Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

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

The City of Manistee *(legal name of grantee)* certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. 1234-01 have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or No
   If No - Date of the rate methodology approval letter: 5/16/2018.
2) Significant Progress Made: Yes or No
   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)
3) Date of rate methodology review letter identifying the gap: _____.
4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on _____.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Thad Taylor, City Manager	at (231) 398-2801	ttaylor@manisteemi.gov
Name	Phone Number	Email

11/26/2018

Signature of Authorized Representative (Original Signature Required) Date

Thad Taylor, City Manager

Print Name and Title of Authorized Representative

November 2018

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:

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

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

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

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: Wastewater Asset Inventory and Condition Assessment

The City's wastewater system consists of three main components: The collection system (pipes and manholes), pump stations, and the wastewater treatment plant (WWTP).

For the City's wastewater 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 wastewater assets (pipes, manholes, pump stations, etc.). From the GIS, 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.

Collection System:

The collection system consists of approximately 41.3 miles of gravity sanitary sewer (2" to 36" Diameter), 970 Manholes, and 5.5 mile of force main (3" to 10" diameter). A summary of the City's gravity sewers by diameter and length is included in Table ES-1.

Table ES-1: City-Owned Sanitary Sewer Pipes By Diameter

Diameter	Total Segments	Total Percentage	Total Length(ft)
2"	2	0.1%	272
3"	5	0.1%	225
4"	2	0.1%	29
6"	32	1.9%	4,092
8"	338	30.5%	66,442
9"	59	6.2%	13,455
10"	236	22.1%	48,198
12"	175	16.5%	35,673
15"	73	6.8%	14,906
18"	42	4.3%	9,422
20"	9	1.2%	2,577
21"	14	1.6%	3,415
22"	2	0.1%	308
24"	27	3.0A%	6,537
27"	34	3.6%	7,882
30"	4	0.3%	706
36"	18	1.7%	3,709
TOTAL	1,073	100%	217,849

Plummer's Environmental Services (PES), located, in Byron Center MI, completed a comprehensive cleaning and televising program of the sanitary sewer pipes. The condition assessment was completed in NASSCO's (National Association of Sewer Service Companies) Pipeline Assessment Certification Program (PACP) standards.

Spicer Group completed a comprehensive inspection of the manholes. Manholes were inventoried and assessed manually or by use of remote inspection equipment which was deployed from the ground surface. The condition assessment was completed in NASSCO's Manhole Assessment Certification Program (MACP) standards.

Pump Stations:

The City owns, operates, and maintains fourteen (14) wastewater pumping / lift stations. Field inspections were conducted on each station with assistance from City staff. All assets associated with the stations were observed, documented, and given a condition rating score. Some of the electrical and instrumentation features, pumps, piping, valves, and standby generators are past their useful life. However, due to regular maintenance over the years, everything is currently operating well.

A summary of the City's pump station's is included in Table ES-2. Key items shown include: install date, station type, location, pump capabilities, etc.

Table ES-2: Pump Station Information

Station Name	Station Address	Install Date	Station Type	Pump HP	Pump Type	Pump Capacity (gpm)	Power Supply	Standby Power
First Street	81 Lakeshore Drive	2011	Duplex	7.5	Submersible	130	3 PH 460V	Yes
Harbor Village	99 Marina Drive	1996	Duplex	3	Submersible	61	3 PH 480V	No
Industrial Park	229 Glocheski Drive	1976	Duplex	5	Submersible	176	3 PH 480V	Yes
Jerumbo Street	313 Jerumbo Street	1992	Duplex	25	Submersible	190	3 PH 460V	Yes
Joslin Cove	144 Joslin Cove	2007	Duplex	2	Submersible	34	Single PH 230V	Yes
Lakeshore	207 Lakeshore Drive North	1996	Duplex	5.0	Submersible	108	3 PH 460V	No
Oaks	1575 Pine Creek Road	1992	Duplex	7.5	Submersible	314	3 PH 480V	Yes
Renaissance Park	621 Renaissance Park Drive	1999	Duplex	50	Submersible	718	3 PH 460V	Yes
6th Avenue	225 6th Avenue	2016	Duplex	20	Submersible	1,200	3 PH 460V	Yes
Sweetnam	2065 Reigle Street	1984	Duplex	3.8	Submersible	23	3 PH 480V	No
Third Street	644 Third Street	1999	Duplex	5	Submersible	250	3 PH 460V	No
Cherry Street	401 Cherry Street #2	1940	Duplex	5	Submersible	75?	3 PH 460V	No
Arthur Street	27 Arthur Street	1954	Duplex	7.5	Submersible	396	3 PH 480V	No
Eighth and Vine	Corner of Vine Street & 8th Street	1967	Duplex w/storm pump	7.5	Drypit Submersible & submersible	926 / 1,728	3 PH 480V	No

WWTP:

The WWTP is located approximately at 15 Ninth St., on the southeast portion of the City, along the western shore of Manistee Lake. The original wastewater treatment plant (WWTP) was constructed as a 1.0 million gallon per day (MGD) primary treatment plant in 1938. In 1973, a phosphorus removal system was added. Construction of the existing WWTP started in 1988 (Phase I) by upgrading the primary treatment facility. In 1990, construction Phases II and III upgraded the plant to a secondary treatment facility with activated sludge. An expansion project in 2006 increased the plant capacity to 1.3 MGD. This expansion included upgrading the activated sludge basins, providing for biological phosphorus removal, increasing sludge storage capacity, and upgrading the UV disinfection system. The WWTP support system includes chemical feed, laboratory facilities, non-potable water system, electrical distribution and control, and HVAC system.

Field investigations of the WWTP were conducted with the help of City Staff. All assets associated with the treatment facility were reviewed, documented, and given a condition rating score. Several recommendations for improvement projects were provided to the City for evaluation. In general, the WWTP's tanks, buildings, and equipment are in fair condition.

Part 2: Level of Service (LOS)

The next phase of the AMP is a Level of Service determination. What level of service does the City want to provide to its wastewater customers? How are projects going to be prioritized and included in the 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 is committed to improving and maintaining the public health protection and performance of our wastewater system, while minimizing the long-term cost of operating those assets. We strive to make the most cost-effective renewal and replacement investments and provide the highest-quality customer service possible.*

LOS - Basic Goals**:**

- Ensure adequate system capacity to customers
- Operate and maintain the system to minimize service disruptions to customers
- Mitigate inflow/infiltration (I/I) entering the system, therefore reducing pumping and treatment costs
- Review operations & maintenance practices and capital improvement projects to determine the lowest cost options for our residents.

Level of Service criteria includes the following categories:

1. "MINIMUM" Level of Service
    - Priority projects to meet the minimum local, Stae, and/or Federal regulations.
    - Actions taken may maintain service life of asset
    - Typically, the least cost option
2. "MEDIUM" Level of Service
    - Projects completed as when other infrastructure projects are occuring or if monies become available earlier than anticipated
    - Actions taken can keep up with depreciation of asset
    - Asset's service life is maintained, and possibly improved
3. "HIGH" Level of Service
    - Projects that are forecasted long range, some of which the current asset may have a considerable amount of remaining useful life
    - Most proactive service level
    - Typically the greatest cost option

As the AMP progressed, different scenarios were evaluated, to determine the City's desired Level of Service based on project costs, associated LOS, and the implication to current and future sewer rates.

Part 3: Criticality (Risk)

For each asset in the City's wastewater system, a criticality/risk analysis was performed to determine and prioritize the City's wastewater components. Key components included the collection system (sewer piping and manholes), pump stations (structures, pumps, electrical, standby power generation), and the WWTP (structures, equipment, processes, electrical, standby power generation, etc). Risk is the product of the Likelihood of Failure (LoF) and Consequence of Failure (CoF), as shown below.

RISK = LoF x CoF

Likelihood of Failue (LoF) is the structural and physical condition assessment of the asset. Based on the field inspections and condition assessment, a resulting the Likelihood of Failure (LoF) was calculated for each asset. A system was developed to address the LoF for each asset in the system (sewers, manholes, pump stations, WWTP). A brief summary of criteria is outlined below.

LoF - Sewer Piping and Manhole Structure

The grading system for these assets are on NASSCO's PACP (pipes) and MACP (manholes). 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. Table ES-3 and Table ES-4 provide a summary of the system as it relates to a low, medium, or high probability of failure of the mainline sewers and manholes in the system.

Table ES-3: Likelihood of Failure (LoF) - Mainline Sanitary Sewers

LoF	Pipe Segments	Length	Percent
Low	303	55,900	25.7%
Medium	512	99,378	45.6%
High	258	62,571	28.7%
Total	1073	217,849	100.0%

Table ES-4: Likelihood of Failure (LoF) - Manholes

LoF	No. of Manholes	Percent
Low	211	21.4%
Medium	672	68.2%
High	102	10.4%
Total	985	100.0%

LoF - Pump Stations and WWTP

Each of the assets at the City of Manistee pump stations and WWTP were given a likelihood of failure score. The likelihood of failure score was based on the field condition score given, the remaining useful life of the asset, and comments from City Staff. Table ES-5 shows a summary of the rating system.

Table ES-5: Likelihood of Failure (LoF) – Pump Stations & WWTP

Rating	Description
1	Very Low Probability
2	Not Likely – No maintenance issues so far
3	50/50 – Asset is passed its expected service life / some maintenance issues
4	Likely to Fail – Asset is passed expected service life / many recorded maintenance issues
5	Asset will fail soon
6	Asset has already failed

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. Table ES-6 and ES-7 summarize the CoF failure scale grade and definitions for the collection system (pipes and manholes) and the pump stations / WWTP.

Table ES-6: Consequence of Failure (CoF) – Sewers & Manholes

Description	Grade	Failure of Asset
Catastrophic Disruption	6	Massive system failure - severe health effect, extensive damages, LOS severely compromised
Major Disruption	5	Major effect - major capacity loss, health effects, and costs, LOS compromised
Moderate to Major Disruption	4	Major effect - moderate to major loss of system capacity, costs, and health effects, LOS may be compromised
Moderate Disruption	3	Moderate effect - moderate loss of system capacity, health effects, and costs, LOS still achieved
Minor Disruption	2	Minor effect - minor capacity loss, costs, and health effects
Insignificant Disruption	1	Slight effect - slight loss of system capacity, minor health effects, minor costs

Table ES-7: Consequence of Failure (CoF) – Pump Stations & WWTP

Rating	Description
1	Inconvenience – Equipment is used but not essential to operation
2	OK – 100% redundant system / no issues if equipment fails during peak flows
3	Marginal – redundant systems can handle daily average flow / equipment can be down for a short time period
4	Bad – backup systems are not reliable / short down time will cause problems / high potential for flooding or permit violation
5	Very Bad – no backup systems / flooding or permit violation will happen
6	Catastrophic – lives will be lost

Finally, the Risk was calculated for each asset in the system. Table ES-8 and ES-9 provides a summary of the system as it relates to low, medium, or high-Risk prioritization for the mainline sewers and manholes in the system.

Risk - Collection System

Table ES-8 and Table ES-9 provide a summary of the system as it relates to a low, medium, or high probability of failure of the mainline sewers and manholes in the system.

Table ES-8: Risk – Mainline Sanitary Sewers

Risk	Pipe Segments	Length	Percent
Low	456	80,935	37.2%
Medium	511	109,475	50.3%
High	106	27,440	12.6%
Total	1073	217,849	100.0%

Table ES-8: Risk – Manholes

Risk	No. of Manholes	Percent
Low	526	53.4%
Medium	444	45.1%
High	15	1.5%
Total	985	100.0%

Risk - Pump Stations

In general, most of the pump stations within the City of Manistee sewer system are in the low range of the medium risk zone, receiving an average score between 10 and 12. This is due to their high consequence of failure scores. The Arthur St. and Cherry St. pump stations are in the high range of the medium risk zone due to their age.

Risk - WWTP

Most assets at the WWTP are in the low risk category due to low likelihood of failure scores and because most systems at the plant have backup/redundant equipment. Disinfection and blower facilities risk scores calculated out to a 15 due to high consequence of failure scores. If these facilities were to fail, permit violations would certainly occur. Sludge recirculation pumping, sludge heating, and the primary digesters are in the medium risk zone mainly due to higher likelihood of failure scores based on age and lack of redundant systems.

Part 4: Capital Improvement Plan

A Capital Improvement Plan (CIP) has been developed based on the results asset management (AM) process. Reviewing the results of the wastewater system inventory & condition assessment, level of service (LOS) determination, criticality (risk), and revenue Structure, categorization and prioritization of CIP projects was generated. This section contains recommendations for capital improvement projects and annual operations & maintenance practices.

MDEQ Corrective Action Program (CAP)

City is working on approval from MDEQ for a basis of design (BOD) approval to meet current NPDES requirement. These requirements broadly include elimination of the existing SSO 018 Regulator by, constructing a new sanitary sewer to the WWTP for conveyance, providing above ground storage at the WWTP, and completing sanitary sewer pipe rehabilitation to eliminate excessive infiltration into the collection system. Low interest loans are being pursued by the City from USDA-RD to pay for the project(s) cost(s). The projects in total are estimated at approximately $15,000,000 to $20,000,000.

CIP Projects - Collection System

The wastewater sewers have been reviewed to determine rehabilitation needs. Criteria was established to review the most structurally deficient sewers based on a LoF score of 4 and 5. Once determined, the sewers identified to be rehabilitated as part the MDEQ CAP project were removed from the list. The remainder of these sewers were then prioritized by the greatest risk condition. This list becomes the starting point for the City to evaluate future CIP projects. It is recommended that sewers with significant structural deficiencies involving spot repairs or replacement be given first priority. The next priority would be those sewers that can be repaired by trenchless means (cured in place pipe lining).

CIP Projects - Pump Stations

- Arthur St. pump station – replace pumps and add a backup generator
- Cherry St. pump station – complete rehabilitation and add a backup generator
- Oaks Prison pump station – replace manual bar screen with automatic screen
- 8th and Vine pump station – replace wet well and pumps
- Joslin Cove pump station – convert to 3phase power, replace pumps, new control panel and add a backup generator

CIP Projects – WWTP

- Replacement of automatic screen
- New influent flow measurement system
- Redundant channel and stand-by ultraviolet disinfection unit
- Install an effluent flow measurement systemOper
- Replacement of the primary sludge pump and provide a redundant pump
- Redundant sludge recirculation pump
- Rehabilitation of the primary digester tanks and covers
- Electrical and Control upgrades for older processes
- Installation of a vactor truck/septage receiving station

Operations and Maintenance

Spicer recommends that the City evaluate the following items for their future annual operations and maintenance (O&M) budget.

1. Sewer Cleaning and Televising
    a. Clean and Televise system within a 10-year to 15-year cycle. Cleaning and Televising performed in the City's SAW and Corrective Action Program (CAP) projects commenced in 2015 and were completed in 2018.
    b. Provide heavy cleaning for those areas prone to back-ups, roots, heavy debris
2. Maintenance and Revision of GIS system
    a. Incorporate new record drawings
    b. Update collection system maps based on development
    c. Update collection system media (videos and reports) for sewer rehabilitation / improvements performed
    d. Include costs for software annual technical subscription / updates
3. 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. The primary objectives of the study were as follows: perform a cost of service allocation; perform a rate structure analysis, perform a revenue sufficiency analysis, assist the City in updating and developing other user charges.

The City ultimately adopted and implemented the rate structure developed by Burton & Associates. The adopted rate structure is itemized in Table ES-9 for Fiscal Year (FY) percentage increases. Table ES-10 denotes the monthly user charges for the City's sewer and water customers base for FY 2017.

Table ES-9: Recommended / Adopted Water & Sewer Rate Increases

Table 1. Recommended Plan of Water and Sewer Rate Revenue Increases

	FY 15*	FY 16	FY 17	FY 18	FY 19
Effective Date	7/1/14	7/1/15	7/1/16	7/1/17	7/1/18
Water Rate Revenue Increases	8.50%	8.50%	3.50%	3.50%	3.50%
Sewer Rate Revenue Increases	8.50%	8.50%	3.50%	3.50%	3.50%
Combined Rate Revenue Increase	8.50%	8.50%	3.50%	3.50%	3.50%

* FY 2015 increase achieved within recommended rate structure adjustments identified in Section 3 of this report, which significantly reduces the impact to average/typical users

Table ES-10: Customer Water & Sewer User Charges – FY 2017

Service	Monthly - Rate
Water (Per 1,000 gal.)	$2.93
Sewer (Per 1,000 gal	$8.03
Water Ready to Serve Fee 5/8 & 3/4 meter	$4.15
Sewer Ready to Serve Fee 5/8 & 3/4 meter	$11.94
Typical Residential Bill (Per 6,000 gal. – average)	$81.85

Since the implementation of the rate structure adjustments in fiscal year 2015, the City has undergone several reviews of their revenue structure as a result of recent development and proposed future development to the collection system. These very specific items include the following

1. Filer Township - Now a bulk user of the City's sanitary sewer collection system. Filer Township recently installed a new gravity sewer system in 2017. The City and Filer Township have entered into an agreement for operations & maintenance of that system as well as capacity provided by the City at the WWTP.

2. Manistee Township – City and Township review of selling City assets within the Township directly to the Township. Negotiations are currently ongoing. Stantec is providing financial analysis for rate and revenue consideration

3. MDEQ Corrective Action Program (CAP) – City is working on approval from MDEQ for a basis of design (BOD) approval to meet current NPDES requirement. (See Part 4)

Each of these items have an impact on the City's ability to fund and forecast the recommended projects in the CIP in Part 4 of the executive summary. It is the City's intent to perform another rate sufficiency analysis once the MDEQ CAP's projects are awarded in 2019 to determine how to proceed with the remainder of the CIP.

Conclusions

The City of Manistee's wastewater system is a typical, aging municipal infrastructure system. The City performs routine operation and maintenance of the components, and the system is in relatively good working order. The SAW grant has identified deficiencies in the collection system, pump stations, and WWTP assets. Resulting CIP projects have been developed, prioritized, and evaluated by the City. The current rate structure, adopted by the City in 2015, and will likely not sustain the proposed projects in the CIP. The City anticipates performing an additional rate study in 2019 to evaluate the current financial conditions as well as the future conditions for CIP planning purposes.

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