

PUMP STATION #7 SANITARY SEWER SERVICE AREA STUDY



INTRODUCTION

- ❖ PURPOSE
- ❖ EXISTING SYSTEM
- ❖ SCOPE OF WORK
- ❖ QUESTION & ANSWER



PURPOSE

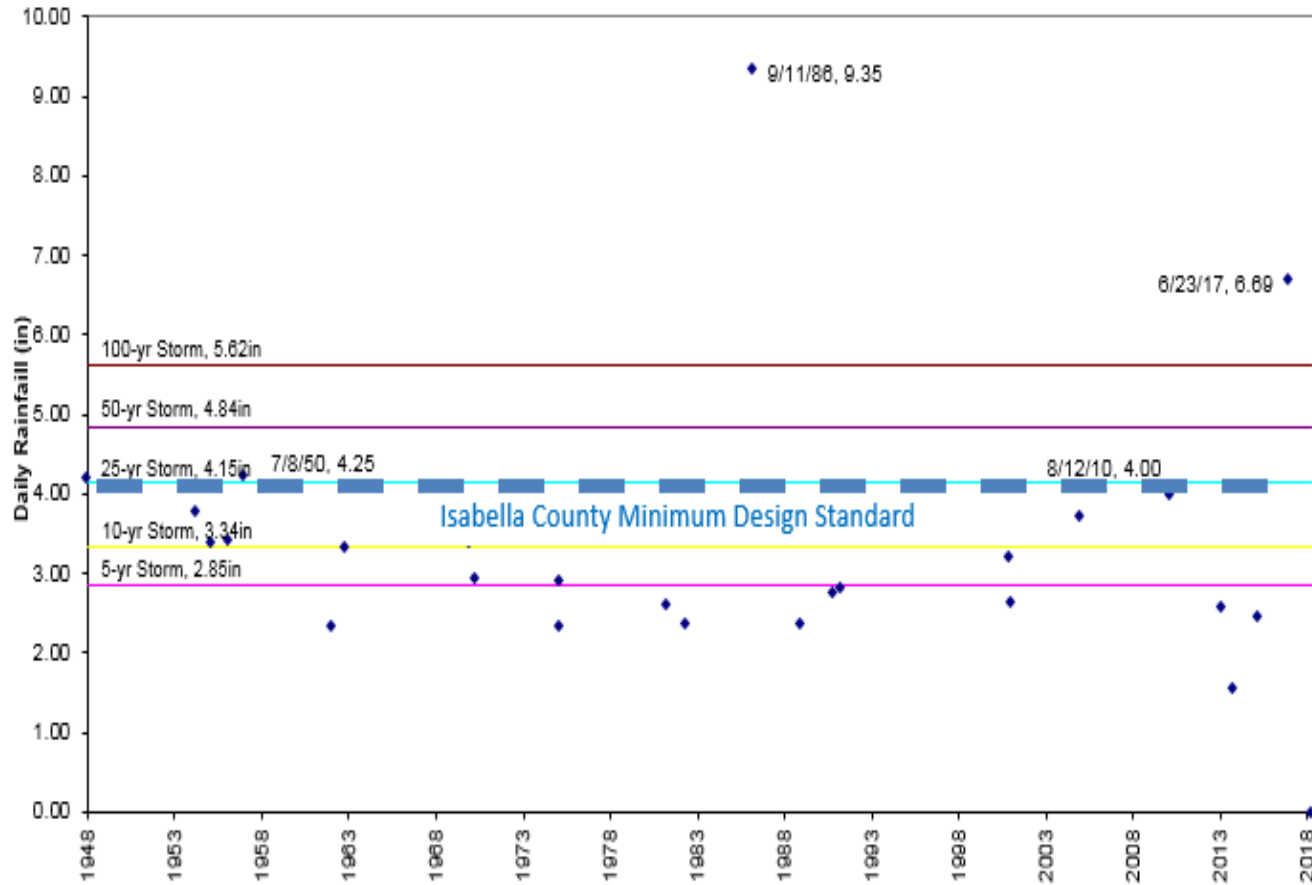
To conduct a comprehensive study of sewer system within the Pump Station #7 Service area. The focus is to evaluate the existing infrastructure (conditions / operations) and determine impact the equipment may have contributed to the June 2017 Flooding Event.

WHO AND WHERE?

- RESIDENTS AND BUSINESSES WITHIN MID MICHIGAN AREA
- SPECIFICALLY THOSE IN THE PUMP STATION #7 SERVICE AREA
- BASEMENT FLOODING WAS REPORTED TO TOWNSHIP STAFF FROM SOME RESIDENTS ALONG O'CONNOR DRIVE
- VISUAL FLOODING CONFIRMED AT MANHOLES UPSTREAM AND AT PUMP STATION #7 BY DPW STAFF



NOAA Storm Data from 1949 to 2017 Top 25 Storms



WHAT AND WHEN?

- SIGNIFICANT RAIN EVENT OCCURRED ON JUNE 22 AND 23, 2017 CAUSING FLOODING
- NOAA REPORTED A TOTAL OF 7.29 INCHES OF RAINFALL WITHIN A 24 HOUR PERIOD
- 25, 50 AND 100 YEAR STORM EVENTS WERE EXCEEDED
- LAST DOCUMENTED RAIN EVENT OF THIS MAGNITUDE WAS IN 1986



WHY?

GFA AS THE ENGINEER OF RECORD FOR THE TOWNSHIP HAS BEEN RETAINED TO EVALUATE AND HELP ASSIST WITH THIS DETERMINATION

SCOPE OF WORK INCLUDES :

- ASSET INVENTORY AND CONDITION ASSESSMENT
- FLOW MONITORING FOR INFLOW / INFILTRATION
- HYDRAULIC MODELING
- REPORT WITH FINDINGS INCLUDING COST ESTIMATES FOR CORRECTIVE MEASURES IF FOUND AND NEEDED TO BE IMPLEMENTED

POSSIBLE CAUSES:

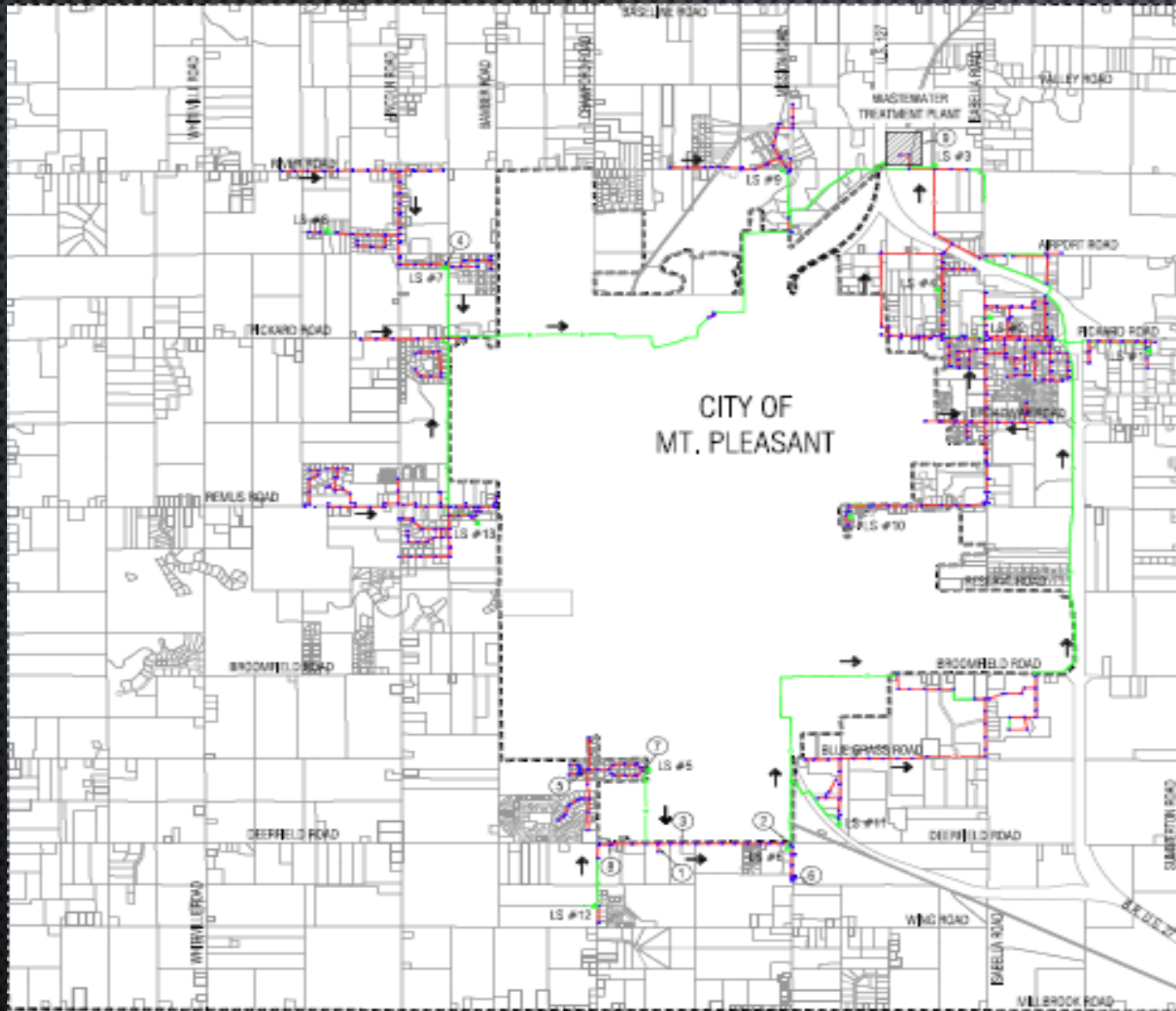
- INTRUSION OF STORM WATER PREVENTING ABILITY FOR EQUIPMENT TO FUNCTION PROPERLY
- EQUIPMENT AGE AND FAILURE
- ILLEGAL / UNKNOWN STORM WATER CONNECTIONS



EXISTING SYSTEM & OPERATIONS



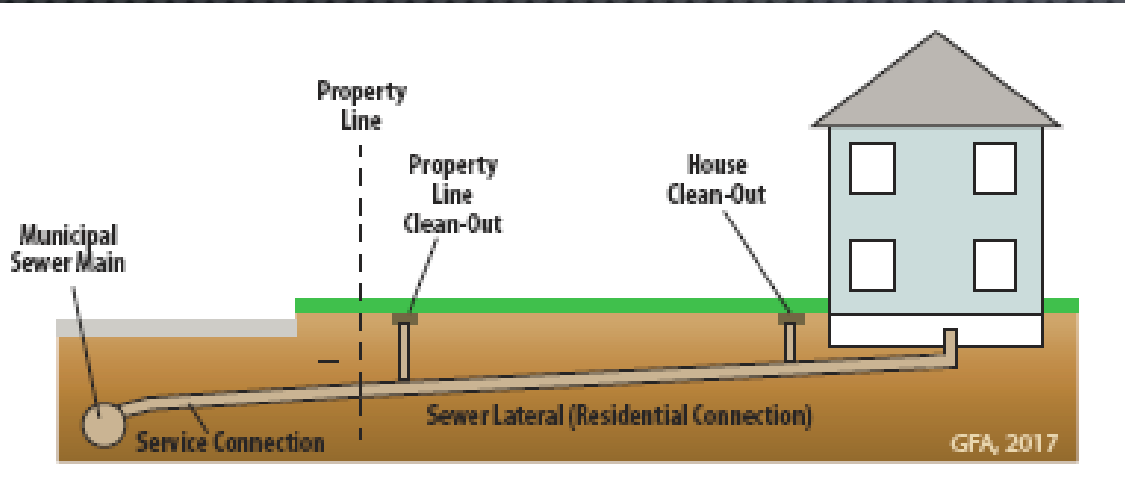
OVERALL SEWER SYSTEM



➤ SYSTEM INCLUDES:

- 28 MILES OF GRAVITY SANITARY SEWER
- 15 MILES OF PRESSURIZED FORCE MAIN
- 19 PUMP STATIONS
- 2.4 MGD WASTEWATER TREATMENT PLANT

TYPICAL SEWER CONNECTION



- THE DPW PROVIDES THE OPERATIONS AND MAINTENANCE OF THE SEWER SYSTEM THAT SERVICES OVER 10,000 CUSTOMERS
- RULE OF THUMB TO MAINTAIN A HEALTHY SYSTEM AS A PROPERTY OWNER AND AVOID POTENTIAL FOR BACKUPS INTO YOUR HOME AND/OR BUSINESS:
 - FLUSH ONLY ITEMS THAT ARE DEGRADABLE AND APPROVED = TOILET PAPER ONLY
 - DO NOT DUMP HOUSEHOLD CLEANERS, HAZARDOUS WASTE, PHARMACEUTICALS DOWN THE DRAIN
 - COLLECT GREASE AND GARBAGE AND DISPOSE SEPARATELY
 - STORM WATER CONNECTIONS ARE NOT ALLOWED AND REQUIRED TO BE DISCONNECTED IF DISCOVERED (FOOTING DRAINS, ROOF DRAINS, SUMP PUMPS ETC.)
 - ALWAYS CONTACT MISS DIG BEFORE EXCAVATING

PUMP STATION #7 SERVICE AREA (MCDONALD DRIVE)



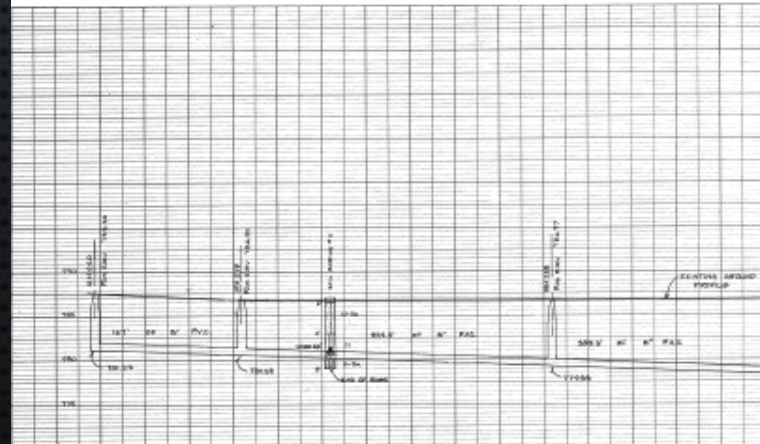
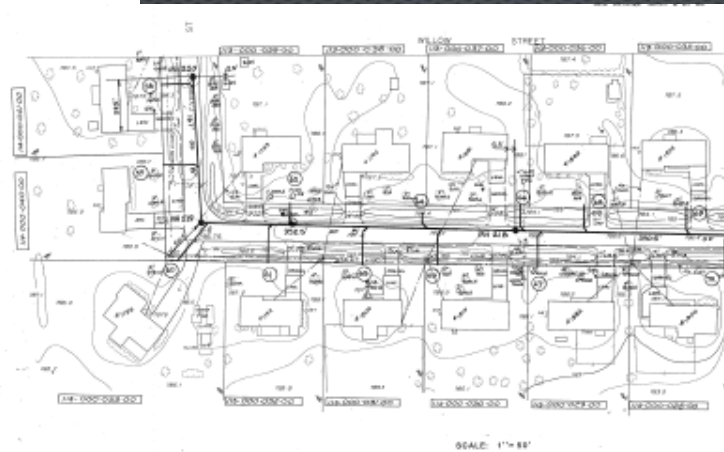
SERVICE AREA - EXISTING INFRASTRUCTURE

ISABELLA COUNTY
SANITARY SEWAGE DISPOSAL
SYSTEM

UNION

TOWNSHIP

C-262790
MISSION CREEK AREA
DIVISION D
COLLECTOR SEWERS
DIVISION E
PUMP STATIONS



SERVICE AREA INFORMATION:

- CONSTRUCTED IN 1980 AND 1990s
 - TWO (2) SUBMERSIBLE PUMP STATIONS AND 8" GRAVITY SEWER
- PUMP STATION #8 SERVICES APPROX. 10 RESIDENCES
 - COLLECTS GRAVITY FLOWS FROM PORTIONS OF SCULLY DRIVE
 - SERVICES AROUND 10 RESIDENCES
- PUMP STATION #7 SERVICES APPROX. 200 RESIDENCE'S / BUSINESSES
 - COLLECTS GRAVITY FLOWS FROM SCULLY ROAD (INCLUDING PS #8), EAST RIVER ROAD, SOUTH LINCOLN ROAD, McDONALD DRIVE, O'CONNOR DRIVE AND BAMBER PROFESSIONAL OFFICE PARK
 - SERVICES AROUND 200 RESIDENCES

STUDY – SCOPE OF WORK



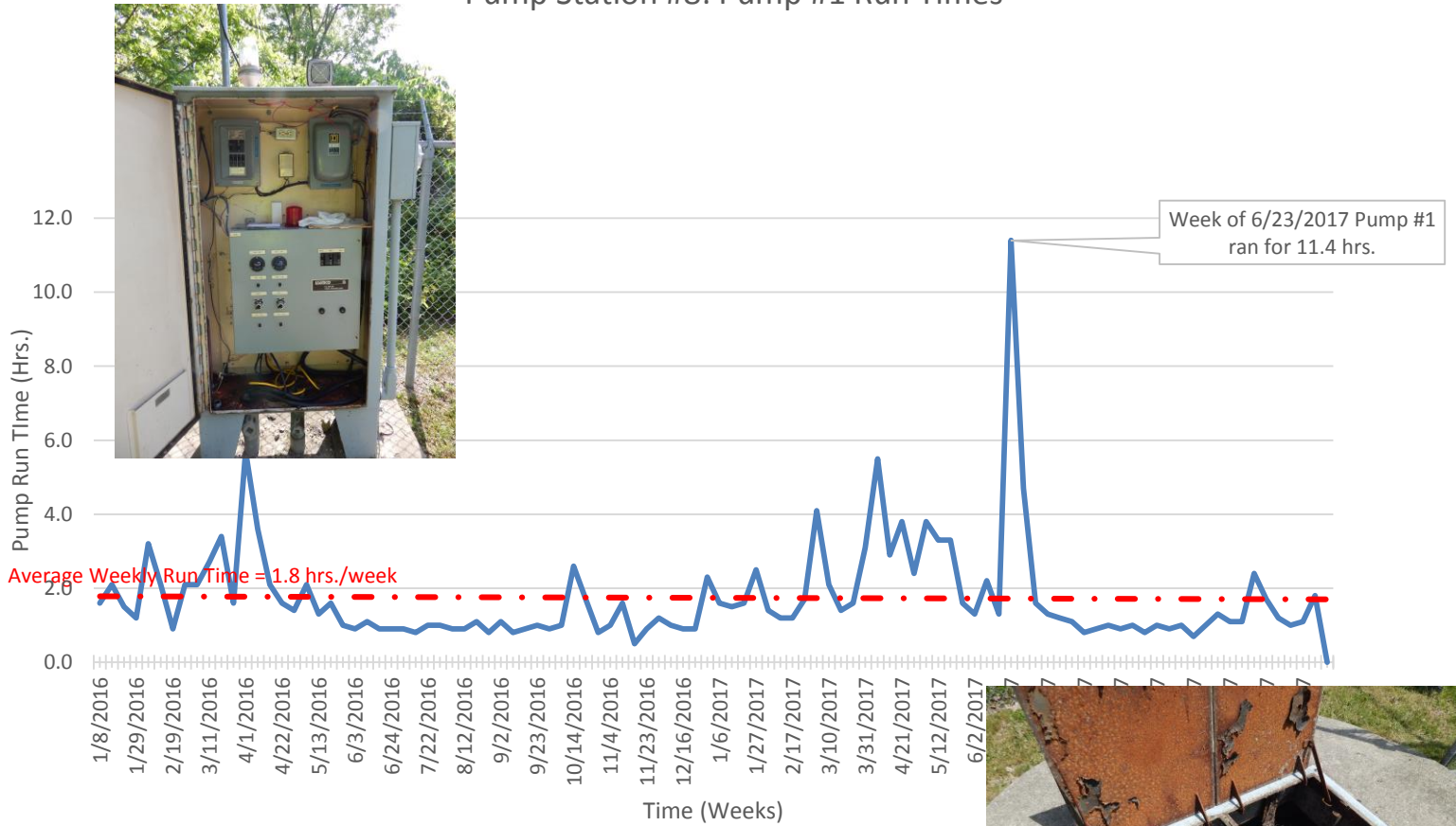
ASSET RESEARCH / ASSESSMENT

INFORMATION COLLECTED / EVALUATED:

- PUMP STATION #7 AND #8 CONDITION AND OPERATIONS
- GRAVITY SEWER CONDITION AND OPERATIONS

Pump Station #7 and #8 Assessment

Pump Station #8: Pump #1 Run Times



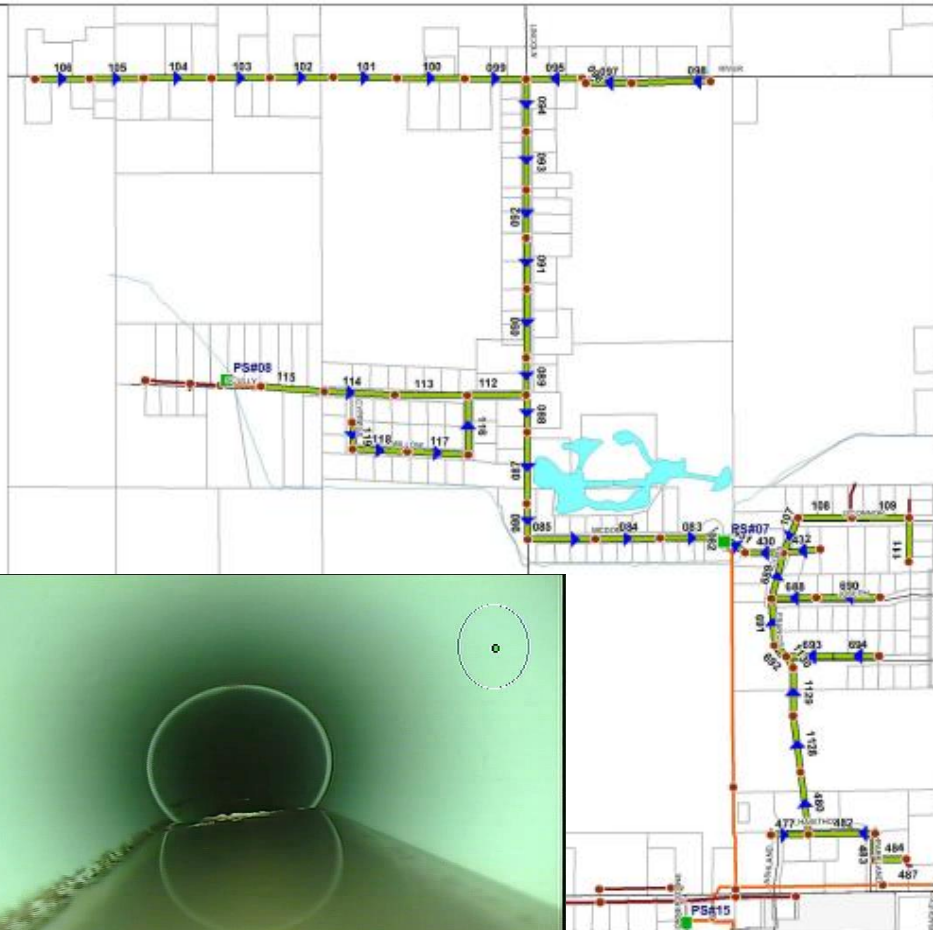
- INVENTORY AND CONDITION ASSESSMENT OF EQUIPMENT INCLUDING:
- FIELD INSPECTIONS TO IDENTIFY MANHOLE, VALVE, AIR RELEASE STRUCTURE CONDITIONS
- ALARM HISTORY (2 YEAR) TO IDENTIFY TRENDS AND WOULD INCLUDE JUNE 22 / 23 RAIN EVENT
- RUN TIME AND FLOW HISTORY (2 YEAR) TO IDENTIFY TRENDS AND WOULD INCLUDE JUNE 22 / 23 RAIN EVENT
- DPW MAINTENANCE / REPAIR HISTORY (10 YEAR)
- COMPARISON TO DEQ AND INDUSTRY STANDARDS FOR OPERATION TO IDENTIFY FAILURE AND/OR DEFICIENCIES

Sewer Assessment

➤ AS PART OF THEIR ASSET MANAGEMENT PROGRAM THE TOWNSHIP PERFORMED INSPECTION AND CLEANING OF THE GRAVITY SEWER LINES WITHIN THE PUMP STATION #7 SERVICE AREA.

○ TELEVISION AND CLEANING WAS COMPLETED FROM OCTOBER 2014 AND COMPLETED IN 2017 FOR ALL GRAVITY SEWER INCLUDING MANHOLES, MAINS, AND SERVICE WYES

○ CONDITION REPORT REVIEWS INCLUDING PIPE INFORMATION, JOINTS, POTENTIAL CRACKS / LEAKS, RATING, NEEDED REPAIRS, ETC.



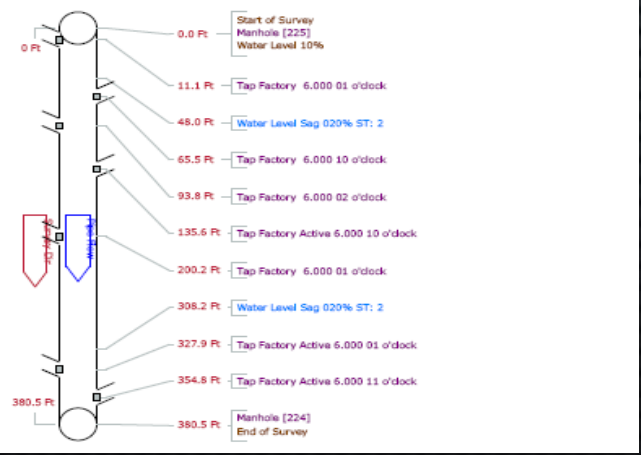
Sewer Pump Station No. 7 Service Area:
Charter Township of Union Isabella County, Michigan

Legend - Pump Station No. 7 Service Zone

- Pump Station (PS)
- Manhole (MH)
- Pump Station No. 7 Service Zone -
 - All sewer cleaned & televised
 - Blue triangles show flow direction
 - Labels indicate video & report IDs
- Sanitary Sewer
- Abandoned Sewer
- Sanitary Force Main

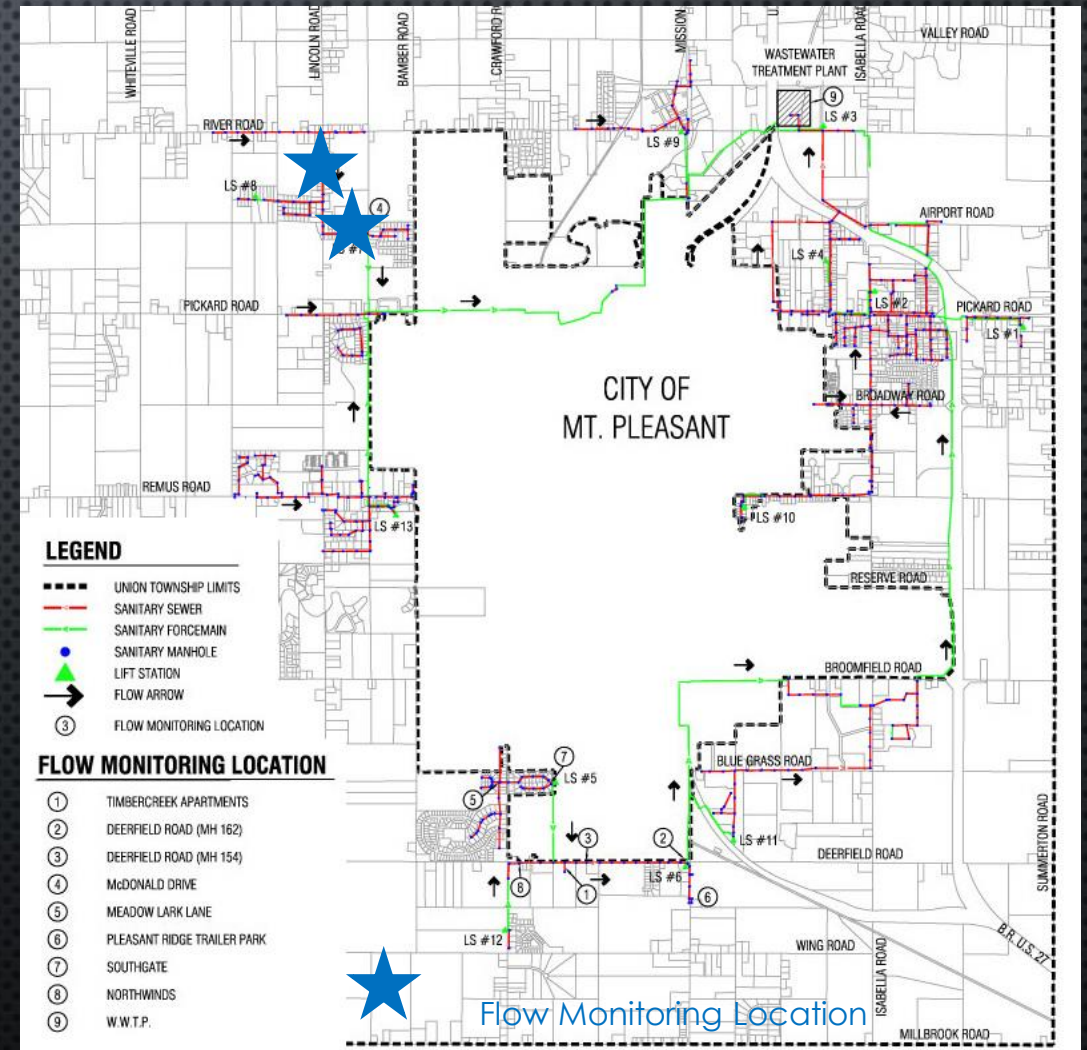
Pipe Graphic Report of P&R 093 for Union Twp

Setup	21	Surveyor	Matt	Certificate #	U-1213-06/09/067	System Owner		
Drainage		Survey Customer						
PID #		Date	2014/10/17	Time	10:07	Street & Block Id		
City	mt pleasant	Further location details						
Up	MH#25-LIN	Rim to Invert		Grade to Invert		Rim to grade		
Down	MH#24-LIN	Rim to Invert		Grade to Invert		Rim to grade		
Use	Sewer	Direction	Downstream	Flow control		Media		
Shape	Circular	Height	8	Width		Date Cleaned		
Material	Polyvinyl Chloride	Joint length		Total length	380.5	Length surveyed		
Lining		Year laid		Year rehabilitated		Weather		
Purpose						Dry		
Additional Info						Structural	O & M	Constructional
Location	Main Highway - Urban				Miscellaneous	Hydraulic		
Project	CLEANING AND TELEVISION 2014				Work Order			
Northing		Easting		Elevation				
Coordinate System				GPS Accuracy				



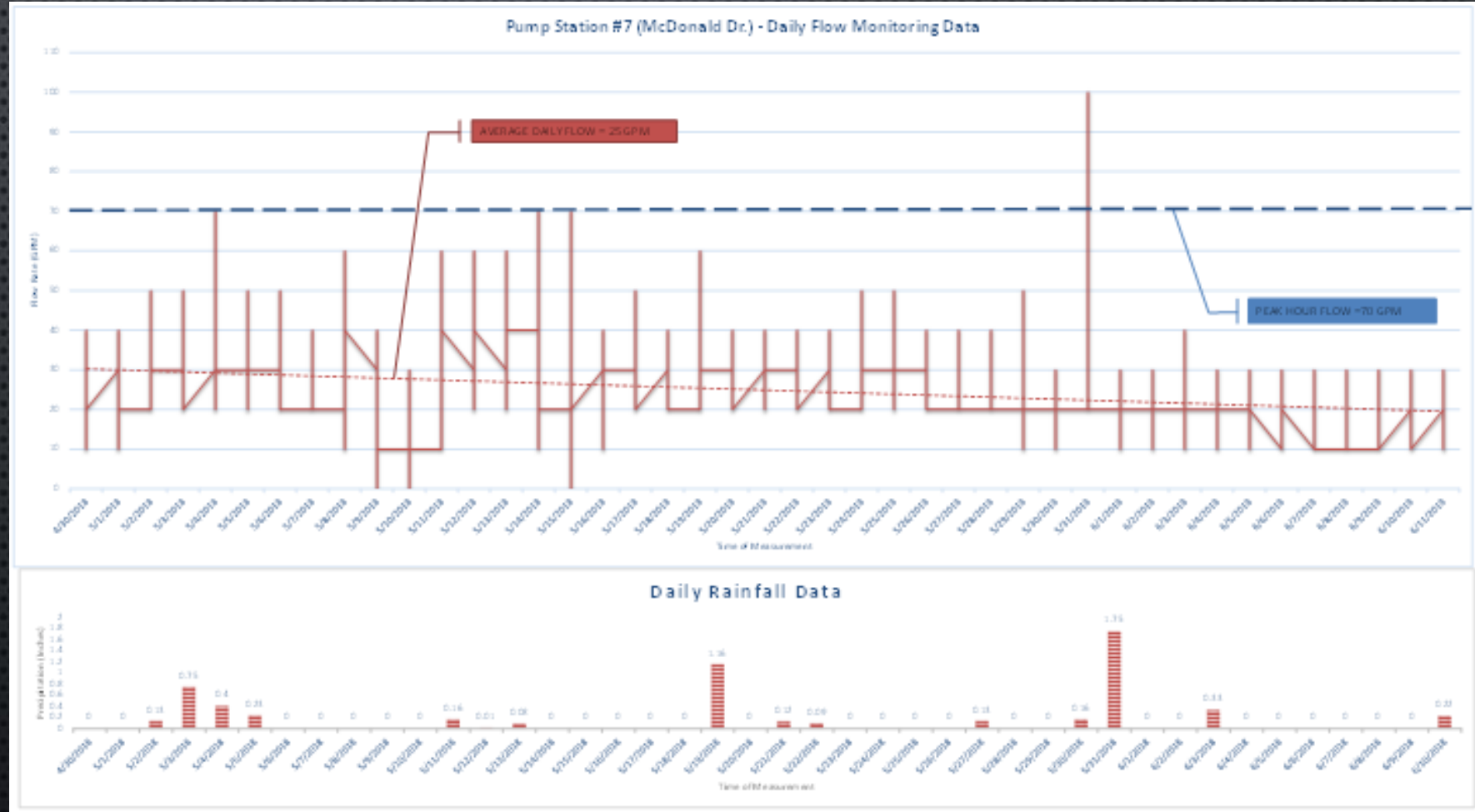
FLOW MONITORING

- EXISTING SEWER FLOWS ARE CURRENTLY BEING MONITORED AND COLLECTED SO THEY CAN BE EVALUATED TO DETERMINE IF ANY WET WEATHER RESPONSE WAS OBSERVED AND INTEGRATED INTO HYDRAULIC MODELLING.
- BEING COMPLETED FOR A 3 MONTH PERIOD TO IDENTIFY TRENDS
- RAIN EVENTS ARE ALSO BEING COLLECTED AS OBTAINED FROM NOAA FOR COMPARISON



FLOW ANALYSIS

- INFLOW – WATER ENTERING THE SANITARY SEWER FROM DIRECT CONNECTIONS (E.G. STORM SEWER, ROOF DRAIN CROSS CONNECTIONS), CAUSING AN IMMEDIATE INCREASE IN WASTEWATER FLOW, SPECIFICALLY PEAK FLOW
- INFILTRATION – WATER ENTERING SANITARY SEWER FROM GROUNDWATER INTRUSION (E.G. PIPE LEAKS,), CAUSING CONSISTENT AND STEADY INCREASES IN WASTEWATER FLOW OVER TIME



HYDRAULIC MODELLING

- DATA COLLECTED FROM THE FLOW MONITORING WILL BE UPDATED IN THE EXISTING MODEL CREATED IN 2006.
- CRITICAL TOOL TO AID WITH IDENTIFYING PERFORMANCE, CAPACITY DEFICIENCIES AND SIMULATIONS OF SYSTEM OPERATIONS TO IDENTIFY POTENTIAL FOR SURCHARGING IN THE SYSTEM.

LAYING OUT SEWER SYSTEM MODEL

The image displays the SewerCAD software interface. The main window shows a sewer system model with various pipes and pumps. A dialog box titled "Pump: PMP-14b" is open, showing the following configuration:

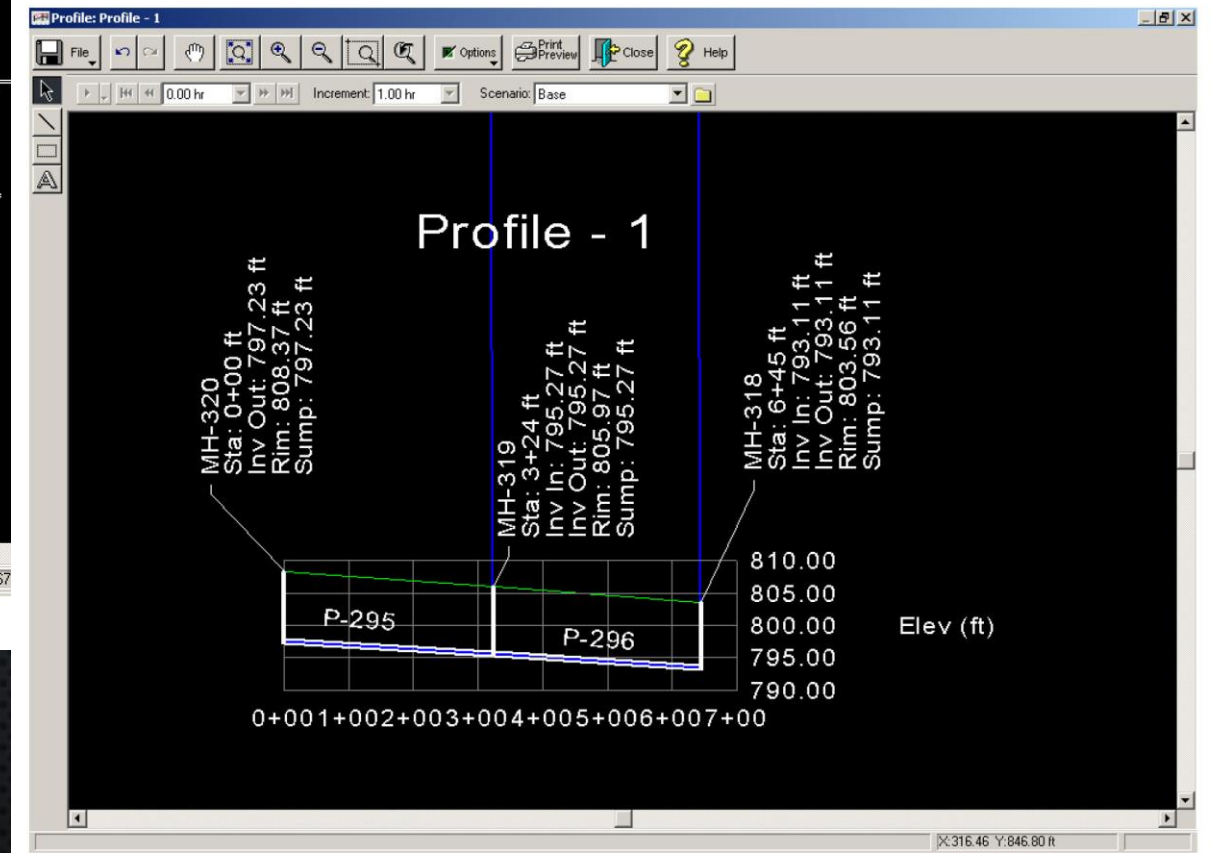
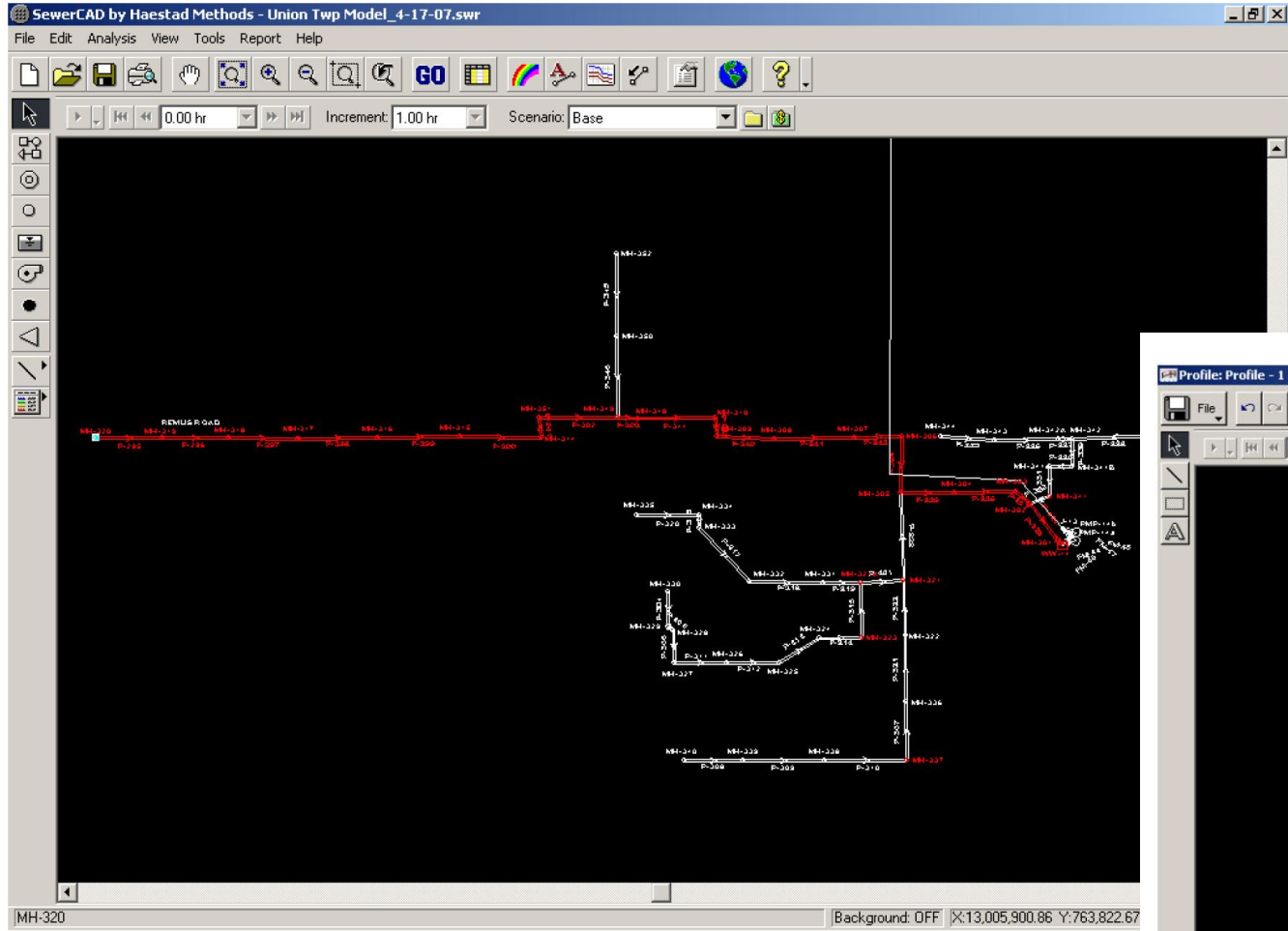
General		Initial Setting	
Label:	PMP-14b	Pump Status:	On
X:	13,008.681.23 ft	Relative Speed Factor:	1.00
Y:	764.040.78 ft		
Elevation:	744.00 ft		

Pump		Calculated Hydraulics	
Pump Type:	Design Point (1 Point)	Intake Pump Grade:	748.64 ft
Shutoff:	Head (ft): 106.67, Discharge (gpm): 0.00	Intake Pump Pressure:	2.01 psi
Design:	Head (ft): 80.00, Discharge (gpm): 500.00	Discharge Pump Grade:	846.39 ft
Max. Operating:	Head (ft): 0.00, Discharge (gpm): 1,000.00	Discharge Pump Pressure:	44.30 psi

Operating Point	
Pressure Flow:	289.06 gpm
Pump Head:	97.75 ft

The background window shows a sewer system model with various pipes and pumps. The status bar at the bottom indicates "Background: OFF X:13,006.423.17 Y:763.313.48 US".





FINAL REPORT

Summary Report that includes:

- Condition and operations of the infrastructure historically and during the June 22/ 23rd Rain event
- I/I analysis including graphs and illustrations
- Hydraulic modelling results including graphs and illustrations
- Conclusions as to what contributed to flooding of residents (as applicable)
- Identifications of deficiencies (as applicable)
- Recommendations and associated cost estimates to implement corrective measures (as applicable)
- Recommendations and associated cost estimates to implement measure to prevent future incidents (as applicable)
- Recommendations of additional investigation measures needed such as dye, smoke testing



QUESTIONS / COMMENTS????

