

VERMONT CONSTRUCTION SPECIFICATION

41. PIPE CONDUITS AND DRAINS

1. SCOPE

The work shall consist of furnishing and placing plastic, corrugated metal, steel pipe and drain tile and the necessary fittings as shown on the drawings.

2. PIPE SPECIFICATIONS

The contractor shall provide the NRCS Representative with a copy of the manufacturer's specifications for the pipe and fittings to be used prior to start of construction.

3. LAYING AND BEDDING OF THE PIPE

Pipe material shall be handled properly at all times in accordance with manufacturer's recommendations. Pipe and fittings shall not be thrown, dropped or dragged. If the coating of the pipe or its fittings are damaged, coatings shall be repaired in accordance with manufacture's recommendations.

The pipe shall be laid to the line and grade shown on the drawings. Pipe with integral bell joints shall be laid with the bell end upgrade. Upgrade ends of all drain pipes shall be closed with suitable plugs. Each pipe section shall be laid in a manner that provides a continuous uniform support.

Bedding, if required, shall be installed according to pipe manufacturer's specifications or as shown on drawings. The depth of bedding shall not exceed 6 inches.

Perforated pipe shall be laid with the perforations down and oriented symmetrically about a vertical center line. Perforations shall be clear of any obstructions at the time the pipe is laid.

4. JOINTS AND FITTINGS

Pipe joints and fittings shall be assembled in accordance with pipe manufacturer's recommendations.

Field cuts of pipe shall be square and perpendicular to the pipe axis. Spigot ends shall be smoothly reamed and beveled to be similar to factory prepared spigots. Where insertion stop marks were provided on standard pipe lengths, they shall be reproduced on the cut lengths for the same distance.

5. PERFORATIONS

When perforated pipe is specified, the water inlet area shall be at least one square inch per foot of pipe length. Round perforations shall not exceed 3/16 inch in diameter. However, a maximum hole diameter of 1/2 inch may be used where filters, envelopes or other protection is provided. Slotted perforations shall not exceed 1/8 inch in width.

6. BACKFILLING

Conduit backfill shall be selected, marked, placed and compacted to the density of the surrounding material taking care not to displace or damage the conduit or its protective coating. The final backfill material shall be a clean gravel, sand or material excavated from the trench. Backfill shall be free of clods, foreign debris and rock fragments greater than 6 inches. Care shall be taken to avoid dropping stones into the trench which could damage the pipe. Rock fragments greater than 3 inches shall not be placed within two feet of the conduit. Organic soils shall not be used for backfill regardless of their origin.

Unless otherwise specified, earth backfill shall be placed in the manner specified in Vermont Construction Specification 11, Earthwork. Special care shall be taken to prevent lifting the pipe from the bedding by pressures exerted by tamping or compacting of backfill under the haunches of the pipe. Backfill shall be placed in horizontal layers with a maximum thickness of 6 inches before compaction. Rolling equipment shall not be used until a minimum of 30 inches of backfill material has been placed over the top of the pipe.

Excess material shall be spoiled in locations shown on the drawings or as designated by the NRCS Representative.

7. TRENCH SAFETY

All trench excavation shall be sloped, braced, and supported to safeguard the work and workers according to Federal and State safety regulations.

Trenches over 5 feet in depth in which workers will enter shall be shored, sloped or otherwise stabilized to prevent sliding or cave-ins. When such bracing and supporting is required, the width of the excavation shall be adjusted to accommodate space for sheeting, bracing or other supporting installations. The Contractor shall furnish, place, and subsequently remove such supporting installations.

8. MATERIALS

A. CORRUGATED METAL PIPE (CMP)

CMP shall be metallic zinc-coated, aluminum-coated or aluminum-zinc alloy-coated corrugated steel pipe and fittings conforming to the requirements of ASTM A760, A762, and A885 for the specified type, class, fabrication of pipe and coating. Coatings shall be equally applied to both inside and outside pipe surfaces.

Coupling bands are to be provided for each section of pipe. The hardware for fastening the coupling band tightly to the connecting pipe shall be fabricated to permit sufficient tightening to provide the required joint tensile strength and, if required, watertightness without failure of its fastening. Gaskets, if specified, shall be sufficient to provide the required gasket seating without warping, twisting or bending.

Fittings shall be made from steel conforming to ASTM A444, A742, A806, A819 and A885. The coatings of fittings shall be the same as that specified for the contiguous corrugated metallic-coated pipe.

B. STEEL PIPE

Steel pipe shall conform to the requirements of the applicable American Society for Testing and Materials, ASTM or American Water Works Association, AWWA listed below for the kind of pipe and the type, weight, grade and finish specified:

<u>Kind of Pipe</u>	<u>ASTM Specification</u>
Welded and seamless steel pipe (Standard Pipe)	A53 or A120
Electric-resistance-welded pipe (30 inch and under)	A135
Arc-welded pipe (4 inch and over)	A139
Arc-welded steel plate pipe (16 inch and over)	A134

<u>Kind of Pipe</u>	<u>AWWA Standard</u>
Fabricated electronically welded steel water pipe	C200
Mill-type steel water pipe	C200

Fittings shall conform to the specified pipe and manufacturer's recommendations.

C. CORRUGATED PLASTIC TUBING

This section covers corrugated plastic tubing, CPT, used for subsurface drainage and non-pressurized underground outlets.

The manufacturer of corrugated plastic tubing is governed by the following: American Society for Testing and Materials (ASTM) Specifications or Natural Resources Conservation Service (NRCS) standards and shall be marked as set forth in the applicable standard or specification.

<u>Kind of Pipe</u>	<u>ASTM Specification</u>
PE Tubing and fittings, 3 inch - 6 inch	ASTM F405
PE Tubing and fittings, 8 inch -24 inch	ASTM F667
PVC Sewer pipe and fittings	ASTM D2729
PVC Pipe	ASTM D3033
PVC Type PSM sewer pipe and fittings	ASTM D3034

D. PLASTIC PIPE

This section covers Poly Vinyl Chloride (PVC), Polyethylene (PE) and Acrylonitrile-Butadiene-Styrene (ABS) pipe, fittings and joint materials. The pipe and fittings shall be homogeneous and free from visible cracks, holes, foreign inclusions or other defects.

The pipe shall be uniform as commercially practicable in color, opaqueness, density and other specified physical properties. The dimensions of the pipe shall be measured as prescribed in ASTM D2122. Pipe shall conform to the requirements of the applicable specification listed below:

Kind of Pipe		ASTM Specification
PVC	Schedules 40, 80, 120	D1785
PVC	Pressure-Rated Pipe (SDR Series)	D2241
PVC	Plastic Drain Waste, and Vent Pipe and Fittings	D2665
PVC	Joints for IPS PVC Pipe Using Solvent Cement	D2672
PVC	Sewer Pipe and Fittings	D2729
PVC	3.25 inch Outside Diameter Plastic Drain, Waste, and Vent Pipe and Fittings	D2949
PVC	Type PSM Sewer Pipe and Fittings	D3034
PVC	Large-Diameter Plastic Gravity Sewer Pipe and Fittings	F679
PVC	Smooth-Wall Plastic Underdrain Systems for Highway, Airport, and Similar Drainage	F758
PVC	Type PS-46 Plastic Gravity Flow Sewer Pipe and Fittings	F789
PE	Plastic Pipe and Schedule	D2104
PE	Plastic Pipe, (SIDR-PR) Based on Controlled Inside Diameter	D2239
PE	Plastic Pipe and Schedules 40 and 80 Based on Outside Diameter	D2447
PE	Plastic Pipe, (SIDR-PR) Based on Controlled Outside Diameter	D3035
PE	Plastic Pipe, (SIDR-PR) Based on Outside Diameter	F714
ABS	Plastic Pipe, Schedules 40 and 80	D1527
ABS	Plastic Pipe, (SDR-PR)	D2282
ABS	Plastic 40 Plastic Drain, Waste and Vent Pipe	D2661
ABS	Sewer Pipe and Fittings	D2751
Kind of Pipe		AWWA Standard
PVC	Pressure Pipe, 4 inch - 12 inch, for Water	C900
PVC	Water Transmission Pipe, Nominal Diameters 14 inch - 36 inch	C905

Fittings and joints shall be of a schedule, SDR, pressure class or pipe stiffness that equals or exceeds that of the plastic pipe. The dimensions of fittings and joints shall be measured in accordance with ASTM D2122. Joints and fittings shall be compatible with the pipe to which they attach. Fittings for use with non-pressure systems shall conform to the requirements of the same ASTM designation as the pipe used.

Pressure pipe fittings shall conform to the requirements of the applicable specification listed below:

Kind of Fitting		ASTM Specification
PVC	Threaded Fittings, Schedule 80	D2464
PVC	Plastic Pipe Fittings, Schedule 40	D2466
PVC	Socket-Type Plastic Pipe Fittings, Schedule 80	D2467
PE	Socket-Type Fittings for Outside Diameter-Controlled Pipe and Tubing	D2683
PE	Butt Heat Fusion Plastic Fittings for Plastic Pipe and Tubing	D3261
ABS	Plastic Pipe Fittings, Schedule 40	D2468
ABS	Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals	D3139
ABS	"Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe Joints Using Flexible Elastomeric Seals	D4161
Kind of Fitting		AWWA Standard
PVC	Pressure Pipe, 4 inch - 12 inch, for Water	C900
PVC	Water Transmission Pipe, Nominal Diameters 14 inch - 36 inch	C905

Solvents for solvent welded pipe joints shall conform to the requirements of the applicable specification listed below:

Kind of Solvent		ASTM Specification
PVC	Primers for Use in Solvent Cement Joints of Plastic Pipe Fittings	F656
PVC	Solvent Cements for Plastic Pipe and Fittings	D2564
ABS	Solvent Cement for Plastic Pipe and Fittings	D2235
ABS	Solvent Cement for Transition Joints Between ABS and PVC	D3138
PVC	Non-Pressure Piping Components	

Rubber gaskets for pipe joints shall conform to the requirements of ASTM F477, Elastomeric Seals (Gaskets) for Joining Plastic Pipe.