



Permitting and Design Criteria Manual

GREATER NEW HAVEN WATER POLLUTION CONTROL AUTHORITY



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GREATER NEW HAVEN WATER POLLUTION CONTROL AUTHORITY
ENGINEERING DEPARTMENT

GNHWPCA Permitting and Design Criteria Manual

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GNHWPCA PERMITTING AND DESIGN CRITERIA MANUAL

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CHAPTER 1 INTRODUCTION AND GENERAL INFORMATION

1.1 PURPOSE

This Manual provides guidance for the design and construction of Laterals and Sanitary Sewer Facilities constructed within the Greater New Haven Water Pollution Control Authority (Authority) service area which includes the municipalities of New Haven, East Haven, Hamden and Woodbridge, Connecticut. The Authority owns, operates, and manages the service area's wastewater system in a manner that protects the environment, ensures public safety, and protects both private and public property from damage.

Included within this document are submittal requirements and procedures for the issuance of Plan Approvals and Permits, and the requirements and procedures for design, inspection, testing, and final acceptance of sanitary sewer facilities.

All sanitary sewer systems shall comply with the requirements of this Manual, the Authority's Standard Specifications and any special criteria established by the Authority. Special criteria shall be outlined at pre-design meetings, as determined necessary by the Authority.

1.2 DEFINITIONS AND ABBREVIATIONS

Whenever in this Manual or in any documents or instruments where the Manual govern, the following terms, abbreviations, or definitions are used, the intent and meaning will be interpreted as follows:

1. Abbreviations

AASHTO	American Association of State Highway and Transportation Officials
ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
ASTM	American Society of Testing and Materials
AWWA	American Water Works Association
CADD	Computer Aided Design and Drafting
CCTV	Closed Circuit Television
CGS	Connecticut General Statutes
CONNDOT	Connecticut Department of Transportation
CTDEP	Connecticut Department of Environmental Protection
CTDPH	Connecticut Department of Public Health
USEPA	United States Environmental Protection Agency
GIS	Geographic Information System
GNHWPCA	Greater New Haven Water Pollution Control Authority
I/I	Inflow/Infiltration
IMS	Infrastructure Management System
IPC	International Plumbing Code 675
OSHA	Federal Occupational Safety and Health Act
PACP	NASSCO's Pipeline Assessment and Certification Program
SCADA	Supervisory Control and Data Acquisition

2. Definitions

APPLICANT: The property owner and/or their agent who requests and fills out an application for any type of permit or agreement required by this Manual. The Applicant includes the contractor hired by the property owner to complete the work.

AUTHORITY: Greater New Haven Water Pollution Control Authority (GNHWPCA).

BOARD: The Board of Directors of the Greater New Haven Water Pollution Control Authority.

CLEANOUT: A pipe fitting with a removable plug for inspecting and cleaning a lateral.

COMMON LATERAL: A lateral which serves more than one building or residential unit.

EASEMENT: Areas along the line of all public sanitary sewer facilities which are outside the road easements or rights-of-way, and are recorded and dedicated to the Authority granting rights along the line of the sanitary sewer facility.

ENGINEER: The Authority's Engineer.

EXECUTIVE DIRECTOR: Executive Director of the Greater New Haven Water Pollution Control Authority.

FOUNDATION DRAINS: Any network of pipes, pumps or drainage mechanism located at, near, or under a footing, foundation or floor slab of any building or structure that intentionally or unintentionally conveys groundwater away from a building or structure.

IMPROVEMENTS: Improvements shall be defined as "Construction, rehabilitation, alteration, conversion, extension or repair of a permanent structure on real property."

LATERAL: A pipe used for transporting waste from the building to the public or private sewer commencing at and including the cleanout, and ending at and excluding the wye or tee fitting at the connection to the sanitary or combined sewer. Same as Building Sewer.

LATERAL CONNECTION: Shall mean the point in which a Lateral is connected to a sanitary or combined sewer in the Authority's service area.

LOW PRESSURE SANITARY SEWER SYSTEM: A wastewater collection system in which multiple users pump wastewater into a common force main.

MANUAL: The Greater New Haven Water Pollution Control Authority's "GNHWPCA Permitting and Design Criteria Manual."

NEW CONNECTION: Shall mean a new Lateral connection to the Authority's sewer system, or a repair, replacement or modification to an existing Lateral that increases the capacity of the Lateral to accommodate a proposed increase in the average daily flow.

PERMIT: Permit required to construct, repair, modify, connect, or abandon any Lateral or sanitary sewer facility within the authority's service area. A permit is the clearance to perform specific work at specific locations.

PLAN REVIEW: Review performed by the Authority of the design plans and documents prepared for the construction of the proposed sanitary sewer facility or lateral. Plan reviews are required prior to permit applications.

PRIVATE SEWER SYSTEM: A sanitary sewer system which is not owned by the Authority and conveys flow from more than one facility, building, and/or property owner. Private sewer systems may be the collective responsibility of a single owner, group of property owners, corporation, company or association.

PUBLIC SEWER: Any sewer or system of system of sewers, exclusive of building sewers, owned, constructed, maintained or controlled by the GNHWPCA.

RECORD DRAWING (AS-BUILTS): Plans certified, signed and dated by a professional engineer or land surveyor registered in the State of Connecticut, indicating the Plans have been reviewed and revised, if necessary, to accurately show all as-built construction and installation details including, but not limited to, key elevations, locations and distances.

RESIDENTIAL UNIT: A “residential unit” is any building or portion thereof which contains one or more habitable rooms that are occupied by, or designed or intended to be occupied by, one person or by a family or group of housemates living together as a single housekeeping unit that includes facilities for living, sleeping and facilities for cooking, eating, and sanitation.

RIGHT-OF-WAY: All land or interest therein which by deed, conveyance, agreement, easement, dedication or process of law is reserved for or dedicated to the use of the general public, within which the Authority shall have the right to install and maintain sanitary sewer facilities.

SANITARY SEWER: Any pipe, conduit or other structure, outlet or drain designed to carry only sanitary sewage.

SANITARY SEWER FACILITY (SSF): An alternate term for Sanitary Sewer System. All facilities for collection, conveyance or transportation, storage, pumping, treatment and disposal of sanitary sewage and industrial wastewater. It does not include watercourses or storm sewers.

SERVICE AREA: Service area means all the area served by the Authority’s sanitary sewer system. Service area includes the municipalities of New Haven, East Haven, Hamden and Woodbridge, Connecticut.

SEWER: A pipe for carrying wastewater (sanitary sewer), storm water (storm sewer) or a combination of both (combined sewer). Wherever in these Standards the word “sewer” is used without distinguishing type, “sewer” shall mean sanitary sewer.

STANDARD DRAWINGS (DETAILS): The drawing of structures, sanitary sewer lines or devices commonly used and referred to on the Plans and in this Manual.

STANDARDS: The Greater New Haven Water Pollution Control Authority Sewer System Design Standards. The requirements for the design and construction of sanitary sewer facilities and laterals as contained herein and all subsequent additions, deletions or revisions. Same as Manual.

STORMWATER: Any flow occurring during or following any form of natural precipitation and resulting therefrom.

TEN STATE STANDARDS: Recommended Standards for Sewage Works, latest edition, developed by the Committee of the Great Lakes - Upper Mississippi River Board of State Sanitary Engineers.

WASTEWATER: A combination of the liquid and water-carried wastes from residences, commercial businesses, institutions and industrial establishments and other sources, together with such groundwater, surface water and stormwater as may be present.

1.3 SEWER ORDINANCE

The Authority's Sewer Ordinance referred to herein is made part of this manual. In the event of discrepancies in requirements or standards, the more stringent standards shall govern. The Authority's Sewer Ordinance is available on the internet at www.gnhwpca.com.

CHAPTER 2

PROCEDURES AND REQUIREMENTS

2.1 PERMITS - GENERAL REQUIREMENTS

A GNHWPCA plan review process is required for any improvement project of a permanent structure on real property inside the Authority's service area with existing or proposed connections to the Authority's Wastewater System. Permits are required to construct, repair, modify, connect, or abandon any lateral or sanitary sewer facility. Included within this Chapter are submittal requirements and procedures for the issuance of plan approvals and permits. Figure 2.1 shows the Authority's plan review process required to obtain sanitary sewer permits.

An Authority permit does not relieve any person from obtaining any and all applicable approvals and permits from other appropriate regulatory or municipal agencies.

Permits must be obtained and fees paid before the start of construction of sanitary sewer facilities or laterals.

The permit is valid for one (1) year from the date of issuance. An extension may be applied for prior to permit expiration.

A sanitary sewer permit is not required for maintenance work performed by or on behalf of the Authority.

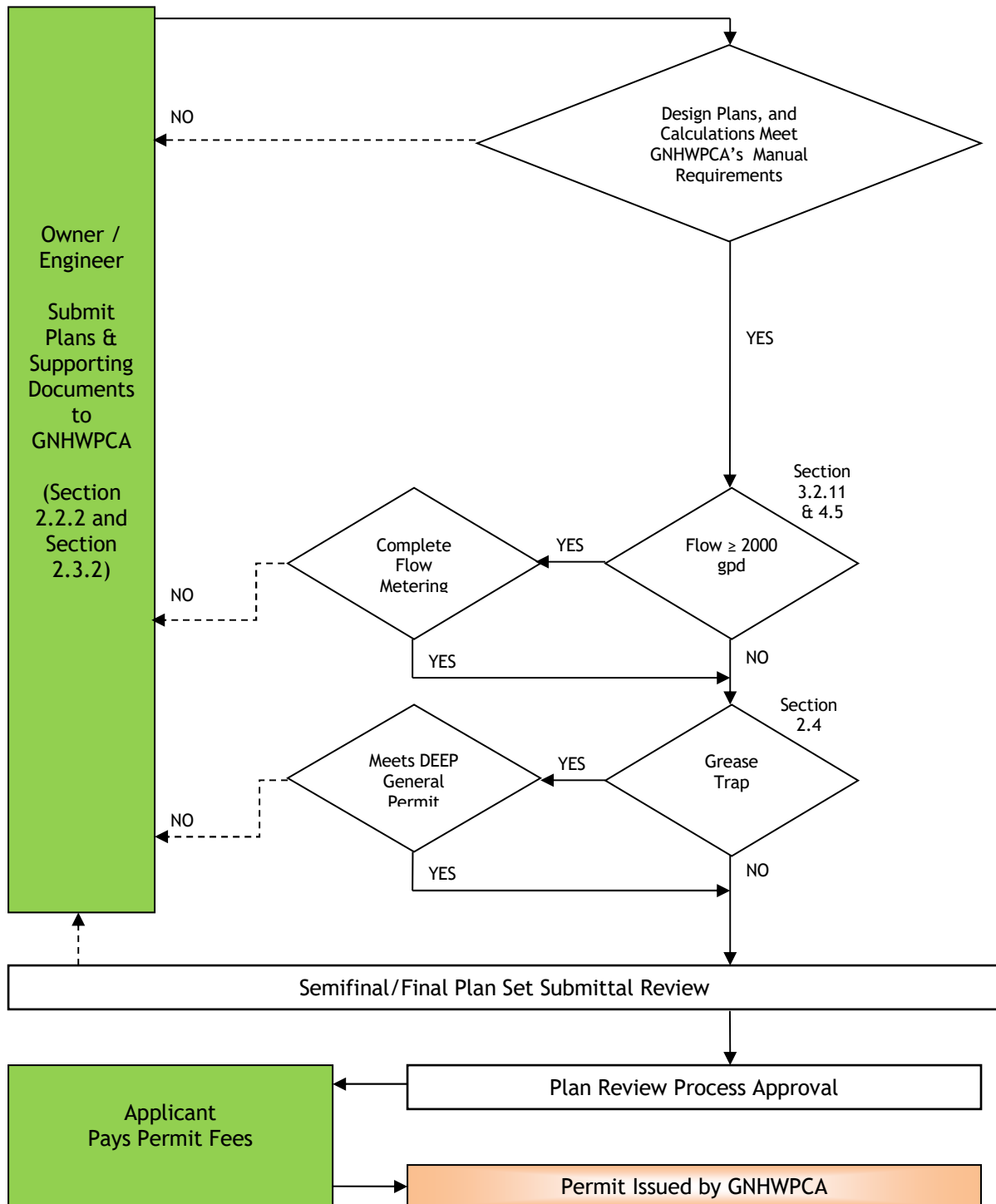
Applicants shall contact the Authority for a current list of all applicable fees.

2.1.1 Amendment of Permits and Plans

After a Permit has been issued, any deviation or change in the information contained in the Permit Application and supporting documentation or the plans shall be considered an amendment subject to approval by the Authority. Prior to the approval of any plan change, the Applicant shall file with the Authority a written request for an amendment. The amendment shall include a statement of the requested change and the submission of any amended plans. The Authority shall give the Applicant written notice that the amendment has been approved or denied, and if approved, copies of the amended application or plans shall be attached to the original application.

Reinspection fees and other fees which are required as a result of the amendment shall be assessed and paid in accordance with the most current Board approved fee schedule.

Figure 2.1 GNHWPCA Plan Review Process Guideline Flowchart.



2.1.2 Revocation of Permit

The Authority may revoke a Permit when:

1. The Authority determines that the application, plans, or supporting documents contain a false statement or misrepresentation; or
2. The contractor is not licensed or qualified; or
3. A construction activity is proceeding in violation of a requirement of this Manual; or
4. A construction activity is proceeding in a manner which is materially different from the application, plans, or supporting documents; or
5. Additional information becomes available that would necessitate the revocation of the Permit (Permit issued in error).

If the Authority revokes a Permit, the Applicant must suspend all sewer related work until a new Permit is issued by the Authority. Work completed prior to the revocation of the permit shall be inspected by GNHWPCA inspectors; any work that does not meet GNHWPCA Standards shall be removed by the Applicant as a condition of the new Permit.

2.1.3 Permit Connection Fees

In 2006, the Authority developed a region-wide Connection Fee that is applied uniformly and fairly to all new customers of the system within each of the member communities. The fee is often defined as a capacity fee, connection charge or impact fee. In simple terms, the connection fee is essentially the fee for “purchasing” wastewater conveyance and treatment capacity. The purpose of this connection fee is to support a “growth pays for growth” approach to limit the impact of growth related costs on existing customers¹.

This connection fee applies to residential, commercial and industrial dischargers. For new facilities, the connection fee is to be paid prior to the time the facility is actually connected to the sewer or, in the case of expanding existing facilities, at the time of expansion of the wastewater discharge.

Appendix A includes the current connection fee schedule as approved by the Board of Directors. For the most current connection fee schedule visit www.gnhwpc.com.

The installation of outside grease traps and oil/sand separators independent of any other site work will be charged the established standard repair fee.

¹ Red Oak Consulting, Greater New Haven Water Pollution Control Authority - Connection Fee Study, July 2006

All applications to the Building Departments within the Authority's constituent municipalities shall be subject to the Authority's Fees regardless of the extent of replacement, renovation or addition.

Fees are to be paid by check at time of issuance of the sanitary sewer permit.

2.2 PERMIT FOR LATERALS - PROCEDURES AND REQUIREMENTS

It shall be the responsibility of the owner, whose property is benefited to make all necessary repairs, extensions, relocations, or changes for the entire length of Lateral, including the portion within public easements and rights-of-way.

A Permit is required to construct, repair, modify, connect, or abandon any Lateral within the Authority's Service Area. Permits may be obtained by the owner or its representative.

These requirements may be altered, modified, or waived, at the discretion of the Authority when it is shown compliance is not possible due to extenuating circumstances.

2.2.1 Lateral Permits, Fees and Penalties

1. Lateral Connection Permits are required for:
 - a. New Lateral connections to the Authority's sewer system.
 - b. Building Improvement projects, and new buildings that connect to the Authority's wastewater system through approved existing Laterals as described on Section 3.2.9 of this Manual.
 - c. Improvements to an existing Lateral that increases the size/capacity of the Lateral.
 - d. Improvements or changes to the size and number of water service meters as these can impact the anticipated flow to the Lateral.
2. Lateral Repair Permits are required for:
 - a. A repair intended to return the existing Lateral to its original design capacity. Examples include, but may not be limited to: repairing offset joints, repairing a broken or collapsed lateral, lateral lining rehabilitation, etc.
 - b. The installation of grease traps (see Section 2.4).
 - c. The installation of oil/sand separators (see Section 2.4).
3. Lateral Disconnection Permits are required for:
 - a. Demolition of an existing building.

- b. Demolition/abandonment of an existing Lateral to be replaced with a new connection.

Lateral demolition/abandonment work shall be as described on Section 3.2.10 of this Manual.

4. Permit fees are calculated as follows:

- a. Lateral Connection Permit: Fees are based on the size of the buildings water service meter in accordance with the schedule shown on Appendix A.1.
 - i. If the existing water meter is being reused, the Permit fee is equal to the Administrative Permit Fee as specified on Appendix A.1.
 - ii. If a new water service meter is replacing an existing meter, the Permit fee for the Improvement project is based on the proposed change in size to the existing water service meter on record at the Authority and calculated as follows:
 - 1) If the size of the proposed water meter is the SAME or SMALLER than the existing water meter, the Permit fee is equal to the Administrative Permit Fee as specified on Appendix A.1.
 - 2) If the size of the proposed water meter is GREATER than the existing meter, the Permit fee is equal to the Connection Permit Fee associated with the requested water meter size, less a credit equal to the value of the Connection Permit Fee for the old meter size being removed, as specified on Appendix A.1.
- b. Lateral Repair Permit: Fees are based on the building's water meter size in accordance with the schedule shown on Appendix A.1.
- c. Lateral Disconnect Permit: Fees are based on the demolished building's water meter size in accordance with the schedule shown on Appendix A.1
 - i. Construction on a site where the Authority received a Disconnect Permit fee and the Authority issued a Lateral Disconnect Permit, the Disconnect Permit fee will be credited toward the Connection Permit fee.
 - ii. Construction on a site where the building was demolished or the existing building is abandoned and it has not discharged sewer flows to the Authority's sewer system in more than 10 years, a new Lateral Connection Permit fee applies without a credit for old water meters.

5. Penalties for commencing sewer work without an Authority issued Permit are effective immediately.
 - a. Violators (owner and contractor) will receive a Notice of Violation. Permits must be obtained by the owner or owner representative within five (5) days of the receipt of this notice.
 - b. Subsequent violations, regardless of address, will be subject to penalty and fines for work commencing prior to issuance of a Permit. The penalty and fines include, but may not be limited to:
 - i. Payment of the required Permit fees
 - ii. Payment of fines of up to \$385 per day
 - iii. Suspension of work
 - c. The above penalties and fines also apply if the Authority identifies/determines that an increase in the size of the water service meter has occurred without a Permit from the Authority and regardless of commencement of any Lateral work.
 - d. The Permit fee and fines are payable to the Authority simultaneous with the submission of the required Permit application for the sewer work.
 - e. Suspension of Work: The Executive director or his/her designee may suspend violators from obtaining Permits to complete sanitary sewer related work. Owners or Contractors under suspension shall not be permitted to apply for any other permit regardless of location or address. Repeat and/or malicious intent to avoid GNHWPCA permitting requirements may result in the Authority suspending permits/work for any amount of time up to one year. Suspension of work can be specific and directed to any individual person, company, or corporation seeking a permit.

2.2.2 Submittal Requirements for a Lateral Permit

The following are submittal requirements for a Lateral Permit:

1. Application shall be made on a form provided by the Authority. A sample permit application is included in Appendix A.
2. Lateral connection or disconnection or repair fee. All appropriate fees shall be paid before a permit will be issued.
3. Existing/Proposed water meter size servicing the building.
4. Plans shall be submitted and at a minimum shall include:
 - a. Existing site layout plan;
 - b. Proposed site layout plan and utilities plan;

- c. Stormwater detention/retention system details;
- d. Lateral construction materials;
- e. Elevation of the lowest floor and lateral sewer, specifically the elevation of the lowest gravity sanitary service;
- f. Elevation of top of frame and invert of nearest upstream and downstream manhole.

5. Design Calculations

- a. Design Summary Form (GNHWPCA SD-01); a copy of the form is included in Appendix B.
6. When requested, a CCTV video and inspection log of the existing lateral. The Authority's Sewer Superintendent or designee must be present during this inspection.
 7. If an easement is required to gain access to the sanitary sewer, proof of such easement is required at the time of the application.
 8. Any additional information deemed necessary to comply with the Authority's requirements.

Sewer lateral connection work shall be performed by a sewer/plumbing contractor licensed in Connecticut.

Laterals shall be inspected to assure compliance with the Standards contained in this Manual.

It is the responsibility of the Applicant to notify the Sewer Superintendent at least 24 hours before the Lateral is available for inspection.

2.2.3 Lateral Construction Inspection

The Authority will conduct inspections on lateral connections from 11:00 A.M. to 4:00 P.M. local time, Monday through Friday, or by appointment. Inspections may not be scheduled for observed State holidays. After hours inspection shall only be permitted upon written direction from the municipality that the work must be performed after hours due to traffic control requirements or other extenuating circumstances.

The Lateral, in its entirety from the lateral cleanout outside the building to the connection with the sewer, or at the location of the repair/modification, shall be exposed for inspection and be properly bedded in accordance with the Standard Specifications to one-half (1/2) the diameter of the lateral. After the Lateral has passed the inspection, the contractor is responsible for completing the placement of the bedding material to one foot above the top of the pipe, and continue with the placement of initial and final backfill.

Construction work shall comply with all laws and regulations. The responsibility for safety measures during construction rests solely with the permit holder. All

excavations shall be adequately protected by barricades, fences, lights, and other such means as necessary to protect the public, and as required by other regulatory agencies, such as, but not limited to OSHA.

2.2.4 Lateral Construction As-Built

All Contractors shall submit as-built drawings to the GNHWPCA Sewer Superintendent's Office, within two (2) weeks after construction is complete. THE AUTHORITY RESERVES THE RIGHT TO DENY FUTURE PERMITS TO CONTRACTOR'S WITH PENDING AS-BUILT DRAWINGS.

Contractor shall complete the Authority's Sewer Lateral As-built Form in its entirety (sample as-built and form is shown on Appendix A.3), and he/she shall follow the following checklist:

- Use a straight edge.
- Show an accurate rendering of the main building, curb line and main roadway.
- Draw any existing and/or proposed sewer work.
- Measure a minimum of three (3) swing ties (triangulated ties) to all applicable features: lateral Connection to sewer main (hub), disconnection plugs, cleanouts, backwater valves, pump chamber, bends, couplings and changes in horizontal and/or vertical direction. A mandatory tie is the upstream and/or downstream manhole cover; Contractor shall provide the distance to the lateral hub from the nearest sanitary sewer manhole. Acceptable structures for ties are as follows: Building corners, manhole covers, catch basins, telephone poles, hydrants.
- Specify type of customer, pipe material, pipe size, type of connection made (e.g., core and boot, chimney, etc.), direction of flow, and north arrow (approximate).
- Label the length of pipe used and the depth of the sanitary sewer lateral invert at all locations listed above and at the curb line.
- Clock diagram cross section depicting the lateral entrance to the main as seen in the direction of flow.

The Authority Representatives may request additional information to be incorporated into the drawing to provide clarity. Please direct any questions or comments to the GNHWPCA Superintendent at 203-466-5263 or via e-mail at sewerinfo@gnhwPCA.com.

2.3 PERMITS FOR SANITARY SEWER FACILITIES (SSF) - PROCEDURES AND REQUIREMENTS

A sanitary sewer plan review approval and permit is required for the construction of new sanitary sewer facilities and/or modifications of existing sanitary sewer facilities within the Authority's Service Area.

To facilitate the SSF permit process, the Authority must approve plans prior to the permit being issued. The approval is intended to inform the Applicant all the requirements related to the design of the SSF have been met. The Applicant shall submit, either concurrently or

consecutively, all the requirements for a SSF permit prior to issuance by the Authority. Upon submission of an SSF plan review and permit, the Applicant agrees to allow the Authority's staff to enter the property as necessary to review the existing and proposed condition.

The approved plans are valid for a period of one (1) year from the date such approval was granted, or until the SSF permit is issued. However, prior to the issuance of the permit, if there are any material changes to approved design plans and specifications, or circumstances which cause the design plans and specifications to be inaccurate or incomplete, then new or corrected design plans and specifications shall be submitted to the Authority as a precondition for obtaining a SSF permit.

SSF Permits will not be issued for connections to existing private sewers unless pre-existing written agreements have been granted (see Section 2.3.4).

During the plan review process, the Applicant may be required to evaluate the downstream system if sufficient information and data are not available from the Authority. Refer to Section 4.5 for the downstream evaluation requirements.

2.3.1 Sanitary Sewer Facility Permits and Fees

Permits and fees are required for the construction of new sanitary sewer facilities within the Authority's Service Area.

The permit fee for the construction of a new SSF will be as established in the Authority's permit fee schedule. A permit fee for the construction of a new SSF will be credited toward the cost of the new lateral permit fees when the laterals are connected to said SSF.

2.3.2 Submittal Requirements for a Sanitary Sewer Facility Permit

The following are the submittal requirements for a plan review approval and permit for the construction of a SSF:

1. Permit application shall be made on a form provided by the Authority. A sample permit application is included in Appendix A.
2. Payment of permit fees in accordance with the most current Board approved fee schedule.
3. Plans shall be submitted and at a minimum shall include:
 - a. Plans shall be developed by, or under the direction of a Professional Engineer. All sheets shall include the Professional Engineer's seal, signature, and date plans were certified including any revision dates;
 - b. Existing site layout plan;
 - c. Proposed site layout plan;
 - d. Sanitary sewer plan/profile sheets. Every sheet in the set that shows plan/profile of sewer should contain at least four evenly distributed coordinate tics (in the corners preferably) that show the Connecticut State

plane Coordinates (Northing, Easting) in NAD83 Feet. All vertical elevations should also conform to NAVD 88 as the datum. State these coordinate systems along with the survey accuracy in the title block notes;

- e. Sewer detail sheets;
 - f. Stormwater detention/retention system details;
 - g. Lift station detail sheets (when applicable);
 - h. Other sheets as deemed necessary;
4. As-built drawings shall comply with the same requirements listed above. As-built drawings are the responsibility of the Applicant, Contractor and Design Engineer.

Installation of SSF shall require a registered Professional Engineer to stamp and certify that the project has been constructed in accordance with the approved plans, the Authority's Standard Specifications, and the permit requirements. **As-built drawings certified by a Professional Engineer shall be filed at the Authority within 2-weeks after construction is complete.** It is the responsibility of the Applicant to provide inspection during construction to validate this certification.

5. Sewer Study as described in Section 4.1.1
6. Design Calculations
- a. Design Summary Form (GNHWPCA SD-01)
 - b. Gravity Sewer Design Computation Form (GNHWPCA SD-02); a copy of this form is included in Appendix B.
7. Lift station submittals as required by the Engineering Department.
8. If an easement is required to gain access to the sanitary sewer, proof of such easement is required at the time of the application.
9. Any additional information deemed necessary to comply with the Authority's requirements.

2.3.3 Construction Inspection and As-Built Drawings

The Authority has the power to inspect and investigate all phases of construction. These inspections and/or investigations may be made at any time by going upon, around, or about the affected property.

After construction begins, the contractor shall be responsible for informing and/or notifying the Authority's Construction Administrator at least forty-eight (48) hours in advance of the following:

- Daily work schedule including any changes in schedule;
- If work is to be performed on weekends and/or holidays;

- Dates trenches will be open and sewers will be installed;
- Dates structures will be installed;
- Date all applicable tests are to be performed;
- Date "as-built" verification is to be performed; and
- Any other information deemed necessary to assure the sanitary sewer facilities are properly constructed.

The Authority, upon request of the Applicant, will schedule the Final Inspection. A CCTV video inspection and inspection log in electronic PACP format of the new installation shall be completed by the Contractor during final inspection.

All testing required per Authority's Standard Specifications, shall be performed under the observation of the Authority's representative. It is the responsibility of the Contractor to schedule the testing with the Authority. Test results obtained in the absence of the Authority shall not be accepted. Any portion of the SSF not passing the tests shall be repaired or replaced to the extent required by the Authority and retested.

Any portion of the SSF not inspected as prescribed by the Standard Specifications may require excavation to the extent required by the Authority.

Failure to comply with these requirements may result in the Authority not accepting the SSF and denying future permits.

2.3.4 Private Sewers

Design, permitting and construction of new private sewers systems that discharge to the Authority's Service Area shall comply with the minimum requirements of this Manual and the Authority's standard specifications.

Upon completion of the private sewer system, the Applicant shall provide as-built drawings, and CCTV video and inspection logs of the private sewer system. The Authority's representative shall be present during the installation, testing, and CCTV inspection of the sewer system as specified in this Manual.

2.3.5 Sanitary Sewer Extensions and Expansions

In the case of any proposal to extend the Authority's collections system or expand capacity of the Authority's collection system (including, without limitation, by way of an increase in the size of a sewer pipe or appurtenance thereto), the Authority, prior to implementing any such extension or expansion, shall obtain or require the developer to obtain consent and required approval(s) of the governing body (i.e. Board of Alderman, Town Council, etc.) of the local Constituent Municipality in which such proposed sanitary sewer extension or expansion is located.

The governing municipality may request the Authority determine the initial feasibility prior to resolving to approve such extension or expansion. Upon written request and concept plan, the Authority will provide a cursory review to determine feasibility. Upon receipt of the concept plan, the Authority may request additional information to make a reasonable feasibility determination. The Authority's initial feasibility does not consider economics, permits, utility conflicts and/or other issues beyond the control or knowledge of the Authority.

If the Authority deems that an extension is feasible, the following approvals must be obtained prior to official Authority approval and acceptance:

1. The Applicant must obtain a Governing Body resolution approving a sewer extension consistent with the Authority's Sewer Ordinance.
2. The Applicant shall submit complete set of plans and design information in accordance with the Manual for the Authority's review and approval.
3. The Authority must complete a review and approval of the proposed development in accordance with the requirements of this Manual. Four final sets will be approved by the Authority, one copy will be kept on file, and three copies will be returned to the Applicant for distribution to Local Building Department and/or appropriate approving body. The Authority requires that the Applicant show an approved stamped copy at the time of obtaining a sewer connection permit.
4. The Applicant will be required to pay the appropriate connection fees at the time of application. In addition, the entire cost of this sewer extension must be borne by the Applicant.

2.4 SANITARY SEWER PRETREATMENT

Any new building to be constructed in an industrially zoned area with a floor space greater than five thousand square feet, or with a water meter size greater than three quarter inch, or if otherwise required by the Authority shall install a sewer monitoring facility prior to final building inspection approval. The monitoring facility shall be situated outside of the building on the user's premises. If the industrial user's service line ties into an existing Authority manhole and such manhole allows for safe sampling and isolation of the industrial user's discharge, the Authority may allow said manhole to serve as the industrial user's monitoring facility.

2.4.1 Grease Interceptors

A plan review approval and permit is required for the construction/ installation of new sanitary sewer grease traps within the Authority's Service Area.

Class II, III and IV food service establishments (FSE), as defined by Section 19-13-B42 of the State of Connecticut Public Health Code, are required to comply with the conditions of the Connecticut Department of Energy and Environmental Protection (CT DEEP) General Permit for the Discharge of Wastewater Associated

with Food Service Establishments (General Permit). The General Permit's requirements include, but are not limited to the installation of: (1) an outdoor in-ground grease trap/interceptor (1,000 gallon minimum), or (2) an Automatic Grease Recovery Unit (AGRU), or (3) a Super Capacity Grease Interceptor (SCGI). The General Permit is available for download at www.ct.gov/deep/.

Engineering drawings (site plans and/or utility plans showing the connection to the sewer and the location of the grease trap/interceptor, and construction details) prepared and signed by the FSE's CT licensed professional engineer must be submitted to the GNHWPCA Engineering Department for review and approval. The FSE is also required to submit sizing calculations demonstrating that the unit chosen is adequate for the FSE's use. Be advised that the local health department will not issue a Food Service License until the Authority verifies compliance with the CT DEEP general permit.

2.4.2 Oil/Sand Separators

A sanitary sewer plan review approval and permit is also required for the construction/installation of new oil/sand separators within the Authority's Service Area.

Oil/sand separators shall be provided to prevent the discharge of petroleum based grease, oil and flammable wastes, sand and other substances harmful or hazardous to the public sewer or the sewage treatment plant or processes.

Separators shall have a capacity of at least 1,000 gallons. The type, and location of each separator shall be subject to approval by the Authority. Separators shall be located to allow ready and easy access for purposes of removing the cover, and for service, maintenance, and inspection. The schedule for service and maintenance of a separator shall be subject to approval by the Authority.

2.4.3 Groundwater Remediation Discharges

Groundwater remediation wastewater is defined by CT DEEP as: wastewater generated in connection with investigating pollution or remediating polluted groundwater or soil. Groundwater remediation wastewater includes without limitation groundwater withdrawn from a groundwater recovery well; groundwater which collects in an excavation or foundation drain or other subsurface facility or structure; groundwater contaminated runoff and stormwater impacted by on-site pollutants from any construction activity; condensate resulting from construction or maintenance of a soil vapor extraction system; washdown or backwash wastewater from treatment facilities; well development wastewater, and wastewater generated by removing an underground tank used at any time for storage of petroleum or petroleum products or by developing, testing, sampling, or purging a well, or by maintaining treatment facilities.

Groundwater remediation discharges are required to comply with the conditions of the Connecticut Department of Energy and Environmental Protection (CT DEEP) General Permit for the Discharge of Groundwater Remediation Wastewater to a Sanitary Sewer (GRW Permit). The GRW Permit's requirements include, but are not

limited to a screening analysis, detailed description of the type of treatment, a site plan signed by a Professional Engineer, and a maximum daily flow of 200,000 gallons per day (approx. 140 gpm).

A plan review approval and permit are required for the construction/installation of new groundwater remediation discharges within the Authority's Service Area. All work shall comply with the requirements of this Manual and the Authority's Standard Specifications and Details. The sewer connection permit fee for groundwater remediation discharges is the connection permit fee of a 5/8" water meter. See Appendix A.1 for the Authority's permit fee schedule.

CHAPTER 3 **LATERAL DESIGN**

3.1 BACKGROUND

All new construction, repairs and/or rehabilitation of sanitary sewer laterals in the Authority's service area shall comply with the requirements of this Manual and the Authority's Standard Specifications.

3.2 LATERAL CONNECTIONS

The size, slope, alignment, materials of construction of sewer laterals, and the methods to be used in excavating, placing the pipe, jointing, testing, and back filling the trench, shall all conform to the requirements of the Standard Specifications and this Manual.

All costs and expenses incidental to the installation and connection of laterals shall be borne by the owner. The owner shall indemnify and hold harmless the Authority from any loss or damage that may result from the installation of the lateral sewer.

The minimum lateral pipe size shall be six (6) inches both within and outside the right-of-way or easement.

3.2.1 Lateral Materials

This is a list of approved materials for use in lateral construction.

- a. PVC Pipe SDR 35 - ASTM D 3034
- b. PVC Pipe SDR 32.5 - ASTM D 2241
- c. PVC Pipe Schedule 40 - ASTM D 2466 (only where approved by GNHWPCA)
- d. PVC Pipe Schedule 80 - ASTM D 2467 (only where approved by GNHWPCA)
- e. Ductile Iron Pipe - ANSI A21.51 Class 50 or AWWA C151 (minimum). Glands on mechanical joint pipe and fittings shall be ductile.

Engineers shall establish pipe installation requirements or site-specific factors that must be taken into account during design, material selection, and construction of sewer laterals.

3.2.2 Depth, and Slope of Lateral

The minimum depth and slope of laterals shall be as follows:

1. Pipe Depth

The minimum depth from the finished grade to the crown of all laterals shall be 42 inches.

2. Pipe Slope

The minimum slope shall be 2.0% (1/4" per foot).

For laterals eight (8) inches and larger, the slope may only be reduced if justified by the design flow.

3.2.3 Location, Length, and Spacing of Lateral

The location, maximum length, and spacing of laterals shall be as follows:

1. Location

The location of the lateral shall be as follows:

- a. All properties shall be served from the street side of the property. Laterals shall be constructed perpendicular to the property line of the property they are going to serve and shall be located a minimum of five (5) feet from the side property line.
- b. Sanitary sewer laterals shall be located a minimum of ten feet away from all water services (measured horizontally).
- c. Where possible, laterals shall not cross abutting properties if the existing gravity sewer can be extended to serve the property.

If crossing an abutting property is unavoidable, laterals shall not cross more than one (1) property. A dedicated easement on the abutting property shall be recorded.

Properties to the rear may not be crossed.

- d. Typical installations should locate the sanitary sewer lateral five (5) feet downstream of the centerline of the lot.
- e. Sanitary sewer laterals shall not be connected to existing or proposed manholes, unless it is approved by the Authority on a case-by-case basis.
- f. Sanitary sewer laterals shall not be installed closer than 4 ft from an existing or proposed manhole.

2. Length

The maximum lengths for laterals are as follows:

- a. On-site length - No maximum length. Cleanouts shall be provided per Section 3.2.4.
- b. Offsite Length - One hundred (100) feet.

The off-site length includes the total distance within both the abutting property (if crossed) and the right-of-way.

3. Spacing between adjacent laterals

The minimum horizontal distances between adjacent laterals and their connections are as follows:

- a. Laterals on the same side of the street/sewer - ten (10) feet.
- b. Laterals on opposite sides of the street/sewer - four (4) feet.

3.2.4 Cleanouts

Cleanouts shall be installed on all laterals as follows:

1. Location

Laterals shall include a wye cleanout located between eighteen (18) and sixty (60) inches from the building's exterior. The cleanout shall be extended to grade.

Lateral cleanouts shall also be installed where bends greater than or equal to 45 degrees are used to build the sewer lateral.

2. Spacing

Cleanouts shall be spaced a maximum of every one hundred (100) feet.

3. Size

Cleanouts shall match the size of the lateral pipe up to a maximum of eight (8) inches.

4. Type

Cleanout covers shall be a threaded-type, water tight and capped at all times. Covers within the paved areas shall be metallic and able to withstand traffic loads.

3.2.5 Lateral Backwater Valve Installation

The Authority recommends that the lowest floor elevation with gravity service is a minimum of one (1) foot above either the first upstream or first downstream manhole cover elevation.

If this condition cannot be met due to the natural topography of the area, then a sanitary sewer backwater valve must be installed upstream of the lateral cleanout

outside the building. Backwater valves shall be installed and maintained at the owner's expense.

3.2.6 Point of Connection

Laterals shall connect to sanitary or combined sewers at manufactured mainline fittings.

Saddle connections are only allowed if a manufactured fitting does not exist. Connection shall be a seated saddle that will not allow the lateral to protrude into the sewer main. The cut into the existing sewer shall be core drilled. Saw cuts and hammer taps are not allowed. Saddles shall be Geneco Sealtite, Inserta Tees or approved equal.

3.2.7 Maximum Number of Building Connections

Common laterals are prohibited.

No more than one (1) building will be permitted to connect to a lateral.

Common laterals for one (1) building with multiple residential units are also prohibited, except for the following:

1. Apartment buildings.
2. Condominiums where different floors have different owners.

The intent is to have individually owned residential units served by individual laterals.

Industrial facilities will be evaluated on a case-by-case basis.

3.2.8 Future Connections

Laterals installed for future connections shall be terminated at the right-of-way or easement and sealed with a manufactured cap/stopper made specifically for the purpose of sealing/capping the end of the sanitary sewer to ensure 100% water tightness.

A tracer wire shall be installed (taped) on the top of the pipe along the entire length of the lateral from the sewer terminating at a one-half ($\frac{1}{2}$) inch metal locator rod at the end of the plugged line to within three (3) feet of the finished grade.

3.2.9 Connections Utilizing an Existing Lateral

Existing laterals may be reused if the existing pipe is rehabilitated by the installation of a cured in place pipe liner. The owner and/or contractor shall perform a Closed Circuit Television (CCTV) inspection to verify that the lateral does not have any defects. Inspections shall take place in the presence of the Authority's inspectors.

The Sewer Superintendent is in charge of the final review and approval of existing laterals for reuse.

Inspected laterals not suitable for rehabilitation shall be abandoned or replaced per requirements of this Manual and the Authority's Standard Specifications.

3.2.10 Lateral Disconnection

Existing sanitary sewer laterals serving buildings that are being demolished and/or laterals that are not approved for reuse shall be disconnected or plugged per requirements of this Manual.

There are two methods to properly disconnect or plug existing laterals connected to the Authority's sewer system: Excavation Method, and Trenchless Method. Figures C.1 and C.2 in Appendix C show the requirements of these two methods. Both methods require the existing lateral to be abandoned to within two (2) feet of the sanitary sewer main.

New lateral connections will not be approved by the Authority until the old laterals are plugged and properly abandoned.

3.2.11 Downstream Evaluation

All developments with a proposed ADF above 2,000 gpd are required to evaluate the capacity of the existing sanitary sewer system. Refer to Section 4.5 for guidelines for the downstream evaluation.

3.3 PROHIBITED LATERAL CONNECTIONS

The Authority's Sewer Ordinance states that only laterals with approved discharges may connect to the wastewater system. Approved discharges include domestic waste and all other commercial and/or industrial discharges that have a valid, current permit issued by the Authority. No person shall connect a lateral to a sanitary or combined sewer when the lateral has any of the following sources of clear water:

1. Foundation/footing drains;
2. Sump pumps with or without foundation drains connected;
3. Roof drains;
4. Heat pump discharge;
5. Cooling water; or
6. Any other sources of clear water, such as, but not limited to, yard and/or driveway drains.

In each area of the City of New Haven in which a project of separation of combined storm water and sanitary sewer lines has been or is to be undertaken, the owner or owners shall separate all storm water from the property that discharges into the Authority's sanitary sewer system. Such separation shall be completed at such time as improvements are made to the property.

3.4 CONNECTION TO BRICK SEWERS

Connections to brick sewers will be evaluated on a case-by-case basis.

If the connection is allowed, a concrete collar shall be installed to provide reinforcement to the brick sewer as shown in Figure C.3 in Appendix C. The connection shall be core-drilled after the collar has been installed.

The connector shall be a PVC SDR-35 pipe stub with non-shrink grout to provide a watertight connection.

If connections to the brick sewer can be avoided, the Authority may require the lateral to be connected to an alternate connection point.

3.5 CONNECTION OF STORM LATERALS

Connection of a new storm lateral to the Authority's wastewater system is prohibited. Refer to Section 4.8 of this Manual.

CHAPTER 4
GRAVITY SANITARY SEWER DESIGN

4.1 BACKGROUND

It is the intent of this Chapter to provide sufficient detailed information to enable Engineers to correctly and efficiently design gravity sanitary sewer systems to be built in the Greater New Haven Water Pollution Control Authority service area. If there is a question or a concern regarding the design of any portion of the sanitary sewer system that is not adequately answered within this Manual, the Owner/Developer or his representative shall contact the Authority to get all issues resolved prior to design.

The sanitary sewer system shall be design by a Professional Engineer registered in the State of Connecticut utilizing the most current technical standards along with good, sound engineering judgment throughout the design process. The design process includes the submittal of a sewer study, and construction drawings for review and approval by the Authority. Additional plan review and permit requirements for the design and construction of Sanitary Sewer Facilities (SSF) are stated in Section 2.3 of this Manual.

The size, slope, alignment, materials of construction of gravity sewer mains, and the methods to be used in excavating, placing the pipe, jointing, testing, and back filling the trench, shall all conform to the requirements of the Standard Specifications and this Manual.

4.1. 1 Sewer Study

The study shall include, as a minimum, the following information and shall be typed and bound in an 8 1/2 inch x 11 inch folder:

- (A) A narrative which describes project location and description, project concept, discussion of any information that would affect the Authority's ability to serve the new area, and any recommendations and conclusions of the analysis.
- (B) The area, in acres, which could be served by gravity by the new sewer, shown on a topographic map which delineates the basin boundaries as stated in (G) below.
- (C) The estimated population densities and total population based on land use projections to be served by the new sewer.
- (D) The estimated quantity and quality of any industrial wastes to be discharged to the system.
- (E) Design flow rates, minimum and maximum flow velocities, minimum and maximum pipe slopes, and infiltration allowances.
- (F) The impact of the additional flows on the existing sanitary sewer system at all critical points between the proposed site and the major interceptor.
- (G) A utility map which includes, a minimum of, the following information:

- Location of all proposed and existing easements and/or rights of way.
- Existing and proposed sanitary sewer lines and appurtenances with sizes and slopes shown.
- Sewer Basin delineation
- All other existing and proposed utilities.

4.2 **DESIGN FLOW**

All sanitary sewer facilities shall be designed to carry the projected design flow from the projected sanitary sewer service area contributing to each respective reach of the sanitary sewer system.

The following is a list of the criteria that should be considered to determine the projected design flow:

- Tributary areas
- Land use
- Residential flows
- Commercial flows
- Industrial flows
- Infiltration and Inflow

The design Flow shall be calculated as follows:

$$\text{Design Flow} = \text{Average Daily Flow} \times \text{Peaking Factor} \quad (\text{Equation 4.1})$$

where:

Design Flow (DF) = Flow used to design a sanitary sewer facility, gpd.

Average Daily Flow (ADF) = Estimated average daily flow, gpd.

Peaking Factor = Ratio of peak hourly flow to average daily flow.

The above variables shall be calculated as follows:

1. Average Daily Flow (ADF)

The ADF shall be the total ADF from the entire Service Area. Each area shall be calculated as follows:

a. Proposed Developments

The ADF for proposed residential developments, commercial sites, and all other land uses shall be determined using the flow rates shown on Table 4.1, multiplied by the number of units.

If a land use being proposed is not included in either Table 4.1 or Table 4.2, engineering judgment may be used to estimate the flow. The Authority reserves the right to determine the appropriateness or applicability of the estimated flow.

b. Developed Unsewered Off-site Areas

The ADF for developed unsewered off-site areas may be determined using the tables described above and multiplying flow rates by the actual number of unsewered units. The Authority will determine if an alternate method may be used.

c. Undeveloped Off-site Areas

The ADF for undeveloped off-site areas shall be determined by using the greater of the following:

- i. Proposed land use as shown in the most recent version of the City/Town Comprehensive Plan, or
- ii. Five (5) Single Family Residential Units/Acre (2,000 gpd/Acre).

2. Peaking Factor

A peaking factor of four (4) shall be used for all calculations unless directed otherwise by the Authority.

Alternate methods to determine the peaking factor such as “Recommended Standards for Wastewater Facilities” latest edition (also known as ‘Ten States Standards’) may be approved on a case-by-case basis.

Large system studies and proposed developments with ADF greater than or equal to 65,000 gpd (0.1 cfs) shall use the equation below to calculate Design flows.

$$DF(cfs) = 2.64(ADF)^{0.905} \quad \text{(Equation 4.2)}$$

Table 4.1 - Average Daily Flow on Specific Developments

TYPE OF DEVELOPMENT	UNIT	ADF (GPD/UNIT)
Auditorium	Seat	5
Automobile parking	1000 Gross square feet	25
Automobile repair garage	1000 Gross square feet	100
Bar	Seat	20
Bar: Public Areas & Tables	15 Gross square feet	20
Barber Shop	1000 Gross square feet	50
Beauty Salon	1000 Gross square feet	200
Carwash	Square feet inside	240
Church	Seat	5
Community center	Occupant	5
Convenience Store with food preparation	1000 Gross square feet	600
Convenience Store without food preparation	1000 Gross square feet	300
Country Club	Member	20
Factories (Exclusive of industrial waste)	Employee/shift	25
Factories (add for showers)	Employee/shift	+10
Gymnasium	1000 Gross square feet	300
Hospital - Convalescent/Rest Homes	Bed	150
Hospital	Bed	250
Jail	Inmate	85
Laboratory - commercial	1000 Gross square feet	300
Laundromat	Washer	400
Library / Museum	1000 Gross square feet	25
Manufacturing - industry	1000 Gross square feet	100
Medical building	1000 Gross square feet	300
Motel/Hotel	Room	100
Motel/Hotel (with cooking facilities)	Room	150
Office building	1000 Gross square feet	200
Residential -		
- single family dwelling, Townhouses	Dwelling unit	400
- bachelor/single, artist dwelling	Dwelling unit	100
- 1 Bedroom apartment or condo	Dwelling unit	150
- 2 Bedroom apartment or condo	Dwelling unit	300
- 3 Bedroom apartment of condo	Dwelling unit	400
- boarding house	Bed	85
- mobile home	Unit	200
- guest house with kitchen	Dwelling unit	300
Restaurant - fixed seat	Seat	50 or
Restaurant (dining area)	15 Gross square feet	50

Table 4.1 - Average Daily Flow on Specific Developments (Cont.)

Type of Development	Unit	ADF (GPD/Unit)
Restaurant - Bakery, Doughnut Shop, take out	1000 Gross square feet	300
School - day care center	Child	10
School - elementary / junior high	Student	10
School - high school	Student	15
School - kindergarten	35 Gross square feet	10
Stadium/Theater - fixed seat	Seat	5
Stores, Shopping Centers, and Malls	1000 Gross square feet	100
University or College	Student	20
University Dormitory	Student	100
Veterinarian	1000 Gross square feet	300
Warehouse	1000 Gross square feet	25

Table 4.1 Notes:

Gross square feet: area to include the sum of the square feet at each floor level within the principal surrounding exterior walls of the building. The square feet area shall exclude courts. For buildings that do not have surrounding exterior walls, the gross square feet shall be calculated based on the horizontal projection of the floor above the area or the roof.

Example Calculation - Assume a 10,000 sq. ft. office building is proposed. The estimated average daily flow is calculated as 10,000 sq. ft. x 200 gpd/1000 sq. ft. = 2000 gpd.

Table 4.2 - Average Flow Rate based on Land Use and Area Density

Land Use / Area Density	Unit	ADF (GPD/Unit)
Low Density Residential (Single Family) (10 people / acre)	acre	1,000
Medium Density (Multi-Family) Residential (12 to 15 people / acre)	acre	1,200 - 1,500
High Density (Multi-Family) Residential (20 to 75 people / acre)	acre	2,000 - 7,500
Office & Institutional	acre	5,000
Commercial & Light Industrial	acre	5,000
Industrial	acre	10,000

The use of ADF rates and a peaking factor is intended to cover normal infiltration for systems built with modern construction techniques. However, an additional allowance should be made to provide capacity for Peak Wet Weather Flow (PWWF). PWWF includes

both DF and rainfall dependent infiltration/inflow flows. These rainfall dependent flows are accounted for by designing pipes to have a maximum Design Depth of Flow Ratio¹ (d/D) of 0.6 for Design Flow.

Design Flows downstream of lift stations shall take into account the flow generated at the maximum pumping rate plus design flow of the area downstream from pumping station.

All developments with a proposed ADF above 2,000 gpd are required to evaluate the capacity of the existing sanitary sewer system. Refer to Section 4.5 for downstream evaluation guidelines.

4.3 GRAVITY SEWER PIPES

4.3.1 Pipe Size

The required diameter of gravity sewers shall be determined by using the Design Flow, Manning's formula and a maximum Design Depth of Flow Ratio of 0.6 (60% full). The minimum gravity sewer pipe shall be eight (8) inches.

4.3.2 Pipe Slope

The slope between manholes shall be uniform.

To prevent deposition of solids, all sewers shall be designed and constructed as to transport ADF at mean velocities of two feet per second (2.0 fps). Where such constraints on the slope would not be practical as determined by the Authority, sewers must be installed with slopes sufficient to give mean velocities of not less than two feet per second (2.0 fps) when flowing full.

The grades shown in Table 4.3 are based on Manning's formula and constitute minimum acceptable slopes sufficient to give a velocity when flowing full of not less than two feet per second (2.0 fps). The minimum acceptable roughness coefficient, "n", for design is 0.013. The "n" used takes into consideration the slime, grit, and grease layers that will affect hydraulics or hinder flow as the pipe matures.

Whenever possible, sewers that are to carry a DF of less than 0.10 cfs shall not be installed at a slope of less than 0.6%.

¹ Design Depth of Flow in the pipeline is evaluated using the Design Depth of Flow Ratio (d/D)

d = depth of flow

D = Pipe diameter

Table 4.3 - Minimum Pipe Slope

Size of Pipe In Inches I.D.	Minimum Slope In Percent
8	0.40
10	0.25
12	0.20
15	0.15
18	0.11
21	0.09
24	0.08
27	0.07
30	0.06
36	0.05
42	0.04

For pipes 48 inches or larger, the slope may be determined by Manning's formula (as shown below) to maintain a minimum mean velocity of not less than 3.0 feet per second when flowing full.

$$V = \frac{1.49}{n} \times R_h^{0.67} \times \sqrt{S} \quad \text{(Equation 4.3)}$$

V = Velocity (ft/s)

n = Manning's Roughness Coefficient (0.013)

R_h = Hydraulic Radius

S = Slope (ft/ft)

Sewers shall not be designed with a maximum velocity greater than 10 feet per second.

Sewers on 20 percent slopes or greater shall be anchored securely with concrete anchors spaced as follows:

- a. Not greater than 36 feet center to center on grades 21% to 35%;
- b. Not greater than 24 feet center to center on grades 35% to 50 %; and
- c. Not greater than 16 feet center to center on grades 50% and over.

Lined pipes may be able to resist scour at high velocities, however, excessive turbulence can become an over-riding design consideration as unacceptable levels of odors may be produced from hydrogen sulfide generation.

4.3.3 Pipe Depth

The minimum depth from the finished grade to the crown of all sewer mains shall be 42 inches. In general, sewers should be sufficiently deep to receive wastewater from basements and to prevent freezing.

When the pipe depth is greater than twenty-five (25) feet, the engineer shall verify the pipe material selected is acceptable for the application. Upon request, the Engineer shall submit all calculations verifying the pipe selected is acceptable.

4.3.4 Pipe Materials

The approved pipe materials for use in gravity sewer construction are:

- a. PVC Pipe SDR 35 - ASTM D 3034 or ASTM F679
- b. PVC Pipe SDR 26 - ASTM D 3034 or ASTM F679
- c. Ductile Iron Pipe - ASTM A 746

The pipe material selected shall be adapted to local conditions, such as: character of industrial wastes, possibility of septicity, soil characteristics, exceptionally heavy external loadings, abrasion, corrosion, and similar problems. Consideration shall also be given to pipes and compression joint materials subjected to corrosive or solvent wastes.

Suitable couplings complying with ASTM specifications shall be used for joining dissimilar materials which take into account the leakage limitations on these joints.

All sewers shall be designed to prevent damage from superimposed live, dead, and frost induced loads. Proper allowance for loads on the sewer shall be made because of soil and potential groundwater conditions, as well as the width and depth of trench. Where necessary, special bedding, haunching and initial backfill, concrete cradle, or other special construction shall be used to withstand anticipated potential superimposed loading or loss of trench wall stability.

4.3.5 Buoyancy

Buoyancy of sewers and sewer facilities shall be considered and flotation of the pipe shall be prevented with appropriate construction where high groundwater conditions are anticipated.

4.4 ALIGNMENT AND LOCATION OF SANITARY SEWER FACILITIES

Sanitary sewer mains shall be straight between manholes, both in horizontal and vertical alignment. Straight alignment shall be checked by the use of a laser.

All sanitary sewer facilities, both existing and proposed, shall be located to provide adequate access for maintenance and/or repair.

New public sanitary sewers shall be constructed within the public right-of-way unless directed otherwise by the Authority.

Under no circumstances should sanitary sewer mains be installed parallel to and directly below any concrete such as sidewalks, curbs or gutters. Lines shall normally be located five feet south or east of street centerline.

Sewer mains will be extended at least ten feet uphill from the lowest lot corner of the uppermost lot to be served adjacent to the sewer main. Sewer mains will terminate in a manhole.

When the sanitary sewer main passes under a highway, railroad or drainage ditch, there shall be a minimum of 3-1/2 feet of cover and the pipe shall be installed inside a steel casing. The steel casing shall extend the entire width of the right-of-way or easement of the crossing structure or as directed by the Authority.

4.4.1 Easements

When easements are required, they shall be exclusive Sanitary Sewer Easements and shall be dedicated and recorded solely for the benefit of the Authority.

Exclusive sanitary sewer easements shall not overlap other easements.

Easement boundaries shall be shown on the plans, specifications, and plots as "Sanitary Sewer Easement." Common utility easements are prohibited for sanitary sewer facilities.

The minimum permanent easement width to be dedicated to the Authority for sanitary sewer pipes is twenty (20) feet.

The easement shall be positioned in such a manner to facilitate maintenance and/or replacement of the facility. For those sanitary sewers constructed in the public right-of-way, the easement shall extend the distance outside the right-of-way necessary to provide the required easement width.

If the sewer is located outside, but within five (5) feet of the public roadway right-of-way and is fifteen (15) inches or less in diameter, the exclusive easement is only required to be ten (10) feet wide. For sewers greater than fifteen (15) inches in diameter, the exclusive easement width shall be as described above.

Easement plans should contain at least four evenly distributed coordinate ticks (in the corners preferably) that show the Connecticut Stateplane Coordinates (Northing, Easting) in NAD83 Feet. All vertical elevations should also conform to NGVD 88 as the datum. The coordinate system, along with the survey accuracy shall be included in the title block notes.

4.5 DOWNSTREAM EVALUATION

All developments with a proposed ADF above 2,000 gpd are required to evaluate the capacity of the existing sanitary sewer system. To evaluate the downstream capacity of a receiving sanitary sewer facility, the Authority will rely on the following:

1. Available Data/Information

Available data/information may include existing flow monitoring data, sanitary sewer studies, maintenance records, past and/or proposed Capital Improvement Projects, and/or any other information deemed relevant by the Authority.

2. Additional Data/Information

If adequate data/information is not available, the applicant may be required to conduct, at no cost to the Authority, all the necessary tasks to assure the Authority makes an informed decision on the adequacy of the downstream sanitary sewer facilities. Such tasks may include the following:

- a. Temporary Flow Monitoring

The requirements for temporary flow monitoring will be determined on a case-by-case basis by the Authority at the time of application. General guidelines include the following:

- i. Number of Monitors - The complexity of the downstream system will determine the number of temporary monitors required. The minimum number of monitors is two (2).
 - ii. Monitoring Duration - The monitoring duration shall be a minimum of three (3) weeks or until one and one-half (1½) inches of rainfall in a 24-hour period is recorded, whichever is the greater period of time.
 - iii. Monitoring Period - If possible, part of the monitoring period shall be done during the months of March, April, May, and June. However, if monitoring cannot be done during those months, the Authority will consider an alternate time period. Monitoring shall not be done during the months of January and February.
 - iv. Flow Monitoring Data and Format - At a minimum, the following data shall be included and shall be typed and bound in an 8 1/2 inch x 11 inch folder: (1) Depth / Velocity Hydrographs; (2) Flow Hydrographs; (3) Scatterplots / Scattergraphs; and (4) Any other data deemed necessary. An electronic copy (ASCII Text File) of the flow data shall be submitted to the Authority on a CD or DVD.

- b. Hydraulic Modeling

The Authority may require a hydraulic model of the proposed development and/or extension of the sanitary sewer system to a manhole downstream of the

point of connection to the existing system. If a hydraulic model is necessary, the model shall be created using PCSWMM.

c. Lift Station System Evaluation

The Authority may require an evaluation of one or more lift station systems. The evaluation may include the following systems: hydraulic, electrical, mechanical, instrumentation & control, and others as deemed necessary.

4.6 INADEQUATE DOWNSTREAM CAPACITY

If the Authority determines downstream capacity is not available for the proposed flow from the development, the applicant has the following options:

1. Make additional capacity available in the downstream system by increasing the capacity in the system, and/or removing a sufficient volume of infiltration/inflow.
2. Connecting to an alternate point within the sanitary or combined sewer system. A downstream analysis of the alternate system may be required.

4.7 CONNECTIONS TO EXISTING SANITARY SEWERS

Sanitary sewers and force mains shall only be connected to the existing sewer system at manholes. Blind tee connections to existing sewers are prohibited. Single home grinder pump systems can be connected to a standard gravity lateral at the property line per Authority standards.

If an existing manhole is not available, as determined by the Authority, a new manhole shall be installed per Authority Standards.

Connections to existing manholes will be evaluated on a case-by-case basis. Rehabilitation may be required at the discretion of the Authority. Rehabilitation methods will be determined on a case-by-case basis to suit field conditions. Brick or block manholes may need to be replaced in lieu of a rehabilitation alternative.

Sanitary sewer connections to existing manholes shall be core-drilled and made using a flexible rubber connector. Saw cutting and hammer taps are prohibited.

No more than four (4) connections to existing manholes, three (3) incoming and one (1) outgoing, will be allowed.

All connections to manholes shall provide for a watertight seal between the pipe and the manhole. The connector shall be manufactured in accordance with ASTM C 923.

When connecting new pipe to existing manholes, a flow channel and bench walls shall be installed.

When a smaller sewer joins a larger one (at a manhole), the invert of the larger sewer should be lowered sufficiently to overcome head losses. An approximate method is to place the 0.8 depth point of both sewers at the same elevation.

4.8 CONNECTIONS IN THE COMBINED SEWER AREAS

The construction of new combined sewers is prohibited.

When constructing or modifying sanitary sewer facilities within the combined sewer area, the Authority will address each plan review/permit application on a case-by-case basis using the following guidelines:

1. Design Criteria for Connections to the Combined Sewer System

All new or updated sanitary and storm sewer facilities/laterals shall be separated prior to connecting to the combined system. To facilitate future separation projects each system shall be connected individually to the combined sewer.

Stormwater management systems like underground infiltration/detention systems and other best management practices shall be installed and maintained to manage site runoff in order to reduce surface and groundwater pollution, prevent flooding, and control peak discharges and provide pollution treatment. Overflow pipes connecting to the combined sewer system shall be equipped with Check/backwater valves.

Per GNHWPCA Standards, the post-development stormwater runoff volume for a 2-year, 6-hour storm frequency (rainfall = 2.13 inches), shall be detained by underground infiltration/detention systems designed by a professional engineer licensed in the state of Connecticut.

From local regulations, post development runoff rates and volumes shall not exceed pre-development rates and volumes for the 2, 10, 25 and 50 year storms. Also stormwater management systems shall be designed to collect, retain, and treat the first inch of rain on-site, so as to trap floating material, oil, and litter.

2. Submittal Requirements for a Lateral Connection to Combined Sewers

Applicant shall meet all submittal requirements as per Section 2.2.2. In addition, a stormwater management plan shall be submitted as part of the plan review/sewer permit application for a storm sewer connection to the combined sewer system. The requirements pertain to any site with existing or proposed impervious cover located within the combined sewer area.

3. Contents of the Stormwater Management Plan

At a minimum, the stormwater management plan shall include the following information:

- Soil characteristics of the site
- Location and description of all proposed stormwater control BMPs for both construction activities and post-construction, long-term stormwater control.

- Proposed operation and maintenance manual and a schedule for maintaining any trash hoods, catch basins, or other BMP devices used to prevent runoff, facilitate sheet flow or infiltration, or treat stormwater.
- Calculations of pre- and post-development stormwater runoff rates and volumes, suspended solids removal rates, and soil infiltration rates.

4. Sewer Separation

To remove stormwater from the combined sewer system, the Authority may require an off-site extension of the proposed storm sewer if an existing storm sewer is available within a reasonable distance of the site property line.

The following factors shall be considered by the Authority when evaluating the separate storm sewer requirement:

- a. Capacity in receiving sewers to accept stormwater flow, and planned capital improvement projects identified within the Authority's CSO Long Term Control Plan (LTCP), or other plans;
- b. Impacts on Water Quality;
- c. Feasibility of separation, including costs to treat, construct, and manage the sewer system as a separate or combined system; and
- d. Other appropriate factors deemed relevant by the Authority.

4.9 PROTECTION OF WATER SUPPLIES

The minimum separation distances between sanitary sewer facilities and water supplies shall be as follows:

1. Cross Connections Prohibited

There shall be no physical connections between a public or private potable water supply system and a sewer, or appurtenance thereto which would permit the passage of any wastewater or polluted water into the potable supply. No water pipe shall pass through or come into contact with any part of a sewer manhole.

2. Relation to Potable Water Structures

A recommended distance of 200 feet shall be maintained between sanitary sewers and private or public water supply wells or other water supply structure or source of drinking water.

The minimum separation shall not be less than 25 feet from a private well or 50 feet from a public water supply well. If this minimum separation can not be maintained, sewer pipe with joints equivalent to public water supply design standards and pressure tested to 150 psi to assure watertightness, shall be used.

Manholes and lift stations shall be separated a minimum of not less than 200 feet from a public water supply well and 50 feet from a private water supply well. Lift stations may require storage if located within a public water supply watershed area.

3. Relation to Water Mains - Horizontal and Vertical Separation

In accordance with the Connecticut Public Health Code, sewers shall be laid at least 10 feet horizontally from any existing or proposed water main. The distance shall be measured edge to edge. In cases where it is not practical to maintain a 10 foot separation, the Authority may allow deviation on a case-by-case basis, if supported by data from the design engineer. Such deviation may allow installation of the sewer closer to a water main, provided that the water main is in a separate trench or on an undisturbed earth shelf located on one side of the sewer and at an elevation so the bottom of the water main is at least 18 inches above the top of the sewer.

If it is impossible to obtain proper horizontal and vertical separation as described above or anytime the sewer is over the water main, both the water main and sewer must be constructed of slip-on or mechanical joint pressure rated pipe complying with public water supply design standards and be pressure tested to 150 psi to assure watertightness before backfilling.

Manholes and lift stations shall be separated a minimum of not less than 10 feet from water mains.

4. Relation to Water Mains - Crossings

Sewers crossing water mains shall be laid to provide a minimum vertical distance of 18 inches between the outside of the water main and the outside of the sewer. The crossing shall be arranged so that the sewer joints will be equidistant and as far as possible from the water main joints.

When it is impossible to obtain proper horizontal and vertical separation as stipulated above, one of the following methods must be specified:

- a. The sewer shall be designed and constructed of pressure rated pipe and shall be pressure tested at 150 psi to assure water tightness prior to backfilling.
- b. Either the water main or the sewer line may be encased in a watertight carrier pipe which extends 10 feet on both sides of the crossing, measured perpendicular to the water main. The carrier pipe shall be of materials approved by the regulatory agency for use in water main construction.

5. Relation to Storm Sewers

A 12 inch vertical separation shall be provided between storm sewer and sanitary sewer lines or pressure rated pipe shall be specified.

4.10 SEWERS IN RELATION TO STREAMS

The minimum separation distances between sanitary sewer facilities and water supplies shall be as follows:

1. Cover Depth

The top of all sewers entering or crossing streams shall be at a sufficient depth below the natural bottom of the stream bed to protect the sewer line. The following cover requirements shall be met:

- One foot of cover where the sewer is located in rock;
- Three feet of cover in other material unless ferrous pipe is specified. In major streams, more than three feet of cover may be required; and
- In paved stream channels, the top of the sewer line should be placed below the bottom of the channel pavement

2. Horizontal Location

Sewers located along streams or lakes, shall be located at least 10 feet outside of the stream bank or sufficiently apart to provide for future possible stream widening and to prevent siltation of the stream during construction.

3. Structures

The sewer outfalls, headwalls, manholes, gate boxes, or other structures shall be located so they do not interfere with the free discharge of flood flows of the stream.

4. Alignment

Sewers crossing streams shall be designed to cross the stream as nearly perpendicular to the stream flow as possible and shall be free from change in grade. Sewer systems shall be designed to minimize the number of stream crossings.

5. Materials

Sewers entering or crossing streams shall be constructed of ductile iron pipe with mechanical joints; otherwise they shall be constructed so they will remain watertight and free from changes in alignment or grade and tested to 150 psi. PVC pipe may be used where a minimum of three feet of cover can be maintained. Material used to backfill the trench shall be stone, coarse aggregate, washed gravel, or other materials which will not readily erode, cause siltation, damage pipe during placement, or corrode the pipe.

4.11 INVERTED SIPHONS

Inverted siphons shall have not less than 2 barrels, with a minimum pipe size of 6 inches. They shall be provided with necessary appurtenances for maintenance, convenient flushing and cleaning equipment. Long radius fittings should be used. The inlet and discharge structures shall have adequate clearances for cleaning equipment, inspection, and flushing.

Design shall provide sufficient head and appropriate pipe sizes to secure velocities of at least 3.0 feet per second for design average flows. The complete inverted siphon shall have capacity for future Peak Wet Weather Flow. Under all flow conditions the siphon should be designed so that head loss does not cause backwater or surcharging in the upstream sewer. Engineering calculations shall be submitted showing the head, flow, and velocity for each barrel at initial and future design flows.

The inlet and outlet structures shall be designed so that the design average flow is diverted to 1 barrel, and so that either barrel may be cut out of service for cleaning.

4.12 AERIAL CROSSINGS

Support shall be provided for all joints in pipes utilized for aerial crossings. Supports shall be designed to prevent frost heave, overturning, and settlement.

Precautions against freezing, such as insulation and increased slope, shall be provided. Expansion jointing shall be provided between above ground and below ground sewers. Where buried sewers change to aerial sewers, special construction techniques shall be used to minimize heaving.

For aerial stream crossings, the impact of flood waters and debris shall be considered. The bottom of the pipe should be placed no lower than the elevation of the 50 year flood. Ductile iron pipe with mechanical joints shall be required.

CHAPTER 5
SANITARY SEWER MANHOLES

5.1 BACKGROUND

This Chapter provides design requirements specific to sanitary sewer manholes to be built in the Greater New Haven Water Pollution Control Authority service area.

5.2 LOCATION

Manholes shall be installed in the following locations:

1. At the end of each line;
2. At all changes in sewer slope, size, or alignment;

At changes in sewer alignment and/or sizes, the energy gradient elevation shall not increase by:

- a. Matching the crown elevations when changes in pipe sizes are necessary.
- b. Providing an elevation difference between incoming and outgoing pipe inverts as follows:
 - i. For sewer angles between zero (0°) degrees (straight through) to and including ninety (90°) degrees - 0.1 feet minimum;
 - ii. Over ninety (90°) degrees - Not allowed.
- c. At all sewer segment intersections;
- d. In areas that will minimize the potential for I/I entering the sewer system.

To minimize the potential for I/I, manholes shall NOT be designed or installed in any drainage path such as, but not limited to, the following locations:

- i. Swales or ditches.
- ii. Roadside gutters.
- iii. Inverted crowns of streets.
- iv. Low points of paved or unpaved areas.
- v. Adjacent stormwater inlets.
- vi. Other areas the Authority deems necessary.

Cleanouts shall not be used in lieu of manholes.

5.2.1 Protection against Ponding

To provide protection against ponding, manholes shall be designed and constructed to provide positive drainage away from the top of casting as follows:

1. Paved areas - Top of casting flush with finished grade.;
2. Unpaved areas - Top of casting a minimum of three (3) inches above finished grade.
3. Tidal Marsh - Top of casting a minimum of one (1) foot above the highest high tide (Quarterly Lunar Tide).

5.2.2 Manhole Spacing

The maximum distance between manholes shall be 400 feet.

5.3 MANHOLE CONSTRUCTION

5.3.1 Manhole Type

Manholes shall be monolithic, cast-in-place concrete, precast concrete or equivalent construction. New brick manholes shall not be used, nor shall brick be used to adjust manhole covers to grade.

Direct-line connections to the manholes or to short stubs (minimum length = 4 ft) integral with the manholes should be made with flexible joints. Flexible joints are those which permit the manholes to settle without destroying the watertight integrity of the line connections.

5.3.2 Manhole Diameter

Manholes shall be of sufficient inside diameters to allow personnel to work within them and to allow proper joining of the sewer pipes in the manhole wall. The inside diameter of manholes shall be not less than 48 inches.

When the pipe diameter is greater than 30 inches to 42 inches inclusive, a 60 inches diameter manhole should be provided.

When the pipe diameter is 42 inches to 54 inches, a 72 inches diameter manhole should be provided.

When the manhole depth is over twelve (12) feet the inside diameter of the manhole shall be not less than 60 inches.

To ensure the structural integrity of the manhole, the Authority may request additional calculations to properly size manholes that connect various pipes at different entrance angles. If at any time the structural integrity of the manhole cannot be maintained, a cast-in-place or precast structure will be required.

5.3.3 Manhole Inverts and Connections

The bottom of the manhole shall be provided with a "U" shaped channel that is as much as possible a smooth continuation of the inlet and outlet pipes. Manhole invert shall be: formed out of manhole brick (grade MS or MM); or formed out of cast-in-place concrete with manhole brick shelf and channel; or a precast concrete manhole base. Manhole shelf shall be built to 0.8 of the diameter of the pipe exiting the manhole.

All pipe connections to new manhole walls shall be cast-in flexible watertight connectors manufactured by Press-Seal Corporation or approved equal. All connections to existing manholes shall be core-drilled and made using a flexible rubber connector as manufactured by Press-Seal or approved equal.

Saw cutting and hammer taps are prohibited.

In manholes with pipes of different sizes, the tops of the pipes shall be placed at the same elevation and flow channels in the invert sloped on an even slope from pipe to pipe.

A bench shall be provided on each side of any manhole channel when the pipe diameter(s) are less than the manhole diameter. The bench should be sloped no less than ½ inch per foot. No lateral sewer, service connection, or drop manhole pipe shall discharge onto the surface of the bench.

5.3.4 Manhole Covers and Access

Manhole covers of nominal 24-inch or larger diameter are to be used for all sewer manholes.

Watertight manhole covers shall be used wherever the manhole tops may be flooded. Ventilation of gravity sewer systems should be considered where continuous watertight sections greater than 1,000 feet in length are incurred.

Design of features for entering manholes shall be in accordance with the Authority's standards. Where steps are used, they shall be made of a noncorrosive material and be in accordance with applicable OSHA specifications as published by the United States Department of Labor.

5.3.5 Drop Manhole Connections

A drop pipe should 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 manhole invert is less than 24 inches, the invert shall be filleted to prevent solids deposition.

Drop manholes should be constructed with an outside wye drop connection. Inside drop connections may be approved on a case-by-case basis if necessary. Inside drop

connections shall be secured to the interior wall of the manhole and provide access for cleaning.

Due to the unequal earth pressures that would result from the backfilling operation in the vicinity of the manhole, the entire outside drop connection shall be encased in controlled low strength material (CLSM).

5.3.6 Manhole Grade Rings

Only concrete grade rings are allowed.

Concrete grade rings shall conform to ASTM C 478 and be free from voids, cracks, and other defects.

The minimum thickness of the concrete adjusting ring shall be three (3) inches.

5.3.7 Manhole Testing

All manholes shall be tested in accordance with the Authority's Standard Specifications.

APPENDIX A

- A.1 REVISED FEE SCHEDULE OF CONNECTION CHARGES
- A.2 SANITARY SEWER PERMIT APPLICATION FORM (SAMPLE)
- A.3 SEWER LATERAL AS-BUILT FORM & GUIDELINE

APPENDIX A.1

APPENDIX A.1
THE GREATER NEW HAVEN WATER POLLUTION CONTROL AUTHORITY
FEE SCHEDULE OF CONNECTION CHARGES

Effective July 1, 2022 the Authority's fee schedule, based on the building's water meter size as approved by the Board of Directors, is as follows:

<u>Water Meter Size</u>	<u>Connection Permit Fee</u>
5/8" (Single Family Only)	\$3,850
3/4" ⁽¹⁾	\$5,635
1"	\$9,565
1.5"	\$18,490
2"	\$29,200
3"	\$58,240
4"	\$90,370

<u>Water Meter Size</u>	<u>Repair Permit Fee</u>
5/8"	\$385
3/4"	\$385
1"	\$385
1.5"	\$770
2"	\$770
3"	\$770
4"	\$770

<u>Water Meter Size</u>	<u>Disconnect Permit Fee</u>
5/8"	\$750
3/4"	\$750
1"	\$750
1.5"	\$1,500
2"	\$1,500
3"	\$1,500
4"	\$1,500

<u>Water Meter Size</u>	<u>Administrative Permit Fee</u>
5/8"	\$280
3/4"	\$280
1"	\$640
1.5"	\$640
2"	\$640
3"	\$1,120
4"	\$1,120



- (1) When, as determined by the GNHWPCA based on the review of the connection fee application, a single-family residence is required by RWA to install the 3/4" meter solely for meter reading purposes (and not capacity), the GNHWPCA will honor the 5/8" meter connection fee rate.

The fee schedule of connection charges may be modified by GNHWPCA from time to time. Please refer to the Authority's website (www.gnhwpc.com) for the most current fee schedule.

Connection Fee Policy Clarification

Connection fees are established by the GNHWPCA Board of Directors in accordance with the GNHWPCA Ordinance and the Connecticut Department of Environmental Protection guidance titled *Methods of Capital Cost Recovery on WPCA Projects* (January 1997). These fees are based on a methodology under which new customers pay for existing, available system capacity, calculated according to water meter size and the estimated value of that capacity. Connection fees may be clarified or modified from time to time by the GNHWPCA.

This policy statement is issued to clarify the application of connection fees associated with multi-family residential units.

Policy Statement

It is the policy of the GNHWPCA that the 5/8" meter size connection fee applies exclusively to single-family residences. If a single-family residence served by a 5/8" meter is converted or expanded into a multi-family residence, multiple dwelling units, or includes an Accessory Dwelling Unit (ADU) served by a shared meter, a revised connection permit fee shall apply. GNHWPCA shall determine the fee based on the number of dwelling units being served and the associated capacity demands in accordance with the following clarified schedule:

Unit Type	Water Meter Size	Connection Permit Fee
Single-family	5/8"	\$3,850
	3/4" (1)	\$5,635
Two-family	5/8"	\$5,635
	3/4"	\$5,635
Multi-family >2 units	5/8" (2)	TBD based on engineering analysis of pipe capacity requirements
	3/4" (2)	TBD based on engineering analysis of pipe capacity requirements

- (1) When, as determined by the GNHWPCA based on the review of the connection fee application, a single-family residence is required by RWA to install the 3/4" meter solely for meter reading purposes (and not capacity), the GNHWPCA will honor the 5/8" meter connection fee rate.
- (2) When, as determined by the GNHWPCA based on the review of the building permit and/or new connection permit application, the number of units on a shared meter is greater than 2, the fee will be based on an engineering analysis of the capacity demands.

APPENDIX A.2

GREATER NEW HAVEN WATER POLLUTION CONTROL AUTHORITY
SANITARY SEWER CONNECTION/DEMOLITION PERMIT APPLICATION

Permit Date: _____ **Permit No.** _____

Permit Type: New Hub/Main Connection Connection to Existing Lateral Repair Demolition
(Circle One)

TO THE EXECUTIVE DIRECTOR OF THE GREATER NEW HAVEN WATER POLLUTION CONTROL AUTHORITY:

Application is hereby made for a Sanitary Sewer Connection/Demolition Permit Application to

- ☐ Connection to the Sanitary Sewer at _____
(Address)
- ☐ Disconnect from the Sanitary Sewer at _____
(Address)

Work Duration: __ (Days) **From:** _____ (Date) **to** _____ (Date)

APPLICANT AGREES TO COMPLY WITH ALL CONDITIONS AND ORDINANCES OF THE GREATER NEW HAVEN WATER POLLUTION CONTROL AUTHORITY AND APPLICABLE STATE AND FEDERAL REGULATIONS

Applicant: _____ **License No.:** _____

Contractor: _____ **Foreman's Name:** _____

Phone: _____ **Cell Phone:** _____

Address: _____

Applicant Signature: _____

Special Conditions (to be filled out by GNHWPCA Superintendent of Sewers):

Permit Approved: _____
(GNHWPCA Superintendent of Sewers)

<u>FINAL FIELD INSPECTION</u>		
Inspection Date:	Time:	Fact Sheet Completed:
Inspector:	Fee Paid: Y/N	Map Provided: Y/N
Approved: Y / N		
Notes:		

APPENDIX A.3

GREATER NEW HAVEN WATER POLLUTION CONTROL AUTHORITY SEWER LATERAL AS-BUILT FORM GUIDELINE

All Contractors shall submit as-built drawings to the Greater New Haven Water Pollution Control Authority (Authority), Sewer Superintendent's Office, within two (2) weeks after construction is complete. THE AUTHORITY RESERVES THE RIGHT TO DENY FUTURE PERMITS TO CONTRACTOR'S WITH PENDING AS-BUILT DRAWINGS.

Contractor shall complete the Authority's Sewer Lateral As-built Form in its entirety (sample as-built is attached), and he/she shall follow the following checklist:

1. Use a straight edge.
2. Show an accurate rendering of the main building, curb line and main roadway.
3. Draw any existing and/or proposed sewer work.
4. Measure a minimum of three (3) swing ties (triangulated ties) to all applicable features: lateral Connection to sewer main (hub), disconnection plugs, cleanouts, backwater valves, pump chamber, bends, couplings and changes in horizontal and/or vertical direction. A mandatory tie is the upstream and/or downstream manhole cover; Contractor shall provide the distance to the lateral hub from the nearest sanitary sewer manhole. Acceptable structures for ties are as follows: Building corners, manhole covers, catch basins, telephone poles, hydrants.
5. Specify type of customer, pipe material, pipe size, type of connection made (e.g., core and boot, chimney, etc.), direction of flow, and north arrow (approximate).
6. Label the length of pipe used and the depth of the sanitary sewer lateral invert at all locations listed above and at the curb line.
7. Clock diagram cross section depicting the lateral entrance to the main as seen in the direction of flow.

The Authority Representatives may request additional information to be incorporated into the drawing to provide clarity. Please direct any questions or comments to the GNHWPCA Superintendent at 203-466-5263 or via e-mail at sewerinfo@gnhwPCA.com.



Greater New Haven Water Pollution Control Authority
www.gnhwPCA.com



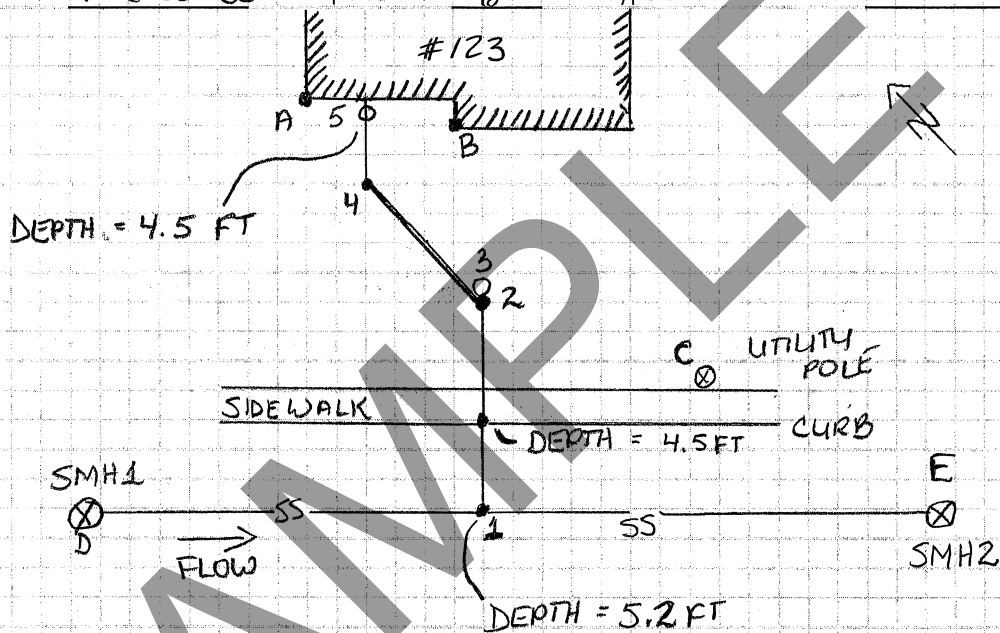
GREATER NEW HAVEN
Water Pollution Control Authority
260 East Street
New Haven, CT 06511
Phone: 203-466-5280
Fax: 203-466-5286

Town NEW HAVEN Date 11-13-09
Address 123 ANYWHERE RD
Contractor ABC CONTRACTORS
Plan Review Number 2009-000
Approved By RH Date 11-13-09
GNHWPCA

SEWER LATERAL AS-BUILT FORM

NOTE: The as-built shall show an accurate rendering of the main building, curb line, main roadway and all sewer work performed. A minimum of three (3) swing ties to all applicable features: lateral connection to sewer main (hub), disconnection plugs, cleanouts, backwater valves, pump chamber, bends, couplings and changes in horizontal and/or vertical direction. A mandatory tie is the upstream and/or downstream manhole cover. Acceptable structures for ties are as follows: Building corners, manhole covers, catch basins, telephone poles, Hydrants.

☒ Single Family ☐ Multi Family ☐ Commercial ☐ Other
Pipe Material= PVC SDR 35 Pipe Size= 6" Type of Connection= SADDLE



Lateral Connection
Clock Diagram

LEGEND

- A- FOUNDATION CORNER
- B- FOUNDATION CORNER
- C- UTILITY POLE
- D- SMH 1
- E- SMH 2
- 1- LATERAL HUB
- 2- 45° ELBOW
- 3- 6" PVC CLEANOUT
- 4- 30° ELBOW
- 5- 6" PVC CLEANOUT
- 6-

DISTANCES (ties and pipe lengths)

E	→	1	=	75'	A	→	5	=	10'
C	→	1	=	45'	B	→	5	=	15'
B	→	1	=	65'		→		=	
C	→	2	=	40'		→		=	
A	→	2	=	40'	5	→	4	=	13'
B	→	2	=	32'	4	→	2	=	30'
C	→	3	=	41'	2	→	1	=	35'
A	→	3	=	38'		→		=	
B	→	3	=	30'		→		=	
C	→	4	=	60'		→		=	
A	→	4	=	16'		→		=	
B	→	4	=	16'		→		=	



GREATER NEW HAVEN
Water Pollution Control Authority
260 East Street
New Haven, CT 06511
Phone: 203-466-5280
Fax: 203-466-5286

Town _____ Date _____
Address _____
Contractor _____
Plan Review Number _____
Approved By _____ Date _____

GNHWPCA

SEWER LATERAL AS-BUILT FORM

NOTE: The as-built shall show an accurate rendering of the main building, curb line, main roadway and all sewer work performed. A minimum of three (3) swing ties to all applicable features: lateral connection to sewer main (hub), disconnection plugs, cleanouts, backwater valves, pump chamber, bends, couplings and changes in horizontal and/or vertical direction. A mandatory tie is the upstream and/or downstream manhole cover. Acceptable structures for ties are as follows: Building corners, manhole covers, catch basins, telephone poles, Hydrants.

☐ Single Family

☐ Multi Family

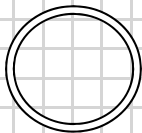
☐ Commercial

☐ Other

Pipe Material= _____

Pipe Size= _____

Type of Connection= _____



Lateral Connection
Clock Diagram

LEGEND

A-	
B-	
C-	
D-	
E-	
1-	
2-	
3-	
4-	
5-	
6-	

DISTANCES (ties and pipe lengths)

	→	=			→	=	
	→	=			→	=	
	→	=			→	=	
	→	=			→	=	
	→	=			→	=	
	→	=			→	=	
	→	=			→	=	
	→	=			→	=	
	→	=			→	=	
	→	=			→	=	
	→	=			→	=	

APPENDIX B

- B.1 DESIGN SUMMARY FORM (GNHWPCA SD-01)
- B.2 GRAVITY SEWER DESIGN COMPUTATION FORM (GNHWPCA SD-02)
- B.3 CRITICAL DEPTH OF FLOW AND SPECIFIC HEAD IN CIRCULAR
PIPES FIGURE

APPENDIX B.1

Sanitary Sewer Design Summary Form
Greater New Haven Water Pollution Control Authority

Project Name:
Date:
P.E. Seal, Signature and Date

Design Flow					
Onsite Flow					
Type of Unit	ADF/Unit,gpd		# Units		ADF,gpd
		X		=	
		X		=	
		X		=	
		X		=	
		X		=	
		X		=	
		X		=	
Onsite Flow =					
Peaking Factor	4.0	Onsite Peak Flow (1) =			
Stormwater Runoff (for combined sewer areas only)		(2 year, 6 hr storm) (2) =			
Total Flow (1+2) =					

Gravity Sanitary Sewers & MH's		☐ n/a
Size, in	Length, ft	Material
Total Length	ft.	
Total No. Manholes		

Forcemain		☐ n/a
	Initial	Ultimate
Velocity, ft/s		n/a
Size, in		n/a
Length, ft		
Material		
# of Air Relief Valves		

The new sewer/forcemain will be connected to an existing _____ - inch diameter sewer located at _____ (relative to streets).
--

Lift Stations	☐ Level 2 ☐ Level 3 ☐ n/a
	Initial Ultimate
Pumping Capacity, gpm	
Total Dynamic Head, ft	
Static Head, ft	
Impeller Size, in	
Horsepower, Hp	
RPM	
Voltage	
Phase	
Manufacturer	
Model	

Wet Well	☐ n/a
	Initial Ultimate
Diameter, ft	
Depth, ft	
Operating Depth, ft	
Operating Volume, gal	
Avg. Detention Time, min	
Invert Elevation, ft	

All calculations and supporting documentation must be submitted per Standards.

APPENDIX B.2



GRAVITY SEWER DESIGN COMPUTATION FORM

Project
Calculated By
Date

MH	Sewer		Population		Flow			Sewer										MH	
No.	Station		Increment Total Equivalent Population	Accumulated Total Equivalent Population	ADF (a)	Peak Factor	DF (b)	Pipe Length	Slope	Pipe Diameter (c)	Q full (d)	Velocity (e) (fps)			d _c (f)	d _n (g)	d _n /D (h)	Flow-Line Elevations	
	From	To										ADF	DF	Q full				(in)	(in)
					(gpd)		(gpd)	(ft)	(ft/ft)	(in)	(cfs)				(in)	(in)	ratio	In	Out

- a. ADF = Average Daily Flow (Use Average Daily Flow Tables or Accumulated Total Equivalent Population x 100 Gallons per person per day)
 - b. DF = Design Flow = ADF x Peak Factor; Peak Factor = 4.0
 - c. Pipe diameter based on $d_n/D \leq 0.6$ at Design Flow. Minimum size = 8 inches
 - d. Discharge Full
 - e. Design objective: ADF velocity ≥ 2 fps. Minimum Q full velocity ≥ 2 fps.
 - f. d_c = Critical Depth (Use Critical Depth of Flow Chart - Appendix B.3)
 - g. d_n = Design Flow Depth
 - h. d_n/D = design depth of flow ratio, D = pipe diameter
- $d_n > d_c$ - Subcritical Flow

$d_n < d_c$ - Supercritical Flow

APPENDIX B.3

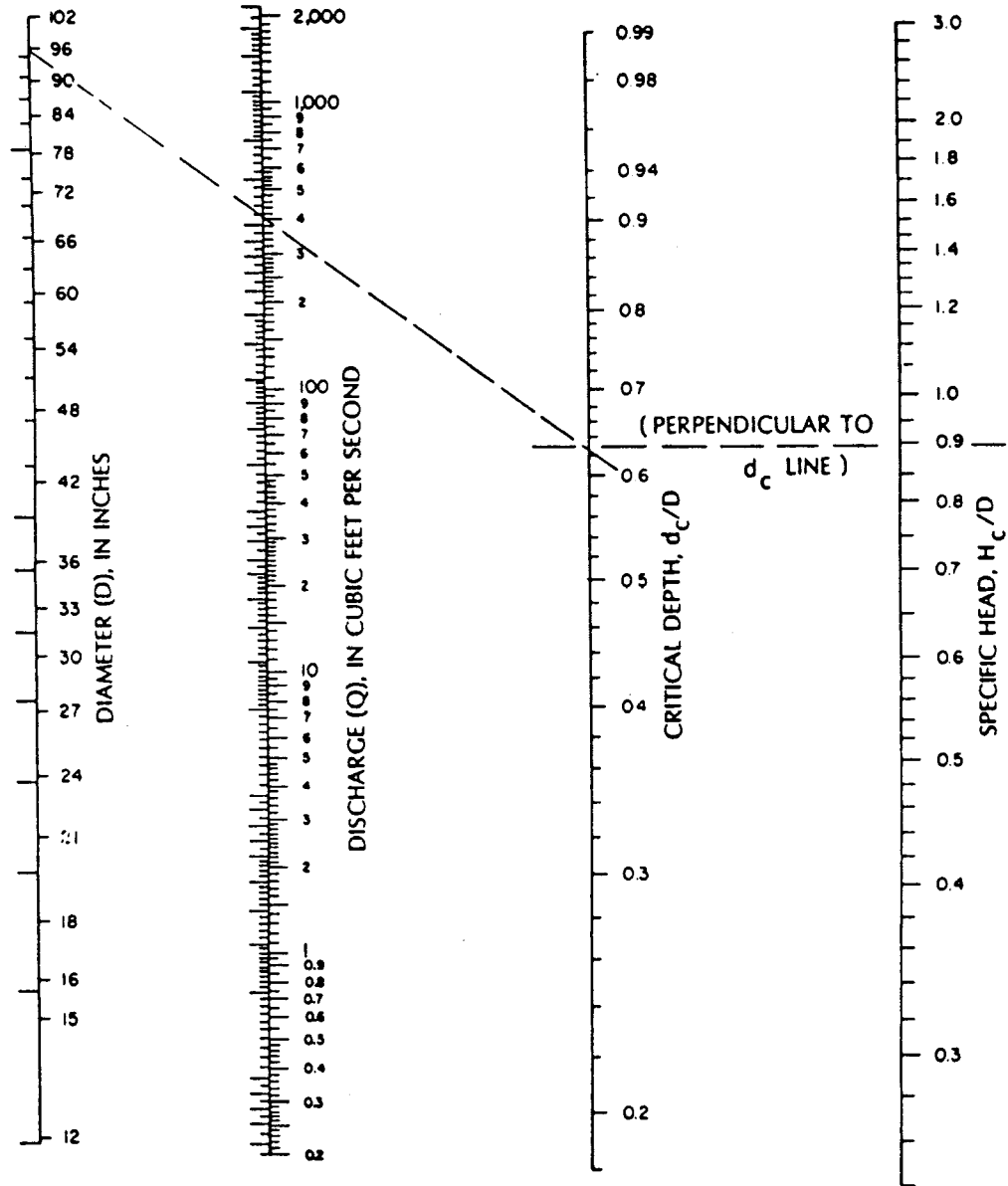


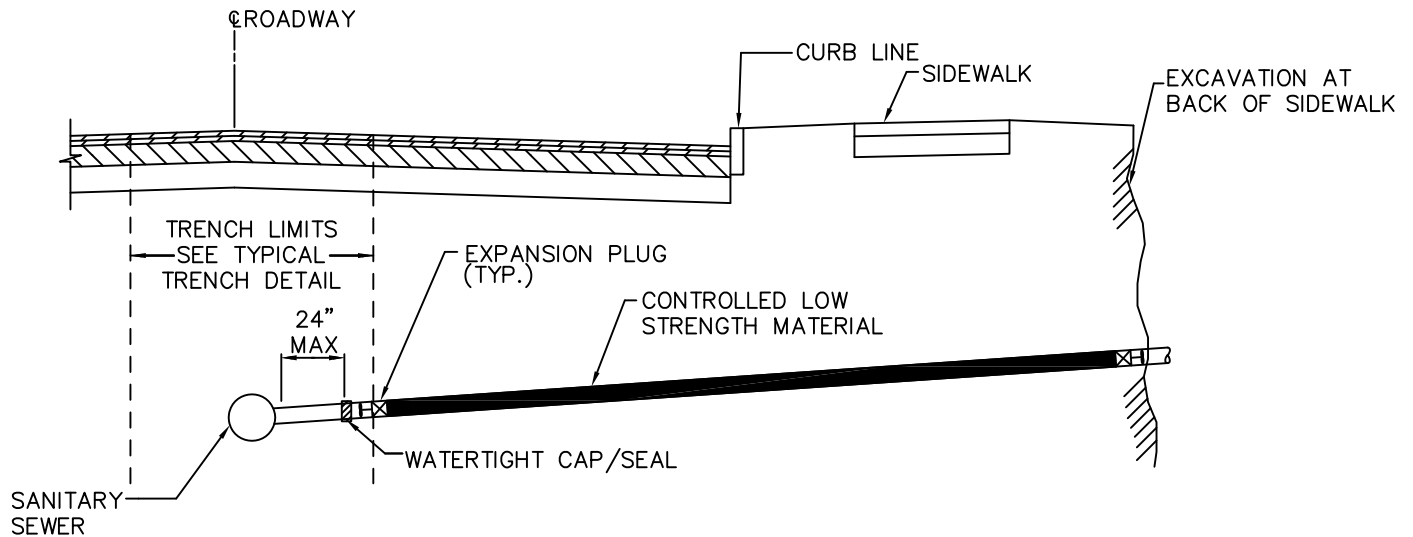
FIGURE B.3
Critical Depth of Flow and Specific Head in Circular Pipes

APPENDIX C

- C.1 PLUGGING SEWER LATERALS - EXCAVATION METHOD DETAIL
- C.2 PLUGGING SEWER LATERALS - TRENCHLESS METHOD DETAIL
- C.3 CONNECTION TO BRICK SEWERS DETAIL

APPENDIX C.1

GREATER NEW HAVEN WATER POLLUTION CONTROL AUTHORITY CONSTRUCTION DETAILS



NOTE:

1. EXCAVATE AS NECESSARY AT BACK OF SIDEWALK AND AT SEWER MAIN.
2. INSTALL PROPERLY SIZED EXPANSION JOINT PLUGS INTO ABANDONED SEWER LATERAL AS INDICATED – 24 INCHES FROM SANITARY SEWER.
3. FILL SEWER LATERAL WITH CONTROLLED LOW STRENGTH MATERIAL AS INDICATED.
4. SEAL SEWER LATERAL HUB WITH MALE ADAPTER AND CAP OR WITH SECOND EXPANSION JOINT OR AS APPROVED BY THE GNHWPCA IN THE FIELD.
5. BACKFILL AS REQUIRED.

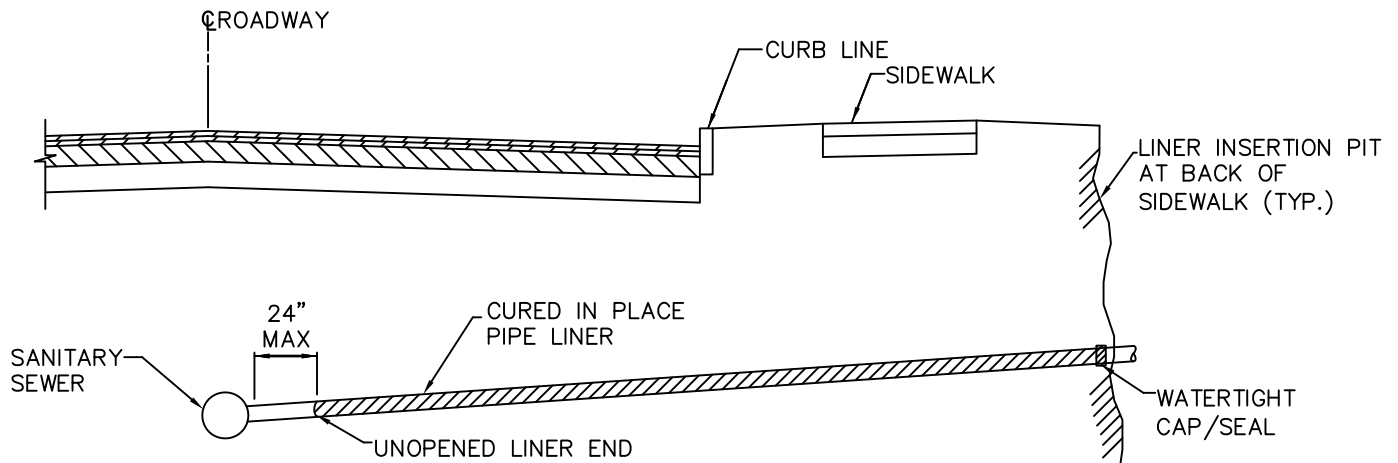
REVISIONS	
NO.	DATE
1	JUNE 2008

PLUGGING SEWER LATERALS – EXCAVATION METHOD

NTS

APPENDIX C.2

GREATER NEW HAVEN WATER POLLUTION CONTROL AUTHORITY CONSTRUCTION DETAILS



NOTES:

1. INSERT LINER BEGINNING AT INSERTION PIT OR CLEANOUT, AND ENDING 24" FROM SANITARY SEWER MAIN OR CLOSER. LINER END SHALL REMAIN UNOPENED TO PROVIDE A WATERTIGHT SEAL.
2. SEAL LINER AT INSERTION END WITH MALE ADAPTER AND CAP OR AS APPROVED BY THE GNHWPCA IN THE FIELD.
3. BACKFILL AS REQUIRED.

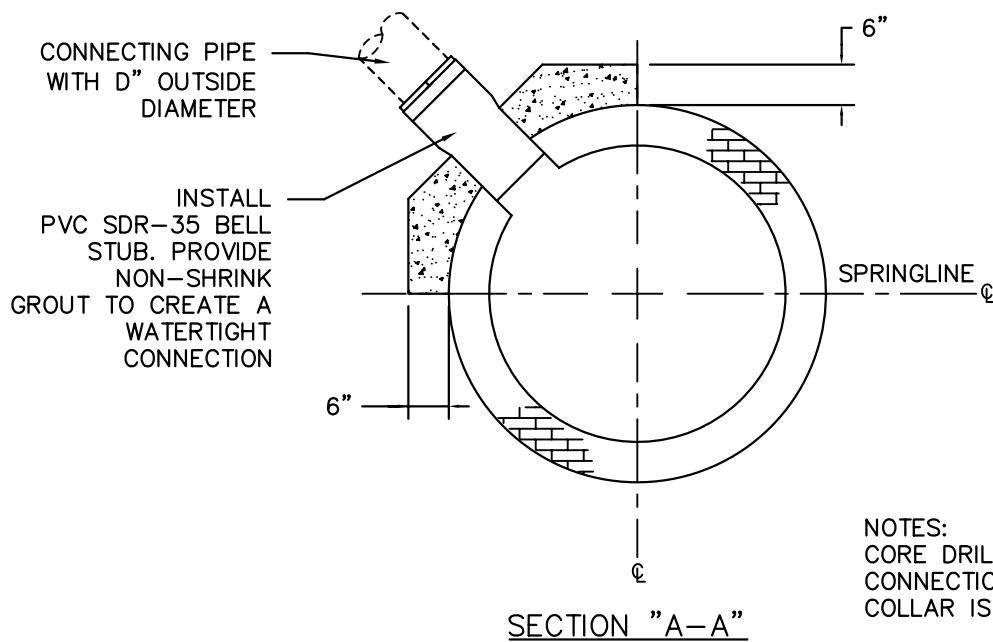
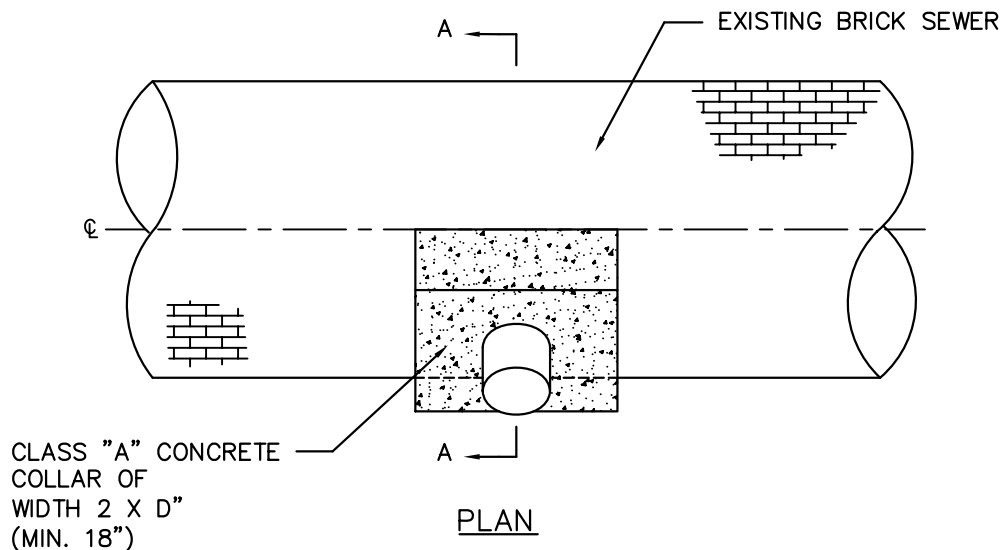
REVISIONS	
NO.	DATE
1	JUNE 2008

PLUGGING SEWER LATERALS – TRENCHLESS METHOD

NTS

APPENDIX C.3

GREATER NEW HAVEN WATER POLLUTION CONTROL AUTHORITY CONSTRUCTION DETAILS



NOTES:
CORE DRILL HOLE FOR LATERAL CONNECTION AFTER CONCRETE COLLAR IS CURED.

CONNECTION TO BRICK SEWERS NTS

REVISIONS	
NO.	DATE
1	JUNE 2008

MANUAL UPDATE LOG

The Manual will be reviewed annually and updated as needed. This log will list updates that have been issued since the original publication of the manual.

Update No.	Update Issued	Description of Change
2010-01	4/1/2010	Updated Table of Contents to include updates below
2010-02	4/1/2010	Section 2.1.3, Page 7 - Rewritten for clarification
2010-03	4/1/2010	Appendix A.1 - Sewer Connection Fee Methodology For Large Diameter New Connections deleted; Replaced with Revised Schedule of Connection Charges.
2010-04	9/1/2010	Updated Table of Contents to include updates below
2010-05	9/1/2010	Modified Manual Title and title page; New Title: GNHWPCA Permitting and Design Criteria Manual.
2010-06	9/1/2010	Figure 2.1, Page 6 - Updated
2010-07	9/1/2010	Section 2.2.4, Page 10 - Rewritten for clarification
2010-08	9/1/2010	Section 2.3.2.4 to Section 2.3.2.7 - Revised; Shared sewer Agreement requirement deleted; As-built requirements explained.
2010-09	9/1/2010	Section 2.3.3, Page 13 - Second paragraph deleted.
2010-10	9/1/2010	Section 2.3.4, Page 14 - Revised; Shared Sewer Agreement requirement deleted.
2010-11	9/1/2010	Section 4.2.2, Page 25 - Peaking factor, added (0.1 cfs) and updated equation 4.2 to specify the units of Design Flow (DF) as cubic feet per second (cfs).
2010-12	9/1/2010	Section 4.3.4, Page 30 - Added list of approved pipe material; deleted "See ASTM D2331 or ASTM C12 when appropriate.
2010-13	9/1/2010	Appendix A.3 - Sample Shared Sewer agreement deleted; replaced with Sewer Lateral As-Built Form and Guideline.
2012-01	1/1/2012	Updated Table of Contents to include updates below
2012-02	1/1/2012	Section 3.2.3.1, Page 18 - Location, added item (e.) and (f.)
2012-03	1/1/2012	Section 5.3.1, Page 40 - Added "(minimum length = 4 ft)" to second paragraph.
2012-04	1/1/2012	Section 5.3.3, Page 41 - First paragraph rewritten for clarification.
2012-05	1/1/2012	Section 5.3.5, Page 42 - Last paragraph, replaced concrete with controlled low strength material (CLSM).
2012-06	7/1/2012	Updated Table of Contents to include updates below
2012-07	7/1/2012	Section 2.2.1, Page 8 - Subsections were renumbered and the Lateral Disconnection Permit and fees item was updated for clarification.
2013-01	2/13/2013	Updated Table of Contents to include updates below
2013-02	2/13/2013	Section 3.2.9, Page 22 - First paragraph, replaced representative with inspectors.

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2013-02	2/13/2013	Section 4.8, Page 35 - Rewritten for clarification; added Stormwater Management Plan, and check/backwater valve requirement.
2013-03	2/13/2013	Section 5.3.3, Page 43 - Second paragraph rewritten for clarification; added connections to existing manholes
2016-01	6/1/2016	Updated Table of Contents to include list of updates below
2016-02	6/16/2016	Section 1.2, Page 2 - Added the definition of Improvement.
2016-03	6/16/2016	Section 1.2, Page 4 - Added the definition of Service Area.
2016-04	6/16/2016	Section 1.2, Page 4 - Removed the definition of Shared Sanitary Sewer Installation and Maintenance Agreement
2016-05	6/16/2016	Section 2.1 First paragraph rewritten for clarification.
2016-06	6/16/2016	Section 2.2.1.1, Page 8 - Subsection b. was added for clarification.
2016-07	6/16/2016	Section 2.2.1.3, Page 9 - Subsection d. was added for clarification.
2016-08	6/16/2016	Section 2.3, Page 12 - Fourth paragraph deleted references to Shared Sewer Agreement.
2016-09	6/16/2016	Section 3.2.3.1, Page 19 - Location, updated item (e.) for clarification.
2016-10	6/16/2016	Section 3.2.9, Page 22 - Last paragraph, rewritten for clarification.
2016-11	6/16/2016	Section 3.3, Page 23 - Last paragraph added for clarification
2017-01	12/1/2017	Section 1.2.2, Page 2, Definitions - Updated the definition of Applicant
2017-02	12/1/2017	Section 2.1, Page 5 - Last sentence, replaced "Permittee" with "Applicants"
2017-03	12/1/2017	Section 2.1.1, Page 5 - First paragraph, replaced "Permittee" with "Applicants"
2017-04	12/1/2017	Figure 2.1, Page 6 - Updated
2017-05	12/1/2017	Section 2.1.2, Page 7 - Added last paragraph for clarification
2017-06	12/17/2017	Section 2.1.3, Page 7 - Third paragraph, replaced "a revised" with "the current".
2017-07	12/17/2017	Section 2.1.3, Page 7 - Fourth paragraph, revised for clarification.
2017-08	12/17/2017	Section 2.2.1, Page 8-10 - Rewritten for clarification.
2017-09	12/1/2017	Section 2.2.2, Page 11 - Last sentence, replaced "Permittee" with Applicant.

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Update No.	Update Issued	Description of Change
2017-10	12/1/2017	Section 2.3, Page 12 - Second paragraph, replaced "owner or owner's agent" with "Applicant"
2017-11	12/1/2017	Section 2.3.2, Page 13 - Item 3d, replace "NGVD" with "NAVD".
2017-12	12/1/2017	Section 2.3.2, Page 14 - Item 4, replace "owner" with "Applicant".
2017-13	12/1/2017	Section 2.3.2, Page 14 - Delete last sentence.
2017-14	12/1/2017	Section 2.3.3, Page 15 - Third paragraph, replaced "Owner and/or Owner's Agent (Contractor)"" with "Applicant"
2017-15	12/1/2017	Section 2.3.4, Page 15 - Second paragraph, replace "owner" with "Applicant".
2017-16	12/1/2017	Section 2.3.5, Page 16 - Item 3, replace all references to owner, developer, contractor with "Applicant"
2017-17	12/1/2017	Section 2.3.5, Page 16 - Item 3, replace the word "born" with "borne"
2017-18	12/1/2017	Section 2.4.1, Page 16 - Second paragraph, updated CT DEEP name and website address.
2017-19	12/1/2017	Section 2.4.1, Page 17 - Delete third paragraph in its entirety.
2017-20	12/1/2017	Section 2.4.2, Page 17 - Section replaced in its entirety.
2017-21	12/1/2017	Section 2.4.3, Page 17 - Add new Section 2.4.3 Groundwater Remediation Discharges
2017-22	12/1/2017	Section 3.2.3, Item f. Page 20 - Replace "and" with "an"
2017-23	12/1/2017	Section 4.8, Page 36 - Replace 2 year, 6-hour storm frequency rainfall value from 2.05 inches to 2.13 inches.
2017-24	12/1/2017	Appendix A.1 - Revised Schedule table.
2019-01	12/19/2019	Section 2.1.3, Page 7 - Connection fee schedule effective date is updated - January 1, 2020.
2019-02	12/19/2019	Section 2.2.1.1, Page 8 - Subsection b. was updated for clarification.
2019-03	12/19/2019	Section 2.2.1.1, Page 8 - Subsection d. was updated for clarification.
2019-04	12/19/2019	Section 2.2.1.4, Page 9 - Subsection a. was updated for clarification.
2019-05	12/19/2019	Section 2.4.3, Page 17 - Add "(approx. 140 gpm)." at the end of the second paragraph.
2019-06	12/19/2019	Section 3.2.1, Page 19 - Updated for clarification.
2019-07	12/19/2019	Section 4.2, Table 4.1 Page 28 - Updated for clarification.
2019-08	12/19/2019	Section 4.5.2.b, Page 35 - Sewer modeling changed to PCSWMM.
2019-09	12/19/2019	Appendix A.1, GNHWPCA Fee Schedule of Connection Charges effective January 1, 2020

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Update No.	Update Issued	Description of Change
2026-01	7/1/2026	Section 2.1.3, Page 7 - Updated for clarification.
2026-02	7/1/2026	Section 2.4.1, Page 16-17 - Updated for Clarification.
2026-03	7/1/2026	Section 2.4.3, Page 18 - Replaced 3/4" with 5/8" water meter size.
2026-04	7/1/2026	Table 4.1, Page 28 - One Bedroom apartment or condo ADF is 150 gpd/unit to follow CT DEEP recommendations. Duplicate entries were also removed.
2026-05	7/1/2026	Section 4.2, Page 30 - Updated for clarification.
2026-06	7/1/2026	Section 4.3.1, Page 30 - Updated for clarification.
2026-07	7/1/2026	Appendix A.1, GNHWPCA Fee Schedule of Connection Charges effective January 1, 2027, including Connection Fee Policy Clarification for multi-family residence or multiple dwelling units in the same property.