



**Department of Environmental Quality
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness**

Completion Due Date November 30, 2018
(no later than 3 years from executed grant date)

The City of Manistee (*legal name of grantee*) certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1234-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to the Department of Environmental Quality or the public upon request by contacting:

Thad Taylor, City Manager
Name

at (231) 398-2801,
Phone Number

ttaylor@manisteemi.gov
Email


Signature of Authorized Representative (Original Signature Required)

11/26/2018

Date

Thad Taylor, City Manager

Print Name and Title of Authorized Representative

CITY OF MANISTEE
SAW Grant Project No. 1234-01

EXECUTIVE SUMMARY

Prepared by: SPICER GROUP, INC.
302 River Street
Manistee, MI 49660

Owner: CITY OF MANISTEE
70 Maple Street
Manistee, MI 49660
(231) 398-2801
Thad Taylor, City Manager

On November 5, 2015, the City of Manistee entered into an agreement with the Michigan Finance Authority for grant funds issued under Public Act No. 511 of 2012 for the *Stormwater, Asset Management, and Wastewater (SAW)* program. The City received the follow grants:

<i>Stormwater Asset Management Plan (SWAMP) – 75% Grant*</i>	<i>\$590,000</i>
Wastewater Asset Management Plan (SWAMP) – 100% Grant**	<u>\$1,315,000</u>
Eligible Cost Subtotal	\$1,905,000
LESS Local Match	<u>(\$147,500)</u>
Total Grant Amount	\$1,757,500

*25% match for grants over \$1,00,000

**Disadvantaged for Wastewater Asset Management Plan; no local match required

The Asset Management Plans (AMPs) needed to be completed within three years of the date of agreement; November 2018.

Each AMP has the following key components:

- Asset Inventory and Condition Assessment
- Level of Service Determination
- Critical Assets (Risk)
- Revenue Structure
- Capital Improvement Plan

Part 1: Asset Inventory and Condition Assessment

For the City’s storm water collection system, Spicer Group, Inc. completed LiDAR survey of the entire City. The survey information, in conjunction with City as-builts, was utilized to develop a comprehensive Geographic Information System (GIS) including all storm water assets (manholes, catch basins, stormwater outfalls, etc.). From the G/IS, as-built plans, pipe/manhole condition ratings, materials, year installed, inspection records, CCTV video inspections, ownership information etc. can be accessed. This information can also be queried to provide specific lists and maps and updated easily when future improvements are made.

The GIS information is located on a new computer in City Hall and is a detailed “smart” mapping system with databases. The City is employing ArcMap software from ESRI as the backbone of the GIS system. The City is currently operating with ArcGIS Online from ESRI to access the information online. In addition, the City has purchased asset management software from Lucity and will be incorporating the GIS information from ESRI. Lucity will maintain all existing asset inventory and condition assessment records and will allow future records to be added for subsequent inspections of the assets. This system can be accessed and updated in the in the office via computer, or the field by City staff with new iPads supplied as part of the SAW grant project.

The City owned, and operated storm water collection system consists of approximately 24 miles of mainline storm sewer, and 7 miles of catch basin leads. The storm sewers range in diameter size from 6”-66”. The City has approximately 2080 structures consisting of manholes and catch basins. There are approximately 45 stormwater outlets in the City. The City’s storm sewers discharge into Manistee Lake and Manistee River. Several of the City’s storm sewers discharge into sewer systems owned by MDOT along US-31 before discharging in Manistee Lake and Manistee River. Ultimate stormwater discharge is to Lake Michigan.

Every storm sewer pipe and structure owned and operated by the City could not be investigated/inventoried due to budget constraints within the SAW. Emphasis was placed on performing condition assessments for the mainline sewers and mainline manholes. Catch basin structures and their associated leads (pipes) will be evaluated in the future. The sewers which were investigated / inventoried are included in Table ES-1 below.

Plummer’s Environmental Services (PES), located in Byron Center, MI completed a cleaning and televising program of approximately 15% (3.5 miles) of the City owned storm sewer pipes. Spicer Group performed a comprehensive inspection for the City’s mainline stormwater manholes. The National Association of Sanitary Sewerage Companies (NASSCO) Manhole/Pipeline Assessment Certification Program (MACP/PACP) standards was used to identify and code defects and apply standardized grading/scoring to provide overall condition ratings of the stormwater assets. A summary table of the City’s existing storm sewer pipes and those sewers which were assessed in the SAW Grant is included on Table ES-1 below.

Table ES-1: City-Owned Storm Water Pipes by Diameter and Material

Diameter	Total Segments	Total Percentage	Total Length(ft)	Sewers Televised Number of Segments	Sewers Televised Percentage of Total Length by Diameter	Sewers Televised Length (ft)
6"	3	0.05%	52	0	0	0
8"	13	1.5%	1,894	1	15.6%	295
10"	7	1.4%	1,747	2	31.5%	550
12"	240	27.2%	34,077	14	10.0%	3,415
15"	98	15.2%	19,032	9	12.4%	2,364
18"	101	14.3%	17,905	13	15.5%	2,783
21"	6	1.3%	1,609	1	9.7%	155
24"	97	12.8%	15,963	14	20.7%	3,308
27"	1	0.3%	317	1	100%	317
30"	21	3.7%	4,709	7	41.6%	1,957
36"	42	7.3%	9,074	3	3.9%	357
42"	15	3.0%	3,751	1	9.4%	352
48"	40	7.9%	9,926	6	20%	1,985
54"	13	3.3%	4,177	1	9.3%	346
60"	1	0.05%	59	0	0	0
66"	2	0.7%	876	0	0	0
TOTAL	700	100.00%	125,169	73	-	18,184

Part 2: Level of Service (LOS)

The next phase of the AMP is a Level of Service determination. What level of storm water service does the City want to provide to its residents? How are projects going to be prioritized and included in a CIP? What cost is the City willing to endure to provide that level of service? These are all questions that were discussed as a part of the overall asset management plan. The City’s Level of Service Statement/Goals are as follows:

The City of Manistee strives to maintain a basic storm water collection system that addresses the residents’ wants and needs and upholds the local, State, and Federal regulatory requirements at a minimum cost to our residents.

LOS - Basic Goals:

1. Operate and maintain the stormwater system to minimize flooding and property damage.
2. Review the condition of storm water assets as a part of other infrastructure construction projects.
3. Seek a funding source for operation & maintenance and repair/replacement of storm water assets.
4. Review the maintenance and capital improvement plans/projects annually to determine the lowest cost options for our residents.

Level of Service criteria includes the following categories:

1. “MINIMUM” Level of Service
 - Address resident complaints as they come in.
 - Rehabilitation to storm sewers or structures (manholes, catch basins) with isolated structural deficiencies
2. “MEDIUM” Level of Service
 - Rehabilitation of storm sewers with significant structural and/or operations deficiencies involving trenchless rehabilitation (CIPP/CIPM Lining)
 - Replacement of existing storm sewers or structures which cannot be rehabilitated by trenchless means
3. “HIGH” Level of Service
 - Address areas in the City with historic flooding or drainage issues where current stormwater infrastructure exists
 - Address areas in the City with historic flooding or drainage issues where stormwater infrastructure does not exist
 - Increase capacity of existing stormwater infrastructure

Generally, the “high” level of service projects will have a higher construction/initial cost but would provide a better long-term or life cycle cost for the City. The “minimum” level of service projects would address the immediate concerns that residents bring to the City’s attention as well as placing emphasis on

the rehabilitating those structures and sewer pipes in need of limited repair that would generally be of a lower construction cost.

The City will deliberate the findings and recommendations from the SAW to solidify the desired Level of Service, based upon the criteria above. Since there is no real funding mechanism for stormwater assets currently, the City has been maintaining a *Minimum* Level of Service, due to financial constraints.

Part 3: Criticality (Risk)

For each asset in the City’s storm water system, a criticality/risk analysis was performed to determine and prioritize the City’s key components. Risk is the product of the Likelihood of Failure (LoF) and Consequence of Failure (CoF), as shown below.

$$\text{RISK} = \text{LoF} \times \text{CoF}$$

Likelihood of Failure (LoF) for sewer and manhole assets is primarily based on the physical condition of the asset as inspected in the field. The grading system is based on a scale of 1 -5. The lowest grade of 1 is an unlikely probability of failure, with the highest grade of 5 being imminent probability of failure. Based on the condition assessments and the field inspections, the Likelihood of Failure (LoF) was calculated for pipes and manholes. For those pipes and manholes which could not be inspected, and estimated LoF was determined. Table ES-2 provides a summary of the system as it relates to a low, medium, or high probability of failure of the mainline storm sewers in the system.

Table ES-2: Likelihood of Failure (LoF) – Mainline Storm Sewers

LoF	Pipe Segments	Length	Percent
Low	564	95,982	76.7%
Medium	103	20,969	16.7%
High	33	8,218	6.6%
Total	700	125,169	100%

Next, the Consequence of Failure (CoF) was calculated and scored for each asset. The Consequence of Failure (CoF) is aggregating the empirical value associated with failure of an asset as it directly and indirectly pertains to social, environmental, and economic (cost) implications.

Finally, the Risk was calculated for each sewer and manhole in the system. Table ES-3 provides a summary of the system as it relates to low, medium, or high-Risk prioritization for the mainline storm sewers in the system.

Table ES-3: Risk – Mainline Storm Sewers

Risk	Pipe Segments	Length	Percent
Low	197	34,955	28.0%
Medium	411	66,882	53.4%
High	92	23,332	18.6%
Total	700	125,169	100%

Part 4: Capital Improvement Plan

The Capital Improvement Plan (CIP) is the culmination of all the parts of the Asset Management Plan (AMP). Reviewing the results of the storm water system Inventory & Condition Assessment, Level of Service (LOS) determination, Criticality (Risk), Revenue Structure, and preliminary CIP project lists, a process was worked through to categorize and prioritize the final CIP. The resulting CIP plan includes the following projects:

1. Storm Sewer & Catch Basin Lead Cleaning and Televising
Level of Service - Minimum to Medium
Construction Cost - \$640,000 to \$1,100,000

To completely evaluate the City’s storm system, we recommend that cleaning and televising be incorporated of the remaining system not captured in the SAW Grant. This includes remaining mainline storm sewer and all catch basin leads. The construction costs associated below were developed from unit pricing in the SAW grant and do not include design or construction engineering. It is anticipated that this project will be performed on a long term incremental basis as funding allows. The cycle and frequency of this program has not been determined to date. Costs to clean and televise the mainline storm sewer (ES-4) and the catch basin leads (ES-5) are shown below.

Table ES-4: Cleaning & Televising Costs - Mainline Storm Sewer

Diameter (in)	Length (ft)	CCTV \$/ft	CCTV Cost	\$/ft for Light Cleaning	\$/ft for Heavy Cleaning	75% Light 25% Heavy Clean Cost	75% Heavy 25% Light Clean Cost
4-12	34150	\$1.05	\$35,858	\$1.15	\$3.00	\$51,118	\$86,656
15-21	33244	\$1.05	\$34,906	\$2.00	\$4.70	\$83,318	\$133,808
24-36	24152	\$1.05	\$25,359	\$4.20	\$16.50	\$157,138	\$324,238
42-48	11340	\$1.05	\$11,907	\$4.75	\$22.00	\$90,543	\$200,576
54-66	4767	\$1.05	\$5,005	\$5.50	\$27.50	\$45,881	\$104,872
Total	107653	\$1.05	\$113,036	-	-	\$427,998	\$850,149

Total Cleaning & Televising Cost = \$540,000 \$960,000

Table ES-5: Cleaning & Televising Costs – Catch Basin Leads

Diameter (in)	Length (ft)	CCTV \$/ft	CCTV Cost	\$/ft for Light Cleaning	\$/ft for Heavy Cleaning	75% Light 25% Heavy Clean Cost	75% Heavy 25% Light Clean Cost
4-12	34161	\$1.05	\$35,869	\$1.15	\$3.00	\$51,134	\$86,683
15-21	1394	\$1.05	\$1,464	\$2.00	\$4.70	\$3,494	\$5,611
24-36	475	\$1.05	\$499	\$4.20	\$16.50	\$3,092	\$6,381
Total	36030	\$1.05	\$37,831	-	-	\$57,720	\$98,674

Total Cleaning & Televising Cost = \$100,000 \$140,000

2. Storm Sewer Rehabilitation
Level of Service - Minimum to Medium
Construction Cost - \$670,000

The following factors were evaluated to prioritize CIP projects: structural defects, LoF (4 or greater), CoF, and Risk. Once all factors were accounted for, the sewer pipes were placed into categories of replacement, trenchless rehabilitation, and/or pipe repair. Recommendations were then established and discussed with the City. A comprehensive Summary Table (Table ES-6) is included below for the storm sewer televised in the SAW which exhibited structural deficiencies and should be rehabilitated. Construction costs do not include contingency or engineering fees.

Table ES-6: Storm Sewer Rehabilitation Costs

Segment Reference ID	Upstream Manhole ID	Downstream Manhole ID	LOF	Risk	Rehab Type	Construction Cost
6970	3560	3559	4.1	16.7	CIPP	\$70,916
6063	3361	3360	4	14.7	CIPP	\$38,275
7333	3115	3116	4.1	14.0	CIPP	\$23,480
7382	3120	3119	4.1	12.6	CIPP	\$21,160
6087	3366	3363	4	12.3	CIPP	\$18,302
7526	3541	5575	4	12.3	CIPP	\$38,276
7054	3559	3389	3	12.3	CIPP	\$240,736
7225	3100	3102	4.2	11.9	CIPP	\$15,789
7220	3102	3101	4.1	11.6	CIPP	\$15,901
7515	3551	3549	4.1	10.9	CIPP	\$3,190
7532	3537	3540	4.1	10.9	CIPP	\$10,131
7337	3118	3117	3	10.3	CIPP	\$9,195
7349	3046	3047	3.1	10.1	CIPP	\$8,535
7336	3116	3118	3	9.8	CIPP	\$9,774
6032	3385	4900	4.1	9.2	CIPP	\$16,639
7089	3548	3574	3.2	9.9	SR	\$28,407
7485	3247	3251	5.1	13.6	SR - CIPP	\$14,228
7211	3096	3095	5.1	16.6	SR - Possible CIPP	\$13,109
7232	3099	3100	5.1	10.2	SR - multiple	\$10,981
7505	3555	3558	4	13.0	SR & CIPP	\$32,634
7509	3549	3555	3.1	8.8	SR & CIPP	\$20,277
6099	3351	3350	4	8.0	SR & CIPP	\$12,259
					Total =	\$670,000

Note: CIPP = Cured In Place Pipe Lining. SR = Spot Repair.

3. Storm Sewer Master Plan – Expand Collection System

Level of Service – Medium to High

Construction Cost – \$2,880,000

There are several areas throughout the City which currently have limited or no storm sewer facilities available. The City has further identified the locations within these areas where significant ponding and/or flooding historically occur. A feasibility analysis was performed to identify which locations could be readily serviced by gravity to existing storm sewers adjacent to the problematic locations. A summary of proposed storm sewer infrastructure improvements for each locations and associated costs is in Table ES-7.

There are several locations where the existing drainage structures have been altered to become infiltration basins during the City’s Combined sewer separation project. A possible solution to constructing new storm sewers at these locations would be to replace the failing infiltration basins with larger infiltration basins to provide more capacity. New infiltration basins will likely require additional O&M to maintain their functionality. The replacement of infiltration basins versus installing new storm sewers will be evaluated on a case by base basis as the final design at each location is completed.

For project cost estimating purposes, a unit cost of \$150/ft was developed based on current industry costs. Design and construction engineering have also included at 20% of the construction estimate.

Table ES-7: Proposed Storm Sewer Improvements

Street	From	To	Sewer Main Length	Estimated Cost of Storm Sewer Construction
8th	US-31	Davis	1,000	\$180,000
Hopkins	6th	8th	660	\$119,000
6th	Hancock	Hopkins	120	\$22,000
Kosciusko	12th	14th	540	\$97,000
14th	Kosciusko	Maywood	300	\$54,000
Maywood	14th	Grand	600	\$108,000
15th	Maywood	Vine	340	\$61,000
Grand	Maywood	Vine	320	\$58,000
Vine	Grand	14th	960	\$173,000
14th	Vine	Manistee	300	\$54,000
Manistee	14th	13th	320	\$58,000
Lincoln	US-31	Jefferson	270	\$49,000
Jefferson	Van Buren	Jackson	280	\$50,000
Jackson	Jefferson	Washington	320	\$58,000
Quincy	Cleveland	Washington	310	\$56,000
5th Ave.	Short	Fremont	1,050	\$189,000
4th Ave.	Franklin	Fremont	280	\$50,000
2nd Ave.	Ford	Franklin	300	\$54,000
Hughes	Ford	Melitzer	940	\$169,000
Saint Marys Pky	Duffy	Dead End	1,600	\$288,000
Ford	Groves	Saint Marys Pky	320	\$58,000
Duffy	Groves	Saint Marys Pky	140	\$25,000
Fremont	Saint Marys Pky	Hughes	320	\$58,000
Melitzer	Hughes	3rd Ave.	710	\$128,000
1st Ave.	Melitzer	Dead End	460	\$83,000
2nd Ave.	Fremont	Dead End	950	\$171,000
5th Ave.	Melitzer	Monroe	900	\$162,000
4th Ave.	Melitzer	Monroe	900	\$162,000
3rd Ave.	Hastings	Dead End	360	\$65,000
Hastings	4th Ave.	3rd Ave.	130	\$23,000

4. Feasibility Study / Analysis

Level of Service – Medium to High
Construction Cost – Unknown

There are several locations within the City with historic flooding and/or ponding at locations where current stormwater infrastructure exists. The City has identified the following locations.

- Maple Street & River Street
- 6th Street and US-31 (Cypress Street)
- 7th Street and Ramsdell Street
- Vine Street and 16th Street
- US-31 (Arthur Street) near the Super 8 hotel

These locations are frequently monitored by the City during precipitation events. A study at each location should be performed to determine capacity/hydraulic constraints and include recommendations from mitigating the flooding issues. Locations along US-31 will need to be coordinated with MDOT along with cost sharing considerations for the study and construction improvements.

5. Annual Operations and Maintenance

We recommend the City incorporate sufficient funds for the annual operations and maintenance budget for the following O&M activities.

1. Cleaning Catch Basins
 - a. Continue cleaning system catch basins program. Currently the City performs cleaning of approximately 1/3 of drainage structures annually.
2. Catch Basin investigations
 - a. Perform investigations of catch basins, which were not completed in the SAW Grant. The investigation should include capturing video of the structure in the 360-degree format including a measurement device similar to a surveyors Philadelphia rod.
 - b. Incorporate video media into GIS / Asset Management software system
3. Maintenance of GIS / Asset Management software system
 - a. Incorporate new record drawings
 - b. General updates of GIS system and feature attributes
 - c. Update collection system maps based on development
 - d. Include costs for software annual technical subscription / updates
4. Training and Development
 - a. Continuing Education for City Staff
 - b. Software training
 - c. NASSCO PACP/MACP/LACP certification

Part 5: Revenue Structure

The City contracted Stantec (formally Burton & Associates in 2014) to perform a comprehensive sewer and water rate study. This study was related to wastewater rates only. The City does not have a separate stormwater funding source, other than their street fund, grant funds or in association with other capital improvement projects.

There is a potential for limited stormwater rehabilitation projects or stormwater master plan projects to be performed, but it is dependent of available funding from the City's current Transportation Improvement Program (TIP) if directly impacting the streets in question. There is also a possibility of storm sewer improvements to be performed within the City's MDEQ NPDES project using eligible funding from USDA-RD program. Future stormwater improvements will need to be funded as part of other capital improvement projects or with other grant or loan programs.

Ultimately, there is currently no revenue structure established for stormwater improvements. Financial review of the City's General Fund indicates that the City cannot fund standalone stormwater improvements. The capital improvement plan (CIP) projects developed in Part 4 herein cannot be sustainably funded by the City's General Fund without outside resources.

Conclusions

The City of Manistee storm water system is a typical, aging municipal infrastructure system. Since there has been no funding mechanism for storm water assets, the City had been maintaining a Minimum Level of Service for its residents. At this time, the CIP projects have not been included into the current fiscal year budget or forecasted in future FY's. The City will evaluate where these projects should be included in future FY's if funding becomes available.

In accordance with the SAW Grant requirements, the City's Storm Water Asset Management Plan (SWAMP) needs to be kept available for citizen review for 15 years. The SWAMP should be reviewed annually, and the components updated and included in the City's annual budget process.