSTRUCTION, AND USE

EXHIBIT C - 2



PLAN



ELEVATION

NOTES:

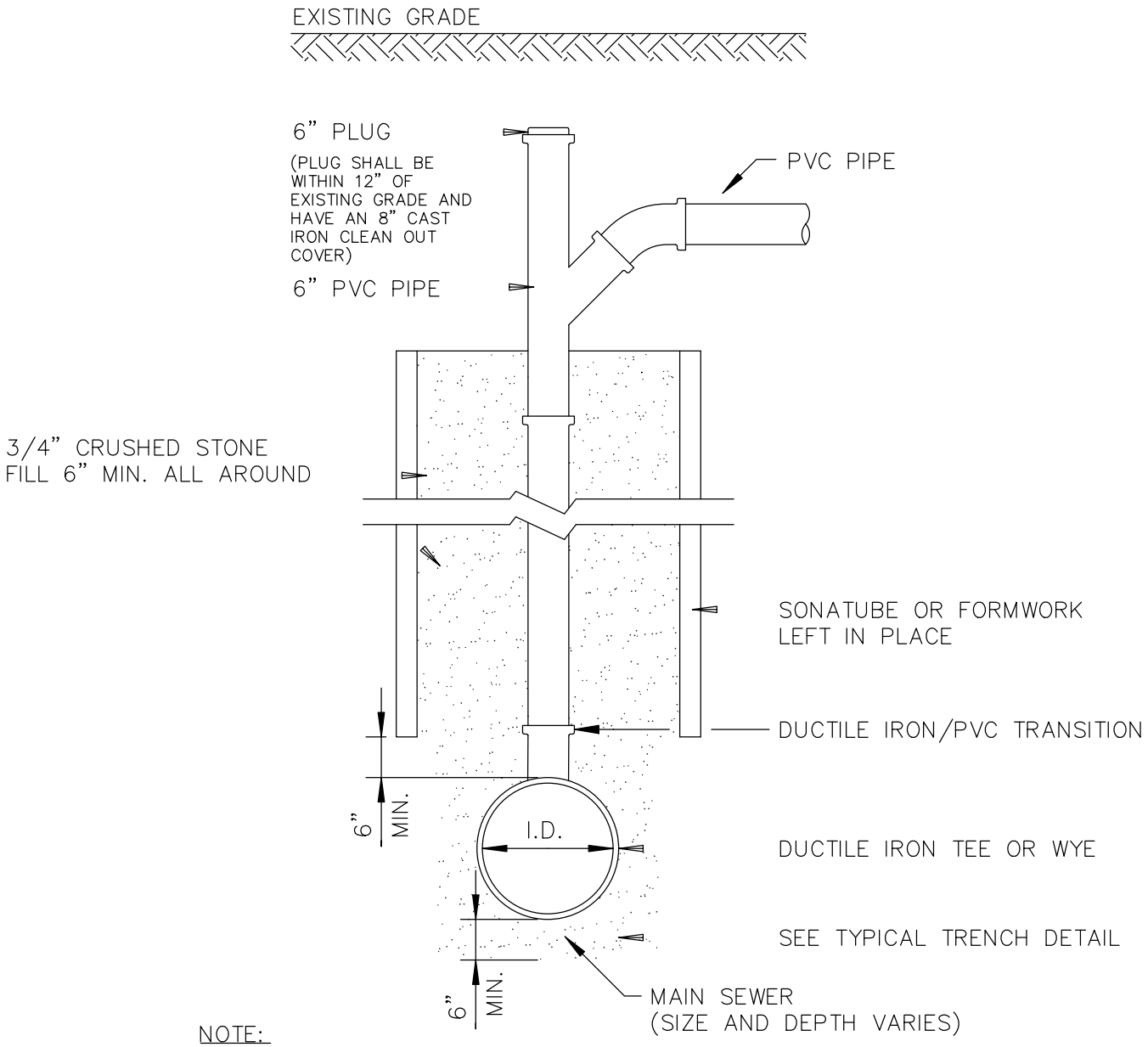
1. INNER EDGE OF BRICK TABLE TO BE AT ELEVATION OF CROWN OF TOP OF PIPE. TABLE TO SLOPE AT 1" PER 1' TO INSIDE OF MANHOLE BASE.
2. TYPICAL SANITARY MANHOLE TO BE 4 FOOT DIAMETER.

TYPICAL MANHOLE DETAIL

NOT TO SCALE

TOWN OF PEPPERELL
REGULATION OF SEWER DESIGN,
CONSTRUCTION, AND USE

EXHIBIT C



NOTE:

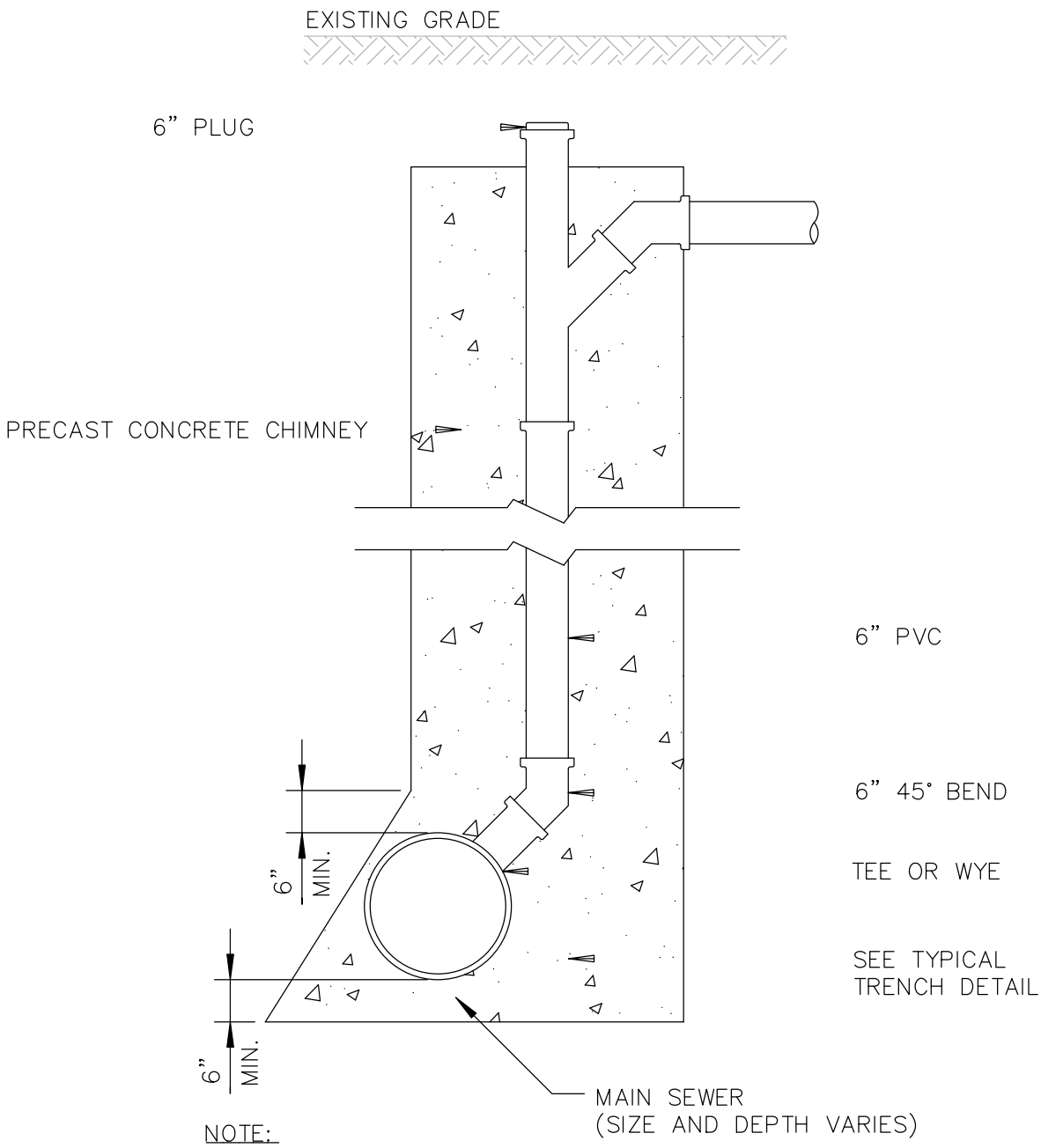
CHIMNEYS ARE ONLY TO BE USED WHERE THE MAIN LINE INVERT IS GREATER THAN 12 FEET DEEP. EXCEPT AS APPROVED BY SUPERINTENDENT

TYPICAL CHIMNEY DETAIL

NOT TO SCALE

TOWN OF PEPPERELL
REGULATION OF SEWER DESIGN, CONSTRUCTION, AND USE

EXHIBIT D



NOTE:

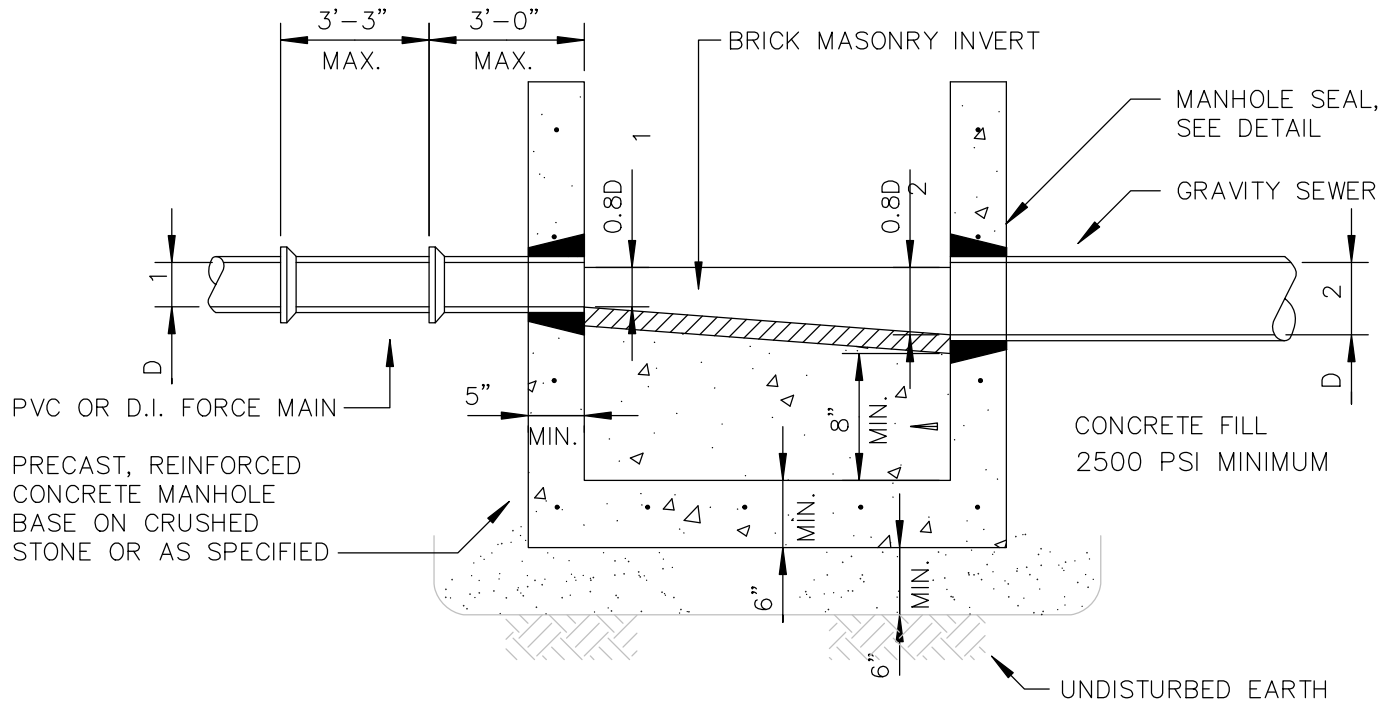
CHIMNEYS ARE ONLY TO BE USED WHERE THE MAIN LINE INVERT IS GREATER THAN 12 FEET DEEP. EXCEPT AS APPROVED BY SUPERINTENDENT

PRECAST CONCRETE CHIMNEY DETAIL

NOT TO SCALE

TOWN OF PEPPERELL
REGULATION OF SEWER DESIGN,
CONSTRUCTION, AND USE

EXHIBIT E

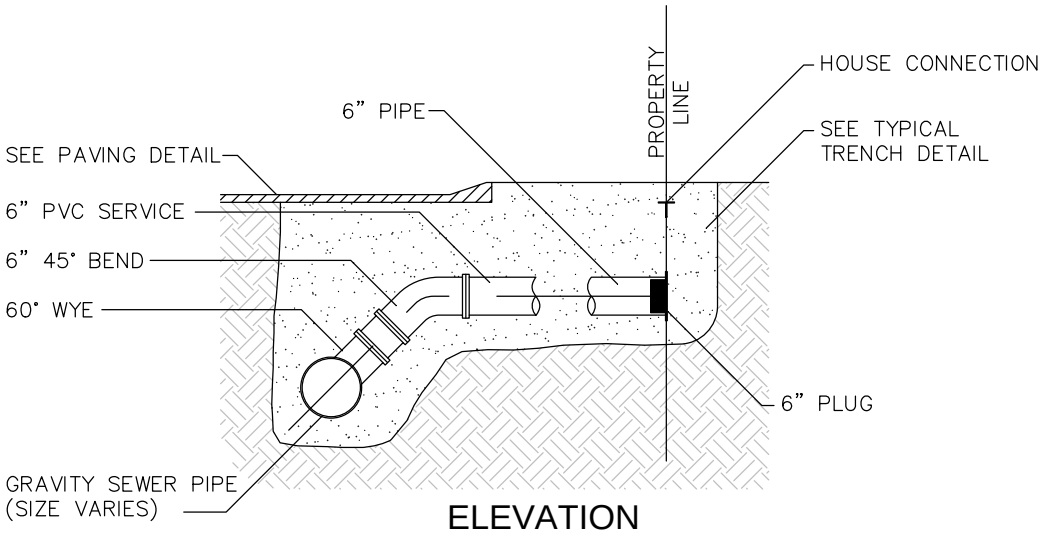


TYPICAL FORCE MAIN CONNECTION TO MANHOLE

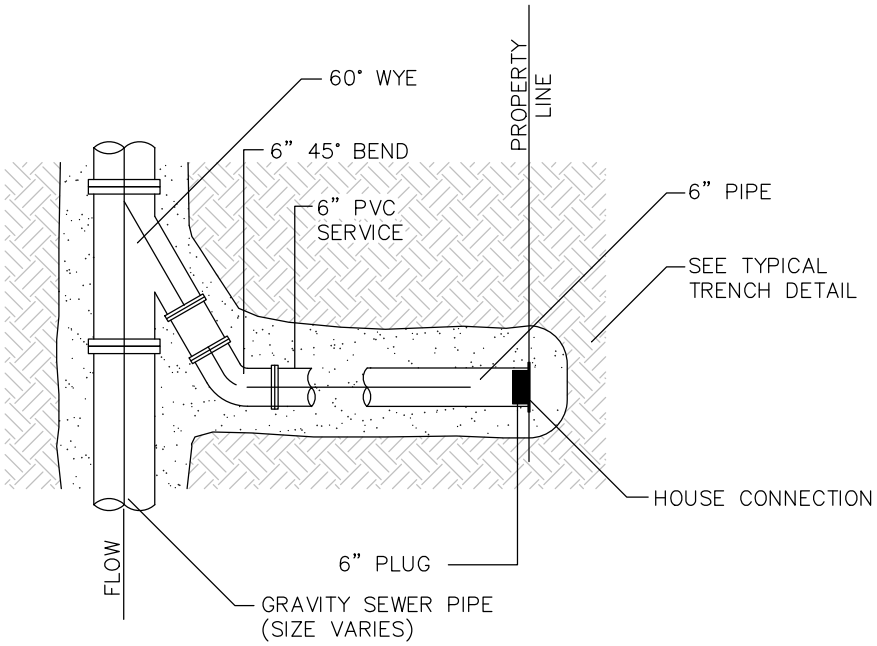
NOT TO SCALE

TOWN OF PEPPERELL
REGULATION OF SEWER DESIGN,
CONSTRUCTION, AND USE

EXHIBIT F



ELEVATION



NOTES:

1. PIPE SIZE FOR LATERAL IS 6" WITH MINIMUM DEPTH OF COVER OF 48"
2. GREEN SEWER MARKING TAPE REQUIRED 18" ABOVE SEWER PIPE
3. PIPE BEDDING 3/4" to 1-1/2" CRUSHED STONE

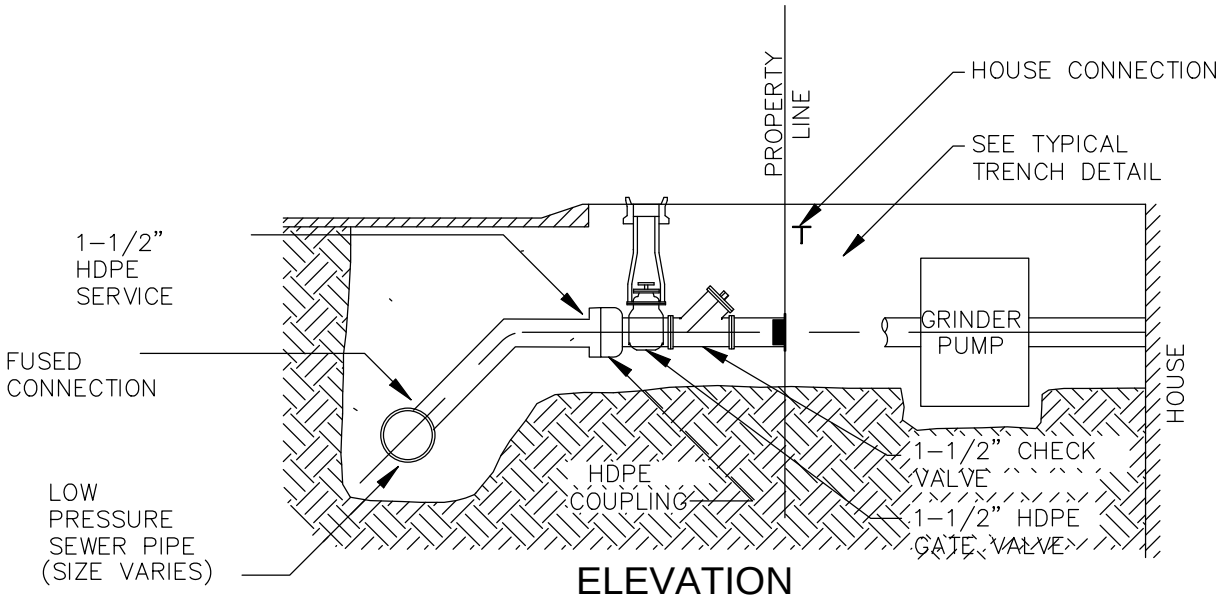
PLAN

TYPICAL GRAVITY HOUSE CONNECTION

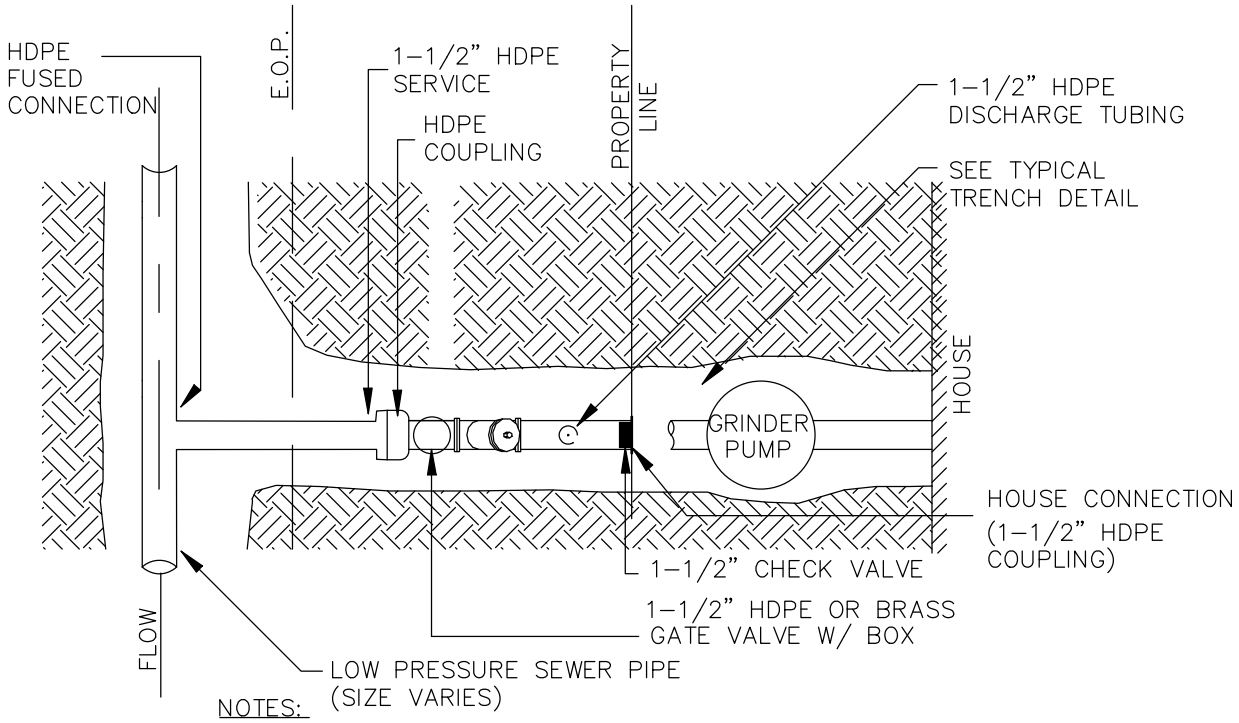
NOT TO SCALE

TOWN OF PEPPERELL
REGULATION OF SEWER DESIGN, CONSTRUCTION, AND USE

EXHIBIT G



ELEVATION



NOTES:

1. SERVICE LATERAL PIPE IS 1–1/2" HDPE WITH A MINIMUM DEPTH OF 48"
2. PIPE BEDDING SHALL BE SAND FOR PRESSURE PIPE
3. GREEN SEWER TAPE 18" ABOVE PRESSURE LINE AND 10 TO 8 GAUGE TRACE WIRE REQUIRED FROM PUMP TO GATE BOX

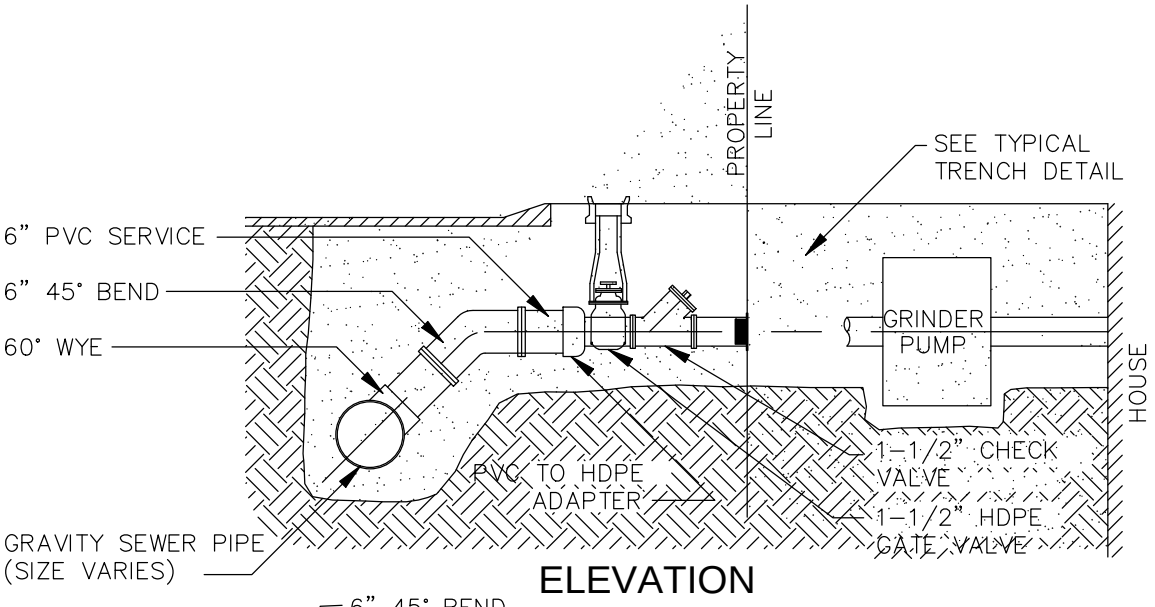
PLAN

TYPICAL LOW PRESSURE SEWER HOUSE CONNECTION

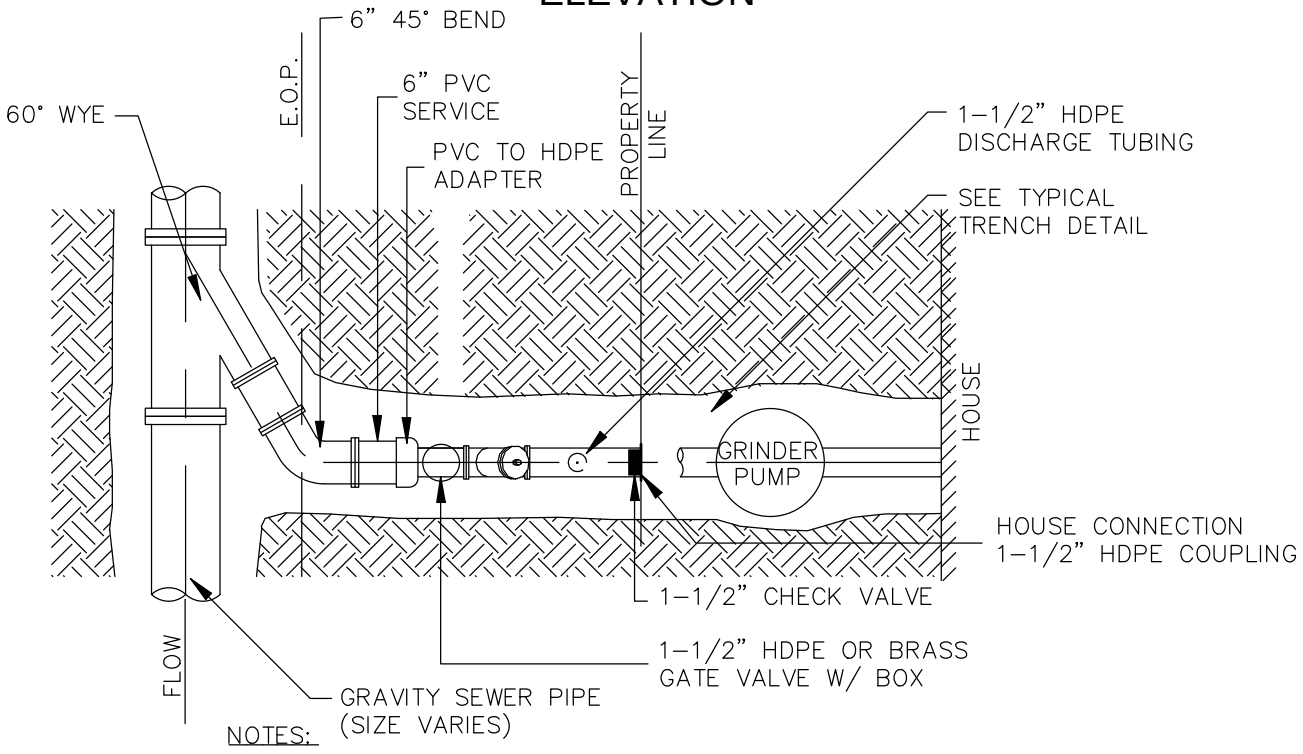
NOT TO SCALE

TOWN OF PEPPERELL
REGULATION OF SEWER DESIGN, CONSTRUCTION, AND USE

EXHIBIT H-1



ELEVATION



NOTES:

1. SERVICE LATERAL PIPE IS 6" WITH A MINIMUM DEPTH OF 48"
2. PIPE BEDDING SHALL BE SAND FOR PRESSURE PIPE AND CRUSHED STONE FOR GRAVITY PIPE
3. GREEN SEWER TAPE 18" ABOVE PRESSURE LINE AND 10 TO 8 GAUGE TRACE WIRE REQUIRED

PLAN

LOW PRESSURE TO GRAVITY SEWER HOUSE CONNECTION

NOT TO SCALE

TOWN OF PEPPERELL
REGULATION OF SEWER DESIGN, CONSTRUCTION, AND USE

EXHIBIT H-2