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Executive Summary

Grand Blanc Township Sanitary Sewer System (GBTSSS) consists of laterals and subtrunks ranging from 8" to 30" and surrounds the City of Grand Blanc flowing into the Genesee County Sanitary Sewer System at several locations. The Township of Grand Blanc owns and operates the system with the exception of multi-community sewers, which are operated by the county. The system also serves a small portion of Oakland County in the Woodfield Subdivision. These operation/ownership responsibilities are indicated on the Sewer System Infrastructure Map (Exhibit 1).

The township is very proactive in master planning for the sanitary sewer system. In 2004, the township updated its sewer master plan and this plan outlines all sewer infrastructure required through build-out of the township and containment of the 25-year, 24-hour wet weather event as required by Michigan Department of Environmental Quality (MDEQ). This plan is reviewed and updated every five years with the 2009 document expected in the second quarter. The 2004-2009 Capital Improvement Program (CIP) has been implemented with all projects either constructed or designed. The build-out CIP and the 2009 - 2015 CIP are included in Appendix A.

Grand Blanc Township Department of Public Works is proactive in sanitary sewer maintenance and has made diligent efforts to remove infiltration and inflow (I&I) from the sanitary sewer system. The township has inspected all manholes, televised, and repaired all of the lateral sewers in the township in the last six years. The township preventative maintenance program is a 5-year clean, televise, and repair cycle that sees the entire township sanitary sewer lateral system cleaned, televised, and repaired on a rotating basis. The township has expended over 3.5 million dollars over the last six years on this program. The township physically inspected all manholes on the subtrunk system and televised the Slack Lake Subtrunk. The remaining subtrunks have not been televised primarily due to access issues. The subtrunks that have not been televised are shown on the Subtrunks Not Televised or Repaired Map (Exhibit 2).

In 2008, as part of an S2 Grant, Grand Blanc Township installed 36 flow meters to monitor I&I throughout the sanitary sewer system. As meter data was collected and evaluated, meters were moved to areas with higher I&I in an effort to localize the data. These metering locations are shown on the Sanitary Sewer Flow Meter Map (Exhibit 3). Despite the efforts outlined above, flow monitoring continues to show excessive I&I in many areas causing system surcharging, flooded basements, and sanitary sewer overflows. The sources of this I&I can be attributed primarily to illicit sump pump and footing drain connections, and secondarily to subtrunks that have not been televised. Flow meter data indicates a relatively quick peak during significant wet weather events indicating that footing drains and sumps are the likely cause of excessive Infiltration and Inflow (I&I) in the system. Significant repair work on the entire lateral system in the Township has done little to reduce these wet weather peaks therefore the subtrunk rehabilitation is seen as the secondary factor in the cause of peak wet weather flows.

The project plan identifies four alternatives for removing excess I&I from the system.

Alternate A is No Action. This is not acceptable as lack of action will result in continued surcharges in the system, flooded basements, sewer overflows and fines and penalties from the Genesee County Drain Commissioner, Division of Water and Waste Services (GCDC-WWS).

Alternate B is the Optimum Performance of Existing Facilities. In order to accommodate existing and future flows, 10 pump stations will require station rehabilitation and retention basins will be required to retain wet weather flows. The total retention storage is 21 million gallons (MG) spread across the township at 10 locations. The 10 retention basins range in size from 1.0 MG to 4.0 MG. Siting these locations is difficult as the locations are in neighborhoods and retention basins may produce septic gases. These gases require treatment to oxidize any odor component. The odor treatment processes are expensive to install and operate, adding further cost to the project. The total cost to implement Alternate B is $49,000,000.

Alternate C is the Township-wide Sump Pump and Footing Drain Removal Program. Prior to 1980, it was common for developers to connect either the structure footing drains or sump pump to the sanitary sewer. Grand Blanc Township pre-1980 subdivisions (Exhibit 4) shows the subdivisions constructed prior to 1980. The pre-1980 subdivisions contain 5,885 homes and it is anticipated that approximately one half of these homes have footing drains or sump pumps connected to the sanitary sewer. The anticipated cost to disconnect these homes is $10,828,400. Alternate C would be the first segment of this disconnect program. The total Alternate C project cost is estimated to be $3,680,000.

Alternate D is the Subtrunk rehabilitation program. Exhibit 2 shows the subtrunks that the township has not televised and repaired. The difficulty in televising and repairing these subtrunks is due to access issues. In many cases the subtrunk easement is overgrown with trees and brush, in some cases buildings have been constructed in the proximity of the easement. In order to access these sewers, easements would have to be cleared and sufficient road constructed to allow television truck access. The total project cost for Alternate D is $18,289,400.

A. Selected Alternate

In order to fulfill the requirements of the S2 Grant the township received, it must apply for an MDEQ SRF or SWQIF low interest loan. The selected alternate for Grand Blanc Township State Revolving Fund application, is a SWQIF project, Alternate C the Township wide Sump Pump and Footing Drain Removal Project at an estimated total cost of $3,680,000.

B. User Cost

If Alternate C qualifies for MDEQ low interest funding it is anticipated that 75% of the principle and interest will be paid from the existing rates which include an annual budget for I&I removal. The remaining 25% of the principle and interest will be funded from the Department of Public Works Sanitary Sewer Capital Improvement Fund. No user rate increase will be required to fund this project.

C. Public Hearings

A public hearing has been advertised and will be held at Grand Blanc Township on March 24, 2009. The public record will be held open until 5:00 p.m. on March 27, 2009. The project plan will be submitted to MDEQ by July 1, 2009 for inclusion in the priority list to be evaluated for low interest funding.

D. Implementation

Implementation of Alternate C will begin as soon as funding is made available and it is anticipated that the project will take three years to complete due to the majority of the project taking place on private property and in individual homes.

I. Introduction

The Charter Township of Grand Blanc encompasses approximately 35 square miles. The township is located in southern Genesee County and is bordered by the City of Burton to the north, Mundy Township to the west, Atlas Township to the east and Oakland County to the south. The mid-decade census reported the township population at 35,075.

The township sanitary sewer collection system collects and transports all wastewater from properties connected to the sewer system. The system utilizes 240 miles of sanitary sewer ranging in size from 3-inch diameter force mains to 33-inch diameter gravity sewers and operates 13 pump stations. The wastewater flow is ultimately discharged into the Genesee County wastewater system and is then conveyed to the Anthony Ragnone Treatment Plant (ARTP) in Montrose, Michigan.

The alternatives to be included in the Grand Blanc Township SRF Project Plan are Alternate A – No Action; Alternate B – Optimization of Existing Facilities; Alternate C – Sump Pump and Footing Drain Disconnection Program; and Alternate D – Subtrunk Rehabilitation Program.

II. Project Background

A. Study Area Characteristics

1. Delineation of Study Area

The Grand Blanc Township Sanitary Sewer System (GBTSSS) planning area includes all of Grand Blanc Township, a small portion of Holly Township in Oakland County and a small portion of Atlas Township in Genesee County (Exhibit 1). The current sewer system planning area of the GBTSSS is approximately 35 square miles including the entities presently served outside of Grand Blanc Township.

The township operates and maintains the sanitary sewer system with the exception of multi-community lines which are operated by GCDC-WWS. Multi-community lines are defined as any facility that serves more than one community and these lines are also noted in Exhibit 1. During heavy rains the area exhibits excessive levels of I&I resulting in system surcharges, flooded basements, and system overflows.

In 2006, the township received an S2 Grant to study the I&I problem and develop a program to reduce I&I. The township installed 36 meters in various area of the township, four rain gauges in different quadrants of the township, and collected data for a two year period. The goal of the project plan is to evaluate the flow data and delineate a program to reduce I&I in Grand Blanc Township.

The System Map, Exhibit 1, indicates the existing major water features, sanitary sewer facilities, pump station, major roads, property lines, and other key features.

2. Land Use in Study Area

   The Grand Blanc Township Master Land Use Plan (Exhibit 4) was updated in 2004 and was used in the preparation of this report. The area has two major freeways running through the township, I-75 and I-475. In general, the developed portion of the service area is single family residential in character with a limited amount of existing commercial and light industrial areas. Excerpts of the Grand Blanc Township Master Land Use Plan are provided in Appendix B. Currently, more than 99 percent of the residential dwellings are served by a public sewer system. The remaining 0.7 percent of residential dwellings generally consist of scattered areas of development and rural areas served by existing septic systems.

   For this plan, it has been assumed that the projected land use for the existing undeveloped areas will be in accordance with the Grand Blanc Township Master Land Use Plan. Sewage quantities from future land development will be generated on the same ratio of residential, commercial and industrial levels presently observed, but without an inflow component. However, the infiltration component will be at or below the US EPA and MDEQ acceptable guidelines (200 gallons per inch mile per day).

3. Surface and Ground Waters

   The township has a variety of surface water features that are shown in Exhibit 1. County drains, as characterized by their name, are used to drain excess water from the open land for agricultural purposes. The surface water features of the township have no known uses or points where water is drawn for drinking, agricultural, or industrial uses. Grand Blanc Township, including the project area, receives its municipal water from Genesee County, via the City of Flint, which ultimately receives their water supply from the City of Detroit via a supply line from Lake Huron. In areas where public water is not available, on site private wells provide water for residential homes and businesses. Exhibit 5 (page following Exhibit 4) shows the Grand Blanc Township Water Supply System.

B. Economic Characteristics

According to the U.S. Census the 2007 median household income for Grand Blanc Township is $62,131. In analyzing the 2000 Census, the 2004 Grand Blanc Township Master Land Use Plan indicates that “the unemployment level for Grand Blanc Township was 2.4 percent, this is lower than the reported 4.5 percent unemployment rate for the Genesee County as a whole. The Census also reports that 2.6 percent of Grand Blanc Township families were living below the poverty line.” It is important to note that recent trends in national and state economies may have increased the unemployment rates both in the township and in the County since the 2000 Census.

The land in the project area is a combination of open space, agricultural land, and single-family residential homes with a limited amount of existing commercial and light industrial areas scattered throughout the project area. The primary employers include the auto industry with their supporting suppliers and the medical field. In general, the project

plan area will see an increase in population. The project plan has been programmed to handle customers with failed septic systems and additional flows due to population increases within the project area through build-out of the township.

Grand Blanc Township is a community that has experienced large amounts of growth in years past and is about 50 percent of the way to build out. The 2004 Maser Land Use Plan indicates that the population increased 55.1 % from 1970 – 2000. Economic characteristics of Southeast Michigan continue to affect the housing market, and development in 2008 has declined considerably. Section a3 of the Master Land Use Plan, Population, Housing and Economy, is in included in Appendix E.

C. Existing Facilities

The GBTSSS is part of the Genesee County Sanitary Sewer System and is served by the ARTP. The collection system has approximately 240 miles of sewer pipe ranging in size from 3-inch force main to 33-inch gravity sewers in diameter. There are also 13 pump stations serving the collection system. Much of the interceptor system was constructed in drainage easements, low-lying areas subject to flooding during significant rain events. River and creek crossings are also frequent.

1. Service Areas

   The existing GBTSSS Service Area is shown on Exhibit 1 in the Executive Summary of the report. The City of Grand Blanc has its own collection system which discharges to the county system through Grand Blanc Township. The 35 square mile planning area for the GBTSSS is served by a number of subtrunks which provide a sanitary sewer connection point for the majority of the service area. Only sections 34 and 35 are currently without easily accessible sanitary sewers. The Grand Blanc Township Sanitary Sewer Master Plan includes sewers for Sections 34 and 35.

2. Sewers

   The majority of the Grand Blanc Township sewer system has been constructed in the last 40 years, and consists of reinforced concrete pipe, vitrified clay pipe, and polyvinyl chloride pipe. The existing sewer system is in relatively good condition, with a few problems related to the under capacity of sewer lines and I&I problems. The current problems are detailed in the following section. Wet weather flows do exceed firm pumping and system storage capacities during significantly large rainfall and/or snow melt events. Exhibit 6 on the next page shows the areas of the GBTSSS that have exhibited surcharge conditions.

3. Pump Stations

   The pump stations in Grand Blanc Township are located at various locations throughout the township and are shown in Exhibit 1. There are two primary pump station configurations for Grand Blanc pump stations:

1. Prefabricated 'can' type pump station that house centrifugal pumps at the base of a dry pit, drawing from a wet pit with SCADA system located at ground level.
2. Submersible system type pump stations that have submersible pumps in a wet pit with electrical control and SCADA system located at ground level.

Firm capacity of the GBTSSS pump stations range from 72 gallons per minute (GPM) to 2000 GPM and are shown below. Pump Station locations are shown in Exhibit 1.

Table II-1 Grand Blanc Township Pump Stations

Pump Station	Design Flow CFS Firm Capacity	Design Flow GPM Firm Capacity
Baldwin & Gainey	0.3	135
Baldwin Road	0.28	126
Dungarvin	1.28	574
Gainey Road	0.39	175
Grand View Lakes 1	0.29	130
Grand View Lakes 2	0.22	99
Holly Road	0.22	99
Heatherwood	0.51	229
McCandlish Road	1.28	574
Saginaw Street	0.16	72
Wakefield Woods	0.38	171
Stockbridge Commons	1.28	574
Woodfield	4.46	2002

4. System Maintenance

Grand Blanc Township has state-of-the-art SCADA system that monitors all of the pump stations in Grand Blanc Township and pages the on-call person in the event of any problems. In addition, the township maintains an infrastructure maintenance program that tracks work orders, repairs, etc. for all water and sewer infrastructure. As part of the S2 grant, an Advanced Asset Management System is being implemented for the township.

Grand Blanc Township Department of Public Works is proactive in sanitary sewer maintenance and has made diligent efforts to remove I&I from the sanitary sewer system. The township has inspected all manholes, televised, and repaired all of the lateral sewers in the township in the last six years. The township preventative

maintenance program is a 5-year clean, televise, and repair cycle that sees the entire township sanitary sewer lateral system cleaned, televised, and repaired on a rotating basis. The township has expended over 3.5 million dollars over the last six years on this program. The township physically inspected all manholes on the subtrunk system and televised the Slack Lake Subtrunk. The remaining subtrunks have not been televised primarily due to access issues. The subtrunks that have not been televised are shown on the Subtrunks Not Televised Map in Section 1 (Exhibit 2).

5. Wastewater Treatment Plant

   GCDC-WWS owns and operates the Anthony Ragnone Treatment Facility (ARTP). The ARTP facility is located on the corner of McKinley and Farrand Roads northeast of the City of Montrose in Montrose Township. ARTP serves the major portion of Genesee County including Grand Blanc Township.

   Sewage flows to ARTP are pumped by the Brent Run Pumping Station (Brent Run) located just south of the plant. Brent Run has a total firm pumping capacity of 110 million gallons per day (MGD).

   All flow from Brent Run flows through the primary settling tanks. The flow then proceeds through the secondary treatment system, which consists of four aerated activated sludge basins and eight final clarifiers. After secondary treatment, the flow is disinfected with chlorine and dechlorinated with sulfur dioxide prior to discharge to the Flint River.

   The secondary treatment system has a design flow of 25.9 MGD with a maximum process and hydraulic capacity flow of 40 MGD. Excess flow from the primary tanks is routed to two equalization tanks and later returned to the primary tank for treatment when the excess flow subsides. During prolonged wet weather events, flows that can receive primary treatment but cannot receive secondary treatment are then routed to the wet weather basin via the two equalization tanks and are chlorinated for disinfection, dechlorinated and then combined into the final plant effluent before being discharged to the Flint River.

6. Illicit Connections

   Prior to 1980, it was common for developers to connect residential footing drains and sump pumps to the sanitary sewer. In the early 1980's GCDC-WWS and Grand Blanc Township passed ordinances banning the connection of footing drains and sump pumps to the sanitary sewer system. However, many of the residences constructed prior to the passage of the ordinance continue to have their footing drains and sump pumps connected to the system. These illicit connections contribute significant clear water to the sanitary sewer system during wet weather events.

D. Need for the Project

1. Compliance Status

   The GBTSSS has no outstanding compliance issues, however, the GBTSSS did have sanitary sewer overflows (SSO's) during peak wet weather events in 1999 and 2000 and many flooded basements. Following the 1999-2000 wet weather events, the township embarked on an aggressive I&I removal program that is described in more detail in Section C.4. During the project plan period (2007 – 2008) there have been several wet weather events that resulted in system surcharges and flooded basements but no known SSO's. Exhibit 6 shows the surcharge areas.

2. Orders

   There are no known orders outstanding against the GBTSSS Service Area.

3. Projected Needs for the Next 20 Years

   The 2004 Grand Blanc Township Sanitary Sewer Master Plan included a CIP outlining the necessary capital projects for the next 20 years and through build-out of the township. The CIP was updated in 2008-2009 and both CIPs are included in Appendix A. A portion of this plan noted as I&I Removal Projects recommends a series of clean water removal projects that will provide significant benefits in preventing future SSO's, sanitary sewer surcharging, and flooded basements.

   A comprehensive sanitary sewer model was developed using MWHSoft's InfoSewer product and Grand Blanc Township's ArcInfo GIS software. Wet weather flow projections were made for existing areas from flow monitoring data accumulated during the project planning period. Exhibit 3 shows the flow monitoring sites that were evaluated during the project planning period. It should be noted that all flow projections are based on the Genesee County requirement that there will be no net increase in I&I as a result of new construction or system deterioration. This "no net increase in I&I" is critical to the overall concept of design flows for the Grand Blanc Township CIP. Only existing areas are recognized as having an I&I related contribution to the total projected flows.

   The future flow projections are based on three key growth elements:

   1. Population growth within the existing Grand Blanc Township service area.
   2. The connection of all existing septic systems to the Grand Blanc Township sewer system and no future septic systems allowed in the township.
   3. Extension of sewer service to all areas of Grand Blanc Township with projected flows based on the current Grand Blanc Township Master Land Use Plan.

   Population growth was projected to Year 2030 based on 2000, mid-decade 2005 figures, and recent projected growth rates. The overall service area population growth is expected to be approximately 37 % by 2030. It is assumed that all of the projected population growth in the service area would be connected to the sewer system based

on Genesee County Design residential equivalency unit (REU) of 90 gallons per capita and 3.5 persons per REU for 315 GPD/REU. This REU is then extrapolated for application to nonresidential uses that connect to the system.

4. Connection of Existing Septic Systems

   The abandonment of existing septic systems and subsequent connection to the GBTSSS will occur as service is extended to new areas of the township. The Genesee County Health Department's septic system database was established in 1988, and does not have available information on septic systems installed before 1988. Examination of Grand Blanc Township records indicates that there are 94 septic systems currently in the township.

5. Industrial and Institutional Contribution

   The major industrial and institutional users are listed below with their annual flow contribution to the system. The top 25 users in the system regardless of type are listed in Appendix C.

Table II-2 Major Industrial and Institutional Sanitary Sewer System Users

Name	Type	Address	Annual Flow CF
Genesys	Institutional	3303 Baldwin Road	6,731,000
Grand Blanc Processing	Industrial	10151 Gainey Drive	4,420,000
General Motors Metal	Industrial	10800 Saginaw St	2,919,100
Genesys Med Sports	Institutional	801 Health Park Drive	799,500
General Motors Parts	Industrial	6200 Grand Pointe	627,000

6. Contributions from Outside Sources

   a) Atlas Township

      Atlas Township currently contributes less than 0.3 MGD to the GCDC-WWS sewer system via GBTSSS. In addition, there are some individual residence leads that are connected to Vassar Road sewer lines. The basis of design for the District 6&11 Interceptor Replacement Project includes provisions for the connection of all Atlas Township parcels fronting on Vassar Road. The projected average dry weather flow (ADWF) contribution for Atlas Township is projected to be 0.5 MGD.

   b) Holly Township, Oakland County

      A small portion of Woodfield Subdivision in Holly Township (Exhibit 1) is served by the GBTSSS. The projected flow from this area is projected to be 60 GPM. Any future sanitary sewer systems in Oakland County that connect to GCDC-WWS system are anticipated to be routed to the proposed Kearsley Creek Interceptor (KCI) extension of NEES Interceptor, some of which may enter the KCI from the vicinity of the existing Grand Blanc Township Vassar Road pump

station, while the majority will be conveyed to the southeast corner of Genesee County at the border of Oakland County. Grand Blanc Township's Vassar Road pump station may be rerouted to the KCI at some point.

7. Total Future Flow

   The current Grand Blanc Township average daily flow is approximately 7.0 MGD Due to population growth, future connection of existing septic systems, and service to areas not presently served, total flows into the GBTSSS will increase by up to 2.6 MGD for ADWF by 2030 to a total of 9.6 MGD.

   The REU flow rate of 315 gpd/REU used in this report is the GCDC-WWS standard used for establishing one unit of wastewater. The 1997 ARTP report provided the following analysis with respect to the standard: "The unit flow rate of 315 gpd per unit has been calculated using 90 gallons per capita per day (gpcd) and 3.5 capita per unit per the GCDC standard practice. It is assumed by the GCDC, and therefore Grand Blanc Township, that each dwelling is equivalent to one sewer unit."

   Within the potential service area there are 94 onsite existing septic systems in use today. The County Health Department does not have an accurate count of failing septic systems in the area. Septic tank systems fail due to poor construction, age and flat/wet/poor soils. As septic systems fail, the proposed new onsite septic concept is a pump/mound system. These pump/mound systems are expensive and costly to maintain. It is expected that connecting to a sanitary sewer system will be more cost effective versus a new pump/mound septic system.

8. Future Environment without the Proposed Project

   Without construction of the Sump Pump and Footing Drain Disconnection Program, many short and long term environmental concerns will develop. The sanitary sewer system will continue to experience surcharges, flooded basements, and sewer overflows to receiving streams. In addition, GCDC-WWS is implementing a series of fines and penalties for wet weather flows that exceed two times the annual average dry weather day. These penalties and fines increase with the severity of the wet weather impacts. At the writing of this document the fine and penalty system has not been completely implemented. However, the rate structure is in place and is included in Appendix D. MDEQ Sanitary Sewer Overflow Policy is included in Appendix G.

E. Population Data

   Over the last decade, Grand Blanc Township has experienced a steady population increase. During the project planning period this growth has slowed considerably due to economic conditions. The Grand Blanc Master Land Use Plan provided much of the population data and projections for this report. The population projections provided by the Grand Blanc Master Land Use Plan cover 1970 to2000. The township's 2005 mid-decade census showed a population of 35,015. Further linear extrapolation was made to estimate the population to reach 45,000 by 2030. These reports indicate a steady increase in the number of people that will require services from GBTSSS. Generally, the area

with the most growth over the next several years is the southern portion of the township. Additional population data from the Master Land Use Plan is included in Appendix E.

F. Environmental Setting

1. Cultural Resources

   There are no known historical or archaeological sites in any of the project areas.

2. Natural Environment

   a) Climate

   Grand Blanc Township is located in the southeastern portion of Michigan, where the lake effect is not as great as it is in most other sections of the state. The main lake effect noticed in Genesee County is increased cloudiness late in fall and early in winter, when the prevailing wind moves cold air across the warmer lake water. About 5 to 10% more sunshine falls on Genesee County than on a similar area in western Michigan.

   Available weather data for Flint, located in the center of the county, shows that precipitation is heaviest during the growing season and it averages about 64% of the annual total during the 6-month period from April through September.

   Snowfall averages 40.5 inches per year but varies considerably from year to year. Cloudiness is greatest late in fall and early in winter and least late in spring and in summer. Records at Flint show that December has an average of 22 cloudy days, seven partly cloudy days, and seven clear days. July has an average of 10 cloudy days, 13 partly cloudy days, and eight clear days.

   The climate in Genesee County should have very little impact on the overall project. The major portion of this project is the construction of storm sewers, sump pumps, discharge pipes and disconnection of footing drains. This can take place almost all year round.

   b) Air Quality

   The installation of the storm sewer pipe and the removal sump and footing drain connections from sanitary sewers as part of the overall project, will require the short term use of construction machinery such as trenchers and backhoes, and some minor electrical work. This machinery will require the use of gasoline and diesel fuel to operate, generating short-term emissions to the project area. It is anticipated that the contractor will install less than 250 feet of storm sewer a day, thus limiting the time and impact to local residents.

   Dust may be generated as part of the excavation process. This will be addressed in the Soil Erosion Sedimentation Control (SESC) plan to keep the amount of dust leaving the excavation site to a minimum.

c) Wetlands

The project alternatives do not cross regulated wetlands.

d) Coastal Zones

Not applicable. There are no coastal zones within the project limits.

e) Floodplains

It is not anticipated the project will cross any 100-year floodplain.

f) Natural or Wild and Scenic Rivers

Not applicable. There are no Natural or Wild and Scenic Rivers within the project limits.

g) Major Surface Waters

Not Applicable. The project will not cross any Major Surface Waters.

h) Recreational Facilities

Not applicable. The project will not cross through any recreational areas.

i) Topography

The landscape of Grand Blanc can be characterized as relatively flat to gently rolling. Generally, the region slopes from the southeast down to the northwest. The highest elevation in the township is on the southern portion and rises 1,010 feet above sea level. The lowest elevation is in the township and is 770 feet above sea level.

j) Soils

Soil types will not impact the construction of the proposed projects.

k) Agricultural Resources

The proposed projects are located in residential areas. Upon restoration, the topsoil will be re-spread over the constructed area.

l) Existing Plant/Animal Communities

Wildlife-There are various types of wildlife that inhabit Grand Blanc Township and the project area. Fur and game mammals can be found in the area including raccoon, weasel, otter, skunk, red fox, woodchuck, squirrel, porcupine, cottontail rabbit, turkey, and whitetail deer. Area lakes and streams contain a variety of fish, amphibians and reptiles. During the summer months, many types of birds can be found in the area. Some of these varieties include the mallard, black and wood ducks, blue-winged teal, the sora, wilson snipe, ruffled grouse, prairie chicken, blue bobtail quail, ring-necked pheasant, mourning dove, various kinds of woodpeckers, blue jay, chickadee, wood thrash, cardinal, robin, and bluebird.

Vegetation-The project will be primarily routed adjacent to roads and within public right-of-way.

m) Unique Features

There are no unique features within the project boundary.

III. Analysis of Alternatives

A. Identification of Potential Alternatives

1. No Action -Alternative A

Alternative A is listed as the baseline or reference alternative only. Because of the nature of population growth, need to serve the community and environmental concerns, Alternative A will not be evaluated in any depth. I&I is currently impacting the sanitary sewer system and, unaddressed, will continue to cause SSO's, system surcharging and flooded basements. The consequence of no action is not acceptable on any basis, monetarily, environmentally, politically or from a health, safety, and service prospective. Therefore, Alternative A will not be considered further.

2. Optimum Performance of Existing Facilities -Alternative B

The existing primary system consists of interceptors and pump stations starting in the southeast portion of Grand Blanc Township and generally flowing to the north and west into the GCDC-WWS system. The project plan CIP indicates a number of system improvements that will optimize the system over the course of township build-out. Pump stations, interceptors, and force mains may need upgrading to handle the future flows. The numerous lateral sewers are considered to be adequate or beyond the intent of this project plan.

Optimizing the existing system to allow for future flows, connections and service areas will require upgrading pump stations, installing retention facilities, upgrading force mains, installing relief sewers or a combination of these activities.

A review of the options for handling current and existing flow indicates that the most feasible alternative is to construct regional retention basins on selected interceptors and at some pump stations. These basins need to be sized to retain the excess flow that cannot be handled by the sanitary sewer system and later pump the stored wastewater back to the system during lower flow conditions. This would entail a series of covered and enclosed basins in the system at key locations. These basins would be located in residential or developed areas. Consequently, the storage facilities will require property acquisition, complete enclosure, odor control, and flushing in order to be acceptable with the local residents where they are located.

The required retention volumes were calculated by using the Peak Wet Weather Flows (PWWF) greater than the system's capacity. The PWWF's are based on a storm of 25-year return frequency and a duration of 24 hours as required by MDEQ. See Appendix G for the MDEQ Policy. This is the same design rain event that was used in the 2004 Master Plan (3.6 inches over 24 hours). The hydraulic model used was MWHSoft's InfoSewer, a GIS based modeling package that resides on an ESRI

ARCGIS platform. This combination provides hydraulic modeling with the added benefits of the township's extensive GIS database. The overflow volumes were determined by modeling the required retention volume to eliminate bypassing or overflow in the township. The required retention volume for each of the basins is provided in Exhibit 7 on the next page.

Costs were determined by multiplying retention basin volumes as calculated, from Exhibit 7, by a representative unit cost. The representative unit cost was determined by using previous construction costs for typical covered wet weather retention basin project. Retention basin cost for Alternative B is addressed in Section 3.B.1. Total project cost is anticipated to be $49,000,000.

3. Sump Pump and Footing Drain Removal Projects -Alternative C

   Prior to 1980 it was common for developers to connect either the structure footing drains or sump pump to the sanitary sewer. Grand Blanc Township pre-1980 subdivisions (Exhibit 8) shows the subdivisions constructed prior to 1980. The pre-1980 subdivisions contain 5,885 homes and it is anticipated that approximately one-half of these homes have footing drains or sump pumps connected to the sanitary sewer.

   In the course of preparing the project plan and with the assistance of an S2 Grant from MDEQ, the township installed 36 flow meters in various parts of the township to evaluate the impact of clean water sources in the sanitary sewer system. The flow data indicates that in certain wet weather events there is significant I&I in the system. Appendix H contains an overview of the flow data at each of the meter sites. The complete data set for each meter will be available on CD in the final report.

   Since 2002, Grand Blanc Township has televised 100 percent of the lateral sewers in the township and repaired 95 percent of the I&I sources that were found. The remaining five percent are scheduled to be repaired in 2008-2009. In addition, the township televised the Slack Lake Interceptor and made repairs to all I&I issues that were found. The township spent approximately $3,500,000 in this effort. The township and ROWE Professional Services Company have physically inspected every manhole under the jurisdiction of the township and made all necessary repairs to the manholes.

   Despite the efforts outlined above, flow monitoring continues to show excessive I&I in many areas causing system surcharging, flooded basements, and sanitary sewer overflows. The sources of this I&I can be attributed primarily to two areas: illicit sump pump and footing drain connections, and subtrunks that have not been televised.

   The anticipated cost to disconnect these homes is $10,828,400. Alternate C would be the first segment of this disconnect program. The total Alternate C project cost is $3,680,000.

4. Subtrunk Rehabilitation

   Exhibit 2 shows the subtrunks that the township has not televised and repaired. The subtrunks total 130,000 linear feet of 15" to 33" sanitary sewer. The difficulty in televising and repairing these subtrunks is due to access issues. In many cases, the subtrunk easement is overgrown with trees and brush, in some cases buildings have been constructed in the proximity of the easement. In order to access these sewers, easements would have to be cleared and sufficient road constructed to allow television truck access. The total project cost for Alternate D is $18,289,400.

B. Analysis of Principal Alternatives

1. Monetary Evaluation

   a) Alternative A-No Action

      This alternative was ruled out as non-viable because of the environmental and economic consequences.

   b) Alternative B Optimum Performance of Existing Facilities

      Estimated project cost is $49,000,000.

      Specific retention methods include underground storage tunnels, in-receiving storage, and retention basins. The most commonly used retention basin is the off-line retention basin. Off-line retention basins are connected in parallel to the combined sewer and receive flows only during wet weather periods. In off-line facilities, flows are regulated by limiting the amount of flow that is diverted to the retention basin. The side-stream flow is regulated by a device located downstream of the diversion or at the basin outlet.

      Based on the results of the InfoSewer modeling, 10 off-line retention basins will be located at various sites within Grand Blanc Township with storage volumes ranging in size from 1,000,000 gallons to 4,000,000 gallons as shown in Exhibit 9 on the next page. The retention basin will consist of two compartments with the first compartment acting as a "First Flush" compartment.

      Covered basins are subject to extreme conditions, including high humidity, corrosive gases, and sludge deposits. In order to remove sediment from the bottom of the basins, tipping buckets will be constructed. A tipping bucket is a cylindrical vessel that is placed above the maximum water level on the back of the retention basin. The vessel fills with water up to a pre-determined depth, and then the vessel rotates on a center axis, spilling the water into the basin and creating a flushing wave.

      Remote-controlled sluice gates will provide direct control of the retention basin outlet flow. These outlets will consist of a flow-monitoring system which will actuate the sluice gates by electrical controls along with a data processing and control unit.

The project cost is based on costs developed in the 2004 Genesee County SRF Project Plan. "Retention basin cost represents actual costs of a five million gallon off-line CSO basin storage constructed in 1996 for the City of Nashville, Tennessee. The construction cost for this facility was $14,900,000 with a total project cost of $19,700,000. The project cost includes legal fees, bonding, construction inspection, engineering, and a 4% contingency. Adjusting the total project costs based upon the Construction Price Index (CPI) from 1996 through 2004, equates to a total project cost of $24,600,000 or approximately $4.90/ gallon. As a means for verifying this information, additional CSO Basin costs were obtained from Detroit Water and Sewerage Department (DWSD). It was revealed that that $4.90 per gallon was indeed a reasonable value for providing budgetary project costs estimates for retention basins."

Alternative B is expensive from a capital, operation, maintenance, and replacement aspect and will continue to have vulnerabilities and be an SSO risk scenario. Alternate B will also require a substantial land purchase to allow construction of the detention basins. The land can be obtained at a high price, and generally in developed areas.

c) Alternative C-Sump Pump and Footing Drain Removal

Estimated total project cost is $10,828,400. Segment 1 SRF/SWQIF project cost is estimated at $3,680,000.

Grand Blanc Township is primarily a bedroom community with some commercial development and minimal industry. The residential developments that were constructed prior to 1980 may have substandard storm water collection facilities and in many cases the footing drains and/or sump pumps are connected to the sanitary sewer. Sixty five subdivisions, totaling 5885 homes, have been identified as being constructed prior to 1980. A survey was mailed to each home to determine the probable extent of illicit connections to the sanitary sewer system and the analysis extrapolated to develop project costs. It is estimated that 50% of the homes in these pre-1980 subdivisions are connected to the sanitary sewer system.

The cost to remove these footing drains and sump pumps can vary widely depending on a variety of factors but, is estimated to be in the range of $2000 to $7000 per household. Similar work in Ann Arbor, Michigan and Davison, Michigan has exhibited average costs of $5,000 for the disconnection of footing drains, installation of sump crock and pump, minor electrical work and construction of a discharge pipe. Due to the project costs and implementation issues associated with this type of work, the project has been outlined in three phases. The first phase has been targeted for SWQIF funding. Exhibit 10 shows the projected cost for the total project and Phase 1.

d) Alternative D-Subtrunk Rehabilitation Program

Estimated project cost is $18,289,400.

Grand Blanc Township operates and maintains an extensive system of subtrunks, pump stations and lateral sewers. As previously discussed, the vast majority of the laterals have been televised, inspected and repaired. Of the eight subtrunks (Exhibit 3) in the township, the Slack Lake Interceptor has been completely rehabilitated. The remaining subtrunks were constructed in the late 1960s and early 1970s and are due for rehabilitation efforts. The subtrunk rehabilitation project is estimated to cost $18,289,400. Exhibit 11, following Exhibit 10, outlines the anticipated cost associated with these rehabilitation efforts.

Alternate B is expensive and will require significant intrusion into overgrown easements, construction of minor roadways and does not appear to have significant cost benefit until sump pumps and footing drains are removed from the system.

2. Environmental Evaluation

Alternative A, No Action is unacceptable as it provides no relief for the SSO's, system surcharging, and flooded basements that have occurred in certain wet weather events and this is unacceptable to Grand Blanc Township and its residents.

Alternate B will require the use of odor control and other mechanical features to minimize any environmental issues in a populated area. Alternative B would have a high environmental impact probability.

Alternate C, sump pump and footing drain disconnection program, by far, has the least cost to construct and maintain and should help eliminate future SSO's. It also is the most environmentally friendly.

Alternate D, subtrunk rehabilitation will require extensive clearing of easements, many of which are along county drains, causing extensive soil erosion control issues.

3. Implementability and Public Participation

The GBTSSS has been involved in the construction of water and wastewater projects since the late 1960s. We have the consultants, background, and institutional knowledge to implement, design and construct the proposed Alternate C.

4. Technical and Other Considerations

a) Inflow and Infiltration Removal

GBTSSS has undertaken a comprehensive effort to reduce I&I for the GBTSSS service area to assure adequate sanitary sewerage collection and disposal services throughout the township.

Two basic approaches to managing I&I exist; removal, and transport and treatment GBTSSS has been actively working at removal since 2001. Transport and treatment requires construction of interceptor sewers, pump station, and wet weather facilities at key points in the system and is discouraged by GCDC-WWS, the owner and operator of the ARTP.

Appendix H includes an overview of the meter data evaluated during the planning period including the peaking factors found at temporary flow metering sites throughout the service area. Analysis of the meter data indicates wet weather flow patterns consistent with systems that have a portion of the sump pumps and footing drains connected to the system.

The conclusions from the project planning I&I report include:

1. There is I&I within the system and evidenced at all metering points.
2. Primary cause of remaining I&I is most likely illicit sump pump and footing drain connections.
3. Secondary cause of remaining I&I is subtrunks that need rehabilitation.
4. I&I exists throughout the system, but is more evident in older portions of the system.
5. Two management solutions are possible, removal or storage and transport.

b) Regional Considerations

As a member of the GCDC-WWS sanitary sewer system GBTSSS must work with all parties to effectively implement an I&I program that works not only on a local basis but regionally as well. The following summarizes GCDC-WWS I&I policy as stated in their SRF Project Plan dated July 2004.

1. Maintain the current "No net increase" policy for I&I.
   This policy recognizes the existence of I&I within the system. It provides an incentive for local municipalities to remove extraneous flow. It allows local municipalities to decide for themselves the most effective way to achieve I&I removal.

2. Implement the Long-Range Facility Plan for relief and wet weather facilities.
   This plan recommends construction of the Northeast Relief Sewer, the West Trunk Relief Sewer and additional wet weather storage facilities at the Brent Run pump station. These facilities are needed to assure adequate transport and treatment of PWWF.

3. Provide close inspection of all new facilities to minimize possible I&I.
   This effort may include inspector training to recognize illicit connections, awareness training for both contractors and inspectors to increase their understanding of the problem and need for I&I control, and as-built certification to assure work meets construction standards.

4. Increase flow monitoring to support the policy of no net increase in I&I as the system grows.
   Adequate flow monitoring is necessary to assure compliance with the existing policy. Currently, only spot checks on the system have been performed. Local municipalities may choose to perform SSES work to help effectively target maintenance efforts. Without awareness of a problem, maintenance cannot be targeted to areas of extraneous flow.

5. Increase maintenance efforts to remove inflow at the county and local levels.
   With increased flow monitoring, maintenance can be directed to identified areas of high inflow. Since inflow is often the easiest component of extraneous flow to identify and remove, constant vigilance in this area should be cost effective.

6. Refine the existing hydraulic model of the ARTP system.
   Coordination of additional metering and refinement of the model calibration will assist in identifying areas where hydraulic bottlenecks, sewer overflows, and potential basement flooding may occur. The model should be updated to include the actual design of new facilities such as the Northeast Relief Sewer.

7. Establish an inspection at time of property transfer to verify sump pump discharge is not connected to the sanitary sewer. This effort emphasizes the need for constant vigilance. It should include a public education effort to inform property owners and realtors of the need for this inflow control strategy, and clear written procedures and assignment of responsibilities in the inspection process. This inspection may be combined with cross connection control efforts and other ordinance and building code enforcement.

8. Encourage local municipalities to enact engineering and site plan ordinances requiring a viable means of disposal for sump pump discharges.
   This effort will help to keep sump pump discharges from new development from being replumbed into the sanitary sewer. Connection of the sump discharge directly to a storm sewer is the most effective means of disposal.

9. Discuss equity issues, transport and treatment charges, rate surcharges for extraneous flow, system wide flow monitoring, and flow limits for extraneous flow entering the county collection system at rates exceeding existing conditions within the existing Water and Sewer Subcommittee.

Consensus building, cooperation between all parties, and vigilance are required to make the existing GCDC-WWS I&I policy work. The experiences of each community should be shared as part of a process to efficiently move forward with I&I removal and control.

c) Sludge and Residuals

The existing collection and conveyance system does not have a residual or sludge quantity of significance to be addressed. No significant additional sludge or residuals problem would be caused by any of the proposed alternatives. Alternative B solids would be flushed back into the system for eventual handling at the downstream facilities and ultimately treated at the ARTP facility.

Residuals from the ARTP are well managed in accordance with the GCDC-WWS residuals management program.

d) Industrial Pretreatment

Industrial Pretreatment Program is performed by GCDC-WWS.

e) Growth Capacity

Not Applicable.

f) Unsewered Areas

GBTSSS records indicate that over 99 percent of the residential dwellings are served by a public sewer system. The remaining one percent of residential dwellings generally consists of scattered areas of development and rural agricultural development which are presently served by septic systems.

IV. Selected Alternative

A. General Description

Alternative C – Sump Pump and Footing Drain Removal Program is the selected alternative.

The program will focus on pre-1980 subdivisions as shown in Exhibit 8. Subdivisions will be prioritized to facilitate work flow and cost control.

The program will consist of township staff or Engineering Consultant along with a contractor(s) inspecting basements to determine if sump pumps or footing drains are connected to the sanitary sewer. Then designing a system to disconnect the illicit connection and reconnect to a suitable outlet. Each home in the prioritized subdivisions will be evaluated to determine what will be necessary to disconnect sump pump and/or footing drains from the township's sanitary sewer system.

Footing Drain Connection – Will require disconnection of the footing drain from the sanitary sewer. The construction of a crock in the basement, the installation of a sump pump in the crock, installation of appropriate electrical service for the sump pump, along

with the installation of sump pump lead to the roadside ditch, roadside storm sewer, county drain or other approved outlet. The contractor will be required to restore the home and yard to its preconstruction condition. Estimated cost is $5,000 per installation.

Sump Pump Connection – Will require the disconnection of the sump pump discharge from the sanitary sewer. The sump pump discharge line will be rerouted to the roadside ditch, roadside storm sewer, county drain or other approved outlet. The contractor will be required to restore the home and yard to its preconstruction condition. Estimated cost is $1,000 per installation.

If it is determined that the sump pump and/or footing drains are not connected to the sanitary sewer no action will be required.

B. Total Project Cost Estimate

Sump Pump and Footing Drain Removal Program Segment 1 is anticipated to cost $3,680,000 for inspection, design, construction and restoration.

C. Project Budget

Footing Drain/Sump Pump Disconnect Project
Grand Blanc Township Pre 1980 Subs

Total Homes to be Inspected	5885
Estimated Homes with Footing Drains or Sumps Connected	2942

		Cost/Home	Cost/Category	Total Project Cost
Estimated Sumps connected to SS @ 25%	1471	$1,000.00	$1,471,250.00	
Estimated Footing Drains connected to SS @ 25%	1471	$5,000.00	$7,356,250.00	$8,827,500.00
Inspection @ $100 per Residence				$588,500.00
Design @ 6% of project cost				$529,650.00
Construction Engineering @ 10%				$882,750.00
Total Project Cost				**$10,828,400.00**

Segment I Cost Estimate - 2009 SWQIF Project

Total Homes Inspected	2000

		Cost/Home	Cost/Category	Total Project Cost
Estimated Sumps connected to SS @ 25%	500	$1,000.00	$500,000.00	
Estimated Footing Drains connected to SS @ 25%	500	$5,000.00	$2,500,000.00	$3,000,000.00
Estimated Homes not connected @ 50%	1000			
Inspection @ $100 per Residence				$200,000.00
Design @ 6% of project cost				$180,000.00
Construction Administration and Engineering @ 10%				$300,000.00
Total Project Cost				**$3,680,000.00**

Segment II Cost Estimate			Total Homes Inspected	2000
		Cost/Home	Cost/Category	Total Project Cost
Estimated Sumps connected to SS @ 25%	500	$1,000.00	$500,000.00	
Estimated Footing Drains connected to SS @ 25%	500	$5,000.00	$2,500,000.00	$3,000,000.00
Estimated Homes not connected @ 50%	1000			
Inspection @ $100 per Residence				$200,000.00
Design @ 6% of project cost				$180,000.00
Construction Engineering @ 10%				$300,000.00
Total Project Cost				**$3,680,000.00**

Segment III Cost Estimate			Total Homes Inspected	1885
		Cost/Home	Cost/Category	Total Project Cost
Estimated Sumps connected to SS @ 25%	471	$1,000.00	$471,250.00	
Estimated Footing Drains connected to SS @ 25%	471	$5,000.00	$2,356,250.00	**$2,827,500.00**
Estimated Homes not connected @ 50%	943			
Inspection @ $100 per Residence				$188,500.00
Design @ 6% of project cost				$169,650.00
Construction Engineering @ 10%				$282,750.00
Total Project Cost				**$3,468,400.00**

D. Authority to Implement the Selected Alternative

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E. User Cost Analysis

Grand Blanc Township SRF 2009 Financial Analysis of Selected Alternative
Selected Alternative C Segment I project cost is estimated at $3,680,000.

SWQIF Low Interest Loan
Scheduled length of loan is 20 years

Initial Capital Cost of Improvements	$3,680,000.00
Annualized cost of Improvements at 2.5% APR	$236,061.43

Conventional Municipal Bond
Scheduled length of loan is 20 years

Initial Capital Cost of Improvements	$3,680,000.00
Annualized cost of Improvements at 5.0% APR	$295,292.72
Annualized difference in interest	$59231.29
Life of loan difference in interest	$1,184,625.75

User Rate Analysis

Total number of Residential Equivalent Units (REU)	21,120
Annualized Project Cost per REU	$11.18
Monthly Project Cost per REU	$1.17
2009 Budget – Existing User Capital Improvements	$340,000
Annualize Revenue per REU	$16.10
Monthly Revenue per REU	$1.34
Current Sanitary Sewer Rate	$8.00/Month/REU

F. Sanitary Sewer Rate Impact

No sanitary sewer rate increase is anticipated to fund this project. It is anticipated that 75% of project cost will be paid for from the Existing User Capital Improvements line item in the annual operating budget and 25% of the project cost will be paid from the Capital Improvement Fund Reserves. The Existing User Capital Improvement line item has been earmarked for the removal of I&I and will cover the associated cost of this project. Appendix F contains Project Costs, Amortization Schedule, Grand Blanc Township 2009 Operating Budget and Township Board meeting minutes approving budget.

G. Interest Rate Savings

Grand Blanc Township will be requesting MDEQ Low Interest Loan funding anticipated to be at 2.5% interest rate for 20 years. The difference in cost from traditional bonds at an estimated 5.0% interest rate for 20 years would be $1,184,625.75.

V. Environmental Impacts

A. General

The selected Alternate C offers the least environmental impact of the viable alternatives. Construction activities are the primary environmental concern and will be limited to 2-3 days per site therefore any impacts will be minimal and temporary in nature.

B. Water Quality Benefits

Water quality will be improved by the removal of clean water from the sanitary sewer system thereby lessening the chances of flooded basements and sanitary sewer overflows.

C. Construction Impacts

Construction impacts will be minimal and temporary in nature as each site should be completed in 2-3 days.

D. Operational Impacts

There are no direct operational impacts. Positive indirect impacts will be generated as footing drains and sump pumps are removed from the sanitary sewer system.

E. Impact on Flora and Fauna

The will be no adverse affects.

F. Human/Social/Economic Impacts

There are no adverse affects.

G. Historical or Archeological Impacts

There are no historical or archeological impacts due to the small construction foot print of the projects.

H. Air Impacts

There will be minimal air impacts related to dust during construction. Project specifications will include provisions for dust control by standard construction practices.

I. Electrical Consumption

Electrical consumption may be increased slightly by the installation of electrical sump pumps. However the environmental benefits of removing clean water from the sanitary sewer system outweigh the electrical impacts.

J. Flooding

The projects will have no impact on flooding.

K. Natural Setting

The projects will have no adverse impacts on natural setting.

L. Prime Agricultural Land

The projects will have no adverse impacts on prime agricultural land.

M. Wetlands

The projects will have no impact on wetlands.

N. Indirect Adverse Impacts

There are no expected adverse impacts from selected Alternative C.

O. Cumulative Impacts

There are no expected adverse impacts from selected Alternative C.

VI. Mitigation Issues

A. Short Term Impacts

All short term impacts of the selected alternative are directly related to construction activities. Construction noise will be controlled by restricting construction work to normal business hours Monday through Friday. The installation contractors will be prequalified by Grand Blanc Township for this type of work and will be required to

adhere to all State, and local requirement for soil erosion control. Project specifications will include provisions for dust control measures.

B. Long Term Impacts

There are no long term impacts that require mitigation for this project.

VII. Public Participation

A. Advertisement for Public Hearing and Affidavit

A Public Hearing Notice was published on February __, 2009 in the Grand Blanc View.

B. Public Meeting on Proposed Alternatives

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C. Public Meeting Transcript

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D. Adoption of Project Plan

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E. List of Local and State Agencies Receiving Written Notice of the Public Hearing

1. MDEQ Operating and Training Section
2. MDEQ District Office
3. Genesee County Drain Commissioner
4. Genesee County Drain Commissioner, Division of Water and Waste Services
5. Oakland County Drain Commissioner
6. Mundy Township
7. City of Burton
8. Atlas Township
9. Holly Township