



02721

Storm Sewerage Systems

This document provides design standards only, and is not intended for use, in whole or in part, as a specification. Do not copy this information verbatim in specifications or in notes on drawings. Refer questions and comments regarding the content and use of this document to the Yale University Project Manager.

CONTENTS

- A. [Summary](#)
 - B. [System Design and Performance Requirements](#)
 - C. [Submittals](#)
 - D. [Manufacturers](#)
 - E. [Materials](#)
 - F. [Special Requirements](#)
 - G. [Preparation](#)
 - H. [Installation Guidelines](#)
 - I. [Quality Control](#)
- [Cleaning and Adjusting](#)

A. Summary

This section contains the design criteria for exterior storm sewer systems. [Section 15160: Storm Drainage Piping](#) contains the design criteria for internal storm sewer piping.

B. System Design and Performance Requirements

1. Separate all combined sanitary and storm sewer systems as part of any new building project. Sanitary and storm sewer systems must be placed five feet from building walls. Sanitary and storm sewer system pipes must be separated by at least three feet.
2. All work with the City of New Haven right-of-way, including connection to public sewer mains, must meet City of New Haven requirements.
3. The minimum slope on all service pipes must be 0.5%.
4. All mains must be at least 12" in diameter.
5. Place at least two, but not more than five, 2" concrete adjusting rings on all storm manholes, before placing the manhole casting.
6. Stamp the words "Storm Sewer" on all manhole casting covers.
7. Install manholes wherever storm sewer pipe must bend. Clean-outs are not allowed for exterior storm sewerage.



8. All storm water management must meet State of Connecticut Department of Environmental Protection guidelines. Work within the critical area of Long Island Sound requires special approvals and design. Check whether the project falls within the critical area.
9. All storm water piping systems must conform to the 10-year, 1-hour design. Storm water management ponds must conform to the 100-year, 24-hour design.
10. Provide erosion control measures for construction activities that meet State of Connecticut Department of Environmental Protection guidelines.
11. During design, always consider removing, to the surface, the direct flow of runoff from pipes and discharge to reduce the time of concentration runoff. This design is consistent with EPA Phase II storm water rules, minimizes downstream impacts, and improves water quality treatment.

C. Submittals

Submit the following design and construction documents.

1. Design Documents

- a. Submit plan and profile views of all design drawings to Yale University.
- b. Submit storm water management calculations to the City of New Haven for review and approval.
- c. All projects with construction activity encompassing more than one acre require a Non-Point Discharge Elimination System (NPDES) permit for construction activity from the State of Connecticut Department of Environmental Protection.

2. Construction Documents

Before starting construction, submit a list of materials, manufacturer specifications, and installation procedures to Yale University.

D. Manufacturers

Subject to compliance with the design requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to, the Campbell Foundry Co. (catch basin and manhole castings and covers).



E. Materials

1. All exterior storm sewer pipe must be:
 - Polyvinyl chloride (PVC) SDR 35, with gasket watertight joints, that meets the requirements of ASTM D3034
 - Class 5, reinforced concrete pipe (RCP), with gasket joints, that meets the requirements of ASTM C76
 - Heavy duty polyethylene (HDPE) pipe that meets AASHTO Specification M294, Type S and the requirements of ASTM D3350
2. All manholes must be pre-cast, reinforced concrete, with aluminum- or plastic-covered steel rungs.
3. Manhole and catch basin castings must be cast iron that meets ASTM A48, Class 25 B requirements for frames and 30 B requirements for covers.

F. Special Requirements

All force main pumps must be duplex pumps.

G. Preparation

1. In conjunction with Yale University, prepare a shutdown procedure document, before starting construction, that outlines scheduling and notification requirements.
2. When connecting to the public sewer main, contact the City of New Haven for approval. A permit is required from the city to connect to their public sewer main and for all work within the City of New Haven right-of-way.

H. Installation Guidelines

Where possible, provide a uniform pipe bedding of suitable on-site material. If suitable material is not available, backfill the trench with sand. Using a material similar to the bedding, backfill the entire trench width evenly in 6" lifts to 6" above the top of the pipe. Compact the lifts to at least a 95% Standard Proctor density, meeting ASTM D1556 standards at optimum moisture (or as recommended by the soils engineer). Backfill the remaining trench in lifts not to exceed 12" up to the sub-grade height for the surface condition encountered. Compact the lifts to a 95% Standard Proctor density, meeting ASTM D1556 standards at optimum moisture (or as recommended by the soils engineer). Backfilling and compacting above the sub-grade must be determined by the soils engineer or by the recommended paving design for the project.



I. Quality Control

Work on exterior storm sewer systems must conform to the following quality control standards.

1. Testing Laboratory

Yale University will retain the services of a qualified, independent testing laboratory to perform soil compaction tests, as directed, during construction.

2. Testing Methodology and Extent

A mandrel test must be performed on all non-concrete storm sewer piping before acceptance by Yale University.

J. Cleaning and Adjusting

With the participation of Yale University personnel, lamp all piping before acceptance by Yale University.