

## EXPERIMENTAL PROJECTS CONSTRUCTION REPORT

### PROFILE WALL PVC PIPE STORM DRAIN TRUNKLINE & LATERALS IN MAINLINE APPLICATION

**Location:** Miles City: Tatro St. & Milwaukee St. (U-8104)

**Project Name:** Tatro Street-Miles City

**Project Number:** STPU 8014(1), CN 7077000

**Experimental Project:** MT-12-11

**Type of Project:** Polyvinyl Chloride (PVC) Storm Drain Lines

**Principal Investigator:** Craig Abernathy: Experimental Projects Manager (ExPM)

**Technical Contact:** Marc Wotring P.E.: Glendive District Hydraulics Engineer

**Contractor:** COP Construction, LLC (Sub)

**Date of Installation:** Summer 2014

#### **Description**

Installation of profile wall polyvinyl chloride (PVC) plastic pipe for use in urban project comprising of new trunkline and lateral connections. Profile wall PVC will also be used for connection into the existing storm drain laterals east of the Tongue River Slough.

#### **Experimental Design**

Profile wall PVC pipe (18"/45.7cm and 12"/30.5cm) meeting ASTM F949, has been chosen to be an experimental pipe material for the trunkline and laterals on this project. Profile wall PVC will also be used for connection into the existing storm drain laterals east of the Tongue River Slough. Based on specifications the Contech A-2000 PVC pipe was selected for this project by the contractor.

The 0.6 mile long project is within the city limits except from RP 0.10 to RP 0.35 where it passes through Custer County jurisdiction. Both Tatro Street and Milwaukee

Street are classified as urban collectors. The project begins at RP 0.00 (Station 0+00) at the intersection of Montana 59 (P-18) and ends at Montana Avenue (U-8004) RP 0.61 (Station 31+65.43).

### **Evaluation Procedures**

Research will document the installation for best practice with attention of the pipe trench and bedding process. If required, additional inspections will document the pipe condition as applicable to accessible sites and any other measurable outcomes.

Research will monitor and report on long-term performance. The measure of effectiveness (MOE) prevalent with this project will focus on:

- Installation practice
- Long-term durability

A point of contact is established with the Miles City Public Utilities Office (PUO) to be a direct liaison to the Glendive District office on any issue involving the PVC pipe after construction. Based on review of the issue the District will determine if Research staff will be contacted for a site visit to document the problem (or fix) to be updated in the project report.

**Construction Documentation:** Will include information specific to the installation events of the PVC pipe.

**Post Documentation:** As stated, the Miles City PUO will contact the Department on any issue involving the PVC pipe after installation up to five years.

Per information from District staff, installation went as planned with no construction issues reported that may affect future performance of the PVC.

The projects bedding specifications had stated the PVC pipe be installed per manufacturer's installation guidelines, and bedded per the plan detail for flexible pipe; allowing bedding material be left un-compacted under the pipe with the haunch and side and top fill placed in 8" (inch) lifts supplemented by vibratory compaction.

Due to the material properties and gradation of the supplied aggregate, it was determined that by the application of dropping the bedding by bucket achieved the necessary 85-90% compaction rate required for an adequate pipe embedment.

A Deflection Gauge (mandrel) was conducted to test the flexible pipe for out-of-roundness or deflection per ASTM specifications (distortions greater than 5 percent of the nominal pipe diameter); no issues were reported.

The purpose of an experimental projects report is to document the phases and events of any given experimental feature to gain the reader an understanding of the specific activities required to install or incorporate the research element into an active

construction or maintenance project.

This report also establishes a baseline for defining performance for any given feature under actual service conditions to determine its relative merits.

The information in this report reflects the installation of the PVC pipe for this particular project.

This report and other information may be found at:  
<http://www.mdt.mt.gov/research/projects/pvc.shtml>

The following are representative images of the project installation with post construction documentation.



← PVC pipe delivered; bundled and stacked.

Notice a black line is applied on the perimeter of the pipe near the spigot end, (examples shown by red circles).

These marks are an indicator when the spigot is homed (or inserted to the proper length) properly into the bell connection.



← PVC sections that are found with defects are marked for identification.

Damaged pipe were cut to fit and used for manhole or culvert connections when a shorter length is required.



← An example of the bedding material stockpiled onsite.

This material was designed to negate or minimize the need for compaction underneath the pipe.



← Example of trenching onsite with stick excavator.



← With the trench filled with sufficient bedding, the PVC is positioned into the manhole.



← The fill material is applied and haunched when needed to secure the pipe.

The aggregate was layered approximately twelve inches (12") over the top of the PVC.



← A worker determines when sufficient amount of bedding has covered the pipe.



← The encapsulated PVC pipe receives an initial layer of backfill material.



← Preliminary compaction implemented by the excavator bucket.



← The sheep's foot/bucket was also used for compaction, but was discontinued early in the process due to poor compaction performance.



← Compaction is completed by using a vibratory smooth-roller.



← Density gauge testing was conducted to confirm compaction at 95 percent (%).



← For most manhole and culvert connections, full sections of pipe were used.

This particular installation a shortened section of PVC pipe was used.

Gaskets are shipped loose and require field installation on the pipe spigot.

Single-grooved gaskets were used on this installation.



← Gaskets are liberally applied with conventional pipe joint lubricant.



← Workers push the spigot into the bell end until resistance is met or the 'home' line is reached (defined by red arrow).

This represents how all PVC connections were done.



↙ Example images of the PVC grout connections with the manhole and box culvert systems.

Application of the grout was applied in the interior as well.

The mortar used was Quikrete Commercial Grade Non-shrinking Precision Grout.



**September 2014 – Completed Project**



↑ Representative images of the completed project: Highway 59 & Tatro St. – view east.

↓ Near North Woodbury at Tatro St. – view west.



## **Disclaimer**

The use of a product and/or procedure in the course of an evaluation does not constitute an endorsement by the Department nor does it imply a commitment to purchase, recommend, or specify the product or procedure in the future.

Data resulting from an evaluation of an experimental feature is public information and will not be considered privileged. The MDT may, at its discretion, release all information developed before, during, and after an evaluation.