Stormwater Infrastructure Engineering Study Report

Village of Sherman

Chautauqua County, New York

Prepared for

Village of Sherman

111A Mill Street
P.O. Box 568
Sherman, New York 14781

March 2020

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TABLE OF CONTENTS

Section **Page**

Tables

Figures

TABLE OF CONTENTS – Continued

Appendices

List of Acronyms

FOIL	Freedom of Information Law
GI	Green Infrastructure
GIGP	Green Innovation Grant Program
GIS	Geographic Information System
GP	General Permit
HSG	Hydrologic Soil Group
LiDAR	Light Detection and Ranging
NRCS	Natural Resources Conservation Service
NYSDEC	New York State Department of Environmental Conservation
NYSDOT	New York State Department of Transportation
SPDES	State Pollutant Discharge Elimination System
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USGS	United States Geological Survey
WQIP	Water Quality Improvement Project

1.0 EXECUTIVE SUMMARY

The Village of Sherman (Village) has received $50,000 in funding from a Community Planning Grant through the NYS Office of Homes and Community Renewal under the 2018 Consolidated Funding Application for completing this Stormwater Management Engineering Study. The purpose of the Study is to evaluate the condition and capacities of existing stormwater management and conveyance systems within the Village of Sherman, and to develop recommended capital improvements for addressing impacts associated with stormwater runoff (i.e., localized flooding) that will also improve the quality of stormwater that discharges to French Creek.

Increased concern with stormwater quantity and quality within the Village has elevated the need for building community resiliency and protecting community assets from stormwater impacts. All concerned have the desire to mitigate the potential impacts of future storm events, minimize localized flooding, and achieve ancillary benefits such as providing water quality improvement to French Creek and the Alleghany River Drainage Basin through the use of green infrastructure (GI) practices.

This Stormwater Management Study Report provides an overview of the site investigation and design process conducted by Barton & Loguidice, D.P.C. (B&L) and partner Terra Pointe Land Surveying PLLC (Terra Pointe). Provided within is an existing conditions assessment including a summary of data collection activities, a stormwater system capacity evaluation (hydrologic and hydraulic modeling), a nutrient/pollutant loading evaluation, an evaluation of mitigation alternatives, concept plans and renderings for five recommended water quality/flood mitigation projects, and an evaluation of potential funding sources and strategies for implementation of the recommended capital improvement projects.

A kick-off meeting was held on May 1, 2019 where B&L met with representatives of the Village to establish consensus regarding the specific goals and objectives of the project. Following the meeting, an initial watershed field inventory was conducted by B&L and the Village. The field team from B&L performed a detailed watershed reconnaissance within the entire Watershed Study Area on May 1, 2019 to identify sites with potential retrofit opportunities. Additional visits were performed in September of 2019 by B&L representatives to further refine the conceptual designs.

Data collection was used to develop a hydrologic and hydraulic model utilizing HydroCAD® that represents existing conditions to evaluate the stormwater system capacity and identify existing infrastructure elements within the community at risk for flood damage. A retrofit opportunity matrix was developed to evaluate potential stormwater mitigation alternatives. The alternatives were based primarily on information obtained during field data collection activities. The potential alternatives comprise a wide range of practices for flood mitigation and water quality improvement including pond retrofits, green infrastructure opportunities, reduction in impervious areas, riparian buffers and detention pond creation/expansion. The projects were ranked based on criteria associated with stormwater benefits (quantity and quality), constructability, cost and "fundability", and co-benefits. The project advisory team utilized this matrix to select the five projects to progress to development of concept plans and renderings.

The goal for selection of the five projects was to include a diverse collection of projects. The projects selected for concept plans, therefore, were not necessarily ranked as the five highest overall scores. The projects were selected based on a collection of potential projects ranging in scale on cost, location (urban vs. rural), and retrofit practice. The purpose was to utilize this matrix as a template that can be repeated by the Village to progress additional projects to concept plans as future funding becomes available. The concept plans/renderings will be utilized to support future grant applications in an attempt to fund implementation of the recommended projects.

The projects selected for further evaluation and development of concept plans/renderings included:

1. Green Infrastructure Retrofit Practices along Main St.
2. Park Street Drainage Infrastructure Improvements
3. Stormwater Detention Retrofit at the Sherman Community Nature Center
4. Pond Retrofit north of Park Street and east of Sherman-Ripley Rd
5. Dry Detention Pond Retrofit upgradient of Sherman High School

This document provides an in-depth discussion and comparison of the aforementioned projects. Cost estimates and maintenance requirements for each project are also included for implementation as future funding becomes available.

2.0 PROJECT BACKGROUND AND HISTORY

2.1 Site Information and Drainage Area Characteristics

The Village of Sherman currently experiences a number of issues related to stormwater quality and quantity. The purpose of this Study is to evaluate existing conditions and to develop recommended improvements to address impacts associated with increased stormwater flow (i.e., localized flooding), and to improve the quality of stormwater that discharges to French Creek.

The Watershed Study Area comprises four separate drainage areas (Drainage Areas 1 through 4; referred to herein as DA-1, DA-2, DA-3, DA-4) with associated subcatchments encompassing nearly 562 acres. Each drainage area ultimately directs stormwater runoff generally south through the Village of Sherman to French Creek. Drainage areas vary in geologic conditions (*e.g.,* soil type, depth to bedrock, groundwater level, and slope). Soils are classified into hydrologic soil groups (HSG) to indicate the minimum rate of infiltration, or rate at which water enters the soil at ground surface. HSG's consist of Groups A, B, C, and D soils. Group A soils have the lowest runoff potential and highest infiltration rates, whereas Group D soils have the highest runoff potential and lowest infiltration rates. Soil properties and qualities are summarized for each drainage area in **Table 1**. A soils map is included in **Figure 1** illustrating the variance between drainage areas. A majority of the study area (70%) consists of Group C/D soils, which exhibit higher runoff potential and lower infiltration rates.

Each drainage area has a moderate slope directing stormwater from the outer extents of each subcatchment towards French Creek to one of 4 modeled outfalls. Generally, the steeper the slope, the shorter the time of concentration is, which produces higher peak runoff flow rates. A topographic map is included in **Figure 2**. Within the Watershed Study Area, steeper slopes are generally located within more ruralized areas north of the Village, and lower slopes are located at a closer proximity to the Village center and French Creek.

Land use is important to the drainage area's hydrologic cycle as it has one of the greatest impacts on water quality. More urbanized land usage generally relates to more impervious covers, resulting in higher peak flows preventing attenuation and filtration of nutrients and sediments. More ruralized land usage generally relates to more pervious covers, resulting in lower peak flows (i.e., rates and volumes) and increased nutrient and sediment filtration. However, some ruralized land usage, such as agriculture, have higher than typical nutrient runoff loads. Within the Watershed Study Area, land use varies with population density, where more urbanized parcels are generally located within the Village and near French Creek and ruralized parcels are generally located farther north from the Village and Creek. Property classes, as defined by parcel data, are presented in **Figure 3**.

Land cover is also important to the drainage hydrologic cycle, exerting considerable influence on the chemical, physical, and biological characteristics of waterbodies. Land cover classifies the vegetation (or lack thereof) covering the ground. Removing the natural vegetation due to human activities reduces the soil's ability to filter nutrients and sediments, resulting in increased amounts of runoff and pollution. Within the Watershed Study Area, land cover varies with population density, where more impervious cover types are generally located within closer proximity to the center of the Village and Creek, and more pervious cover types (*e.g.,* crops and forest) are generally located farther north from the Creek. Land cover, as defined by the 2011 National Land Cover Database, is presented in **Figure 4**.

The groundwater level varies greatly between soil groups, land use, and land cover. Areas with lower groundwater levels and high infiltration rates provide positive impacts to water quality by trapping sediments and capturing pollutants prior to discharging to closed drainage systems and French Creek. In some instances with HSG A soils and forest areas, high groundwater levels may contribute to runoff. Approximate groundwater levels, as defined by Soil Survey Database (gSSURGO, 2018), are included within **Figure 5**.

A floodplain by definition is a nearly flat plain near a waterbody that is naturally subject to flooding. Floodplains generally contribute to localized flooding, however, offer much needed nutrient filtration. Floodplains exist within the Watershed Study Area, originating mostly within established tributaries to French Creek. The 100-year and 500-year floodplain, as defined by the Federal Emergency Management Agency (FEMA, 2019), are illustrated in **Figure 6**.

2.2 Ownership and Service Area

Lands within the Village are primarily privately owned with a small percentage of municipally owned public land with exception to the Sherman High School, athletic fields, and Sherman Community Nature Center. Localized flooding can be problematic within private yards, athletic fields, municipally owned bridges and undersized stormwater conveyance systems during large high intensity precipitation events. Holistically, flood affected areas and water quality impairment negatively impact residents, tourists, and business owners within the Village of Sherman.

3.0 EXISTING CONDITIONS

3.1 Field Data Collection

Issues arriving from localized flooding may be mitigated after better understanding the causes. An initial watershed field inventory was conducted by B&L and the Village. The field team from B&L performed an initial detailed watershed reconnaissance within the entire Watershed Study Area on May 1, 2019 to identify drainage basin boundaries, characteristics, existing drainage infrastructure (i.e., swales/ditches, ponds, pipes, basins, etc.) and its condition, along with potential flood mitigation and retrofit opportunities. Additional visits were performed in September of 2019 by B&L representatives to further refine the conceptual designs. Field data collection findings attributed localized flooding to several functions, and identified several opportunities for mitigating flooding/erosion/sedimentation including:

- Urbanization: Land use within the study area shows that more urbanized areas are generally located within closer proximity to the Creek. Typically, with urban areas, impervious land cover areas increase reducing the presence of nutrient filtering vegetation and soils. Higher peak flow rates/volumes after storm events also result with the increase in impervious cover. GI practices focus on capturing and treating runoff at the source in an attempt to promote infiltration. GI practices implemented in these urban areas would provide peak flow attenuation and nutrient treatment, further reducing localized flooding and nutrient loads to the Creek (see below for additional information).
- Inadequately designed stormwater management practices: Some existing stormwater practices were identified to be inadequate for attenuating stormwater runoff during high intensity storms. Modifications to land use or land cover upstream of current stormwater practices may have negatively impacted the success of the practice in attenuating stormwater flows.
- Opportunities for GI: Typically, GI is implemented in more urban areas where stormwater is otherwise conveyed via conventional piped drainage. Delivering environmental, social, and economic benefits, GI reduces and treats stormwater runoff at its source. Such examples include (but are not limited to) rain gardens, bioswales, porous (permeable) pavements, urban tree canopies, and green roofs. In the case of the Village of Sherman, the majority of the drainage areas are located in rural areas above the closed drainage systems in the Village “core”, necessitating consideration of additional practices such as stormwater management, or detention ponds.
- Inadequately designed stormwater conveyance piping: Some existing stormwater piping was identified as having insufficient capacity for conveying stormwater flow during high intensity runoff events. Either poorly located or inadequately sized, reports of localized flooding were common in select locations. Additionally, modifications to

land use or land cover upstream of stormwater conveyance piping may have negatively impacted the ability to adequately convey stormwater.

3.2 Field Survey Data Collection

Limited field survey and topographic information was obtained for evaluating alternative stormwater mitigation opportunities and developing conceptual designs of the five recommended projects. Following the selection of projects for further evaluation and development of concept plans (discussed in Section 6.0), limited survey was conducted for the three select project locations noted below, and included cross-sections of drainage swales/ditches, and pipe/structure invert and rim elevations that were needed for developing the hydraulic model for existing conveyance infrastructure. Additional survey will likely be required to progress the concept design to final design. Field personnel from Terra Pointe Land Surveying (Terra Pointe) performed the limited topographic survey in July 2019 at the following areas:

- Sherman Community Nature Center,
- Sherman High School athletic fields, and
- Cross sections within tributaries to French Creek.

The surveyed locations are shown in **Appendix A**. Light detection and ranging (LiDAR) data for Chautauqua County were made available through the NYS Geographic Information System (GIS) website (NYS GIS, 2019). Contours were created and utilized for hydraulic and hydrologic modeling to supplement the targeted field survey. Additionally, record plans of the drainage system along Kipp Street and West and East Main Street were obtained through a Freedom of Information Law (FOIL) request to the NYS Department of Transportation (see **Appendix B**). These plans were utilized to confirm stormwater conveyance piping locations and directions necessary for hydraulic and hydrologic modeling.

3.3 Hydrologic and Hydraulic Evaluation

A HydroCAD® model was developed to identify the existing areas of localized flooding and predict anticipated peak flows during specific design frequency storm events (i.e., 1-year, 10-year, etc.), and to provide an “base” existing conditions model that can be modified to show results of recommended alternatives. B&L performed a site reconnaissance on May 1, 2019 to collect field measurements and data to aid in model development and perform drainage area delineation. Field measurements and data collection focused on existing stormwater infrastructure and locations that may potentially act as an inhibiter of flow (*i.e.,* culverts under major roadways), causing localized flooding during large storm events.

The Watershed Study Area was separated into four distinct drainage areas with corresponding subcatchments:

- Drainage Area 1 (DA-1)
  - Subcatchments 1-1, 1-2, 1-3, and 1-4
- Drainage Area 2 (DA-2)
  - Subcatchments 2-1, 2-2, 2-3, 2-4, and 2-5
- Drainage Area 3 (DA-3)
  - Subcatchments 3-1, 3-2, 3-3, 3-3A, 3-4, 3-5, 3-6, 3-7, and 3-8
- Drainage Area 4 (DA-4)
  - Subcatchments 4-1, 4-2, 4-3, and 4-4

Ponds were utilized within the model to either represent a detention pond or a catch basin. Reaches were utilized to represent channelized flow. Modeling assumed reaches operate under free discharge conditions based on normal Manning's flow and confirmed during the field investigations.

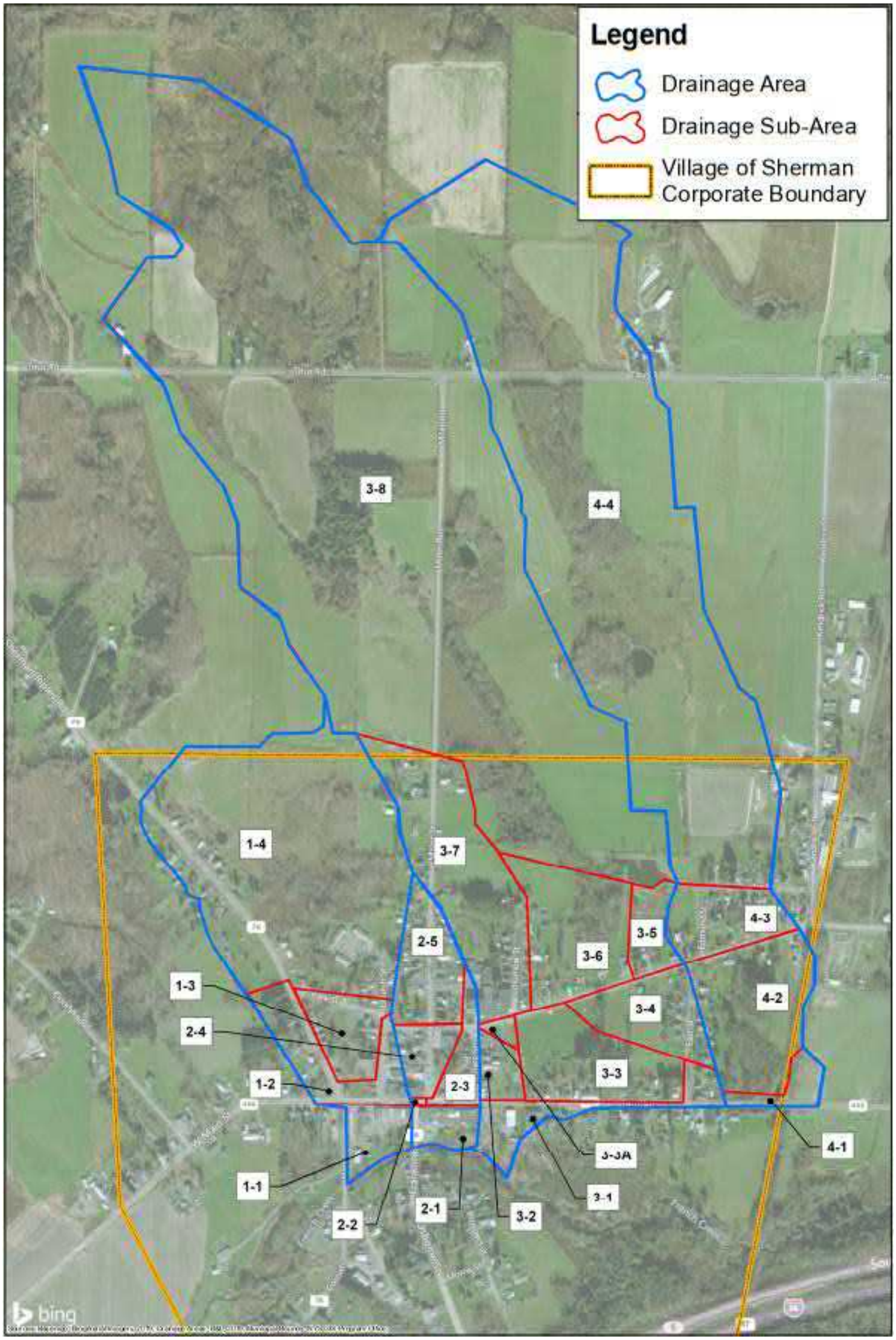


Figure 3-1: Delineated Watershed Study Areas

The HydroCAD® existing conditions model predicts areas of localized flooding by estimating peak flow rate and flow volume as a function of precipitation data, topography, soil type, land cover, and land use. The following data and corresponding sources were utilized to calibrate the model to the Watershed Study Area:

- Precipitation Data:
  - The 1-, 1.5-, 2-, 10-, 25-, 50-, 100-, and 500-year events were downloaded from Precip.net (an interactive web tool for extreme precipitation analysis) (see **Appendix C**).
- Topography: Maps were used to calculate slopes and to approximate inverts and flood elevations.
  - Chautauqua County LIDAR data used to calculate slopes and to approximate inverts and flood elevations (USGS, 2019).
- Soil Type:
  - Soil types were retrieved from the United States Department of Agriculture (USDA) National Resources Conservation Service (NRCS) gSSURGO dataset (USDA, 2019).
- Land Cover and Land Use:
  - Acreages were retrieved from the 2011 National Land Cover Database (Homer et al., 2015).

The HydroCAD® summary reports for the existing conditions model are included in **Appendix D**. Modeled flows are compared to flows derived from United States Geological Survey (USGS) StreamStats (see **Appendix E**) within **Table 2**. Generally, modeled flows are greater than flows predicted by StreamStats for the 1-year, 1.5-year, and 2-year storm events as StreamStats is a more general tool and does not accurately capture the entire study area nor the individual cover types, land uses, etc. During larger storm events, the modeled peak flows are limited by stormwater conveyance piping exceeding Manning's capacity, creating flooding upstream. It should also be noted that one or more of the parameters used in StreamStats fell outside the suggested range, therefore the program extrapolated estimates. The level of detail (input variables) is more precise in the HydroCAD model as compared to StreamStats. Unfortunately, there were no available USGS gaging stations within, or connected to, the Watershed Study Area that could be used to further calibrate the model.

Modeled water levels that peak above a reach's modeled flow capacity presents flood risks to infrastructure and adjacent private property. Modeled water levels that peak above modeled flood elevations associated with roadway culverts risk flooding streets. Graphic figures representing potential areas where flooding may occur during the 1-, 10-, 50-, and 100-year design storm events are included in **Figures 7** to **10**, respectively. The model predicted localized flooding anywhere from a 1-yr storm to a 500-yr storm event.

Drainage Area 1:

Peak flows within DA-1 to the outlet to French Creek, and flooding locations predicted by the HydroCAD® model are included within **Table 3-1**. The area was modeled via 4 separate subcatchments.

Table 3-1: DA-1 Peak Flow and Flooding Locations

Storm Event	Modeled Peak Flow at Outlet (cfs)	Modeled Flooding Location
1-Year Storm	59	• Within the lot south of buildings along West Main St. from CB-299
1.5-Year Storm	59	• No additional flooding areas
2-Year Storm	60	• No additional flooding areas
10-Year Storm	71	• Within reach north of West Main St. between Kipp St. and Church St.
25-Year Storm	78	• No additional flooding areas
50-Year Storm	85	• No additional flooding areas
100-Year Storm	94	• Open swale north of Park St.
500-Year Storm	123	• No additional flooding areas

1 – Much of the flooding within the reaches does not account for flooding in rural settings where water floods onto an adjoining floodplain causing no damage to surrounding properties

Note: All locations that are modeled to flood during more frequent storm events will also flood during subsequent events. For example, if a location is modeled to flood during a 1-year event it will also flood during the 1.5, 2, 10, 25, 50, 100 and 500 year events.

Figure 3-2: DA- 1 Model

Drainage Area 2:

Peak flows within DA-2 to the outlet to French Creek, and flooding locations predicted by the HydroCAD® model are included within **Table 3-2**. The area was modeled via 5 separate subcatchments.

Table 3-2: DA-2 Peak Flow and Flooding Locations

Storm Event	Modeled Peak Flow at Outlet(cfs)	Modeled Flooding Location
1-Year Storm	10	• Northwest corner of intersection of Miller St. and W. Main St.
1.5-Year Storm	13	• No additional flooding areas
2-Year Storm	15	• No additional flooding areas
10-Year Storm	33	• West side of parking lot to Chautauqua Rails-To-Trails along east side of Franklin St. • Intersection of Franklin St. and W. Main St. • Intersection of Park St. and Miller St.
25-Year Storm	49	• No additional flooding areas
50-Year Storm	63	• No additional flooding areas
100-Year Storm	81	• No additional flooding areas
500-Year Storm	138	• W. Main St. from Franklin St. to Miller St.

Note: All locations that are modeled to flood during more frequent storm events will also flood during subsequent events. For example, if a location is modeled to flood during a 1-year event it will also flood during the 1.5, 2, 5, 10, 25, 50, 100 and 500 year events.

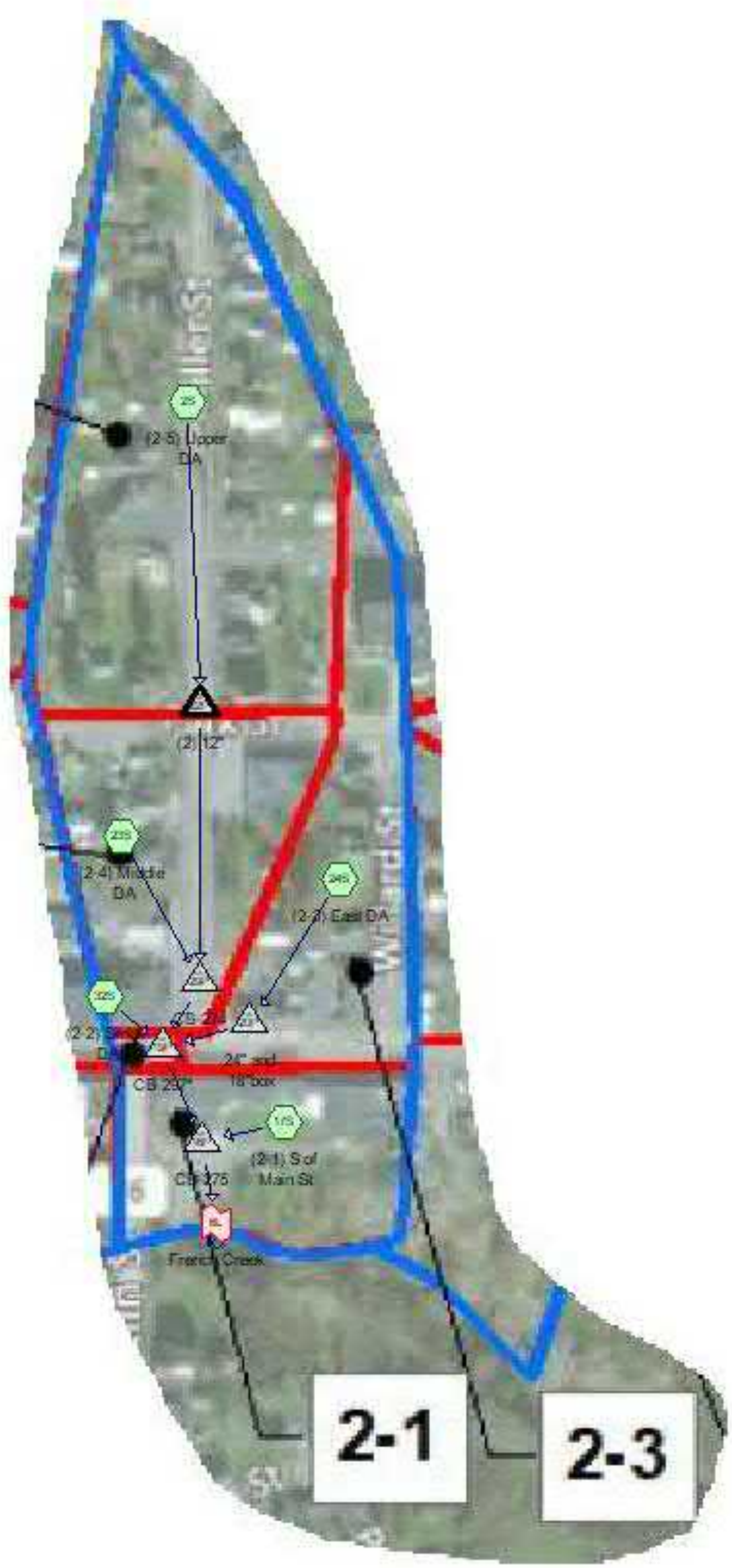


Figure 3-3: DA-2 Model

Drainage Areas 3 and 4:

Peak flows within DA-3 and DA-4 to the outlet to French Creek, and flooding locations predicted by the HydroCAD® model are included within **Table 3-3**. The area was modeled via 13 separate subcatchments. The drainage areas were combined since the Sherman Community Nature Center's pond within DA-3 may overflow to the east into DA-4 during large storm events.

Table 3-3: DA-3 and DA-4 Peak Flow and Flooding Locations

Storm Event	Modeled Peak Flow at Outlet (cfs)	Modeled Flooding Location
1-Year Storm	68	• Within the reach west of Columbia St. north of Sherman High School in residents' backyards • Sherman High School athletic fields just southwest of the baseball diamond • Sherman High School athletic fields just south of Park St. and east of the faculty lot • Within the reach northwest of the Sherman Community Nature Center pond • Within a reach north of Sherman Mayville Rd. just east of Chautauqua-Rails-To-Trails
1.5-Year Storm	70	• No additional flooding areas
2-Year Storm	71	• No additional flooding areas
10-Year Storm	84	• Within the reach that borders the Sherman High School athletic fields to the south • Within the reach south of Park St. and east of East St. • Overtopping the east side of Edmunds St.
25-Year Storm	92	• Overtopping the west side of Edmunds St. • Overtopping south side of E. Main St. • Within the reach south of E. Main St. • Overtopping west side of Columbia St. just north of the Sherman High School • Overtopping CB-118 adjacent to a house north of Park St. • Overtopping the intersection of Columbia St. and Park St. • Within the reach south of Park St. along the east side of the athletic fields
50-Year Storm	92	• Overtopping the Sherman Community Nature Center's pond with flow going east from DA-3 to DA-4 • Within the reach west of Edmunds St. within DA-4
100-Year Storm	91	• Overtopping the existing Sherman Community Nature Center pond
500-Year Storm	91	• Overtopping north side of Park St. upstream of the swale that runs along the athletic fields

Note: All locations that are modeled to flood during more frequent storm events will also flood during subsequent events. For example, if a location is modeled to flood during a 1-year event it will also flood during the 1.5, 2, 5, 10, 25, 50, 100 and 500 year events.

Figure 3-4: DA-3 & DA-4 Model

4.0 ALTERNATIVES ANALYSIS

A retrofit opportunity matrix was developed to evaluate potential stormwater mitigation alternatives based on information obtained from prior studies and field data collection activities. The potential alternatives include:

- Stormwater detention – this practice focuses on providing localized storage to a drainage area to allow either detention and sedimentation or retention and infiltration, reducing total nutrient and sediment loads and peak runoff flow rates to downstream conveyance infrastructure.
- Reduction in impervious areas – this practice focuses on replacing existing or proposed impervious areas with more permeable areas that capture and infiltrate stormwater runoff. As a result, peak flow and nutrient and sediment loads are reduced.
- Bioretention/rain garden/drainage infrastructure improvements – these GI practices focus on modifying existing drainage infrastructure to incorporate a bioretention/rain garden area to aid in reducing peak flows downstream by allowing retention and infiltration while benefiting habitat and enhancing public safety and community aesthetics.

The projects were ranked based on criteria associated with stormwater benefits (quantity and quality), constructability, cost and co-benefits. The rankings were based on the following criteria with total available points for each criterion in parentheses (see **Appendix F** for the detailed ranking matrix).

- Stormwater Benefits (total 50 out of 100 points)
  - Water Quantity Flood Reduction (10 points)
  - TSS reduction (15 points)
  - Phosphorus reduction (15 points)
  - Nitrogen reduction (5 points)
  - Other contaminant reduction (5 points)
- Constructability (total 20 out of 100 points)
  - Ownership: public or private (10 points)
  - Known constraints (5 points)
  - Permitting (5 points)
- Cost (total 20 out of 100 points)
  - Construction Cost – not included in ranking as we are seeking a range of projects
  - Maintenance Cost (5 points)
  - Fundability (15 points)
- Co-Benefits (total 10 out of 100 points)
  - Energy and air quality impacts (2 points)
  - Habitat and biodiversity (2 points)
  - Community and aesthetic benefits (2 points)

- Human health benefits (2 points)
- Educational Opportunities/Visibility (2 points)

The project advisory team utilized this matrix and recommendations from the B&L-led engineering team to select the five projects to progress to development of concept plans and renderings. The goal for selection of the five projects was to include a diverse collection of projects. Therefore, the projects selected for concept plans were not necessarily ranked based on the five highest overall scores. For example, a proposed stormwater detention retrofit project adjacent to Park Street ranked favorably, but it was not selected as one of the five projects to advance to concept design. The project advisory team determined that the advantage this project had over other concepts regarding stormwater benefits did not outweigh the project's lack of co-benefits provided. Although the Park Street detention retrofit outscored the Main Street green infrastructure concept, the diversity of benefits provided by the latter ultimately led to its selection.

The projects were selected based on developing a diverse collection of potential projects ranging in scale on cost, location (urban vs. rural), and retrofit practice. The purpose was to utilize this matrix as a template that can be repeated by the Village, along with additional surrounding communities, to progress additional projects to concept plans as future funding becomes available.

The projects selected for further evaluation and development of concept plans/visualizations included:

1. DA-1 & DA-2: Green Infrastructure Retrofit Practices along Main Street within the Village's core business district
2. DA-3: Park Street Green Infrastructure Improvements
3. DA-3: Stormwater Detention Retrofit at the Sherman Community Nature Center pond
4. DA-1: Pond Retrofit north of Park Street and east of Sherman-Ripley Rd
5. DA-3: Pond Retrofit upgradient of Sherman High School

The five project locations selected to progress to concept design are provided on **Figure 11**.

4.1 Project Description and Objectives

Project No. 1: Green Infrastructure Retrofit Practices along Main Street are intended to reduce the amount of runoff flowing into the existing NYSDOT storm water closed drainage system, improve water quality by expanding the infiltration capabilities, and decrease the amount of impervious surfaces. The site currently has a 45-60' wide asphalt road with painted parking lines and a bike lane. There are several catch basins and pipes underneath these features which collect/convey runoff directly into the closed drainage system to French Creek.

The proposed concept plan for Main Street, included in **Appendix G**, recommends the installation of the following green infrastructure elements to capture stormwater runoff, treat the water, and allow the water to re-enter the environment naturally through infiltration and evapotranspiration.

- **Permeable Pavement**: A permeable pavement system combines surface, storage, and outflow that allows storm water to infiltrate, through layers of material. The subsurface composition of uniform and large aggregates, creates pore space to capture and store storm water, which will then pass through a layer of sand which captures pollutants in the storm water before it returns to groundwater.
  - **Permeable Asphalt Pavement**: Approximately 3,500 square feet of existing standard asphalt pavement will be replaced with heavy duty permeable asphalt placement with specifications developed by the NYS Department of Transportation. In areas where subsurface material is less permeable, storage stone will be equipped with appropriate overflow underdrain pipe for extreme storm events.
  - **Flexible Porous Pavement**: Approximately 6,500 square feet of standard concrete and asphalt pavement will be replaced with heavy-duty porous pavement made from recycled rubber, stone and a urethane binding agent. The material is extremely porous, removes up to 90% of soluble phosphates and nitrates, is resistant to freeze/thaw, and is resistant to most chemicals. The flexible porous pavement within the project area will capture runoff from adjacent impervious sidewalks, which would be regraded to provide positive pitch towards the flexible porous pavement, and allow infiltration.
- **Bio-Retention Bumpouts**: A series of bioretention bumpouts, totaling approximately 10,000 SF will be incorporated to capture and filter stormwater runoff from the existing crowned roadways via curb drops. The bioretention areas will provide pollution treatment to the collected stormwater and promote groundwater recharge through infiltration. They will be planted with native trees, shrubs, grasses and perennial flowers to provide aesthetic appeal, natural habitat for birds and insects, biological uptake and evapotranspiration. Hardy plant species, from the New York State Department of Environmental Conservation (NYSDEC) recommended plant lists, will be placed in groupings for low maintenance along the state road-way. Due to significant storm

events not intended to be managed by the bioretention bumpouts, overflow risers will convey stormwater to the storm sewer system. Although the primary function of the bumpouts will be stormwater management, they will also act as traffic calming measures to improve safety for pedestrians and vehicles in addition to creating gateways into the heart of the Village business district. Locations of the bioretention bumpouts will be placed strategically to harvest the maximum amount of runoff while providing bumpouts near intersections, defining on-street parking, and incorporating two mid-block crossings for pedestrians along Main Street.

- **Downspout Disconnections**: The existing downspouts along the storefront roofs on Main St. will be disconnected and directed into rain barrels and stormwater infiltration planters. Store owners will have the ability to reuse stormwater runoff from the rain barrels to water planters. Due to significant storm events not intended to be managed by the disconnected downspouts, the rain barrels and stormwater infiltration planters will overflow into adjacent bioretention bumpouts.
- **Stormwater Street Trees:** The project includes planting approximately 22 urban stormwater street trees in CU structural soil to provide water quality benefits such as reduction in stormwater runoff volume by infiltration and evapotranspiration and stormwater interception. The trees also provide numerous other benefits including reduction of urban heat island effect, phytoremediation of contaminated water, reduction in atmospheric carbon, interception of particulate matter, absorption of ozone, nitrogen and sulfur dioxide and an overall improved visual quality. Tree species will be selected from the NYSDEC recommended plant lists; promoting biodiversity throughout the corridor to avoid complete loss due to pest related issues.
- **Reduced Driveway Widths:** The project proposes removing standard impervious expanses of driveways to install bioretention bumpouts that would provide stormwater management benefits and improved safety for vehicles and pedestrians.
- **Interpretive Education Panels:** Following the NYSEFC standards listed online, interpretive educational signage panels will be incorporated to increase awareness of these systems and to educate residents and visitors about benefits of green infrastructure and its positive impacts to preserving the water quality of French Creek.
- **Public Parking Improvements:** Installation of non-porous pavements in an area currently comprised of dirt/gravel, to be pitched towards bioretention gardens. Stormwater runoff is captured and treated before entering the creek. This may also include porous pavement within parking stalls only.

Perspective renderings of the proposed green infrastructure retrofits along Main Street are provided in **Appendix H**.

Project No. 2: Park Street Green Infrastructure Improvements adjacent to the school athletic fields along the Park Street frontage will vastly improve current stormwater runoff collection and pedestrian safety while also enhancing the aesthetics of this community recreation observation area. The current configuration of the Park Street roadway shoulder promotes sheet flow of storwater runoff to the entire length of the athletic field, and contributes to the seasonal localized flooding of the athletic fields during heavy storm events. Construction of a new curbed, flexible porous pavement sidewalk provides an opportunity to better manage and treat stormwater runoff, and to reduce peak flows to the field while improving pedestrian and athletic event spectator safety. Overall, the proposed project would provide education and aesthetic value, pedestrian safety enhancements, improve water quality, and provide a reduction in localized flooding using green infrastructure features. The concept plan for the proposed improvements is provided in **Appendix G**.

Based on a field review of the site conditions, there are two principal mechanisms causing seasonal flooding at the project site (i.e., the athletic field below/adjacent to Park Street). These conditions include:

- **Undersized Stormwater Conveyance Culverts**: the existing 12-inch culvert that runs north to south under the west end of the athletic fields was modeled under existing conditions and resulted in exceeding capacity during a 1-year storm. Various modeling scenarios were conducted, including increasing the size of these culverts to convey stormwater runoff during larger storm events. However, increasing the culvert size exacerbates flooding farther downstream. Therefore, a section of the existing 36-inch culvert must also be increased in diameter to 48-inched to preclude stormwater surcharge in the 12-inch Park Street culvert and within the drainage swale running along the south edge of the athletic field. Proposed changes to the existing pipe network are shown on **Figure 12**.

- **Insufficient Drainage Infrastructure on Park Street**: Currently there are no drainage inlets along the south side of Park Street above the athletic fields. The pavement section is configured with an oversized paved shoulder which allows street runoff to sheet flow to and through the chain link fence and down onto the athletic field. As described above, street runoff should be intercepted and conveyed to the existing closed drainage system at the west end of the field adjacent to the pedestrian tunnel. Further, due to the limited capacity of the existing 12" pipe between Park Street and the 36" closed system at East Main Street, it is recommended that green infrastructure features be used to capture, treat, and attenuate peak runoff flows prior to entering the 12" closed drainage system.

Project No. 3: Stormwater Detention Retrofit at the Sherman Community Nature Center proposes to expand the facility's existing wet pond in order to increase stormwater storage capacity and reduce peak flows to downstream infrastructure. Currently, excessive peak flows result downstream of the existing pond due to insufficient storage, especially during large rainfall events where the volume of inflow exceeds the pond's available storage and infiltration capacity. This condition causes ongoing channel erosion downstream and increased sediment deposition into French Creek. Provision of additional off-line water quantity storage will reduce flooding in downstream areas, including the school athletic fields, which currently experience localized flooding from the 1-year storm. Additionally, the location of the existing pond near the boundary separating DA-3 and DA-4 results in overflow to the east into DA-4 during large storm events.

The proposed pond expansion will result in roughly 7.7 acre-feet of additional storage capacity, totaling approximately 20.8 acre-feet of combined capacity between the ponds. Additionally, this increased storage capacity will decrease peak flows to French Creek during the 1-, 1.5-, 5-, 10-, 25-, 50-, 100-, and 500- year storm events, as discussed further in **Section 4.2**. The proposed concept plan, for Project No. 4, provided in **Appendix G**, recommends expanding the area of the pond by approximately 1.5 acres and including the following features and benefits:

- **Vegetated Berm:** The project includes construction of a vegetated berm to separate the existing wet pond from the proposed off-line detention pond. This berm will allow for overflow into the detention pond once the wet pond has reached its capacity, where outflow will be controlled. The vegetated berm will also increase the aesthetics of the pond for patrons of the Sherman Community Nature Center, as well as provide increased habitat diversity and natural filtering of runoff overflow.
- **Outlet Control Device:** The existing wet pond at the Sherman Nature Community Center does not allow for conveyance of detained stormwater by any means other than infiltration and evapotranspiration. The proposed detention pond will include installation of an outflow control device which will aid in reduction of peak flows downstream, increase the pond's storage capacity as detained water is released, and enhance the pond's pollutant removal potential.
- **Underground Outlet to Stream:** The project proposes to release detained stormwater to a stream channel located west of the existing pond via approximately 100 LF of subsurface outlet piping extending from the outlet control device. This outlet pipe will work in conjunction with the outlet control device to reduce peak flows downstream, while making more storage capacity within the ponds available during longer storm events.
- **Emergency Spillway:** The project proposes addition of an emergency spillway along the west side of the existing wet pond. The spillway will be constructed to allow for flood release during 100-year storms or greater. The position of the proposed spillway will allow for flood waters released from the pond to flow downgradient toward the stream channel west of the pond and would essentially consist of an excavated opening within the existing pond bank with small stone armoring for erosion protection.

Project No. 4: Pond Retrofit north of Park Street and east of Sherman-Ripley Road proposes to increase stormwater storage capacity within DA-1 in order to attenuate flows from upstream areas before reaching the more densely developed areas of the Village. Currently, a lack of storage in the upper reaches of this drainage area results in excessive peak flows and associated erosion and sediment deposition downstream of the proposed detention pond. This will result in a reduction in peak flows and localized flooding downstream of this pond retrofit, including localized flooding from the 1-year storm along West Main Street. Additionally, the proposed pond will provide a number of aquatic and wetland habitat enhancements, as well as enhanced water quality through off-line water quality treatment storage.

The proposed stormwater detention pond will result in approximately 12.0 acre-feet of additional storage capacity within DA-1. This increased storage capacity will decrease peak flows to the Village- and NYSDOT-owned closed drainage systems in the business district and French Creek during the 1-, 1.5-, 5-, 10-, 25-, 50-, 100-, and 500- year storm events, as discussed further in **Section 4.2**. The proposed concept plan, provided in **Appendix G**, recommends constructing a wet detention pond approximately 3.4 acres in area, including the following features and benefits:

- **Forebay (with spillway):** A forebay on the west side of the proposed pond will allow for pretreatment of inflow, as well as storage of approximately 10% of the water quality volume (WQv) to protect the flow pipe and avoid sediment resuspension. The forebay will include a spillway designed to allow water to flow into a high marsh, bordered by a vegetated berm, where water will infiltrate.
- **High Marsh:** The high marsh will act as an internal berm to provide a minimum flow path of 2:1 (length to relative width) and will be heavily vegetated with a variety of native plants. The high marsh is designed to be inundated with approximately 0.5 feet of water during large storm runoff events.
- **Low Marsh:** The proposed pond includes a low marsh which provides a low flow channel between pools. This low marsh will typically be inundated with approximately 1.5 feet of water.
- **Micro-Pool:** A smaller permanent pool (approximately 7 feet deep) is proposed between the low marsh and the pond's outfall. This pool will aid in avoiding resuspension or settling of particles, and will also provide habitat for aquatic plants and animals.
- **Emergency Spillway:** The project proposes addition of an emergency spillway to allow for flood release during 10-year storms or greater. The position of the spillway will allow for flood waters released from the pond to flow downgradient toward the stream channel west of the pond.
- **Outlet Control Device:** The proposed detention pond will include outflow control devices which will aid in reduction of peak flows downstream, increase the storage

capacities of the pond as detained water is released, and enhance the pond's pollutant removal potential. This outfall will outlet to an existing shallow concentrated flow path adjacent to the pond.

- **Habitat Diversity:** The proposed detention pond will not only provide habitat for numerous aquatic species, but also for waterfowl and other wetland species through selection of native wetland plantings.
- **Enhanced Water Quality:** Off-line water quality treatment storage from the contributing drainage area of the proposed pond will be provided via pollutant settling and biological uptake.

Project No. 5: Dry Detention Pond Retrofit upgradient of Sherman High School proposes to increase stormwater storage capacity within DA-3 in order to attenuate flows from upstream areas before reaching the more densely developed areas of the Village, including the school property, Columbia Street, and athletic field. Currently, a lack of storage in the upper reaches of this drainage area results in excessive peak flows and associated erosion and sediment deposition downstream of the proposed dry detention pond. The proposed pond will be oriented to capture runoff flowing south along Miller Street and provide temporary off-line storage before conveying flow back toward natural drainage channels to the south and east. This will result in reductions in peak flow rates and localized flooding downstream of this pond retrofit, including localized flooding from the 1-year storm between Miller Street and Columbia Street within the backlot swale just north of the school. Additionally, the proposed pond will provide enhanced water quality through off-line water quality treatment storage. This detention pond will be designed to collect and store stormwater runoff only during storm events; otherwise the pond will remain dry via a low-flow channel equipped with a stone-lined underdrain.

The proposed dry detention pond will result in approximately 5.25 acre-feet of additional storage capacity within DA-3 above the shallow swale that conveys runoff south to a closed drainage system that outlets to drainage structures within the athletic field (Project 2). This increased storage capacity will decrease peak flow rates to the Village- and NYSDOT-owned closed drainage systems in the school's athletic field, business district and French Creek during the 1-, 1.5-, 5-, 10-, 25-, 50-, 100-, and 500- year storm events, as discussed further in **Section 4.2**. The proposed concept plan, provided in **Appendix G**, recommends constructing a pond approximately 1.25 acres in area, including the following features and benefits:

- **Forebay (with spillway):** A forebay on the north side of the proposed pond will allow for pretreatment of inflow, as well as storage of approximately 10% of the water quality volume (WQv) to protect the flow pipe and avoid sediment resuspension. The forebay will include a rip-rap spillway designed to allow water to flow into the larger storage area where water will infiltrate as well as drain to the pond's underdrain system.

- **Underdrain System:** A 12-inch underdrain pipe beneath the pond will collect stormwater collected during low flows and drain it to the pond's outlet control device. Grading will be such that a "low flow channel" will be placed above the underdrain.
- **Emergency Spillway:** The proposed dry pond concept includes an emergency spillway to allow for flood release during 10-year storms or greater. The position of the emergency spillway, located on the southeast side of the pond, will release flood waters away from existing infrastructure along Miller Street and flow downgradient toward the stream channel southeast of the pond.
- **Outlet Control Device:** The proposed dry detention pond will include an outflow control device which will aid in reduction of peak flow rates to downstream infrastructure, increase the storage capacities of the pond as detained water is released, and enhance the pond's pollutant removal potential. This outfall will discharge toward an existing stream channel.
- **Medium Stone Outlet Protection:** The pond outlet will be armored with medium stone outlet protection to stabilize the land receiving discharged stormwater from the pond outlet by reducing the velocity of flow.
- **Level Spreader:** A level spreader will be used at the pond outlet to dissipate high velocity discharges and reduce the risk of erosion immediately downstream of the pond. The level spreader will consist of a depression in the soil surface at the point of discharge from the pond outlet, which will spread stormwater flows leaving the pond over a level, stabilized surface.
- **Enhanced Water Quality:** Off-line water quality treatment storage from the contributing drainage area of the proposed pond will be provided via pollutant settling and biological uptake.
- **Vegetated Berm:** The pond design will include an approximately 1.5-foot tall berm, which will be vegetated with native plantings using Ernst Conservation Seed Mix to enhance aesthetics and habitat diversity.

4.2 Water Quantity and Quality Benefits

The storage created by proposed Projects 3, 4 and 5 would attenuate stormwater flows and reduce peak flows downgradient of the proposed project locations within the Village's core business district. An updated HydroCAD® model was developed to include the added storage provided by the proposed detention pond projects. Precipitation data, topography, soil type, land cover, land use, and existing drainage were carried over from the existing condition HydroCAD® model, and ponds were added to the drainage network based on the concept plans provided in **Appendix G** to observe the effect of this added storage on peak flows downstream. Peak flows at each drainage area's outlet (French Creek) were predicted for the 1-, 1.5-, 2-, 10-, 25-, 50-, 100-, and 500-year storm events using the proposed conditions model. These results were compared to the output from the existing conditions model for the same storm events in order to observe the downstream benefits which would be created by Projects 3, 4, and 5. These comparisons are summarized in **Table 4-1**, below. The HydroCAD® summary reports for the updated model (proposed conditions) are included in **Appendix D**.

Table 4-1. Peak Discharges to French Creek: Existing vs. Proposed Conditions

Drainage Area	1-Year Storm Event		1.5-Year Storm Event		2-Year Storm Event		10-Year Storm Event	
	Existing Condition (cfs)	Proposed Condition (cfs)	Existing Condition (cfs)	Proposed Condition (cfs)	Existing Condition (cfs)	Proposed Condition (cfs)	Existing Condition (cfs)	Proposed Condition (cfs)
DA-1	**59**	16	**59**	19	**60**	22	**71**	44
DA-2	10	10	13	13	15	15	33	33
DA-3	65	41	67	49	68	57	82	61
DA-4	3	3	3	3	3	3	3	3
Drainage Area	**25-Year Storm Event**		**50-Year Storm Event**		**100-Year Storm Event**		**500-Year Storm Event**	
	Existing Condition (cfs)	**Proposed Condition (cfs)**	**Existing Condition (cfs)**	**Proposed Condition (cfs)**	**Existing Condition (cfs)**	**Proposed Condition (cfs)**	**Existing Condition (cfs)**	**Proposed Condition (cfs)**
DA-1	78	62	85	77	94	93	123	123
DA-2	49	49	63	63	81	81	138	138
DA-3	89	68	89	81	88	87	87	88
DA-4	3	3	3	3	3	3	3	3

WQv for the Project 1 drainage area was calculated using the formula developed in Center for Watershed Protection's 2015 New York State Storm Water Development Manual. Rainfall for this calculation uses the 90% rainfall event, equal to 1.0 inch for Sherman, NY. Project 1 is capable of capturing the full WQv for its contributing drainage area, based on this design storm event. A summary of WQv reduced by Project 1, known as Runoff Reduction Volume (RRv), is provided in **Table 4-2**, below. A detailed summary of how these values were calculated for both projects is provided in **Appendix I.**

Table 4-2. Summary of Water Quality and Runoff Reduction Volumes					
Project	Total Area (Acres)	Impervious Area (Acres)	Percent Impervious %	WQv (ft^3)	RRv (ft^3)
Project 1 - Green Infrastructure Retrofit Practices along Main St.	3.3	0.75	100	11,380	11,380
Project 5 - Park Street Green Infrastructure Improvements	1.0	1.0	100	3,449	3,449

4.3 Opinion of Probable Cost Estimates

Approximate, detailed, line item costs are included within **Appendix J**. Table **4-3** summarizes these approximations. Note that cost estimates assume a 20% construction contingency.

Table 4-3. Cost Estimate and Benefit-Cost Analysis				
Project	Total Cost Estimate ($)	Water Quantity Benefit	Water Quality Benefit	Other Benefit
Green Infrastructure Retrofit Practices along Main St.	$1,433,193	Volumetric reduction to closed drainage system and reduction of localized flooding at Main St.	Reduction of sediment, phosphorus, and nitrogen loads	Infrastructure improvements Educational opportunities Pedestrian safety/traffic calming Aesthetic value
Park Street Green Infrastructure Improvements	$431,829	Volumetric reduction to closed drainage system and reduction of localized funding on school ball fields and Park Street	Reduction of sediment, phosphorus, and nitrogen loads	Infrastructure improvements Educational opportunities Pedestrian safety/traffic calming Aesthetic value
Stormwater Detention Retrofit at the Sherman Community Nature Center	$511,782	Reduction of localized flooding downstream	Decreased sediment erosion downstream via reduced peak flows Water quality treatment via pollutant settling and biological uptake	Enhancement of habitat and diversity Mitigates need for downstream capacity improvements
Pond Retrofit north of Park Street and east of Sherman-Ripley Rd.	$584,337	Reduction of localized flooding downstream	Decreased sediment erosion downstream via reduced peak flows Water quality treatment via pollutant settling and biological uptake	Enhancement of habitat and diversity Mitigates need for downstream capacity improvements
Dry Detention Pond Retrofit upgradient of Sherman High School	$266,530	Reduction of localized flooding downstream	Decreased sediment erosion downstream via reduced peak flows Water quality treatment via pollutant settling and biological uptake	Enhancement of habitat and diversity Mitigates need for downstream capacity improvements

4.4 Anticipated Regulatory Approval and Permits

Anticipated permit requirements were identified for each of the five recommended projects, including:

- United States Army Corps of Engineers (USACE) Clean Water Act Section 404 is required for excavation or fill below the ordinary high water elevation of Waters of the United States.
- NYSDEC Clean Water Act Section 401 Water Quality Certification is required for projects that require any federal permit that may result in discharge to Waters of the United States.
- A State Pollutant Discharge Elimination System (SPDES) General Permit (GP) for Stormwater Discharges from Construction Activity is required for a construction project that will involve soil disturbance of one or more acres of land.
- New York State Department of Transportation (NYSDOT) Highway Work Permit for Non-Utility Work (Perm33) is required for any work within a state route right of way. Anticipated permit requirements for each project are summarized in **Table 4-4** below.

Table 4-4: Permits Needed

Selected Alternatives	USACE Clean Water Act Section 404	NYSDEC Clean Water Act Section 401 Water Quality Certification	SPDES GP for Stormwater Discharges from Construction Activity	NYSDOT Highway Work Permit (Perm33)
Green Infrastructure Retrofit Practices along Main Street			✓	✓
Park Street Green Infrastructure Improvements			✓	
Stormwater Detention Retrofit at the Sherman Community Nature Center	✓	✓	✓	
Pond Retrofit north of Park Street and east of Sherman-Ripley Road			✓	
Dry Detention Pond Retrofit upgradient of Sherman High School			✓	

In addition to the permit requirements summarized in the table above, the following regulatory approvals are anticipated to be required for each of the proposed projects if implemented individually or together:

- State Environmental Quality Review (Village of Sherman)
- Endangered Species Act Section 7 Consultation (US Fish and Wildlife Service via the U.S. Army Corps of Engineers)
- Section 106 Finding of No Effect (New York State Historic Preservation Office)

4.5 Potential Funding Sources

The following table summarizes programs offered through the New York State Consolidated Funding Application (CFA) that may provide funding opportunities and assistance to support implementation of the recommended projects.

Table 4-5: Potential Funding and Assistance Opportunities

Selected Alternatives	NYSDEC WQIP Program	EFC GIGP Program	HCR CDBG
Green Infrastructure Retrofit Practices along Main St.	✓	✓	✓
Park Street Green Infrastructure Improvements		✓	✓
Stormwater Detention Retrofit at the Sherman Community Nature Center	✓		
Pond Retrofit north of Park Street and east of Sherman-Ripley Road	✓		✓
Dry Detention Pond Retrofit upgradient of Sherman High School			

The NYSDEC Water Quality Improvement Project (WQIP) Program provided $70 million of funding in 2019 to implement projects that addressed water quality impairments or protected a drinking water source. This grant provided 75% of the total cost, only requiring a local match of 25% (NYSO, 2019). All the selected alternatives aside from the Dry Pond Retrofit upgradient of Sherman High School should be eligible for this grant upon announcement of 2020 funding.

The EFC Green Innovation Grant Program (GIGP) provided $15 million of funding in 2019 to implement projects that improved water quality and demonstrated green stormwater infrastructure in New York. This grant provided a range of 90% to 40% of the total cost, requiring a local match between 10% and 60% (NYSO, 2019). The Main Street Green Infrastructure Retrofit Project and the Park Street Green Infrastructure Improvements should both be eligible for this funding.

The Homes and Community Renewal (HCR) Community Development Block Grant (CDBG) offers eligible municipalities up to $600,000 in grant funding for implementing public water, sanitary sewer and/or stomwater infrastructure improvement projects that directly benefit greater than 5-percent of a municipality’s low-to-moderate income families. Up to $1,000,000 may be awarded for projects receiving co-funding from other sources. The Main Street GI and two stormwater retention pond retrofit projects offer benefits to the entire Village population, and may therefore attract funding from the CDBG program.

Each grant program requires a local match in the form of cash or in-kind “force account” services. It is anticipated that the local match for Projects 1, 2, 3, and 4 would be a combination of cash and in-kind services, the final details or work plan for which would be developed during the grant application process. For Project 5, it is envisioned that the Village DPW, in partnership with the Town Highway Department, and/or County Highway Department, would construct the majority of the dry detention pond and associated grading, fill, and appurtenances.

This report, prepared by B&L D.P.C., certifies that all studies and evaluations on the cost and effectiveness for the recommended projects as shown in **Appendix K**. Additionally, the projects were assessed using the Smart Growth Assessment Form provided in **Appendix L** to aid potential funding.

5.0 OPERATION AND MAINTENANCE

Once constructed, GI and other stormwater flood mitigation projects will require continued investment in long-term operation and maintenance to sustain the life of the asset and to obtain grant funding. The following inspection and maintenance schedules are recommended for the various practices recommended herein.

Porous Pavement Maintenance Requirements	
Inspection Activities	**Suggested Schedule**
Ensure that the porous pavement surface is free of sediment and debris (e.g., mulch, leaves, trash, etc.).	As needed
Ensure that the contributing area upstream of the porous pavement surface is free of sediment and debris.	As needed
Check to make sure that the porous pavement dewaters between storms.	Monthly
Inspect the surface for structural integrity. Inspect for evidence of deterioration or spalling.	Annually
Maintenance Activities	**Suggested Schedule**
Ensure that contributing area and porous pavement surface are clear of debris (e.g., mulch, leaves, trash, etc.).	As needed, based on inspection
Ensure that the contributing and adjacent area is stabilized and mowed, with clippings removed.	As needed, based on inspection
Vacuum sweep porous pavement surface to keep free of sediment.	Typically three to four times per year
Replace the porous pavement, including the top and base course, as needed.	Upon failure

Bioretention & Infiltration Planter Maintenance Requirements	
Inspection Activities	**Suggested Schedule**
Inspect trees and shrubs to evaluate health, replace if necessary.	Twice per year
Inspection underdrain cleanout.	Twice per year
Verify drainage out time of system	Twice per year
Maintenance Activities	**Suggested Schedule**
Add additional mulch.	Annually
Remove sediment buildup, replace vegetation, etc.	Annually

Wet Detention Pond Maintenance Requirements	
Inspection Activities	**Suggested Schedule**
Inspect condition of embankment and emergency spillway for adequate vegetative cover, embankment erosion, and slope failure.	Annually, and after major storm events
Inspect condition of outfalls and drain pipes for obstructions, etc.	Annually, and after major storm events
Inspect sediment forebay for sediment accumulation.	Annually
Inspect condition of wetlands, including vegetative health, evidence of invasive species, etc.	Annually
Inspect drainage area for erosion and possible illicit discharges.	Annually
Maintenance Activities	**Suggested Schedule**
Perform sediment and debris cleanout within forebay or other areas showing accumulation.	When accumulation is >50% design depth, or following observation of negative downstream effects
Replace or repair damaged or missing vegetation	As needed, based on inspection
Repair clogging or erosion at inlets, outlets and spillways	As needed, based on inspection
Perform necessary mowing or weed/invasive species control	Monthly

Dry Detention Pond Maintenance Requirements	
Inspection Activities	**Suggested Schedule**
Inspect condition of embankment and emergency spillway for adequate vegetative cover, embankment erosion, and slope failure.	Annually, and after major storm events
Inspect condition of outfalls and drain pipes for obstructions, etc.	Annually, and after major storm events
Inspect sediment forebay for sediment accumulation.	Annually
Inspect drainage area for erosion and possible illicit discharges.	Annually
Maintenance Activities	**Suggested Schedule**
Perform sediment and debris cleanout within forebay or other areas showing accumulation.	When accumulation is >50% design depth, or following observation of negative downstream effects
Replace or repair damaged or missing vegetation	As needed, based on inspection
Repair clogging or erosion at inlets, outlets and spillways	As needed, based on inspection
Perform necessary mowing or weed/invasive species control	Monthly

6.0 RESOURCES

Center for Watershed Protection, 2015. New York State Stormwater Management Design Manual, NYSDEC, January 2015.

Federal Emergency Management Agency (FEMA), 2019. Q3 Flood Data, Chautauqua County, New York. ESRI ArcInfo Interchange file. Federal Emergency Management Agency, Washington, D.C.

Homer, C.G., Dewitz, J.A., Yang, L., Jin, S., Danielson, P., Xian, G., Coulston, J., Herold, N.D., Wickham, J.D., and Megown, K., 2015. Completion of the 2011 National Land Cover Database for the conterminous United States-Representing a decade of land cover change information. *Photogrammetric Engineering and Remote Sensing*, v. 81, no. 5, p. 345-354

New York State Geographic Information Systems Clearinghouse (NYS GIS), 2019. "NYSGPO Southwest Spring 2017." Accessed July, 2019.

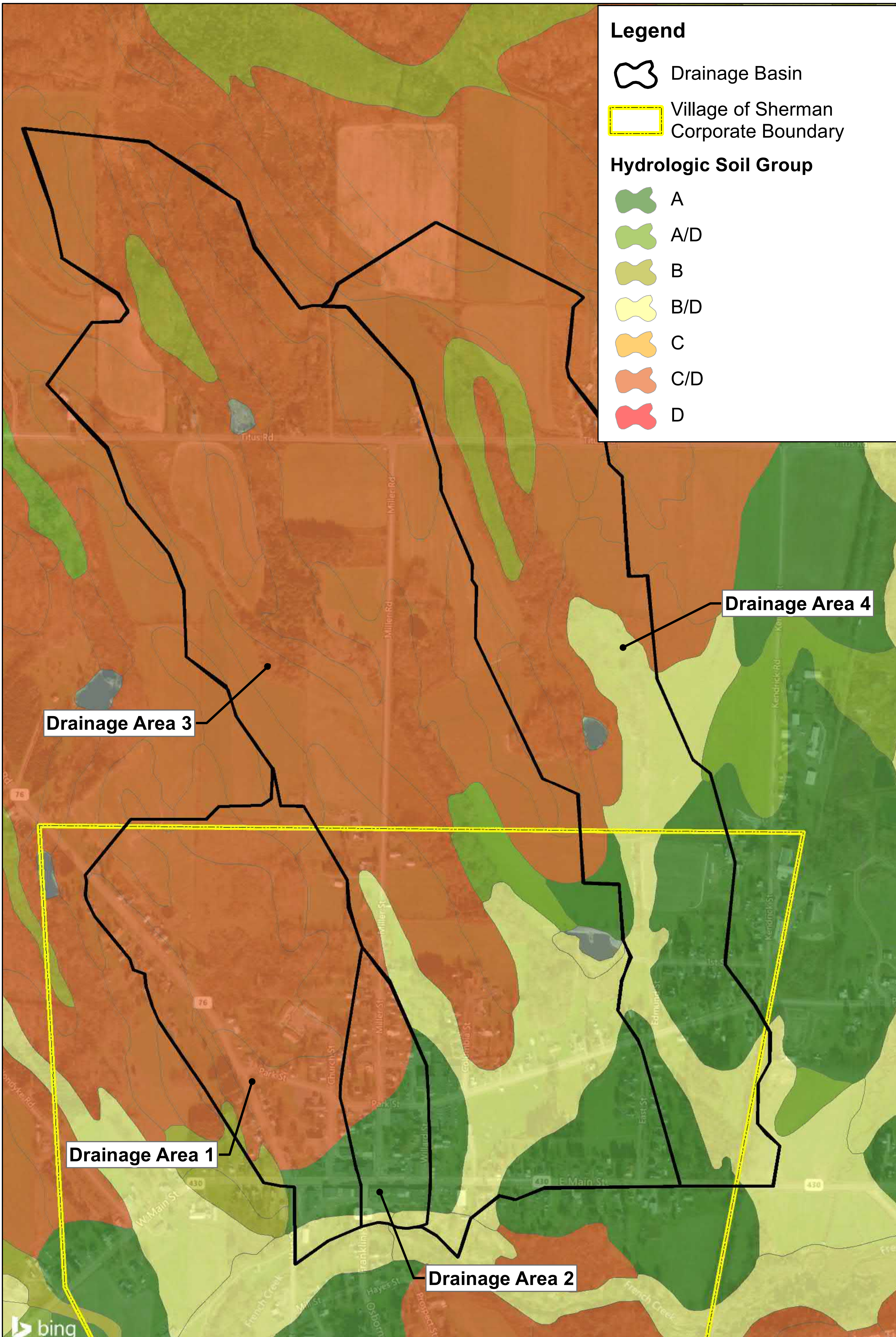
New York State of Opportunity (NYSO), 2019. Regional Economic Development Councils "2018 Available CFA Resources," May, 2019.

Soil Survey Staff. Gridded Soil Survey Geographic (gSSURGO) Database for *New York*. United States Department of Agriculture, Natural Resources Conservation Service. FY2018 Official Release. Available from: https://gdg.sc.egov.usda.gov/

U.S. Department of Agriculture (USDA), 2019. Web Soil Survey. Available from: https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx

U.S. Geological Survey (USGS), 2019. Southwest 17 – Spring, New York Lidar; Classified Point Cloud. Available from: https://gis.ny.gov/elevation/metadata/2017NY-Southwest-NY-Classified-Point-Cloud-USGSv1.2.xml

FIGURES



Barton & Loguidice

N W E S

0 500 1,000 1,500 2,000 Feet

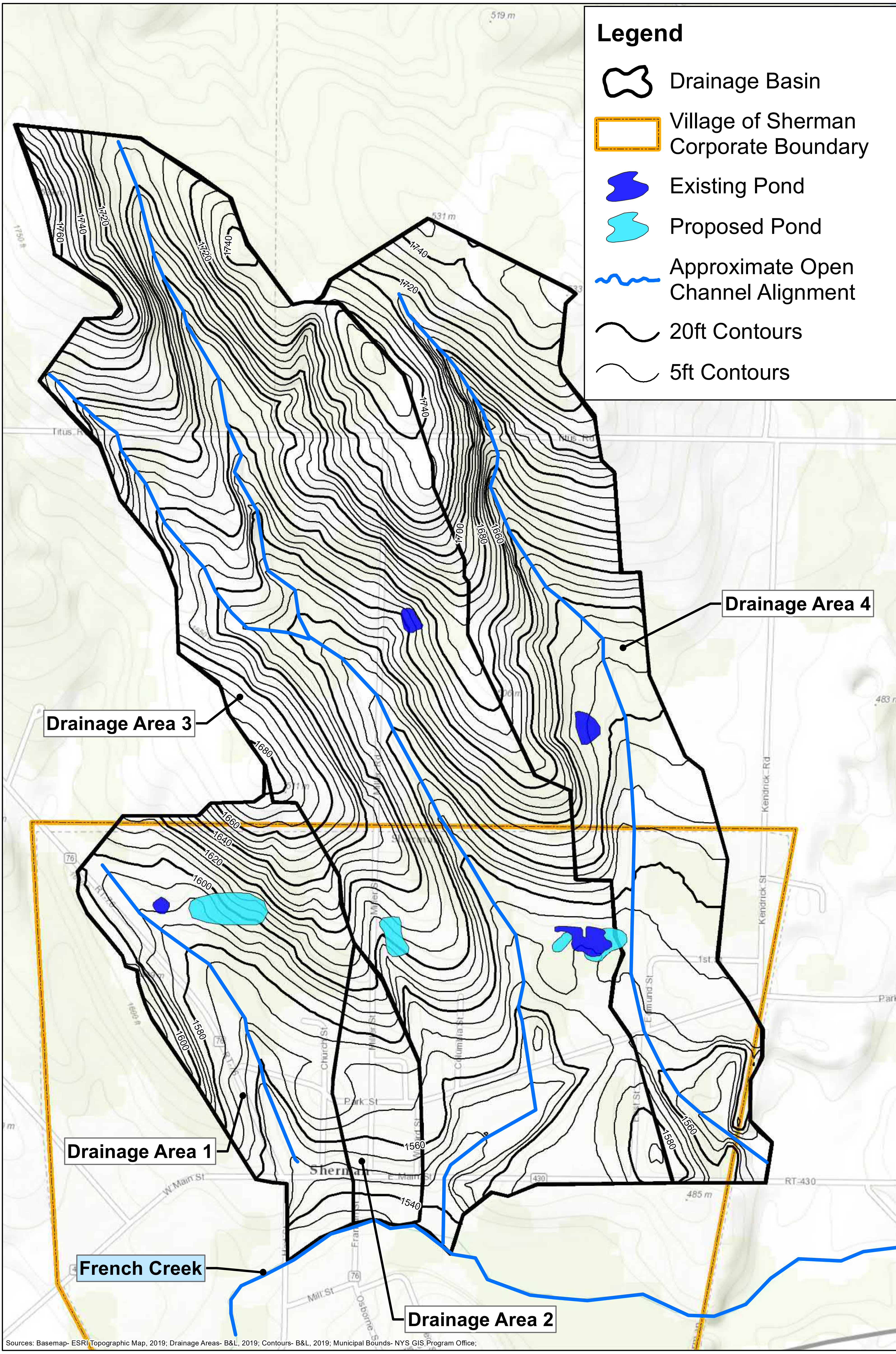
Village of Sherman

Soils Map

Chautauqua County | January 2020 | New York

Figure 1

Project No. 2056.003



Barton & Loguidice

N W E S

0 500 1,000 1,500 2,000 Feet

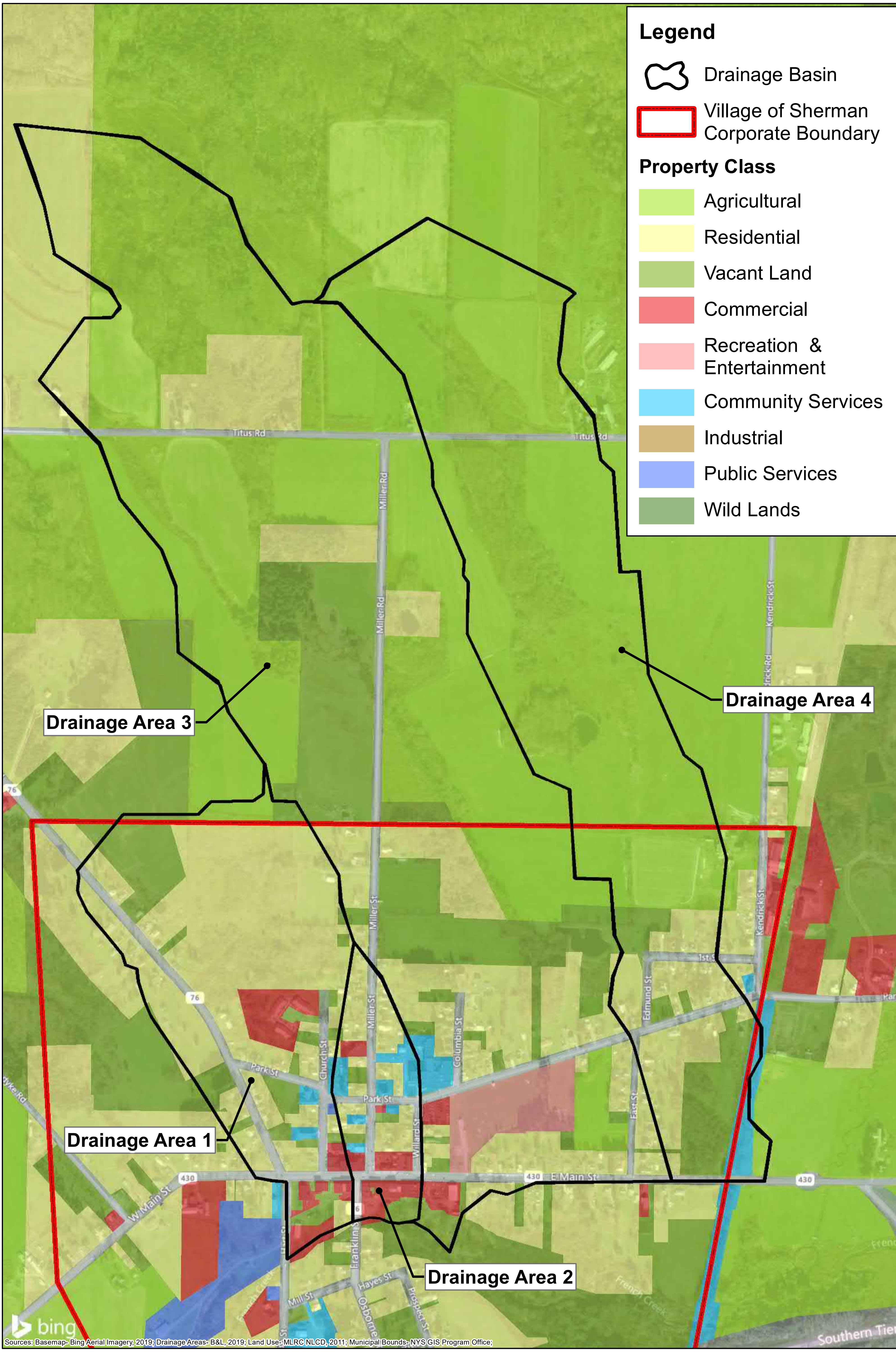
Village of Sherman

Topographic Map

Chautauqua County | February 2020 | New York

Figure 2

Project No. 2056.003



Barton & Loguidice

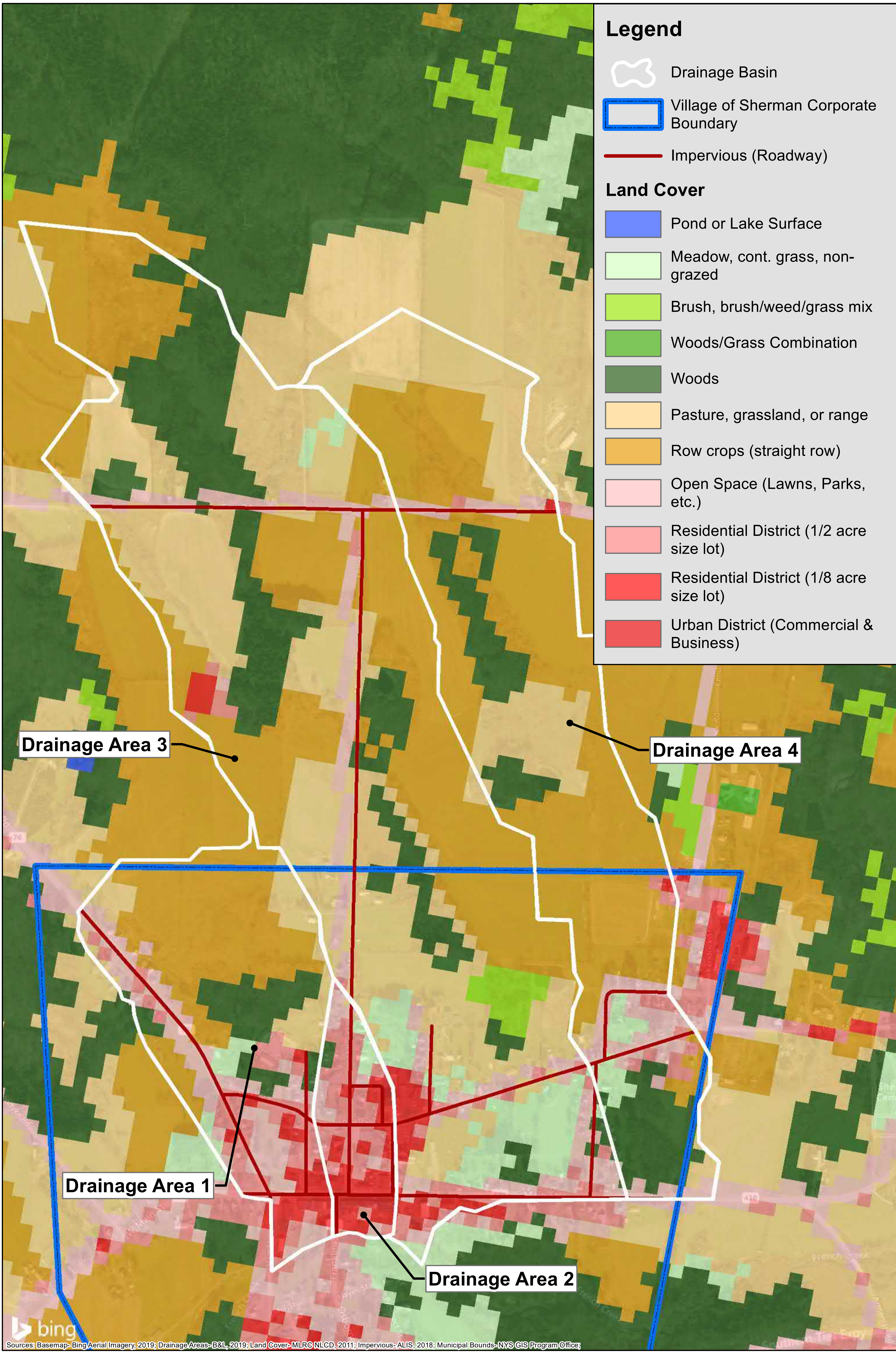
Village of Sherman

Land Use

Chautauqua County | January 2020 | New York

Figure 3

Project No. 2056.003



Barton & Loguidice

N W E S

0 500 1,000 1,500 2,000 Feet

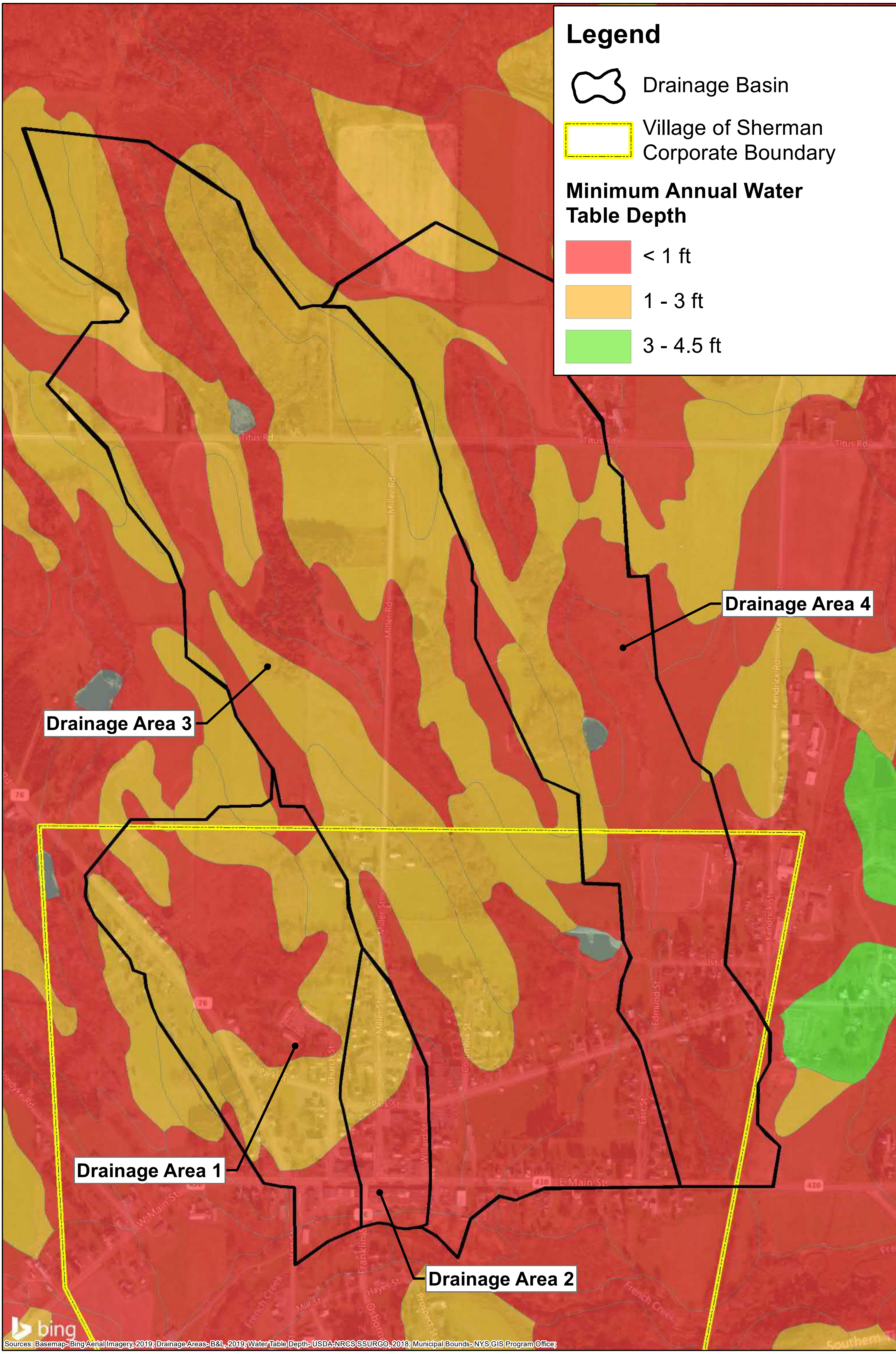
Village of Sherman

Land Cover

Chautauqua County January 2020 New York

Figure 4

Project No. 2056.003



Barton & Loguidice

N W E S

0 500 1,000 1,500 2,000 Feet

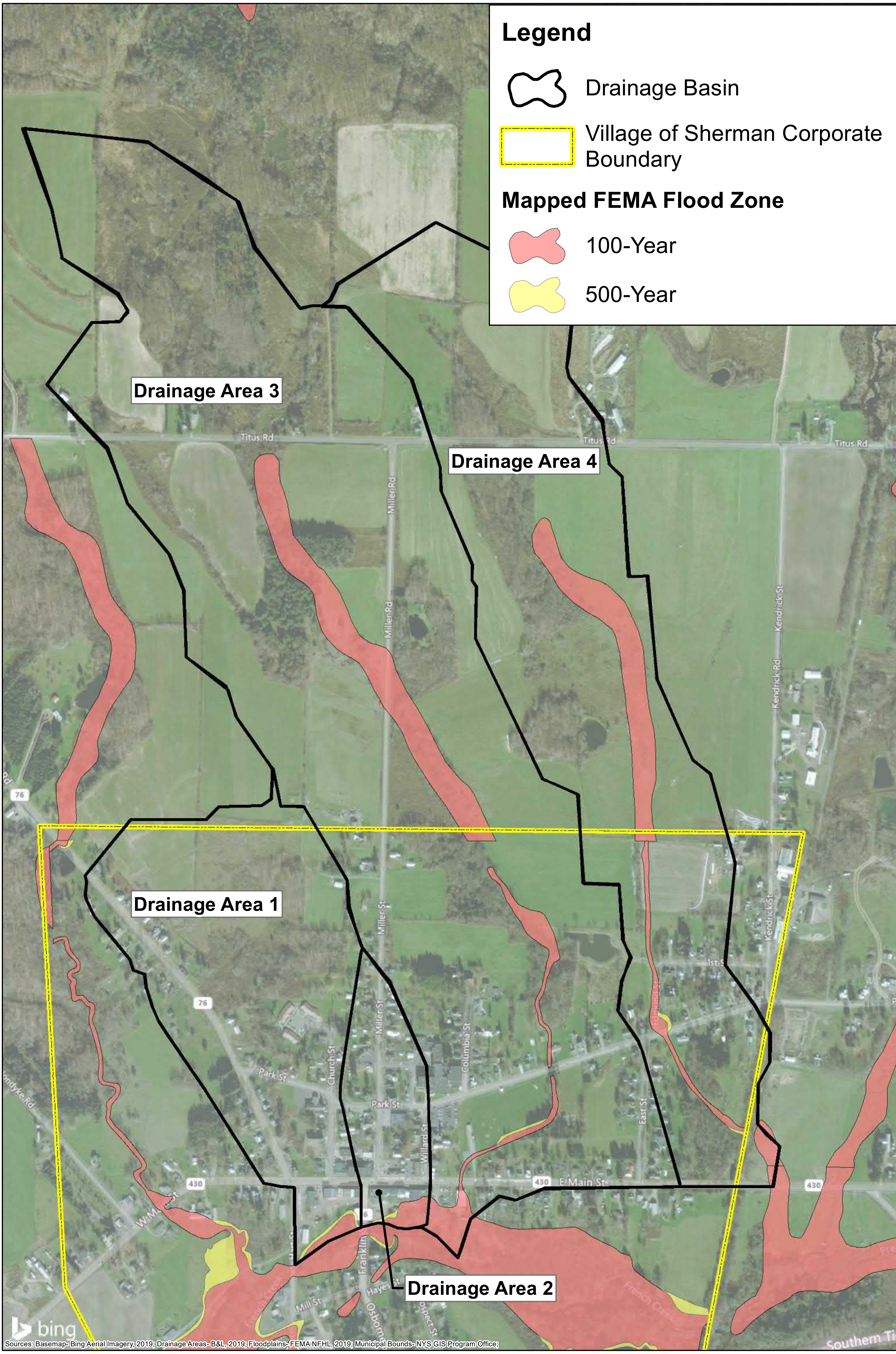
Village of Sherman

Groundwater Levels

Chautauqua County | January 2020 | New York

Figure 5

Project No. 2056.003



Barton & Loguidice

0 500 1,000 1,500 2,000 Feet

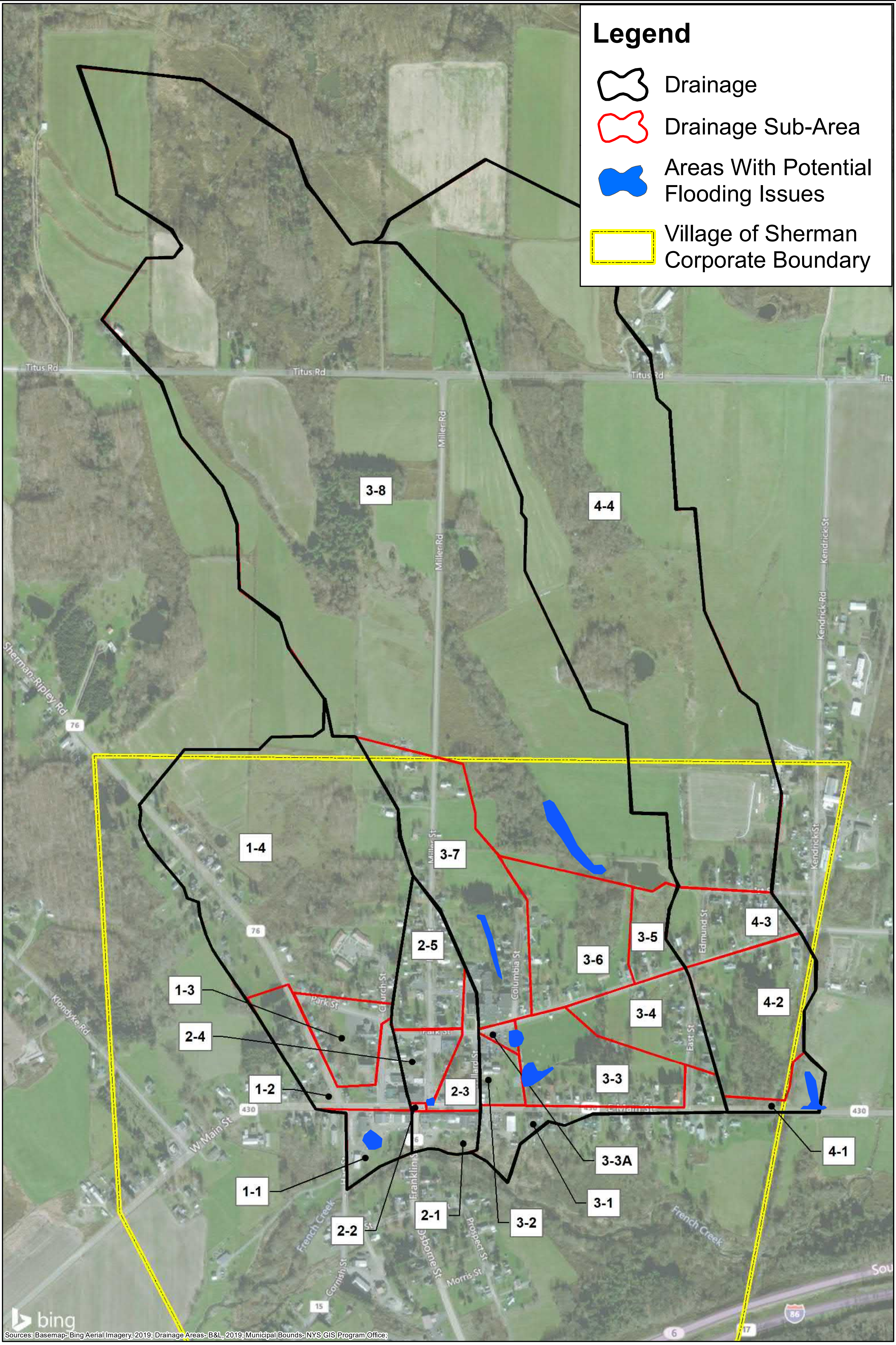
Village of Sherman

Mapped Floodplains

Chautauqua County | January 2020 | New York

Figure 6

Project No. 2056.003



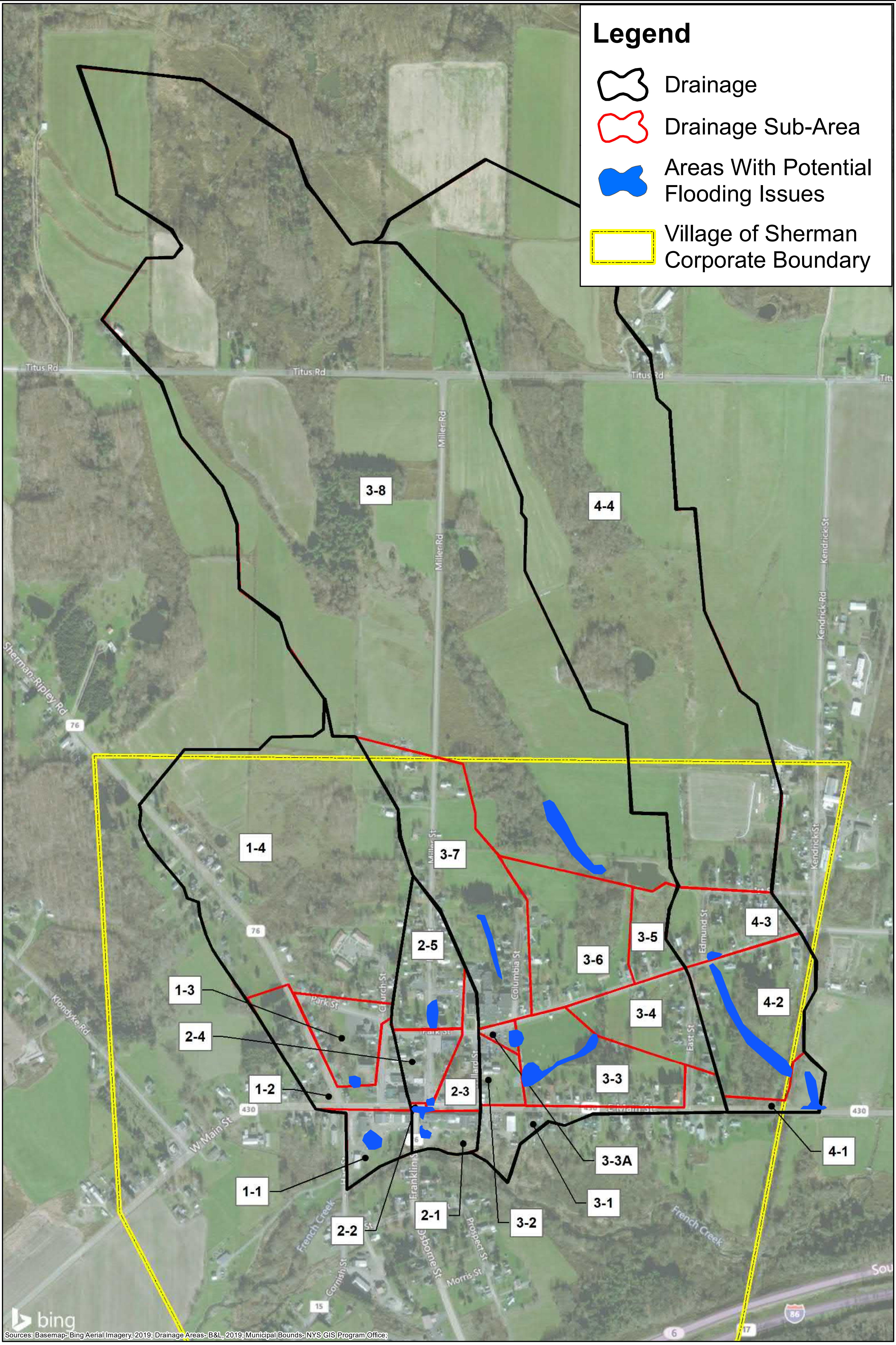
Barton & Loguidice

1 inch = 600 feet

Village of Sherman
1-Year Storm
Areas With Potential Flooding Issues
Chautauqua County January 2020 New York

Figure 7

Project No. 2056.003



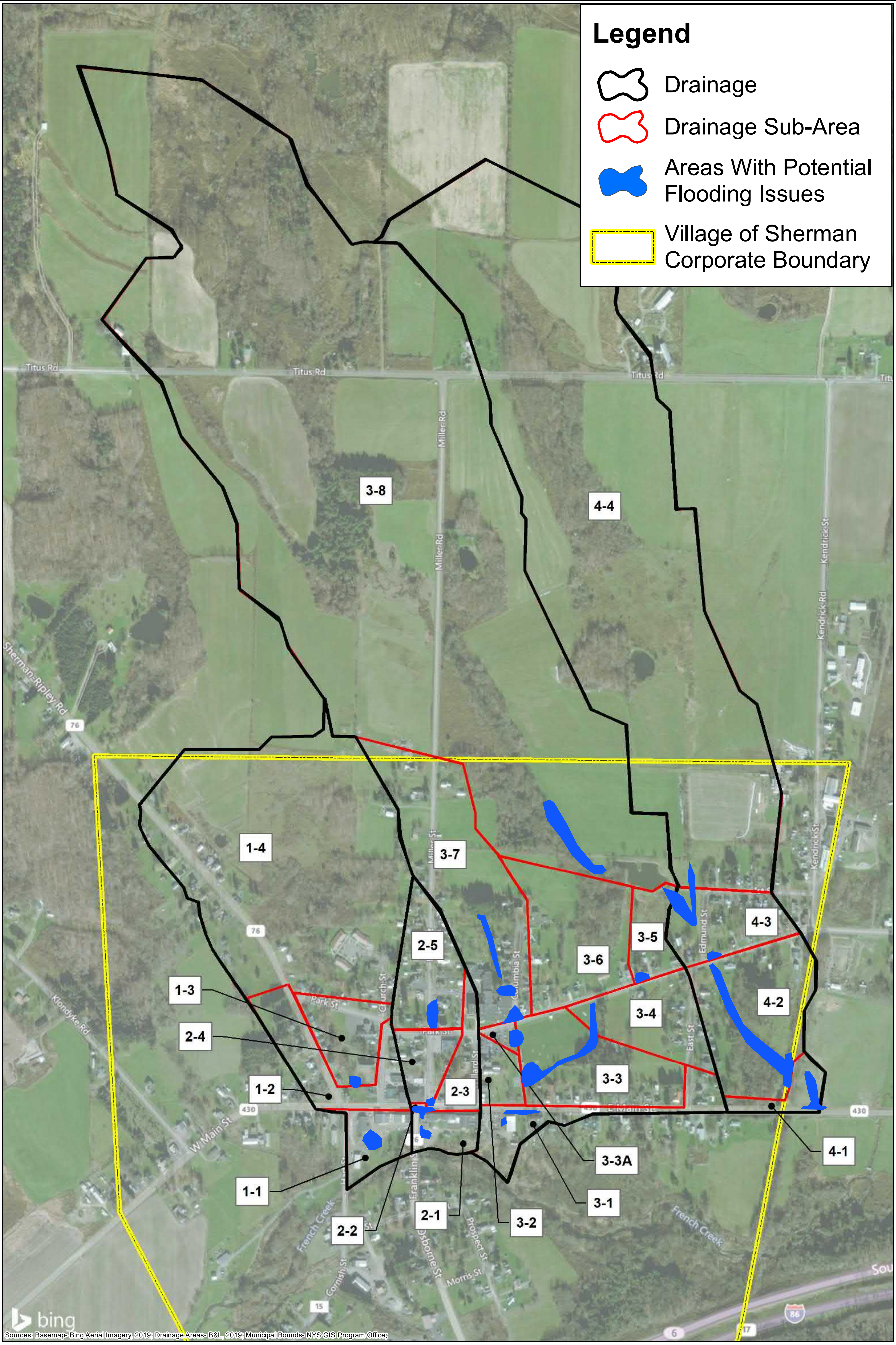
Barton & Loguidice

1 inch = 600 feet

Village of Sherman
10-Year Storm
Areas With Potential Flooding Issues
Chautauqua County | January 2020 | New York

Figure 8

Project No. 2056.003



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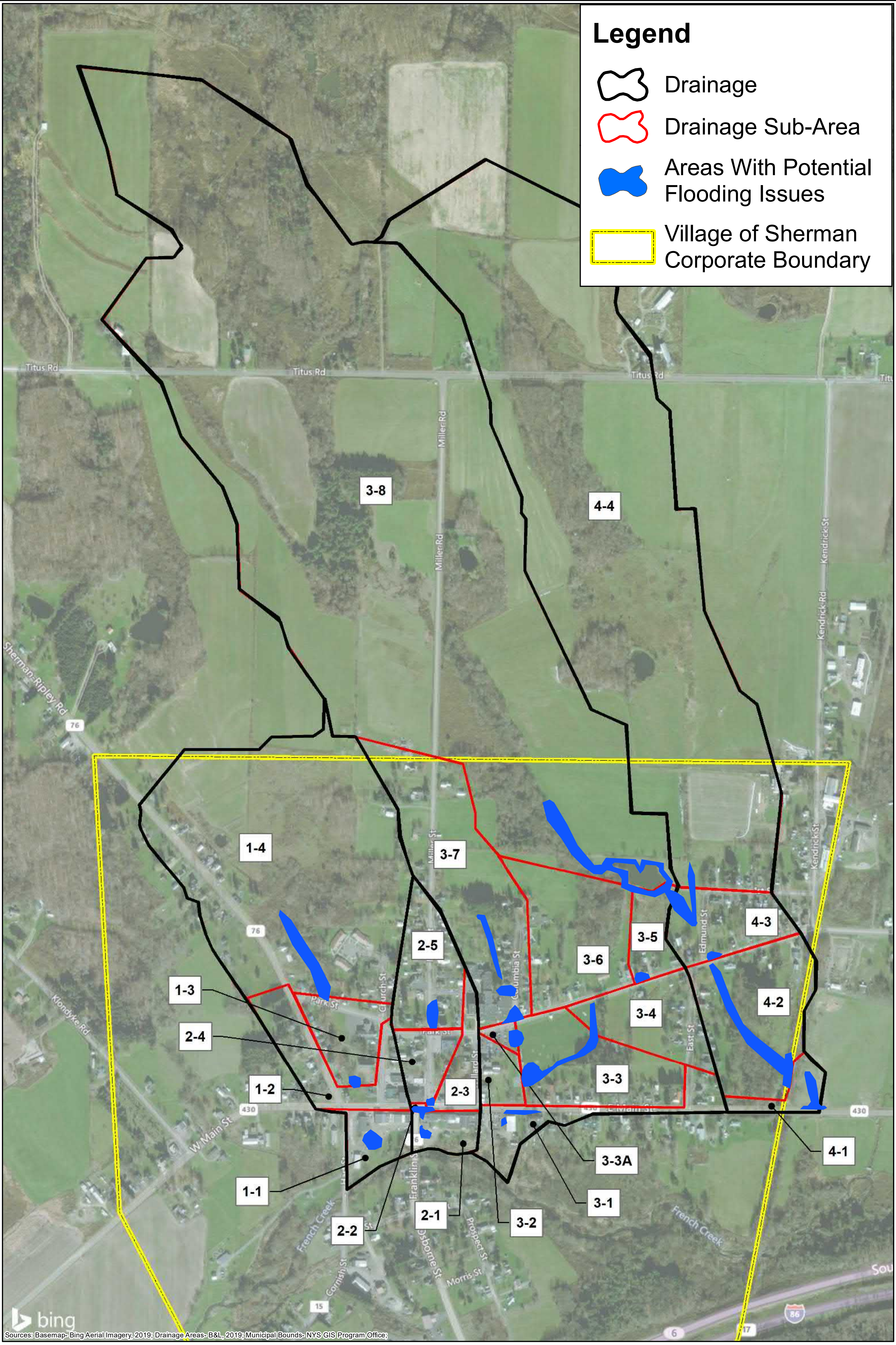
1 inch = 600 feet

Village of Sherman
50-Year Storm
Areas With Potential Flooding Issues
Chautauqua County | January 2020 | New York

Figure 9
Project No. 2056.003



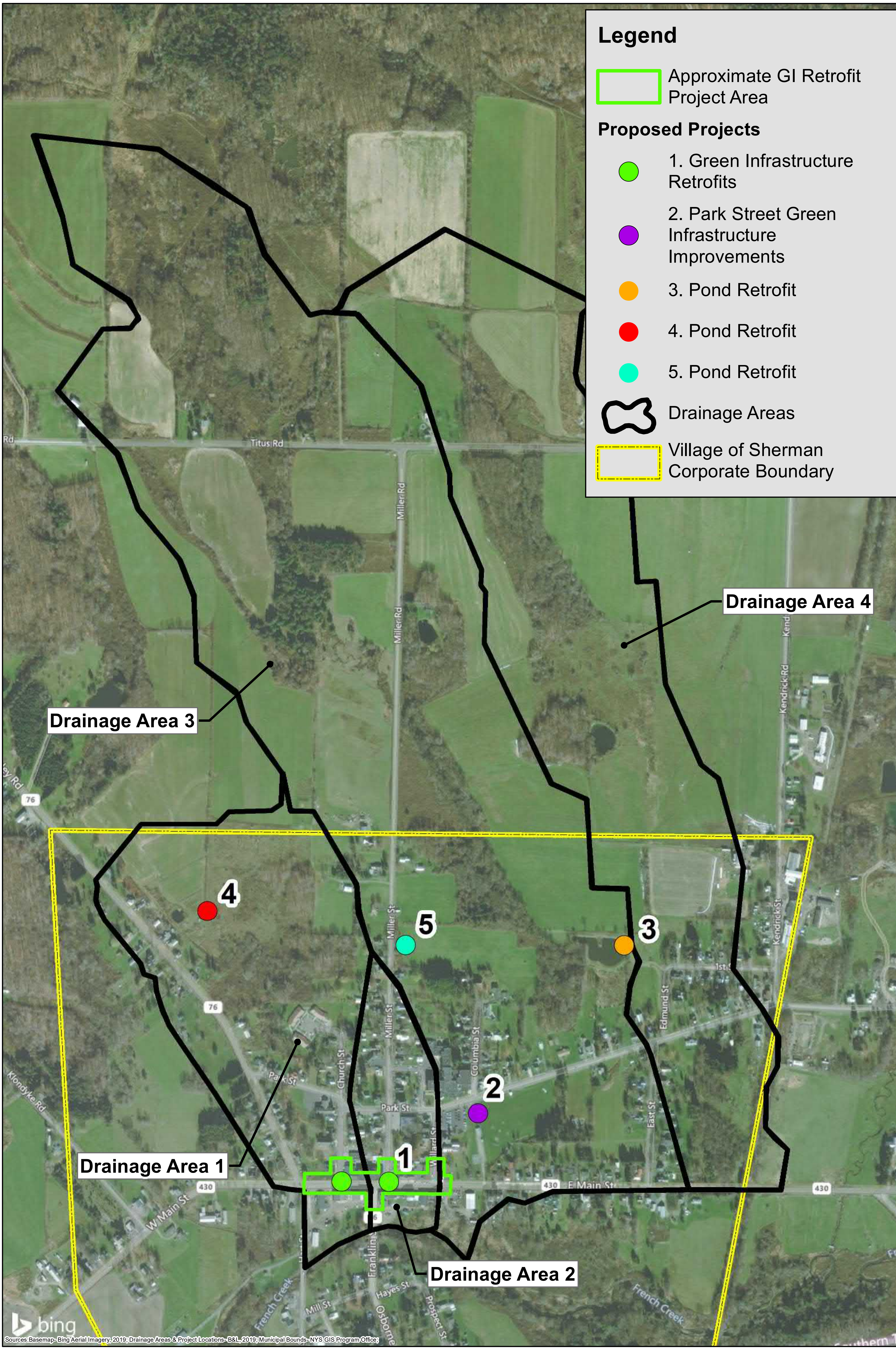
Barton & Loguidice

1 inch = 600 feet

Village of Sherman
100-Year Storm
Areas With Potential Flooding Issues
Chautauqua County | January 2020 | New York

Figure 10

Project No. 2056.003



Barton & Loguidice

1 inch = 600 feet

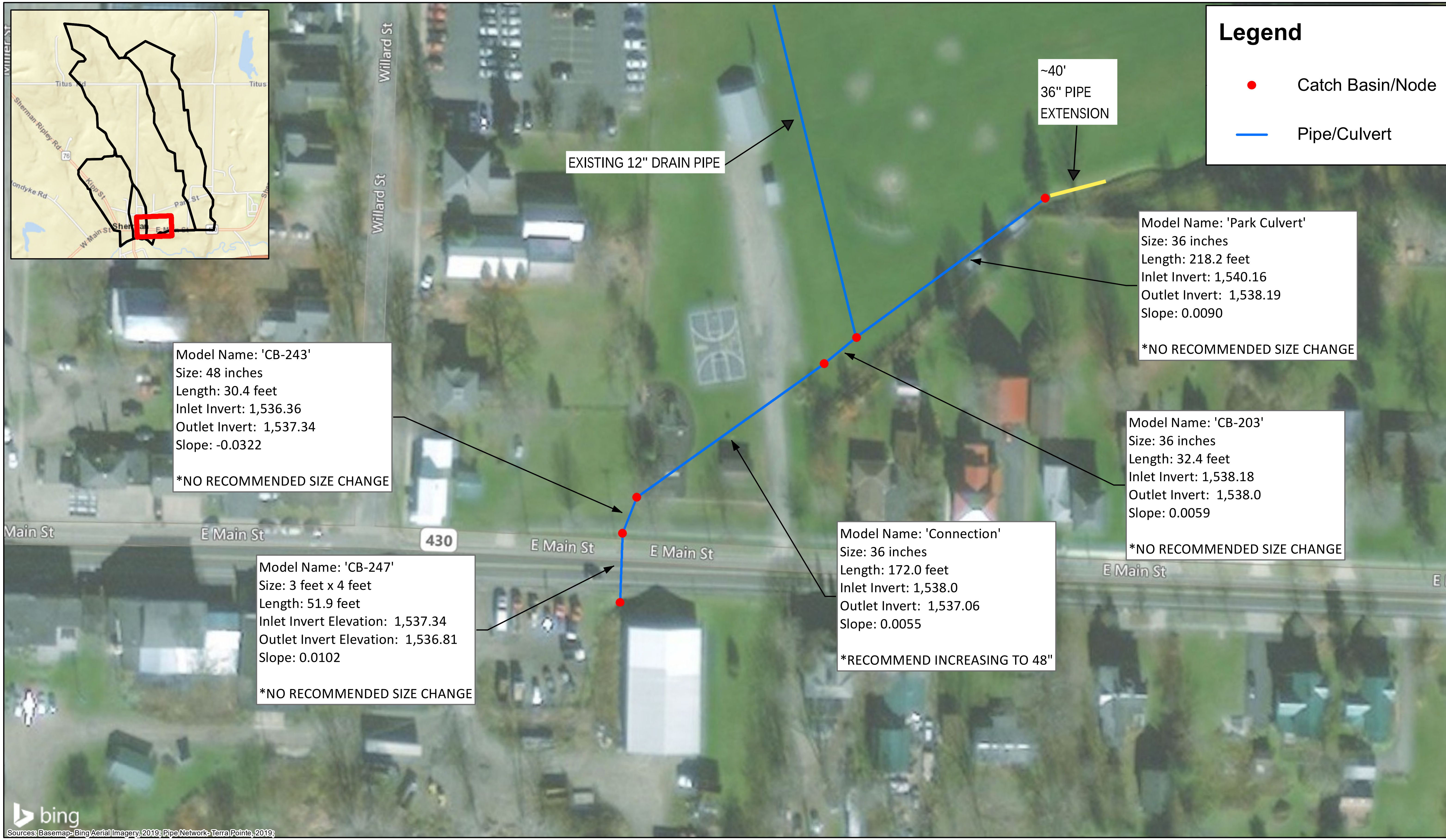
Village of Sherman

Concept Plan Locations

Chautauqua County | March 2020 | New York

Figure 11

Project No. 2056.003



Barton & Loguidice

N W E S
1 inch = 75 feet

Village of Sherman

Proposed Pipe Network Changes

Chautauqua County | March 2020 | New York

Figure 12

Project No. 2056.003

TABLE 1
Soil Properties & Qualities Summary

Table 1. Soil Properties and Qualities Summary Hydrologic Soil Group					
Drainage Area	A	A/D	B	B/D	C/D
1	5.9%	0.0%	1.6%	2.2%	90.3%
2	50.8%	0.0%	0.0%	5.1%	44.1%
3	8.6%	2.5%	1.9%	12.8%	74.2%
4	18.6%	0.1%	6.9%	21.5%	52.9%

<u>Hydrologic Soil Group (HSG) Properties</u>

Group A

- Sand, loamy sand or sandy loam soils
- Low runoff potential and high infiltration rate, including when wetted
- Well to excessively drained

Group B

- Silt loam or loam soils
- Moderate infiltration rate when wetted
- Moderately well to well drained
- Moderately fine to moderately coarse textures

Group C

- Sandy clay loam soils
- Low infiltration rates when wetted
- Consist generally of soils with a restrictive layer or moderately fine to fine textures

Group D

- Clay loam, silty clay loam, sandy clay, silty clay, or clay soils
- High runoff potential / low infiltration rate when wetted
- Consist of soils with a restrictive clay layer, permanent high water table, high swelling potential, etc.

Dual HSG Groups (A/D, B/D, C/D)

- First letter applies to the drained/unsaturated condition
- Second letter applies to the undrained/saturated condition

TABLE 2
Modeled Existing Conditions Peak Flow Summary

Table 2. Sherman Stormwater Peak Flow Summary																
	1-Year Flood		1.5-Year Flood		2-Year Flood		10-Year Flood		25-Year Flood		50-Year Flood		100-Year Flood		500-Year Flood	
Drainage Area	Modeled Results (cfs)	StreamStats Results (cfs)	Modeled Results (cfs)	StreamStats Results (cfs)	Modeled Results (cfs)	StreamStats Results (cfs)	Modeled Results (cfs)	StreamStats Results (cfs)	Modeled Results (cfs)	StreamStats Results (cfs)	Modeled Results (cfs)	StreamStats Results (cfs)	Modeled Results (cfs)	StreamStats Results (cfs)	Modeled Results (cfs)	StreamStats Results (cfs)
1	59	-	59	11	60	14	71	27	78	35	85	41	94	47	123	63
2*	10	-	13	-	15	-	33	-	49	-	63	-	81	-	138	-
3	65	-	67	38	68	47	82	95	89	121	89	144	88	167	88	224
4	27	-	32	25	37	31	74	64	73	83	70	99	70	116	70	157

Drainage Area 2 was not represented within StreamStats.

Drainage Area 4 peak flows were observed directly upstream from the "Maint St Culvert" as it is undersized and grossly underestimates peak flows by exceeding capacity.

APPENDIX A
Topographic Survey

Barton & Loguidice

1 inch = 333 feet

Village of Sherman

Topographic Survey Locations

Chautauqua County January 2020 New York

Appendix A

Project No. 2056.003

Survey Attribute Data - Survey Points

FID	Shape *	FID_	Entity	Layer	Color	Linetype	Elevation	LineWt	RefName	Angle	type	group	name	preference	descriptio	DNT
0	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	0	Breakline	607 ADJ FLD PTS	81	DITCH	DITCH LINE	FALS
1	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	181	TOP	TOP of bank	FALS
2	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	100	TOP	TOP of bank	FALS
3	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	91	EP	Edge of paved road	FALS
4	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	281	EP	Edge of paved road	FALS
5	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
6	Point ZM	0	Insert	SANITARY	3	Continuous	0	0	SAN_1	0			0			
7	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
8	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
9	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	60	TOP	TOP of bank	FALS
10	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	70	TOP	TOP of bank	FALS
11	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	0	Breakline	607 ADJ FLD PTS	80	DITCH	DITCH LINE	FALS
12	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	FNC_1	0	Breakline	607 ADJ FLD PTS	191	FNC	Chainlink fence	FALS
13	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV	0			0			
14	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	90	EP	Edge of paved road	FALS
15	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	GRVL	0	Breakline	607 ADJ FLD PTS	210	GRVL	EDGE GRAVEL	FALS
16	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	31	EP	Edge of paved road	FALS
17	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
18	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
19	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	61	TOP	TOP of bank	FALS
20	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	0	Breakline	607 ADJ FLD PTS	71	DITCH	DITCH LINE	FALS
21	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	0	Breakline	607 ADJ FLD PTS	83	DITCH	DITCH LINE	FALS
22	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	120	EP	Edge of paved road	FALS
23	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	93	EP	Edge of paved road	FALS
24	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	GRVL	0	Breakline	607 ADJ FLD PTS	220	GRVL	EDGE GRAVEL	FALS
25	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	32	EP	Edge of paved road	FALS
26	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
27	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
28	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	62	TOP	TOP of bank	FALS
29	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	72	TOP	TOP of bank	FALS
30	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV	0			0			
31	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	130	TOP	TOP of bank	FALS
32	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	92	EP	Edge of paved road	FALS
33	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	230	EP	Edge of paved road	FALS
34	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	33	EP	Edge of paved road	FALS
35	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	0	Breakline	607 ADJ FLD PTS	43	DITCH	DITCH LINE	FALS
36	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
37	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	WATER	0			0			
38	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	73	TOP	TOP of bank	FALS
39	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	85	EP	Edge of paved road	FALS
40	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	95	EP	Edge of paved road	FALS
41	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	BLDG_1	0	Breakline	607 ADJ FLD PTS	240	BLDG	Building corner	FALS
42	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	34	EP	Edge of paved road	FALS
43	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	0	Breakline	607 ADJ FLD PTS	44	DITCH	DITCH LINE	FALS
44	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
45	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	WATER	0			0			
46	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	0	Breakline	607 ADJ FLD PTS	74	DITCH	DITCH LINE	FALS
47	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	84	EP	Edge of paved road	FALS
48	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	150	TOP	TOP of bank	FALS
49	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	94	EP	Edge of paved road	FALS
50	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	250	EP	Edge of paved road	FALS
51	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	35	EP	Edge of paved road	FALS
52	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	0	Breakline	607 ADJ FLD PTS	45	DITCH	DITCH LINE	FALS
53	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
54	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	WATER	0			0			
55	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	75	TOP	TOP of bank	FALS
56	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV	0			0			
57	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV	0			0			
58	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV	0			0			
59	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	36	EP	Edge of paved road	FALS
60	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
61	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
62	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	WATER	0			0			
63	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	76	TOP	TOP of bank	FALS
64	Point ZM	0	Insert	STORM	32	Continuous	0	0	CB_3	0			0			
65	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	0	Breakline	607 ADJ FLD PTS	170	DITCH	DITCH LINE	FALS
66	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	96	EP	Edge of paved road	FALS
67	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	0	Breakline	607 ADJ FLD PTS	270	DITCH	DITCH LINE	FALS
68	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
69	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
70	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
71	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	67	TOP	TOP of bank	FALS
72	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	0	Breakline	607 ADJ FLD PTS	77	DITCH	DITCH LINE	FALS
73	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	89	EP	Edge of paved road	FALS
74	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	180	TOP	TOP of bank	FALS
75	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	101	TOP	TOP of bank	FALS
76	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	99	TOP	TOP of bank	FALS
77	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	280	EP	Edge of paved road	FALS
78	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
79	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
80	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
81	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	58	TOP	TOP of bank	FALS
82	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	0	Breakline	607 ADJ FLD PTS	68	DITCH	DITCH LINE	FALS
83	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	78	TOP	TOP of bank	FALS
84	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	88	EP	Edge of paved road	FALS
85	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
86	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	0	Breakline	607 ADJ FLD PTS	98	DITCH	DITCH LINE	FALS
87	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	GRVL	0	Breakline	607 ADJ FLD PTS	211	GRVL	EDGE GRAVEL	FALS
88	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
89	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
90	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	59	TOP	TOP of bank	FALS
91	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	69	TOP	TOP of bank	FALS
92	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	0	Breakline	607 ADJ FLD PTS	79	DITCH	DITCH LINE	FALS
93	Point ZM	0	Insert	STORM	32	Continuous	0	0	CB_3	0			0			
94	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	GRVL	0	Breakline	607 ADJ FLD PTS	221	GRVL	EDGE GRAVEL	FALS
95	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	131	TOP	TOP of bank	FALS
96	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	231	EP	Edge of paved road	FALS
97	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	141	TOP	TOP of bank	FALS
98	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	FNC_1	0	Breakline	607 ADJ FLD PTS	241	FNC	Chainlink fence	FALS
99	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	151	TOP	TOP of bank	FALS
100	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	251	EP	Edge of paved road	FALS
101	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV	0			0			
102	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV	0			0			
103	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	171	TOP	TOP of bank	FALS
104	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	271	TOP	TOP of bank	FALS
105	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	FNC_1	0	Breakline	607 ADJ FLD PTS	183	FNC	Chainlink fence	FALS
106	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	102	TOP	TOP of bank	FALS
107	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	283	EP	Edge of paved road	FALS
108	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	FNC_1	0	Breakline	607 ADJ FLD PTS	202	FNC	Chainlink fence	FALS
109	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
110	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV	0			0			
111	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	293	EP	Edge of paved road	FALS
112	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	212	EP	Edge of paved road	FALS
113	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV	0			0			
114	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	GRVL	0	Breakline	607 ADJ FLD PTS	222	GRVL	EDGE GRAVEL	FALS

FID	Shape *	FID_	Entity	Layer	Color	Linetype	Elevation	LineWt	RefName	Angle	type	group	name	preference	descriptio	DNT
115	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	132	TOP	TOP of bank	FALS
116	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	232	EP	Edge of paved road	FALS
117	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	142	TOP	TOP of bank	FALS
118	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	BLDG_1	0	Breakline	607 ADJ FLD PTS	242	BLDG	Building corner	FALS
119	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	152	TOP	TOP of bank	FALS
120	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	252	EP	Edge of paved road	FALS
121	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	0	Breakline	607 ADJ FLD PTS	162	DITCH	DITCH LINE	FALS
122	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV	0			0			
123	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	172	TOP	TOP of bank	FALS
124	Point ZM	0	Insert	STORM	32	Continuous	0	0	CB_3	0			0			
125	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	FNC_1	0	Breakline	607 ADJ FLD PTS	182	FNC	Chainlink fence	FALS
126	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	103	TOP	TOP of bank	FALS
127	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	282	EP	Edge of paved road	FALS
128	Point ZM	0	Insert	STORM	32	Continuous	0	0	CB_3	0			0			
129	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	FNC_1	0	Breakline	607 ADJ FLD PTS	192	FNC	Chainlink fence	FALS
130	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV	0			0			
131	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	292	EP	Edge of paved road	FALS
132	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	213	EP	Edge of paved road	FALS
133	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	0	Breakline	607 ADJ FLD PTS	123	DITCH	DITCH LINE	FALS
134	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	GRVL	0	Breakline	607 ADJ FLD PTS	223	GRVL	EDGE GRAVEL	FALS
135	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	133	EP	Edge of paved road	FALS
136	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	233	EP	Edge of paved road	FALS
137	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	143	TOP	TOP of bank	FALS
138	Point ZM	0	Insert	STORM	32	Continuous	0	0	CB_3	0			0			
139	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	153	TOP	TOP of bank	FALS
140	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV	0			0			
141	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	163	TOP	TOP of bank	FALS
142	Point ZM	0	Insert	STORM	32	Continuous	0	0	CB_3	0			0			
143	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	0	Breakline	607 ADJ FLD PTS	173	DITCH	DITCH LINE	FALS
144	Point ZM	0	Insert	STORM	32	Continuous	0	0	CB_3	0			0			
145	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
146	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	0	Breakline	607 ADJ FLD PTS	104	DITCH	DITCH LINE	FALS
147	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	285	EP	Edge of paved road	FALS
148	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	GRVL	0	Breakline	607 ADJ FLD PTS	204	GRVL	EDGE GRAVEL	FALS
149	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
150	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	114	EP	Edge of paved road	FALS
151	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	295	EP	Edge of paved road	FALS
152	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	214	EP	Edge of paved road	FALS
153	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	0	Breakline	607 ADJ FLD PTS	124	DITCH	DITCH LINE	FALS
154	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	224	EP	Edge of paved road	FALS
155	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	134	EP	Edge of paved road	FALS
156	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	234	EP	Edge of paved road	FALS
157	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
158	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	154	TOP	TOP of bank	FALS
159	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	164	TOP	TOP of bank	FALS
160	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV	0			0			
161	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	174	TOP	TOP of bank	FALS
162	Point ZM	0	Insert	STORM	32	Continuous	0	0	CB_3	0			0			
163	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	FNC_1	0	Breakline	607 ADJ FLD PTS	184	FNC	Chainlink fence	FALS
164	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	105	TOP	TOP of bank	FALS
165	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	284	EP	Edge of paved road	FALS
166	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	GRVL	0	Breakline	607 ADJ FLD PTS	205	GRVL	EDGE GRAVEL	FALS
167	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
168	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	115	EP	Edge of paved road	FALS
169	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	294	EP	Edge of paved road	FALS
170	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	215	EP	Edge of paved road	FALS
171	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	125	TOP	TOP of bank	FALS
172	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	225	EP	Edge of paved road	FALS

FID	Shape *	FID_	Entity	Layer	Color	Linetype	Elevation	LineWt	RefName	Angle	type	group	name	preference	descriptio	DNT
173	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV	0			0			
174	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	235	EP	Edge of paved road	FALS
175	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	0	Breakline	607 ADJ FLD PTS	145	DITCH	DITCH LINE	FALS
176	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
177	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	155	TOP	TOP of bank	FALS
178	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV	0			0			
179	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	165	TOP	TOP of bank	FALS
180	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	265	TOP	TOP of bank	FALS
181	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	175	TOP	TOP of bank	FALS
182	Point ZM	0	Insert	STORM	32	Continuous	0	0	CB_3	0			0			
183	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	FNC_1	0	Breakline	607 ADJ FLD PTS	187	FNC	Chainlink fence	FALS
184	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	106	TOP	TOP of bank	FALS
185	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	287	EP	Edge of paved road	FALS
186	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	GRVL	0	Breakline	607 ADJ FLD PTS	206	GRVL	EDGE GRAVEL	FALS
187	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	FNC_1	0	Breakline	607 ADJ FLD PTS	197	FNC	Chainlink fence	FALS
188	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	116	EP	Edge of paved road	FALS
189	Point ZM	0	Insert	STORM	32	Continuous	0	0	CB_3	0			0			
190	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	216	EP	Edge of paved road	FALS
191	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	126	TOP	TOP of bank	FALS
192	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	226	EP	Edge of paved road	FALS
193	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV	0			0			
194	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	236	EP	Edge of paved road	FALS
195	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	0	Breakline	607 ADJ FLD PTS	146	DITCH	DITCH LINE	FALS
196	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
197	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV	0			0			
198	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV	0			0			
199	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	166	TOP	TOP of bank	FALS
200	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	0	Breakline	607 ADJ FLD PTS	266	DITCH	DITCH LINE	FALS
201	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV	0			0			
202	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	276	EP	Edge of paved road	FALS
203	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	FNC_1	0	Breakline	607 ADJ FLD PTS	186	FNC	Chainlink fence	FALS
204	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	0	Breakline	607 ADJ FLD PTS	107	DITCH	DITCH LINE	FALS
205	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	286	EP	Edge of paved road	FALS
206	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
207	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
208	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	117	EP	Edge of paved road	FALS
209	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	296	EP	Edge of paved road	FALS
210	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
211	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	127	TOP	TOP of bank	FALS
212	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	227	EP	Edge of paved road	FALS
213	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	FNC_1	0	Breakline	607 ADJ FLD PTS	237	FNC	Chainlink fence	FALS
214	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	147	TOP	TOP of bank	FALS
215	Point ZM	0	Insert	STORM	32	Continuous	0	0	CB_3	0			0			
216	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	0	Breakline	607 ADJ FLD PTS	157	DITCH	DITCH LINE	FALS
217	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV	0			0			
218	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	167	TOP	TOP of bank	FALS
219	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	267	TOP	TOP of bank	FALS
220	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	0	Breakline	607 ADJ FLD PTS	177	DITCH	DITCH LINE	FALS
221	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	277	EP	Edge of paved road	FALS
222	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
223	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	108	TOP	TOP of bank	FALS
224	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	289	EP	Edge of paved road	FALS
225	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
226	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
227	Point ZM	0	Insert	STORM	32	Continuous	0	0	CB_3	0			0			
228	Point ZM	0	Insert	STORM	32	Continuous	0	0	CB_3	0			0			
229	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
230	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	128	TOP	TOP of bank	FALS

FID	Shape *	FID_	Entity	Layer	Color	Linetype	Elevation	LineWt	RefName	Angle	type	group	name	preference	descriptio	DNT
231	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	228	EP	Edge of paved road	FALS
232	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	FNC_1	0	Breakline	607 ADJ FLD PTS	238	FNC	Chainlink fence	FALS
233	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	148	TOP	TOP of bank	FALS
234	Point ZM	0	Insert	STORM	32	Continuous	0	0	CB_3	0			0			
235	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV	0			0			
236	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV	0			0			
237	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	168	TOP	TOP of bank	FALS
238	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV	0			0			
239	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	178	TOP	TOP of bank	FALS
240	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	278	EP	Edge of paved road	FALS
241	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	FNC_1	0	Breakline	607 ADJ FLD PTS	188	FNC	Chainlink fence	FALS
242	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV	0			0			
243	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	288	EP	Edge of paved road	FALS
244	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	GRVL	0	Breakline	607 ADJ FLD PTS	209	GRVL	EDGE GRAVEL	FALS
245	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	FNC_1	0	Breakline	607 ADJ FLD PTS	198	FNC	Chainlink fence	FALS
246	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	119	EP	Edge of paved road	FALS
247	Point ZM	0	Insert	STORM	32	Continuous	0	0	CB_3	0			0			

FID	Shape *	FID_	Entity	Layer	Color	Linetype	Elevation	LineWt	RefName	Angle	type	group	name	preference	descriptio	DNT
248	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	GRVL	0	Breakline	607 ADJ FLD PTS	219	GRVL	EDGE GRAVEL	FALS
249	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	129	TOP	TOP of bank	FALS
250	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	FNC_1	0	Breakline	607 ADJ FLD PTS	229	FNC	Chainlink fence	FALS
251	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	BLDG_1	0	Breakline	607 ADJ FLD PTS	239	BLDG	Building corner	FALS
252	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	149	TOP	TOP of bank	FALS
253	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	249	EP	Edge of paved road	FALS
254	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV	0			0			
255	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV	0			0			
256	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	169	TOP	TOP of bank	FALS
257	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	269	TOP	TOP of bank	FALS
258	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADJ FLD PTS	179	TOP	TOP of bank	FALS
259	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	279	EP	Edge of paved road	FALS
260	Point ZM	0	Insert	North Arrow	1	Continuous	0	0	NORTH_1	0			0			
261	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	0	Breakline	607 ADJ FLD PTS	119	EP	Edge of paved road	FALS
262	Point ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U13	10.9365			0			
263	Point ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U13	190.936			0			
264	Point ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U13	100.936			0			
265	Point ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U13	10.9365			0			
266	Point ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U13	10.9365			0			
267	Point ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U13	190.936			0			
268	Point ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U13	190.936			0			
269	Point ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U14	100.936			0			
270	Point ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U15	190.936			0			
271	Point ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U15	23.4733			0			
272	Point ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U15	0.54142			0			
273	Point ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U15	180.541			0			
274	Point ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U15	180.541			0			
275	Point ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U13	280.936			0			
276	Point ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U15	358.492			0			
277	Point ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U14	178.492			0			
278	Point ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U14	172.672			0			
279	Point ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U15	180.541			0			
280	Point ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U15	180.541			0			
281	Point ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U15	180.541			0			
282	Point ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U14	137.070			0			
283	Point ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U14	137.070			0			
284	Point ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U15	180.541			0			
285	Point ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U15	0.54142			0			
286	Point ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U13	262.717			0			
287	Point ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U15	82.7174			0			
288	Point ZM	0	Insert	North Arrow	1	DGN Style 3	0	0	SCALE	0			0			
289	Point ZM	0	Insert	SITE TXT	3	Continuous	0	0	Z:\BL-Vault\	0			0			
290	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
291	Point ZM	0	Insert	STORM	32	Continuous	0	0	CB_3	0			0			
292	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
293	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
294	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOE	0	Breakline	607 ADD PTS	333	TOE	Bottom of bank	FALS
295	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADD PTS	334	TOP	TOP of bank	FALS
296	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
297	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
298	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADD PTS	326	TOP	TOP of bank	FALS
299	Point ZM	0	Insert	STORM	32	Continuous	0	0	CB_3	0			0			
300	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOE	0	Breakline	607 ADD PTS	327	TOE	Bottom of bank	FALS
301	Point ZM	0	Insert	STORM	32	Continuous	0	0	CB_3	0			0			
302	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
303	Point ZM	0	Insert	STORM	32	Continuous	0	0	CB_3	0			0			
304	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
305	Point ZM	0	Insert	STORM	32	Continuous	0	0	CB_3	0			0			

FID	Shape *	FID_	Entity	Layer	Color	Linetype	Elevation	LineWt	RefName	Angle	type	group	name	preference	descriptio	DNT
0	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
1	Point ZM	0	Insert	STORM	32	Continuous	0	0	CB_3	0			0			
2	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
3	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
4	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOE	0	Breakline	607 ADD PTS	333	TOE	Bottom of bank	FALS
5	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADD PTS	334	TOP	TOP of bank	FALS
6	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
7	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
8	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	0	Breakline	607 ADD PTS	326	TOP	TOP of bank	FALS
9	Point ZM	0	Insert	STORM	32	Continuous	0	0	CB_3	0			0			
10	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOE	0	Breakline	607 ADD PTS	327	TOE	Bottom of bank	FALS
11	Point ZM	0	Insert	STORM	32	Continuous	0	0	CB_3	0			0			
12	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
13	Point ZM	0	Insert	STORM	32	Continuous	0	0	CB_3	0			0			
14	Point ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1	0			0			
15	Point ZM	0	Insert	STORM	32	Continuous	0	0	CB_3	0			0			

Survey Attribute Data - Pipe Network

FID	Shape *	FID_	Entity	Layer	Color	Linetype	Elevation	LineWt	RefName	type	group	name	preference	descriptio	DNT
0	Polyline ZM	0	LWPolyline	PAVT	1	Continuous	0	0				0			
1	Polyline ZM	0	LWPolyline	PAVT	1	Continuous	0	0				0			
2	Polyline ZM	0	LWPolyline	SURVEY BREAKLINES	8	DGN Style 6	0	0				0			
3	Polyline ZM	0	LWPolyline	SURVEY BREAKLINES	8	Continuous	0	0				0			
4	Polyline ZM	0	LWPolyline	WATER	5	Continuous	0	0				0			
5	Polyline ZM	0	LWPolyline	SURVEY BREAKLINES	8	Continuous	0	0				0			
6	Polyline ZM	0	LWPolyline	SURVEY BREAKLINES	8	DGN Style 6	0	0				0			
7	Polyline ZM	0	LWPolyline	SURVEY BREAKLINES	8	Continuous	0	0				0			
8	Polyline ZM	0	LWPolyline	SURVEY BREAKLINES	8	DGN Style 6	0	0				0			
9	Polyline ZM	0	LWPolyline	SURVEY BREAKLINES	8	DGN Style 6	0	0				0			
10	Polyline ZM	0	LWPolyline	SURVEY BREAKLINES	8	DGN Style 6	0	0				0			
11	Polyline ZM	0	LWPolyline	PAVT	1	Continuous	0	0				0			
12	Polyline ZM	0	LWPolyline	PAVT	1	Continuous	0	0				0			
13	Polyline ZM	0	LWPolyline	PAVT	1	Continuous	0	0				0			
14	Polyline ZM	0	LWPolyline	SURVEY BREAKLINES	8	DGN Style 6	0	0				0			
15	Polyline ZM	0	LWPolyline	SURVEY BREAKLINES	8	DGN Style 6	0	0				0			
16	Polyline ZM	0	LWPolyline	SURVEY BREAKLINES	8	Continuous	0	0				0			
17	Polyline ZM	0	LWPolyline	SURVEY BREAKLINES	8	Continuous	0	0				0			
18	Polyline ZM	0	LWPolyline	PAVT	1	Continuous	0	0				0			
19	Polyline ZM	0	LWPolyline	PAVT	1	Continuous	0	0				0			
20	Polyline ZM	0	LWPolyline	PAVT	1	Continuous	0	0				0			
21	Polyline ZM	0	LWPolyline	SURVEY BREAKLINES	8	DGN Style 6	0	0				0			
22	Polyline ZM	0	LWPolyline	SURVEY BREAKLINES	8	DGN Style 6	0	0				0			
23	Polyline ZM	0	LWPolyline	SURVEY BREAKLINES	8	Continuous	0	0				0			
24	Polyline ZM	0	LWPolyline	PAVT	1	Continuous	0	0				0			
25	Polyline ZM	0	LWPolyline	SURVEY BREAKLINES	8	Continuous	0	0				0			
26	Polyline ZM	0	LWPolyline	SURVEY BREAKLINES	8	DGN Style 6	0	0				0			
27	Polyline ZM	0	LWPolyline	SURVEY BREAKLINES	8	DGN Style 6	0	0				0			
28	Polyline ZM	0	LWPolyline	SURVEY BREAKLINES	8	DGN Style 6	0	0				0			
29	Polyline ZM	0	LWPolyline	SURVEY BREAKLINES	8	Continuous	0	0				0			
30	Polyline ZM	0	LWPolyline	SURVEY BREAKLINES	8	DGN Style 6	0	0				0			
31	Polyline ZM	0	LWPolyline	SURVEY BREAKLINES	8	Continuous	0	0				0			
32	Polyline ZM	0	LWPolyline	PAVT	1	Continuous	0	0				0			
33	Polyline ZM	0	LWPolyline	PAVT	1	Continuous	0	0				0			
34	Polyline ZM	0	LWPolyline	PAVT	1	Continuous	0	0				0			
35	Polyline ZM	0	LWPolyline	PAVT	1	Continuous	0	0				0			
36	Polyline ZM	0	LWPolyline	PAVT	1	Continuous	0	0				0			
37	Polyline ZM	0	LWPolyline	BLDG	5	Continuous	0	53				0			
38	Polyline ZM	0	LWPolyline	PAVT	1	Continuous	0	0				0			
39	Polyline ZM	0	LWPolyline	PAVT	1	Continuous	0	0				0			
40	Polyline ZM	0	LWPolyline	PAVT	1	Continuous	0	0				0			
41	Polyline ZM	0	LWPolyline	PAVT	1	Continuous	0	0				0			
42	Polyline ZM	0	LWPolyline	PAVT	1	Continuous	0	0				0			
43	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	Breakline	607 ADJ FLD PTS	81	DITCH	DITCH LINE	FALS
44	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	181	TOP	TOP of bank	FALS
45	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	100	TOP	TOP of bank	FALS
46	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	91	EP	Edge of paved road	FALS
47	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	281	EP	Edge of paved road	FALS
48	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
49	Polyline ZM	0	Insert	SANITARY	3	Continuous	0	0	SAN_1			0			
50	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
51	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
52	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	60	TOP	TOP of bank	FALS
53	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	70	TOP	TOP of bank	FALS
54	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	Breakline	607 ADJ FLD PTS	80	DITCH	DITCH LINE	FALS
55	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	FNC_1	Breakline	607 ADJ FLD PTS	191	FNC	Chainlink fence	FALS
56	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV			0			
57	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	90	EP	Edge of paved road	FALS
58	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	GRVL	Breakline	607 ADJ FLD PTS	210	GRVL	EDGE GRAVEL	FALS
59	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	31	EP	Edge of paved road	FALS
60	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
61	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
62	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	61	TOP	TOP of bank	FALS
63	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	Breakline	607 ADJ FLD PTS	71	DITCH	DITCH LINE	FALS
64	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	Breakline	607 ADJ FLD PTS	83	DITCH	DITCH LINE	FALS
65	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	120	EP	Edge of paved road	FALS
66	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	93	EP	Edge of paved road	FALS
67	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	GRVL	Breakline	607 ADJ FLD PTS	220	GRVL	EDGE GRAVEL	FALS
68	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	32	EP	Edge of paved road	FALS
69	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
70	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
71	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	62	TOP	TOP of bank	FALS
72	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	72	TOP	TOP of bank	FALS
73	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV			0			
74	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	130	TOP	TOP of bank	FALS
75	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	92	EP	Edge of paved road	FALS
76	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	230	EP	Edge of paved road	FALS
77	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	33	EP	Edge of paved road	FALS
78	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	Breakline	607 ADJ FLD PTS	43	DITCH	DITCH LINE	FALS
79	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
80	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	WATER			0			
81	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	73	TOP	TOP of bank	FALS
82	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	85	EP	Edge of paved road	FALS
83	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	95	EP	Edge of paved road	FALS
84	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	BLDG_1	Breakline	607 ADJ FLD PTS	240	BLDG	Building corner	FALS
85	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	34	EP	Edge of paved road	FALS
86	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	Breakline	607 ADJ FLD PTS	44	DITCH	DITCH LINE	FALS
87	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
88	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	WATER			0			
89	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	Breakline	607 ADJ FLD PTS	74	DITCH	DITCH LINE	FALS
90	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	84	EP	Edge of paved road	FALS
91	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	150	TOP	TOP of bank	FALS
92	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	94	EP	Edge of paved road	FALS
93	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	250	EP	Edge of paved road	FALS
94	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	35	EP	Edge of paved road	FALS
95	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	Breakline	607 ADJ FLD PTS	45	DITCH	DITCH LINE	FALS
96	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
97	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	WATER			0			
98	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	75	TOP	TOP of bank	FALS
99	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV			0			
100	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV			0			
101	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV			0			
102	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	36	EP	Edge of paved road	FALS
103	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
104	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
105	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	WATER			0			
106	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	76	TOP	TOP of bank	FALS
107	Polyline ZM	0	Insert	STORM	32	Continuous	0	0	CB_3			0			
108	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	Breakline	607 ADJ FLD PTS	170	DITCH	DITCH LINE	FALS
109	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	96	EP	Edge of paved road	FALS
110	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	Breakline	607 ADJ FLD PTS	270	DITCH	DITCH LINE	FALS
111	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
112	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
113	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
114	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	67	TOP	TOP of bank	FALS
115	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	Breakline	607 ADJ FLD PTS	77	DITCH	DITCH LINE	FALS

FID	Shape *	FID_	Entity	Layer	Color	Linetype	Elevation	LineWt	RefName	type	group	name	preference	descriptio	DNT
116	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	89	EP	Edge of paved road	FALS
117	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	180	TOP	TOP of bank	FALS
118	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	101	TOP	TOP of bank	FALS
119	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	99	TOP	TOP of bank	FALS
120	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	280	EP	Edge of paved road	FALS
121	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
122	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
123	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
124	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	58	TOP	TOP of bank	FALS
125	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	Breakline	607 ADJ FLD PTS	68	DITCH	DITCH LINE	FALS
126	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	78	TOP	TOP of bank	FALS
127	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	88	EP	Edge of paved road	FALS
128	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
129	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	Breakline	607 ADJ FLD PTS	98	DITCH	DITCH LINE	FALS
130	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	GRVL	Breakline	607 ADJ FLD PTS	211	GRVL	EDGE GRAVEL	FALS
131	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
132	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
133	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	59	TOP	TOP of bank	FALS
134	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	69	TOP	TOP of bank	FALS
135	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	Breakline	607 ADJ FLD PTS	79	DITCH	DITCH LINE	FALS
136	Polyline ZM	0	Insert	STORM	32	Continuous	0	0	CB_3			0			
137	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	GRVL	Breakline	607 ADJ FLD PTS	221	GRVL	EDGE GRAVEL	FALS
138	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	131	TOP	TOP of bank	FALS
139	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	231	EP	Edge of paved road	FALS
140	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	141	TOP	TOP of bank	FALS
141	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	FNC_1	Breakline	607 ADJ FLD PTS	241	FNC	Chainlink fence	FALS
142	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	151	TOP	TOP of bank	FALS
143	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	251	EP	Edge of paved road	FALS
144	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV			0			
145	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV			0			
146	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	171	TOP	TOP of bank	FALS
147	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	271	TOP	TOP of bank	FALS
148	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	FNC_1	Breakline	607 ADJ FLD PTS	183	FNC	Chainlink fence	FALS
149	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	102	TOP	TOP of bank	FALS
150	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	283	EP	Edge of paved road	FALS
151	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	FNC_1	Breakline	607 ADJ FLD PTS	202	FNC	Chainlink fence	FALS
152	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
153	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV			0			
154	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	293	EP	Edge of paved road	FALS
155	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	212	EP	Edge of paved road	FALS
156	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV			0			
157	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	GRVL	Breakline	607 ADJ FLD PTS	222	GRVL	EDGE GRAVEL	FALS
158	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	132	TOP	TOP of bank	FALS
159	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	232	EP	Edge of paved road	FALS
160	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	142	TOP	TOP of bank	FALS
161	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	BLDG_1	Breakline	607 ADJ FLD PTS	242	BLDG	Building corner	FALS
162	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	152	TOP	TOP of bank	FALS
163	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	252	EP	Edge of paved road	FALS
164	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	Breakline	607 ADJ FLD PTS	162	DITCH	DITCH LINE	FALS
165	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV			0			
166	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	172	TOP	TOP of bank	FALS
167	Polyline ZM	0	Insert	STORM	32	Continuous	0	0	CB_3			0			
168	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	FNC_1	Breakline	607 ADJ FLD PTS	182	FNC	Chainlink fence	FALS
169	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	103	TOP	TOP of bank	FALS
170	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	282	EP	Edge of paved road	FALS
171	Polyline ZM	0	Insert	STORM	32	Continuous	0	0	CB_3			0			
172	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	FNC_1	Breakline	607 ADJ FLD PTS	192	FNC	Chainlink fence	FALS
173	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV			0			
174	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	292	EP	Edge of paved road	FALS
175	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	213	EP	Edge of paved road	FALS
176	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	Breakline	607 ADJ FLD PTS	123	DITCH	DITCH LINE	FALS
177	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	GRVL	Breakline	607 ADJ FLD PTS	223	GRVL	EDGE GRAVEL	FALS
178	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	133	EP	Edge of paved road	FALS
179	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	233	EP	Edge of paved road	FALS
180	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	143	TOP	TOP of bank	FALS
181	Polyline ZM	0	Insert	STORM	32	Continuous	0	0	CB_3			0			
182	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	153	TOP	TOP of bank	FALS
183	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV			0			
184	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	163	TOP	TOP of bank	FALS
185	Polyline ZM	0	Insert	STORM	32	Continuous	0	0	CB_3			0			
186	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	Breakline	607 ADJ FLD PTS	173	DITCH	DITCH LINE	FALS
187	Polyline ZM	0	Insert	STORM	32	Continuous	0	0	CB_3			0			
188	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
189	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	Breakline	607 ADJ FLD PTS	104	DITCH	DITCH LINE	FALS
190	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	285	EP	Edge of paved road	FALS
191	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	GRVL	Breakline	607 ADJ FLD PTS	204	GRVL	EDGE GRAVEL	FALS
192	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
193	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	114	EP	Edge of paved road	FALS
194	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	295	EP	Edge of paved road	FALS
195	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	214	EP	Edge of paved road	FALS
196	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	Breakline	607 ADJ FLD PTS	124	DITCH	DITCH LINE	FALS
197	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	224	EP	Edge of paved road	FALS
198	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	134	EP	Edge of paved road	FALS
199	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	234	EP	Edge of paved road	FALS
200	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
201	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	154	TOP	TOP of bank	FALS
202	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	164	TOP	TOP of bank	FALS
203	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV			0			
204	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	174	TOP	TOP of bank	FALS
205	Polyline ZM	0	Insert	STORM	32	Continuous	0	0	CB_3			0			
206	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	FNC_1	Breakline	607 ADJ FLD PTS	184	FNC	Chainlink fence	FALS
207	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	105	TOP	TOP of bank	FALS
208	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	284	EP	Edge of paved road	FALS
209	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	GRVL	Breakline	607 ADJ FLD PTS	205	GRVL	EDGE GRAVEL	FALS
210	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
211	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	115	EP	Edge of paved road	FALS
212	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	294	EP	Edge of paved road	FALS
213	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	215	EP	Edge of paved road	FALS
214	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	125	TOP	TOP of bank	FALS
215	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	225	EP	Edge of paved road	FALS
216	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV			0			
217	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	235	EP	Edge of paved road	FALS
218	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	Breakline	607 ADJ FLD PTS	145	DITCH	DITCH LINE	FALS
219	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
220	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	155	TOP	TOP of bank	FALS
221	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV			0			
222	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	165	TOP	TOP of bank	FALS
223	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	265	TOP	TOP of bank	FALS
224	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	175	TOP	TOP of bank	FALS
225	Polyline ZM	0	Insert	STORM	32	Continuous	0	0	CB_3			0			
226	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	FNC_1	Breakline	607 ADJ FLD PTS	187	FNC	Chainlink fence	FALS
227	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	106	TOP	TOP of bank	FALS
228	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	287	EP	Edge of paved road	FALS
229	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	GRVL	Breakline	607 ADJ FLD PTS	206	GRVL	EDGE GRAVEL	FALS
230	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	FNC_1	Breakline	607 ADJ FLD PTS	197	FNC	Chainlink fence	FALS

FID	Shape *	FID_	Entity	Layer	Color	Linetype	Elevation	LineWt	RefName	type	group	name	preference	descriptio	DNT
231	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	116	EP	Edge of paved road	FALS
232	Polyline ZM	0	Insert	STORM	32	Continuous	0	0	CB_3			0			
233	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	216	EP	Edge of paved road	FALS
234	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	126	TOP	TOP of bank	FALS
235	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	226	EP	Edge of paved road	FALS
236	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV			0			
237	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	236	EP	Edge of paved road	FALS
238	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	Breakline	607 ADJ FLD PTS	146	DITCH	DITCH LINE	FALS
239	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
240	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV			0			
241	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV			0			
242	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	166	TOP	TOP of bank	FALS
243	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	Breakline	607 ADJ FLD PTS	266	DITCH	DITCH LINE	FALS
244	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV			0			
245	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	276	EP	Edge of paved road	FALS
246	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	FNC_1	Breakline	607 ADJ FLD PTS	186	FNC	Chainlink fence	FALS
247	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	Breakline	607 ADJ FLD PTS	107	DITCH	DITCH LINE	FALS
248	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	286	EP	Edge of paved road	FALS
249	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
250	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
251	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	117	EP	Edge of paved road	FALS
252	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	296	EP	Edge of paved road	FALS
253	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
254	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	127	TOP	TOP of bank	FALS
255	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	227	EP	Edge of paved road	FALS
256	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	FNC_1	Breakline	607 ADJ FLD PTS	237	FNC	Chainlink fence	FALS
257	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	147	TOP	TOP of bank	FALS
258	Polyline ZM	0	Insert	STORM	32	Continuous	0	0	CB_3			0			
259	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	Breakline	607 ADJ FLD PTS	157	DITCH	DITCH LINE	FALS
260	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV			0			
261	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	167	TOP	TOP of bank	FALS
262	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	267	TOP	TOP of bank	FALS
263	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	DITCH	Breakline	607 ADJ FLD PTS	177	DITCH	DITCH LINE	FALS
264	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	277	EP	Edge of paved road	FALS
265	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
266	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	108	TOP	TOP of bank	FALS
267	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	289	EP	Edge of paved road	FALS
268	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
269	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
270	Polyline ZM	0	Insert	STORM	32	Continuous	0	0	CB_3			0			
271	Polyline ZM	0	Insert	STORM	32	Continuous	0	0	CB_3			0			
272	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
273	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	128	TOP	TOP of bank	FALS
274	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	228	EP	Edge of paved road	FALS
275	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	FNC_1	Breakline	607 ADJ FLD PTS	238	FNC	Chainlink fence	FALS
276	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	148	TOP	TOP of bank	FALS
277	Polyline ZM	0	Insert	STORM	32	Continuous	0	0	CB_3			0			
278	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV			0			
279	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV			0			
280	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	168	TOP	TOP of bank	FALS
281	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV			0			
282	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	178	TOP	TOP of bank	FALS
283	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	278	EP	Edge of paved road	FALS
284	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	FNC_1	Breakline	607 ADJ FLD PTS	188	FNC	Chainlink fence	FALS
285	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV			0			
286	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	288	EP	Edge of paved road	FALS

FID	Shape *	FID_	Entity	Layer	Color	Linetype	Elevation	LineWt	RefName	type	group	name	preference	descriptio	DNT
287	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	GRVL	Breakline	607 ADJ FLD PTS	209	GRVL	EDGE GRAVEL	FALS
288	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	FNC_1	Breakline	607 ADJ FLD PTS	198	FNC	Chainlink fence	FALS
289	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	119	EP	Edge of paved road	FALS
290	Polyline ZM	0	Insert	STORM	32	Continuous	0	0	CB_3			0			
291	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	GRVL	Breakline	607 ADJ FLD PTS	219	GRVL	EDGE GRAVEL	FALS
292	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	129	TOP	TOP of bank	FALS
293	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	FNC_1	Breakline	607 ADJ FLD PTS	229	FNC	Chainlink fence	FALS
294	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	BLDG_1	Breakline	607 ADJ FLD PTS	239	BLDG	Building corner	FALS
295	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	149	TOP	TOP of bank	FALS
296	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	249	EP	Edge of paved road	FALS
297	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV			0			
298	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	INV			0			
299	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	169	TOP	TOP of bank	FALS
300	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	269	TOP	TOP of bank	FALS
301	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADJ FLD PTS	179	TOP	TOP of bank	FALS
302	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	279	EP	Edge of paved road	FALS
303	Polyline ZM	0	Line	SANITARY	3	TPS_SAN	0	0				0			
304	Polyline ZM	0	Line	SANITARY	3	TPS_SAN	0	0				0			
305	Polyline ZM	0	Line	SANITARY	3	TPS_SAN	0	0				0			
306	Polyline ZM	0	Insert	North Arrow	1	Continuous	0	0	NORTH_1			0			
307	Polyline ZM	0	Line	PAVT	1	Continuous	0	0				0			
308	Polyline ZM	0	Line	PAVT	1	Continuous	0	0				0			
309	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
310	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
311	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
312	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
313	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
314	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
315	Polyline ZM	0	LWPolyline	STORM	32	TPS_STORM	0	0				0			
316	Polyline ZM	0	LWPolyline	STORM	32	TPS_STORM	0	0				0			
317	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	EP_1	Breakline	607 ADJ FLD PTS	119	EP	Edge of paved road	FALS
318	Polyline ZM	0	LWPolyline	STORM	32	TPS_STORM	0	0				0			
319	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
320	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
321	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
322	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
323	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
324	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
325	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
326	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
327	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
328	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
329	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
330	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
331	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
332	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
333	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
334	Polyline ZM	0	LWPolyline	FENCE	1	TPS_FENCE	0	0				0			
335	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
336	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
337	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
338	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
339	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
340	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
341	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
342	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
343	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
344	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			

FID	Shape *	FID_	Entity	Layer	Color	Linetype	Elevation	LineWt	RefName	type	group	name	preference	descriptio	DNT
345	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
346	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
347	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
348	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
349	Polyline ZM	0	Line	SURVEY BREAKLINES	8	DGN Style 6	0	0				0			
350	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
351	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
352	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
353	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
354	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
355	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
356	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
357	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
358	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
359	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
360	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
361	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
362	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
363	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
364	Polyline ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U13			0			
365	Polyline ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U13			0			
366	Polyline ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U13			0			
367	Polyline ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U13			0			
368	Polyline ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U13			0			

FID	Shape *	FID_	Entity	Layer	Color	Linetype	Elevation	LineWt	RefName	type	group	name	preference	descriptio	DNT
369	Polyline ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U13			0			
370	Polyline ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U13			0			
371	Polyline ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U14			0			
372	Polyline ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U15			0			
373	Polyline ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U15			0			
374	Polyline ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U15			0			
375	Polyline ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U15			0			
376	Polyline ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U15			0			
377	Polyline ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U13			0			
378	Polyline ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U15			0			
379	Polyline ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U14			0			
380	Polyline ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U14			0			
381	Polyline ZM	0	Line	SURVEY BREAKLINES	8	DGN Style 6	0	0				0			
382	Polyline ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U15			0			
383	Polyline ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U15			0			
384	Polyline ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U15			0			
385	Polyline ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U14			0			
386	Polyline ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U14			0			
387	Polyline ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U15			0			
388	Polyline ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U15			0			
389	Polyline ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U13			0			
390	Polyline ZM	0	Insert	STORM	32	TPS_STORM	0	0	*U15			0			
391	Polyline ZM	0	LWPolyline	SURVEY BREAKLINES	8	DGN Style 6	0	0				0			
392	Polyline ZM	0	LWPolyline	FENCE	1	TPS_FENCE	0	0				0			
393	Polyline ZM	0	Line	PAVT	1	Continuous	0	0				0			
394	Polyline ZM	0	Insert	North Arrow	1	DGN Style 3	0	0	SCALE			0			
395	Polyline ZM	0	Line	PAVT	1	Continuous	0	0				0			
396	Polyline ZM	0	Line	SURVEY BREAKLINES	8	DGN Style 6	0	0				0			
397	Polyline ZM	0	LWPolyline	FENCE	1	TPS_FENCE	0	0				0			
398	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
399	Polyline ZM	0	Insert	STORM	32	Continuous	0	0	CB_3			0			
400	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
401	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
402	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOE	Breakline	607 ADD PTS	333	TOE	Bottom of bank	FALS
403	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADD PTS	334	TOP	TOP of bank	FALS
404	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
405	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
406	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADD PTS	326	TOP	TOP of bank	FALS
407	Polyline ZM	0	Insert	STORM	32	Continuous	0	0	CB_3			0			
408	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOE	Breakline	607 ADD PTS	327	TOE	Bottom of bank	FALS
409	Polyline ZM	0	Insert	STORM	32	Continuous	0	0	CB_3			0			
410	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
411	Polyline ZM	0	Insert	STORM	32	Continuous	0	0	CB_3			0			
412	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
413	Polyline ZM	0	Insert	STORM	32	Continuous	0	0	CB_3			0			
414	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
415	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
416	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
417	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
418	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
419	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
420	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
421	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
422	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
423	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
424	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
425	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
426	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			

FID	Shape *	FID_	Entity	Layer	Color	Linetype	Elevation	LineWt	RefName	type	group	name	preference	descriptio	DNT
0	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
1	Polyline ZM	0	Insert	STORM	32	Continuous	0	0	CB_3			0			
2	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
3	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
4	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOE	Breakline	607 ADD PTS	333	TOE	Bottom of bank	FALS
5	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADD PTS	334	TOP	TOP of bank	FALS
6	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
7	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
8	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOP	Breakline	607 ADD PTS	326	TOP	TOP of bank	FALS
9	Polyline ZM	0	Insert	STORM	32	Continuous	0	0	CB_3			0			
10	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	TOE	Breakline	607 ADD PTS	327	TOE	Bottom of bank	FALS
11	Polyline ZM	0	Insert	STORM	32	Continuous	0	0	CB_3			0			
12	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
13	Polyline ZM	0	Insert	STORM	32	Continuous	0	0	CB_3			0			
14	Polyline ZM	0	Insert	SHOT CODES	7	Continuous	0	0	G_1			0			
15	Polyline ZM	0	Insert	STORM	32	Continuous	0	0	CB_3			0			
16	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
17	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
18	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
19	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
20	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
21	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
22	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
23	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
24	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
25	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
26	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
27	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			
28	Polyline ZM	0	Line	STORM	32	TPS_STORM	0	0				0			

APPENDIX B
Kipp Street and West and East As-Built Plans and NYSDOT FOIL Request
(Record Plans are available on CD upon request)

APPENDIX C
Modeled Storm Event Data

Extreme Precipitation Tables

Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

Smoothing	Yes
State	New York
Location	
Longitude	79.595 degrees West
Latitude	42.159 degrees North
Elevation	0 feet
Date/Time	Wed, 17 Jul 2019 10:32:04 -0400

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.28	0.43	0.54	0.70	0.88	1.08	**1yr**	0.76	1.00	1.23	1.48	1.76	2.09	2.37	**1yr**	1.85	2.28	2.78	3.35	3.99	**1yr**
2yr	0.33	0.51	0.64	0.84	1.06	1.30	**2yr**	0.91	1.18	1.47	1.76	2.08	2.44	2.75	**2yr**	2.16	2.64	3.21	3.91	4.47	**2yr**
5yr	0.39	0.61	0.76	1.02	1.31	1.62	**5yr**	1.13	1.46	1.84	2.20	2.59	3.01	3.40	**5yr**	2.67	3.27	3.91	4.69	5.41	**5yr**
10yr	0.44	0.69	0.87	1.19	1.54	1.93	**10yr**	1.33	1.72	2.19	2.61	3.06	3.53	4.00	**10yr**	3.13	3.84	4.55	5.39	6.25	**10yr**
25yr	0.52	0.83	1.05	1.45	1.92	2.41	**25yr**	1.66	2.13	2.74	3.26	3.80	4.36	4.95	**25yr**	3.86	4.76	5.57	6.48	7.56	**25yr**
50yr	0.58	0.93	1.20	1.68	2.27	2.87	**50yr**	1.96	2.51	3.27	3.88	4.50	5.12	5.83	**50yr**	4.53	5.60	6.48	7.44	8.74	**50yr**
100yr	0.67	1.08	1.39	1.97	2.68	3.40	**100yr**	2.31	2.96	3.87	4.59	5.30	6.01	6.86	**100yr**	5.32	6.60	7.56	8.55	10.11	**100yr**
200yr	0.75	1.23	1.60	2.29	3.17	4.03	**200yr**	2.74	3.49	4.60	5.44	6.26	7.06	8.08	**200yr**	6.25	7.77	8.81	9.83	11.70	**200yr**
500yr	0.91	1.50	1.96	2.84	3.97	5.06	**500yr**	3.42	4.35	5.77	6.80	7.78	8.74	10.03	**500yr**	7.73	9.65	10.79	11.82	14.19	**500yr**

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.23	0.36	0.44	0.59	0.72	0.85	1yr	0.62	0.83	0.98	1.19	1.48	1.87	1.99	1yr	1.66	1.91	2.43	3.16	3.47	1yr
2yr	0.32	0.49	0.61	0.82	1.01	1.17	2yr	0.88	1.14	1.29	1.56	1.85	2.36	2.67	2yr	2.09	2.56	3.11	3.80	4.33	2yr
5yr	0.36	0.55	0.69	0.94	1.20	1.37	5yr	1.04	1.34	1.51	1.83	2.15	2.80	3.15	5yr	2.48	3.03	3.61	4.37	5.00	5yr
10yr	0.39	0.60	0.74	1.04	1.34	1.55	10yr	1.16	1.52	1.69	2.04	2.41	3.18	3.57	10yr	2.81	3.43	4.01	4.85	5.50	10yr
25yr	0.44	0.67	0.83	1.18	1.56	1.83	25yr	1.35	1.79	1.96	2.36	2.81	3.75	4.22	25yr	3.32	4.05	4.61	5.57	6.19	25yr
50yr	0.47	0.72	0.90	1.29	1.74	2.07	50yr	1.50	2.03	2.17	2.63	3.15	4.25	4.81	50yr	3.77	4.63	5.14	6.20	6.75	50yr
100yr	0.52	0.78	0.98	1.42	1.94	2.35	100yr	1.68	2.29	2.43	2.92	3.56	4.83	5.49	100yr	4.28	5.28	5.75	6.91	7.33	100yr
200yr	0.57	0.85	1.08	1.56	2.18	2.66	200yr	1.88	2.60	2.71	3.25	4.00	5.52	6.26	200yr	4.88	6.02	6.42	7.69	7.99	200yr
500yr	0.64	0.95	1.22	1.78	2.53	3.17	500yr	2.18	3.10	3.16	3.71	4.70	6.61	7.46	500yr	5.85	7.17	7.47	8.83	8.88	500yr

Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.31	0.48	0.58	0.78	0.96	1.12	1yr	0.83	1.10	1.29	1.58	1.83	2.27	2.59	1yr	2.01	2.49	3.02	3.53	4.36	1yr
2yr	0.35	0.55	0.67	0.91	1.12	1.25	2yr	0.97	1.22	1.41	1.70	1.99	2.53	2.86	2yr	2.24	2.75	3.36	4.06	4.70	2yr
5yr	0.43	0.66	0.82	1.12	1.43	1.61	5yr	1.23	1.57	1.78	2.17	2.62	3.26	3.69	5yr	2.89	3.55	4.22	5.04	5.77	5yr
10yr	0.50	0.77	0.96	1.34	1.73	1.96	10yr	1.49	1.91	2.16	2.66	3.21	3.99	4.49	10yr	3.53	4.32	5.05	5.96	6.81	10yr
25yr	0.64	0.97	1.20	1.72	2.26	2.54	25yr	1.95	2.49	2.79	3.46	4.23	5.19	5.79	25yr	4.59	5.56	6.40	7.44	8.56	25yr
50yr	0.76	1.15	1.44	2.06	2.78	3.10	50yr	2.40	3.03	3.40	4.25	5.19	6.31	7.01	50yr	5.59	6.74	7.68	8.81	10.19	50yr
100yr	0.91	1.38	1.72	2.49	3.41	3.78	100yr	2.95	3.69	4.14	5.23	6.38	7.65	8.50	100yr	6.77	8.17	9.20	10.41	12.13	100yr
200yr	1.09	1.64	2.08	3.01	4.20	4.61	200yr	3.62	4.51	5.04	6.42	7.83	9.28	10.29	200yr	8.21	9.89	11.01	12.30	14.45	200yr
500yr	1.40	2.08	2.67	3.88	5.52	6.00	500yr	4.76	5.86	6.56	8.46	10.28	11.98	13.24	500yr	10.60	12.73	13.98	15.35	18.23	500yr

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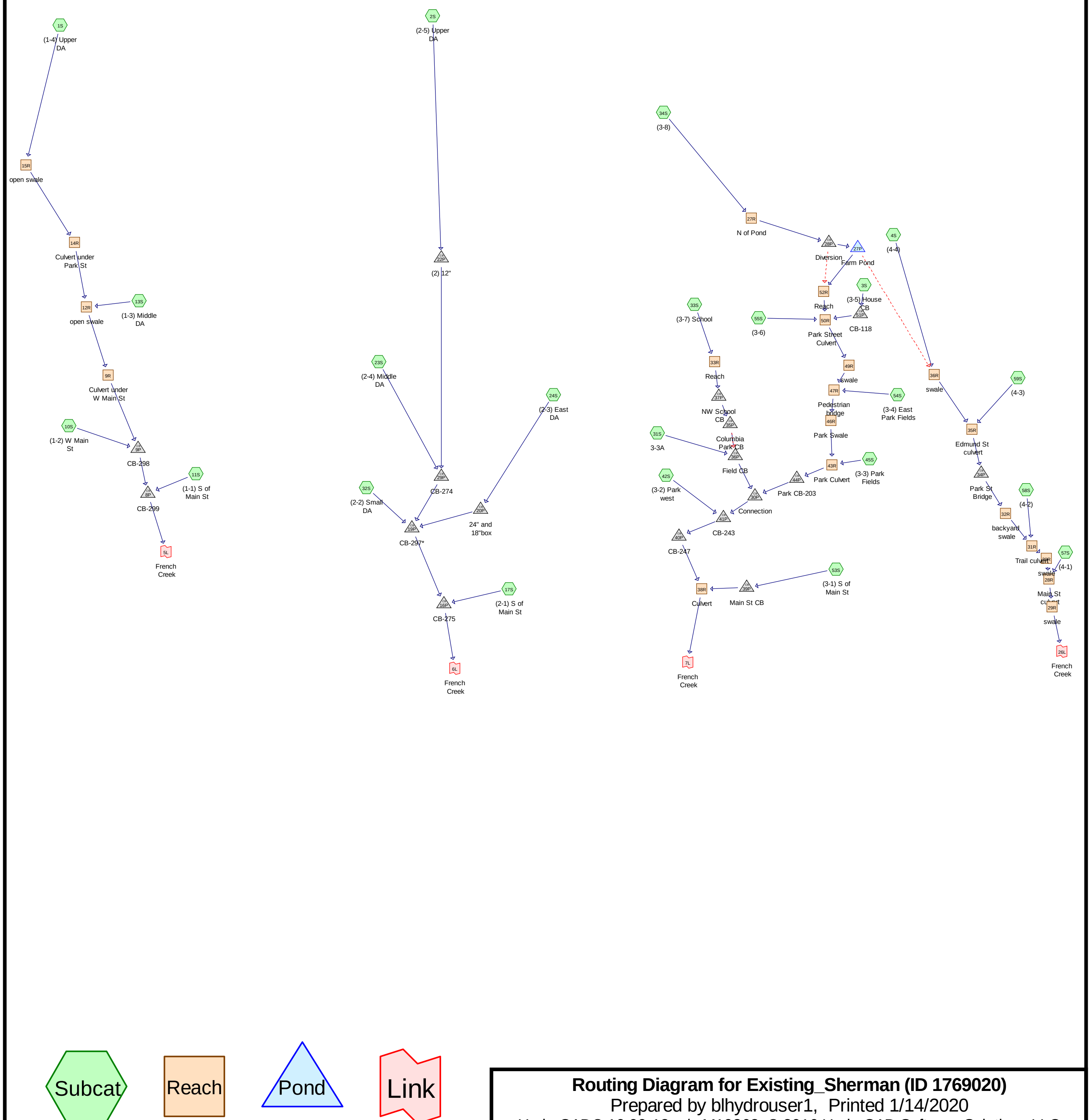
Northeast Regional Climate Center

APPENDIX D
HYDROCAD® Summary Reports
(Existing and Proposed Conditions)
(Full Summary Reports are available on CD upon request)

EXISTING CONDITION MODEL



Routing Diagram for Existing_Sherman (ID 1769020)
Prepared by blhydrouser1, Printed 1/14/2020
HydroCAD® 10.00-18 s/n M19368 © 2016 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
10.815	54	1/2 acre lots, 25% imp, HSG A (2S, 3S, 4S, 10S, 11S, 17S, 23S, 24S, 31S, 33S, 42S, 45S, 53S, 54S, 58S, 59S)
0.747	70	1/2 acre lots, 25% imp, HSG B (4S, 10S, 11S, 13S)
18.844	85	1/2 acre lots, 25% imp, HSG D (1S, 2S, 3S, 4S, 10S, 11S, 13S, 17S, 23S, 33S, 34S, 42S, 45S, 53S, 54S, 55S, 58S)
0.896	61	1/4 acre lots, 38% imp, HSG A (42S)
10.572	77	1/8 acre lots, 65% imp, HSG A (2S, 4S, 10S, 11S, 13S, 17S, 23S, 24S, 31S, 32S, 33S, 45S, 53S)
5.246	92	1/8 acre lots, 65% imp, HSG D (1S, 2S, 4S, 10S, 11S, 13S, 17S, 23S, 31S, 33S, 34S, 45S, 53S)
12.655	39	>75% Grass cover, Good, HSG A (3S, 4S, 10S, 11S, 24S, 31S, 42S, 45S, 53S, 54S, 57S, 58S, 59S)
1.128	61	>75% Grass cover, Good, HSG B (4S, 10S, 13S)
35.445	80	>75% Grass cover, Good, HSG D (1S, 2S, 3S, 4S, 10S, 11S, 13S, 17S, 23S, 31S, 33S, 34S, 42S, 45S, 53S, 54S, 55S, 57S, 58S, 59S)
4.481	73	Brush, Good, HSG D (3S, 34S, 55S)
8.328	30	Meadow, non-grazed, HSG A (2S, 3S, 4S, 24S, 33S, 45S, 54S, 58S, 59S)
0.822	58	Meadow, non-grazed, HSG B (10S, 13S, 53S)
14.356	78	Meadow, non-grazed, HSG D (1S, 2S, 4S, 10S, 13S, 17S, 33S, 34S, 45S, 54S, 55S, 58S, 59S)
1.194	39	Pasture/grassland/range, Good, HSG A (3S, 42S, 45S, 59S)
0.104	61	Pasture/grassland/range, Good, HSG B (4S, 34S)
141.687	80	Pasture/grassland/range, Good, HSG D (1S, 2S, 3S, 4S, 33S, 34S, 42S, 45S, 54S, 55S, 57S, 58S, 59S)
16.569	67	Row crops, straight row, Good, HSG A (4S, 34S, 58S, 59S)
8.121	78	Row crops, straight row, Good, HSG B (4S, 34S)
183.096	89	Row crops, straight row, Good, HSG D (1S, 3S, 4S, 34S, 58S, 59S)
0.600	87	Small grain, straight row, Good, HSG D (10S, 13S)
2.978	89	Urban commercial, 85% imp, HSG A (2S, 10S, 11S, 17S, 23S, 24S, 31S, 32S, 33S, 42S, 45S, 53S)
0.213	95	Urban commercial, 85% imp, HSG D (11S, 53S)
6.173	30	Woods, Good, HSG A (4S, 45S, 54S, 57S, 58S)
7.456	55	Woods, Good, HSG B (4S, 34S)
69.780	77	Woods, Good, HSG D (1S, 2S, 4S, 13S, 34S, 45S, 55S, 57S, 58S)
562.306	**79**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
70.180	HSG A	2S, 3S, 4S, 10S, 11S, 13S, 17S, 23S, 24S, 31S, 32S, 33S, 34S, 42S, 45S, 53S, 54S, 57S, 58S, 59S
18.378	HSG B	4S, 10S, 11S, 13S, 34S, 53S
0.000	HSG C	
473.748	HSG D	1S, 2S, 3S, 4S, 10S, 11S, 13S, 17S, 23S, 31S, 33S, 34S, 42S, 45S, 53S, 54S, 55S, 57S, 58S, 59S
0.000	Other	
562.306		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
10.815	0.747	0.000	18.844	0.000	30.406	1/2 acre lots, 25% imp	1S, 2S, 3S, 4S, 10S, 11S, 13S, 17S, 23S, 24S, 31S, 33S, 34S, 42S, 45S, 53S, 54S, 55S, 58S, 59S
0.896	0.000	0.000	0.000	0.000	0.896	1/4 acre lots, 38% imp	42S
10.572	0.000	0.000	5.246	0.000	15.818	1/8 acre lots, 65% imp	1S, 2S, 4S, 10S, 11S, 13S, 17S, 23S, 24S, 31S, 32S, 33S, 34S, 45S, 53S
12.655	1.128	0.000	35.445	0.000	49.228	>75% Grass cover, Good	1S, 2S, 3S, 4S, 10S, 11S, 13S, 17S, 23S, 24S, 31S, 33S, 34S, 42S, 45S, 53S,

Ground Covers (all nodes) (continued)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	4.481	0.000	4.481	Brush, Good	3S, 34S, 55S
8.328	0.822	0.000	14.356	0.000	23.506	Meadow, non-grazed	1S, 2S, 3S, 4S, 10S, 13S, 17S, 24S, 33S, 34S, 45S, 53S, 54S, 55S, 58S, 59S
1.194	0.104	0.000	141.687	0.000	142.985	Pasture/grassland/range, Good	1S, 2S, 3S, 4S, 33S, 34S, 42S, 45S, 54S, 55S, 57S, 58S, 59S
16.569	8.121	0.000	183.096	0.000	207.786	Row crops, straight row, Good	1S, 3S, 4S, 34S, 58S, 59S
0.000	0.000	0.000	0.600	0.000	0.600	Small grain, straight row, Good	10S, 13S
2.978	0.000	0.000	0.213	0.000	3.191	Urban commercial, 85% imp	2S, 10S, 11S, 17S, 23S, 24S, 31S, 32S, 33S, 42S, 45S, 53S

Ground Covers (all nodes) (continued)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
6.173	7.456	0.000	69.780	0.000	83.409	Woods, Good	1S, 2S, 4S, 13S, 34S, 45S, 54S, 55S, 57S, 58S
70.180	**18.378**	**0.000**	**473.748**	**0.000**	**562.306**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	9R	1,536.78	1,536.00	203.7	0.0038	0.010	36.0	0.0	0.0
2	14R	1,552.35	1,550.56	86.2	0.0208	0.012	48.0	0.0	0.0
3	28R	1,541.44	1,541.19	52.7	0.0047	0.020	15.0	0.0	0.0
4	31R	1,547.09	1,544.70	91.4	0.0261	0.020	36.0	0.0	0.0
5	35R	1,562.22	1,560.62	110.0	0.0145	0.013	36.0	0.0	0.0
6	38R	1,536.42	1,534.30	192.1	0.0110	0.011	36.0	0.0	0.0
7	43R	1,540.16	1,538.19	218.2	0.0090	0.015	36.0	0.0	0.0
8	47R	1,545.50	1,544.94	17.7	0.0316	0.012	36.0	0.0	0.0
9	50R	1,551.04	1,546.67	96.4	0.0453	0.012	60.0	0.0	0.0
10	8P	1,529.55	1,525.21	247.9	0.0175	0.015	36.0	0.0	0.0
11	9P	1,536.00	1,529.10	219.5	0.0314	0.015	36.0	0.0	0.0
12	16P	1,536.80	1,528.42	178.2	0.0470	0.015	24.0	0.0	0.0
13	19P	1,544.44	1,536.90	92.0	0.0820	0.015	24.0	0.0	0.0
14	20P	1,545.87	1,544.44	102.0	0.0140	0.011	24.0	18.0	0.0
15	22P	1,560.76	1,544.97	523.0	0.0302	0.015	12.0	0.0	0.0
16	22P	1,560.76	1,544.97	523.0	0.0302	0.015	12.0	0.0	0.0
17	29P	1,544.94	1,544.44	94.7	0.0053	0.012	12.0	0.0	0.0
18	30P	1,538.00	1,537.06	172.0	0.0055	0.015	36.0	0.0	0.0
19	34P	1,560.25	1,559.86	56.0	0.0070	0.013	36.0	0.0	0.0
20	35P	1,553.79	1,546.55	74.2	0.0976	0.010	24.0	0.0	0.0
21	35P	1,553.06	1,546.55	74.2	0.0877	0.010	12.0	0.0	0.0
22	36P	1,547.00	1,538.00	421.0	0.0214	0.010	12.0	0.0	0.0
23	37P	1,556.53	1,553.76	184.8	0.0150	0.010	24.0	0.0	0.0
24	39P	1,543.43	1,540.88	17.4	0.1466	0.015	12.0	0.0	0.0
25	40P	1,537.34	1,536.81	51.9	0.0102	0.012	48.0	36.0	0.0
26	41P	1,536.36	1,537.34	30.4	-0.0322	0.010	48.0	0.0	0.0
27	44P	1,538.19	1,538.00	32.4	0.0059	0.015	36.0	0.0	0.0
28	51P	1,558.76	1,551.04	319.3	0.0242	0.010	12.0	0.0	0.0

Time span=5.00-40.00 hrs, dt=0.01 hrs, 3501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: (1-4) Upper DA Runoff Area=61.724 ac 1.41% Impervious Runoff Depth=0.81"
Flow Length=1,437' Tc=18.0 min CN=84 Runoff=57.57 cfs 4.157 af

Subcatchment 2S: (2-5) Upper DA Runoff Area=8.759 ac 18.13% Impervious Runoff Depth=0.66"
Flow Length=1,093' Tc=18.2 min CN=81 Runoff=6.45 cfs 0.483 af

Subcatchment 3S: (3-5) House CB Runoff Area=4.352 ac 1.05% Impervious Runoff Depth=0.54"
Flow Length=770' Tc=34.7 min CN=78 Runoff=1.58 cfs 0.194 af

Subcatchment 4S: (4-4) Runoff Area=128.604 ac 0.37% Impervious Runoff Depth=0.71"
Flow Length=5,676' Tc=119.4 min CN=82 Runoff=26.60 cfs 7.595 af

Subcatchment 10S: (1-2) W Main St Runoff Area=4.836 ac 30.38% Impervious Runoff Depth=0.30"
Flow Length=981' Tc=15.3 min CN=71 Runoff=1.33 cfs 0.122 af

Subcatchment 11S: (1-1) S of Main St Runoff Area=4.334 ac 43.77% Impervious Runoff Depth=0.54"
Flow Length=467' Tc=3.6 min CN=78 Runoff=4.44 cfs 0.193 af

Subcatchment 13S: (1-3) Middle DA Runoff Area=10.296 ac 17.89% Impervious Runoff Depth=0.81"
Flow Length=575' Tc=10.9 min CN=84 Runoff=12.33 cfs 0.693 af

Subcatchment 17S: (2-1) S of Main St Runoff Area=3.057 ac 58.83% Impervious Runoff Depth=0.71"
Flow Length=457' Tc=9.1 min CN=82 Runoff=3.40 cfs 0.181 af

Subcatchment 23S: (2-4) Middle DA Runoff Area=3.959 ac 39.80% Impervious Runoff Depth=0.23"
Flow Length=537' Tc=11.8 min CN=68 Runoff=0.76 cfs 0.074 af

Subcatchment 24S: (2-3) East DA Runoff Area=3.850 ac 54.29% Impervious Runoff Depth=0.30"
Flow Length=980' Tc=4.9 min CN=71 Runoff=1.79 cfs 0.097 af

Subcatchment 31S: 3-3A Runoff Area=0.832 ac 47.48% Impervious Runoff Depth=0.25"
Flow Length=250' Tc=3.4 min CN=69 Runoff=0.31 cfs 0.017 af

Subcatchment 32S: (2-2) Small DA Runoff Area=0.143 ac 80.38% Impervious Runoff Depth=0.92"
Flow Length=100' Slope=0.0350 '/' Tc=1.1 min CN=86 Runoff=0.28 cfs 0.011 af

Subcatchment 33S: (3-7) School Runoff Area=21.606 ac 7.07% Impervious Runoff Depth=0.62"
Flow Length=1,428' Tc=33.4 min CN=80 Runoff=9.75 cfs 1.113 af

Subcatchment 34S: (3-8) Runoff Area=229.121 ac 0.55% Impervious Runoff Depth=0.71"
Flow Length=4,107' Tc=35.8 min CN=82 Runoff=116.95 cfs 13.531 af

Subcatchment 42S: (3-2) Park west Runoff Area=2.950 ac 15.76% Impervious Runoff Depth=0.02"
Flow Length=519' Tc=6.0 min CN=54 Runoff=0.01 cfs 0.004 af

Subcatchment 45S: (3-3) Park Fields Runoff Area=15.722 ac 5.13% Impervious Runoff Depth=0.04"
Flow Length=1,358' Tc=28.7 min CN=57 Runoff=0.07 cfs 0.054 af

Subcatchment 53S: (3-1) S of Main St Runoff Area=5.408 ac 34.94% Impervious Runoff Depth=0.33"
Flow Length=1,547' Tc=9.0 min CN=72 Runoff=2.32 cfs 0.149 af

Subcatchment 54S: (3-4) East Park Fields Runoff Area=9.396 ac 2.28% Impervious Runoff Depth=0.00"
Flow Length=939' Tc=22.2 min CN=50 Runoff=0.00 cfs 0.001 af

Subcatchment 55S: (3-6) Runoff Area=15.214 ac 0.40% Impervious Runoff Depth=0.54"
Flow Length=1,212' Tc=21.4 min CN=78 Runoff=7.75 cfs 0.679 af

Subcatchment 57S: (4-1) Runoff Area=2.924 ac 0.00% Impervious Runoff Depth=0.18"
Flow Length=672' Tc=20.3 min CN=66 Runoff=0.25 cfs 0.044 af

Subcatchment 58S: (4-2) Runoff Area=16.984 ac 2.14% Impervious Runoff Depth=0.08"
Flow Length=1,049' Tc=31.2 min CN=60 Runoff=0.18 cfs 0.109 af

Subcatchment 59S: (4-3) Runoff Area=8.235 ac 2.42% Impervious Runoff Depth=0.01"
Flow Length=617' Tc=26.8 min CN=53 Runoff=0.01 cfs 0.007 af

Reach 9R: Culvert under W Main St Avg. Flow Depth=3.00' Max Vel=8.65 fps Inflow=58.30 cfs 4.851 af
36.0" Round Pipe n=0.010 L=203.7' S=0.0038 '/' Capacity=53.66 cfs Outflow=57.76 cfs 4.851 af

Reach 12R: open swale Avg. Flow Depth=0.97' Max Vel=6.09 fps Inflow=58.81 cfs 4.851 af
n=0.030 L=600.0' S=0.0230 '/' Capacity=1,009.29 cfs Outflow=58.30 cfs 4.851 af

Reach 14R: Culvert under Park St Avg. Flow Depth=1.35' Max Vel=14.74 fps Inflow=54.77 cfs 4.157 af
48.0" Round Pipe n=0.012 L=86.2' S=0.0208 '/' Capacity=224.24 cfs Outflow=54.74 cfs 4.157 af

Reach 15R: open swale Avg. Flow Depth=1.60' Max Vel=4.62 fps Inflow=57.57 cfs 4.157 af
n=0.030 L=1,000.0' S=0.0077 '/' Capacity=257.03 cfs Outflow=54.77 cfs 4.157 af

Reach 27R: N of Pond Avg. Flow Depth=1.43' Max Vel=8.37 fps Inflow=116.95 cfs 13.531 af
n=0.025 L=2,935.9' S=0.0171 '/' Capacity=200.53 cfs Outflow=112.41 cfs 13.531 af

Reach 28R: Main St culvert Avg. Flow Depth=1.25' Max Vel=2.69 fps Inflow=26.72 cfs 7.756 af
15.0" Round Pipe n=0.020 L=52.7' S=0.0047 '/' Capacity=2.89 cfs Outflow=2.98 cfs 6.587 af

Reach 29R: swale Avg. Flow Depth=0.19' Max Vel=2.10 fps Inflow=2.98 cfs 6.587 af
n=0.030 L=722.0' S=0.0183 '/' Capacity=182.55 cfs Outflow=2.89 cfs 6.542 af

Reach 30R: swale Avg. Flow Depth=0.89' Max Vel=3.43 fps Inflow=26.67 cfs 7.712 af
n=0.030 L=429.0' S=0.0076 '/' Capacity=117.74 cfs Outflow=26.66 cfs 7.712 af

Reach 31R: Trail culvert Avg. Flow Depth=1.28' Max Vel=9.24 fps Inflow=26.67 cfs 7.712 af
36.0" Round Pipe n=0.020 L=91.4' S=0.0261 '/' Capacity=70.11 cfs Outflow=26.67 cfs 7.712 af

Reach 32R: backyard swale Avg. Flow Depth=0.75' Max Vel=4.18 fps Inflow=26.54 cfs 7.603 af
n=0.030 L=937.0' S=0.0136 '/' Capacity=70.91 cfs Outflow=26.50 cfs 7.603 af

Reach 33R: Reach Avg. Flow Depth=0.45' Max Vel=1.34 fps Inflow=9.75 cfs 1.113 af
n=0.022 L=682.0' S=0.0103 '/' Capacity=1.03 cfs Outflow=8.57 cfs 1.113 af

Reach 35R: Edmund St culvert Avg. Flow Depth=1.19' Max Vel=10.21 fps Inflow=26.54 cfs 7.603 af
36.0" Round Pipe n=0.013 L=110.0' S=0.0145 '/' Capacity=80.44 cfs Outflow=26.54 cfs 7.603 af

Reach 36R: swale Avg. Flow Depth=0.91' Max Vel=5.03 fps Inflow=26.60 cfs 7.595 af
n=0.035 L=760.0' S=0.0247 '/' Capacity=122.96 cfs Outflow=26.54 cfs 7.595 af

Reach 38R: Culvert Avg. Flow Depth=2.01' Max Vel=12.98 fps Inflow=65.61 cfs 16.111 af
36.0" Round Pipe n=0.011 L=192.1' S=0.0110 '/' Capacity=82.81 cfs Outflow=64.87 cfs 16.111 af

Reach 43R: Park Culvert Avg. Flow Depth=3.00' Max Vel=8.85 fps Inflow=101.39 cfs 14.827 af
36.0" Round Pipe n=0.015 L=218.2' S=0.0090 '/' Capacity=54.93 cfs Outflow=57.19 cfs 14.827 af

Reach 46R: Park Swale Avg. Flow Depth=1.99' Max Vel=7.27 fps Inflow=101.49 cfs 14.773 af
n=0.025 L=410.0' S=0.0113 '/' Capacity=229.68 cfs Outflow=101.39 cfs 14.773 af

Reach 47R: Pedestrian bridge Avg. Flow Depth=1.31' Max Vel=17.11 fps Inflow=101.49 cfs 14.773 af
36.0" Round Pipe x 2.00 n=0.012 L=17.7' S=0.0316 '/' Capacity=257.05 cfs Outflow=101.49 cfs 14.773 af

Reach 49R: swale Avg. Flow Depth=1.53' Max Vel=5.27 fps Inflow=101.53 cfs 14.772 af
n=0.022 L=176.2' S=0.0066 '/' Capacity=418.30 cfs Outflow=101.49 cfs 14.772 af

Reach 50R: Park Street Culvert Avg. Flow Depth=1.39' Max Vel=22.77 fps Inflow=101.54 cfs 14.772 af
60.0" Round Pipe n=0.012 L=96.4' S=0.0453 '/' Capacity=600.73 cfs Outflow=101.53 cfs 14.772 af

Reach 52R: Reach Avg. Flow Depth=1.98' Max Vel=8.31 fps Inflow=99.21 cfs 13.904 af
n=0.025 L=1,100.0' S=0.0148 '/' Capacity=1,036.12 cfs Outflow=98.69 cfs 13.899 af

Pond 8P: CB-299 Peak Elev=1,534.07' Inflow=59.15 cfs 5.166 af
36.0" Round Culvert n=0.015 L=247.9' S=0.0175 '/' Outflow=59.15 cfs 5.166 af

Pond 9P: CB-298 Peak Elev=1,540.46' Inflow=58.55 cfs 4.973 af
36.0" Round Culvert n=0.015 L=219.5' S=0.0314 '/' Outflow=58.55 cfs 4.973 af

Pond 16P: CB-275 Peak Elev=1,538.29' Inflow=10.39 cfs 0.846 af
24.0" Round Culvert n=0.015 L=178.2' S=0.0470 '/' Outflow=10.39 cfs 0.846 af

Pond 19P: CB-297* Peak Elev=1,545.67' Inflow=7.67 cfs 0.666 af
24.0" Round Culvert n=0.015 L=92.0' S=0.0820 '/' Outflow=7.67 cfs 0.666 af

Pond 20P: 24" and 18"box Peak Elev=1,546.30' Inflow=1.79 cfs 0.097 af
24.0" x 18.0" Box Culvert n=0.011 L=102.0' S=0.0140 '/' Outflow=1.79 cfs 0.097 af

Pond 22P: (2) 12" Peak Elev=1,561.99' Inflow=6.45 cfs 0.483 af
Outflow=6.45 cfs 0.483 af

Pond 27P: Farm Pond Peak Elev=1,568.13' Storage=5.376 af Inflow=76.16 cfs 9.092 af
Primary=66.33 cfs 9.464 af Secondary=0.00 cfs 0.000 af Outflow=66.33 cfs 9.464 af

Pond 28P: Diversion Peak Elev=1,569.61' Inflow=112.41 cfs 13.531 af
Primary=76.16 cfs 9.092 af Secondary=36.25 cfs 4.440 af Outflow=112.41 cfs 13.531 af

Pond 29P: CB-274 Peak Elev=1,550.65' Inflow=7.16 cfs 0.558 af
12.0" Round Culvert n=0.012 L=94.7' S=0.0053 '/' Outflow=7.16 cfs 0.558 af

Pond 30P: Connection Peak Elev=1,544.24' Inflow=65.21 cfs 15.958 af
36.0" Round Culvert n=0.015 L=172.0' S=0.0055 '/' Outflow=65.21 cfs 15.958 af

Pond 34P: Park St Bridge Peak Elev=1,562.68' Inflow=26.54 cfs 7.603 af
36.0" Round Culvert n=0.013 L=56.0' S=0.0070 '/' Outflow=26.54 cfs 7.603 af

Pond 35P: Columbia Park CB Peak Elev=1,554.70' Inflow=8.57 cfs 1.113 af
Primary=4.53 cfs 0.207 af Secondary=4.04 cfs 0.906 af Outflow=8.57 cfs 1.113 af

Pond 36P: Field CB Peak Elev=1,556.38' Inflow=8.61 cfs 1.130 af
12.0" Round Culvert n=0.010 L=421.0' S=0.0214 '/' Outflow=8.61 cfs 1.130 af

Pond 37P: NW School CB Peak Elev=1,557.85' Inflow=8.57 cfs 1.113 af
24.0" Round Culvert n=0.010 L=184.8' S=0.0150 '/' Outflow=8.57 cfs 1.113 af

Pond 39P: Main St CB Peak Elev=1,544.30' Inflow=2.32 cfs 0.149 af
12.0" Round Culvert n=0.015 L=17.4' S=0.1466 '/' Outflow=2.32 cfs 0.149 af

Pond 40P: CB-247 Peak Elev=1,540.43' Inflow=65.21 cfs 15.962 af
48.0" x 36.0" Box Culvert n=0.012 L=51.9' S=0.0102 '/' Outflow=65.21 cfs 15.962 af

Pond 41P: CB-243 Peak Elev=1,540.53' Inflow=65.21 cfs 15.962 af
48.0" Round Culvert n=0.010 L=30.4' S=-0.0322 '/' Outflow=65.21 cfs 15.962 af

Pond 44P: Park CB-203 Peak Elev=1,542.84' Inflow=57.19 cfs 14.827 af
36.0" Round Culvert n=0.015 L=32.4' S=0.0059 '/' Outflow=57.19 cfs 14.827 af

Pond 51P: CB-118 Peak Elev=1,559.44' Inflow=1.58 cfs 0.194 af
12.0" Round Culvert n=0.010 L=319.3' S=0.0242 '/' Outflow=1.58 cfs 0.194 af

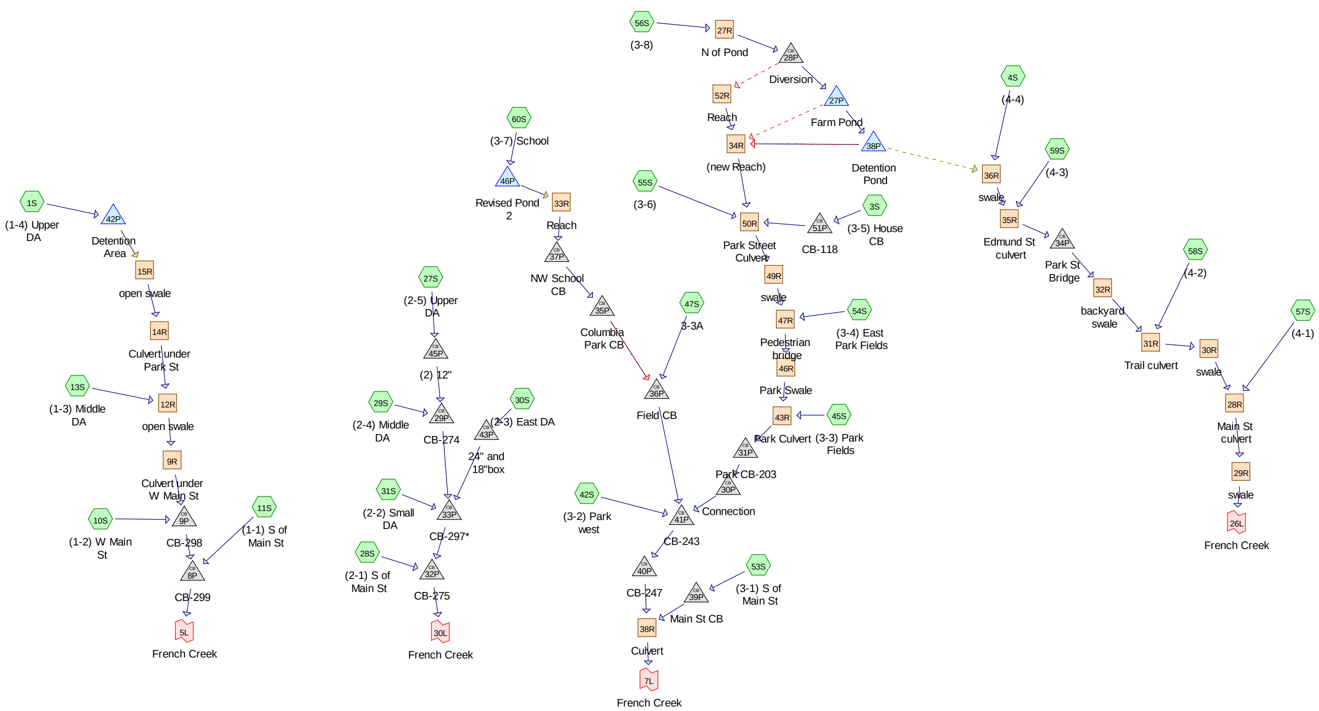
Link 5L: French Creek Inflow=59.15 cfs 5.166 af
Primary=59.15 cfs 5.166 af

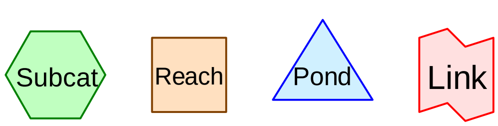
Link 6L: French Creek Inflow=10.39 cfs 0.846 af
Primary=10.39 cfs 0.846 af

Link 7L: French Creek Inflow=64.87 cfs 16.111 af
Primary=64.87 cfs 16.111 af

Link 26L: French Creek Inflow=2.89 cfs 6.542 af
Primary=2.89 cfs 6.542 af

Total Runoff Area = 562.306 ac Runoff Volume = 29.512 af Average Runoff Depth = 0.63"
96.28% Pervious = 541.370 ac 3.72% Impervious = 20.936 ac





Routing Diagram for Proposed_Sherman_new Pond DA3_022620
Prepared by blhydrouser1, Printed 2/26/2020
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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
10.815	54	1/2 acre lots, 25% imp, HSG A (3S, 4S, 10S, 11S, 27S, 28S, 29S, 30S, 42S, 45S, 47S, 53S, 54S, 58S, 59S, 60S)
0.747	70	1/2 acre lots, 25% imp, HSG B (4S, 10S, 11S, 13S)
18.844	85	1/2 acre lots, 25% imp, HSG D (1S, 3S, 4S, 10S, 11S, 13S, 27S, 28S, 29S, 42S, 45S, 53S, 54S, 55S, 56S, 58S, 60S)
0.896	61	1/4 acre lots, 38% imp, HSG A (42S)
10.572	77	1/8 acre lots, 65% imp, HSG A (4S, 10S, 11S, 13S, 27S, 28S, 29S, 30S, 31S, 45S, 47S, 53S, 60S)
5.246	92	1/8 acre lots, 65% imp, HSG D (1S, 4S, 10S, 11S, 13S, 27S, 28S, 29S, 45S, 47S, 53S, 56S, 60S)
12.655	39	>75% Grass cover, Good, HSG A (3S, 4S, 10S, 11S, 30S, 42S, 45S, 47S, 53S, 54S, 57S, 58S, 59S)
1.128	61	>75% Grass cover, Good, HSG B (4S, 10S, 13S)
35.445	80	>75% Grass cover, Good, HSG D (1S, 3S, 4S, 10S, 11S, 13S, 27S, 28S, 29S, 42S, 45S, 47S, 53S, 54S, 55S, 56S, 57S, 58S, 59S, 60S)
4.481	73	Brush, Good, HSG D (3S, 55S, 56S)
8.328	30	Meadow, non-grazed, HSG A (3S, 4S, 27S, 30S, 45S, 54S, 58S, 59S, 60S)
0.822	58	Meadow, non-grazed, HSG B (10S, 13S, 53S)
14.356	78	Meadow, non-grazed, HSG D (1S, 4S, 10S, 13S, 27S, 28S, 45S, 54S, 55S, 56S, 58S, 59S, 60S)
1.194	39	Pasture/grassland/range, Good, HSG A (3S, 42S, 45S, 59S)
0.104	61	Pasture/grassland/range, Good, HSG B (4S, 56S)
141.687	80	Pasture/grassland/range, Good, HSG D (1S, 3S, 4S, 27S, 42S, 45S, 54S, 55S, 56S, 57S, 58S, 59S, 60S)
16.569	67	Row crops, straight row, Good, HSG A (4S, 56S, 58S, 59S)
8.121	78	Row crops, straight row, Good, HSG B (4S, 56S)
183.096	89	Row crops, straight row, Good, HSG D (1S, 3S, 4S, 56S, 58S, 59S)
0.600	87	Small grain, straight row, Good, HSG D (10S, 13S)
2.978	89	Urban commercial, 85% imp, HSG A (10S, 11S, 27S, 28S, 29S, 30S, 31S, 42S, 45S, 47S, 53S, 60S)
0.213	95	Urban commercial, 85% imp, HSG D (11S, 53S)
6.173	30	Woods, Good, HSG A (4S, 45S, 54S, 57S, 58S)
7.456	55	Woods, Good, HSG B (4S, 56S)
69.780	77	Woods, Good, HSG D (1S, 4S, 13S, 27S, 45S, 55S, 56S, 57S, 58S)
562.306	**79**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
70.180	HSG A	3S, 4S, 10S, 11S, 13S, 27S, 28S, 29S, 30S, 31S, 42S, 45S, 47S, 53S, 54S, 56S, 57S, 58S, 59S, 60S
18.378	HSG B	4S, 10S, 11S, 13S, 53S, 56S
0.000	HSG C	
473.748	HSG D	1S, 3S, 4S, 10S, 11S, 13S, 27S, 28S, 29S, 42S, 45S, 47S, 53S, 54S, 55S, 56S, 57S, 58S, 59S, 60S
0.000	Other	
562.306		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
10.815	0.747	0.000	18.844	0.000	30.406	1/2 acre lots, 25% imp	1S, 3S, 4S, 10S, 11S, 13S, 27S, 28S, 29S, 30S, 42S, 45S, 47S, 53S, 54S, 55S, 56S, 58S, 59S, 60S
0.896	0.000	0.000	0.000	0.000	0.896	1/4 acre lots, 38% imp	42S
10.572	0.000	0.000	5.246	0.000	15.818	1/8 acre lots, 65% imp	1S, 4S, 10S, 11S, 13S, 27S, 28S, 29S, 30S, 31S, 45S, 47S, 53S, 56S, 60S
12.655	1.128	0.000	35.445	0.000	49.228	>75% Grass cover, Good	1S, 3S, 4S, 10S, 11S, 13S, 27S, 28S, 29S, 30S, 42S, 45S, 47S, 53S,

Ground Covers (all nodes) (continued)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	4.481	0.000	4.481	Brush, Good	3S, 55S, 56S
8.328	0.822	0.000	14.356	0.000	23.506	Meadow, non-grazed	1S, 3S, 4S, 10S, 13S, 27S, 28S, 30S, 45S, 53S, 54S, 55S, 56S, 58S, 59S, 60S
1.194	0.104	0.000	141.687	0.000	142.985	Pasture/grassland/range, Good	1S, 3S, 4S, 27S, 42S, 45S, 54S, 55S, 56S, 57S, 58S, 59S, 60S
16.569	8.121	0.000	183.096	0.000	207.786	Row crops, straight row, Good	1S, 3S, 4S, 56S, 58S, 59S
0.000	0.000	0.000	0.600	0.000	0.600	Small grain, straight row, Good	10S, 13S
2.978	0.000	0.000	0.213	0.000	3.191	Urban commercial, 85% imp	10S, 11S, 27S, 28S, 29S, 30S, 31S, 42S, 45S, 47S,

Ground Covers (all nodes) (continued)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
6.173	7.456	0.000	69.780	0.000	83.409	Woods, Good	1S, 4S, 13S, 27S, 45S, 54S, 55S, 56S, 57S, 58S
70.180	**18.378**	**0.000**	**473.748**	**0.000**	**562.306**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	9R	1,536.78	1,536.00	203.7	0.0038	0.010	36.0	0.0	0.0
2	14R	1,552.35	1,550.56	86.2	0.0208	0.012	48.0	0.0	0.0
3	28R	1,541.44	1,541.19	52.7	0.0047	0.020	15.0	0.0	0.0
4	31R	1,547.09	1,544.70	91.4	0.0261	0.020	36.0	0.0	0.0
5	35R	1,562.22	1,560.62	110.0	0.0145	0.013	36.0	0.0	0.0
6	38R	1,536.42	1,534.30	192.1	0.0110	0.011	36.0	0.0	0.0
7	43R	1,540.16	1,538.19	218.2	0.0090	0.015	36.0	0.0	0.0
8	47R	1,545.50	1,544.94	17.7	0.0316	0.012	36.0	0.0	0.0
9	50R	1,551.04	1,546.67	96.4	0.0453	0.012	60.0	0.0	0.0
10	8P	1,529.55	1,525.21	247.9	0.0175	0.015	36.0	0.0	0.0
11	9P	1,536.00	1,529.10	219.5	0.0314	0.015	36.0	0.0	0.0
12	29P	1,544.94	1,544.44	94.7	0.0053	0.012	12.0	0.0	0.0
13	30P	1,538.00	1,537.06	172.0	0.0055	0.015	48.0	0.0	0.0
14	31P	1,538.19	1,538.00	32.4	0.0059	0.015	36.0	0.0	0.0
15	32P	1,536.80	1,528.42	178.2	0.0470	0.015	24.0	0.0	0.0
16	33P	1,544.44	1,536.90	92.0	0.0820	0.015	24.0	0.0	0.0
17	34P	1,560.25	1,559.86	56.0	0.0070	0.013	36.0	0.0	0.0
18	35P	1,553.79	1,546.55	74.2	0.0976	0.010	24.0	0.0	0.0
19	35P	1,553.06	1,546.55	74.2	0.0877	0.010	12.0	0.0	0.0
20	36P	1,547.00	1,538.00	421.0	0.0214	0.010	12.0	0.0	0.0
21	37P	1,556.53	1,553.76	184.8	0.0150	0.010	24.0	0.0	0.0
22	39P	1,543.43	1,540.88	17.4	0.1466	0.015	12.0	0.0	0.0
23	40P	1,537.34	1,536.81	51.9	0.0102	0.012	48.0	36.0	0.0
24	41P	1,536.36	1,537.34	30.4	-0.0322	0.010	48.0	0.0	0.0
25	43P	1,545.87	1,544.44	102.0	0.0140	0.011	24.0	18.0	0.0
26	45P	1,560.76	1,544.97	523.0	0.0302	0.015	12.0	0.0	0.0
27	45P	1,560.76	1,544.97	523.0	0.0302	0.015	12.0	0.0	0.0
28	51P	1,558.76	1,551.04	319.3	0.0242	0.010	12.0	0.0	0.0

Time span=5.00-40.00 hrs, dt=0.01 hrs, 3501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: (1-4) Upper DA Runoff Area=61.724 ac 1.41% Impervious Runoff Depth=0.81"
Flow Length=1,437' Tc=18.0 min CN=84 Runoff=57.57 cfs 4.157 af

Subcatchment 3S: (3-5) House CB Runoff Area=4.352 ac 1.05% Impervious Runoff Depth=0.54"
Flow Length=770' Tc=34.7 min CN=78 Runoff=1.58 cfs 0.194 af

Subcatchment 4S: (4-4) Runoff Area=128.604 ac 0.37% Impervious Runoff Depth=0.71"
Flow Length=5,676' Tc=119.4 min CN=82 Runoff=26.60 cfs 7.595 af

Subcatchment 10S: (1-2) W Main St Runoff Area=4.836 ac 30.38% Impervious Runoff Depth=0.30"
Flow Length=981' Tc=15.3 min CN=71 Runoff=1.33 cfs 0.122 af

Subcatchment 11S: (1-1) S of Main St Runoff Area=4.334 ac 43.77% Impervious Runoff Depth=0.54"
Flow Length=467' Tc=3.6 min CN=78 Runoff=4.44 cfs 0.193 af

Subcatchment 13S: (1-3) Middle DA Runoff Area=10.296 ac 17.89% Impervious Runoff Depth=0.81"
Flow Length=575' Tc=10.9 min CN=84 Runoff=12.33 cfs 0.693 af

Subcatchment 27S: (2-5) Upper DA Runoff Area=8.759 ac 18.13% Impervious Runoff Depth=0.66"
Flow Length=1,093' Tc=18.2 min CN=81 Runoff=6.45 cfs 0.483 af

Subcatchment 28S: (2-1) S of Main St Runoff Area=3.057 ac 58.83% Impervious Runoff Depth=0.71"
Flow Length=457' Tc=9.1 min CN=82 Runoff=3.40 cfs 0.181 af

Subcatchment 29S: (2-4) Middle DA Runoff Area=3.959 ac 39.80% Impervious Runoff Depth=0.23"
Flow Length=537' Tc=11.8 min CN=68 Runoff=0.76 cfs 0.074 af

Subcatchment 30S: (2-3) East DA Runoff Area=3.850 ac 54.29% Impervious Runoff Depth=0.30"
Flow Length=980' Tc=4.9 min CN=71 Runoff=1.79 cfs 0.097 af

Subcatchment 31S: (2-2) Small DA Runoff Area=0.143 ac 80.38% Impervious Runoff Depth=0.92"
Flow Length=100' Slope=0.0350 '/' Tc=1.1 min CN=86 Runoff=0.28 cfs 0.011 af

Subcatchment 42S: (3-2) Park west Runoff Area=2.950 ac 15.76% Impervious Runoff Depth=0.02"
Flow Length=519' Tc=6.0 min CN=54 Runoff=0.01 cfs 0.004 af

Subcatchment 45S: (3-3) Park Fields Runoff Area=15.722 ac 5.13% Impervious Runoff Depth=0.04"
Flow Length=1,358' Tc=28.7 min CN=57 Runoff=0.07 cfs 0.054 af

Subcatchment 47S: 3-3A Runoff Area=0.832 ac 47.48% Impervious Runoff Depth=0.25"
Flow Length=250' Tc=3.4 min CN=69 Runoff=0.31 cfs 0.017 af

Subcatchment 53S: (3-1) S of Main St Runoff Area=5.408 ac 34.94% Impervious Runoff Depth=0.33"
Flow Length=1,547' Tc=9.0 min CN=72 Runoff=2.32 cfs 0.149 af

Subcatchment 54S: (3-4) East Park Fields Runoff Area=9.396 ac 2.28% Impervious Runoff Depth=0.00"
Flow Length=939' Tc=22.2 min CN=50 Runoff=0.00 cfs 0.001 af

Subcatchment 55S: (3-6) Runoff Area=15.214 ac 0.40% Impervious Runoff Depth=0.54"
Flow Length=1,212' Tc=21.4 min CN=78 Runoff=7.75 cfs 0.679 af

Subcatchment 56S: (3-8) Runoff Area=229.121 ac 0.55% Impervious Runoff Depth=0.71"
Flow Length=4,107' Tc=35.8 min CN=82 Runoff=116.95 cfs 13.531 af

Subcatchment 57S: (4-1) Runoff Area=2.924 ac 0.00% Impervious Runoff Depth=0.18"
Flow Length=672' Tc=20.3 min CN=66 Runoff=0.25 cfs 0.044 af

Subcatchment 58S: (4-2) Runoff Area=16.984 ac 2.14% Impervious Runoff Depth=0.08"
Flow Length=1,049' Tc=31.2 min CN=60 Runoff=0.18 cfs 0.109 af

Subcatchment 59S: (4-3) Runoff Area=8.235 ac 2.42% Impervious Runoff Depth=0.01"
Flow Length=617' Tc=26.8 min CN=53 Runoff=0.01 cfs 0.007 af

Subcatchment 60S: (3-7) School Runoff Area=21.606 ac 7.07% Impervious Runoff Depth=0.62"
Flow Length=1,428' Tc=33.4 min CN=80 Runoff=9.75 cfs 1.113 af

Reach 9R: Culvert under W Main St Avg. Flow Depth=1.06' Max Vel=6.43 fps Inflow=14.41 cfs 7.520 af
36.0" Round Pipe n=0.010 L=203.7' S=0.0038 '/' Capacity=53.66 cfs Outflow=14.38 cfs 7.520 af

Reach 12R: open swale Avg. Flow Depth=0.44' Max Vel=3.91 fps Inflow=14.92 cfs 7.522 af
n=0.030 L=600.0' S=0.0230 '/' Capacity=1,009.29 cfs Outflow=14.41 cfs 7.520 af

Reach 14R: Culvert under Park St Avg. Flow Depth=0.42' Max Vel=7.41 fps Inflow=5.23 cfs 6.829 af
48.0" Round Pipe n=0.012 L=86.2' S=0.0208 '/' Capacity=224.24 cfs Outflow=5.23 cfs 6.828 af

Reach 15R: open swale Avg. Flow Depth=0.42' Max Vel=2.21 fps Inflow=5.24 cfs 6.836 af
n=0.030 L=1,000.0' S=0.0077 '/' Capacity=257.03 cfs Outflow=5.23 cfs 6.829 af

Reach 27R: N of Pond Avg. Flow Depth=1.43' Max Vel=8.37 fps Inflow=116.95 cfs 13.531 af
n=0.025 L=2,935.9' S=0.0171 '/' Capacity=200.53 cfs Outflow=112.41 cfs 13.531 af

Reach 28R: Main St culvert Avg. Flow Depth=1.25' Max Vel=2.69 fps Inflow=26.72 cfs 7.756 af
15.0" Round Pipe n=0.020 L=52.7' S=0.0047 '/' Capacity=2.89 cfs Outflow=2.98 cfs 6.587 af

Reach 29R: swale Avg. Flow Depth=0.19' Max Vel=2.10 fps Inflow=2.98 cfs 6.587 af
n=0.030 L=722.0' S=0.0183 '/' Capacity=182.55 cfs Outflow=2.89 cfs 6.542 af

Reach 30R: swale Avg. Flow Depth=0.89' Max Vel=3.43 fps Inflow=26.67 cfs 7.712 af
n=0.030 L=429.0' S=0.0076 '/' Capacity=117.74 cfs Outflow=26.66 cfs 7.712 af

Reach 31R: Trail culvert Avg. Flow Depth=1.28' Max Vel=9.24 fps Inflow=26.67 cfs 7.712 af
36.0" Round Pipe n=0.020 L=91.4' S=0.0261 '/' Capacity=70.11 cfs Outflow=26.67 cfs 7.712 af

Reach 32R: backyard swale Avg. Flow Depth=0.75' Max Vel=4.18 fps Inflow=26.54 cfs 7.603 af
n=0.030 L=937.0' S=0.0136 '/' Capacity=70.91 cfs Outflow=26.50 cfs 7.603 af

Reach 33R: Reach Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.022 L=682.0' S=0.0103 '/' Capacity=1.03 cfs Outflow=0.00 cfs 0.000 af

Reach 34R: (new Reach) Avg. Flow Depth=1.14' Max Vel=6.26 fps Inflow=36.74 cfs 12.221 af
n=0.025 L=880.0' S=0.0147 '/' Capacity=1,035.16 cfs Outflow=36.51 cfs 12.208 af

Reach 35R: Edmund St culvert Avg. Flow Depth=1.19' Max Vel=10.21 fps Inflow=26.54 cfs 7.603 af
36.0" Round Pipe n=0.013 L=110.0' S=0.0145 '/' Capacity=80.44 cfs Outflow=26.54 cfs 7.603 af

Reach 36R: swale Avg. Flow Depth=0.91' Max Vel=5.03 fps Inflow=26.60 cfs 7.595 af
n=0.035 L=760.0' S=0.0247 '/' Capacity=122.96 cfs Outflow=26.54 cfs 7.595 af

Reach 38R: Culvert Avg. Flow Depth=1.47' Max Vel=11.62 fps Inflow=40.15 cfs 13.295 af
36.0" Round Pipe n=0.011 L=192.1' S=0.0110 '/' Capacity=82.81 cfs Outflow=40.14 cfs 13.294 af

Reach 43R: Park Culvert Avg. Flow Depth=1.89' Max Vel=8.47 fps Inflow=39.83 cfs 13.126 af
36.0" Round Pipe n=0.015 L=218.2' S=0.0090 '/' Capacity=54.93 cfs Outflow=39.82 cfs 13.124 af

Reach 46R: Park Swale Avg. Flow Depth=1.22' Max Vel=5.62 fps Inflow=39.89 cfs 13.078 af
n=0.025 L=410.0' S=0.0113 '/' Capacity=229.68 cfs Outflow=39.83 cfs 13.072 af

Reach 47R: Pedestrian bridge Avg. Flow Depth=0.80' Max Vel=13.21 fps Inflow=39.89 cfs 13.078 af
36.0" Round Pipe x 2.00 n=0.012 L=17.7' S=0.0316 '/' Capacity=257.05 cfs Outflow=39.89 cfs 13.078 af

Reach 49R: swale Avg. Flow Depth=0.98' Max Vel=4.12 fps Inflow=39.92 cfs 13.081 af
n=0.022 L=176.2' S=0.0066 '/' Capacity=418.30 cfs Outflow=39.89 cfs 13.078 af

Reach 50R: Park Street Culvert Avg. Flow Depth=0.87' Max Vel=17.35 fps Inflow=39.92 cfs 13.082 af
60.0" Round Pipe n=0.012 L=96.4' S=0.0453 '/' Capacity=600.73 cfs Outflow=39.92 cfs 13.081 af

Reach 52R: Reach Avg. Flow Depth=1.13' Max Vel=6.27 fps Inflow=36.25 cfs 4.440 af
n=0.025 L=220.0' S=0.0149 '/' Capacity=1,039.95 cfs Outflow=36.23 cfs 4.440 af

Pond 8P: CB-299 Peak Elev=1,531.15' Inflow=16.44 cfs 7.835 af
36.0" Round Culvert n=0.015 L=247.9' S=0.0175 '/' Outflow=16.44 cfs 7.835 af

Pond 9P: CB-298 Peak Elev=1,537.55' Inflow=15.71 cfs 7.641 af
36.0" Round Culvert n=0.015 L=219.5' S=0.0314 '/' Outflow=15.71 cfs 7.641 af

Pond 27P: Farm Pond Peak Elev=1,567.86' Storage=5.021 af Inflow=76.16 cfs 9.092 af
Primary=62.77 cfs 8.554 af Secondary=0.00 cfs 0.000 af Outflow=62.77 cfs 8.554 af

Pond 28P: Diversion Peak Elev=1,569.61' Inflow=112.41 cfs 13.531 af
Primary=76.16 cfs 9.092 af Secondary=36.25 cfs 4.440 af Outflow=112.41 cfs 13.531 af

Pond 29P: CB-274 Peak Elev=1,550.65' Inflow=7.16 cfs 0.558 af
12.0" Round Culvert n=0.012 L=94.7' S=0.0053 '/' Outflow=7.16 cfs 0.558 af

Pond 30P: Connection Peak Elev=1,540.68' Inflow=39.82 cfs 13.124 af
48.0" Round Culvert n=0.015 L=172.0' S=0.0055 '/' Outflow=39.82 cfs 13.124 af

Pond 31P: Park CB-203 Peak Elev=1,541.60' Inflow=39.82 cfs 13.124 af
36.0" Round Culvert n=0.015 L=32.4' S=0.0059 '/' Outflow=39.82 cfs 13.124 af

Pond 32P: CB-275 Peak Elev=1,538.29' Inflow=10.39 cfs 0.846 af
24.0" Round Culvert n=0.015 L=178.2' S=0.0470 '/' Outflow=10.39 cfs 0.846 af

Pond 33P: CB-297* Peak Elev=1,545.67' Inflow=7.67 cfs 0.666 af
24.0" Round Culvert n=0.015 L=92.0' S=0.0820 '/' Outflow=7.67 cfs 0.666 af

Pond 34P: Park St Bridge Peak Elev=1,562.68' Inflow=26.54 cfs 7.603 af
36.0" Round Culvert n=0.013 L=56.0' S=0.0070 '/' Outflow=26.54 cfs 7.603 af

Pond 35P: Columbia Park CB Peak Elev=1,553.06' Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond 36P: Field CB Peak Elev=1,547.27' Inflow=0.31 cfs 0.017 af
12.0" Round Culvert n=0.010 L=421.0' S=0.0214 '/' Outflow=0.31 cfs 0.017 af

Pond 37P: NW School CB Peak Elev=1,556.53' Inflow=0.00 cfs 0.000 af
24.0" Round Culvert n=0.010 L=184.8' S=0.0150 '/' Outflow=0.00 cfs 0.000 af

Pond 38P: Detention Pond Peak Elev=1,568.41' Storage=4.152 af Inflow=62.77 cfs 8.554 af
.00 cfs 0.000 af Primary=1.93 cfs 3.254 af Secondary=5.23 cfs 4.527 af Tertiary=0.00 cfs 0.000 af Outflow=7.16 cfs 7.781 af

Pond 39P: Main St CB Peak Elev=1,544.30' Inflow=2.32 cfs 0.149 af
12.0" Round Culvert n=0.015 L=17.4' S=0.1466 '/' Outflow=2.32 cfs 0.149 af

Pond 40P: CB-247 Peak Elev=1,539.47' Inflow=39.85 cfs 13.146 af
48.0" x 36.0" Box Culvert n=0.012 L=51.9' S=0.0102 '/' Outflow=39.85 cfs 13.146 af

Pond 41P: CB-243 Peak Elev=1,539.68' Inflow=39.85 cfs 13.146 af
48.0" Round Culvert n=0.010 L=30.4' S=-0.0322 '/' Outflow=39.85 cfs 13.146 af

Pond 42P: Detention Area Peak Elev=1,560.08' Storage=3.930 af Inflow=57.57 cfs 4.157 af
Primary=4.29 cfs 6.743 af Secondary=0.96 cfs 0.093 af Tertiary=0.00 cfs 0.000 af Outflow=5.24 cfs 6.836 af

Pond 43P: 24" and 18"box Peak Elev=1,546.30' Inflow=1.79 cfs 0.097 af
24.0" x 18.0" Box Culvert n=0.011 L=102.0' S=0.0140 '/' Outflow=1.79 cfs 0.097 af

Pond 45P: (2) 12" Peak Elev=1,561.99' Inflow=6.45 cfs 0.483 af
Outflow=6.45 cfs 0.483 af

Pond 46P: Revised Pond 2 Peak Elev=1,569.57' Storage=1.113 af Inflow=9.75 cfs 1.113 af
Outflow=0.00 cfs 0.000 af

Pond 51P: CB-118 Peak Elev=1,559.44' Inflow=1.58 cfs 0.194 af
12.0" Round Culvert n=0.010 L=319.3' S=0.0242 '/' Outflow=1.58 cfs 0.194 af

Link 5L: French Creek Inflow=16.44 cfs 7.835 af
Primary=16.44 cfs 7.835 af

Link 7L: French Creek Inflow=40.14 cfs 13.294 af
Primary=40.14 cfs 13.294 af

Link 26L: French Creek

Inflow=2.89 cfs 6.542 af
Primary=2.89 cfs 6.542 af

Link 30L: French Creek

Inflow=10.39 cfs 0.846 af
Primary=10.39 cfs 0.846 af

Total Runoff Area = 562.306 ac Runoff Volume = 29.512 af Average Runoff Depth = 0.63"
96.28% Pervious = 541.370 ac 3.72% Impervious = 20.936 ac

APPENDIX E
StreamStats Reports

Drainage Area 1

Drainage Area 1

StreamStats Report

Region ID:	NY
Workspace ID:	NY20191122013341182000
Clicked Point (Latitude, Longitude):	42.15848, -79.59589
Time:	2019-11-21 20:34:59 -0500

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.13	square miles
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	95.6	feet per mi
PRECIP	Mean Annual Precipitation	50.1	inches
JUNAVPRE	Mean June Precipitation	4.85	inches
CENTROIDX	Basin centroid horizontal (x) location in state plane coordinates	120095.6	meters
CENTROIDY	Basin centroid vertical (y) location in state plane units	4678184.6	meters
CSL1085LO	10-85 slope of lower half of main channel in feet per mile.		feet per mi
MAR	Mean annual runoff for the period of record in inches	30.8	inches
SSURGOB	Percentage of area of Hydrologic Soil Type B from SSURGO	1.13	percent
JULAVPRE	Mean July Precipitation	4.22	inches
MAYAVPRE	Mean May Precipitation	3.78	inches
PRJUNAUG00	Basin average mean precip for June to August from PRISM 1971-2000	13.8	inches
JUNMAXTMP	Maximum June Temperature, in degrees F	74.6	degrees F
SSURGOA	Percentage of area of Hydrologic Soil Type A from SSURGO	2.78	percent
EL1200	Percentage of basin at or above 1200 ft elevation	100	percent

Peak-Flow Statistics Parameters[2006 Full Region 5]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.13	square miles	1.7	4773
CSL10_85	Stream Slope 10 and 85 Method	95.6	feet per mi	2.76	222.55
PRECIP	Mean Annual Precipitation	50.1	inches	31.64	49.79

Drainage Area 1

Peak-Flow Statistics Disclaimers[2006 Full Region 5]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report[2006 Full Region 5]

Statistic	Value	Unit
1.25 Year Peak Flood	8.9	ft^3/s
1.5 Year Peak Flood	10.9	ft^3/s
2 Year Peak Flood	13.7	ft^3/s
5 Year Peak Flood	21.4	ft^3/s
10 Year Peak Flood	27.2	ft^3/s
25 Year Peak Flood	34.8	ft^3/s
50 Year Peak Flood	41.1	ft^3/s
100 Year Peak Flood	47.3	ft^3/s
200 Year Peak Flood	53.7	ft^3/s
500 Year Peak Flood	62.8	ft^3/s

Peak-Flow Statistics Citations

Lumia, Richard, Freehafer, D.A., and Smith, M.J.,2006, Magnitude and Frequency of Floods in New York: U.S. Geological Survey Scientific Investigations Report 2006–5112, 152 p. (http://pubs.usgs.gov/sir/2006/5112/)

Bankfull Statistics Parameters[Bankfull Region 6 SIR2009 5144]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.13	square miles	1.02	290

Bankfull Statistics Disclaimers[Bankfull Region 6 SIR2009 5144]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Bankfull Statistics Flow Report[Bankfull Region 6 SIR2009 5144]

Statistic	Value	Unit
Bankfull Area	4.56	ft^2
Bankfull Depth	0.632	ft
Bankfull Streamflow	8.61	ft^3/s
Bankfull Width	7.19	ft

Bankfull Statistics Citations

Mulvihill, C.I., Baldigo, B.P., Miller, S.J. , and DeKoskie, Douglas,2009, Bankfull Discharge and Channel Characteristics of Streams in New York State: U.S. Geological Survey Scientific Investigations Report 2009-5144, 51 p. (http://pubs.usgs.gov/sir/2009/5144/)

Flow-Duration Statistics Parameters[Statewide duration flows excl LongIsl 2014 5220]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.13	square miles	3.14	4780
JUNAVPRE	Mean June Precipitation	4.85	inches	3.59	5.33
CENTROIDX	CENTROIDX	120095.6	meters	166000	658000
CENTROIDY	CENTROIDY	4678184.6	meters	4560000	4920000
CSL1085LO	10-85 slope of lower half of main channel		feet per mi	1.56	152
MAR	Mean Annual Runoff in inches	30.8	inches	11.6	37.4
SSURGOB	SSURGO Percent Hydrologic Soil Type B	1.13	percent	1.14	65.7
JULAVPRE	Mean July Precipitation	4.22	inches	3.2	5.26

Drainage Area 1

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
MAYAVPRE	Mean May Precipitation	3.78	inches	3.15	5.68
PRJUNAUG00	Basin average mean precip for June to August	13.8	inches	10.5	15.5
JUNMAXTMP	Maximum June Temperature	74.6	degrees F	68.8	78.8
SSURGOA	SSURGO Percent Hydrologic Soil Type A	2.78	percent	0.62	51.2
EL1200	Percentage of Basin Above 1200 ft	100	percent	0	100

Flow-Duration Statistics Flow Report[Statewide duration flows excl LongIsl 2014 5220]

Statistic	Value	Unit

Flow-Duration Statistics Citations

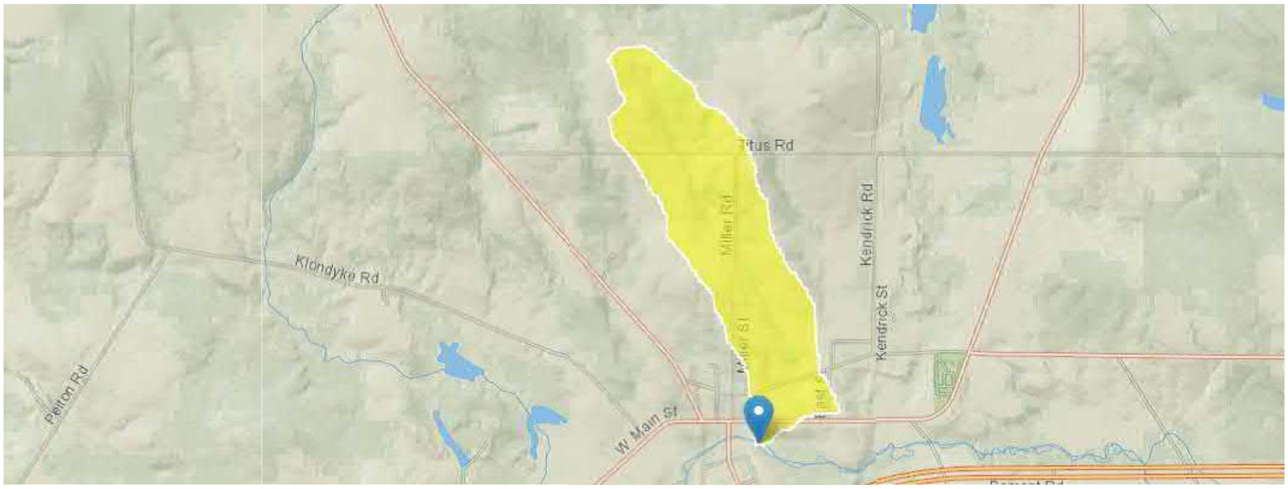
Application Version: 4.3.8

Drainage Area 3

Drainage Area 3

StreamStats Report

Region ID:	NY
Workspace ID:	NY20191122013859644000
Clicked Point (Latitude, Longitude):	42.15812, -79.59342
Time:	2019-11-21 20:39:15 -0500



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.48	square miles
JUNAVPRE	Mean June Precipitation	4.85	inches
CENTROIDX	Basin centroid horizontal (x) location in state plane coordinates	120346.8	meters
CENTROIDY	Basin centroid vertical (y) location in state plane units	4678788	meters
CSL1085LO	10-85 slope of lower half of main channel in feet per mile.		feet per mi
MAR	Mean annual runoff for the period of record in inches	30.7	inches
SSURGOB	Percentage of area of Hydrologic Soil Type B from SSURGO	4.48	percent
JULAVPRE	Mean July Precipitation	4.22	inches
MAYAVPRE	Mean May Precipitation	3.78	inches
PRJUNAUG00	Basin average mean precip for June to August from PRISM 1971-2000	13.8	inches
JUNMAXTMP	Maximum June Temperature, in degrees F	74.4	degrees F
SSURGOA	Percentage of area of Hydrologic Soil Type A from SSURGO	7.45	percent
EL1200	Percentage of basin at or above 1200 ft elevation	100	percent
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	93	feet per mi
PRECIP	Mean Annual Precipitation	49.9	inches

Bankfull Statistics Parameters[Bankfull Region 6 SIR2009 5144]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.48	square miles	1.02	290

Bankfull Statistics Disclaimers[Bankfull Region 6 SIR2009 5144]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Drainage Area 3

Bankfull Statistics Flow Report[Bankfull Region 6 SIR2009 5144]

Statistic	Value	Unit
Bankfull Area	10.8	ft^2
Bankfull Depth	0.869	ft
Bankfull Streamflow	25.9	ft^3/s
Bankfull Width	12.4	ft

Bankfull Statistics Citations

Mulvihill, C.I., Baldigo, B.P., Miller, S.J. , and DeKoskie, Douglas,2009, Bankfull Discharge and Channel Characteristics of Streams in New York State: U.S. Geological Survey Scientific Investigations Report 2009-5144, 51 p. (http://pubs.usgs.gov/sir/2009/5144/)

Flow-Duration Statistics Parameters[Statewide duration flows excl LongIsl 2014 5220]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.48	square miles	3.14	4780
JUNAVPRE	Mean June Precipitation	4.85	inches	3.59	5.33
CENTROIDX	CENTROIDX	120346.8	meters	166000	658000
CENTROIDY	CENTROIDY	4678788	meters	4560000	4920000
CSL1085LO	10-85 slope of lower half of main channel		feet per mi	1.56	152
MAR	Mean Annual Runoff in inches	30.7	inches	11.6	37.4
SSURGOB	SSURGO Percent Hydrologic Soil Type B	4.48	percent	1.14	65.7
JULAVPRE	Mean July Precipitation	4.22	inches	3.2	5.26
MAYAVPRE	Mean May Precipitation	3.78	inches	3.15	5.68
PRJUNAUG00	Basin average mean precip for June to August	13.8	inches	10.5	15.5
JUNMAXTMP	Maximum June Temperature	74.4	degrees F	68.8	78.8
SSURGOA	SSURGO Percent Hydrologic Soil Type A	7.45	percent	0.62	51.2
EL1200	Percentage of Basin Above 1200 ft	100	percent	0	100

Flow-Duration Statistics Flow Report[Statewide duration flows excl LongIsl 2014 5220]

Statistic	Value	Unit

Flow-Duration Statistics Citations

Peak-Flow Statistics Parameters[2006 Full Region 5]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.48	square miles	1.7	4773
CSL10_85	Stream Slope 10 and 85 Method	93	feet per mi	2.76	222.55
PRECIP	Mean Annual Precipitation	49.9	inches	31.64	49.79

Peak-Flow Statistics Disclaimers[2006 Full Region 5]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report[2006 Full Region 5]

Statistic	Value	Unit
1.25 Year Peak Flood	31.1	ft^3/s
1.5 Year Peak Flood	37.8	ft^3/s
2 Year Peak Flood	47.4	ft^3/s
5 Year Peak Flood	74.2	ft^3/s
10 Year Peak Flood	94.5	ft^3/s

Drainage Area 3

Statistic	Value	Unit
25 Year Peak Flood	121	ft^3/s
50 Year Peak Flood	144	ft^3/s
100 Year Peak Flood	167	ft^3/s
200 Year Peak Flood	190	ft^3/s
500 Year Peak Flood	224	ft^3/s

Peak-Flow Statistics Citations

Lumia, Richard, Freehafer, D.A., and Smith, M.J.,2006, Magnitude and Frequency of Floods in New York: U.S. Geological Survey Scientific Investigations Report 2006–5112, 152 p. (http://pubs.usgs.gov/sir/2006/5112/)

Application Version: 4.3.8

Drainage Area 4

Drainage Area 4

StreamStats Report

Region ID: NY
Workspace ID: NY20191122014207680000
Clicked Point (Latitude, Longitude): 42.15925, -79.58502
Time: 2019-11-21 20:42:24 -0500

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.27	square miles
JUNAVPRE	Mean June Precipitation	4.86	inches
CENTROIDX	Basin centroid horizontal (x) location in state plane coordinates	120844.2	meters
CENTROIDY	Basin centroid vertical (y) location in state plane units	4678744.6	meters

Drainage Area 4

Parameter Code	Parameter Description	Value	Unit
CSL1085LO	10-85 slope of lower half of main channel in feet per mile.		feet per mi
MAR	Mean annual runoff for the period of record in inches	30.6	inches
SSURGOB	Percentage of area of Hydrologic Soil Type B from SSURGO	6.64	percent
JULAVPRE	Mean July Precipitation	4.22	inches
MAYAVPRE	Mean May Precipitation	3.78	inches
PRJUNAUG00	Basin average mean precip for June to August from PRISM 1971-2000	13.8	inches
JUNMAXTMP	Maximum June Temperature, in degrees F	74.6	degrees F
SSURGOA	Percentage of area of Hydrologic Soil Type A from SSURGO	19.9	percent
EL1200	Percentage of basin at or above 1200 ft elevation	100	percent
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	127	feet per mi
PRECIP	Mean Annual Precipitation	49.8	inches

Bankfull Statistics Parameters[Bankfull Region 6 SIR2009 5144]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.27	square miles	1.02	290

Bankfull Statistics Disclaimers[Bankfull Region 6 SIR2009 5144]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Drainage Area 4

Bankfull Statistics Flow Report[Bankfull Region 6 SIR2009 5144]

Statistic	Value	Unit
Bankfull Area	7.4	ft^2
Bankfull Depth	0.756	ft
Bankfull Streamflow	15.9	ft^3/s
Bankfull Width	9.76	ft

Bankfull Statistics Citations

Mulvihill, C.I., Baldigo, B.P., Miller, S.J. , and DeKoskie, Douglas,2009, Bankfull Discharge and Channel Characteristics of Streams in New York State: U.S. Geological Survey Scientific Investigations Report 2009-5144, 51 p. (http://pubs.usgs.gov/sir/2009/5144/)

Flow-Duration Statistics Parameters[Statewide duration flows excl LongIsl 2014 5220]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.27	square miles	3.14	4780
JUNAVPRE	Mean June Precipitation	4.86	inches	3.59	5.33
CENTROIDX	CENTROIDX	120844.2	meters	166000	658000
CENTROIDY	CENTROIDY	4678744.6	meters	4560000	4920000
CSL1085LO	10-85 slope of lower half of main channel		feet per mi	1.56	152
MAR	Mean Annual Runoff in inches	30.6	inches	11.6	37.4
SSURGOB	SSURGO Percent Hydrologic Soil Type B	6.64	percent	1.14	65.7
JULAVPRE	Mean July Precipitation	4.22	inches	3.2	5.26
MAYAVPRE	Mean May Precipitation	3.78	inches	3.15	5.68

Drainage Area 4

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
PRJUNAUG00	Basin average mean precip for June to August	13.8	inches	10.5	15.5
JUNMAXTMP	Maximum June Temperature	74.6	degrees F	68.8	78.8
SSURGOA	SSURGO Percent Hydrologic Soil Type A	19.9	percent	0.62	51.2
EL1200	Percentage of Basin Above 1200 ft	100	percent	0	100

Flow-Duration Statistics Flow Report[Statewide duration flows excl LongIsl 2014 5220]

Statistic	Value	Unit

Flow-Duration Statistics Citations

Peak-Flow Statistics Parameters[2006 Full Region 5]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.27	square miles	1.7	4773
CSL10_85	Stream Slope 10 and 85 Method	127	feet per mi	2.76	222.55
PRECIP	Mean Annual Precipitation	49.8	inches	31.64	49.79

Peak-Flow Statistics Disclaimers[2006 Full Region 5]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report[2006 Full Region 5]

Statistic	Value	Unit

Drainage Area 4

Statistic	Value	Unit
1.25 Year Peak Flood	20	ft^3/s
1.5 Year Peak Flood	24.5	ft^3/s
2 Year Peak Flood	31	ft^3/s
5 Year Peak Flood	49.6	ft^3/s
10 Year Peak Flood	63.9	ft^3/s
25 Year Peak Flood	83.1	ft^3/s
50 Year Peak Flood	99.4	ft^3/s
100 Year Peak Flood	116	ft^3/s
200 Year Peak Flood	132	ft^3/s
500 Year Peak Flood	157	ft^3/s

Peak-Flow Statistics Citations

Lumia, Richard, Freehafer, D.A., and Smith, M.J.,2006, Magnitude and Frequency of Floods in New York: U.S. Geological Survey Scientific Investigations Report 2006–5112, 152 p. (http://pubs.usgs.gov/sir/2006/5112/)

Application Version: 4.3.8

APPENDIX F
Project Retrofit Matrix

					10	15	15	5	5	10	5	5	0	5	15	2	2	2	2	2	50	20	20	10	100
Project	Photo ID	Subcatchment	Project Type	Location	Stormwater Benefits					Constructability			Cost			Co-Benefits					Stormwater Benefits Total	Constructability Total	Cost Total	Co-Benefits Total	Total
					Water Quantity / Flood reduction	TSS	P	N	Other (trace metals, pesticides, cl, debris, hydrocarbons)	Ownership	Known Constraints (utilities, depth to groundwater, site access, soils)	Permitting	Cost	Maintenance	Fundability	Energy and Air Quality Impacts	Habitat & Biodiversity	Community & Aesthetic Benefits	Human Health Benefits	Educational Opportunities/ Visibility					
1		3-8	Pond Expansion	Sherman Community Nature Center	10	10	10	5	2	5	5	5		3	10	0	1.5	2	0.5	2	37	15	13	6	71
2		3-3	Stormwater Detention	Park St.	10	10	10	5	5	10	3	3		3	10	0	1	0	0.5	0.5	40	16	13	2	71
5		3-3	Riparian buffer/wetland along creek bank	Park St.	5	10	10	5	5	10	3	3		3	10	0.5	1.5	1	0.5	0.5	35	16	13	4	68
3		1-4	Stormwater Detention	North of Park St.	10	10	10	5	2	5	3	5		3	10	0	1	2	0.5	0.5	37	13	13	4	67
4		3-8	Pond Retrofit	Near Miller Rd.	10	10	10	5	2	5	3	5		3	10	0	1	2	0.5	0.5	37	13	13	4	67
18		4-4	Stormwater Detention	North of 1st. St.	10	10	10	5	2	5	3	5		3	10	0	1	2	0.5	0.5	37	13	13	4	67
22		3-7	Stormwater Detention	North of School and between Miller St. and Columbia St.	10	10	10	5	2	5	3	5		3	10	0	1	2	0.5	0.5	37	13	13	4	67
7		1-2, 2-2 and 2-3	GI Retrofit-Bioretention bumpouts	Main St.	5	5	5	2	5	10	3	5		3	10	2	2	2	1.5	2	22	18	13	9.5	62.5
7		2-2	GI Retrofit-Greenroof over pedestian walkway	Main St.	5	5	5	2	5	10	3	5		3	10	2	2	2	1.5	2	22	18	13	9.5	62.5
8		1-2, 2-2, and 2-3	GI Retrofit-Street Trees	Main St.	5	5	5	2	5	10	3	5		3	10	2	2	2	1.5	1.5	22	18	13	9	62
9		3-3	Bioretention / Rain Garden / Drainage Infrastructure Improvements	Park St.	5	5	5	2	5	10	3	3		3	10	2	2	2	2	2	22	16	13	10	61
10		1-2	GI Retrofit- Bioretention Median	Main St.	5	5	5	2	5	10	3	3		3	10	1	1.5	2	1.5	1	22	16	13	7	58
11		3-1, 3-2, 3-3, and 3-7	Drainage Infrastructure Improvements	School and sports fields	5	5	5	5	2	10	3	3		5	10	0	0	1	1.5	0.5	22	16	15	3	56
12		1-1 and 1-2	Drainage Infrastructure Improvements	W. Main St.	5	5	5	5	2	10	3	3		5	10	0	0	1	0.5	0.5	22	16	15	2	55
13		2-5	Drainage Infrastructure Improvements	Miller St.	5	5	5	5	2	10	3	3		5	10	0	0	1	0.5	0.5	22	16	15	2	55
14		2-1, 2-2, and 2-4	Drainage Infrastructure Improvements	W. Main St. near Franklin St.	5	5	5	5	2	10	3	3		5	10	0	0	1	0.5	0.5	22	16	15	2	55
15		2-1 and 2-3	Drainage Infrastructure Improvements	Willard St.	5	5	5	5	2	10	3	3		5	10	0	0	1	0.5	0.5	22	16	15	2	55
16		1-1, 2-2, and 2-3	GI Retrofit-Flexi Pave Sidewalks pitched towards GI	Main St.	5	5	5	2	5	10	3	5		3	10	0	0	0.5	0	0.5	22	18	13	1	54
17		3-5	Drainage Infrastructure Improvements	Park St.	5	5	5	5	2	5	3	3		5	10	0	0	1	0.5	0.5	22	11	15	2	50
19		4-3	Drainage Infrastructure Improvements	Edmund St.	5	5	5	5	2	5	3	3		5	10	0	0	1	0.5	0.5	22	11	15	2	50
20		4-1	Drainage Infrastructure Improvements	E. Main St.	5	5	5	5	2	5	3	3		5	10	0	0	1	0.5	0.5	22	11	15	2	50
21		1-1, 2-2, and 2-3	Parallel Parking- Accommodate driveway entrnaces minimizing the quantity	Main St.	5	5	5	2	5	10	3	5		3	5	0	0	0	0	0	22	18	8	0	48
																					0	0	0	0	0

Notes - cost not included in priority ranking. Intent is to develop projects with a varying range of costs.
- text in bold represent the Top 6 projects selected for further evaluation and development of concept plans/renderings.

Stormwater Benefits:

Quantity:
0 - negligible reduction in peak flow.
5 - addresses localized flooding (road/culvert overtopping) or GI practice that promotes infiltration or impervious reduction 1,000 - 100,000 sf
10 - creation of stormwater attenuation or impervious reduction over 100,000 sf

TSS & P:
Streambanks:
5 - < 50'
10 - 50' to 249'
15 - 250'+
10 - Wetland & pond retrofits
5 - impervious area reduction

N
2 - Impervious area reduction
5 - Wetlands & pond retrofits
5 - Roadside stabilization > 500'
5 - Park GI
2 - Streambanks (urban)
5 - Streambanks (rural)

Other
2 - Rural
5 - Urban/Suburban

Constructability:

Ownership
0 - uninterested private owner
5 - interested private owner or unknown interest level private owner
10 - public

Known Constraints
1 - Constraints identified
3 - Possible constraints identified
5 - No constraints identified

Permitting
1 - Multiple permits required (NYSDEC, ACOE, Local ROW, etc.) and Project is located on Private Property
3 - Multiple permits required (NYSDEC, ACOE, Local ROW, etc.) and Project is located on Public Property
5 - Low permitting demand anticipated

Cost:

Maintenance
1 - >$1 per sf/year
3 - >$.50, < $1 per sf/year
5 - <$.50 per sf/year

Fundability
5- not fundable through stormwater management and flooding prevention grants (PDMGP, GIGP)
10 - fundable through one of the above grants
15 - multiple funding sources identified

Co-Benefits modified from "The Value of Green Infrastructure: A Guide to Recognizing its Economic, Environmental, and Social Benefits," Center for Neighborhood Technology and American Rivers, 2010 and "Green Infrastructure Practices and Benefits", National Oceanic and Atmospheric Administration, 2014"

Co-benefits on a scale from 0 (no benefit) to 2 (significant benefit)
Energy and Air Quality Impacts includes: energy use reduction, air quality improvements and atmospheric C02 reduction
Habitat and Biodiversity includes: increases biodiversity, increases habitat connectivity, and provides pollinator habitat
Community and Aesthetic Benefits includes: improved aesthetics, increased recreational opportunities, and increased property values
Human health benefits includes health benefits and accident reduction

APPENDIX G
Project Concept Plans

Village of Sherman

Stormwater Infrastructure Preliminary Engineering Report

Project No. 1: Concept Plan

January 2020

Green Infrastructure Retrofit Practices

1. **Bio-retention Bumpouts**
   Installation of bio-retention bumpouts with curb drops to capture stormwater runoff, for a total coverage of 10,000 SF.
2. **Permeable Asphalt Parking**
   Replacement of existing pavement, for a total coverage of 3,500 SF.
3. **Flexible Porous Pavement**
   Replacement of existing pavement with flexible porous pavement for snow storage and infiltration. Place stormwater street trees with CU structural soil where feasible. 6,500 SF coverage.
4. **Concrete Sidewalk**
   Concrete sidewalks pitched towards flexible porous pavement for infiltration. Install granite curbing with 6" reveal to direct roadway runoff to curb drops.
5. **Eastern & Western Village Gateways**
   Visually notify the driver that they are entering a dense residential area...and to SLOW DOWN!
6. **Downspout Disconnections**
   Installation of rain barrels and stormwater to planters capture and re-use stormwater from downspouts, for a total coverage of 1,060 SF.
7. **Public Parking & Trailhead Improvements**
   Installation of non-porous pavements pitched towards bioretention gardens and enhanced riparian buffer strip along French Creek at existing Chautauqua Rails-to-Trails trailhead.

Site Improvements

8. **Pedestrian Crossings**
   Enhanced crossings at bumpouts provide traffic calming and pedestrian safety.
9. **Shared Lane Markings**
   Install shared lane markings indicating shared space between vehicles and bicyclists.
10. **EV Charging Stations**
    Install electric vehicle charging stations at select location (s) for Climate Smart Community certification.

Barton & Loguidice

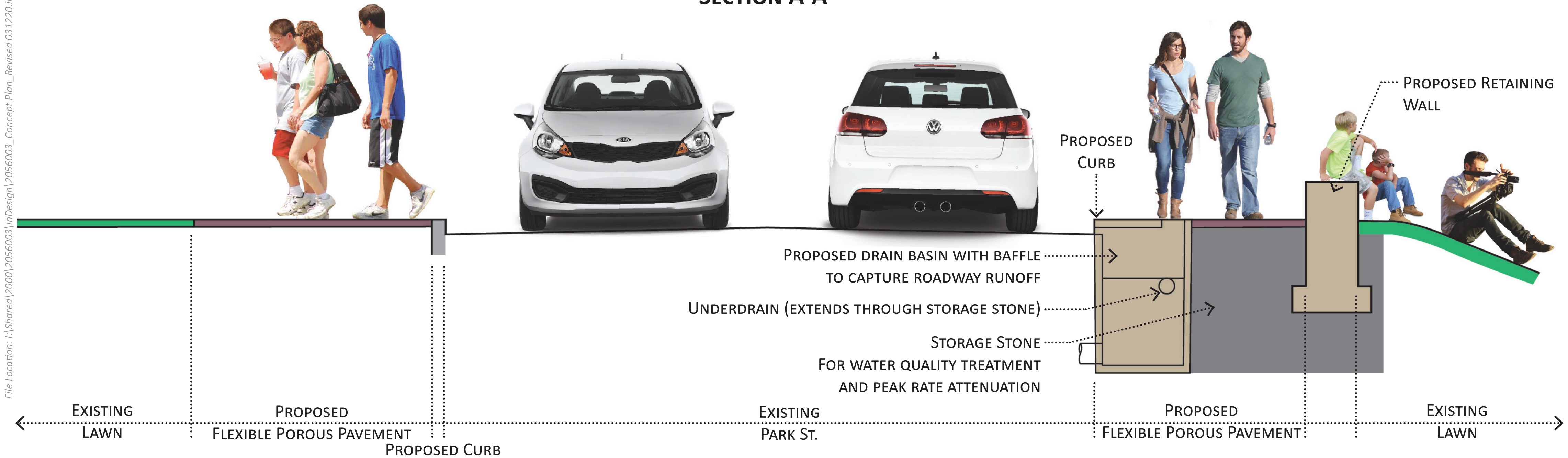
Village of Sherman

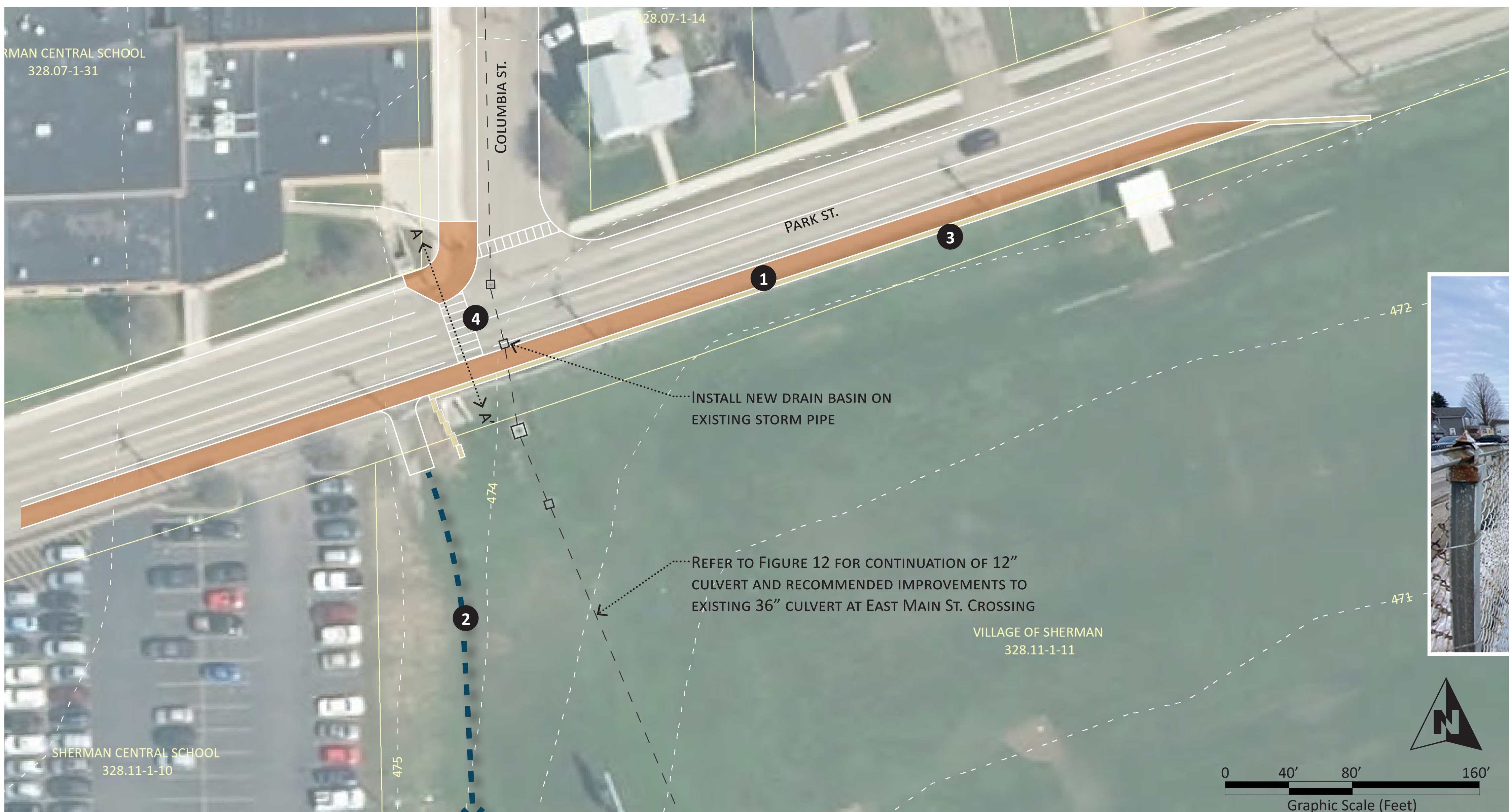
Stormwater Infrastructure Preliminary Engineering Report

Project No. 2: Concept Plan

January 2020

SECTION A-A'





GREEN INFRASTRUCTURE RETROFIT PRACTICES

1. **FLEXIBLE POROUS PAVEMENT**
   Replacement of existing asphalt shoulder pavement with curbed flexible porous pavement for infiltration and pedestrian safety. Proposed drain basins with baffle walls along the proposed curb will capture roadway runoff into the storage stone below.

SITE IMPROVEMENTS

2. **SHARED-USE PATH**
   10-foot wide stone dust path for pedestrians and park maintenance vehicles.

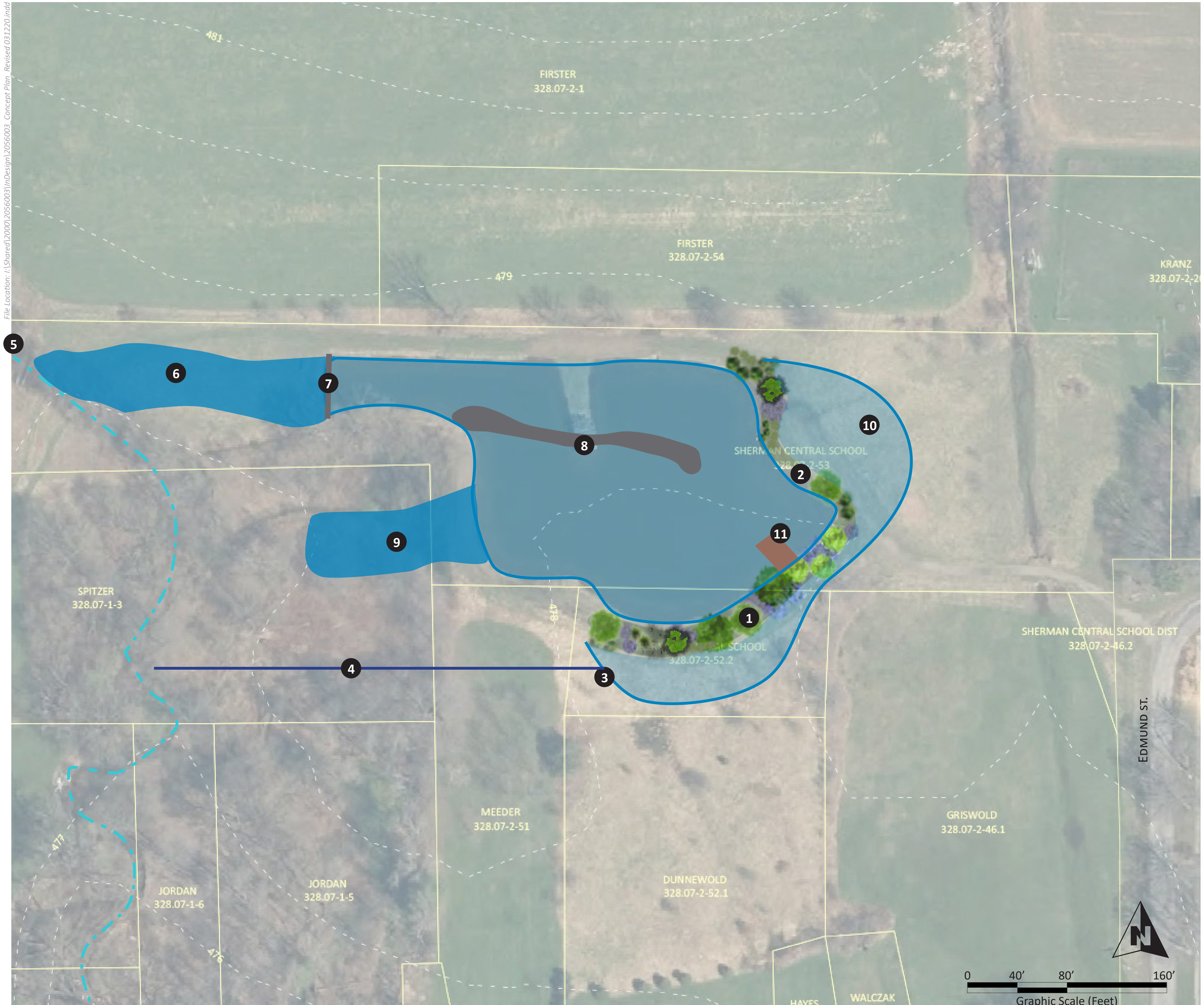
3. **RETAINING WALL**
   Concrete or natural stone wall to replace existing steel guiderail that acts as a retaining wall, and to support the proposed pedestrian walkway.

4. **BUMPOUT & PEDESTRIAN CROSSINGS**
   Enhanced crossings at bumpouts to provide traffic calming and pedestrian safety.

EXISTING CONDITIONS PHOTOS

Proposed improvements will remove existing steel guiderail, chain link fence, and a portion of the paved shoulder.

Barton & Loguidice



Village of Sherman

Stormwater Infrastructure Preliminary Engineering Report

Project No. 3: Concept Plan

January 2020

Stormwater Detention

Stormwater Detention expands on the existing pond at the Sherman Community Nature Center to reduce peak flows downstream via detention and controlled stormwater outflow in lieu of just providing storage.

1. **Vegetated Berm**
Vegetated berm to separate detention pond from wet pond and increase aesthetics and habitat diversity.

2. **Overflow**
Overflow into detention pond at 1567.0′ designed to allow water from wet pond to flow into detention pond once full where outflow is controlled via outlet control device.

3. **Outlet Control Device**

4. **Underground Outlet to Stream**

5. **Flow Diversion**

6. **Forebay**

7. **Spillway**

8. **Gabion Baffle**
Gabion baffle to direct flow into detention area.

9. **Emergency Spillway**
Emergency spillway designed for flood release during 100-year storms or greater.

10. **Reduce Peak Storm Flows**
Provide off-line water quantity storage to reduce flooding in downstream areas including the school athletic fields by preventing localized flooding from a 1-year storm.

11. **Relocated Dock**
Relocate dock to allow proper flow of the stormwater into the detention area.

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Village of Sherman

Stormwater Infrastructure Preliminary Engineering Report

Project No. 4: Concept Plan

January 2020

0 50′ 100′ 200′

Graphic Scale (Feet)

Stormwater Detention

1. **Forebay**
   Pretreatment approximately 4′ to 6′ deep and stores approximately 10% of the water quality volume to protect the flow pipe from clogging and prevent sediment resuspension.
2. **Forebay spillway**
   Overflow designed to allow water from forebay to flow into high marsh bordered by vegetated berm where water infiltrates.
3. **High marsh**
   Internal berm to provide a minimum flow path of 2:1 (length to relative width) heavily vegetated with a variety of native plants. During large storm events, the high berm is inundated and approximately 0.5′ deep.
4. **Low marsh**
   Provides a low flow channel and is typically inundated (approximately 1.5′ deep).
5. **Micro-pool**
   A smaller permanent pool to avoid resuspension or settling of particles, provide habitat for aquatic plants and animals, and is approximately 7′ deep).
6. **Emergency spillway**
   Emergency spillway at 1570.0′ designed for flow release during 10-year storms or greater.
7. **Outfall**
   Outlet to existing shallow concentrated flow path.
8. **Reduce peak storm flows**
   Provide water quantity storage and detention to reduce flooding in downstream areas including the lots between Miller St. and Columbia St. by preventing localized flooding from a 1-year storm.
9. **Habitat Diversity**
   Provide habitat for waterfowl and other wetland species through selection of native wetland plantings.
10. **Enhance water Quality**
    Provide off-line water quality treatment storage from the contributing drainage area via pollutant settling and biological uptake.

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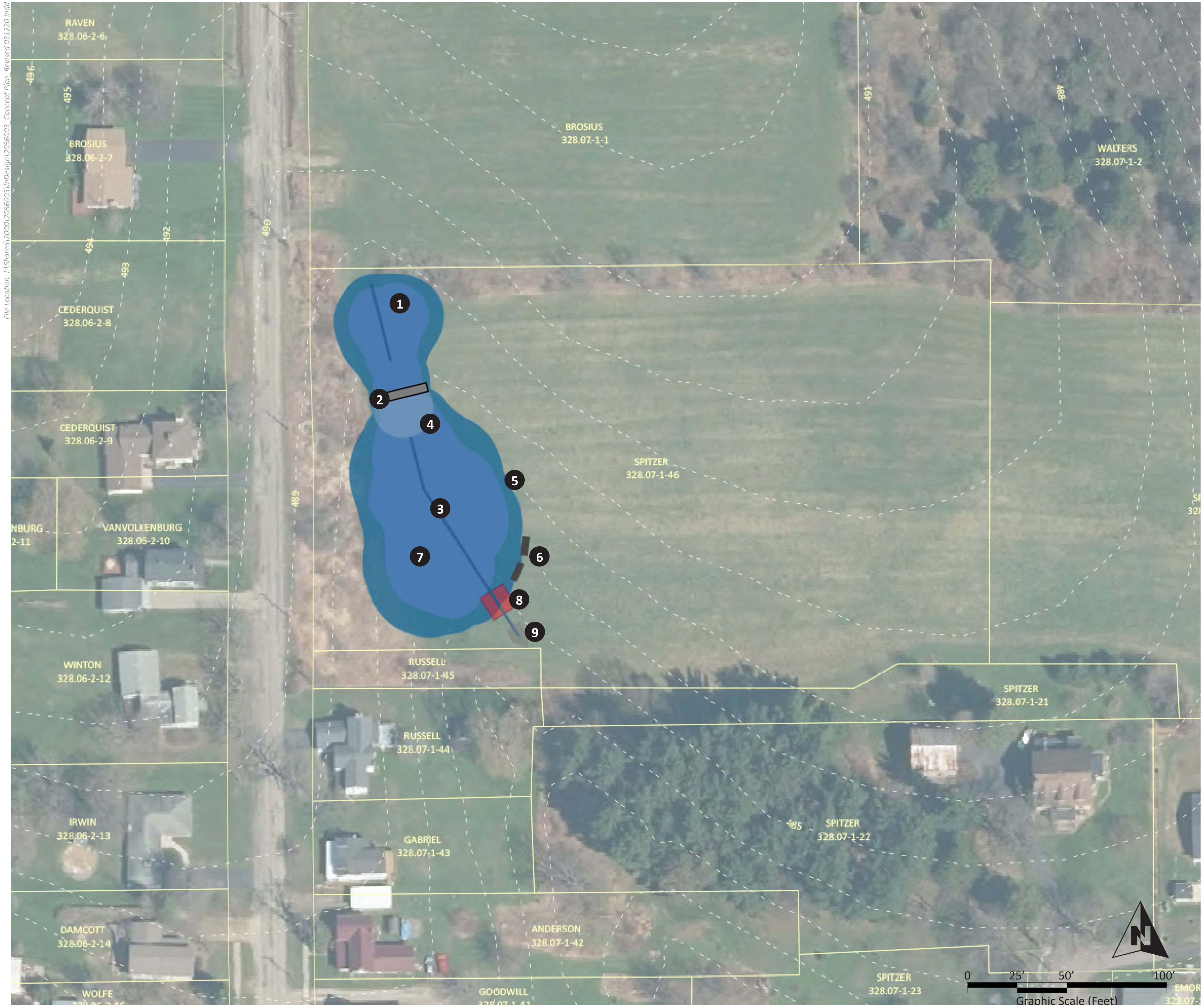

Village of Sherman

Stormwater Infrastructure Preliminary Engineering Report

Project No. 5: Concept Plan

January 2020

Stormwater Detention

1. **Forebay**
   To provide pretreatment. Forebay will be inundated during precipitation events and will drain during dry periods.
2. **Forebay Spillway**
   Designed to allow water from forebay to flow into primary dry detention storage area.
3. **Underdrain**
   12" underdrain pipe designed to drain the dry detention pond during low flows.
4. **Rip-Rap Spillway**
5. **Vegetated Berm**
   Approximately 1.5' high berm. Berm will be vegetated with native plantings using Ernst Conservation See Mix to enhance aesthetics and habitat diversity.
6. **Emergency Spillway**
   Designed to route extreme storm events away from infrastructure.
7. **Dry Detention Pond Area**
   Pond area will be inundated during precipitation events and will drain during dry periods.
8. **Outlet Control Structure**
9. **Medium Stone Outlet Protection & Level Spreader**
   To convey flow back to existing channel.

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APPENDIX H
Perspective Renderings

Village of Sherman

Stormwater Infrastructure Preliminary Engineering Report

Project No.1: Perspective on Main Street (view west)

January 2020

PROPOSED CONCEPT SKETCH

EXISTING CONDITIONS

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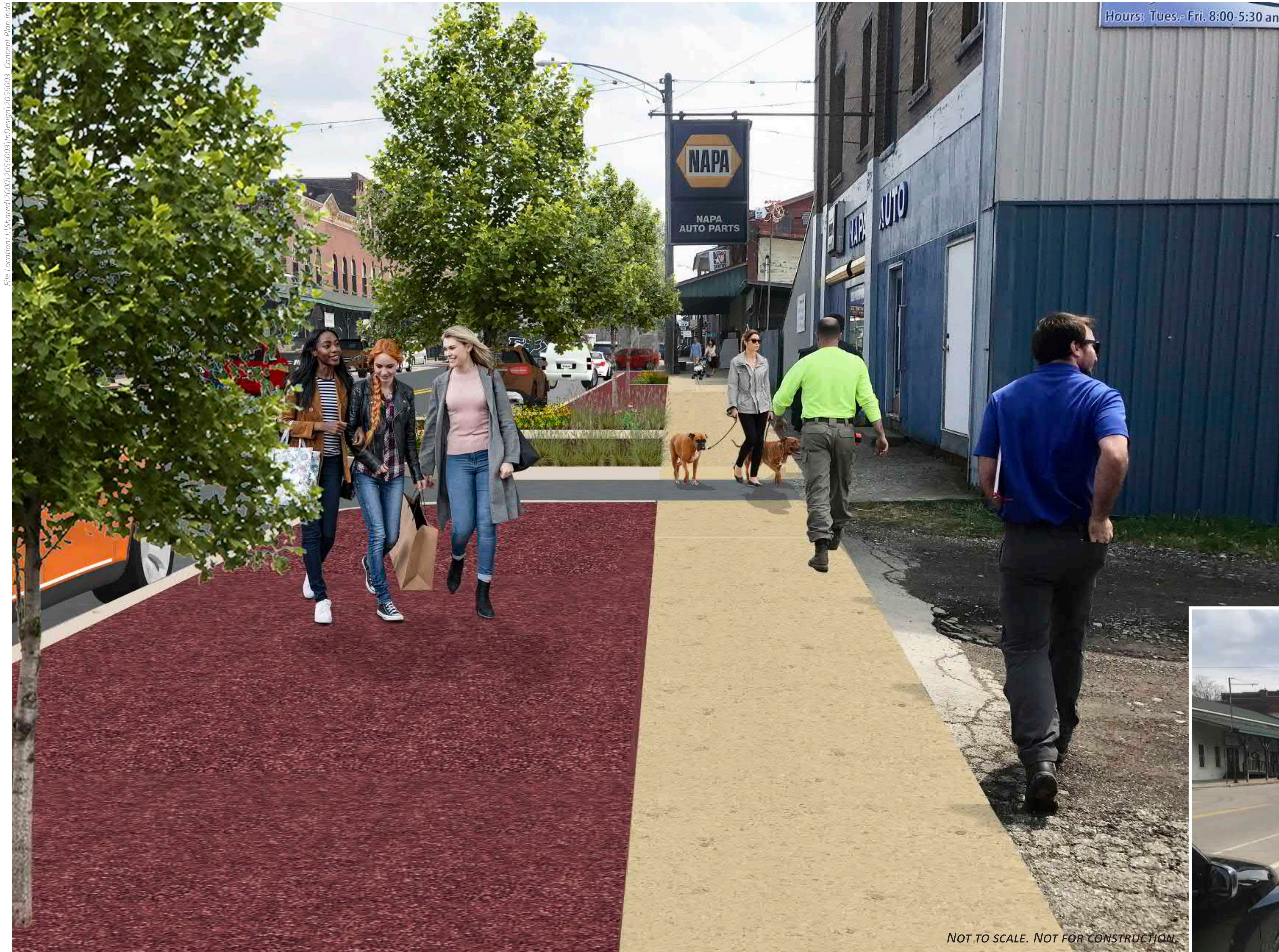
Village of Sherman

Stormwater Infrastructure Preliminary Engineering Report

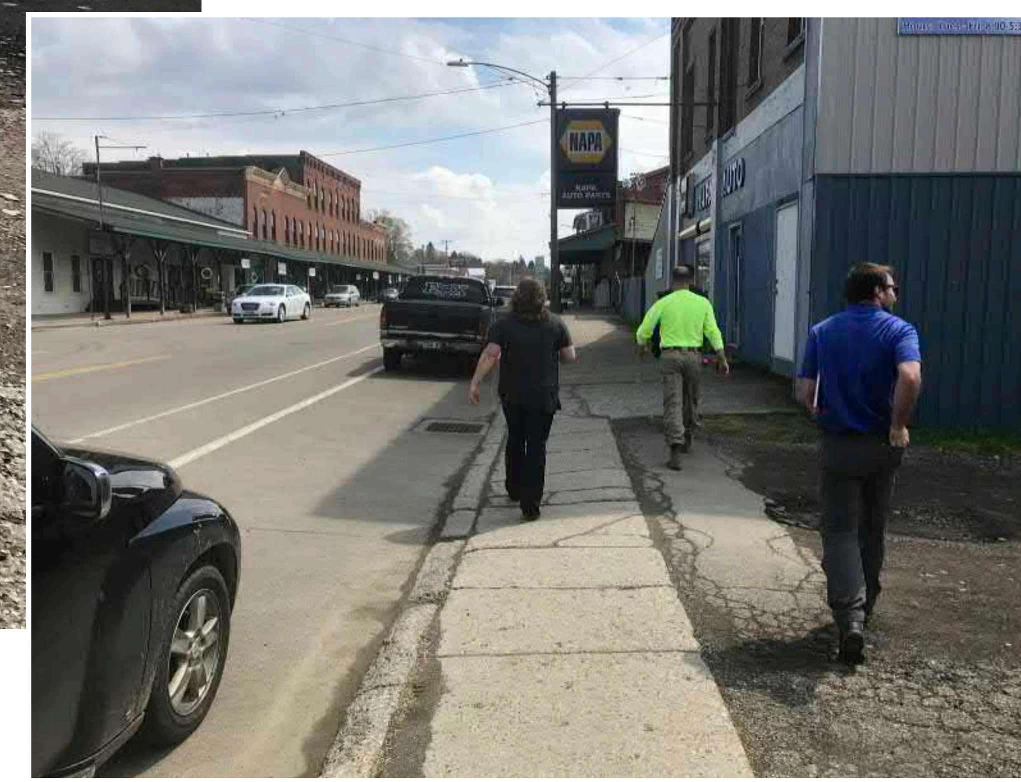
Project No. 1: Perspective on Main Street (view east)

January 2020



Proposed Concept Sketch

Existing Conditions



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APPENDIX I
Water Quality Volume Calculations

Version 1.8
Last Updated: 11/09/2015

Total Water Quality Volume Calculation
WQv(acre-feet) = [(P)(Rv)(A)] /12

PROJECT 1

Is this project subject to Chapter 10 of the NYS Design Manual (i.e. WQv is equal to post-development 1 year runoff volume)?...	No

Design Point:	1	
P=	1.00	*inch*

Manually enter P, Total Area and Impervious Cover.

Breakdown of Subcatchments						
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Description**
1	0.75	0.75	100%	0.95	2,586	Porous Pavement
2	0.90	0.90	100%	0.95	3,104	Porous Pavement
3	1.05	1.05	100%	0.95	3,621	Infiltration Bioretention
4	0.30	0.30	100%	0.95	1,035	Stormwater Planter
5	0.30	0.30	100%	0.95	1,035	Tree Planting/Tree Pit
6						
7						
8						
Subtotal (1-30)	3.30	3.30	100%	0.95	**11,380**	**Subtotal 1**
Total	3.30	3.30	100%	0.95	**11,380**	**Initial WQv**

Identify Runoff Reduction Techniques By Area			
Technique	**Total Contributing Area** *(Acre)*	**Contributing Impervious Area** *(Acre)*	**Notes**
Conservation of Natural Areas	0.00	0.00	*minimum 10,000 sf*
Riparian Buffers	0.00	0.00	*maximum contributing length 75 feet to 150 feet*
Filter Strips	0.00	0.00	
Tree Planting	0.30	0.30	*Up to 100 sf directly connected impervious area may be subtracted per tree*
Total	**0.30**	**0.30**	

Recalculate WQv after application of Area Reduction Techniques					
	Total Area *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Runoff Coefficient Rv**	**WQv** *(ft^3)*
"<<Initial WQv"	3.30	3.30	100%	0.95	11,380
Subtract Area	-0.30	-0.30			
WQv adjusted after Area Reductions	**3.00**	**3.00**	100%	0.95	10,346
Disconnection of Rooftops		0.00			
Adjusted WQv after Area Reduction and Rooftop Disconnect	3.00	3.00	100%	0.95	**10,346**
WQv reduced by Area Reduction techniques					1,035

Runoff Reduction Volume and Treated volumes						
	Runoff Reduction Techiques/Standard SMPs		**Total Contributing Area**	**Total Contributing Impervious Area**	**WQv Reduced (RRv)**	**WQv Treated**
			(acres)	**(acres)**	**cf**	**cf**
Area/Volume Reduction	Conservation of Natural Areas	RR-1	0.00	0.00		
	Sheetflow to Riparian Buffers/Filter Strips	RR-2	0.00	0.00		
	Tree Planting/Tree Pit	RR-3	0.30	0.30		
	Disconnection of Rooftop Runoff	RR-4		0.00		
	Vegetated Swale	RR-5	0.00	0.00	0	
	Rain Garden	RR-6	0.00	0.00	0	
	Stormwater Planter	RR-7	0.30	0.30	1035	
	Rain Barrel/Cistern	RR-8	0.00	0.00	0	
	Porous Pavement	RR-9	1.65	1.65	5690	
	Green Roof (Intensive & Extensive)	RR-10	0.00	0.00	0	
Standard SMPs w/RRv Capacity	Infiltration Trench	I-1	0.00	0.00	0	0
	Underground Infiltration System	I-4				
	Bioretention & Infiltration Bioretention	F-5	2.10	2.10	3621	3621
	Dry swale	O-1	0.00	0.00	0	0
Standard SMPs	Micropool Extended Detention (P-1)	P-1				
	Wet Pond (P-2)	P-2				
	Wet Extended Detention (P-3)	P-3				
	Multiple Pond system (P-4)	P-4				
	Pocket Pond (p-5)	P-5				
	Surface Sand filter (F-1)	F-1				
	Underground Sand filter (F-2)	F-2				
	Perimeter Sand Filter (F-3)	F-3				
	Organic Filter (F-4	F-4				
	Shallow Wetland (W-1)	W-1				
	Extended Detention Wetland (W-2	W-2				
	Pond/Wetland System (W-3)	W-3				
	Pocket Wetland (W-4)	W-4				
	Wet Swale (O-2)	O-2				
	Totals by Area Reduction	→	0.30	0.30	1035	
	Totals by Volume Reduction	→	1.95	1.95	6725	
	Totals by Standard SMP w/RRV	→	2.10	2.10	3621	3621
	Totals by Standard SMP	→	0.00	0.00		0
	Totals (Area + Volume + all SMPs)	→	4.35	4.35	11,380	3,621

Infiltrating Bioretention Worksheet

(For use on HSG A or B Soils without underdrains)

WQv ≤ VSM + VDL + (DP x ARG)

VSM = ARG x DSM x nSM

VDL (optional) = ARG x DDL x nDL

Design Point:	**1**						
Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	**Total Area** *(Acres)*	**Impervious Area**	**Percent Impervious**	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
3	1.05	1.05	1.00	0.95	3620.93	1.00	Infiltration Bioretention
Enter Impervious Area Reduced by Disconnection of Rooftops		0.00	100%	0.95	3,621	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.					0	*ft^3*	
Infiltrating Bioretention Parameters							
Treatment Volume		WQv	3,621	*ft^3*			
Enter depth of soil Media		DSM	2.50	*ft*	*2.5 - 4 ft*		
Enter porosity of Soil Media		nSM	0.20		*≥20%*		
Enter porosity of Drainage		nDL	0.40		*≥ 40%*		
Required Bioretention Area		ARG	3017	*sf*			
Bioretention Area Provided			10,000	*ft2*			
Native Soil Infiltration Rate			0.50	*in/hr*	*Okay*		
Are you using underdrains?			No				
Total Volume Provided			12,000	*ft^3*	*Sum of storage Volume Provided in each layer*		
Determine Runoff Reduction							
Runoff Reduction			**3,621**	***ft^3***	***This is 80% of storage volume provided or WQv whichever is less***		
Volume Treated			0	*ft^3*	*This is the portion of the WQv that is not reduced in the practice*		
Sizing √			*OK*		*Check to be sure Area provided ≥ Af*		

Porous Pavement Worksheet

$$Ap = Vw / (n \times dt)$$

Ap	Required porous pavement surface area	*ft2*	
Vw	Design Volume	*ft3*	
n	porosity of gravel bed/resevoir		*Assume .4 for gravel*
dt	depth of gravel bed/resevoir		

Design Point:	**1**

Enter Site Data For Drainage Area to be Treated by Practice

Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
1	0.75	0.75	1.00	0.95	2586.38	1.00	Porous Pavement

Enter Soil Infiltration Rate

Soil Inflitration Rate	0.50	*in/hour*	

Calculate Required Surface Area

Design Volume	Vw	2,586	*ft^3*	
Porosity of Gravel Bed	*n*	0.40	-	
Gravel Bed Depth	dt	2.00	*ft*	
Required Surface Area	Ap	3,233	*sf*	
Surface Area Provided		3,500	*sf*	*Dimensions of pavement can be provided here*
Storage Volume Provided		2,800	*ft^3*	

Determine the Runoff Reduction

RRv	**2,586**	***ft^3***	

Porous Pavement Worksheet

$$Ap = Vw / (n \times dt)$$

Ap	Required porous pavement surface area	*ft2*	
Vw	Design Volume	*ft3*	
n	porosity of gravel bed/resevoir		*Assume .4 for gravel*
dt	depth of gravel bed/resevoir		

Design Point:	**1**						
Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	**Total Area** *(Acres)*	**Impervious Area**	**Percent Impervious**	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
2	0.90	0.90	1.00	0.95	3103.65	1.00	Porous Pavement
Enter Soil Infiltration Rate							
Soil Inflitration Rate	0.50	*in/hour*					
Calculate Required Surface Area							
Design Volume	Vw	3,104	*ft^3*				
Are underdrains being used?		No	-				
Porosity of Gravel Bed	*n*	0.40	-				
Gravel Bed Depth	dt	2.00	*ft*				
Required Surface Area	Ap	3,880	*sf*				
Surface Area Provided		6,500	*sf*	*Dimensions of pavement can be provided here*			
Storage Volume Provided		5,200	*ft^3*				
Determine the Runoff Reduction							
RRv	**3,104**	***ft^3***					

Stormwater Planter Worksheet

Af=WQv*(df)/[k*(hf+df)(tf)]

where:		
where:	*Af*	Required Surface Area (ft2)
	WQv	Water Quality Volume (ft^3)
	df	Depth of the Soil Medium (ft)
	k	The Hyrdaulic Conductivity (ft/day), usually set at 4 ft/day when soil is loosely **_Sand_** - 3.5 ft/day (City of Austin 1988); **_Peat_** - 2.0 ft/day (Galli 1990); **_Leaf Compost_** - 8.7 ft/day (Claytor and Schueler, 1996); **_Bioretention Soil_**
	hf	Average Height of Water above planter bed (ft)
	tf	The Design Time to Filter the Treatment Volume Through the Filter Media (days)

Design Point:	**1**						
Enter Site Data For Drainage Area to be Treated by Practice							
Catchment	**Total Area**	**Impervious**	**Percent**	**Rv**	**WQv**	**Precipitation**	**Description**
4	0.30	0.30	1.00	0.95	1034.55	1.00	Stormwater Planter
Calculate the Mimimum Filter Area							
Depth of Soil Media	1.5	*ft*	*df*				
Hydraulic Conductivity	4	*ft/d*	*k*				
Average Height of Ponding	0.5	*ft*	*hf*				
Filter Time	0.17	*d*	*tf*				
Required Area of Filter	1141	*ft^2*	*Af*				
Area of Filter							
Width	10	*ft*					
Length	106	*ft*					
Area Provided	1060	*ft^2*					
Volume Provided	961.066667						
Runoff Reduction							
Soil Type	A						
Flow Through Planter?	*No*						
Determine the Runoff Reduction							
RRv	**1,035**	***ft^3***					
RRv Applied	**1,035**	***ft^3***					

Tree Planting/Tree Pits

Design Point:	**1**						
Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
5	0.30	0.30	1.00	0.95	1034.55	1.00	Tree Planting/Tree Pit
Do you intend to use this practice for area reduction or volume reduction?			Area	Design practice using criteria below			
Design Elements							
Is another area based practice applied to this area?			*No*				
Diameter of Mature Canopy			30	*ft*			
Area Reduced per Tree			100	*sf*	*For up to a 16-foot diameter canopy of a mature tree, the area considered for reduction shall be ½ the area of the tree*		
Number of Trees			22				
Total Area Reduced			2200	*sf*			
			0.05	*af*	*Practice too small. Plant more trees.*		
Area Ratio: Total to Impervious area			1.0		*Minimum loading ratio 3:1*		
Are All Criteria in Section 5.3.4 met?			*Yes*				
Subtract			**0.30**	***Acres from total Impervious Area***			

Version 1.8
Last Updated: 11/09/2015

Total Water Quality Volume Calculation
WQv(acre-feet) = [(P)(Rv)(A)] /12

PROJECT 2

Is this project subject to Chapter 10 of the NYS Design Manual (i.e. WQv is equal to post-development 1 year runoff volume)?...	No

Design Point:	1	
P=	1.00	*inch*

Manually enter P, Total Area and Impervious Cover.

Breakdown of Subcatchments						
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft³)*	**Description**
1	1.00	1.00	100%	0.95	3,449	Porous Pavement
2						
3						
4						
5						
6						
7						
8						
9						
10						
Subtotal (1-30)	1.00	1.00	100%	0.95	**3,449**	**Subtotal 1**
Total	1.00	1.00	100%	0.95	**3,449**	**Initial WQv**

Identify Runoff Reduction Techniques By Area			
Technique	**Total Contributing Area** *(Acre)*	**Contributing Impervious Area** *(Acre)*	**Notes**
Conservation of Natural Areas	0.00	0.00	*minimum 10,000 sf*
Riparian Buffers	0.00	0.00	*maximum contributing length 75 feet to 150 feet*
Filter Strips	0.00	0.00	
Tree Planting	0.00	0.00	*Up to 100 sf directly connected impervious area may be subtracted per tree*
Total	**0.00**	**0.00**	

Recalculate WQv after application of Area Reduction Techniques					
	Total Area *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Runoff Coefficient Rv**	**WQv** *(ft³)*
"<<Initial WQv"	1.00	1.00	100%	0.95	3,449
Subtract Area	0.00	0.00			
WQv adjusted after Area Reductions	**1.00**	**1.00**	100%	0.95	3,449
Disconnection of Rooftops		0.00			
Adjusted WQv after Area Reduction and Rooftop Disconnect	1.00	1.00	100%	0.95	**3,449**
WQv reduced by Area Reduction techniques					0

Runoff Reduction Volume and Treated volumes						
	Runoff Reduction Techiques/Standard SMPs		**Total Contributing Area**	**Total Contributing Impervious Area**	**WQv Reduced (RRv)**	**WQv Treated**
			(acres)	**(acres)**	**cf**	**cf**
Area/Volume Reduction	Conservation of Natural Areas	RR-1	0.00	0.00		
	Sheetflow to Riparian Buffers/Filter Strips	RR-2	0.00	0.00		
	Tree Planting/Tree Pit	RR-3	0.00	0.00		
	Disconnection of Rooftop Runoff	RR-4		0.00		
	Vegetated Swale	RR-5	0.00	0.00	0	
	Rain Garden	RR-6	0.00	0.00	0	
	Stormwater Planter	RR-7	0.00	0.00	0	
	Rain Barrel/Cistern	RR-8	0.00	0.00	0	
	Porous Pavement	RR-9	1.00	1.00	3449	
	Green Roof (Intensive & Extensive)	RR-10	0.00	0.00	0	
Standard SMPs w/RRv Capacity	Infiltration Trench	I-1	0.00	0.00	0	0
	Infiltration Basin	I-2	0.00	0.00	0	0
	Dry Well	I-3	0.00	0.00	0	0
	Underground Infiltration System	I-4				
	Bioretention & Infiltration Bioretention	F-5	0.00	0.00	0	0
	Dry swale	O-1	0.00	0.00	0	0
Standard SMPs	Micropool Extended Detention (P-1)	P-1				
	Wet Pond (P-2)	P-2				
	Wet Extended Detention (P-3)	P-3				
	Multiple Pond system (P-4)	P-4				
	Pocket Pond (p-5)	P-5				
	Surface Sand filter (F-1)	F-1				
	Underground Sand filter (F-2)	F-2				
	Perimeter Sand Filter (F-3)	F-3				
	Organic Filter (F-4	F-4				
	Shallow Wetland (W-1)	W-1				
	Extended Detention Wetland (W-2	W-2				
	Pond/Wetland System (W-3)	W-3				
	Pocket Wetland (W-4)	W-4				
	Wet Swale (O-2)	O-2				
	Totals by Area Reduction	→	0.00	0.00	0	
	Totals by Volume Reduction	→	1.00	1.00	3449	
	Totals by Standard SMP w/RRV	→	0.00	0.00	0	0
	Totals by Standard SMP	→	0.00	0.00		0
	Totals (Area + Volume + all SMPs)	→	1.00	1.00	3,449	0

Porous Pavement Worksheet

$Ap = Vw / (n \times dt)$

Ap	Required porous pavement surface area	*ft2*	
Vw	Design Volume	*ft3*	
n	porosity of gravel bed/resevoir		*Assume .4 for gravel*
dt	depth of gravel bed/resevoir		

Design Point:	**1**						
Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
1	1.00	1.00	1.00	0.95	3448.50	1.00	Porous Pavement
Enter Soil Infiltration Rate							
Soil Inflitration Rate	0.50	*in/hour*					
Calculate Required Surface Area							
Design Volume	Vw	3,449	*ft^3*				
Are underdrains being used?		No	-				
Porosity of Gravel Bed	*n*	0.40	-				
Gravel Bed Depth	dt	2.00	*ft*				
Required Surface Area	Ap	4,311	*sf*				
Surface Area Provided		4,915	*sf*	*Dimensions of pavement can be provided here*			
Storage Volume Provided		3,932	*ft^3*				
Determine the Runoff Reduction							
RRv	**3,449**	***ft^3***					

APPENDIX J
Project Cost Estimates

PRELIMINARY ESTIMATE BREAKDOWN

Project Title: STORMWATER INFRASTRUCTURE PRELIMINARY ENGINEERING REPORT
Location: Village of Sherman
Submittal: Project No. 1: Green Infrastructure Practices along Main Street

1/21/2020
JOB NO: 2056.003
PREP BY:
CHECKED BY: NMC

ITEM NUMBER	DESCRIPTION	UNIT	QTY	COST/UNIT	Cost
SITE CONSTRUCTION					
201.06	CLEARING AND GRUBBING	LS	NEC	$ 1,000.00	$ 1,000.00
203.2	UNCLASSIFIED EXCAVATION AND DISPOSAL	CY	4,000	$ 35.00	$ 140,000.00
207.21	GEOTEXTILE SEPARATION	SY	2,800	$ 2.00	$ 5,600.00
609.0203	STONE/GRANITE CURB (TYPE C)	LF	2,870	$ 45.00	$ 129,150.00
627.50140008	CUTTING PAVEMENT	LF	450	$ 3.00	$ 1,350.00
608.0101	CONCRETE SIDEWALKS AND DRIVEWAYS	CY	235	$ 350.00	$ 82,180.00
304.12	SUBBASE COURSE, TYPE 2	CY	200	$ 30.00	$ 6,000.00
-	DOWNSPOUT DISCONNECT	EACH	5	$ 1,500.00	$ 7,500.00
420.98000004	FLEXIBLE POROUS PRODUCT FOR TREE AREAS	SF	6,500	$ 25.00	$ 162,500.00
685.11	WHITE EPOXY REFLECTORIZED PAVEMENT STRIPES- .20 MLS	LF	4,820	$ 1.50	$ 7,230.00
685.12	YELLOW EPOXY REFLECTORIZED PAVEMENT STRIPES - .20 MLS	LF	950	$ 1.50	$ 1,425.00
685.14	WHITE EPOXY REFLECTORIZED PAVEMENT SYMBOLS - .20 MLS	EACH	20	$ 175.00	$ 3,500.00
402.096203	9.5 F2 TOP COURSE HMA, 60 SERIES COMPACTION	TON	230	$ 90.00	$ 20,700.00
402.196903	19 F9 BINDER COURSE HMA, 60 SERIES COMPACTION	TON	460	$ 80.00	$ 36,800.00
402.376903	37.5 F9 BASE COURSE HMA, 60 SERIES COMPACTION	TON	460	$ 100.00	$ 46,000.00
				TOTAL	**$ 650,935**
DRAINAGE INFRASTRUCTURE					
203.07	SELECT GRANULAR FILL	CY	180	$ 50.00	$ 9,000.00
208.0103002	BIORETENTION AND DRY SWALE SOIL	CY	700	$ 60.00	$ 42,000.00
620.02	STONE FILLING (FINE) (RIVER COBBLE)	CY	30	$ 75.00	$ 2,250.00
604.0726001	CONNECTION TO EXISTING DRAINAGE FACILITIES	EACH	17	$ 1,000.00	$ 17,000.00
	12" PVC DRAIN BASIN	EACH	18	$ 1,200.00	$ 21,600.00
605.1602	PERFORATED CORRUGATED POLYETHYLENE UNDERDRAIN TUBING, 6" DIAMETER	LF	2200	$ 25.00	$ 55,000.00
				TOTAL	**$ 146,850**
LANDSCAPE					
611.0111	PLANTING-MAJOR DECIDUOUS TREES- SIZE AS SPECIFIED B&B, FIELD POTTED/FIELD BOXED	EACH	28	$ 625.00	$ 17,500.00
611.0741	PLANTING - HERBACEOUS PLANTS - NUMBER 1 CONTAINER - CONTAINER GROWN	EACH	4,500	$ 30.00	$ 135,000.00
611.0411	PLANTING - DECIDUOUS SHRUBS - AS SPECIFIED B&B, FIELD POTTED/FIELD BOXED	EACH	120	$ 55.00	$ 6,600.00
610.1602	TURF ESTABLISHMENT - LAWNS	SY	190	$ 3.00	$ 570.00
	TRAILHEAD IMPROVEMENTS (SIGNAGE, SEATING, STONEDUST)	LS	1	$ 20,000.00	$ 20,000.00
				TOTAL	**$ 179,670**
				CONSTRUCTION SUBTOTAL	**$ 977,455**
CONTRACT ITEMS					
619.01	BASIC WORK ZONE TRAFFIC CONTROL (1.5%)	LS	NEC	$ 14,661.83	$ 14,661.83
625.01	SURVEY AND STAKEOUT (2%)	LS	NEC	$ 19,549.10	$ 19,549.10
699.040001	MOBILIZATION (4%)	LS	NEC	$ 39,098.20	$ 39,098.20
	CONTINGENCY (20%)	LS	NEC	$ 195,491.00	$ 195,491.00
					$ 268,800
ENGINEERING					
	DESIGN & CONSTRUCTION ADMIN/SUPPORT (15%)	LS	NEC	$ 186,938.27	**$ 186,938**
				TOTAL	**$ 1,433,193**

PRELIMINARY ESTIMATE BREAKDOWN

Project Title: STORMWATER INFRASTRUCTURE PRELIMINARY ENGINEERING REPORT
Location: Village of Sherman
Submittal: Project No. 2: Park Street Drainage Infrastructure Improvements

1/21/2020
JOB NO: **2056.003**
PREP BY:
CHECKED BY: **NMC**

ITEM NUMBER	DESCRIPTION	UNIT	QTY	COST/UNIT	Cost
SITE CONSTRUCTION					
201.06	CLEARING AND GRUBBING	LS	NEC	$ 1,000.00	$ 1,000.00
203.2	UNCLASSIFIED EXCAVATION AND DISPOSAL	CY	500	$ 35.00	$ 17,500.00
207.21	GEOTEXTILE SEPARATION	SY	545	$ 2.00	$ 1,090.00
609.0203	STONE/GRANITE CURB (TYPE C)	LF	575	$ 45.00	$ 25,875.00
627.50140008	CUTTING PAVEMENT	LF	625	$ 3.00	$ 1,875.00
608.0101	CONCRETE SIDEWALKS AND DRIVEWAYS	CY	10	$ 350.00	$ 3,500.00
304.12	SUBBASE COURSE, TYPE 2	CY	395	$ 30.00	$ 11,850.00
420.98000004	FLEXIBLE POROUS PRODUCT FOR TREE AREAS	SF	4,915	$ 25.00	$ 122,875.00
685.11	WHITE EPOXY REFLECTORIZED PAVEMENT STRIPES- .20 MLS	LF	55	$ 1.50	$ 82.50
402.096203	9.5 F2 TOP COURSE HMA, 60 SERIES COMPACTION	TON	14	$ 90.00	$ 1,260.00
402.196903	19 F9 BINDER COURSE HMA, 60 SERIES COMPACTION	TON	28	$ 80.00	$ 2,240.00
	CONCRETE WALL	SY	175	$ 350.00	$ 61,250.00
				TOTAL	**$ 250,398**
DRAINAGE INFRASTRUCTURE					
203.07	SELECT GRANULAR FILL	CY	173	$ 50.00	$ 8,650.00
604.0726001	CONNECTION TO EXISTING DRAINAGE FACILITIES	EACH	6	$ 1,000.00	$ 6,000.00
	DRAIN BASIN WITH BAFFLE WALL	EACH	6	$ 2,500.00	$ 15,000.00
605.1602	PERFORATED CORRUGATED POLYETHYLENE UNDERDRAIN TUBING, 6" DIAMETER	LF	575	$ 25.00	$ 14,375.00
				TOTAL	**$ 44,025**
LANDSCAPE					
610.1602	TURF ESTABLISHMENT - LAWNS	SY	30	$ 3.00	$ 90.00
				TOTAL	**$ 90**
				CONSTRUCTION SUBTOTAL	**$ 294,513**
CONTRACT ITEMS					
619.01	BASIC WORK ZONE TRAFFIC CONTROL (1.5%)	LS	NEC	$ 4,417.69	$ 4,417.69
625.01	SURVEY AND STAKEOUT (2%)	LS	NEC	$ 5,890.25	$ 5,890.25
699.040001	MOBILIZATION (4%)	LS	NEC	$ 11,780.50	$ 11,780.50
	CONTINGENCY (20%)	LS	NEC	$ 58,902.50	$ 58,902.50
					$ 80,991
ENGINEERING					
	DESIGN & CONSTRUCTION ADMIN/SUPPORT (15%)	LS	NEC	$ 56,325.52	**$ 56,326**
				TOTAL	**$ 431,829**

PRELIMINARY ESTIMATE BREAKDOWN

Project Title:	**SHERMAN STORMWATER RETROFIT - STORMWATER DETENTION POND**		*February 4. 2019*
Location:	**SHERMAN COMMUNITY NATURE CENTER**	**JOB NO:**	**2056.003**
Submittal:	**STORMWATER INFRSTRUCTURE ENGINEERING STUDY**	**PREP BY:**	**JMW3**
		CHECKED BY:	**DRH**

ITEM NUMBER	DESCRIPTION	UNIT	QTY	COST/UNIT	Cost
SITE CONSTRUCTION & STABILIZATION					
	CLEARING AND GRUBBING	AC	1.7	$ 11,200.00	$ 19,040.00
	EXCAVATION AND GRADING	CF	335,400	$ 0.85	$ 285,090.00
	OUTLET CONTROL STRUCTURE	EACH	2	$ 5,000.00	$ 10,000.00
	HEAVY STONE	LS	1	$ 5,000.00	$ 5,000.00
	FLOW DIVERSION STRUCTURE	EACH	1	$ 5,000.00	$ 5,000.00
	OUTLET PIPE	LS	1	$ 10,000.00	$ 10,000.00
	STABILIZATION	LS	1	$ 10,000.00	$ 10,000.00
				TOTAL	**$ 344,130**
				CONSTRUCTION SUBTOTAL	**$ 344,130**
CONTRACT ITEMS					
	SURVEY AND STAKEOUT	LS	1	$ 20,000.00	$ 20,000.00
	MOBILIZATION	LS	1	$ 10,000.00	$ 10,000.00
	CONTINGENCY (20%)	%	20	$ 344,130.00	$ 68,826.00
					$ 98,826
ENGINEERING					
	DESIGN & CONSTRUCTION ADMIN/SUPPORT (20%)	%	20	$ 344,130.00	**$ 68,826**
				TOTAL	**$ 511,782**

NOTES

Annual O&M Cost = $2,400[1]
Total Life Cycle Cost ($ over 30 years*) = $583,782

*Total life cycle cost assumes a 4% discount rate
1. Mateleska, K., 2016. <https://www3.epa.gov/region1/npdes/stormwater/ma/green-infrastructure-stormwater-bmp-cost-estimation.pdf>. February, 2016

PRELIMINARY ESTIMATE BREAKDOWN

Project Title:	**SHERMAN STORMWATER RETROFIT - STORMWATER DETENTION POND**		*February 27, 2020*
Location:	**NORTH OF PARK ST, EAST OF SHERMAN-RIPLEY ROAD**	**JOB NO:**	**2056.003**
Submittal:	**STORMWATER INFRASTRUCTURE ENGINEERING STUDY**	**PREP BY:**	**JMW3**
		CHECKED BY:	**DRH**

ITEM NUMBER	DESCRIPTION	UNIT	QTY	COST/UNIT	Cost
SITE CONSTRUCTION & STABILIZATION					
	CLEARING AND GRUBBING	AC	3.4	$ 11,200.00	$ 38,080.00
	EXCAVATION AND GRADING	CF	397,500	$ 0.85	$ 337,875.00
	OUTLET CONTROL STRUCTURE	EACH	1	$ 5,000.00	$ 5,000.00
	HEAVY STONE	LS	1	$ 5,000.00	$ 5,000.00
	STABILIZATION	LS	1	$ 10,000.00	$ 10,000.00
				TOTAL	**$ 395,955**
				CONSTRUCTION SUBTOTAL	**$ 395,955**
CONTRACT ITEMS					
	SURVEY AND STAKEOUT	LS	1	$ 20,000.00	$ 20,000.00
	MOBILIZATION	LS	1	$ 10,000.00	$ 10,000.00
	CONTINGENCY (20%)	%	20	$ 395,955.00	$ 79,191.00
					$ 109,191
ENGINEERING					
	DESIGN & CONSTRUCTION ADMIN/SUPPORT (20%)	%	20	$ 395,955.00	**$ 79,191**
				TOTAL	**$ 584,337**

NOTES

Annual O&M Cost = $2,400[1]
Total Life Cycle Cost ($ over 30 years*) = $656,337

*Total life cycle cost assumes a 4% discount rate
1. Mateleska, K., 2016. <https://www3.epa.gov/region1/npdes/stormwater/ma/green-infrastructure-stormwater-bmp-cost-estimation.pdf>. February, 2016

PRELIMINARY ESTIMATE BREAKDOWN

Project Title: **SHERMAN STORMWATER RETROFIT - STORMWATER DETENTION POND**
Location: **UPGRADIENT OF SHERMAN HIGH SCHOOL**
Submittal: **STORMWATER INFRASTRUCTURE ENGINEERING STUDY**

February 27, 2019
JOB NO: **2056.003**
PREP BY: **JMW3**
CHECKED BY: **DRH**

ITEM NUMBER	DESCRIPTION	UNIT	QTY	COST/UNIT	Cost
SITE CONSTRUCTION & STABILIZATION					
	CLEARING AND GRUBBING	AC	1.25	$ 11,200.00	$ 14,000.00
	EXCAVATION AND GRADING	CF	147,000	$ 0.85	$ 124,950.00
	OUTLET CONTROL STRUCTURE	EACH	1	$ 5,000.00	$ 5,000.00
	HEAVY STONE	LS	1	$ 5,000.00	$ 5,000.00
	UNDERDRAIN	LS	1	$ 10,000.00	$ 10,000.00
	STABILIZATION	LS	1	$ 10,000.00	$ 10,000.00
				TOTAL	**$ 168,950**
				CONSTRUCTION SUBTOTAL	**$ 168,950**
CONTRACT ITEMS					
	SURVEY AND STAKEOUT	LS	1	$ 20,000.00	$ 20,000.00
	MOBILIZATION	LS	1	$ 10,000.00	$ 10,000.00
	CONTINGENCY (20%)	%	20	$ 168,950.00	$ 33,790.00
					$ 63,790
ENGINEERING					
	DESIGN & CONSTRUCTION ADMIN/SUPPORT (20%)	%	20	$ 168,950.00	**$ 33,790**
				TOTAL	**$ 266,530**

NOTES

Annual O&M Cost = $2,400[1]
Total Life Cycle Cost ($ over 30 years*) = $338,530

*Total life cycle cost assumes a 4% discount rate
1. Mateleska, K., 2016. <https://www3.epa.gov/region1/npdes/stormwater/ma/green-infrastructure-stormwater-bmp-cost-estimation.pdf>. February, 2016

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