

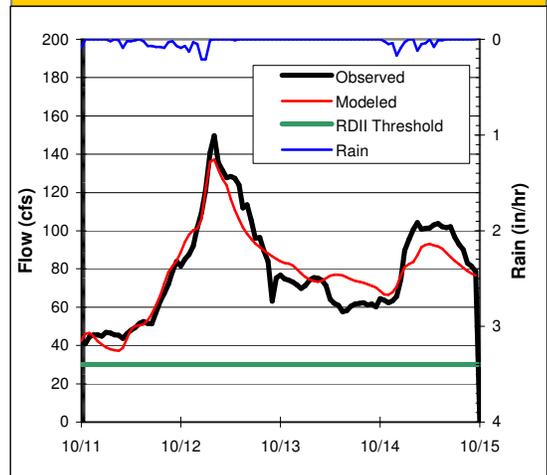
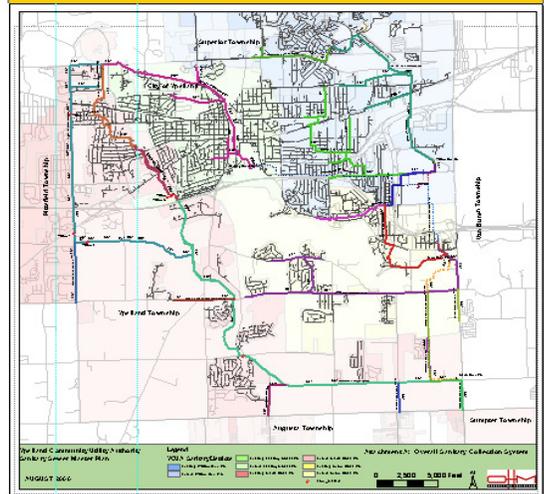
Ypsilanti Community Utilities Authority (YCUA) Antecedent Moisture Modeling Study

February 2008

2007 Flow Metering Study

- Paint Creek Interceptor
- Snow Road Pump Station Incremental Area
- Golfside Interceptor
- Whittaker Road Trunk Sewer

Prepared for:
Ypsilanti Community Utilities
Authority



OHM

Table of Contents

Executive Summary

Section 1
Flow Monitoring Report

Section 2
Paint Creek Interceptor Post-Rehabilitation Analysis

Section 3
Snow Road Pump Station Incremental Area Flow Metering and Modeling

Section 4
Golfside Interceptor Flow Metering and Modeling

Section 5
Whittaker Road Trunk Sewer Flow Metering

Executive Summary

Introduction

In 2006, the Ypsilanti Community Utilities Authority (YCUA) performed an Update to the Sanitary Collection System Master Plan (2006 Master Plan Update). The 2006 Master Plan Update recommended more modest upgrades at the Martz Road Pump Station, Snow Road Pump Station, and the Paint Creek Interceptor. Prior to implementing these improvements, it was recommended that YCUA perform local flow monitoring to verify local flow rates and the effectiveness of rehabilitation prior to constructing capital improvements. This memorandum summarizes the results of the 2007 Flow Metering Study, which was performed to accomplish these goals.

Purpose of Flow Metering

Flow metering was performed at six locations and rainfall measurements were collected at three locations from March through November of 2007. The purpose of the flow metering was to quantify the system performance for the four specific areas outlined below:

- 1. Evaluation of the Paint Creek Interceptor Inflow and infiltration (I/I) source removal -** The Sanitary Sewer Evaluation Study (SSES) performed for this area in 2006 indicated that there was a break in the Paint Creek Interceptor at the Paint Creek, as a result of drain cleaning that was thought to be a significant inflow source to the Interceptor. The break in the Paint Creek Interceptor was repaired and the Paint Creek Interceptor was re-metered for this study to determine the effectiveness of the rehabilitation.
- 2. Evaluation of the Snow Road Incremental area flows -** The model results from the 2006 Master Plan Update indicated that the flows through the Ford Lake Interceptor and the Textile Road East Trunk Sewer exceeded the capacity of these interceptors. The flows within the Snow Road Pump Station District, which include the Ford Lake Interceptor and the Textile Road East Trunk Sewer, were not directly metered and were determined by subtracting the metered flows at the Martz Pump Station from the metered flows at the Snow Pump Station. The meter subtraction method was suspected to produce high errors depending on the accuracy of the meters, thus artificially elevating flows within the Snow District. Because of this, the Snow Road Incremental Area was directly metered for this study to more accurately determine the tributary area flows.
- 3. Evaluation of the flows from the Golfside Interceptor -** A large part of the increase in flows within the Martz Pump Station District is due to increased development within the areas upstream of the Golfside Interceptor such as Pittsfield Township. For this reason, the 2006 Master Plan Update recommended that a semi-permanent meter be installed on the Golfside Interceptor to evaluate the baseline flows coming from the high growth areas. The Golfside Interceptor was directly metered for this study to establish a baseline flow for this area and to verify that flows from growth and I/I are within planned rates.

4. **Evaluation of the flows from the Whittaker Road Trunk Sewer** – Significant growth has occurred and is planned in the areas served by the Whittaker Road Trunk Sewer. These areas consist of the southern portion of Ypsilanti Township and the western portion of Augusta Township. This area was metered to understand the remaining capacity in this trunk sewer and to establish a baseline of flows for this area to verify that flows from growth and I/I are within planned rates.

Results

The flow metering data was collected and analyzed to determine the condition of each of the four areas outlined above. Technical memorandums were prepared for each item, and the results are summarized here.

1. **Paint Creek Interceptor** - The flow metering data collected was compared to the 1999 and 2004 flow metering performed prior to the rehabilitation. The analysis showed that the repair made to the interceptor significantly reduced the rate of wet weather I/I into the interceptor. The pre-rehabilitation peak design flow was 17.2 cfs, and the analysis shows that the post-rehabilitation design peak flow rate is 9.0 cfs, which represents a 47% decrease. Even with this decrease in design peak flows, approximately 6,000 feet of the interceptor has peak flows that are up to 46% more than the interceptor capacity. This will require either additional I/I removal, an upgrade to the interceptor, or both.
2. **Snow Road Incremental area** - The flow meters at the Snow Road and Martz Road Pump Stations were calibrated using dye testing to provide a more accurate flow rate through the stations. Additionally, metering was performed directly on the incremental district between the pump stations that includes the Ford Lake Interceptor and the Textile Road East Trunk Sewer. The results of the analysis show that these interceptors do have adequate capacity for the future peak flows. The calculations made in the 2006 Master Plan study that showed these pipes as over capacity were indeed caused by inaccuracies arising from numerical meter subtraction.
3. **Golfside Interceptor** - The metering verified that the Golfside Interceptor has adequate capacity for future peak flows. The rates of I/I measured are consistent with that estimated in the 2006 Master Plan Update, and consistent with level of I/I in the rest of the system. This area does not appear to have unusual I/I or warrant additional investigation at this time. The data collected from the 2007 metering can be used as a baseline to evaluate future changes to the system from growth and I/I.
4. **Whittaker Road Trunk Sewer** – The metering verified that the Whittaker Road Trunk Sewer has adequate capacity for existing peak flows. The rates of I/I measured are slightly higher than the levels used in the 2006 Master Plan Update and slightly higher than the average I/I in the rest of the system. This result did not affect the conclusions from the 2006 Master Plan, and makes sense considering that this area includes some older sewers within Augusta Township. The data collected from the 2007 metering can be used as a baseline to evaluate future changes to the system from growth and I/I.

Recommendations

Based on the flow metering and the results from the analyses performed, we offer the following recommendations:

1. Perform improvements on the Paint Creek Interceptor system to address capacity deficiencies. Perform the manhole rehabilitation outlined in the 2006 SSES to further reduce the rates of I/I into the system. Perform post-manhole rehabilitation metering and update the analysis to see if adequate flow was removed. Once the impacts of the rehabilitation are quantified, if the interceptor is still over capacity, investigate the impacts of surcharging the interceptor to determine whether the level of surcharging would adversely affect local service. A parallel relief sewer or further I/I reduction on private property may be necessary if these steps do not adequately address the issue.
2. Perform periodic metering of the major sub-areas tributary to the Martz Road Pump Station. The tributary areas are large and the flow meter at the Martz Road Pump Station is affected by significant upstream routing effects and pipe storage. Actual monitoring data from a number of large events would provide strong supporting data for management of the system, rather than relying on model projections alone.