

STORMWATER TREATMENT SYSTEM

****From Brandon NH 019-3(495)**

xx. DESCRIPTION. This work shall consist of furnishing and installing a stormwater treatment structure, diversion structure, inlet and outlet piping, and all appurtenances at the location indicated in the Plans.

The work under this Section shall be performed in accordance with these provisions, the Plans, and Sections 601 and 604 of the Standard Specifications, as appropriate.

xx. MATERIALS. Materials shall meet the requirements of the following Subsections:

Concrete Masonry Blocks.....	705.02
Precast Drop Inlets, Catch Basins, and Manholes.....	705.04
Mortar, Type II.....	707.02
Bar Reinforcement.....	713.01
Welded Steel Wire Fabric.....	713.05
Cast Iron Frame, Grate and Cover.....	715.01(b)

Concrete for precast stormwater treatment systems shall conform to ASTM C 857 and C 858 and shall have a minimum compressive strength of 30 Mpa (4,000 psi) as tested after 28 days. Precast structures shall also meet the following additional requirements:

- (a) The wall thickness shall not be less than 150 mm (6 inches) or as shown on the Fabrication Drawings. In all cases the wall thickness shall be no less than the minimum thickness necessary to sustain MS18 (HS20-44) loading requirements as determined by a licensed Professional Engineer registered in the State of Vermont.
- (b) Sections shall have tongue and groove or ship-lap joints with a butyl mastic sealant conforming to ASTM C 990.
- (c) Cement shall be Type II Portland cement conforming to ASTM C 150.
- (d) All sections shall be cured by an approved method. Sections shall not be shipped until the concrete has attained a compressive strength of 30 Mpa (4,000 psi) or until 5 days after fabrication and/or repair, whichever is the longer.
- (e) Pipe openings shall be sized to accept pipes of the specified size(s) and material(s), and shall be sealed by the Contractor with a hydraulic cement conforming to ASTM C 595M.

Internal component material requirements shall be as required and approved for the system design.

Brick or masonry used to build the manhole frame to grade shall conform to ASTM C 32 or ASTM C 139 and shall be installed in

conformance with all local requirements.

Casting for manhole frames and covers shall be in accordance with ASTM A48, CL.30B and AASHTO M 105.

Inlet and overflow piping shall be as indicated on the drainage details in the Plans and conform to the requirements of Section 710.

- xx. DESIGN AND MANUFACTURING REQUIREMENTS. The stormwater treatment system shall be capable of accumulating and storing settleable solids, trapping oil and floating contaminants from stormwater runoff, preventing re-suspension of captured particles, and preventing the re-entrainment of trapped oil and floating contaminants into stormwater runoff. The stormwater treatment system shall include a circular vortex separation chamber (or grit chamber) with a tangential inlet to induce a swirling flow pattern, a diversion structure with a weir wall, and inlet and overflow piping.

The stormwater treatment system shall be of a hydraulic design that includes flow controls designed and certified by a Professional Engineer registered in the State of Vermont using accepted principles of fluid mechanics, with an elevated water surface inside the structure at a pre-determined level in order to prevent the re-entrainment of trapped floating contaminants.

A water-lock feature shall be incorporated into the design of the stormwater treatment system to prevent the introduction of trapped oil and floatable contaminants to the downstream piping during routine maintenance and to ensure that no oil escapes the system during the ensuing rain event. Direct access shall be provided to the sediment and floatable contaminant storage chambers to facilitate maintenance. There shall be no appurtenances or restrictions within these chambers.

The stormwater treatment system shall be capable of removing 80% of the net annual Total Suspended Solids (TSS). The stormwater treatment system supplier shall provide documentation of net TSS removal and removal efficiency from laboratory testing conducted on the supplier's full size system. The documentation must be submitted and approved prior to delivery of any materials. The documentation shall include TSS removal efficiency versus operating rate for the full operating range of the stormwater treatment system. It shall include testing on graded sediment which is typical of stormwater sediment as defined as follows:

27%	> 250 micron
11%	150-250 micron
7%	100-150 micron
9%	75-100 micron
4%	63-75 micron
42%	< 63 micron

Additional TSS removal efficiency test data shall be submitted on a uniform 50-micron sediment. The stormwater treatment system manufacturer shall base the documentation for 80% net TSS removal

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on the 50-micron particle size.

The stormwater treatment system supplier shall also submit data on field-testing of a stormwater treatment system similar to the system specified herein which demonstrates at least 80% net annual TSS removal.

The stormwater treatment system shall be sized to meet a minimum design treatment capacity of 49 L/s (1.7 cf/s). Sediment storage capacity shall be a minimum of 0.91 m³ (0.8 cy).

The system shall be designed such that the pump-out volume is less than 1/2 of the total system volume. The system shall be designed to not allow surcharge of the upstream piping network during dry weather conditions.

The stormwater treatment system shall be capable of achieving the 80% net annual TSS removal based on flows indicated in the Plans or as ordered. The stormwater treatment system shall include a bypass component to enable flows in excess of the design capacity indicated in the Plans to bypass the treatment unit.

Stormwater treatment system inverts shall be as indicated on the Plans. The stormwater treatment system shall provide direct access to all chambers without removal of components for all maintenance operations.

The stormwater treatment system shall be of a type that has been installed and used successfully for a minimum of 5 years. The manufacturer of said system shall have been regularly engaged in the engineering design and production of systems for the physical treatment of stormwater runoff.

The following manufacturers are capable of supplying a stormwater treatment system that meets the requirements of these specifications:

Manufacturer: Hydro International
Portland, ME
Product: Downstream Defender®
Contact: Kim Jordan, Regional Sales Manager
Tel.: (518)531-3600
Fax: (207)756-6212
E-mail: kjordan@hil-tech.com

Manufacturer: CONTECH Construction Products, Inc.
200 Enterprise Dr.
Scarborough, ME 04074
Tel.: (207)885-6193
Fax: (207)885-9825
E-mail: leblancd@contech-cpi.com

Manufacturer: CEMEX
Westfield, MA
Product: Stormceptor®
Contact: Lawrence Galkowski, P.E. - Regional Engineer, New England Division

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Tel.: (413)562-3647
Fax: (413)562-7010
E-mail: lgalkowski@cemexusa.com

Requests for substitutions for the above shall be submitted to the Agency's Office of Contract Administration a minimum of 10 days in advance of the bid opening date. Substitutions for the above after award shall be approved by the Resident Engineer.

- xx. SUBMITTALS. Prior to delivery, the Contractor shall submit to the Engineer Fabrication Drawings in accordance with Section 105 showing details of construction, reinforcing, any cast-in-place appurtenances, materials to be used, all applicable standards for materials, and design assumptions prepared, stamped, and signed by a licensed Professional Engineer registered in the State of Vermont.
- xx. CONSTRUCTION REQUIREMENTS. The stormwater treatment system shall be handled, stored, and installed in strict accordance with the manufacturer's recommendations and instructions.

The precast base unit shall be placed on a level granular backfill subbase with a minimum thickness of 150 mm (6 inches) after compaction.

All lift holes on precast structures shall be filled with a non-shrink grout. All voids at precast structures around inlet and outlet piping shall be filled with a non-shrink grout.

Testing and start-up of the stormwater treatment system shall be in accordance with the manufacturer's recommendations.

The Contractor shall submit Operation and Maintenance instructions for the stormwater treatment system.

Backfill material shall be approved by the Engineer and placed in layers not exceeding 150 mm (6 inches) in depth. Each layer shall be thoroughly tamped using mechanical tampers. Special care shall be taken to ensure adequate compaction around the inlet and outlet pipes of the structure.

- xx. METHOD OF MEASUREMENT. The quantity of Special Provision (Stormwater Treatment System) to be measured for payment will be the number of each system installed in the complete and accepted work.
- xx. BASIS OF PAYMENT. The accepted quantity of Special Provision (Stormwater Treatment System) will be paid at the Contract unit price per each. One complete unit shall be defined as the treatment structure, diversion structure, and inlet and outlet piping between these two structures. Payment will be full compensation for furnishing, transporting, handling, and placing the materials specified, including all integral concrete sections, reinforcing steel, sealants, frames, grates, mortar, brick, internal weir wall materials and components, and other accessories and appurtenances required for a complete and functioning system; testing the system; performing any required

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excavation, bedding, backfilling, and surface restoration; and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Payment for Trench Excavation of Rock shall be made under the appropriate Contract item.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.620 Special Provision (Stormwater Treatment System)	Each